FARM MANAGEMENT HANDBOOK OF KENYA

VOL. II

– Natural Conditions and Farm Management Information –

Part B

CENTRAL KENYA

(Rift Valley and Central Provinces)

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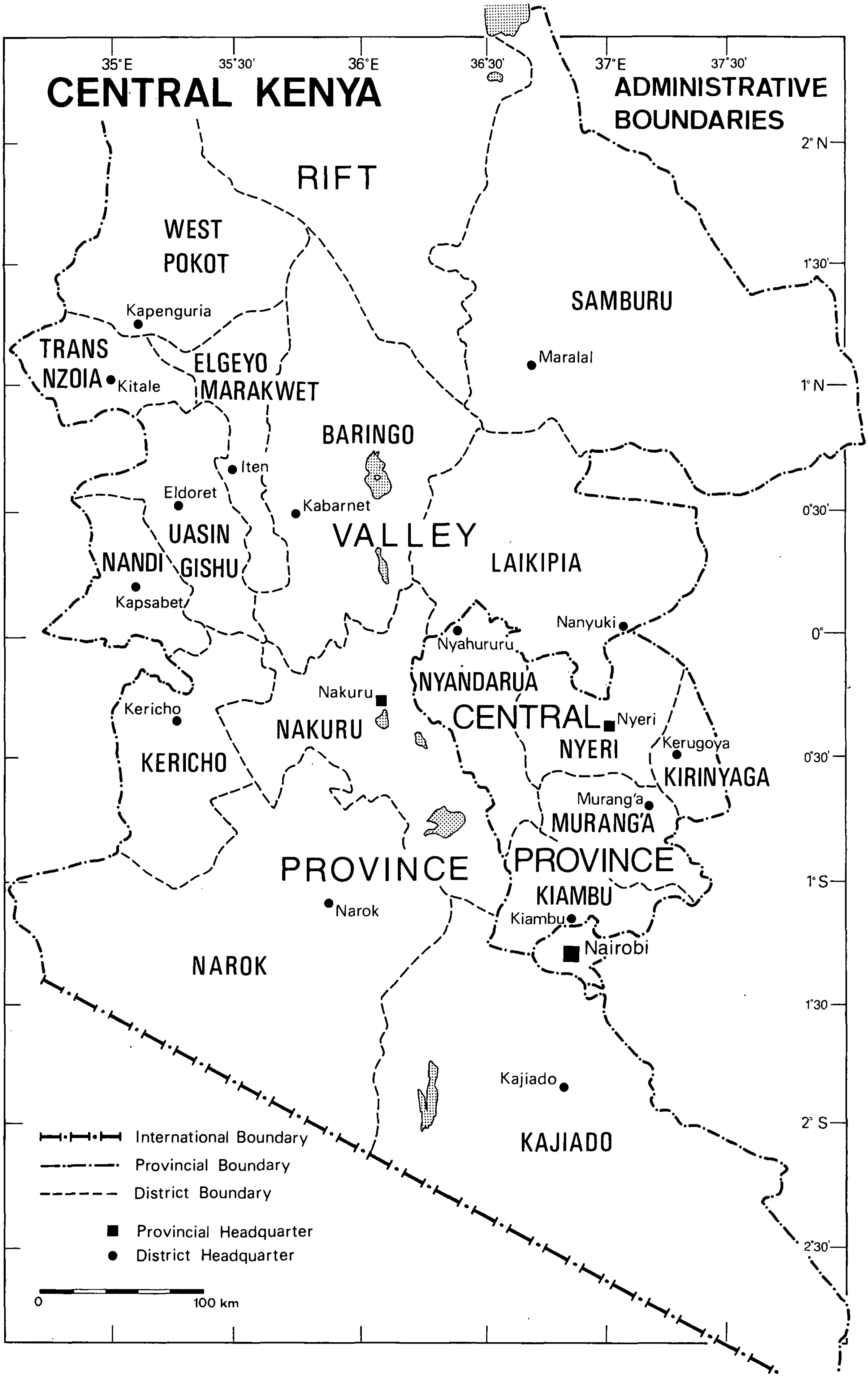

CENTRAL KENYA
ADMINISTRATIVE BOUNDARIES
35°E
35°30'
36°E
36°30'
37°E
37°30'
2° N
1°30'
1° N
0°30'
0°
0°30'
1° S
1°30'
2° S
2°30'
RIFT
VALLEY
PROVINCE
CENTRAL
PROVINCE
WEST POKOT
Kapenguria
TRANS NZOIA
Kitale
ELGEYO MARAKWET
Iten
BARINGO
Kabarnet
SAMBURU
Maralal
UASIN GISHU
Eldoret
NANDI
Kapsabet
LAIKIPIA
Nanyuki
Nyahururu
NYANDARUA
Nakuru
NAKURU
Kericho
KERICHO
Nyeri
NYERI
Kerugoya
KIRINYAGA
Murang'a
MURANG'A
KIAMBU
Kiambu
Nairobi
Narok
NAROK
Kajiado
KAJIADO
International Boundary
Provincial Boundary
District Boundary
Provincial Headquarter
District Headquarter
0
100 km

Farm Management Handbook of Kenya:

VOL.	I	Labour Requirement Availability and Costs of Mechanisation
VOL.	II	Natural Conditions and Farm Management Information
	II/A	WEST KENYA Nyanza and Western Provinces
	II/B	CENTRAL KENYA Rift Valley and Central Provinces
	II/C	EAST KENYA Eastern and Coast Provinces
VOL.	III	Farm Management Information – Annual Publications
	III/A	Agriculture Land, Holdings and Farm Statistics
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VOL.	V	Production Techniques and Economics of Horticultural Enterprises

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Ministry of Agriculture

FARM MANAGEMENT HANDBOOK OF KENYA

VOL. II

– Natural Conditions and Farm Management Information –

VOL. II/B

CENTRAL KENYA

(Rift Valley and Central Provinces)

by

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Contributions by: R. Swoboda – execution of Small Farm Survey; C.M. Kang'e & J.G.M. Muasya – assessment of farm management data; W. Zettelmeyer – computing farm data; H. Kutsch – computing crop water relations for yield probabilities, rainfall analysis, crop list; M. Buch – transcripting soil maps; M. Kronen – soil requirements and fertility groups; H. Ritz – district climate tables; F.N. Muchena, B.J.A. van der Pouw, W. Siderius, W.G. Sombroek and H.M.H. Braun – simplified district soil maps; C.G. Wenner and S.N. Njoroge – soil conservation

Vol. II of the Handbook covers the following areas:

VOL. II A WEST KENYA

Nyanza Province:	Kisii, South Nyanza, Kisumu, Siaya Districts
Western Province:	Busia, Bungoma, Kakamega Districts

VOL. II B CENTRAL KENYA

Rift Valley Province:	Nandi, Kericho, Trans Nzoia, Uasin Gishu, West Pokot, Keiyo (Elgeyo) Marakwet, Baringo, Laikipia, Nakuru, Narok, Kajiado Districts
Central Province:	Samburu, Nyandarua, Kiambu, Murang'a, Nyeri, Kirinyaga Districts

VOL. II C EAST KENYA

Eastern Province:	Embu, Meru, Machakos, Kitui Districts
Coast Province:	Lamu, Tana River, Kilifi, Taita Taveta, Kwale Districts

The Handbook is supplemented by:

Large coloured district maps (mainly 1:250 000)
Transparent mother prints for large district maps (mainly 1:100 000)
Electronic data bank containing the rainfall data (1926–76)
Electronic data bank containing the farm management data
Agriculture Land Statistics obtained from Survey of Kenya

The information is kept by the Farm Management Research Officer, Ministry of Agriculture, Kilimo House, Nairobi.
In addition to that there exists an electronic programme packet for decadic water requirements of about 50 crops in different climates kept by Dr. H. Kutsch, Fachgruppe Geographie/Geowissenschaften, Universität Trier, West Germany

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List of Abbreviations

AEZ	=	Agro-Ecological Zone
A	=	Alpine
add.	=	additional
a. o.	=	and others
av.	=	average
b.	=	beginning
bl.	=	black
br	=	bimodal rainfall
C.	=	Cooperative
CAZRI	=	Central Arid Zone Research Station (Jodhpur, India)
comp.	=	composite
D.	=	District
E_0	=	evaporation of a water surface
e.	=	end
f. i.	=	for instance
For.	=	Forest
F.	=	Farmer, Farmers
H	=	Highland; with crop name: hybrid
h.	=	heavy
ha	=	hectar
i	=	intermediate rains
kc	=	crop coefficient as a potential evapotranspiration of a crop expressed in parts of E_0
KSS	=	Kenya Soil Survey
L	=	Lowland, lower
l	=	long
LU	=	Livestock unit of 300 kg
M	=	Midland
m.	=	medium
mat.	=	maturing
max.	=	maximum
min.	=	minimum
NARS	=	National Agriculture Research Station
norm.	=	normally
O.	=	Office
p	=	permanent
per.	=	period
pl.	=	planting
pr.	=	precipitation
r.	=	rains, rainy season
res.	=	resistant
R.	=	Reserve
s	=	short
sec.	=	secondary
St.	=	Station
T	=	Tropical
t	=	temperature; with yields: tons
U	=	Upper
ur	=	unimodal rainfall
v	=	very
var.	=	variety
y.	=	year
<	=	less than
>	=	more than
~	=	about, nearly, around
&	=	and

EXPLANATION OF THE EVALUATION OF THE NATURAL POTENTIAL

METHOD OF THE AGRO-ECOLOGICAL ZONATION

by Ralph Jaetzold

An Agro-Ecological Zone is a zone which is defined by its relevant agro-climatic factors (in the Tropics mainly moisture supply) and differentiated by soil pattern. The aim is to provide a frame-work for the ecological (natural) land use potential.

Generalized agro-ecological zones were established by FAO in 1978[1]. They are suited to make decisions in international and long term agricultural policy. In order to give advice to farmers in the district a more differentiated system showing yield probabilities and risks as well had to be developed:

1. The zone groups are **temperature belts** (Table I) defined according to the maximum temperature limits within which the main crops in Kenya can flourish; cashew and coconuts for the lowlands, sugar cane and cotton for the lower midlands, Arabica coffee for the upper midlands (usually known as "Highlands" – *the term 'midlands' is used here to denote their central importance),* tea for the lower highlands, pyrethrum for the upper highlands. The highest zone is high altitude rough grazing i.e. tropical alpine (or afro-alpine) vegetation. The threshold values of annual mean temperatures have been established along similar lines to those of H.M.H. BRAUN (see map in Vol. II A)[2] but supplemented by limiting factors for many crops e.g. mean minimum temperature, frost etc.

2. The **main zones** (Table I) are based on their probability of meeting the temperature and *water requirements* of the main leading crops i.e. climatic yield potential, calculated by computer (see Vol. IIA, p. 19). The zones are roughly parallel with Braun's climatic zones of the Precipitation/Evaporation Index (see map in back cover of Vol. IIA), but there are differences according to the influence of the length and intensity of arid periods, a factor also considered by the computer programme.

   The names of the main zones refer to potentially leading crops here; many of them can be grown in some other zones, too:

Maize in zones:	LH 1–3; UM 1–4; LM 1–4; L 2–4
Hybrid maize in zones:	LH 1–3; UM 1–3; LM 1–3
Wheat in zones:	UH 2–3; LH 2–4
Unirrigated rice in zones:	L 1–3; LM 1–2
Irrigated rice in zones:	L 1–6, (7); LM 1–6, (7)
Sorghum in zones:	UM (1–3), 4–5; LM (1–3), 4–5; L (1–3), 4–5
Finger millet in zones:	LH (1–3); UM (1–3), 4; LM (1–3), 4, (5); L (1–3), 4, (5)
Groundnuts in zones:	LM (1–2), 3–4; L (2–3), 4
Cotton in zones:	LM (2), 3–4; L (2), 3–4

   ( ) mean that in these zones the crop is normally not competitive to related crops (f.i. sorghum to maize)

   Livestock is possible in all zones. Decreasing stocking rates from 1 to 7 (from 0.4 ha up to more than 25 ha per livestock unit of 300 kg)

   The colours assigned to the main zones become lighter at higher altitudes (Table I). Additionally they become more red in the drier climates and at higher altitudes. This is due to the fact that with the same amount of water, the production of biomass is still less in cooler altitudinal climates. Also, the chances to ripe a crop before the end of the rainy seasons become smaller in these higher belts because of the increasing length of growing periods. Therefore, the Ranching Zone which covers Zone 6 in the Lowlands occurs already in Zone 5 in the Lower Highlands and even in Zone 4 in the Upper Highlands.

3. These main zones are divided into **subzones** according to the yearly distribution and the lengths of the *growing periods* on a 60 % probability factor i.e. the given length of the growing period should be reached or surpassed in at least 6 out of 10 years (Table II). "Growing periods" are definded as seasons with enough moisture in the soil to grow most crops, starting with a supply for plants to transpirate more than 0.4 E_0 (i.e. > 40 % of the open water evaporation), coming up to > E_0 (in the ideal case) during the time of peak demand, and then falling down in the maturity phase again. The length is normally given in decades (i.e. a ten day period) for medium soils. Figures are also available for heavy and light soils, and they are also considered in the computer programme for the yield potential of H. KUTSCH and H.J. SCHUH (see Vol. IIA, p. 19).[7]

   This programme compares the water requirement curves of almost all the main crops (as provided by the FAO, 1977[3] and 1979[4], re-calculated by H. KUTSCH for 50 Kenyan varieties and adapted to the different agro-climates of R. JÄTZOLD[5]) with all rainfall occurrences in Kenya from 1926 to 1976, in decades (10 day periods), and their effects on the water supply to the root zone for 3 soil groups and 3 plant population densities. On this basis, an ecological land use potential has been drawn up for each subzone, showing climatic yield expectations and risks.

   The length of the growing period is the key to selecting the right annual crops within an agro-ecological zone. The symbols used for the lengths of the growing periods are straight-forward:

vl	=	very long
l	=	long
m	=	medium
s	=	short
vs	=	very short

TABLE I: AGRO-ECOLOGICAL ZONES OF THE TROPICS [1)]

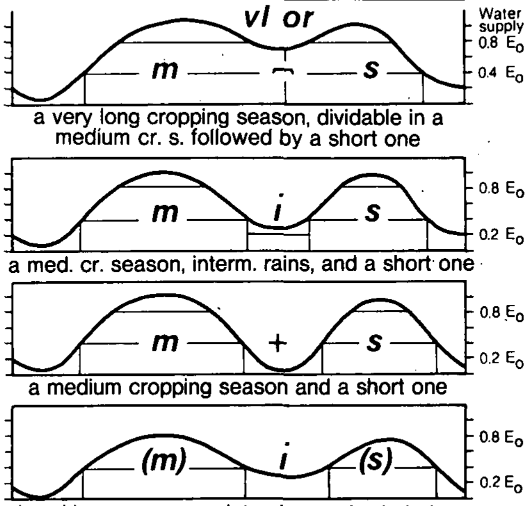
Main Zones / Belts of Z.	0 (perhumid)	1 (humid)	2 (subhumid)	3 (semi-humid)	4 (transitional)	5 (semi-arid)	6 (arid)	7 (perarid)
TA Tropical Alpine Zones Ann. mean 2-10° C	Glacier; Mountain swamps	II. Sheep Zone; I. Cattle-Sheep Zone	II. Sheep Zone; I. Cattle-Sheep Zone	II. Sheep Zone; I. Cattle-Sheep Zone	II. Sheep Zone	II. Sheep Zone	II. Sheep Zone; High altitude deserts	High altitude deserts
UH Upper Highland Zones Ann. mean 10-15° Seasonal night frosts		Sheep-Dairy Zone	Pyrethrum-Wheat Zone	Wheat-Barley Zone	U. Highland Ranching Zone	* U. H. Nomadism Zone [4)]		High altitude deserts
LH Lower Highl. Zones Ann. mean 15-18° M. min. 8-11° norm. no frost	[illegible] Zones	Tea-Dairy Zone	Wheat/Maize [2)] - Pyrethrum Zone	Wheat/(M)[2)]- Barley Zone	Cattle-Sheep-Barley Zone	L. Highland Ranching Zone	* L. H. Nomadism Zone [4)]	
UM Upper Midland Zones Ann. mean 18-21° M.min. 11-14°		Coffee-Tea Zone	Main Coffee Zone	Marginal Coffee Zone	Sunflower-Maize [3)] Zone	Livestock-Sorghum Zone	U. Midland Ranching Zone	U. Midland Nom. Zone [4)]
LM Lower Midland Zones Ann. mean 21-24° M. min. >14°	[illegible]	L. Midl. Sugarcane Zone	Marginal Sugarcane Zone	L. Midland Cotton Zone	Marginal Cotton Zone [6)]	L. Midland Livestock-Millet Zone	L. Midland Ranching Zone	L. Midland Nom. Zone [4)]
L Lowland Zones **IL** Inner Lowland Z. Ann. mean >24° Mean max. >31°	[illegible]	[illegible]	Sugarcane Zone	* Lowland Cotton Zone	* Groundnut Zone	Lowland Livestock-Millet Zone	Lowland Ranching Zone	Lowland Nom. Zone [4)]
CL Coastal Lowl. Z.[5)] Ann. mean >24° Mean max. <31°	[illegible]	[illegible]	[illegible]	Coconut-Cassava Zone	Cashewnut-Cass. Zone	Lowland Livestock-Millet Zone	Lowland Ranching Zone	Lowland Nom. Zone [4)]

1) Inner Tropics, different zonation towards the margins. The T for Tropical is left out in the thermal belts of zones (except at TA), because it is only necessary if other climates occur in the same country. The names of potentially leading crops were used to indicate the zones . Of course these crops can also be grown in some other zones , but they are then normally less profitable.
2) Wheat or maize depending on farm scale , topography, a.o.
3) Maize is a good cash crop here, but maize also in LH 1, UM 1-3, LM and L 1-4;
4) Nomadism, semi-nomadism and other forms of shifting grazing
5) An exception because of the vicinity of cold currents are the tropical cold Coastal Lowlands cCL in Peru and Namibia. Ann. mean there between 18 and 24°
6) In unimodal rainfall areas growing periods may be already too short for cotton. Then the zone could be called Lower Midland Sunflower-Maize Zone.
* Not in Kenya

TABLE II: SUBZONES ACCORDING TO GROWING PERIODS FOR ANNUAL CROPS

Formula	Cropping seasons	Lengths of growing periods[1] exceeded in 6 out of 10 years
p	Normally permanent	More than 364 days
vl	Very long	285 - 364 days
vl/l	Very long to long	235 - 284 "
l/vl	Long to very long	215 - 234 "
l	Long	195 - 214 "
l/m	Long to medium	175 - 194 "
m/l	Medium to long	155 - 174 "
m	Medium	135 - 154 "
m/s	Medium to short	115 - 134 "
s/m	Short to medium	105 - 114 "
s	Short	85 - 104 "
s/vs	Short to very short	75 - 84 "
vs/s	Very short to short	55 - 74[2] "
vs	Very short	40 - 54[3] "

Samples of combination during the year in Kenya



a very long cropping season, dividable in a medium cr. s. followed by a short one

a med. cr. season, interm. rains, and a short one

a medium cropping season and a short one

a (weak) m. cr. season, int. rains, and a (w.) sh. one

Additional information: ur = unimodal rainfall, br = bimodal r., tr = trimodal r.

i = intermediate rains (at least 5 decades more than 0.2 E_O)[4]

( ) = weak performance of growing period (most decades less than 0.8 E_O)

\+ = Distinct arid period between growing periods

⌐ = No distinct arid period between growing periods

f = full, i.e. no subdivision of grow. periods, for inst. fm means 115-174 days

1) Growing period = life of annual plants from seed to physical maturity. Figures show the time in which rain and stored soil moisture allow evapotranspiration of more than 0.4 E_O (in medium soils of at least 60 cm depth), enough for most crops to start growing. During main growing time they need more (>0.8E_O).
2) Lowlands and lower midlands, in UM, LH and UH 65-74 days
3) Lowlands, in LM 45-54 days, in UM 50-64 days, in LH and UH 55-64 days
4) That means moisture conditions are above wilting point for most crops

These are further defined to give more detailed information by the use of "short **to** medium" "medium **to** long" etc. (Table II). If it is not desirable to subdivide the growing period in this way, the letter "**f**" for "**fully**" occurs before the symbol for the period.

The growing period formula is put in **brackets** if there is a weak performance i.e. although the moisture content is sufficient for growth, the peak demand which exceeds 0.8 E_O is not satisfied in the right time.

Where there are 2 rainy seasons per annum (bimodal rainfall areas), this is shown by a plus sign (+) between the two growing periods to show the yearly pattern.

If there is no distinct arid period of at least 3 decades (30 days) between humid growing periods, the sign ⌐ is introduced i.e. both periods are bridged together. Expressed in words, it means ".... followed by".

In Rift Valley and Western Kenya, the rainfall is unimodal (i.e. one major rainy season p.a.) but the length of the vegetation periods allows for the planting of one late-maturing crop or two early-maturing crops. In this case the words ".... or two" are used after the symbol for the length of the season. In some cases 3 crops per vegetation period are possible, in which case the words ".... or three" occur after the length symbol.

In some areas, e.g. the Coast, the rains do not stop suddenly, and there is sufficient rainfall between the humid seasons to allow for the growth of some crops (cowpeas, simsim). However, this ist not regarded as a real growing period; those "intermediate rains" are symbolized by an "i" if they last at least 5 decades (50 days) (see Table II, footnote 4).

These complicated annual rainfall patterns make it difficult for the **seasonal rainfall probability maps** included for each district to set rigid limits for the start and the end of the rainfall. Then the most likely periods are chosen; in clear bimodal rainfall areas, the probabilities are given for the growing period itself.

4. The climatic agro-ecological zones are printed on **soil maps** derived from the Exploratory Soil Map of Kenya 1 : 1 Mio. (Kenya Soil Survey, 1982) to show *agro-ecological mosaics* within the zones. The soil units were roughly shaded on the basis of their natural fertility, in order to illustrate their potential and the inputs needed to improve them.

   The soils should be considered as closely as possible. For many areas special reports from the Kenya Soil Survey already exist. The average yield expectations given for the Agro-ecological Zones of the district only show what is climatically possible (on prevailing soils) *when other conditions are optimized.*

Therefore, many other factors apart from soil and climate have to be considered as technologically standard, possibilities of additional irrigation[6] and so on. For drier areas of Kenya this is described in the volumes of the Kenya Marginal and Semi-arid Land Pre-investment Reports (Nairobi 1978). From the given agro-ecologically land use potential for each AEZ it has to be chosen carefully what is economically and sociologically reasonable for the time being.

5. The agro-ecological zones are illustrated by rainfall (water availability) and water requirement diagrams (see district descriptions). The curves in the diagrams are calculated – or if proper datas are not available they are estimated – for optimum water requirements of crops from seeding to physical maturity. Harvest is later according to ripening stage, but then the plants need little or even no water.

1) FAO,1978: Report on the Agro-ecological Zones Project. Methodology and Results for Africa. (= World Soil Resources Rep., 48/1), Rome

2) Kenya Soil Survey, 1982: Exploratory Soil Map and Agro-Climatic Zones Map of Kenya, scale 1 : 1 000 000. Rep. E 1, Nairobi

3) FAO, 1977: Crop Water Requirements.- (= Irrigation and Drainage Paper, 24), Rome

4) FAO, 1979: Yield Response to Water.- (= Irrigation and Drainage Paper, 33), Rome

5) JÄTZOLD, R., 1978: Klimageographie – Ostafrika. Afrika-Kartenwerk E 5, Berlin, Beiheft Berlin 1981

6) Artificial irrigation possibilities are normally not yet considered in the land use potentials of the Agro-ecological Zones, because they go beyond the climatic natural potential. Nevertheless, we are able to calculate if requested decadically water requirements of irrigated crops for defined sites.

7) Heavy soil means heavy loam; clay may have less *available* water for plants. Light soil means loamy sand.

A BROAD ESTIMATE OF THE DOMINANT CHARACTERISTICS OF THE MAJOR SOIL CLASSIFICATION UNITS IN KENYA

(variable = more than 3 classes)

Major Soil Class, Unit	texture subsoil	texture topsoil	depth	organic matter content of topsoil	pH (water)	drainage	workability	fertility	water holding capacity	Remarks
Ferralsols	clay	clay	variable	variable	variable	good	moderate to good	low	moderate	
Luvisols	clay	variable	variable	variable	above 5.5	moderate	moderate to good	low to moderate	moderate	
Acrisols	clay	variable	variable	variable	below 5.5	moderate to good	moderate to good	low	moderate	
Arenosols	sand	sand	variable	low	variable	good	good	low to very low	low to very low	
Nitosols	clay	clay	deep	moderate to high	variable	good	good	moderate to high	moderate to high	Kikuyu Red loam
Phaeozems	clay	variable	variable	high	above 5.5	good	good	high	high	Prairie soils
Andosols	clay	clay	deep	moderate to high	variable	good	good	high	high	Volcanic Ash Soils
Rendzinas	clay	clay	variable	high	above 5.5	good	good	high	high	
Cambisols	variable	variable	variable	variable	variable	moderate to good	moderate to good	moderate to high	variable	young soils
Fluvisols	variable	variable	variable	variable	variable	variable	variable	moderate to high	variable	Alluvial soil
Vertisols	clay	clay	variable	low to moderate	variable	poor	poor	moderate to high	high	Black Cotton soils cracking clay
Planosols	clay	variable	variable	low to moderate	variable	poor	moderate to poor	low to moderate	moderate to low	Vlei soils
Xerosols	clay	variable	variable	variable	above 5.5	variable	variable	variable	variable	non saline or sodic soils of dry regions
Solonchaks	clay	variable	variable	variable	above 7	variable	variable	variable	variable	saline soils
Solonetz	clay	variable	variable	variable	above 7	poor	poor	low	variable	sodic (alkali) soils
Regosols	clay	variable	variable	moderate to high	variable	variable	variable	variable	variable	
Rankers	clay	variable	variable	variable	below 5.5	variable	variable	variable	variable	
Lithosols	rock	variable	very shallow	variable	variable	variable	variable	variable	very low	very shallow soils
Gleysols	clay	clay	variable	moderate to high	variable	poor	poor	variable	moderate to high	poorly drained soils
Greyzems	clay	variable	variable	moderate to high	variable	moderate to poor	moderate	moderate	moderate to high	
Histosols	peat-clay	peat	variable	very high	below 5.5	moderate to poor	variable	moderate to high	moderate to high	peat soils

H.M.H. Braun, Kenya Soil Survey

EXPLANATORY NOTES ON FARM MANAGEMENT INFORMATION

Sound farm management, advice and planning must take into consideration the natural conditions of soil and climate, the socio-economic situation of the farm and cost/price developments.

Volume II of the Handbook describes these natural conditions[1)] i.e. the AEZ is the key to which crop can be grown with which degree of success in which part of the district.

Any planning done, operation undertaken or communication made must refer to a particular area of uniform natural conditions. The most economic and exact way to do so is by using maps.

All officers and institutions dealing in any way with rural development have been supplied with the Handbook and with large and small AEZ maps. All officers involved in rural development are requested **to refer to the particular political unit (location, division etc.) and the AEZ** into which the area under discussion falls. This can be done by using the charts which can be obtained from the maps without difficulty.

The **fertility of the soils often differs** widely within one agro-ecological zone. The extension officer must therefore study the information given and compare the soil conditions with the soil requirements of the crops before making any definite recommendations.[2)] A steep increase in fertilizer use is necessary but fertilizer is one of the most expensive inputs. It is therefore essential to study the explanations for the input/output table. Information about the use of plant protective agents is forwarded to you annually;[3)] the costs of inputs and prices for agricultural produce are also given. It will be most important to observe the fertilizer use recommendations which will become available from new research towards the year 1985–90.

The **conservation of the fertility of the soil** or its improvement should be a major part of farm management advice, because it is the basis for successful farming, in particular when using large amounts of inputs. Soil conservation is probably one of the best investments a farmer can make and should always be included in overall farm budgets. Studying the advice on soil conservation included in Vol. II will help you to give technically sound advice and assist in cost calculation.

1) Vol. I supplies labour data, Vol. IV production techniques; information about farm organisation and profitability is published annually by the FMB.

2) Additional information about the soils of your region can be obtained from the National Soil Map of Kenya available at the DAO's office.

3) Farm management publication: „Yields, Costs and Prices"

GENERAL STATISTICS

Land Area[1)]

As important as the knowledge of the potential of land is the knowledge of the actual land area available for production. Complete and exact land statistics exist only for those areas where land adjudication has been completed and for the former scheduled areas.[2)] The statistics have been compiled per sub-location, location, division, etc. The land areas of the political units below district level are constantly changing because of subdivision of sub-locations and reallocation of land areas etc. It is however advisable to use the statistics given in the Handbook.[3)]

The land areas of the former scheduled areas are recorded according to land reference numbers and cadastral sheet number. The land area of a farm can easily be established by identifying the land reference numbers belonging to one farm and adding up the areas belonging to each land reference number.

The creation of new land reference numbers is a legal act which requires measurement of the newly created area unit and can therefore be traced easily. Space is given in the land statistic tables to enter any future major changes by hand.

The land: population ratio is most important. For this reason the maps used for the 1979 census were used as base maps for the large AEZ maps. In order to find out the amount of land available, the land area which falls into the respective AEZ has been measured and the average land area per household and person calculated and printed in table. This table is the most suitable statistic for the production potential of particular areas. When using it together with the information on cropping patterns and yields, it is possible to calculate a fairly exact output statistic per area unit.

Population statistics

The land: population ratio is an important basis for land use recommendations etc. The total population and the household composition has been included.

Note: The number of households depends very much on the particular location, but is rapidly changing at present (1981/82) towards one extended household per farm, entered into the table as „total number of persons per household". The statistics were obtained from the 1979 census; the annual population growth rate is approximately 3.9 % p.a.

Other statistics

Statistics of the four most important industrial crops, pyrethrum, tea, coffee and cotton are published by the respective boards and the KTDA. Other information is compiled by the CBS. The Farm Management Research Officer will forward this information to the DAO in future, who should then enter it in the respective column by hand.

1) Official agricultural land statistics will be included in the annual publication of the Handbook Vol. III/A.

2) Land area statistics are compiled in two different departments: a) Survey of Kenya, b) Department of Lands. The Land statistics are not always consistent, but it was not always possible to detect the errors.

3) Area transfer is usually done for political reasons and is legalised by the establishment of the new boundaries by the Survey of Kenya; the time lag is usually 10 years.

TABLES COMPILED FROM THE SMALL FARM SURVEY (SFS)

The Small Farm Survey was carried out during 1977. A well trained group of ten enumerators interviewed 1,620 smallscale farmers asking each the same set of questions. The enumerators were closely guided by a supervisor and the team leader was an experienced agricultural economist. The investigation area was chosen according to its ecological potential and the socio-economic situation of the farming community. The farmers were selected at random from the members' register of the co-operative societies of the particular area.

Co-operative society members are usually involved in the cash economy and farmers who are co-op members usually practise somewhat more advanced farm management. It is a safe assumption that *the production level reflected in the tables will be reached by the average farmer towards the year 1985.*

The information obtained from the farmers is comprehensive, but in using the data, one should, however, keep in mind that data obtained in interviews has certain limitations.

The data is shown as obtained from the farmers and only obvious recording errors have been excluded. The aim of SFS was to get information about the average structure of family farms and the know-how and opinion of the farmer about his operation. In addition, *information obtained from two individual farms is included: Upper Quartile and Lower Quartile.* In a few cases, the information may seem illogical e.g. high input, low yield, but the overriding aim in compilation was to present the information as far as possible as it had been supplied by the farmer.

The tables are self-explanatory; possible exceptions are the table a) „Inputs and Yields of Major Crops" and b) the graph „Distribution of Farming Activities".

to a) As stated above, the information is printed as supplied by the farmer. The input/output relation in many cases does not seem logical. Besides purchased inputs there are however a large number of yield influencing factors like fertility, state of the soil, timely availability of the inputs etc. For example, a clear correlation between early planting of maize and grain yield was one of the outcomes of the survey, but it was not possible to establish a production function for fertilizer input. What the table clearly shows is that *Kenya's family farmers*[1] *know that the use of improved seeds, fertilizer and plant protective agents helps to increase the yield, but they are in urgent need of information as to how to use them best;* the table also shows that field preparation is a major bottleneck on the small farms.

to b) The income of a family farm is the return on the work input of the farmer and his family. The vegetation period is roughly equal to the production period i.e. the time when the farmer can generate income through work. Practically nothing is produced during the dry season, thus the farmer cannot work and has very little income. The smaller the farm, the more crucial is the length of the vegetation-production period for the farmer's employment opportunities.

An ideal employment situation for the family farmer exists only in AEZs LH 1, UM 1 + 2, but in all other zones, labour peaks reduce his employment possibilities throughout the rest of the year. Planning and farm advice which does not consider labour management can only be incorrect and is of little value.

The graphs indicate the time of the year in which various operations are executed on the farms. They also reflect the constraints to which a farmer is subject e.g. cultivation can only be started after a certain amount of rain has softened the soil but must be stopped before the remaining vegetation period gets too short, otherwise the returns on his efforts become marginal.[2]
It is advisable to compare the distribution of farming activities with the precipitation graphs shown in this book, in order to detect possibilities of making better use of the full vegetation period. The graph does not give any information about the amount of work (mh) involved in the different operations.[3]

1) „Family farm" is a holding where more than 50 % of the manual labour input is done by the farmer and his family – the aim of the operation is to generate income through self-employment.

Large-scale farms are operated by employing labourers for practically all manual work; the income of the operation is a return on management and capital invested.

2) For example, 3 weeks delay in maize planting reduces hybrid maize yield in UM 3–4 West of the Rift by 25 %..

3) For this, see Vol. I Labour Study. It is planned to compile two more labour studies, one for the bimodal rainfall region. It is hoped that they will be available towards 1985–90.

PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONE OUTPUT & NUTRIENT INPUT

Remarks

The input: output ratio is probably the most important single piece of information required by the farm management extension and agricultural planning officer.

Almost every enterprise yields more than one product, e.g. maize produces grain plus straw, legumes produce seeds, straw and enrich the soil with nitrogen etc. Therefore the actual value of the output can only be arrived at after assessing the sum of the individual values of the different products. However, most crops are planted in order to produce one major product which can be sold and/or consumed on the farm. This product is generally referred to as the yield of the enterprise.

Likewise a number of different **inputs** are required to grow a crop. The kind, variety, amount and number of inputs used depends on a large number of circumstances and therefore can only be assessed properly on an individual basis. There are, however, two major inputs: (a) the work input, (b) the nutrient supply. Work execution on smaller family farms is usually done by hand, while large farms use tractors. These input components have already been dealt with in the Farm Management Handbook Vol. I[1] and for this reason Table 15 gives information on the nutrient requirement of the different crops only.

The kinds of nutrients needed by each individual crop are many and the amount required depends on a large number of circumstances and conditions. An attempt has been made to include the three most important factors – climate, soils and yields – in the table.

The table provides details on the yields and fertilizer requirement (N + P_2O_5) of the most important crops, for the AEZ where the individual crop is or can be grown, and for the soil type which covers the largest portion of land within the particular AEZ.

Yields and N + P_2O_5 requirement are shown for **three production levels** and for a yield achievable without nutrient application. The proportions of farmers achieving any one of the three yield levels is so far known only *very* approximately[2] and should be assessed as soon as possible using the yield figures given.

Production Level I –

reflects traditional production techniques – farmers apply a regionally developed and relatively wide variation of production techniques; they do not apply fertilizer and/or plant protective agents (except for coffee and tea). They use their own seed, with the exception of maize where 75 % plant purchased hybrid maize. Cultivation is done by hand hoeing (in AEZ LH 1 + 2, UM 1 + 2 and L 2 + 3 + 4) (up to 60 %) and with the help of draught animals in LM 1–4 (65 %).

Production Level I includes small family farms only; when large farms achieve Level I yields only, this is usually because they fail to apply improved technology properly. It seems feasible that ± 60 % of the family farms of Production Level I will reach Production Level II by the year 2 000.

Production Level II –

Farmers apply the recommended husbandry methods, use fertilizer, new seed and plant protection methods within the constraints of practical farming. The larger family farms (above 5 ha) within AEZ LH 1–4, UM 1–4 and LM 1–2 in the Rift Valley, Western and Nyanza Province hire tractors for the first ploughing (± 50 %); farmers in AEZ LM 3–4–5 use draught animals (± 65 %) for ploughing.

Production Level II includes family farms and practically all large mechanised farms.

Production Level III –

reflects the yield level which can be achieved under optimal conditions in practical farming, i.e. if the objective (natural) and subjective (management) conditons are optimal. Yield Level III shows the actual potential which can be reached if the knowledge available at present is put into practice. Although the yields shown are now being achieved by some farmers, a significant proportion (± 25 %) will not reach this Production Level III before the year 2 000.

The approximate distribution of family farms within the three Production Levels is at present (1981/82) as follows:

Production Level[3]	Enterprises	
	Major Food and Cash Crops	Other Crops and Cotton
I	75%	85%
II	23%	15%
III	2%	–

1) Labour Requirement/Availability and Economics of Mechanisation

2) For some guidance, see table Assets, Land Use, Farming Intensity, Inputs

3) rainfed agriculture only

Assessment of the Data

Yields:

The only exact method of establishing reliable information on crop yields in non-book-keeping farms is to harvest and weigh the crop of an exactly measured area by a specially employed team over a number of years (crop cutting). This method has never been employed, thus exact on-farm yield figures are not available.

On the other hand, a large number of relatively small investigations have been carried out to acquire information about yields of some crops. Comparatively long term information is available from farms keeping books, and the results of approximately 30 years of agricultural research work give some insight into present yield levels and the production potential of Kenya's agriculture.

Practically all information on yields available in Kenya has been analysed to assess the yield figures shown inthe table.The climatological yield potential for the individual crops within the different agro-ecological zones has become available through work on the AEZs, and information about the approximate soil fertility has been supplied by the K.S.S.. The Small Farm Survey (S.F.S.), executed to obtain basic farm management data for the Handbook, supplied additional information about the yield level in the smallholder sector at present.

The yield figures obtained from, or based on this considerable amount of data have been discussed throroughly and repeatedly with the agricultural extension and research officers. The author of the table was able to base his assessments on 10 years' experience with agriculture in Kenya. He was therefore in a position to assess the magnitude of the impact of socio-economic constraints on yields in particular.

However, it is more difficult to predict **yield developments**, which depend on a large number of factors and constellations, many of them still unknown at present. On the other hand some likely development trends are visible. For example, a farmer will always produce enough food for his family and those who help to cultivate his farm, if he has sufficient land at his disposal, and the natural conditions are suitable. This is the case in AEZs: LH 1–2, UM 1–4, LM 1–2 and L 2–3. It is therefore a safe assumption that agricultural output in this region will, in line with the population increase, increase by + 4 % p.a., but there is very little or no scope for increasing agricultural production in arid/semi-arid regions, employing the technology available at present. Food is also needed for the urban population and agricultural products required for export. The additional amount of products required can only be produced in the high rainfall areas (AEZ: LH,UM,LM 1–3) – thus an overall output increase of approximately 8 % p.a. is required. The natural potential of the high rainfall areas allows for a doubling of the present yields of most enterprises, employing the technology available at present.

The yield figures shown for the three Production Levels have been established in three steps:

a) **Establishing the present Level** using mainly the results of:

- the Small Farm Survey,
- the demonstration trials in the farmer's field,
- other socio-economic surveys and research results.

Based on this information, the yields per AEZ per district have been established. From these data, average yield figures for eleven **zones** of similar ecological and socio-economic potential have been compiled. These data have been used in turn to assess the impact of the socio-economic constraints by comparison with the deviation in yields in different localities of similar natural potential from the average yield of the particular zone.

b) Establishing the yield potential using mainly the results of:

- the work on the agro-ecological zones,
- the work on the Kenya soil maps,
- top farmers in national competitions and from various surveys,
- agricultural research.

c) **Establishing a likely possible development path** using information from:

- advanced farms in advanced districts,
- book-keeping farms,
- past developments, and predicting future trends using the future possibilities and constraints presently known.

The yields given refer to the harvested, saleable product; storage losses etc. have not been accounted for. **Grass yields** are given in kg of total digestible nutrients (TDN) because green matter and/or dry matter figures are less informative and difficult to compare. The figures have been arrived at by analysing the yield data, stocking rates, etc. available. The following formula has been used:

Feed Value of Grass[1)]

Grass	GM	DM of GM in %	TDN of DM[2)] in %	DCP in DM[2)] in %
Natural Pasture and Leys	100	20	65	25
Napier and Bana Grass	100	20	55	15

1) refers to AEZ: LH 1 – pasture grazed, napier grass = zero grazing

2) the digestibility of the DM has been reduced by 20 % – from 65 % in LH 1 to 45 % in LM, L 2–5 using a straight line function in order to make up for the influence of the temperature; average of the crop when grazed and/or fed etc.

Nutrient/Fertilizer required

Apart from climate, the fertility of the soil, in the broadest sense, is the most important production factor in agriculture. Natural fertility has been reduced through intensive cropping – nutrients stored in the soil are absorbed by the crops grown and are removed with the harvest from the field and often from the farm because of selling the crop.

In traditional agriculture, land was left fallow in order to allow for a restoration of soil fertility, or in large commercial farms, leys were planted for the same reason. This rest period of 4–5 years was generally enough to maintain a fairly good nutritional balance. Both practices are no longer, or only occasionally practised today as the rapid population increase has led to continuous cropping. Furthermore, in traditional agriculture only the fertile lands were cultivated, while today all kinds of often extremely infertile soils are utilised.

Only three to four soil types in Kenya have good natural fertility, but most are extremely infertile, and for all these reasons, the natural fertility of agricultural land is declining quickly. Therefore the nutrient which is taken out of the soil must be given back to it. The amount of nutrient to be applied must be equal to the amount which is taken away with the harvested yield. Agricultural output must increase by roughly 10 % p.a. in order to keep pace with demand; thus the amount of nutrients applied should increase by 10 % p.a. as well.

The only realistic way to achieve this is in the application of synthetic fertilizer. Kenyan farmers purchase fertilizer for approximately KShs. 250 million p.a. at present (1981/82) and urgently need advice on its correct use.

Correct advice for fertilizer application can be based only on scientifically proven data. Good farm management advice on fertilizer use must be based on correctly assessed *production functions.* The advisor must know how much additional yield he can expect per additional amount of nutrient applied to a particular crop in a particular location. However, no scientifacally proven data basis for such information is available yet.[1)]

On the other hand, some research work and a large number of fertilizer trials and demonstrations on farms have been implemented to get an insight into the fertilizer requirements and response of the major crops to nutrient application. Almost all data available on fertilizer application response in Kenya has been studied for the compilation of the data shown in the table. The data available indicate that there is very little response to K_2O application and therefore no information is given for this nutrient.

1) A large soil testing and fertilizer trial programme is presently planned; comprehensive results will be available towards 1990–95.

Assessment of the Data

The data available on fertilizer use and response are insufficient for the compilation of proper fertilizer recommendations. In addition, research has concentrated on particular areas and crops, while other areas, and the so-called subsistence crops, have been virtually neglected. In order to arrive at some information for all areas suitable for rainfed agriculture, and for the most common crops, the assessment had to be done in two steps (a and b) and a number of assumptions had to be made.

a) The results of research work, demonstrations on the farm, results of book-keeping farms, etc. have been analysed to assess fertilizer response.

b) The nutrient **removal** per weight unit of the different crops has been compiled. The amount of nutrient to be applied has then been assessed by using a set of nutrient *recovery rates* for the three major ecological regions, as shown below:

Recovery Rate of Nutrients
in %

Region	N	Nutrients P_2O_5	K_2O
Upper-Lower Highlands, Upper Midlands and Lower Midlands in W. Kenya	60	15	70
Lower Midlands (East Kenya)	70	20	50
Lowlands (Coast)	50	20	50

The recovery rate of different plants varies, but this variation has been ignored because it is largely unknown. The data arrived at by way of these calculations have been altered somewhat according to (a) the natural fertility of the (20) most important soil types in the particular AEZ, (b) the length of the vegetation period and the *kind* of rainfall,(c) the knowledge of fertilizer use on the part of the farmers of the particular region.

For **coffee** the recommendation of research stations has been included as published, the nutrient requirements for **tea** have been based on production function figures supplied by the tea research station.

The **legumes** included in the table produce approximately 25 kg N/ha per crop. This nutrient has been ignored as it is only partly available for the particular legume crop.

Note: **The fertilizer recommendations given in district tables 15 can be a guide only. They will be replaced by the information obtained by the fertilizer use research programme within the next 10–15 years.**

An underlying assumption is that farmers who apply more fertilizer apply improved husbandry as well. Thus the yield increase per amount of nutrient applied is due to both factors – better nutrient availability for the plant and better husbandry for its protection.

DISTRICT INFORMATION AND STATISTICS

INTRODUCTION TO CENTRAL KENYA AND TO THE LAND USE POTENTIALS

The Rift Valley Province covers more than the Rift Valley, while the Central Province does not include all of Central Kenya, because the central part of the Rift Valley and its bordering plateaus also belong to C.K.. The distribution of rainfall during the year is not as unimodal as in West Kenya but still not as bimodal as in East Kenya. Because of the transition between both systems, many areas have a trimodal rainfall with peaks in April, July, and November. In low rainfall areas, not one of the three rainy seasons may get enough rain for growing crops. This is the problem in the areas of the Rift Valley lying in the rain shadow of the bordering plateaus and on the Laikipia Plateau in the rain shadow of Mount Kenya. The districts on the eastern slopes of the Nyandarua Range, however, have the bimodal rainfall pattern of East Kenya and normally enough rain for the cultivation of maize. The best maize zone is on the Trans Nzoia Plateau (UM 4 near Kitale).

In the highlands, Central Kenya also has many valuable wheat producing areas. This can be seen in the large extension of the agro-ecological zones UH 2 & 3 and LH 2 & 3. In the lists of the cropping potential of their subzones, the most suitable group of varieties is mentioned by naming the first variety of this group according to the length of the growing period. To minimize the danger of rust, it is advisable to plant several varieties of this group and to include earlier and later maturing ones. The NARS, Njoro, issues variety recommendations yearly which should be considered closely. Good husbandry, crop protection and rotation are also essential for combating diseases (especially fungus in the wet climates)[1)] and insect pests. The yield expectations given in the AEZ are only valid if these farm management standards are optimal and the soils are suitable and well manured. It must be remembered that the classification of yield expectations in > 80 %, 60–80 %, 40–60 % and 20–40 % of the optimum (under field conditions) is still a rough calculation or rather, an estimate (for these crops for which exact water requirements are not available).

The growing seasons are for medium soils if not otherwise noted. For heavy soils they are roughly 1–2 decades longer (if the agro-humid period is not weak), on light soils about 1–2 decades shorter. There are very good volcanic soils but also very poor ones which need considerable improvement. The soil maps and descriptions are derived from the National Soil Map of the Kenya Soil Survey. The symbols are simplified to make it easier for non-specialists to use them and an introduction is given to the soils of each district, as explained by SIDERIUS (1979)[2)].

Central Kenya also has the biggest contrasts in farm sizes within the country. Therefore one has to select carefully from the given ecological land use potentials what is economically reasonable, according to the size of the farm and to other factors. Some new food crops may not fit into existing systems, e.g. marketing has to be organised for new cash crops. These problems have to be considered closely when trying innovations. The annual crops in the potentials are listed in the following order: cereals; pulses; tubers; oil seed; real cash crops; fruits and vegetables[3)]. The perennial crops are listed more or less according to their importance.

Very little information exists about pasture and forage apart from real rangeland (PRATT and GWYNNE 1977)[4)]. The recommendations given are therefore only a very rough guide, and fodder cultivation depends on many factors besides climate and soil. The main problems outside the large-scale farming area and Masailand are overgrazing and soil erosion, which are destroying the means of livelihood of coming generations. The livestock unit (LU) in our estimated stocking rates is 300 kg liveweight (a local bull or seven sheep or goats). This is for smallholders with mainly indigenous cattle, a more realistic figure then the Standard Stock Unit (SSU) of 1000 lb (450 kg) introduced by the British. – Districts or divisions with virtually no climatic cropping possibilities were not included in this book (Turkana District, most of Kajiado District).

1) Phytosanitary aspects have been considered as far as possible, but more information is necessary.

2) SIDERIUS, W.: Simplified Soil Maps of Kenya. KSS, 2nd ed. Nairobi 1979.

3) It was impossible to list all vegetables which may be grown in each AEZ. Information about vegetables not mentioned may be found in Vol. V of the Handbook, or obtained from Kirchhoffs Seed Company, Box 30472, Nairobi.

4) PRATT, D.J. and M.D. GWYNNE (Eds.): Rangeland Management and Ecology in East Africa. London 1977.

RIFT VALLEY PROVINCE

NANDI DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The Nandi District has four high-rainfall areas receiving more than 1 500 mm annual average. They form extended Agro-Ecological Zones for potential tea cultivation (LH 1 and UH 1): the North Nandi Forest above the Nandi Escarpment, the South Nandi Forest which is the eastern extension of the Kakamega Forest (as a zone of high convergence rainfall, see VOL.II A, p.81), the Nandi Hills (nearly completely cleared), and the Northern Tinderet Forest (here only the lower part ist suitable for tea, as the higher has a mean temperature of less than 15°C and night frosts occur). On the border of the present forests, formerly more extensive, there is already tea cultivation. Careful scientific investigations are necessary to decide which parts of the remaining forests could still be opened for cultivation without endangering climate, soil, water retention and nature conservation. East of Tindinvo, it is already noticeable that only bush and grass now grow where real rain forest should exist due to the high annual rainfall of 1 800–2 000 mm.

The *relatively* dry contrast area is in the north-eastern valley basins of the district, although the annual average is still high (1 200 mm) and the 60% reliability is not too low and suits maize with at least 400 mm in the first rains, 500 in the second. These figures can be combined roughly because there is no real break between them.

On the plateau-like main parts of the district, the temperatures are close to the upper limit of the Upper Midlands (UM), and to the lower limit of the Lower Highlands (LH), thus creating many transitions and local exceptions through micro-climate. For instance, in some places of the LH belt one can still see bananas, which is unusual elsewhere. Only a small portion, an edge of the Kano Plains, belongs to the Lower Midland Zones (LM) with mean temperatures of at least 21°C, and there ist also enough rainfall for a Sugar Cane Zone, although it is mainly marginal due to the dry period from December to February and the altitude approaches 1 500 m (LM 2).

NANDI DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Monthly rainfall in mm											
					Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
8934072	Kaimosi Tea Estate	26	Average	2 024	89	100	175	302	258	155	157	218	184	152	132	104
1 767 m																
8934078	Esirwa Kaimosi F.T.C.	36	Av.	2 119	78	88	160	282	301	197	190	235	202	162	122	103
1 707 m																
8935001	Songhor, Kaabirir	56	Av.	1 424	56	74	110	220	202	127	139	162	109	78	83	66
1 889 m			60% prob.[1]	1 280	30	33	84	185	171	115	116	143	83	68	48	29
8935018	Kapsabet, D. Office	68	Av.	1 557	50	70	118	194	208	160	106	205	151	96	82	57
1 998 m			60%	1 342	20	27	71	146	157	138	130	160	119	67	48	33
8935033	Nandi Hills, Savani	46	Av.	1 567	72	92	134	206	182	137	138	166	121	104	114	102
1 828 m	Estate															
8935050	Songhor, Tereno	30	Av.	1 385	51	54	82	218	192	122	171	170	100	88	82	59
1 950 m																
8935062	Baraton Vet. Training	38	Av.	1 539	57	62	110	201	200	157	159	201	148	103	81	62
1 981 m	Centre															
8935071	Siret Tea Co. Ltd.	32	Av.	1 568	67	72	103	236	208	118	147	152	124	120	113	101
2 160 m																
8935112	Nandi Forest Station	24	Av.	1 708	63	73	140	215	199	168	163	227	168	122	102	68
1 981 m			60%	1 600	37	31	130	184	165	153	129	210	156	106	73	42
8935120	Eldoret, Kibabet	23	Av.	1 519	72	60	88	206	162	129	159	197	132	124	111	79
2 133 m	Est. Ltd.															
8935127	Kapsabet, Kapiyet	22	Av.	1 358	55	54	91	175	154	126	155	202	123	94	78	52
1 828 m	Disp.															
8935130	Kapsabet, Nandi Tea	21	Av.	1 583	79	86	116	222	176	142	131	193	138	125	119	87
1 981 m	Est. Kapsiwoni															
8935152	Nandi Hills	14	Av.	1 643	79	103	98	246	187	127	141	194	119	133	140	79
1 999 m																
8935161	Nandi, Kibwari Tea	17	Av.	1 640	77	94	129	224	192	114	138	187	137	120	128	100
2 102 m	Estate															
8935185	Chemelil Sisal Estate	10	Av.	1 431	81	129	158	247	123	105	93	107	111	81	124	72
1 379 m																
9034013	Miwani Sugar Estate	40	Av.	1 460	82	94	161	229	141	96	89	110	99	103	154	104
1 219 m	Sect. III		60%	1 310	49	63	147	189	109	64	75	83	89	93	90	89
9035009	Mbago Vle. Estate	42	Av.	1 722	64	102	135	298	236	152	147	155	111	102	117	104
1 950 m	Songhor		60%	1 550	31	48	115	261	204	138	134	139	88	92	59	68
9035042	Equator, Langoni	42	Av.	1 616	57	74	95	188	200	139	178	234	143	131	106	71
2 011 m			60%	1 450	11	23	64	137	168	124	143	209	128	111	56	46
9035080	Guest House Kamarero	36	Av.	1 536	58	65	124	237	218	138	159	153	99	92	104	88
1 981 m			60%	1 379	20	41	91	208	187	117	134	136	86	73	59	45
9035263	Tinderet Tea Estate	18	Av.	1 898	89	89	140	276	249	146	177	202	154	146	134	96
2 072 m																

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years

NANDI DISTRICT

TABLE 2: TEMPERATURE DATA

No. and altitude	Name of Station	AEZ 1)	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
8934009	Kaimosi	UM	Mean max.	26.8	27.4	27.1	26.5	26.0	25.3	23.8	24.9	25.9	25.7	25.4	26.2	25.9	8
1 615 m	Mission	1	Mean temp.	21.1	21.6	21.4	21.1	20.5	20.1	19.3	19.8	20.4	20.4	20.6	20.8	20.6	
	(operating	hp	Mean min.	15.3	15.7	15.7	15.6	14.9	14.8	14.8	14.7	14.9	15.0	15.8	15.4	15.2	
	to 1943)		Abs. min.	10.0	9.4	10.0	10.0	8.3	8.9	8.9	8.9	10.6	10.6	11.1	8.9	8.3	
8935018	Kapsabet	LH	Mean max.	25.5	25.7	25.9	26.1	23.4	22.8	22.0	22.1	22.2	24.4	25.4	24.3	24.1	36
1 998 m	D.C.	1–2	Mean temp.	18.1	18.3	18.6	18.8	17.1	16.7	16.2	16.1	16.1	17.5	18.1	17.5	17.4	
	(operating	lp	Mean min.	10.7	10.8	11.3	11.5	10.8	10.5	10.4	10.1	10.0	10.6	10.8	10.6	10.7	
	to 1954)		Abs. min.	3.9	5.0	5.6	6.1	5.6	5.6	3.9	4.4	4.4	5.6	5.0	5.0	3.9	
8935066	Songhor,	LH	Mean. max.	25.9	26.4	24.9	23.1	22.1	21.1	20.6	21.3	23.3	24.8	24.1	24.9	23.5	7
2 133 m	Kepchomo	1–2	Mean temp.	19.4	19.7	19.3	18.3	17.8	16.8	16.6	16.9	17.7	18.8	18.8	19.2	18.3	
	Estate		Mean min.	12.9	13.0	13.6	13.4	13.4	12.5	12.6	12.4	12.1	12.8	13.5	13.4	13.0	
	(operating		Abs. min.	10.6	10.0	10.0	11.1	10.0	10.0	9.4	10.0	8.9	10.0	10.0	8.3	8.3	
	to 1944)																

1) AEZ = Agro-ecological zone; lp = lower places, hp = higher places within the zone

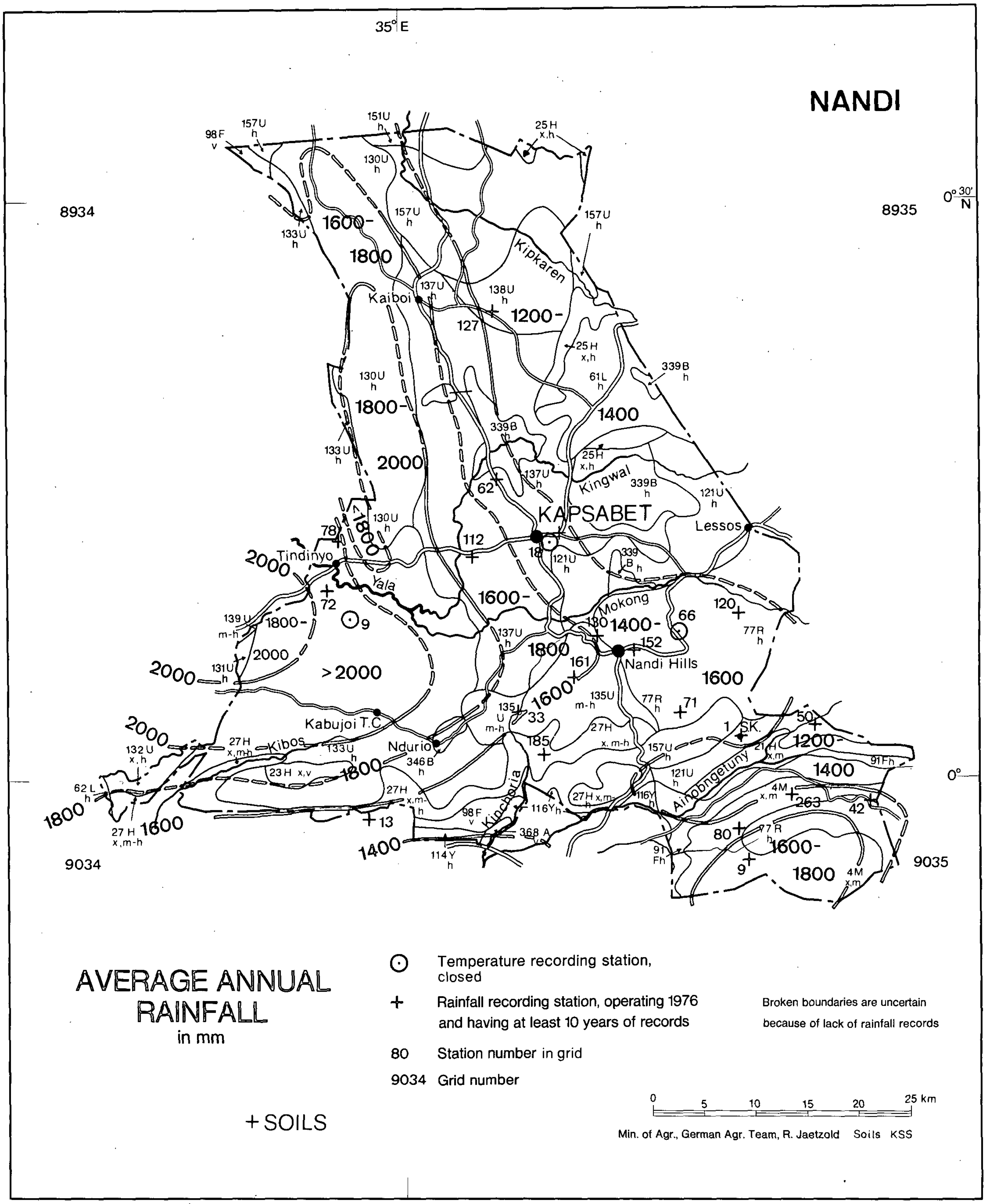
TABLE 3: CLIMATE IN THE AGRO-ECOLOGICAL ZONES

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall 1)		60 % reliability of growing period		
					1st rains in mm	2nd rains in mm	1st rains 2) in days	2nd rains in days	Total 3) in days
UH 1 Sheep-Dairy Zone	vl i	Here Forest Reserve							
LH 1 Tea-Dairy Zone	p or two	1 900–2 400	18.0–15.0	1 500–2 100	650–850	580–800	165 or more	190–200	365
	vl i or two			1 300–1 850	630–820	550–750	155 or more	140–195	295–350
LH 2 Wheat/Maize-Pyrethrum Zone	vl/l or two	1 900–2 400	18.0–15.0	1 300–1 800	600–750	500–700	150 or more	90–135	240–285
LH 3 Wheat/Maize-Barley Zone	l/vl or two	1 900–2 300	18.0–15.7	1 280–1 650	500–680	500–600	140 or more	80–100	220–240
UM 1 Coffee-Tea Zone	p or two/three	1 500–2 000	20.5–17.5	1 800–2 100	750–850	650–800	160 or more	190–205	365
	p or two			1 700–2 000	700–780	630–780	160 or more	185–200	345–360
	vl i or two			1 500–1 850	650–750	550–700	150 or more	175–185	325–335
UM 2 Coffee Zone	vl i or two	Very small and transitional to 3, see Kericho							
UM 3 Marginal Coffee Zone	transitional	Very small, see Kericho or Bungoma							
UM 4 Sunflower-Maize Zone	l/vl or two	1 600–2 000	19.9–17.5	1 200–1 600	400–600	500–600	115 or more	115 or less	~230
LM 1 Lower Midland Sugar Cane Zone	p or two	Very small, see Kakamega							
LM 2 Marginal Sugar Cane Zone	l/m ⌢ (m/s)	1 200–1 500	22.3–20.9	1 200–1 580	560–700	500–600	170 or more	115–125	285–295

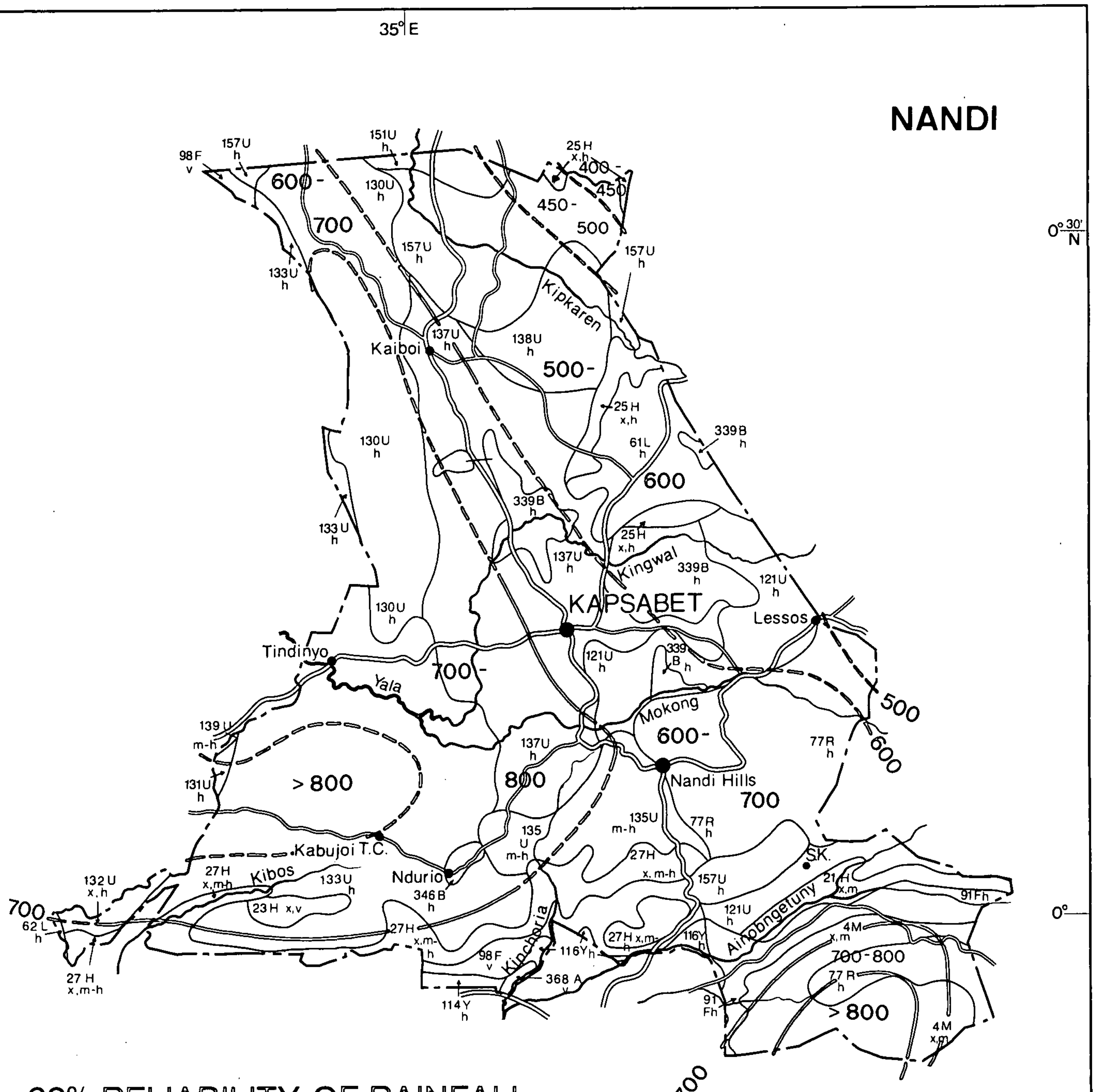
1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants

2) More if growing cycle of cultivated plants continues into the period of second rains

3) Agrohumid conditions continue from 1st to 2nd rains in the whole district


NANDI
35° E
0° 30' N
0°
8934
8935
9034
9035
Kaiboi
KAPSABET
Lessos
Tindinyo
Nandi Hills
Kabujoi T.C.
Ndurio
Kipkaren
Kingwal
Yala
Mokong
Kibos
Kimondi
Ainobngetuny
1600-1800
1200-
1400
1800-2000
>2000
1600-
1800
AVERAGE ANNUAL RAINFALL
in mm
+ SOILS
Temperature recording station, closed
Rainfall recording station, operating 1976 and having at least 10 years of records
80 Station number in grid
9034 Grid number
Broken boundaries are uncertain because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS

NANDI



60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF FIRST RAINS

(e. of Feb. - b. of July)

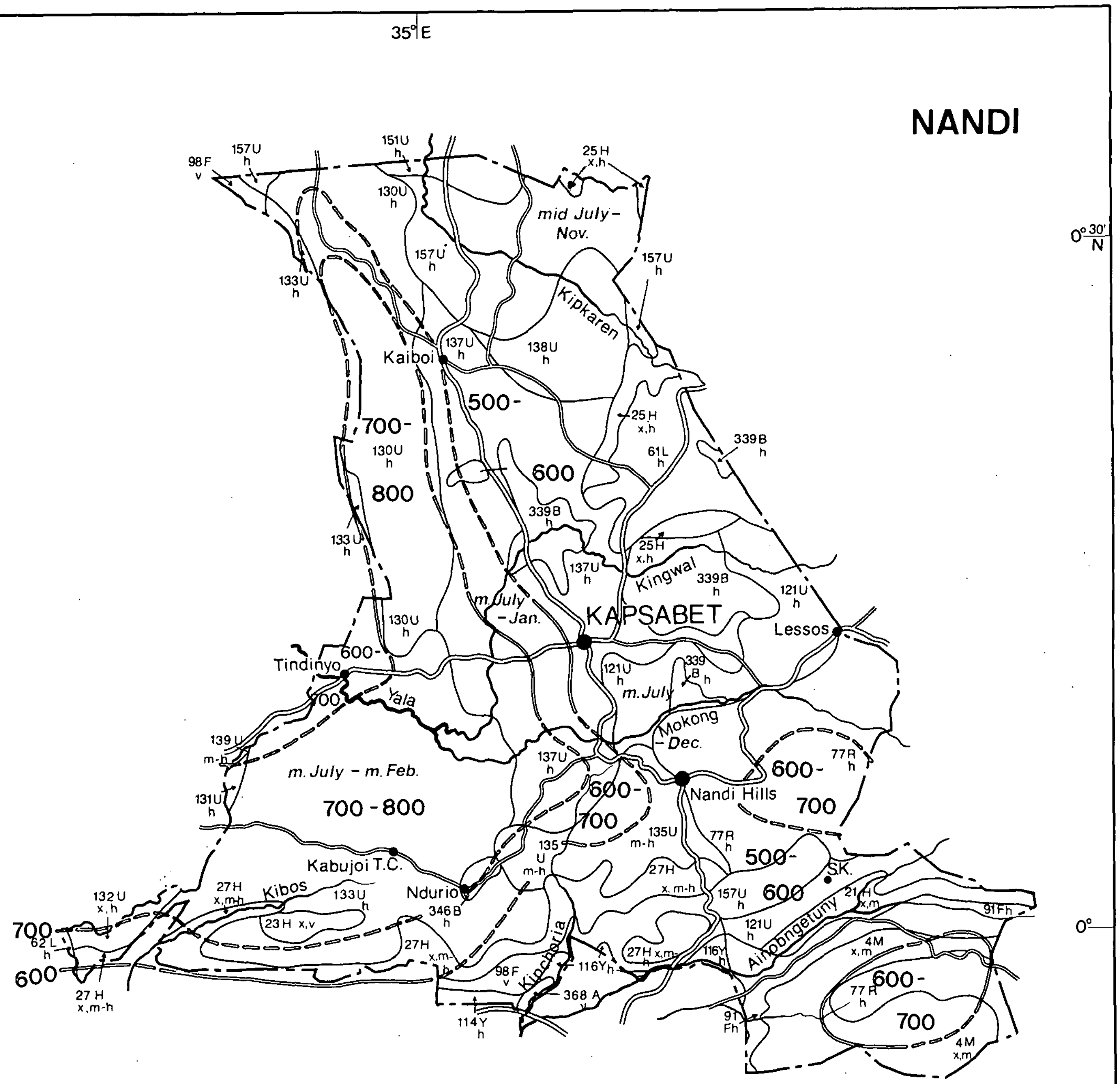
Amounts in mm, surpassed norm. in 6 out of 10 years

+ SOILS

Broken boundaries are uncertain because of lack of rainfall records

0 5 10 15 20 25 km

Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RAINS

(m. July - m. Feb. or less)

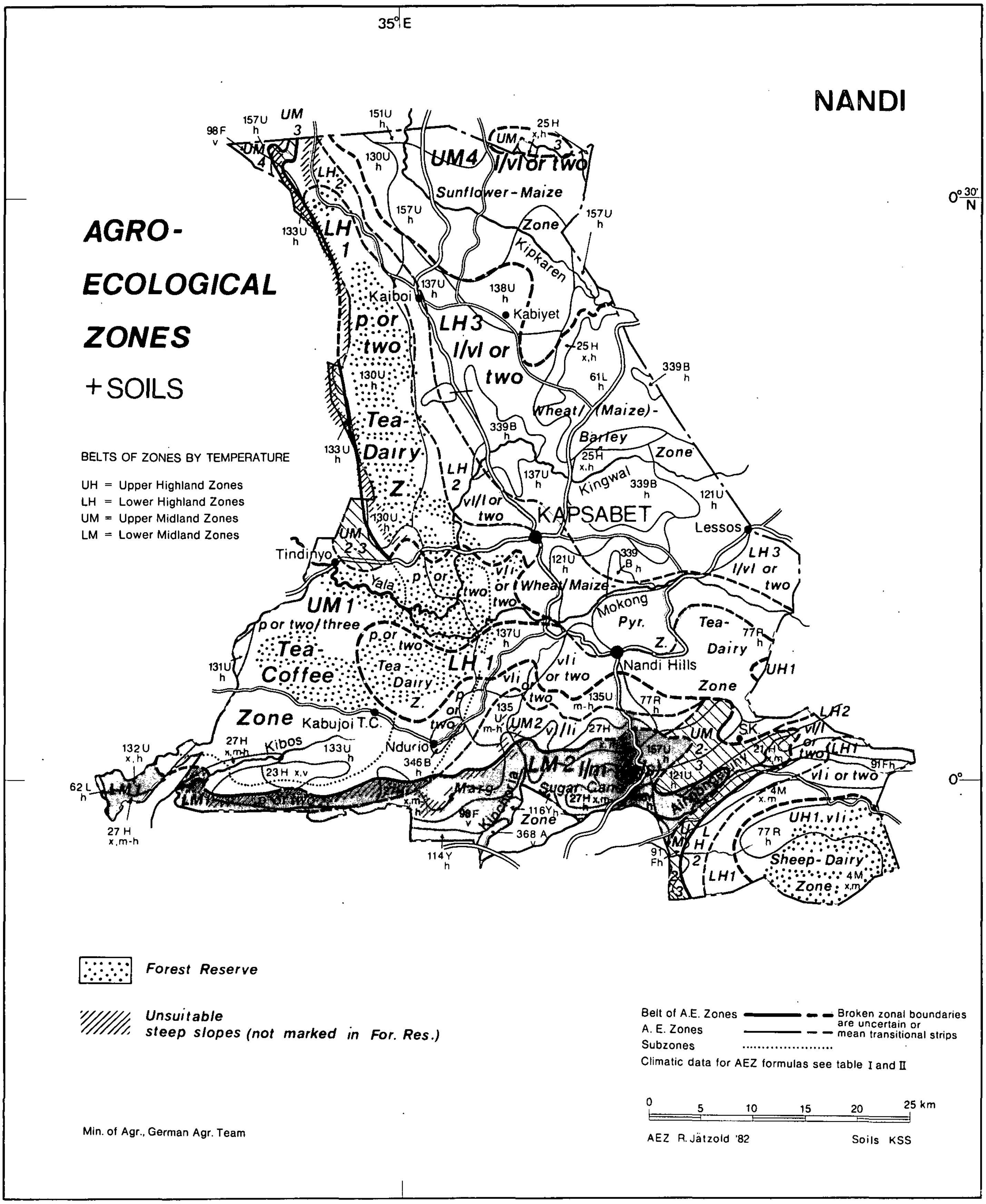
Amounts in mm, surpassed norm. in 6 out of 10 years

+ SOILS

Broken boundaries are uncertain because of lack of rainfall records

0 5 10 15 20 25 km

Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


35° E
NANDI
AGRO-
ECOLOGICAL
ZONES
+ SOILS
BELTS OF ZONES BY TEMPERATURE
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
0° 30' N
0°
KAPSABET
Kaiboi
Kabiyet
Lessos
Tindinyo
Nandi Hills
Kabujoi T.C.
Nduric
Kipkaren
Kingwal
Yala
Kibos
Mokong
UM4 I/vI or two
Sunflower-Maize Zone
LH 3 I/vI or two
Wheat/(Maize)-Barley Zone
LH 1 p or two Tea-Dairy Z.
UM 1 p or two/three Tea-Coffee Zone
LM 2 I/or ... Sugar Cane Zone
UH1 vIi Sheep-Dairy Zone
Forest Reserve
Unsuitable steep slopes (not marked in For. Res.)
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team
AEZ R. Jätzold '82
Soils KSS

AGRO-ECOLOGICAL ZONES

UH = *UPPER HIGHLAND ZONES*

UH 1 = *Sheep and Dairy Zone*

Here very steep, therefore Forest Reserve. Land use potential see Kericho District

LH = *LOWER HIGHLAND ZONES*

LH 1 = *Tea-Dairy Zone*

LH 1 p or two = *Tea-Dairy Zone with permanent cropping possibilities, dividable in two variable cropping seasons*

Very good yield potential (av. more than 80 % of the optimum)
1st rains, start norm. end of F.: Peas, cabbages, carrots, spinach
2nd rains, start norm. end of Jy.: Peas
Whole year: Tea (higher places less than 80 % av., but high quality)

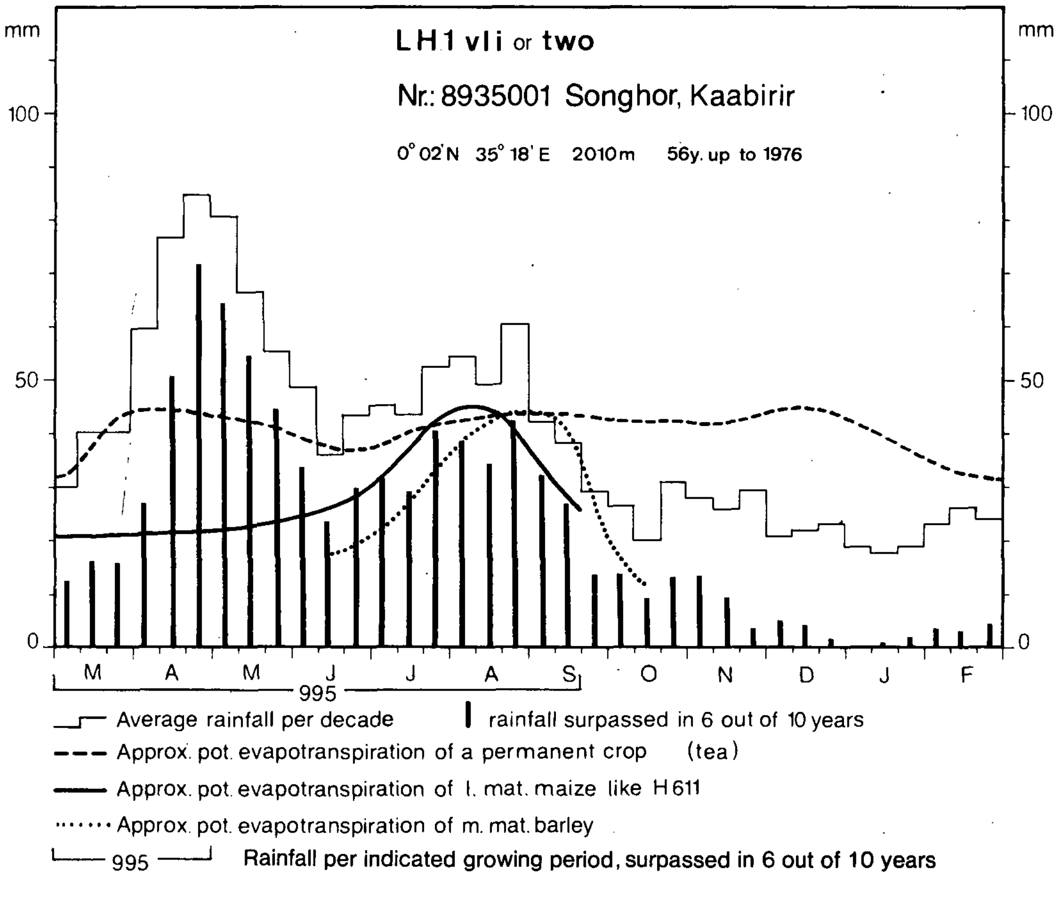
Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd r.): L. mat.: maize like H 7081 (~ 60 % in higher places if not too wet) or H 611 (~ 60 %, lower drier places); rapeseed; kales, kauliflower, beetroot, leek, celery, lettuce
2nd rains: Cabbages, carrots, kales, a. o. vegetables
Whole year: Passion fruit (lower places)

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Finger millet; beans (below 2 100 m); potatoes[1], sweet pot. (lower places); onions
2nd rains: M. mat. barley like Kenya Research or in higher places Proctor (June–O.); beans (below 2 100 m)

Pasture and forage
0.4–0.8 ha/LU on secondary or artificial pasture of Kikuyu grass (montane moist forest originally); very suitable for grade dairy cows; Louisiana white clover up to 2 100 m, above Kenya white clover as best additional forage.

LH 1 vl i or two = *Tea-Dairy Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.*

Potential like LH 1 p but tea only good-fair, maize ~70 %



LH 2 = *W h e a t / M a i z e - P y r e t h r u m Z o n e* 2)

LH 2 vl/l or two = *Wheat/Maize-Pyrethrum Zone with a very long to long cropping season, dividable in two variable cropping seasons and i.r.*

(see Diagram Kapsabet)

G o o d y i e l d p o t e n t i a l

1st rains (to 2nd r.), start norm. March: Late mat. wheat like Kenya Bongo (60–70 %, Apr./May–O./N.), late mat. triticale, late mat. maize like H 611 (e. of F./Apr.–S./N., ~ 80 % on deep soils); peas, horse beans, potatoes1) (Apr.–Aug.); late mat. sunflower like Kenya White (60–70 %), linseed, rapeseed; cabbages, kales, cauliflower, carrots, beetroot, spinach, celery, lettuce

2nd rains, start indistinctly around July: Barley like Kenya Research or in higher places Proctor (June–O.), m. mat. wheat like K. Tembo and other varieties (June–O.); linseed; kales, carrots, beetroot, spinach, tomatoes (lower places), celery

Whole year: Black Wattle, New Zealand flax (higher places)

F a i r y i e l d p o t e n t i a l

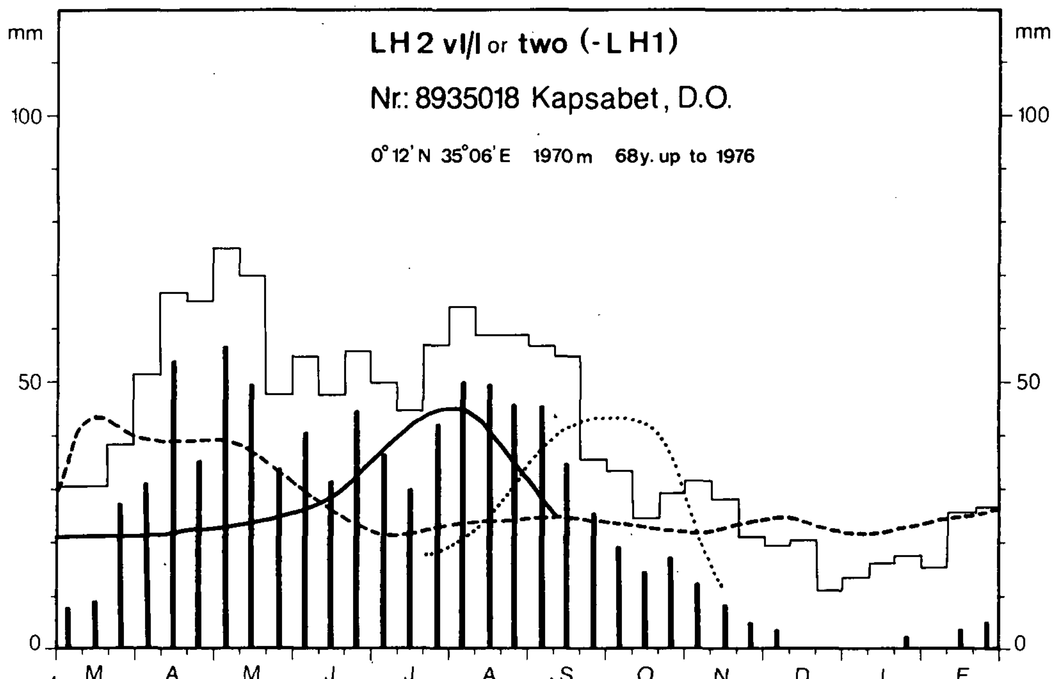
1st rains: Finger millet; m. mat. beans like Cuarentino (50–60 % lower places); tomatoes, onions

2nd rains: Peas, beans (below 2 100 m); potatoes (S.–D./J.); cabbages, cauliflower, onions, lettuce

Whole year: Pyrethrum (nearly 60 %); apples, pears, and plums (all above 2 200 m); passion fruit (below 2 100 m), strawberries

P a s t u r e a n d f o r a g e

Around 1 ha/LU on highland savanna of Kikuyu, Red oats and tufted grass3) between Cedar forest remnants; ~ 0.6 ha/LU on art. pasture of Nandi Setaria above 2 000 m or Rhodes grass below 2 000 m; with add. feeding of Giant Setaria and Lotononis or clover down to about 0.3 ha/LU; suitable for grade dairy cows



LH 3 = *W h e a t / M a i z e - B a r l e y Z o n e* 2)

LH 3 l/vl or two = *Wheat/Maize-Barley Zone4) with a long to very long cropping season, dividable in two variable cropping seasons*

G o o d y i e l d p o t e n t i a l

1st rains, start norm. end of March: M. mat. wheat like R 200 a. o. var. (Apr.–S.); m. mat. durum wheat, late mat. wheat like Kenya Bongo (Apr.–O.), m. mat. barley, late mat. triticale, on deep soils late mat. maize H 611 (higher places), H 612–614 (lower places, 60–70 %); peas; linseed, late mat. sunflower like Kenya White; cabbages, carrots

2nd rains, start indistinctly between end of June a. July: M. mat. wheat like Africa Mayo a. o. var. (June–D.), m. mat. barley; rapeseed (end of June–O.)
Whole year: Black wattle

Fair yield potential
1st rains: Potatoes; rapeseed; kales, cauliflower, carrots, beetroot
2nd rains: Beans (lower places); tomatoes, kales, beetroot
Whole year: Avocadoes (lower places)

Pasture and forage
About 1.2 ha/LU on highland savanna of Red oats and wire grass, about 0.7 ha/LU on art. past. of Nandi Setaria or Rhodes grass; suited for grade dairy cows and grade cattle; subterranean clover and Lotononis as add. forage

UM = UPPER MIDLAND ZONES

UM 1 = Tea-Coffee Zone

UM 1 p or two/three = Tea-Coffee Zone with permanent cropping possibilities, dividable in two to three cropping seasons

Very good yield potential
1st rains, start norm. b. of March: Cabbages, kales
2nd rains, start norm. end of July: M. mat. sunflower like Comet
Whole year: Tea (~ 80 %, less quality), passion fruit, guavas

Good yield potential
1st rains (to 2nd r.): Late mat. maize H 7801 or H 612–614, finger millet; potatoes (60–70 %, higher places), sweet potatoes; late mat. sunflower like Kenya White, soya beans; spinach, onions, carrots (above 1 600 m)
2nd rains: Beans (~ 60 %), sweet potatoes; kales, onions, tomatoes, e. mat. soya beans
Whole year: Bananas, taro, yams, mountain pawpaws, loquats, avocadoes

Fair yield potential
1st rains: Cold tolerant sorghum; beans (50–60 %)[6]; tomatoes
2nd rains: Maize H 511 & 512, cold tol. sorghum (Aug.–F.), finger millet; potatoes (higher places), cabbages
3rd rains, start indistinctly around end of O.: V. e. mat. beans and fast growing vegetables
Whole year: Arabica coffee[5], citrus

Pasture and forage
About 0.6 ha/LU on art. or sec. pasture of star grass; down to 0.12 ha/LU feeding Napier or Bana grass, banana leaves, and fodder legumes (Desmodium, Stylosanthes)

UM 1 p or two = Tea-Coffee Zone with permanent cropping possibilities, dividable in two cropping seasons

Potential like UM 1 p or two/three, but no reliable third crop in N.–F. Stocking rates about 10 % less

UM 1 vl i or two = Tea-Coffee Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.

Potential like UM 1 p or two/three but tea only good to fair, beans 1st r. good, no third season, stocking rates about 20 % less

UM 2 = Coffee-Zone[5]

UM 2 vl i or two = Coffee Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.

Very good yield potential
1st rains (to 2nd r.), start norm. begin. of March: Late mat. maize H 7801, H 612–614 (~80 %, higher places, Mch.–S.); cabbages, kales
Whole year, best planting time March: Castor

Good yield potential
1st rains: Maize H 622, 632 (70–80 %, lower places, Mch.–Au.), finger millet; m. mat. beans (lower places)[6]; sweet potatoes (lower places); late mat. sunflower like Kenya White (May–O.), m. mat. soya beans; onions, spinach, tomatoes

2nd rains, start indistinctly b. of Aug.: E. mat. beans (~ 60 %, S.–D.), onions (on light soils)
Whole year: Macadamia nuts, passion fruit , avocadoes, mountain pawpaws, guavas, bananas (in valleys)

Fair yield potential
1st rains: Pigeon peas (lower places); potatoes and sweet potatoes in higher places
2nd rains: M. mat. maize H 511–513 (50–60 %), 622, 632 (~ 50 %); potatoes, sweet potatoes; tomatoes
Whole year: Arabica coffee[4], bananas (outside valleys), citrus, taro (in valleys), yams, pineapples (lower places)

Pasture and forage
0.6–1 ha/LU on sec. pasture, dairy cows about 0.5 ha/LU on art. pasture of Rhodes grass; down to 0.15 ha/LU feeding Napier and Bana grass; Desmodium uncinatum best fodder legume (for rotation)

UM 3 = *Marginal Coffee Zone*

UM 3 vl/l i or two = *Marginal Coffee Zone with a very long to long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.*

Small and transitional, potential 1st rains nearly like UM 2 less about 10 % and prefering maize H 612. Second rains start indistinctly around July with fair chances for m. mat. maize like H 511–12. Marginal for coffee, also on good soils. No very good yield potential

UM 4 = *Sunflower-Maize Zone*

UM 4 l/vl or two = *Sunflower-Maize Zone with a long to very long cropping season, dividable in two variable cropping seasons*

Good yield potential
1st rains, start norm. around end of March (to 2nd rains): Late mat. maize like H 612–614; e. mat.beans (~ 60 %)[6], soya beans (below 1 800 m); sweet potatoes (~ 60 %); late mat. sunflower like Kenya White; cabbages, kales, spinach
2nd rains, start norm. b. of July: M. mat. sunflower like Comet
Whole year: Sisal, castor

Fair yield potenial
1st rains: Finger millet, cold tol. sorghum (50–60 %); tomatoes, e. mat. onions (on light soils)
2nd rains: M. or late mat. beans (50–60 %), sweet potatoes, potatoes; late mat. onions (50–60 % on light soils)
Whole year: Avocadoes[7], citrus[7], pineapples

Pasture and forage
About 1.2 ha/LU on nat. pasture of Hyparrhenia savanna, ~ 0.6 ha/LU on art. pasture of Rhodes grass; down to 0.2 ha/LU feeding Napier or better Bana grass and Desmodium; suitable for grade cattle and dairy cows (silage or hay for dry season profitable)

LM = *LOWER MIDLAND ZONES*

LM 1 = *Sugar Cane Zone*

Very small, potential see Kakamega District

LM 2 = *Marginal Sugar Cane Zone*

LM 2 l/m ⌐ (m/s) = *Marginal Sugar Cane Zone with a long to medium cropping season followed by a (weak) medium to short one*

Very good yield potential
1st rains, start norm. end of Febr.: M. mat. sorghum; sweet potatoes; m. mat. soya beans, e. mat. sunflower like 252 or Hybrid S 345; sweet pepper, chillies, pumpkins

Good yield potential
1st rains: M. mat. maize like H 511–513 and 622 (~ 60 %), late mat. sorghum, finger millet; beans, pigeon peas, late mat. groundnuts (rosette resistant); late mat. soya beans, roselle; egg plants, tomatoes, onions
2nd rains, start indistinctly towards end of Aug.: Green grams (up to 1 250 m); e. mat. sunflower (~ 60 %)

Whole year, best planting time end of F.: Cassava, pawpaws (70–80 %), bananas (~ 60 % on deep soils), yam beans (best near rivers)

Fair yield potential

1st rains: Rice in mbugas; cowpeas; tobacco, cotton (50–60 %, low quality, danger of rain in open bolls); cabbages, kales, egg plants

2nd rains: M. mat. sorghum (50–60 %), m. mat. maize (40–50 %); beans (higher places), cowpeas (lower places), bambarra groundnuts (light soils); sweet potatoes (~ 40 %); cotton (July–F., relayplanted in maize of first rains)

Whole year: Sugar cane, pineapples, sisal, citrus (low quality), mangoes (endangered by fungus diseases)

Pasture and forage

0.6–1.2 ha/LU on sec. high grass savanna; down to 0.15 ha/LU feeding Napier or Bana grass, maize stalks, Banana leaves, and fodder legumes

1) Spraying against fungus diseases important

2) Wheat or maize mainly depending on farm scale

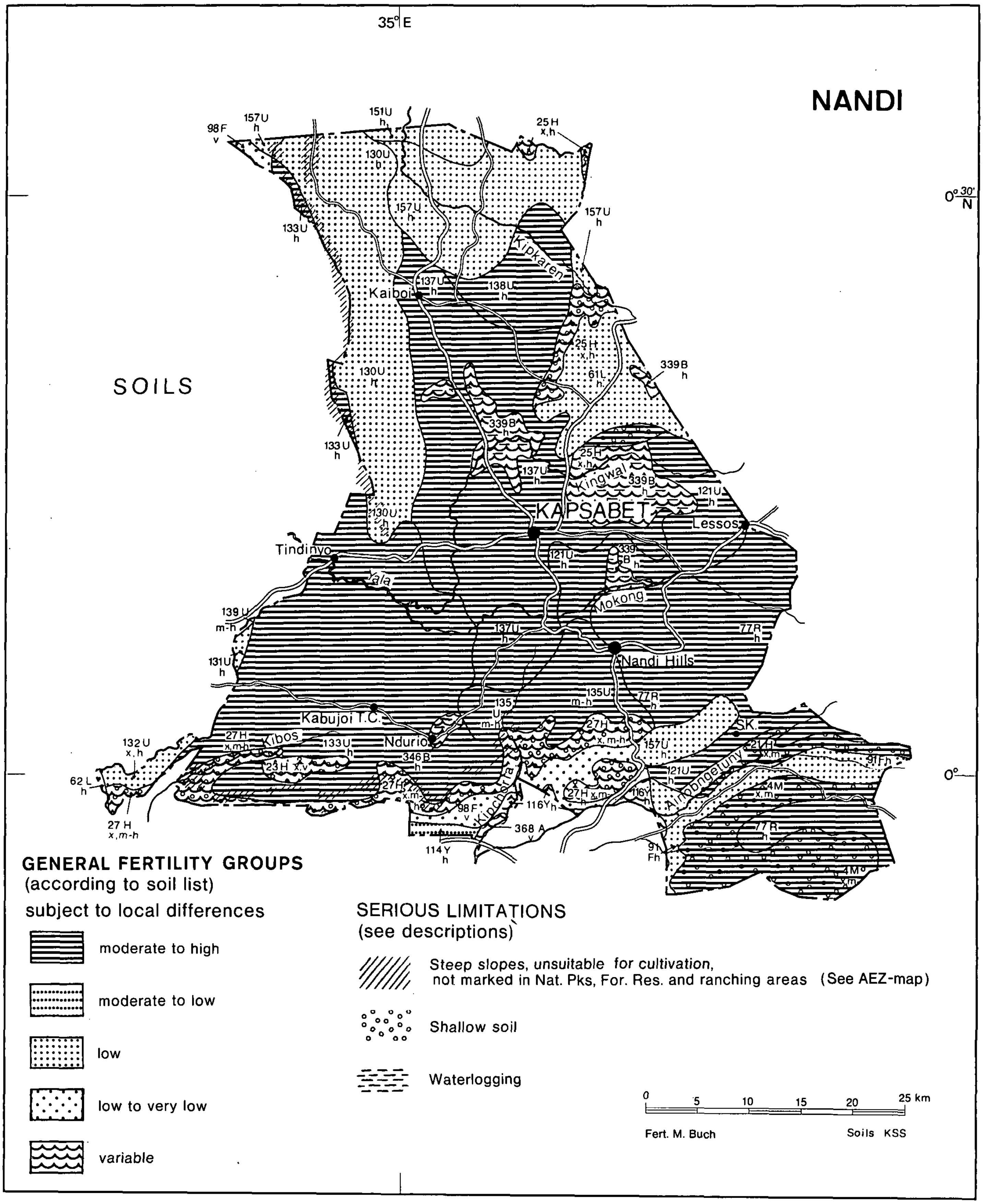
3) The bad tufted grasses Eleusine jaegeri and Pennisetum schimperi are expanding if the areas are overgrazed. They may be controlled by fire.

4) Maize in most parts better suited to local ecological and social conditions than wheat

5) Coffee yields are low because of unsuitable soils, diseases (too wet), and less flowering because of undistinct rainfall distribution

6) Sometimes rotting because of too wet conditions

7) With add. irrigation (D.–F.) well growing


NANDI
SOILS
35° E
0° 30' N
0°
KAPSABET
Kaiboi
Tindinyo
Lessos
Nandi Hills
Kabujoi T.C.
Nduric
SK.
Kipkaren
Kingwal
Yala
Mokong
Kibos
Kipchoria
Ainopngetuny
98 F v
157 U h
151 U h
130 U h
25 H x,h
157 U h
133 U h
137 U h
138 U h
25 H x,h
61 L h
339 B h
130 U h
339 B h
133 U h
137 U h
25 H x,h
339 B h
121 U h
130 U h
121 U h
339 B h
139 U m-h
137 U h
77 R h
131 U h
135 U m-h
77 R h
135 U m-H
27 H x,m-h
157 U
27 H x,m-h
133 U h
346 B h
132 U x, h
23 H x,v
21 H x,m
91 Fh
62 L h
27 H x,m-h
121 U h
27 H x,m
116 Y h
4 M x,m
98 F v
116 Y h
27 H x,m-h
368 A v
77 R h
114 Y h
91 Fh
4 M x,m
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
moderate to high
moderate to low
low
low to very low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation,
not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Waterlogging
0 5 10 15 20 25 km
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The physiography of the major part of the district may be described as an undulating upland underlain by basalts and biotite gneisses. In the northwestern corner, the boundary is formed by the Nandi Escarpment, which also determines the destrict along its southern side. The greatest topographical differences occur in the extreme southeastern part of the area.

On the mountains, soils are relatively rich in organic matter (soil unit 4 M). On the hills, similar soils occur (units 20 H, 21 H), and soils with little profile development with a variable or moderate to high fertility also occur on the hills and minor scarps (23 H, 25 H, 27 H). On areas associated with the scarps and the mountains, the footridges carry soils with a topsoil of humic material, of moderate to high fertility (77 R).

On the flat area around Miti the soils are generally underlain by murram between 50–80 cm (unit 61 L). Similar but deeper soils occur on sloping positions on the footslopes (91 F, 98 F).

Similar soils are also found on the majority of the upland (137 U). They are of moderate to high fertility. Similar soils but with a higher humus content (133 U) occur on this upland too, west and southwest from Kapsabet. In addition soils of unit 130 U are found, but they have a moderately low natural fertility. The lower, middle-level upland in the northeastern part of the district is occupied by soils of low fertility (151 U, 157 U) which overlie murram or ironstone.

Within unit 137 U, depressional areas without visible drainage outlet are found. The soils in these areas are dark in colour (unit 339 B). Smaller areas of bottomlands are found within unit 133 U. The soils are developed on infill mainly from different Basement System rocks (346 B).

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

4 M = well drained, shallow to moderately deep, dark reddish brown, friable, humic rocky and stony clay loam (nito-humic CAMBI-
x, m[1] = SOLS, rocky phase)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on basic igneous rocks (serpentinites, basalts, nepheline phonolites; older basic tuffs included)

20 H somewhat excessively drained, shallow to moderately deep, dark reddish brown, friable, gravelly clay, with acid humic topsoil
x, m (humic CAMBISOLS, partly paralithic phase)

21 H = well drained, shallow, dark reddish brown, friable, rocky and stony clay loam (nito-chromic CAMBISOLS, lithic phase; with
x, m Rock Outcrops)

Soils developed on granites

23 H = complex of somewhat excessively drained, shallow, stony and rocky soils of varying colour, consistence and texture (dystric
x, v REGOSOLS; with ferralic CAMBISOLS, lithic phase and Rock Outcrops)

Soils developed on various parent materials (mixed igneous and metamorphic rocks)

25 H = well drained, shallow, reddish brown, friable, rocky and stony, sandy clay to clay (chromic CAMBISOLS, lithic phase: with
x, h eutric REGOSOLS, LITHOSOLS and Rock Outcrops)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

27 H = complex of excessively drained to well drained, shallow, dark red to brown, friable sandy clay loam to clay; in many places
x, m – h rocky, bouldery and stony and in places with acid humic topsoil (dystric REGOSOLS; with LITHOSOLS, humic CAMBISOLS lithic phase and Rock Outcrops)

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on intermediate igneous rocks (syenites, trachytes, phonolites, etc.)

61 L = well drained, moderately deep to deep, dark red, friable clay, over petroplinthite; with inclusions of small bottomlands of
h unit 339 B (rhodic FERRALSOLS, petroferric phase)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included

77 R = well drained, extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil (humic NITOSOLS)
h

SOILS ON FOOTSLOPES

Soils developed on colluvium from basic igneous rocks (serpentinites, basalts, etc.)

91 F = well drained, deep to very deep, dusky red to dark reddish brown, friable clay, often with humic topsoil (nitorhodic FERRAL-
h SOLS, with verti-mollic NITOSOLS)

Soils developed on colluvium from undifferentiated Basement System rocks

98 F = complex of well drained, deep to very deep, dark reddish brown to dark yellowish brown soils of varying consistence and
x, v texture (ferralic ARENOSOLS; with ferralo-chromic orthic LUVISOLS)

SOILS ON PIEDMONT PLAINS

Soils developed on alluvium from undifferentiated Basement System rocks

116 Y h = complex of moderately well drained to poorly drained, very deep, dark brown to dark grey, firm to very firm, sandy clay to clay, in places stratified, sodic and/or cracking (PLANOSOLS, GLEYSOLS, SOLONETZ, VERTISOLS and FLUVISOLS)

SOILS ON UPPER MIDDLE-LEVEL UPLANDS

Soils developed on Tertiary or older basic igneous rocks (basalts, nepheline phonolites, etc.; basic tuffs included)

121 U h = well drained, extremely deep, dark reddish brown, friable clay, with humic topsoil (mollic NITOSOLS)

Soils developed on undifferentiated Basement System rocks

130 U h = well drained, deep, red to yellowish red, friable sandy clay (ferralo-chromic ACRISOLS)

Soils developed on granites

131 U h = well drained, very deep, dark red, friable sandy clay to clay, with acid humic topsoil (humic ACRISOLS)

132 U x, h = like 131 U, but rocky (humic ACRISOLS, rocky phase)

133 U h = well drained, deep, yellowish red to brown, friable clay loam, with acid humic topsoil (humic CAMBISOLS; with humic ACRISOLS)

Soils developed on quartzites

135 U m – h = well drained, very deep, reddish brown to brown, friable, sandy clay loam to clay, with very thick acid humic topsoil (humic CAMBISOLS)

Soils developed on biotite gneisses

137 U h = well drained, extremely deep, dark reddish brown, friable clay, with thick acid humic topsoil (humic NITOSOLS)

Soils developed on hornblende gneisses

138 U h = well drained, extremely deep, dark reddish brown, friable clay, with thick humic topsoil (mollic NITOSOLS)

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on granites

151 U h = well drained, deep to very deep, brown to dark brown, friable, sandy clay to clay (ferralo-orthic ACRISOLS)

Soils developed on biotite gneisses

157 U = well drained, deep, red, friable clay (rhodic FERRALSOLS; with ferralo-chromic ACRISOLS)

SOILS ON BOTTOMLANDS

Soils developed on infill from intermediate igneous rocks (phonolites)

339 B h = poorly drained, moderately deep, dark grey to grey, mottled, firm clay, with humic topsoil; in many places over petroplinthite (mollic GLEYSOLS, partly petro-ferric phase)

Soils developed on infill mainly from undifferentiated Basement System rocks

346 B h = complex of imperfectly drained to very poorly drained, very deep, very dark grey to dark greyish brown, mottled, firm clay; in places peaty or with acid humic topsoil (dystric GLEYSOLS; with eutric PLANOSOLS and some dystric HISTOSOLS)

SOILS ON FLOODPLAINS

Soils developed on sediments from various sources (recent floodplains)

368 A v = complex of well drained to imperfectly drained, very deep, dark greyish brown to dark reddish brown, stratified soils of varying consistence and texture (eutric FLUVISOLS)

1) Soil texture-classes

- h = heavy
- l = light
- m = medium
- x = stony or bouldery
- v = varying texture
- m–h = medium to heavy
- m,h = medium and heavy (e. g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-climatic Zone Map of Kenya, Scale 1:1 000 000. Expl. Soil Survey Rep. E1, Nairobi 1982. See this map also for colours; symbols simplified here. Distribution and fertility remarks of all districts except Samburu modified from Siderius, W.: Simplified Soil Maps of some Districts in Kenya. KSS, Misc. Soil Paper M 19, 2nd impr. Nairobi 1979

POPULATION AND LAND

According to the results of the Census in September 1979, nearly 300 000 people were registered in the Nandi District (Table 4). Of this figure, only 1% lived in the township, Kapsabet, i.e. the majority depend on agriculture, although only 192 600 ha of agricultural land is available (Table 6). Thus, an average household of 5.20 people had not more than 3.39 ha and only 0.65 ha were available per person (Table 6). This is not much, but is still sufficient to do fairly well on a small farm. Regarding the population growth, it must be remembered that it will be impossible in the future to keep this level without efforts in intensification of agriculture as a whole.

Taking into account that by 1979 even more restrictive conditions existed – in Kapkangani location only 1.62 ha were available per household and 0.29 ha per person – the above statement becomes even more obvious. Some areas suitable for wheat (LH 3) still have more than 5 ha per household. Here some degree of mechanisation would help to produce a saleable surplus.

NANDI DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Nandi Hills	38 663	31 911	70 574	15 800	631	111
Kilibwani	14 663	14 680	29 343	5 701	223	131
Tinderet Division	53 326	46 591	99 917	21 501	855	116
Kaptumo	11 601	11 344	22 945	3 829	204	112
Chemundu	17 625	17 871	35 496	6 588	230	153
Kapkangani	14 253	14 487	28 740	5 057	104	274
Kemeloi	20 895	21 543	42 438	7 793	241	175
Aldai Division	64 374	65 245	129 619	23 267	781	165
Kosirai	6 552	6 759	13 311	2 371	143	92
Sangalo	11 588	11 928	23 516	4 632	220	106
Mosop Division	18 140	18 687	36 827	7 003	363	101
Kabiyet	16 156	16 800	32 956	5 750	343	96
Kabiyet Division	16 156	16 800	32 956	5 750	343	96
Nandi District	151 996	147 323	299 319	57 521	2 745	109

NANDI DISTRICT

TABLE 5: COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Nandi Hills	15755	2.68	0.88	0.46	0.46	4.47
Kilibwani	5680	2.94	1.28	0.74	0.20	5.16
Division Tinderet	21435	2.76	0.97	0.54	0.39	4.65
Location:						
Kaptumo	3881	3.22	1.45	0.79	0.46	5.91
Chemundu	6576	2.96	1.31	0.77	0.29	5.33
Kapkangani	5050	3.02	1.58	0.90	0.19	5.69
Kemeloi	7778	3.02	1.41	0.73	0.29	5.45
Division Aldai	23285	3.03	1.43	0.79	0.30	5.55
Location:						
Kosirai	2375	2.91	1.28	1.04	0.37	5.60
Sangalo	4614	2.79	1.22	1.20	0.32	5.09
Division Mosop	6989	2.82	1.25	0.86	0.33	5.26
Location:						
Kabiyet	5743	3.01	1.40	0.94	0.39	5.73
Division Kabiyet	5743	3.01	1.40	0.94	0.39	5.73
DISTRICT: NANDI	57452	2.91	1.22	0.72	0.34	5.20

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, includes one and two persons per household as well.

NANDI DISTRICT

TABLE 6: **AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON**

	in '00 ha = sqkm					in '00 ha = sqkm										in ha	
Location/Division without townships	Area total Census 79	Non-agricultural land: Unsuit. steep slopes	Forest Res., lakes, swamps	Others (roads, home-steads, rivers...)	Agri-cultural land	Area in agro-ecological zones AEZ: UH 1	LH 1	LH 2	LH 3	UM 1	UM2	UM 2–3	UM 4	LM 1	LM 2	Agric. land per house-hold	person
Nandi Hills	631	5		90	536	36	183	91		33	36	65			92	3,39	0,76
Kilibwani	223			33	190	1		28	161							3,33	0,65
Tinderet Division	854	5		123	726	37	183	119	161	33	36	65			92	3,36	0,71
Kaptumo	204	16	sw. 13	20	168		21			68	21			1	57	4,39	0,73
Chemundo	230		F. 9	35	173		29	64	69	11						2,63	0,49
Kapkangani	104	3		19	82		16			49		17				1,62	0,29
Kemeloi	241	38		36	167					153				11	3	2,39	0,44
Aldai Division	779	57	22	110	590		66	64	69	281	21	17		12	60	2,65	0,48
Kosirai	143		sw. 2	14	129			3	126							5,44	0,97
Sangalo	220	15	F. 4	26	173		39	43	41			11	39			3,73	0,74
Mosop Division	363	15	6	40	302		39	46	167			11	39			4,59	0,86
Kabiyet	343		sw. 1	34	308				80				228			5,36	0,93
Kabiyet Division	343		sw. 1	34	308				80				228			5,36	0,93
Total rural area	2 339	87	29	307	1 926	37	288	229	477	314	57	93	267	12	152	3,39	0,65

TABLE 7: LAND SITES IN FORMER SCHEDULED AREAS[1)]

Cadastral Sheet No	Land Reference No	Area in ha
102/IV	1898/R	121.72
	1898/1	9.61
	1890	132.30
	1891	136.40
	1897/2	136.40
	1897/1	10.73
	1896	131.50
	1899	142.50
	1892	124.90
	1895	141.20
	1894	135.98
	1893	132.70
	1763/1	19.80
	1763/R	113.94
	1762	133.96
Total		1,623.64
103/III	9353	485.64
	9399/R	3,656.46
	10214/3	8.09
	10214/4	21.65
	10214/5	14.13
	10214/2	21.65
	9282	514.17
	9399/5	449.90
	9245/2	170.78
	9285	202.35
	9286	271.55
	11187	276.41
	7041/1	25.51
	7041/2	35.23
	9401/2	186.16
	9401/1	152.57
	6053	178.06
	5423/2	433.02
	6065	141.64
	11141/2	407.50
	11141/1	9.10
	1481/4/3	16.69
	7949/2/2	72.70
	1481/7	217.70
	13048	8.55
	11607	459.33
	10779/1	457.71
	10779/4	501.50
	6078/R	315.26
103/III (contd.)	6047	838.13
	1475/4	631.73
	9457/1	221.20
	9457/2	82.34
	1475/1	221.20
	6082	29.54
	12107	1,139.00
	6075	390.13
	10344	201.74
	6044/3	163.29
	6044/4/R	115.33
	10235	410.36
	6061/2	124.50
	6061/1	269.20
	12338	5.63
	10236/1	214.89
	13158	401.30
	5401/2	251.40
	10214/R	247.06
	5413/2	143.18
	4075	143.18
	7057	573.45
	10263	400.24
	6074/3	293.20
	12357	99.22
	10264/1	775.40
	10264/2	161.90
	1468	1,465.01
	6076	362.20
	5483	157.59
	1467/9	1,096.73
	5408	408.74
	10703	468.64
	1472/1/R	283.69
	5419	201.54
	5488/R	573.17
	4836	280.05
	7697	1,044.53
	10813	494.94
	6010	212.46
	7698	651.94
	1475/3	726.03
	1462/2	894.79
	10815	625.04
	10814	695.67
	1482/1	455.89
	1482/2	3,414.17
	11770/R	1,361.12
103/III	1480/2/1	8.10
	1480/3	58.27
	1480/2/R	95.51
	6085/6	12.22
	6085/7	97.53
	6085/5/1	101.20
	10105	543.10
	6085/5/1	101.20
	8000	583.98
	9354	983.01
	1458/2	1,380.43
	9343	101.98
	7324/1	605.02
	7324/4	568.60
	7324/3	333.87
	1459/1/R	885.88
	1459/2	426.14
	1459/4	200.73
	1459/3	200.93
	8821	1,187.39
	10935	404.29
	6084/1	163.69
	6084/23	419.67
	6084/25	184.94
	6084/16	481.18
	7299/1	105.22
	7299/R	695.27
	7300	783.49
	10816	624.04
	6078/R	315.26
	10779/3	80.00
	6085/5/R	190.18
	1475/1	214.49
Total		46,936.01
117/I	1457/8	40.47
	8478	56.25
	10763	1,238.38
	6011	5.89
	5500	430.19
	1625	60.70
	3107	61.51
	3108	62.32
	6015/3	549.98
	1628	633.35
	6058	3.83
117/I (contd.)	6052/3	172.10
	6052/1	193.30
	1454/4	964.40
Total		4,472.67
117/2	7403	358.95
	1455	1,724.83
	1454/3	717.12
	7313/1	851.89
	10817/1	439.20
	10817/2	307.00
	10816	624.04
	7300	783.49
	7299/2	694.05
	7299/1	105.22
	6084/25	184.94
	6084/26	335.90
	6084/16	481.13
	6084/23	419.67
	11490	1,573.87
	6084/21	114.73
	5499	202.14
	8821	1,187.39
	10935	404.29
Total		11,509.92
TOTAL DISTRICT		64,542.24

1) Compiled for Agricultural Extension and Planning work only; not to be used in any legal affairs.

Source: Survey of Kenya, December 1980

AGRICULTURAL STATISTICS[1)]

There are a number of large tea estates in the Nandi district cultivating approximately 7 500 ha of tea yielding roughly 8 000 kg of green leaves. Family farmers possess roughly 1 500 ha of tea (0.50 ha per farm) and harvest about 1 300 kg of green leaves per ha/p.a. The high **pyrethrin** content (1.5% to 1.6%) of the pyrethrum grown reflects the potential for expansion of this crop. However, the good farm size and the special interest of the farmers in cattle enterprises makes the expansion and/or introduction of labour intensive enterprises unlikely and unnecessary in the near future.

1) For more detailed and up to date information, see FMHB Vol. III/A

NANDI DISTRICT

TABLE 8a: TEA

Area – Production – Growers – Yields – Returns[a)]

Small Farmers

Division	Item	Unit	Year				
			1975/76	1976/77	1977/78	1978/79	1979/80
Central	Area	ha	335	342	348	360	368
	Production	t	197	296	453	477	407
	Value	'000 Shs	258	913	937	1,325	101
	Growers	No	1,049	1,072	1,078	1,098	1,108
	Yield per ha	kg	588	865	1,301	1,325	1,106
	Value per ha	Shs	770	2,670	2,693	3,681	274
	Area per Grower	ha	0.32	0.32	0.32	0.32	0.33
	Returns per Grower	Shs	246	852	869	1,207	91
East	Area	ha	352	361	365	381	397
	Production	t	276	315	599	574	424
	Value	'000 Shs	361	917	1,240	1,597	1,047
	Growers	No	1,196	1,223	1,227	1,252	1,286
	Yield per ha	kg	784	873	1,642	1,507	1,068
	Value per ha	Shs	1,026	2,540	3,397	4,192	2,637
	Area per Grower	ha	0.29	0.30	0.30	0.30	0.31
	Returns per Grower	Shs	302	780	1,011	1,276	814
Lessos	Area	ha	183	185	187	195	197
	Production	t	184	159	337	341	241
	Value	'000 Shs	241	489	698	947	594
	Growers	No	260	267	271	273	275
	Yield per ha	kg	1,005	859	1,802	1,749	1,223
	Value per ha	Shs	1,317	2,643	3,733	4,856	3,015
	Area per Grower	ha	0.70	0.69	0.69	0.71	0.72
	Returns per Grower	Shs	927	1,831	2,576	3,469	2,160
North	Area	ha	203	216	227	240	249
	Production	t	243	272	411	400	355
	Value	'000 Shs	318	837	850	1,112	828
	Growers	No	716	754	781	798	811
	Yield per ha	kg	1,197	1,259	1,810	1,667	1,426
	Value per ha	Shs	1,567	3,875	3,744	4,633	3,325
	Area per Grower	ha	0.28	0.29	0.29	0.30	0.31
	Returns per Grower	Shs	444	1,110	1,088	1,393	1,020
South	Area	ha	252	262	266	282	294
	Production	t	237	352	437	505	4,365
	Value	'000 Shs	310	1,085	905	1,403	1,078
	Growers	No	881	911	913	32	953
	Yield per ha	kg	940	1,344	1,644	1,891	14,846
	Value per ha	Shs	1,230	4,141	3,402	4,975	3,667
	Area per Grower	ha	0.29	0.29	0.29	0.30	0.31
	Returns per Grower	Shs	352	1,191	991	1,505	1,131

a) Source: K.T.D.A.

NANDI DISTRICT

TABLE 8b: **COFFEE**
AREA – PRODUCTION – YIELDS[a)]

Estates

Name	Item	Unit	Year				
			74/75	75/76	76/77	77/78	79/80
Nandi/ Kaimosi	Area	ha	150	150	141	138	170
	Production	t	63	29	116	37	32
	Yield	kg/ha	420	193	823	268	188

TABLE 8c: **PYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[b)]

Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	5.16	3.6	2.7	4.4	3.1
Pyrethrin content %	1.5	1.4	1.5	1.6	1.5

Sources: a) C.B.K.
b) Pyrethrum Board

SMALL FARM SURVEY (SFS)[1)]

The farm sizes were 11.5 ha (LH 1) and 5.4 ha (UM 1), and approximately one-fifth of the farm land in both areas was planted with annual crops.[2)] The UM 1 farms have 15% of their land under perennial crops. The larger (LH 1) farms had 70% of their farm land under natural pasture, while in smaller UM 1 farms the land under pasture was 60% of the farm area. The stocking rates were 1.7 LU/ha (LH 1) and 2.0 LU/ha respectively; between 70% and 90% of the cattle are of improved stock. In both farming regions one crop per year is planted and comparatively high amounts of fertilizer are used in LH 1 farms (table 8 & 9). Maize and maize interplanted with beans are planted on 90% of the annual crop area; all other crops are unimportant, apart from tea in LH 1 and sugar cane in UM 1 (table 10). Between 8–13% of the grazing livestock are goats and sheep, while 20% of the total cattle population is male (table 11). The comparatively high maize yields indicate that the farmers are well informed about production techniques; the large amounts of fertilizer applied to tea and high tea yields do not reflect the district average which is 1 500 kg/ha of green leaves only (table 12).

The LH 1 farmer sells roughly 60% of the food crop harvested to the marketing board, which suggests that this region exports, while in the smaller UM 1 area the food crop harvested is probably completely consumed within that region (table 13). The distribution of farm activities shows that the farmers practise commercial maize production – most of them using tractors for field preparation – but it also shows that maize requires nearly 12 months from planting till harvesting (graph 14). Very few research results are available for assessing the yield levels and the soils of the district are of varying fertility. However, with the use of fertilizer and improved husbandry, high yields from natural pasture, tea, potatoes and, to a lesser extent, for maize, can be achieved (table 15).

The Nandi district is mainly a food-producing region and output increase requires the improvement of labour productivity through mechanisation of farm work. Most farmers are well informed as to the positive effects of fertilizers, etc., and will use them if economic.

1) For more detailed and up to date information, see FMHB Vol. III/B

2) For holding sizes, see also table 6

SMALL FARM SURVEY AREAS (1977)

NANDI

and

AGRO-ECOLOGICAL ZONES

+ SOILS

Forest Reserve

Unsuitable steep slopes (only marked outside Nat. Park or Forest Res.)

15 National Number of Survey Area

Survey Area. sample size 30 per number

Belt of A.E. Zones — Broken zonal boundaries are uncertain or mean transitional strips

A. E. Zones

Subzones

Climatic data for AEZ formulas see table I and II

0 5 10 15 20 25 km

Min. of Agr., German Agr. Team

AEZ R. Jätzold '82

Soils KSS

TABLE 9a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Item	Unit	Farm Size & Land Use / Livestock on Farm / Farm Size Group: small	medium	large
Farm Size Total	ha	4.4	10.4	22.3
Land Use: Annual Crops 1) First Season				
Maize	ha	1.0	1.7	3.4
Maize & Beans	ha	0.1	0.2	0.5
Beans	ha	-	0.1	-
Fingermillet	ha			
	ha			
Total	ha	1.1	2.0	3.9
Second Season 1)				
	ha			
	ha			
	ha			
	ha			
Permanent Crops 1)				
Tea	ha	0.1	0.3	0.4
	ha			
	ha			
	ha			
Portion of total	%	2 %	3 %	1 %
Grazing & Forage	ha	2.9	7.2	16.9
portion of total	%	66 %	69 %	74 %
Other Land Use	ha	0.3	0.9	1.7
Livestock on Farm:				
Cattle: local	LU	0.2	0.4	2.3
improved	LU	9.8	8.7	20.4
Sheep & Goats	LU	0.5	0.5	2.7
Total	LU	10.5	9.6	25.4

Item	Unit	Intensity, Labour/Persons on Farm / Home Consumption / Farm Size Group: small	medium	large
Farming Intensity:				
Cropping Intensity	-	0.3	0.2	0.2
Portion of improved cattle kept	%	98 %	96 %	90 %
Portion of Farmers owning a Plough	%	60 %	60 %	30 %
Labour on Farm:				
Family Adults	persons	2.6	2.2	3.4
Perm. Hired Labour	"	0.1	0.4	0.6
Children > 14 years	"	1.3	1.5	2.4
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.38	0.45	2.83
Children < 14 years	"	2.49	-	2.49
Subsistence Units	SU	3.87	0.45	4.32
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1289	2078	
Beans	kg	86	137	
Fingermillet	kg	10	16	
Cooking Bananas	kg	10	4	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Bananas, Citrus Fruit

1) Major crops only considered

2) Based on 1979 Census figures

NANDI DISTRICT

AEZ: UM 1 – LM 2

TABLE 9b: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 16

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	2.o	4.1	9.5
Land Use: Annual Crops[1] First Season				
Maize	ha	o.3	o.4	o.5
Maize & Beans	ha	o.4	o.3	1.8
Beans	ha	-	-	o.1
Cabbage	ha	-	-	o.1
	ha			
Total	ha	o.7	o.7	2.5
Second Season[1]				
English Potatoes	ha	o.1	-	-
Beans	ha	-	o.2	o.1
Cabbage	ha	-	-	-
Total	ha	o.1	o.2	o.1
Permanent Crops[1]				
Sugarcane	ha	o.2	o.3	o.5
Tea	ha	-	o.2	o.2
Coffee	ha	-	-	o.1
	ha			
Portion of total	%	1o %	12 %	8 %
Grazing & Forage	ha	o.9	2.7	5.5
portion of total	%	45 %	5 %	58 %
Other Land Use	ha	o.2	o.2	1.2
Livestock on Farm:				
Cattle: local	LU	1.3	1.4	2.8
improved	LU	2.6	4.o	8.o
Sheep & Goats	LU	o.2	o.4	o.9
Total	LU	4.1	5.8	11.7

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.5	o.3	o.3
Portion of improved cattle kept	%	67 %	74 %	74 %
Portion of Farmers owning a Plough	%	3o %	4o %	8o %
Labour on Farm:				
Family Adults	persons	2.4	3.3	2.5
Perm. Hired Labour	"	-	-	o.7
Children > 14 years	"	1.6	o.3	2.5
Persons living on Farm[2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.44	o.3	2.74
Children < 14 years	"	3.o9	-	3.o9
Subsistence Units	SU	4.29	o.3	4.59
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1283	2o68	
Beans	kg	198	315	
English Potatoes	kg	24	8	
Sweet Potatoes	kg	17	1o	
Cabbage	kg	83	8	
	kg			
	kg			
	kg			

Other Crops cultivated: Sweet Potatoes, Bananas

1) Major crops only considered

2) Based on 1979 Census figures

NANDI DISTRICT

TABLE 10a: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: LH 1–3 + UM 4

Survey Area 15

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children >14 No.
Avg. 0	11.5	30.1	1.1	2.6	0.4	1.7
Avg. 1	11.5	31.1	1.8	2.7	1.4	2.4
Up. Qu.	13.6	35.0	2.0	3.0	1.0	3.0
Lo. Qu.	5.6	15.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	2.2	20	0.2	2	7.9	71	0.3	2	0.2	2	0.3	3
Avg. 1	2.2	16	0.7	5	7.9	58	1.2	9	1.5	11	0.3	3
Up. Qu.	3.0	29	0.2	4	10.0	78	-	-	-	-	0.4	5
Lo. Qu.	1.2	13	-	-	3.8	58	-	-	-	-	0.1	1
Total	65.4		7.2		237.6		8.2		5.8		10.0	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.9	1.2	1.7	86.6
Avg. 1			1.7	86.6
Up. Qu.	1.0	1.4	2.4	97.6
Lo. Qu.	1.0	0.8	1.1	83.6

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P2O5		K2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	88.8	7.1	1.0	16.8	0.5	-	-	-	-	0.2	-	-	-
Avg. 1	88.8	14.2	2.8	19.3	6.4	-	-	-	-	0.5	-	-	-
Up. Qu.	100.0	5.7	1.4	27.5	-	-	-	-	-	0.3	-	-	-
Lo. Qu.	100.0	-	-	6.7	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

NANDI DISTRICT

TABLE 10b: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: UM 1 – LM 2

Survey Area 16

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children >14 No.
Avg. 0	5.4	16.2	1.0	2.7	0.3	1.6
Avg. 1	5.4	16.2	1.7	2.7	2.0	2.9
Up. Qu.	7.1	22.0	1.0	3.0	-	3.0
Lo. Qu.	2.6	7.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	1.2	22	0.5	10	3.1	58	-	-	0.2	4	0.3	5
Avg. 1	1.2	18	1.0	15	3.3	50	0.2	2	0.7	11	0.3	4
Up. Qu.	1.2	32	0.7	20	3.2	70	-	-	0.2	5	0.2	6
Lo. Qu.	0.6	13	-	-	1.0	39	-	-	-	-	0.1	1
Total	35.6		15.9		93.0		0.3		5.8		8.4	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.9	1.4	2.4	68.1
Avg. 1			2.0	88.4
Up. Qu.	1.0	2.3	3.8	98.3
Lo. Qu.	1.0	0.9	1.2	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P2O5		K2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	56.4	0.4	1.5	6.4	0.9	-	0.1	-	-	0.1	-	-	-
Avg. 1	56.6	5.5	7.8	13.5	5.9	-	0.7	0.1	0.1	0.6	0.1	-	0.1
Up. Qu.	100.0	-	-	3.7	-	-	-	-	-	-	-	-	-
Lo. Qu.	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

NANDI DISTRICT

TABLE 11a: **CROPPING PATTERN**

AEZ: LH 1–3 + UM 4

Survey Area 15

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	1.9	2.0	2.80	0.80	56.3	87.5
Fingermillet	0.0	0.1	0.00	0.00	0.2	0.4
Beans	0.0	0.6	0.00	0.00	0.6	0.9
Maize & Beans	0.2	1.0	0.20	0.00	7.2	11.2
Total					64.4	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Total					0.0	0.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Sweet Bananas	0.0	0.0	0.00	0.00	0.0	0.5
Tea	0.3	0.7	0.52	0.00	8.2	99.0
Citrus	0.0	0.0	0.00	0.00	0.0	0.5
Total					8.2	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

NANDI DISTRICT

TABLE 11b: **CROPPING PATTERN**

AEZ: UM 1 – LM 2

Survey Area 16

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.4	0.9	0.80	0.00	12.8	28.3
Beans	0.0	0.4	0.00	0.00	0.8	1.8
Engl. Potatoes	0.0	0.3	0.00	0.00	0.5	1.2
Cabbage	0.0	0.4	0.00	0.00	0.4	0.9
Sweet Potatoes	0.0	0.2	0.00	0.00	0.2	0.4
Sugarcane	0.3	0.8	0.52	0.00	9.6	21.2
Maize & Beans	0.7	1.2	0.80	0.00	20.9	46.3
Total					45.2	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Beans	0.1	0.4	0.00	0.00	2.4	18.5
Engl. Potatoes	0.0	0.4	0.00	0.00	0.8	6.2
Cabbage	0.0	0.2	0.00	0.00	0.2	1.5
Sugarcane	0.3	0.8	0.52	0.00	9.6	73.8
Total					13.0	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.1	0.00	0.00	0.1	1.9
Coffee	0.0	0.3	0.00	0.00	1.5	23.4
Tea	0.2	1.2	0.00	0.00	4.7	74.7
Total					6.3	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

NANDI DISTRICT

TABLE 12a: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: LH 1–3 + UM 4

Sept. '77, Survey Area 15

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	1.63	0.20	0.13	3.67				1.41			1.41
	Upper Qu.	2	-	-	6				2.0			2.0
1 - 2 years,	Average	0.43	0.23	0.37	2.07				1.55			1.55
	Upper Qu.	-	-	-	3				1.5			1.5
Over 2 years,	Average	0.50	0.33	1.10		7.23			8.78			8.78
	Upper Qu.	-	-	2		8			9.6			9.6
Subtotal(improved)	Total	77	23	48	172	217			352.2			352.2
	Average	2.57	0.77	1.60	5.73	7.23			11.74			11.74
	Upper Qu.	4	1	4	9	8			15.8			-
	Lower Qu.	-	-	-	2	4			7.0			-
LU Male Cattle =		21.8 % of total cattle,				Calves + Heifers =			79.3 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.03	-	0.10	0.30		1.93	1.40	0.42	-		0.42
	Upper Qu.	-	-	-	-		3	3	0.6	-		0.6
1 - 2 years,	Average	-	0.07	-	0.47				0.24			0.24
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	-	-	0.33		0.33	4.07	3.13	1.15	-	8.43	1.15
	Upper Qu.	-	-	-		-	4	4	-	-	2	-
Subtotal (unimp.)	Total	1	2	13	23	10	180	136	54.4	-	253	54.4
	Average	0.03	0.07	0.43	0.77	0.33	6.00	4.53	1.81	-	8.43	1.81
	Upper Qu.	-	-	-	-	-	6	7	1.8	-	13	1.8
	Lower Qu.	-	-	-	-	-	-	-	0.2	-	2	0.2
LU Male Cattle =		36.0 % of total cattle,				Calves + Heifers =			230.0 % of dairy cows			
LU Goats + Sheep =		58.1 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	78	25	61	195	227	180	136	406.6	-	253	406.6
	Average	2.60	0.83	2.03	6.50	7.57	6.00	4.53	13.55	-	8.43	13.55
	Upper Qu.	4	1	4	10	8	6	7	16.7	-	13	1.8
	Lower Qu.	-	-	-	2	4	-	-	7.0	-	2	0.2
LU Male Cattle =		22.6 % of total cattle,				Calves + Heifers =			85.9 % of dairy cows			
LU Goats + Sheep =		7.8 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 12b: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: UM 1 – LM 2

Sept. '77, Survey Area 16

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.23	0.20	-	1.23				0.42			0.42
Upper Qu.	-	-	-	2				0.5			0.5
1 - 2 years, Average	0.27	0.43	0.17	1.20				1.03			1.03
Upper Qu.	-	-	-	2				1.0			1.0
Over 2 years, Average	0.07	0.13	0.63		2.90			3.57			3.57
Upper Qu.	-	-	-		3			3.0			3.0
Subtotal(improved) Total	17	23	24	73	87			150.5			150.5
Average	0.57	0.77	0.80	2.43	2.90			5.02			5.02
Upper Qu.	1	-	1	4	3			5.0			-
Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =	24.1 % of total cattle,				Calves + Heifers =			83.9 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	0.23	-	0.03	0.57		0.93	0.70	0.33	-		0.33
Upper Qu.	-	-	-	-		1	1	0.2	-		0.2
1 - 2 years, Average	0.13	0.07	0.07	0.43				0.31			0.31
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	0.03	0.07	0.83		1.17	1.90	1.53	1.71	-	12.70	1.71
Upper Qu.	-	-	1		2	4	2	-	-	4	-
Subtotal (unimp.) Total	12	4	28	30	35	85	67	70.6	-	381	70.6
Average	0.40	0.13	0.93	1.00	1.17	2.83	2.23	2.35	-	12.70	2.35
Upper Qu.	-	-	3	1	2	5	4	3.2	-	20	3.2
Lower Qu.	-	-	-	-	-	-	-	0.1	-	4	0.1
LU Male Cattle =	42.2 % of total cattle,				Calves + Heifers =			85.7 % of dairy cows			
LU Goats + Sheep =	21.5 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	29	27	52	103	122	85	67	221.1	-	381	221.1
Average	0.97	0.90	1.73	3.43	4.07	2.83	2.23	7.37	-	12.70	7.37
Upper Qu.	1	1	3	5	4	5	4	9.0	-	20	3.2
Lower Qu.	-	-	-	-	2	-	-	3.3	-	4	0.1
LU Male Cattle =	29.0 % of total cattle,				Calves + Heifers =			84.4 % of dairy cows			
LU Goats + Sheep =	6.9 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

NANDI DISTRICT

TABLE 13a: **INPUTS AND YIELDS OF MAJOR CROPS**

AEZ: LH 1–3 + UM 4

Survey Area 15

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	100	84	135	-	-	1	-	3,296
	UpQu	100	25	110	-	-	1	-	3,690
	LoQu	100	-	25	-	-	-	-	2,700
Maize & Beans									
Maize	Avg.	100	39	108	-	-	2	-	3,979
Beans	Avg.	17	8	33	-	-	1	-	420
Maize	UpQu	100	55	115	-	-	3	-	4,500
Beans	UpQu	-	23	58	-	-	-	-	450
Maize	LoQu	100	14	60	-	-	-	-	2,700
Beans	LoQu	-	-	-	-	-	-	-	150
Second Rains									
Nil									
Perennial Crops									
Tea	Avg.	-	87	16	-	-	-	-	3,561
	UpQu	-	130	-	-	-	-	-	4,200
	LoQu	-	21	-	-	-	-	-	1,250

NANDI DISTRICT

TABLE 13b: **INPUTS AND YIELDS OF MAJOR CROPS**

AEZ: UM 1 – LM 2

Survey Area 16

Crop		Inputs							Yield
		Imp-roved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fung-icide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	93	2	82	-	0.20	1	-	2,897
	UpQu	100	-	-	-	0.23	2	-	3,375
	LoQu	100	-	-	-	-	-	-	2,250
Engl. Potatoes	Avg.	-	-	62	-	-	-	-	4,388
Maize & Beans									
Maize	Avg.	100	-	25	-	0.07	-	-	3,559
Beans	Avg.	-	3	1	-	-	-	-	429
Maize	UpQu	100	-	18	-	-	-	-	3,947
Beans	UpQu	-	-	-	-	-	-	-	563
Maize	LoQu	100	-	-	-	-	-	-	2,250
Beans	LoQu	-	-	-	-	-	-	-	300
Second Rains									
Beans	Avg.	-	-	-	-	0.06	-	-	1,016
	UpQu	-	-	-	-	-	-	-	900
	LoQu	-	-	-	-	-	-	-	450
Engl. Potatoes	Avg.	-	-	58	-	-	-	1	3,375
Cabbage	Avg.	100	-	-	-	-	-	-	58,000
Sweet Potatoes	Avg.	-	-	-	-	-	-	-	6,250
Perennial Crops									
Sugarcane	Avg.	-	3	-	-	0.06	-	-	1,558
	UpQu	-	-	-	-	-	-	-	-
	LoQu	-	-	-	-	-	-	-	-
Coffee	Avg.	-	-	-	-	0.50	1	2	2,863
	UpQu	-	-	-	-	-	-	2	5,250
	LoQu	-	-	-	-	-	-	-	625
Tea	Avg.	-	40	36	1	-	-	-	9,585
	UpQu	-	59	59	-	-	-	-	4,500
	LoQu	-	-	-	-	-	-	-	2,308

NANDI DISTRICT

TABLE 14a: DISPOSAL OF CROPS

AEZ: LH 1–3 + UM 4

Survey Area 15

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	188,280	108,810	58	11,700	6	67,770	36
Maize & Beans	27,398	14,300	52	1,120	4	11,978	44
Beans	540	360	67	0	0	180	33
Fingermillet	300	0	0	0	0	300	100
Second Rains							
Nil							
	Permanent Crops						
Sweet Bananas	600	0	0	300	50	300	50
Citrus	180	0	0	140	78	40	22

NANDI DISTRICT

TABLE 14b: DISPOSAL OF CROPS

AEZ: UM 1 – LM 2

Survey Area 16

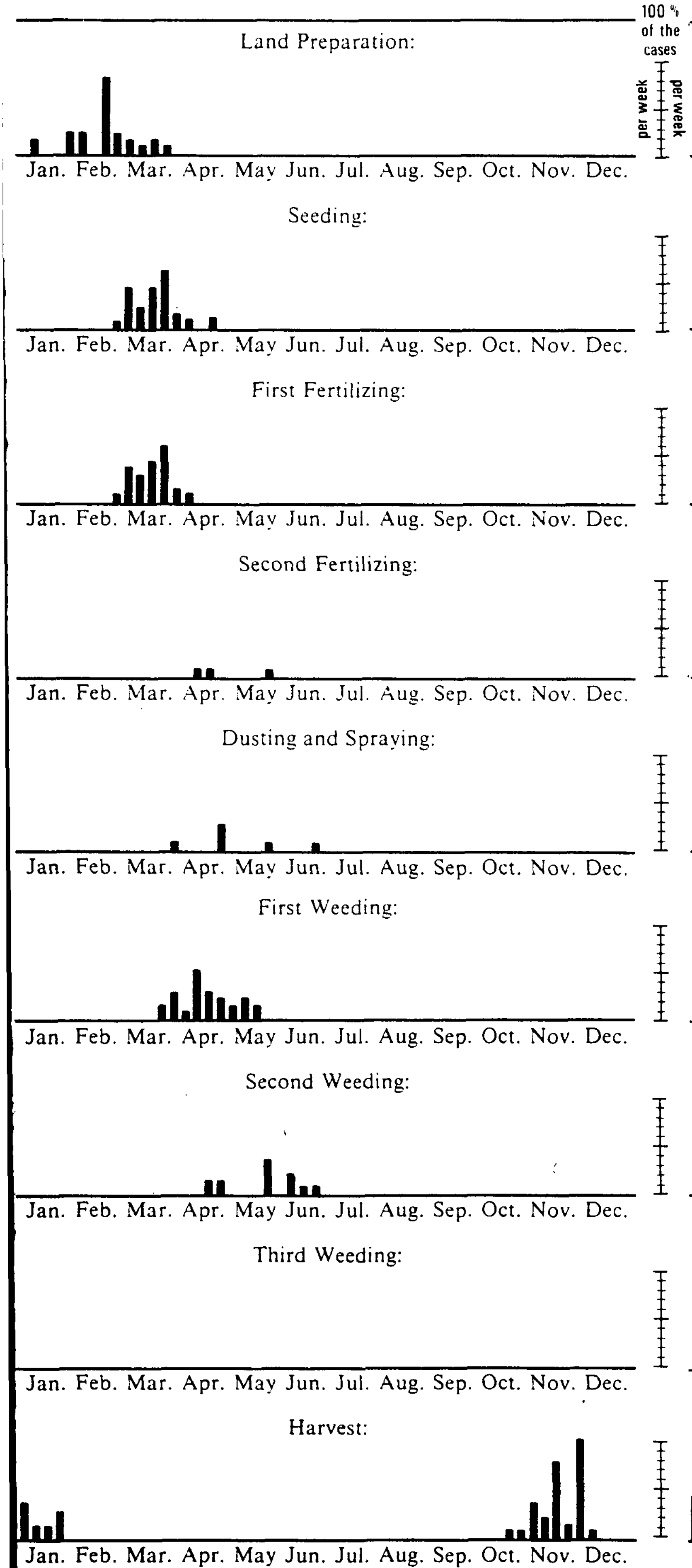
Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	36,370	0	0	8,640	24	27,730	76
Maize & Beans	85,770	5,400	6	39,385	46	40,985	48
Beans	160	0	0	120	75	40	25
Engl. Potatoes	3,510	0	0	3,100	88	410	12
Second Rains							
Beans	3,000	0	0	1,890	63	1,110	37
Engl. Potatoes	2,700	0	0	2,400	89	300	11
Sweet Potatoes	1,250	0	0	750	60	500	40
Cabbage	46,000	0	0	43,500	95	2,500	5
	Permanent Crops						
Nil							

NANDI DISTRICT

TABLE 15a: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 28

AEZ: LH 1–3 + UM 4 Survey Area 15 Sample Size: 30

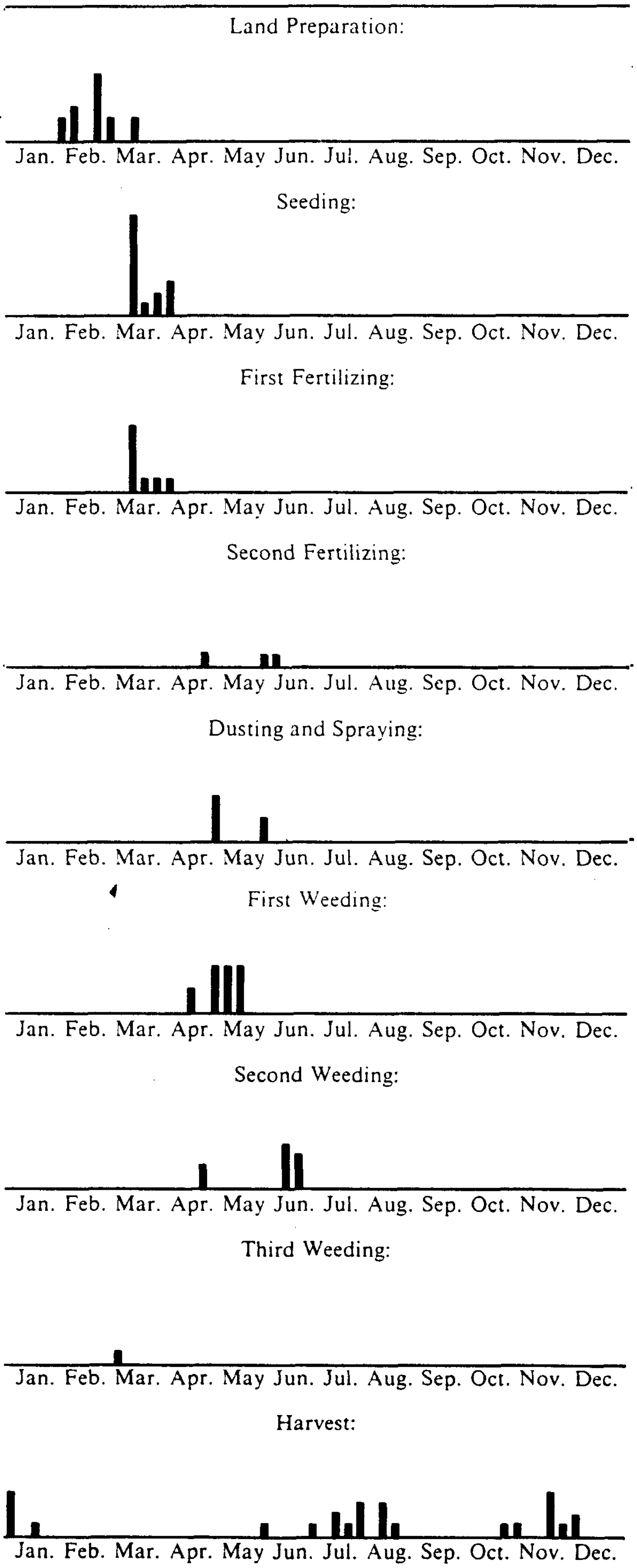


NANDI DISTRICT

TABLE 15b: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 15

AEZ: LH 1–3 + UM 4 Survey Area 15 Sample Size: 30

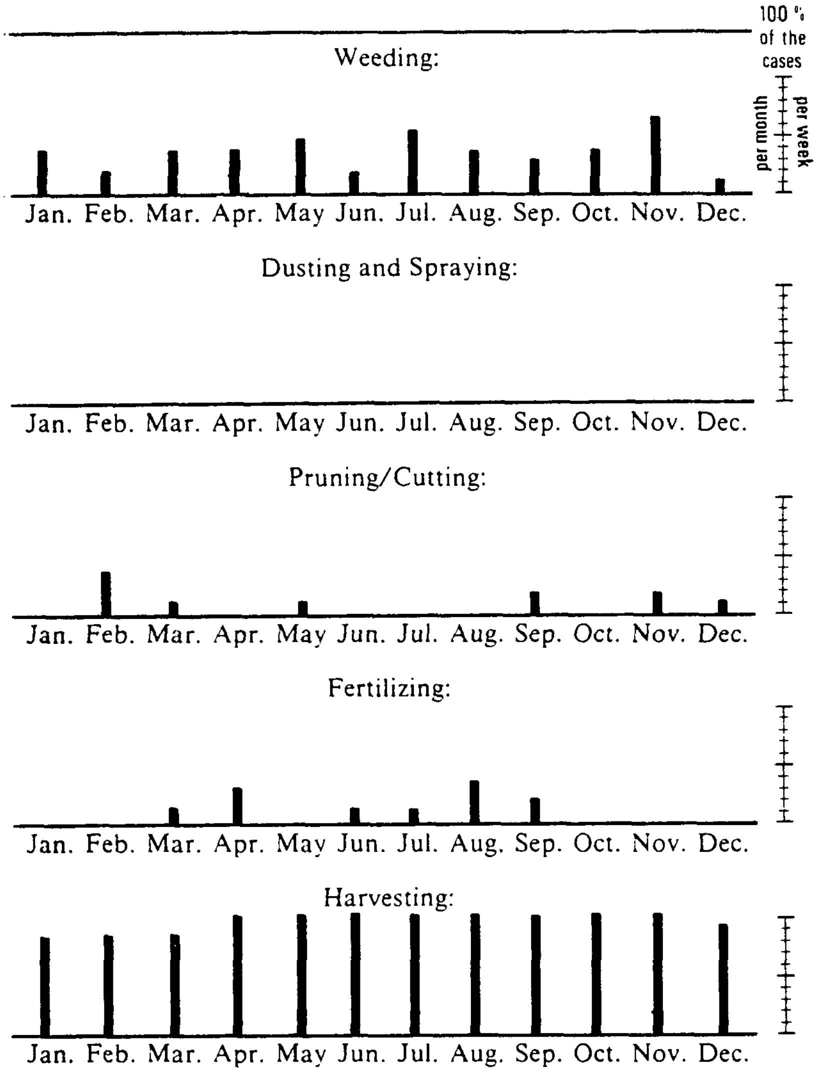


NANDI DISTRICT

TABLE 15c: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 Tea Cases: 12

AEZ: LH 1–3 + UM 4 Survey Area 15 Sample Size 30



NANDI DISTRICT

TABLE 15d: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 Maize Cases: 15

AEZ: UM 1 – LM 2 Survey Area 16 Sample Size: 30

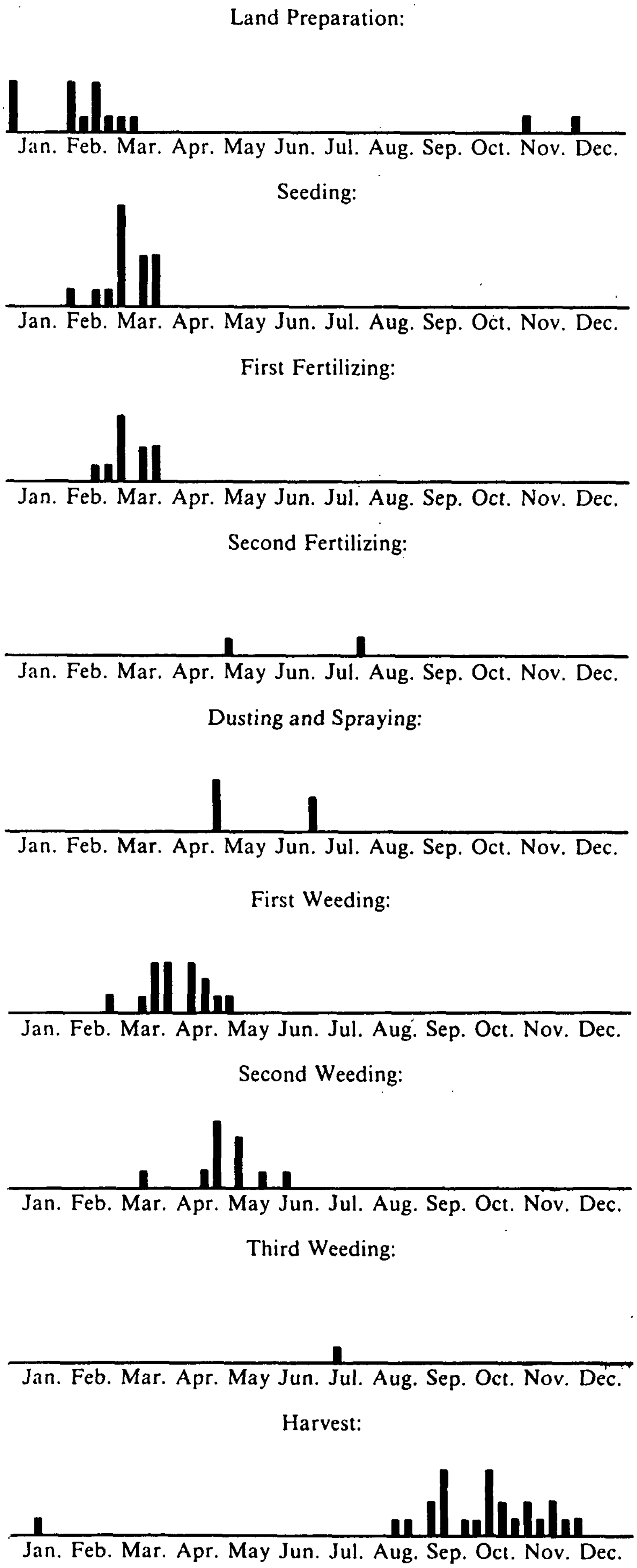


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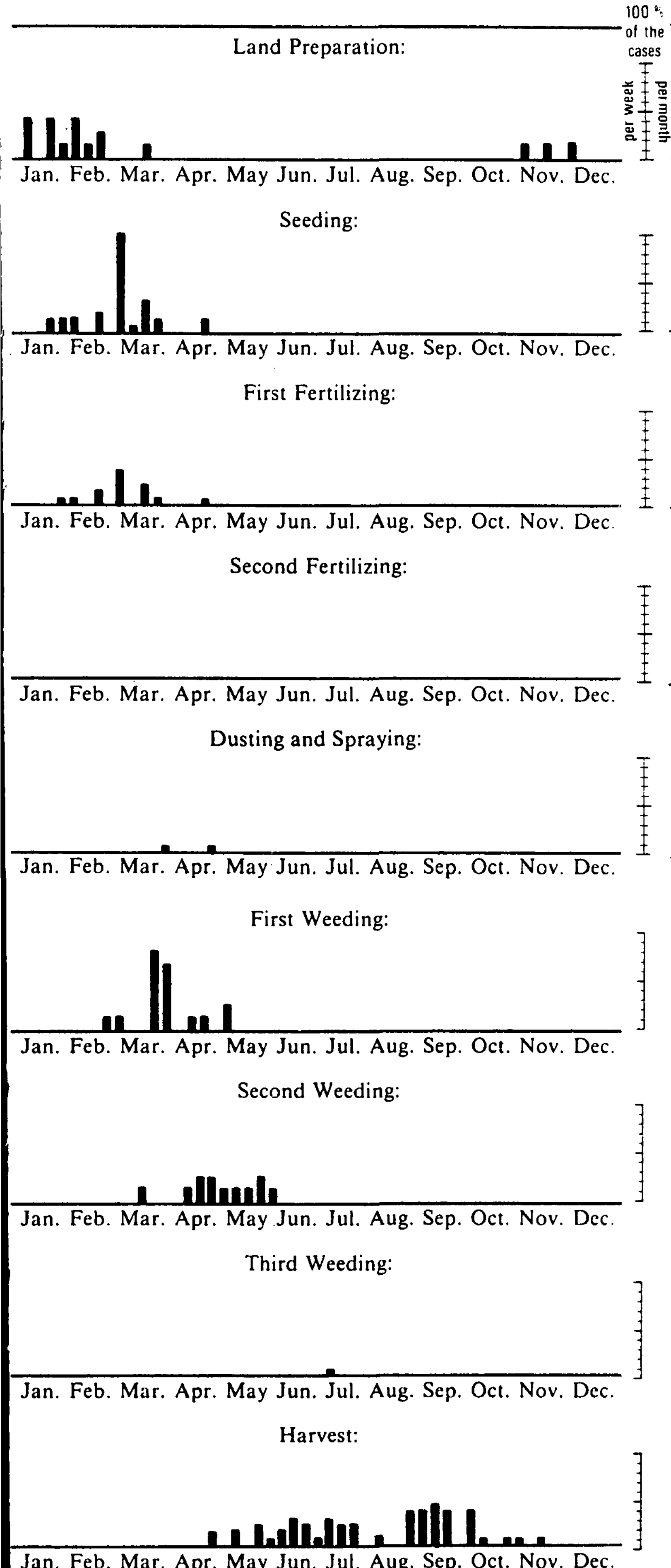
TABLE 15e: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 34[1)]

AEZ: UM 1 – LM 2 Survey Area 16 Sample Size: 30



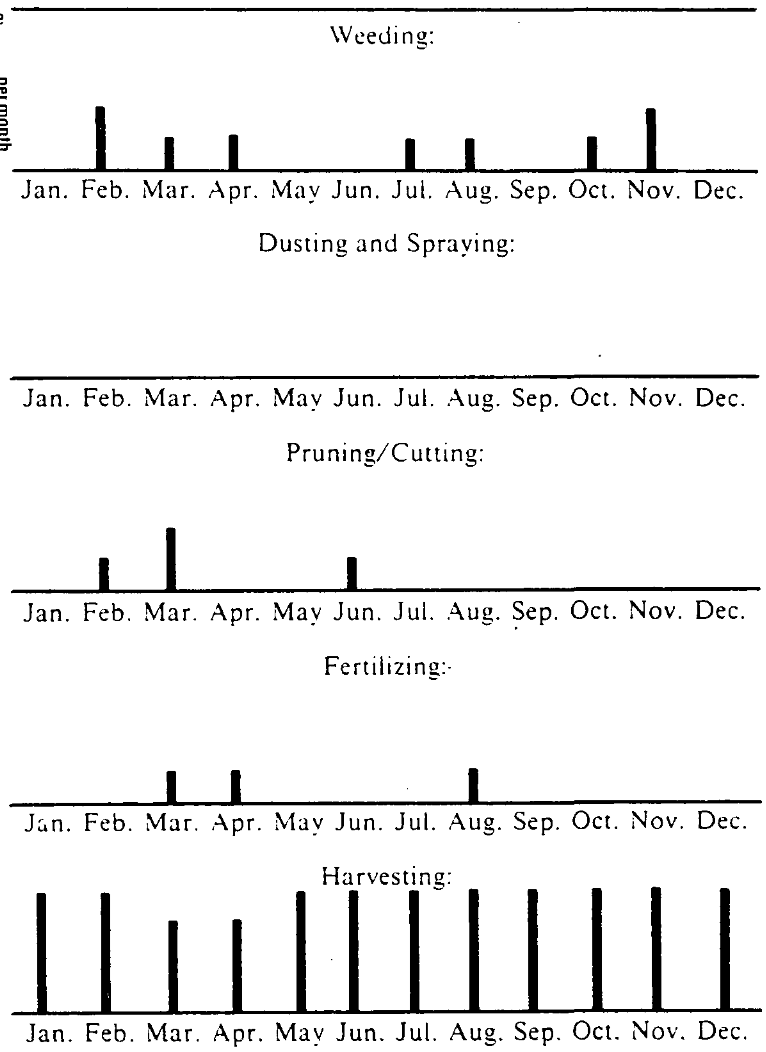
1) Maximum 30 per crop and season

NANDI DISTRICT

TABLE 15f: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 Tea Cases: 4

AEZ: UM 1 – LM 2 Survey Area 16 Sample Size: 30

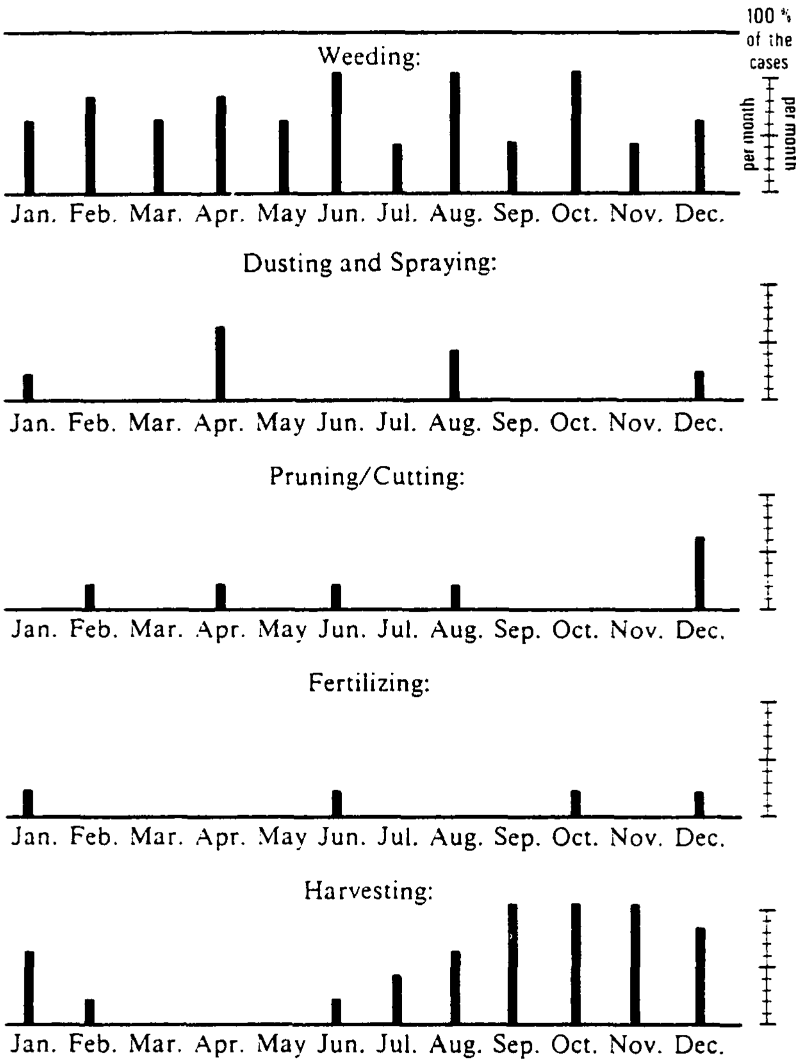


NANDI DISTRICT

TABLE 15g: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 | **Coffee** | Cases: 5

AEZ: UM 1 – LM 2 | Survey Area 16 | Sample Size: 30

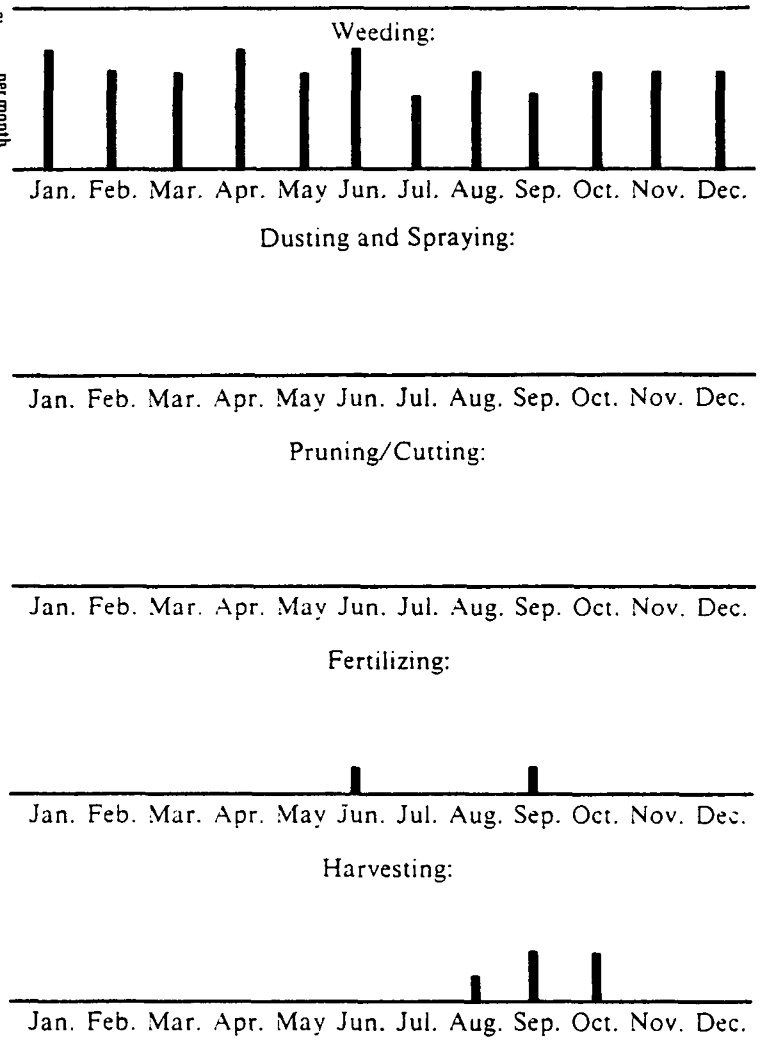


NANDI DISTRICT

TABLE 15h: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 63 | **Sugarcane** | Cases 12

AEZ: UM 1 – LM 2 | Survey Area 16 | Sample Size: 30



NANDI DISTRICT

TABLE 16a: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT AND NUTRIENT INPUT

		A.E.Z.: LH 1 TEA/DAIRY ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE							
		Vegt. Period 1st + 2nd: p or two in Days, 1st: 165 or more		2nd: 190 or 200	total: 365	vl/1 or two 150 or more		90-135	240-285				
		Soil: ACRISOLS				NITOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	3,000			8,000	3,000			7,000				
Fertilizer N	kg				272				222				
P_2O_5	kg				138				111				
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg	3,000			8,000	4,000			8,000				
Fertilizer N	kg				272				222				
P_2O_5	kg				138				111				
K_2O													
CROP: TEA													
Farmers in Production Level	%												
Yields	kg	2,200		3,000	11,000	2,500	1,250	3,500	4,200				
Fertilizer N	kg			27	440			33	57				
P_2O_5	kg			5	88								
K_2O	kg			5	88								
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg					600		800	1,100				
Fertilizer N	kg							5	13				
P_2O_5	kg							7	19				
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg	3,000		6,000	14,000								
Fertilizer N	kg			48	176								
P_2O_5	kg			90	330								
K_2O	kg												
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,000	2,100	3,300	4,500	2,200	2,700	3,200	4,000				
Fertilizer N	kg		3	33	66		13	25	45				
P_2O_5	kg		2	31	60		14	28	50				
K_2O	kg												

NANDI DISTRICT

TABLE 16b: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT AND NUTRIENT INPUT

		A.E.Z.: LH 1 TEA/DAIRY ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE							
		Vegt. Period 1st + 2nd: p or two in Days, 1st: 165 or more		2nd: 19o or 2oo	total: 365	vl/1 or two 150 or more		9o-135	24o-285				
		Soil: ACRISOLS				NITOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg	2,000	2,100/500	3,300/500		2,200	2,700/250	3,200/350					
Fertilizer N	kg		25	57			25	42					
P_2O_5	kg		9	41			19	35					
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg					1,200	450	750	1,500				
Fertilizer N	kg												
P_2O_5	kg												
K_2O													
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg					1,000	800	1,200	2,200				
Fertilizer N	kg							7	41				
P_2O_5	kg							8	50				
K_2O	kg												
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	6,000	2,500	4,000	15,000	6,400	3,000	12,000	27,000				
Fertilizer N	kg				90			44	164				
P_2O_5	kg				81			50	185				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	3,500	2,000	10,000	30,000								
Fertilizer N	kg			52	208								
P_2O_5	kg			39	159								
K_2O	kg												
CROP: SUKUMAWIKI													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

NANDI DISTRICT

TABLE 16c: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT AND NUTRIENT INPUT

		A.E.Z.: UM 1 COFFEE/TEA ZONE											
		Vegt. Period in Days, 1st + 2nd: p or two/three; 1st: 16o or more		2nd: 19o-2o5	total: 365								
		Soil: CAMBISOLS											
	Unit	Without Fertilizer	Production Level I	Production Level II	Production Level III	Without Fertilizer	Production Level I	Production Level II	Production Level III	Without Fertilizer	Production Level I	Production Level II	Production Level III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O													
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg			400	700								
Fertilizer N	kg			40	70								
P_2O_5	kg			90	90								
K_2O	kg												
CROP: TEA													
Farmers in Production Level	%												
Yields	kg	2,100		4,000	11,000								
Fertilizer N	kg			63	445								
P_2O_5	kg			13	89								
K_2O	kg			13	89								
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg	3,000		12,000	18,000								
Fertilizer N	kg			126	210								
P_2O_5	kg			189	315								
K_2O	kg												

TABLE 16d: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES

OUTPUT AND NUTRIENT INPUT

		A.E.Z.: UM 1 COFFEE/TEA ZONE											
		Vegt. Period 1st + 2nd: p or two/three; in Days, 1st: 160 or more		2nd: 190	total: 365								
		Soil: CAMBISOLS											
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg		2,000	8,000	28,000								
Fertilizer N	kg			113	308								
P_2O_5	kg			45	123								
K_2O	kg												
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	1,900	1,800	4,000	5,000								
Fertilizer N	kg			53	76								
P_2O_5	kg			50	74								
K_2O													
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg	1,900	2,300/300	3,500/400	4,000/400								
Fertilizer N	kg			72	95								
P_2O_5	kg			58	82								
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 16e: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT AND NUTRIENT INPUT

		A.E.Z.: UM 1 COFFEE/TEA ZONE											
		Vegt. Period 1st + 2nd: p or two/three in Days 1st: 160 or more		2nd: 190-205	total: 365								
		Soil: CAMBISOLS											
	Unit	Without Fertilizer	Production Level			Without Fertilizer	Production Level			Without Fertilizer	Production Level		
			I	II	III		I	II	III		I	II	III
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	6,000	2,500	4,000	18,000								
Fertilizer N	kg				96								
P_2O_5	kg				108								
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O													
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg		2,000	6,000	14,000								
Fertilizer N	kg		14	42	98								
P_2O_5	kg		12	36	84								
K_2O	kg												
CROP: SUKUMAWIKI													
Farmers in Production Level	%												
Yields	kg		4,000	6,000	12,000								
Fertilizer N	kg		28	42	84								
P_2O_5	kg		24	36	72								
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

KERICHO DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

Most areas of Kericho District receive high rainfall, more than 1400 mm as an annual average. Only the Nyando and the Sondu Valley, the bordering Kano Plains, and the South of the district are relatively dry with less than 1300 mm, mainly due to rain shadow. The rainfall is also well distributed except for the small dry season in January and February (see Diagram Kericho). There is no real break between the first and the second rains, and the subzones of the Agro-Ecological Zones are therefore often characterized by one very long cropping season or two variable ones, i.e. planting times may differ according to factors other than climate. If one special differentiation in two certain seasons seems reasonable, it is described as follows: „ . . . or two, for instance . . . “.

The largest high rainfall area is mainly LH 1, the famous Kericho Tea Zone. The slightly drier zones 2 in the Upper Highlands (UH 2) are still mainly forest and should remain so forever because the slopes are steep and the valuable timber is of national importance. In the Lower Highlands (LH 2), there is a fairly good potential for pyrethrum if runoff loss of water and soil in the generally sloping areas is stopped by soil protection measures (see chapter Soil Conservation). Due to higher evaporation during the dry season, water stress may severely affect productivity if water is not preserved.

The Zone UM 2 is the Main Coffee Zone in East Kenya. Here in Kericho District, which lies west of the Rift, coffee does not do so well because of the more uniform rainfall which discourages flowering and favours the spread of diseases. The soils are also not so suitable for coffee. Alternative cash earners may be found in the land use potential list (p. 12–14). In UM 3 the dry season is already critical for coffee (see Diagram Fort Ternan Tunnel Station). In the South, low temperature is a problem caused by cold nights.

UM 4 is the zone where the potential for maize and sunflowers is normally not surpassed by any other crop. However, sorghum is strongly advisable in some southern areas because the rainy season is often weak and, on the other hand, many soils are susceptible to water-logging. Both factors affect sorghum less than maize. There is even a Livestock-Sorghum Zone (UM 5) in the far South, where the average annual rainfall drops below 1000 mm and the cropping periods are predominantly weak with sharply divided peaks, giving this formula for the subzone: (m/s) + (s/vs).

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
9035001 1 829 m	Jamji Tea Estate	53	Average	1 643	77	91	160	245	224	135	113	139	121	111	119	106
			60 % rel.[1]	1 472	46	56	130	219	182	122	96	119	90	81	71	78
9035002 2 317 m	Londiani Forest	68	Av.	1 182	36	44	79	161	150	134	148	172	96	58	62	54
			60 %	1 060	9	22	35	132	130	107	135	149	84	42	33	28
9035003 1 981 m	Kericho District Office	71	Av.	1 880	70	89	157	275	265	160	160	185	155	133	132	98
			60 %	1 689	44	58	125	236	248	143	130	165	135	113	80	83
9035007 1 768 m	Fort Ternan, Tunnel Station	44	Av.	1 275	46	66	113	186	166	123	132	142	94	64	74	70
			60 %	1 139	31	31	78	166	157	105	107	120	74	56	39	48
9035013 1 824 m	Sotik, Monieri	60	Av.	1 377	73	108	138	190	144	117	92	133	110	84	102	88
			60 %	1 215	53	71	118	161	119	99	68	98	89	71	74	53
9035017 1 615 m	Nginimini Estate, Koru	44	Av.	1 520	63	96	154	233	214	143	148	134	87	78	77	94
			60 %	1 356	34	60	112	196	177	121	126	116	64	68	43	54
9035020 1 931 m	Lumbwa Station	62	Av.	1 143	37	64	93	172	155	120	125	133	90	59	52	43
			60 %	1 024	9	27	51	120	137	106	101	111	74	36	23	31
9035027 1 920 m	Lumbwa M.; Taragon	41	Av.	1 304	49	59	101	188	173	123	132	158	110	67	79	67
			60 %	1 171	21	31	61	163	150	100	102	139	92	57	33	39
9035049 2 347 m	Londiani, Braeside	43	Av.	1 227	49	59	82	152	145	114	158	175	95	69	88	60
			60 %	1 090	21	22	47	114	129	84	130	147	60	49	45	22
9035059 2 134 m	Litein, Mission	35	Av.	1 525	84	98	149	235	203	87	79	122	91	121	141	113
			60 %	1 369	59	59	129	208	170	63	56	88	71	102	87	66
9035068 1 920 m	Lumbwa, Gwonongween Estate	31	Av.	1 312	74	78	81	159	156	110	143	169	100	75	99	68
			60 %	1 179	30	36	63	118	135	109	113	141	63	77	53	38
9035075 2 195 m	Kaisugu House, K.	37	Av.	1 810	84	89	171	237	252	151	165	197	145	120	110	89
			60 %	1 626	37	54	162	220	223	123	152	176	125	103	67	64
9035078 2 317 m	Londiani, Hundreds Acres	35	Av.	1 251	41	44	71	180	156	119	148	182	104	64	71	62

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
9035079 1 986 m	Tenwek Mission	35	Av.	1 383	77	87	140	262	169	85	66	69	83	85	127	115
			60 %	1 238	57	53	121	225	132	72	56	62	75	83	94	104
9035084 2 400 m	Londiani, Sunnybrook Farm	35	Av.	1 177	34	37	73	164	144	111	144	149	98	59	68	59
			60 %	1 056	24	22	42	130	138	87	122	137	58	51	75	35
9035128 2 370 m	Sorget Forest Station	25	Av.	1 255	27	56	71	139	150	105	178	228	103	58	89	52
			60 %	1 127	4	13	53	97	139	81	149	169	68	36	56	30
9035155 2 379 m	Londiani, Makutano Forest	20	Av.	1 192	57	57	87	168	121	103	118	177	72	54	100	76
9035185 2 460 m	Equator, Tendeno Farm	10	Av.	1 180	54	38	81	109	138	79	185	244	113	70	36	34
9035188 2 100 m	Tinga, Lumbwa	16	Av.	1 242	53	77	100	157	133	78	159	193	95	68	77	62
9035199 1 950 m	Kericho, Ainomoi	14	Av.	1 446	79	88	149	234	188	100	118	119	101	105	94	75
9035226 2 280 m	Londiani, Forest Training School	18	Av.	1 267	61	52	79	154	135	111	162	215	86	61	87	63
9035227 1 920 m	Bomet, District Office	17	Av.	1 266	90	92	160	239	148	77	46	63	58	69	120	103
9035236 1 740 m	Sotik, Chepalungu	13	Av.	1 618	125	161	175	274	139	96	62	112	73	90	153	160
9035256 2 100 m	Malagat Forest St.	10	Av.	1 312	67	115	104	147	144	125	170	209	84	53	61	38
9035261 1 980 m	Kericho, Ngoina Estate	10	Av.	1 515	80	129	138	225	161	126	132	147	93	76	123	85
9135008 1 096 m	Kaiboson	14	Av.	1 015	74	97	109	156	93	58	40	74	45	50	98	121

TABLE 2: **TEMPERATURE DATA**

No. and altitude	Name of Station	AEZ[1]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
				Temperature in °C													
9035002 2 317 m	Londiani Forest Station	LH 1 hp	Mean max.	23.0	24.0	23.1	22.8	22.4	22.0	21.0	21.0	22.0	22.5	21.6	21.8	22.3	31
			Mean temp.	15.5	15.9	15.8	16.1	15.8	15.0	14.4	14.4	14.8	15.6	15.1	15.1	15.3	
			Mean min.	7.9	7.7	8.5	9.3	9.1	7.9	7.8	7.7	7.6	8.6	8.5	8.4	8.3	
			Absol. min.	2.2	2.2	3.9	4.4	5.0	2.2	3.3	2.2	3.3	4.4	3.9	3.3	2.2	
9035069 2 765 m	Equator, Met. St. (operating to 1960)	UH 1–2 hp	Mean max.	19.7	20.6	20.6	19.2	18.3	17.2	15.8	16.1	17.9	18.6	18.1	18.3	18.4	30
			Mean temp.	13.7	14.3	15.0	14.0	13.5	12.6	11.8	11.4	12.8	13.1	13.0	13.0	13.2	
			Mean min.	7.7	7.9	8.3	8.8	8.6	8.0	7.8	7.7	7.6	7.6	7.9	7.7	8.0	
			Absol. min	3.5	4.6	5.3	4.6	5.0	4.9	3.7	4.9	4.8	4.9	4.4	4.5	3.5	
9035145 2 071 m	Kericho, Tea Research Institute	LH 1 lp	Mean max.	23.9	24.4	24.2	23.1	22.9	22.2	21.6	22.1	22.8	23.4	22.9	23.4	23.1	22
			Mean temp.	16.8	17.0	17.2	16.5	16.3	15.7	15.3	15.5	15.9	16.4	16.3	17.2	16.4	
			Mean min.	9.7	9.6	10.2	9.8	9.6	9.2	8.9	8.9	9.0	9.3	9.6	10.9	9.6	
			Absol. min.	0.6	5.0	4.4	4.4	2.8	3.3	2.8	−1.1	3.3	3.3	3.9	1.7	−1.1	
9035155 2 379 m	Makutano Forest Station	LH 2 lp	Mean max.	21.6	22.3	22.5	21.1	20.8	20.3	19.4	19.6	20.4	21.0	20.4	20.2	20.8	19
			Mean temp.	14.4	14.4	15.0	15.9	16.2	13.3	13.1	13.2	13.2	13.8	14.5	14.4	14.0	
			Mean min.	6.8	6.5	7.5	8.7	7.6	6.2	6.7	6.8	6.0	6.5	8.5	8.6	7.2	
			Absol. min.	0.0	1.1	1.1	1.1	2.2	1.1	1.1	1.1	1.1	1.1	1.1	2.2	0.0	
9035235 2 071 m	Kericho, Chakaik Estate	LH 1 lp	Mean max.	22.4	23.8	23.9	23.2	22.4	22.6	21.7	21.9	22.1	23.1	22.5	22.5	22.7	16
			Mean temp.	15.7	16.6	16.8	16.3	15.7	15.8	15.2	15.9	15.5	16.3	16.2	16.5	16.0	
			Mean min.	9.0	9.3	9.6	9.3	8.9	8.9	8.6	8.9	8.9	9.5	9.8	10.5	9.3	
			Absol. min.	4.4	4.4	4.4	4.4	5.6	4.4	4.4	4.4	4.4	5.6	5.6	4.4	4.4	
9035244 2 133 m	Kericho Timbilil	LH 1 lp	Mean max.	24.3	23.7	23.6	21.8	22.0	21.1	20.4	20.6	21.6	21.7	21.5	22.3	22.1	14
			Mean temp.	16.4	16.4	16.5	16.0	15.8	15.0	14.8	14.8	15.0	15.3	15.1	15.5	15.6	
			Mean min.	8.5	9.0	9.3	10.2	9.5	8.7	9.1	8.9	8.3	8.9	9.6	8.7	9.1	
			Absol. min.	2.5	2.8	5.6	6.1	6.0	4.5	5.5	5.6	5.4	4.2	5.6	5.0	2.5	

[1] AEZ = Agro-ecological zone; lp = lower places; hp = higher places within the zone

KERICHO DISTRICT

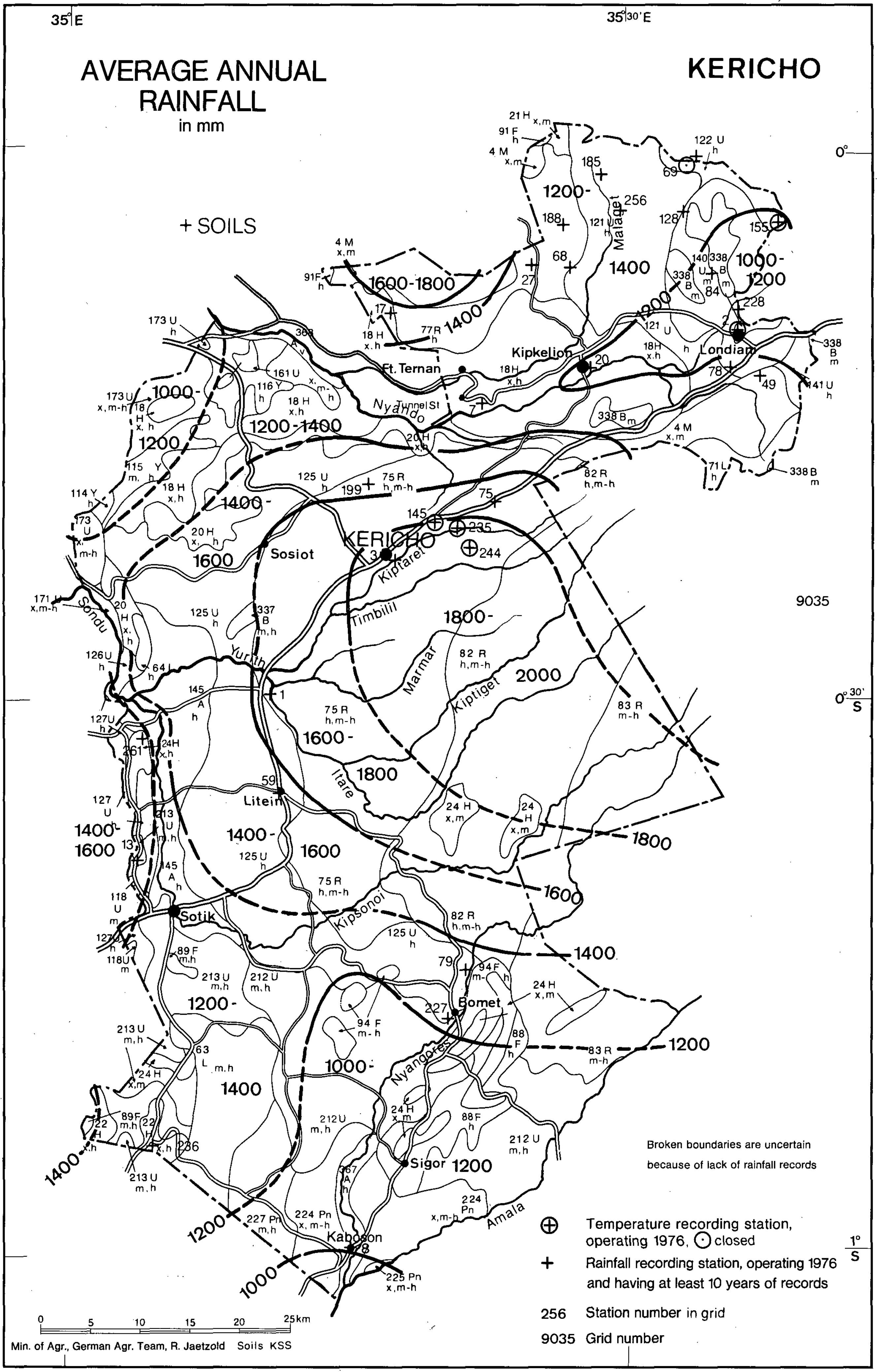
TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1)] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2)] in days	2nd rains in days	Total[3)] in days
UH 0 Forest Zone		2 300–2 450	16.0–15.1	1 750–2 000	900–1 000	600–700	Whole year very wet		
UH 1 Sheep-Dairy Zone	vl i or two	2 350–2 800	15.7–13.0	1 300–1 750	550– 950	500–680	130 or more	160–190	290–320
UH 2 Pyrethrum-Wheat Zone	vl i or two	2 350–2600	15.7–14.2	1 100–1 300	450– 650	430–600	130 or more	150–170	280–300
LH 0 Forest Zone		2 100–2 300	17.2–16.0	1 800–1 950	900–1 000	600–700	Whole year very wet		
LH 1 Tea-Dairy Zone	p or two	1 850–2 350	18.7–15.7	1 400–1 800	550– 950	410–650	160 or more	190–205	350–365
LH 2 Wheat/Maize-Pyrethrum Zone	vl i or two	1 900–2 350	18.4–15.7	1 200–1 500	(500–)800	320–500	140 or more	130–200	270–340
LH 3 Wheat/Maize-Barley Zone	vl/l i or two	1 900–2 350	18.4–15.7	1 100–1 300	450– 650	310–480	120 or more	130–150	250–270
UM 1 Coffee-Tea Zone	p or two/three	1 800–1 900	19.0–18.4	1 400–1 650	650– 850	440–610	165 or more	185–200	345–365
UM 2 Coffee Zone	vl i or two	1 650–1 950	19.9–18.1	1 150–1 500	550– 750	420–520	155 or more	120–180	270–335
UM 3 Marginal Coffee Zone	vl/l i or two m/l ⌐ (m/s)i	1 550–2 000	20.5–17.8	1 200–1 350 1 150–1 300	600– 720 400– 600	400–470 280–390	150 or more 155 or more	110–160 115–135	260–310 270–290
UM 4 Sunflower-Maize Zone	f m i ⌐ f s	1 650–1 950	19.9–18.1	1 000–1 200	300– 480	230–350	130 or more	75–115	205–265
UM 5 Livestock-Sorghum Zone		Very small, see Narok District							
LM 2 Marginal Sugar Cane Zone		Very small, see Kisumu District							
LM 3 L. Midland Cotton Zone		Very small, see Kisumu District							

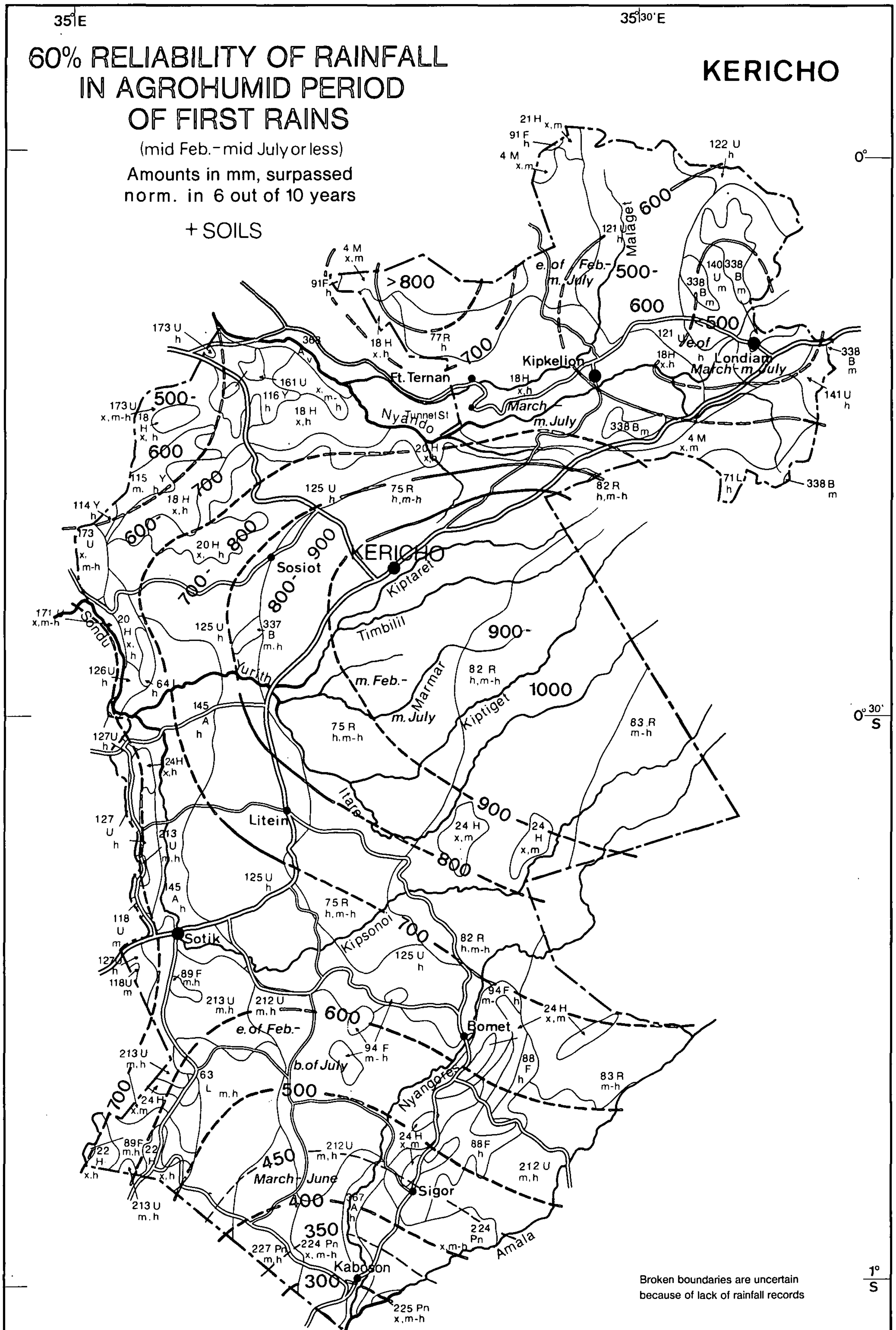
1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants.

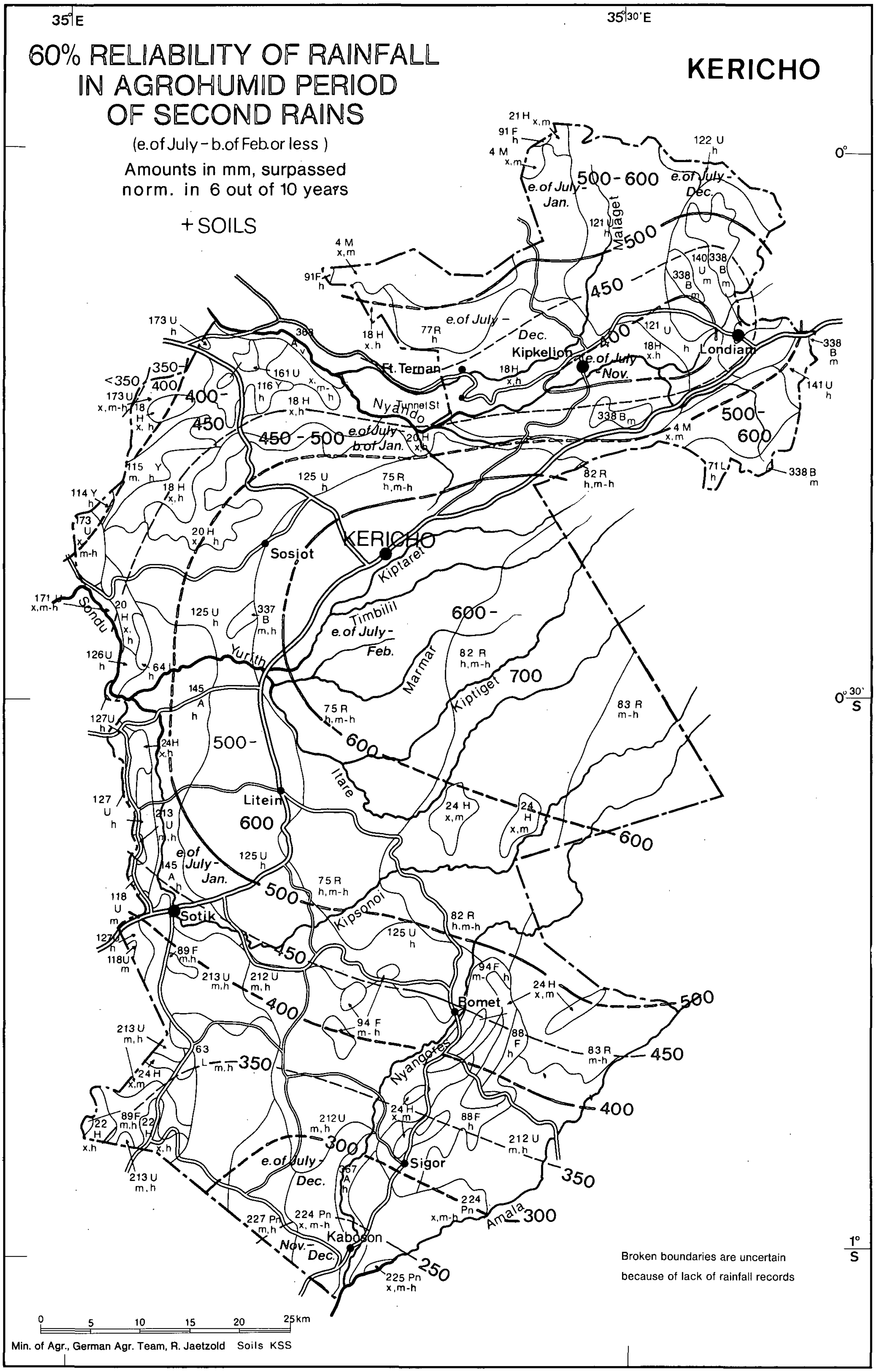
2) More if growing cycle of cultivated plants continues into the period of second rains

3) Agro-humid conditions continue from 1st to 2nd rains in the whole district

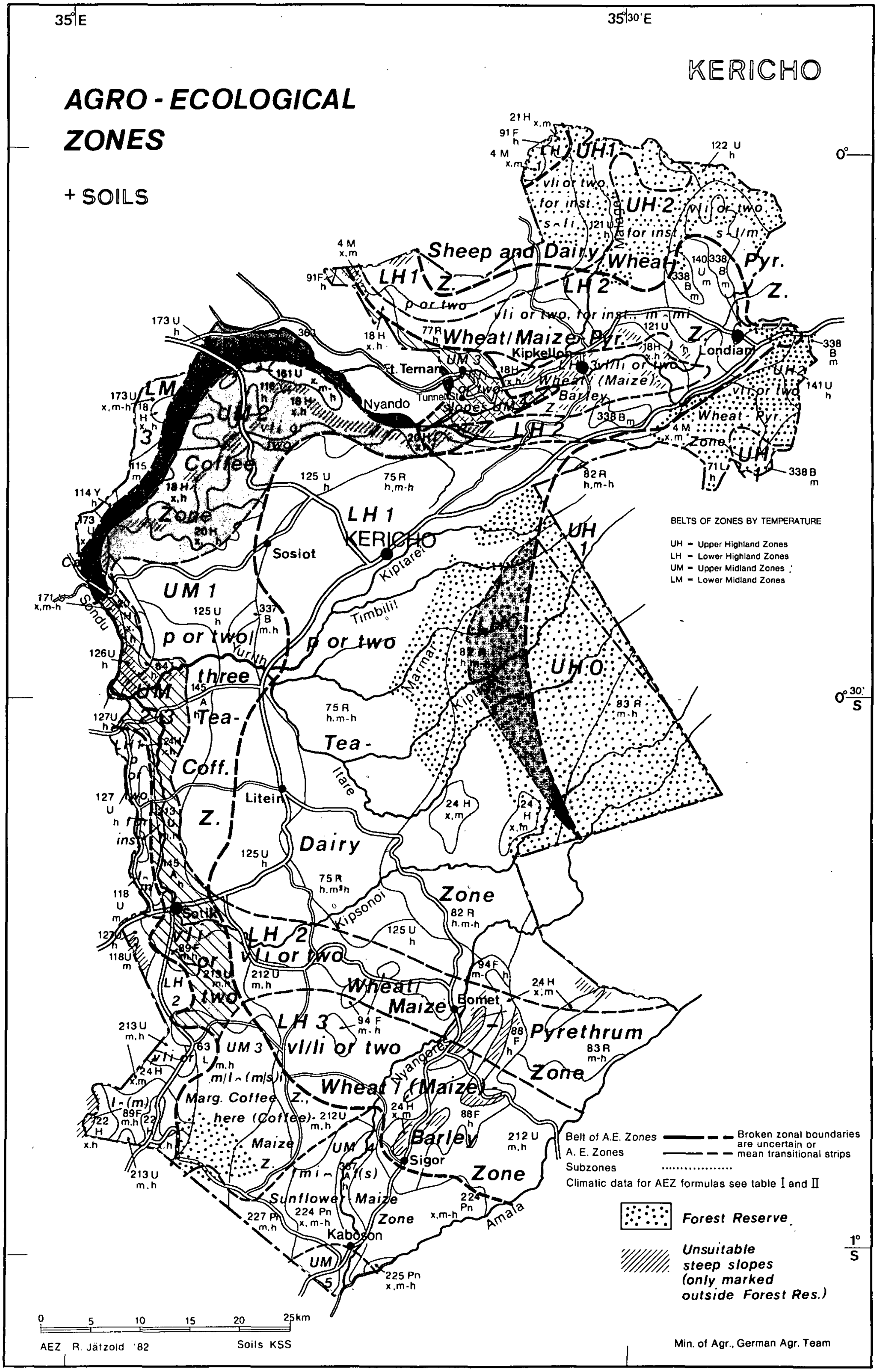


AVERAGE ANNUAL RAINFALL
in mm
KERICHO
+ SOILS
35° E
35° 30' E
0°
0° 30' S
1° S
9035
Kipkelion
Ft. Ternan
Tunnel St
Londiani
Nyando
Malaget
KERICHO
Sosiot
Kiptaret
Timbilil
Marmar
Kiptiget
Yurith
Sondu
Itare
Litein
Sotik
Kipsonoi
Bomet
Nyangores
Sigor
Kaboson
Amala
Broken boundaries are uncertain because of lack of rainfall records
Temperature recording station, operating 1976, closed
Rainfall recording station, operating 1976 and having at least 10 years of records
256 Station number in grid
9035 Grid number
0 5 10 15 20 25km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


35°E
35°30'E
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF FIRST RAINS
(mid Feb.- mid July or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+ SOILS
KERICHO
0°
0°30' S
1° S
Kipkelion
Londiani
Ft. Ternan
Tunnel St
Nyando
KERICHO
Sosiot
Kiptaret
Timbilil
Marmar
Kiptiget
Sondu
Yurith
Litein
Itare
Sotik
Kipsonoi
Bomet
Nyangores
Sigor
Amala
Kaboson
Malaget
>800
e. of Feb.- m. July
e. of March - m. July
March - m. July
m. Feb.- m. July
e. of Feb.- b. of July
March - June
Broken boundaries are uncertain because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



35°E
35°30'E
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF SECOND RAINS
(e.of July - b.of Feb.or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+ SOILS
KERICHO
0°
0°30' S
1° S
Kipkelion
Londiani
Ft. Ternan
Tunnel St
Nyando
Kericho
Sosiot
Kiptaret
Timbilil
Marmar
Kiptiget
Yurith
Sondu
Itare
Litein
Sotik
Kipsonoi
Bomet
Nyangores
Sigor
Kaboson
Amala
Malaget
e. of July - Feb.
e. of July - Jan.
e. of July - Dec.
e. of July - Nov.
Nov. - Dec.
Broken boundaries are uncertain
because of lack of rainfall records
0 5 10 15 20 25km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


AGRO - ECOLOGICAL ZONES
+ SOILS
KERICHO
35°E
35°30'E
0°
0°30' S
1° S
BELTS OF ZONES BY TEMPERATURE
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
Forest Reserve
Unsuitable steep slopes (only marked outside Forest Res.)
Sheep and Dairy Zone
Wheat/Maize Pyr. Z.
Wheat - Pyr. Zone
Coffee Zone
Tea - Coff. Z.
Tea - Dairy Zone
Wheat / Maize - Pyrethrum Zone
Wheat / (Maize) - Barley Zone
Marg. Coffee Z., here (Coffee)- Maize Z.
Sunflower - Maize Zone
KERICHO
Kipkelion
Londiani
Ft. Ternan
Nyando
Sosiot
Litein
Sotik
Bomet
Sigor
Kaboson
Kiptaret
Timbilil
Itare
Kipsonoi
Nyangores
Amala
Sondu
Yurith
Marmar
0 5 10 15 20 25km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team

AGRO-ECOLOGICAL ZONES

UH = *UPPER HIGHLAND ZONES*

UH 0 = *Forest Zone*

Very wet and steep, forest best land use

UH 1 = *Sheep-Dairy Zone*

UH 1 vl i or two = *Sheep-Dairy Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons[1] and i.r.*

Here mainly forest reserve (steep)

Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd r.), start norm. March[1]: Oats (April–S.), peas, potatoes; late mat. rapeseed (~ 60 %); cabbage, carrots, kohlrabi, celery, endive, rampion, leek, radish
2nd rains, start norm. end of June[1]: The same but normally crops of first rains not yet ready; planting from end of August onward yield expectations only fair
Whole year: Strawberries

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Late mat. wheat like Kenya Bongo (~ 40 %), triticale
2nd rains: M.mat. barley like Proctor, 3rd crop of potatoes (N.–F., ~ 40 %, on microclimatic frostfree slopes)
Whole year, best pl. time end of March: Pyrethrum (50–60 %)

Pasture and forage
About 0.5 ha/LU (lower places) to 1.2 ha/LU (drier upper places) on sec. pasture of Kikuyu grass, very suitable for Merino sheep, up to 2700 m also for grade dairy cows; rye grass (Lolium perenne) to improve pasture for dairy (not near wheat fields)

UH 2 = *Wheat-Pyrethrum Zone*

UH 2 vl i or two = *Wheat-Pyrethrum Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Good yield potential
1st rains (to 2nd r.), start norm. March: High Alt. Comp. or Cuzco (60–70 %, in frostfree lower places); late mat. wheat like Kenya Bongo (70–80 %, May–N./D.), triticale (Apr.–0.), m.mat. barley (May–S./O.), oats (Apr.–S.); peas (~ 60 %), potatoes (March–July)[1]; m.mat. rapeseed (Apr./May–S.); cabbages (nearly 80 %), kales, carrots (nearly 80 %), kohlrabi, celery, endive, rampion, leek, radish
2nd rains, start norm. b. of July: Oats, m.m.barley like Proctor; e.mat. rapeseed, peas, and the above vegetables excl. kohlrabi, but planting from mid August onward only fair expectations
Whole year: Pyrethrum, strawberries

Fair yield potential
1st rains: Maize varieties as above but higher places (2500 to 2700 m, risk by frosts in valleys)
2nd rains: Potatoes (Au.–N., 50–60 %), kohlrabi
Whole year: Plums, pears, apples (below 2600 m)

Pasture and forage
About 0.8 ha/LU on sec. pasture of Kikuyu and tufted grass (if not overgrazed, otherwise Kikuyu grass is disappearing), suitable for Merino sheep and grade dairy cows; rye grass to improve pasture for dairy, down to 0,5 ha/LU; lucerne best add. forage, Kenya white clover also suited

LH = *LOWER HIGHLAND ZONES*

LH 0 = *Forest Zone*

Very wet and steep, forest best land use

LH 1 = *T e a – D a i r y Z o n e*

LH 1 p or two = *Tea-Dairy Zone with permanent cropping possibilities, dividable in two variable cropping seasons*

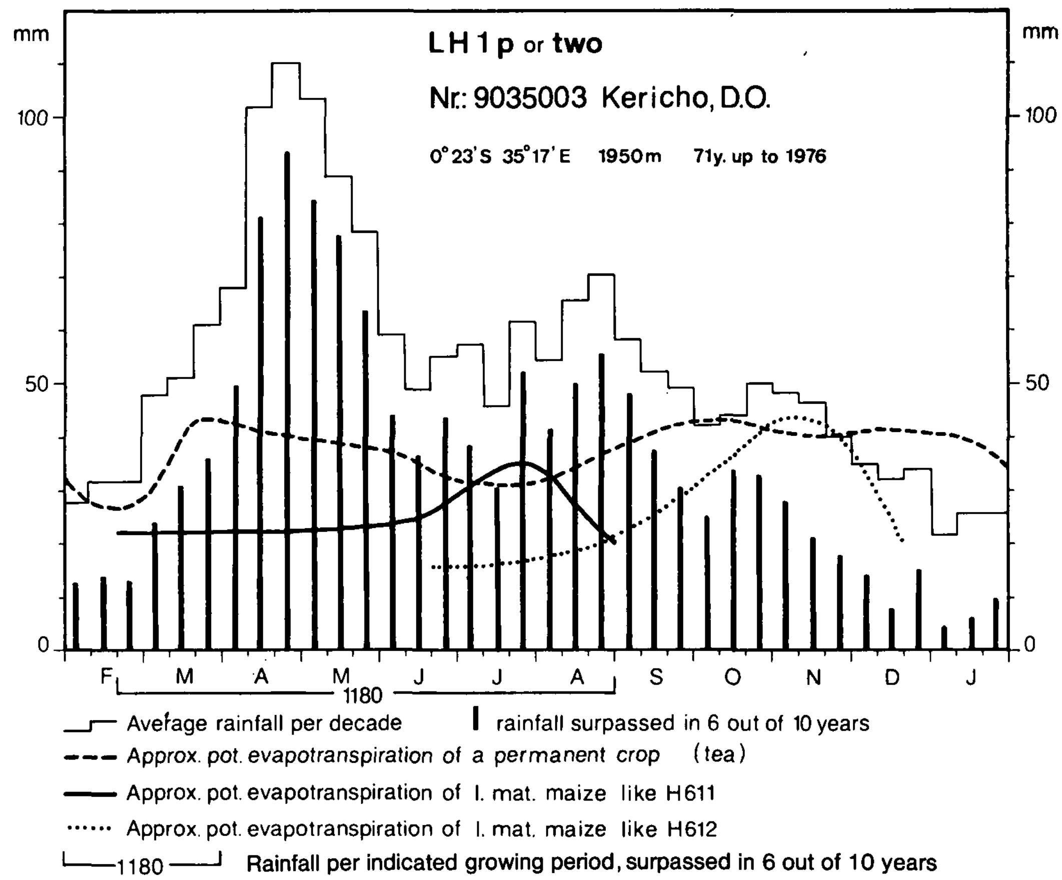
(See Diagram Kericho)

V e r y g o o d y i e l d p o t e n t i a l (av. > 80 % of the optimum)
1st rains, start norm. end of F.: Peas, cabbages, carrots, spinach
2nd rains, start indistinctly around end of July: Peas
Whole year: Tea (higher places less than 80 % av., but high quality)

G o o d y i e l d p o t e n t i a l
1st rains (to 2nd r.): Late mat. maize like H 7081 (~ 60 % higher places if not too wet) or H 611 (~ 60 % lower drier places); rapeseed; kales, cauliflower, beetroot, leek, celery, lettuce
2nd rains: Cabbages, carrots, kales a.o. vegetables
Whole year: Passion fruit (lower places)

F a i r y i e l d p o t e n t i a l
1st rains: Finger millet; beans (below 2100 m); potatoes[2] (e. of Apr.–Aug.), sweet pot. (lower places); onions
2nd rains: Maize like H 612 (e. of June–D., lower places), beans (below 2100 m)

P a s t u r e a n d f o r a g e
0.4–0.8 ha/LU on sec. or art. pasture of Kikuyu grass (montane moist forest originally); very suitable for grade dairy cows; Kenya white clover best add. forage above 2100 m, Louisiana white clover below



LH 2 = *W h e a t / M a i z e - P y r e t h r u m Z o n e[3]*

LH 2 vl i or two = *Wheat/Maize-Pyrethrum Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

(See Diagram Sorget)

Good yield potential

1st rains (to 2nd r.), start norm. March: Late mat. wheat like Kenya Bongo (60–70 %, Apr./May–O./N.), late mat. triticale, late mat. maize like H 611 (e. of F./Apr.–S./N., 80 % on deep soils); peas, horse beans, potatoes[2] (e. of Apr.–Au.); late mat. sunflower like Kenya White (60–70 %), linseed, rapeseed; cabbages, kales, cauliflower, carrots, beetroot, spinach, celery, lettuce, artichokes, gourgettes

2nd rains, start norm. around July: M.mat. barley like K. Research or in higher places Proctor (June–O.), m. mat. wheat like Tembo and other varieties (June–O.); linseed; kales, carrots, beetroot, spinach, tomatoes (lower places), celery

Whole year: Black Wattle, New Zealand flax (higher places)

Fair yield potential

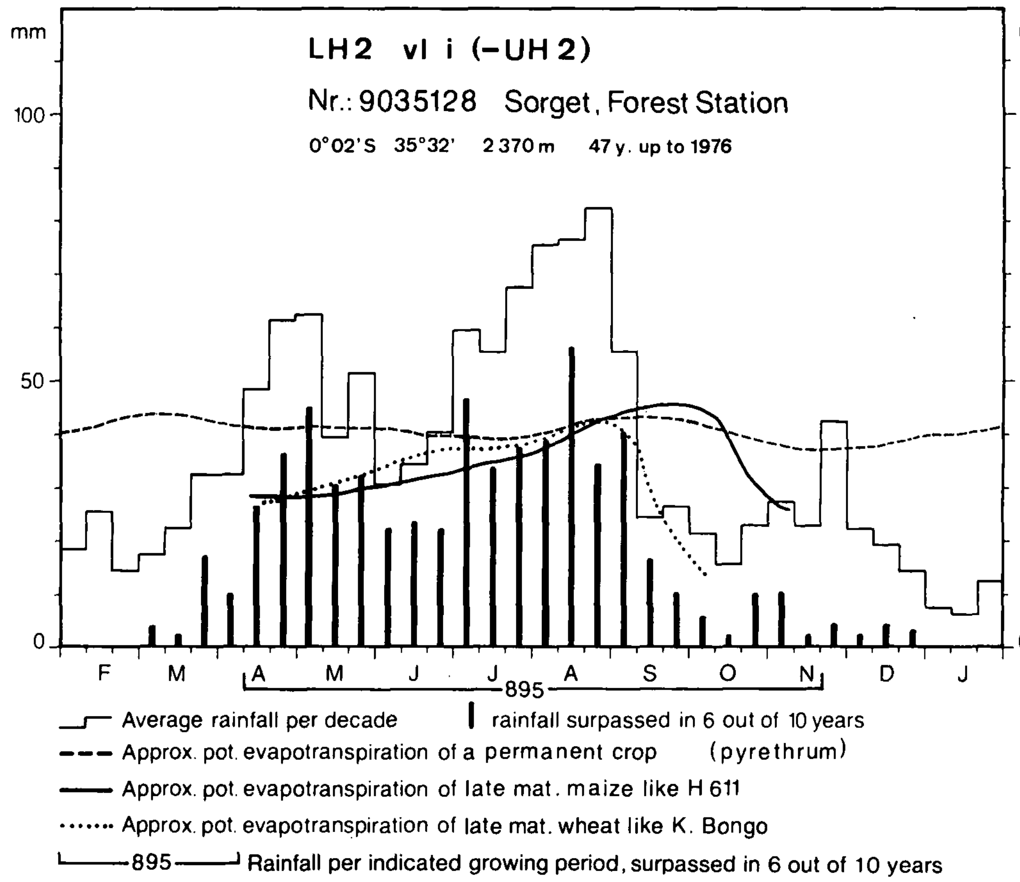
1st rains: Finger millet; m.mat. beans like Cuarentino, tomatoes, onions

2nd rains: Peas, beans (below 2100 m); potatoes (S.–D./J.), cabbages, cauliflower, onions, lettuce

Whole year: Pyrethrum (nearly 60 %); apples, pears, and plums above 2200 m; strawberries, passion fruit (below 2100 m), tea (below 2150 m)

Pasture and forage

About 1 ha/LU on highland savanna of Kikuyu, Red oats and tufted grass[4] between Cedar forest remnants; about 0.6 ha/LU on art. pasture of Nandi Setaria below 2150 m or Rhodes grass below 2000 m; with add. feeding of Giant Setaria, Napier grass (< 2000 m) and clover, lucerne or Lotononis down to about 0.3 ha/LU; suitable for grade dairy cows



LH 2 = Wheat/Maize-Pyrethrum Zone
vl i or with a very long cropping season and intermediate rains,
l ⌐ (m) i dividable in a long and a (weak) medium one

Potential not very much differing from above. For small differences see Kisii District

LH 3 = Wheat/(Maize)-Barley Zone

LH 3 = Wheat/ (Maize)[3]-Barley Zone
vl/l i or with a very long to long cropping season and intermediate rains,
two dividable in two variable cropping seasons (second weak) and i.r.

G o o d y i e l d p o t e n t i a l
1st rains (to 2. r.), start norm. March: Med.mat. wheat like Africa Mayo and other var. (Apr.–S.), late mat. like Kenya Bongo (Apr.–O.), late mat. triticale, on deep soils late mat. maize like H 611–614 (Mch.–S./O., 60–70 %), m.mat. barley like K. Research; peas; linseed, sunflower Kenya White; cabbages, carrots
2nd rains, start between end of June and S. (not distinct): M.mat. wheat like Africa Mayo a.o. var. (June–D.), m.mat. barley; rapeseed (end of June–O.)
Whole year: Black wattle

F a i r y i e l d p o t e n t i a l
1st rains: Potatoes; rapeseed; kales, cauliflower, beetroot
2nd rains: Tomatoes, kales, beetroot; beans in lower places
Whole year: Avocadoes (lower places)

P a s t u r e a n d f o r a g e
Around 1.2 ha/LU on highland savanna of Red oats and wire grass, about 0.7 ha on art. pasture of Nandi Setaria or Rhodes grass; suited for grade dairy cows and grade cattle; subterr. clover and Lotononis as add. forage

UM = *UPPER MIDLAND ZONES*

UM 1 = *T e a - C o f f e e Z o n e*[5)]

UM 1 p or two/ three = *Tea-Coffee Zone with permanent cropping possibilities, dividable in two to three cropping seasons*

V e r y g o o d y i e l d p o t e n t i a l
1st rains, start norm. end of F.: Cabbages, kales
2nd rains, start indistinctly end of July/beginning of Aug.: M.mat. sunflower like Comet
Whole year: Tea (~ 80 %, lower quality than in LH 1), passion fruit, guavas

G o o d y i e l d p o t e n t i a l
1st rains (to 2nd r.): Late mat. maize like H 7801 or H 612–614, finger millet; beans (~ 60 %)[6)]; potatoes (60–70 %, higher places), sweet potatoes; late mat. sunflower like Kenya White, m.mat. like Hybrid S 301 A, soya beans; spinach, onions, carrots (above 1600 m)
2nd rains: Beans (~ 60 %), sweet potatoes; e.mat. soya beans; kales, onions, tomatoes
Whole year: Bananas, yams, mountain pawpaws, avocadoes, taro (in valleys), loquats

F a i r y i e l d p o t e n t i a l
1st rains: Cold tol. sorghum; tomatoes
2nd rains: Maize H 511 & 512, cold tolerant sorghum (Aug.–F.), finger millet; potatoes, cabbages
3rd rains, start indistinctly e.of O.: V.e.mat. beans and fast growing vegetables
Whole year: Arabica coffee[5)], taro, (on slopes), citrus

P a s t u r e a n d f o r a g e
About 0.6 ha/LU on art. or sec. pasture of star grass; down to 0.12 ha/LU feeding Napier or Bana grass, banana leaves, and fodder legumes (Desmodium uncinatum, Stylosanthes)

UM 2 = *C o f f e e Z o n e*

UM 2 vl i or two = *Coffee Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

V e r y g o o d y i e l d p o t e n t i a l
1st rains (to 2nd r.), start norm. b. of March: Late mat. maize H 7801, H 612–614 (~ 80 %, higher places, Mch.–S.); cabbages, kales
Whole year, best planting time March: Castor

G o o d y i e l d p o t e n t i a l
1st rains: Maize H 622, 632 (70–80 %, lower places, Mch.–Au.), finger millet; m.mat. beans (lower places)[6)]; sweet potatoes (lower places); late mat. sunflower like Kenya White (May–O.), m.mat. like HS 301 A; m.mat. soya beans; onions, spinach, tomatoes
2nd rains, start indistinctly b. of Aug.: E.mat. beans (~ 60 %, S.–D.); onions (on light soils)
Whole year: Macadamia nuts, passion fruit, avocadoes, mountain pawpaws, bananas (in valleys), guavas

F a i r y i e l d p o t e n t i a l
1st rains: M.mat. wheat and barley (only near LH 2 in northeastern higher places, May–S.); pigeon peas (lower

places); potatoes and sweet potatoes in higher places
2nd rains: M.mat. maize H 511–513 (50–60 %), 622, 632 (~ 50 %); potatoes, sweet potatoes; tomatoes
Whole year: Arabica coffee[5], bananas (outside valleys), citrus, taro (in valleys), yams, pineapples (lower places)

Pasture and forage
0.6–1 ha/LU on sec. pasture, dairy cows about 0.5 ha/lu on art. pasture of Rhodes grass; down to 0.15 ha/LU feeding Napier and Bana grass a.o.; Desmodium uncinatum best fodder legume (for rotation and dairy cows)

UM 3 = Marginal Coffee Zone, here (Coffee-) Maize Zone

UM 3 m/l ⌐ (m/s) i = Marginal Coffee Zone or (Coffee-) Maize Zone with a medium to long cropping season followed by a (weak) medium to short one and intermediate rains

Good yield potential
1st rains, start norm. b. of March: Maize H 612–614 (higher places), H 511–514, 622, 632 (lower places), finger millet, high alt. sorghum; m.mat. beans[6], sweet potatoes; m.mat. sunflower like Comet, late mat. like Kenya White (~ 60 %), soya beans; cabbages, kales, onions (on light soils), tomatoes, spinach
2nd rains, start indistinctly b. of Aug.: V.e.mat. beans (~ 60 %); onions (~ 60 % on light soils)
Whole year: Castor, mountain pawpaws, Macadamia nuts, sisal, black wattle (higher places)

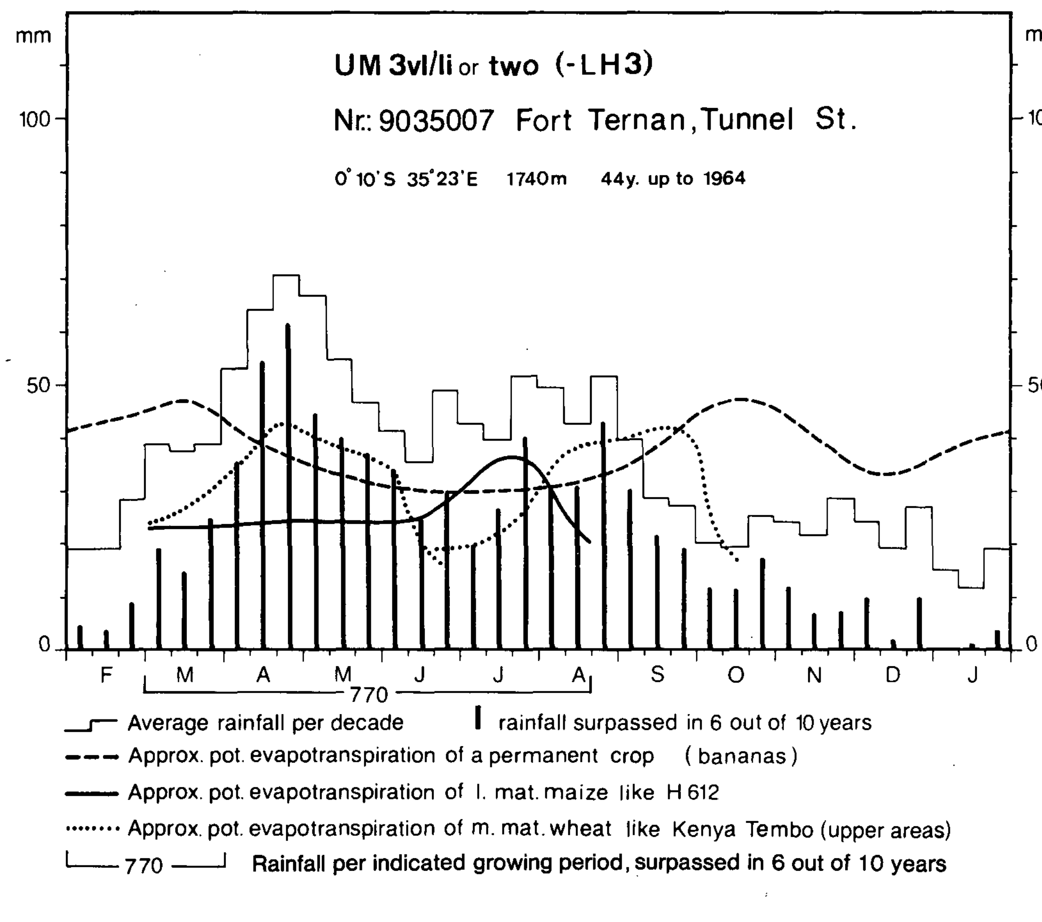
Fair yield potential
1st rains: Chick peas (on h.bl. soils); potatoes (higher places)
2nd rains: Potatoes (higher pl.), sweet pot., tomatoes
Whole year: Bananas (on deep soils), avocadoes, citrus[7], pineapples (lower places)

Poor yield potential (av. 20–40 % of the optimum)
Whole year: Arabica coffee, pyrethrum (higher places)

Pasture and forage
1–1.2 ha/LU on sec. pasture, ~ 0.6 ha/LU on art. pasture of Rhodes grass; down to ~ 0.18 ha/LU feeding Bana and Napier grass a.o.; Desmodium uncinatum best fodder legume

UM 3 vl/l i or two = Marginal Coffee Zone with a very long to long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.

(See Diagram Ft. Ternan, Tunnel Station)



Small, potential 1st rains almost as UM 3 m/l ⌐ (m/s) i prefering maize H 612, but second rains start indistinctly around b. of July with fair chances for m.mat. maize like H 511–12. Marginal for coffee also on good soils. No very good yield potential

UM 4 = *Sunflower-Maize Zone*

UM 4 fm i ⌐ f(s) = *Sunflower-Maize Zone with a fully medium cropping season and intermediate rains, followed by a fully (weak) short cropping season*

Good yield potential

1st rains, start norm. e. of Feb.: Katumani maize, H 512–514 (~ 60 %)[8], m.mat. cold tolerant sorghum, finger millet (~ 60 %); beans, chick peas (on h.bl. soils, ~ 60 %); m.mat. sunflowers, m.mat. soya beans (~ 60 %), onions (~ 60 %, on light soils)
Whole year: Sisal, castor

Fair yield potential

1st rains: Potatoes, sweet potatoes; tomatoes, cabbages, kales, spinach
2nd rains, start norm. Nov.[9]: Katumani maize, finger millet (~ 40 %); v.e. and e.mat. beans, chick peas (on h.bl. soils); kales
Whole year: Pineapples, mountain pawpaws (~ 40 %), Macadamia nuts

Pasture and forage

1–1.5 ha/LU on mixed sav. pasture, ~ 1 ha on vlei soils; horse tamarind (Leucaena leucocephala) and saltbush (Atriplex nummularia) best suitable fodder shrubs on free draining soils

UM 5 = *Livestock-Sorghum Zone*

Very small, potential see Narok District

LM = *LOWER MIDLAND ZONES*

LM 2 = *Marginal Sugar Cane Zone*

LM 2 l/m ⌐ (m/s) = *Marginal Sugar Cane Zone with a long to medium cropping season followed by a (weak) medium to short one*

Very good yield potential

1st rains, start norm. end of Febr.: M.mat. sorghum; sweet potatoes; m.mat. soya beans, e.mat. sunflower like 252 or Hybrid S 345; sweet pepper, chillies, pumpkins

Good yield potential

1st rains: M.mat. maize like H 511–513 and 622 (~ 60 %), late mat. sorghum, finger millet; beans, pigeon peas, late mat. groundnuts (rosette resistant); late mat. soya beans, roselle; egg plants, tomatoes, onions
2nd rains, start indistinctly towards end of Aug.: Green grams (up to 1 250 m); e. mat sunflower (~ 60 %)
Whole year: best planting time end of F.: Cassava, pawpaws (70–80 %), bananas (~ 60 % on deep soils), yam beans (best near rivers)

Fair yield potential

1st rains: Rice in mbugas; cowpeas; tobacco, cotton (50–60 %, low quality, danger of rain in open bolls); cabbages, kales, egg plants
2nd rains: M.mat. sorghum (50–60 %), m.mat. maize (40–50 %); beans (higher places), cowpeas (lower places), bambarra groundnuts (light soils); sweet potatoes (~ 40 %); cotton (July–F., relayplanted in maize of first rains)
Whole year: Sugar cane, pineapples, sisal, citrus (low qual.), mangoes (endangered by fungus diseases)

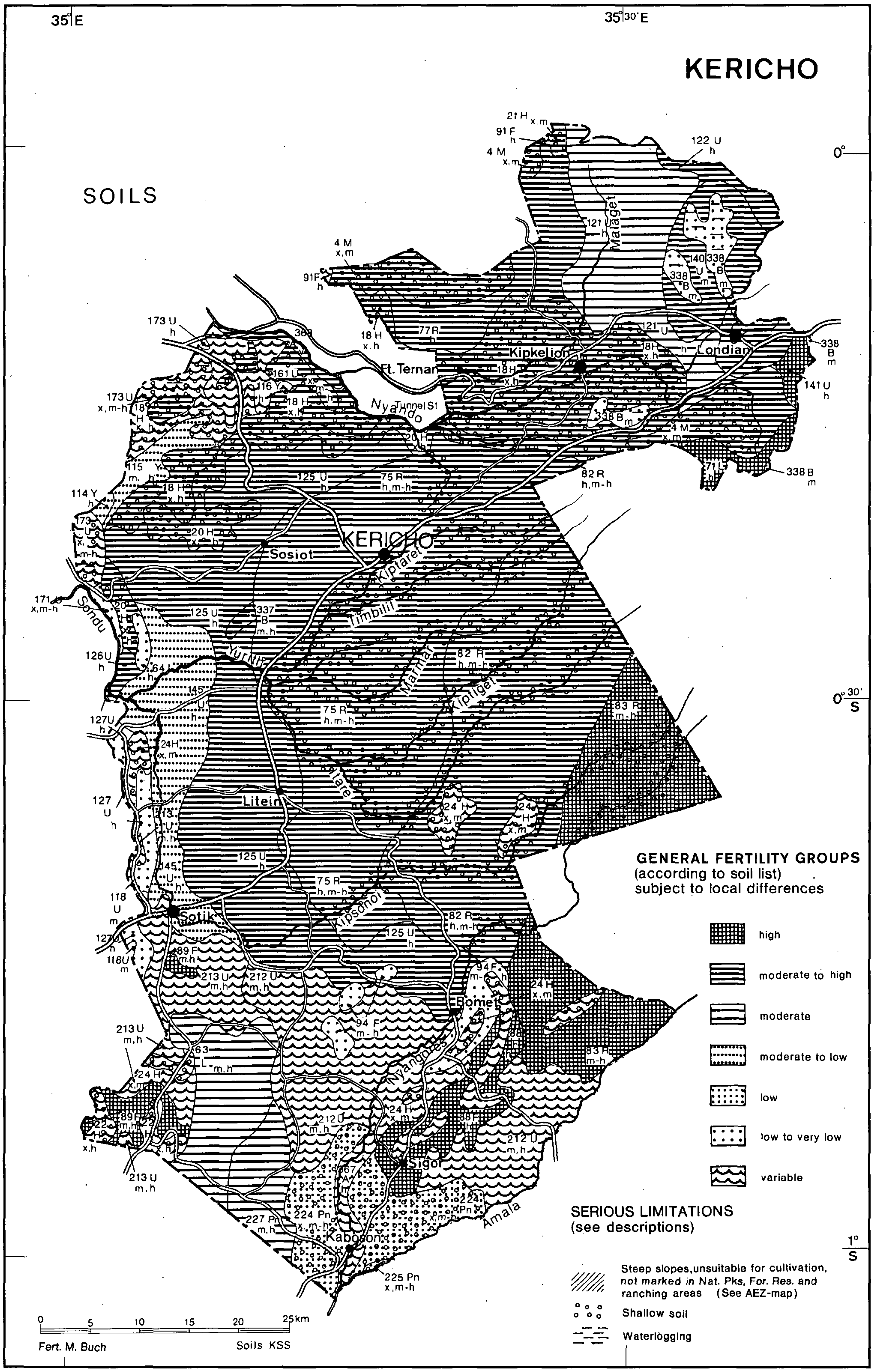
Pasture and forage

0.6–1.2 ha/LU on sec. high grass savanna; down to 0.15 ha/LU feeding Napier or Bana grass, maize stalks, banana leaves, and fodder legumes

LM 3 = *Cotton Zone*

Very small, potential see Kisumu District

1) Start and end of rainy seasons in whole district not very distinct, especially second rains, in some places there is even a third peak. So planting times are variable according to crops and their rotation
2) Spraying against fungus diseases important
3) Wheat or maize mainly depending on farm scale
4) The bad tufted grasses Eleusine jaegeri and Pennisetum schimperi are expanding if the area is overgrazed. They may be controlled by fire.
5) Coffee yields low because of unsuitable soils, diseases (too wet), and less flowering because of rainfall distribution
6) Sometimes rotting because of too wet conditions
7) With add. irr. (D.–F.) well growing
8) Many areas not well drained for maize
9) Southern parts, in other areas August



KERICHO
SOILS
35°E
35°30'E
0°
0°30' S
1° S
Kipkelion
Londiani
Ft. Ternan
Tunnel St
Nyando
KERICHO
Sosiot
Kiptaret
Timbilil
Yurith
Sondu
Marinat
Kiptiget
Litein
Itare
Kipsonoi
Sotik
Bomet
Nyangores
Sigor
Kaboson
Amala
Malaget
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
moderate to high
moderate
moderate to low
low
low to very low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Waterlogging
0 5 10 15 20 25km
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The major part of the Kericho District exhibits undulating to rolling topography that gives way to flatter terrain in the south. The overall slope of the land is towards the west, consequently drainage is also in that direction, at least in the eastern part, cutting deep valleys (except in the southern part).

Intermediate and basic volcanic rocks (phonolites) underlie most of the area, while undifferentiated Basement System rocks (mainly granites) outcrop in the South. From the high to low lying terrain, the following map units are distinguished:

On the mountains West and South of Londiani mountain, soil unit 4 M has an unstable fertility 2) On the hills and minor scarps a variety of soils occur: map unit 18 H is similar to 4 M but had a humic topsoil, map units 20 H, 22 H and 24 H also have a low fertility today.

On the associated footslopes, the following soils are encountered: map unit 94 F of low fertility and unit 89 F with high fertility. A small area of piedmont plain is found in the northwest with soils of variable fertility (unit 116 Y).

The central part, which is the largest part of the district, is occupied by volcanic footridge landscape. Here we find soil units 75 R and 82 R of moderate fertility. In the eastern part of the district, soils of unit 83 R occur with generally high fertility.

Smaller plateaus occur south and north of Sotik, soils either belong to unit 64 L with low to very low fertility, or to unit 63 L with moderately high fertility. Similar soils also occur on the plains with map unit 227 Pn which are associated with unit 224 Pn. They have low fertility. In the extreme northwest, on the lacustrine plains, soils of unit 325 Pl of moderate to high fertility are found.

The greater part of the uplands is covered by soils of moderate to high (unit 125 U) or low (unit 145 U) fertility. Around Londiani, unit 140 U of moderate to high fertility is present. They are associated with soils of unit 141 U which have high fertility. This soil is similar to unit 71 L occurring in a small area in the northeast. In the southeast, the map unit 212 U carries soils of variable fertility. This unit is associated with unit 213 U. In the bottomlands, soils of unit 338 B of very low fertility are common. In the alluvial floodplains two units occur: map unit 368 A of moderate to high fertility, and soils of map unit 367 A of variable fertility.

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

4 M = well drained, shallow to moderately deep, dark reddish brown, friable, humic, rocky and stony clay loam (nito-humic CAMBISOLS, rocky phase)
x, m[1]

SOILS ON HILLS AND MINOR SCARPS

Soils developed on intermediate igneous rocks (syenites, trachytes, etc.)

18 H = well drained to moderately well drained, shallow to moderately deep, dark reddish brown to dark brown, firm, bouldery or stony, clay, with humic topsoil (verto-luvic PHAEOZEMS, lithic and bouldery phase)
x, h

Soils developed on basic igneous rocks (serpentinites, basalts, nepheline phonolites; older basic tuffs included)

20 H = somewhat excessively drained, shallow to moderately deep, dark reddish brown, friable, gravelly clay, with acid humic topsoil (humic CAMBISOLS, partly paralithic phase)
x, h

21 H = well drained, shallow, dark reddish brown, friable, rocky and stony clay loam (nito-chromic CAMBISOLS, lithic phase; with Rock Outcrops)
x,m

Soils developed on acid igneous rocks (rhyolites, aplites), with recent volcanic ash admixture

22 H = somewhat excessively drained, shallow, dark reddish brown, friable, gravelly clay; in places with humic topsoil, partly acid (RANKERS; with ando-haplic PHAEOZEMS, lithic phase and LITHOSOLS)
x, m

Soils developed on quartzites

24 H = somewhat excessively drained, shallow, dark brown, very friable, rocky, sandy loam to clay loam; in many places with acid humic topsoil (RANKERS; with LITHOSOLS and Rock Outcrops)
x, h

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on intermediate igneous rocks (syenites, trachytes, phonolites, etc.)

62 L = well drained, very deep, dark reddish brown to dark red, friable clay (nito-rhodic FERRALSOLS)
h

Soils developed on biotite-hornblende granites, with volcanic ash admixture

63 L = imperfectly drained, very deep, very dark greyish brown to black, very firm sandy clay, with a topsoil of friable, humic, sandy clay loam to clay loam (orthic GREYZEMS)
m, h

Soils developed on quartzites

64 L = well drained, deep to very deep, reddish brown, friable clay, with acid humic topsoil (humic FERRALSOLS)
h

SOILS ON PLATEAU/UPPER-LEVEL UPLAND TRANSITIONS

Soils developed on ashes and other pyroclastic rocks from recent volcanoes

71 L = well drained, deep to very deep, dark brown, friable and smeary, sandy clay to clay, with acid humic topsoil
h (humic ANDOSOLS)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

75 R = association of: – well drained, extremely deep, dark reddish brown, friable clay, with acid humic topsoil; on interfluves
h, m–h (humic NITOSOLS)
– well drained, shallow to moderately deep, dark reddish brown to dark brown, friable clay loam to clay, with acid humic topsoil; on valley sides (humic CAMBISOLS, partly lithic phase)

77 R = well drained, extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil
h (humic NITOSOLS)

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included) and with volcanic ash admixture

82 R = association of: – well drained, extremely deep, dark reddish brown, friable and slightly smeary clay, with acid humic topsoil;
h, m–h on interfluves (ando-humic NITOSOLS)
– well drained, shallow to moderately deep, dark brown, friable, clay loam to clay, with acid humic topsoil; on valley sides (humic CAMBISOLS, partly lithic phase)

Soils developed on ashes and other pyroclastic rocks from recent volcanoes

83 R = association of: – well drained, very deep, dark reddish brown, very friable and smeary, sandy clay loam to clay, with thick
m – h humic topsoil; on interfluves (mollic ANDOSOLS)
– well drained, shallow to moderately deep, dark brown to dark reddish brown, very friable and slightly smeary, clay loam to clay; on valley sides (ando-eutric CAMBISOLS, partly lithic phase)

SOILS ON FOOTSLOPES

Soils developed on colluvium from ashes and other pyroclastic rocks of recent volcanoes

88 F = well drained to moderately well drained, very deep, dark brown, friable and slightly smeary clay, with humic topsoil (ando-
h luvic PHAEOZEMS)

Soils developed on colluvium from acid igneous rocks (rhyolites), with volcanic ash admixture

89 F = moderately well drained to imperfectly drained, deep, dark reddish brown, mottled, friable clay loam, with humic topsoil and
m, h deeper subsoil of compact clay (gleyic PHAEOZEMS)

Soils developed on colluvium from basic igneous rocks (serpentinites, basalts, etc.)

91 F = well drained, deep to very deep, dusky red to dark reddish brown, friable clay, often with humic topsoil (nitorhodic FERRAL-
h SOLS, with verti-mollic NITOSOLS)

Soils developed on colluvium from quartzites

94 F = well drained, deep to very deep, reddish brown to yellowish red, friable, sandy loam to clay, often with acid humic topsoil
m – h (humic ACRISOLS; with luvic ARENOSOLS)

SOILS ON PIEDMONT PLAINS

Soils developed on alluvium from undifferentiated Basement System rocks

114 Y = imperfectly drained, very deep, very dark grey to black, very firm, cracking, gravelly clay to clay, with calcareous deeper
h subsoil; in places gravelly (verto-eutric PLANOSOLS)

115 Y = poorly drained, very deep, dark greyish brown to very dark grey, mottled, firm to very firm, clay, abruptly underlying a
m, h topsoil of friable, sandy clay loam; in places with a sodic deeper subsoil (eutric PLANOSOLS; with solodic PLANOSOLS)

116 Y = complex of moderately well drained to poorly drained, very deep, dark brown to dark grey, firm to very firm, sandy clay to
h clay, in places stratified, sodic and/or cracking (PLANOSOLS, GLEYSOLS, SOLONETZ, VERTISOLS and FLUVISOLS)

SOILS ON UPPER-LEVEL UPLANDS

Soils developed on acid igneous rocks (rhyolites), with volcanic ash admixture

118 U = well drained, deep to very deep, dark reddish brown, friable and slightly smeary, silty clay loam, with thick humic topsoil
m (andoluvic PHAEOZEMS)

SOILS ON UPPER MIDDLE-LEVEL UPLANDS

Soils developed on Tertiary or older basic igneous rocks (basalts, nepheline phonolites, etc.; basic tuffs included)

121 U = well drained, extremely deep, dark reddish brown, friable clay, with humic topsoil
h (mollic NITOSOLS)

122 U = well drained, extr. deep, dark reddish brown, friable clay
h (eutric NITOSOLS)

125 U = well drained, extremely deep, dark reddish brown to dark red, friable clay, with acid humic topsoil
h (humic NITOSOLS)

Soils developed on intermediate igneous rocks (syenites, andesites, etc.), with volcanic ash admixture

126 U = well drained, extremely deep, reddish brown, friable clay, with thick humic topsoil
h ((dystro-) mollic NITOSOLS)

Soils developed on various rocks with volcanic ash admixture

140 U = moderately well drained, moderately deep, reddish brown to red, firm clay loam, with humic topsoil
m (ando-luvic PHAEOZEMS)

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on ashes and other pyroclastic rocks from recent volcanoes

141 U = well drained, deep to very deep, dark reddish brown, friable and smeary, silty clay to clay, with humic topsoil (mollic ANDOSOLS)
h

Soils developed on intermediate igneous rocks (andesites, etc.)

145 U = well drained, very deep, dusky red to dark red, friable clay
h (nito-rhodic FERRALSOLS)

Soils developed on undifferentiated Basement System rocks

161 U = well drained, shallow, dark brown to dark yellowish brown, friable, gravelly sandy clay loam to sandy clay, over soft rock
x, m – h (eutric CAMBISOLS, paralithic phase)

SOILS ON LOWER-LEVEL UPLANDS

Soils developed on basic igneous rocks (basalts, etc.)

171 U = well drained, moderately deep, red, firm clay, with humic topsoil; with inclusions of imperfectly drained, deep, dark grey,
x, m – h mottled, very firm clay (chromo-luvic PHAEOZEMS; with gleyic LUVISOLS)

Soils developed on intermediate igneous rocks (andesites, etc.)

173 U = well drained, shallow, dark reddish brown to brown, sandy clay loam to gravelly clay, partly over petrophlinthite („murram
h cuirass" soils (50–75 %) and eutric CAMBISOLS, lithic or petroferric phase; with orthic LUVISOLS)

SOILS ON UPLAND-PLAIN TRANSITIONAL LANDS

Soils developed on basic igneous rocks (basalts, etc.) with volcanic ash admixture

212 U = association of: – imperfectly drained, deep, very dark greyish brown to very dark grey, very firm clay, abruptly under-lying
m, h a topsoil of friable silty clay loam; on straight to convex slopes (eutric PLANOSOLS)
– imperfectly drained, deep, very dark greyish brown to very dark grey, very firm, cracking clay; in places sodic on flat interfluves (chromic VERTISOLS)

Soils developed on acid igneous rocks (rhyolites), with volcanic ash admixture

213 U = association of: – poorly drained, deep, very dark grey, very firm, cracking clay, often abruptly underlying a topsoil of friable
m, h humic loam, on flat parts (eutric PLANOSOLS; with chromic VERTISOLS)
– well drained, moderately deep, dark reddish brown, firm clay loam, with humic topsoil; on slopes (chromo-luvic PHAEOZEMS)

SOILS ON NON-DISSECTED EROSIONAL PLAINS

Soils developed on granites, with volcanic ash admixture

224 Pn = imperfectly drained, deep, dark greyish brown, mottled, very firm, gravelly clay loam to clay, abruptly underlying a thick
x, m – h topsoil of friable loam (eutric PLANOSOLS)

Soils developed on granites, with predominant volcanic ash influence

225 Pn = imperfectly drained, moderately deep, very dark greyish brown, very firm, slightly sodic, gravelly clay, abruptly underlying a
x, m – h topsoil of friable loam (solodic PLANOSOLS)

Soils developed on biotite gneisses, with volcanic ash admixture

227 Pn = imperfectly drained, deep, very dark grey to very dark greyish brown, very firm clay (hardpan), with a topsoil of friable clay
m, h loam (verto-orthic GREYZEMS)

SOILS ON LACUSTRINE PLAINS

Soils developed on sediments from lacustrine mudstones

324 Pl = poorly drained, shallow to deep, very dark brown to very dark grey, firm to very firm, slightly sodic, cracking clay (upper level
h of Kano plains) (chromic VERTISOLS, sodic and partly lithic phase)

325 Pl = poorly drained, very deep, very dark grey to black, very firm, slightly sodic, cracking clay, with calcareous deeper subsoil
h (lower level of Kano plains) (pellic VERTISOLS, sodic phase)

SOILS ON BOTTOMLANDS

Soils developed on infill from undifferentiated volcanic rocks

337 B = imperfectly drained, very deep, dark brown to dark grey, firm, slightly to moderately saline, moderately sodic, cracking clay;
m – h in many places calcareous (chromic and pellic VERTISOLS, saline-sodic phase)

Soils developed on infill from volcanic ashes

338 B = imperfectly drained to poorly drained, moderately deep, dark greyish brown, mottled, very firm clay loam (hardpan), abruptly
m underlying a topsoil of acid humic friable loam (humic PLANOSOLS)

SOILS ON FLOODPLAINS

Soils developed on sediments from various sources (recent floodplains)

367 A = poorly drained, deep, dark greyish brown, mottled, firm clay, with acid humic topsoil
h (humic GLEYSOLS)

1) Soil texture-classes

h	=	heavy
l	=	light
m	=	medium
x	=	stony or bouldery
v	=	varying texture
m – h	=	medium **to** heavy
m, h	=	medium **and** heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-climatic Zone Map of Kenya, scale 1:1 000 000. Expl. Soil Survey Rep. E1, Nairobi 1982. See this map also for colours; symbols simplified here.

2) Moderate to high fertility under forest, low fertility after cultivation (humus erosion)

POPULATION AND LAND

The result of the Census in September 1979 showed 633,348 people in the Kericho District (Table 4). Of this figure, 4.7 % lived in Kericho Township and 1.6 % in the trading centres. Consequently about 94 % of the total population depended on agriculture for a living, strictly speaking on 337,500 ha of agricultural land (Table 6), i.e. only 2.88 ha per household and 0.56 ha per person were available on average (Table 6).

Comparing the minimum with the maximum acreage per location, in the area of Mosop (mainly LH 1), only 1.81 ha were available per household and 0.43 ha per person – in Soin (mainly UM 2) however, 5.99 ha per household and 1.43 ha per person. In the first case, and in the majority of the district due to population growth, agricultural intensification is very necessary, and in the second case a certain degree of mechanization would help to produce a saleable surplus. There are several locations in the Tea-Dairy Zone which have more than 0.5 ha per person, which would support more people if more tea were planted.

KERICHO DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Emkwen	21 198	22 155	43 353	6 694	255	169
Sigor	15 319	17 451	32 770	6 718	239	136
Longisa	26 375	28 768	55 143	9 830	344	160
Ndanai	17 622	19 161	36 783	6 258	279	131
Kongasis	16 173	17 730	33 903	6 238	279	121
Sot Division	96 687	105 265	201 952	35 738	1 398	144
Konoin	34 041	27 113	61 154	13 077	348	175
Techoget	29 208	28 642	57 850	10 586	245	235
Kisyaara	22 277	21 895	44 172	7 839	221	199
Buret Division	85 526	77 650	163 176	31 502	815	200
Waldai	44 002	39 001	83 003	16 275	372	223
Soin	11 707	11 847	23 554	5 609	387	60
Mosop	23 908	20 301	44 209	10 553	213	207
Belgut Division	96 032	84 337	180 369	39 886	1 040	173
Kipkelion	28 663	28 927	57 590	11 220	512	112
Londiani	15 149	15 112	30 261	6 501	163	184
Kipkelion Division	43 812	44 039	87 851	17 721	675	129
Kericho District	322 057	311 291	633 348	124 847	3 931	161

KERICHO DISTRICT

TABLE 5: COMPOSITION OF HOUSEHOLDS
PER
LOCATION AND DIVISION[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Emkwen	6665	3.36	1.93	0.51	0.59	6.40
Sigor	6699	2.55	1.22	0.46	0.69	4.88
Longisa	9810	2.84	1.60	0.64	0.53	5.61
Ndanai	6226	2.99	1.49	0.72	0.69	5.89
Kongasis	6228	2.65	1.38	0.62	0.78	5.44
Division Sot	35628	2.94	1.54	0.59	0.64	5.64
Location:						
Konoin	13047	1.15	0.98	0.38	0.66	4.68
Techoget	10555	2.95	1.33	0.30	0.84	5.42
Kisyaara	7874	3.04	1.44	0.50	0.57	5.56
Division Buret	31476	2.86	1.21	0.38	0.70	5.15
Location:						
Waldai	1626	2.81	1.08	0.60	0.59	5.09
Soin	5596	2.49	0.89	0.45	0.36	4.19
Mosop	10541	2.50	0.80	0.44	0.44	4.18
Kericho Township	7463	2.40	0.70	0.39	0.07	3.85
Division Belgut	39861	2.62	0.90	0.50	0.48	4.49
Location:						
Kipkelion	11302	2.91	1.36	0.49	0.32	5.08
Londiani	6583	2.65	1.25	0.42	0.27	4.59
Division Kipkelion	17885	2.80	1.34	0.46	0.30	4.90
DISTRICT: KERICHO	124850	2.76	1.23	0.49	0.55	5.04

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per household as well.

TABLE 6: AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON

Location/Division without townships	in '00 ha = sqkm: Area total Census 79	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps	Non-agricultural land: Others (roads, homesteads, rivers)	Agricultural land	in '00 ha = sqkm, Area in agro-ecological zones, AEZ: UH 1	UH 2	LH 1	LH 2	LH 2–3	LH 3	UM 1	UM 2	UM 2–3	UM 3	UM 4	UM 5	LM 2	LM 3	in ha, Agric. land per household	person
Emkwen	255	1		26	228			125	75		28									3.42	0.52
Sigor	239	13		24	202				3		75					103	21			3.00	0.61
Longisa	344	5		34	305			63	147		95									3.14	0.56
Ndanai	279	10	F.18	28	223				112					13	91	7				3.56	0.61
Kongasis	279		F.10	28	241			2	45		86			13	30	65				3.86	0.71
Sot Division	1 396	29	F.28	140	1 199			190	382		284			26	121	175	21			3.39	0.60
Knonoin	348			35	313			313												2.39	0.51
Techoget	243			25	218			138	20	38		22								2.06	0.37
Kisyaara	221	1		22	198			67				86		45						2.52	0.45
Buret Division	812	1		82	729			518	20	38		108		45						2.32	0.45
Waldai	372	1		37	334			126				147	61							2.04	0.40
Soin	387	12		39	336			6					192					96	42	5.99	1.43
Mosop	213			21	192			171	5				16							1.81	0.43
Belgut Division	972	13		97	862			303	5			147	269					96	42	3.28	0.75
Kipkelion	505	7		51	447	44	12	93	188		62				47			1		3.96	0.78
Londiani	157	2	F.1	16	138		30		92		16									2.10	0.45
Kipkelion Division	662	9	F.1	67	585	44	42	93	280		78				47			1		3.03	0.62
Total rural area	3 842	52	F.29	386	3 375	44	42	1 104	687	38	362	255	269	71	168	175	21	97	42	2.88	0.56

AGRICULTURAL STATISTICS [1)]

The Kericho district is partly farmed by **large plantations** and some large mixed farms and partly by smallholders. At present 13,000 ha of **tea**, producing approximately 10,000 kg of green leaves per ha, and roughly 1,000 ha of **coffee** yielding 250 kg of clean coffee per ha are cultivated in **large enterprises. Tea** is by far the most important cash crop, while the coffee zone is relatively small and (estate) coffee is likely to disappear completely in future.

Small-scale farms cultivate 8,200 ha of **tea** at present, yielding roughly 2,400 kg of green leaves per ha. There are 140 ha of **coffee**, producing as little as 30 kg of clean coffee per ha; the **pyrethrum** output declined during 1975/76–1979/80 from roughly 800 t to 400 t despite the good pyrethrin content of 1.4 %, which indicates organisational and marketing difficulties.

1) For more detailed and up to date information, see FMHB Vol. III/A

KERICHO DISTRICT

TABLE 7 a: TEA

AREA – PRODUCTION – GROWERS – YIELDS – RETURNS[a)]

Small Farmers

Division	Item	Unit	Year				
			1975/76	1976/77	1977/78	1978/79	1979/80
Buret	Area	ha	1,494	1,611	1,854	1,914	2,031
	Production	t	3,319	5,393	6,433	6,325	4,412
	Value	'000 Shs	6,114	18,982	14,346	14,863	9,856
	Growers	No	3,095	3,427	3,729	3,875	4,059
	Yield per ha	kg	2,252	3,548	3,566	3,305	2,172
	Value per ha	Shs	4,092	11,783	7,952	7,765	4,853
	Area per Grower	ha	0.48	0.47	0.48	0.49	0.50
	Returns per Grower	Shs	1,975	5,539	3,847	3,836	2,428
Chepsir	Area	ha	41	41	42	43	44
	Production	t	55	49	84	78	55
	Value	'000 Shs	84	159	190	167	128
	Growers	No	30	30	33	32	33
	Yield per ha	kg	1,341	1,195	2,007	1,814	1,250
	Value per ha	Shs	2,049	3,878	4,524	3,884	2,909
	Area per Grower	ha	1.37	1.37	1.27	1.34	1.7
	Returns per Grower	Shs	2,800	5,300	5,758	5,219	3,879
Konoin	Area	ha	1,507	1,738	1,876	1,977	2,054
	Production	t	4,721	6,560	7,908	8,570	7,202
	Value	'000 Shs	6,449	21,975	17,492	20,053	17,224
	Growers	No	3,182	3,823	4,006	4,186	4,279
	Yield per ha	kg	3,133	3,774	4,163	4,335	3,506
	Value per ha	Shs	4,279	12,644	9,324	16,143	8,415
	Area per Grower	ha	0.47	0.45	0.46	0.47	0.48
	Returns per Grower	Shs	2,026	5,748	3,466	4,790	4,039
Mosop	Area	ha	397	466	490	544	559
	Production	t	641	915	1,160	1,314	1,129
	Value	'000 Shs	968	2,994	2,609	2,839	2,609
	Growers	No	922	1,119	1,169	1,313	1,354
	Yield per ha	kg	1,615	1,964	2,367	2,415	2,020
	Value per ha	Shs	2,438	6,425	5,324	5,219	4,667
	Area per Grower	ha	0.43	0.42	0.42	0.41	0.41
	Returns per Grower	Shs	1,050	2,677	2,231	2,162	1,927
West Sotik	Area	ha	928	943	930	1,097	
	Production	t	1,415	2,120	3,344	2,933	
	Value	'000 Shs	2,207	6,996	8,044	7,156	6,170
	Growers	No	1,102	1,160	1,209	2,962	
	Yield per ha	kg	1,525	2,248	3,730	2,674	
	Value per ha	Shs	2,378	7,419	8,467	6,523	
	Area per Grower	ha	0.84	0.81	0.79	0.37	
	Returns per Grower	Shs	2,000	6,031	6,653	2,416	

a) Source: K.T.D.A.

KERICHO DISTRICT

CONTIN. TABLE 7 a: TEA

AREA – PRODUCTION – GROWERS – YIELDS – RETURNS[a)]

Small Farmers

Division	Item	Unit	Year				
			75/76	76/77	77/78	78/79	79/80
Waldai	Area	ha	890	934	1013	1151	1208
	Production	t	2003	2774	3839	4872	3736
	Value	'000 Shs	3024	9070	8638	10525	8630
	Growers	No	2303	2491	2603	2829	2928
	Yield p.ha	kg	2251	2970	3790	4233	3093
	Value p.ha	Shs	3398	9710	8527	9144	7144
	Area p.Grow.	ha	0.39	0.37	0.38	0.41	0.41
	Ret. p.Grow.	Shs	1113	3641	3318	3720	2947
Bomet Sot.	Area	ha	793	906	980	1097	1144
	Production	t			2595	2933	2458
	Value	'000 Shs			1153	7156	6170
	Growers	No	2041	2375	2746	2962	2964
	Yield p.ha	kg			2647	2674	2149
	Value p.ha	Shs			1177	6523	5393
	Area p.Grow.	ha			0.36	0.37	0.39
	Ret. p.Grow.	Shs			419	2416	2081

a) Source: K.T.D.A.

KERICHO DISTRICT

TABLE 7b: COFFEE
AREA – PRODUCTION – YIELDS[a)]

Co-operatives

Item	Unit	Year				
		74/75	75/76	76/77	77/78	79/80
Area	ha	138	138	138	138	138
Production	t	9	7	2	6	4
Yield	kg/ha	65	51	15	43	29

Estates

Name	Item	Unit	Year				
			74/75	75/76	76/77	77/78	79/80
Songhor/ Koru	Area	ha	454	454	411	453	483
	Production	t	52	57	46	37	59
	Yield	kg/ha	115	126	120	82	122
Fort Ternan/ Lumbwa	Area	ha	676	676	656	675	675
	Production	t	129	105	79	68	264
	Yield	kg/ha	190	155	120	101	391

TABLE 7 c: PYRETHRUM
TRENDS IN PRODUCTION AND QUALITY[b)]

Item	Year				
	75/76	76/77	77/78	78/79	79/80
Production in t dried flowers	823	770	462	381	368
Pyrethrin content %	1.4	1.4	1.4	1.5	1.4

Sources: a) C.B.K.
b) Pyrethrum Board

SMALL FARM SURVEY AND STATISTICS OF MEDIUM TO LARGE FARMS

SMALL FARM SURVEY (SFS)[1]

The SFS was carried out in the Litein/Kapkatet area (AEZ LH 1–2 + UM 1) and in the Sigor region (AEZ LH 3 + UM 4). While the LH 1–2 + UM 1 region offers ideal conditions for small-scale farming – high, well-distributed rainfall and good (mostly Nitosols) soils – farming in the LH 3 + UM 4 zones is not only affected by low rainfall but often by heavy soils (black clays, etc.) which make cultivation difficult and limits even further the crops which could be cultivated because of poor drainage.

The average size of the farms included was 4.1 (LH 1) and 7.2 ha[2] (LH 3). The LH 1 farmers planted 21 % of their land with annual crops, 8 % with perennial crops, and had 65 % under pasture. It is important to know that practically all land of this region is arable. The farmers in the LH 3 zone planted 24 % with annual crops and used 71 % of their land for grazing, which indicates the difficulties these farmers face when cultivating the heavy soils. The stocking rate was roughly 3 LU/ha (LH 1) and 2 LU/ha in LH 3. Roughly 80 % of the cattle kept in the LH 1 zone are improved (dairy) cattle, while in LH 3 the proportion of improved cattle was 22 %. Relatively little or no fertilizer was used in either farms (table 8 & 9). In both areas maize and maize and beans cover nearly 90 % of the annual crop area. Besides these crops, potatoes (LH 1) and fingermillet (LH 3) are of some importance (table 13). Practically no goats and/or sheep are kept in LH 1 zone, while in LH 3 they make up 13 % of the total grazing livestock kept. In both areas, male cattle account for 25 % of the total cattle population only, which shows that milk production is a major source of income (table 15). Maize yiels are high in the LH 1 farms, roughly 4,000 kg/ha, a fact which is supported by the NCPB Survey results of 4,200 kg/ha. The farmers in the LH 3 zone harvest only half as much but do not use any fertilizer, while in the LH 1 region P-fertilizer application is fairly common (table 19). There is probably no surplus maize production within the district, because the surpluses sold by the farms are purchased and consumed by the large population of plantation workers (table 20). Tea has an evenly spread labour profile and thus is an ideal crop for family farms. The labour profile shows that planting and cultivation of annual crops can be carried out during very limited periods only in LH 3 (the heavy soils quickly become too wet or too dry for manual cultivation), while such difficulties do not exist in the LH 1 zone (graph 21). The output and nutrient input table shows the enormous potential for grass, tea, and maize production in LH 1 and the limitations in AEZ LH 3 (table 22).

Ideal farming conditions exist in about two-thirds of the Kericho district area. Considerable production increases are possible if labour productivity is increased through mechanization. Tea yield increases are hampered by the marginal returns on fertilizer use (1 kg N + 0.25 P_2O_5 + 0.25 K_2O = approximately + 20 to + 30 kg green leaves), by the high labour demand and the possibility for most farmers to earn better returns on their work input when concentrating on milk production. The farmers of the region enjoy an exceptionally high standard of living.

1) For more detailed and up to date information, see FMHB Vol. III/B
2) For holding sizes, see also table 6

STATISTICS[1] OF MEDIUM TO LARGE FARMS

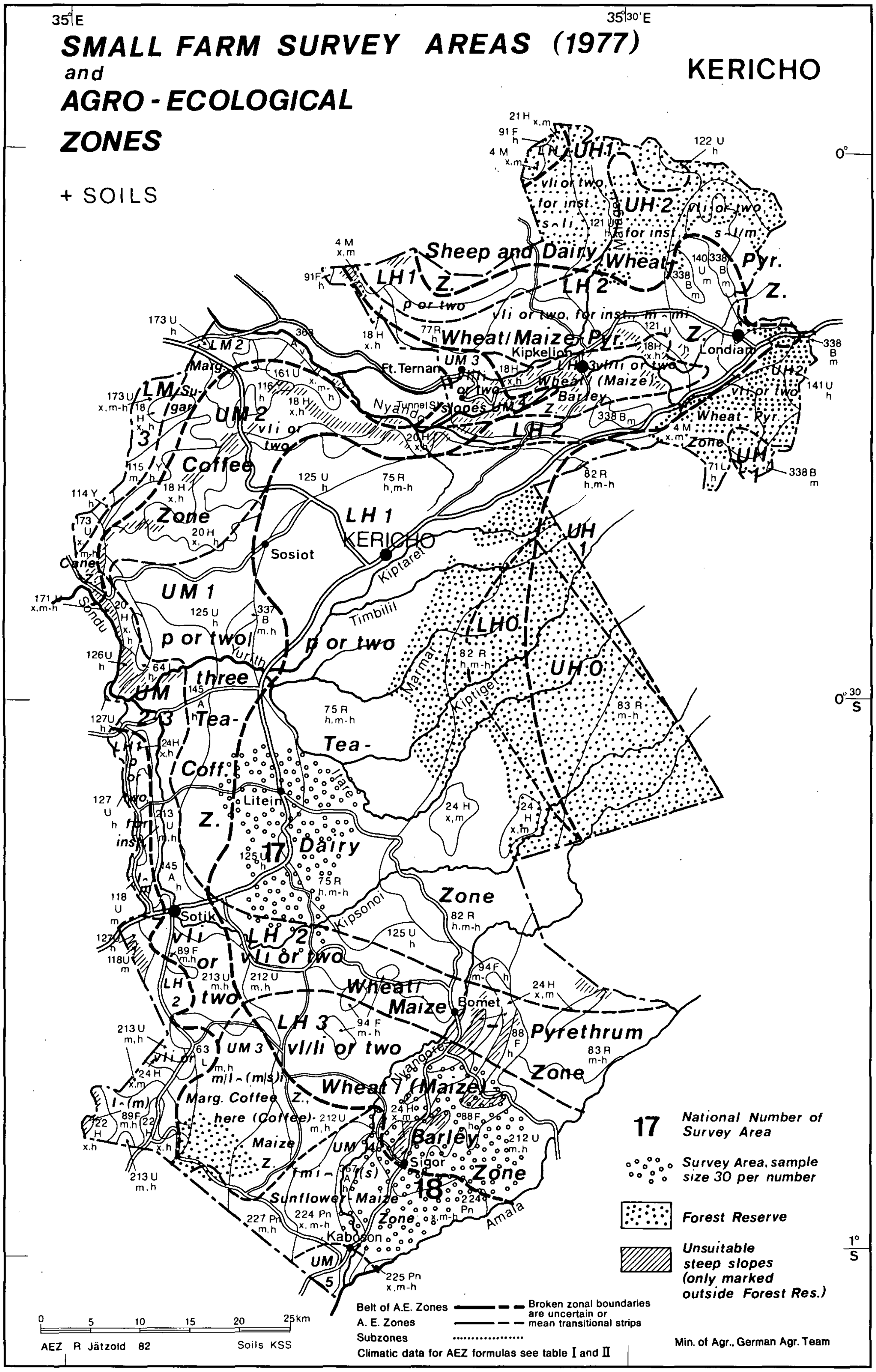
The district has a history of both large and small farm cultivation. The data shown in the tables refer to farms above 20 ha in size, but there has been a continuous change in farm sizes and a shift in farm organization since Independence. The accuracy of the statistics available is therefore limited.

Approximately 85,000 ha were cultivated by mixed farms and tea plantations in the district during 1974. It is estimated that roughly 50 large mixed farms of about 400 ha will continue to farm 20,000 ha in future, while roughly 40,000 ha, at present commonly owned and farmed, will be subdivided among their 16,000 owners to form smallholdings of 2.5 ha of land on average.[2]

About 13,000 ha of tea are cultivated in the Kericho/Sotik area by large estates yielding about 10,000 kg of green leaves per ha.

Table 10 considers only legalized farm size changes and therefore does not reflect the above-described development.[3] Approximately 220 tractors are used on the farms (above 20 ha), roughly one per 60 ha. It must, however, be taken into consideration that some of these machines are also used for contract work (table 11). Roughly two-thirds of the land is used for cereal production and one-third for forage (table 14). Most of the dairy cattle are kept in herds of 20–200 head, beef cattle in herds of 50–100 head, while sheep were kept in comparatively small flocks of 25–50 head only (table 17). The numbers of grazing livestock have increased during the past five years; non-grazing stock has very limited importance (table 16). The yield assessment done in table 18 also reflects the potential of the large farms.

1) For more up to date information, see FMHB Vol. III/A and III/B; see also Land : Population ratio, table 6
2) Large Farm Sector Study 1977
3) It is planned to carry out a more comprehensive farm management survey in the Rift Valley, which should yield better data towards 1985/1986.


SMALL FARM SURVEY AREAS (1977)
and
AGRO-ECOLOGICAL
ZONES
+ SOILS
KERICHO
35°E
35°30'E
0°
0°30' S
1° S
Sheep and Dairy Z.
Wheat/Maize-Pyr. Z.
Wheat-Pyr. Zone
Coffee Zone
Tea-Coff. Z.
Tea-Dairy Zone
Wheat/Maize-Pyrethrum Zone
Wheat/(Maize)-Barley Zone
Marg. Coffee Z.
Sunflower-Maize Zone
LH 1
LH 2
LH 3
UH 1
UH 2
UH 0
LH 0
UM 1
UM 2
UM 3
UM 4
UM 5
LM 2
LM 3
Kericho
Kipkelion
Londiani
Ft. Ternan
Sosiot
Litein
Sotik
Bomet
Sigor
Kaboson
Kiptaret
Timbilil
Yurith
Sondu
Marmar
Kiptiget
Kipsonoi
Nyangores
Amala
17
18
17 National Number of Survey Area
Survey Area, sample size 30 per number
Forest Reserve
Unsuitable steep slopes (only marked outside Forest Res.)
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 5 10 15 20 25 km
AEZ R Jätzold 82
Soils KSS
Min. of Agr., German Agr. Team

KERICHO DISTRICT

AEZ: LH 1–2 + UM 1

TABLE 8 a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 17

Item	Unit	Farm Size & Land Use, Livestock on Farm, Farm Size Group: small	medium	large
Farm Size Total	ha	1.7	4.2	1o.4
Land Use: Annual Crops 1) First Season				
Maize	ha	o.3	o.8	o.7
Maize & Beans	ha	o.2	o.4	o.3
Fingermillet	ha	-	-	-
Beans	ha	-	o.1	-
	ha			
Total	ha	o.5	1.3	1.o
Second Season 1) Beans	ha	-	-	-
English Potatoes	ha	-	-	-
	ha			
	ha			
Permanent Crops 1) Pyrethrum	ha	o.1	o.1	-
Tea	ha	o.1	o.3	o.6
Coffee	ha	-	-	-
	ha			
Portion of total	%	12 %	1o %	6 %
Grazing & Forage	ha	o.9	2.3	8.6
portion of total	%	39 %	55 %	86 %
Other Land Use	ha	o.1	o.2	o.2
Livestock on Farm:				
Cattle: local	LU	o.6	1.6	2.6
improved	LU	3.2	5.2	15.9
Sheep & Goats	LU	o.2	o.4	o.7
Total	LU	4.o	7.2	19.2

Item	Unit	Intensity, Labour/Persons on Farm, Home Consumption, Farm Size Group: small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.4	o.4	o.2
Portion of improved cattle kept	%	9o %	76 %	86 %
Portion of Farmers owning a Plough	%	3o %	5o %	2o %
Labour on Farm:				
Family Adults	persons	2.1	2.5	2.2
Perm. Hired Labour	"	o.4	o.3	1.6
Children > 14 years	"	1.4	1.8	3.8
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.1o	o.5	2.6o
Children < 14 years	"	3.o4	-	3.o4
Subsistence Units	SU	3.92	o.5	4.42
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1o91	1759	
Beans	kg	491	785	
Fingermillet	kg	33	52	
English Potatoes	kg	3	1	
Cabbage	kg	2	-	
	kg			
	kg			
	kg			

Other Crops cultivated: Sorghum, Cabbage, Beans, Potatoes

1) Major crops only considered

2) Based on 1979 Census figures

KERICHO DISTRICT

AEZ: LH 3 + UM 4

TABLE 8 b: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 18

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	2.4	6.8	16.5
Land Use: Annual Crops[1)] First Season				
Maize	ha	o.4	o.8	1.8
Fingermillet	ha	-	o.2	o.2
Beans	ha	-	-	-
Maize & Beans	ha	o.2	o.7	1.1
	ha			
Total	ha	o.6	1.7	3.1
Second Season[1)]				
Beans	ha	-	o.1	o.1
	ha			
	ha			
Total	ha	-	o.1	o.1
Permanent Crops[1)]	ha			
	ha			
	ha			
	ha			
Portion of total	%			
Grazing & Forage	ha	1.3	4.3	13.6
portion of total	%	54 %	63 %	82 %
Other Land Use	ha	o.5	o.8	o.4
Livestock on Farm:				
Cattle: local	LU	3.8	8.3	9.8
improved	LU	1.2	2.8	3.6
Sheep & Goats	LU	o.7	2.1	o.9
Total	LU	5.7	13.2	14.3

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.3	o.3	o.2
Portion of improved cattle kept	%	24 %	25 %	27 %
Portion of Farmers owning a Plough	%	3o %	7o %	8o %
Labour on Farm:				
Family Adults	persons	3.4	3.o	3.3
Perm. Hired Labour	"	-	o.1	-
Children > 14 years	"	2.5	1.9	3.5
Persons living on Farm[2)] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	1.77	o.73	2.5o
Children < 14 years	"	1.95	-	1.95
Subsistence Units	SU	2.94	o.73	3.68
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1355	2184	
Beans	kg	179	284	
Fingermillet	kg	74	116	
English Potatoes	kg	3	1	
Sweet Potatoes	kg	117	66	
	kg			
	kg			
	kg			

Other Crops cultivated: Maize & Fingermillet, Sweet Potatoes

1) Major crops only considered

2) Based on 1979 Census figures

KERICHO DISTRICT

TABLE 9 a: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: LH 1–2 + UM 1

Survey Area 17

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	4.1	14.9	0.7	2.3	0.6	1.9
Avg. 1	4.1	15.4	1.3	2.3	1.9	2.9
Up. Qu.	4.6	19.0	1.0	2.0	1.0	3.0
Lo. Qu.	2.0	6.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	%	Perm. Crops ha	%	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	0.9	21	0.3	8	2.7	65	-	-	0.1	3	0.1	2
Avg. 1	0.9	19	0.4	8	2.9	58	0.1	1	0.6	12	0.1	2
Up. Qu.	1.2	38	0.5	17	2.9	65	-	-	-	-	0.2	4
Lo. Qu.	0.4	15	0.1	4	0.8	40	-	-	-	-	-	-
Total	26.2		9.9		81.3		0.1		4.2		2.7	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.9	1.9	2.9	78.8
Avg. 1			2.9	87.5
Up. Qu.	1.0	2.5	4.7	96.2
Lo. Qu.	1.0	1.2	2.0	35.7

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	66.3	0.5	2.7	5.9	0.8	-	0.1	-	-	-	-	-	-
Avg. 1	70.1	2.3	5.7	8.0	2.1	-	2.5	0.3	-	0.7	0.5	-	-
Up. Qu.	100.0	-	1.5	6.4	-	-	-	-	-	-	-	-	-
Lo. Qu.	85.7	-	-	2.1	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

KERICHO DISTRICT

TABLE 9 b: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: LH 3 + UM 4

Survey Area 18

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	7.2	31.8	0.9	3.2	-	2.4
Avg. 1	7.2	31.8	1.3	3.2	1.0	3.7
Up. Qu.	8.4	34.0	1.0	4.0	-	3.0
Lo. Qu.	3.2	15.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	1.7	24	-	-	5.1	71	-	-	0.1	1	0.3	4
Avg. 1	1.7	22	0.1	1	5.1	66	-	-	0.5	7	0.3	4
Up. Qu.	2.1	38	-	-	7.0	74	-	-	-	-	0.4	6
Lo. Qu.	0.8	14	-	-	1.6	53	-	-	-	-	0.1	2
Total	51.1		0.1		151.8		-		3.2		7.8	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.0	1.5	2.1	22.0
Avg. 1			2.1	81.1
Up. Qu.	1.0	2.7	4.5	-
Lo. Qu.	1.0	1.1	1.7	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	56.8	2.3	-	0.6	-	0.5	-	-	-	-	-	-	-
Avg. 1	66.3	313.3	-	3.6	-	62.7	-	-	-	0.4	-	-	-
Up. Qu.	100.0	-	-	-	-	-	-	-	-	-	-	-	-
Lo. Qu.	58.8	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

TABLE 10: **DISTRIBUTION OF LAND BY HOLDING SIZE**
Medium-Large Farms[a)]

Size Group in ha	Number of Holdings in Size Group															
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
- 19	5	5	7	7	9											
20 - 49	9	9	8	8	7											
50 - 99	10	10	12	13	12											
100 - 199	19	19	20	22	24											
200 - 299	16	17	16	18	21											
300 - 399	21	20	21	21	20											
400 - 499	13	14	14	13	13											
500 - 999	44	43	43	44	39											
1,000 - 1,999	17	17	17	16	16											
2,000 - 3,999	3	3	3	2	2											
4,000 - 19,999	1	1	1	1	1											
20,000 - and over	-	-	-	-	-											

TABLE 11: **MAJOR FARM MACHINERY AND IMPLEMENTS ON FARMS**

Machinery/Implements	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Farm Tractors	220	310	208	199	212											
Combine Harvesters	20	16	16	14	6											
Plough & Harrow	194	175	184	155	149											
Cultivators & Tooth Harrow	55	44	44	42	31											
Planters & Sprayers	98	68	37	42	58											

a) farms above 20 ha in size

Source: *Central Bureau of Statistics, Agricultural Census of Large Farms, P. O. Box 30266, Nairobi.*

TABLE 12: **LAND USE**

Medium-Large Farms[a)]

Land Under	In '000 ha								Percent							
	1975	1976	1977	1978	1979	1980	1981	1982	1975	1976	1977	1978	1979	1980	1981	1982
Temporary Crops	12.8	12.0	13.4	12.8	10.6				13	13	14	13				
Temporary Leys & Meadows	0.5	0.5	0.8	0.3	0.4				1	1	1	1				
Temporary Fallow Land	2.9	2.6	3.3	3.2	2.6				4	3	3	3				
Subtotal	16.2	15.1	17.5	16.3	13.6				18	17	18	17				
Permanent Crops:																
Permanent Meadows (natural pasture)	41.5	42.3	41.7	39.3	34.7				44	45	44	41				
Permanent Crops (incl. tree crops)	15.1	14.7	15.4	15.8	15.2				15	16	16	17				
Subtotal	56.6	57.0	57.1	55.1	49.9				59	61	60	58				
Forest Land	10.9	10.5	10.2	8.2	7.5				11	11	11	9				
Other Land	11.4	10.7	10.5	15.4	22.1				12	11	11	16				
Subtotal	22.3	21.2	20.7	23.6	29.6				23	22	22	25				
TOTAL	95.1	93.3	95.3	95.0	93.1				100	100	100	100				

Land Under	In '000 ha								Percent							
	1983	1984	1985	1986	1987	1988	1989	1990	1983	1984	1985	1986	1987	1988	1989	1990
Temporary Crops																
Temporary Leys & Meadows																
Temporary Fallow Land																
Subtotal																
Permanent Crops:																
Permanent Meadows (natural pasture)																
Permanent Crops (incl. tree crops)																
Subtotal																
Forest Land																
Other Land																
Subtotal																
TOTAL																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P. O. Box 30266, Nairobi

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TABLE 13 a: **CROPPING PATTERN**

AEZ: LH 1–2 + UM 1

Survey Area 17

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.5	0.9	0.80	0.00	15.8	55.9
Fingermillet	0.0	0.1	0.00	0.00	0.4	1.3
Beans	0.0	0.4	0.00	0.00	0.8	2.8
Cabbage	0.0	0.0	0.00	0.00	0.0	0.1
Pyrethrum	0.1	0.2	0.20	0.00	2.8	9.9
Maize & Beans	0.3	0.7	0.40	0.00	8.3	29.5
FMlt & Sorghum	0.0	0.1	0.00	0.00	0.1	0.4
Total					28.2	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Beans	0.0	0.2	0.00	0.00	0.2	6.4
Engl. Potatoes	0.0	0.1	0.00	0.00	0.1	3.8
Pyrethrum	0.1	0.2	0.20	0.00	2.8	89.7
Total					3.1	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Coffee	0.0	0.2	0.00	0.00	0.4	6.1
Tea	0.2	0.5	0.40	0.00	6.2	93.9
Total					6.6	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

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TABLE 13 b: **CROPPING PATTERN**

AEZ: LH 3 + UM 4

Survey Area 18

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.9	1.2	1.20	0.00	27.4	54.8
Fingermillet	0.1	0.3	0.20	0.00	2.8	5.6
Beans	0.0	0.5	0.00	0.00	1.4	2.8
Engl. Potatoes	0.0	0.2	0.00	0.00	0.2	0.4
Sweet Potatoes	0.0	0.2	0.00	0.00	0.5	1.0
Others	0.0	0.1	0.00	0.00	0.1	0.2
Maize & FMilt	0.0	0.1	0.00	0.00	0.1	0.2
Maize & Beans	0.6	1.9	0.60	0.00	17.4	34.9
Total					49.9	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Beans	0.1	0.5	0.00	0.00	2.3	100.0
Total					2.3	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Sweet Bananas	0.0	0.1	0.00	0.00	0.1	100.0
Total					0.1	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

TABLE 14: **CROPPING PATTERN**
Medium-Large Farms a)

Land under:	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Cereals (in '000 ha)																
Maize	3.9	3.5	3.5	3.2	4.2											
Wheat	2.2	1.8	1.5	0.9	1.0											
Barley	0.6	0.8	0.8	0.8	0.3											
Oats	0.1	0.1	0.1	0.8	0.1											
Others	-	-	-	-	0.1											
Total	6.8	6.2	5.9	5.7	5.7											
Grassing/Fodder Crops (in ha)																
Leys b)	-	-	-	-	356											
Nat. Pasture b)	-	-	-	-	2609											
Lucerne	6	5	6	-	1											
Silage Crops	18	22	18	3	23											
Others	18	6	10	20	41											
Total	42	33	34	23	3300											
Vegetables/Root Crops (in ha)																
Potatoes	19	48	41	49	55											
Tomatoes	2	2	5	16	16											
Beans & Peas	42	38	129	42	48											
Onions	3	2	2	5	8											
Others	9	4	16	27	42											
Total	75	94	193	139	169											

a) farms above 20 ha in size
b) 1975–78 not recorded
Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P. O. Box 30266, Nairobi

TABLE 15a: HERD COMPOSITION (GRAZING LIVESTOCK)

– in Head & Livestock Units –

AEZ: LH 1–2 + UM 1

Sept. '77, Survey Area 17

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.77	-	0.07	1.70				0.63			0.63
Upper Qu.	1	-	-	3				1.0			1.0
1 - 2 years, Average	0.27	0.10	0.03	1.67				1.03			1.03
Upper Qu.	-	-	-	3				1.5			1.5
Over 2 years, Average	0.13	0.03	0.20		4.17			4.46			4.46
Upper Qu.	-	-	-		4			4.0			4.0
Subtotal(improved) Total	35	4	9	101	125			183.8			183.8
Average	1.17	0.13	0.30	3.37	4.17			6.13			6.13
Upper Qu.	2	-	-	7	4			8.0			-
Lower Qu.	-	-	-	-	-			1.0			-
LU Male Cattle =	11.5 % of total cattle,				Calves + Heifers =			80.8 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	0.03	-	-	0.33		0.23	1.17	0.21	-		0.21
Upper Qu.	-	-	-	-		-	2	0.2	-		0.2
1 - 2 years, Average	-	-	-	0.40				0.18			0.18
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	0.10	0.07	0.33		1.13	0.80	1.13	1.25	-	4.17	1.25
Upper Qu.	-	-	-		2	-	2	-	-	-	-
Subtotal (unimp.) Total	4	2	10	22	34	31	69	49.5	-	125	49.5
Average	0.13	0.07	0.33	0.73	1.13	1.03	2.30	1.65	-	4.17	1.65
Upper Qu.	-	-	-	-	2	-	4	2.0	-	6	2.0
Lower Qu.	-	-	-	-	-	-	-	0.1	-	-	0.1
LU Male Cattle =	25.2 % of total cattle,				Calves + Heifers =			64.7 % of dairy cows			
LU Goats + Sheep =	20.2 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	39	6	19	123	159	31	69	233.3	-	125	233.3
Average	1.30	0.20	0.63	4.10	5.30	1.03	2.30	7.77	-	4.17	7.77
Upper Qu.	2	-	2	8	6	-	4	10.2	-	6	2.0
Lower Qu.	-	-	-	1	2	-	-	2.5	-	-	0.1
LU Male Cattle =	13.9 % of total cattle,				Calves + Heifers =			77.4 % of dairy cows			
LU Goats + Sheep =	4.3 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 15b: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: LH 3 + UM 4

Sept. '77, Survey Area 18

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.20	-	0.07	0.60				0.22			0.22
Upper Qu.	-	-	-	-				-			-
1 - 2 years, Average	0.07	-	0.03	0.43				0.27			0.27
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	0.03	-	0.10		1.80			1.91			1.91
Upper Qu.	-	-	-		-			-			-
Subtotal(improved) Total	9	-	6	31	54			71.7			71.7
Average	0.30	-	0.20	1.03	1.80			2.39			2.39
Upper Qu.	-	-	-	-	-			-			-
Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =	9.3 % of total cattle,				Calves + Heifers =			57.4 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	0.57	-	0.20	2.93		1.53	2.40	1.13	-		1.13
Upper Qu.	1	-	-	4		3	4	1.7	-		1.7
1 - 2 years, Average	-	0.27	0.13	2.87				1.47			1.47
Upper Qu.	-	-	-	4				1.8			1.8
Over 2 years, Average	-	0.33	1.77		5.40	4.37	5.70	5.88	-	8.80	5.88
Upper Qu.	-	-	2		9	5	8	1.5	-	4	1.5
Subtotal (unimp.) Total	17	18	63	174	162	177	243	254.6	-	264	254.6
Average	0.57	0.60	2.10	5.80	5.40	5.90	8.10	8.48	-	8.80	8.48
Upper Qu.	1	-	3	9	9	8	12	11.3	-	12	11.3
Lower Qu.	-	-	-	1	2	-	3	2.8	-	4	2.8
LU Male Cattle =	24.0 % of total cattle,				Calves + Heifers =			107.4 % of dairy cows			
LU Goats + Sheep =	16.5 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	26	18	69	205	216	177	243	326.3	-	264	326.3
Average	0.87	0.60	2.30	6.83	7.20	5.90	8.10	10.87	-	8.80	10.87
Upper Qu.	2	-	4	9	10	8	12	17.0	-	12	11.3
Lower Qu.	-	-	-	2	3	-	3	2.8	-	4	2.8
LU Male Cattle =	20.3 % of total cattle,				Calves + Heifers =			94.9 % of dairy cows			
LU Goats + Sheep =	12.9 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 16: NUMBER OF LIVESTOCK KEPT ON FARMS (IN '000 HEAD)
Medium-Large Farms[a)]

Kind of Livestock	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Dairy Cattle:																
Cows	11.9	12.0	11.2	11.3	13.6											
Heifer & Heifer Calves	5.4	5.4	4.5	5.3	4.0											
Stud Bulls & Bull "	1.2	1.3	1.1	1.6	2.9											
Total	18.5	18.7	16.8	18.2	20.5											
Beef Cattle:																
Cows	1.6	1.5	1.3	2.4	2.7											
Heifer & Heifer Calves	0.7	0.7	0.8	1.1	1.0											
Other Beef Cattle	4.1	3.7	2.0	2.1	3.9											
Total	6.4	5.9	4.1	5.6	7.6											
Sheep:																
Ewes	6.0	6.3	7.3	7.7	9.4											
Rams	0.3	0.2	0.3	0.5	0.6											
Lambs	2.3	3.6	5.2	2.1	8.2											
Others	0.6	1.0	1.1	5.4	1.1											
Total	9.2	11.1	13.9	15.7	19.3											
Pigs:																
Breeding Sows	0.1	0.1	0.1	0.1	0.1											
Breeding Boars	-	-	-	-	-											
Others	0.5	0.4	0.4	0.6	0.5											
Total	0.6	0.5	0.5	0.7	0.6											
Poultry:																
Breeding Stock	-	1.4	0.2	0.6	0.4											
Other Poultry	1.3	0.4	1.8	2.3	1.4											
Total	1.3	1.8	2.0	2.9	1.8											

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

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TABLE 17: HERD AND FLOCK SIZES

Medium–Large Farms[a)]

Stock	Number of Herds and Flocks in Herd Size Groups																															
	Sheep: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
	Cattle: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
	Year: '75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78
Dairy Cattle	9	7	11	12	19	17	23	23	21	22	16	19	16	16	11	13	15	12	15	11	5	5	5	7	19	19	5	20	3	6	19	7
Beef Cattle	10	16	13	18	5	5	11	7	25	17	15	8	4	6	3	2	5	1	1	2	2	2	1	2	1	1	3	1	2	3	2	4
Sheep	18	18	16	13	8	10	10	5	6	4	5	6	5	4	1	1	1	1	-	1					1	4	3	3	4	3	5	6

Stock	Sheep: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
	Cattle: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
	Year: '79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82
Dairy Cattle	10				20				23				13				9				4				23				7			
Beef Cattle	13				9				1				2				4				3				6				5			
Sheep	16				3				4				5				5				1				1				3			

Stock	Sheep: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
	Cattle: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
	Year: '83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86
Dairy Cattle																																
Beef Cattle																																
Sheep																																

Stock	Sheep: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
	Cattle: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
	Year: '87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90
Dairy Cattle																																
Beef Cattle																																
Sheep																																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 18: LIVESTOCK PRODUCTION, SALES AND CONSUMPTION ON FARM
Medium–Large Farms[a)]

Livestock	Produce	Unit	Year							
			1975	1976	1977	1978	1979	1980	1981	1982
Dairy	Milk Production, Total	'000 Litre	8503	6533	7753	9561	10477			
	Milk sold off farm	'000 Litre	-	5454	6753	8203	9760			
	Cattle	'000 Head	0.6	1.6	1.5	0.3	-			
Beef	Sales for slaughter and consumed on farm	'000 Head	1.3	1.7	2.2	1.5	1.1			
	Sales for breeding and fattening	'000 Head	0.5	0.5	0.6	0.6	0.2			
Sheep	Total Sales and consumed on farm	'000 Head	-	0.8	2.4	2.8	2.6			
	Wool	'000 kg	3.0	2.9	6.4	19.3	35.1			

Livestock	Produce	Unit	Year							
			1983	1984	1985	1986	1987	1988	1989	1990
Dairy	Milk Production, Total	'000 Litre								
	Milk sold off farm	'000 Litre								
	Cattle	'000 Head								
Beef	Sales for Slaughter and consumed on farm	'000 Head								
	Sales for breeding and fattening	'000 Head								
Sheep	Total Sales and consumed on farm	'000 Head								
	Wool	'000 kg								

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

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TABLE 19a: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: LH 1–2 + UM1 Survey Area 17

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	95	3	27	-	-	-	-	4,100
	UpQu	100	-	26	-	-	-	-	3,938
	LoQu	100	-	12	-	-	-	-	2,250
Beans	Avg.	-	-	-	-	-	-	-	1,425
Cabbage	Avg.	100	-	-	-	1.00	-	-	7,500
Maize & Beans									
Maize	Avg.	90	-	19	-	0.21	-	-	2,977
Beans	Avg.	-	-	1	-	0.21	-	-	416
Maize	UpQu	100	-	18	-	-	-	-	4,050
Beans	UpQu	-	-	-	-	-	-	-	450
Maize	LoQu	100	-	11	-	-	-	-	1,731
Beans	LoQu	-	-	-	-	-	-	-	267
Second Rains									
Beans	Avg.	-	-	9	-	-	-	-	2,475
Engl. Potatoes	Avg.	-	-	-	-	0.25	17	17	4,667
Perennial Crops									
Pyrethrum	Avg.	-	-	12	-	-	1	-	791
	UpQu	-	-	-	-	-	-	-	917
	LoQu	-	-	-	-	-	-	-	480
Tea	Avg.	-	40	10	3	-	-	-	6,188
	UpQu	-	63	5	-	-	-	-	5,882
	LoQu	-	-	-	-	-	-	-	2,857

KERICHO DISTRICT

TABLE 19b: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: LH 3 + UM 4 Survey Area 18

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	94	-	-	-	0.01	-	-	2,065
	UpQu	100	-	-	-	-	-	-	2,704
	LoQu	100	-	-	-	-	-	-	900
Fingermillet	Avg.	-	-	-	-	-	-	-	1,012
	UpQu	-	-	-	-	-	-	-	1,000
	LoQu	-	-	-	-	-	-	-	700
Beans	Avg.	-	-	-	-	-	-	-	625
Sweet Potatoes	Avg.	-	-	-	-	-	-	-	11,139
Maize & Beans									
Maize	Avg.	80	251	4	50	0.08	-	-	2,235
Beans	Avg.	-	-	-	-	-	-	-	492
Maize	UpQu	100	-	-	-	-	-	-	2,250
Beans	UpQu	-	-	-	-	-	-	-	600
Maize	LoQu	-	-	-	-	-	-	-	2,025
Beans	LoQu	-	-	-	-	-	-	-	250
Second Rains									
Maize	Avg.	100	-	5	-	-	-	-	1,245
	UpQu	100	-	9	-	-	-	-	1,350
	LoQu	100	-	-	-	-	-	-	600
Beans	Avg.	-	-	-	-	-	-	-	1,069
	UpQu	-	-	-	-	-	-	-	1,200
	LoQu	-	-	-	-	-	-	-	600

KERICHO DISTRICT

TABLE 20a: DISPOSAL OF CROPS

AEZ: LH 1–2 + UM 1

Survey Area 17

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	43,290	8,190	19	16,650	38	18,450	43
Maize & Beans	29,052	3,600	12	10,285	35	15,167	52
Beans	11,230	54	0	720	6	10,456	93
Fingermillet	890	0	0	0	0	890	100
FMlt & Sorghum	130	0	0	0	0	130	100
Cabbage	300	0	0	240	80	60	20
Second Rains							
Maize & Beans	2,700	0	0	0	0	2,700	100
Beans	990	0	0	190	19	800	81
Engl. Potatoes	560	0	0	480	86	80	14
Permanent Crops							
Coffee	270	270	100	0	0	0	0
Pyrethrum	296	296	100	0	0	0	0

KERICHO DISTRICT

TABLE 20b: DISPOSAL OF CROPS

AEZ: LH 3 + UM 4

Survey Area 18

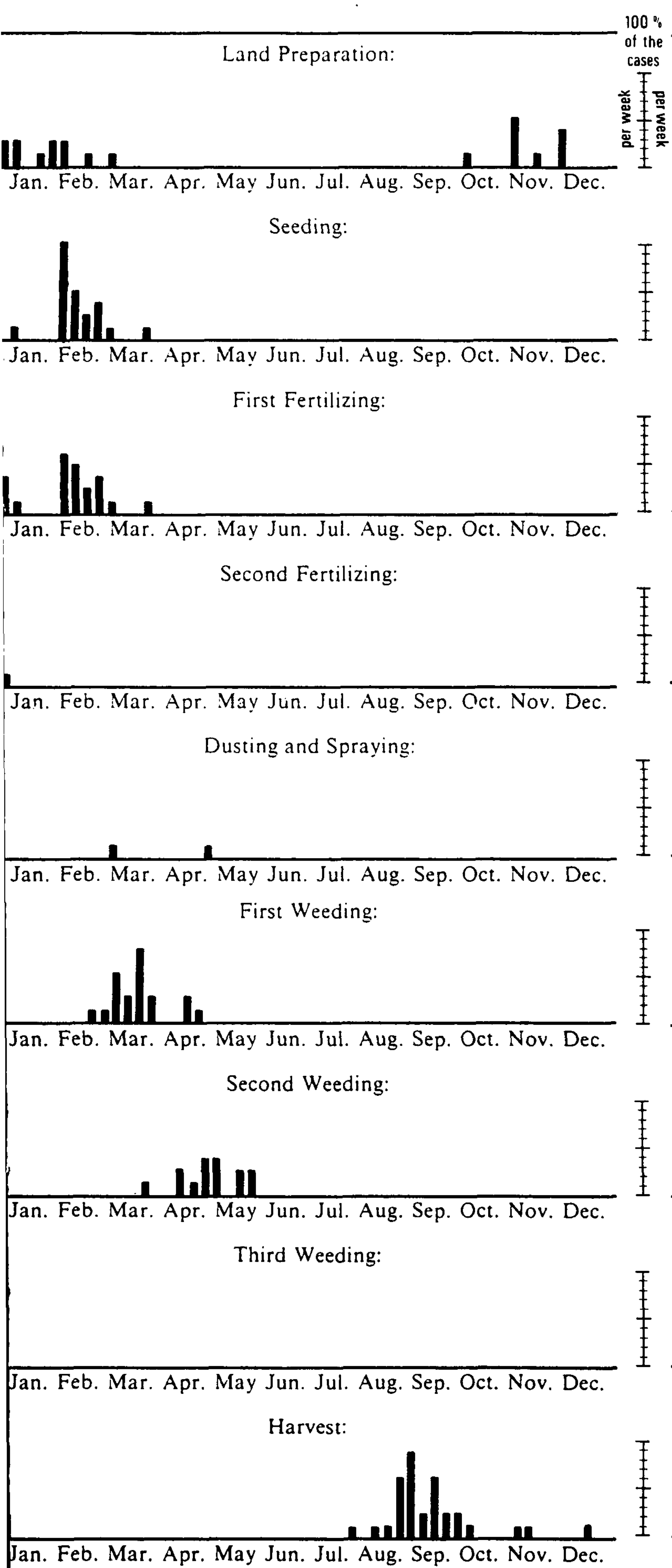
Crops	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	47,640	0	0	19,560	41	28,080	59
Maize & Beans	29,600	0	0	14,170	48	15,430	52
Maize & FMilt	360	0	0	45	13	315	88
Beans	1,230	0	0	900	73	330	27
Fingermillet	2,010	0	0	360	18	1,650	82
Engl. Potatoes	1,800	0	0	1,710	95	90	5
Sweet Potatoes	5,950	0	0	2,450	41	3,500	59
Second Rains							
Maize	4,230	0	0	900	21	3,330	79
Maize & Beans	7,218	0	0	160	2	7,058	98
Beans	1,800	0	0	1,245	69	555	31
Fingermillet	510	0	0	0	0	510	100
Permanent Crops							
Nil							

KERICHO DISTRICT

TABLE 21 a: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 20

AEZ: LH 1–2 + UM 1 Survey Area 17 Sample Size: 30

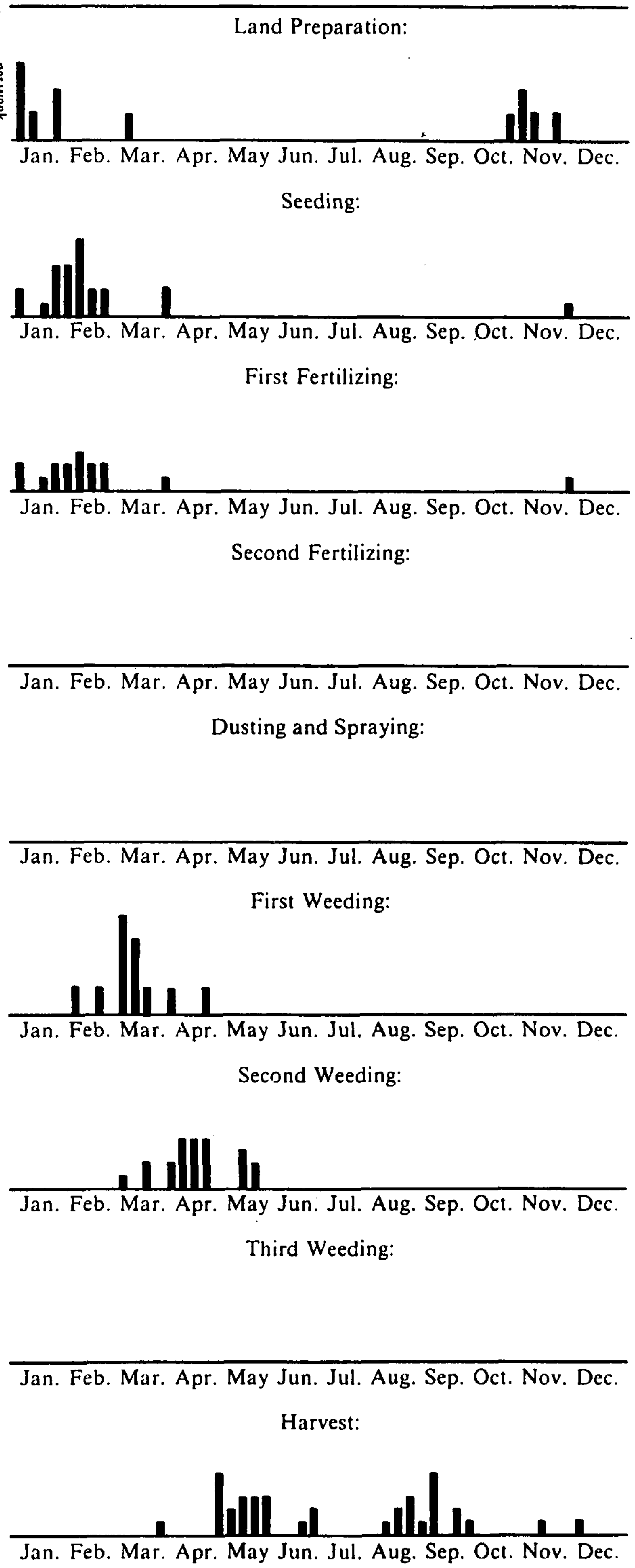


KERICHO DISTRICT

TABLE 21 b: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 24

AEZ: LH 1–2 + UM 1 Survey Area 17 Sample Size: 30

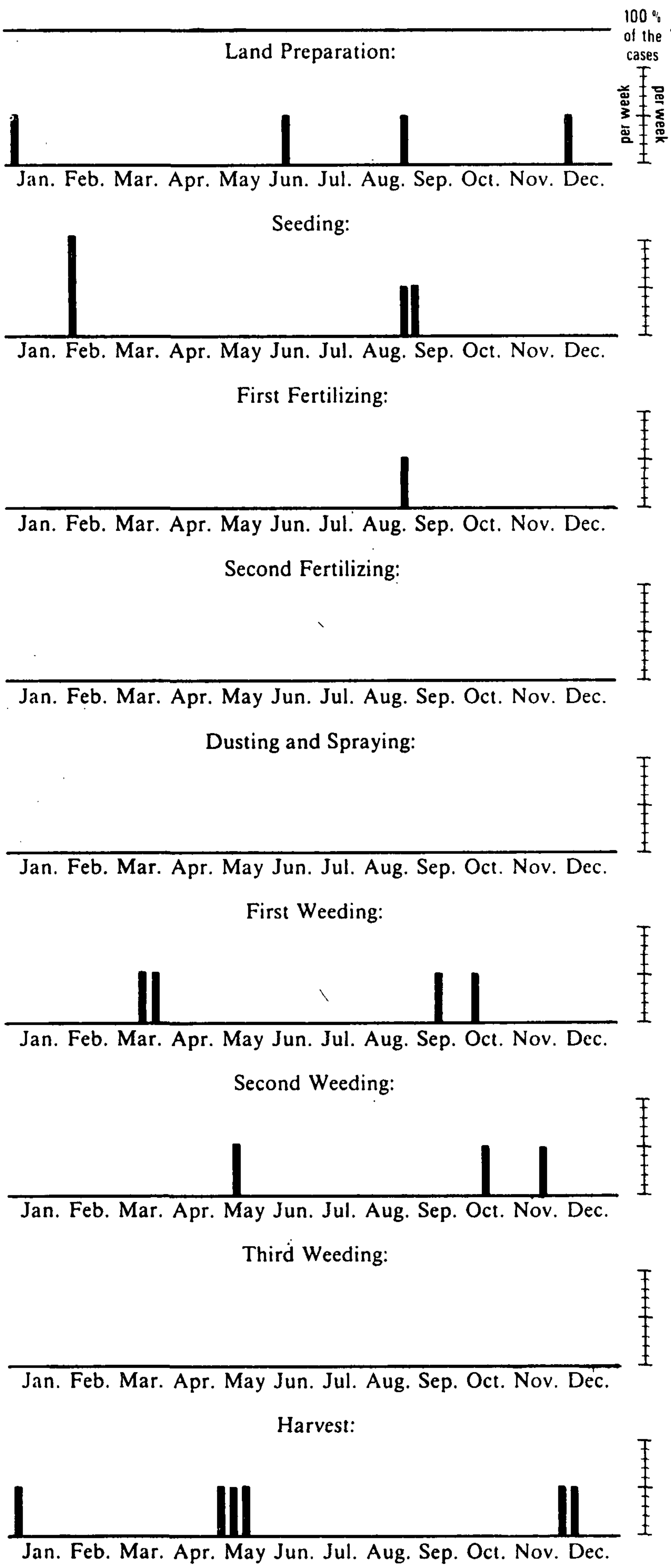


KERICHO DISTRICT

TABLE 21 c: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 **Beans** Cases: 4

AEZ: LH 1–2 + UM 1 Survey Area 17 Sample Size: 30

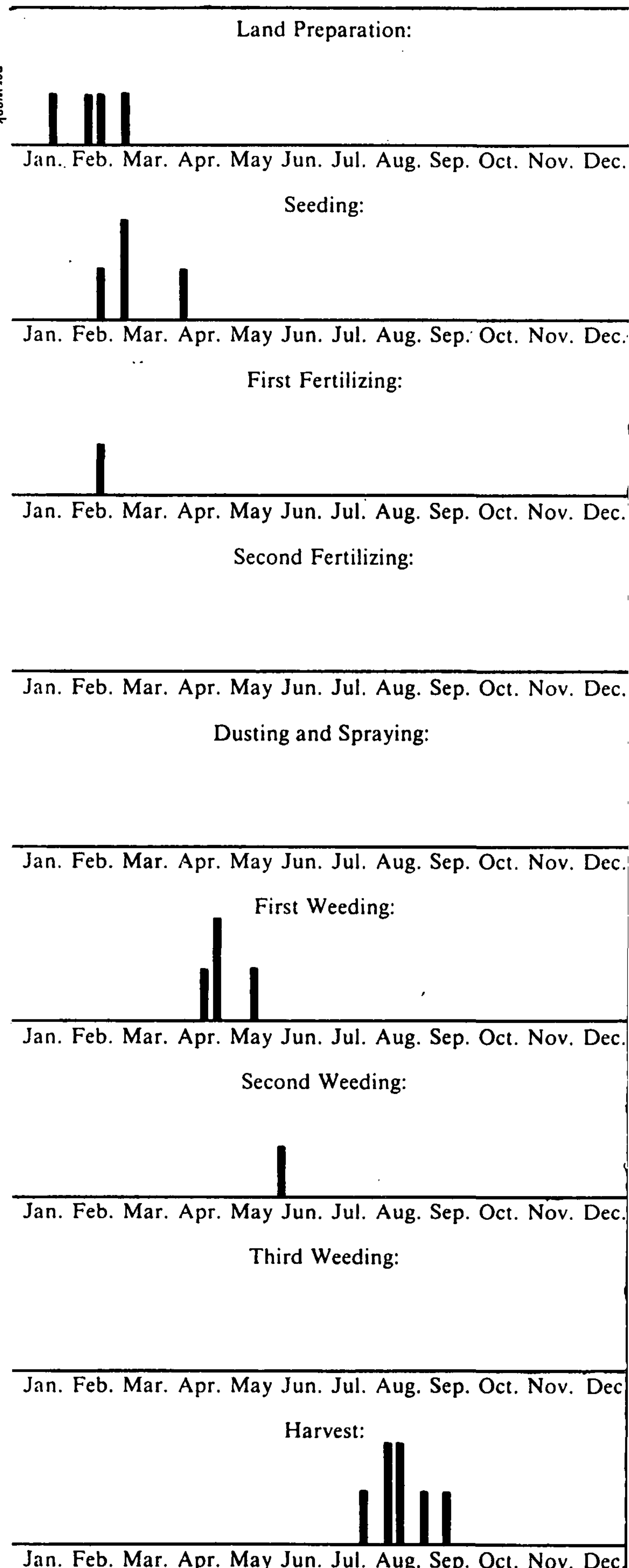


KERICHO DISTRICT

TABLE 21 d: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 12 **Fingermillet** Cases: 4

AEZ: LH 1–2 + UM 1 Survey Area 17 Sample Size: 30

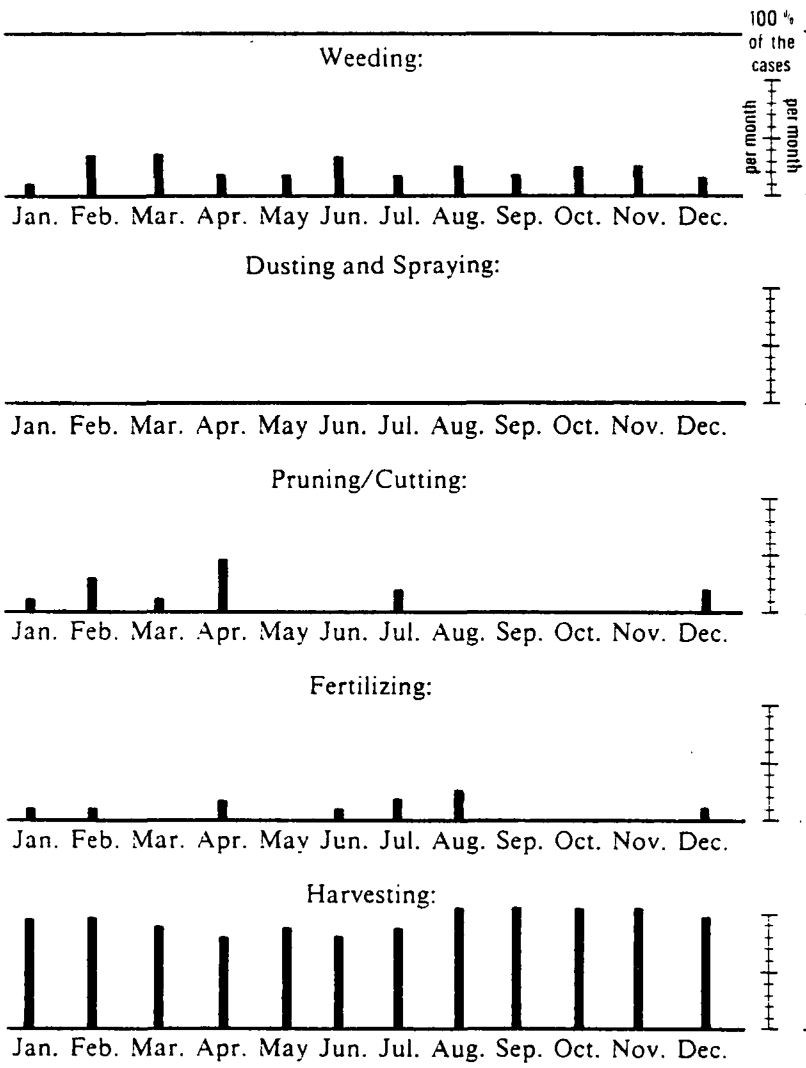


KERICHO DISTRICT

TABLE 21 e: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 **Tea** Cases: 12

AEZ: LH 1–2 + UM 1 Survey Area 17 Sample Size: 30

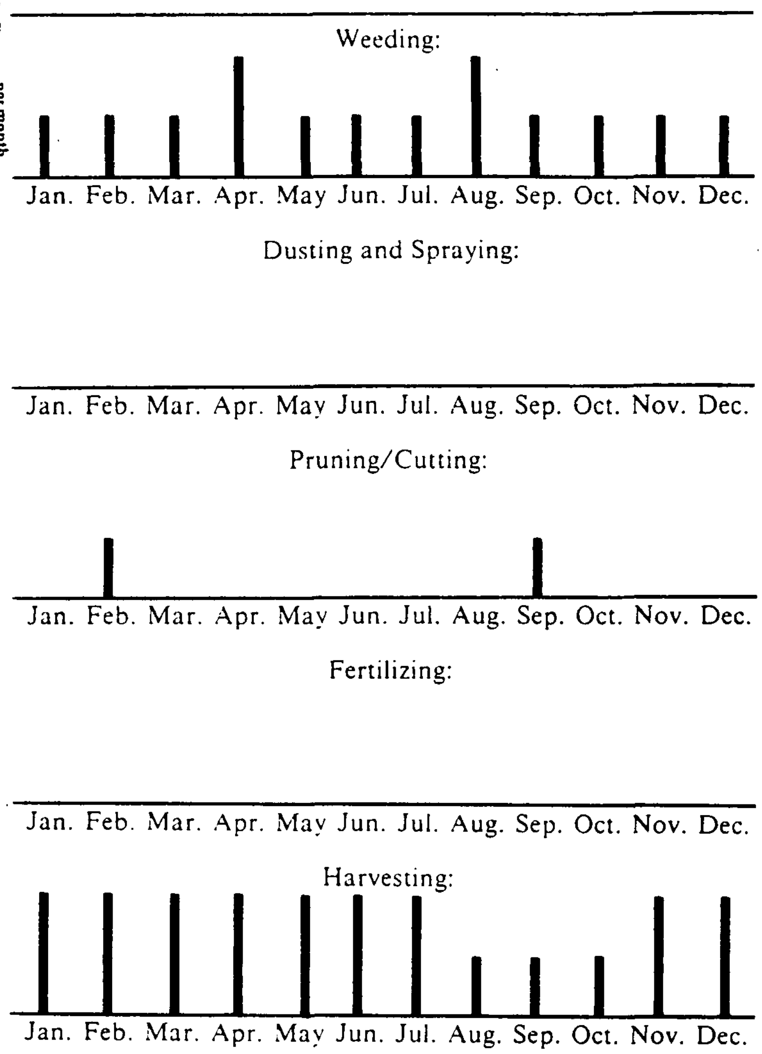


KERICHO DISTRICT

TABLE 21 f: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 **Coffee** Cases: 2

AEZ: LH 1–2 + UM 1 Survey Area 17 Sample Size: 30

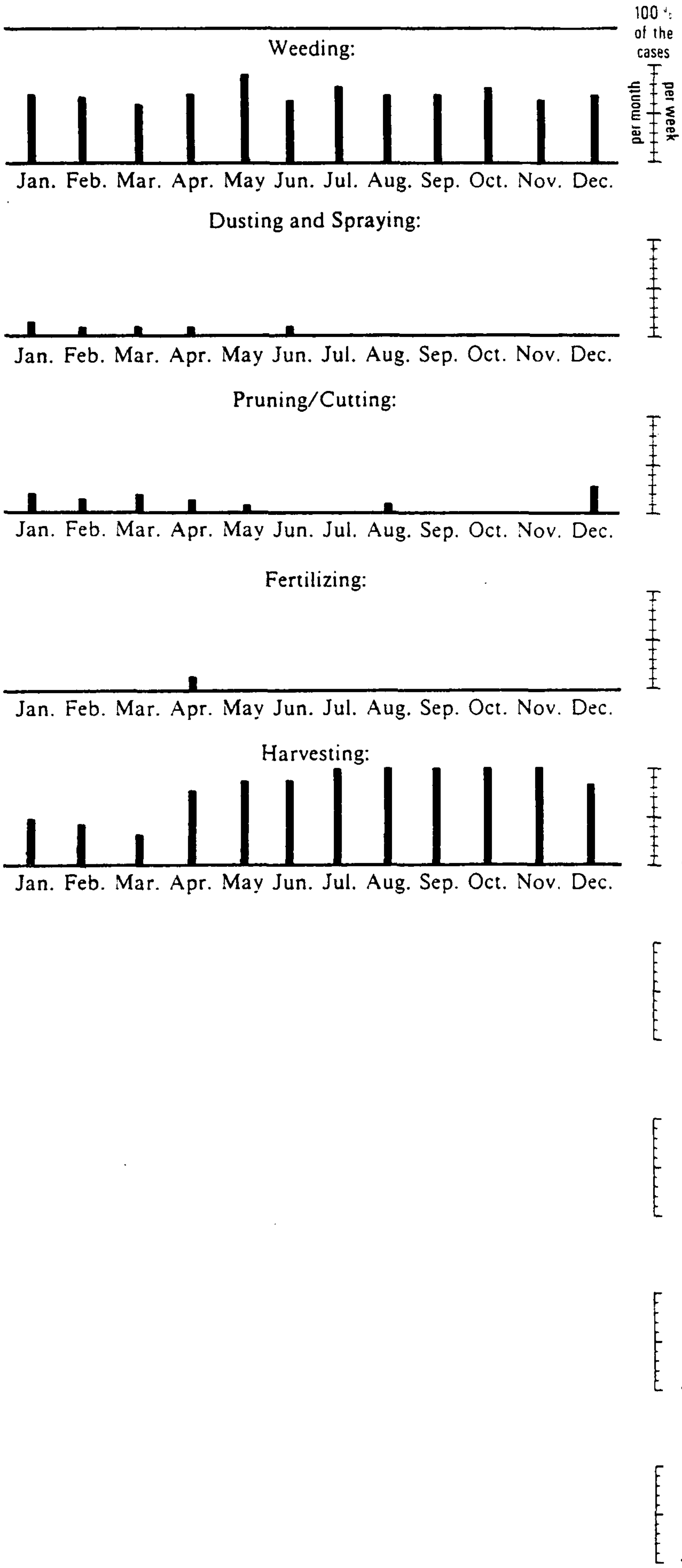


KERICHO DISTRICT

TABLE 21 g: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 52 | **Pyrethrum** | Cases: 16

AEZ: LH 1 – 2 + UM 1 | Survey Area 17 | Sample Size: 30

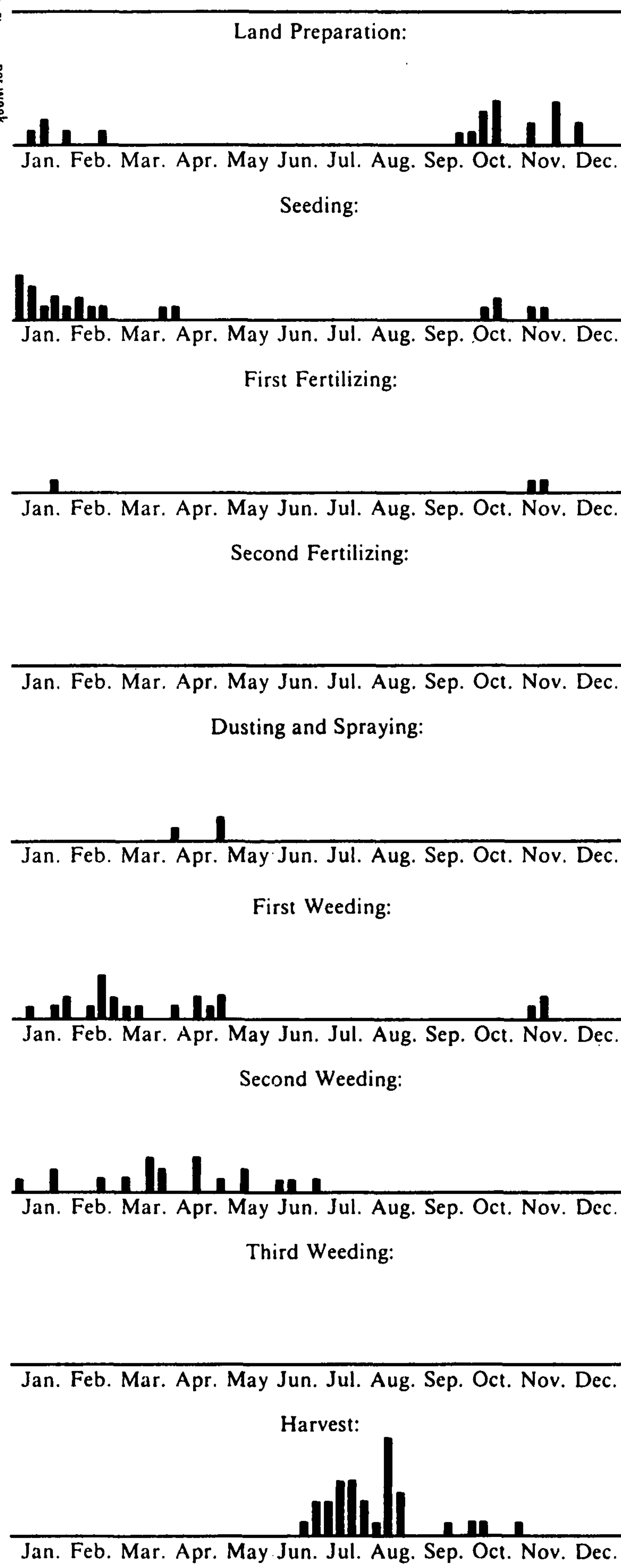


KERICHO DISTRICT

TABLE 21 h: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 | **Maize** | Cases: 22

AEZ: LH 3 + UM 4 | Survey Area 18 | Sample Size: 30

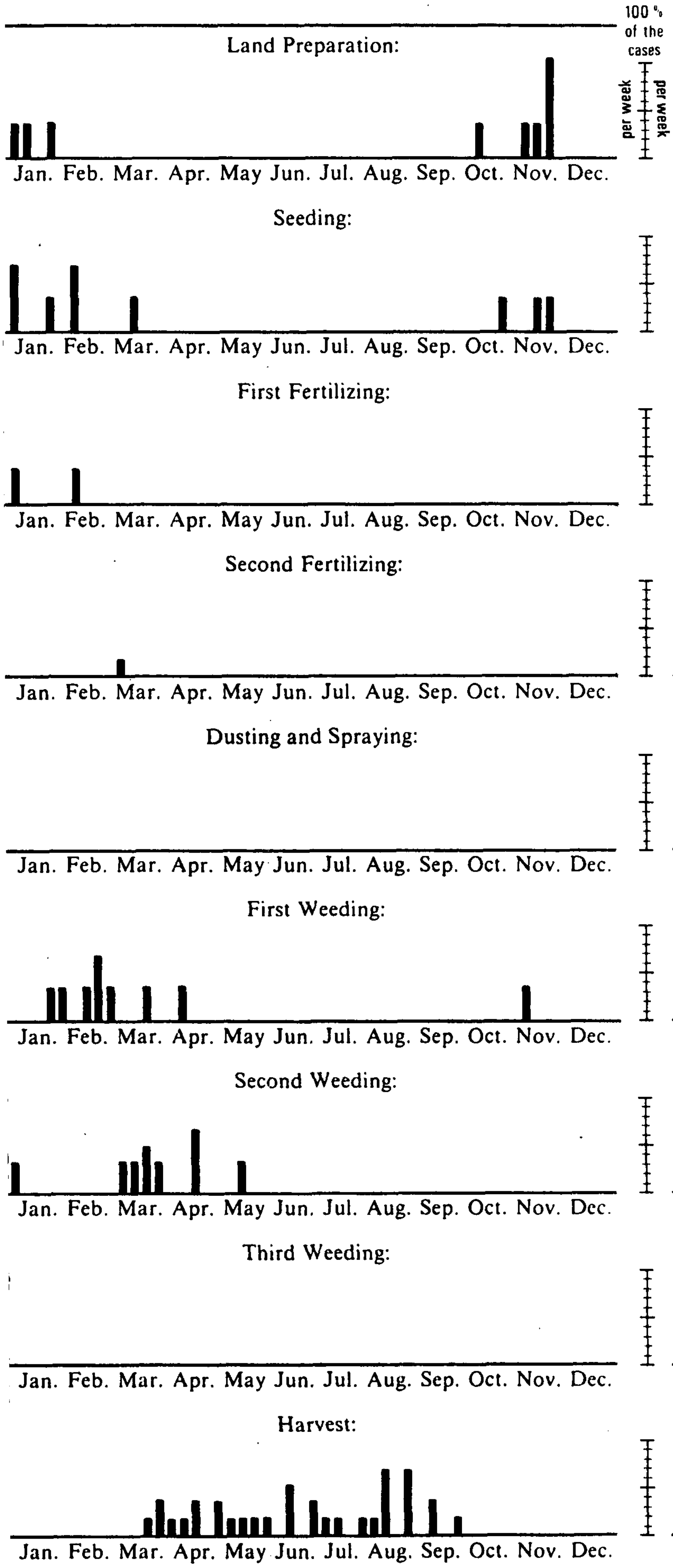


KERICHO DISTRICT

TABLE 21 i: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 18

AEZ: LH 3 + UM 4 Survey Area 18 Sample Size: 30

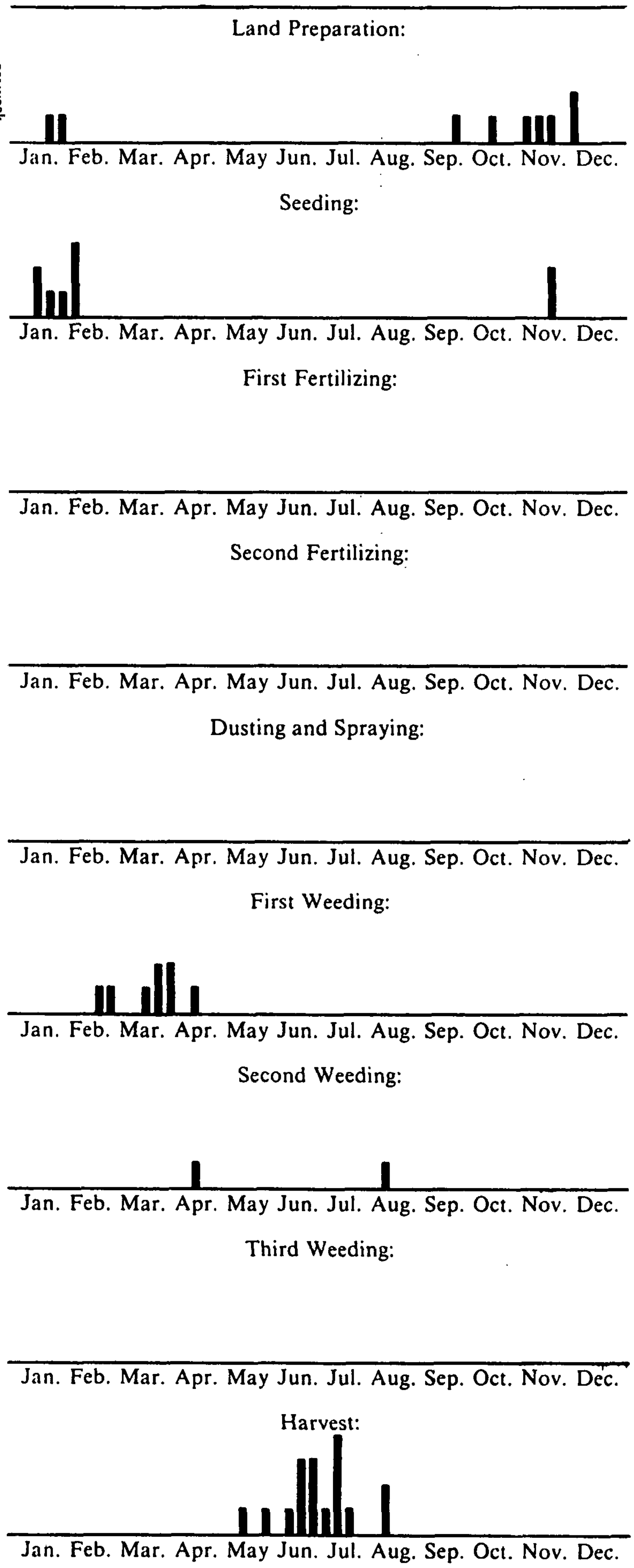


KERICHO DISTRICT

TABLE 21 j: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 12 **Fingermillet** Cases: 9

AEZ: LH 3 + UM 4 Survey Area 18 Sample Size: 30



KERICHO DISTRICT

TABLE 22 a: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 1 TEA-DAIRY ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE							
Vegt. Period 1st + 2nd: in Days, 1st:		p or two 16o or more		2nd: 19o-2o5	total: 35o-365	vli or two 14o or more		13o-2oo	27o-34o				
Soil:		NITOSOLS				ACRISOLS							
	Unit	Without Fertilizer	Production Level			Without Fertilizer	Production Level			Without Fertilizer	Production Level		
			I	II	III		I	II	III		I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	3,000			6,000	2,000			4,000				
Fertilizer N	kg				166				111				
P_2O_5	kg				83				55				
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg	4,500			9,000	3,000			6,500				
Fertilizer N	kg				250				194				
P_2O_5	kg				125				97				
K_2O													
CROP: TEA													
Farmers in Production Level	%												
Yields	kg	2,300	3,500	6,000	12,000	2,300	2,800	5,800	6,200				
Fertilizer N	kg		40	123	485		17	117	130				
P_2O_5	kg		8	25	97		3	23	26				
K_2O	kg		8	25	97		3	23	26				
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg					530	450	750	900				
Fertilizer N	kg							6	9				
P_2O_5	kg							14	23				
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg	3,200		8,000	16,000								
Fertilizer N	kg			77	205								
P_2O_5	kg			101	269								
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg					700	700	1,200	1,400				
Fertilizer N	kg							17	24				
P_2O_5	kg							21	29				
K_2O	kg												

TABLE 22 b: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 1 TEA-DAIRY ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE							
		Vegt. Period 1st + 2nd: in Days, 1st: p or two 16o or more		2nd: 19o-2o5	total: 35o-365	vli or two 14o or more		13o-2oo	27o-34o				
		Soil: NITOSOLS				ACRISOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,000	2,000	4,500	6,000	1,400	2,200	4,000	4,500				
Fertilizer N	kg			63	100		20	65	78				
P_2O_5	kg			60	96		22	73	87				
K_2O	kg												
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg	2,000	2,100/500	3,300/500		2,200	2,200/200	4,000/400					
Fertilizer N	kg			87			30	84					
P_2O_5	kg			70			29	87					
K_2O													
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg					800	400	800	800				
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	6,400	2,500	5,000	25,000	4,000	4,000	14,000	30,000				
Fertilizer N	kg				186			80	208				
P_2O_5	kg				167			100	260				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,000	2,800	10,000	40,000	2,500	5,000	15,000	25,000				
Fertilizer N	kg			48	272		18	86	158				
P_2O_5	kg			36	204		18	86	158				
K_2O	kg												
CROP: SUKUMAWIKI													
Farmers in Production Level	%												
Yields	kg					2,500	5,000	7,000	25,000				
Fertilizer N	kg						18	32	158				
P_2O_5	kg						18	32	158				
K_2O	kg												

KERICHO DISTRICT

TABLE 22 c: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 1 COFFEE-TEA ZONE				A.E.Z.: UM 2 COFFEE ZONE				A.E.Z.: UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: p or two or three in Days, 1st: 165 or more		2nd: 185-200	total: 345-365	vl i or two 155 or more		120-180	275-335	m/l-(m/s)i 155 or more		115-135	270-290
		Soil: NITOSOLS				PHAEOZEMS				GREYZEMS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	3,000			6,000	2,400			4,800	1,900			3,800
Fertilizer N	kg				166				133				105
P_2O_5	kg				83				66				52
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg	6,200			14,000	4,500			10,500				
Fertilizer N	kg				433				333				
P_2O_5	kg				216				166				
K_2O													
CROP: TEA													
Farmers in Production Level	%												
Yields	kg	2,200	3,000	5,500	9,000								
Fertilizer N	kg		26	110	340								
P_2O_5	kg		5	22	68								
K_2O	kg		5	22	68								
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg		100	450	800								
Fertilizer N	kg		10	45	80								
P_2O_5	kg		90	90	90								
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg	3,200		10,000	20,000	3,600		14,000	24,000				
Fertilizer N	kg			95	235			146	286				
P_2O_5	kg			145	353			146	286				
K_2O	kg												
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg	8,000	3,500	12,000	30,000	9,000	3,000	14,000	30,000				
Fertilizer N	kg			60	330			75	315				
P_2O_5	kg			12	132			20	84				
K_2O	kg												

TABLE 22 d: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 1 COFFEE-TEA ZONE				A.E.Z.: UM 2 COFFEE ZONE				A.E.Z.: UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: p or two or three; in Days, 1st: 165 or more		2nd: 185-200	total: 345-365	vli or two 155 or more		120-180	275-335	m/l~(m/s)i 155 or more	115-135		270-290
		Soil: NITOSOLS				PHAEZEMS				GREYZEMS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,200	3,000	4,000	5,500	2,500	3,000	4,000	6,000	1,200	3,000	4,000	5,000
Fertilizer N	kg		20	45	83		13	38	88		45	70	95
P_2O_5	kg		19	43	79		8	24	56		50	78	106
K_2O	kg												
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg	2,200	2,400/300	3,500/400	4,000/400	2,500	3,000/300	3,000/500	4,000/500	1,200	3,000/300	2,500/300	3,000/400
Fertilizer N	kg		34	64	102		27	62	112				
P_2O_5	kg		25	51	87		14	34	66				
K_2O													
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg					1,400	600	1,200	1,900	700	600	1,200	1,400
Fertilizer N	kg								24			24	34
P_2O_5	kg								10			18	25
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	1,000	500	1,000	1,700	1,100	500	1,100	1,900	650	500	800	1,300
Fertilizer N	kg				24				27			5	22
P_2O_5	kg				29				22			7	32
K_2O	kg												
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yields	kg	1,400		1,000	2,100	1,400		1,100	2,300	1,000		900	1,700
Fertilizer N	kg				28				31				28
P_2O_5	kg				23				20				27
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

KERICHO DISTRICT

TABLE 22 e: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 1 COFFEE-TEA ZONE				A.E.Z.: UM 2 COFFEE ZONE				A.E.Z.: UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: in Days,1st: p or two or three 165 or more		2nd: 185-2oo	total: 345-365	vli or two 155 or more		12o-18o	275-335	m/1-(m/s)i 155 or more		115-135	27o-29o
		Soil: NITOSOLS				PHAEZEMS				GREYZEMS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	6.500	2.500	8,000	20,000								
Fertilizer N	kg			12	108								
P_2O_5	kg			14	122								
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	8,000	5,000	10,000	30,000	7,000	2,500	8,000	25,000	5,000	2,000	6,000	18,000
Fertilizer N	kg			16	176			8	144			8	105
P_2O_5	kg			12	132			4	74			2	91
K_2O													
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,000	2,500	8,000	25,000	4,500	2,500	6,000	26,000				
Fertilizer N	kg			28	147			11	151				
P_2O_5	kg			24	86			6	86				
K_2O	kg												
CROP: SUKUMAWIKI													
Farmers in Production Level	%												
Yields	kg	4,000	4,000	8,000	22,000	4,200	4,000	10,000	24,000	4,400	3,000	8,000	20,000
Fertilizer N	kg			28	126			41	139			25	109
P_2O_5	kg			24	108			23	79			25	109
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TRANS NZOIA DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The Trans Nzoia District is the continuation of the fertile Uasin Gishu Plateau beyond ("trans") the Nzoia River. This part of the plateau has higher rainfall than most parts of the Uasin Gishu (annual average 1 000–1 200 mm compared to 900–1 000 mm there). It is the best zone in the country for maize and sunflower (UM 4) as the climate is ideal for late maturing hybrids. They grow together during the entire agro-humid period of both rainy seasons. It was therefore not reasonable to draw a rainfall reliability map of the first rains, as in other districts; it was better to show the reliability of rainfall in the total agro-humid period, which lasts from March to November/December in the UM 4. An expectation of getting 900 mm or more during that time in at least 6 out of 10 years (and not much less in the other 4 years) is a good position for maize cultivators (compare Crop List, Vol. IIA).

The altitude on the plateau is mainly between 1 800–1 900 m, i.e. it is just on the upper end of the zone UM 4. Wheat and barley are already in the process of being tried and may be successful if grown after the heavy first rains, to minimize the risk of diseases, especially rust. But it is better to concentrate these crops on the slightly higher Wheat/(Maize)–Barley Zone LH 3, although there is also the danger of rust there and late planting is advisable. The second rains start indistinctly around July (Table 1) and have their peak at the end of July/August. It is advisable to plant wheat or malt barley at the end of April to beginning of May so that the peak water demand in the growing of these crops will coincide with the rainfall peak. The 60 % rainfall reliability is then more than 600 mm, enough for a good yield.

The plain becomes drier towards the North due to the rain shadow of Mount Elgon and the Cherangani Hills, which changes the better zones to a transition of the Livestock-Barley and Livestock-Sorghum Zones. Barley means fodder barley in the general AEZ-System, but here it is not so recommended due to the availability of maize cobs or stalks.

It is difficult to divide the District into well-defined zones because many areas are transitional. The plain is bordered by mountain slopes or foot hills, parts of which are wet enough for Arabica coffee and, although at the upper limits for this crop, coffee cultivation here reaches the remarkable altitude of 2 150 m. However, the unimodal rainfall distribution and the sometimes relatively long dry season from October to February (the "small rains" in October/November are lacking) do not favour coffee. UM 3 – LH 3 and UM 2 – LH 2 in the map means coffee only on places with good, deep forest soils on microclimatically frost-free gentle slopes.

The District also grows tea, but good yields are obtained only in the very eastern part where it has a tea zone LH 1. Tea also occurs in zone LH 2 but the yields are fair to poor there.

TRANS NZOIA DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
8834001	Mt. Elgon, Forest	46	Average	1 236	23	48	78	156	161	118	169	176	98	98	74	39
2 225 m	Station		60 % rel.[1]	1 110	6	17	58	132	143	99	141	160	95	78	52	18
8834009	Elgon Downs,	40	Av.	1 045	17	33	58	141	143	98	134	150	90	86	61	34
1 920 m	Endebess		60 %	940	5	20	37	110	119	71	115	124	74	70	32	12
8834010	O.H. Knight	30	Av.	1 047	15	27	64	151	142	103	145	145	86	77	65	26
2 073 m			60 %	941	5	14	46	135	133	86	114	139	53	58	30	11
8834013	ADC Chorlini	49	Av.	1 048	15	34	62	145	146	103	137	153	82	83	62	26
1 981 m			60 %	942	5	20	47	122	120	91	116	141	68	58	29	11
8835005	Kipkoitet,	54	Av.	1 086	27	34	66	134	133	105	160	164	93	71	60	38
1 920 m	Cherangani		60 %	972	10	17	49	107	100	88	136	142	68	62	35	14
8835008	Kitale, N.A.R.S.	39	Av.	1 182	21	43	70	143	159	133	155	175	105	81	62	35
1 890 m	Farm		60 %	1 060	4	20	50	144	135	116	139	155	84	54	35	19
8934008	Kimini, G. Vale Est.	59	Av.	1 286	25	51	83	166	183	132	139	166	133	95	71	38
1 829 m			60 %	1 150	6	29	51	149	158	103	130	138	107	73	28	15
8934033	Kabewyan Est.	38	Av.	1 365	31	60	91	183	176	140	141	169	107	116	102	48
2 164 m			60 %	1 210	5	37	84	137	142	111	114	145	66	77	63	24
8935043	Kaigamu Est.	43	Av.	970	20	31	66	123	117	99	139	149	70	63	66	27
1 920 m			60 %	870	2	12	44	108	121	86	121	128	53	50	38	13
8935107	Kapsirowa Est.	34	Av.	1 136	31	38	58	118	133	108	159	181	102	78	85	49
2 160 m			60 %	1 020	13	13	43	98	117	87	142	172	86	68	57	18

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

TABLE 2: **TEMPERATURE DATA**

No. and altitude	Name of Station	AEZ[1]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Y. of rec.
8835001	Kitale, D.C.	UM 4	Mean max.	27.2	27.6	26.9	26.1	24.4	23.4	22.5	22.9	23.9	24.9	24.7	25.4	25.0	
1 880 m	(operating	hp	Mean temp.	19.2	19.8	19.8	19.7	18.7	17.8	17.3	17.3	17.6	18.3	18.2	18.4	18.5	19
	to 1951)		Mean min.	11.2	11.9	12.6	13.2	12.9	12.1	12.1	11.7	11.2	11.7	11.7	11.4	12.0	
			Abs. min.	7.8	7.8	7.2	7.2	7.1	8.6	7.8	7.2	7.8	8.9	8.9	6.7	6.7	
8835008	Kitale,	UM 4	Mean max.	27.1	27.3	27.1	25.4	24.4	23.8	22.9	23.1	24.2	24.9	24.9	25.3	25.0	
1 880 m	Agricultural	hp	Mean temp.	19.0	19.3	19.5	19.0	18.4	17.5	17.1	16.9	17.5	18.2	18.1	18.3	18.2	20
	Department		Mean min.	10.9	11.3	11.8	12.6	12.3	11.2	11.2	10.7	10.8	11.4	11.2	11.2	11.4	
	N.A.R.S.		Abs. min.	7.0	6.7	3.9	7.2	8.9	7.2	5.6	5.6	6.0	7.0	6.1	7.5	3.9	
	Farm																
8835024	Kitale, Met.	UM 4	Mean max.	27.1	27.1	26.2	25.2	24.6	24.0	22.9	23.5	24.4	24.8	24.4	25.8	25.0	
1 890 m	Station	hp	Mean temp.	18.6	19.5	19.2	19.0	18.7	17.7	17.2	17.4	17.7	18.1	17.8	17.9	18.3	5
			Mean min.	10.4	11.8	12.1	12.8	12.7	11.3	11.8	11.3	10.7	11.4	11.2	10.0	11.5	
			Abs. min.	6.4	7.4	8.0	9.8	9.7	8.5	8.1	8.6	7.9	8.0	7.5	6.4	6.4	
8934076	Kitale,	UM 4	Mean max.	27.8	28.1	27.5	26.1	24.9	24.2	23.1	23.5	24.9	25.5	25.8	26.2	25.6	
1 920 m	Airfield	hp	Mean temp.	18.7	19.0	19.3	19.3	18.6	17.7	17.2	17.2	17.6	18.2	18.0	18.2	18.2	11
	(operating	to	Mean min.	9.5	9.9	11.1	12.5	12.2	11.1	11.2	10.9	10.3	10.8	10.2	10.2	10.8	
	to 1960)	UM 3	Abs. min.	4.2	5.0	6.9	7.7	8.3	7.2	7.1	6.4	5.3	4.9	5.8	5.3	4.2	
		lp															

1) AEZ = Agro-ecological zone; lp = lower places; hp = higher places within the zone

TRANS NZOIA DISTRICT

TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1)] Tot. agrohum. per. in mm[2)]	60 % reliability of rainfall[1)] 2nd rains in mm	60 % reliability of growing period 1st rains[3)] in days	60 % reliability of growing period 2nd rains in days	60 % reliability of growing period Total in days
TA I and TA II Tropical Alpine Zones				Here National Park					
UH 0 Forest Zone		Here National Park or Forest Reserve							
UH 1 Sheep-Dairy Zone	p or l – m	Here mainly Forest Reserve because this timber land is too valuable to be cutted for grazing, or it is too slopy for cultivation							
UH 2 Pyrethrum-Wheat Zone	vl i or two	2 400–2 500	15.0–14.5	1 200–1 600	950–1 250	580–650	100 or more	170–200	270–300
LH 1 Tea-Dairy Zone	(vl) i or two	2 400–2 450	15.2–15.0	1 250–1 400	1 000–1 050	650–700	100 or more	190–210	290–310
LH 2 Wheat/Maize-Pyrethrum Zone	vl i or two (vl/l) i or two	1 940–2 400	18.0–15.0	1 100–1 600 1 100–1 250	950–1 100 950–1 050	580–700 600–650	100 or more 90 or more	170–200 170–180	270–300 240–280
LH 2 - UM 3 [4)] Wheat/Maize-Pyrethrum Zone to Marginal Coffee Zone	transitional	1 820–2 050	18.7–17.5	1 100–1 300	880–1 100	520–600	90 or more	150–160	250–260
LH 3 Wheat/(M.)-Barley Zone	vl/l or two l/vl or two	1 920–2 280	18.0–15.9	1 000–1 300 950–1 100	920–980 880–980	550–590 420–620	90 or more 90 or more	140–160 120–140	230–260 210–240
LH 3 - UM 3 [4)] Wheat/(M.)-Barley Zone to Marginal Coffee Zone	vl/l i or two	1 700–2 100	19.4–17.2	1 050–1 300	880–1 100	490–580	90 or more	140–160	230–260
LH 4 - UM 4 [4)] Cattle-Sheep-Barley Zone to Sunflower-Maize Zone	(l) i - (l/vl)	1 750–2 000	19.1–17.6	900–1 050	800–900	400–500	90 or more	110–130	200–230
UM 2 Coffee Zone	vl i or two	1 700–1 950	19.4–17.9	1 250–1 350	1 000–1 150	570–630	100 or more	160–190	260–290
UM 3 Marginal Coffee Zone	l/vl l/vl i (l/vl) i	1 700–2 000	19.4–17.6	1 050–1 100 Very small, see Bungoma Very small, see West Pokot	920–950	490–600	100 or more	110–130	210–240
UM 4 Sunflower-Maize Zone	vl/l or two l/vl or two (l/vl)	1 700–1 950	19.4–17.9	1 050–1 250 950–1 250 950–1 020	900–1 000 850–950 800–900	510–580 440–550 400–490	100 or more 100 or more 100 or more	130–170 110–140 110–130	230–280 210–240 210–230
UM 4–5 Sunflower-Maize Zone to Livestock-Sorghum Zone	transitional			Very small and unimportant, see West Pokot					

1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants

2) Agro-humid conditions continue smoothly from 1st to 2nd rains in the whole district, therefore 1st rains not separately shown, figures for total agro-humid period more instructive

3) More if growing cycle of cultivated plants continues into the period of second rains

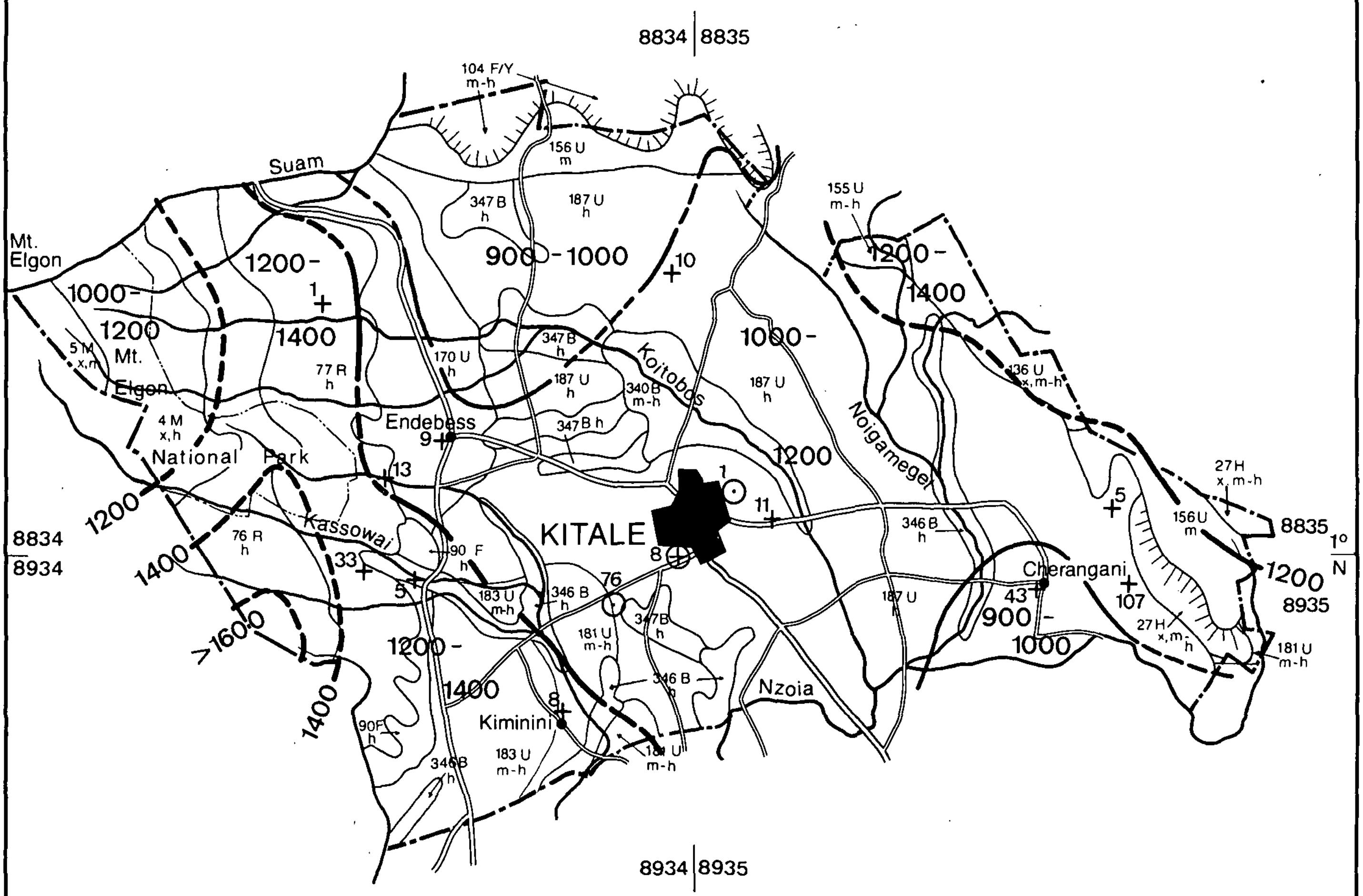
4) Transitional Zone due to patterns of micro-climate and/or soils suiting the one zone or the other

35° E

AVERAGE ANNUAL RAINFALL

in mm

+SOILS



⊕ Temperature recording station, operating 1976, ⊙ closed

\+ Rainfall recording station, operating 1976 and having at least 10 years of records

76 Station number in grid

8934 Grid number

Broken boundaries are uncertain because of lack of rainfall records

TRANS NZOIA

0 5 10 15 20 25 km

Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS 79018

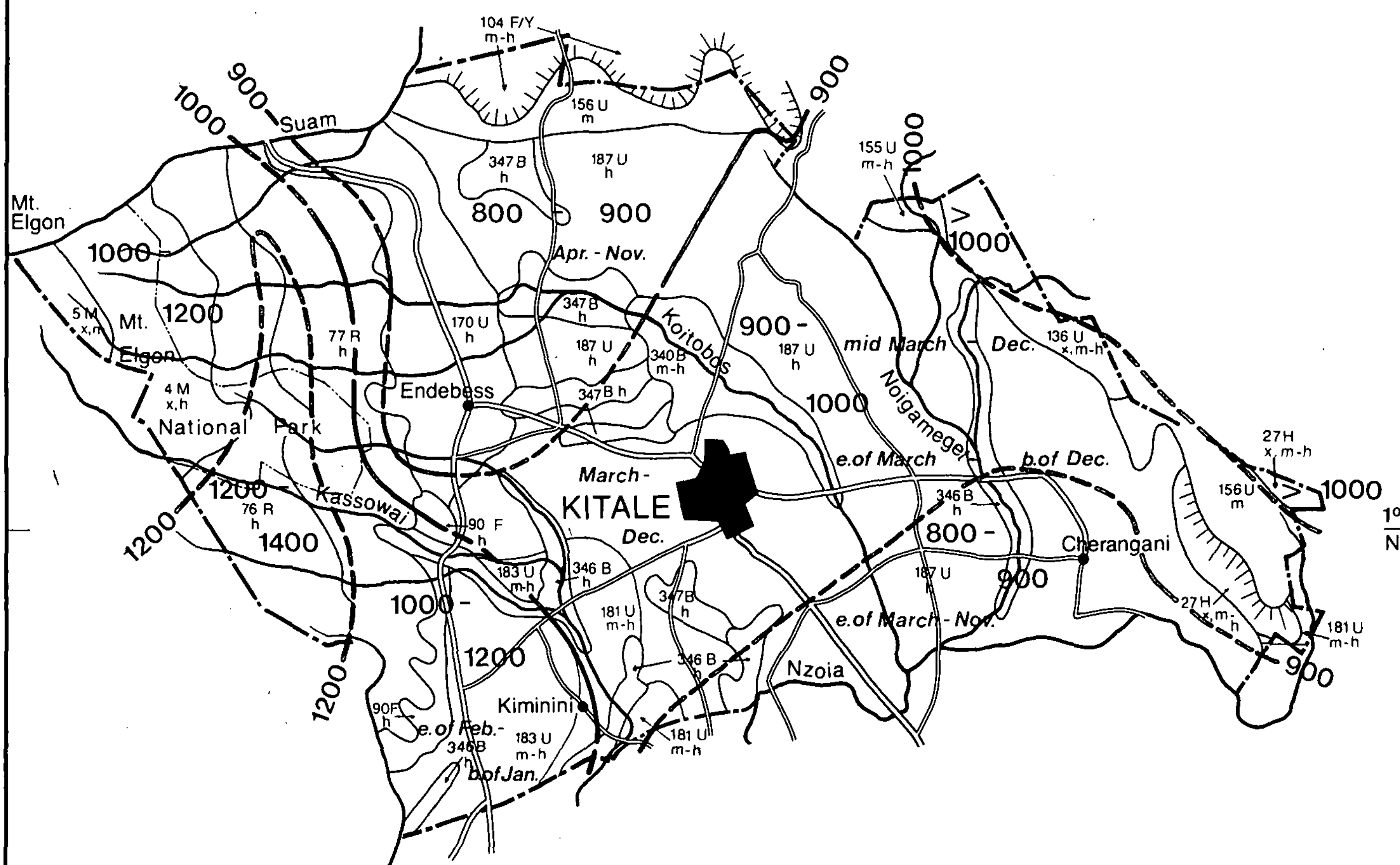
35°E

60% RELIABILITY OF RAINFALL IN TOTAL AGROHUMID PERIOD

(e.of Feb. - Jan. or less)

Amounts in mm, surpassed norm. in 6 out of 10 years

+ SOILS



Broken boundaries are uncertain because of lack of rainfall records

0 5 10 15 20 25 km

TRANS NZOIA

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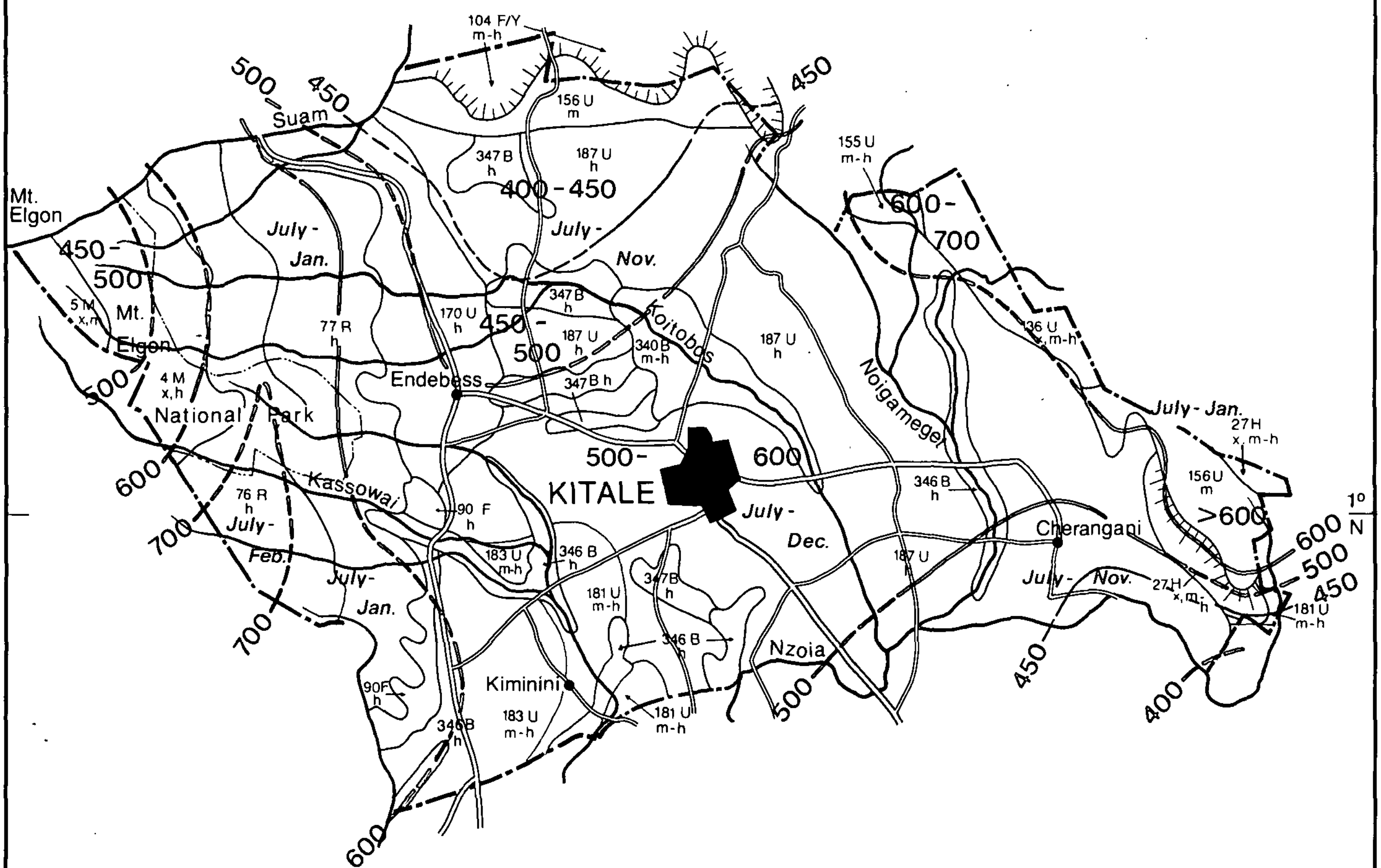
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RAINS

(July - Feb. or less)

Amounts in mm, surpassed norm. in 6 out of 10 years

+ SOILS



Broken boundaries are uncertain because of lack of rainfall records

TRANS NZOIA

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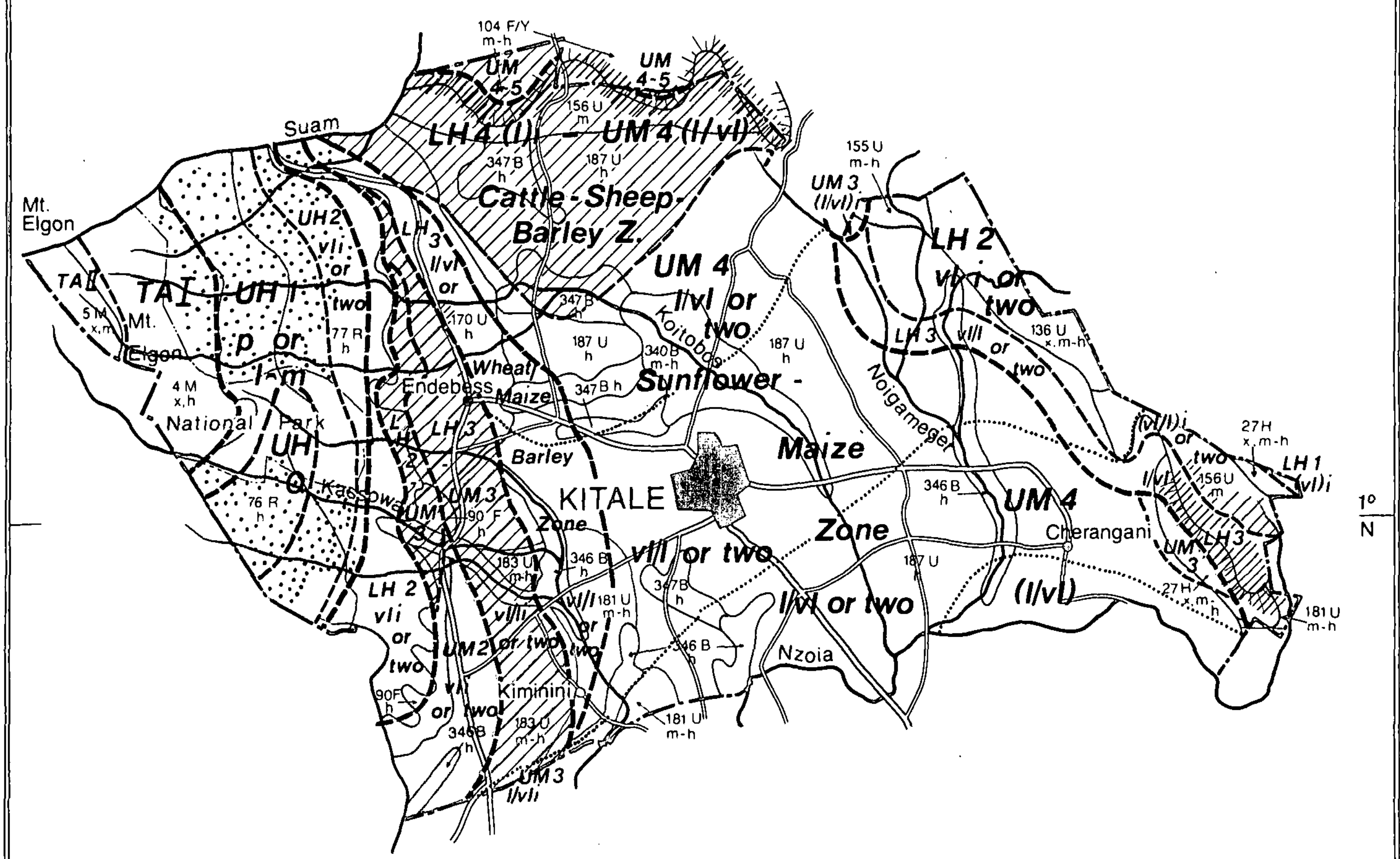
35°E

AGRO - ECOLOGICAL ZONES + SOILS

BELTS OF ZONES BY TEMPERATURE

TA = Trop. Alpine Zones
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones



Forest Reserve

Unsuitable steep slopes (only marked outside Nat. Parks or Forest Res.)

Belt of A. E. Zones — Broken zonal boundaries are uncertain or mean transitional strips
A. E. Zones
Subzones
Climatic data for AEZ formulas see table I

TRANS NZOIA

0 5 10 15 20 25 km

Min. of Agr., German Agr. Team   AEZ R. Jätzold '82   Soils KSS 79018

AGRO-ECOLOGICAL ZONES

TA = *TROPICAL-ALPINE ZONES*

Here National Park

UH = *UPPER HIGHLAND ZONES*

UH 0 = *Forest Zone*

National Park or Forest Reserve

UH 1 = *Sheep and Dairy Zone*

Here also National Park or Forest Reserve because of steep slopes and conservation requirements. Potential for very small areas outside see Uasin Gishu District

UH 2 = *Pyrethrum-Wheat Zone*

UH 2 vl i or two = *Pyrethrum-Wheat Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Steep slopes, mainly Forest Reserve. Potential for small areas outside see Uasin Gishu District

LH = *LOWER HIGHLAND ZONES*

LH 1 = *Tea-Dairy Zone*

Very small, see West Pokot

LH 2 = *Wheat/Maize-Pyrethrum Zone*

LH 2 vl i or two = *Wheat/Maize-Pyrethrum Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd r.), start norm. March: Late mat. wheat like Kenya Bongo (Apr./May–O./N.), late mat. triticale, late mat. maize like H 611 (e. of F./Apr.–S./N., ~ 80 % on deep volcanic soils in lower places); peas, horse beans; potatoes[1] (e. of Apr.–Au.); late mat. sunflower like Kenya White (60–70 %, lower places ~ 70 %), linseed, rapeseed; cabbages, kales, cauliflower, carrots, beetroot, spinach, celery, lettuce, fennel, artichokes, gourgettes
2nd rains, start undistinctly around end of June: M. mat. barley like K. Research or in higher places Proctor (June–O.), m. mat. wheat like R 200 (June–O.) and other varieties; linseed; kales, carrots, beetroot, spinach, tomatoes (lower places), celery
Whole year: Black Wattle, New Zealand Flax (higher places)

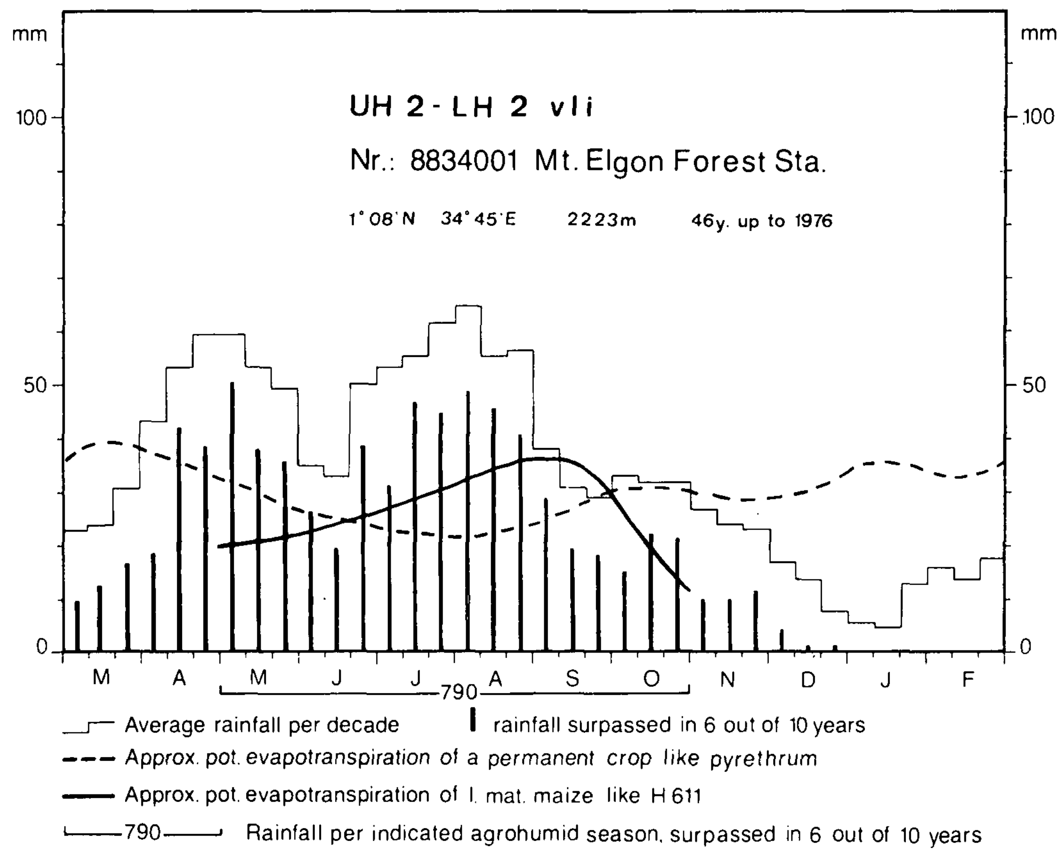
Fair yield potential (av. 40–60 % of the optimum)
1st rains: Finger millet; m. mat. beans like Cuarentino (50–60 %, lower places); tomatoes, onions
2nd rains: Peas, beans (below 2 200 m); potatoes (S.–D./J.); cabbages, cauliflower, onions, lettuce
Whole year: Pyrethrum (nearly 60 %); apples, pears and plums above 2 200 m; strawberries, passion fruit (below 2 100 m)

Poor yield potential (av. 20–40 % of the optimum)
Whole year: Tea

Pasture and forage
Around 1 ha/LU on highland savanna of Kikuyu, red oats and tufted grass[2] between Cedar forest remnants; about 0.6 ha/LU on art. pasture of Nandi Setaria between 2 000 and 2 200 m or Rhodes grass < 2 000 m; with add. feeding of Giant Setaria and lucerne, clover or Lotononis down to about 0.3 ha/LU; suitable for grade dairy cows

1) Spraying against fungus diseases important

2) The bad tufted grasses Eleusine jaegeri and Pennisetum schimperi are expanding if the areas are overgrazed. They may be controlled by fire.



LH 2	=	*Wheat/Maize-Pyrethrum Zone*
(vl/l) i		*with a (weak) very long cropping season and intermediate rains,*
or two		*dividable in two variable cropping seasons and i.r.*

Small, see Elgeyo Marakwet District

LH 3 = *Wheat/Maize-Barley Zone*

LH 3	=	*Wheat/Maize-Barley Zone*
vl/l		*with a very long to long cropping season,*
or two		*dividable in two variable cropping seasons*

Good yield potential

1st rains, start norm. e. of March: M. mat. wheat like R 200 (70–80 %, e. of Apr.–S.) and other var.; m. mat. durum wheat, late mat. wheat like Kenya Bongo (70–80 %, Apr.–O.), m. mat. barley, late mat. triticale, on deep soils late mat. maize H 611 (higher places), H 612–614 (lower places); peas; linseed, rapeseed, late mat. sunflower like Kenya White; cabbages, carrots, kales, spinach

2nd rains, start indistinctly between end of June and Aug.: M. mat. wheat like Africa Mayo and other var. (m. June–N.), m. mat. barley; rapeseed (end of June–O.)

Whole year: Black wattle

Fair yield potential

1st rains: Potatoes; cauliflower, carrots, beetroot

2nd rains: Tomatoes (lower places), kales, beetroot; beans (lower places)

Whole year: Avocadoes (lower places)

Pasture and forage

Around 1.2 ha/LU on highland savanna of red oats and wire grass, about 0.6 ha/LU on art. pasture of Nandi Setaria or Rhodes grass; suited for grade dairy cows and grade cattle; subterr. clover, Lotononis and Silver leaf Desmodium (Desmodium uncinatum) as add. forage

LH 3 = Wheat/Maize-Barley Zone
l/vl with a long to very long cropping season,
or two dividable in two variable cropping seasons

Good yield potential
1st rains, start norm. end of March: M. mat. wheat like R 200 (e. of Apr.–S.) and other var.; m. mat. durum wheat, late mat. wheat like Kenya Bongo (Apr.–O.), m. mat. barley, late mat. triticale, on deep soils late mat. maize H 611 (higher places), H 612–614 (lower places, 60–70 %); peas; linseed, late mat. sunflower like Kenya White; cabbages, carrots
2nd rains, start indistinctly between end of June and Aug.: M. mat. wheat like Africa Mayo and other var. (m. June–N.), m. mat. barley; rapeseed (end of June–O.)
Whole year: Black wattle

Fair yield potential
1st rains: Potatoes; rapeseed; kales, cauliflower, carrots, beetroot
2nd rains: Tomatoes, kales, beetroot; beans on lower places
Whole year: Avocadoes (lower places)

Pasture and forage
About 1.2–1.5 ha/LU on highland savanna of red oats and wire grass, about 0.7 ha/LU on art. pasture of Nandi Setaria or Rhodes grass; suited for grade dairy cows and grade cattle; subterr. clover and Lotononis as add. forage, esp. for dairy cows

LH 4 = Cattle-Sheep-Barley Zone
(l) i with a (weak) long cropping season and intermediate rains

Mostly ranching

Fair yield potential
1st rains, start norm. begining of April: M. mat. barley (other crops mostly marginal). The variability of rainfall is so high that crop failures occur from time to time, expecially on shallow soils in the northern parts. Ranching is therefore more advisable

Pasture and forage
Around 2 ha/LU on nat. pasture of short grass highland savanna; down to 1 ha/LU on art. pasture of Rhodes grass (var. Elmba most recommended); suited for grade cattle; subterr. clover and m. mat. fodder barley like B 106 as add. forage

UM = UPPER MIDLAND ZONES

UM 2 = Main Coffee Zone

UM 2 = Main Coffee Zone
vl i with a very long cropping season and intermediate rains,
or two dividable in two variable cropping seasons and i.r.

Very good yield potential (av. more than 80 % of the optimum)
1st rains, start norm. March: Late mat. maize H 612–614 (~ 80 %, Mch.–O./N.); cabbages, kales
Whole year, best planting time March: Castor

Good yield potential
1st rains: Finger millet; sweet potatoes (lower places); late mat. sunflower like Kenya White (May–O., 70–80 %), m. mat. soya beans (lower places); onions, spinach, tomatoes
2nd rains, start indistinctly around July: E. mat. beans (~ 60 %), m. mat. sunflower like HS 301 A (lower places); onions (on light soils)
Whole year: Arabica coffee (~ 60 %, on good deep volvanic soils[3]), Macadamia nuts, passion fruit, avocadoes, mountain pawpaws, bananas (in valleys), guavas

Fair yield potential
1st rains: M. mat. wheat and barley (nearly 60 %, in higher places, May/June–O.); beans[4], potatoes, sweet potatoes (higher places)
2nd rains: M. mat. maize H 511–513 (50–60 %), 622, 632 (~ 50 %); potatoes, sweet potatoes; tomatoes
Whole year: Arabica coffee (on less suitable soils), bananas (outside valleys), citrus, taro (in valleys), yams

[3] Yields relatively low because of unimodal rainfall and high elevation

[4] Sometimes rotting because of too wet conditions

Pasture and forage

0.7–1 ha/LU on sec. pasture, around 0.5 ha/LU on art. pasture of Rhodes grass; down to 0.16 ha/LU feeding Napier & Bana grass; Silver leaf Desmodium (D. uncinatum) best fodder legume (for rotation and dairy cows)

UM 3 = *Marginal Coffee Zone (here Coffee-Maize Zone)*

UM 3 vl/l i or two = *Marginal Coffee Zone with a very long to long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Good yield potential

1st rains, start norm. b. of March: Maize H 612–614 (nearly 80 %), finger millet (~ 60 %), high alt. = cold tol. sorghum; m. mat. beans; late mat. sunflower like Kenya White (May/June–O./N. ~ 60 %), m. mat soya beans (lower places, ~ 60 %); cabbages, kales, onions (on light soils), tomatoes, spinach

2nd rains, start indistinctly around July: E. mat. beans (~ 60 %), m. mat. sunflower like Comet (July–N.) or HS 301 A (lower places); onions

Whole year: Macadamia nuts, castor, mountain pawpaws

Fair yield potential

1st rains: M. mat. wheat and barley; potatoes, sweet potatoes

2nd rains: Potatoes, sweet potatoes; tomatoes

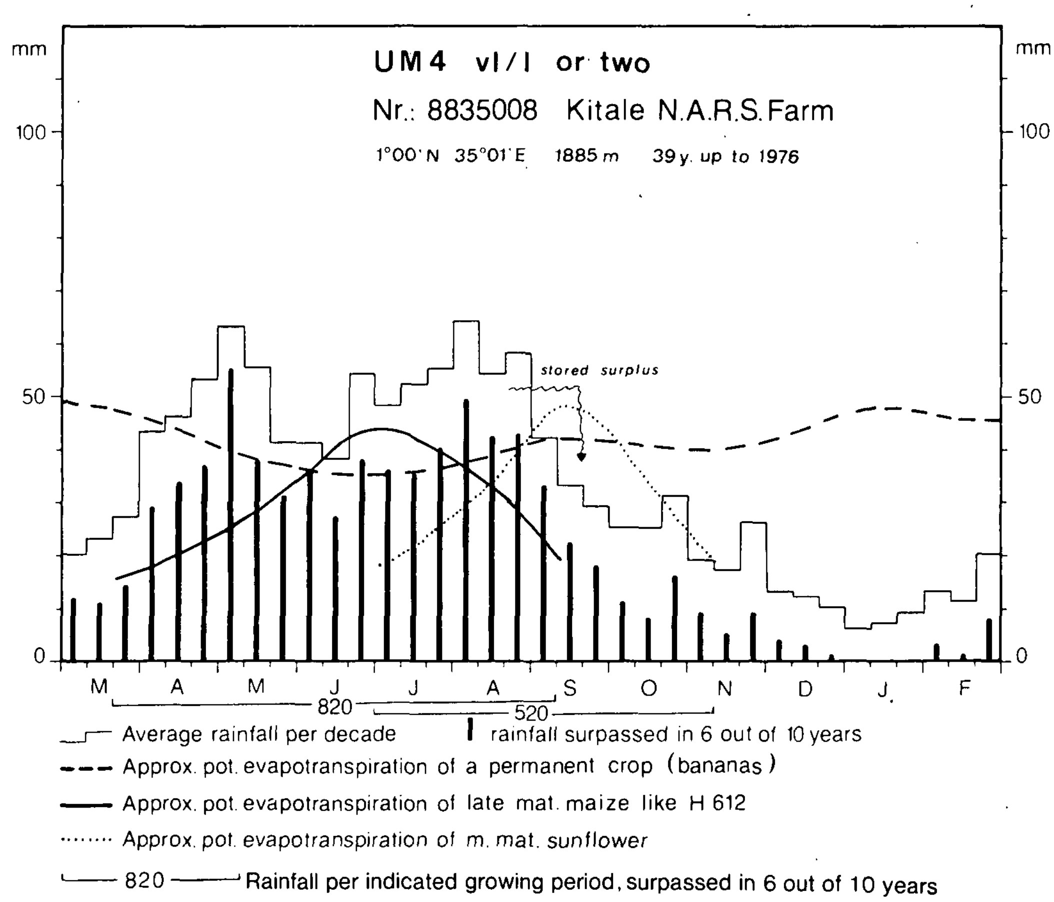
Whole year: Arabica coffee (with mulching on good deep soils ~ 40 %, otherwise poor resp. marginal)[3)], bananas (like coffee), avocadoes, citrus, pineapples (lower places)

Pasture and forage

1–1.2 ha/LU on nat. savanna pasture, about 0.6 ha/LU on art. pasture of Rhodes grass; down to 0.18 ha/LU feeding Napier and Bana grass. Silver leaf Desmodium (D. uncinatum) best fodder legume

UM 3 (l/vl) i = *Marginal Coffee Zone with a (weak) long to very long cropping season and intermediate rains*

Very small, see West Pokot



UM 4 = *Sunflower-Maize Zone*

UM 4 vl/l or two = *Sunflower-Maize Zone with a very long to long cropping season, dividable in two variable cropping seasons*

(see Diagram Kitale)

Very good yield potential
1st rains, start norm. Mch.: Maize H 611 (higher places), 612–614 (lower places, e. of Mch.–S./O.); cabbages, kales (to 2nd r.), spinach, pumpkins, gourgettes
2nd rains, start indistinctly around July: M. mat. sunflower like Comet or HS 301 A (b. of July–Nov.)

Good yield potential
1st rains: High alt. sorghum, finger millet; late mat. sunflower like Kenya White (June–N., 60–70 %), m. mat. sfl. like HS 301 A, soya beans (lower places)
2nd rains: Cabbages, spinach
Whole year: Citrus[5], sisal (lower places), avocadoes, perennial castor

Fair yield potential
1st rains: Late mat. and late planted m. mat. beans[4]; sweet potatoes, egg plants and tomatoes (to 2nd r.); onions (on light soils)
2nd rains: Beans, potatoes, sweet pot.; onions (on light soils); m. mat. barley (higher places)

Pasture and forage
About 1 ha/LU on nat. pasture of medium grass savanna with Zebra grass (Hyparrhenia rufa) and red oats grass (Themeda triandra) predominant; around 0.6 ha/LU on art. pasture of Rhodes grass; down to about 0.2 ha/LU feeding Napier or Bana grass and Desmodium; well suited for grade cattle, and on art. pasture plus fodder very well for dairy cows

UM 4 l/vl or two = *Sunflower-Maize Zone with a long to very long cropping season, dividable in two variable cropping seasons*

Good yield potential
1st rains, start norm. e. of Mch.: Late mat. maize like H 612–614 (e. of Mch.–S./O., 70–80 %), cold tol. sorghum, finger millet; late mat. sfl. like Kenya White (June–N., ~ 60 %), soya beans (below 1 800 m); cabbages, kales, spinach
2nd rains, start indistinctly around July/Aug.: M. mat. sunflower like HS 301 A or Comet (July–N.)
Whole year: Sisal, perennial castor like C–15

Fair yield potential
1st rains: Late and m. mat. beans[4]; sweet potatoes, egg plants and tomatoes (to 2nd r.), onions (on light soils)
2nd rains: Beans, potatoes (higher places), sweet pot.; onions (on light soils); m. mat. barley (higher places)
Whole year, best pl. time b. of April: Avocadoes[5], citrus[5], pineapples (lower places)

Pasture and forage
About 1.2 ha/LU on nat. pasture of medium grass savanna with Zebra grass and red oats grass predominant; about 0.6 ha/LU on art. pasture of Rhodes grass, down to 0.23 ha/LU feeding Bana or Napier grass and Desmodium; suited for grade cattle and dairy cows (with special care, esp. silage or hay for dry season)

UM 4 (l/vl) = *Sunflower-Maize Zone with a (weak) long to very long cropping season*

Good yield potential
1st rains, start norm. e. of Mch.: Maize H 612–614 on deep soils (Apr.–O., 60–70 %), cold tol. sorghum, m. mat. sunflower like Comet (June–O., ~ 60 %)
Whole year: Sisal

Fair yield potential
1st rains: Maize H 612–614 on moderately deep soils, finger millet; beans; potatoes (higher places), sweet potatoes; m. mat. sunflower like HS 301 A, late mat. sunflower like Kenya White, soya beans (below 1 800 m), egg plants, cabbages, kales, spinach, tomatoes, onions (on light soils)
2nd crop possible with early mat. varieties
Whole year: Perennial castor (50–60 %), pineapples (lower places)

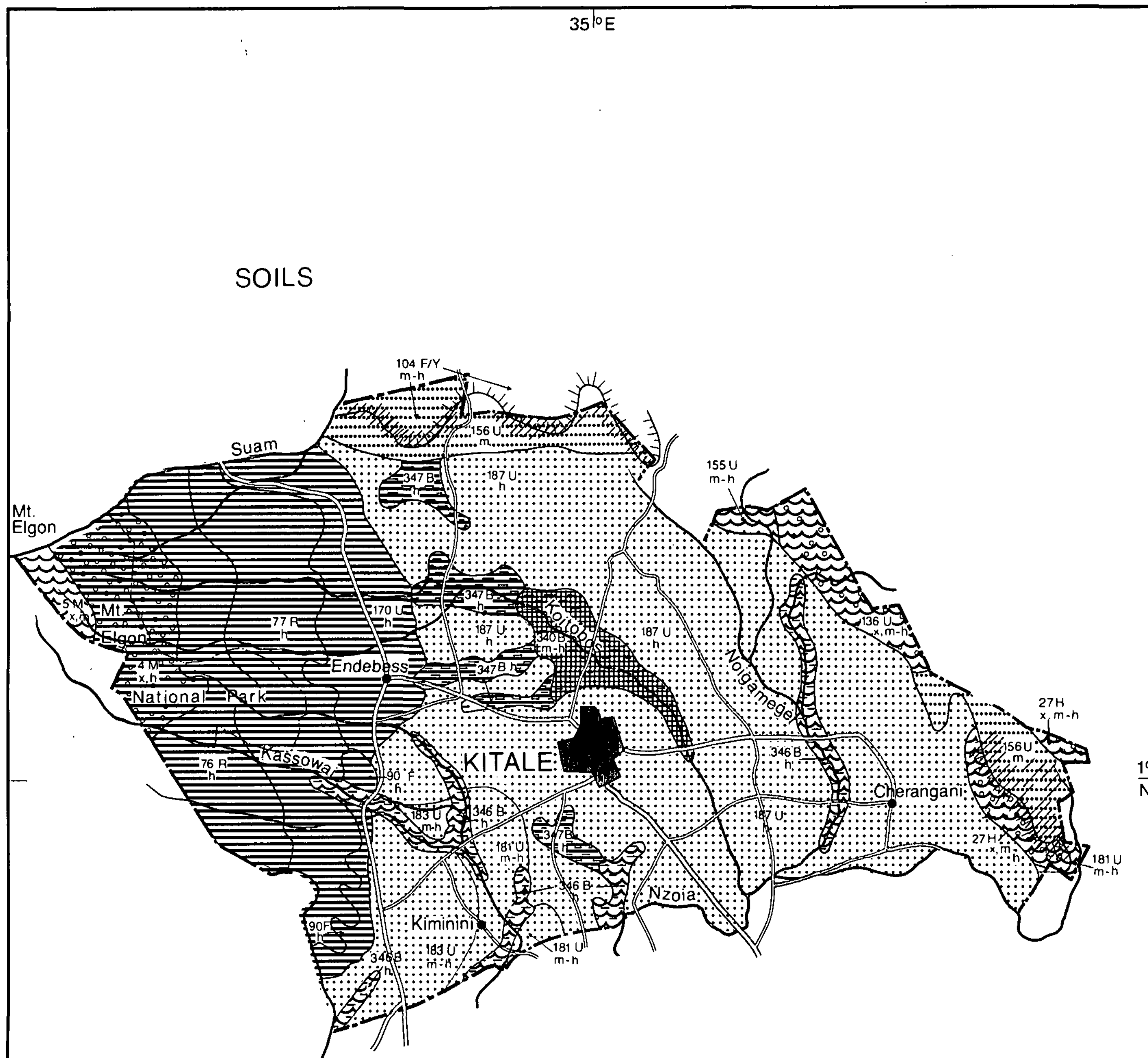
Pasture and forage
1.3–1.7 ha/LU on undestroyed nat. pasture of medium grass savanna mixed with dry bushland, about 0.8 ha/LU on art. pasture of Rhodes grass, down to 0.28 ha/LU feeding Bana grass and other forage; suited for grade cattle; if eroded see Baringo District UM 4 (l/m) i for palatable shrubs

UM 5 = *Livestock-Sorghum Zone*

Transitional, downward escarpment near northern boundary. Potential see West Pokot District

[5] With add. irrigation (D.–F.) better growing

SOILS



GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences

- high
- moderate to high
- moderate to low
- variable
- low

SERIOUS LIMITATIONS
(see descriptions)

- Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and (See AEZ-map)
- Shallow soil
- Waterlogging

0 5 10 15 20 25 km

TRANS NZOIA

Fert. M. Buch

Soils KSS 79018

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The major part of the district consists of a series of uplands of progressively lower altitude towards the west. The eastern boundary is formed by the Cherangani Hills, while on the western boundary the extinct volcano Mt. Elgon is an outstanding landmark. A scarp in the north marks the watershed between the Lake Turkana drainage basin and the Lake Victoria basin, the latter contributed to by the Nzoia River, which drains most of the district. Its tributaries have caused numerous valleys in the peneplains, of which only the major ones are indicated. Apart from the volcanic rocks of the Mt. Elgon area, the majority of the district is underlain by acid to intermediate rocks of the Basement System.

From the high- to low-lying areas, the following soil units are encountered. On the mountains, units 5 M is found, which is rich in organic matter. At slightly lower altitudes, soils of unit 4 M occur which are developed on volcanic ash and have a topsoil rich in organic matter. On the associated volcanic footridges, soils of units 76 R occur, with a humic topsoil and 77 R, which is less enriched with ash. Both have a moderate to high fertility. South of Endebess, the latter unit is associated with soils of the footslopes (unit 90 F) of moderate to high fertility. Soils of unit 170 U are similar but occur on lower-level uplands, i.e. on less sloping terrain. In the north, on similar topography but different parent material (colluvium and alluvium from undifferentiated Basement System rocks), soils of low to moderate fertility (104 F) occur.

On hills and minor scarps, there are soils of unit 27 H of variable fertility. The various upland levels are subdivided according to altitude. The highest unit is 136 U on upper middle-level uplands, occuring in the southeast to east of the district. To the north, this unit is associated with 155 U, a soil of low fertility. Unit 187 U is the most extensive one in the district but is of low natural fertility. Northwards, this unit borders unit 156 U, also of relatively low fertility. The lowlying areas within the uplands are occupied by soils of units 346 B of variable fertility and 347 B of moderate to high fertility. Both are subject to flooding. The bottomlands are mainly still used for grazing, while the uplands support good-yielding cereals, of which maize is most important.

SOILS ON MOUNTAINS AND MAJOR SCARPS*

Soils developed on olivine basalts and ashes of major older volcanoes

4 M
x, h[1)] = well drained, shallow to moderately deep, dark reddish brown, friable, humic, rocky and stony clay loam (nito-humic CAMBISOLS, rocky phase)

5 M
x, m = imperfectly drained, shallow to moderately deep, dark greyish brown, very friable, acid humic to peaty, loam to clay loam, with rock outcrops and ice in the highest parts (dystric HISTOSOLS, lithic phase; with LITHOSOLS, Rock Outcrops and ice)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

27 H
x, m–h = complex of excessively drained to well drained, shallow, dark red to brown, friable, sandy clay loam to clay; in many places rocky, bouldery and stony and in places with acid humic topsoil (dystric REGOSOLS; with LITHOSOLS, humic CAMBISOLS lithic phase and Rock Outcrops)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

76 R
h = well drained, extremely deep, dark reddish brown to dark brown, friable and slightly smeary clay, with acid humic topsoil (ando-humic NITOSOLS; with humic ANDOSOLS)

77 R
h = well drained, extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil (humic NITOSOLS)

SOILS ON FOOTSLOPES

Soils developed on colluvium from basic igneous rocks (serpentinites, basalts, etc.)

90 F
h = well drained, very deep, dark reddish brown, firm, moderately calcareous clay (calcic CAMBISOLS)

SOILS ON FOOTSLOPES AND UNDIFFERENTIATED PIEDMONT PLAINS

Soils developed on colluvium and alluvium from undifferentiated Basement System rocks

104 F
m–h = well drained, moderately deep to deep, red to dark reddish brown, firm, sandy clay loam to clay (chromic and vertic LUVISOLS)

SOILS ON UPPER MIDDLE-LEVEL UPLANDS

Soils developed on biotite gneisses

136 U
x, m–h = well drained, moderately deep to deep, dark reddish brown to dark brown, friable, sandy clay loam to clay, with thick acid humic topsoil; in places shallow and rocky (humic ACRISOLS and humic CAMBISOLS, partly lithic phase; with Rock Outcrops

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on biotite gneisses

155 U = well drained, moderately deep to deep, dark reddish brown to brown, friable to firm, sandy clay loam to clay, partly with acid
m–h humic topsoil (ferralo-orthic ACRISOLS; with dystric and humic CAMBISOLS and humic ACRISOLS)

156 U = well drained, moderately deep to deep, brown to dark yellowish brown, firm sandy clay loam
m (orthic LUVISOLS)

SOILS ON LOWER-LEVEL UPLANDS

Soils developed on basic igneous rocks (basalts, etc.)

170 U = well drained, extremely deep, dark red, friable clay
h (eutric NITOSOLS)

Soils developed on granites and quartz-feldspar gneisses

181 U = well drained, deep, strong brown to reddish yellow, very friable, sandy clay loam to sandy clay
m–h (orthic FERRALSOLS; with ferralic CAMBISOLS)

Soils developed on biotite gneisses

183 U = well drained, very deep, dark red to dark reddish brown, very friable, sandy clay loam to clay
m–h (rhodic FERRALSOLS)

Soils developed on undifferentiated Basement System rocks

187 U = well drained, very deep, red to dark red, very friable to friable clay
h (rhodic FERRALSOLS)

SOILS ON BOTTOMLANDS

Soils developed on infill from limestones

340 B = poorly drained, deep, very dark grey to very dark brown, firm, moderately calcareous, clay loam to clay, with humic topsoil
m–h (haplic CHERNOZEMS)

Soils developed on infill mainly from undifferentiated Basement System rocks

346 B = complex of imperfectly drained to very poorly drained, very deep, very dark grey to dark greyish brown, mottled, firm clay; in
h places peaty or with acid humic topsoil (dystric GLEYSOLS; with eutric PLANOSOLS and some dystric HISTOSOLS)

347 B = poorly drained, very deep, dark greyish brown to black, very firm, slightly calcareous, cracking clay; in many places with a
h saline and sodic deeper subsoil (pellic VERTISOLS, partly saline-sodic phase; with eutric or vertic GLEYSOLS)

[1] Soil texture-classes

h = heavy soil
l = light soil
m = medium soil
x = stony or bouldery soil
v = varying texture
m–h = medium to heavy
m, h = medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

* Soil description from Kenya Soil Survey:
Exploratory Soil Map and Agro-climatic Zone Map of Kenya, scale 1 : 1 000 000. Expl. Soil Survey Rep. E1, Nairobi 1982.
See this map also for colours; symbols simplified here.

POPULATION AND LAND

According to the Census of September 1979, 259 503 people lived in the Trans Nzoia District (Table 4). Of the total population about 11 % (28 327 people) inhabited the Kitale Municipality, and the remaining 89 % lived in the rural areas. Therefore, the rural population (231 176 people)[1] had to live on 155 900 ha of agricultural land (Table 6). Derived from these figures, an average household of 5.26 persons had only 3.67 ha per household and 0.67 ha per person (Table 6). The Kwanza location is worth mentioning (mainly LH 4 and UM 4), as it seems that there is more land available – people there had 4.20 ha per household and 0.80 ha per person – but in LH 4 (Cattle-Sheep-Barley Zone) there must be a higher proportion of grazing land. Finally it has to be said that all these figures lead to the conclusion that even in a medium- and large-scale farming area like the Trans Nzoia District, population pressure already exists and will endanger the saleable surplus (especially of maize) to other districts if no intensification (yield increase) is promoted.

1) Not included are rural people living in the municipality, but on the other hand, there are some non-rural people outside in trading centres, schools, etc.

TRANS NZOIA DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Cherangani	35 497	35 105	70 602	12 757	534	132
Kitale Municipality	15 640	12 687	28 327	6 533	80	352
Cherangani Division	51 137	47 792	98 929	19 290	615	160
Saboti	36 210	36 341	72 551	12 959	480	151
Saboti Division	36 210	36 341	72 551	12 959	480	151
Kwanza	44 543	43 480	88 023	16 752	983	89
Kwanza Division	44 543	43 480	88 023	16 752	983	89
Trans Nzoia District	131 890	127 613	259 503	49 001	2 078	124

TRANS NZOIA DISTRICT

TABLE 5: COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Cherangani	12718	3.00	1.52	0.75	0.28	5.55
Kitale Municipality	6475	2.46	0.72	0.55	0.37	4.10
Division Cherangani	19193	2.84	1.23	0.68	0.31	5.06
Location:						
Saboti	12918	3.13	1.60	0.68	0.20	5.61
Division Saboti	12918	3.13	1.60	0.68	0.20	5.61
Location:						
Kwanza	16811	2.95	1.37	0.68	0.23	5.23
Divsion Kwanza	16811	2.95	1.37	0.68	0.23	5.23
DISTRICT: TRANS NZOIA	48922	2.94	1.37	0.68	0.25	5.26

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, includes one and two persons per households as well

TRANS NZOIA DISTRICT

TABLE 6: AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON[1)]

	in '00 ha = sqkm					in '00 ha = sqkm												in ha	
Location/Division without townships	Area total Census 79	Non-agricultural land: Unsuit. steep slopes	Forest Res., lakes, swamps	Others (roads, home-steads, rivers...)	Agri-cultural land	Area in agro-ecological zones AEZ: UH1	UH2	LH1	LH2	LH3	LH4-UM4	UM2	UM3	UM3-LH2	UM3-LH3	UM4	UM4-5	Agric. land per house-hold	person
Cherangani	534	17	F.12 Sw. 5	61	439			2	96	57			9			275		3.45	0.62
Cherangani Division	534	17	17	61	439			2	96	57			9			275		3.45	0.62
Saboti	480			66	414	7	7		50	50		61		18	80	141		3.20	0.57
Saboti Division	480			66	414	7	7		50	50		61		18	80	141		3.20	0.57
Kwanza	983	80		197	706	29	31		39	119	143			27	56	244	18	4.20	0.80
Kwanza Division	983	80		197	706	29	31		39	119	143			27	56	244	18	4.20	0.80
Total rural area	1 997	97	17	329	1 559	36	38	2	185	226	143	61	9	45	136	660	18	3.67	0.67

1) For official land statistics see supplementary publication to FM-Handbook, Vol. III A: Agriculture Land Statistics

AGRICULTURAL STATISTICS

AREA, PRODUCTION, YIELDS AND NUMBER OF GROWERS OF MAJOR CASH CROPS

TRANS NZOIA DISTRICT

TABLE 7: **TEA**
AREA – PRODUCTION – GROWERS – YIELDS – RETURNS[a)]

Division	Item	Unit	Year 75/76	76/77	77/78	78/79	79/80
Cherangani	Area	ha	478	486	487	503	511
	Production	t	317	337	631	683	447
	Value	'000 Shs	896	890	1035	1899	912
	Growers	No	637	660	662	684	688
	Yield p.ha	kg	663	693	1296	1358	875
	Value p.ha	Shs	1874	185	2125	3775	1785
	Area p.Grow.	ha	0.75	0.74	0.74	0.73	0.74
	Ret. p.Grow.	Shs	1407	1364	1563	2776	1326

TABLE 8: **COFFEE**
AREA – PRODUCTION – YIELDS[b)]

Co-operatives - Nil
Estates

Name	Item	Unit	Year 74/75	75/76	76/77	77/78	79/80
Trans-Nzoia/ Kipk. T.	Area	ha	1899	99	1742	1998	2423
	Production	t	384	397	6116	193	358
	Yield	kg/ha	202	442	3511	97	148

TABLE 9: **PYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[c)]

Item	Year 1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	0.56	0.80	0.50	1.0	0.8
Pyrethrin content %	1.4	1.4	1.2	1.4	1.3

Sources: a) K.T.D.A.
b) C.B.K.
c) Pyrethrum Board

STATISTICS[1)] OF MEDIUM TO LARGE FARMS

Pre Independence, the Trans Nzoia district was almost exclusively farmed by large-scale mixed farms, and by 1973/74 185,000 ha of land was still cultivated in large units. Because of the comparatively high population density, and the multiple ownership of the mixed farms, many of them have been, or will be, subdivided into individually managed smallholdings. It is estimated that roughly 200–220 large farms of approximately 500 ha in size will remain, while the rest of the land will be farmed by small family farms in units of 2–6 ha in size.[2)]

The figures given in table 10 only reflect the legally registered farms and therefore do not consider the above-described development (table 10).[3)] There ist roughly one tractor per 100 ha of arable land and one combine harvester per 125 ha of wheat crop (table 11). Two-thirds of the land is planted with annual crops and one-third with leys (table 12). Maize is the most important annual crop followed by wheat (table 13). Dairy cattle are evenly distributed in herds of 10 to 500 head, while beef cattle and sheep are mostly kept in small units up to 100 head (table 15). There has been a decline in the number of dairy cattle kept during the past five years; besides grazing livestock, pigs are of some importance in the district (table 14). Milk sales remained stable while livestock sales declined somewhat (table 16). The yields given in table 8 reflect large farm potential as well. It is a safe assumption that most large farms have reached production level II; further output increases depend largely on economics, as they have to be ‚bought' with considerable input increases.

1) For more up to date information see FMHB Vol. III/A and III/B; see also Land: Population ratio, table 6.

2) Large Farm Sector Study 1977

3) It is planned to carry out a more comprehensive farm management survey in the Rift Valley, which should yield better data towards 1985/86.

TABLE 10: DISTRIBUTION OF LAND BY HOLDING SIZE
Medium–Large Farms[a)]

Size Group in ha	Number of Holdings in Size Group															
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
- 19	27	28	28	30	31											
20 - 49	31	30	34	32	31											
50 - 99	25	29	28	37	38											
100 - 199	47	46	51	48	54											
200 - 299	69	67	70	76	75											
300 - 399	53	54	51	54	53											
400 - 499	37	38	38	35	34											
500 - 999	87	85	84	86	77											
1,000 - 1,999	32	32	34	35	34											
2,000 - 3,999	5	5	5	5	5											
4,000 - 19,999	1	1	1	-	2											
20,000 - and over	-	-	-	-	-											

TABLE 11: MAJOR FARM MACHINERY AND IMPLEMENTS ON FARMS

Machinery/Implements	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Farm Tractors	868	868	916	855	788											
Combine Harvesters	69	95	67	65	55											
Plough & Harrow	1035	1072	1087	1062	1080											
Cultivators & Tooth Harrow	493	518	495	423	419											
Planters & Sprayers	530	502	597	580	475											

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 12: LAND USE

TRANS NZOIA DISTRICT: Medium–Large Farms[a)]

Land Under	In '000 ha								Percent							
	1975	1976	1977	1978	1979	1980	1981	1982	1975	1976	1977	1978	1979	1980	1981	1982
Temporary Crops	45.9	52.3	57.1	54.3	55.6				25	29	31	28	29			
Temporary Leys & Meadows	27.1	24.8	23.2	20.4	24.4				15	14	12	10	13			
Temporary Fallow Land	3.3	2.3	3.5	3.4	3.0				2	1	2	2	2			
Subtotal	76.3	79.4	83.8	78.1	83.0				42	44	45	41	44			
Permanent Crops:																
Permanent Meadows (natural pasture)	91.5	85.0	80.1	81.5	72.2				49	46	43	43	38			
Subtotal	91.5	85.0	80.1	81.5	72.2				49	46	43	43	38			
Permanent Crops (incl. fruit trees)	1.8	1.7	1.5	1.3	1.5				1	1	1	1	1			
Forest Land	5.6	6.0	8.7	7.4	8.2				3	3	5	4	4			
Other Land	9.0	11.4	12.0	23.0	25.0				5	6	6	12	13			
Subtotal	16.4	19.1	22.2	31.7	34.7				9	10	12	17	18			
TOTAL	184.2	183.5	186.1	191.3	189.9				100	100	100	100	100			

Land Under	In '000 ha								Percent							
	1983	1984	1985	1986	1987	1988	1989	1990	1983	1984	1985	1986	1987	1988	1989	1990
Temporary Crops																
Temporary Leys & Meadows																
Temporary Fallow Land																
Subtotal																
Permanent Crops:																
Permanent Meadows (natural pasture)																
Subtotal																
Permanent Crops (incl. fruit Trees)																
Forest Land																
Other Land																
Subtotal																
TOTAL																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 13: CROPPING PATTERNS
Medium–Large Farms[a)]

Land under:	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Cereals (in '000 ha)																
Maize	26.2	30.0	33.5	30.0	24.4											
Wheat	6.2	6.2	6.0	5.7	6.8											
Barley	0.4	0.4	0.3	0.6	0.7											
Oats	0.2	0.2	0.2	0.2	0.1											
Others	0.2	0.4	0.3	0.3	0.3											
Total	33.2	37.2	40.3	36.8	32.3											
Grassing/Fodder Crops (in ha)																
Leys[b)]	-	-	-	-	24350											
Nat. Pasture[b)]	-	-	-	-	3013											
Lucerne	101	98	57	35	10											
Silage Crops	460	752	718	413	273											
Others	1040	1156	864	762	661											
Total	1601	2006	1639	1210	28307											
Vegetables/Root Crops (in ha)																
Potatoes	53	36	22	59	71											
Tomatoes	1	3	10	7	4											
Beans & Peas	262	369	482	261	498											
Onions	6	6	5	6	6											
Others	10	15	27	61	55											
Total	332	429	546	394	634											

a) farms above 20 ha in size b) 1975–78 not recorded

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 14: NUMBER OF LIVESTOCK KEPT ON FARMS (IN '000 HEAD)
Medium–Large Farms[a)]

Kind of Livestock	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Dairy Cattle:																
Cows	38.6	41.4	37.5	37.1	35.7											
Heifer & Heifer Calves	22.7	23.0	20.5	18.8	18.8											
Stud Bulls & Bull "	2.2	2.9	4.1	3.5	3.8											
Total	63.5	67.3	62.1	59.4	58.3											
Beef Cattle:																
Cows	11.5	11.2	12.5	11.6	10.6											
Heifer & Heifer Calves	10.8	10.9	10.4	9.5	6.9											
Other Beef Cattle	22.5	23.5	21.7	19.9	20.3											
Total	44.8	45.6	44.6	41.0	37.8											
Sheep:																
Ewes	3.4	3.9	3.8	4.5	3.5											
Rams	0.4	0.4	0.5	0.4	0.5											
Lambs	1.5	1.3	1.9	2.0	1.2											
Others	0.7	1.2	1.7	1.2	1.9											
Total	6.0	6.8	7.9	8.1	7.1											
Pigs:																
Breeding Sows	1.1	0.8	2.1	1.0	2.5											
Breeding Boars	0.1	0.3	0.4	0.3	0.5											
Others	6.7	5.8	4.5	6.0	5.7											
Total	7.9	6.9	7.0	7.3	8.7											
Poultry:																
Breeding Stock	0.2	0.3	0.8	2.4	3.2											
Other Poultry	0.6	1.2	1.2	2.4	4.2											
Total	0.8	1.5	2.0	4.8	7.4											

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 15: HERD AND FLOCK SIZES

Medium–Large Farms[a)]

Stock	Number of Herds and Flocks in Herd Size Groups																															
Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78
Dairy Cattle	33	37	29	37	36	29	47	43	54	39	37	36	43	39	42	35	32	30	32	25	24	23	18	12	74	84	68	72	27	29	26	26
Beef Cattle	33	27	24	31	19	22	22	18	21	23	17	16	9	10	4	5	1	3	6	5	11	8	3	4	16	12	14	20	27	24	28	21
Sheep	42	45	42	48	17	18	21	22	23	23	23	24	9	7	10	4	3	5	5	6					4	9	11	12	1	-	-	-

Stock																																
Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82
Dairy Cattle	43				28				47				46				24				15				66				25			
Beef Cattle	28				28				15				7				6				3				13				23			
Sheep	40				32				14				10				4				10				-				-			

Stock																																
Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86
Dairy Cattle																																
Beef Cattle																																
Sheep																																

Stock																																
Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90
Dairy Cattle																																
Beef Cattle																																
Sheep																																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 16: LIVESTOCK PRODUCTION, SALES AND CONSUMPTION ON FARM
Medium–Large Farms[a)]

Livestock	Produce	Unit	Year							
			1975	1976	1977	1978	1979	1980	1981	1982
Dairy	Milk Production, Total	'000 Litre	39133	30521	30711	41064	38137			
	Milk sold off farm	'000 Litre	-	26028	27696	34891	36048			
	Cattle	'000 Head	2.7	1.9	2.3	1.7	-			
Beef	Sales for slaughter and consumed on farm	'000 Head	12.8	13.1	13.0	12.7	9.7			
	Sales for breeding and fattening	'000 Head	5.9	6.2	6.4	6.1	2.7			
Sheep	Total Sales and consumed on farm	'000 Head	0.6	0.8	1.2	1.5	1.0			
	Wool	'000 kg	3.2	3.2	2.8	4.8	4.2			

Livestock	Produce	Unit	Year							
			1983	1984	1985	1986	1987	1988	1989	1990
Dairy	Milk Production, Total	'000 Litre								
	Milk sold off farm	'000 Litre								
	Cattle	'000 Head								
Beef	Sales for slaughter and consumed on farm	'000 Head								
	Sales for breeding and fattening	'000 Head								
Sheep	Total Sales and consumed on farm	'000 Head								
	Wool	'000 kg								

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 17a: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: LH 3 WHEAT/(MAIZE)-BARLEY ZONE				A.E.Z.:LH 4-UM 4 CATTLE-SHEEP-BARLEY-Z			
		Vegt. Period 1st + 2nd: vli or two in Days,1st: 100 or more		2nd: 170-200	total: 270-300	vl/1 or two 90 or more		140-160	230-260	(1)i-(1/vl) 90 or more		110-130	200-230
		Soil: NITOSOLS				NITOSOLS				FERRALSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	2,200			5,100	2,000			4,800	1,200			2,400
Fertilizer N	kg				161				155				66
P_2O_5	kg				80				77				33
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg	4,100			9,000	3,800			7,000	1,500			4,000
Fertilizer N	kg				272				177				138
P_2O_5	kg				136				88				69
K_2O													
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg	500		700	1,000								
Fertilizer N	kg			5	13								
P_2O_5	kg			11	27								
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg	1,500		2,500	3,200	1,100	1,500	2,300	3,000	1,100	1,500	1,800	2,000
Fertilizer N	kg			24	41		11	34	53		11	19	52
P_2O_5	kg			42	71		17	50	80		17	30	82
K_2O	kg												

TRANS NZOIA DISTRICT

TABLE 17b: **PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES**

OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: LH 3 WHEAT/(MAIZE)-BARLEY ZONE				A.E.Z.: LH 4-UM 4 CATTLE-SHEEP-BARLEY-Z			
		Vegt. Period 1st + 2nd: in Days, 1st: vl i or two 100 or more		2nd: 170-200	total: 270-300	vl/l or two 90 or more		140-160	230-260	(l) i-(l/vl) 90 or more		110-130	200-230
		Soil: NITOSOLS				NITOSOLS				FERRALSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: BARLEY													
Farmers in Production Level	%												
Yields	kg	1,400	1,500	2,200	3,000	1,200	1,500	2,000	3,200				
Fertilizer N	kg		2	16	32		7	19	48				
P_2O_5	kg		4	29	52		13	34	84				
K_2O	kg												
CROP: TRITICALE													
Farmers in Production Level	%												
Yields	kg					1,300		2,500	3,000				
Fertilizer N	kg							29	65				
P_2O_5	kg							48	108				
K_2O													
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,200	2,700	4,000	8,000	2,000	2,500	3,500	5,000	2,000	2,500	3,000	4,000
Fertilizer N	kg		13	45	145		14	42	84		14	28	57
P_2O_5	kg		12	43	139		13	38	75		13	25	50
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	800		1,200	2,500	700	600	1,100	2,300	500	600	1,100	2,000
Fertilizer N	kg			14	58			14	54		4	21	53
P_2O_5	kg			11	48			20	78		6	30	75
K_2O	kg												
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: RAPESEED													
Farmers in Production Level	%												
Yields	kg	500		800	1,200	400		800	1,000				
Fertilizer N	kg			30	70			40	60				
P_2O_5	kg			30	70			40	60				
K_2O	kg												

TABLE 17c: **PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES**

OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: LH 3 WHEAT/(MAIZE)-BARLEY ZONE				A.E.Z.:LH 4-UM 4 CATTLE-SHEEP-BARLEY-Z			
		Vegt. Period 1st + 2nd: vli or two; in Days.1st: 100 or more		2nd: 170-200	total: 270-300	vl/1 or two; 90 or more		140-160	230-260	(1)i-(1/vl); 90 or more		110-130	200-230
		Soil: NITOSOLS				NITOSOLS				FERRALSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	6,500		18,500	33,500								
Fertilizer N	kg			148	268								
P_2O_5	kg			167	302								
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O													
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

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TABLE 17d: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 2 COFFEE ZONE				A.E.Z.: UM 3 MARGINAL COFFEE ZONE				A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE			
		Vegt. Period 1st + 2nd: vli or two; in Days, 1st: 100 or more		2nd: 160-190	total: 260-290	l/vl 100 or more		110-130	210-240	l/vl or two 100 or more		110-140	210-240
		Soil: FERRALSOLS				FERRALSOLS				FERRALSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	1,800			3,600	1,500			3,000	1,200			2,400
Fertilizer N	kg				100				83				76
P_2O_5	kg				50				41				43
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg	3,500			8,000	3,100			7,000	2,500			5,500
Fertilizer N	kg				250				216				166
P_2O_5	kg				125				108				83
K_2O													
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg		400	800	1,200								
Fertilizer N	kg		40	80	120								
P_2O_5	kg		90	90	100								
K_2O	kg												
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 17e: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 2 COFFEE ZONE				A.E.Z.: UM 3 MARGINAL COFFEE ZONE				A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE			
		Vegt. Period 1st + 2nd: vli or two in Days. 1st: 100 or more		2nd: 160-190	total: 260-290	1/vl 100 or more		110-130	210-240	1/vl or two 100 or more		110-140	210-240
		Soil: FERRALSOLS				FERRALSOLS				FERRALSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,000	2,700	4,000	7,000	2,000	2,500	4,000	5,500	2,000	2,700	4,000	5,000
Fertilizer N	kg		18	50	125		13	50	86		18	50	75
P_2O_5	kg		20	56	140		14	56	98		20	56	85
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	800	-	1,200	2,300	700	-	1,200	2,000	700	-	1,200	1,800
Fertilizer N	kg			14	51			17	44			17	31
P_2O_5	kg			20	75			25	64			25	45
K_2O													
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yielde	kg	1,000		1,500	2,300	700		1,200	2,000	600	700	1,100	1,900
Fertilizer N	kg			17	44			17	44		3	17	44
P_2O_5	kg			19	49			19	49		4	19	49
K_2O	kg												
CROP: RAPESEED													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	5,000		8,000	20,000	4,000		5,000	16,000				
Fertilizer N	kg			24	120			8	96				
P_2O_5	kg			21	105			7	84				
K_2O	kg												

UASIN GISHU DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The fertile Uasin Gishu Plateau is the largest wheat and malt barley area of Kenya, with the largest area of the agro-ecological zone LH 3, called Wheat/(Maize)-Barley Zone, which is the best zone of the wheat producing ones. Altitude and mean temperatures are higher than 1 900 m and less than 17.5°C during the growing period. This is suitable for these cereals except in the lower western parts of the district. Rainfall is sufficient in most places. The annual averages are 900–1 100 mm in the main parts, and more than that in the peripheral parts of the district. The rainfall distribution during the year is nearly unimodal, with a first peak in April and a second one in August. These "2nd rains", with 350–600 mm or more recorded in 6 out of 10 years, start indistinctly in July and have a 100 mm higher rainfall expectation than the 1st rains. The 2nd rains are the main rains for medium maturing wheat varieties.[1] The planting should begin in June to get the peak of the rains during the peak water demand of the growing period and to have an expectation of at least 450 mm in 6 out of 10 years. The soils are also good, i.e. rich in minerals due to volcanic deposits in the southern two-thirds of the district. Nevertheless, fertilizing is important to restore the nutrient removed by cropping, in order to avoid a "mining agriculture" leaving the problem of soil restoration to the coming generations.

A typical maize zone is UM 4 in the eastern and north eastern parts. Maize can also be grown in the Wheat/(Maize)-Barley Zone LH 3 but not everywhere as well as wheat. For this reason, maize is put in brackets. Maize cultivation becomes critical in the centre of the plateau because of the predominantly weak performance of the humid season and soils with less water holding capacity. For this reason we described it as a Wheat-Barley Zone only in the AEZ map. In the eastern centre of the plateau, the water storage capacity of the soils becomes even lower. This makes the area drier than the average annual rainfall suggests. It is the Cattle-Sheep Barley Zone LH 4. Barley means fodder barley, according to the general agro-ecological zonation of the Tropics, although for economic reasons it is more of a ranching area here, with almost no additional fodder growing. We also find this kind of drier area in the Nzoia-Arobobutch Basin in the North. The higher southern part of the district is wetter and the best land use would be pyrethrum and wheat where it is not too wet (UH 2), and timber production in Forest Reserves (UH 1).

1) Several varieties should be planted to minimize the risk of loss caused by rust

UASIN GISHU DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**

having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
8935010	Kaptagat For. Station	47	Average	1 261	32	44	93	205	167	100	146	165	73	69	94	73
2 438 m			60% rel.[1)]	1 136	8	14	64	170	134	86	135	142	67	51	44	36
8935016	Soy, Kipsomba Estate	53	Av.	1 052	22	38	58	123	145	109	166	175	87	48	50	32
1 951 m			60%	940	10	12	42	94	115	99	126	157	75	34	15	16
8935022	Timboroa	27	Av.	1 171	21	38	72	156	130	118	172	211	109	48	51	46
2 743 m			60 %	1 050	6	11	31	117	115	93	147	180	96	34	22	24
8935041	Eldoret, Eureka	39	Av.	972	27	47	66	166	115	85	128	113	52	55	75	43
2 286 m	Estate		60%	875	11	7	52	150	87	58	108	102	26	43	40	16
8935045	Eldoret, K.C.C.	36	Av.	986	31	23	60	120	109	87	167	189	78	54	43	26
2 073 m			60%	885	0	6	46	86	69	49	153	150	69	41	22	15
8935067	Kaptagat,	36	Av.	1 211	40	42	83	194	147	98	144	166	82	64	86	66
2 438 m	Mvita Estate		60%	1 090	15	10	62	140	103	52	93	148	39	35	66	35
8935080	Nabkoi For. Station	29	Av.	1 185	46	31	69	156	125	99	153	204	105	57	56	50
2 591 m			60%	1 067	12	9	51	114	109	94	130	179	77	35	46	17
8935108	Moiben, Kenley Farm	25	Av.	970	21	33	59	123	133	75	114	147	62	56	104	42
2 134 m			60%	870	6	6	38	102	103	64	95	132	39	36	31	20
8935117	Kipkabus, L. Estate	25	Av.	1 276	45	52	93	184	150	88	128	178	84	81	123	71
2 499 m			60%	1 145	13	15	65	170	130	82	107	158	75	62	86	37
9035069	Equator, C.D.	36	Av.	1 204	40	57	89	159	133	98	154	187	89	54	90	55
2 762 m	Cullen		60%	1 084	10	14	67	126	102	79	133	168	61	30	53	27

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

TABLE 2: **TEMPERATURE DATA**

No. and altitude	Name of Station	AEZ[1)]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
				Temperature in °C													
8935026	Eldoret	LH	Mean max.	25.6	26.2	25.9	25.3	23.9	23.1	21.8	22.0	23.5	24.5	24.2	24.4	24.2	20
2 080 m	D.C.	3	Mean temp.	17.1	17.6	17.9	18.1	17.4	16.2	15.6	15.4	15.9	16.9	17.2	16.7	16.8	
		lp	Mean min.	8.5	9.0	9.9	10.8	10.8	9.2	9.4	8.8	8.4	9.3	10.1	8.9	9.4	
			Abs. min.	3.1	3.7	4.7	6.1	5.0	4.4	3.3	4.4	4.4	4.4	4.5	2.8	2.8	
8935086	Eldoret	LH	Mean max.	24.9	25.7	25.9	24.3	23.4	22.6	21.4	21.6	23.1	23.7	23.6	23.7	23.7	21
2 084 m	Met. Stat.	3	Mean temp.	16.9	17.3	17.8	17.8	16.8	15.8	15.5	15.5	15.9	16.7	16.9	16.6	16.6	
		lp	Mean min.	8.8	8.8	9.7	11.2	10.2	8.9	9.5	9.3	8.7	9.6	10.2	9.5	9.5	
			Abs. min.	1.6	2.6	3.4	5.0	4.9	4.4	4.9	5.2	4.5	4.5	3.6	3.6	1.6	
8935133	Eldoret	LH	Mean max.	23.6	23.9	24.1	22.5	22.1	21.6	20.3	20.9	22.1	22.2	21.6	21.9	22.2	8
2 180 m	Experimen-	3	Mean temp.	16.0	16.1	16.6	16.5	15.8	15.2	15.4	14.5	14.7	15.9	16.0	15.5	15.5	
	tal Farm	hp	Mean min.	8.4	8.2	9.1	10.5	9.4	7.7	8.4	8.1	7.2	9.6	10.3	9.0	8.8	
			Abs. min.	1.1	2.2	3.3	4.4	4.7	3.3	3.9	−1.1	3.3	5.0	5.3	1.1	−1.1	
8935046	Ainabkoi	UH	Mean max.	19.2	20.2	19.9	19.1	18.7	18.6	18.2	18.1	18.6	19.2	18.5	18.8	18.9	14
2 660 m	(operating	2	Mean temp.	13.4	13.9	13.8	13.5	13.3	13.0	12.9	12.8	13.1	13.6	13.1	13.2	13.3	
	to 1959)	lp	Mean min.	7.6	7.6	7.6	7.8	7.8	7.3	7.3	7.5	7.9	7.9	7.6	7.6	7.6	
			Abs. min.	2.8	3.3	5.0	5.0	4.4	5.0	4.4	4.4	5.0	5.0	4.4	5.0	2.8	
8935077	Kipkabus	UH	Mean max.	19.9	21.0	20.8	19.8	19.4	19.1	18.3	18.1	19.1	19.1	18.3	18.4	19.3	7
2 525 m	Downs	1	Mean temp.	13.9	14.3	14.8	14.4	14.3	13.1	12.8	12.8	13.2	14.0	13.7	13.9	13.8	
	Estate	lp	Mean min.	7.9	7.5	8.7	8.9	9.1	7.1	7.3	7.4	7.2	8.8	9.1	9.3	8.2	
	(operating		Abs. min.	2.2	4.4	3.3	0.6	5.0	4.4	4.4	3.9	4.4	4.4	5.0	4.4	0.6	
	to 1963)																

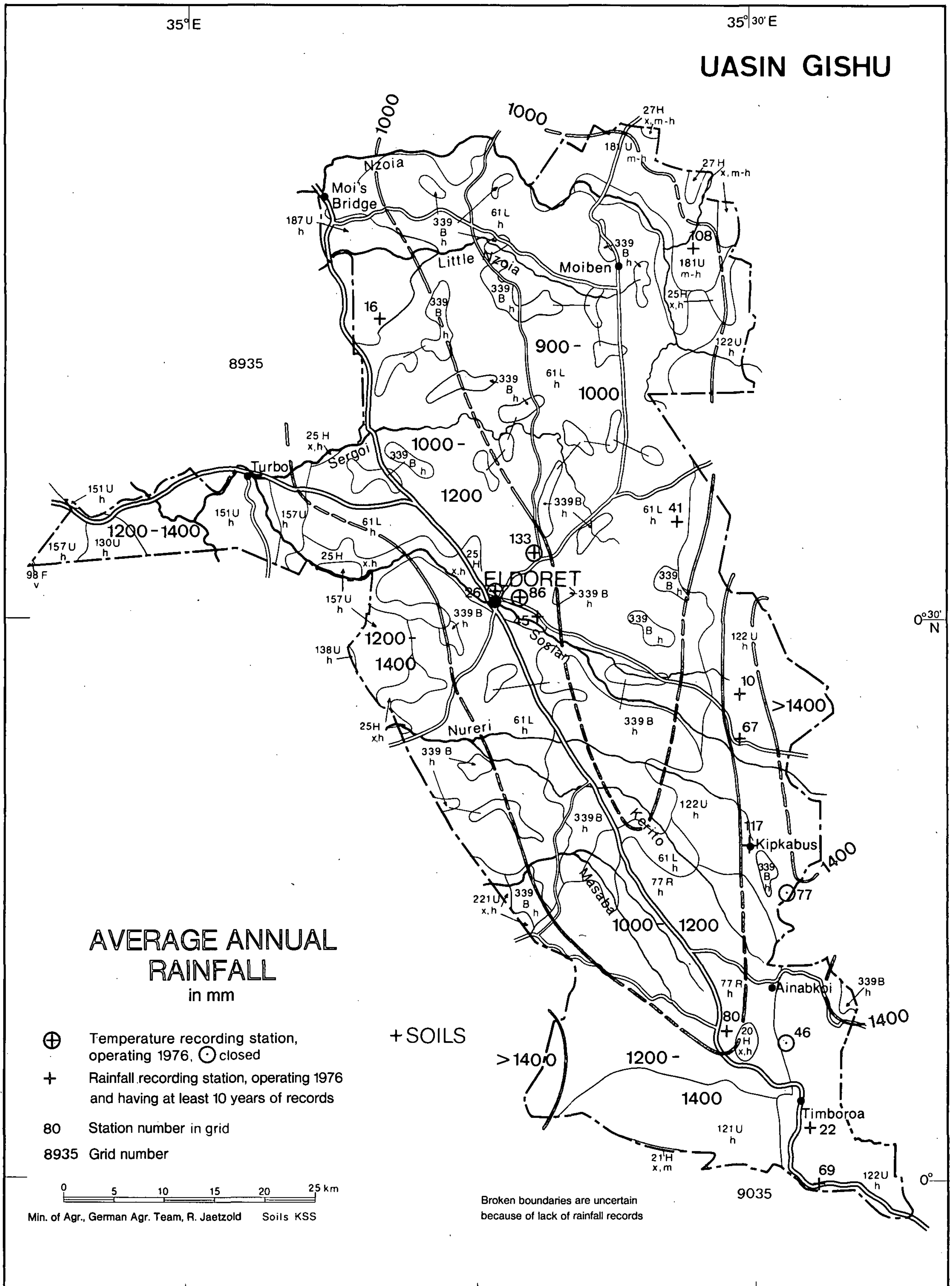
1) AEZ = Agro-ecological zone; lp = lower places, hp = higher places within the zone

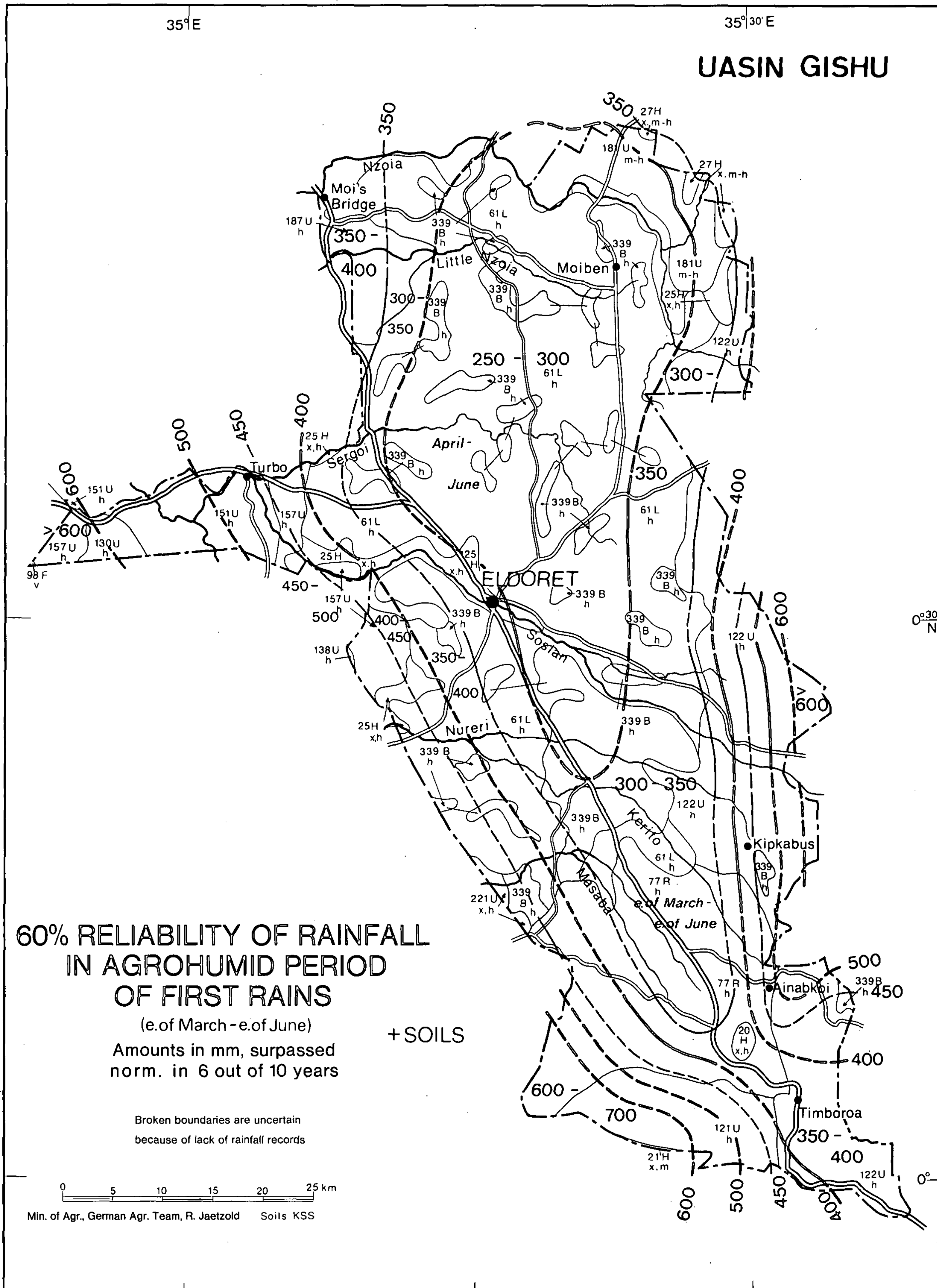
UASIN GISHU DISTRICT

TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2] in days	2nd rains in days	Total[3] in days
UH 1 Sheep-Dairy Zone	vl i or two	Here mainly Forest Reserve because this timber land is too valuable to be cutted for grazing							
UH 2 Pyrethrum/ Wheat Zone	vl i or two	2 300–2 700	15.7–13.3	1 150–1 400	360–600	460–600	110 or more	160–200	270–310
UH 3 Wheat-Barley Zone	vl/l or two	2 400–2 600	15.1–13.9	1 100–1 200	350–450	450–550	100 or more	150–170	250–270
LH 1 Tea-Dairy Zone	p or two vl i or two	Here mainly Forest Reserve Very small, see Nandi							
LH 2 Wheat/Maize-Pyrethrum Zone	(vl/l) i vl/l or two vl i or two	Very small, see Elgeyo-Marakwet Very small, see Nandi 2 300–2 400	 15.7–15.1	 1 150–1 220	 360–500	 450–560	 110 or more	 160–190	 270–300
LH 3 Wheat/(Maize)-Barley Zone	l/vl or two (l/vl)	1 900–2 400	17.9–15.1	900–1 300 900–1 100	300–490 250–350	350–600 350–550	100 or more 100 or more	115–140 115–130	215–240 215–230
LH 4 Cattle-Sheep-Barley Zone	(l)	1 900–2 200	17.9–16.3	900–1 100	250–320	350–500	100 or more	95–115	195–215
UM 3 Marginal Coffee Zone	l/vl i or m – s i	Very small, see Bungoma							
UM 4 Sunflower-Maize Zone	l/vl or two l/vl	1 500–1 900	20.5–18.0	1 000–1 400 900–1 000	300–620 280–380	430–600 380–480	100 or more 100 or more	115–140 115–130	215–240 215–230

1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants
2) More if growing cycle of cultivated plants continues into the period of second rains
3) Agro-humid conditions continue from 1st to 2nd rains in the whole district


35°E
35°30'E
UASIN GISHU
0°30' N
0°
Moi's Bridge
Nzoia
Little Nzoia
Moiben
Turbo
Sergoi
ELDORET
Sosiani
Nureri
Kerita
Masaba
Kipkabus
Ainabkoi
Timboroa
8935
9035
AVERAGE ANNUAL RAINFALL
in mm
Temperature recording station, operating 1976, closed
Rainfall recording station, operating 1976 and having at least 10 years of records
80 Station number in grid
8935 Grid number
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS
+SOILS
Broken boundaries are uncertain because of lack of rainfall records



60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF FIRST RAINS

(e.of March - e.of June)

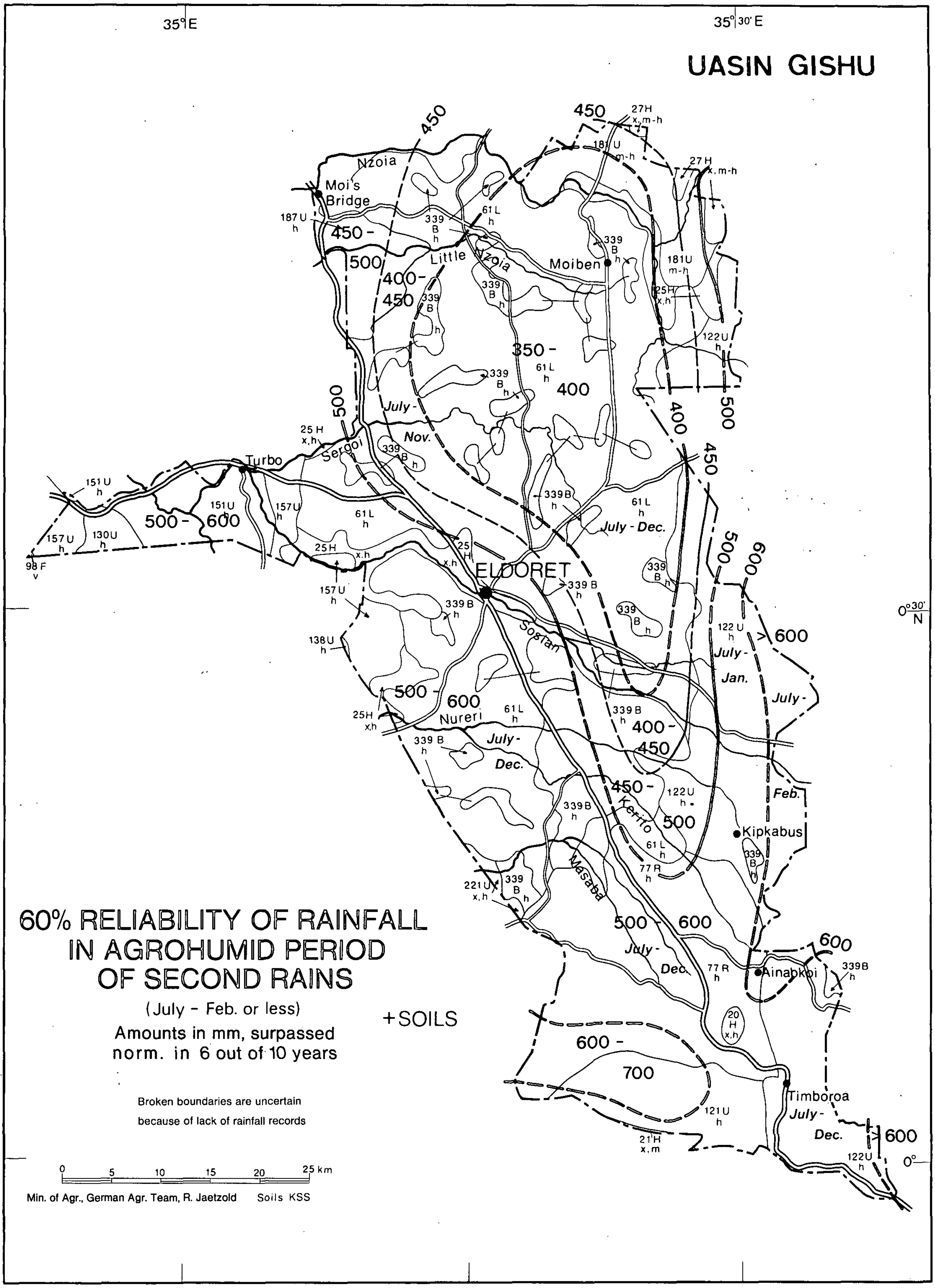
Amounts in mm, surpassed norm. in 6 out of 10 years

+ SOILS

Broken boundaries are uncertain because of lack of rainfall records

0 5 10 15 20 25 km

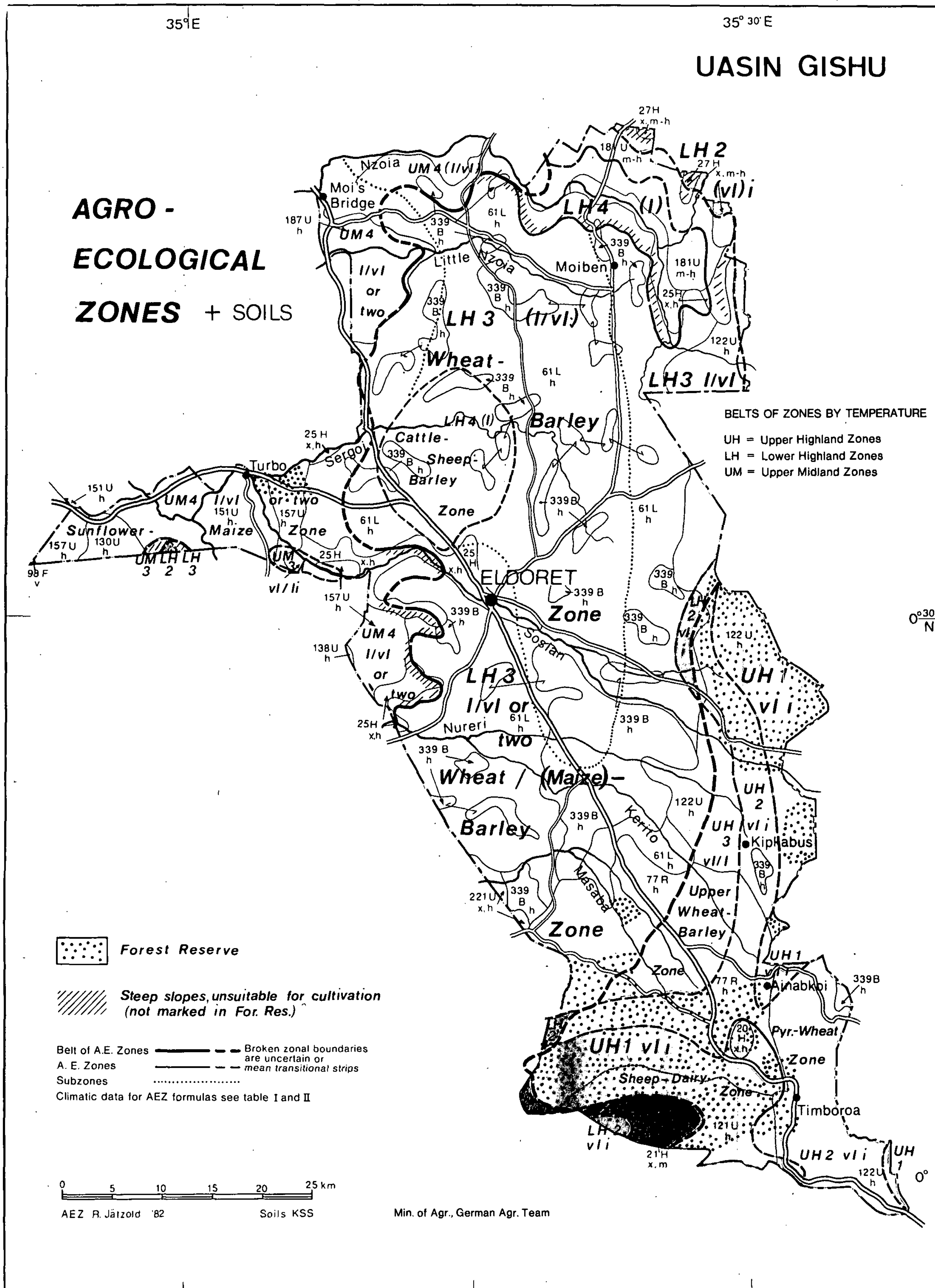
Min. of Agr., German Agr. Team, R. Jaetzold   Soils KSS



60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF SECOND RAINS

(July - Feb. or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years

+SOILS


UASIN GISHU
AGRO - ECOLOGICAL ZONES + SOILS
35°E
35° 30' E
0°30' N
0°
BELTS OF ZONES BY TEMPERATURE
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
Forest Reserve
Steep slopes, unsuitable for cultivation (not marked in For. Res.)
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 5 10 15 20 25 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team
Moi's Bridge
Nzoia
Little Nzoia
Moiben
Turbo
Sergoit
ELDORET
Sosiani
Nureri
Kerito
Masaba
Kipkabus
Ainabkoi
Timboroa
LH 3 (I/vl)
Wheat - Barley Zone
Cattle - Sheep - Barley Zone
LH 3 I/vl or two
Wheat / (Maize) - Barley Zone
Sunflower - Maize Zone
UM 4 I/vl or two
UH 1 vl i
Sheep - Dairy Zone
Upper Wheat - Barley Zone
Pyr.-Wheat Zone
UH 2 vl i
LH 2 vl i
LH 4 (I)
LH 3 I/vl
LH 2 (vl) i

AGRO-ECOLOGICAL ZONES

UH = *UPPER HIGHLAND ZONES*

UH 1 = *Sheep and Dairy Zone*

UH 1 vl i or two = *Sheep and Dairy Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Here mainly Forest Reserve. Agricultural land use potential see Kericho District

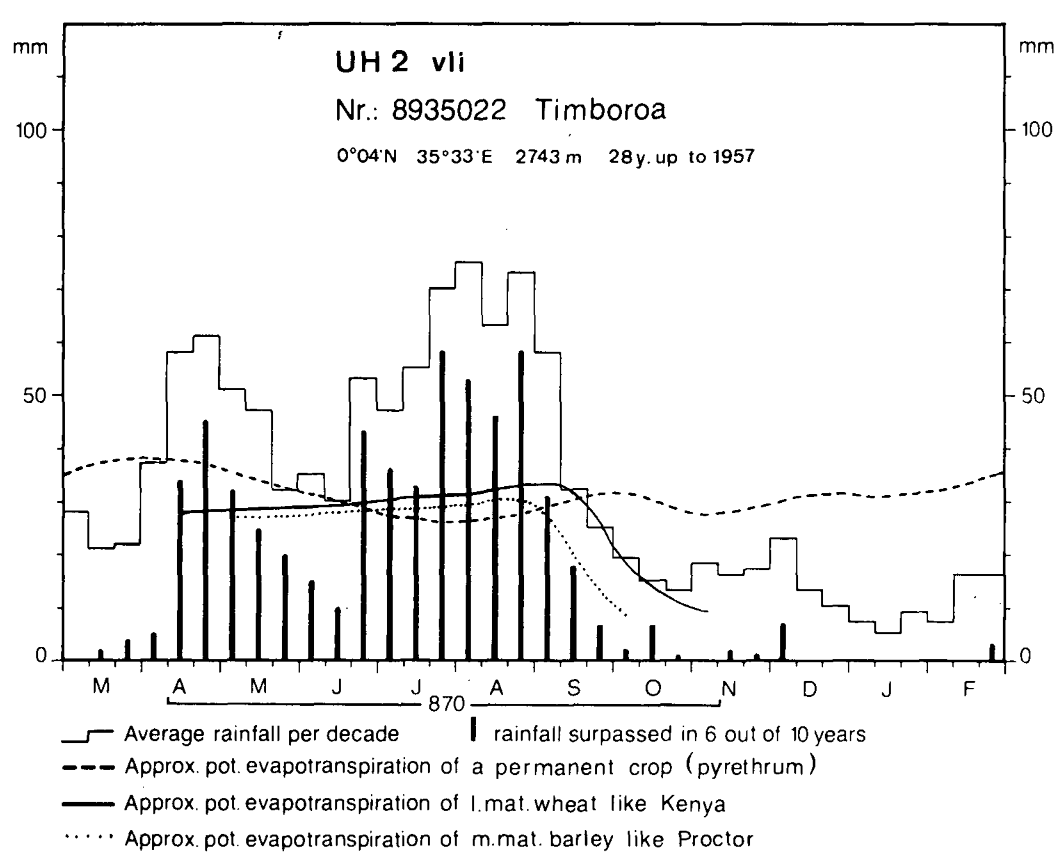
UH 2 = *Pyrethrum-Wheat Zone*

UH 2 vl i or two = *Pyrethrum-Wheat Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*
(See Diagram Timboroa)

Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd r.), start norm. March: Late mat. wheat like Kenya Bongo (70–80 %, May–N./D.), triticale (Apr.–O.), m.mat. barley (May–S./O.), oats (Apr.–S.); peas (~ 60 %); potatoes (March–July)[1]; m.mat. rapeseed (Apr./May–S.); cabbages (nearly 80 %), kales, carrots (nearly 80 %), kohlrabi, celery, endive, rampion, leek, radish
2nd rains, start norm. end of June: Oats, m.mat. barley like Proctor; e.mat. rapeseed; peas and the above vegetables excl. kohlrabi, but planting from mid August onward gives only fair yields
Whole year: Pyrethrum, strawberries

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Very late mat. maize like High Alt. Comp. or Cuzco (risk by frosts esp. in valleys)
2nd rains: Potatoes (Au.–N., 50–60 %); kohlrabi
Whole year: Plums, pears, apples (below 2 600 m)

Pasture and forage
About 0.8 ha/LU on sec. pasture of Kikuyu and tufted grass (if not overgrazed, otherwise Kikuyu grass is disappearing), suitable for Merino sheep and grade dairy cows; rye grass (not near wheat) to improve pasture for dairy, down to 0.5 ha/LU; lucerne best add. forage, Kenya white clover also suited



[1] Spraying against fungus diseases important

UH 3 = *Wheat-Barley Zone*

UH 3 = *Wheat-Barley Zone*
vl/l *with a very long to long cropping season,*
or two *dividable in two variable cropping seasons*

Good yield potential
1st rains, start norm. end of March: Late mat. wheat like Kenya Bongo (May/June–N.), m.mat. barley like Proctor (June–N.), late mat. triticale (Apr.–O., 60–70 %); peas (Mch.–June/Jy., about 60 %), potatoes (Mch.–Jy.); rapeseed (Apr./May–b. of S., 60–70 %), linseed or flax, green onions, cabbages (60–70 %), cauliflower, kohlrabi
Whole year: New zealand flax (up to 2 500 m)

Fair yield potential
1st rains: Very late mat. maize like High Alt. Comp. or Cuzco (on microclimatic frost free places), oats (Apr.–b. of S.); m.mat. sunflower like Vympel; carrots (nearly 60 %), kales, celeri, endive, rampion, leek, radish
2nd rains, start around end of July but no distinct dry period before that: E.mat. barley, potatoes and e.mat. vegetables
Whole year: Pyrethrum

Pasture and forage
More than 1 ha/LU on sec. pasture of mixed grasses; suitable for grade beef cattle, dairy cows and Merino sheep; barley B 106 for stockfeed; rye grass (not near wheat), cocksfoot and tall fescue to improve pasture; subterranean and Kenya white clover for dairy cows

LH = *LOWER HIGHLAND ZONES*

LH 1 = *Tea-Dairy Zone*

LH 1 = *Tea-Dairy Zone*
p *with permanent cropping possibilities,*
or two *dividable in two variable cropping seasons*

Here mainly Forest Reserve. Agricultural land use potential see Kericho District

LH 1 = *Tea-Dairy Zone*
vl i *with a very long cropping season and intermediate rains,*
or two *dividable in two variable cropping seasons and i.r.*

Very small, potential see Nandi District

LH 2 = *Wheat/Maize[2)]-Pyrethrum Zone*

LH 2 = *Wheat/Maize-Pyrethrum Zone*
vl i *with a very long cropping season and intermediate rains,*
or two *dividable in two variable cropping seasons and i.r.*

Good yield potential
1st rains, start norm. mid March: Late mat. wheat like Kenya Bongo (60–70 %, Apr./May–O./N.), late mat. maize like H 611 (Mch./Apr.–N./D., ~ 60 %; ~ 70 % on deep soils); peas, horse beans; m.mat. potatoes (Apr.–Aug.); sunflower Kenya White (60–70 %), linseed, rapeseed; cabbages, kales, cauliflower, carrots, beetroot, spinach, celery, lettuce, artichokes, gourgettes, fennel
2nd rains, start indistinctly end of June: M.mat. wheat like R 200 (June–O.) and other var., m.mat. barley like K. Research (June–O.); linseed, kales, carrots, beetroot, celery
Whole year: Black Wattle, New Zealand flax

Fair yield potential
1st rains: Finger millet; tomatoes, onions; m.mat. beans like Cuarentino
2nd rains: Peas, e.mat. beans like Canadian Wonder; tomatoes, cabbages, cauliflower, onions, spinach, lettuce
Whole year: Pyrethrum; apples, pears and plums above 2 200 m; strawberries

Pasture and forage
About 1 ha/LU on highland savanna of Kikuyu, red oats and tufted grass between Cedar forest remnants; about 0.6 ha on art. pasture of Nandi Setaria grass; suitable for grade dairy cows

2) Wheat or maize mainly depending on farm scale. Climate in LH 3 better suited for wheat

LH 2 (vl/l) i	= *Wheat/Maize-Pyrethrum Zone with a (weak) very long to long cropping season and intermediate rains*

Yields and stocking rates about 10 % lower than in LH 2 vl i

LH 2 vl/l or two	= *Wheat/Maize-Pyrethrum Zone with a very long to long cropping season, dividable in two variable cropping seasons*

Very small, potential see Nandi District

LH	= *W h e a t / M a i z e[2] - B a r l e y Z o n e*

LH 3 l/vl or two	= *Wheat/(Maize)-Barley Zone with a long to very long cropping season, dividable in two variable cropping seasons* (See Diagram Eldoret)

G o o d y i e l d p o t e n t i a l

1st rains, start norm. end of March: M.mat. wheat like R 200 (b. of May–S.) and other varieties; m.mat. durum wheat, late mat. wheat like Kenya Bongo (higher places, Apr.–O.), m.mat. barley like Kenya Research (May–S.), late mat. triticale, on deep soils late mat. maize H 611 (higher places), H 612–614 (lower places, e. of Apr.–O., 60–70 %); peas; linseed, late mat. sunflower like Kenya White; cabbages

2nd rains, start indistinctly m. June/July: M.mat wheat like R 200 Africa Mayo and other var. (m. June–b. of N.), m.mat. barley; rapeseed (end of June–O.)

Whole year: Black wattle

F a i r y i e l d p o t e n t i a l

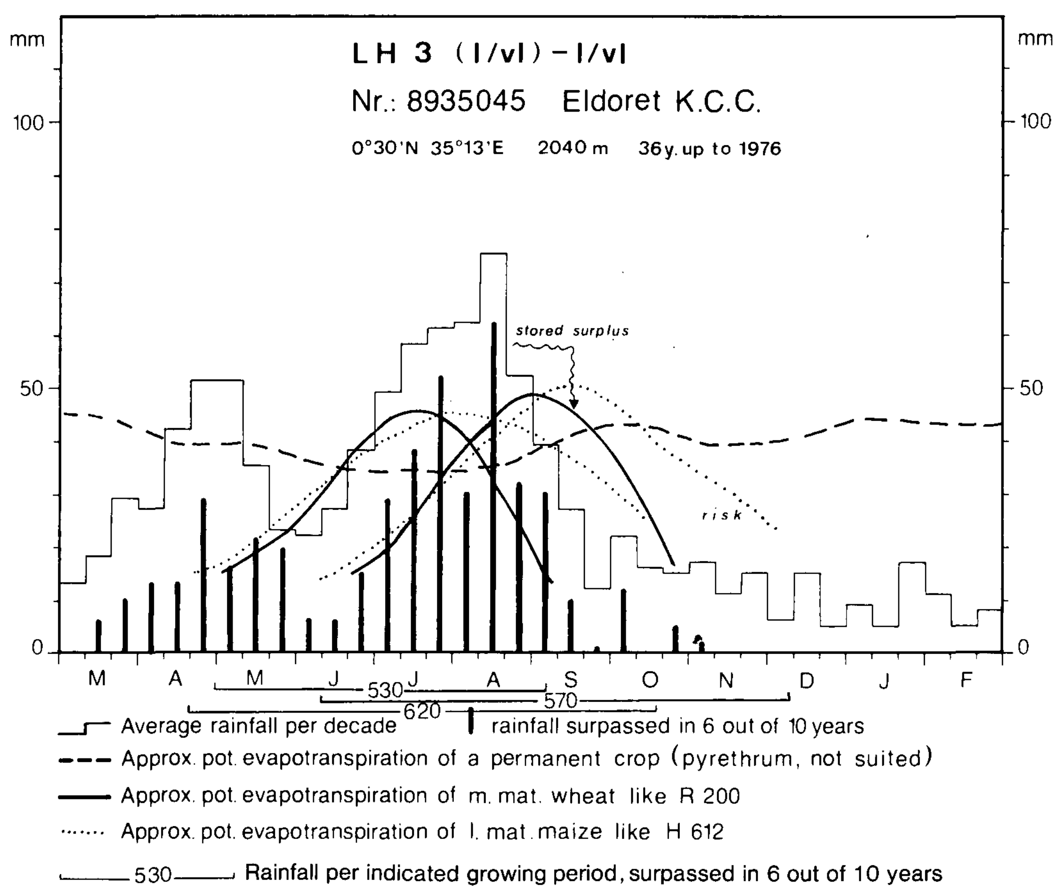
1st rains: Potatoes, rapeseed; kales, cauliflower, carrots, beetroot

2nd rains: Maize H 612–614 (b. of June–D.); tomatoes, kales,beetroot; beans (lower places)

Whole year: Avocadoes (lower places)

P a s t u r e a n d f o r a g e

About 1.2–1.5 ha/LU on highland savanna of Red oats and wire grass, about 0.7 ha/LU on artificial pasture of Nandi Setaria or Rhodes grass; suited for grade dairy cows and grade cattle; subterr. clover and Lotononis as add. forage



LH 3 = *Wheat/(Maize)[2]-Barley Zone*
(l/vl) *with a (weak) long to very long cropping season*
(See Diagram Eldoret)

Good yield potential
1st rains, start norm. b. of April: Late mat. wheat (Apr.–O., 60–70 %), m.mat. wheat (e. of Apr./b. of May–S., 60–70 %), m.mat. barley (60–70 %)
Whole year: Black wattle (deep soils)

Fair yield potential
1st rains: Late mat. maize H 612–614 (m. A.–e. of O., marginal on shallow soils); peas; linseed, late mat. sunflower like Kenya White; cabbages and other vegetables
2nd rains, start m. June/July: M.mat. wheat (m. June–end of O./N., nearly 60 %), m.mat. barley

Pasture and forage
About 1.5–2 ha/LU on nat. pasture of Red oats and wire grass; down to 0.8 ha/LU on art. pasture of Nandi Setaria between 2 000 and 2 150 m, below that Rhodes grass (var. Mbarara or Masaba); suited for grade cattle; subterr. clover and barley like B 106 as add. forage

LH 4 = *Cattle-Sheep-Barley Zone*

LH 4 = *Cattle-Sheep-Barley Zone*
(l) *with a (weak) long cropping season*

Fair yield potential
1st rains, start norm. b. of April: M.mat. barley (other crops mostly marginal).
This area has soils with a low water holding capacity, and the variability of rainfall is so high that crop failures occur from time to time. Ranching is therefore more advisable.

Pasture and forage
More than 2 ha/LU on nat. pasture of short grass highland savanna; down to 1 ha/LU on art. pasture of Rhodes grass (var. Elmba most recommended); suited for grade cattle; subterr. clover and m.mat. fodder barley like B 106 as add. forage

UM = *UPPER MIDLAND ZONES*

UM 3 = *Marginal Coffee Zone*

UM 3 = *Marginal Coffee Zone*
l/vl i *with a long to very long cropping season and intermediate rains,*
or m ⌐ s i *dividable in a medium cropping season followed by a short one and i.r.*

Very small, land use potential see Bungoma District

UM 4 = *Sunflower-Maize Zone*

UM 4 = *Sunflower-Maize Zone*
l/vl *with a long to very long cropping season,*
or two *dividable in two variable cropping seasons*

Good yield potential
1st rains, start norm. end of March: Late mat. maize like H 612–614 (e. of Mch.–S./O., 70–80 %), cold tol. sorghum, finger millet; late mat. sunflower like Kenya White (June–N., ~ 60 %), soya beans (below 1 800 m); cabbages, kales, spinach
2nd rains, start indistinctly around July/Aug.: M.mat. sunflower like HS 301 A or Comet (July–N.)
Whole year: Sisal, perennial castor like C–15

Fair yield potential
1st rains: Late and m.mat. beans (sometimes rotting because of too wet conditions); sweet potatoes, egg plants and tomatoes (to 2nd r.), onions (on light soils)
2nd rains: Beans, potatoes (higher places), sweet pot.; onions (on light soils)
Whole year, best planting time beginning of April: Avocados[3], citrus[3], pineapples (lower places)

[3] With add. irrigation (D.–F.) well growing

Pasture and forage

About 1.2 ha/LU on nat. pasture of medium grass savanna with zebra grass (Hyparrhenia rufa) and red oats grass (Themeda triandra) predominant; about 0.6 ha/LU on art. pasture of Rhodes grass, down to 0.23 ha/LU feeding Bana or Napier grass and Desmodium; suited for grade cattle and dairy cows (with special care, esp. silage or hay for dry season)

UM 4 (l/vl) = *Sunflower-Maize Zone with a (weak) long to very long cropping season*

Good yield potential

1st rains, start norm. end of March: Maize H 612–614 on deep soils (Apr.–O., 60–70 %), cold tol. sorghum, m.mat. sunflower like Comet (June–O., ~ 60 %)

Whole year: Sisal

Fair yield potential

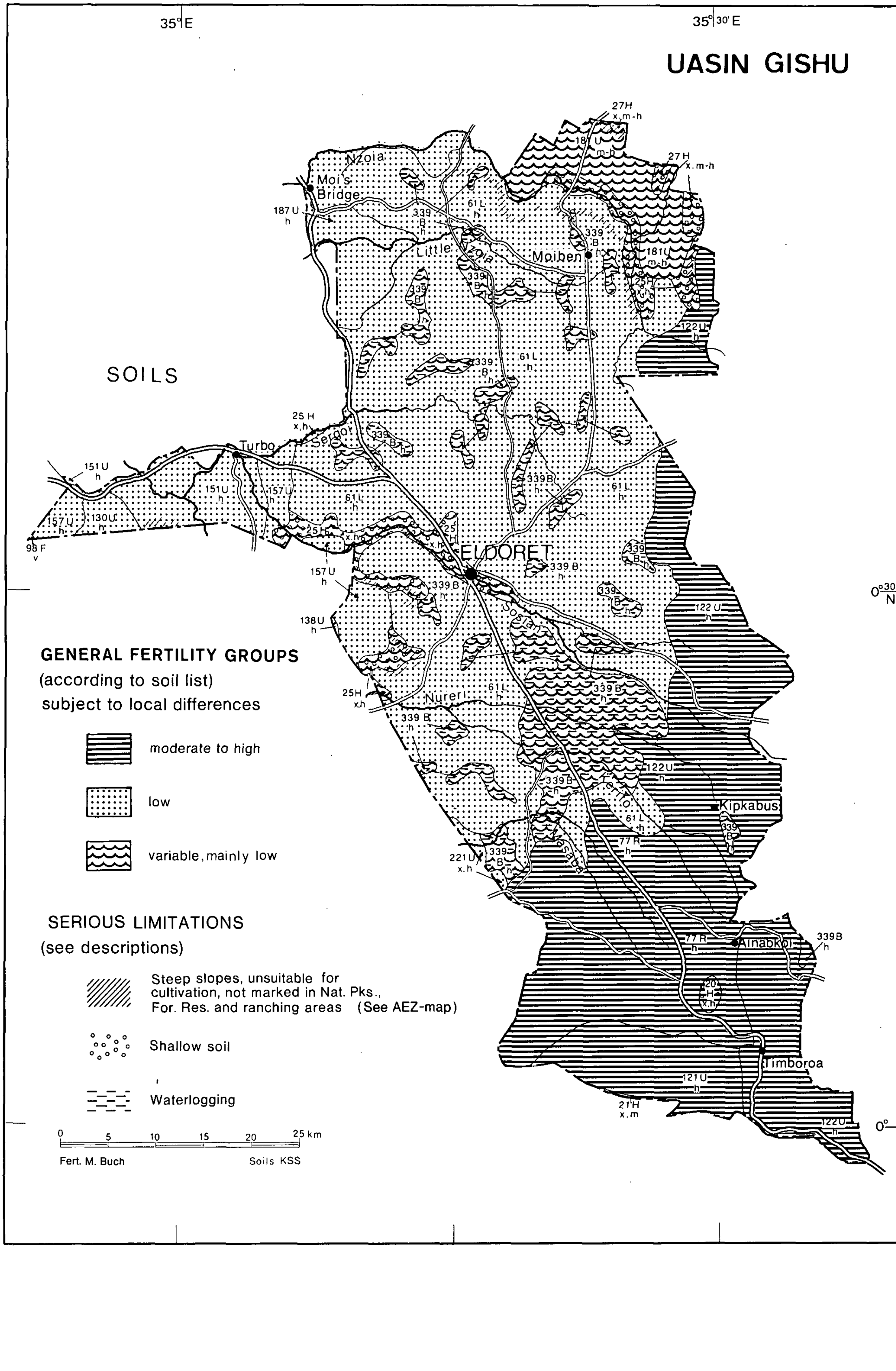
1st rains: Maize H 612--614 on moderately deep soils, finger millet; beans; potatoes (higher places), sweet potatoes; m.mat. sunflower like H S 301 A, late mat. sfl. like Kenya White, soya beans (below 1 800 m); egg plants, cabbages, kales, spinach, tomatoes, onions (on light soils)

2nd crop possible with early mat. varieties

Whole year: Perennial castor (50–60 %), pineapples (lower places)

Pasture and forage

1.3–1.7 ha/LU on undestroyed nat. pasture of medium grass savanna mixed with dry bushland, about 0.8 ha/LU on art. pasture of Rhodes grass, down to 0.28 ha/LU feeding Bana grass and other forage; suited for grade cattle; if eroded see Baringo District UM 4 (l/m i) for palatable shrubs


UASIN GISHU
SOILS
35°E
35°30'E
0°30' N
0°
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
moderate to high
low
variable, mainly low
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks., For. Res. and ranching areas (See AEZ-map)
Shallow soil
Waterlogging
0 5 10 15 20 25 km
Fert. M. Buch
Soils KSS
Moi's Bridge
Nzoia
Little Nzoia
Moiben
Turbo
Sergoit
ELDORET
Sosiani
Nureri
Kipkabus
Ainabkoi
Timboroa
Masaba
27H x,m-h
181U m-h
187U h
339 B h
61 L h
25 H x,h
151 U h
157 U h
130 U h
98 F v
138 U h
122 U h
221 U x,h
77 R h
20 H x,h
121 U h
21 H x,m

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The central and nothern parts of the district are characterised by level terrain (plateaus) bordering undulating uplands. In the southern part, the topography becomes more dissected (the volcanic footridges). The plateau is dotted by numerous bottomlands. The majority of the district is underlain by Tertiary intermediate volcanic rocks. Basement System rocks outcrop in a few hills.

A number of hills and minor scarps occur in the district with soils of units 20 H and 27 H which are developed on basic igneous rocks and various Basement System rocks. Soils of unit 25 H of varying fertility are found on acid igneous rocks and various other parent materials.

The upland occurs at several levels. Soils of lower levels are mainly those of units 151 U, 181 U, and unit 157 U with a low natural fertility. Most fertile volcanic upland soils occur in the higher southeastern part of the district, i.e. 77 R, 121 U, 122 U with a moderate to high fertility. The soils of unit 121 U and 122 U are similar to those of unit 77 R but the latter occur on more undulating topography and also have a humic topsoil.

The majority of the district carries soils of unit 61 L with a low fertility and is underlain by murram. In the bottomlands (339 B), the soils are imperfectly drained and are also of low fertility.

SOILS ON HILLS AND MINOR SCARPS

Soils developed on basic igneous rocks (serpentinites, basalts, nepheline phonolites; older basic tuffs included)

20 H = somewhat excessively drained, shallow to moderately deep, dark reddish brown, friable, gravelly clay, with acid humic topsoil
x,h[1)] (humic CAMBISOLS, partly paralithic phase)

21 H = well drained, shallow, dark reddish brown, friable, rocky and stony clay loam (nito–chromic CAMBISOLS, lithic phase; with
x,m Rock Outcrops)

Soils developed on various parent materials (mixed igneous and metamorphic rocks)

25 H = well drained, shallow, reddish brown, friable, rocky and stony, sandy clay to clay (chromic CAMBISOLS, lithic phase; with eutric
x,h REGOSOLS, LITHOSOLS and Rock Outcrops)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

27 H = complex of excessively drained to well drained, shallow, dark red to brown, friable sandy clay loam to clay; in many places
x,m–h rocky, bouldery and stony and in places with acid humic topsoil (dystric REGOSOLS; with LITHOSOLS, humic CAMBISOLS lithic phase and Rock Outcrops)

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on intermediate igneous rocks (syenites, trachytes, phonolites, etc.)

61 L = well drained, moderately deep to deep, dark red, friable clay, over petroplinthite; with inclusions of small bottomlands of unit
h 339 Bh (rhodic FERRALSOLS, petroferric phase)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

77 R = well drained, extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil
h (humic NITOSOLS)

SOILS ON FOOTSLOPES

Soils developed on colluvium from basic igneous rocks (serpentinites, basalts, etc.)

91 F = well drained, deep to very deep, dusky red to dark reddish brown, friable clay, often with humic topsoil (nito–rhodic
h FERRALSOLS, with verti–mollic NITOSOLS)

Soils developed on colluvium from undifferentiated Basement System rocks

98 F = complex of well drained, deep to very deep, dark reddish brown to dark yellowish brown soils of varying consistence and
v texture, in places gravelly and stratified (ferralic ARENOSOLS; with ferralo–chromic, orthic LUVISOLS)

SOILS ON UPPER MIDDLE–LEVEL UPLANDS

Soils developed on Tertiary or older basic igneous rocks (basalts, nepheline phonolites, etc.; basic tuffs included)

121 U = well drained, extremely deep, dark reddish brown, friable clay, with humic topsoil
h (mollic NITOSOLS)

122 U = well drained, extremely deep, dark reddish brown, friable clay
h (eutric NITOSOLS)

Soils developed on undifferentiated Basement System rocks

130 U = well drained, deep, red to yellowish red, friable sandy clay
h (ferralo–chromic ACRISOLS)

Soils developed on granites

133 U h = well drained, deep, yellowish red to brown, friable clay loam, with acid humic topsoil (humic CAMBISOLS; with humic ACRISOLS)

Soils developed on biotite gneisses

136 U x,m-h = well drained, moderately deep to deep, dark reddish brown to dark brown, friable, sandy clay loam to clay,with thick acid humic topsoil; in places shallow and rocky (humic ACRISOLS and humic CAMBISOLS, partly lithic phase; with Rock Outcrops)

137 U h = well drained, extremely deep, dark reddish brown, friable clay, with thick acid humic topsoil (humic NITOSOLS)

Soils developed on hornblende gneisses

138 U h = well drained, extremely deep, dark reddish brown, friable clay, with thick humid topsoil (mollic NITOSOLS)

Soils developed on various rocks, with volcanic ash admixture

140 U = see: NAKURU DISTRICT SOILS

SOILS ON LOWER MIDDLE–LEVEL UPLANDS

Soils developed on granites

151 U h = well drained, deep to very deep, brown to dark brown, friable, sandy clay to clay (ferralo–orthic ACRISOLS)

Soils developed on biotite gneisses

156 U m = well drained, moderately deep to deep, brown to dark yellowish brown, firm sandy clay loam (orthic LUVISOLS)

157 U h = well drained, deep, red, friable clay (rhodic FERRALSOLS; with ferralo–chromic ACRISOLS)

SOILS ON LOWER–LEVEL UPLANDS

Soils developed on granites and quartz–feldspar gneisses

181 U m–h = well drained, deep, strong brown to reddish yellow, very friable, sandy clay loam to sandy clay (orthic FERRALSOLS; with ferralic CAMBISOLS)

Soils developed on undifferentiated Basement System rocks

187 U h = well drained, very deep, red to dark red, very friable to friable, clay (rhodic FERRALSOLS)

SOILS ON NON–DISSECTED EROSIONAL PLAINS

Soils developed on basic igneous rocks (basalts, etc.)

221 U x,h = well drained, very deep, dark reddish brown to dusky red, friable clay; in places bouldery (nito–rhodic FERRALSOLS)

SOILS ON BOTTOMLANDS

Soils developed on infill from intermediate igneous rocks (phonolites)

339 B h = poorly drained, moderately deep, dark grey to grey, mottled, firm clay, with humic topsoil; in many places over petroplinthite (mollic GLEYSOLS, partly petroferric phase)

1) Soil texture-classes

h = heavy
l = light
m = medium
x = stony or bouldery
v = varying texture
m-h = medium to heavy
m, h = medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-climatic Zone Map of Kenya, scale 1:1 000 000. Expl. Soil Survey Rep. E 1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

At the time of the Census in September 1979, the population of Uasin Gishu District was 300 766 people (Table 4). About 16.8 % (50 503 people) of the total population lived in the Eldoret Municipality and another 0.85 % (2 559 people) in the trading centres of the district. The rural population (247 704 people) lived on 278 100 ha of agricultural land (Table 6), i.e. an average household of 4.96 persons (Table 5) would have had only 5.94 ha theoretically, or 1.11 ha per person (Table 6), if farming were not organised into medium- and large-scale enterprises which are best in wheat and barley zones. Typical is the Moiben location (mainly LH 3 and LH 4), which has nearly 50 % of the total agricultural land, 45 % of the total rural area, and 37 % of the total rural population. The figures roughly indicate that one farm labourer per 5.67 persons per household (Table 5) works 8.11 ha on average in a bigger mechanized farm (Table 6). Another telling example is the Lessos/Plateau location (46 600 ha agricultural land mainly in LH 3 = 16.8 % of the total agricultural land). Like the Moiben location, the figures range above average for the district.

On the other hand, it should be mentioned that in locations like Ainabkoi, (mainly UH 2, only 12 % of the total agricultural land but 22.8 % of the total rural population) smallholders can not develop in the same way as e.g. Moiben and Lessos/Plateau, which still have enough land to produce a grain surplus, as long as they are not further subdivided by population pressure.

UASIN GISHU DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Moiben	48 179	48 127	96 306	16 966	1 529	62
Turbo	15 881	15 960	31 841	5 911	380	83
Northern Division	64 060	64 087	128 147	22 877	1 910	67
Lessos/Plateau	21 355	20 363	41 718	7 851	598	69
Kaptagat	12 017	11 855	23 872	4 807	258	92
Ainabkoi	28 474	28 052	56 526	11 248	653	86
Southern Division	61 846	60 270	122 116	23 906	1 510	80
Eldoret Municipality	28 930	21 573	50 503	13 431	57	847
Central Division	28 930	21 573	50 503	13 431	57	847
Uasin Gishu District	154 836	145 930	300 766	60 214	3 478	89

UASIN GISHU DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION[a)]**

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Moiben	16915	3.09	1.51	0.73	0.33	5.67
Turbo	5020	3.34	1.57	0.81	0.44	6.34
Division Northern	22835	2.10	0.47	0.72	0.34	5.59
Location:						
Lessos/Plateau	7825	2.98	1.38	0.60	0.33	5.30
Kaptagat	4806	2.83	1.35	0.50	0.27	4.95
Ainabkoi	11247	2.87	1.41	0.49	0.25	5.02
Division Southern	23878	2.91	1.37	0.53	0.28	5.10
Location:						
Eldoret Municipality	13394	2.27	0.51	0.56	0.30	3.63
Division Central	13394	2.27	0.51	0.56	0.30	3.63
DISTRICT: UASIN GISHU	60107	2.84	1.20	0.61	0.31	4.96

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, includes one and two persons per households as well

UASIN GISHU DISTRICT

TABLE 6: **AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON**

Location/Division without townships	in '00 ha = sqkm: Area total Census 79	Non-agricultural land: Unsuit. steep slopes	Forest Res., lakes, swamps	Others (roads, home-steads, rivers)	Agri-cultural land	in '00 ha = sqkm: Area in agro-ecological zones AEZ: UH1	UH2	UH3	LH1	LH2	LH3	LH4	UM3	UM4	in ha: Agric. land per house-hold	person
Moiben	1 529			153	1 376					18	918	278		162	8.11	1.43
Turbo	380			38	342					2	64	14	13	249	5.79	1.07
Northern Division	1 909			191	1 718					20	982	292	13	411	6.95	1.25
Lessos/Plateau	598	12	F. 10	60	516		4	30			466			16	6.59	1.24
Kaptagat	258		F. 17	28	213	35	39			21	118				4.43	0.89
Ainabkoi	653		F. 254	65	334	45	164	73			52				2.97	0.59
Southern Division	1 509	12	F. 281	153	1 063	80	207	103		21	636			16	4.45	0.87
Total rural area	3 418	12	F. 281	344	2 781	80	207	103		41	1 618	292	13	427	5.94	1.11

For official land statistics see supplementary publication to FM-Handbook, Vol. III A: Agriculture Land Statistics

AGRICULTURAL STATISTICS

PRODUCTION OF MAJOR CASH CROPS

UASIN GISHU DISTRICT

TABLE 7: PYRETHRUM
TRENDS IN PRODUCTION AND QUALITY[a)]

Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	209	245	205	362	430
Pyrethrin content %	1.4	1.4	1.5	1.6	1.6

a) Source: Pyrethrum Board

STATISTICS[1)] OF MEDIUM TO LARGE FARMS

In the past, the district was almost exclusively farmed by large mixed farms. During 1973/74, about 290 000 ha were cultivated in large units, many of them commonly owned. The desire to own and farm the land individually has resulted in subdivision and this trend will continue. It is estimated that roughly 230 large farms will remain, each 475 ha in size, i.e. 110 000 ha. Some 140 000 ha are, or will be, subdivided into holdings of approximately 2.50 ha in size.[2)]

Pyrethrum, a typical smallholder cash crop, is gaining in importance in the district; roughly 450 t of dried flowers are produced p.a. – the pyrethrin content is very good at 1.6 %. Table 8 does not reflect the above changes as it is based on legally registered farms.[3)] Approximately one tractor per 110 ha of arable land was recorded on the farms, with roughly one combine harvester for 300 ha of wheat (Table 8). About 80 % of the land is planted with annual crops and 15–20 % is under leys which is a rather small percentage (Table 10). Roughly 60 % of the annual crop area is planted with wheat and 40 % with maize (Table 11). Dairy stock herd sizes are fairly evenly distributed, while sheep flocks are comparatively small (Table 12). The total number of livestock kept in the area remained stable (Table 13), but milk production fluctuated widely (Table 14).

The yield levels compiled in table 15 reflect the low soil fertility in some parts of the district. These infertile soils make small-scale farming difficult.

1) For more up to date and detailed information, see FMHB Vol. III/A and III/B; see also Land : Population ratio, table 6 page 19.
2) Large Farm Sector Study 1977
3) It is planned to carry out a comprehensive farm management survey in the Rift Valley which should yield better data towards 1985/86.

TABLE 8: **DISTRIBUTION OF LAND BY HOLDING SIZE**
Medium–Large Farms[a)]

Size Group in ha	Number of Holdings in Size Group															
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
- 19	14	13	14	11	12											
20 - 49	27	26	20	23	23											
50 - 99	27	27	28	29	36											
100 - 199	74	73	72	73	72											
200 - 299	80	77	77	80	78											
300 - 399	61	59	59	57	57											
400 - 499	74	72	73	72	72											
500 - 999	118	120	120	119	116											
1,000 - 1,999	41	41	41	44	46											
2,000 - 3,999	6	6	6	5	4											
4,000 - 19,999	7	7	7	7	8											
20,000 - and over	-	-	-	-	-											

TABLE 9: **MAJOR FARM MACHINERY AND IMPLEMENTS ON FARMS**

Machinery/Implements	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Farm Tractors	817	804	886	873	810											
Combine Harvesters	147	128	127	124	99											
Plough & Harrow	1187	1177	1581	1198	1012											
Cultivators & Tooth Harrow	378	381	370	385	306											
Planters & Sprayers	512	525	569	579	477											

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

UASIN GISHU DISTRICT

TABLE 10: LAND USE
Medium–Large Farms[a)]

Land Under	In '000 ha								Percent							
	1975	1976	1977	1978	1979	1980	1981	1982	1975	1976	1977	1978	1979	1980	1981	1982
Temporary Crops	71.3	73.5	77.7	73.0	72.1				24	25	26	25	28			
Temporary Leys & Meadows	12.7	12.6	12.0	12.3	12.5				4	4	4	4	4			
Temporary Fallow Land	9.8	8.9	20.9	11.0	6.7				3	3	7	4	2			
Subtotal	93.8	95.0	110.6	96.3	91.3				31	32	37	33	34			
Permanent Crops:																
Permanent Meadows (natural pasture)	160.6	158.6	139.4	130.3	126.3				54	53	47	45	43			
Subtotal	160.6	158.6	139.4	130.3	126.3				54	53	47	45	43			
Permanent Crops (incl. fruit trees)	14.5	13.9	14.1	16.6	13.9				5	5	5	6	4			
Forest Land	12.3	13.8	15.3	11.7	12.9				4	5	5	4	4			
Other Land	16.9	16.1	17.8	33.4	43.5				6	5	6	12	15			
Subtotal	43.7	43.8	47.2	61.7	70.3				15	15	16	22	23			
TOTAL	298.1	297.4	297.2	288.3	287.9				100	100	100	100	100			

Land Under	In '000 ha								Percent							
	1983	1984	1985	1986	1987	1988	1989	1990	1983	1984	1985	1986	1987	1988	1989	1990
Temporary Crops																
Temporary Leys & Meadows																
Temporary Fallow Land																
Subtotal																
Permanent Crops:																
Permanent Meadows (natural pasture)																
Subtotal																
Permanent Crops (incl. fruit																
Forest Land																
Other Land																
Subtotal																
TOTAL																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 11: **CROPPING PATTERN**
Medium–Large Farms[a)]

Land under:	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Cereals (in '000 ha)																
Maize	25.2	25.2	31.0	28.1	19.5											
Wheat	33.2	33.3	27.7	25.1	29.6											
Barley	0.7	0.4	0.5	0.5	0.3											
Oats	0.9	0.6	0.4	0.4	0.3											
Others	0.2	0.1	0.2	0.2	0.3											
Total	60.2	59.6	59.8	54.3	50.0											
Grassing/Fodder Crops (in ha)																
Leys[b)]	-	-	-	-	12529											
Nat. Pasture[b)]	-	-	-	-	6645											
Lucerne	45	22	8	23	11											
Silage Crops	140	182	136	103	63											
Others	232	250	215	182	109											
Total	417	454	359	308	19357											
Vegetables/Root Crops (in ha)																
Potatoes	48	64	68	71	65											
Tomatoes	11	15	10	6	12											
Beans & Peas	250	116	88	112	56											
Onions	4	5	1	1	1											
Others	33	26	12	46	40											
Total	346	226	179	236	174											

a) farms above 20 ha in size
Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 12: NUMBER OF LIVESTOCK KEPT ON FARMS (IN '000 HEAD)
Medium–Large Farms[a)]

Kind of Livestock	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Dairy Cattle:																
Cows	42.4	42.0	43.7	42.6	41.2											
Heifer & Heifer Calves	18.8	20.2	19.4	18.0	14.7											
Stud Bulls & Bull "	5.4	4.3	8.2	7.2	6.6											
Total	66.6	66.5	71.3	67.8	62.5											
Beef Cattle:																
Cows	11.6	9.6	8.6	12.3	11.7											
Heifer & Heifer Calves	8.5	9.1	5.0	7.3	6.4											
Other Beef Cattle	16.9	14.4	10.2	15.4	14.1											
Total	37.0	33.1	23.8	35.0	32.2											
Sheep:																
Ewes	7.6	7.4	7.5	7.2	7.6											
Rams	1.4	1.2	1.1	1.0	1.4											
Lambs	3.1	2.7	2.8	2.5	2.9											
Others	2.5	2.6	2.1	2.5	2.5											
Total	14.6	13.9	13.5	13.2	14.4											
Pigs:																
Breeding Sows	0.1	0.1	-	0.1	0.1											
Breeding Boars	-	-	0.2	-	0.2											
Others	0.3	0.7	0.1	0.4	0.4											
Total	0.4	0.8	0.3	0.5	0.7											
Poultry																
Breeding Stock	2.6	2.0	2.2	1.7	2.5											
Other Poultry	9.2	9.1	10.1	0.7	1.2											
Total	11.8	11.1	12.3	2.4	3.7											

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 13: HERD AND FLOCK SIZES
Medium–Large Farms[a)]

Stock	Number of Herds and Flocks in Herd Size Groups																															
Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78
Dairy Cattle	23	27	35	26	67	54	48	49	92	79	85	79	37	54	56	47	47	40	41	42	36	27	34	46	74	78	71	65	22	18	22	23
Beef Cattle	23	18	21	22	26	19	9	17	38	24	24	23	16	21	9	4	14	7	4	8	3	5	6	7	14	14	13	18	15	12	6	10
Sheep	62	56	60	32	40	44	27	33	40	29	33	36	12	15	18	11	10	7	8	12					14	12	9	11	2	3	4	3

Stock Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82
Dairy Cattle	29				49				88				48				45				33				69				14			
Beef Cattle	19				20				8				6				4				7				18				13			
Sheep	49				25				35				12				7				17				5				-			

Stock Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86
Dairy Cattle																																
Beef Cattle																																
Sheep																																

Stock Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90
Dairy Cattle																																
Beef Cattle																																
Sheep																																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 14: LIVESTOCK PRODUCTION, SALES AND CONSUMPTION ON FARM
Medium–Large Farms[a)]

Livestock	Produce	Unit	1975	1976	1977	1978	1979	1980	1981	1982
Dairy	Milk Production, Total	'000 Litre	30879	24803	46137	36697	62517			
	Milk sold off farm	'000 Litre	-	20234	38288	31952	53621			
	Cattle	'000 Head	1.1	1.5	9.9	2.4				
Beef	Sales for slaughter and consumed on farm	'000 Head	8.8	11.5	7.9	7.8	9.5			
	Sales for breeding and fattening	'000 Head	2.7	1.5	2.0	1.9	1.5			
Sheep	Total Sales and consumed on farm	'000 Head	2.8	2.8	1.7	1.8	1.8			
	Wool	'000 kg	5.5	9.3	9.3	8.2	5.5			

Livestock	Produce	Unit	1983	1984	1985	1986	1987	1988	1989	1990
Dairy	Milk Production, Total	'000 Litre								
	Milk sold off farm	'000 Litre								
	Cattle	'000 Head								
Beef	Sales for slaughter and consumed on farm	'000 Head								
	Sales for breeding and fattening	'000 Head								
Sheep	Total Sales and consumed on farm	'000 Head								
	Wool	'000 kg								

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

UASIN GISHU DISTRICT TABLE 15a: **PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES**

OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: LH 3 WHEAT/(MAIZE)-BARLEY ZONE				A.E.Z.: LH 4 CATTLE-SHEEP-BARLEY ZONE			
		Vegt. Period 1st + 2nd: in Days,1st: vl i 110 or more		2nd: 150-180	total: 260-290	1/vl 100 or more		115-130	215-230	(1) 100 or more		95-115	195-215
		Soil: NITOSOLS				FERRALSOLS				FERRALSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	2,200			5,000	1,800			3,600	1,200			2,400
Fertilizer N	kg				155				100				66
P_2O_5	kg				77				50				33
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg	-			-	3,000			7,000	-			-
Fertilizer N	kg								222				
P_2O_5	kg								111				
K_2O													
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg	400	400	700	1,000								
Fertilizer N	kg			8	16								
P_2O_5	kg			10	20								
K_2O	kg												
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg	1,200		2,500	3,200	1,100	1,500	2,300	3,000	600		1,000	1,500
Fertilizer N	kg			24	41		11	34	53			10	22
P_2O_5	kg			42	71		17	50	80			17	38
K_2O	kg												

UASIN GISHU DISTRICT TABLE 15b: **PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES**

OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: LH 3 WHEAT/(MAIZE)-BARLEY ZONE				A.E.Z.: LH 4 CATTLE-SHEEP-BARLEY ZONE			
		Vegt. Period 1st + 2nd: vl i in Days,1st: 110 or more		2nd: 150-180	total: 260-290	1/vl 100 or more		115-130	215-230	(1) 100 or more		95-115	195-215
		Soil: NITOSOLS				FERRALSOLS				FERRALSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: BARLEY													
Farmers in Production Level	%												
Yields	kg					1,100	1,500	2,000	3,100	600		1,200	1,800
Fertilizer N	kg						10	22	48			12	24
P_2O_5	kg						17	38	84			22	43
K_2O	kg												
CROP: TRITICALE													
Farmers in Production Level	%												
Yields	kg					1,300		2,500	3,000				
Fertilizer N	kg							29	41				
P_2O_5	kg							48	68				
K_2O													
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,200	2,700	4,000	6,000	2,000	2,500	3,500	4,500	1,800	2,000	3,000	3,500
Fertilizer N	kg		13	45	100		13	38	63		5	30	43
P_2O_5	kg		12	43	93		14	42	70		6	34	48
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	800		1,200	2,500	600	600	1,000	2,000	600	500	800	1,200
Fertilizer N	kg			14	58			14	48			7	20
P_2O_5	kg			11	48			20	69			10	29
K_2O	kg												
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: RAPESEED													
Farmers in Production Level	%												
Yields	kg	500		800	1,200	400		800	1,000				
Fertilizer N	kg			30	70			40	60				
P_2O_5	kg			30	70			40	60				
K_2O	kg												

WEST POKOT DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The West Pokot District stretches from the Cherangani Hills in the south, to the lava mountains of the Karasuk Hills and their surroundings in the north. This rugged area beyond 2°N has agricultural possibilities in only a few pockets, so that the agro-ecological zonation was confined to the southern part of West Pokot.

In this southern part, there are many areas which are also unsuitable for agriculture because of steep slopes, shallow and stony soils and/or too little rain.[1] In the Cherangani Hills, some places are even too cold for cultivation due to sharp night frosts. There can be either very high ridges of more than 3 000 m (up to 3 365 m), or microclimatically unsuitable basins in which the heavy cold air flows in and accumulates during the night. Xerophytic tropical-alpine grasses are mixed with grassland patches of zone UH 2, caused by relatively weak humid seasons, enforced water stress due to strong wind, and probably fire.

Slightly lower towards the west, the water balance improves to a potential tea zone (LH 1). Unfortunately, the forests there are being cleared and the potential will disappear: without forests, there will be less rain, less relative humidity, less water holding capacity (of the depleted soils), and lower temperatures during the night. At least pyrethrum should be established as a perennial crop, also in LH 2.

In the Upper and Lower Midland Zones, the annual average rainfall of 700–1 200 mm seems relatively high, but evaporation is high too, and the distribution of rainfall during the year is unfavourable (see Diagram Kacheliba/Kongelai), i.e. it is not parallel to the water requirement curves of important crops. To regulate the water availability curve, water storage in soils plays an important role. But the soils are denuded and eroded, no humus catches the water, a lot of rain is lost by runoff even in non-sloping areas. For this reason, we have mixed zones: UM 4–5 and LM 5–6, and the possibilities of the better zone are found only on the good soils (non-deteriorated ones).

The Rift Valley floor is generally unsuitable for agriculture except for a slightly better strip of land near the escarpment and a few irrigation possibilities. But even to graze cattle is difficult today in most places. Overstocking has reduced the grass which competed for water with trees and shrubs. Now the bush has become so dense that cattle have difficulties in penetrating it and there is much less fodder available. The suggestion is to clear it gradually, to plant Turkana sorghum for one or two seasons using methods of runoff-catching agriculture (see Fig. 1 in Baringo District), then to reseed it with grasses and fodder shrubs, using the micro-catchments for first establishment.

[1] Detailed information about soils (including maps of climate and vegetation) can be found in the study of H.F. GELENS, H.C. KINYANJUI and R.F. VAN DE WEG (ed): Soils of the Kapenguria Area (quarter degree sheet 75). Kenya Soil Survey, Nairobi 1976.

WEST POKOT DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
8835004	Kapenguria, D.O.	40	Average	1 289	14	35	71	165	198	124	194	206	111	81	64	32
2 134 m			60 % rel.[1]	1 096	3	4	35	98	153	65	140	120	24	68	51	15
8835026	Kongelai, Kacheliba	22	Av.	923	25	38	45	83	132	83	144	132	80	61	53	36
1 311 m	D. Office		60 %	784	7	13	38	47	93	37	108	101	73	47	35	3
8835027	Sebit	20	Av.	791	20	34	57	157	101	50	94	36	52	54	49	36
1 311 m			60 %	710	5	23	34	84	90	44	67	35	32	22	32	11
8835029	Sigor D.O.	19	Av.	842	25	28	61	152	122	62	102	79	49	63	69	30
1 067 m			60 %	752	5	4	47	107	78	38	68	35	29	56	48	11
8835032	Chebunyal,	19	Av.	967	25	24	71	110	130	91	159	137	89	75	47	17
2 377 m	Chief's Office		60 %	871	3	19	21	58	94	67	135	94	47	70	24	9

[1] These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

WEST POKOT DISTRICT

TABLE 2: **TEMPERATURE DATA**

No. and altitude	Name of Station	AEZ[1)]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
8835014	Kapenguria	LH 2	Mean max.	24.4	24.8	25.9	23.8	22.3	22.0	21.0	21.9	22.7	23.4	23.6	23.9	23.3	5
2 080 m	Government	lp	Mean temp.	18.2	18.7	18.8	18.4	17.5	17.2	16.7	16.9	17.2	17.7	17.7	17.6	17.7	
	School		Mean min.	12.1	12.7	12.7	13.0	12.7	12.4	12.4	11.9	11.7	12.0	11.8	11.4	12.2	
	operating to 1944		Abs. min.	10.0	10.0	8.9	10.6	8.9	8.9	8.9	9.4	10.0	10.0	10.0	7.8	7.8	
8835033	Cheywoyet	LH 2	Mean max.	25.0	25.6	25.9	23.8	22.8	22.5	21.3	21.6	22.6	23.0	22.9	23.6	23.4	15
2 130 m	School		Mean temp.	16.6	17.1	17.5	16.8	16.7	15.9	15.4	15.5	15.8	16.1	16.0	16.1	16.3	
			Mean min.	8.2	8.7	9.2	9.9	10.6	9.3	9.6	9.4	9.1	9.3	9.1	8.6	9.3	
			Abs. min.	4.4	5.0	5.0	6.1	7.0	6.0	5.0	5.0	2.5	5.6	4.4	4.4	2.5	

Temperature in °C applies to the columns Jan. to Year.

1) AEZ = Agro-ecological zone; lp = lower places within the zone

TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1)] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2)] in days	2nd rains in days	Total[3)] in days
TA I and TA II Tropical Alpine Zone		Unimportant grazing zones							
UH 1 Sheep-Dairy Zone	(vl)i or two	2 600–3 200	13.6–10.0	>1 250	370–450	550–650	110 or more	165–185	275–295
UH 1–2	(vl)i	2 400–3 000	14.8–11.2	>1 200	360–450	500–620	110 or more	155–175	265–290
UH 2 Wheat-Pyrethrum-Zone	(vl)i	Small steep strip, water catchment area, figures see Elgeyo-Marakwet							
LH 1 Tea-Dairy-Zone	(vl)i	2 100–2 370	16.6–15.0	>1 300	420–450	550–>600	110 or more	180–200	290–310
LH 2 Wheat/Maize-Pyrethrum Zone	vl/i or two	1 900–2 400	17.9–14.8	>1 200	360–420	520–600	110 or more	160–180	270–290
	(vl/l)i or two			>1 150	320–410	480–600	100 or more	130–160	230–260
LH 3 Wheat/Maize-Barley Zone	(l/vl)i	Mainly unsuitable soil or topography, figures see Uasin-Gishu							
LH 4 Cattle-Sheep-Barley Zone	(l)i	1 700–2 300	19.0–15.4	900–1 100	190–300	350–450	75 or more	120–130	195–205
UM 3 Marginal Coffee Zone	(l/vl)i or two	1 950–2 100	17.5–16.6	1 100–>1 200	280–360	460–600	90 or more	130–150	220–240
UM 4 Sunflower-Maize Zone	(l/vl)i	1 670–2 000	19.2–17.9	1 050–1 100	270–290	440–540	85 or more	120–140	205–235
	(m/l)i			1 000–1 100	250–280	370–410	70 or more	90–100	160–170

CONTINUATION

TABLE 3: CLIMATE IN THE AGRO-ECOLOGICAL ZONES

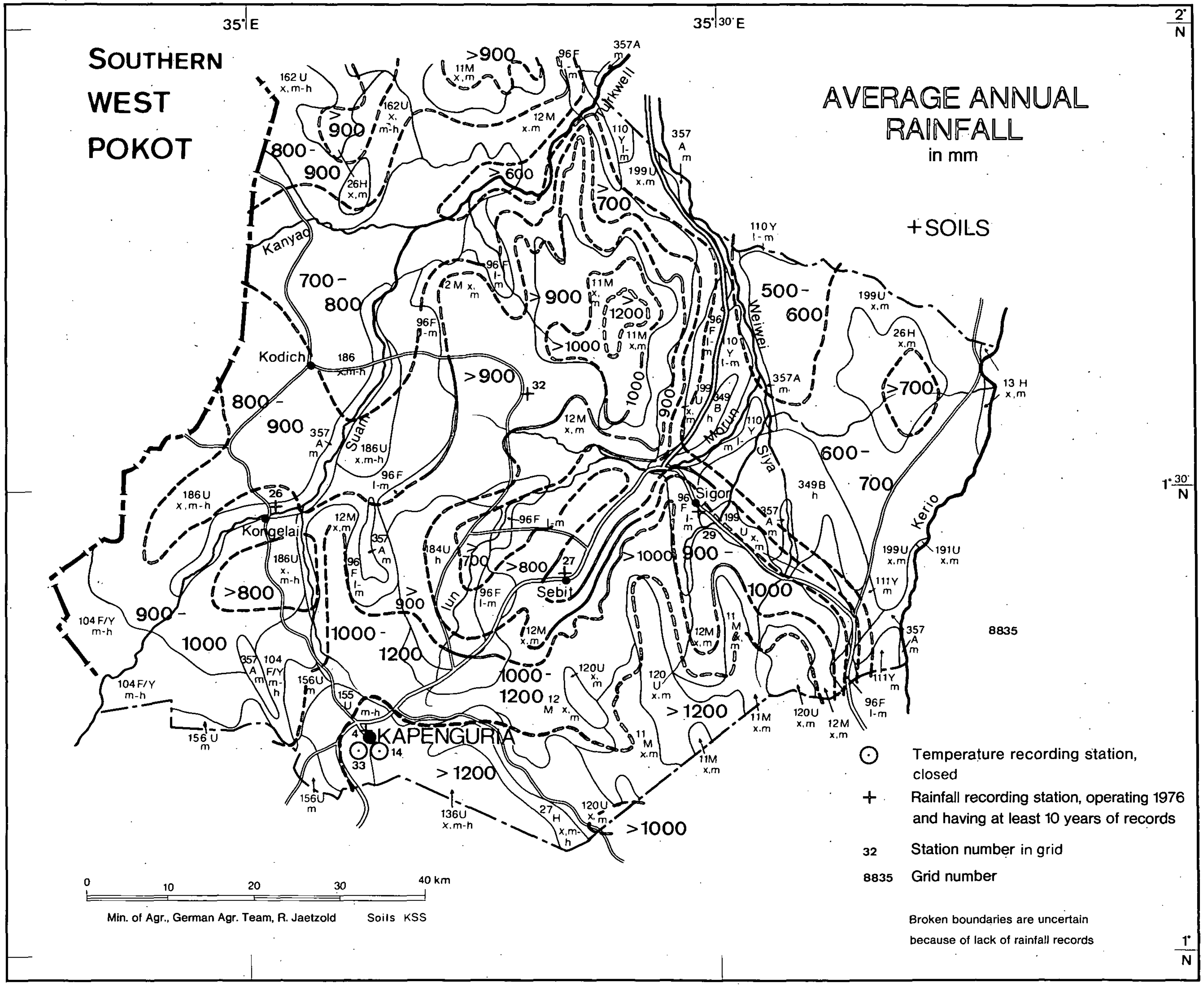
Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2] in days	2nd rains in days	Total[3] in days
UM 4–5 Maize-Sunflower to Livestock-Sorghum-Zone (transition)	(l/m)i	1 380–1 850	21.0–18.1	950–1 100	240–290	380–450	70 or more	100–120	170–190
	(m/l)i or (vs ⌐ s/m)i			880–1 000	210–270	350–400	55 or more	90–110	145–170
	(m)i or (vs/s ⌐ fvs)i			800–1 050	210–270	300–400	65 or more	60– 80	125–145
	(m/l)i			860– 950	180–300	350–400	65 or more	75–105	140–170
UM 5 Livestock-Sorghum Zone	(m)i or two	1 380–2 100	21.0–16.6	680– 950	200–260	200–350	65 or more	60– 75	125–145
LM 4 Marginal Cotton Zone	(m/l)i or two	1 100–1 400	22.6–21.0	880– 950	240–300	350–400	70 or more	85–100	155–170
LM 4–5	(m/l)i or two	1 300–1 400	21.4–21.0	900–1 000	200–230	330–380	60 or more	80–110	150–170
LM 5 Lower Midland Livestock-Millet Zone	(m)i or (vs ⌐ s/vs)i	1 150–1 500	22.3–20.5	780– 920	170–220	300–370	50 or more	80– 90	130–140
	(vs ⌐ fvs)i			750– 800	150–220	250–350	45 or more	60– 70	100–110
	i(vs)i			700– 800	120–160	160–230	<45	45– 60	
LM 5–6	(vs ⌐ fs)i	1 350–1 450	21.1–20.7	850– 930	150–230	290–360	45 or more	75–110	130–155
LM 6 Lower Midland Ranching Zone	ur i	1 000–1 350	23.6–21.2	630– 750	80–150	130–200	<45	<45[4]	
IL 6 Ranching Zone	ur i	800–1 000	24.8–23.6	500– 800	50–150	100–220	<45	<45[4]	

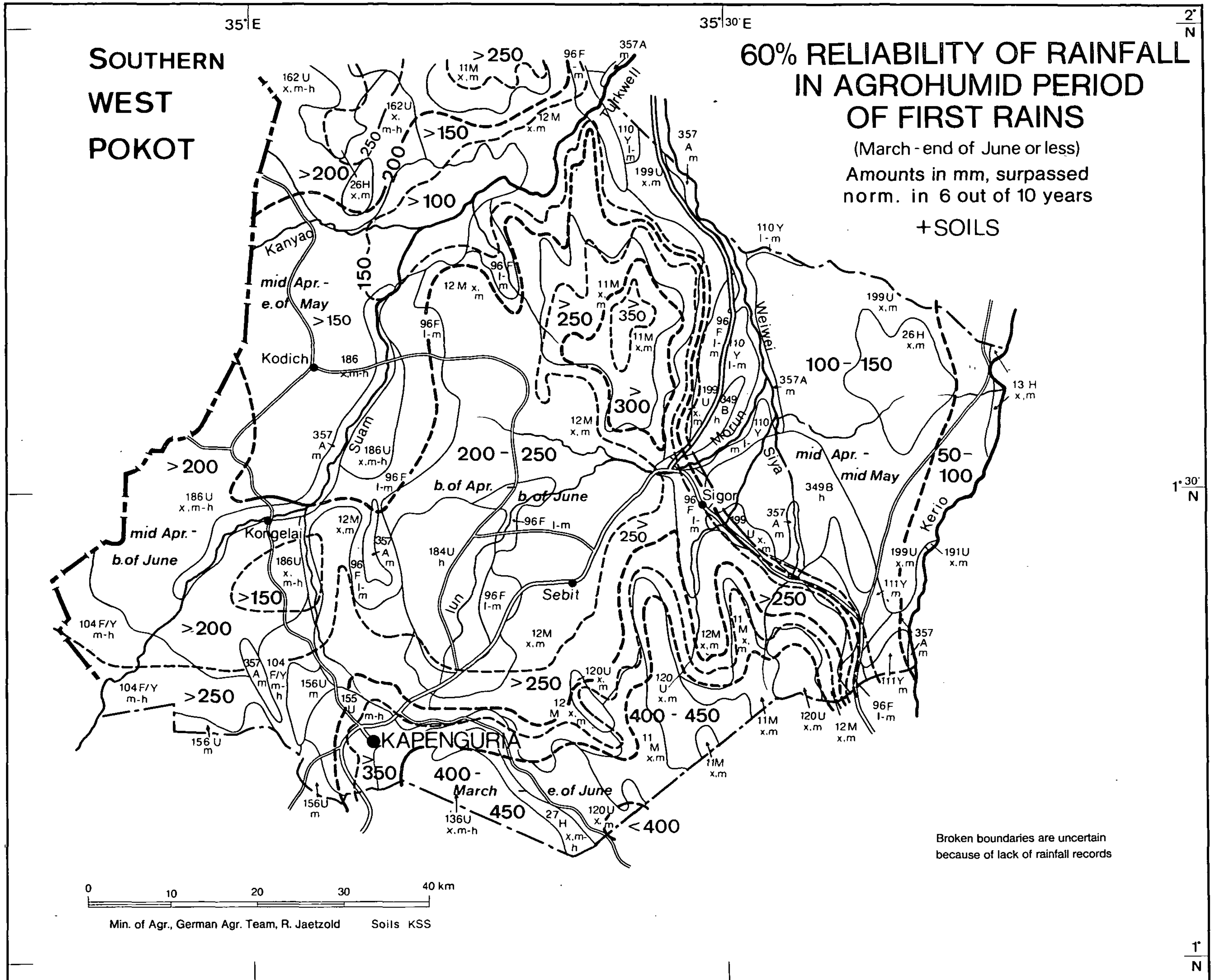
1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants

2) More if growing cycle of cultivated plants continues into the period of second rains

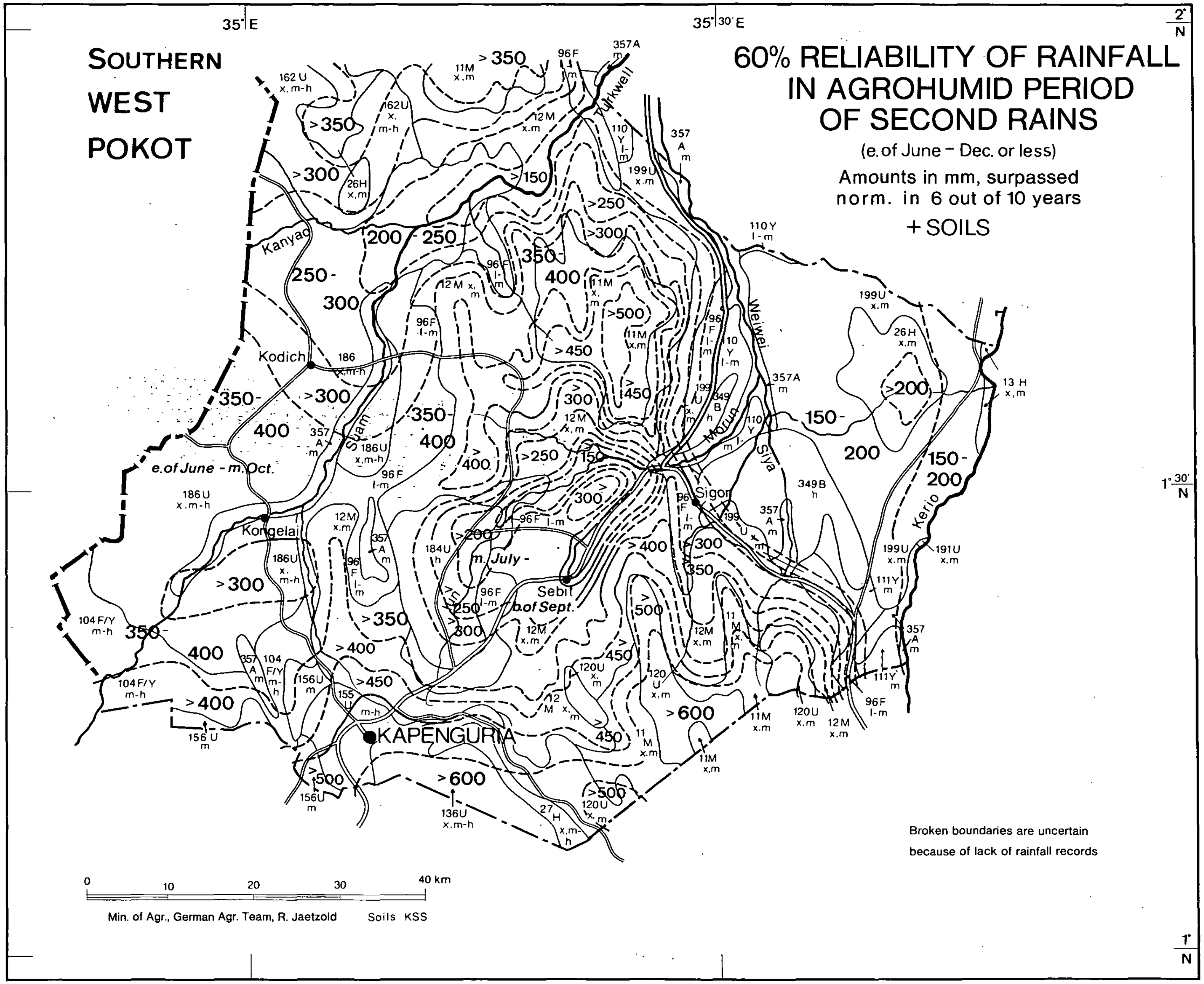
3) Only added if agro-humid conditions continue from first to second rains

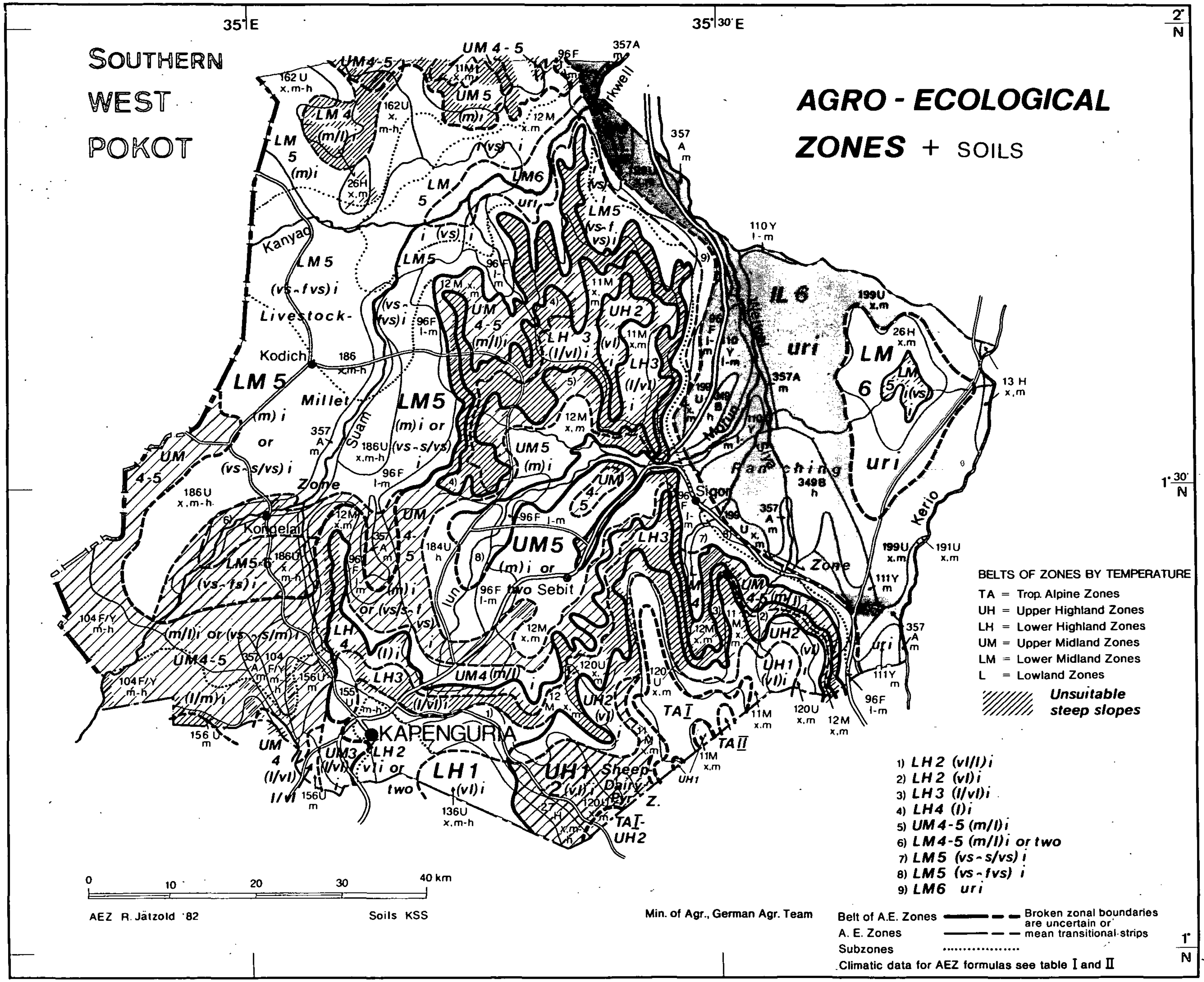
4) Continuously, with interruption it may be more


SOUTHERN
WEST
POKOT
AVERAGE ANNUAL
RAINFALL
in mm
+SOILS
35° E
35° 30' E
2° N
1° 30' N
1° N
KAPENGURIA
Kongelai
Kodich
Sigor
Sebit
Kanyao
Suam
Weiwei
Morun
Siya
Kerio
Turkwell
8835
Temperature recording station, closed
Rainfall recording station, operating 1976 and having at least 10 years of records
32 Station number in grid
8835 Grid number
Broken boundaries are uncertain because of lack of rainfall records
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold
Soils KSS



SOUTHERN
WEST
POKOT
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF FIRST RAINS
(March - end of June or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+SOILS
35°E
35°30'E
2° N
1°30' N
1° N
Kanyao
Kodich
Kongelai
Suam
Turkwell
Weiwei
Morun
Siya
Kerio
Sigor
Sebit
KAPENGURIA
mid Apr. - e. of May
mid Apr. - b. of June
b. of Apr. - b. of June
mid Apr. - mid May
March - e. of June
> 250
> 150
> 200
> 100
150
200
250
> 250
> 350
> 300
200 - 250
100 - 150
50 - 100
400 - 450
< 400
> 350
Broken boundaries are uncertain because of lack of rainfall records
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold
Soils KSS


SOUTHERN WEST POKOT
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RAINS
(e. of June – Dec. or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+ SOILS
35° E
35° 30' E
2° N
1° 30' N
1° N
Kanyao
Kodich
Kongelai
Sebit
Sigor
KAPENGURIA
Turkwell
Weiwei
Morun
Siya
Kerio
Siam
e. of June - m. Oct.
m. July -
b. of Sept.
Broken boundaries are uncertain because of lack of rainfall records
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold
Soils KSS



SOUTHERN
WEST
POKOT
AGRO - ECOLOGICAL
ZONES + SOILS
35°E
35°30'E
2° N
1°30' N
1° N
BELTS OF ZONES BY TEMPERATURE
TA = Trop. Alpine Zones
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
L = Lowland Zones
Unsuitable steep slopes
1) LH 2 (vl/l) i
2) LH 2 (vl) i
3) LH 3 (l/vl) i
4) LH 4 (l) i
5) UM 4-5 (m/l) i
6) LM 4-5 (m/l) i or two
7) LM 5 (vs-s/vs) i
8) LM 5 (vs-fvs) i
9) LM 6 uri
0 10 20 30 40 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
KAPENGURIA
Kodich
Kongelai
Sigor
Sebit
LM 5 Livestock-Millet Zone
IL 6 uri
Sheep Dairy Z.

AGRO-ECOLOGICAL ZONES

TA = TROPICAL-ALPINE ZONES

TA I = Tropical-Alpine Cattle and Sheep Zone

Nat. grazing well suitable for Corriedale sheep, less suitable for Merinos and cattle; dairy cows lower places only and good night shelter recommended. No proper grass or forage species. Lamas and Alpakas could be tried.

TA II = Tropical-Alpine Sheep Zone

Well suitable for Corriedale sheep, grass too hard for cattle

UH = UPPER HIGHLAND ZONES

UH 1 = Sheep and Dairy Zone

UH 1 (vl) i or two = Sheep and Dairy Zone with a (weak) very long[1] cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.

Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd r.), start norm. March[1]: Oats (April–S.); peas (~ 60 %), potatoes; cabbage, carrots, celery, endive, rampion, leek, spinach, cauliflower
2nd rains, start norm. end of June[1]: Carrots, leek
Whole year: Strawberries, pinus trees

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Late mat. wheat like Kenya Bongo, late mat. triticale (50–60 %); rapeseed; kohlrabi, radish
2nd rains: M.mat. barley like Proctor or Kenya Res.; potatoes; cabbage, celery, endive, rampion
Whole year, best planting time end of March: Pyrethrum (nearly 60 %)

Pasture and forage
Around 0.6 ha/LU (lower places) to 1.3 ha/LU (drier upper places with hard grass) on sec. pasture of Kikuyu grass, very suitable for Merino and Corriedale sheep, up to 2 700 m also for grade dairy cows and (store feeded pigs; rye grass (Lolium perenne) to improve pasture for dairy; lucerne and Kenya white clover as add. forage, also fodder oats, rapeseed herbage

UH 2 = Wheat-Pyrethrum Zone

UH 2 (vl) i or two = Wheat-Pyrethrum Zone with a (weak) very long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.

Small steep strip and water catchment area, not advisable for cultivation. Potential see Elgeyo-Marakwet District

LH = LOWER HIGHLAND ZONES

LH 1 = Tea Dairy Zone

LH 1 (vl) i or two = Tea-Dairy Zone with a (weak) very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.

Good yield potential
1st rains (to 2nd r.), start norm. March: Late mat. Maize like H 7 801 (higher places) or H 614 (lower places); peas, rapeseed; cabbages, carrots, kales, kauliflower, beetroot, leek, spinach, celery, lettuce, gourgettes, fennel
2nd rains, start norm. July[1]: Cabbages, carrots, kales a.o. vegetables
Whole year: Passion fruit (lower places), tea on deep good soils, cypress trees

[1] Start and end of rainy seasons in whole district not very distinct, especially second rains, in some places there is even a third peak. So planting times are variable according to crops and their rotation.

Fair yield potential
1st rains: Finger millet, beans, potatoes, onions
2nd rains: Beans
Whole year: Tea on normal soils

Pasture and forage
0.5–0.8 ha/LU on sec. or art. pasture of Kikuyu grass; very suitable for grade dairy cows; Kenya white clover var. Glabrescens as add. forage, Rhodes grass var. Pokot (for hay)

LH 2 = ***Wheat/Maize-Pyrethrum Zone***

LH 2 vl i or two = ***Wheat/Maize-Pyrethrum Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.***
(see Diagram Kapenguria)

Good yield potential
1st rains (to 2nd r.), start norm. March: Late mat. wheat like Kenya Bongo (Apr./May–O./N.), late mat. triticale, late mat. maize like H 611–614 (e. of F./Apr.–S./N., ~ 80 % on deep volcanic soils in lower places); peas, horse beans, potatoes (Apr.–Au.); late mat. sunflower like Kenya White (60–70 %, lower places ~70 %), linseed, rapeseed; cabbages, kales, cauliflower, carrots, beetroot, spinach, celery, lettuce, fennel, artichokes, gourgettes
2nd rains, start indistinctly around June: M.mat. barley like K. Research (June–O.), e.mat. wheat like K. Tembo) June–O.) and other var.; linseed; kales, carrots, beetroot, spinach, tomatoes (lower places), celery
Whole year: Black Wattle, New Zealand flax (higher places)

Fair yield potential
1st rains: Finger millet, m.mat. beans like Cuarentino (50–60 % lower places); tomatoes, onions
2nd rains: Peas, beans (below 2 100 m); potatoes (S.–D./J.); cabbages, cauliflower, onions, lettuce
Whole year: Pyrethrum (nearly 60 %); apples, pears, and plums above 2 200 m; strawberries, passion fruit (below 2 100 m)

Poor yield potential (av. 20–40 % of the optimum)
Whole year: Tea

Pasture and forage
Around 1 ha/LU on highland savanna of Kikuyu, red oats and tufted grass[2)] between Cedar forest remnants; about 0.6 ha/LU on art. pasture of Nandi Setaria > 2 000 m or Rhodes grass < 2 000 m; with add. feeding of Giant Setaria, Napier grass (< 2 000 m), lucerne, clover and Lotononis down to about 0.3 ha/LU; suitable for grade dairy cows

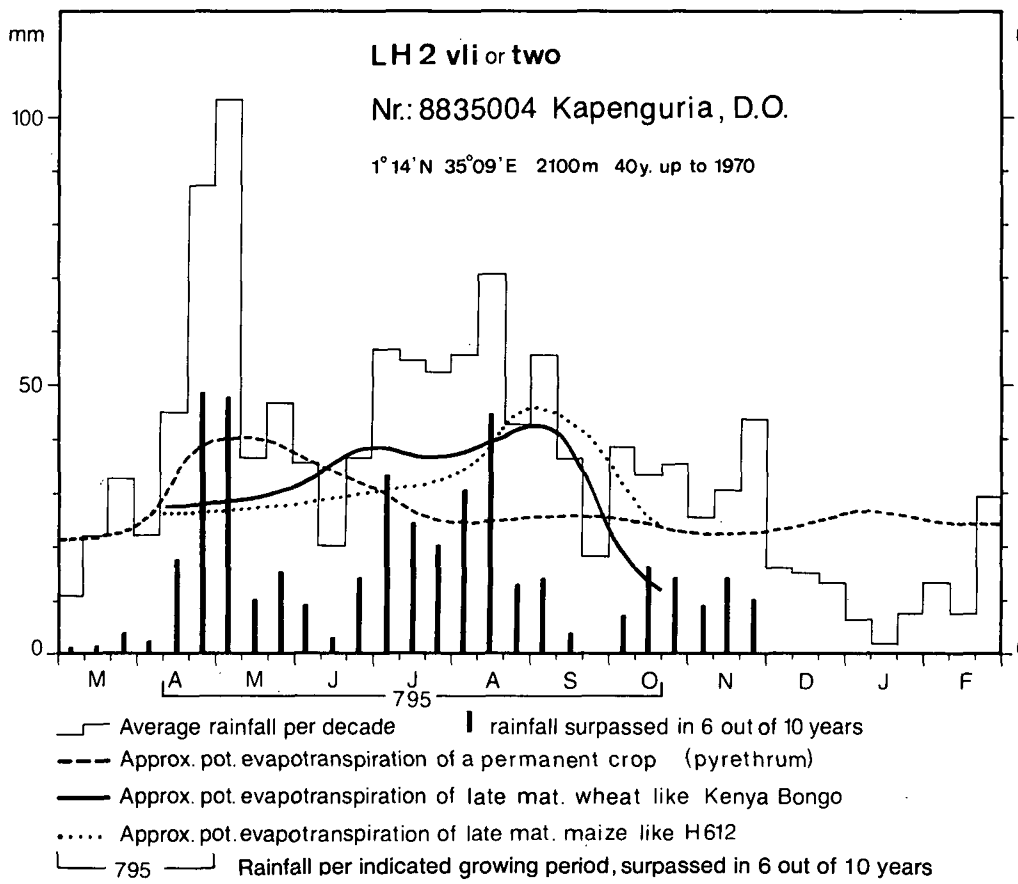
LH 2 (vl/l) i or two = ***Wheat/Maize-Pyrethrum Zone with a (weak) very long to long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.***

Good yield potential
1st rains (to 2nd r.), start norm. April: Late mat. wheat like Kenya Bongo (~60 %, Apr.–O.), late mat. triticale, late mat. maize like H 611 (~ 60 %, Apr.–N., higher places), H 612–614 (lower places), peas (60–70 %), horse beans, potatoes (Apr.–Au.); late mat. sunflower like Kenya White (~60 %), linseed, rapeseed (60–70 %); cabbages, kales, carrots, beetroot, spinach, celery, lettuce
2nd rains, start undistinctly around end June: M.mat. barley like K. Research (June–O.), m.mat. wheat like Kenya Tembo (June–O.); linseed; kales, carrots, beetroot, spinach, tomatoes (lower places), celery
Whole year: Black Wattle

Fair yield potential
1st rains: Finger millet; m.mat. beans like Cuarentino (40–50 %); cauliflower, onions, tomatoes (lower places)
2nd rains: Peas, e.mat. beans (40–50 %); tomatoes (40–50 %), cabbages, cauliflower, onions, spinach, lettuce
Whole year: Pyrethrum; apples, pears, and plums above 2 200 m; strawberries

Pasture and forage
About 1.1 ha/LU on sec. pasture of Kikuyu and tufted grass[2)] between Cedar forest remnants; 0.6–0.7 ha/LU on art. pasture of Nandi Setaria above 2 000 m or Rhodes grass below 2 000 m; suitable for grade dairy cows with add. forage like LH 2 vl i

[2)] The bad tufted grasses Eleusine jaegeri and Pennisetum schimperi are expanding if the areas are overgrazed. They may be controlled by fire.



LH 3 = *W h e a t / M a i z e*[3] *- B a r l e y Z o n e*

LH 3 (l/vl) i = *Wheat/(Maize)-Barley Zone with a (weak) long to very long cropping season and intermediate rains*

Mainly unsuitable soil or topography. Potential of small useful plateau areas see Trans Nzoia District. Stocking rates much less, 1.5–3 ha/LU according to poorer soils and grass cover

LH 4 = *C a t t l e - S h e e p - B a r l e y Z o n e*

LH 4 (l) i = *Cattle-Sheep-Barley Zone with a (weak) long cropping season and intermediate rains*

Mainly poor, stony and shallow soils. Yield expectations and stocking rates therefore much less than in Trans Nzoia District. M.mat. barley fair (~40 %), but with high risk because of rainfall variability. Other crops marginal. More than 3 ha/LU on open bushland

UM = *UPPER MIDLAND ZONE*

UM 3 = *M a r g i n a l C o f f e e Z o n e , h e r e (C o f f e e -) M a i z e Z o n e*[4]

UM 3 (l/vl) i or two = *Marginal Coffee Zone with a (weak) long to very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

G o o d y i e l d p o t e n t i a l
1st rains, start norm. end of March: Maize H 612–614 (60–70 %), finger millet (60–70 %), high alt. sorghum; m.mat. beans, sweet potatoes; m.mat. sunflower like Comet; cabbages, kales, onions (on light soils), tomatoes, spinach
2nd rains, start norm. b. of July: E.mat. beans (~60 %), onions (~60 % on light soils)
Whole year: Per. castor, Macadamia nuts, sisal, black wattle

3) Wheat or maize depending on farm scale and topography; here smallholders on slopes, therefore maize more suited
4) Unimodal rainfall distribution, altitude and poor soils are lowering coffee yields

F a i r y i e l d p o t e n t i a l
1st rains: Potatoes
2nd rains: Potatoes, sweet pot. (40–50 %); tomatoes
Whole year: Bananas (on deep soils), avocadoes, citrus[5], mountain pawpaws

P o o r y i e l d p o t e n t i a l
Whole year: Arabica coffee

P a s t u r e a n d f o r a g e
About 1.2 ha/LU on sec. pasture, ~ 0.7 ha/LU on art. pasture of Rhodes grass; down to 0.25 ha/LU feeding Bana or Napier grass and Silverleaf Desmodium (D. uncinatum) or Siratro as fodder legumes, sweet potato vines as add. forage

UM 4 = *S u n f l o w e r - M a i z e Z o n e*

UM 4 (l/m) i or two = *Sunflower-Maize Zone with a (weak) long to medium cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

G o o d y i e l d p o t e n t i a l
1st rains, start norm. April: Dwarf sorghum (Apr.–June, ~ 60 %), m.mat. cold tol. sorghum (m. of Apr.–S., 60–70 %)
2nd rains, start norm. b. of July: Dwarf sorghum; dwarf sunflower
Whole year: Sisal, Eucalyptus trees

F a i r y i e l d p o t e n t i a l
1st rains: Late mat. maize H 614 (higher places), H 622 & 633 (lower places), finger millet, m.mat. barley (higher places); beans, sweet potatoes (to 2nd r.), pigeon peas (to 2nd r.); m.mat. sunflower like Hybrid S 301 A (higher places), like Comet (lower places); tomatoes (to 2nd r.); groundnuts (lower places)
2nd rains: V.e.mat. beans, onions (on light soils); e.mat. sunflower like 252, e.mat. soya beans
Whole year: Pineapples, per. castor (50–60 %), cassava (lower places)

P a s t u r e a n d f o r a g e
1.4–2.0 ha/LU on uneroded nat. open semi-dry bushland. On good soils ~ 0.7 ha/LU on art. pasture of Rhodes grass. Down to 0.28 ha/LU feeding Bana grass, moth bean vines, horse tamarind (Leucaena leuc.) and saltbush (Atriplex nummularia); grade cattle possible

UM 4 (m/l) i or (vs ⌐ s/m) = *Sunflower-Maize Zone with a (weak) medium to long cropping season and intermediate rains, dividable in a (weak) very short cropping season, followed by a (weak) short to medium one and i.r.*

Potential almost as UM 4 (l/m) i but cold tolerant sorghum fair, Turkana sorghum better, maize only m.mat. like H 622–633, e.mat. sunflower 252. Stocking rates about 10 % lower

UM 4–5 (m) i or (vs/s ⌐ fvs) i *Sunflower-Maize to Livestock-Sorghum Zone with a (weak) medium cropping season and intermediate rains, dividable in a (weak) very short to short cropping season, followed by a (weak) fully very short one and i.r.*

G o o d y i e l d p o t e n t i a l
1st rains, start end of March: Dwarf sorghum
Whole year: Sisal (60–70 %)

F a i r y i e l d p o t e n t i a l and stocking rates see UM 4 (l/m) i less about 20 %.
Tendency to zone 4 on soils with good water storage capacity. On eroded places 5 (or even 6)

UM 5 = *L i v e s t o c k - S o r g h u m Z o n e*

UM 5 (m) i or two = *Livestock-Sorghum Zone with a (weak) medium cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*
(see Diagram Sebit)

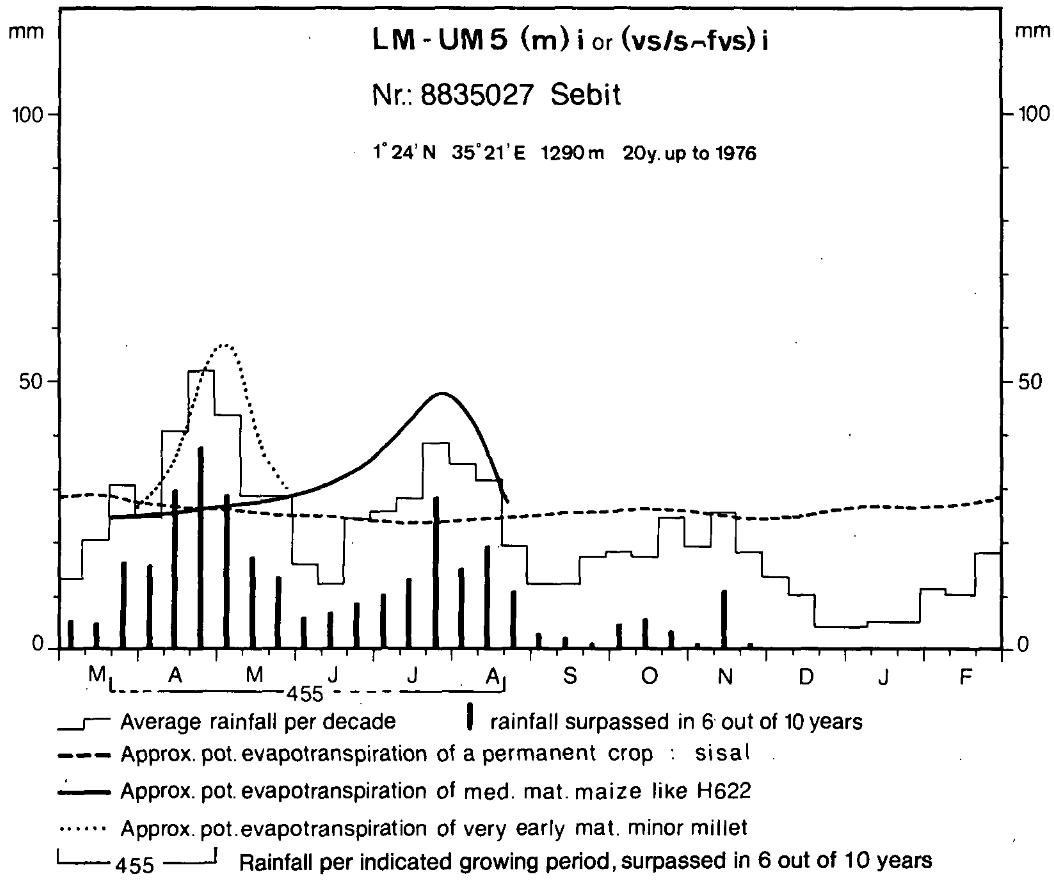
G o o d y i e l d p o t e n t i a l
Whole year: Sisal (~ 60 % on deep soils)

5) With add. irrigation (D.–F.) well growing

Fair yield potential
1st rains, start norm. end of March/b. of April: Dwarf and Turkana sorghum on deep soils, e.mat. finger millet
Whole year: Marama beans[6] (on light and medium soils), perennial castor

Poor yield potential
1st rains: M.mat. maize like H 622 (on deep soils)

Pasture and forage
2–4 ha/LU on undestroyed pasture of semi-dry sclerophytic bushland; indigenous cattle, sheep and goats; saltbush (Atriplex nummularia), and horse tamarind (Leucaena leucocephala) are palatable shrubs or trees to be planted with local buffel grass (Cenchrus ciliaris) for re-establishing and improving pasture on eroded soils, Gao trees (Acacia albida) on deep soils



LM = LOWER MIDLAND ZONES

LM 4 = Marginal Cotton Zone[7]

LM 4 (m/l) i or two = Marginal Cotton Zone with a (weak) medium to long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.
(see Diagram Kacheliba/Kongelai)

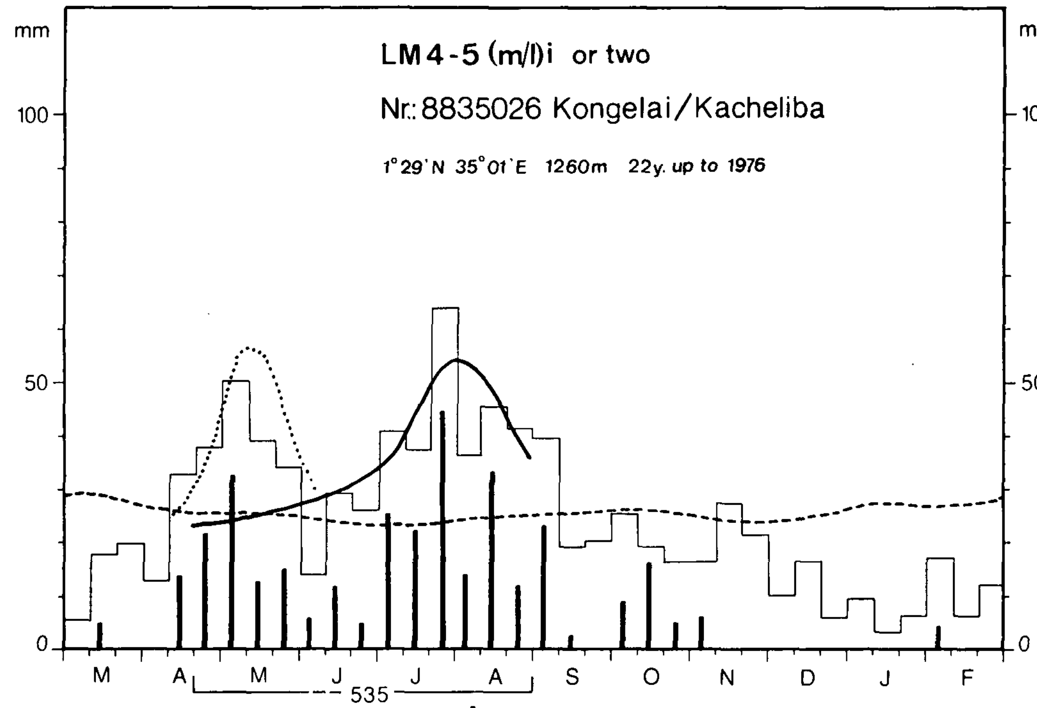
Good yield potential
1st rains, start norm. end of March/b. of Apr.: V.e. mat. sorghum; horse grams; safflor, dwarf castor
Whole year: Sisal (60–70 %) and perennial castor on deep soils, buffalo gourds[6] (on only soils), Marama beans[6], jojoba

Fair yield potential
1st rains: M.mat. maize like Coast comp. or H 511 (Apr.–Aug., on deep soils and preventing runoff), e.mat. sorghum like Serena (Apr.–b. of July), m.mat. sorghum (50–60 %, mid Apr.–b. of S.), m.mat. bulrush millet (bird rejecting awned var.), finger millet (40–50 %); green grams, cowpeas (50–60 %), pigeon peas (pest problems), beans, m.mat. groundnuts; cotton (end of March–O., near Suam River good), m.mat. sunflower like Kenya White (bird prot. necess.), m.mat. soya beans (40–50 %)
2nd rains, start norm. end of June: Ratoon of e.mat. sorghum, e.mat. foxtail millet; green grams, cowpeas, mwezi moja beans (40–50 %), tepary beans
Whole year: Cassava

6) Still experimental

7) In the district there is only LM 4–5, it means 4 only on good, deep cotton soils, esp. near the rivers

Pasture and forage
Around 2 ha/LU on undestroyed pasture of semi-dry sclerophytic bushland; indigenous cattle, sheep and goats; saltbush (Atriplex nummularia), and horse tamarind (Leucaena leucoc.) are palatable shrubs or trees to be planted with local buffel grass (Cenchrus ciliaris) for re-establishing or improving pasture on eroded soils, Gao trees (Acacia albida) on deep soils. Tsetse flies, esp. along the river Suam



Average rainfall per decade — rainfall surpassed in 6 out of 10 years
--- Approx. pot. evapotranspiration of a permanent crop: sisal
— Approx. pot. evapotranspiration of med. mat. maize like H511
...... Approx. pot. evapotranspiration of early mat. minor millet
535 Rainfall per indicated growing period, surpassed in 6 out of 10 years

LM 5 = Livestock-Millet Zone

LM 5 = Livestock-Millet Zone
(vs ⌐ s/vs) with a (weak) very short cropping season followed by a (weak) short to very short one

Good yield potential
1st rains, start norm. b. of April (to 2nd rains): Safflor, horse gram (~ 60 %), dwarf castor
Whole year: Sisal (on deep soils), buffalo gourds[6] (on sandy soils), Marama beans[6], Vigna lobatifolia[6]

Fair yield potential
1st rains: E.mat. sorghum like 2 K X 17, Serena or Turkana (b. of May–b. of Aug.), m. mat. sorghum (mid Apr.–b. of S.) m.mat. bulrush millet (bird reject. var.); green grams, cowpeas, m.mat. groundnuts (b. of Apr.–S., ~ 40 %)
2nd rains, start norm. end of June: Ratoon of e.mat. sorghum, e.mat. foxtail millet; green grams, cowpeas, tepary beans
Whole year: Cassava, perennial castor, jojoba

Poor yield potential
M.mat. maize like Coast Composite or H 511 on deep soils (near rivers) or chance cropping, water concentration advised (see Fig. 1 Baringo District), the same for finger millet

Pasture and forage
3–5 ha/LU on Acacia bushland if not denuded and eroded; goats thrive better than cattle and sheep. Tepary beans as add. fodder; saltbush (Atriplex nummularia) best palatable shrub for re-establishing or improving pasture, others and grass see next subzone

LM 5 = Livestock-Millet Zone
(vs ⌐ vs/s) i with a (weak) very short cropping season followed by a (weak) very short to short one and i.r.

Good yield potential
Whole year: Buffalo gourds[6] on sandy soils, Vigna lobatifolia[6], Marama beans[6]

F a i r y i e l d p o t e n t i a l
1st rains, start begin of April: Turkana sorghum, v.e.mat. dwarf sorghum, e.mat. foxtail and proso millet; cowpeas
2nd rains start norm. end of June/b. of July: Ratoon of sorghum, e.mat. proso millet (~ 40 %), e.mat. foxtail millet; green grams, tepary beans, cowpeas for leaves

P o o r y i e l d p o t e n t i a l
1st to 2nd rains: M.mat. maize like Coast comp. (on deep soils only), e. and m.mat. finger millet, m.mat. sorghum

P a s t u r e a n d f o r a g e
4–6 ha/LU on Acacia wood- and bushland if not denuded and eroded; goats thrive better than cattle and sheep. Local buffel grass (Cenchrus ciliaris) should be sown on good deep soils; saltbush (Atriplex), Mesquite and Algarrobo (Prosopis juliflora and chilensis) and Cassia are palatable shrubs for re-establishing pasture also on stony soils; horse tamarind (Leucaena) with some add. water in 1st dry season (to be planted esp. in higher areas where local Acacia mellifera is not thriving well), Opuntia spec. Tsetse danger in eastern parts

LM 5 = *Livestock-Millet Zone*
i (vs) i *with a (weak) very short cropping season framed by intermediate rains*

G o o d y i e l d p o t e n t i a l
Whole year: Buffalo gourds[6)] (on sandy soils), Marama beans[6)], Vigna lobatifolia[6)]

F a i r y i e l d p o t e n t i a l
2nd rains, start end of June/b. of July: E.mat. foxtail millet, tepary beans, cowpeas for leaves and pulses (all crops on deep soils only). With water concentration (see Fig. 1 in Baringo District) also v.e.mat. sorghum (1st rains and ratoon in 2nd r.), simsim, pigeon peas, cassava (1st to 2nd r.)

P a s t u r e a n d f o r a g e
8–15 ha/LU on Acacia mellifera bushland, 5–10 ha/LU on Acacia tortilis woodland if not denuded and eroded. Buffel grass (Cenchrus ciliaris) for re-establishing pasture on good deep soils, palatable shrubs like Atriplex nummularia and Cassia sturtii to be planted also on stony soils; more suited for goats if pasture is not improved. Seeding of nutritious grass like Masai love grass (Eragrostis superba) with water concentration technics

LM 6 = *L o w e r M i d l a n d R a n c h i n g Z o n e*

LM 6 = *Lower Midland Ranching Zone*
ur i *with unimodal rainfall and intermediate rains*

No rainfed agriculture possible. Limited irrigation

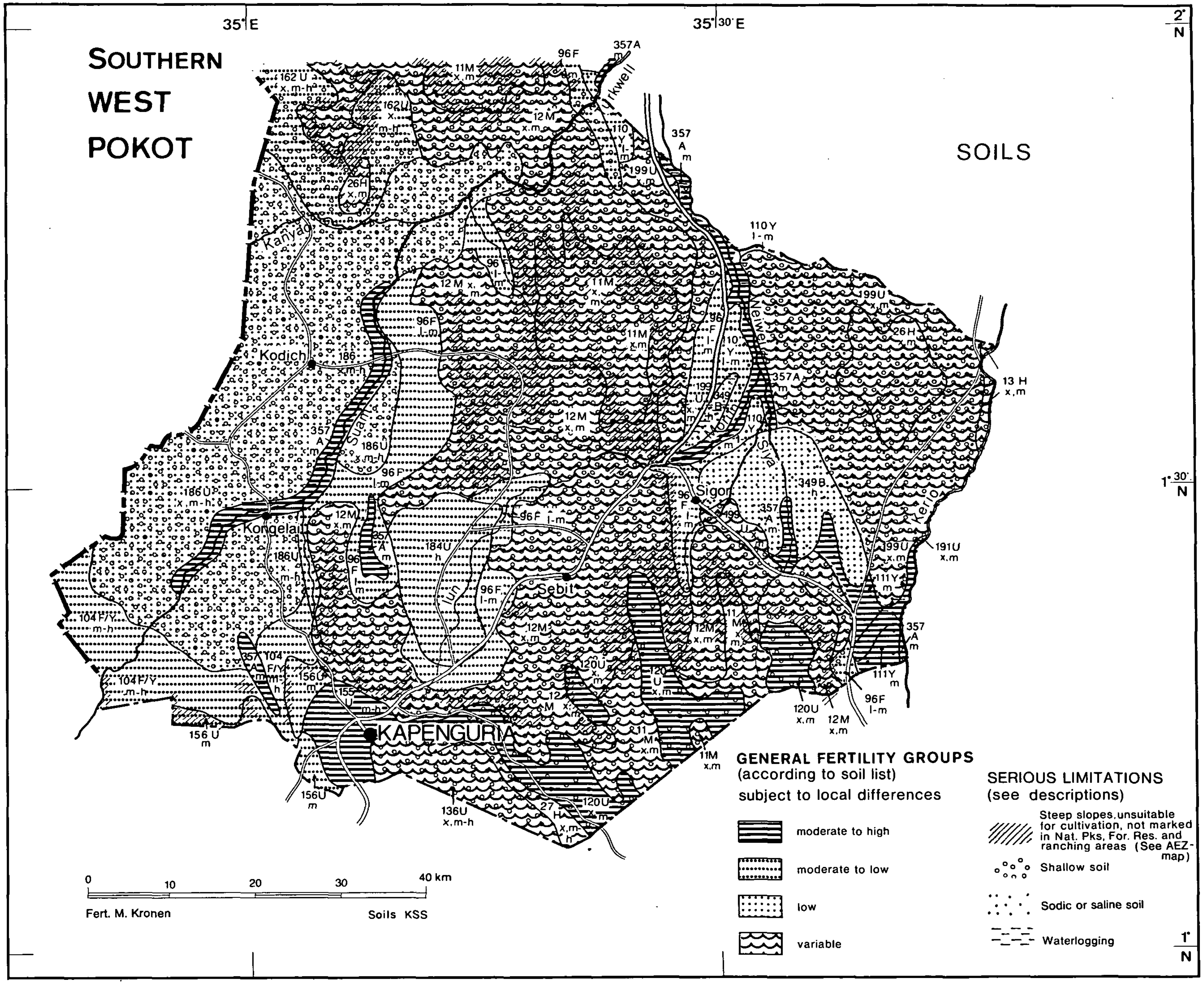
P a s t u r e a n d f o r a g e
More than 10 ha/LU on dry Acacia mellifera bushland or Acacia-Commiphora woodland. Most areas denuded and eroded, there up to 25 ha/LU;Buffel grass (Cenchrus ciliaris) for re-establishing pasture on good, deep soils; palatable shrubs see LM 5. Thick bush more suited for goats

IL = *INNER LOWLAND ZONES*

IL 6 = *Inner Lowland Ranching Zone*

IL 6 = *Inner Lowland Ranching Zone*
ur i *with unimodal rainfall and intermediate rains*

Almost as LM 6, but grazing very limited at present due to overgrazing. Camels more suited than other livestock. Ye-eb nuts (Cordeauxia edulis) from Somalia plantable for human consumption


SOUTHERN
WEST
POKOT
SOILS
35° E
35° 30' E
2° N
1° 30' N
1° N
Kodich
Kongelai
KAPENGURIA
Sigor
Sebit
Kanyao
Suam
Muruny
Weiwei
Kerio
Orkwell
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
moderate to high
moderate to low
low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes,unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Sodic or saline soil
Waterlogging
0 10 20 30 40 km
Fert. M. Kronen
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS[1)]

Extreme relief differences are found, caused not only by individual and complex hills and mountains, but also by major and minor scarps in the eastern and western part of the district. The underlying parent rocks are mainly different types of Basement System gneisses.

The soils of the higher mountains have humic topsoils (11 M), but sometimes they are also found without the organic rich topsoil (12 M). Both soil units have shallow areas and rock outcrops. In the area north of Kapenguria and especially in the surroundings of the Morobus hills, the units 11 M and 12 M occur together. From the chemical and physical point of view, the soils of unit 12 M are poor.

Some areas occur in the mountains with upland soils which have a humic topsoil and moderate to high fertility (120 U, 136 U, 155 U). On the hills there are Regosols (26 H, 27 H). On the lower upland level, we find mainly poor soils of units 186 U and 199 U. In the southeast and northwest of Kapenguria, better soils of higher uplands (136 U, 155 U, 156 U) occur. Similar soils with a somewhat higher fertility are found in the area north of Cheperaria (184 U). Units 136 U, 155 U, 186 U also occur in association with units 120 U, 136 U, 162 U.

On the sloping foothills, soils of units 96 F and 104 F/Y are found. These units are associated with unit 110 Y. They have a moderate to low natural fertility.

The low-lying areas contain bottomland soils of unit 349 B. Soils developed from alluvium have varying texture, structure and other characteristics but normally a higher fertility. They are unit 357 A.

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

11 M x,m[2)]	= well drained, moderately deep, reddish brown to brown, friable, stony sandy clay loam, with humic topsoil (humic CAMBISOLS: with eutric REGOSOLS and Rock Outcrops)
12 M x, m	= somewhat excessively drained, shallow to moderately deep, reddish brown, friable, rocky and stony, sandy clay loam (eutric CAMBISOLS with LITHOSOLS, eutric REGOSOLS and Rock Outcrops)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

13 H x, m	= well drained, shallow, dark reddish brown, friable, very calcareous, bouldery or stony, loam to clay laom; in many places saline (LITHOSOLS; with calcic XEROSOLS, bouldery and saline phase and Rock Outcrops)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

26 H x, m	= somewhat excessively drained, shallow, reddish brown, friable, rocky or stony, sandy clay loam (eutric REGOSOLS; with Rock Outcrops and calcic CAMBISOLS)
27 H x, m–h	= complex of excessively drained to well drained, shallow, dark red to brown, friable, sandy clay loam to clay; in many places rocky, bouldery and stony and in places with acid humic topsoil (dystric REGOSOLS; with LITHOSOLS, humic CAMBISOLS lithic phase and Rock Outcrops)

SOILS ON FOOTSLOPES

Soils developed on colluvium from undifferentiated Basement System rocks

96 F l–m	= well drained, very deep, yellowish red to dark reddish brown, friable, coarse loamy sand to sandy clay loam (chromic LUVISOLS; with rhodic FERRALSOLS; and luvic/ferralic ARENOSOLS)

Soils developed on colluvium and alluvium from undifferentiated Basement System rocks

104 F/Y m–h	= well drained, moderately deep to deep, red to dark reddish brown, firm, sandy clay loam to clay (chromic and vertic LUVISOLS)

SOILS ON PIEDMONT PLAINS

Soils developed on alluvium from undifferentiated Basement System rocks

110 Y l–m	= moderately well drained, very deep, dark yellowish brown to strong brown, friable, slightly to moderately calcareous and slightly sodic, loamy sand to sandy clay loam (haplic XEROSOLS, sodic phase; with calcaro-cambic ARENOSOLS)
111 Y m	= well drained, deep, dark brown, friable, moderately calcareous clay loam, with sodic deeper subsoil (calcic CAMBISOLS, sodic phase)

1) Detailed information about soils can be found in the study of H.F. GELENS, H.C. KINYANJUI and R.F. VAN DE WEG (ed.): Soils of the Kapenguria Area (quarter degree sheet 75). Kenya Soil Survey, Nairobi 1976.

2) Soil texture-classes

h = heavy
l = light
m = medium
x = stony or bouldery
v = varying texture
m–h = medium to heavy
m, h = medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

SOILS ON UPPER LEVEL UPLANDS

Soils developed on undifferentiated Basement System rocks

120 U = complex of: - well drained, shallow, black to very dark brown, acid humic, very friable laom; in places rocky (RANKERS)
x–m - well drained, moderately deep, dark brown, friable clay loam, with a very thick acid humic topsoil (humic CAMBISOLS)

SOILS ON UPPER MIDDLE-LEVEL UPLANDS

Soils developed on biotite gneisses

136 U = well drained, moderately deep to deep, dark reddish brown to dark brown, friable, sandy clay loam to clay, with thick acid
x, m–h humic topsoil; in many places shallow and rocky (humic ACRISOLS and humic CAMBISOLS, partly lithic phase; with Rock Outcrops)

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on biotite gneisses

155 U = well drained, moderately deep to deep, dark reddish brown to brown, friable to firm, sandy clay loam to clay, partly with acid
m–h humic topsoil (ferralo-orthic ACRISOLS; with dystric and humic CAMBISOLS and humic ACRISOLS)

156 U = well drained, moderately deep to deep, brown to dark yellowish brown, firm sandy clay loam
m (orthic LUVISOLS)

Soils developed on undifferentiated Basement System rocks

162 U = complex of well drained, shallow to deep, red to dark red, friable to firm, sandy clay loam to sandy clay; in places rocky
x, m–h (chromic and ferralo-chromic LUVISOLS; with chromic CAMBISOLS and Rock Outcrops)

SOILS ON LOWER-LEVEL UPLANDS

Soils developed on Basement System rocks rich in ferromagnesian minerals

184 U = well drained, moderately deep to deep, dark reddish brown to dark red, friable to firm, sandy clay to clay; in many places with
h stonelines (chromic LUVISOLS)

Soils developed on undifferentiated Basement System rocks

186 U = complex of well drained to imperfectly drained, shallow to moderately deep, dark red to dark yellowish brown, firm, non-rocky
x, m–h to non-stony to stony sandy loam to clay, partly over pisoferric material (orthic ACRISOLS, pisoferric phase; with chromic LUVISOLS and eutric CAMBISOLS, lithic phase)

SOILS ON UPLANDS, UNDIFFERENTIATED LEVELS

Soils developed on undifferentiated volcanic rocks (mainly basalts)

191 U = well drained, shallow, dark brown, friable, strongly calcareous, stony loam, often strongly saline and moderately sodic; with
x, m stone mantle (desert pavement); (dissected older piedmont plain) (calcaric REGOSOLS, stone-mantle and saline-sodic phase)

Soils developed on undifferentiated Basement System rocks

199 U = well drained, shallow, brown, friable, strongly calcareous and moderately to strongly sodic and saline, gravelly sandy clay loam
x, m with gravel mantle (desert pavement) (calcaric REGOSOLS, gravel-mantle and saline-sodic phase; with gleyic SOLONETZ)

SOILS ON BOTTOMLANDS

Soils developed on infill mainly from undifferentiated Basement System rocks

349 B = *imperfectly drained to poorly drained, very deep, brown to dark brown, very firm, slightly calcareous, strongly sodic clay*
h (orthic SOLONETZ)

SOILS ON FLOODPLAINS

Soils developed on sediments from various sources (recent floodplains)

357 A = well drained to imperfectly drained, very deep, dark brown to yellowish brown, stratified, strongly calcareous, micaceous, pre-
m dominantly loamy soils (calcaric FLUVISOLS)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-climatic Zone Map of Kenya, scale 1:1.000.000. Expl. Soil Survey Rep. E1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

According to the results of the Census in September 1979, a total of 158 652 people were registered in the West Pokot District (Table 4). Because of the natural conditions, population density varies considerably. In the northern part, agriculture plays no role, shifting grazing is almost the only possible activity here, as it is very dry and the AEZs are not measured in this part. In the southern part, 607 200 ha can be called "rural" (including the steep and dry areas, Table 6). Strictly speaking, less than 60 % of this (360 000 ha) can be used for agriculture (Table 6). When interpreting the population data this fact has to be taken into account, in order not to misunderstand the fact that in the South of West Pokot, there is an average of 19.11 ha agricultural land per housesold (average 5.40 people, Table 5) and 3.64 ha per person available. Here, agricultural and livestock are the sole basis of the economy: there are only two trading centres with not more than 5 000 people, of which Kapenguria as the District headquarter is by far the more important.

In the higher parts of the district, for example in Cherangani Hills (see Table 6, Lelan), there is little agriculture and rough grazing predominates, so 21.81 ha per household is not excessive. Even UH 1 can be called marginal here because of the low temperatures.

The lower hillsides are densely populated (see Table 6, Mwina: 4.11 ha per household and 0.84 ha per person) and here the forest degradation is extremely high. Some areas there have old, additional irrigation systems, like the area of Cheptulel in the AEZs LM 5 and LM 4. However, the possibilities are not yet fully exploited, a lot remains to be done to improve the present situation, and help is necessary to repair the channel systems, as in the Keiyo-Marakwet District. In the future, there will be no alternative and all opportunities must be taken, as agricultural output has to grow to keep pace with the rapid population growth in the area (nearly 4 % per year).

For the unirrigable semi-arid lands, some positive measures for improvements could be taken, using the example of Baringo District, where some new investigations and experiments have been made. It is essential to do everything possible to intensify agriculture and to improve the fodder situation for livestock (runoff-catching and water concentration agriculture). Many serious problems of vegetation degradation caused by overgrazing and soil erosion have to be countered, especially in the lower parts of the area. In addition to that, overstocking has reduced the grass, and shrubs of species mainly not palatable to livestock have encroached, so the carrying capacity for livestock has been reduced to below 50 %. If Masole location is used as an example, where one household with 4.42 people now needs 70 ha to support the family, the seriousness of the problem becomes obvious. The only chance to improve conditions in the long run is by good range management, which combines these various measures. It should initiate the recultivation of the destroyed areas in order to restore the natural conditions. It would thus be possible to increase the number of livestock units without danger to the vegetation. Combined with agricultural intensification, this should guarantee the nutrition of the growing population for some years to come.

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Mnagei	17 849	17 337	35 186	6 452	390	90
Riwaa	4 740	4 879	9 619	1 922	733	13
Lelan	5 387	5 762	11 149	2 022	514	21
Kapenguria Division	27 976	27 978	55 954	10 396	1 638	34
Kipkomo	7 222	7 406	14 628	2 936	321	45
Sook	4 515	4 810	9 325	2 092	694	13
Balei	5 560	5 576	11 136	2 263	343	32
Chepareria Division	17 297	17 792	35 089	7 291	1 358	25
Weiwei	2 821	2 694	5 515	1 167	253	21
Lomut	3 253	3 434	6 687	1 343	412	16
Sekerr	3 696	3 458	7 154	1 594	511	13
Mwina	3 432	3 725	7 157	1 461	110	64
Masole	1 693	1 781	3 474	786	622	5
Cheptulel	2 032	2 206	4 238	968	69	61
Sigor Division	16 927	17 298	34 225	7 319	1 980	17
Suam	3 630	3 883	7 513	1 042	376	19
Kapchok	3 686	3 766	7 452	973	724	10
Alale	6 725	6 817	13 542	1 361	1 646	8
Kasei	2 384	2 493	4 877	759	1 265	3
Karapokot Division	16 425	16 959	33 384	4 135	4 013	8
West Pokot	78 625	80 027	158 652	29 141	9 090	17

WEST POKOT DISTRICT

TABLE 5: COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Mnagei	6438	2.81	1.19	0.92	0.50	5.41
Riwaa	1921	3.06	1.04	0.63	0.28	5.01
Lelan	1990	2.87	1.29	0.77	0.65	5.59
Division Kapenguria	10349	2.86	1.19	0.84	0.49	5.37
Location:						
Kipkomo	2914	2.81	1.22	0.61	0.36	4.99
Sook	2103	2.74	1.07	0.38	0.21	4.40
Balei	2237	2.74	1.12	0.60	0.36	4.80
Division Chepareria	7254	2.75	1.15	0.54	0.32	4.76
Location:						
Weiwei	1166	2.86	1.03	0.45	0.38	4.73
Lomut	1387	3.10	1.16	0.42	0.14	4.82
Sekerr	1599	2.93	0.98	0.26	0.28	4.45
Mwina	1458	3.09	1.30	0.39	0.14	4.91
Masole	785	2.95	1.04	0.32	0.12	4.42
Cheptulel	967	2.75	1.08	0.39	0.16	4.38
Division Sigor	7362	2.97	1.10	0.37	0.21	4.64
Location:						
Suam	1027	3.69	1.30	0.37	0.86	7.23
Kapchok	962	4.00	1.57	1.20	0.82	7.59
Alale	1339	5.32	2.24	1.53	0.72	9.81
Kasei	755	3.80	1.50	0.62	0.53	6.45
Division Karapokot	4083	4.29	1.73	1.25	0.74	8.02
DISTRICT: WEST POKOT	29048	3.07	1.22	0.70	0.41	5.40

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, includes one and two persons per households as well

TABLE 6: **AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON[1)]**

Location/Division without townships	Area total Census 79 (in '00 ha = sqkm)	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps	Non-agricultural land: Others (roads, home-steads, rivers...)	Agri-cultural land	TA I	TA II	TA I– UH 2	UH 1	UH 2	LH 1	LH 2	LH 3	LH 4	LH4– UM 4	UM 3	UM 4	UM4– UM 5	UM 5	LM 4	LM4– LM 5	LM 5	LM5– LM 6	LM 6	L 6	Agric. land per household (in ha)	Agric. land per person (in ha)
						Area in agro-ecological zones (in '00 ha = sqkm) – AEZ																					
Mnagei	390	36		39	315						7	82	35	22	3	31	20	113					2			4.88	0.89
Riwaa	733	28		74	631									16	8			215			101	170	121			32.83	6.56
Lelan	514	22		51	441	60	5	12	161	66	44	44	20	12			12	5								21.81	3.96
Kapenguria Div.	1 637	86		164	1 387	60	5	12	161	66	51	126	55	50	11	31	32	333			101	170	123			19.84	3.80
Kipkomo	321			32	289								13	17				129	80		5	45				9.84	1.98
Sook	694	130		82	482								17					120	53			245		47		23.04	5.17
Balei	343	44		34	265				9	7			16	22			8	47	125			31				11.71	2.38
Chepareria Div.	1 358	174		148	1 036				9	7			46	39			8	296	258		5	321		47		14.86	3.18
Weiwei	253	39		25	189					3			18	3				1	19	4		54			87	16.20	3.43
Lomut	412	34		41	337				13	19		13						19			3	32		12	226	25.09	5.04
Sekerr	511	102		51	358					6			46									77		36	193	22.46	5.00
Mwina	110	39		11	60	11			14	9			7					14		5						4.11	0.84
Masole	622	10		62	550																	13		166	371	69.97	15.83
Cheptulel	69	12		7	50					13								3			1	12			21	5.17	1.18
Sigor Division	1 977	236		197	1 544	11			27	50		13	71	3				37	19	9	4	188		214	898	23.83	5.22
Suam	376			21	355													163			14	168	10			34.07	4.73
Kapchok	724	43		72	609													5		12		592				62.59	8.17
Alale	1 646					Northern West Pokot not measured, mainly steep slopes and LM 6 & IL 6																					
Kasei	1 265					Northern West Pokot not measured, mainly steep slopes and LM 5 & 6																					
Karapokot Division[2)]	4 011	43		93	964													168		12	14	760	10			48.33	6.45
Southern West Pokot	6 072	539		602	4 931	71	5	12	197	123	51	139	172	92	11	31	40	838	277	21	120	1 439	133	261	898	19.11	3.64
Total rural area	8 983	Main parts of northern area not suitable for agriculture, therefore not measured																									

1) For official land statistics see supplementary publication to FM-Handbook, Vol. III A: Agriculture Land Statistics

2) Without Alale and Kasei

AGRICULTURAL STATISTICS[1)]

Despite the fact that within the West Pokot district the Tea/Dairy Zone (LH 1) is very small, approximately 500 ha of tea have been planted, yielding as little as 900 kg of green leaves per ha. The tea leaves have to be transported some 50 km for processing in the western part of the Trans Nzoia district which reduces the income the farmer receives even further. Besides tea, some pyrethrum is produced showing a very good pyrethrin content (1.5 %).

1) For more detailed and up to date information, see FMHB Vol. III/A

WEST POKOT DISTRICT

TABLE 7: **PYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[a)]

Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	0.34	1.50	1.10	1.18	3.40
Pyrethrin content %	1.1	1.6	1.5	1.6	1.5

a) Source: Pyrethrum Board

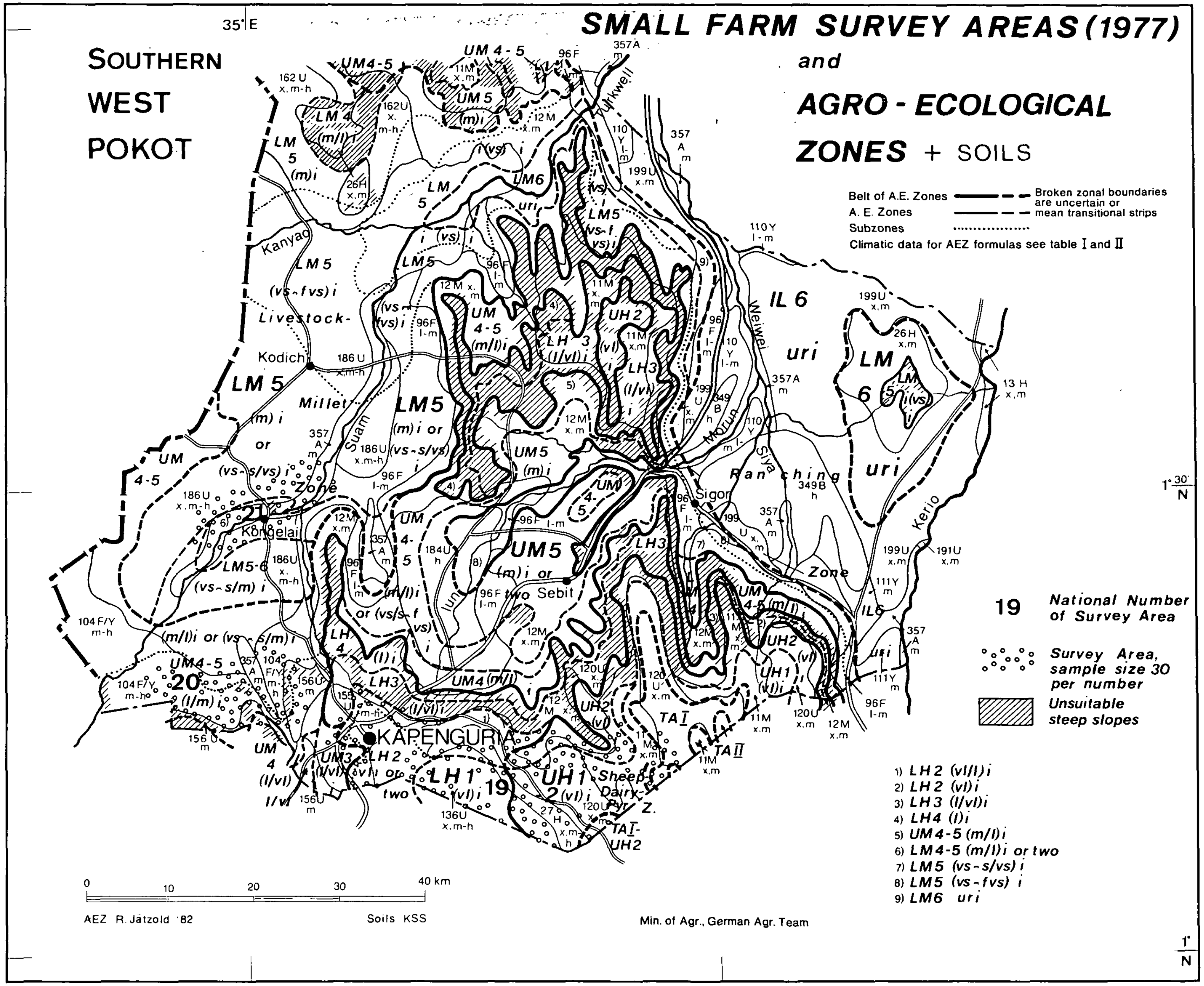
SMALL FARM SURVEY (SFS)[1)]

A large proportion of this area, probably more than 70 %, is, because of its hilly character and in some parts because of the low rainfall, unsuitable for agriculture. The SFS was carried out in three locations but only the investigations conducted in the Kapenguria area (AEZ UH 1–2 + LH 1–2 + UM 3) enable some more general conclusions to be drawn. In AEZ UM 4–5 and to a larger extent in AEZ LM 4–5, farming has not yet been developed or the natural conditions make proper farming impossible.

Most family farms in the LH 1–LH 2 regions have been created through settlement projects and therefore are still very uniform in size, farm organisation and development level. The farms investigated were 13 ha in size,[2)] planted 20 % of their land with annual crops, roughly 65 % of the farm area was under pasture, while 7 % was left fallow. The stocking rate was 3.0 LU/ha, but off-farm grazing and grazing on annual crops and fallow land is not included in this figure. The farmers harvest 0.8 crops p.a. and use N and P fertilizers mainly in their annual crops (table 8 & 9). Maize and maize & beans are the two most important arable enterprises occupying roughly 80 % of the arable crop area (table 10). Twenty-five percent of the grazing livestock were sheep and goats, while 33 % of the cattle were male, and roughly 25 % of the cattle kept were of improved stock (table 11). The yields of practically all crops are comparatively low and so are the amounts of purchased inputs (table 12). Half of the food crop produced is sold and probably exported from the district (table 13). Planting is delayed by extended land preparation periods which indicates that these farmers are in need of some kind of mechanised field preparation (graph 14). The output and nutrient input table (table 15) indicates the subsistence level of farming practised in much of the district area (LM 4–5) at present, and the limited scope for production increases in future.

In two-thirds of the district extension advice is probably the only economic input for many years to come. The income in the settlement farms in AEZ LH 1–2 can be improved through mechanisation of farm work, in particular by the use of draught animals. The expansion of pyrethrum and other labour intensive cash crops depends on the degree to which other farm work can be mechanised. Milk production is probably the most promising enterprise and should therefore receive most attention. As a result of the destruction of much of the Cherangani Forest, soil conservation is a matter of great urgency.

1) For more detailed and up to date information, see FMHB Vol. III/B
2) For holding sizes, see also table 6, page 21


SMALL FARM SURVEY AREAS (1977)
and
AGRO - ECOLOGICAL
ZONES + SOILS
SOUTHERN
WEST
POKOT
35° E
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
19 National Number of Survey Area
Survey Area, sample size 30 per number
Unsuitable steep slopes
1) LH 2 (vl/l) i
2) LH 2 (vl) i
3) LH 3 (l/vl) i
4) LH4 (l) i
5) UM 4-5 (m/l) i
6) LM 4-5 (m/l) i or two
7) LM 5 (vs - s/vs) i
8) LM 5 (vs - fvs) i
9) LM6 uri
Kodich
Kongelai
KAPENGURIA
Sebit
Sigor
Livestock-Millet Zone
Ranching Zone
Sheep-Dairy Z.
Kanyao
Suam
Turkwell
Weiwei
Muruny
Siyoi
Kerio
IL 6 uri
LM 6-5 uri
1° 30' N
1° N
0 10 20 30 40 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team

WEST POKOT DISTRICT

AEZ: UH 1–2 + LH 1–2 + UM 3

TABLE 8 a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 19

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	4.8	1o.7	23.7
Land Use: Annual Crops1)				
First Season		o.1		
Maize	ha	1.2	1.9	o.1
Maize & Beans	ha	o.3	o.2	1.7
Sunflower	ha	o.1	o.4	o.5
English Potatoes	ha	-	o.1	-
Others	ha	o.1	-	o.1
Total	ha	1.8	2.6	2.4
Second Season1)				
English Potatoes	ha		o.1	o.1
Beans	ha			
Cabbage	ha			
Total	ha	-	o.1	o.1
Permanent Crops1)				
Coffee	ha	-	-	o.4
Pyrethrum	ha	o.1	o.1	o.1
	ha			
	ha			
Portion of total	%	2 %	1 %	2 %
Grazing & Forage	ha	1.5	6.o	14.o
portion of total	%	31 %	56 %	59 %
Other Land Use	ha	1.4	2.o	6.8
Livestock on Farm:				
Cattle: local	LU	13.4	3.8	16.9
improved	LU	1.5	9.3	8.o
Sheep & Goats	LU	4.7	3.8	3.7
Total	LU	19.6	16.9	28.6

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.4	o.3	o.1
Portion of improved cattle kept	%	1o %	71 %	32 %
Portion of Farmers owning a Plough	%	2o %	1o %	3o %
Labour on Farm:				
Family Adults	persons	3.3	2.1	2.8
Perm. Hired Labour	"	o.8	o.5	1.7
Children > 14 years	"	1.8	2.6	3.3
Persons living on Farm2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.51	o.35	2.86
Children < 14 years	"	2.82	-	2.82
Subsistence Units	SU	4.2o	o.35	4.55
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	14o4	2263	
Beans	kg	63	1oo	
English Potatoes	kg	1o5	34	
Cabbage	kg	13	1	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Sorghum

1) Major crops only considered

2) Based on 1979 Census figures

TABLE 8 b: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	4.9	1o.1	22.3
Land Use: Annual Crops1)				
First Season		o.1	o.1	
Maize	ha	1.2	1.3	1.9
Maize & Beans	ha	o.1	o.4	o.4
Fingermillet	ha	o.3	o.4	o.4
Sunflower	ha	o.1	o.7	1.6
Beans	ha	-	-	o.4
Total	ha	1.8	2.9	4.7
Second Season1)				
Beans	ha		o.1	o.4
	ha			
	ha			
Total	ha	-	o.1	o.4
Permanent Crops1)	ha			
	ha			
	ha			
	ha			
Portion of total	%			
Grazing & Forage	ha	2.7	5.9	16.4
portion of total	%	55 %	58 %	74 %
Other Land Use	ha	o.4	1.3	1.2
Livestock on Farm:				
Cattle: local	LU	7.o	7.4	2o.6
improved	LU	1.4	3.4	11.o
Sheep & Goats	LU	2.2	1.9	6.7
Total	LU	1o.6	12.7	38.3

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.7	o.3	o.2
Portion of improved cattle kept	%	17 %	31 %	35 %
Portion of Farmers owning a Plough	%	6o %	9o %	1oo %
Labour on Farm:				
Family Adults	persons	2.4	3.1	2.5
Perm. Hired Labour	"	o.2	o.1	2.5
Children > 14 years	"	o.5	2.4	4.o
Persons living on Farm2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.35	o.65	3.oo
Children < 14 years	"	2.58	-	2.58
Subsistence Units	SU	3.89	o.65	4.54
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1285	2o71	
Beans	kg	79	126	
Fingermillet	kg	1o7	168	
Sorghum	kg	23	36	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Sorghum, Cabbage

1) Major crops only considered

2) Based on 1979 Census figures

WEST POKOT DISTRICT

AEZ: LM 4–5

TABLE 8 c: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 21

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	0.8	1.9	7.0
Land Use: Annual Crops 1) First Season			0.1	
Maize	ha	0.5	0.7	2.4
	ha	0.1	0.1	0.1
	ha	0.1	0.1	-
	ha	0.1	0.4	-
	ha			
Total	ha	0.8	1.3	2.6
Second Season 1)	ha			
	ha			
	ha			
	ha			
Permanent Crops 1)	ha			
	ha			
	ha			
	ha			
Portion of total	%			
Grazing & Forage	ha	-	0.3	2.5
portion of total	%	-	16 %	36 %
Other Land Use	ha	-	0.3	1.9
Livestock on Farm:				
Cattle: local	LU	8.0	7.7	5.9
improved	LU	-	-	-
Sheep & Goats	LU	2.6	2.2	4.2
Total	LU	10.6	9.9	10.1

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	1.0	0.7	0.4
Portion of improved cattle kept	%	-	-	-
Portion of Farmers owning a Plough	%	20 %	-	30 %
Labour on Farm:				
Family Adults	persons	2.8	2.3	2.9
Perm. Hired Labour	"	-	0.4	0.3
Children > 14 years	"	2.2	2.3	1.6
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.33	0.3	2.63
Children < 14 years	"	2.24	-	2.24
Subsistence Units	SU	3.67	0.3	3.97
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1370	2208	
Beans	kg	79	126	
Fingermillet	kg	47	74	
Sorghum	kg	85	133	
Millet	kg	10	16	
	kg			
	kg			
	kg			

Other crops cultivated: Bulrush Millet, Beans

1) Major crops only considered

2) Based on 1979 Census figures

WEST POKOT DISTRICT

TABLE 9 a: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: UH 1–2 + LH 1–2 + UM 3 — Survey Area 19

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	13.3	72.5	1.0	2.8	1.1	2.6
Avg. 1	13.3	75.0	1.9	2.8	2.0	3.7
Up. Qu.	16.0	93.0	2.0	4.0	2.0	4.0
Lo. Qu.	5.9	35.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	%	Perm. Crops ha	%	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	2.2	20	0.3	3	7.3	67	-	-	0.8	7	0.3	3
Avg. 1	2.2	15	0.8	5	8.4	55	0.4	3	3.0	20	0.3	2
Up. Qu.	2.6	33	0.2	3	11.2	80	-	-	0.8	5	0.4	4
Lo. Qu.	0.8	8	-	-	2.0	17	-	-	-	-	0.2	1
Total	66.4		8.3		218.6		0.8		24.0		9.0	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.8	1.7	3.0	26.9
Avg. 1			2.3	42.6
Up. Qu.	1.0	3.5	3.6	46.0
Lo. Qu.	0.7	0.7	0.3	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	85.0	4.3	0.3	3.5	0.1	-	-	-	-	0.2	0.1	-	-
Avg. 1	86.0	18.0	2.5	12.9	6.8	-	-	0.1	-	0.8	0.4	-	-
Up. Qu.	100.0	-	-	-	-	-	-	-	-	-	-	-	-
Lo. Qu.	87.5	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper /Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

WEST POKOT DISTRICT

TABLE 9 b: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: UM 4–5

Survey Area 20

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	8.5	44.0	1.3	2.7	0.3	1.6
Avg. 1	8.5	50.8	1.8	2.7	2.0	2.9
Up. Qu.	10.8	73.0	2.0	3.0	-	2.0
Lo. Qu.	4.8	17.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	%	Perm. Crops ha	%	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	2.5	32	-	-	5.1	64	-	-	0.1	1	0.2	2
Avg. 1	2.5	29	0.3	4	5.3	61	-	-	0.4	4	0.2	2
Up. Qu.	3.2	43	-	-	6.0	74	-	-	0.2	2	0.2	3
Lo. Qu.	1.4	19	-	-	2.8	45	-	-	-	-	0.1	1
Total	75.9		0.3		153.1		-		3.4		5.6	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.0	1.5	2.5	17.5
Avg. 1			2.3	62.9
Up. Qu.	1.0	2.6	4.0	-
Lo. Qu.	0.9	0.7	1.0	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	61.5	2.3	0.1	2.1	-	-	-	-	-	0.3	-	-	-
Avg. 1	68.3	8.1	2.7	6.1	-	-	-	0.2	-	1.1	-	-	0.1
Up. Qu.	80.0	-	-	2.4	-	-	-	-	-	-	-	-	-
Lo. Qu.	45.5	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms

Avg. 1 = average of all farms excluding zero entries

Up. Qu./Lo. Qu. = Upper /Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points

AC = Annual Crops

PC = Perennial Crops

WEST POKOT DISTRICT

TABLE 9 c: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: LM 4–5 | Survey Area 21

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	2.8	44.3	0.4	2.7	0.2	2.1
Avg. 1	2.8	49.2	1.8	2.7	1.2	3.6
Up. Qu.	2.8	65.0	-	3.0	-	3.0
Lo. Qu.	0.9	12.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	1.4	52	-	-	0.8	28	-	-	0.1	4	0.4	16
Avg. 1	1.4	31	-	-	1.9	41	-	-	0.6	13	0.7	15
Up. Qu.	1.7	100	-	-	0.6	23	-	-	-	-	0.1	10
Lo. Qu.	0.8	55	-	-	-	-	-	-	-	-	-	-
Total	42.8		-		22.8		-		3.6		12.9	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.9	3.6	13.5	-
Avg. 1			4.0	-
Up. Qu.	1.0	10.8	1.1	-
Lo. Qu.	1.0	0.8	-	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	42.8	-	-	-	-	-	-	-	-	0.1	-	-	-
Avg. 1	71.5	-	-	-	-	-	-	0.4	-	0.7	-	-	-
Up. Qu.	90.9	-	-	-	-	-	-	-	-	-	-	-	-
Lo. Qu.	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms

Avg. 1 = average of all farms excluding zero entries

Up. Qu./Lo. Qu. = Upper /Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points

AC = Annual Crops

PC = Perennial Crops

WEST POKOT DISTRICT

TABLE 10 a: **CROPPING PATTERN**

AEZ: UH 1–2 + LH 1–2 + UM 3

Survey Area 19

First Rains
Annual & Semipermanent Crops

Crop	Average 0	Average 1	Upper Quartile	Lower Quartile	Total Sample Area	
	ha	ha	ha	ha	ha	%
Maize	1.6	2.3	2.00	0.00	47.6	67.3
Beans	0.0	0.4	0.00	0.00	0.8	1.1
Sunflower	0.1	1.4	0.00	0.00	4.2	5.9
Engl. Potatoes	0.0	0.4	0.00	0.00	1.4	2.0
Cabbage	0.0	0.3	0.00	0.00	1.0	1.4
Sweet Potatoes	0.0	0.7	0.00	0.00	1.4	2.0
Pyrethrum	0.1	0.5	0.00	0.00	2.8	3.9
Others	0.0	0.4	0.00	0.00	0.4	0.6
Maize & Beans	0.4	1.8	0.00	0.00	11.0	15.5
Maize & Others	0.0	0.2	0.00	0.00	0.2	0.3
Total					70.8	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0	Average 1	Upper Quartile	Lower Quartile	Total Sample Area	
	ha	ha	ha	ha	ha	%
Beans	0.0	0.2	0.00	0.00	0.2	4.2
Beans IPC	0.0	0.6	0.00	0.00	0.6	12.6
Engl. Potatoes	0.0	0.3	0.00	0.00	1.0	21.0
Cabbage	0.0	0.2	0.00	0.00	0.2	4.2
Pyrethrum	0.1	0.5	0.00	0.00	2.8	58.0
Total					4.8	100.0

Permanent Crops

Crop	Average 0	Average 1	Upper Quartile	Lower Quartile	Total Sample Area	
	ha	ha	ha	ha	ha	%
Coffee	0.1	1.0	0.00	0.00	3.9	100.0
Total					3.9	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of all total farm land

WEST POKOT DISTRICT

TABLE 10 b: **CROPPING PATTERN**

AEZ: UM 4–5

Survey Area 20

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	1.3	1.5	2.00	0.40	39.2	51.7
Sorghum	0.0	0.3	0.00	0.00	0.9	1.2
Fingermillet	0.3	0.5	0.40	0.00	9.8	12.9
Beans	0.1	0.5	0.00	0.00	2.6	3.4
Sunflower	0.5	1.4	0.80	0.00	15.0	19.8
Cabbage	0.0	0.2	0.00	0.00	0.2	0.3
Others	0.0	0.2	0.00	0.00	0.2	0.3
Maize & Beans	0.3	1.1	0.40	0.00	8.0	10.5
Total					75.9	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Beans	0.1	0.7	0.00	0.00	2.0	100.0
Total					2.0	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Coffee	0.0	0.3	0.00	0.00	0.3	100.0
Total					0.3	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of all total farm land

WEST POKOT DISTRICT

TABLE 10 c: **CROPPING PATTERN**

AEZ: LM 4–5

Survey Area 21

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	1.0	1.3	1.60	0.00	30.8	73.6
Sorghum	0.1	0.3	0.20	0.00	3.2	7.5
Fingermillet	0.0	0.1	0.04	0.00	1.3	3.1
Bulrushmillet	0.0	0.3	0.00	0.00	0.6	1.4
Beans	0.0	0.3	0.00	0.00	1.0	2.4
Maize & Beans	0.2	0.8	0.00	0.00	5.0	11.9
Total					41.9	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Beans	0.0	0.4	0.00	0.00	0.4	100.0
Total					0.4	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Total					0.0	0.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of all total farm land

TABLE 11 a: **HERD COMPOSITION (GRAZING LIVESTOCK)**

AEZ: UH 1–2 + LH 1–2 + UM 3 — in Head & Livestock Units — Sept. '77, Survey Area 19

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.20	-	-	1.07				0.32			0.32
Upper Qu.	-	-	-	1				0.3			0.3
1 - 2 years, Average	0.53	0.13	0.20	1.37				1.12			1.12
Upper Qu.	-	-	-	1				0.5			0.5
Over 2 years, Average	0.70	1.33	0.47		2.53			4.53			4.53
Upper Qu.	1	-	-		2			2.8			2.8
Subtotal(improved) Total	43	44	20	73	76			179.0			179.0
Average	1.43	1.47	0.67	2.43	2.53			5.97			5.97
Upper Qu.	1	-	-	2	2			4.6			-
Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =	41.6 % of total cattle,				Calves + Heifers =			96.1 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	0.83	0.10	-	3.63		7.47	4.97	2.16	-		2.16
Upper Qu.	1	-	-	4		13	5	2.8	-		2.8
1 - 2 years, Average	0.47	0.33	0.13	3.47				1.98			1.98
Upper Qu.	-	-	-	5				2.3			2.3
Over 2 years, Average	2.53	1.73	0.83		9.07	14.07	14.37	12.05	-	7.03	12.05
Upper Qu.	2	1	-		12	24	17	0.2	-	-	0.2
Subtotal (unimp.) Total	115	65	29	213	272	646	580	485.7	-	211	485.7
Average	3.83	2.17	0.97	7.10	9.07	21.53	19.33	16.19	-	7.03	16.19
Upper Qu.	4	2	-	7	12	40	25	21.6	-	10	21.6
Lower Qu.	-	-	-	-	-	4	-	1.7	-	-	1.7
LU Male Cattle =	32.4 % of total cattle,				Calves + Heifers =			78.3 % of dairy cows			
LU Goats + Sheep =	25.2 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	158	109	49	286	348	646	580	664.7	-	211	664.7
Average	5.27	3.63	1.63	9.53		21.53	19.33	22.15	-	7.03	22.15
Upper Qu.	5	3	-	10	17	40	25	28.1	-	10	21.6
Lower Qu.	-	-	-	4	2	4	-	8.3	-	-	1.7
LU Male Cattle =	35.4 % of total cattle,				Calves + Heifers =			82.2 % of dairy cows			
LU Goats + Sheep =	18.4 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11 b: **HERD COMPOSITION (GRAZING LIVESTOCK)**

AEZ: UM 4–5 — in Head & Livestock Units — Sept. '77, Survey Area 20

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.33	-	-	0.73				0.27			0.27
	Upper Qu.	-	-	-	-				-			-
1 - 2 years,	Average	0.03	-	-	0.53				0.28			0.28
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	0.43	-	0.40		1.00			1.67			1.67
	Upper Qu.	-	-	-		-			-			-
Subtotal(improved)	Total	24	-	12	38	30			66.5			66.5
	Average	0.80	-	0.40	1.27	1.00			2.22			2.22
	Upper Qu.	-	-	-	-	-			-			-
	Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle	=	34.6 % of total cattle,				Calves + Heifers	=		126.7 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.47	-	2.23	2.43		2.37	4.43	1.71	-		1.71
	Upper Qu.	-	-	-	4		3	6	1.7	-		1.7
1 - 2 years,	Average	0.40	0.20	0.53	2.77				1.75			1.75
	Upper Qu.	-	-	-	5				2.3			2.3
Over 2 years,	Average	0.63	0.70	2.23		4.63	5.83	10.70	6.98	-	9.63	6.98
	Upper Qu.	1	-	4		6	9	20	-	-	4	-
Subtotal (unimp.)	Total	45	27	150	156	139	246	454	313.4	-	289	313.4
	Average	1.50	0.90	5.00	5.20	4.63	8.20	15.13	10.44	-	9.63	10.44
	Upper Qu.	3	-	4	10	6	10	30	16.8	-	13	16.8
	Lower Qu.	-	-	-	-	-	-	-	2.6	-	4	2.6
LU Male Cattle	=	41.5 % of total cattle,				Calves + Heifers	=		112.2 % of dairy cows			
LU Goats + Sheep	=	22.3 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	69	27	162	194	169	246	454	379.9	-	289	379.9
	Average	2.30	0.90	5.40	6.47	5.63	8.20	15.13	12.66	-	9.63	12.66
	Upper Qu.	4	-	5	10	8	10	30	18.0	-	13	16.8
	Lower Qu.	-	-	-	-	-	-	-	3.4	-	4	2.6
LU Male Cattle	=	40.0 % of total cattle,				Calves + Heifers	=		114.8 % of dairy cows			
LU Goats + Sheep	=	18.4 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11 c: **HERD COMPOSITION (GRAZING LIVESTOCK)**

AEZ: LM 4–5 – in Head & Livestock Units – Sept. '77, Survey Area 21

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	-	-	-	-				-			-
	Upper Qu.	-	-	-	-				-			-
1 - 2 years,	Average	-	-	-	-				-			-
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	-	-	-		-			-			-
	Upper Qu.	-	-	-		-			-			-
Subtotal(improved)	Total	-	-	-	-	-			-			-
	Average	-	-	-	-	-			-			-
	Upper Qu.	-	-	-	-	-			-			-
	Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =		0.0 % of total cattle,				Calves + Heifers =			0.0 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	1.17	-	-	2.77		3.33	5.40	1.66	-		1.66
	Upper Qu.	-	-	-	5		5	8	2.3	-		2.3
1 - 2 years,	Average	0.67	0.07	0.10	3.07				1.75			1.75
	Upper Qu.	1	-	-	5				2.7			2.7
Over 2 years,	Average	1.20	0.37	0.50		5.33	8.47	11.83	6.84	-	5.07	6.84
	Upper Qu.	1	-	-		8	7	18	0.2	-	-	0.2
Subtotal (unimp.)	Total	91	13	18	175	160	354	517	307.7	-	152	307.7
	Average	3.03	0.43	0.60	5.83	5.33	11.80	17.23	10.25	-	5.07	10.25
	Upper Qu.	4	-	-	10	8	12	25	15.8	-	8	15.8
	Lower Qu.	-	-	-	-	-	-	2	3.2	-	-	3.2
LU Male Cattle =		26.5 % of total cattle,				Calves + Heifers =			109.4 % of dairy cows			
LU Goats + Sheep =		28.3 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	91	13	18	175	160	354	517	307.7	-	152	307.7
	Average	3.03	0.43	0.60	5.83	5.33	11.80	17.23	10.25	-	5.07	10.25
	Upper Qu.	4	-	-	10	8	12	25	15.8	-	8	15.8
	Lower Qu.	-	-	-	-	-	-	2	3.2	-	-	3.2
LU Male Cattle =		26.5 % of total cattle,				Calves + Heifers =			109.4 % of dairy cows			
LU Goats + Sheep =		28.3 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

WEST POKOT DISTRICT

AEZ: UH 1–2 + LH 1–2 + UM 3

TABLE 12 a: **INPUTS & YIELDS OF MAJOR CROPS**

Survey Area 19

Crop		Inputs							Yield
		Imp-roved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fung-icide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	100	7	17	-	-	1	-	2,737
	UpQu	100	19	58	-	-	-	-	4,050
	LoQu	100	-	-	-	-	-	-	1,425
Sunflower	Avg.	100	9	9	-	-	-	-	380
Engl. Potatoes	Avg.	-	-	-	-	0.31	-	-	5,300
	UpQu	-	-	-	-	-	-	-	4,500
	LoQu	-	-	-	-	-	-	-	2,500
Cabbage	Avg.	100	9	23	-	-	5	-	1,350
Maize & Beans									
Maize	Avg.	100	-	-	-	0.27	-	-	2,906
Beans	Avg.	-	-	-	-	0.15	-	-	673
Maize	UpQu	100	-	-	-	0.50	-	-	3,000
Beans	UpQu	-	-	-	-	-	-	-	150
Maize	LoQu	100	-	-	-	-	-	-	1,125
Beans	LoQu	-	-	-	-	-	-	-	30
Second Rains									
Engl. Potatoes	Avg.	-	-	-	-	0.42	-	-	6,100
Cabbage	Avg.	100	9	23	-	-	15	15	6,750
Perennial Crops									
Pyrethrum	Avg.	-	-	-	-	-	-	-	581
	UpQu	-	-	-	-	-	-	-	288
	LoQu	-	-	-	-	-	-	-	-
Coffee	Avg.	-	29	19	-	0.14	9	-	3,784
	UpQu	-	42	-	-	-	8	-	3,804
	LoQu	-	-	-	-	-	4	-	1,333

WEST POKOT DISTRICT

TABLE 12 b: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: UM 4–5 Survey Area 20

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	67	6	9	-	0.21	1	-	2,432
	UpQu	100	-	-	-	-	-	-	3,375
	LoQu	-	-	-	-	-	-	-	1,125
Fingermillet	Avg.	-	-	-	-	-	-	-	1,074
	UpQu	-	-	-	-	-	-	-	1,350
	LoQu	-	-	-	-	-	-	-	625
Beans	Avg.	-	5	6	-	-	1	-	969
	UpQu	-	9	-	-	-	-	-	1,400
	LoQu	-	-	-	-	-	-	-	225
Sunflower	Avg.	100	4	4	-	0.06	-	-	900
	UpQu	100	-	-	-	-	-	-	925
	LoQu	100	-	-	-	-	-	-	700
Cabbage	Avg.	-	-	-	-	0.45	-	-	1,000
Maize & Beans									
Maize	Avg.	100	4	6	-	0.23	1	-	1,745
Beans	Avg.	-	-	-	-	0.11	-	-	273
Maize	UpQu	100	-	-	-	0.40	3	-	2,463
Beans	UpQu	-	-	-	-	0.24	-	-	300
Maize	LoQu	100	-	-	-	-	-	-	1,108
Beans	LoQu	-	-	-	-	-	-	-	175
Second Rains									
Beans	Avg.	-	9	9	-	-	6	6	713
Perennial Crops									
Coffee	Avg.	-	81	-	-	-	-	3	1,738

WEST POKOT DISTRICT

TABLE 12 c: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: LM 4–5

Survey Area 21

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	50	-	-	-	0.03	-	-	1,735
	UpQu	100	-	-	-	-	-	-	2,250
	LoQu	-	-	-	-	-	-	-	938
Sorghum	Avg.	-	-	-	-	-	-	-	902
	UpQu	-	-	-	-	-	-	-	1,000
	LoQu	-	-	-	-	-	-	-	500
Fingermillet	Avg.	-	-	-	-	-	-	-	1,006
	UpQu	-	-	-	-	-	-	-	1,250
	LoQu	-	-	-	-	-	-	-	500
Bulrushmillet	Avg.	-	-	-	-	-	-	-	625
Beans	Avg.	-	-	-	-	-	-	-	1,374
	UpQu	-	-	-	-	-	-	-	1,600
	LoQu	-	-	-	-	-	-	-	120
Maize & Beans									
Maize	Avg.	50	-	-	-	-	-	-	1,316
Beans	Avg.	-	-	-	-	-	-	-	129
Maize	UpQu	100	-	-	-	-	-	-	2,250
Beans	UpQu	-	-	-	-	-	-	-	169
Maize	LoQu	-	-	-	-	-	-	-	675
Beans	LoQu	-	-	-	-	-	-	-	67
Second Rains									
Perennial Crops									

WEST POKOT DISTRICT

TABLE 13 a: **DISPOSAL OF CROPS**

AEZ: UH 1–2 + LH 1–2 + UM 3 | Annual Crops | Survey Area 19

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	208,870	109,220	52	10,230	5	89,420	43
Maize & Beans	34,372	13,350	39	2,816	8	18,206	53
Maize & Others	810	0	0	270	33	540	67
Beans	90	0	0	30	33	60	67
Beans IPC	800	0	0	0	0	800	100
Engl. Potatoes	7,140	0	0	3,210	45	3,930	55
Sweet Potatoes	240	0	0	120	50	120	50
Sunflower	2,730	1,880	69	850	31	0	0
Cabbage	1,020	0	0	970	95	50	5
Second Rains							
Maize & Beans	630	540	86	0	0	90	14
Maize & Others	360	0	0	90	25	270	75
Beans	340	160	47	0	0	180	53
Engl. Potatoes	5,660	0	0	1,750	31	3,910	69
Cabbage	2,700	0	0	1,750	65	950	35
	Permanent Crops						
Nil							

WEST POKOT DISTRICT

TABLE 13 b: **DISPOSAL OF CROPS**

AEZ: UM 4–5 | Annual Crops | Survey Area 20

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	85,842	25,200	29	17,250	20	43,392	51
Maize & Beans	18,725	240	1	8,920	48	9,565	51
Beans	1,605	480	30	325	20	800	50
Fingermillet	8,070	0	0	3,850	48	4,220	52
Sorghum	1,870	0	0	950	51	920	49
Sunflower	11,460	11,010	96	450	4	0	0
Cabbage	200	0	0	100	50	100	50
Second Rains							
Beans	1,150	480	42	260	23	410	36
Sunflower	750	750	100	0	0	0	0
	Permanent Crops						
Nil							

WEST POKOT DISTRICT

TABLE 13 c: **DISPOSAL OF CROPS**

AEZ: LM 4–5 **Annual Crops** Survey Area 21

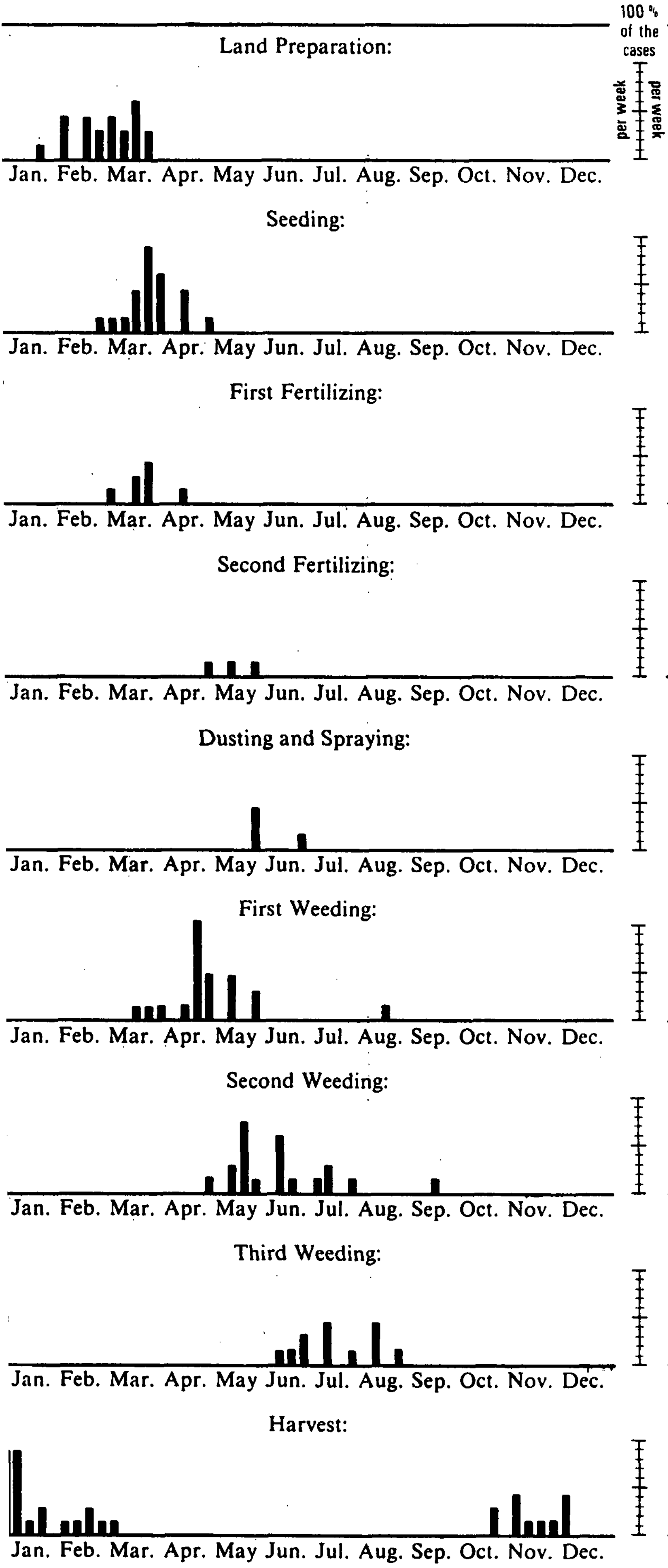
Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	42,545	0	0	7,360	17	35,185	83
Maize & Beans	10,230	0	0	2,830	28	7,400	72
Beans	1,878	0	0	990	53	888	47
Fingermillet	1,460	0	0	40	3	1,420	97
Bulrushmillet	300	0	0	0	0	300	100
Sorghum	2,600	0	0	50	2	2,550	98
Second Rains							
Nil							
	Permanent Crops						
Nil							

WEST POKOT DISTRICT

TABLE 14 a: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 20

AEZ: UH 1–2 + LH 1–2 + UM 3 Survey Area 19 Sample Size: 30

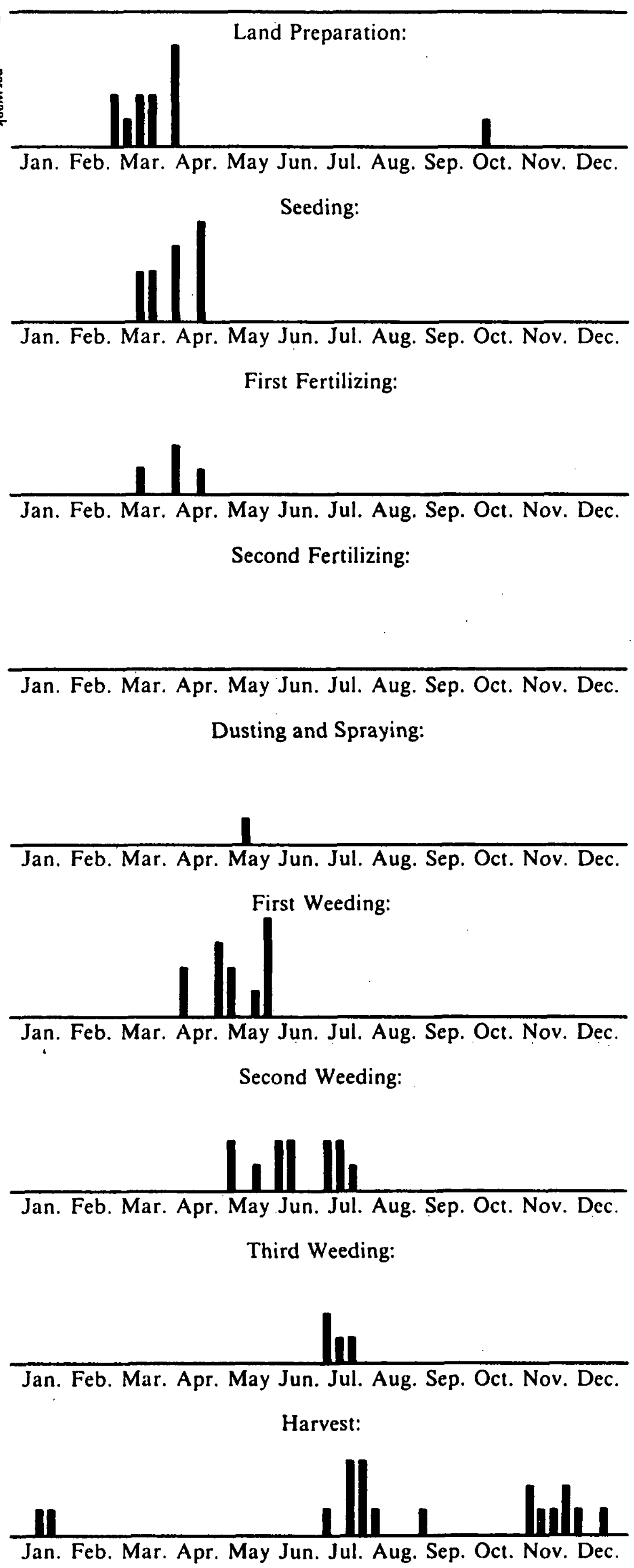


WEST POKOT DISTRICT

TABLE 14 b: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases 12

AEZ: UH 1–2 + LH 1–2 + UM 3 Survey Area 19 Sample Size: 30

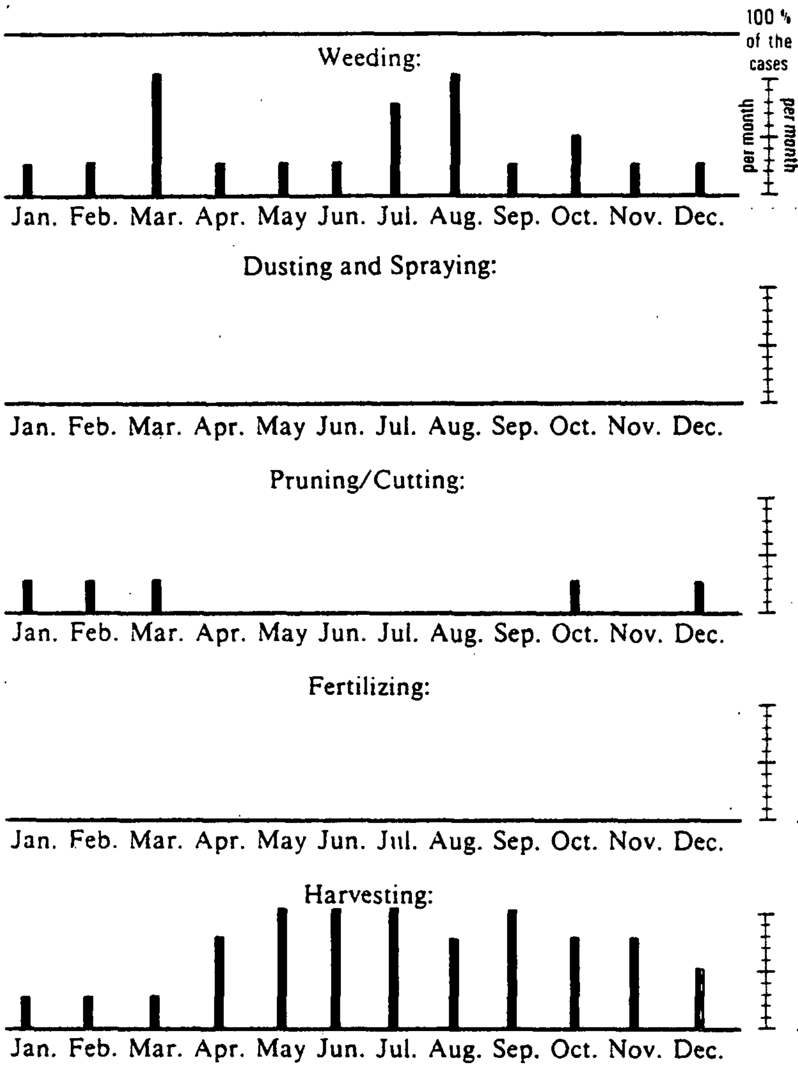


WEST POKOT DISTRICT

TABLE 14 c: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 52 **Pyrethrum** Cases: 6

AEZ: UH 1–2 + LH 1–2 + UM 3 Survey Area 19 Sample Size: 30

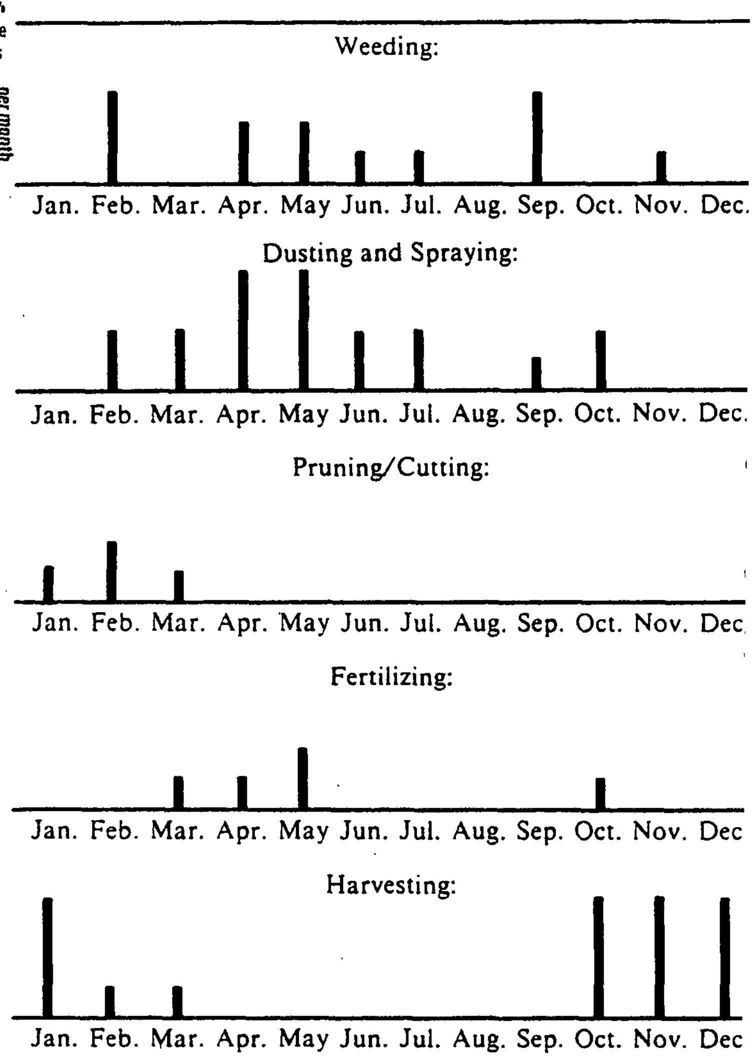


WEST POKOT DISTRICT

TABLE 14 d: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 **Coffee** Cases: 4

AEZ: UH 1–2 + LH 1–2 + UM 3 Survey Area 19 Sample Size: 30

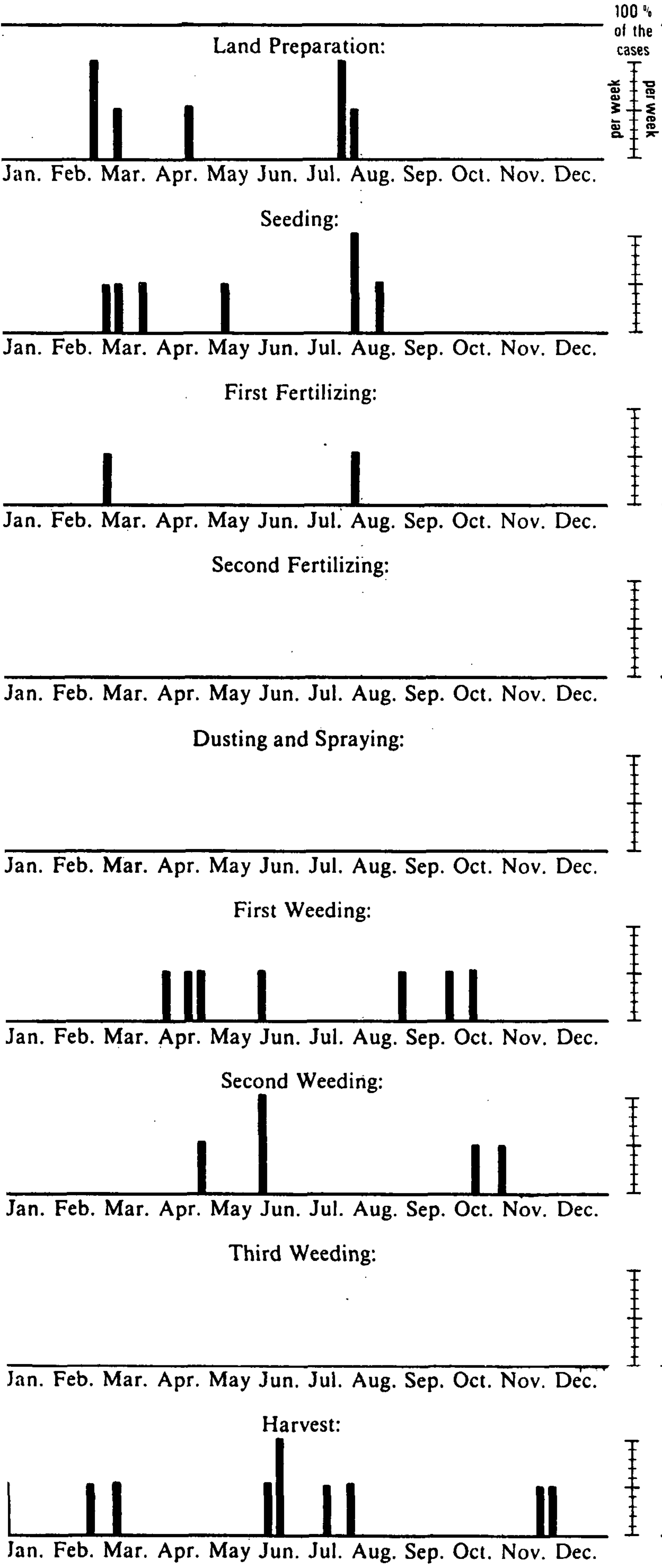


VEST POKOT DISTRICT

TABLE 14 e: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl.Potatoes** Cases: 7

AEZ: UH 1–2 + LH 1–2 + UM 3 Survey Area 19 Sample Size: 30

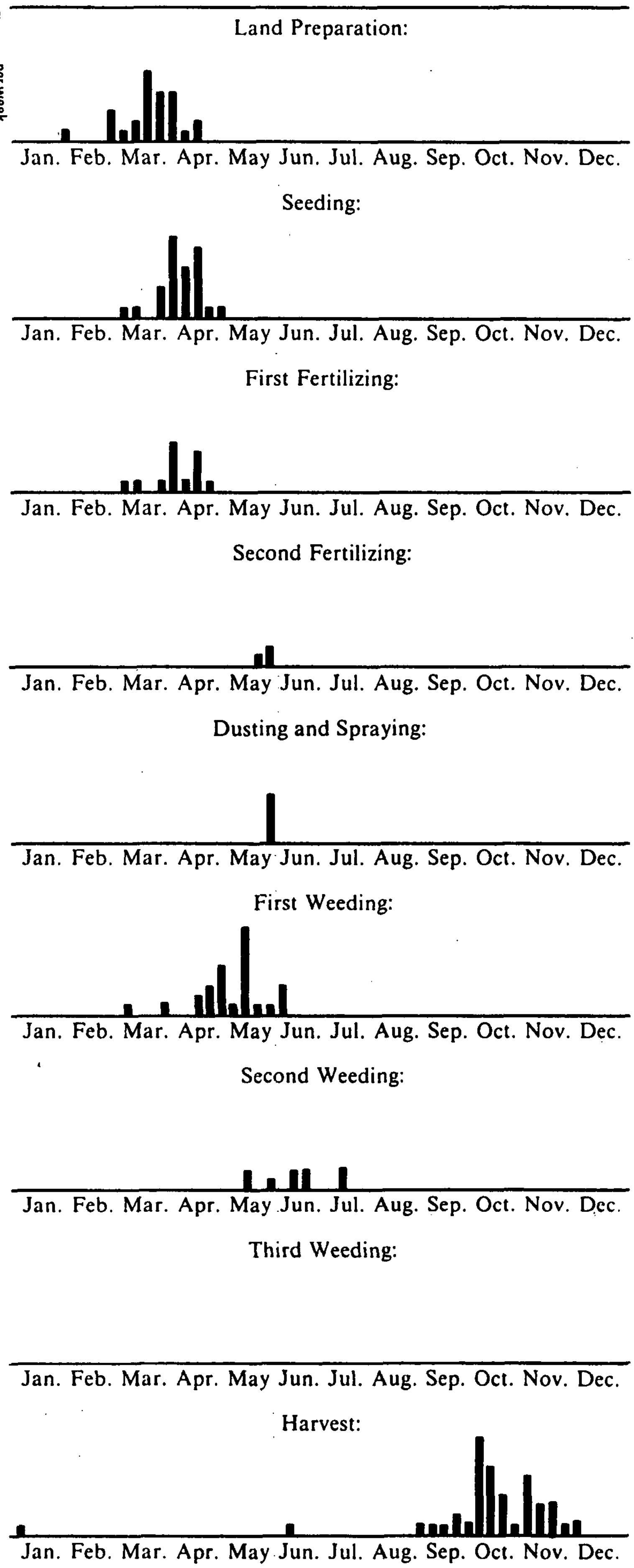


WEST POKOT DISTRICT

TABLE 14 f: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 27

AEZ: UM 4–5 Survey Area 20 Sample Size: 30

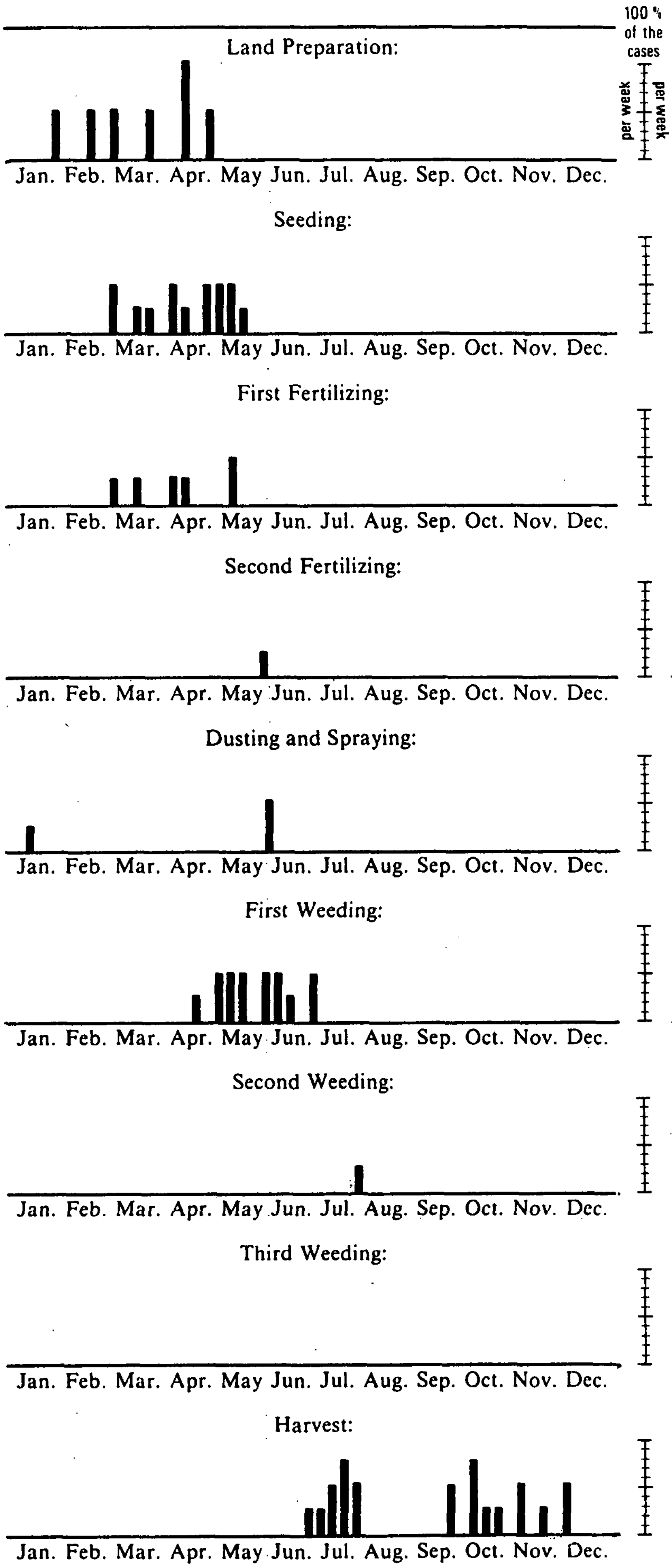


WEST POKOT DISTRICT

TABLE 14 h: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 12 **Fingermillet** Cases: 21

AEZ: UM 4–5 Survey Area 20 Sample Size: 30

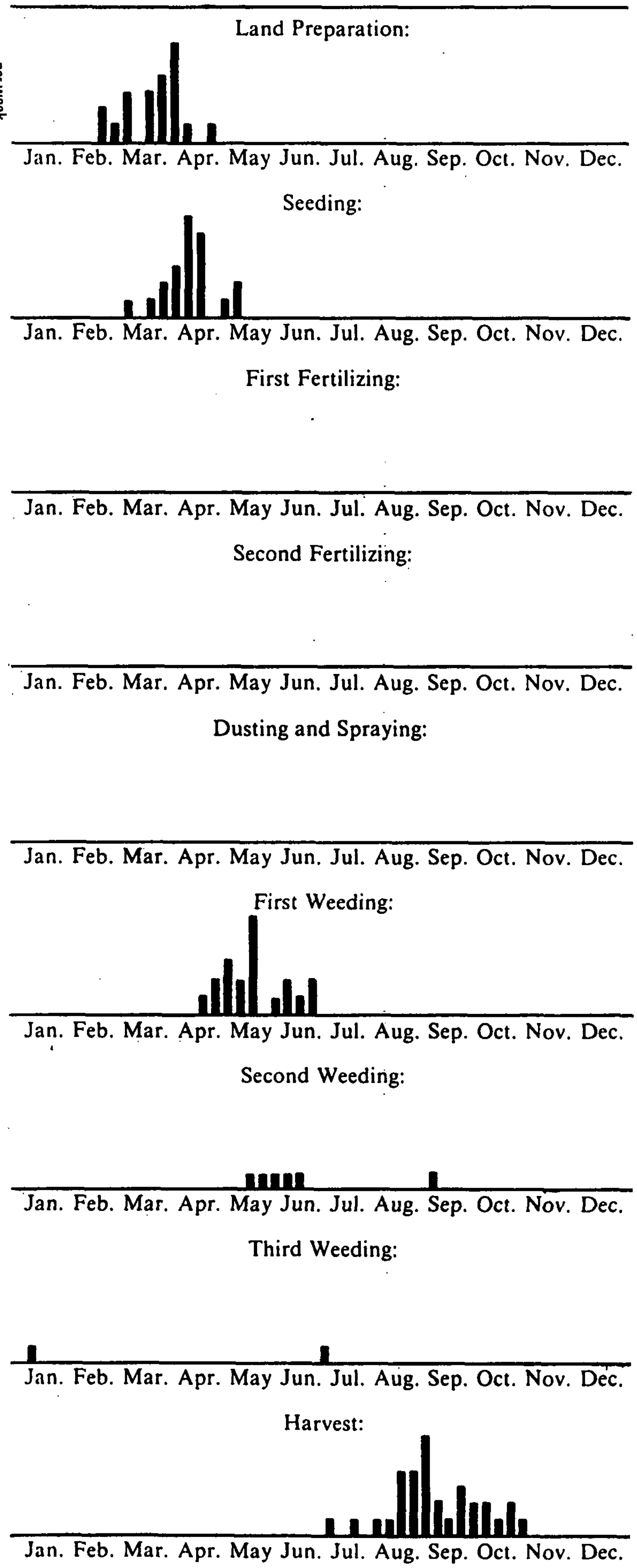


WEST POKOT DISTRICT

TABLE 14 g: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 14

AEZ: UM 4–5 Survey Area 20 Sample Size: 30

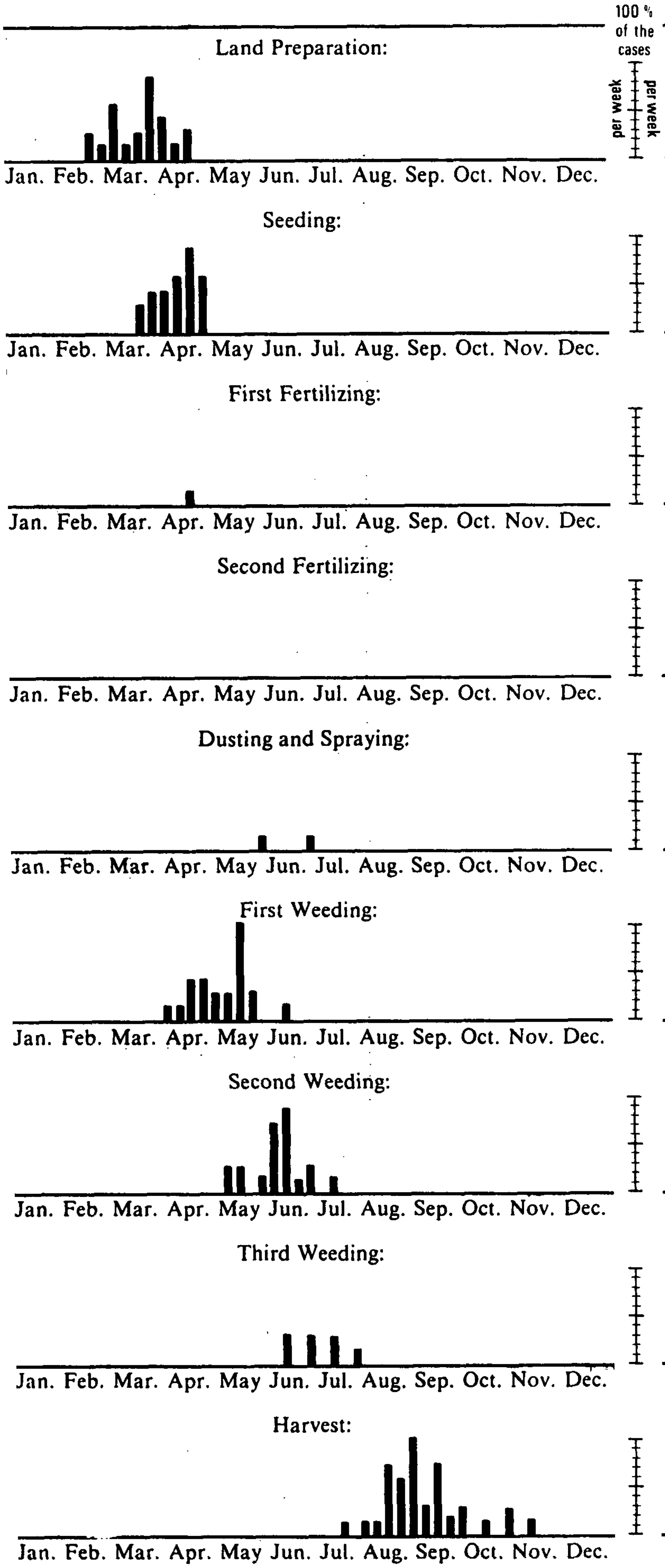


WEST POKOT DISTRICT

TABLE 14 i: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 | **Maize** | Cases: 22

AEZ: LM 4–5 | Survey Area 21 | Sample Size: 30

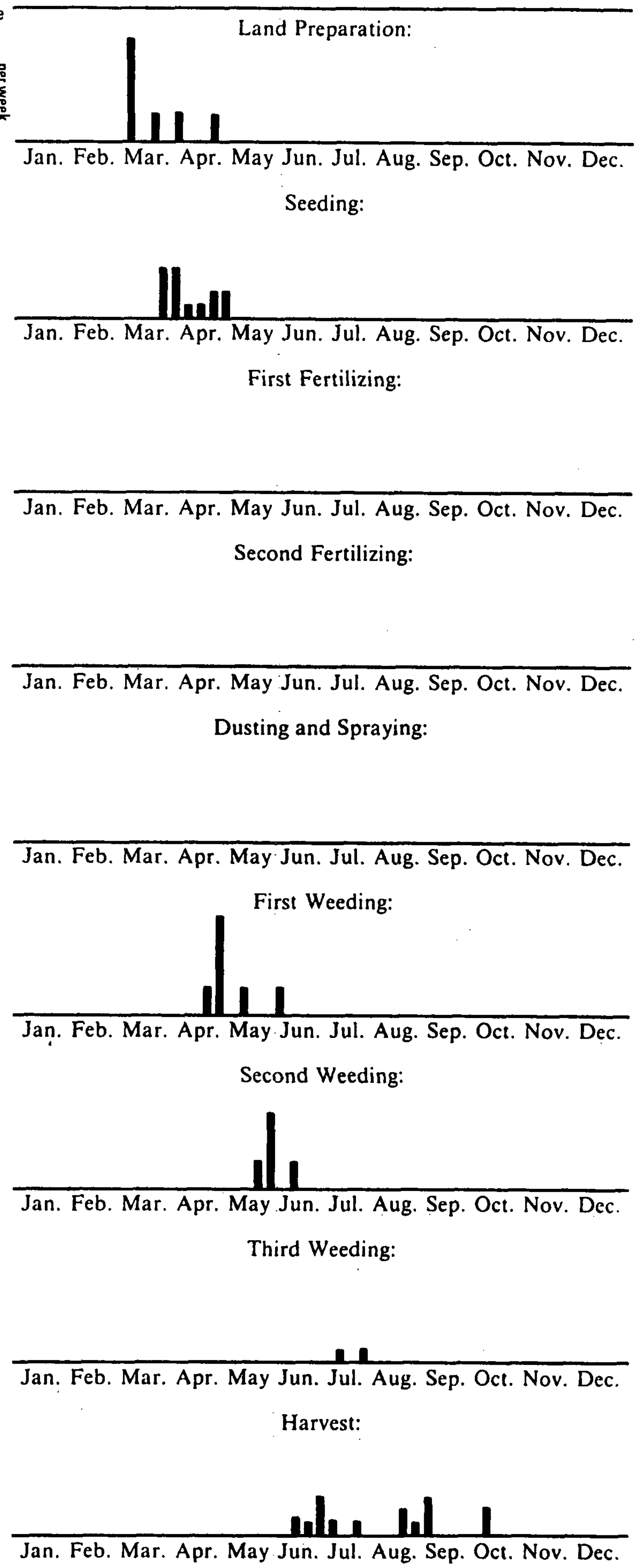


WEST POKOT DISTRICT

TABLE 14 j: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 | **Maize & Beans** | Cases: 14

AEZ: LM 4–5 | Survey Area 21 | Sample Size 30

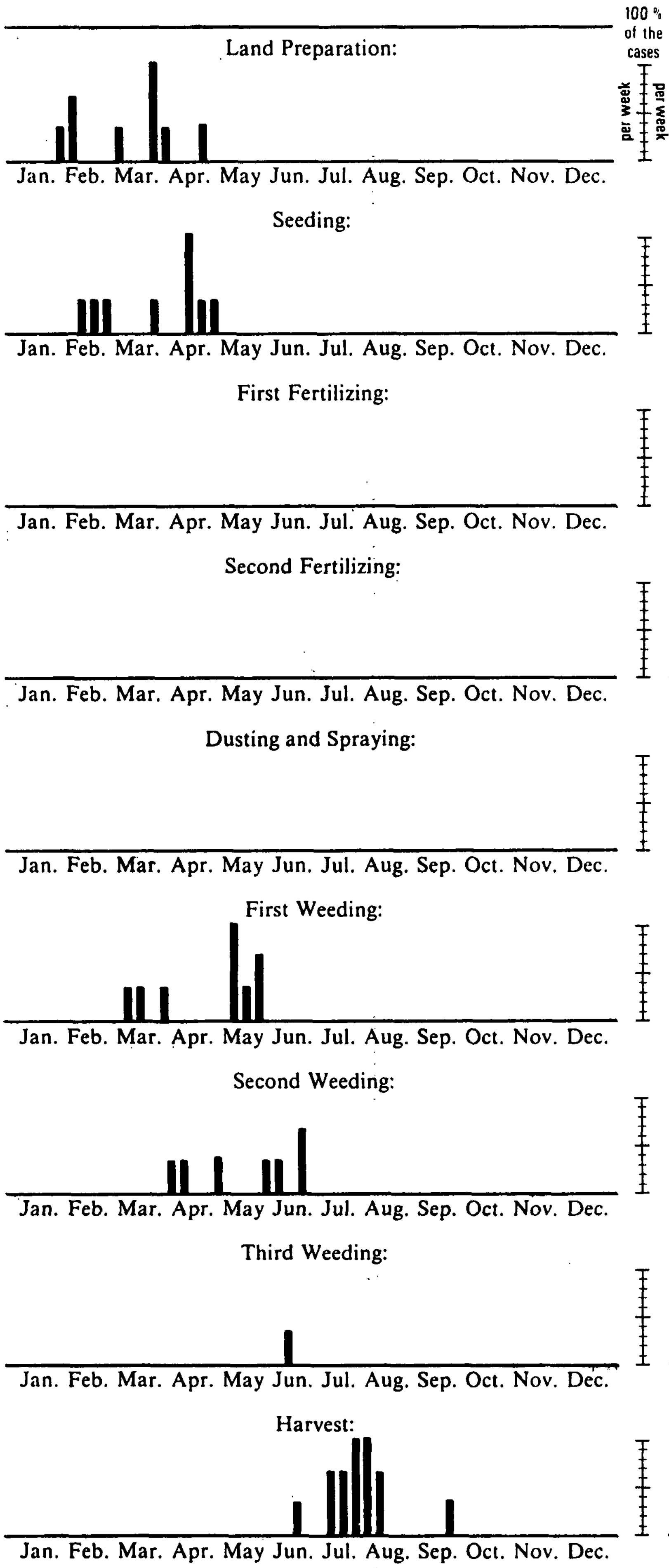


WEST POKOT DISTRICT

TABLE 14 k: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 12 **Fingermillet** Cases: 9

AEZ: LM 4–5 Survey Area 21 Sample Size 30



WEST POKOT DISTRICT

TABLE 14 l: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 18 **Sorghum** Cases: 12

AEZ: LM 4–5 Survey Area 21 Sample Size 30

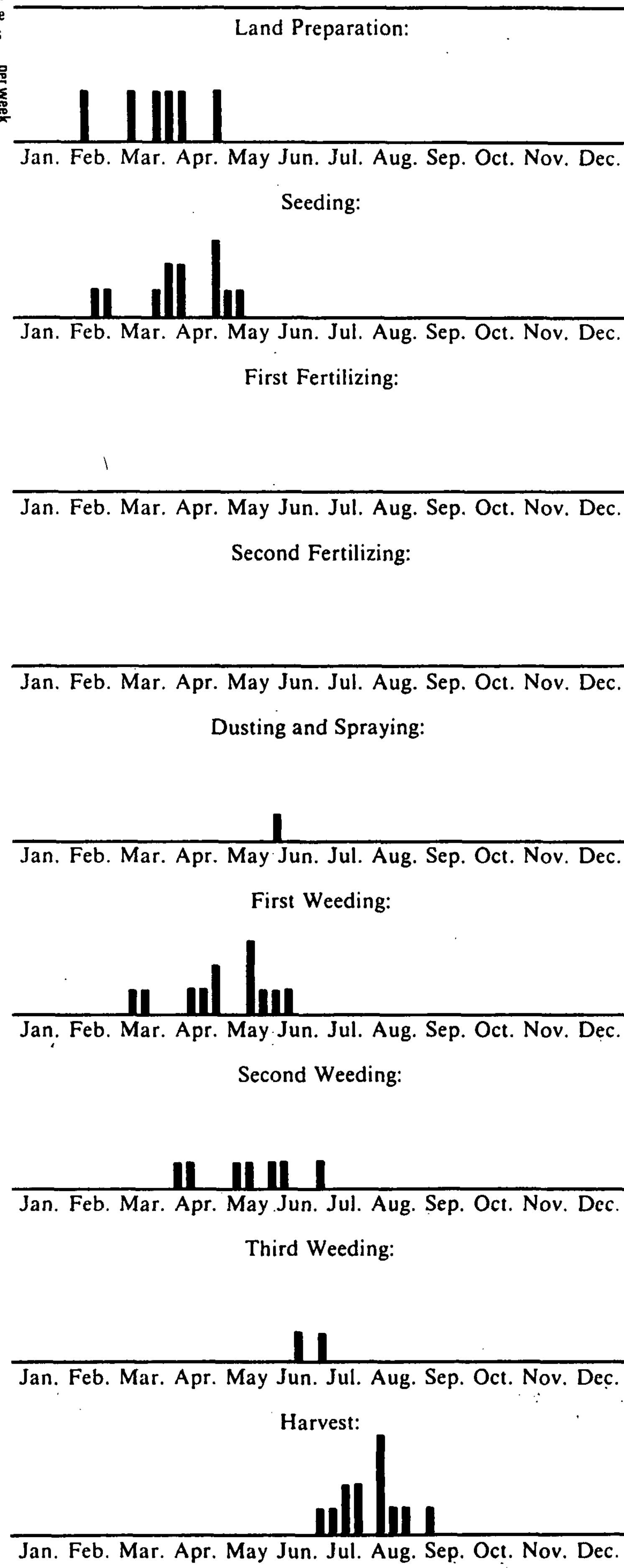


TABLE 15 a: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UH 1 SHEEP - DAIRY ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM Z.				A.E.Z.: UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: in Days, 1st: (vl)i or two 110 or more		2nd: 160-185	total: 270-295	vl/li or two 110 or more		150-170	260-280	(1/vl)i or two 90 or more		130-150	220-240
		Soil: CAMBISOLS				CAMBISOLS				ACRISOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	2,400			4,200	2,200			4,000	900			1,800
Fertilizer N	kg				100				100				50
P_2O_5	kg				50				50				25
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg									1,800			4,000
Fertilizer N	kg												122
P_2O_5	kg												61
K_2O													
CROP: TEA													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg										270	600	600
Fertilizer N	kg										27	60	60
P_2O_5	kg										90	90	90
K_2O	kg												
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg					700		1,200	1,400				
Fertilizer N	kg							17	24				
P_2O_5	kg							21	29				
K_2O	kg												
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg									5,500		8,000	10,000
Fertilizer N	kg											38	68
P_2O_5	kg											15	27
K_2O	kg												

TABLE 15 b: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES

OUTPUT & NUTRIENT INPUT

		A.E.Z.: UH 1 SHEEP - DAIRY ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM Z.				A.E.Z.: UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: in Days, 1st: (vl)i or two 110 or more		2nd: 160-185	total: 270-295	vl/li or two 110 or more		150-170	260-280	(l/vl)i or two 90 or more		130-150	220-240
		Soil: CAMBISOLS				CAMBISOLS				ACRISOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg					2,000	1,800	2,500	3,200				
Fertilizer N	kg							12	29				
P_2O_5	kg							21	50				
K_2O	kg												
CROP: BARLEY													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O													
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg					2,200	3,200	4,000	5,500	1,600	1,800	2,500	3,500
Fertilizer N	kg						25	45	83		5	23	48
P_2O_5	kg						24	43	79		5	22	46
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg									2,500	1,800	2,800	4,000
Fertilizer N	kg											12	57
P_2O_5	kg											10	54
K_2O	kg												
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg									1,600	1,800/300	2,500/400	3,500/400
Fertilizer N	kg										19	42	67
P_2O_5	kg										14	34	58
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg					900	500	1,000	1,600	700	400	800	1,200
Fertilizer N	kg							3	24			3	17
P_2O_5	kg							4	29			5	25
K_2O	kg												

TABLE 15 c: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES

OUTPUT & NUTRIENT INPUT

		A.E.Z.: UH 1 SHEEP - DAIRY ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM Z.				A.E.Z.: UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: in Days, 1st: (vl)i or two 110 or more		2nd: 160-185	total: 270-295	vl/li or two 110 or more		150-170	260-280	(l/vl)i or two 90 or more		130-150	220-240
		Soil: CAMBISOLS				CAMBISOLS				ACRISOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	7,000	6,000	12,000	30,000	6,000	6,000	18,000	40,000	4,000	4,000	8,000	16,000
Fertilizer N	kg			40	184			96	272			32	96
P_2O_5	kg			45	207			108	306			36	108
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg									5,500	1,200	6,000	16,000
Fertilizer N	kg											4	84
P_2O_5	kg											3	63
K_2O													
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,000	7,000	15,000	35,000	6,200	5,000	16,000	32,000	3,000	3,000	12,000	20,000
Fertilizer N	kg		21	77	217			69	181			63	119
P_2O_5	kg		18	66	186			59	155			63	119
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg									1,000	600	1,200	1,400
Fertilizer N	kg											12	24
P_2O_5	kg											6	12
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15 d: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE				A.E.Z.: LM 4 MARGINAL COTTON ZONE				A.E.Z.: LM 5 L.MIDL.LIVESTOCK-MILLET Z.			
		Vegt. Period 1st + 2nd: (l/vl)i in Days,1st: 85 or more		2nd: 120-140	total: 205-235	(m/l)i or two 70 or more		85-100	155-170	(m)i or (vs-s/vs)i 50 or more		80-90	130-140
		Soil: ACRISOLS				ACRISOLS				ACRISOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS Farmers in Production Level	%												
Yields	kg	900			1,600	750			1,000	400			700
Fertilizer N	kg				33				-				-
P_2O_5	kg				17								
K_2O	kg												
CROP: NAPIER/BANA GRASS Farmers in Production Level	%												
Yields	kg	1,400			3,200	1,000			2,500				
Fertilizer N	kg				100				83				
P_2O_5	kg				50				41				
K_2O													
CROP: COTTON Farmers in Production Level	%												
Yields	kg					450		600	900				
Fertilizer N	kg							17	50				
P_2O_5	kg							14	42				
K_2O	kg												
CROP: MAIZE Farmers in Production Level	%												
Yields	kg	1,500	1,800	2,500	2,800	900		1,500	1,700				
Fertilizer N	kg		8	25	33			15	20				
P_2O_5	kg		8	28	36			14	19				
K_2O	kg												
CROP: SORGHUM Farmers in Production Level	%												
Yields	kg	2,200	1,000	2,000	3,000	1,600	1,400	2,200	2,400	800	700	1,000	1,800
Fertilizer N	kg				24			20	24		5	7	30
P_2O_5	kg				20			16	20		5	7	27
K_2O	kg												
CROP: MILLET Farmers in Production Level	%												
Yields	kg					1,400	500	1,100	1,600				
Fertilizer N	kg								4				
P_2O_5	kg								4				
K_2O	kg												

TABLE 15 e: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE				A.E.Z.: LM 4 MARGINAL COTTON ZONE				A.E.Z.: LM 5 L.MIDL.LIVESTOCK-MILLET Z.			
		Vegt. Period 1st + 2nd: (1/vl)i in Days, 1st: 85 or more		2nd: 120-140	total: 205-235	(m/l)i or two 70 or more		85-100	155-170	(m)i or (vs-s/vs)i 50 or more		80-90	130-140
		Soil: ACRISOLS				ACRISOLS				ACRISOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P2O5	kg												
K2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg					800		800	1,000				
Fertilizer N	kg								12				
P2O5	kg								6				
K2O													
CROP: COW PEAS													
Farmers in Production Level	%												
Yields	kg									450		700	900
Fertilizer N	kg											10	18
P2O5	kg											8	15
K2O	kg												
CROP: GRAMS													
Farmers in Production Level	%												
Yields	kg					900		800	1,200	600		600	600
Fertilizer N	kg								8				
P2O5	kg								9				
K2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P2O5	kg												
K2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P2O5	kg												
K2O	kg												

WEST POKOT DISTRICT

TABLE 15 f: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES

OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE				A.E.Z.: LM 4 MARGINAL COTTON ZONE				A.E.Z.: LM 5 L.MIDL.LIVESTOCK-MILLET Z.			
		Vegt. Period 1st + 2nd: (l/vl)i in Days, 1st: 85 or more		2nd: 120-140	total: 205-235	(m/l)i or two 70 or more		85-100	155-170	(m)i or (vs-s/vs)i 50 or more		80-90	130-140
		Soil: ACRISOLS				ACRISOLS				ACRISOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	700		700	1,300								
Fertilizer N	kg				20								
P_2O_5	kg				25								
K_2O	kg												
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yields	kg					600		600	800				
Fertilizer N	kg								8				
P_2O_5	kg								7				
K_2O													
CROP: GROUNDNUTS													
Farmers in Production Level	%												
Yields	kg									550		600	900
Fertilizer N	kg											1	8
P_2O_5	kg											1	10
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	5,000		6,000	10,000								
Fertilizer N	kg			10	40								
P_2O_5	kg			6	31								
K_2O	kg												
CROP: CASSAVA													
Farmers in Production Level	%												
Yields	kg					3,800	2,100	5,000	7,000				
Fertilizer N	kg							5	13				
P_2O_5	kg							7	19				
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

KEIYO (ELGEYO) MARAKWET DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The Keiyo (formerly Elgeyo) Marakwet District is dominated by the steep Elgeyo Escarpment which rises to over 2 700 m, and the Kerio Valley, a part of the Great Rift Valley at about 1 200 m. Therefore the contrasts between the agricultural potential of the higher and the lower areas are tremendous.

The Cherangani Hills are the highest part. This is an undulating plateau about 2 800 m high, with some higher ridges up to 3 365 m, and is mainly on the upper limit of the agriculturally usable Upper Highland Zones with transitions to the open mountain grasslands of the Tropical Alpine Zones. The Agro-Ecological Zonation is therefore not very distinct; many areas are transitional, ranging from UH to TA. Large parts of the Cherangani Hills are Forest Reserve; the forests include open spaces of tropical alpine and other grassland vegetation, and outside the reserves grassland is dominant. Corriedale and Merino sheep are best suited to the area and also graze in the more open forests. Dairy cattle only thrive well in the lower (below 2 700 m) and wetter part of the Cherangani Hills because the nights are too cold on the plateau and the grasses tend to be xerophytic, as the humid season has mainly a weak performance there and the arid season lasts normally 2 months, in dry years even up to 6. The potential given for UH 1 refers mainly to the lower and wetter plateaus in the southern parts of the district. On the Cherangani Hills, the microclimate must be considered well before cultivating a certain spot because night frosts are frequent. Some areas in the rain shadow also seem to be too dry for most high altitude crops like potatoes, pyrethrum, cabbages and carrots. Fore more information about the climate, soils, and vegetation see the publication of the Kenya Soil Survey.[1)]

The long but narrow zones near the edge of the escarpment have the best natural potential of the district. Maize is doing well except in the higher parts in the south. The zone suitable for tea cultivation is unfortunately very small because sufficiently wet areas are too high. The same applies to coffee because the rainfall in suitable altitudes is unreliable and most decades of the agro-humid season have only a weak performance (water supply between 40 % and 80 % of the potential evaporation). Therefore, not enough soil moisture is stored for the dry season which lasts in UM 3 normally from December to February. September may also be dry.

The climatically defined Maize-Sunflower Zone UM 4 and the Marginal Cotton Zone LM 4 are mainly on the middle and lower slopes of the escarpment, and few places are really suited to these crops. Too many slopes are already cleared and cultivated (mainly with maize and finger millet), causing a lot of soil erosion. Soil conservation is the most urgent problem there (methods see Vol. II A). On the foot of the escarpment some unirrigated cotton is possible and some maize. Coast Composite was found to do much better than Katumani Comp. B here[2)] due to relatively high temperatures and scattered rainfall.

The rainfall stations in the Kerio Valley have only been established recently and are therefore not yet mentioned in the map or the District Table 1. For comparison, Sigor which lies about 40 km north of the District, but at the foot of the same escarpment, may be used as an example (Table 1, situation see West Pokot District Annual Rainfall Map) although it is wetter than the main parts of the valley. The rainfall records of the Kiboino Primary School of Chebloch in Baringo District, which is situated somewhat higher on the other side of the Kerio, are also valuable in understanding the climate of the valley and are therefore reproduced as a diagram here (see p. 12), being representative of the Marginal Cotton Zone LM 4. The first rains create only a very short agro-humid period. Unfortunately, there is then a break in May/June where planted crops would have their peak demand. The maximum in July–August could probably be better used if water from April were conserved and planting started in May. The October-November rains are normally too short and weak to support another cropping season. In any case, additional irrigation is good for cotton and for most other crops, especially in the next drier zone LM 5 where maize yields would otherwise be too poor. Even millet and sorghum thrive much better with some additional water. Some famous, traditional and sophisticated systems of irrigation already exist, most of them in the Endo location near Tot. There ist an urgent need to repair, with modern methods, the channels which bring the water down the escarpment to places far from the rivers.

1) H.F. GELENS, H.C. KINYANJUI and R.F. VAN DE WEG (ed.): Soils of the Kapenguria area (quarter degree sheet 75). Kenya Soil Survey, Nairobi 1976. – *It covers the northern part of the Cherangani Hills.*

2) CRITCHLEY, William: Chesongoch Agricultural Project 1977–79. Final Report (1980). Mimeo. Chesongoch Catholic Mission, P.O. Box 1200, Eldoret.

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Monthly rainfall in mm Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
8935002	Afr. Inland Mission,	41	Average	1 181	38	49	92	186	169	73	108	91	68	105	145	58
2 286 m	Kapsowar		60 % rel.[1)]	1 066	9	25	73	142	124	48	66	76	40	69	93	30
8935014	Tambach, District	50	Av.	1 205	35	43	88	189	168	92	132	121	68	35	114	71
1 829 m	Office		60 %	1 076	8	20	69	143	123	55	71	89	39	20	61	43
8935104	Chebiemit	24	Av.	1 445	34	44	76	191	143	65	112	108	55	89	130	66
2 438 m			60 %	1 220	10	17	40	170	105	48	86	85	38	60	79	42
8935106	Elgeyo Forest	25	Av.	1 325	38	49	99	201	180	91	124	130	72	120	158	64
2 316 m	Station		60 %	1 147	11	20	56	179	131	67	98	109	58	89	100	40
8935121	Eldoret, Skyline	22	Av.	1 414	57	50	107	230	167	104	138	179	107	84	106	87
2 590 m	Estate															
8935131	Tambach, Chepkorio	21	Av.	1 703	78	63	191	251	199	122	157	188	105	129	184	116
2 590 m																
8935134	Elgeyo, Kesup Forest	20	Av.	1 277	43	44	100	187	165	84	120	128	59	105	169	74
1 981 m	Reserve															
8935158	Chebororwa	16	Av.	1 081	37	43	60	131	108	88	148	175	57	70	91	93
2 057 m	Farmers T.C.															
8835034	Cherangani Forest	20	Av.	1 214	47	47	71	120	162	109	160	182	91	91	85	46
2 224 m	Station															
8835035	Lelan Agric.	16	Av.	1 242	33	49	64	110	147	122	195	216	85	95	78	50
2 986 m	(formerly Cobot Farm)		60 %	1 110	0	14	50	94	82	79	129	188	52	70	46	13
8835029	Sigor (West Pokot)	19	Av.	842	25	28	61	152	122	62	102	79	49	63	69	30
1 066 m	D. Officers Office		60 %	780	5	4	47	107	78	38	68	35	29	56	48	11

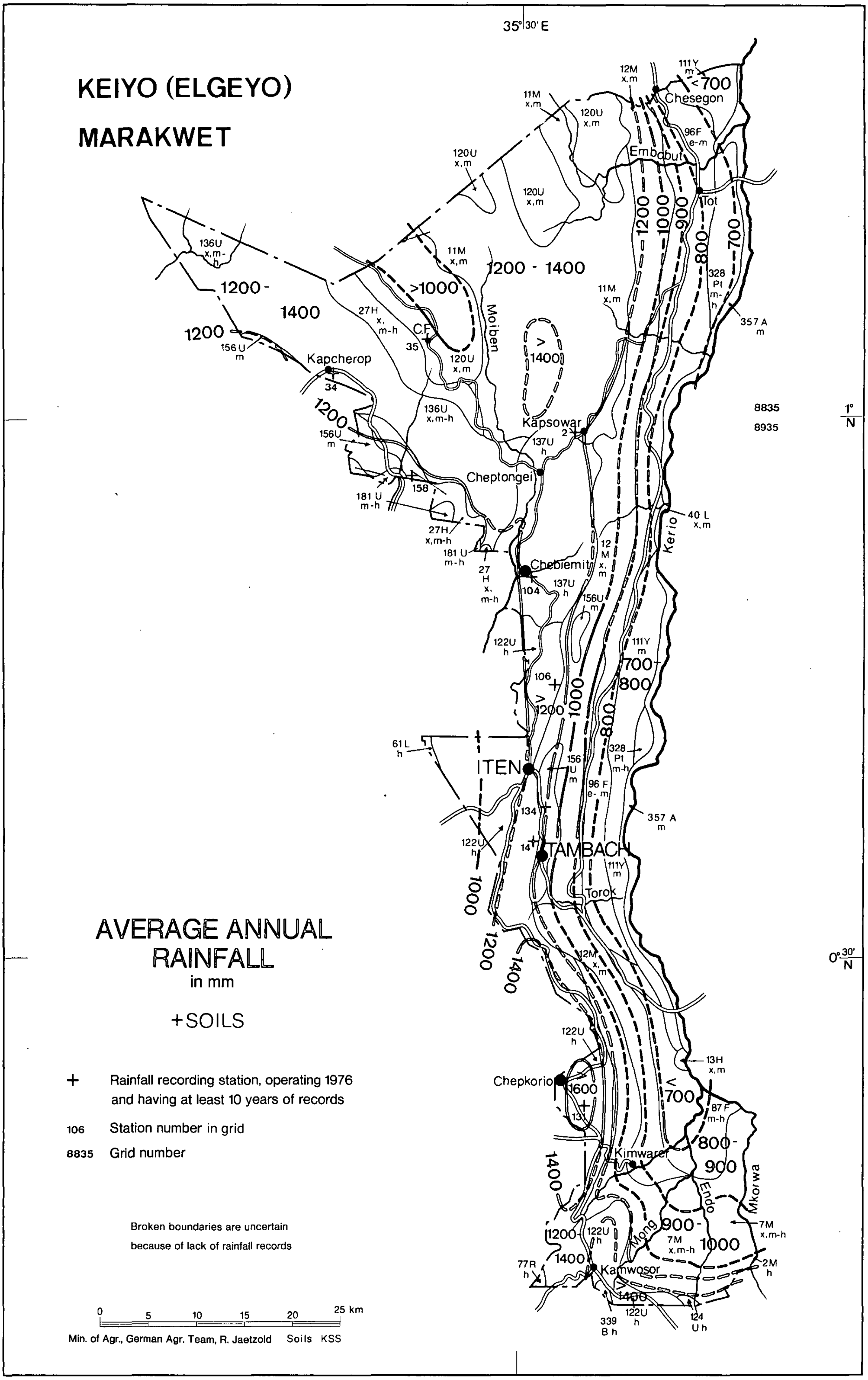
1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

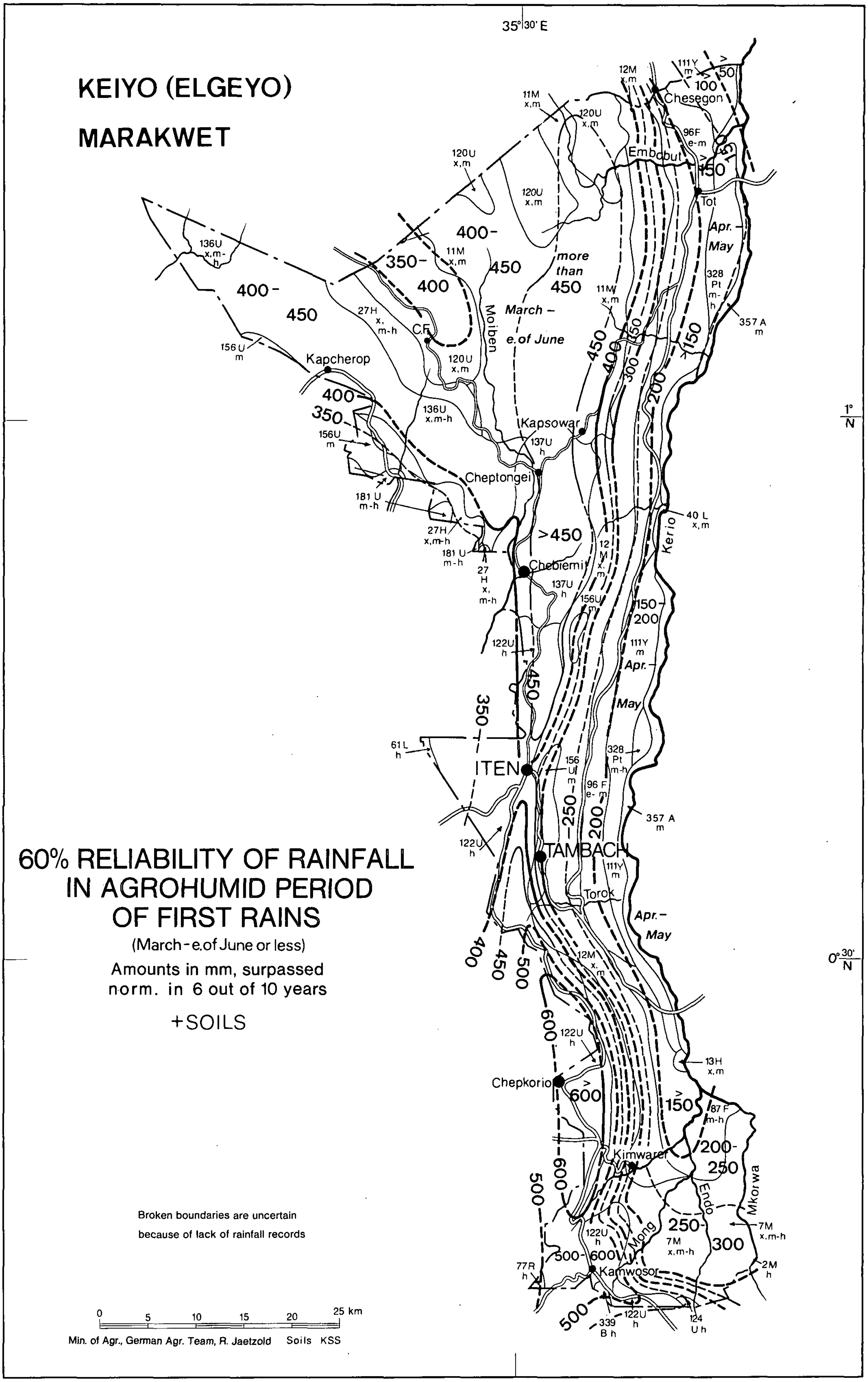
KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 2: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

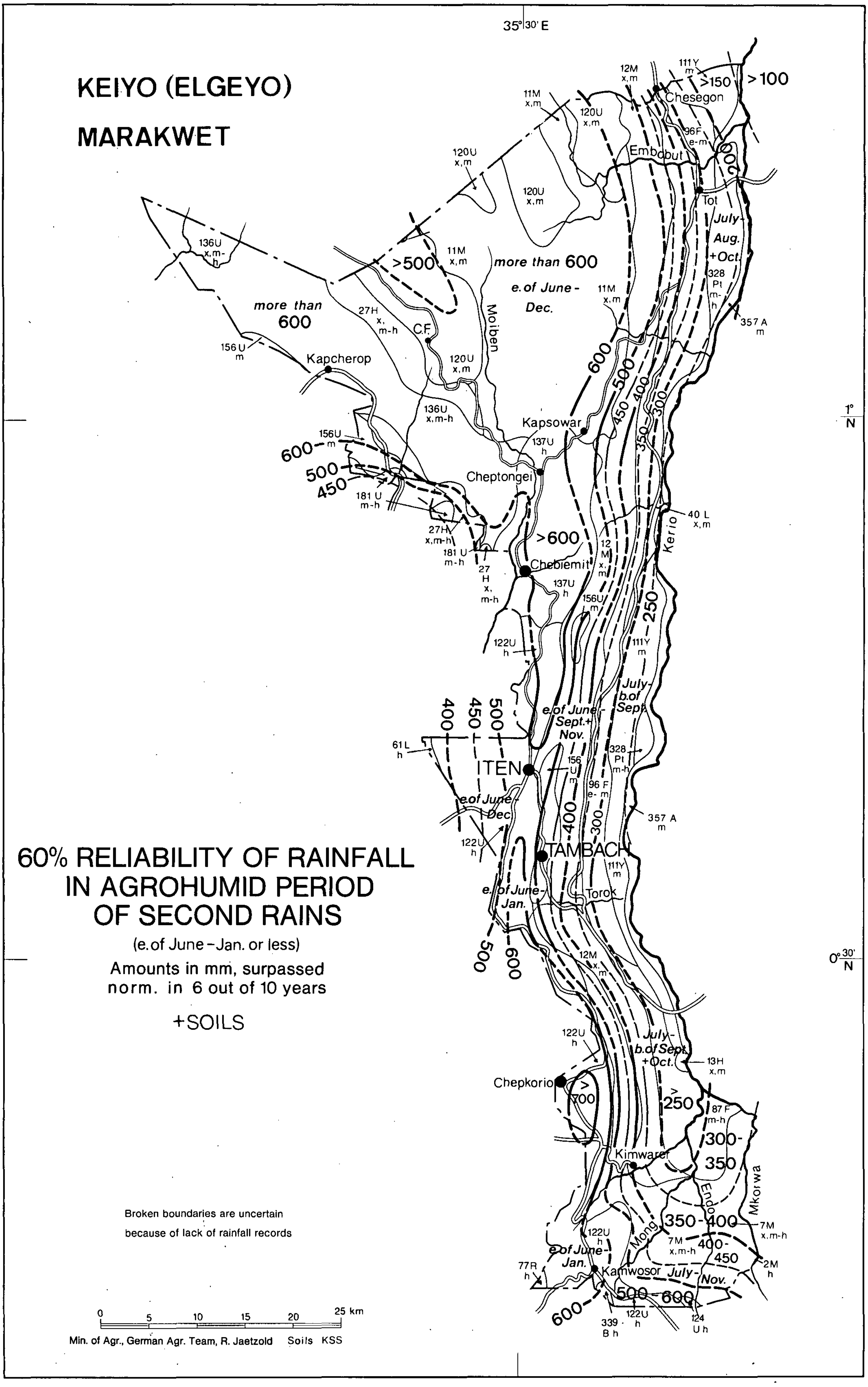
Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1]		60 % reliability of growing period		
					1st rains in mm	2nd rains in mm	1st rains[2] in days	2nd rains in days	Total[3] in days
TA I u. TA II Tropical Alpine Zones				Rough natural grazing, unimportant					
TA I–II – UH 2–3 Cattle and Sheep Zone	transitional	2 800–3 150	12.4– 9.7	1 050–1 250	350–400	500–610	110 or more	190–200	300–310
UH 1 Sheep and Dairy Zone	vl i or two (vl) i or two	2 370–3 100	14.8–10.1	1 200–1 700 1 200–1 400	400–630 420–480	550–700 560–650	110 or more 110 or more	200–220 170–210	310–330 280–320
UH 1–2	(vl) i or two	2 350–3 000	15.0–11.2	1 200–1 350	400–450	>600	110 or more	170–210	280–320
UH 2 Pyrethrum- Wheat Zone	(vl) i or two	2 350–2 880	15.0–11.9	1 150–1 250	360–420	550–600	110 or more	170–200	280–310
LH 1 Tea-Dairy Zone	(vl) i or two	2 100–2 350	16.6–15.0	1 250–1 350	400–420	>600	110 or more	180–210	290–320
LH 2 Wheat/Maize- Pyrethrum Zone	vl i or two (vl/l) i or two fvl i or l ¬ (s)i	2 000–2 400	17.2–14.8	1 200–1 250 1 150–1 300 1 100–1 400	400–420 340–450 320–K600	>600 500–600 500–700	110 or more 100 or more 100 or more	170–200 160–180 140–200	280–310 260–280 240–300
LH 3 Wheat/(Maize)- Barley-Zone	l/vl	2 010–2 350	17.3–15.1	900–1 200	320–400	380–550	100 or more	120–140	220–240
UM 3 Marginal Coffee Zone				Very small and steep, see Baringo District					
UM 4 Sunflower-Maize Zone	f(l) i or two	1 500–1 900	20.5–18.0	900–1 100	240–500	320–450	80 or more	100–150	180–230
LM 4 Marginal Cotton Zone	(m/l) i or two/three	1 120–1 500	22.6–20.6	800– 900	200–250	280–360	70 or more	80–110	150–180
LM 5 Lower Midland Livestock-Millet Zone	(vs ¬ s/vs) i (vs ¬ fvs) i	1 000–1 300	23.5–21.7	700– 800 680– 750	180–200 150–180	250–330 200–250	50 or more 45 or more	70–100 45– 75	120–150 90–120
IL 6 Lowland Ranching Zone	u r i	950– 990	23.8–23.6	<680	80–150	140–200	<40	<40	–

1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants
2) More if growing cycle of cultivated plants continues into the period of second rains
3) Agro-humid conditions continue from 1st to 2nd rains nearly in the whole district


KEIYO (ELGEYO)
MARAKWET
35°30' E
1° N
0°30' N
8835
8935
Chesegon
Embobut
Tot
Kapcherop
Moiben
Kapsowar
Cheptongei
Chebiemit
Kerio
ITEN
TAMBACH
Torok
Chepkorio
Kimwarer
Endo
Mkorwa
Mong
Kamwosor
1200 - 1400
>1000
>1400
1000
900
800
700
<700
1600
700-800
800-900
900-1000
AVERAGE ANNUAL
RAINFALL
in mm
+SOILS
+ Rainfall recording station, operating 1976 and having at least 10 years of records
106 Station number in grid
8835 Grid number
Broken boundaries are uncertain because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



KEIYO (ELGEYO)
MARAKWET
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF FIRST RAINS
(March - e.of June or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+SOILS
Broken boundaries are uncertain
because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS
35°30' E
1° N
0°30' N
Chesegon
Embobut
Tot
Kapcherop
C.F.
Kapsowar
Cheptongei
Chebiemit
ITEN
TAMBACH
Torok
Chepkorio
Kimwarer
Kamwosor
Moiben
Kerio
Endo
Mkorwa
Mong
more than 450
March - e. of June
Apr. - May
>450



60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RAINS

(e. of June - Jan. or less)

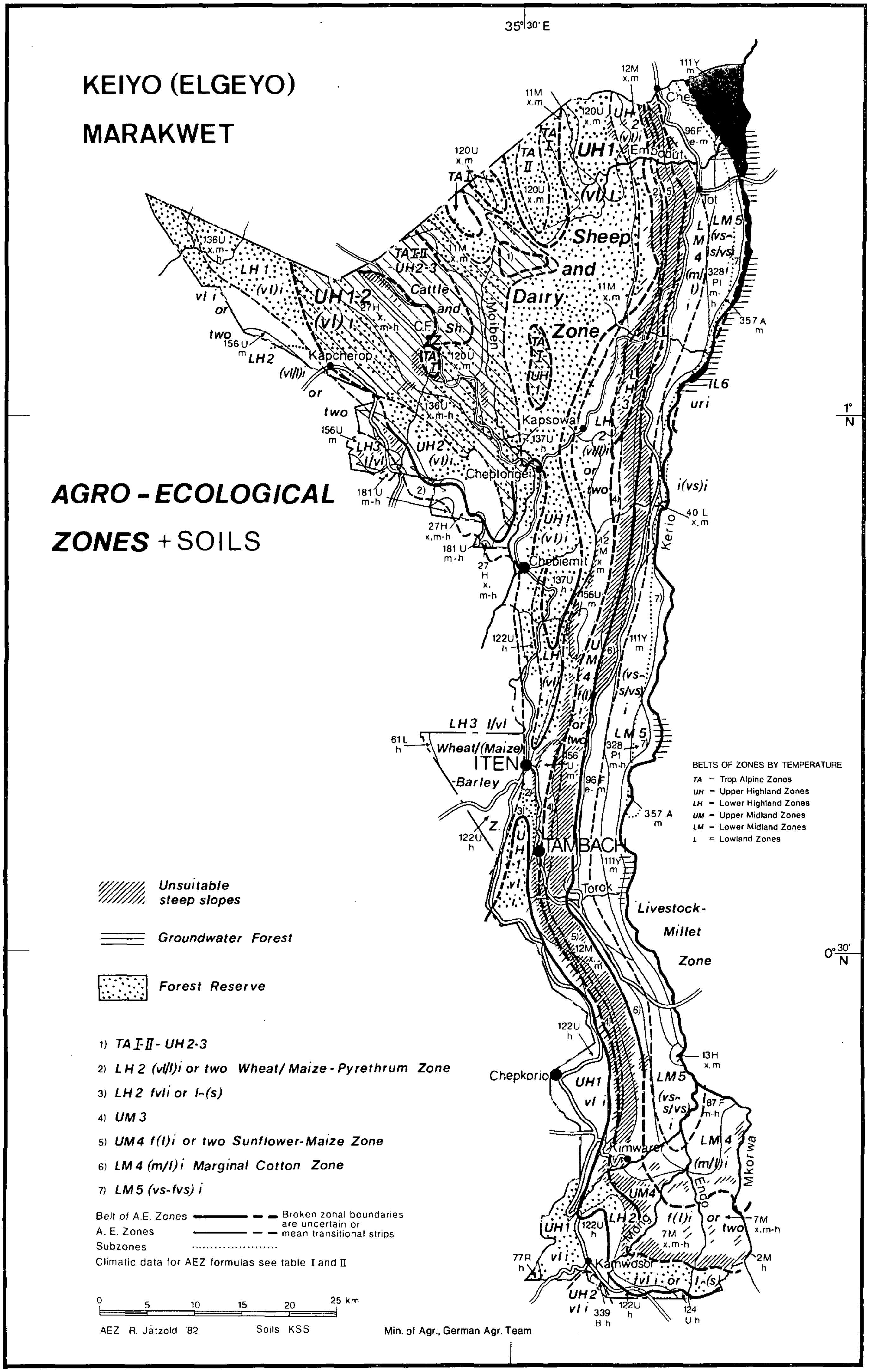
Amounts in mm, surpassed norm. in 6 out of 10 years

+SOILS

Broken boundaries are uncertain because of lack of rainfall records

0 5 10 15 20 25 km

Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


KEIYO (ELGEYO)
MARAKWET
AGRO - ECOLOGICAL
ZONES + SOILS
35°30' E
1° N
0°30' N
Sheep and Dairy Zone
Cattle and Sh.
Livestock-Millet Zone
Wheat/(Maize) -Barley
Kapcherop
Kapsowar
Cheptongei
Chebiemit
ITEN
TAMBACH
Torok
Chepkorio
Kimwarer
Kamwosor
Embobut
Kerio
Moiben
Mkorwa
BELTS OF ZONES BY TEMPERATURE
TA = Trop Alpine Zones
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
L = Lowland Zones
Unsuitable steep slopes
Groundwater Forest
Forest Reserve
1) TA I-II - UH 2-3
2) LH 2 (vl/l)i or two Wheat/Maize-Pyrethrum Zone
3) LH 2 fvli or l-(s)
4) UM 3
5) UM4 f(l)i or two Sunflower-Maize Zone
6) LM 4 (m/l)i Marginal Cotton Zone
7) LM 5 (vs-fvs) i
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 5 10 15 20 25 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team

AGRO-ECOLOGICAL ZONES

TA = *TROPICAL-ALPINE ZONES*

TA I = *Tropical-Alpine Cattle and Sheep Zone*

Nat. grazing very well suitable for Corriedale sheep, less suitable for Merinos and cattle; dairy cows on lower places only and good night shelter recommended.

TA II = *Tropical-Alpine Sheep Zone*

Well suitable for Corriedale sheep, less suitable for Merinos

UH = *UPPER HIGHLAND ZONES*

UH 1 = *Sheep and Dairy Zone*

UH 1 vl i or two = *Sheep and Dairy Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.*

Here mainly forest reserve

Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd r.), start norm. March[1]: Oats (April–September), peas (~ 60 %), potatoes; m. mat. rapeseed (~ 60 %); cabbage, spinach, carrots, kohlrabi, celery, endive, rampion, leek, radish
2nd rains, start norm. end of June[1]: The same but normally crops of first rains not yet ready; planting from end of August onward yield expectations only fair
Whole year: Strawberries

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Late mat. wheat like Kenya Bongo (~ 40 %, lower places), triticale
2nd rains: M. mat. barley like Proctor, 3rd crop of potatoes (N.–F., ~ 40 %, on microclimatic frostfree slopes)
Whole year, best pl. time end of March: Pyrethrum (50–60 %)

Pasture and forage
~ 0.5 ha/LU (lower places) to 1.2 ha/LU (drier upper places) on sec. pasture of Kikuyu grass, very suitable for Merino sheep, up to 2 700 m also for grade dairy cows; rye grass (Lolium perenne) to improve pasture for dairy

UH 1 (vl) i or two = *Sheep and Dairy Zone with a (weak) very long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.*

Yields and stocking rates about 10 % lower than in UH 1 vl i, see West Pokot District

UH 2 = *Wheat-Pyrethrum Zone*

UH 2 (vl) i or two = *Wheat-Pyrethrum Zone with a (weak) very long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.*

Good yield potential
1st rains (to 2nd r.), start norm. March: Very late mat. maize like High Alt. Comp. or Cuzco (~ 60 %, in frost free lower places); late mat. wheat like Kenya Bongo (60–70 %, May–N./D.), triticale (Apr.–O.), m. mat. barley (May–S./O.), oats (60–70 %, Apr.–S.); peas (~ 60 %), potatoes (March–July); m. mat. rapeseed (60–70 %, Apr./May–S.); cabbages, kales, carrots, kohlrabi, celery, endive, rampion, leek, radish
2nd rains, start norm. b. of July: E. mat. oats (60–70 %), m. mat. barley like Proctor; e. mat. rapessed, peas and the above vegetables excl. kohlrabi, but planting from mid August onward only fair expectations
Whole year: Pyrethrum, strawberries

Fair yield potential
1st rains: Maize varieties like above but in higher places (2 500 to 2 700 m), risk by frosts in valleys

[1] Start and end of rainy seasons in whole district not very distinct, especially second rains, in some places there is even a third peak. So planting times are variable according to crops and their rotation.

2nd rains: Potatoes (Aug.–N.); kohlrabi
Whole year: Plums, pears, apples (below 2 600 m)

Pasture and forage
~ 0.9 ha/LU on sec. pasture of Kikuyu and tufted grass (if not overgrazed, otherwise Kikuyu grass is disappearing)[2], suitable for Merino sheep and grade dairy cows; rye grass to improve pasture for dairy (not near wheat)

LH = LOWER HIGHLAND ZONES

LH 1 = Tea-Dairy Zone

LH 1 (vl) i or two = Tea-Dairy Zone with a (weak) very long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.

Very small and transitional to LH 2.
Mainly Forest Reserve. Potential see Nandi District LH 1 vl i but tea only fair. Windbreaks important (Hakea saligna)

LH 2 = Wheat/Maize-Pyrethrum Zone[3]

LH 2 vl i or two = Wheat/Maize-Pyrethrum Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.

Very small, see Trans Nzoia

LH 2 f vl i or l ⌐ (s) i = Wheat/Maize-Pyrethrum Zone with a fully very long cropping season, dividable in a long cropping season followed by a (weak) short one and intermediate rains

Good yield potential
1st rains, start norm. mid March: Late mat. wheat like Kenya Bongo (60–70 %, Apr./May–O./N.), late mat. maize like H 611 (Mch./Apr.–N./D., ~ 60 %; ~ 70 % on deep soils); peas, horse beans; m. mat. potatoes (Apr.–Aug.); sunflower Kenya White (60–70 %), linseed, rapeseed; cabbages, kales, cauliflower, carrots, beetroot, spinach, celery, lettuce
2nd rains, start norm. end of June: M. mat. barley like K. Research (June–O.); linseed; kales, carrots, beetroot, celery
Whole year: Black Wattle, New Zealand flax

Fair yield potential
1st rains: Finger millet; tomatoes, onions; m. mat. beans like Cuarentino
2nd rains: Peas, e. mat. beans (up to 2 100 m); tomatoes, cabbages, cauliflower, onions, spinach, lettuce
3rd rains, start norm. b. of O.: E. mat. barley; e. mat. potatoes
Whole year: Pyrethrum; apples, pears and plums above 2 200 m; strawberries

Pasture and forage
About 1 ha/LU on highland savanna of Kikuyu, red oats and tufted grass[4] between Cedar forest remnants; about 0.6 ha on art. pasture of Nandi Setaria > 2 000 m or Rhodes grass < 2 000 m; suitable for grade dairy cows

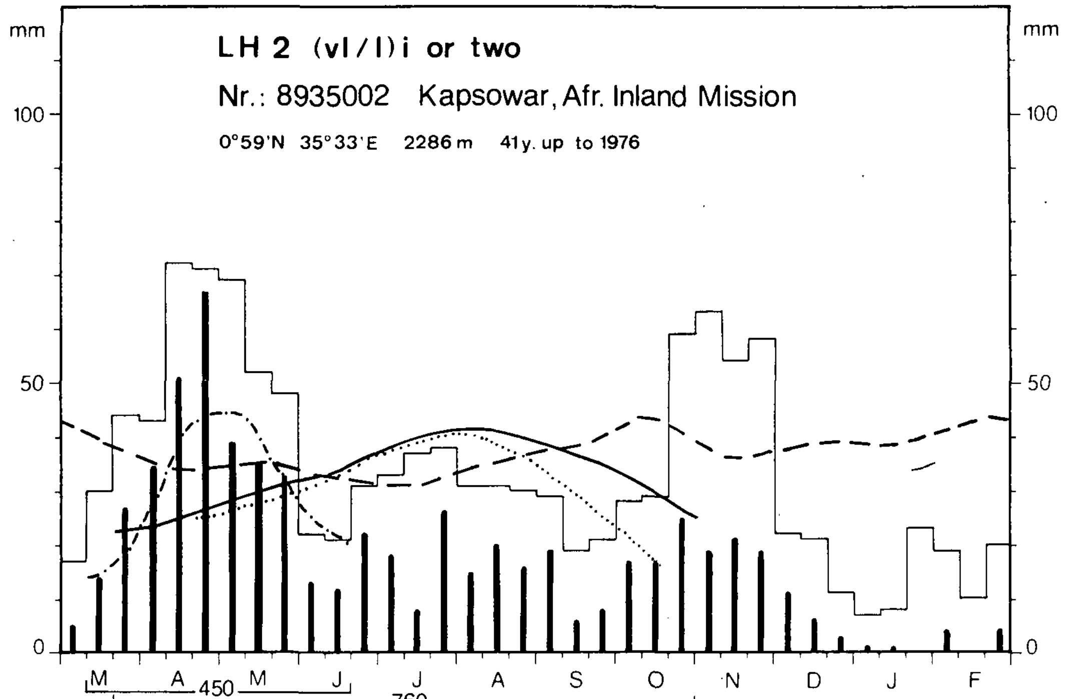
LH 2 (vl/l) i = Wheat/Maize-Pyrethrum Zone with a very long to long (weak) cropping season and intermediate rains
(see Diagram Kapsowar)

Yields and stocking rates about 10 % lower than in LH 2 f vl i

LH 3 = Wheat/(Maize)-Barley Zone

LH 3 l/vl = Wheat/(Maize)-Barley Zone with a long to very long cropping season

[2] Tufted grass is disliked by livestock
[3] Here maize is better according to small farm scale and topography
[4] The bad tufted grasses Eleusine jaegeri and Pennisetum schimperi are expanding if the areas are overgrazed. They may be controlled by fire.



Average rainfall per decade | rainfall surpassed in 6 out of 10 years
--- Approx. pot. evapotranspiration of a permanent crop (pyrethrum)
—— Approx. pot. evapotranspiration of late mat. maize like H 611
.... Approx. pot. evapotranspiration of late mat. wheat like K.Bongo
—·— Approx. pot. evapotranspiration of e. mat. peas
450 Rainfall per indicated growing period, surpassed in 6 out of 10 years

Good yield potential
1st rains, start norm. end of March: M. mat. wheat like R 200 (b. of May–S.) and other varieties; m. mat. durum wheat, late mat. wheat like Kenya Bongo (higher places, Apr.–O.), m. mat barley like Kenya Research (May–S.), late mat. triticale, on deep soils late mat. maize H 611 (higher places), H 612–614 (lower places, e. of Apr.–O., 60–70 %); peas; linseed, late mat. sunflower like Kenya White; cabbages
2nd rains, start indistinctly m. June/July: M. mat wheat like R 200, Africa Mayo and other var. (m. June–b. of N.), m. mat. barley; rapeseed (end of June–O.)
Whole year: Black wattle

Fair yield potential
1st rains: Potatoes, rapeseed; kales, cauliflower, carrots, beetroot
2nd rains: Maize H 612–614 (b. of June–D.); tomatoes, kales, beetroot; beans (lower places)
Whole year: Avocadoes (lower places)

Pasture and forage
About 1.2–1.5 ha/LU on highland savanna of red oats and wire grass, about 0.7 ha/LU on artificial pasture of Nandi Setaria or Rhodes grass; suited for grade dairy cows and grade cattle; subterr. clover and Lotononis as add. forage

UM = UPPER MIDLAND ZONES

UM 3 = Marginal Coffee Zone

Very small, potential see Baringo District

UM 4 = Sunflower-Maize Zone

UM 4 (l/m) i or two = Sunflower-Maize Zone with a (weak) long to medium cropping season and intermediate rains, dividable in two variable cropping seasons and i. r.

Good yield potential
1st rains, start norm. end of March: Cold tolerant sorghum (~ 60 %), grain amaranth
Whole year: Sisal, Eucalyptus trees

Fair yield potential

1st rains: Late mat. maize like H 614 on higher places, med. mat. like H 622 & 632 on lower places, finger millet; beans, groundnuts, pigeon peas (lower places, end of March–D.); potatoes, sweet pot.; egg plants, cabbages; late mat. sunflower like Kenya White (Apr.–S.)

2nd rains: Start norm. end of June: Beans, potatoes, sweet pot.; onions, e. mat. soya beans, e. mat. sunflower

Whole year: Castor, pineapples

Pasture and forage

1.3–2 ha/LU on undestroyed nat. pasture of semi-dry sclerophytic bushland, about 0.8 ha/LU on art. pasture of Rhodes grass down to ~ 0.3 ha/LU feeding Bana or Napier grass and other forage; grade cattle possible

LM = LOWER MIDLAND ZONES

LM 4 = Marginal Cotton Zone

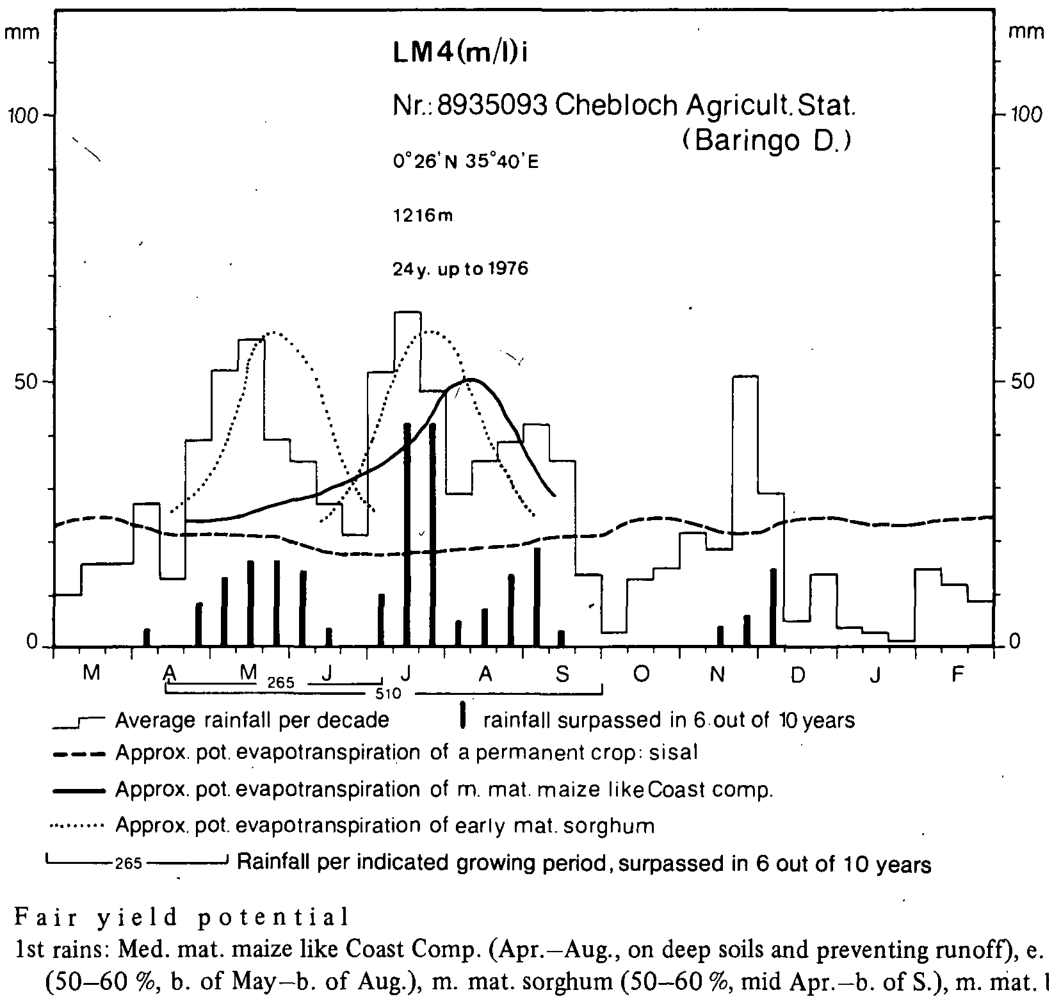
LM 4 (m/l) i or two = Marginal Cotton Zone with a (weak) medium to long cropping season and intermediate rains, dividable in two (weak) cropping seasons and i. r.

See diagram Chebloch (Baringo District). Important additional irrigation possibilities

Good yield potential

1st rains, start norm. end of March/b. of Apr. (to 2nd r.): Horse grams; safflor, dwarf castor

Whole year: Sisal (60–70 %) and perennial castor on deep soils, buffalo gourds[5] and Marama beans[5], jojoba



Fair yield potential

1st rains: Med. mat. maize like Coast Comp. (Apr.–Aug., on deep soils and preventing runoff), e. mat. sorghum (50–60 %, b. of May–b. of Aug.), m. mat. sorghum (50–60 %, mid Apr.–b. of S.), m. mat. bulrush millet (bird rejecting awned var.), finger millet; green grams, cowpeas (50–60 %), pigeon peas, e. mat. beans, m. mat. groundnuts; cotton (on good soils end of March–O., var. BPA & 59/240 suited), e. mat. sunflower like 252 (bird prot. necess.), m. mat. soya beans (40–50 %)

2nd rains, start norm. end of June: E. mat. maize (~ 40 % on very good soils), e. mat. foxtail and proso millet (50–60 %); green grams, cowpeas, mwezi moja beans (40–50 %), tepary beans

Whole year: Cassava

5) Palatable seeds and tubers, but still experimental

Pasture and forage
About 2 ha/LU on undestroyed pasture on semi-dry sclerophytic bushland; indigenous cattle, sheep and goats; tepary, Mauritius beans and siratro for add. fodder; saltbush (Atriplex nummularia) and horse tamarind (Leucaena leucocephala) are palatable shrubs to be planted with local buffel grass (Cenchrus ciliaris) for re-establishing pasture on eroded soils; Gao trees (Acacia albida) on deep soils

LM 5 = Livestock-Millet. Zone

LM 5 (vs ⌐ s/vs) i = Livestock-Millet Zone with a (weak) very short cropping season followed by a (weak) short to very short one and intermediate rains

Good yield potential
1st rains, start norm. begin of April (to 2nd r.): Safflor, horse grams (~ 60 %), dwarf castor
Whole year: Sisal on deep soils, buffalo gourds[5] on sandy soils, Vigna lobatifolia[5], Marama beans[5]. Possibilities for additional irrigation

Fair yield potential
1st rains: E. mat. sorghum like Serena (b. of May–b. of Aug.), m. mat. sorghum (mid Apr.–b. of S.), m. mat. bulrush millet (bird rejecting var.); green grams, cowpeas, m. mat. groundnuts (b. of Apr.–S.)
2nd rains, start norm. end of June: E. mat. foxtail millet green grams, cowpeas
Whole year: Cassava, perennial castor

Poor yield potential (av. 20–40 % of the optimum)
1st to 2nd rains: M. mat. maize like Coast Composite or H 511 on deep soils, cotton (good with additional irrigation, also bananas, lemons and many other crops)

Pasture and forage
3–5 ha/LU on Acacia bushland if not denuded and eroded; goats thrive better than cattle and sheep.
Tepary beans and cowpeas for fodder; saltbush (Atriplex nummularia) best palatable shrub for re-establishing pasture, other forage and grass see next subzone.

LM 5 (vs ⌐ fvs) i = Livestock-Millet Zone with a (weak) very short cropping season followed by a (weak) fully very short one and intermediate rains

Good yield potential
Whole year: Buffalo gourds[5] (on sandy soils), Marama beans[5], Vigna lobatifolia[5]. Possibilities for additional irrigation

Fair yield potential
1st rains, start b. of April: Turkana sorghum, v. e. mat. dwarf sorghum, e. mat. foxtail and proso millet; cowpeas, horse grams (to 2nd r.)
2nd rains, start norm. end of June/b. of July: Ratoon of sorghum, e. mat. foxtail millet; green grams, tepary beans, cowpeas for leaves

Poor yield potential
1st rains, start b. of April, to 2nd rains: M. mat. maize like Coast Composite, m. mat. sorghum (both on deep soils only), e. and m. mat. finger millet (var. Ekalakala)

Pasture and forage
4–6 ha/LU on Acacia wood- and bushland if not denuded and eroded; goats thrive better than cattle and sheep. Local buffel grass (Cenchrus ciliaris) should be sown on good deep soils; saltbush (Atriplex), Mesquite and Algarrobo (Prosopis juliflora and chilensis) and Cassia sturtii are palatable shrubs for re-establishing pasture also on stony soils. Opuntia var. without prickles

LM 5 i (vs) i = Livestock-Millet Zone with a (weak) very short cropping season framed by intermediate rains

Good yield potential
Whole year: Buffalo gourds[5] on sandy soils, Marama beans[5], Vigna lobatifolia[5]

Fair yield potential
2nd rains, start end of June/b. of July: E. mat. proso or foxtail millet; tepary beans, cowpeas for leaves and pulses (all crops on deep soils only); simsim with water concentration (see Fig. 1 in Baringo District), with this technic in 1st and 2nd rains also v. e. mat. sorghum (ratooning from 1st rains), pigeon peas, cassava, and others

Pasture and forage
8–15 ha/LU (cattle, goats and sheep, higher stocking if goats only) on Acacia mellifera bushland, 5–10 ha/LU on Acacia tortilis woodland if not denuded and eroded. Buffel grass for re-establishing pasture especially on deep soils, palatable shrubs saltbush (Atriplex) and Cassia to be planted also on stony soils; more suited for goats and camels if pasture is not improved. Seeding of nutritious grass like Masai love grass (Eragrostis superba) with water concentration technics (= runoff-catching,water harvesting)

IL = *INNER LOWLAND ZONES*

IL 6 = *Inner Lowland Ranching Zone*

IL 6 uri = *Inner Lowland Ranching Zone with unimodal rainfall and intermediate rains*

Rainfed agriculture only in suited places with runoff-catching methods possible. Limited irrigation possibilities

Grassland and forage
More than 10 ha/LU on dry Acacia mellifera bushland or Acacia-Commiphora woodland
Buffel grass (Cenchrus ciliaris) for re-establishing pasture on good, deep soils, palatable shrubs see LM 5. Tsetse danger near rivers

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The district is bound on the eastern side by the Kerio river. From its alluvial plain the topography gradually rises towards the west. The Keiyo (Elgeyo) Marakwet Escarpment stands out distinctly and causes relief differences of up to 1 500 m. In the northern and southern part of the district the topography is rugged, giving way to more subdued relief differences going westwards. The underlying geology mainly consists of gneisses from the Basement System.

Soils of the mountains are 7 M, 11 M, 12 M, partly with humic topsoil. They are associated with upland soils of unit 122 U having a moderate to high fertility and units 124 U, 137 U,156 U with moderate fertility.

Upland soils of units 120 U, 124 U, 136 U occur in the northern part of the district where the topography is more or less like an upland within the mountains. The often occur together with rock outcrops and their topsoil is rich in organic matter. Northwest of Cheptongei, the undulating topography carries soils of unit 136 U together with soils of units 120 U and 124 U.

Unit 111 Y comprises soils of the footslopes as well as of the piedmont plains, with a moderately high fertility. On the western side they touch unit 357 A, which consists of the fairly young alluvial soils developed from various parent materials. On the associated plain, we find soils with a moderately high fertility (122 U). Footslopes in the extreme South of the Kerio Valley have a variable soil cover (87 F).

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

7 M x, m–h[1) = well drained, shallow to moderately deep, dark reddish brown to dark brown, rocky and bouldery, clay loam to clay; in places with humic topsoil (nito-chromic CAMBISOLS; with haplic PHAEOZEMS, lithic phase, LITHOSOILS, eutric REGOSOLS and Rock Outcrops)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

11 M x, m = well drained, moderately deep, reddish brown to brown, friable, stony sandy clay loam, with humic topsoil (humic CAMBISOLS: with eutric REGOSOLS and Rock Outcrops)

12 M x, m = somewhat excessively drained, shallow to moderately deep, reddish brown, friable, rocky and stony, sandy clay loam (eutric CAMBISOLS with LITHOSOLS, eutric REGOSOLS and Rock Outcrops)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

13 H x, m = well drained, shallow, dark reddish brown, friable, very calcareous, bouldery or stony, loam to clay loam; in many places saline. (LITHOSOLS; with calcic XEROSOLS, bouldery and saline phase and Rock Outcrops)

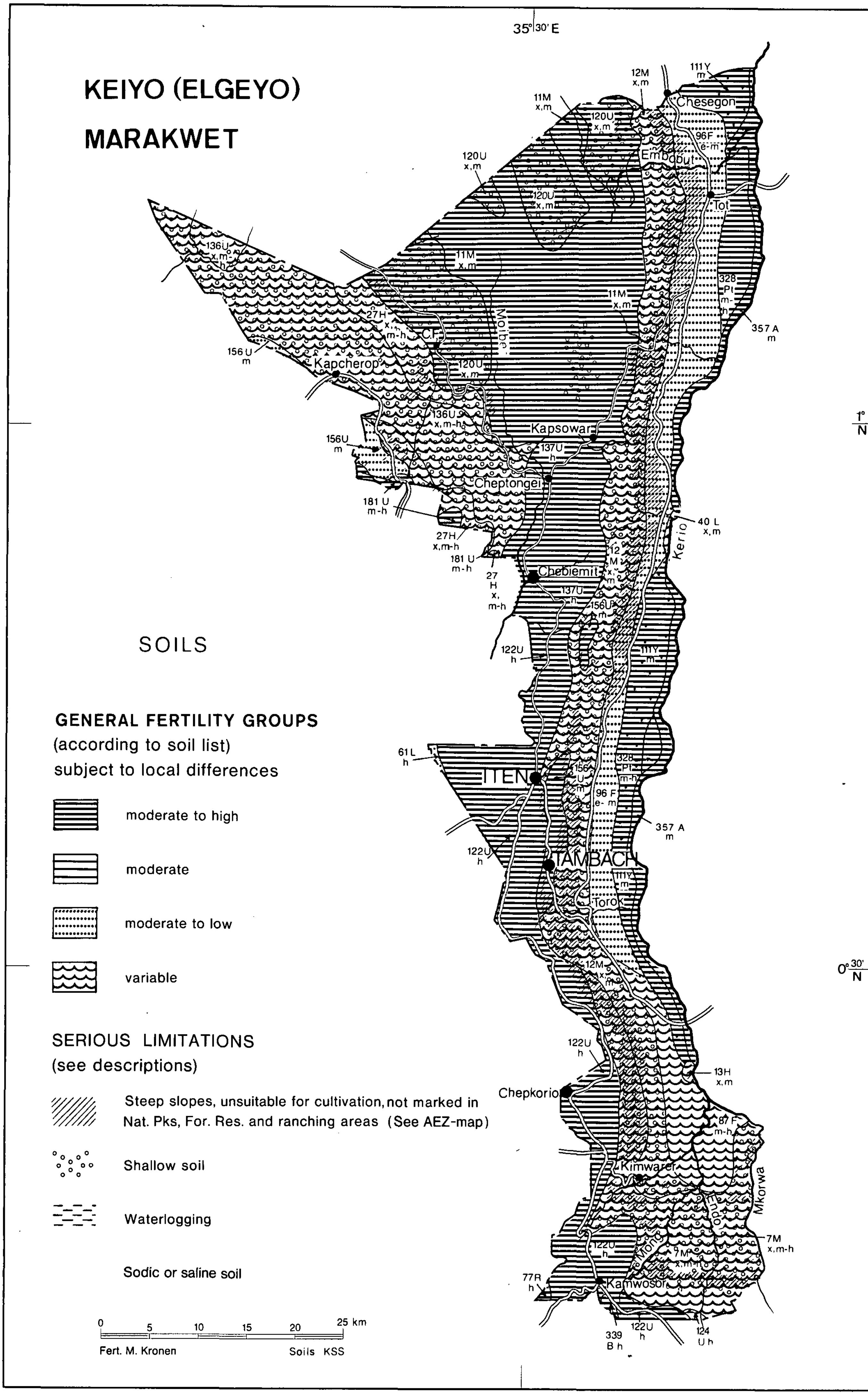
Soils developed on undifferentiated Basement System rocks, predominantly gneisses

27 H x, m–h = complex of excessively drained to well drained, shallow, dark red to brown, friable sandy clay loam to clay; in many places rocky, bouldery and stony and in places with acid humic topsoil (dystric REGOSOLS; with LITHOSOLS, humic CAMBISOLS lithic phase and Rock Outcrops)

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older, basic tuffs included)

40 L x, m = well drained, shallow to moderately deep, dark reddish brown, firm, strongly calcareous clay loam, with stony to bouldery surface, partly saline and/or sodic (calcic XEROSOLS, boulder-mantle and saline-sodic phase)


KEIYO (ELGEYO)
MARAKWET
35°30' E
1° N
0°30' N
SOILS
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
moderate to high
moderate
moderate to low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Waterlogging
Sodic or saline soil
0 5 10 15 20 25 km
Fert. M. Kronen
Soils KSS
Chesegon
Embobut
Tot
Kapcherop
Kapsowar
Cheptongei
Chebiemit
ITEN
TAMBACH
Torok
Chepkorio
Kimwarer
Kamwosor
Moiben
Kerio
Mkorwa
Endo
Mong
12M x,m
111Y m
11M x,m
120U x,m
96F e-m
136U x,m-h
11M x,m
328 Pt m-h
357 A m
27H x,m-h
156 U m
156U m
137U h
181 U m-h
27H x,m-h
181 U m-h
27 H x, m-h
40 L x,m
12 M x,m
122U h
111Y m
61 L h
156 U m
96 F e-m
357 A m
122U h
13H x,m
87 F m-h
7M x,m-h
77R h
339 B h
122U h
124 U h

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

77 R
h
= well drained extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil (humic NITOSOLS)

SOILS ON FOOTSLOPES

Soils developed on colluvium from various volcanic rocks (mainly basalts)

87 F
m–h
= complex of well drained to moderately well drained, deep, reddish brown to very dark greyish brown, firm, sandy clay loam to clay; partly with humic topsoil and/or cracking; often moderately calcareous (LUVISOLS, undifferentiated, luvic PHAEOZEMS and chromic VERTISOLS)

Soils developed on colluvium from undifferentiated Basement System rocks

96 F
l–m
= well drained, very deep, yellowish red to dark reddish brown, friable, coarse loamy sand to sandy clay loam (chromic LUVISOLS; with rhodic FERRALSOLS and luvic/ferralic ARENOSOLS)

SOILS ON PIEDMONT PLAINS

Soils developed on alluvium from undifferentiated Basement System rocks

111 Y
m
= well drained, deep, dark brown, friable, moderately calcareous clay loam, with sodic deeper subsoil (calcic CAMBISOLS, sodic phase)

SOILS ON UPPER LEVEL UPLANDS

Soils developed on undifferentiated Basement System rocks

120 U
x, m
= complex of:
– well drained, shallow, black to very dark brown, acid humic, very friable loam; in places rocky (RANKERS)
– well drained, moderately deep, dark brown, friable clay loam, with a very thick acid humic topsoil (humic CAMBISOLS)

SOILS ON UPPER MIDDLE-LEVEL UPLANDS

Soils developed on Tertiary or older basic igneous rocks (basalts, nepheline phonolites, etc.; basic tuffs included)

122 U
h
= well drained, extemely deep, dark reddish brown, friable clay (eutric NITOSOLS)

124 U
h
= complex of:
– well drained, extremely deep, dark reddish brown, friable clay eutric NITOSOLS)
– well drained, shallow to moderately deep, dark reddish brown to dark red, friable clay (nito-chromic CAMBISOLS, partly lithic phase)

Soils developed on biotite gneisses

136 U
x, m–h
= well drained, moderately deep to deep, dark reddish brown to dark brown, friable, sandy clay loam to clay, with thick acid humic topsoil; in places shallow and rocky (humic ACRISOLS and humic CAMBISOLS, partly lithic phase; with Rock Outcrops)

137 U
h
= well drained, extremely deep, dark reddish brown, friable clay, with thick acid humic topsoil (humic NITOSOLS)

156 U
m
= well drained, moderately deep to deep, brown to dark yellowish brown, firm sandy clay loam (orthic LUVISOLS)

SOILS ON SEDIMENTARY PLAINS OF UPPER RIVER TERRACES

Soils developed on sediments mainly from undifferentiated Basement System rocks

328 P
m–h
= well drained to moderately well drained, deep, dark brown, friable to firm, slightly calcareous, clay loam to clay (eutric CAMBISOLS)

SOILS ON BOTTOMLANDS

Soils developed on infill from intermediate igneous rocks (phonolites)

339 B
h
= poorly drained, moderately deep, dark grey to grey, mottled, firm clay, with humic topsoil; in many places over petroplinthite (mollic GLEYSOLS, partly petroferric phase)

SOILS ON FLOODPLAINS

Soils developed on sediments from various sources (recent floodplains)

357 A
m
= well drained to imperfectly drained, very deep, dark brown to yellowish brown, stratified, strongly calcareous, micaceous, predominantly loamy soils (calcaric FLUVISOLS)

1) Soil texture-classes

h	= heavy		x	=	stony or bouldery
l	= light		v	=	varying texture
m	= medium		m–h	=	medium to heavy
			m,h	=	medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey:
Exploratory Soil Map and Agro-Climatic Zones Map of Kenya, scale 1 : 1 000 000. Expl. Soil Survey Rep. E1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

The population of Elgeyo (Keiyo) Marakwet District, at the time of the Census in September 1979, was 148,868 people (Table 3). As there is no township, almost the whole population lives on 157,800 ha of agricultuaral land (Table 5), i.e. per average household of 4.4 people (Table 4) only 4.69 ha of agricultural land was available (in 1979) and per person only 1.06 ha (Table 5).

The most striking area is the Mosop location, mostly in UH 1. Because of its population density (210 people per sq km – the average of the district is 65) only 0.41 ha per person and 2.14 ha of agricultural land were available per household.

This smallholder area on the cold and wet top of the escarpment has insufficient grazing land for sheep and dairy, for which the zone UH 1 is most suited. Therefore a lot of potatoes are grown and pyrethrum is planted, although the yield expectations are only fair and the potatoes are endangered by frosts in some microclimatically less suitable places. Vegetables are more advisable.

The figures for other locations like Soy (28,000 ha mainly in UM 3–4 and LM 4–5) and Lelan (10,900 ha in the Tropical Alpine Zones and Upper Highlands) range far above the average of the district. In both locations the population density is relatively low (Table 3) and the amount of agricultural land seems relatively high: in Soy e.g. 7.99 ha were available per household and 2.30 ha per person. In Lelan, although it has only about 7 % of the total amount of agricultural land and less than half of the amount of Soy, 9.92 ha were available per household and 2.25 ha per person. But Soy is mainly situated in the Kerio Valley where, apart from a few irrigation possibilities, the potential is low. Half of the statistically available land of one holding would be needed to keep one cow! Overgrazing is one consequence of this overpopulation. In Lelan on the Cherangani Hills the situation is slightly better. About 5–10 LU could be kept on the average holding, but there are only a few additional cultivation possibilities because the main part which is situated in the Upper Highland Zones is faced with the danger of severe frosts on its higher limits, and sometimes it does not get enough rainfall.

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 3: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Mosop	6 308	6 765	13 073	2 474	64	201
Soy	6 193	5 963	12 156	3 505	432	28
Metkei	4 336	4 630	8 966	1 845	92	96
Southern Division	16 837	17 358	34 195	7 824	589	57
North Iriong	5 170	5 131	10 301	2 196	188	54
South Iriong	12 471	12 574	25 045	5 427	367	68
Central Division	17 641	17 705	35 346	7 623	556	63
Moiben	7 730	7 751	15 481	3 235	165	93
Cherangani	8 011	7 938	15 949	3 206	250	63
Endo	9 698	10 420	20 118	4 845	270	74
Sambirir	7 503	7 768	15 271	3 939	181	84
Lelan	2 543	2 302	4 845	1 099	158	30
Arror	3 774	3 889	7 663	1 886	105	72
Northern Division	39 259	40 068	79 327	18 210	1 132	70
Elgeyo Marakwet District	73 737	75 131	148 868	33 657	2 279	65

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 4: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Mosop	2471	2.97	1.36	0.64	0.32	5.29
Soy	3496	2.24	0.55	0.38	0.34	3.48
Metkei	1842	2.89	1.17	0.59	0.21	4.86
Division Southern	7809	2.77	0.94	0.51	0.29	4.38
Location:						
North Iriong	2192	2.78	1.03	0.57	0.31	4.70
South Iriong	5436	2.59	0.96	0.65	0.31	4.58
Division Central	7628	2.66	0.97	0.67	0.31	4.61
Location:						
Moiben	3223	2.70	1.02	0.63	0.38	4.74
Cherangani	3253	2.79	1.18	0.62	0.32	4.90
Endo	4838	2.62	0.94	0.44	0.13	4.12
Sambirir	3936	2.42	0.79	0.42	0.24	3.88
Lelan	1102	2.43	0.98	0.65	0.34	4.39
Arror	1880	2.50	0.81	0.44	0.28	4.03
Division Northern	18232	3.09	0.46	0.51	0.26	4.32
DISTRICT: ELEGEYO MARAKWET	33669	3.14	0.44	0.55	0.28	4.40

a) Source: Central Bureau of Statistics (CBS)
b) Average figures, include one and two persons per household as well

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 5: **AEZ – LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON**[1)]

Location/Division without townships	Area total Census 79 (in '00 ha = sqkm)	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps	Non-agricultural land: Others (roads, homesteads rivers..)	Agricultural land	TA I	TA I–II –UH 2–3	TA I – UH 2–3	UH 1	UH 1–2	UH 2	LH 1	LH 2	LH 3	UM 3–4	LM 4	LM 5	Agric. land per household (in ha)	Agric. land per person (in ha)
Mosop	64			11	53				50				3					2.14	0.41
Soy	432	96	F. 13	43	280				1				5		97	99	78	7.99	2.30
Metkei	92		F. 30	15	47				36		3		8					2.55	0.52
Southern Division	588	96	43	69	380				87		3		16		97	99	78	4.86	1.11
North Iriong	188	32		19	137							3	39	4	10	19	62	6.24	1.33
South Iriong	367	54	24	40	249				20			6	28	60	26	34	75	4.59	0,99
Central Division	555	86	24	59	386				20			9	67	64	36	53	137	5.42	1.16
Moiben	165	4	F. 34	23	104				3	28	19	4	44	1	5			3.21	0.67
Cherangani	250	21	F. 24	25	180	5				73	18	17	53	14				5.61	1.13
Endo	270	32		30	208[2)]				3		22		10		13	31	85	4.29	1.03
Sambirir	181	14		24	143		2	9	9	21	10	6	19	7	8	24	28	3.63	0.94
Lelan	158		F. 33	16	109	11	59	5	26	8								9.92	2.25
Arror	105	23		14	68							4	12		13	17	22	3.61	0.89
Northern Division	1 129	94	91	132	812	16	61	14	41	130	69	31	138	22	39	72	135	4.46	1.02
Total rural area	2 272	276	158	260	1 578	16	61	14	148	130	72	40	221	86	172	224	350	4.69	1.06

Columns: "in '00 ha = sqkm" covers Area total through Agricultural land; "in '00 ha = sqkm – Area in agro-ecological zones – AEZ" covers TA I through LM 5; "in ha – Agric. land per" covers household and person.

1) For official land statistics see supplementary publication to FM-Handbook, Vol. III A: Agriculture Land Statistics

2) Included are 44 sqkm in L 6

AGRICULTURAL STATISTICS[1)]

Cash crops are cultivated only in some pockets of the district. Some tea and pyrethrum is produced but in unimportant quantities; because of the hilly and rocky nature of the district, there is very limited scope for expansion of agriculture. Cotton is produced in the Kerio Valley.

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 6: TEA
TEA – PRODUCTION – GROWERS – YIELDS – RETURNS[a)]

Small Farmers

Division	Item	Unit	Year				
			75/76	76/77	77/78	78/79	79/80
Elgeyo Marakwet	Area	ha	40	42	43	44	45
	Production	t	11	12	18	20	11
	Value	'000 Shs	11	32	29	56	22
	Growers	No	209	215	216	218	222
	Yield p.ha	kg	275	285	411	455	244
	Value p.ha	Shs	275	762	674	1273	488
	Area p.Grow.	ha	0.19	0.20	0.20	0.20	0.20
	Ret. p.Grow.	Shs	53	149	1343	257	99

TABLE 7: PYRETHRUM
TRENDS IN PRODUCTION AND QUALITY[b)]

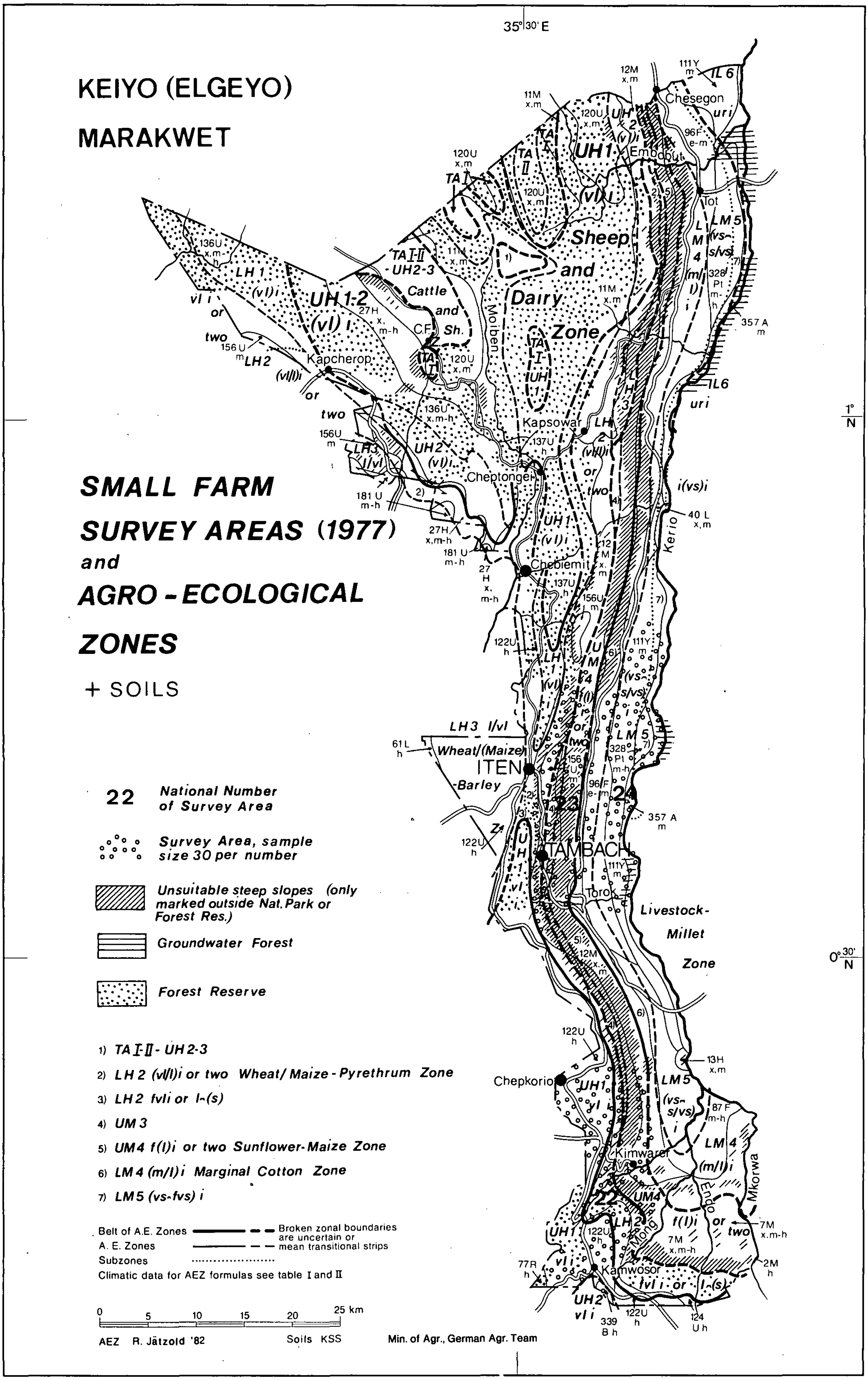
Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	153	136	83	81	106
Pyrethrin content %	1.3	1.3	1.3	1.4	1.4

Sources: a) K.T.D.A.
b) Pyrethrum Board

SMALL FARM SURVEY (SFS)[2)]

The SFS was carried out in the Kapchebelel (AEZ UH 1 + LH 2 + UM 4), Tambach (AEZ LH 2 + UM 3–4), and Kabulwa (AEZ LM 4–5) areas. The survey gives some indication of the farm organisation and productivity but generalisations are not possible because of the great diversity of the natural conditions even within short distances. Most farmers practise subsistence agriculture and development will continue to be hampered by adverse natural conditions. However, in some of the comparatively small pockets of good agricultural potential, milk production is well developed and vegetable growing for the Nakuru market has good prospects. Small irrigation schemes and ranching are other development possibilities.

1) For more detailed and up to date information, see FMHB Vol. III/A
2) For more detailed and up to date information, see FMHB Vol. III/B



KEIYO (ELGEYO)
MARAKWET
SMALL FARM
SURVEY AREAS (1977)
and
AGRO - ECOLOGICAL
ZONES
+ SOILS
22 National Number of Survey Area
Survey Area, sample size 30 per number
Unsuitable steep slopes (only marked outside Nat. Park or Forest Res.)
Groundwater Forest
Forest Reserve
1) TA I-II - UH 2-3
2) LH 2 (vl/l)i or two Wheat/ Maize - Pyrethrum Zone
3) LH 2 fvl i or l-(s)
4) UM 3
5) UM4 f(l)i or two Sunflower-Maize Zone
6) LM 4 (m/l)i Marginal Cotton Zone
7) LM 5 (vs-fvs) i
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 5 10 15 20 25 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team
35°30' E
1° N
0°30' N
Chesegon
Embobut
Tot
Kapcherop
Kapsowar
Cheptongei
Chebiemit
ITEN
TAMBACH
Torok
Chepkorio
Kimwarer
Kamwosor
Sheep and Dairy Zone
Cattle and Sh.
Livestock-Millet Zone
Wheat/(Maize) -Barley
Kerio
Moiben
Mkorwa
Endo
Mong
23
24
22

KEIYO (ELGEYO) MARAKWET DISTRICT

AEZ: UH 1 + LH 2 + UM 4

TABLE 8a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 22

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group small	medium	large
Farm Size Total	ha	2.3	3.9	7.8
Land Use: Annual Crops 1) First Season				
Maize	ha	o.8	o.6	1.4
Maize & Beans	ha	o.1	o.1	-
English Potatoes	ha	-	o.1	o.1
	ha			
	ha			
Total	ha	o.9	o.8	1.5
Second Season 1)				
English Potatoes	ha	-	o.1	o.1
	ha			
	ha			
Total	ha	-	o.1	o.1
Permanent Crops 1)				
Pyrethrum	ha	o.1	o.2	o.4
	ha			
	ha			
	ha			
Portion of total	%	4 %	5 %	5 %
Grazing & Forage	ha	1.o	2.4	5.1
portion of total	%	43 %	64 %	65 %
Other Land Use	ha	o.3	o.3	o.8
Livestock on Farm:				
Cattle: local	LU	1.4	o.5	2.1
improved	LU	3.9	6.6	9.4
Sheep & Goats	LU	o.4	1.2	o.8
Total	LU	5.7	8.3	12.3

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.4	o.3	o.3
Portion of improved cattle kept	%	74 %	5o %	82 %
Portion of Farmers owning a Plough	%	-	1o %	1o %
Labour on Farm:				
Family Adults	persons	2.o	2.5	2.6
Perm. Hired Labour	"	-	o.4	o.6
Children > 14 years	"	o.8	2.6	2.5
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	1.93	o.2o	2.13
Children < 14 years	"	1.45	-	1.45
Subsistence Units	SU	2.8o	o.2o	3.oo
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1615	26o3	
Beans	kg	29	46	
English Potatoes	kg	17	6	
Cabbage	kg	27	3	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Cabbage, Beans

1) Major crops only considered

2) Based on 1979 Census figures

TABLE 8b: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	1.2	2.9	6.8
Land Use: Annual Crops[1] First Season				
Maize	ha	o.1	o.3	1.o
Fingermillet	ha	o.1	o.2	o.3
Maize & Beans	ha	o.5	o.9	2.o
	ha			
	ha			
Total	ha	o.7	1.4	3.3
Second Season[1]	ha			
	ha			
	ha			
	ha			
Permanent Crops[1]	ha			
	ha			
	ha			
	ha			
Portion of total	%			
Grazing & Forage	ha	o.3	1.2	2.2
portion of total	%	25 %	41 %	32 %
Other Land Use	ha	o.2	o.3	1.2
Livestock on Farm:				
Cattle: local	LU	1.7	3.3	4.7
improved	LU	o.1	o.5	o.1
Sheep & Goats	LU	1.8	3.4	2.5
Total	LU	3.6	7.2	7.3

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.6	o.5	o.5
Portion of improved cattle kept	%	6 %	13 %	2 %
Portion of Farmers owning a Plough	%	1o %	4o %	5o %
Labour on Farm:				
Family Adults	persons	2.3	3.o	2.3
Perm. Hired Labour	"	-	o.2	o.3
Children > 14 years	"	1.5	2.3	2.5
Persons living on Farm[2] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	1.79	o.24	2.o3
Children < 14 years	"	1.25	-	1.25
Subsistence Units	SU	2.54	o.24	2.78
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1218	1963	
Beans	kg	281	447	
Fingermillet	kg	123	193	
Cabbage	kg	1		
	kg			
	kg			
	kg			
	kg			

1) Major crops only considered

2) Based on 1979 Census figures

KEIYO (ELGEYO) MARAKWET DISTRICT

AEZ: LM 4–5 — TABLE 8c: **FARM ORGANISATION ACCORDING TO FARM SIZE GROUP** — Survey Area 24

Item	Unit	Farm Size & Land Use, Livestock on Farm, Farm Size Group: small	medium	large
Farm Size Total	ha	1.8	3.4	8.3
Land Use: Annual Crops[1]				
First Season		o.1		
Maize	ha	o.5	-	o.3
Fingermillet	ha	o.1	o.1	o.2
Maize & Fingermillet	ha	o.1	o.3	o.3
Cotton	ha	o.1	o.4	o.3
Others	ha	o.2	o.9	o.3
Total	ha	1.1	1.7	1.4
Second Season[1]	ha			
	ha			
	ha			
	ha			
Permanent Crops[1]	ha			
	ha			
	ha			
	ha			
Portion of total	%			
Grazing & Forage	ha	o.5	1.o	5.6
portion of total	%	28 %	29 %	67 %
Other Land Use	ha	o.2	o.7	1.3
Livestock on Farm:				
Cattle: local	LU	3.8	6.7	6.8
improved	LU	o.5	o.8	5.1
Sheep & Goats	LU	5.5	1.7	4.o
Total	LU	9.8	8.2	15.9

Item	Unit	Intensity, Labour/Persons on Farm, Home Consumption, Farm Size Group: small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.6	o.5	o.2
Portion of improved cattle kept	%	12 %	11 %	43 %
Portion of Farmers owning a Plough	%	1o %	-	-
Labour on Farm:				
Family Adults	persons	2.1	2.9	2.9
Perm. Hired Labour	"	o.2	o.3	o.1
Children > 14 years	"	1.1	o.9	1.6
Persons living on Farm[2] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.o9	1.45	3.54
Children < 14 years	"	2.93	-	2.93
Subsistence Units	SU	3.84	1.45	5.29
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1173	1891	
Beans	kg	8o	127	
Fingermillet	kg	244	382	
Cowpeas	kg	82	134	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Beans, Cowpeas, Groundnuts, Sunflower

1) Major crops only considered

2) Based on 1979 Census figures

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 9a: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: UH 1 + LH 2 + UM 4 — Survey Area 22

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	4.5	20.8	0.9	2.4	0.3	2.1
Avg. 1	4.5	21.5	1.5	2.4	1.7	3.7
Up. Qu.	5.7	21.0	1.0	2.0	-	4.0
Lo. Qu.	2.8	12.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	1.0	23	0.2	5	2.7	62	-	1	0.1	3	0.2	5
Avg. 1	1.0	20	0.4	7	2.7	54	0.3	5	0.4	9	0.2	4
Up. Qu.	1.2	38	0.4	9	3.2	70	-	-	0.3	6	0.3	7
Lo. Qu.	0.6	14	-	-	1.2	48	-	-	-	-	0.1	2
Total	30.9		7.2		82.0		1.3		4.0		6.2	

Farming Intensity

Range	cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.9	1.9	3.1	76.3
Avg. 1			3.1	86.2
Up. Qu.	1.0	2.6	4.7	96.6
Lo. Qu.	0.7	1.3	2.5	75.0

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	81.3	2.2	-	5.8	-	-	-	-	-	0.3	-	-	-
Avg. 1	82.7	7.1	-	7.9	-	-	-	0.1	-	1.0	-	-	-
Up. Qu.	100.0	0.8	-	8.6	-	-	-	-	-	-	-	-	-
Lo. Qu.	100.0	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 9b: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: LH 2 + UM 3–4

Survey Area 23

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	2.8	29.7	0.6	2.5	0.1	2.0
Avg. 1	2.8	37.1	1.4	2.5	1.3	3.1
Up. Qu.	3.4	45.0	1.0	3.0	-	3.0
Lo. Qu.	1.2	7.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	%	Perm. Crops ha	%	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	1.5	56	-	-	0.9	36	-	-	-	1	0.2	6
Avg. 1	1.5	40	0.1	3	1.1	29	-	-	0.8	22	0.2	6
Up. Qu.	1.6	71	-	-	1.4	40	-	-	-	-	0.2	9
Lo. Qu.	0.6	35	-	-	0.2	17	-	-	-	-	-	-
Total	43.9		0.1		28.4		-		0.8		4.7	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.0	1.9	5.7	4.0
Avg. 1			5.6	25.5
Up. Qu.	1.0	3.3	11.0	-
Lo. Qu.	1.0	0.2	0.2	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	50.4	-	-	0.4	-	-	-	0.1	-	0.4	-	-	-
Avg. 1	54.5	-	-	35.0	-	-	-	0.4	-	2.1	-	-	-
Up. Qu.	100.0	-	-	-	-	-	-	-	-	-	-	-	-
Lo. Qu.	66.7	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 9c: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: LM 4–5

Survey Area 24

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	3.9	57.9	0.6	2.5	0.2	1.2
Avg. 1	3.9	62.0	1.6	2.5	1.5	2.2
Up. Qu.	6.0	69.0	1.0	3.0	-	2.0
Lo. Qu.	2.0	19.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	1.3	36	-	-	2.0	53	-	-	0.3	9	0.1	3
Avg. 1	1.3	25	-	-	2.8	53	-	-	1.1	20	0.1	2
Up. Qu.	2.0	91	-	-	4.0	62	-	-	0.2	10	0.1	7
Lo. Qu.	0.6	17	-	-	-	-	-	-	-	-	-	-
Total	40.3		-		59.1		-		9.6		2.8	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.8	2.8	5.6	14.5
Avg. 1			3.1	57.1
Up. Qu.	1.0	5.8	4.8	-
Lo. Qu.	0.7	0.8	-	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	52.3	-	-	-	-	-	-	-	-	0.4	-	-	-
Avg. 1	56.9	-	-	-	-	-	-	-	-	0.9	-	-	-
Up. Qu.	100.0	-	-	-	-	-	-	-	-	0.3	-	-	-
Lo. Qu.	40.0	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 10a: **CROPPING PATTERN**

AEZ: UH 1 + LH 2 + UM 4

Survey Area: 22

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.9	1.0	1.20	0.40	26.0	68.6
Beans	0.0	0.4	0.00	0.00	0.4	1.1
Engl. Potatoes	0.1	0.5	0.00	0.00	2.0	5.3
Cabbage	0.0	0.2	0.00	0.00	0.3	0.8
Pyrethrum	0.2	0.4	0.40	0.00	7.2	19.0
Maize & Beans	0.0	0.7	0.00	0.00	1.4	3.7
Maize & Others	0.0	0.6	0.00	0.00	0.6	1.6
Total					38.0	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Engl. Potatoes	0.1	0.5	0.00	0.00	1.6	17.0
Cabbage	0.0	0.3	0.00	0.00	0.6	6.4
Pyrethrum	0.2	0.4	0.40	0.00	7.2	76.6
Total					9.4	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Total					0.0	0.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 10b: **CROPPING PATTERN**

AEZ: LH 2 + UM 3–4

Survey Area 23

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.4	1.2	0.60	0.00	10.5	24.7
Fingermillet	0.2	0.3	0.20	0.00	4.7	11.0
Cabbage	0.0	0.2	0.00	0.00	0.2	0.5
Pyrethrum	0.0	0.1	0.00	0.00	0.1	0.3
Maize & Beans	0.9	1.2	1.20	0.00	27.1	63.6
Total					42.6	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cabbage	0.0	0.2	0.00	0.00	0.2	62.5
Pyrethrum	0.0	0.1	0.00	0.00	0.1	37.5
Total					0.3	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Total					0.0	0.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 10c: **CROPPING PATTERN**

AEZ: LM 4–5

Survey Area 24

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.3	0.9	0.40	0.00	9.6	23.8
Fingermillet	0.1	0.4	0.40	0.00	4.5	11.1
Beans	0.0	0.2	0.00	0.00	1.4	3.5
Cowpeas	0.0	0.2	0.00	0.00	0.4	1.0
Groundnuts	0.0	0.2	0.00	0.00	0.3	0.8
Sunflower	0.0	0.5	0.00	0.00	0.9	2.3
Cotton	0.2	0.8	0.08	0.00	5.9	14.7
Maize & FMilt	0.2	0.7	0.16	0.00	5.9	14.6
Maize & Beans	0.2	0.7	0.40	0.00	5.5	13.6
Maize & Others	0.2	1.2	0.00	0.00	5.9	14.6
Total					40.3	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Total					0.0	0.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Total					0.0	0.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

TABLE 11a: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: UH 1 + LH 2 + UM 4

Sept. '77, Survey Area 22

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.43	0.20	-	1.60				0.56			0.56
	Upper Qu.	1	-	-	3				1.0			1.0
1 - 2 years,	Average	0.43	0.10	0.07	1.67				1.13			1.13
	Upper Qu.	1	-	-	3				2.0			2.0
Over 2 years,	Average	0.30	0.33	0.27		4.20			4.92			4.92
	Upper Qu.	-	-	-		6			6.0			6.0
Subtotal(improved)	Total	35	19	10	98	126			198.4			198.4
	Average	1.17	0.63	0.33	3.27	4.20			6.61			6.61
	Upper Qu.	2	1	-	5	6			9.5			-
	Lower Qu.	-	-	-	1	2			3.0			-
LU Male Cattle =		17.8 % of total cattle,				Calves + Heifers =			77.8 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.23	-	-	0.33		1.47	0.50	0.31	-		0.31
	Upper Qu.	-	-	-	-		2	-	0.2	-		0.2
1 - 2 years,	Average	-	0.03	-	0.43				0.21			0.21
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	0.07	0.20	-		1.03	5.60	1.30	1.53	-	8.37	1.53
	Upper Qu.	-	-	-		-	6	-	0.2	-	4	0.2
Subtotal (unimp.)	Total	9	7	-	23	31	212	54	61.7	-	251	61.7
	Average	0.30	0.23	-	0.77	1.03	7.07	1.80	2.05	-	8.37	2.05
	Upper Qu.	-	-	-	-	-	8	-	1.2	-	11	1.2
	Lower Qu.	-	-	-	-	-	2	-	0.3	-	4	0.3
LU Male Cattle =		20.1 % of total cattle,				Calves + Heifers =			74.2% of dairy cows			
LU Goats + Sheep =		43.1 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	44	26	10	121	157	212	54	260.0	-	251	260.0
	Average	1.47	0.87	0.33	4.03	5.23	7.07	1.80	8.67	-	8.37	8.67
	Upper Qu.	3	1	-	6	6	8	-	10.8	-	11	1.2
	Lower Qu.	-	-	-	2	3	2	-	5.2	-	4	0.3
LU Male Cattle =		18.2 % of total cattle,				Calves + Heifers =			77.1 % of dairy cows			
LU Goats + Sheep =		10.2 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11b: HERD COMPOSITION (GRAZING LIVESTOCK)

– in Head & Livestock Units –

AEZ: LH 2 + UM 3–4

Sept. '77, Survey Area 23

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	-	-	-	0.10				0.03			0.03
	Upper Qu.	-	-	-	-				-			-
1 - 2 years,	Average	-	-	-	0.07				0.03			0.03
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	-	0.03	0.03		0.10			0.15			0.15
	Upper Qu.	-	-	-		-			-			-
Subtotal(improved)	Total	-	1	1	5	3			6.4			6.4
	Average	-	0.03	0.03	0.17	0.10			0.21			0.21
	Upper Qu.	-	-	-	-	-			-			-
	Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =		25.2 % of total cattle,				Calves + Heifers =			166.7 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.40	-	-	0.93		1.67	6.83	1.12	-		1.12
	Upper Qu.	1	-	-	2		2	6	1.4	-		1.4
1 - 2 years,	Average	0.17	-	0.13	0.70				0.45			0.45
	Upper Qu.	-	-	-	1				0.5			0.5
Over 2 years,	Average	0.27	0.03	0.73		2.10	4.70	10.67	3.57	-	7.87	3.57
	Upper Qu.	-	-	2		3	8	14	-	-	-	-
Subtotal (unimp.)	Total	25	1	26	49	63	191	525	154.2	-	236	154.2
	Average	0.83	0.03	0.87	1.63	2.10	6.37	17.50	5.14	-	7.87	5.14
	Upper Qu.	2	-	2	3	3	10	24	7.4	-	10	7.4
	Lower Qu.	-	-	-	-	-	-	-	2.4	-	-	2.4
LU Male Cattle =		32.2 % of total cattle,				Calves + Heifers =			77.8 % of dairy cows			
LU Goats + Sheep =		46.4 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	25	2	27	54	66	191	525	160.6	-	236	160.6
	Average	0.83	0.07	0.90	1.80	2.20	6.37	17.50	5.35	-	7.87	5.35
	Upper Qu.	2	-	2	3	3	10	24	7.4	-	10	7.4
	Lower Qu.	-	-	-	-	-	-	-	2.4	-	-	2.4
LU Male Cattle =		31.7 % of total cattle,				Calves + Heifers =			81.8 % of dairy cows			
LU Goats + Sheep =		44.6 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11c: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: LM 4–5

Sept. '77, Survey Area 24

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.13	-	0.07	0.20				0.10			0.10
Upper Qu.	-	-	-	-				-			-
1 - 2 years, Average	-	-	-	1.80				0.90			0.90
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	0.07	-	0.10		0.47			0.60			0.60
Upper Qu.	-	-	-		-			-			-
Subtotal(improved) Total	6	-	5	60	14			48.0			48.0
Average	0.20	-	0.17	2.00	0.47			1.60			1.60
Upper Qu.	-	-	-	-	-			-			-
Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =	11.5 % of total cattle,				Calves + Heifers =			428.6 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	0.23	0.20	0.10	2.17		5.60	11.60	2.26	3.33		2.76
Upper Qu.	-	-	-	3		6	10	2.2	-		2.2
1 - 2 years, Average	0.53	0.07	1.07	1.63				1.48			1.48
Upper Qu.	-	-	-	2				0.9			0.9
Over 2 years, Average	0.70	0.27	0.37		3.77	10.23	13.20	5.66	-	10.83	5.66
Upper Qu.	1	-	-		6	10	20	0.3	-	-	0.3
Subtotal (unimp.) Total	44	16	46	114	113	475	744	282.1	100	325	297.1
Average	1.47	0.53	1.53	3.80	3.77	15.83	24.80	9.40	3.33	10.83	9.90
Upper Qu.	2	-	-	5	6	17	30	12.1	-	20	13.2
Lower Qu.	-	-	-	-	-	2	6	3.1	-	-	3.1
LU Male Cattle =	32.3 % of total cattle,				Calves + Heifers =			100.9 % of dairy cows			
LU Goats + Sheep =	43.2 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	50	16	51	174	127	475	744	330.1	100	325	345.1
Average	1.67	0.53	1.70	5.80	4.23	15.83	24.80	11.00	3.33	10.83	11.50
Upper Qu.	2	-	-	5	6	17	30	20.5	-	20	13.2
Lower Qu.	-	-	-	1	1	2	6	4.2	-	-	3.1
LU Male Cattle =	27.5 % of total cattle,				Calves + Heifers =			137.0% of dairy cows			
LU Goats + Sheep =	36.9 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 12a: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: UH 1 + LH 2 + UM 4 — Survey Area 22

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	96	5	32	-	0.03	1	-	3,091
	UpQu	100	13	58	-	-	-	-	3,375
	LoQu	100	-	-	-	-	-	-	1,800
Engl. Potatoes	Avg.	-	26	11	-	-	1	-	3,100
	UpQu	-	16	-	-	-	-	-	2,500
	LoQu	-	-	-	-	-	-	-	2,250
Cabbage	Avg.	67	11	26	-	-	9	-	7,856
Maize & Beans									
Maize	Avg.	100	-	-	-	-	-	-	4,500
Beans	Avg.	-	-	-	-	-	-	-	200
Second Rains									
Engl. Potatoes	Avg.	-	29	1	-	-	3	3	3,300
Cabbage	Avg.	100	-	-	-	-	50	50	13,500
Perennial Crops									
Pyrethrum	Avg.	-	-	-	-	-	-	-	1,297
	UpQu	-	-	-	-	-	-	-	833
	LoQu	-	-	-	-	-	-	-	357

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 12b: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: LH 2 + UM 3–4 — Survey Area 23

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	80	-	-	-	0.83	1	-	3,251
	UpQu	100	-	-	-	-	3	-	3,600
	LoQu	-	-	-	-	-	-	-	1,725
Fingermillet	Avg.	-	-	-	-	-	-	-	1,103
	UpQu	-	-	-	-	-	-	-	1,500
	LoQu	-	-	-	-	-	-	-	500
Maize & Beans									
Maize	Avg.	95	-	1	-	0.43	1	-	2,950
Beans	Avg.	-	-	1	-	-	-	-	332
Maize	UpQu	100	-	-	-	0.21	1	-	4,500
Beans	UpQu	-	-	-	-	-	-	-	533
Maize	LoQu	100	-	-	-	-	-	-	2,077
Beans	LoQu	-	-	-	-	-	-	-	200
Second Rains									
Cabbage	Avg.	100	-	-	-	-	40	40	6,000
Perennial Crops									
Pyrethrum	Avg.	-	-	-	-	-	-	-	2,400

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 12c: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: LM 4–5

Survey Area 24

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	100	-	-	-	0.03	1	-	4,430
	UpQu	100	-	-	-	-	-	-	5,600
	LoQu	100	-	-	-	-	-	-	3,150
Fingermillet	Avg.	-	-	-	-	-	-	-	1,836
	UpQu	-	-	-	-	-	-	-	2,250
	LoQu	-	-	-	-	-	-	-	450
Beans	Avg.	-	-	-	-	-	-	-	1,033
	UpQu	-	-	-	-	-	-	-	1,333
	LoQu	-	-	-	-	-	-	-	500
Ground nuts	Avg.	-	-	-	-	-	-	-	3,646
Cotton	Avg.	71	-	-	-	-	5	-	1,259
	UpQu	100	-	-	-	-	4	-	1,750
	LoQu	-	-	-	-	-	-	-	263
Maize & FMilt									
Maize	Avg.	71	-	-	-	-	-	-	4,300
FMilt	Avg.	-	-	-	-	-	-	-	1,484
Maize	UpQu	100	-	-	-	-	-	-	5,625
FMilt	UpQu	-	-	-	-	-	-	-	2,000
Maize	LoQu	-	-	-	-	-	-	-	2,925
FMilt	LoQu	-	-	-	-	-	-	-	750
Maize & Beans									
Maize	Avg.	86	-	-	-	-	-	-	4,240
Beans	Avg.	-	-	-	-	-	-	-	338
Maize	UpQu	100	-	-	-	-	-	-	5,708
Beans	UpQu	-	-	-	-	-	-	-	600
Maize	LoQu	100	-	-	-	-	-	-	3,000
Beans	LoQu	-	-	-	-	-	-	-	84
Second Rains									
Perennial Crops									

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 13a: DISPOSAL OF CROPS

AEZ: UH 1 + LH 2 + UM 4 | Survey Area 22

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	97,370	630	1	39,980	41	56,760	58
Maize & Beans	7,800	0	0	3,490	45	4,310	55
Maize & Others	2,150	0	0	560	26	1,590	74
Engl. Potatoes	6,430	0	0	6,250	97	180	3
Cabbage	6,260	0	0	5,460	87	800	13
Second Rains							
Engl. Potatoes	5,430	0	0	5,100	94	330	6
Cabbage	2,700	0	0	9,000	333	-6,300	-233
	Permanent Crops						
Pyrethrum	380	1,080	284	0	0	-700	-184

TABLE 13b: DISPOSAL OF CROPS

AEZ: LH 2 + UM 3–4 | Survey Area 23

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	39,735	4,350	11	14,580	37	20,805	52
Maize & Beans	79,375	11,000	14	26,260	33	42,115	53
Fingermillet	4,285	0	0	610	14	3,675	86
Cabbage	600	0	0	400	67	200	33
Second Rains							
Cabbage	1,200	0	0	1,000	83	200	17
	Permanent Crops						
Nil							

TABLE 13c: **DISPOSAL OF CROPS**

AEZ: LM 4–5

Survey Area 24

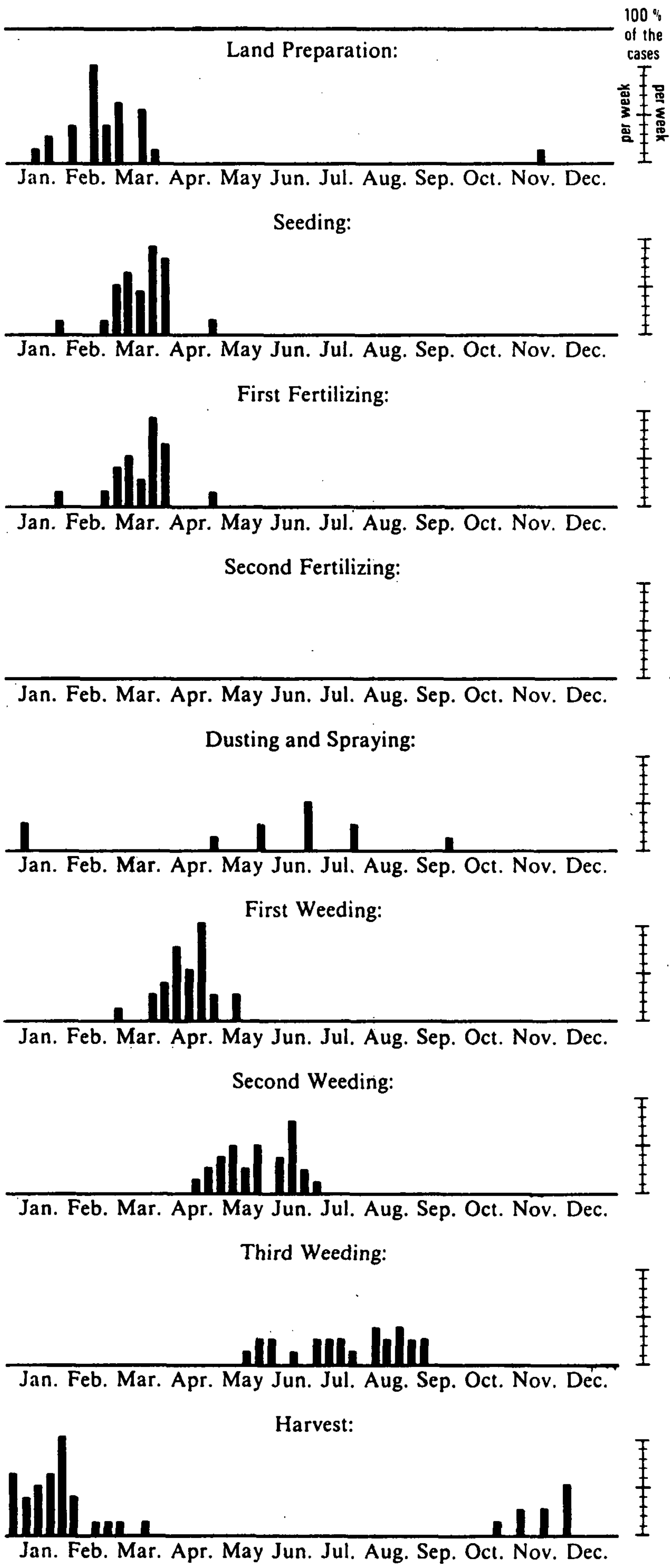
Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	40,720	0	0	21,380	53	19,340	47
Maize & Beans	21,595	0	0	12,865	60	8,730	40
Maize & FMilt	21,135	0	0	9,940	47	11,195	53
Maize & Others	28,070	0	0	16,600	59	11,470	41
Beans	1,300	0	0	660	51	640	49
Fingermillet	8,000	0	0	2,910	36	5,090	64
Cowpeas	480	0	0	320	67	160	33
Groundnuts	1,125	500	44	625	56	0	0
Sunflower	920	920	100	0	0	0	0
Cotton	6,531	6,342	97	0	0	189	3
Second Rains							
Nil							
Permanent Crops							
Nil							

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 14a: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 28

AEZ: UH 1 + LH 2 + UM 4 Survey Area 22 Sample Size: 30

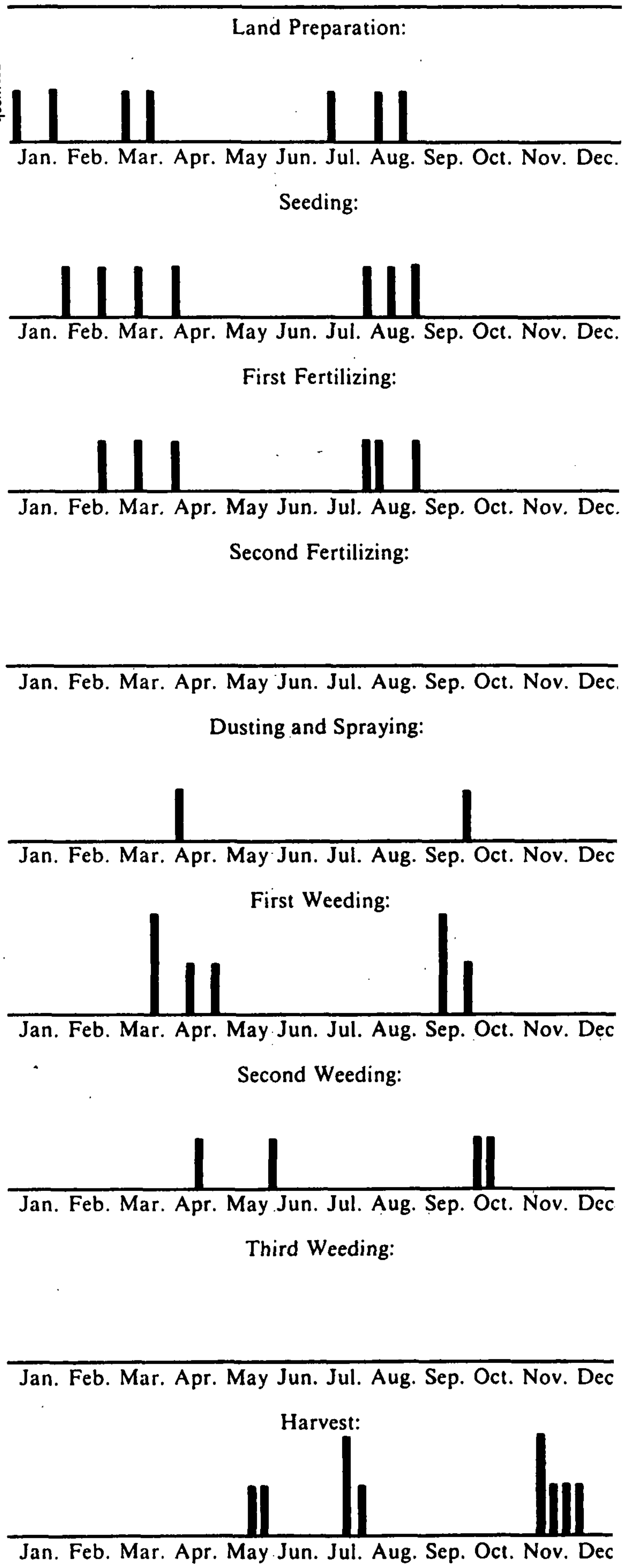


KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 14b: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 7

AEZ: UH 1 + LH 2 + UM 4 Survey Area 22 Sample Size: 30

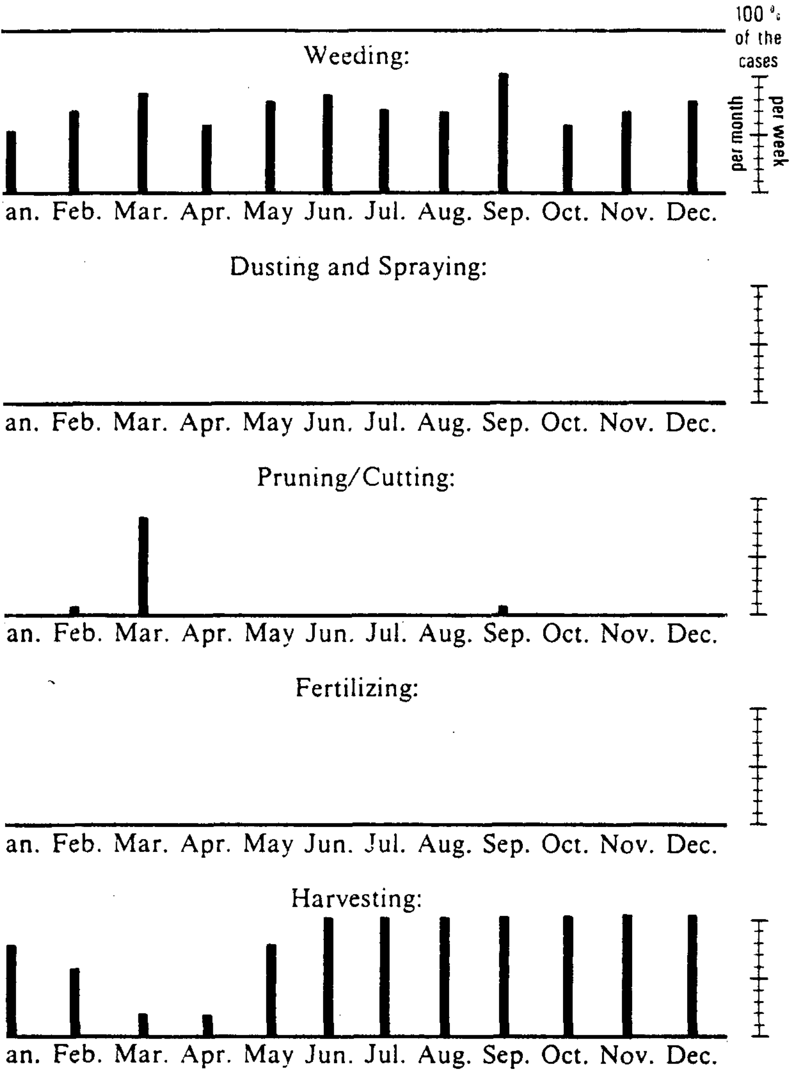


EIYO (ELGEYO) MARAKWET DISTRICT

TABLE 14c: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 52 **Pyrethrum** Cases: 19

EZ: UH 1 + LH 2 + UM 4 Survey Area 22 Sample Size: 30

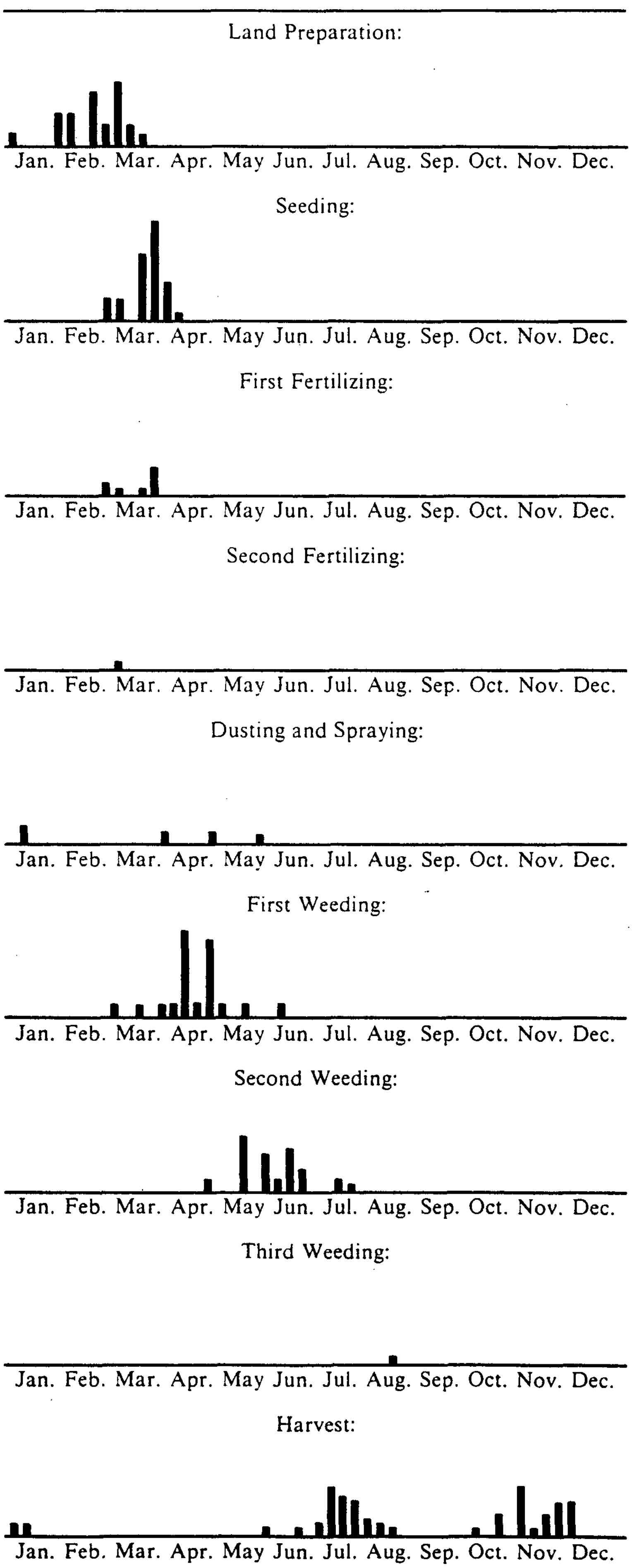


KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 14d: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 46[1)]

AEZ: LH 2 + UM 3–4 Survey Area 23 Sample Size: 30



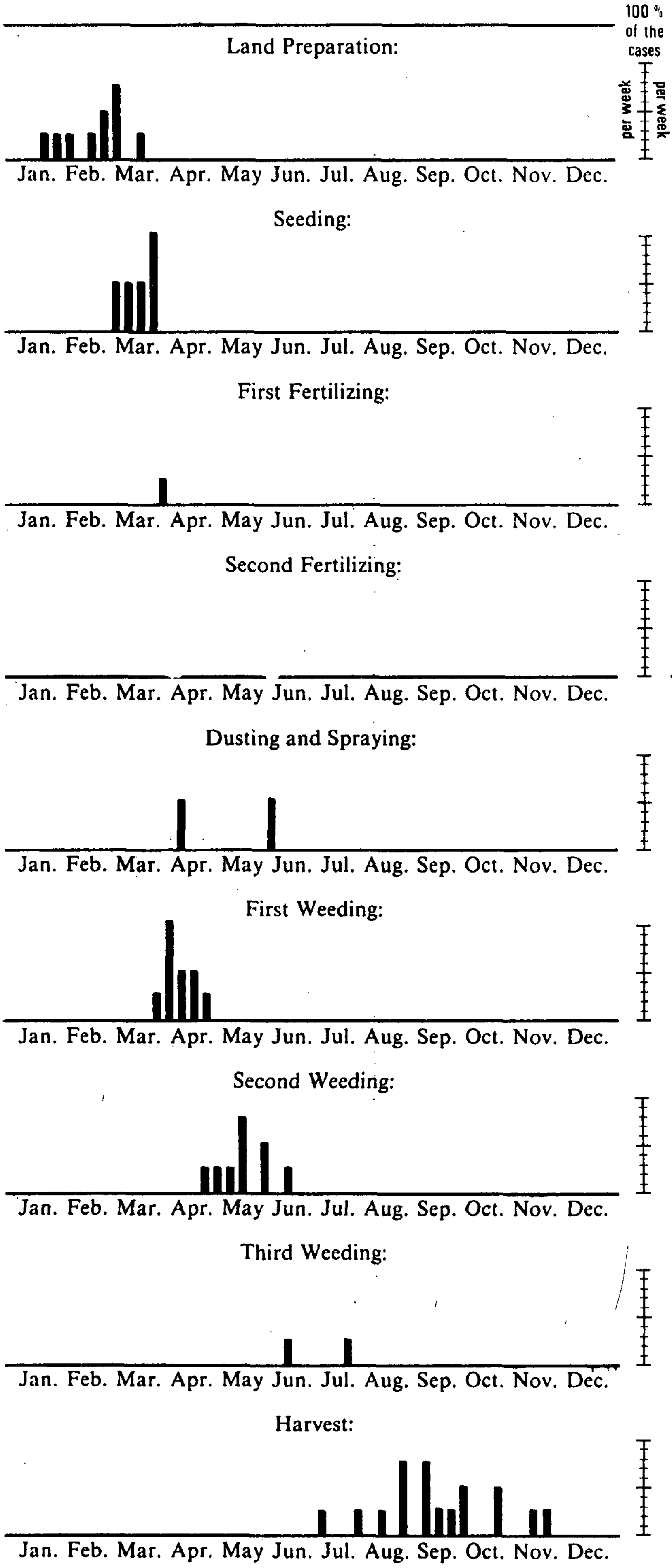
1) Maximum 30 per crop and season

KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 14e: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 10

AEZ: LM 4–5 Survey Area 24 Sample Size: 30

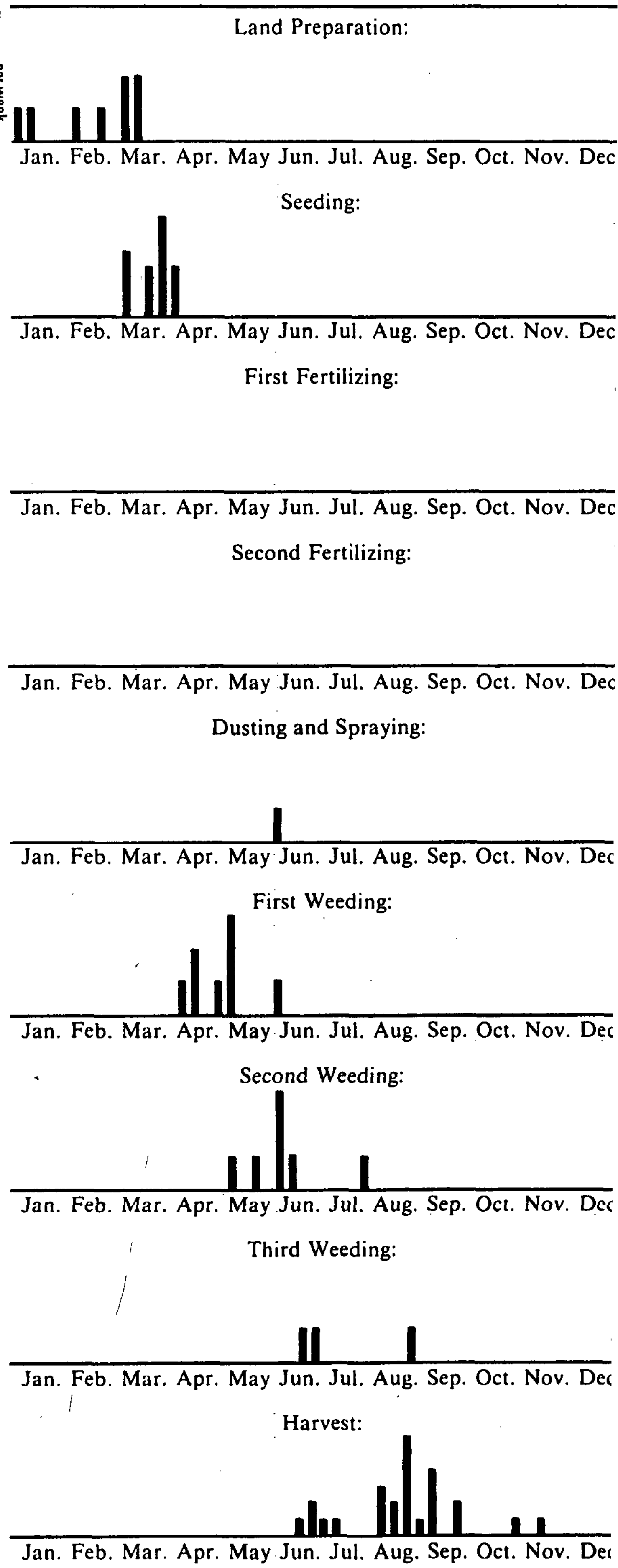


KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 14f: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 16

AEZ: LM 4–5 Survey Area 24 Sample Size: 3

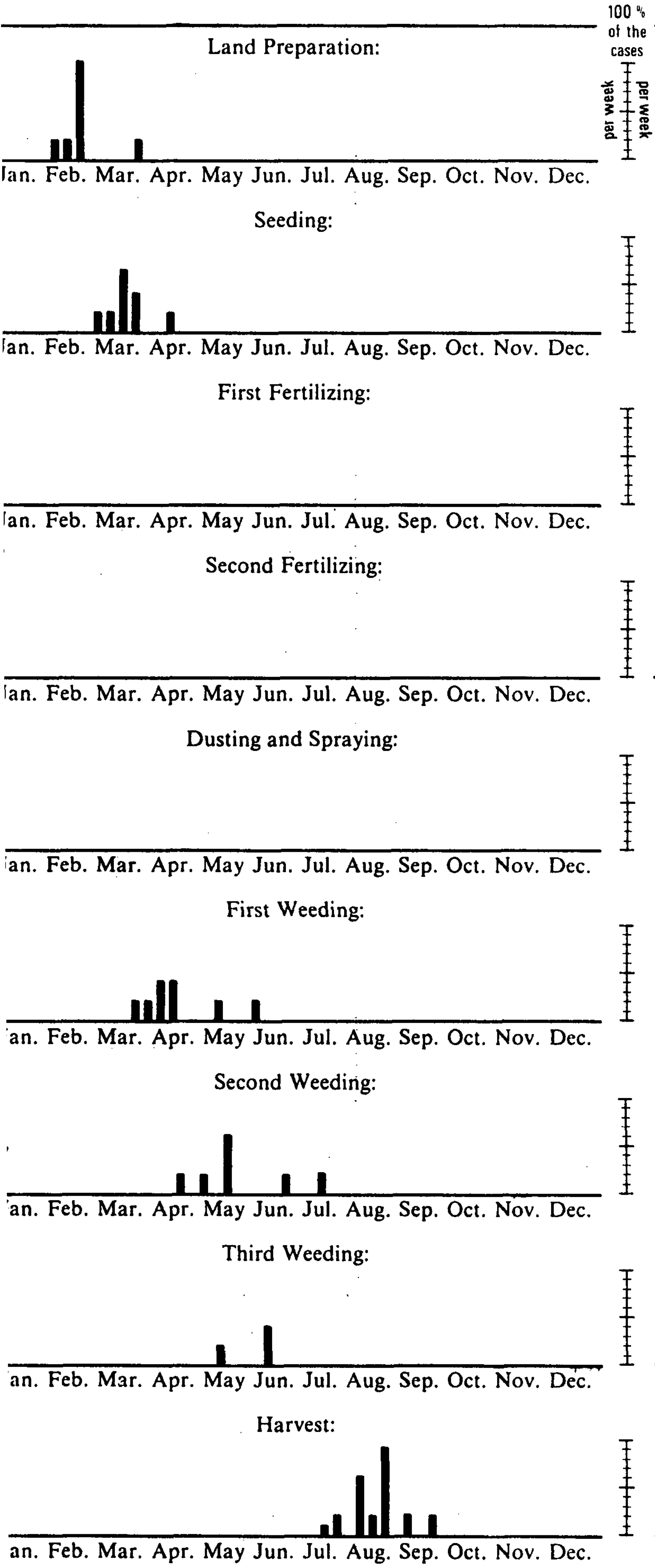


EIYO (ELGEYO) MARAKWET DISTRICT

TABLE 14g: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 3 **Maize & Fingermillet** Cases: 16

EZ: LM 4–5 Survey Area 24 Sample Size: 30

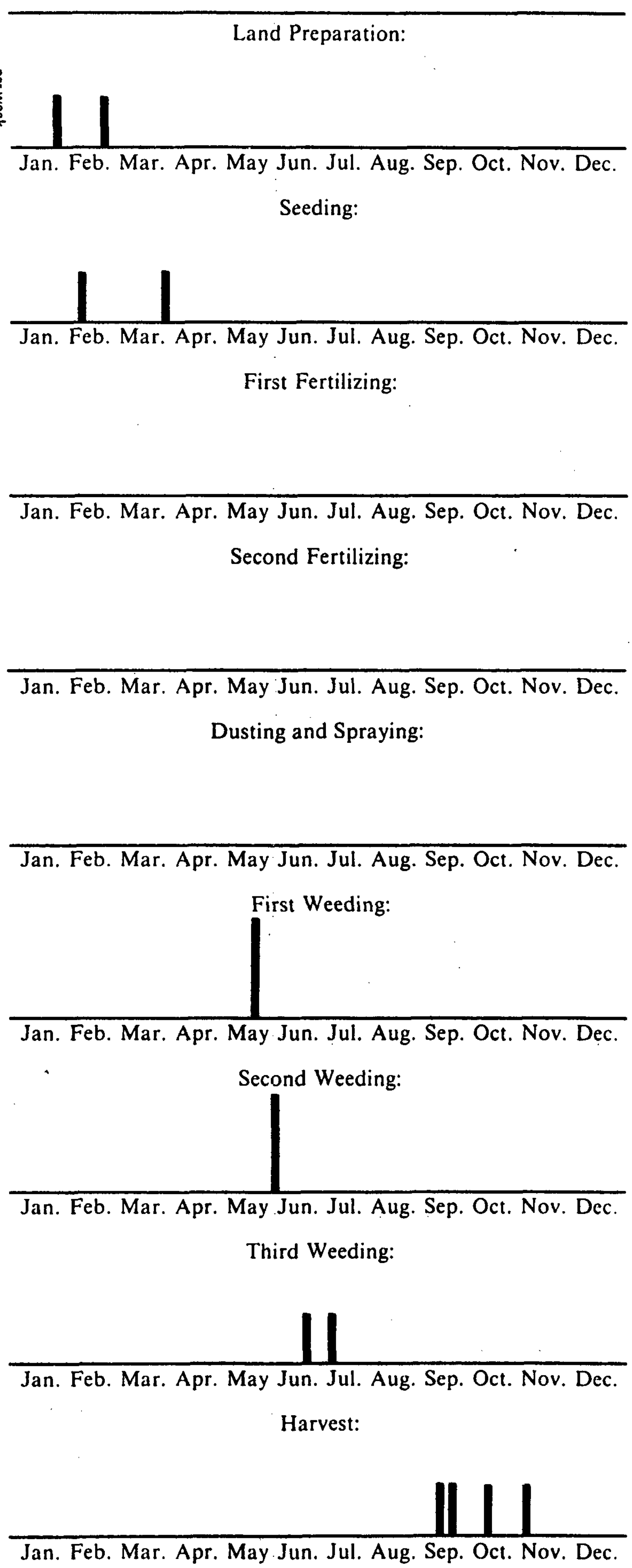


KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 14h: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 24 **Groundnuts** Cases: 2

AEZ: LM 4–5 Survey Area 24 Sample Size: 30



KEIYO (ELGEYO) MARAKWET DISTRICT

TABLE 14i: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 35 Cotton Cases: 7

AEZ: LM 4–5 Survey Area 24 Sample Size: 30

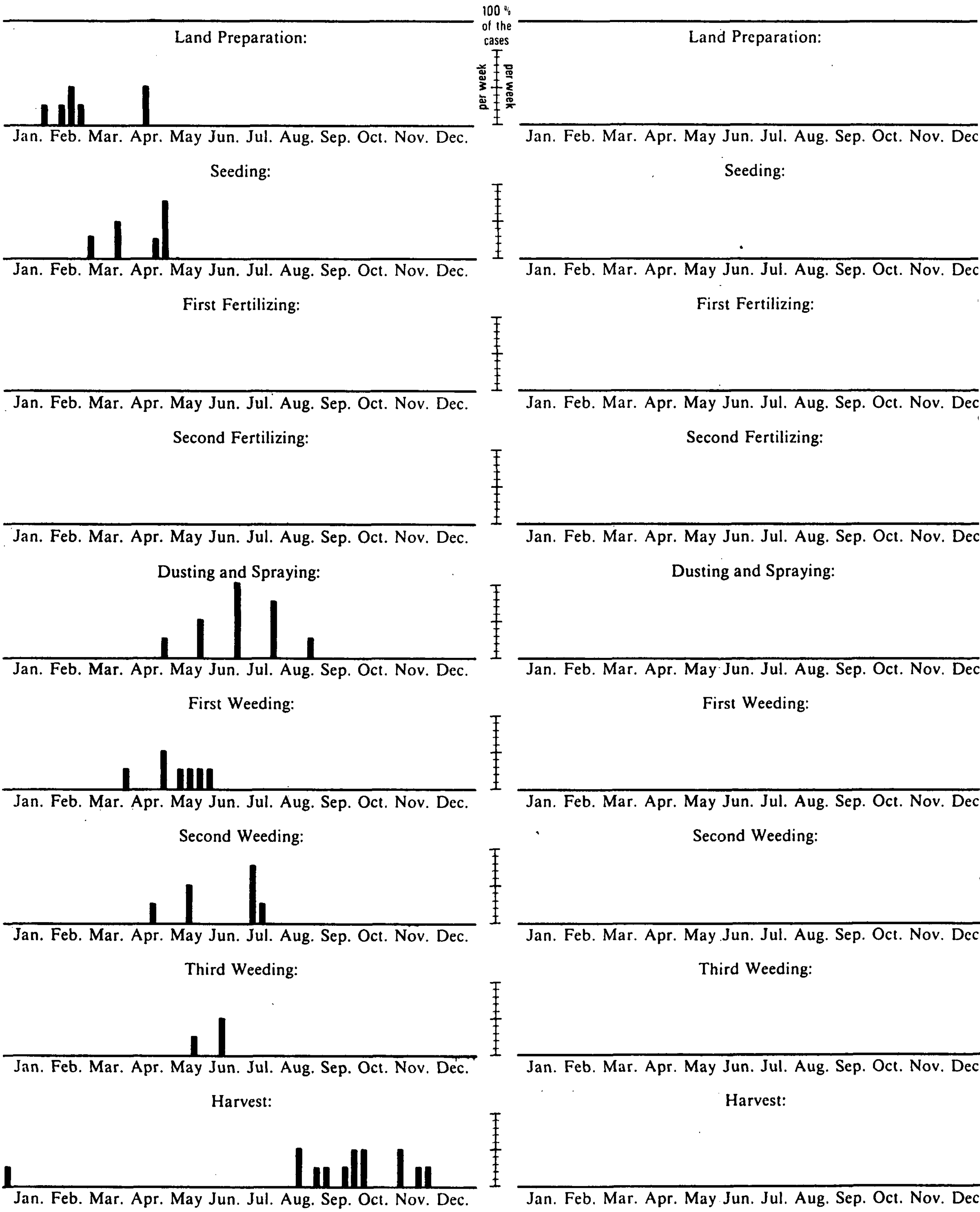


TABLE 15a: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UH 1 SHEEP - DAIRY ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE							
		Vegt. Period 1st + 2nd: vli or two; in Days, 1st: 110 or more		2nd: 190-200	total: 300-310	fvl i or l-(s)i; 100 or more		140-200	240-300				
		Soil: FERRALSOLS				REGOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	2,000			3,900	2,000			4,500				
Fertilizer N	kg				105				138				
P_2O_5	kg				52				69				
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg					3,500			7,000				
Fertilizer N	kg								194				
P_2O_5	kg								97				
K_2O													
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg	400	400	600	800								
Fertilizer N	kg			5	10								
P_2O_5	kg			11	22								
K_2O	kg												
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg					1,200	2,000	2,500	2,700				
Fertilizer N	kg						19	31	36				
P_2O_5	kg						40	65	75				
K_2O	kg												
CROP: BARLEY													
Farmers in Production Level	%												
Yields	kg	1,400	1,100	1,800	2,000								
Fertilizer N	kg			8	12								
P_2O_5	kg			14	22								
K_2O	kg												
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg					1,500	2,800	3,500	4,000				
Fertilizer N	kg						33	50	75				
P_2O_5	kg						36	56	70				
K_2O	kg												

TABLE 15b: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UH 1 SHEEP - DAIRY ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE							
		Vegt. Period 1st + 2nd: vli or two in Days, 1st: 110 or more		2nd: 190-200	total: 300-310	fvl i or l-(s)i 100 or more		140-200	240-300				
		Soil: FERRALSOLS				REGOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	4,800	12,000	15,000	25,000	4,800	15,000	- 22,000	30,000				
Fertilizer N	kg		58	82	162		81	138	201				
P_2O_5	kg		72	102	202		91	172	252				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,200	12,000	20,000	24,000	3,000	6,000	14,000	26,000				
Fertilizer N	kg		55	111	139		21	77	161				
P_2O_5	kg		55	111	139		21	77	161				
K_2O													
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15c: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE				A.E.Z.: LM 4 MARGINAL COTTON ZONE				A.E.Z.: LM 5 LIVESTOCK/MILLET ZONE			
		Vegt. Period 1st + 2nd: f(l)i or two; in Days, 1st: 80 or more		2nd: 100-150	total: 180-230	(m/l)i or two; 70 or more		80-110	150-180	(vs~s/vs)i; 50 or more		70-100	120-150
		Soil: CAMBISOLS				ACRISOLS				FLUVISOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	1,200			2,400	750			1,500	450			900
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg	2,400			3,500	1,500			3,000				
Fertilizer N	kg												
P_2O_5	kg												
K_2O													
CROP: COTTON													
Farmers in Production Level	%												
Yields	kg					550		800	1,100				
Fertilizer N	kg							28	61				
P_2O_5	kg							20	44				
K_2O	kg												
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,300	1,800	2,800	3,500	800	1,500	1,700	1,700				
Fertilizer N	kg			13	30		18	23	23				
P_2O_5	kg			14	34		20	25	25				
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg	2,000	900	2,500	3,800	1,500	1,500	2,000	2,200	1,200	600	1,200	2,200
Fertilizer N	kg			15	60			15	22				32
P_2O_5	kg			13	57			13	16				28
K_2O	kg												
CROP: MILLET													
Farmers in Production Level	%												
Yields	kg					1,300	600	1,200	1,400				
Fertilizer N	kg								5				
P_2O_5	kg								5				
K_2O	kg												

TABLE 15d: **PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES**
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE				A.E.Z.: LM 4 MARGINAL COTTON ZONE				A.E.Z.: LM 5 LIVESTOCK/MILLET ZONE			
		Vegt. Period 1st + 2nd: in Days, 1st: f(l)i or two 80 or more		2nd: 100-150	total: 180-230	(m/l)i or two 70 or more		80-110	150-180	(vs-s/vs)i 50 or more		70-100	120-150
		Soil: CAMBISOLS				ACRISOLS				FLUVISOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg					750		600	900				
Fertilizer N	kg								10				
P_2O_5	kg								7				
K_2O	kg												
CROP: COW PEAS													
Farmers in Production Level	%												
Yields	kg									800		800	1,200
Fertilizer N	kg												16
P_2O_5	kg												16
K_2O													
CROP: GRAMS													
Farmers in Production Level	%												
Yields	kg					800		1,000	1,100				
Fertilizer N	kg							5	8				
P_2O_5	kg							7	11				
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yields	kg					500		600	800				
Fertilizer N	kg							4	12				
P_2O_5	kg							4	11				
K_2O	kg												
CROP: GROUNDNUTS													
Farmers in Production Level	%												
Yields	kg									800		800	1,300
Fertilizer N	kg												16
P_2O_5	kg												16
K_2O	kg												

TABLE 15e: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE				A.E.Z.: LM 4 MARGINAL COTTON ZONE				A.E.Z.: LM 5 LIVESTOCK/MILLET ZONE			
Vegt. Period 1st + 2nd: in Days, 1st:		f(l)i or two 80 or more		2nd: 100-150	total: 180-230	(m/l)i or two 70 or more		80-110	150-180	(vs-s/vs)i 50 or more		70-100	120-150
Soil:		CAMBISOLS				ACRISOLS				FLUVISOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	6,500	5,000	7,000	16,000								
Fertilizer N	kg			4	76								
P_2O_5	kg			3	67								
K_2O	kg												
CROP: CASSAVA													
Farmers in Production Level	%												
Yields	kg					3,500	2,100	4,000	6,000				
Fertilizer N	kg							2	10				
P_2O_5	kg							4	18				
K_2O													
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

BARINGO DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The Baringo District, with 9,885 sqkm, is exceptionally large, about double most other Kenyan districts. For this reason, the scale of the district maps could only be half of most others. The problem of this district is the fact that 45 % of its land is too steep or too dry for agriculture (Inner Lowland and Lower Midland Ranching Zones IL 6 and LM 6, except on alluvial valley soils with ground water, with water concentration and runoff-catching agriculture or with additional irrigation).

Although the annual average rainfall in the zones IL 6 and LM 6 seems adequate with 500–700 mm, distribution during the year is scattered into three seasons making each one too weak and short (see Diagram Nginyang=Kinyang). The 60 % **reliability** of rainfall for the **agro-humid** period of the first rains (April-May) is only about 50–100 mm compared to the **average** of the **total** first rains which is 170–300 mm (March-June).[1] For the more reliable middle or second rains, the figures are 80–150 mm compared to 125–250 mm (July-September). In 6 out of 10 years the third peak in November is too weak to create at least one decade with agro-humid conditions. On the other hand, the evaporative demand is very high there, 2100–2300 mm per year, due to a low relative humidity (35 % average at 15^{00}), and the mean temperature is nearly 2^{0} higher than normal at this altitude: the upper limit of the Lowland Zones is at about 1000 m (in East Kenya at 700 m).

35 % of the district is semi-arid and still very risky and marginal for usual agriculture, especially for maize cultivation, and is therefore classified as Livestock-Sorghum and Livestock-Millet Zones (UM 5 and LM 5). Here, the methods of water concentrated and runoff-catching agriculture are even more effective than in LM 6 or IL 6 and allow many crops to grow.

15 % of the district is still sub-arid (UM 4 and LM 4) with a weak performance in the agro-humid season, so that the name „Maize-Sunflower Zone“ in the Upper Midlands UM 4 does not indicate the same potential as the Kitale area. This is expressed in the different symbols of the subzones (see the AEZ maps Baringo and Trans Nzoia). In the Lower Midlands there is a potential for cotton. Although climatically it is only a Marginal Cotton Zone (LM 4), on alluvial fans (with groundwater) on the border of the Kerio Valley good cotton yields are also possible – unfortunately these are not so very extensive.

Nevertheless, these areas need more agriculture and better livestock management, and also improvement of the fodder situation because with present methods, the land is absolutely overexploited: soil erosion is tremendous, **decreasing** the potential for an **increasing** population. Valuable investigative work has been done[2] and practical testing continues at the new Research Station for marginal and semi-arid areas in Marigat, as well as at the Catholic Mission in Kositei, and in many experimental plots of both.

The contrast areas to these marginal and semi-arid lands are the Tugen Hills, an uplift inside the Rift Valley. Here the natural conditions are also not too good, the Coffee Zone is mainly marginal (UM 3) due to moisture, altitude and soils, and it is small, covering only 1.5 % of the district, the zones 2 and 3 together 5 %. But the Tugen people are industrious, working hard to make the best out of their small plots on the top of steep slopes. Unfortunately the hills are uplifted like a desk, which makes the eastern side very steep due to gulley erosion, and the soils are removed from the less steep western side by sheet erosion. Soil conservation must be improved, but what people need most now is a better supply of fertilizers and high quality seeds and seedlings.

The best area of the district lies southwest of Eldama Ravine where the Wheat/Maize-Barley Zone (LH 2) is still so low, and the volcanic soil so fertile, that good yields of maize can be achieved.

[1] The figure for the total rainy season is important for water concentrated agriculture, because this method creates longer agro-humid conditions on the planted spots.

[2] Catholic Diocese of Nakuru: East Pokot Agricultural Project. Progress Reports by Edmund Barrow and others, Kositei Cath. Mission, P.O. Marigat, 1978 ff. (Mimeo). G.O.K./USAID; Consortium for International Development: Marginal/Semi-Arid Lands Preinvestment Inventory. Nairobi 1978

BARINGO DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**

having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
8836010 762 m	Kappedo	10	Average	377	17	16	22	66	38	46	47	56	23	17	22	7
8935007	Eldama Ravine, D.O.	61	Av.	1 119	30	41	84	171	145	94	126	131	76	75	94	53
2 194 m			60%prob.[1)]	929	3	11	31	128	103	55	102	110	55	47	43	19
8935020	Kabarnet, D.O.	55	Av.	1 346	30	46	78	187	168	130	204	233	83	52	85	55
2 042 m			60 %	1 206	6	11	36	152	131	93	188	192	56	46	39	22
8935051	Kabartonjo, Prim.	29	Av.	1 445	53	59	84	183	183	104	203	221	89	68	114	85
2 255 m	School		60 %	1 227	16	7	38	116	168	72	158	179	46	47	90	23
8935087	Esageri, Controlled	19	Av.	1 082	52	48	74	133	136	98	132	118	65	73	94	59
1 737 m	Grazing Scheme		60 %	888	25	16	52	101	120	57	84	107	41	43	84	16
8935091	Tenges	21	Av.	1 138	28	23	64	177	151	97	153	158	75	58	82	75
1 889 m	Coffee Nursery		60 %	1 054	8	9	29	114	123	62	141	138	51	47	42	8
8935092	Poi, Dispensary	15	Av.	956	15	19	39	151	144	69	116	140	54	39	95	75
1 676 m			60 %	901	6	8	26	93	111	60	97	104	13	23	57	17
8935109	Narasha Forest	24	Av.	1 233	46	50	81	191	154	84	121	148	77	68	123	91
2 377 m	Station		60 %	1 100	9	12	68	172	113	63	85	130	41	65	90	32
8935128 1 950 m	Kabarnet, Demonstr. Holding	17	Av.	1 383	35	58	83	182	135	114	189	213	85	97	117	74
8935143	Cheberen	15	Av.	949	32	31	61	159	106	54	118	117	54	68	86	63
1 371 m			60 %	811	3	4	53	86	73	32	81	92	41	37	48	21
8935146	Barwesa	17	Av.	915	37	36	58	122	144	79	98	95	68	30	91	59
1 676 m			60 %	688	0	0	18	53	114	29	60	46	33	13	16	3
8935149	Talal	15	Av.	1 316	70	20	111	175	171	81	136	194	63	71	141	84
2 133 m			60 %	1 161	6	9	36	65	95	59	115	171	50	56	60	19
8935153 1 981 m	Kabarnet, Bartolimo Agric. Station	10	Av.	1 229	43	63	90	181	178	83	156	157	79	84	86	30
8935155 2 194 m	102 Ravine Scheme	10	Av.	1 412	43	36	87	245	176	120	169	173	86	77	135	64
8935163	Perkerra Irrigation	20	Av.	652	41	23	62	70	83	52	77	86	37	36	47	40
1 066 m	Scheme, Marigat		60 %	590	2	4	25	44	53	37	75	69	27	29	27	3
8936020	Nginyang, Health	26	Av.	584	18	17	34	88	90	72	94	79	29	26	28	12
914 m	Centre		60 %	467	0	3	7	39	64	35	71	49	13	25	17	0
8936026	Kabarnet, Hot	31	Av.	731	24	24	52	105	80	62	106	96	57	50	48	29
1 219 m	Springs Disp.		60 %	651	7	4	34	63	68	17	70	59	33	45	35	9
8936067 975 m	Snake Farm, Lake Baringo	10	Av.	693	34	32	58	81	73	99	86	102	32	26	60	11
9035006	Kamara Shops	47	Av.	1 270	42	48	91	197	152	107	151	164	85	58	99	77
2 560 m			60 %	1 140	19	21	56	173	121	88	127	147	72	47	53	44
9035028	Maji Mazuri F.	46	Av.	1 242	41	45	94	201	147	104	141	143	77	64	111	75
2331 m	Station		60 %	1 112	14	18	52	159	124	79	113	119	76	53	75	43
9035035	Sabatia,	31	Av.	1 129	35	28	87	167	143	103	132	144	75	60	95	62
2 209 m	Forest School		60 %	1 006	15	0	21	73	129	74	61	115	39	55	114	47
9035155	Londiani, Makutano	16	Av.	1 558	57	57	87	168	121	103	118	177	7	54	100	76
2 416 m	Forest Station		60 %	1 162	8	15	48	140	90	78	81	133	48	36	64	33
9035231	Esageri Forest	12	Av.	1 222	59	53	84	198	140	70	120	123	71	72	151	80
2 133 m	Station		60 %	1 149	7	8	43	154	79	54	107	103	61	63	69	18

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

BARINGO DISTRICT

TABLE 2: **TEMPERATURE DATA**

No. and altitude	Name of Station	AEZ[1]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
9835007	Eldama	LH 3	Mean max.	24.7	24.8	26.2	24.5	23.7	23.4	22.3	21.9	23.4	23.8	22.4	23.4	23.7	17
2 147 m	Ravine,	hp	Mean temp.	16.4	16.8	17.6	17.2	16.5	16.1	15.5	15.2	15.7	16.0	15.8	15.7	16.2	
	Police Stat.		Mean min.	8.2	8.8	9.1	9.9	9.4	8.9	8.7	8.6	8.0	8.3	9.2	8.0	8.8	
	(operating		Abs. min.	2.8	2.8	4.4	5.6	4.4	3.3	2.2	3.3	3.3	3.3	3.3	2.8	2.2	
	to 1932)																
8935163	Perkerra	IL 6	Mean max.	33.2	33.7	33.6	32.6	32.4	32.0	30.3	31.0	33.1	32.9	31.3	31.4	32.3	12
1 065 m	Irrigation	hp –	Mean temp.	24.7	25.3	25.7	25.3	24.8	24.1	23.7	23.5	24.4	24.8	24.2	23.9	24.5	
	Scheme,	LM 5	Mean min.	16.2	17.0	17.8	18.0	17.2	16.3	17.1	16.1	15.7	16.8	17.2	16.5	16.8	
	Marigat	lp	Abs. min.	11.3	10.9	12.5	14.9	13.4	10.2	12.5	11.7	12.1	12.9	12.1	10.2	10.2	

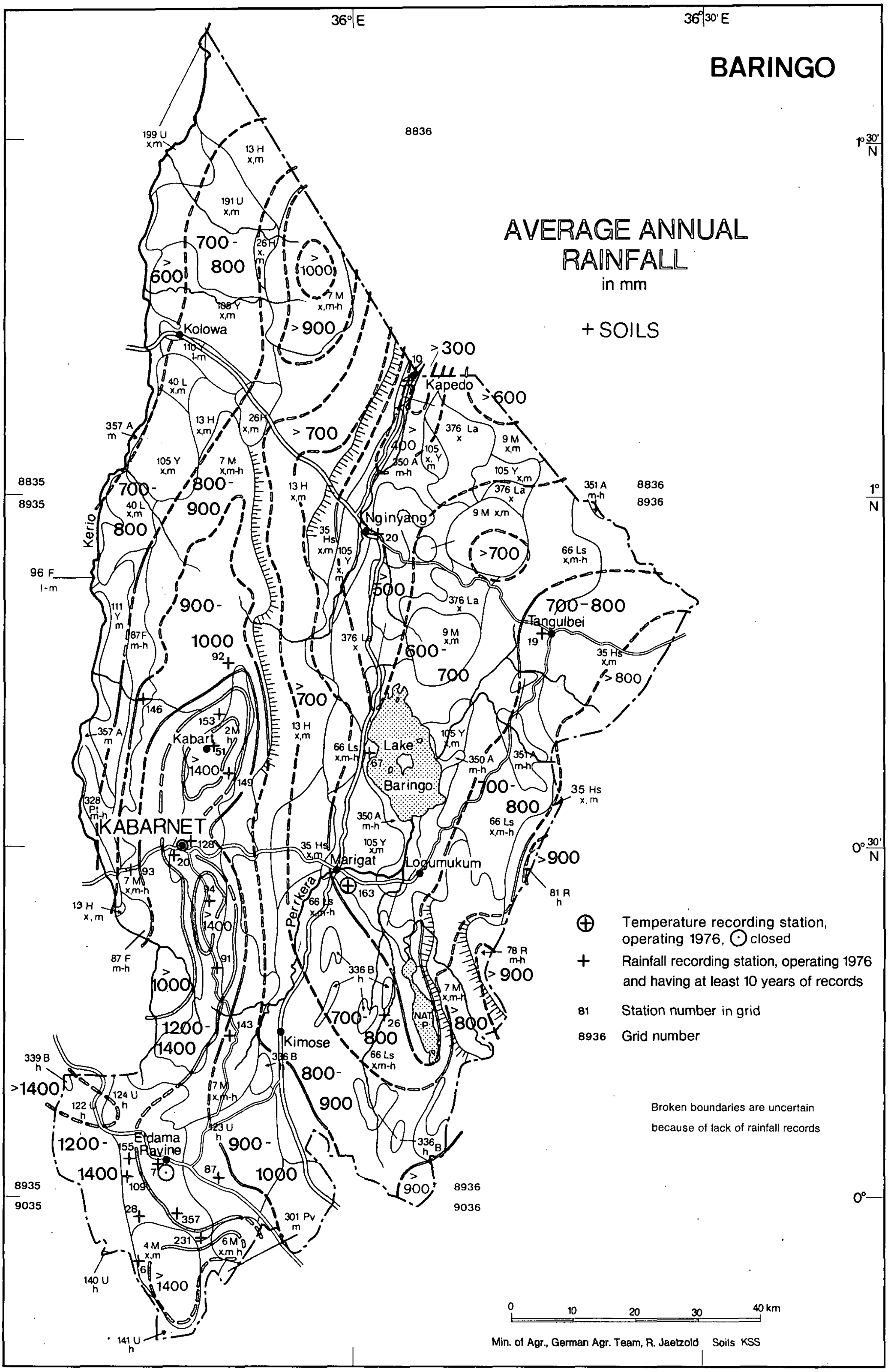
(Temperature in °C)

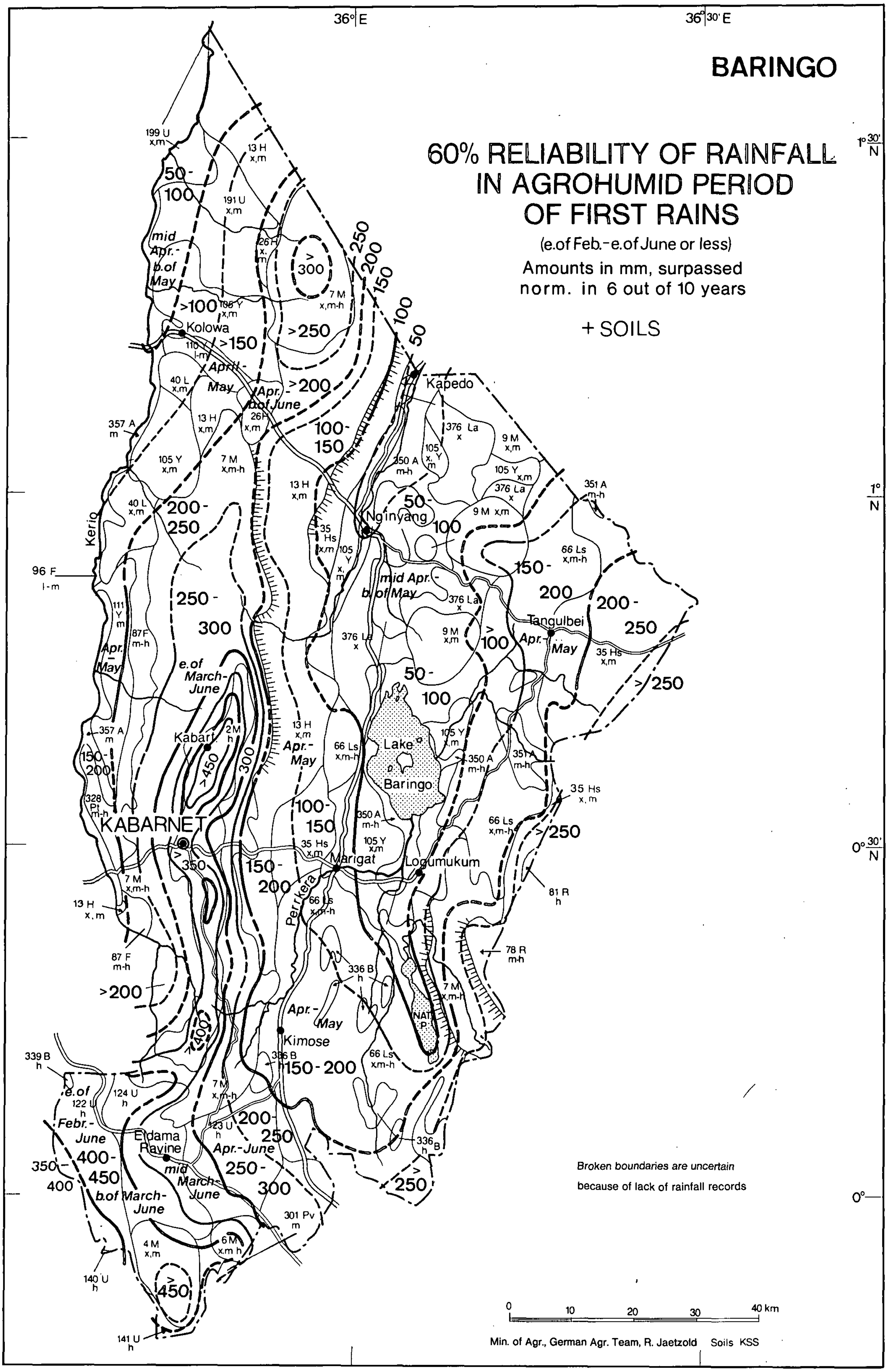
1) AEZ = Agro-ecological zone; lp = lower places, hp =higher places within the zone

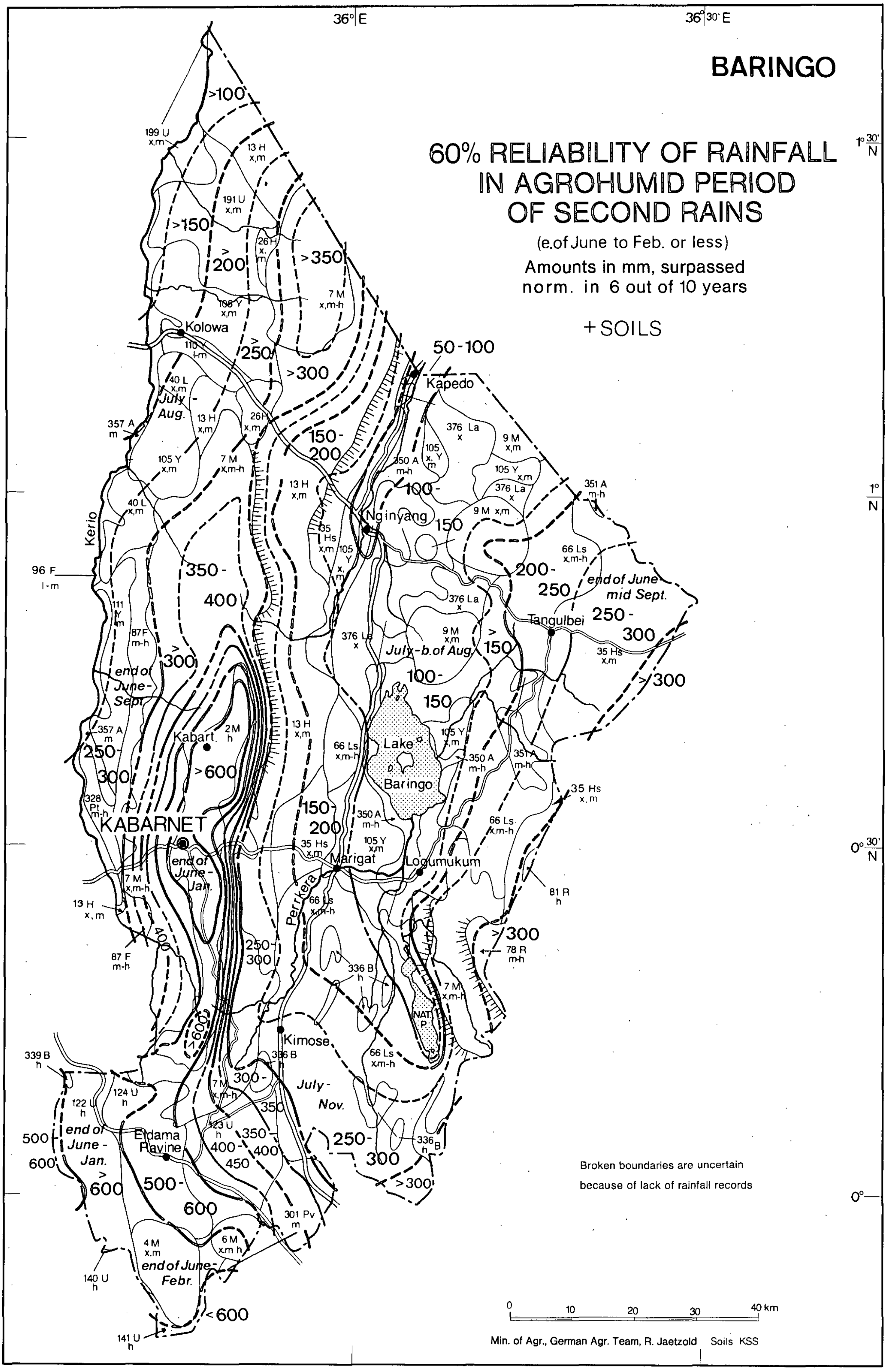
TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2] in days	2nd rains in days	Total[3] in days
UH 1 Sheep-Dairy Zone	Here Forest Reserve (very steep, cold and wet)								
UH 2 Pyrethrum – Wheat Zone	vl i or two	2 400–2 700	15.0–12.2	1 200–1 500	350–450	500–650	105 or more	200–240	305–345
LH 2 Wheat/Maize – Pyrethrum Zone	vl i or two	2 100–2 400	16.5–15.0	1 200–1 450	350–450	480–630	100 or more	185–210	285–310
LH 3 Wheat/(M.) – Barley Zone	(vl) i or two	1 960–2 400	18.0–15.0	900–1 300	250–400	300–600	95 or more	190–205	285–300
	(vl) or two			1 100–1 200	310–350	500–550	95 or more	190–195	285–290
UM 3 Marginal Coffee Zone	(vl/l) i or two	1 800–>2 000	19.2–<18.0	1 000–1 400	300–450	400–600	95 or more	140–190	235–285
UM 4 Sunflower – Maize Zone	f(l) i or two	1 550–1 950	21.0–18.1	850–1 400	200–400	280–650	90 or more	85–145	175–235
	(l/m) i or two			800– 900	220–250	280–300	90 or more	85–105	175–195
	(m/l) i or two			800–1 100	220–300	270–450	85 or more	70– 85	155–175
UM 5 Livestock – Sorghum Zone	(m/l) i or two	1 530–1 850	21.0–18.7	700– 950	150–250	200–380	75 or more	70–85	145–165
LM 4 Marginal Cotton Zone	(m/l) i or two	1 060–1 550	23.8–21.0	800–1 200	200–300	250–600	80 or more	70–85	150–165
LM 5 Lower Midland Livestock – Millet Zone	(vs ⌐ s/vs) i	1 030–1 550	24.0–21.0	700– 980	150–220	230–300	45–60	75–85	120–145
	(vs ⌐ vs/s) i			700– 950	130–200	200–280	45–55	55–75	100–130
	i (vs) i			650– 750	100–160	150–250		45–55	
LM 6 Lower Midland Ranching Zone	ur i	1 000–1430	24.0–21.6	580– 750	50–120	100–180	less than 45		
IL 6 Inner Lowland Ranching Zone	ur i	900–>1 000	24.0–25.0	300– 750	<50–120	80–150	less than 40		

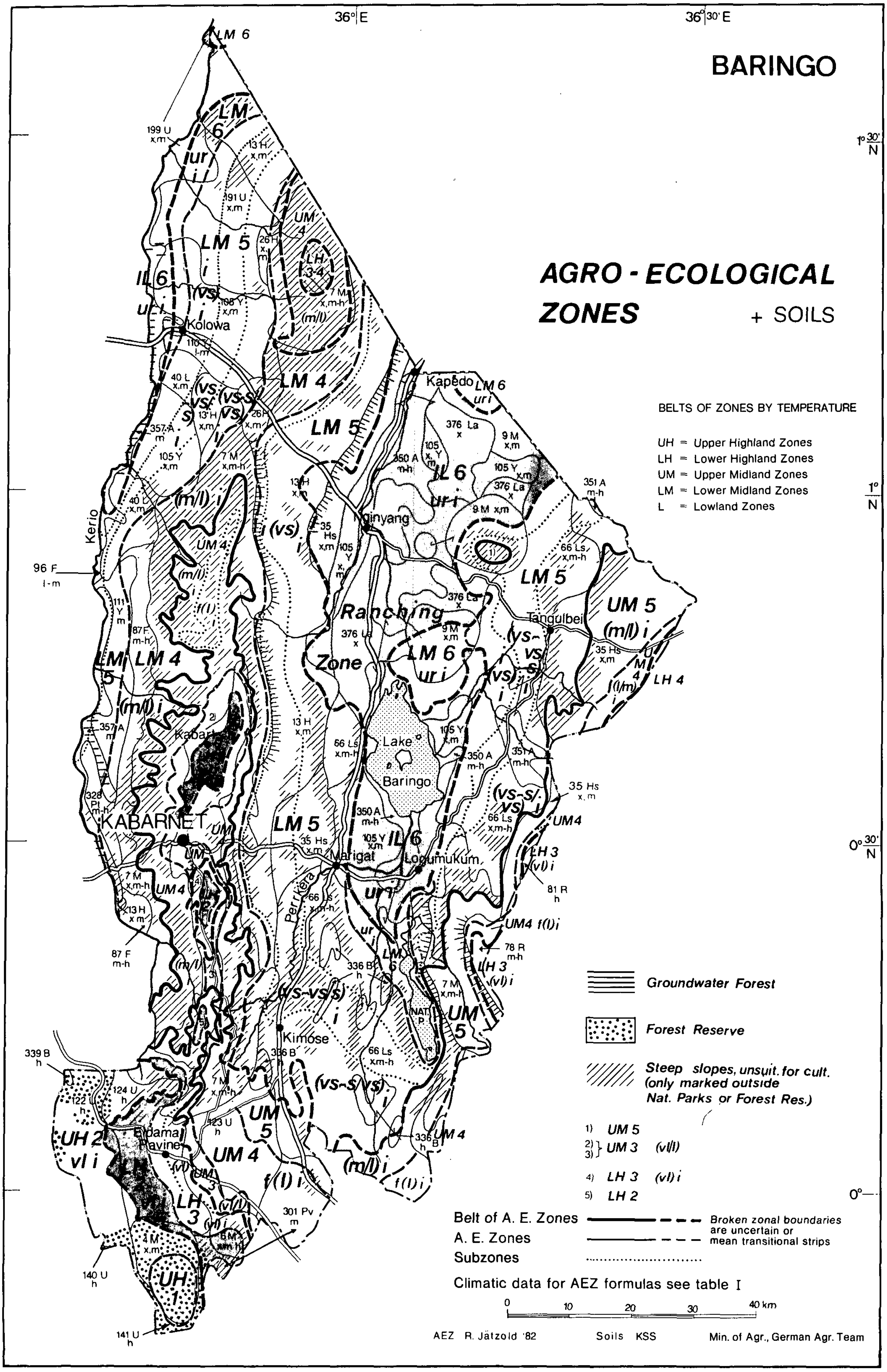
1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants
2) More if growing cycle of cultivated plants continues into the period of second rains
3) Agro-humid conditions continue from 1st to 2nd rains nearly in the whole district except in LM 5 i(vs) i, LM 6, and IL 6


BARINGO
AVERAGE ANNUAL RAINFALL in mm
+ SOILS
36° E
36°30' E
1°30' N
1° N
0°30' N
0°
8836
8835
8935
8936
9035
9036
Kolowa
Kapedo
Nginyang
Tangulbei
Kabarnet
KABARNET
Marigat
Loruk
Logumukum
Lake Baringo
Kimose
Eldama Ravine
Kerio
Perkera
NAT. P.
Temperature recording station, operating 1976, closed
Rainfall recording station, operating 1976 and having at least 10 years of records
81 Station number in grid
8936 Grid number
Broken boundaries are uncertain because of lack of rainfall records
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


36° E
36° 30' E
BARINGO
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF FIRST RAINS
(e.of Feb.-e.of June or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+ SOILS
1° 30' N
1° N
0° 30' N
0°
Kolowa
Kapedo
Nginyang
Tangulbei
Lake Baringo
KABARNET
Kabartonjo
Marigat
Logumukum
Kimose
Eldama Ravine
Kerio
Perkera
NAT. P.
mid Apr.- b.of May
April-May
Apr.- b.of June
e.of March-June
Apr.-May
mid Apr.- b.of May
e.of Febr.-June
mid March-June
b.of March-June
Apr.-June
Broken boundaries are uncertain
because of lack of rainfall records
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



BARINGO
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF SECOND RAINS
(e.of June to Feb. or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+SOILS
36° E
36°30' E
1°30' N
1° N
0°30' N
0°
Kolowa
Kapedo
Nginyang
Tangulbei
Kabart.
KABARNET
Marigat
Loruk
Lake Baringo
Kimose
Eldama Ravine
Kerio
Perkera
NAT. P.
July - Aug.
end of June - Sept.
end of June - Jan.
end of June - mid Sept.
July - b. of Aug.
July - Nov.
end of June - Febr.
Broken boundaries are uncertain
because of lack of rainfall records
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



BARINGO
AGRO - ECOLOGICAL ZONES + SOILS
36° E
36° 30' E
1° 30' N
1° N
0° 30' N
0°
BELTS OF ZONES BY TEMPERATURE
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
L = Lowland Zones
Groundwater Forest
Forest Reserve
Steep slopes, unsuit. for cult. (only marked outside Nat. Parks or Forest Res.)
1) UM 5
2) 3) } UM 3 (vl/l)
4) LH 3 (vl) i
5) LH 2
Belt of A. E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I
0 10 20 30 40 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team
Kolowa
Kapedo
Nginyang
Tangulbei
Ranching Zone
Lake Baringo
Kabarnet
Marigat
Loruumukum
Kimose
Eldama Ravine
Kerio
Perkera

AGRO-ECOLOGICAL ZONES

UH = *UPPER HIGHLAND ZONES*

UH 1 = Very small and steep, here Forest Reserve

UH 2 = *Pyrethrum-Wheat Zone*

UH 2 vl i or two = *Pyrethrum-Wheat Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Very good yield potential (av. over 80 % of the optimum)
No important crops

Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd r.), start norm. begin of March: Late mat. wheat like Kenya Bongo (May/June–N./D.), triticale, very late mat. maize like High altitude composite or Cuzco (Mch./Apr.–Jan.) on frost-free slopes (in lower places, higher places fair to poor), oats, quinoa; peas; potatoes; rapeseed; cabbages, kales, carrots, kohlrabi, celery, endive, rampion, leek, radish, spinach (lower places)
2nd rains, start undistinctly end of June: Oats, m. mat. barley like Proctor; rapeseed, peas; cabbages, kales, carrots, celery, endive, rampion, leek, radish
Whole year, best planting time March/April: Pyrethrum (70–80 %)

Fair yield potential (av. 40–60 % of the optimum)
2nd rains: Potatoes; kohlrabi, spinach
Whole year: Pears, plums, and apples below 2600 m

Pasture & forage
About 0.8 ha/LU on sec. pasture of Kikuyu and tufted grass[1];

LH = *LOWER HIGHLAND ZONES*

LH 2 = *Wheat/Maize-Pyrethrum Zone*[2]

LH 2 vl i or two = *Wheat/Maize-Pyrethrum Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Good yield potential
1st rains, start norm. mid March: Late mat. wheat like Kenya Bongo (60–70 %, Apr./May–O./N.), late mat. maize like H 611 (Mch./Apr.–N./D., ~ 80 % on deep soils); peas, horse beans; potatoes (Apr.–Au.); late mat. sunflower like Kenya White (60–70 %), linseed, rapeseed; cabbages, kales, cauliflower, carrots, beetroot, spinach, celery, lettuce
2nd rains, start undistinctly end of June: M. mat. wheat like Africa Mayo, m. mat. barley like K. Research (June–O.); linseed; kales, cauliflower, carrots, beetroot, spinach, tomatoes, celery
Whole year: Black Wattle, New Zealand flax

Fair yield potential
1st rains: Finger millet; m. mat. beans like Cuarentino; tomatoes, onions
2nd rains: Peas; potatoes (S.–D./J.); rapeseed; cabbages, onions, lettuce
Whole year: Pyrethrum; apples, pears, and plums above 2200 m; strawberries

Pasture & forage
0.6–1 ha/LU on sec. grassland of Kikuyu, Red oats, and tufted grass[1] between cedar forest remnants; about 0.5 ha on art. pasture of Nandi Setaria above 2000 m or Rhodes grass below 2000 m and add. fodder legumes; suitable for grade dairy cows

LH 3 = *Wheat/Maize*[2]*-Barley Zone*

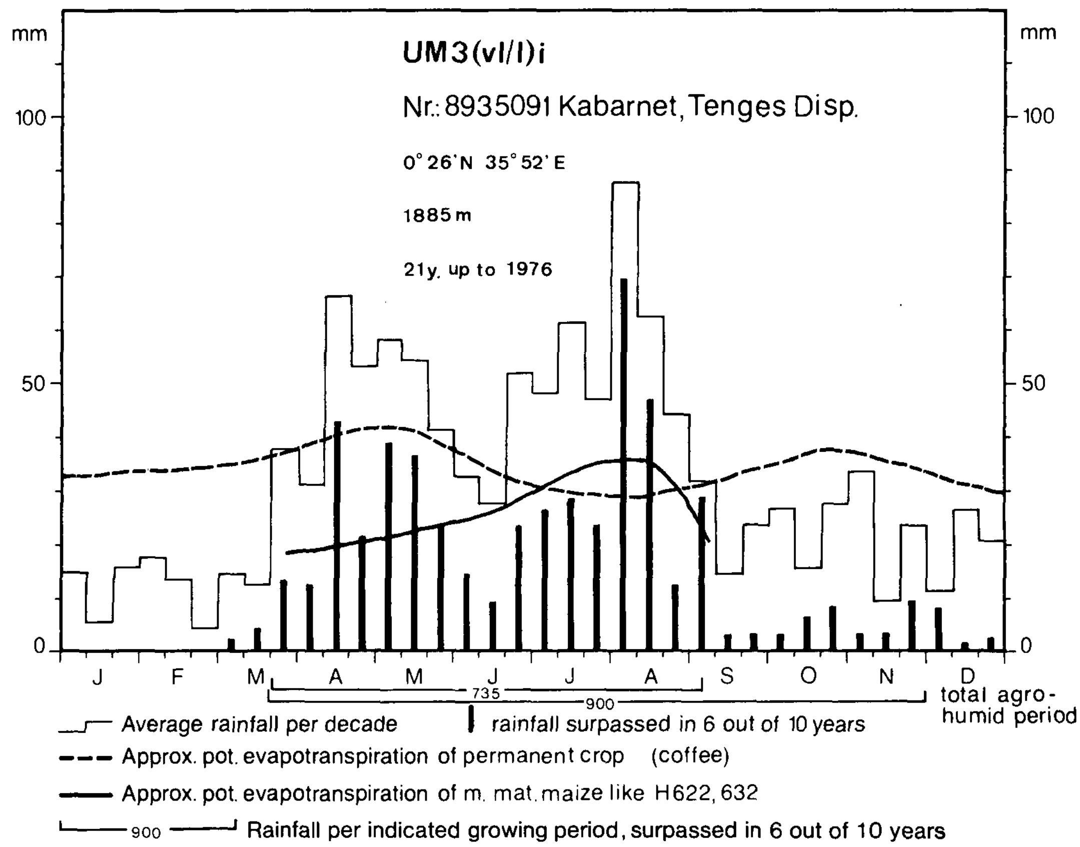
LH 3 (vl) i or two = *Wheat/Maize-Barley Zone with a (partly weak) very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Good yield potential
1st rains (to 2. r), start norm. end of March: Medium mat. wheat like Africa Mayo (Apr./May–S./O.), late mat. like Kenya Bongo (Apr./May–O./D.), on deep good soils late mat. maize like H 611–614 (end of March/Apr.–O./N.), m. mat. barley like K. Research; peas; linseed, late mat. sunflower like Kenya White; cabbages

2nd rains, start undistinctly end of June: M.mat. wheat like Africa Mayo (June–D.); rapeseed (end of June–O.)
Whole year: Black wattle

F a i r y i e l d p o t e n t i a l
1st rains: Finger millet, maize like H 611–614 on normal soils; potatoes; rapeseed; kales, cauliflower, carrots, beetroot
2nd rains: Tomatoes, kales, beetroot; beans in lower places
Whole year: Avocadoes in lower places

P a s t u r e & f o r a g e
Around 1 ha/LU on undestroyed highland savanna of Red Oats and wire grass[1]; about 0.7 ha/LU on art. pasture of Nandi Setaria or Rhodes grass; grade dairy cows and grade cattle; Napier grass in lower places



UM = UPPER MIDLAND ZONES

UM 3 = M a r g i n a l C o f f e e Z o n e

UM 3 (vl/l) i or two = Marginal Coffee Zone with a (weak) very long to long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.

(see Diagram Tenges)

G o o d y i e l d p o t e n t i a l
1st rains, start norm. end of March: Late mat.maize like H 612–613 on middle and higher places, med.mat. like 622–632 on lowest pl., finger millet; beans; sweet pot., potatoes; egg plants (Mch.–S./O.), cabbages, kales, pumpkins
2nd rains, start undistinctly and unreliable end of June: Beans; potatoes; onions (on light soils), cabbages, kales
Whole year: Passion fruit on deep soils, castor, Macadamia nuts, guavas

F a i r y i e l d p o t e n t i a l
1st rains: Late mat. sorghum
2nd rains: Sweet potatoes
3rd rains (weak and unreliable, start end of O.): Potatoes, e.mat. beans
Whole year: Bananas, cassava, Citrus

M a r g i n a l y i e l d p o t e n t i a l (av. about 30–50 % of the optimum)
Whole year: Coffee fair–poor because rainfall distribution, temperature, and soils are not well suited

Pasture & forage
Around 1 ha/LU on sec. pasture between remnants of semi-moist submontane forest; down to 0.25 ha/LU feeding sweet potato vines, maize stalks, banana leaves, Bana & Napier grass, fodder legumes; grade cattle advisable, grade dairy cows with additional feeding only

UM 4 = *Sunflower-Maize Zone*

UM 4 f(l) i or two = *Sunflower-Maize Zone with a fully (weak) long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Good yield potential
1st rains, start norm. end of March: V.e.mat. sorghum like IS 8595 (~ 60 %, in lower places, end of March.–m. June), cold tolerant sorghum (60–70 %, Apr.–S.), grain amaranth; pumpkins (~ 60 %)
2nd rains, start unreliable and undistinctly end of June: E.mat. sorghum like 2 KX 17; dwarf sunflower
Whole year: Sisal, Eucalyptus trees

Fair yield potential
1st rains: late mat.maize like H 613–614 on higher places, late to med.mat.like H 622 & 632 on lower places, finger millet; e.mat. beans, groundnuts (lower pl.), pigeon peas (lower places, end of March–D.); potatoes (higher pl.), sweet pot.; egg plants, cabbages; late mat.sunflower like Kenya White (Apr.–S.)
2nd rains: E.mat. beans, sweet potatoes; onions; e.mat. soya beans, e.mat. sunflower
Whole year: Castor, pineapples, pawpaws (~ 40 %), cassava (lower places)

Pasture & forage
1.2–2 ha/LU on undestroyed nat. pasture of semi-dry sclerophytic bushland, about 0.8 ha/LU on art. pasture of Rhodes grass; down to ~ 0.3 ha/LU feeding Bana grass, sweet potato vines, moth bean hay and other fodder legumes, horse tamarind (Leucaena leucocephala) and saltbush (Atriplex nummularia); grade cattle possible

UM 4 (l/m) i or two = *Sunflower-Maize Zone with a (weak) long to medium cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Suitable areas small, potential about 10 % lower, stocking rates 20 % lower as above

UM 4 (m/l) i or two = *Sunflower-Maize Zone with a (weak) medium to long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Potential nearly like above but only med. mat. maize; yields and stocking rates about 10 % lower as in UM 4 (l/m) i. Potatoes poor

UM 5 = *Livestock-Sorghum Zone*

UM 5 (m/l) i = *Livestock-Sorghum Zone with a (weak) medium to long cropping season and intermediate rains*

Good yield potential
Whole year: Sisal (~ 60 % on deep soils)

Fair yield potential
1st rains, start norm. end of March/b. April: Sorghum, grain amaranth
Whole year: Marama beans[3] on light and medium soils, perennial castor

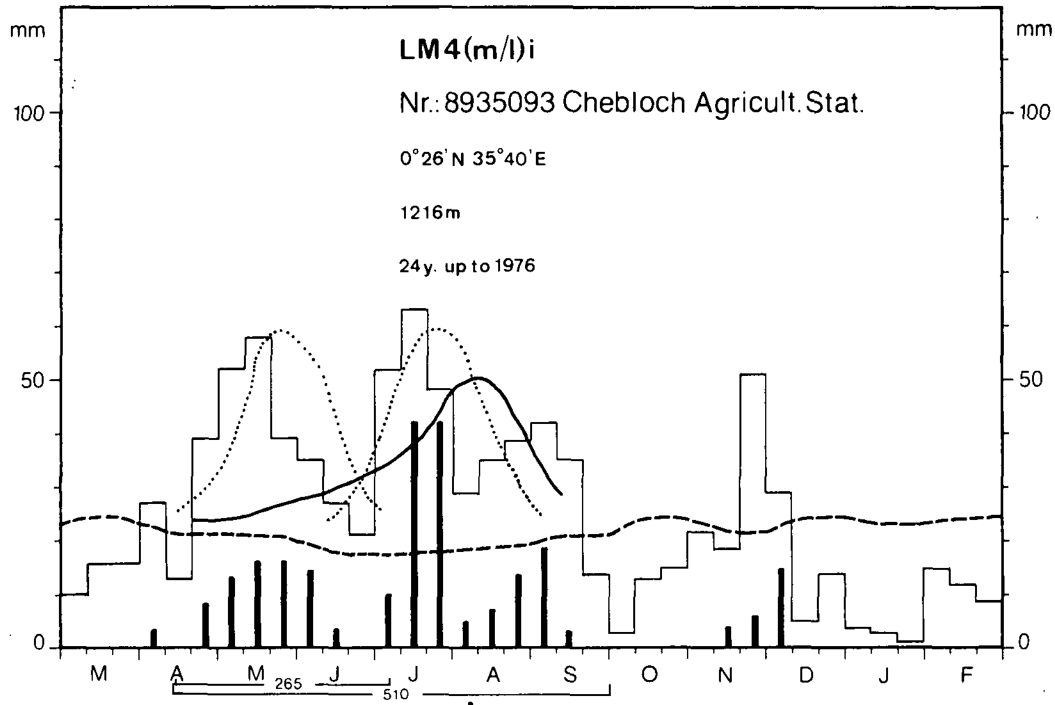
Pasture & forage
1.8–4 ha/LU on undestroyed pasture of semi-dry sclerophytic bushland; indigenous cattle, sheep and goats; saltbush (Atriplex) and horse tamarind (Leucaena) are palatable shrubs to be planted with local buffel grass (Cenchrus ciliaris) for re-establishing pasture on eroded soils

LM = *LOWER MIDLAND ZONES*

LM 4 = *Marginal Cotton Zone*

LM 4 (m/l) i or two = *Marginal Cotton Zone with a (weak) medium towards long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

(see Diagram Chebloch)



Average rainfall per decade — rainfall surpassed in 6 out of 10 years
Approx. pot. evapotranspiration of a permanent crop: sisal
Approx. pot. evapotranspiration of m. mat. maize like Coast comp.
Approx. pot. evapotranspiration of early mat. sorghum
265 Rainfall per indicated growing period, surpassed in 6 out of 10 years

Good yield potential
1st rains, start norm. end of March/begin of Apr.: E.mat. sorghum; horse grams; safflor, dwarf castor, cotton on alluvial flats with groundwater
Whole year: Sisal (60–70 %) and perennial castor on deep soils, buffalo gourds[3] on sandy soils; Marama beans[3]; bananas near rivers, jojoba

Fair yield potential
1st rains: Med. mat. maize like H 511, 512 or Coast comp. (Apr.–Aug. on deep soils and preventing run-off) m. mat. sorghum (50–60 %, mid Apr.–begin of S.), m. mat. bulrush millet (bird rejecting awned var.), finger millet; green grams (50–60 %), cowpeas, pigeon peas, beans, m. mat. groundnuts; cotton (on good soils end of March–O.), e. mat. sunflower like 252 (bird protection necessary), m. mat. soya beans (40–50 %)
2nd rains, start undist. end of June: Ratoon of e. mat. sorghum; e. mat. foxtail and proso millet; green grams, cowpeas, mwezi moja beans (40–50 %), tepary beans
Whole year: Cassava

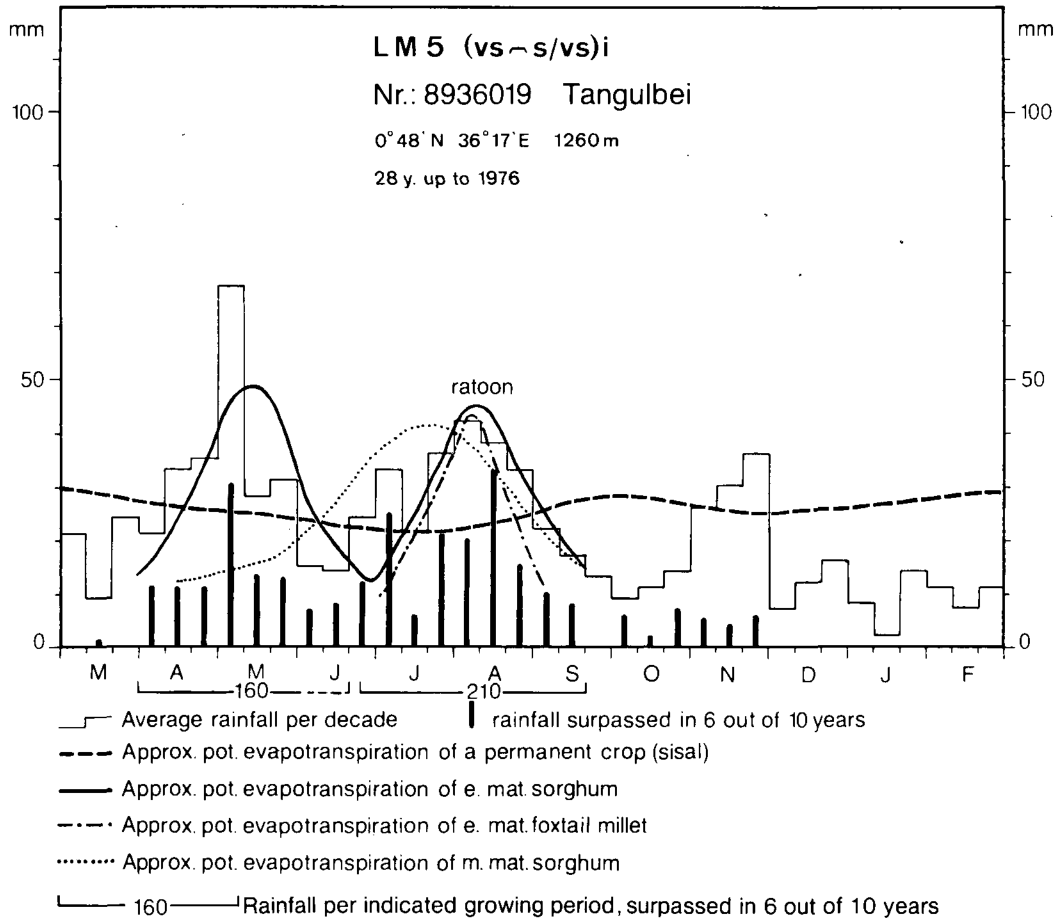
Poor yield potential (av. 20–40 % of the optimum)
Cotton on red soils without groundwater

Pasture & forage
About 2 ha/LU on undestroyed pasture of semi-dry sclerophytic bushland with rotation; on eroded areas up to 6 ha/LU, indigenous cattle, sheep and goats; tepary and Mauritius beans for add. fodder; saltbush (Atriplex) and horse tamarind (Leucaena) are palatable shrubs to be planted with local buffel grass (Cenchrus ciliaris) for re-establishing pasture on eroded soils, Gao trees (Acacia albida) on deep soils, esp. in Kerio valley. Tsetse near rivers

LM 5 = *Livestock-Millet Zone*

LM 5 (vs — s/vs) i = *Livestock-Millet Zone with a (weak) very short cropping season followed by a (weak) short to very short one and intermediate rains*

(see Diagram Tangulbei)



G o o d   y i e l d   p o t e n t i a l

1st rains, start norm. begin of April: Safflor, horse grams (~ 60 %), dwarf castor
Whole year: Sisal on deep soils, buffalo gourds[3] on sandy soils, Marama beans[3], Vigna lobatifolia[3]

F a i r   y i e l d   p o t e n t i a l

1st rains: E. mat. sorghum like Serena or 2 KX 17, m. mat. sorghum (mid Apr.–begin of S.), m. mat. bulrush millet (bird reject. var.), e. mat. foxtail and proso millet; green grams, cowpeas, m. mat. groundnuts (begin of Apr.–S.), tepary beans (50–60 %)
2nd rains, start norm. end of June: Ratoon of e. mat. sorghum, e. mat. foxtail and proso millet; green grams, cowpeas
Whole year: Cassava, perennial castor, jojoba

P o o r   y i e l d   p o t e n t i a l

1st to 2nd rains: M. mat. maize like Coast comp. or H 511 on deep soils (chance cropping, about 1 good harvest out of 5 years; wide spacing as a first form of water concentration and other methods advisable), m. mat. finger millet

P a s t u r e   &   f o r a g e

3–5 ha/LU on Acacia bushland if not denuded and eroded; goats thrive better than cattle and sheep. Tepary beans for fodder; saltbush (Atriplex) best palatable shrub for re-establishing pasture, others and grass see next subzone

LM 5 (vs ⌢ vs/s) i = *Livestock-Millet Zone with a (weak) very short cropping season followed by a (weak) very short to short one and intermediate rains*

G o o d   y i e l d   p o t e n t i a l

Whole year: Buffalo gourds[3] on sandy soils, Vigna lobatifolia[3], Marama beans[3]

F a i r   y i e l d   p o t e n t i a l

1st rains, start begin of April: Turkana sorghum, v.e. mat. dwarf sorghum, e. mat. foxtail and proso millet; cowpeas
2nd rains start norm. end of June/b. July: Ratoon of sorghum, e. mat. proso millet (~ 40 %), e. mat. foxtail millet; green grams, tepary beans, cowpeas for leaves

P o o r   y i e l d   p o t e n t i a l

1st to 2nd rains: M. mat. maize like Coast comp. (on deep soils only), e. and m. mat. finger millet, m. mat. sorghum

Pasture & forage
4–6 ha/LU on Acacia wood- and bushland if not denuded and eroded; goats thrive better than cattle and sheep. Local buffel grass (Cenchrus ciliaris) should be sown on good deep soils; saltbush (Atriplex), Mesquite and Algarrobo (Prosopis juliflora and chilensis) and Cassia are palatable shrubs for re-establishing pasture also on stony soils; horse tamarind (Leucaena) with some add. water in 1st dry season (to be planted esp. in higher areas where local Acacia mellifera is not thriving well). Opuntia var. (also as vegetable and fruit)

LM 5 i (vs) i = *Livestock-Millet Zone with a very short (weak) cropping season framed by intermediate rains*

Good yield potential
Whole year: Buffalo gourds[3] on sandy soils, Marama beans[3], Vigna lobatifolia[3]

Fair yield potential
2nd rains, start end of June/begin of July: E. mat. proso or foxtail millet; tepary beans, cowpeas for leaves and pulses (all crops on deep soils only); simsim with water concentration (see Fig. 1), with this technic in 1st and 2nd rains also v. e. mat. sorghum (ratooning from 1st rains), pigeon peas, cassava, and others

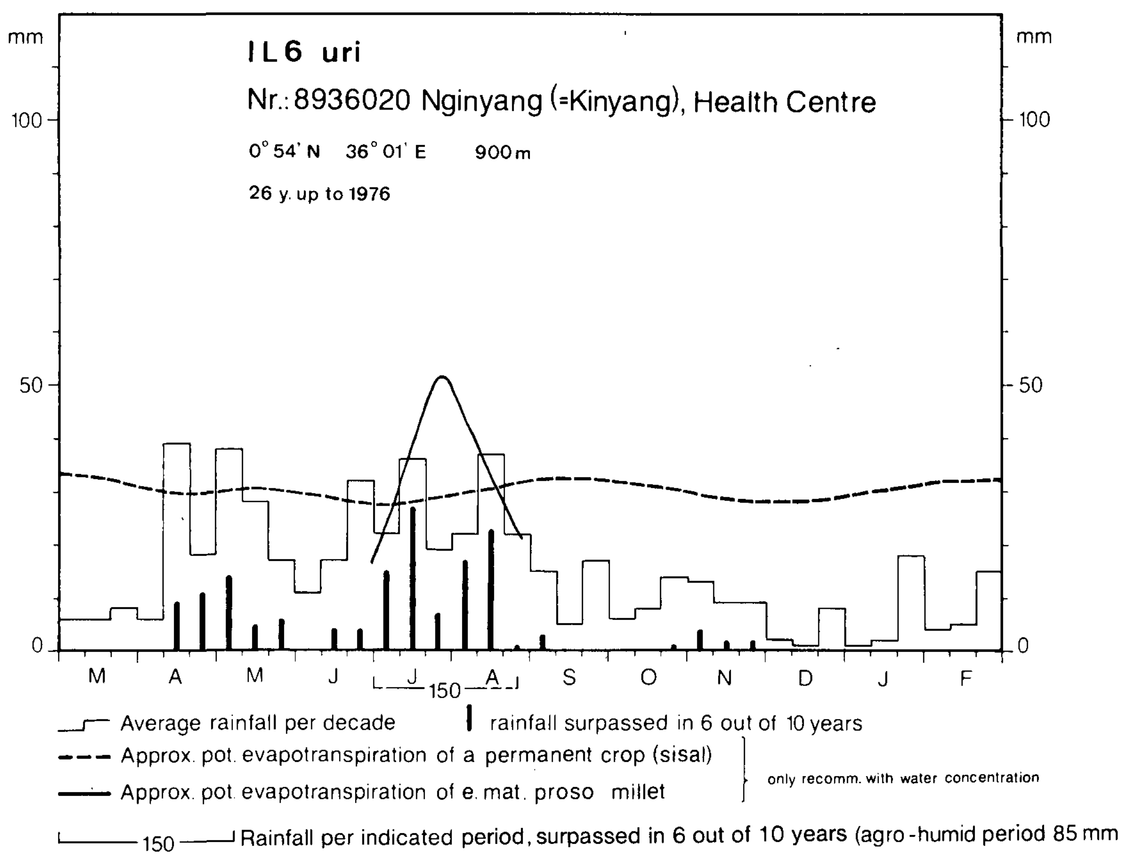
Pasture & forage
8–15 ha/LU (cattle, goats and sheep, higher stocking if goats only) on Acacia mellifera bushland, 5–10 ha/LU on Acacia tortilis woodland if not denuded and eroded. Buffel grass for re-establishing pasture especially on deep soils, palatable shrubs saltbush (Atriplex) and Cassia to be planted also on stony soils; more suited for goats and camels if pasture is not improved. Seeding of nutritious grass like Masai love grass (Eragrostis superba) with water concentration technics (= runoff-catching or water harvesting)

LM 6 = *Lower Midland Ranching Zone*

LM 6 ur i = *Lower Midland Ranching Zone with unimodal rainfall and intermediate rains*

Rainfed agriculture only in suited places especially with water concentration (= runoff-catching) methods for e. mat. sorghum (ratooning), tepary beans and cowpeas, pigeon peas, cassava. Limited irrigation possibilities

Pasture & forage
With goats and camels about 10 ha/LU on undestroyed dry Acacia mellifera bushland or Acacia-Commiphora woodland, otherwise more ha/LU. Most areas denuded and eroded, there up to 25 ha/LU; Buffel grass (Cenchrus ciliaris) for re-establishing pasture on good, deep soils, palatable shrubs see LM 5



IL = *INNER LOWLAND ZONES*

IL 6 = *Inner Lowland Ranching Zone*

IL 6 ur i = *Inner Lowland Ranching Zone with unimodal rainfall and intermediate rains*

(see Diagram Nginyang = Kinyang)

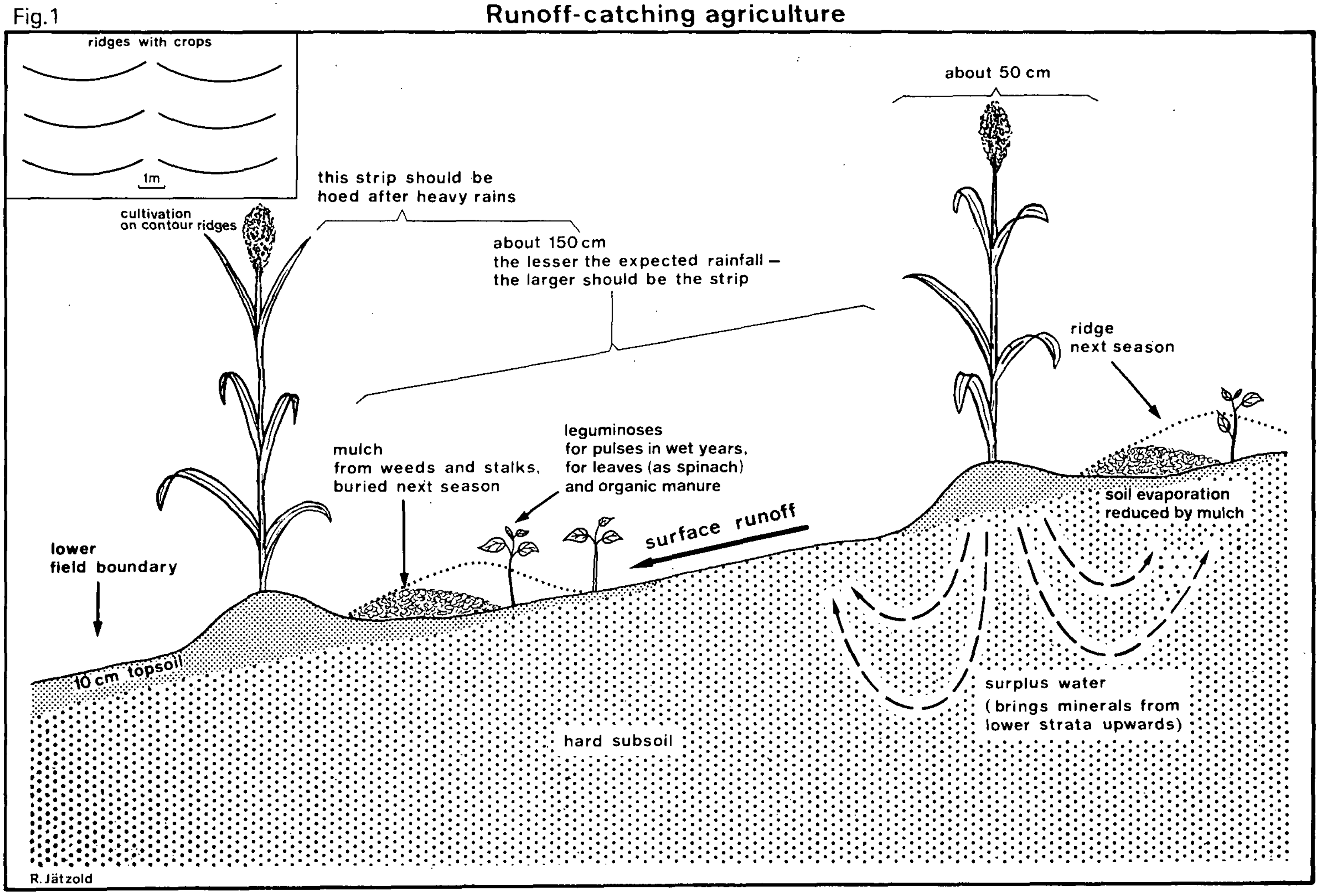
Like LM 6, but grazing very limited at present due to overgrazing. Camels more suited than other livestock. Ye-eb nuts (Cordeauxia edulis) from Somalia for human consumption plantable

1) The bad tufted grasses Eleusine jaegeri and Pennisetum schimperi are expanding if the area is overgrazed

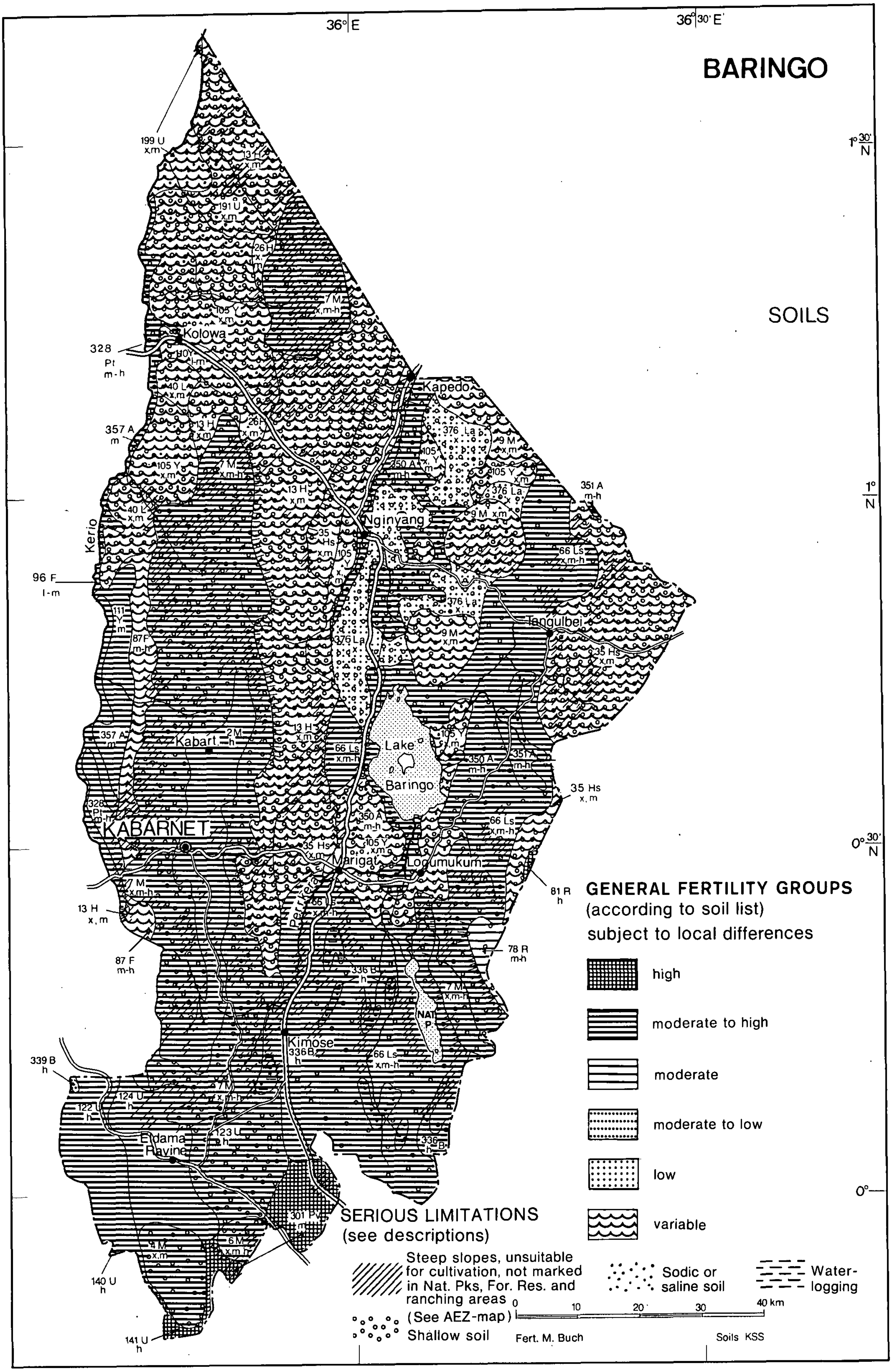
2) Wheat or maize mainly depending on farm scale, here maize better

3) Still experimental

Fig. 1 **Runoff-catching agriculture**



for areas with 200-300 mm average precipitation per rainy season


BARINGO
SOILS
36° E
36° 30' E
1° 30' N
1° N
0° 30' N
0°
Kolowa
Kapedo
Nginyang
Tangulbei
Lake Baringo
Kabart.
KABARNET
Marigat
Loruk
Kimose
Eldama Ravine
Kerio
Perkerra
NAT. P.
SERIOUS LIMITATIONS
(see descriptions)
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
moderate to high
moderate
moderate to low
low
variable
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Sodic or saline soil
Water-logging
0 10 20 30 40 km
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY, AND MAJOR CHARACTERISTICS

The district is part of the central Rift Valley area and escarpments occur in the east and west. In the northern part of the district some extinct volcanoes rise sharply over the surrounding plateaus. Significant features associated with the physiography of the Rift Valley are the two lakes, Bogoria and Baringo, the former saline and the latter fresh water. The underlying rock is mainly basalt. Alluvium covers the ground to a large extent near the western district boundary which is formed by the Kerio river.

Soils of unit 7 M which have a moderate to high fertility are most extensive in the mountainous areas. They occur together with rock outcrops and lava vents. On individual mountains, map unit 9 M is found, including lava fields. South of Eldama Ravine, the mountains carry soils (units 4 M, 6 M) of moderate to high natural fertility.

A long, north-south stretch in the central part of the district has „minimal“ soil development. The majority of the soils belong to map unit 35 Hs which are variably fertile. This unit also occurs in the north-eastern corner of the district. Associated with this topography are the plateaus, mainly around the lake areas (unit 66 Ls) which are extensive and consist of moderately to highly fertile soils. Soil unit 60 L with high fertility also occurs, but the climate is dry (see AEZ map).

In the extreme south of the district, the soils in the plain have a humic topsoil and a high fertility (unit 301 Pv). On the sloping areas of the footslopes and piedmont plains, soils of map unit 105 Y are found which have a variable fertility. In the western part, there are soils of unit 111 Y and on the western flank of the Tugen Hills, soils of unit 87 F with low to moderate fertility.

Upland topography is restricted to an area in the northwest (map unit 191 U) and to areas in the southern part of the district (map units 122 U, 124 U). Soils of unit 191 U have a variable fertility, units 122 U and 124 U have a moderate to high fertilitiy.

Soils of the lower-lying areas belong to the units 336 B and 350 A of moderate to high and variable fertility. Soil unit 351 A, also occurring on floodplains, has soils of moderate to high fertility.

Recent lava flows, including badlands with little or no soil, are indicated as map unit 376 La.

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

2 M
h[1) = well drained, deep, dusky red to dark reddish brown, friable clay (eutric NITOSOLS)

4 M
x, m = well drained, shallow to moderately deep, dark reddish brown, friable, humic, rocky and stony clay loam (nito-humic CAMBISOLS, rocky phase)

6 M
x, m – h = well drained, very deep, dark reddish brown to dark brown, very friable and smeary, clay loam to clay, with thick, acid humic topsoil; in places shallow to moderately deep and rocky (humic ANDOSOLS, partly lithic phase)

7 M
x, m – h = well drained, shallow to moderately deep, dark reddish brown to dark brown, rocky and bouldery, clay loam to clay; in places with humic topsoil (nito-chromic CAMBISOLS; with haplic PHAEOZEMS, lithic phase, eutric REGOSOLS and Rock Outcrops)

Soils developed on ashes and other pyroclastic rock of recent volcanoes

9 M
x, m = somewhat excessively drained, shallow to moderately deep, brown to dark brown, firm and slightly smeary, strongly calcareous, gravelly to stony clay loam; in many places saline and/or sodic and with inclusions of lava fields (ando-calcaric REGOSOLS)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

13 H
x, m = well drained, shallow, dark reddish brown, friable, very calcareous, bouldery or stony, loam to clay loam; in many places saline (LITHOSOLS; with calcic XEROSOLS, bouldery and saline phase and Rock Outcrops)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

26 H
x, m = somewhat excessively drained, shallow, reddish brown, friable, rocky or stony, sandy clay loam (eutric REGOSOLS; with Rock Outcrops and calcic CAMBISOLS)

27 H
x, m – h = complex of exessively drained to well drained, shallow, dark red to brown, friable, sandy clay loam to clay; in many places rocky, bouldery and stony and in places with acid humic topsoil (dystric REGOSOLS; with LITHOSOLS, humic CAMBISOLS, lithic phase and Rock Outcrops)

SOILS ON STEP-FAULTED SCARPS OF THE RIFT VALLEY

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

35 Hs
x, m = predominantly well drained, shallow, dark reddish brown, friable, strongly calcareous, rocky or stony, clay loam; in many places saline (LITHOSOLS; with Rock Outcrops and XEROSOLS, bouldery and saline phase)

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older basic tuffs included)

40 L = well drained, shallow to moderately deep, dark reddish brown, firm, strongly calcareous clay loam, with stony to bouldery
x, m surface, partly saline and/or sodic (calcic XEROSOLS, boulder-mantle and saline-sodic phase)

Soils developed on volcanic ashes and other pyroclastics of recent volcanoes

60 L = complex of:
m – h
- well drained, deep to very deep, very dark greyish brown to dark brown, friable and slightly smeary clay loam (ando-luvic PHAEOZEMS)
- imperfectly drained, deep, very dark greyish brown to black, firm, moderately calcareous, slightly cracking clay (verto-luvic PHAEOZEMS)

SOILS ON STEP-FAULTED FLOOR OF THE RIFT VALLEY

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older basic tuffs included)

66 Ls = *well drained, moderately deep, dark reddish brown to reddish brown, friable to firm and slightly smeary, bouldery and stony,*
x, m – h clay loam to clay; in places calcareous (ando-chromic CAMBISOLS, bouldery phase; with calcic XEROSOLS)

SOILS ON FOOTSLOPES

Soils developed on colluvium from various volcanic rocks (mainly basalts)

87 F = complex of well drained to moderately well drained, deep, reddish brown to very dark greyish brown, firm, sandy clay loam
m – h to clay; partly with humic topsoil and/or cracking; often moderately calcareous (LUVISOLS, undifferentiated, luvic PHAEOZEMS and chromic VERTISOLS)

Soils developed on colluvium from undifferentiated Basement System rocks

96 F = well drained, very deep, yellowish red to dark reddish brown, friable, coarse loamy sand to sandy clay loam (chromic LUVI-
l – m SOLS; with rhodic FERRALSOLS and luvic/ferralic ARENOSOLS)

SOILS ON PIEDMONT PLAINS

Soils developed on alluvium from Tertiary/Quaternary volcanic rocks (mainly basalts)

105 Y = moderately well drained, very deep, dark brown to greyish brown, predominantly strongly calcareous, moderately to strongly
x, m saline and often sodic, firm, fine sandy loam to clay loam, with stone surface (desert pavement) (orthic SOLONCHAKS, stone-mantle phase)

Soils developed on alluvium from undifferentiated Basement System rocks

110 Y = moderately well drained, very deep, dark yellowish brown to strong brown, friable, slightly to moderately calcareous and
x, l – m slightly sodic, loamy sand to sandy clay loam (haplic XEROSOLS, sodic phase; with calcarocambic ARENOSOLS)

111 Y = well drained, deep, dark brown, friable, moderately calcareous clay loam, with sodic deeper subsoil (calcic CAMBISOLS,
m sodic phase)

SOILS ON UPPER MIDDLE-LEVEL UPLANDS

Soils developed on Tertiary or older basic igneous rocks (basalts, nepheline phonolites, etc.; basic tuffs included)

122 U = well drained, extremely deep, dark reddish brown, friable clay (eutric NITOSOLS)
h

123 U = well drained, shallow to moderately deep, dark reddish brown to dark red, friable clay (nito-chromic CAMBISOLS, partly
h lithic phase)

124 U = complex of soils of unit 122 U and 123 U

SOILS ON UPLANDS, UNDIFFERENTIATED LEVELS

Soils developed on undifferentiated volcanic rocks (mainly basalts)

191 U = well drained, shallow, dark brown, friable, strongly calcareous, stony loam, often strongly saline and moderately sodic; with
x, m stone mantle (desert pavement); (dissected older piedmont plain) (calcaric REGOSOLS, stone-mantle and saline-sodic phase)

Soils developed on basic igneous rocks (basalts, etc.) with predominant volcanic ash influence

197 U = well drained, deep to very deep, dark reddish brown to dark red, firm clay; with inclusions of imperfectly drained, modera-
h tely deep, dark greyish brown clay (nito-ferric/chromic LUVISOLS; with gleyic LUVISOLS, partly lithic or pisoferric phase)

Soils developed on undifferentiated Basement System rocks

199 U = well drained, shallow, brown, friable, strongly calcareous and moderately to strong sodic and saline, gravelly sandy clay loam
x, m with gravel mantle (desert pavement) (calcaric REGOSOLS, gravel-mantle and saline-sodic phase; with gleyic SOLONETZ)

SOILS ON VOLCANIC PLAINS

Soils developed on ashes and pumice from recent volcanoes

301 Pv = well drained, moderately deep to deep, brown to dark brown, very friable, loam to sandy clay loam (vitric ANDOSOLS)
m

SOILS ON SEDIMENTARY PLAINS OF UPPER RIVER TERRACES

Soils developed on sediments mainly from undifferentiated Basement System rocks

328 Pt m – h = well drained to moderately well drained, deep, dark brown, friable to firm slightly calcareous, clay loam to clay (eutric CAMBISOLS)

SOILS ON BOTTOMLANDS

Soils developed on infill from undifferentiated volcanic rocks

336 B h = imperfectly drained, deep, dark brown to olive grey, firm to very firm clay soils of varying calcareousness, salinity and sodicity; in many places cracking (VERTISOLS and SOLONCHAKS, undifferentiated)

SOILS ON FLOODPLAINS

Soils developed on sediments from various volcanic rocks and pyroclastics (Rift Valley floodplains)

350 A m – h = poorly drained, verry deep, greyish brown to light olive brown, friable, strongly calcareous, strongly saline and slightly to moderately sodic, silt loam to clay (SOLONCHAKS, undifferentiated; with FLUVISOLS, saline-sodic phase)

351 A m – h = well drained, very deep, very dark greyish brown to dark yellowish brown, friable, stratified, micaceous, moderately to strongly calcareous, non to slightly saline but moderately sodic, loam to clay (calcaric FLUVISOLS, sodic phase)

Soils developed on sediments from various sources (recent floodplains)

357 A m = well drained to imperfectly drained, very deep, dark brown to yellowish brown, stratified, strongly calcareous, micaceous, predominantly loamy soils (calcaric FLUVISOLS)

SOILS ON LAVA FLOWS

376 La x = excessively drained, exceedingly bouldery to stony, extremely rocky land (Boulders and Rock Outcrops)

1) Soil texture-classes

h = heavy
l = light
m = medium
x = stony or bouldery
v = varying texture
m–h = medium to heavy
m, h = medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-climatic Zone Map of Kenya, Scale 1: 1 000 000. Rep. E 1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

The total population of the Baringo District was 203, 792 people at the time of the Census in September 1979 (Table 6). Only about 2 % of this figure lived in the township, Eldama Ravine, 5.47 % in Kabarnet and four other trading centres, i.e. more than 92 % of the population made a living from agriculture and livestock, i.e. 188, 710 people on a total area of 987, 500 ha, of which only 718, 500 ha could be used as agricultural land (Table 4 and 6). Of the last-mentioned figure, 176, 900 ha were only suitable for dry grazing and browsing land (LM 6, L 6), so that altogether not more than 541, 600 ha arable land remained (including very marginal parts in LM 5).

Theoretically, there were 18.46 ha per household (average: 4.76 people) and 3.81 ha per person (Table 6). These figures, however, give a wrong impression of the conditions in this district, because the relatively good areas on the higher parts (UH 2, LH 2 and 3, UM 3 and 4, LM 4) are densely populated (see location Kakamor with 0.67 ha per person, Table 6). The lower parts of the district are very dry and therefore the agricultural activities are subject to problems of water supply. For livestock, a sufficient amount of land would be available if the most serious problems such as soil erosion and degradation could be solved. Today 25 ha are needed per Livestock Unit in LM 6 and even up to 15 ha in LM 5. With intensive care for soil conservation, a lot could be done to improve the present critical situation up to the true potential carrying capacities (see p. BAR. 14) The same is true for agriculture: the only way to increase productivity here (with water concentration, runoff-catching agriculture or additional irrigation) needs a lot of work and money (especially for irrigation).

A good start has been made with the Perkerra Marigat Irrigation Scheme, the Semi-Arid and Marginal Land Research Station at Marigat, and the activities of the Catholic Mission at Kositei. Calculating the population growth since 1979 and for the future, these measures to improve agriculture and livestock conditions seem the only possible way to increase the output and thereby the nutrition situation in this big but poor district.

BARINGO DISTRICT

TABLE 4: POPULATION PER LOCATION AND DIVISION
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Kabarnet	6 585	6 708	13 293	3 461	261	50
Sacho	2 752	2 917	5 669	1 358	144	39
Ewalei	3 817	3 940	7 757	1 803	223	34
Kamnarok	8 267	8 253	16 520	3 586	365	45
Saimo	8 850	9 096	17 946	4 083	491	36
Kaboskei	4 425	4 568	8 993	1 808	378	23
Ngorora	2 095	2 361	4 456	948	488	9
Kabarnet Division	36 791	37 843	74 634	17 047	2 353	31
Lembus	14 629	13 912	28 541	5 401	483	59
Pokor/Keben	6 699	6 668	13 367	2 922	570	23
Endorois	3 353	3 507	6 860	1 600	454	15
Kakamor	2 593	2 598	5 191	1 211	123	41
Ravine	13 629	12 874	26 503	5 449	296	89
Eldama Ravine Division	40 903	39 559	80 462	16 583	1 929	41
Loboi	1 456	1 466	2 922	614	349	8
Marigat Special Area	821	654	1 475	325	16	91
Chapchep	4 302	4 298	8 600	2 364	297	28
Njemps	4 195	4 587	8 782	1 580	497	17
Marigat Division	10 774	11 005	21 779	4 883	1 160	18
Loyamorok	2 146	1 793	3 939	601	765	5
Korossi	4 113	4 475	8 588	1 593	1 309	6
Ribkwo	6 381	6 967	13 348	1 851	1 569	8
Tirioko	498	544	1 042	166	796	1
Nginyang Division	13 138	13 779	26 917	4 211	4 441	6
Baringo District	101 606	102 186	203 792	42 724	9 885	20

BARINGO DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Kabarnet	3441	2.36	0.79	0.42	0.26	3.83
Sacho	1359	2.42	0.98	0.41	0.36	4.17
Ewalei	1797	2.56	1.07	0.44	0.24	4.31
Kamnarok	3587	2.81	1.09	0.23	0.48	4.60
Saimo	4084	2.62	1.04	0.35	0.38	4.39
Kaboskei	1805	2.95	1.20	0.59	0.23	4.98
Ngorora	943	2.84	1.14	0.46	0.27	4.72
Division Kabarnet	17016	2.64	1.01	0.39	0.34	4.38
Location:						
Lembus	5376	2.91	1.26	0.54	0.55	5.26
Pokor/Keben	2918	2.64	1.04	0.40	0.46	4.54
Endorois	1601	2.60	1:02	0.31	0.36	4.28
Kakamor	1207	2.57	1.00	0.43	0.30	4.29
Ravine	5405	2.58	1.29	0.40	0.44	4.87
Division Eldama Ravine	16506	2.75	1.19	0.44	0.46	4.84
Location:						
Loboi	616	2.75	1.01	0.38	0.59	4.74
Marigat Special Area	325	2.58	0.66	0.24	1.06	4.54
Chapchep	2361	2.20	0.39	0.27	0.47	3.63
Njemps	1568	2.95	1.20	0.18	0.83	5.55
Division Marigat	4870	2.96	0.47	0.38	0.64	4.45
Location:						
Loyamorok	596	3.64	1.39	0.29	1.03	6.51
Korossi	1592	3.34	1.28	0.39	0.39	5.39
Ribkwo	1844	4.18	1.83	0.50	0.61	7.23
Division Nginyang	4198	3.84	1.56	0.42	0.58	6.39
DISTRICT: BARINGO	42590	2.79	1.12	0.41	0.44	4.76

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, includes one and two persons per households as well

BARINGO DISTRICT

TABLE 6: **AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON**

Location/Division without townships	in '00 ha = sqkm					in '00 ha = sqkm										in ha	
	Area total Census 79	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps rivers...)	Non-agricultural land: Others (roads, home-steads	Agri-cultural land	Area in agro-ecological zones AEZ: UH 2	LH 2	LH 3	UM 3	UM 4	UM 5	LM 4	LM 5	LM 6	L 6	Agric. land per household	Agric. land per person
Kabarnet	261	78	F. 2	26	155		5	1	23	49		61	16			4.48	1.17
Sacho	144	36	5	14	89			9	1	33		43	3			6.55	1.57
Ewalei	223	37	7	22	157		5		22	19		13	98			8.70	2.02
Kamnarok	365	10	8	37	310		3		23	62		134	88			8.64	1.88
Saimo	491	81	9	49	352		46		34	13		17	201		41	8.62	1.96
Kaboskei	378	84	F. 1	38	255					55		102	98			14.10	2.84
Ngorora	488	98		49	341					85		85	115		56	35.97	7.65
Kabarnet Division	2 350	424	32	235	1 659		59	10	103	316		455	619		97	10.35	2.34
Lembus	483	100	F. 26	48	309			27	4	240	38					6.36	1.17
Pokor/Keben	570	92		57	421		2	8		58	96	19	238			14.96	3.26
Endorois	454	137	31	45	241			8		13	57	8	155			15.06	3.51
Kakamor	123	56	F. 15 Sw. 5	12	35			5	4	14	3	9				2.89	0.67
Ravine	296	16		30	250	73	68	73	22	14						7.16	1.34
Eldama Ravine Div.	1 926	401	77	192	1 256	73	70	121	30	339	194	36	393			8.97	1.97
Loboi	349	23	L. 21 Sw. 14	35	256			19		20	82		77	35	23	41.69	8.76
Marigat Special Area	16			2	14										14 (irrig.)	4.31	0.95
Chapchep	297	86		30	181		5	13	12	5		12	134			8.38	2.38
Njemps	497	34		60	403			5		11	26		216	7	138	25.70	4.63
Marigat Division	1 159	143	35[1]	127	854		5	37	12	36	108	12	427	42	175	18.25	4.11
Loyamorok	765	11		38	716						6		108	15	587	119.13	18.18
Korossi	1 309	105		131	1 073					59	197		481	114	222	67.36	12.49
Ribkwo	1 569	315		157	1 097					52		107	641	43	254	59.27	8.22
Tirioko	796	186		80	530					15		29	266	81	139	319.28	50.86
Nginyang Division	4 439	617		406	3 416					126	203	136	1 496	253	1 202	81.12	12.69
Total rural area	9 875[2]	1 585	144	960	7 185[3]	73	134	168	145	817	505	639	2 935	295	1 474	18.46	3.81

1) 168 sqkm lake and 30 sqkm swamps are not included in the Census area

2) 10 sqkm excluded for trading centres

3) For official land statistics see supplementary publication to FM-Handbook, Vol. III A: Agriculture Land Statistics

AGRICULTURAL STATISTICS [1)]

Rainfed agriculture is limited to two small areas of the district and no meaningful agricultural statistics for the district exist. Development projects of considerable size have been started which will hopefully enlarge and improve the information available. Some coffee, tea, and pyrethrum is grown, but in unimportant quantities – the expansion of these crops is limited by the natural conditions within the district.

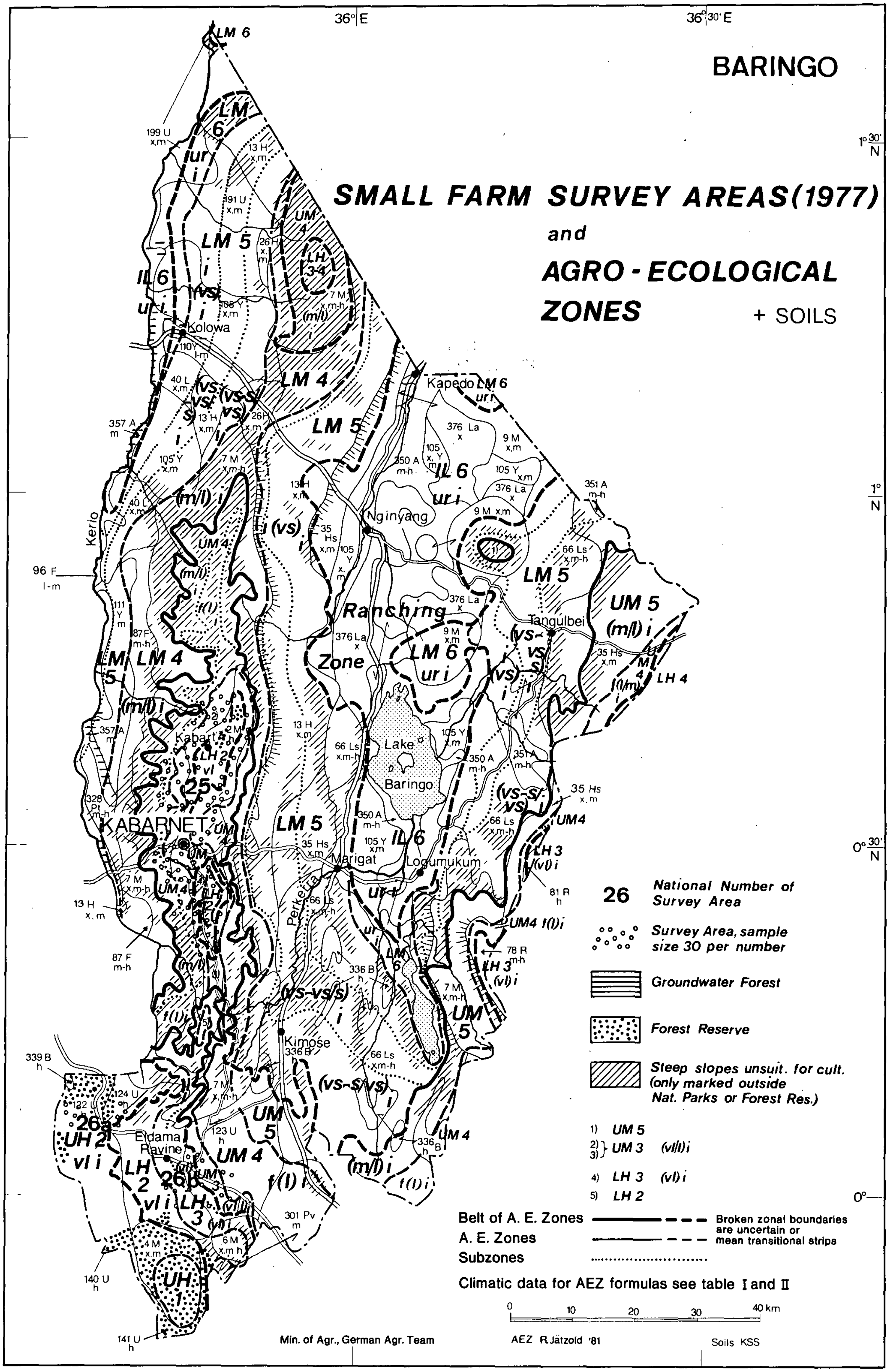
BARINGO DISTRICT

TABLE 7: PYRETHRUM
TRENDS IN PRODUCTION AND QUALITY[a)]

Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	65	80	68	123	158
Pyrethrin content %	1.4	1.4	1.5	1.6	1.5

a) Source: Pyrethrum Board

1) For more detailed and up to date information, see FMHB Vol. III/A



BARINGO
SMALL FARM SURVEY AREAS (1977)
and
AGRO-ECOLOGICAL ZONES
+ SOILS
36° E
36°30' E
1°30' N
1° N
0°30' N
0°
Kolowa
Kapedo
Nginyang
Tangulbei
Kerio
Ranching Zone
Lake Baringo
KABARNET
Kabartonjo
Marigat
Logumukum
Perkerra
Kimose
Eldama Ravine
26 National Number of Survey Area
Survey Area, sample size 30 per number
Groundwater Forest
Forest Reserve
Steep slopes unsuit. for cult. (only marked outside Nat. Parks or Forest Res.)
1) UM 5
2) 3) UM 3 (vl/l) i
4) LH 3 (vl) i
5) LH 2
Belt of A. E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 10 20 30 40 km
Min. of Agr., German Agr. Team
AEZ R.Jätzold '81
Soils KSS

SMALL FARM SURVEY (SFS)[1)]

The SFS was carried out in the two areas where mixed farming under rainfed conditions is possible, the Kabarnet (AEZ LH 2–UM 3+4) and the Eldama Ravine (AEZ UH 2–LH 2+3–UM 3+4) regions.

While the farms in AEZ LH 2–UM 3+4 are only roughly 4 ha in size, the farmers in UH 2–LH 2+3–UM 3+4 cultivate approximately 14 ha each. Arable farming is the mainstay of the smaller farms, while the bigger farms of the southern part of the district receive much of their income from milk production. The proportion of improved cattle kept is 60 % (LH 2 –UM 3+4) and 90 % (UH 2–LH 2+3–UM 3+4) respectively (table 8 & 9). The most important annual crops are maize, and beans interplanted into maize. They are planted on about 80 % of the annual crop area (table 10). There are some well established large farms in the southern part of the district practising mixed farming (wheat/dairy): the rest of the district is used for ranching.

The improvement of the infrastructure will help to make vegetable production more economic in the small farms, while the improvement of dairying in larger family farms seems to be the most logical development. There are areas where high altitude sorghum could produce satisfactory yields, but for much of the district a perennial crop is required which yields similar returns on labour and capital as those of tea, but under arid conditions, if any marked and lasting improvement of the overall socio-economic situation is to be achieved.

1) For more detailed and up to date information, see FMHB Vol. III/B

BARINGO DISTRICT

AEZ: LH 2 – UM 3 + 4

TABLE 8 a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 25

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	1.o	3.7	1o.2
Land Use: Annual Crops 1) First Season				
Maize	ha	o.2	o.5	o.8
Maize & Beans	ha	o.3	o.5	o.5
Fingermillet	ha	-	-	o.2
	ha			
	ha			
Total	ha	o.5	o.5	1.5
Second Season 1)	ha			
	ha			
	ha			
	ha			
Permanent Crops 1)				
Pyrethrum	ha	-	o.7	o.2
Coffee	ha	-	o.3	o.6
	ha			
	ha			
Portion of total	%	-	14 %	8 %
Grazing & Forage	ha	o.4	1.7	6.9
portion of total	%	4o %	46 %	68 %
Other Land Use	ha	o.1	o.5	1.o
Livestock on Farm:				
Cattle: local	LU	2.9	o.8	o.8
improved	LU	1.5	3.o	5.5
Sheep & Goats	LU	o.4	1.8	o.5
Total	LU	4.8	5.6	6.8

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.5	o.3	o.2
Portion of improved cattle kept	%	34 %	79 %	87 %
Portion of Farmers owning a Plough	%			
Labour on Farm:				
Family Adults	persons	2.o	2.6	3.1
Perm. Hired Labour	"	-	o.3	1.o
Children > 14 years	"	1.6	1.6	4.4
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.oo	o.39	2.39
Children < 14 years	"	2.4o	-	2.4o
Subsistence Units	SU	3.44	o.39	3.83
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1424	2295	
Beans	kg	174	277	
Fingermillet	kg	89	139	
Cabbage	kg	43	4	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Onions, Beans, Cabbage, Maize & Fingermillet

1) Major crops only considered

2) Based on 1979 Census figures

TABLE 8 b: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

AEZ: UH 2 – LH 2 + 3 – UM 3 + 4

Survey Area 26

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	5.2	9.7	2o.5
Land Use: Annual Crops 1) First Season				
Maize	ha	o.6	o.7	1.7
Maize & Beans	ha	1.3	o.5	o.9
Fingermillet	ha	o.1	-	o.2
Cowpeas	ha	-	-	o.3
	ha			
Total	ha	2.o	1.2	3.1
Second Season 1)	ha			
	ha			
	ha			
	ha			
Permanent Crops 1) Pyrethrum	ha	o.1	o.1	o.1
	ha			
	ha			
	ha			
Portion of total	%	2 %	1 %	-
Grazing & Forage	ha	2.1	7.6	14.6
portion of total	%	4o %	78 %	71 %
Other Land Use	ha	1.o	1.2	2.7
Livestock on Farm:				
Cattle: local	LU	o.3	o.9	o.6
improved	LU	13.1	8.4	14.2
Sheep & Goats	LU	2.7	o.3	1.4
Total	LU	16.1	9.6	16.2

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.4	o.1	o.2
Portion of improved cattle kept	%	98 %	9o %	96 %
Portion of Farmers owning a Plough	%	8o %	1o %	4o %
Labour on Farm:				
Family Adults	persons	2.4	2.1	2.4
Perm. Hired Labour	"	1.4	o.5	1.6
Children > 14 years	"	3.8	1.5	2.8
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	1.98	o.15	2.13
Children < 14 years	"	2.26	-	2.26
Subsistence Units	SU	3.33	o.15	3.48
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1288	2o76	
Beans	kg	15o	238	
Fingermillet	kg	47	74	
English Potatoes	kg	125	41	
Cabbage	kg	3		
	kg			
	kg			
	kg			

Other Crops cultivated: English Potatoes, Coffee, Cabbage

1) Major crops only considered

2) Based on 1979 Census figures

BARINGO DISTRICT

TABLE 9 a: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: LH 2 – UM 3 + 4

Survey Area 25

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	4.7	18.6	0.9	2.6	0.4	2.3
Avg. 1	4.7	20.0	1.6	2.6	2.0	3.5
Up. Qu.	5.6	20.0	2.0	3.0	-	4.0
Lo. Qu.	2.0	7.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	1.0	22	0.5	10	2.7	58	0.1	3	0.1	3	0.2	4
Avg. 1	1.1	19	0.7	12	2.9	49	0.4	6	0.6	9	0.2	4
Up. Qu.	1.6	41	0.5	11	3.0	61	0.4	5	-	2	0.3	7
Lo. Qu.	0.4	18	-	-	0.8	27	-	-	-	-	-	3
Total	31.3		13.8		80.8		3.7		4.4		5.8	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.9	1.2	2.0	57.1
Avg. 1			1.9	72.7
Up. Qu.	1.0	1.8	4.4	96.8
Lo. Qu.	0.9	0.7	1.1	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	60.6	0.2	1.3	2.1	0.4	-	-	-	-	1.4	0.4	-	1.0
Avg. 1	61.4	6.8	5.4	4.5	7.4	-	-	0.2	0.1	1.7	0.7	0.3	1.8
Up. Qu.	100.0	-	-	1.9	-	-	-	-	-	2.2	0.3	-	0.5
Lo. Qu.	50.0	-	-	-	-	-	-	-	-	0.2	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

BARINGO DISTRICT

TABLE 9 b: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: UH 2 – LH 2 + 3 – UM 3 + 4

Survey Area 26

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	13.3	30.5	1.6	2.3	1.1	2.4
Avg. 1	13.3	30.5	2.4	2.3	1.6	3.4
Up. Qu.	20.0	43.0	2.0	2.0	2.0	3.0
Lo. Qu.	7.4	16.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	%	Perm. Crops ha	%	pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	2.2	17	0.1	1	9.3	73	0.2	1	0.4	3	0.5	4
Avg. 1	2.2	14	0.3	2	9.6	64	1.2	8	1.1	8	0.6	4
Up. Qu.	2.8	21	-	1	12.8	83	-	-	0.6	4	0.4	4
Lo. Qu.	1.2	11	-	-	5.9	57	-	-	-	-	0.1	1
Total	65.0		2.6		278.6		4.7		12.6		16.2	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.8	1.0	1.4	86.1
Avg. 1			1.4	86.1
Up. Qu.	1.0	1.5	2.0	100.0
Lo. Qu.	0.8	0.7	1.0	84.2

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	65.0	1.3	0.1	3.9	0.1	-	-	-	-	0.4	-	-	-
Avg. 1	65.9	3.5	0.9	5.2	4.3	0.7	-	-	-	0.8	-	-	0.2
Up. Qu.	100.0	1.9	-	6.0	-	-	-	-	-	0.6	-	-	-
Lo. Qu.	90.9	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

BARINGO DISTRICT

TABLE 10 a: **CROPPING PATTERN**

AEZ: LH 2 – UM 3 + 4

Survey Area 25

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.5	0.9	0.80	0.00	14.1	40.4
Maize IPC	0.0	0.6	0.00	0.00	0.6	1.7
Fingermillet	0.1	0.3	0.04	0.00	2.4	6.9
Beans IPC	0.0	0.2	0.00	0.00	0.2	0.6
Cabbage	0.0	0.2	0.00	0.00	0.2	0.6
Onions	0.0	0.1	0.00	0.00	0.1	0.3
Pyrethrum	0.1	0.3	0.40	0.00	4.2	12.2
Maize & FMilt	0.0	0.4	0.00	0.00	0.4	1.1
Maize & Beans	0.4	0.8	0.80	0.00	12.6	36.2
Total					34.8	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cabbage	0.0	0.1	0.00	0.00	0.1	2.8
Pyrethrum	0.1	0.3	0.40	0.00	4.2	97.2
Total					4.4	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Coffee	0.3	0.6	0.28	0.00	7.7	98.5
Citrus	0.0	0.1	0.00	0.00	0.1	1.5
Total					7.8	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo.Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

BARINGO DISTRICT

TABLE 10 b: **CROPPING PATTERN**

AEZ: UH 2 – LH 2 + 3 – UM 3 + 4 Survey Area 26

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	%
Maize	1.1	1.7	1.60	0.00	33.2	49.8
Fingermillet	0.1	0.4	0.12	0.00	2.9	4.4
Cowpeas	0.1	3.6	0.00	0.00	3.6	5.4
Engl. Potatoes	0.0	0.5	0.00	0.00	1.0	1.5
Cabbage	0.0	0.2	0.00	0.00	0.2	0.3
Pyrethrum	0.1	0.3	0.00	0.00	1.8	2.8
Maize & Beans	0.8	1.6	2.00	0.00	23.6	35.3
FMlt & Sorghum	0.0	0.4	0.00	0.00	0.4	0.6
Total					66.8	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	%
Engl. Potatoes	0.0	0.4	0.00	0.00	0.4	17.9
Pyrethrum	0.1	0.3	0.00	0.00	1.8	82.1
Total					2.2	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	%
Coffee	0.0	0.4	0.00	0.00	0.8	100.0
Total					0.8	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo.Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

BARINGO DISTRICT

TABLE 11 a: **HERD COMPOSITION (GRAZING LIVESTOCK)**

AEZ: LH 2 – UM 3 + 4

– in Head & Livestock Units –

Sept. '77, Survey Area 25

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.53	0.03	-	0.90				0.37			0.37
	Upper Qu.	1	-	-	1				0.5			0.5
1 - 2 years,	Average	0.43	0.57	-	0.53				0.77			0.77
	Upper Qu.	-	-	-	1				0.5			0.5
Over 2 years,	Average	0.13	0.23	-		1.83			2.13			2.13
	Upper Qu.	-	-	-		3			3.0			3.0
Subtotal(improved)	Total	33	25	-	43	55			97.8			97.8
	Average	1.10	0.83	-	1.43	1.83			3.26			3.26
	Upper Qu.	1	-	-	2	3			4.3			-
	Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle	=	28.7 % of total cattle,				Calves + Heifers	=		78.2 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.17	-	-	0.33		2.57	3.00	0.66	-		0.66
	Upper Qu.	-	-	-	-		2	-	0.2	-		0.2
1 - 2 years,	Average	0.27	-	-	0.43				0.31			0.31
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	0.13	0.07	-		1.27	3.23	1.97	1.47	-	6.47	1.47
	Upper Qu.	-	-	-		2	4	-	-	-	-	-
Subtotal (unimp.)	Total	17	2	-	23	38	174	149	73.4	-	194	73.4
	Average	0.57	0.07	-	0.77	1.27	5.80	4.97	2.44	-	6.47	2.44
	Upper Qu.	1	-	-	-	2	6	-	3.8	-	10	3.8
	Lower Qu.	-	-	-	-	-	-	-	0.1	-	-	0.1
LU Male Cattle	=	20.7 % of total cattle,				Calves + Heifers	=		60.5 % of dairy cows			
LU Goats + Sheep	=	44.0 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	50	27	-	66	93	174	149	171.2	-	194	171.2
	Average	1.67	0.90	-	2.20	3.10	5.80	4.97	5.70	-	6.47	5.70
	Upper Qu.	2	-	-	3	4	6	-	10.0	-	10	3.8
	Lower Qu.	1	-	-	1	2	-	-	1.7	-	-	0.1
LU Male Cattle	=	26.3 % of total cattle,				Calves + Heifers	=		71.0 % of dairy cows			
LU Goats + Sheep	=	18.9 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

BARINGO DISTRICT

AEZ: UH 2 – LH 2 + 3 – UM 3 + 4

TABLE 11 b: **HERD COMPOSITION (GRAZING LIVESTOCK)**
– in Head & Livestock Units –

Sept. '77, Survey Area 26

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	1.00	0.20	-	3.13				1.08			1.08
Upper Qu.	2	-	-	4				1.5			1.5
1 - 2 years, Average	0.80	0.67	-	4.27				2.87			2.87
Upper Qu.	2	-	-	5				3.5			3.5
Over 2 years, Average	0.13	0.13	0.10		7.27			7.56			7.56
Upper Qu.	-	-	-		10			10.0			10.0
Subtotal(improved) Total	58	30	3	222	218			345.3			345.3
Average	1.93	1.00	0.10	7.40	7.27			11.51			11.51
Upper Qu.	3	2	-	10	10			15.2			-
Lower Qu.	-	-	-	4	4			7.3			-
LU Male Cattle =	11.5 % of total cattle,				Calves + Heifers =			101.8% of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	0.03	-	-	0.07		1.33	1.47	0.30	-		0.30
Upper Qu.	-	-	-	-		2	1	0.3	-		0.3
1 - 2 years, Average	-	0.07	-	0.20				0.12			0.12
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	0.10	-	0.13		0.63	5.10	3.67	1.44	-	20.33	1.44
Upper Qu.	-	-	-		-	5	1	-	-	8	-
Subtotal (unimp.) Total	4	2	4	8	19	193	154	55.8	-	610	55.8
Average	0.13	0.07	0.13	0.27	0.63	6.43	5.13	1.86	-	20.33	1.86
Upper Qu.	-	-	-	-	-	8	2	3.0	-	25	3.0
Lower Qu.	-	-	-	-	-	-	-	-	-	8	-
LU Male Cattle =	26.8 % of total cattle,				Calves + Heifers =			42.1% of dairy cows			
LU Goats + Sheep =	62.2 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	62	32	7	230	237	193	154	401.1	-	610	401.1
Average	2.07	1.07	0.23	7.67	7.90	6.43	5.13	13.37	-	20.33	13.37
Upper Qu.	3	2	-	10	10	8	2	19.2	-	25	3.0
Lower Qu.	-	-	-	4	5	-	-	8.1	-	8	-
LU Male Cattle =	12.4 % of total cattle,				Calves + Heifers =			97.0% of dairy cows			
LU Goats + Sheep =	8.7 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

BARINGO DISTRICT

TABLE 12 a: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: LM 2 – UM 3 + 4

Survey Area 25

Crop		Inputs							Yield
		Improved	Nutrients				Chemicals		
		Improved Seed	N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	93	1	11	-	0.17	7	-	3,131
	UpQu	100	-	29	-	-	8	-	3,600
	LoQu	100	-	-	-	-	-	-	1,929
Fingermillet	Avg.	-	-	-	-	-	-	-	1,186
	UpQu	-	-	-	-	-	-	-	1,250
	LoQu	-	-	-	-	-	-	-	875
Cabbage	Avg.	-	-	-	-	-	10	-	7,500
Maize & Beans									
Maize	Avg.	100	-	7	-	0.11	3	-	2,832
Beans	Avg.	-	-	-	-	0.14	-	-	437
Maize	UpQu	100	-	18	-	0.06	5	-	3,600
Beans	UpQu	-	-	-	-	0.25	-	-	563
Maize	LoQu	100	-	-	-	-	3	-	1,800
Beans	LoQu	-	-	-	-	-	-	-	200
Second Rains									
Cabbage	Avg.	100	-	-	-	-	-	-	1,667
Perennial Crops									
Pyrethrum	Avg.	-	-	4	-	-	1	-	2,423
	UpQu	-	-	-	-	-	3	-	800
	LoQu	-	-	-	-	-	-	-	375
Coffee	Avg.	-	28	2	-	0.91	11	28	7,982
	UpQu	-	33	-	-	1.25	8	30	4,286
	LoQu	-	-	-	-	-	-	-	-

BARINGO DISTRICT

TABLE 12 b: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: UH 2 – LH 2 + 3 – UM 3 + 4

Survey Area 26

Crop		Inputs							Yield
		Improved Seed	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	89	10	25	-	0.03	2	-	2,666
	UpQu	100	23	38	-	-	4	-	3,600
	LoQu	100	-	-	-	-	-	-	1,731
Fingermillet	Avg.	-	-	-	-	-	-	-	726
	UpQu	-	-	-	-	-	-	-	964
	LoQu	-	-	-	-	-	-	-	250
Engl.Potatoes	Avg.	50	5	80	-	-	-	-	6,875
Cabbage	Avg.	100	-	-	-	-	-	-	5,000
Maize & Beans									
Maize	Avg.	100	5	17	-	0.01	2	-	2,970
Beans	Avg.	-	2	3	-	-	-	-	288
Maize	UpQu	100	-	25	-	-	4	-	3,875
Beans	UpQu	-	-	2	-	-	-	-	417
Maize	LoQu	100	-	-	-	-	-	-	2,250
Beans	LoQu	-	-	-	-	-	-	-	128
Second Rains									
Engl.Potatoes	Avg.	-	-	46	-	-	-	-	5,400
Perennial Crops									
Pyrethrum	Avg.	-	-	16	-	-	-	-	2,472
	UpQu	-	-	-	-	-	-	-	2,100
	LoQu	-	-	-	-	-	-	-	225
Coffee	Avg.	-	53	-	-	-	-	11	2,715

BARINGO DISTRICT

TABLE 13 a: **DISPOSAL OF CROPS**

AEZ: LH 2 – UM 3 + 4

Survey Area 25

Crop	Production kg	Marketing Board kg	Marketing Board %	Local Market kg	Local Market %	Home Consumption kg	Home Consumption %
First Rains							
Maize	43,865	0	0	22,670	52	21,195	48
Maize & Beans	45,542	0	0	19,750	43	25,792	57
Maize & FMilt	810	0	0	360	44	450	56
Maize IPC	540	0	0	0	0	540	100
Fingermillet	3,040	0	0	460	15	2,580	85
Cabbage	3,000	0	0	1,800	60	1,200	40
Second Rains							
Beans IPC	75	0	0	0	0	75	100
Cabbage	200	0	0	100	50	100	50
	Permanent Crops						
Coffee	2,600	2,600	100	0	0	0	0
Pyrethrum	1,325	1,325	100	0	0	0	0

TABLE 13 b: **DISPOSAL OF CROPS**

AEZ: UH 2 – LH 2 + 3 – UM 3 + 4

Survey Area 26

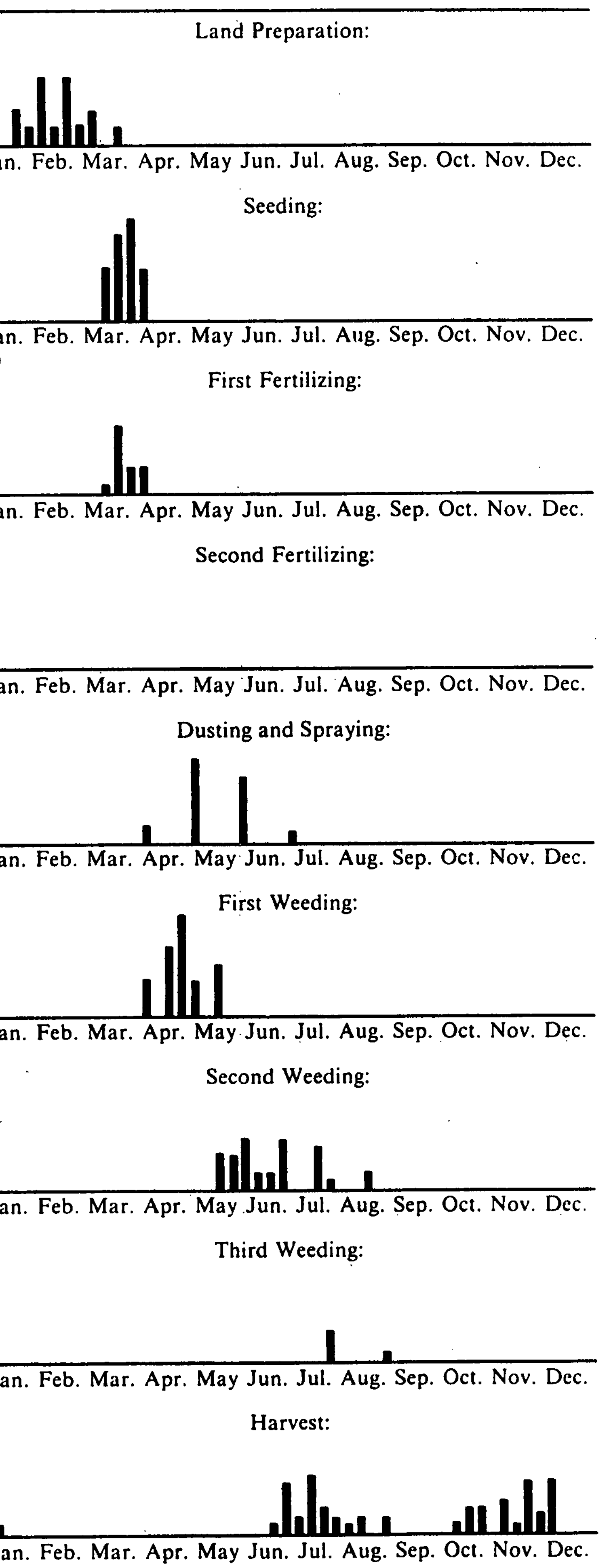
Crop	Production kg	Marketing Board kg	Marketing Board %	Local Market kg	Local Market %	Home Consumption kg	Home Consumption %
First Rains							
Maize	106,110	65,070	61	9,540	9	31,500	30
Maize & Beans	99,303	28,920	29	32,810	33	37,573	38
Fingermillet	1,465	0	0	290	20	1,175	80
FMlt & Sorghum	1,060	0	0	770	73	290	27
Engl. Potatoes	5,550	3,600	65	0	0	1,950	35
Cabbage	1,000	0	0	900	90	100	10
Second Rains							
Engl. Potatoes	5,400	3,600	67	0	0	1,800	33
	Permanent Crops						
Nil							

ARINGO DISTRICT

TABLE 14 a: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 34[1)]

EZ: LH 2 – UM 3 + 4 Survey Area 25 Sample Size: 30



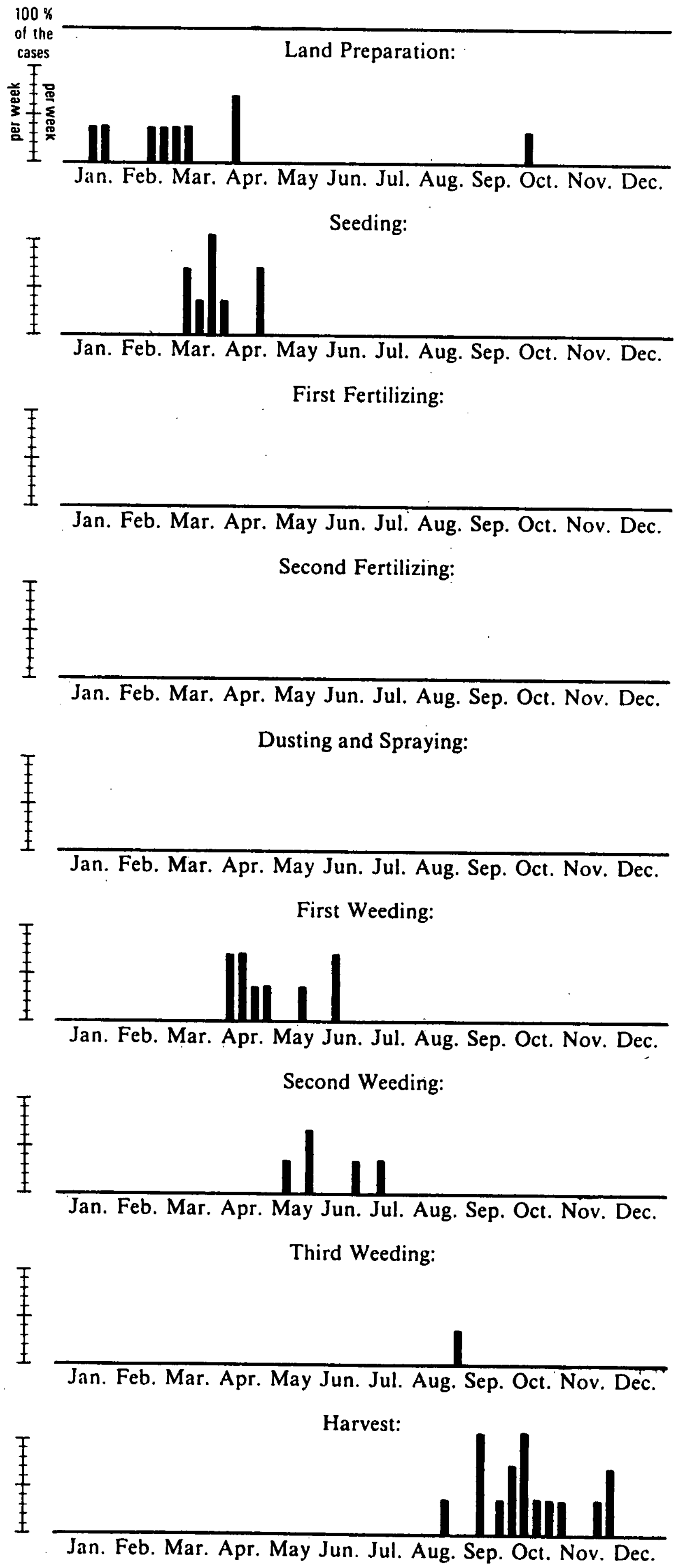
1) Maximum 30 per crop and season

BARINGO DISTRICT

TABLE 14 b: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 12 **Fingermillet** Cases: 9

AEZ: LH 2 – UM 3 + 4 Survey Area 25 Sample Size: 30

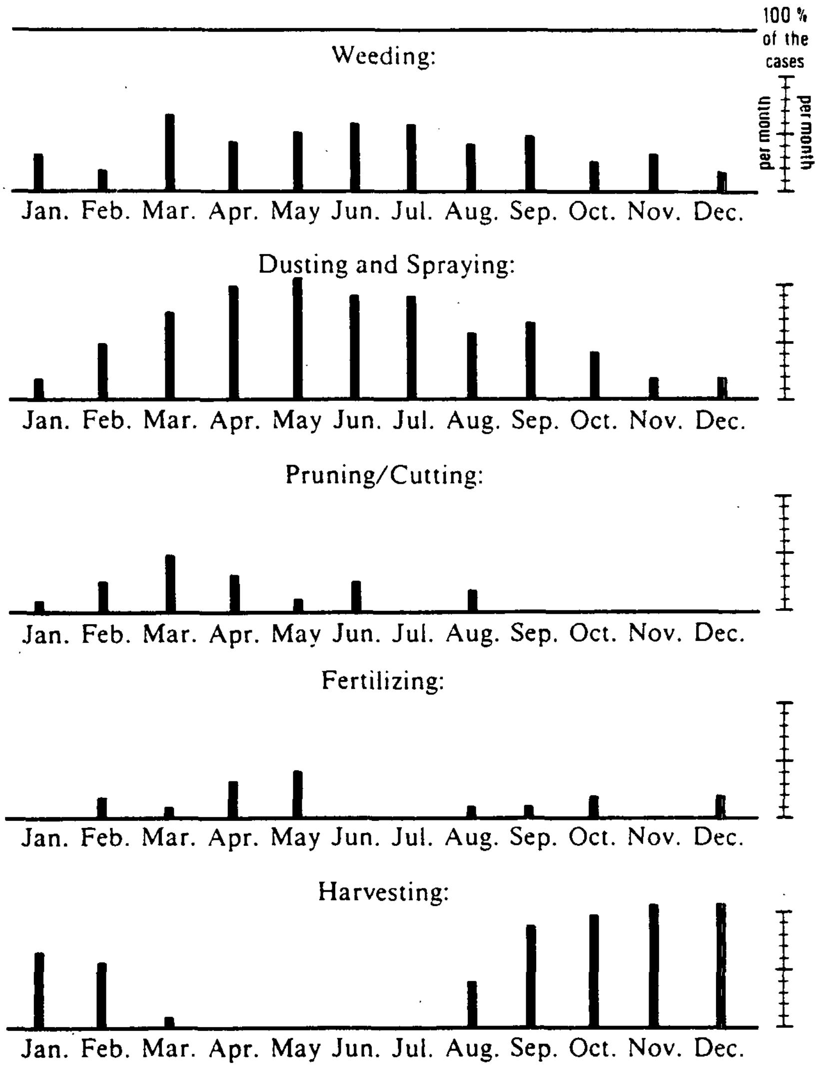


BARINGO DISTRICT

TABLE 14 c: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 **Coffee** Cases: 17

AEZ: LH 2 – UM 3 + 4 Survey Area 25 Sample Size: 30

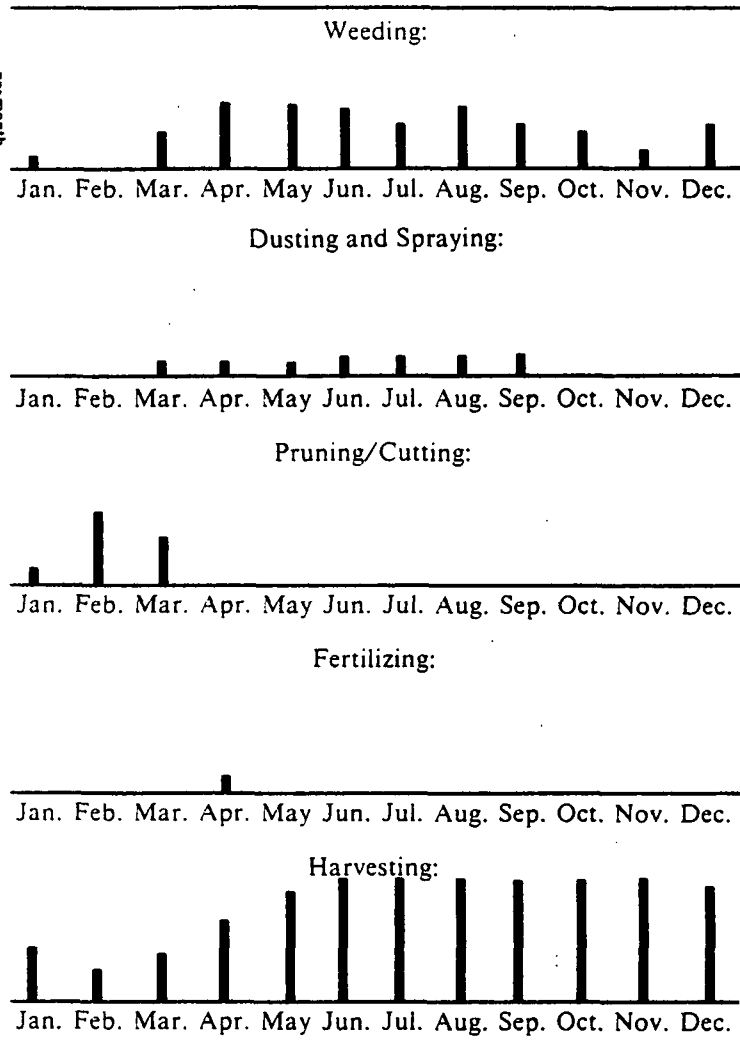


BARINGO DISTRICT

TABLE 14 d: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 52 **Pyrethrum** Cases: 14

AEZ: LH 2 – UM 3 + 4 Survey Area 25 Sample Size: 30



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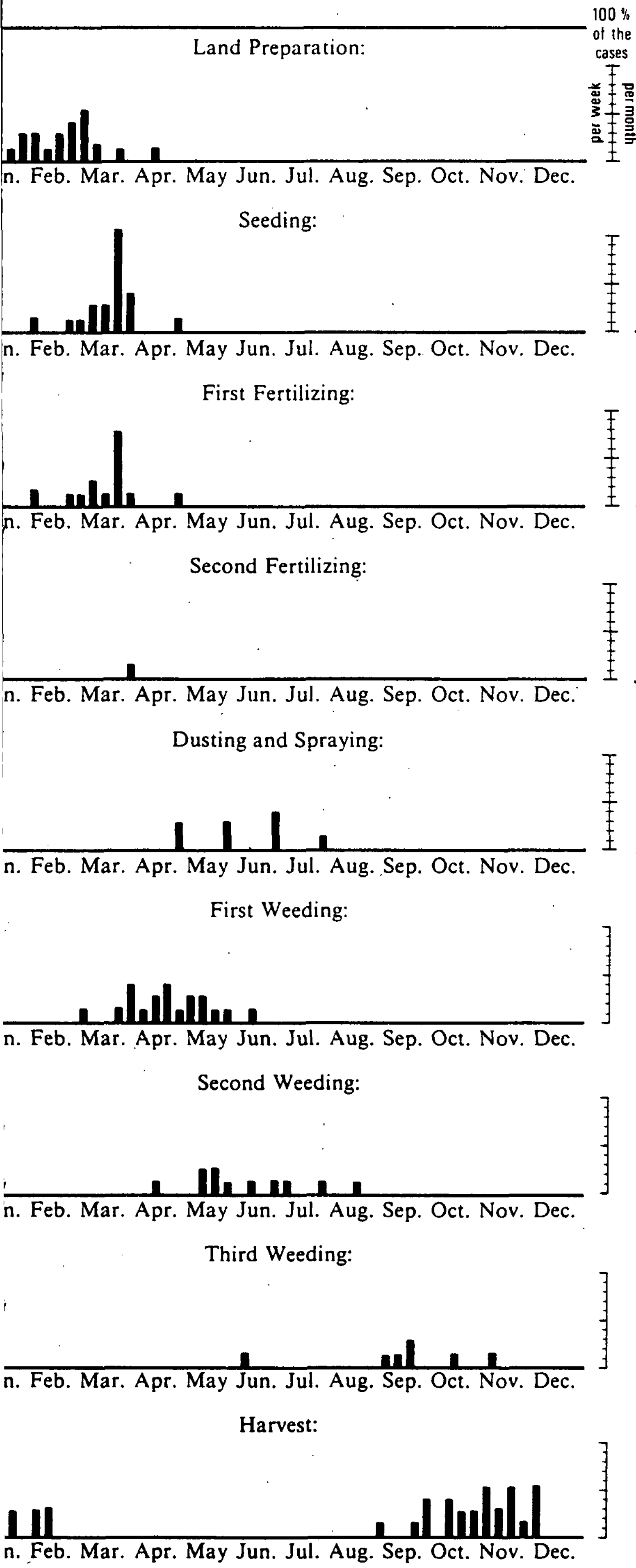
ABLE 14 e: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 19

Z: UH 2 – LH 2 + 3 – UM 3 + 4 Survey Area 26 Sample Size: 30

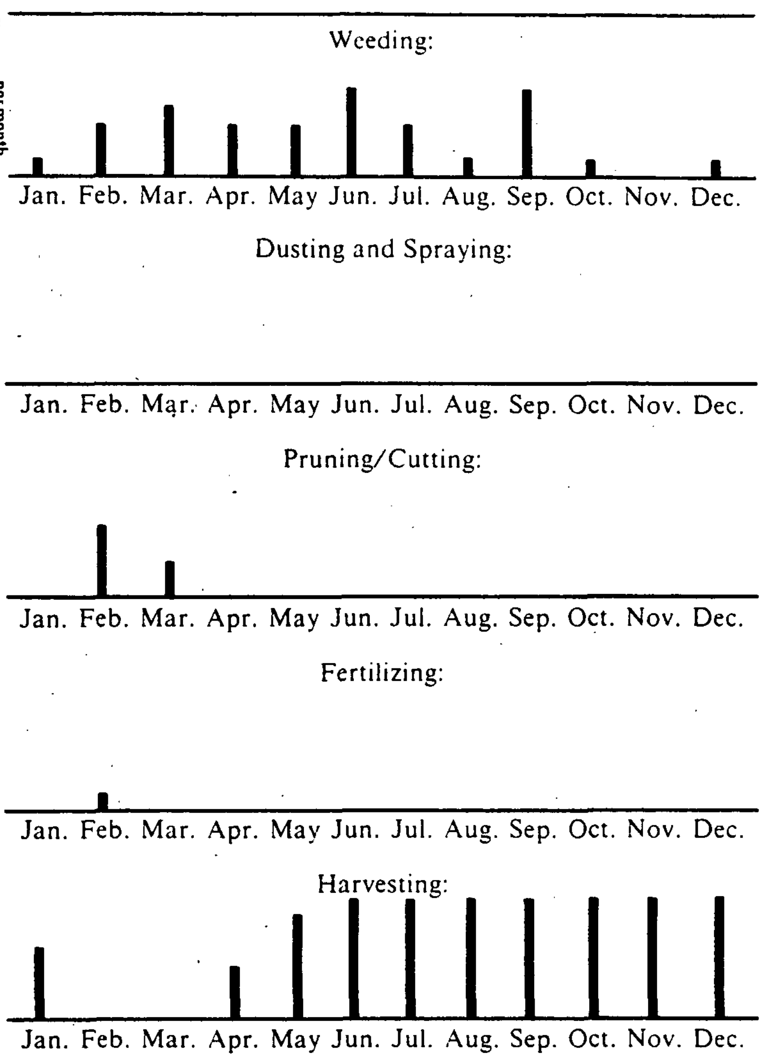


BARINGO DISTRICT

TABLE 14 f: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 52 **Pyrethrum** Cases: 7

AEZ: UH 2 – LH 2+3 – UM 3+4 Survey Area 26 Sample Size: 30



BARINGO DISTRICT

TABLE 15 a: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT AND NUTRIENT INPUT

		A.E.Z.: UH 1 SHEEP & DAIRY ZONE				A.E.Z.: UH 2 PYRETHRUM-WHEAT ZONE							
Vegt. Period 1st + 2nd: in Days, 1st:		vl or two 120 or more		2nd: 180 or less	total: (300)	vli or two 1o5 or more		2oo-24o	3o5-345				
Soil:		NITOSOLS				NITOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	2,000			3,800	2,000			4,000				
Fertilizer N	kg				100				111				
P_2O_5	kg				50				55				
K_2O	kg												
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg	700	350	700	1,100	700	350	700	1,100				
Fertilizer N	kg				10				10				
P_2O_5	kg				14				14				
K_2O													
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg					2,250	1,800	2,500	2,800				
Fertilizer N	kg							6	13				
P_2O_5	kg							11	22				
K_2O	kg												
CROP: BARLEY													
Farmers in Production Level	%												
Yields	kg					2,500	1,400	1,800	2,800				
Fertilizer N	kg								6				
P_2O_5	kg								11				
K_2O	kg												
CROP: TRITICALE													
Farmers in Production Level	%												
Yields	kg					2,600		2,600	3,000				
Fertilizer N	kg								10				
P_2O_5	kg								14				
K_2O	kg												
CROP: OATS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15 b: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT AND NUTRIENT INPUT

		A.E.Z.: UH 1 SHEEP & DAIRY ZONE				A.E.Z.: UH 2 PYRETHRUM-WHEAT ZONE							
		Vegt. Period 1st + 2nd: in Days, 1st: vl or two 120 or more		2nd: 180 or less	total: (300)	vli or two 1o5 or more		2oo-24o	3o5-345				
		Soil: NITOSOLS				NITOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg					2,400	2,600	3,000	5,500				
Fertilizer N	kg						6	15	78				
P_2O_5	kg						6	14	74				
K_2O	kg												
CROP: RAPESEED													
Farmers in Production Level	%												
Yields	kg					500		800	1,000				
Fertilizer N	kg							30	50				
P_2O_5	kg							30	50				
K_2O													
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg					7,000	15,000	20,000	38,000				
Fertilizer N	kg						64	104	248				
P_2O_5	kg						72	117	279				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg					3,500	14,000	28,000	45,000				
Fertilizer N	kg						84	196	332				
P_2O_5	kg						63	147	249				
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15 c: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES OUTPUT AND NUTRIENT INPUT

		A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: LH 3 WHEAT/(M.)-BARLEY ZONE							
		Vegt. Period 1st + 2nd: vli or two in Days, 1st: 100 or more		2nd: 185-210	total: 285-310	(vl)i or two 95 or more		190-205	285-300				
		Soil: NITOSOLS				CAMBISOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields	kg	2,200			4,500	2,100			4,200				
Fertilizer N	kg				127				118				
P_2O_5	kg				63				58				
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg	3,000			7,000	3,000			5,000				
Fertilizer N	kg				222				194				
P_2O_5	kg				111				97				
K_2O													
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg	400	400	700	1,000								
Fertilizer N	kg			8	16								
P_2O_5	kg			10	20								
K_2O	kg												
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg	1,800	1,400	2,600	3,300	2,100	1,500	2,300	2,500				
Fertilizer N	kg			19	36			4	8				
P_2O_5	kg			34	63			8	17				
K_2O	kg												
CROP: BARLEY													
Farmers in Production Level	%												
Yields	kg					2,600	1,400	2,000	3,400				
Fertilizer N	kg								20				
P_2O_5	kg								38				
K_2O	kg												
CROP: OATS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15 d: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT AND NUTRIENT INPUT

		A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: LH 3 WHEAT/(M.)-BARLEY ZONE							
		Vegt. Period 1st + 2nd: vli or two in Days,1st: 1oo or more		2nd: 185-21o	total: 285-31o	(vl)i or two 95 or more		19o-2o5	285-3oo				
		Soil: NITOSOLS				CAMBISOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,500	2,800	3,500	5,500	2,500	2,500	3,000	4,000				
Fertilizer N	kg		8	25	75			13	38				
P_2O_5	kg		7	24	72			12	36				
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	560	400	900	1,600	1,200	400	1,200	1,500				
Fertilizer N	kg			12	35				10				
P_2O_5	kg			14	44				13				
K_2O													
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg					6,500	2,800	10,000	18,000				
Fertilizer N	kg							28	92				
P_2O_5	kg							32	104				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,500	5,000	12,000	32,000	4,500	4,000	12,000	25,000				
Fertilizer N	kg		4	53	193			53	144				
P_2O_5	kg		3	45	165			53	144				
K_2O	kg												
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg					2,500	2,500/250	3,000/300	4,000/400				
Fertilizer N	kg							15	46				
P_2O_5	kg							7	36				
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15 e: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT AND NUTRIENT INPUT

		A.E.Z.: UM 3 MARGINAL COFFEE ZONE				A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE							
		Vegt. Period 1st + 2nd: in Days, 1st: (vl/l)i or two 95 or more		2nd: 14o-19o	total: 235-285	(l/m)i or two 9o or more		85-1o5	175-195				
		Soil: NITOSOLS				CAMBISOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS Farmers in Production Level	%												
Yields	kg	1,300			2,700	800			2,000				
Fertilizer N	kg				77				66				
P_2O_5	kg				38				33				
K_2O	kg												
CROP: NAPIER/BANA GRASS Farmers in Production Level	%												
Yields	kg	2,700			6,000	1,800			3,000				
Fertilizer N	kg				183				66				
P_2O_5	kg				91				33				
K_2O													
CROP: COFFEE Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: BANANAS Farmers in Production Level	%												
Yields	kg	8,000		8,000	14,000								
Fertilizer N	kg				90								
P_2O_5	kg				36								
K_2O	kg												
CROP: MAIZE Farmers in Production Level	%												
Yields	kg	2,500	2,000	3,000	4,000	2,000	1,800	2,500	3,500				
Fertilizer N	kg			13	38			13	38				
P_2O_5	kg			12	37			12	36				
K_2O	kg												
CROP: SORGHUM Farmers in Production Level	%												
Yields	kg					2,100	900	2,500	3,800				
Fertilizer N	kg							14	52				
P_2O_5	kg							10	46				
K_2O	kg												

TABLE 15 f: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES OUTPUT AND NUTRIENT INPUT

		A.E.Z.: LM 4 MARGINAL COTTON ZONE				A.E.Z.: LM 5 LOWER MIDLAND LIVESTOCK-MILLET ZONE							
Vegt. Period 1st + 2nd: in Days, 1st:		(m/l)i or two 9o or more		2nd: 65-85	total: 155-175	(vs-s/vs)i 45-55		75-85	12o-14o				
Soil:		CAMBISOLS				LITHOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: COWPEAS													
Farmers in Production Level	%												
Yields	kg					500		700	900				
Fertilizer N	kg							8	16				
P_2O_5	kg							7	13				
K_2O	kg												
CROP: GRAMS													
Farmers in Production Level	%												
Yields	kg					650		600	700				
Fertilizer N	kg								2				
P_2O_5	kg								3				
K_2O													
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yields	kg	650		700	1,000								
Fertilizer N	kg			3	15								
P_2O_5	kg			2	13								
K_2O	kg												
CROP: GROUNDNUTS													
Farmers in Production Level	%												
Yields	kg					550	600	1,000					
Fertilizer N	kg						1	11					
P_2O_5	kg						1	12					
K_2O	kg												
CROP: CASSAVA													
Farmers in Production Level	%												
Yields	kg	4,500	2,000	6,000	9,000								
Fertilizer N	kg			6	18								
P_2O_5	kg			11	32								
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg	2,000	1,500	2,200	2,700	800	400	1,200	1,800				
Fertilizer N	kg			8	22			12	30				
P_2O_5	kg				19			10	27				
K_2O	kg												

TABLE 15 g: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT AND NUTRIENT INPUT

		A.E.Z.: UM 3 MARGINAL COFFEE ZONE				A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE							
		Vegt. Period 1st + 2nd: in Days, 1st: (vl/l)i or two 95 or more		2nd: 140-190	total: 235-285	(l/m)i or two 90 or more		85-105	175-195				
		Soil: NITOSOLS				CAMBISOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg	2,500	2,000/300	3,000/400	4,000/400								
Fertilizer N	kg			20	45								
P_2O_5	kg			12	36								
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg	1,400	800	1,400	1,800								
Fertilizer N	kg				24								
P_2O_5	kg				16								
K_2O													
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	900	700	1,200	1,500	800	500	700	900				
Fertilizer N	kg			10	20				3				
P_2O_5	kg			13	25				3				
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	7,500	8,000	10,000	22,000	4,000	4,000	7,000	16,000				
Fertilizer N	kg		4	20	116			24	96				
P_2O_5	kg		3	15	87			18	75				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	3,500	4,000	16,000	25,000								
Fertilizer N	kg		4	88	151								
P_2O_5	kg		3	75	129								
K_2O	kg												
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	6,500	2,800	10,000	20,000								
Fertilizer N	kg			28	108								
P_2O_5	kg			35	135								
K_2O	kg												

TABLE 15 h: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES OUTPUT AND NUTRIENT INPUT

		A.E.Z.: LM 4 MARGINAL COTTON ZONE				A.E.Z.: LM 5 LOWER MIDLAND LIVESTOCK-MILLET ZONE							
Vegt. Period 1st + 2nd: in Days,1st:		(m/1)i or two 9o or more		2nd: 65-85	total: 155-175	(vs-s/vs)i 45-55		75-85	12o-14o				
Soil:		CAMBISOLS				LITHOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE													
Farmers in Production Level	%												
Yields	kg	1,000			1,500	450			700				
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields	kg	2,000			3,500								
Fertilizer N	kg												
P_2O_5	kg												
K_2O													
CROP: COTTON													
Farmers in Production Level	%												
Yields	kg	500		600	1,000								
Fertilizer N	kg			11	55								
P_2O_5	kg			8	40								
K_2O	kg												
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	1,000	1,100	1,800	1,800								
Fertilizer N	kg		3	20	20								
P_2O_5	kg		2	19	19								
K_2O	kg												
CROP: MILLET													
Farmers in Production Level	%												
Yields	kg	1,800	500	1,200	1,600								
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg	800		800	1,200								
Fertilizer N	kg				24								
P_2O_5	kg				12								
K_2O	kg												

LAIKIPIA DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The Laikipia District extends from the north-eastern foot of the Aberdares to the western foot of Mt. Kenya. It consists mainly of an elevated plateau covered by volcanic ashes. This plain, situated at an altitude of 1 800–2 000 m, is the Laikipia Plateau, a semi-arid grassland, formerly inhabited by a Masai subtribe, (a relict group of which is still living together around Don Dol). Even before the Masai came, the plateau was not cultivated because of unfavourable rainfall. The Lower Highland and Upper Midland Ranching Zones LH 5 and UM 6 are dominant.

The annual average rainfall is fairly high with about 600–850 mm, but it is too unreliable and too scattered during the year. It is divided into three seasons (see Diagram Rumuruti p. 12): First rains in April–May have a 60 % reliability of about 100 mm only (normally 6 out of 10 years get at least this amount), the middle rains in June–July expect more than 120 mm, and the third rains in October–November more than 60 mm. This is not enough for each season, but with water conservation techniques, a certain amount of water from the first period could be saved for the next one ('dry farming', see p. 12). Areas with good potential for that are marked as LH 4–5. In the Upper Midlands Livestock-Sorghum Zone UM 5 this method would also increase the chances for cropping. People need some cultivation possibilities now, as many have moved in recently, buying ranches cooperatively or just as squatters. High altitude (cold-tolerant) sorghum is one possibility. It could be extended to LH 5 because the altitude boundaries are not very pronounced here. On the other hand, a more suitable grain crop like Quinoa or Amaranth from the Altiplano in Bolivia and Peru would probably give much safer results than sorghum or barley.

There is only one better area, apart from a small strip uphill beyond Nanyuki, and that is the top of the Laikipia Escarpment which borders the Rift Valley north of Nyandarua. This is a complex of ridges at an altitude of 2 000 to 2 600 m, where wheat and malt barley are possible, and to a certain extent maize. For coffee it is either too cold or in lower areas, too dry, although planted coffee trees may survive and yield low amounts. For tea, the same thing applies at a higher altitude level, i.e. there is no real chance for it. The forests occurring there are not rainforests but partly sclerophytic. They contain valuable timber and have been partly changed to quicker producing pine plantations by the Forest Department. Because of this timber production and the sloping topography, it would not be wise to clear the forests for cultivation, although they are situated mainly in the AEZ UH 2. Melioration of the swamps and additional irrigation is another possibility now investigated by scientists on the Laikipia Plateau, an area best suited for large-scale ranching generally.

LAIKIPIA DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**

having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
8936001	Rumuruti	46	Average	620	23	21	40	87	63	49	88	77	35	38	68	33
1 850 m			60% rel.[1]	553	4	2	16	61	32	36	69	53	17	21	39	13
8936006	Ewaso Ngiro Swamp	17	Av.	524	16	18	31	82	84	32	49	59	18	35	64	37
1 930 m			60%	452	8	0	9	52	56	13	25	42	6	25	38	24
8936013	Rumuruti, Hatura	45	Av.	615	27	24	54	95	50	41	74	70	30	38	71	41
1 910 m	Estate		60%	544	14	7	29	77	30	26	56	48	19	24	49	27
8936015	Nyahururu	17	Av.	1022	38	42	57	123	97	84	128	147	68	54	93	91
2 400 m	(Thomson's Falls)		60%	932	15	7	42	87	65	75	111	122	61	26	57	53
8936045	Nanyuki, Segera Ltd.	19	Av.	732	14	31	48	144	90	41	54	76	39	69	82	44
1 790 m			60%	640	4	0	36	115	77	36	20	58	18	51	49	32
8936049	01 Mysor	25	Av.	574	12	17	28	94	90	42	57	76	28	42	64	25
1 890 m			60%	496	0	0	7	73	61	25	45	46	13	33	48	11
9036099	Ngobit, Suguroi	16	Av.	804	37	44	49	118	66	39	72	85	46	53	118	78
2 020 m	Estate		60%	632	24	9	28	96	38	23	49	50	24	20	44	16
9036085	Karameno Estates	10	Av.	901	60	43	96	129	82	22	45	60	38	82	129	115
2 060 m			60%	818	49	24	93	92	44	10	22	26	19	53	77	83
8937022	Nanyuki, Met.	36	Av.	758	20	25	60	126	87	45	55	68	49	84	96	45
1 947 m	Station		60%	652	6	1	44	101	74	38	21	52	15	61	59	33

[1] These figures of rainfall reliability should be exceeded normally in 6 out of 10 years

LAIKIPIA DISTRICT

TABLE 2: **TEMPERATURE DATA**

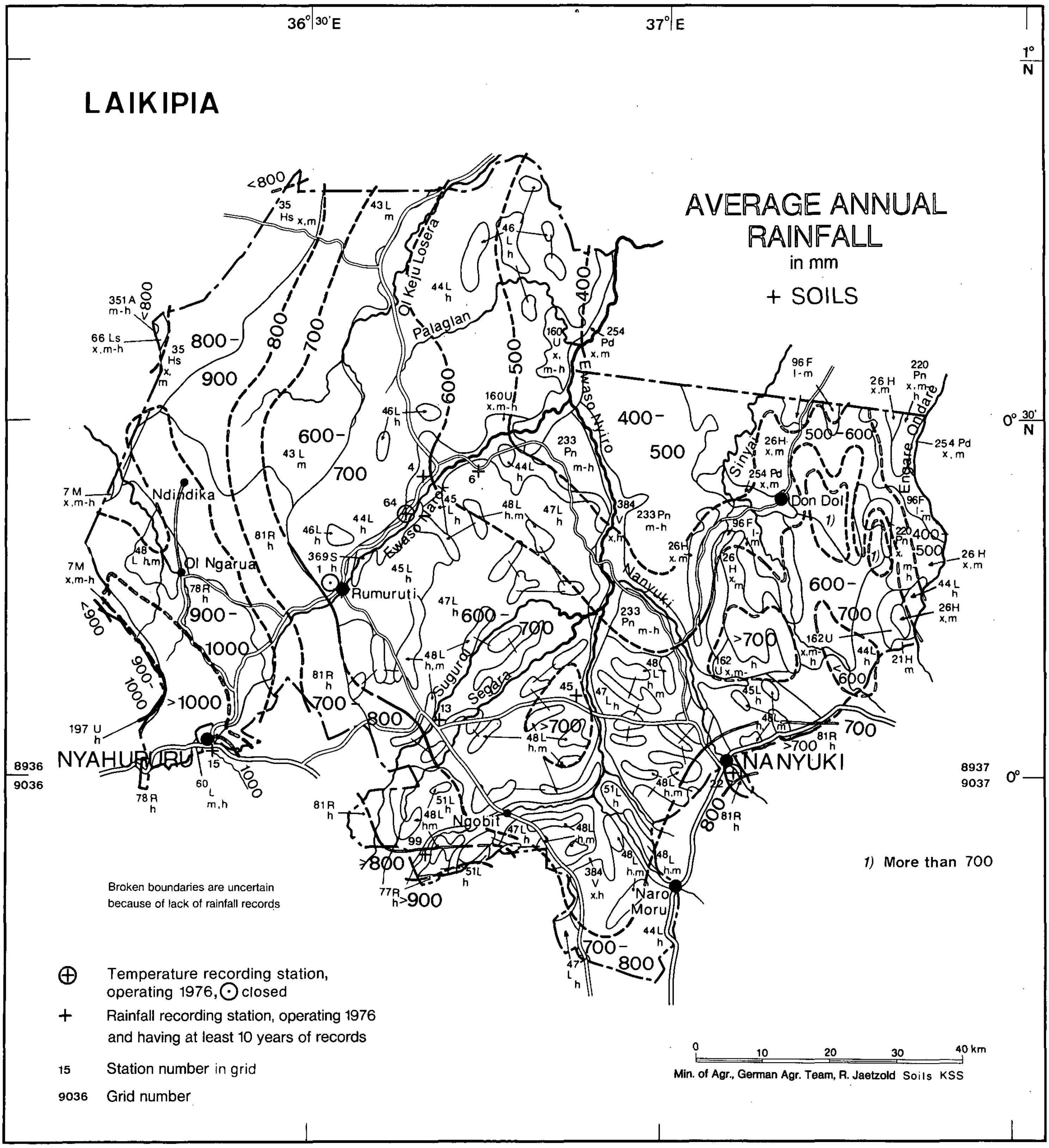
No. and altitude	Name of Station	AEZ[1]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
8937022	Nanyuki,	LH	Mean max.	24.8	25.9	25.3	23.5	23.1	23.1	22.5	22.8	23.0	23.5	22.1	22.9	23.5	
1 947 m	Meteorolo-	4	Mean temp.	17.7	18.5	16.4	13.1	13.2	14.6	14.0	14.4	15.1	14.9	12.7	14.9	14.9	30
	gical	lp	Mean min.	7.1	7.4	8.9	10.4	9.9	8.5	8.5	8.4	7.9	8.6	9.4	8.0	8.6	
	Station		Abs. min.	0.7	2.0	4.2	6.1	5.0	3.9	3.6	3.3	4.1	3.7	4.4	1.9	0.7	
8936064	Rumuruti,	LH	Mean max.	25.6	27.1	26.9	25.8	25.6	25.4	24.8	24.9	26.4	25.2	24.3	24.9	25.7	
1 768 m	M.O.W.	5	Mean temp.	19.2	19.6	18.6	15.1	16.5	18.2	16.4	16.8	19.8	17.2	14.0	16.7	17.4	7
		lp	Mean min.	6.4	7.5	8.3	10.7	9.1	7.2	8.4	8.1	6.6	9.0	10.3	8.2	8.3	
			Abs. min.	–0.6	1.1	3.3	4.4	3.9	1.7	1.7	1.7	0.6	0.6	4.4	1.7	–0.6	

1) AEZ = Agro-ecological zone; lp = lower places, hp = higher places within the zone

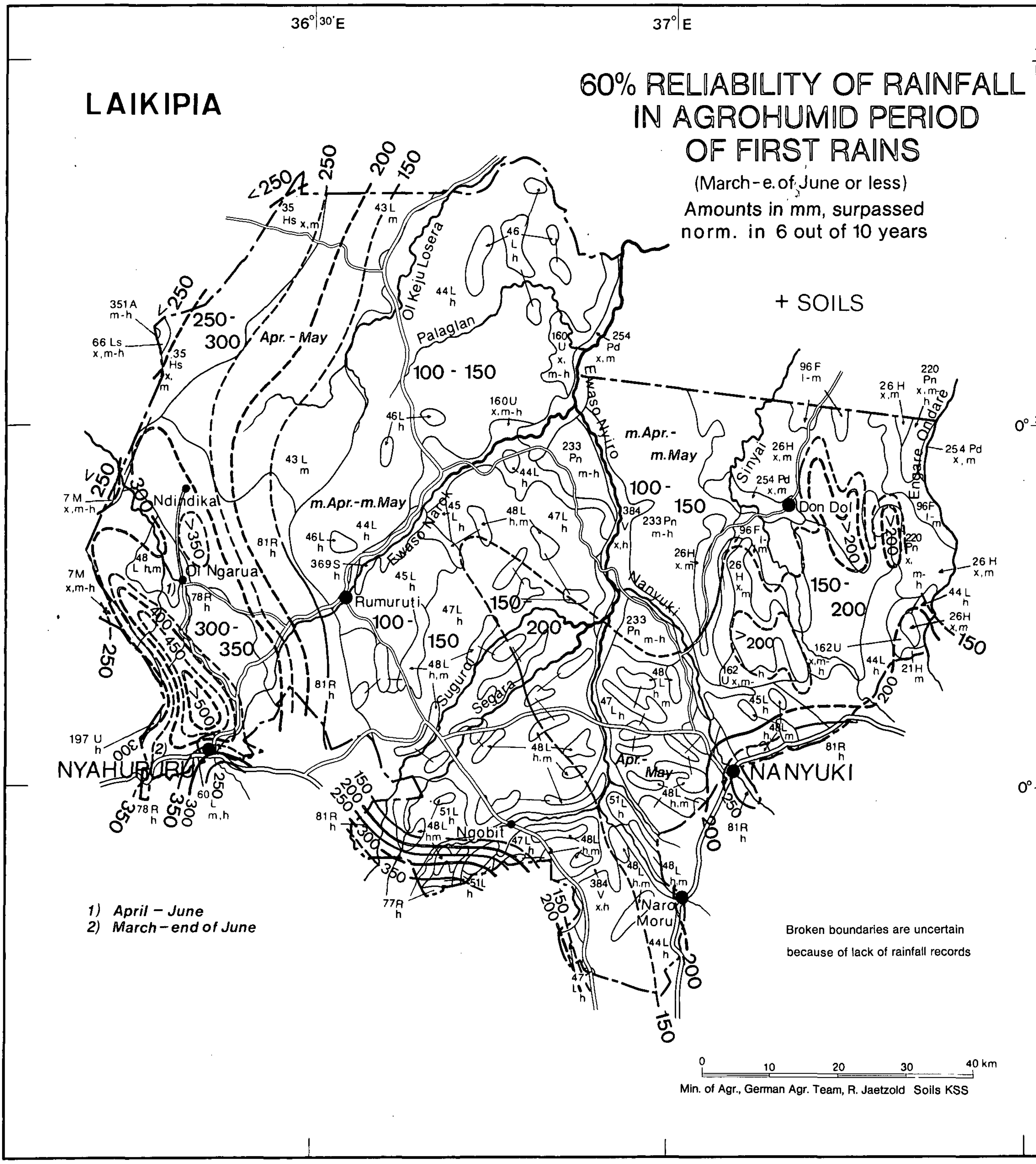
TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

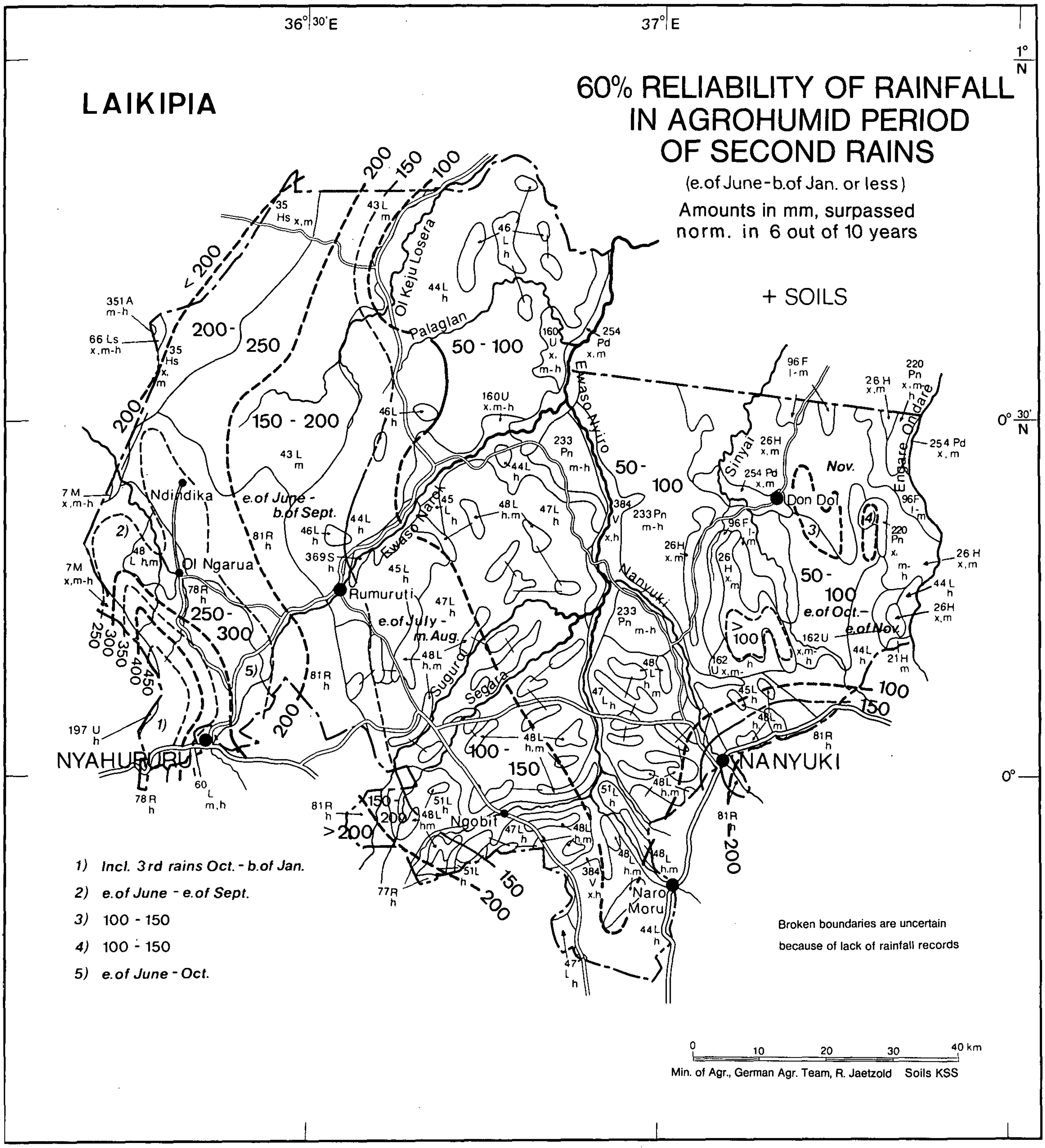
Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2] in days	2nd rains in days	Total[3] in days
UH 2 Pyrethrum-Wheat Zone	vl i or two	Forest Reserve, see Nyandarua District							
	vl/l or two	2 280–2 590	14.9–12.9	1 000–1 200	300–400	300–450	100 or more	135–190	235–290
UH 3 Wheat-Barley Zone	l/vl (l) i (s/vs)	Very small, see Nyandarua District							
LH 2 Wheat/Maize-Pyrethrum Zone	(vl) i or two	Very small, mainly Forest Reserve							
LH 3 Wheat/(Maize)-Barley Zone	(vl/l) i or two	2 200–2 350	15.6–14.9	900–1 000	300–350	250–300	90–100	140–180	230–280
	(l/vl)	2 100–2 300	16.1–15.0	850– 950	300–350	230–280	80– 90	130–140	210–230
LH 4 Cattle-Sheep-Barley Zone	(l)			850– 900	250–300	200–250	60– 80	120–130	180–210
	f (m) i (vs/s)	Very small, see Meru District							
	(s/m) i (vs/s)	1 820–2 280	17.7–16.5	700– 800	210–250	110–150	100–110	60– 70	160–180
	i (s/m) + (vs/s)			790– 880	180–230	150–180	100–110	60– 70[4]	–[3]
	(vs ⌐ s) + (vs)			730– 850	200–280	200–250	50– 60	80–100	–
LH 5 Lower Highland Ranching Zone	t r			580– 800	100–200	100–200	30– 50	40– 50	–
	b r i	1 800–2 140	17.3–15.3	680– 780	150–200	100–200	40– 50	40– 50	–
	b r			570– 700	100–150	100–150	40– 50	30– 50	–
UM 5 Livestock-Sorghum Zone	(fs ⌐ vs) i			600– 700	150–200	50–100	70–110	50– 60	120–190
	(vs/s) i (vs) i	1 760–1 830	17.9–17.5	590– 680	150–200	50–100	60– 70	50– 60	120–130
	(s/vs or vs/s) + (vs/s)			590– 670	150–200	60– 80	60– 80	60– 70	–
UM 6 Upper Midland Ranching Zone	t r	1 660–1 780	18.6–17.8	430– 620	100–150	50–100	20– 40	30– 50	–
	b r	1 300–1 800	20.9–17.8	380– 600	100–150	50–100	30– 40	30– 40	–
LM 6	b r	1 200–1 300	21.5–20.9	400– 500	80–120	20– 50	20– 30	30– 40	–

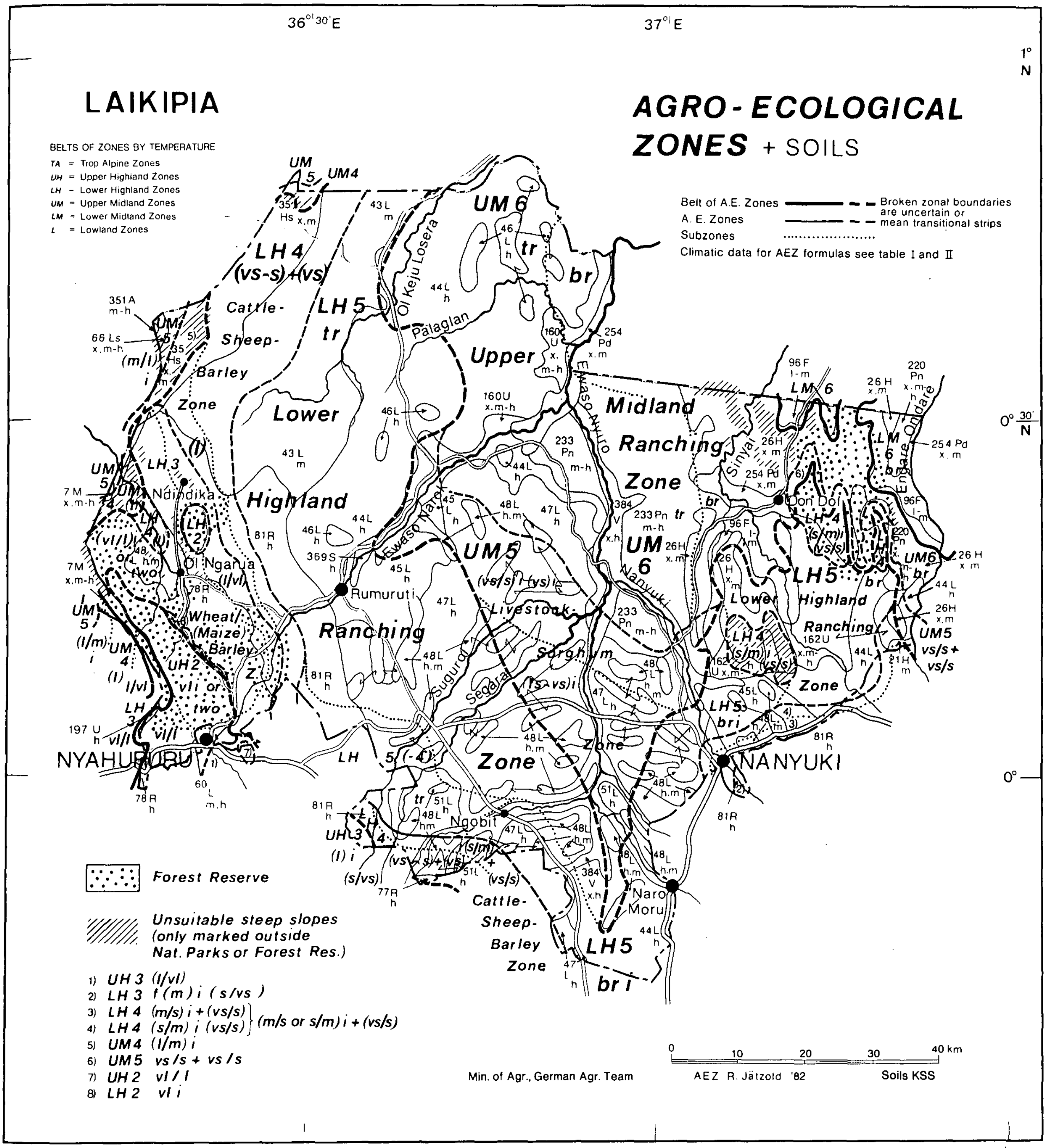
1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants
2) More if growing cycle of cultivated plants continues into the period of second rains
3) Only added if agro-humid conditions continue from 1st to 2nd rains (in the western and central parts of the district, except in ranching areas)
4) Around O. and N. = 3rd rains in W-Laikipia



LAIKIPIA
AVERAGE ANNUAL RAINFALL
in mm
+ SOILS
36° 30'E
37° E
1° N
0° 30' N
0°
NYAHURURU
NANYUKI
Rumuruti
Ol Ngarua
Ndindika
Don Dol
Ngobit
Naro Moru
Ewaso Narok
Ewaso Nyiro
Ol Keju Losera
Palaglan
Suguroi
Segera
Nanyuki
Sinyai
Engare Ondare
8936
9036
8937
9037
1) More than 700
Broken boundaries are uncertain because of lack of rainfall records
⊕ Temperature recording station, operating 1976, ⊙ closed
+ Rainfall recording station, operating 1976 and having at least 10 years of records
15 Station number in grid
9036 Grid number
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


LAIKIPIA
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF FIRST RAINS
(March - e. of June or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+ SOILS
36° 30'E
37° E
1° N
0° 30' N
0°
NYAHURURU
NANYUKI
Rumuruti
Ol Ngarua
Ndindika
Don Dol
Ngobit
Naro Moru
Ewaso Narok
Ewaso Nyiro
Ol Keju Losera
Palaglan
Nanyuki
Sinyai
Engare Ondare
Suguroi
Segera
Apr. - May
m.Apr.-m.May
m.Apr. - m.May
1) April – June
2) March – end of June
Broken boundaries are uncertain
because of lack of rainfall records
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


LAIKIPIA
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RAINS
(e.of June-b.of Jan. or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+ SOILS
36°|30'E
37°|E
1° N
0° 30' N
0°
Nyahururu
Ol Ngarua
Ndindika
Rumuruti
Nanyuki
Don Dol
Ngobit
Naro Moru
Palaglan
Ol Keju Losera
Ewaso Narok
Ewaso Nyiro
Nanyuki
Sinyai
Engare Ondare
Suguroi
Segera
e.of June - b.of Sept.
e.of July - m.Aug.
e.of Oct.- e.of Nov.
Nov.
1) Incl. 3rd rains Oct. - b.of Jan.
2) e.of June - e.of Sept.
3) 100 - 150
4) 100 - 150
5) e.of June - Oct.
Broken boundaries are uncertain because of lack of rainfall records
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



LAIKIPIA
AGRO-ECOLOGICAL ZONES + SOILS
36°30'E
37°E
1° N
0° 30' N
0°
BELTS OF ZONES BY TEMPERATURE
TA = Trop Alpine Zones
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
L = Lowland Zones
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
Cattle-Sheep-Barley Zone
Lower Highland Ranching Zone
Upper Midland Ranching Zone
Livestock-Sorghum Zone
Lower Highland Ranching Zone
Wheat/(Maize)/Barley Z.
NYAHURURU
Rumuruti
Ol Ngarua
Ndindika
Ngobit
NANYUKI
Naro Moru
Dol Dol
Ol Keju Losera
Palaglan
Ewaso Narok
Ewaso Nyiro
Suguroi
Segera
Nanyuki
Sinyai
Engare Ondare
Forest Reserve
Unsuitable steep slopes (only marked outside Nat. Parks or Forest Res.)
1) UH 3 (l/vl)
2) LH 3 f (m) i (s/vs)
3) LH 4 (m/s) i + (vs/s)
4) LH 4 (s/m) i (vs/s) } (m/s or s/m) i + (vs/s)
5) UM 4 (l/m) i
6) UM 5 vs/s + vs/s
7) UH 2 vl/l
8) LH 2 vl i
0 10 20 30 40 km
Min. of Agr., German Agr. Team
AEZ R. Jätzold '82
Soils KSS

AGRO-ECOLOGICAL ZONES

UH = UPPER HIGHLAND ZONES

UH 2 = P y r e t h r u m - W h e a t Z o n e

UH 2 vl i or two = *Pyrethrum-Wheat Zone with a very long cropping season followed by intermediate rains, dividable in two variable cropping seasons and i.r.*

Here Forest Reserve with large timber plantations. Agricultural potential see Nyandarua District

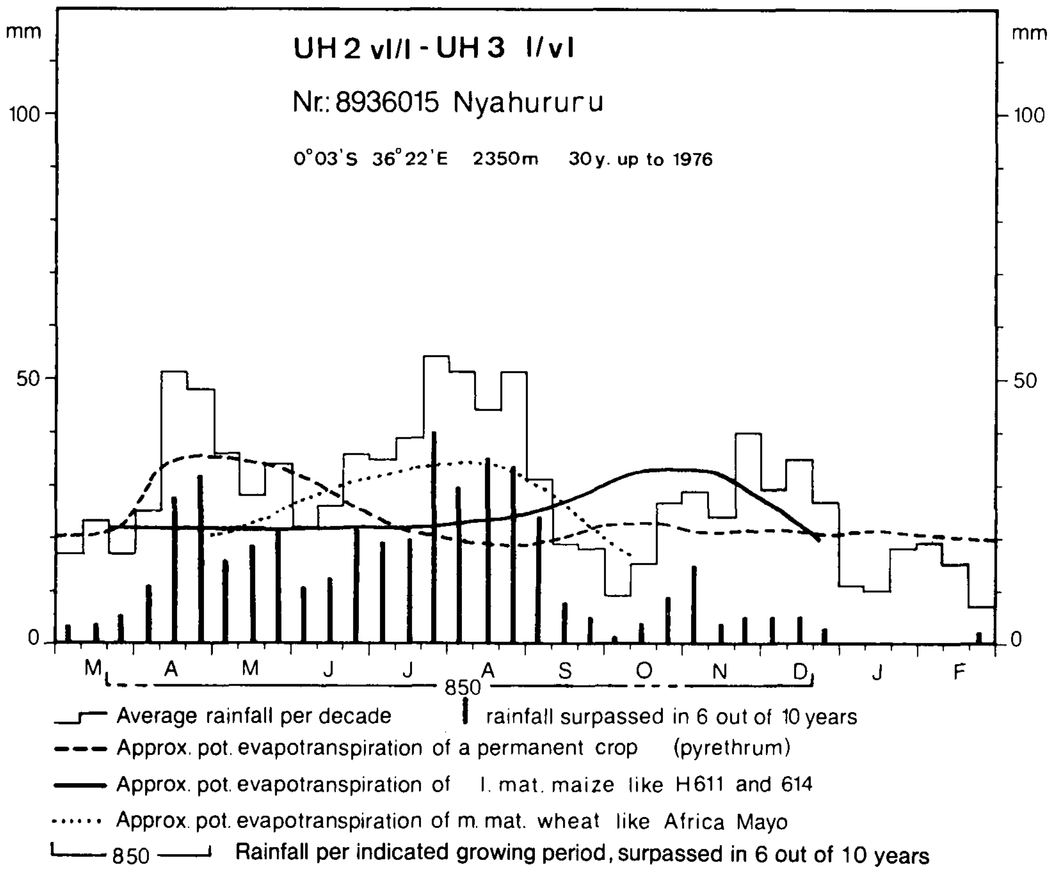
UH 2 vl/l or two = *Pyrethrum-Wheat Zone with a very long to long cropping season, dividable in two variable cropping seasons*
(See Diagram Nyahururu)

G o o d y i e l d p o t e n t i a l
1st rains, start norm. end of March: M. mat. wheat like Africa Mayo [1)2)], late mat. wheat like Kenya Bongo[1)], triticale, m. mat. barley like Proctor; peas[1)], horse beans (below 2 700 m), rapeseed; potatoes[1)3)]; carrots, cabbages, celery, endive, rampion, leek, radish, kohlrabi, kales
2nd rains, start indistinctly around July: Potatoes; carrots, celery, endive, rampion, leek, radish, kales
Whole year: Pyrethrum

F a i r y i e l d p o t e n t i a l
2nd rains: Peas, rapeseed; cabbages, kohlrabi
Whole year: Pears, plums, apples < 2 500 m

P o o r y i e l d p o t e n t i a l
1st rains: High alt. maize or H 611 on frost free places

P a s t u r e a n d f o r a g e
Suitable for Merino sheep and grade dairy cows; around 1.2 ha/LU on sec. pasture of Kikuyu and tufted grass[4)]; perennial rye grass for improving pasture on suitable soils (except near wheat fields)



1) Sometimes frost damage, local micro-relief important (lakes of cold air)
2) Med. mat. varieties fit better in the moisture supply than late mat. ones
3) Blight resistant varieties important
4) The bad tufted grasses Eleusine jaegeri and Pennisetum schimperi are expanding if the area is overgrazed

UH 3 = *Wheat-Barley Zone*

UH 3 (l/vl) = *Wheat-Barley Zone with a (weak) long to very long cropping season*

Very small, potential see Nyandarua District

UH 3 (l) i (s/vs) = *Wheat-Barley Zone with a (weak) long cropping season, intermediate rains, and a (weak) short to very short one*

Very small, potential see Nyandarua District

LH = *LOWER HIGHLAND ZONES*

LH 2 = *Wheat/Maize-Pyrethrum Zone*

Very small, mainly Forest Reserve

LH 3 = *Wheat/(Maize)-Barley Zone*

LH 3 (vl/l) i or two = *Wheat/(Maize)-Barley Zone with a (weak) very long to long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Good yield potential
1st rains (to 2.r.), start norm. end of March: Med. mat. wheat like Africa Mayo or e. mat. like K. Tembo (Apr./May–S./O.), late mat. like Kenya Bongo (Apr./May–O./D.), on deep soils late mat. maize like H 611 (e. of Mch./Apr.–O./N.), m. mat. barley like K. Research (~ 60 %) peas; linseed, late mat. sunflower like Kenya White; cabbages
2nd rains, start indistinctly end of June: M. mat wheat like Africa Mayo (June–D.); rapeseed (end of June–O.)
3rd rains, start norm. mid O.: Too unreliable
Whole year: Black wattle

Fair yield potential
1st rains: Potatoes; rapeseed; kales, cauliflower, carrots, beetroot
2nd rains: Tomatoes, kales, beetroot, beans in lower places
Whole year: Avocadoes in lower places

Pasture and forage
Around 1.2 ha/LU on sec. grassland (former Cedar forest), ~ 0.7 ha/LU on art. past. of Nandi Setaria or Rhodes grass; suitable for grade dairy cows and grade cattle

LH 3 (l/vl) = *Wheat/(Maize)-Barley Zone with a (weak) long to very long cropping season*

Good yield potential
1st rains, start norm. b. of April: Late mat. wheat like Kenya Bongo, m. mat. barley like Kenya Research; potatoes

Fair yield potential
1st rains: Maize H 611 a.o.; peas; rapeseed, linseed or flax, sunflower Kenya White (50–60 %); cabbage, kales, carrots, cauliflower, beetroot
2nd rains, start indistinctly end of June/Jy.: E. mat. wheat like Kenya Tembo, e. mat. barley like Tumaini; beans (lower places); rapeseed; potatoes; tomatoes, kales, beetroot
Whole year: Black wattle

Pasture and forage
Good for grade beef cattle and Merino sheep. Around 1.5 ha/LU or more on nat. grassland; 0.7–1.2 ha/LU on art. pasture of Nandi Setaria; barley B 106 for stockfeed

LH 4 = *Cattle-Sheep-Barley Zone*

LH 4 (l) = *Cattle-Sheep-Barley Zone with a (weak) long cropping season*

Fair yield potential
1st rains, start norm. end of March: M. mat. barley (other crops mostly marginal)

Pasture and forage
More than 2 ha/LU on nat. pasture of short grass highland savanna; down to about 1 ha/LU on art. pasture of Rhodes grass (var. Elmba most recommended); suited for grade cattle; subterr. clover and m. mat. fodder barley as add. forage

LH 4 f (m) i (vs/s) = *Cattle-Sheep-Barley Zone with a fully (weak) medium[5] cropping season, intermediate rains, and a (weak) very short to short one*

Very small, potential see Meru District

LH 4 (s/m) i (vs/s) = *Cattle-Sheep-Barley Zone with a (weak) short to medium cropping season, intermediate rains, and a (weak) very short one*

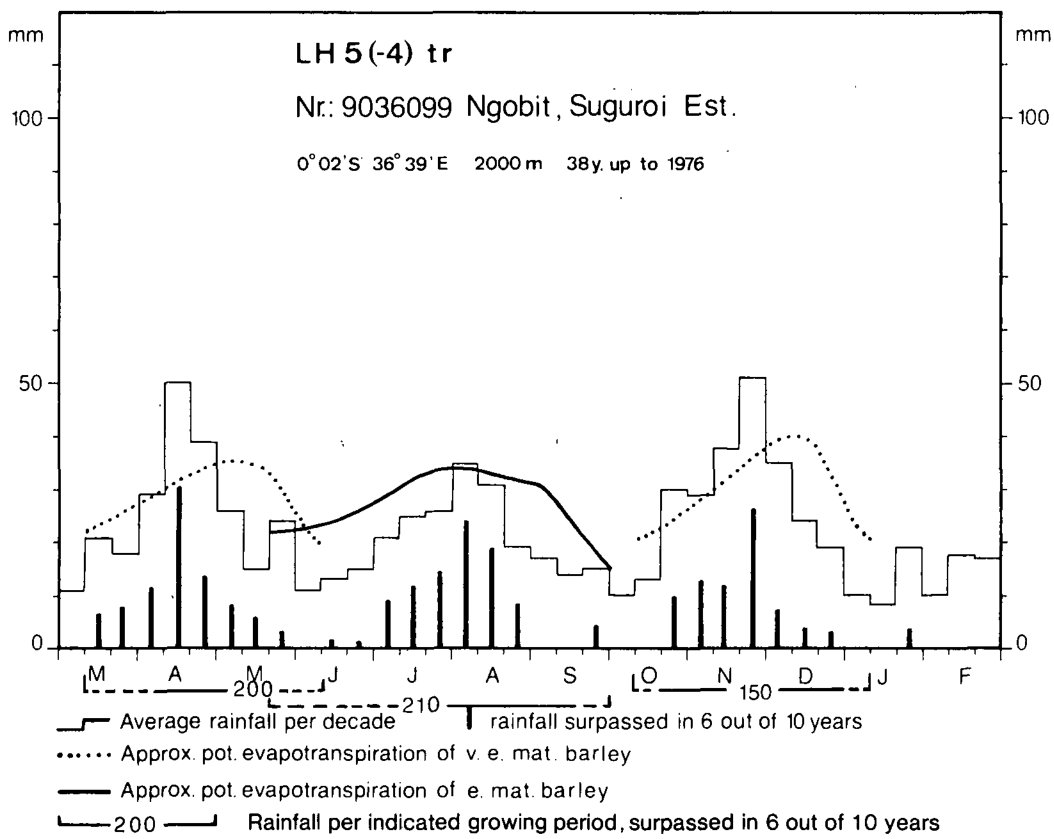
Fair yield potential
1st rains, start norm. b. of April: E. mat. fodder barley like Amani

Poor yield potential
1st rains: E. mat. wheat like Kenya Ngiri; green onions
2nd rains, start norm. end of O.: V. e. mat. barley

Pasture and forage
3–5 ha/LU on nat. grassland[6], subterr. clover as add. forage

LH 4 i (s/m) + (vs/s) = *Cattle-Sheep-Barley Zone with intermediate rains, a (weak) short to medium cropping season and a (weak) very short to short one*

Fair yield potential
Nearly the same as above but main rains and planting start norm. end of June



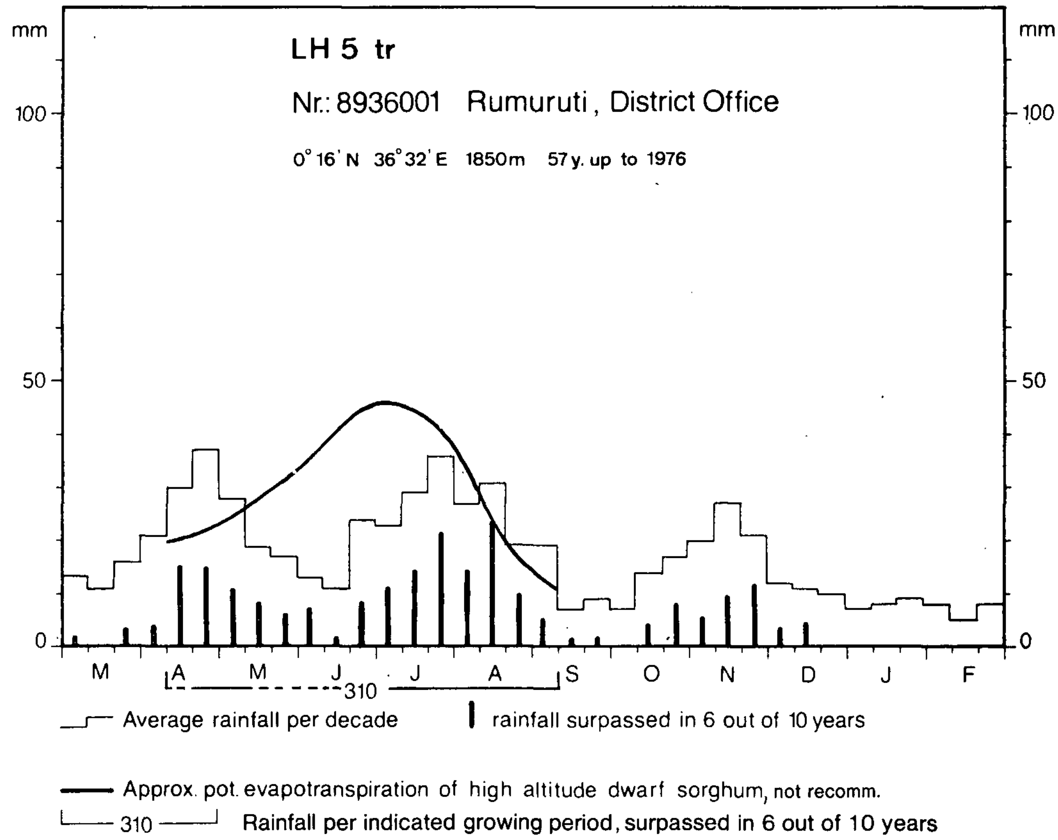
5) Fully (weak) medium means (m/l), (m) and (m/s)
6) Bushland >6 ha/LU

LH 4 *(vs ⌐ s)* *+ (vs)* = *Cattle-Sheep-Barley Zone with a (weak) very short cropping season, followed by a (weak) short one, and a (weak) very short one*

Fair yield potential
Main rains, start norm. end of June: Early mat. barley like Tumaini

Poor yield potential
1st rains, start norm. m. March: V. e. mat. barley; green onions, rapeseed leaves as vegetables (1st to main rains)
2nd rains (resp. 3rd r.), start norm. end of O.: V. e. mat. barley

Pasture and forage
3–5 ha/LU on nat. grassland[6]; subterr. clover as add. forage



LH 5 = ***Lower Highland Ranching Zone***

LH 5 *t r* = *Lower Highland Ranching Zone with trimodal rainfall*

Not suitable for rainfed agriculture except in wetter parts (see Diagram Ngobit, Suguroi Estate) for very early mat. barley cultivated with dry farming techniques: Water from first rains should be stored by contour ploughing resp. harrowing and stubble mulching for main rains (June–August); the same method could be used for a cultivation in the third rains (Oct.–D.), but for cultivation in first rains this technique gives probably no success because the dry season in Jan. and F. is too severe.

Pasture and forage
More than 4.5 ha/LU on short grass highland savanna[6]; no proper forage up to now

LH 5 *b r i* = *Lower Highland Ranching Zone with bimodal rainfall and intermediate rains*

Potential almost the same as LH 5 t r but third rains are so weak that there is no cultivation at all possible

LH 5 *b r* = *Lower Highland Ranching Zone with bimodal rainfall*

Middle rains are disappearing in the very Eastern part of the District. Potential almost the same as LH 5 b r i

UM = UPPER MIDLAND ZONES

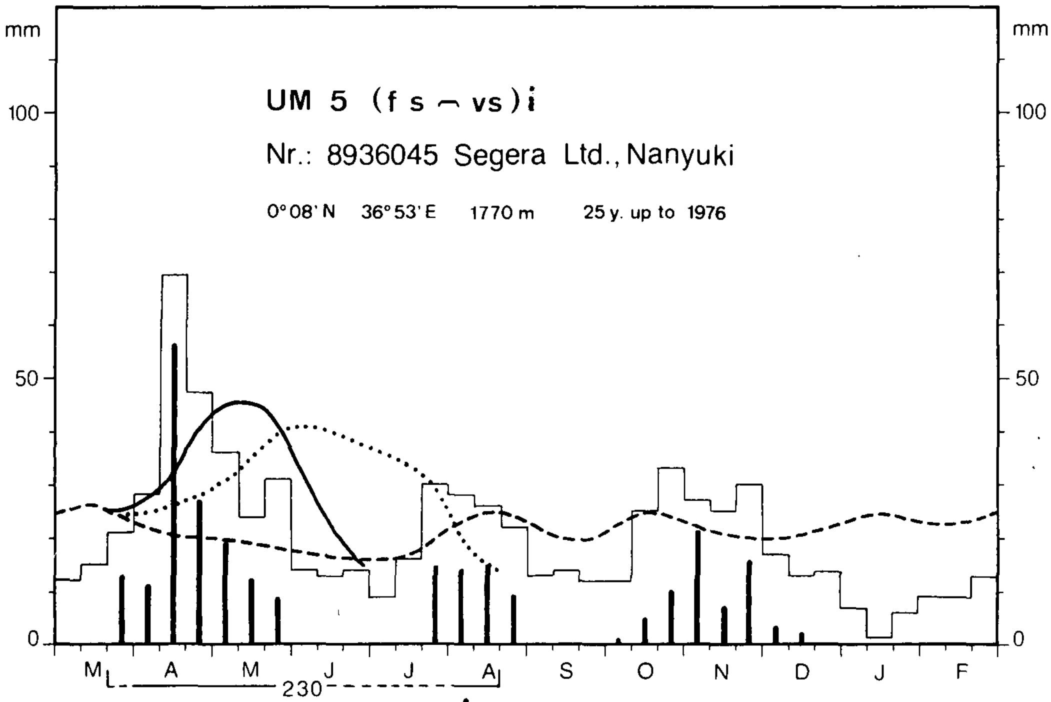
UM 5 = Livestock-Sorghum Zone

UM 5 (fs ⌐ vs) i = Livestock-Sorghum Zone with a fully (weak) short cropping season, followed by a (weak) very short one and intermediate rains

Fair yield potential
1st rains, start norm. end of March: High alt. dwarf sorghum (end of March–b. of July, 50–60 %), high alt. sorghum (end of March–mid S.); dwarf sunflower (end of March–end of June, 40–50 %)
Whole year: Sisal

Some marginal crops with poor yield potential
1st rains: E. mat. maize, e. mat. beans

Pasture and forage
More than 3.8 ha/LU on short grass savanna; with green dwarf fodder sorghum as add. forage and planted salt bushes (Atriplex nummularia) much higher stocking rate; suitable for grade cattle



Average rainfall per decade | rainfall surpassed in 6 out of 10 years
--- Approx. pot. evapotranspiration of a permanent crop: sisal
— Approx. pot. evapotranspiration of dwarf sorghum
..... Approx. pot. evapotranspiration of m. mat. high alt. sorghum
└—230—┘ Rainfall per indicated growing period, surpassed in 6 out of 10 years

UM 5 (vs/s) i (vs) i = Livestock-Sorghum Zone with a (weak) very short to short cropping season and intermediate rains, followed by a (weak) very short one and intermediate rains

Fair yield potential
1st rains, start normally b. of April: High alt. dwarf sorghum (b. of Apr.–b. of July, 40–50 %)

Some marginal crops with poor yield potential
High alt. sorghum (b. of Apr.–mid S.), e. mat. beans
Whole year: Sisal (nearly 40 %)

Pasture and forage
More than 4 ha/LU on short grass savanna; with planted saltbushes somewhat higher stocking rate and more fodder reserves in dry years. Opuntia var. without prickles (also as vegetable and fruit)

UM 5 (s/vs or vs/s) + (vs/s) = Livestock-Sorghum Zone with a (weak) short to very short or very short to short cropping season and a (weak) very short to short one

Fair yield potential

1st rains, start norm. e. of March/b. of April: Cold tol. dwarf sorghum (higher places), dwarf sorghum (lower places), dwarf sunflower (~ 40 %, higher places)
2nd rains, start norm. end of O.: Dwarf sorghum
Whole year: Sisal

Pasture and forage

More than 3.5 ha/LU on short grass savanna; with planted saltbushes somewhat higher stocking rate and more fodder reserves in dry years. Opuntia var. without prickles

UM 6 = Upper Midlands Ranching Zone

UM 6 t r = Upper Midlands Ranching Zone with trimodal rainfall

Not suited for rainfed agriculture

Pasture and forage

More than 4.8 ha/LU on short grass thornbush savanna; with planted salt bushes somewhat higher stocking rate and more fodder reserves in dry years

UM 6 b r = Upper Midlands Ranching Zone with bimodal rainfall

Nearly the same as UM 6 t r but more than 5 ha/LU[7]

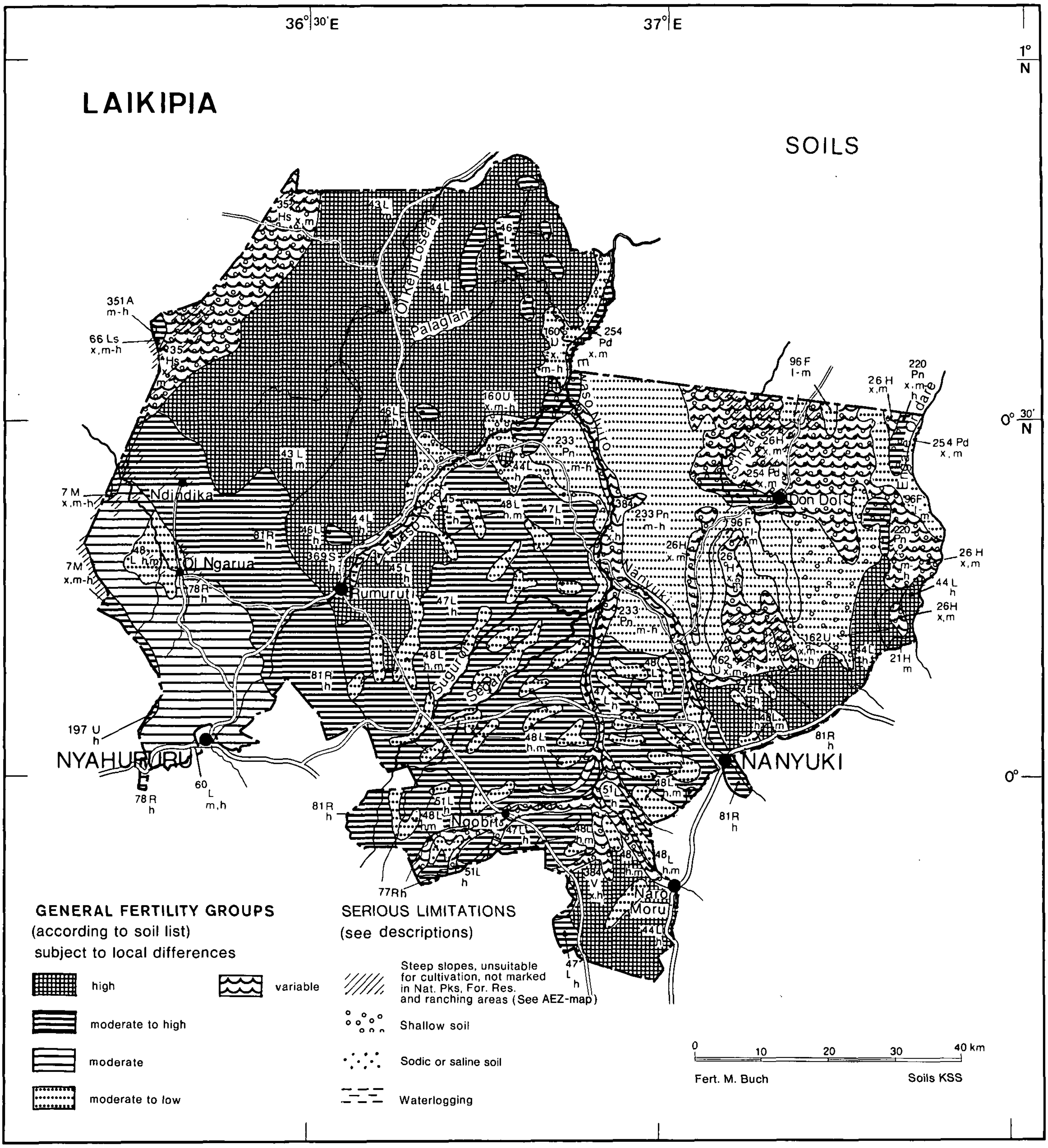
LM = LOWER MIDLAND ZONES

LM 6 = Lower Midland Ranching Zone

LM 6 b r = Lower Midland Ranching Zone with bimodal rainfall

Nearly the same as UM 6 b r but less stocking due to smaller rainfall and higher evaporation

[7] On degraded and eroded pasture even more than 10 ha/LU



LAIKIPIA
SOILS
36° 30'E
37° E
1° N
0° 30' N
0°
NYAHURURU
NANYUKI
Rumuruti
Ol Ngarua
Ndindika
Don Dol
Ngobit
Naro Moru
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
moderate to high
moderate
moderate to low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Sodic or saline soil
Waterlogging
0 10 20 30 40 km
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The topographical situation of the Laikipia District is dominated by Mt. Kenya in the southeast and the Aberdare Range in the southwest. The northern part of the district is occupied by extensive plateaus and high-level structural plains. Some parts of the Ewaso Narok River are taken up by swamps or dissected erosional plains in the North.

On the mountains, moderate to highly fertile soils occur (unit 7 M). In the east of the district, hills and minor scarps are covered by soil units 21 H and 26 H. Soils of these units are of moderate to high fertility (21 H) or of variable fertility (26 H).

The extensive soil units in the northern and northwestern parts are 43 L and 44 L which occur on plateaus and high-level structural plains. They are of high fertility. On plateaus all over the district, soils of units 46 L, 47 L, 48 L and 51 L are found which are in general of moderate to high fertility.

Volcanic footridges occupy the western, southwestern and some eastern regions of the district, where the soils of units 77 R, 78 R, 81 R and 84 R are of moderate to high fertility.

Soils which are developed on uplands can be found in the northeastern part of the district (120 U, 160 U, 162 U, 197 U). These soils are variable in fertility but most of them are of low to moderate fertility.

Variably fertile soils on swamps occur along the Ewaso Narok River, and on lower landscape, soils of bottomlands (unit 349 B) of low fertility can be found.

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

7 M
x, m–h[1] = well drained, shallow to moderately deep, dark reddish brown to dark brown, rocky and bouldery, clay loam to clay; in places with humic topsoil (nito-chromic CAMBISOLS; with haplic PHAEOZEMS, lithic phase, LITHOSOLS, eutric REGOSOLS and Rock Outcrops)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

12 M
x, m = somewhat excessively drained, shallow to moderately deep, reddish brown, friable, rocky and stony, sandy clay loam (eutric CAMBISOLS with LITHOSOLS, eutric REGOSOLS and Rock Outcrops)

SOILS ON HILLS AND MINOR SCARPS

Soils develped on basic igneous rocks (serpentinites, basalts, nepheline phonolites; older basic tuffs included)

21 H
x, m = well drained, shallow, dark reddish brown, friable, rocky and stony clay loam (nito-chromic CAMBISOLS, lithic phase; with Rock Outcrops)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

26 H
x, m = somewhat excessively drained, shallow, reddish brown, friable, rocky or stony, sandy clay loam (eutric REGOSOLS; with Rock Outcrops and calcic CAMBISOLS)

SOILS ON STEP-FAULTED SCARPS OF THE RIFT VALLEY

Soils develped on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

35 Hs
x, m = predominantly well drained, shallow, dark reddish brown, friable, strongly calcareous, rocky or stony, clay loam; in many places saline (LITHOSOLS; with Rock Outcrops and XEROSOLS, bouldery and saline phase)

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older, basic tuffs included)

43 L
m = well drained, shallow to moderately deep, reddish brown, firm clay loam, with humic topsoil (chromo-luvic PHAEOZEMS, partly lithic phase)

44 L
h = well drained, moderately deep to deep, dark brown, firm clay, with thick humic topsoil (ortho-luvic PHAEOZEMS)

45 L
h = well drained to moderately well drained, deep, very dark greyish brown, firm and slightly cracking clay, with thick humic topsoil (verto-luvic PHAEOZEMS)

46 L
h = imperfectly drained, deep, very dark greyish brown, very firm, cracking clay (chromic VERTISOLS)

47 L
h = imperfectly drained, deep, black to dark grey, very firm, slightly to strongly cracking clay (pellic VERTISOLS and verto-luvic PHAEOZEMS)

48 L
h, m = imperfectly drained, deep, dark greyish brown, firm clay (hardpan), abruptly underlying a topsoil of sandy clay loam (eutric PLANOSOLS)

51 L
h = moderately well drained, very deep, dark greyish brown, firm clay (verto-luvic PHAEOZEMS; with eutric PLANOSOLS)

Soils developed on volcanic ashes and other pyroclastics of recent volcanoes

60 L
m, h = complex of:
- well drained, deep to very deep, very dark greyish brown to dark brown, friable and slightly smeary clay loam (ando-luvic PHAEOZEMS)
- imperfectly drained, deep, very dark greyish brown to black, firm, moderately calcareous, slightly cracking clay (verto-luvic PHAEOZEMS)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

77 R h = well drained, extremely deep, dusky red to dark reddish brown, friable clay; with acid humic topsoil (humic NITOSOLS)

78 R h = well drained, extremely deep, dusky red to dark reddish brown, friable clay; with inclusions of well drained, moderately deep, dark red to dark reddish brown, friable clay over rock, pisoferric or petroferric material (eutric NITOSOLS; with nito-chromic CAMBISOLS and chromic ACRISOLS, partly pisoferric or petroferric phase)

81 R h = well drained, moderately deep to deep, dark reddish brown, friable to firm clay, with humic topsoil (chromo-luvic PHAEOZEMS)

Soils developed on ashes and other pyroclastic rocks from recent volcanoes

84 R h = well drained, very deep, dark reddish brown, friable to firm, clay, with humic topsoil (chromo-luvic PHAEOZEMS; over buried NITOSOLS)

SOILS ON FOOTSLOPES

Soils developed on colluvium from undifferentiated Basement System rocks

96 F l–m = well drained, very deep, yellowish red to dark reddish brown, friable, coarse loamy sand to sandy clay loam (chromic LUVISOLS; with rhodic FERRALSOLS and luvic/ferralic ARENOSOLS)

SOILS ON UPPER-LEVEL UPLANDS

Soils developed on undifferentiated Basement System rocks

120 Ŭ x, m = complex of:
- well drained, shallow, black to very dark brown, acid humic, very friable loam; in places rocky (RANKERS)
- well drained, moderately deep, dark brown, friable clay loam, with a very thick acid humic topsoil (humic CAMBISOLS)

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on undifferentiated Basement System rocks

160 U x, m–h = well drained, shallow to moderately deep, strong brown to brown, firm, gravelly to stony, sandy clay to clay loam, over soft rock (orthic LUVISOLS, partly paralithic phase)

162 U x, m–h = complex of well drained, shallow to deep, red to dark red, friable to firm, sandy clay loam to sandy clay; in places rocky (chromic and ferralo-chromic LUVISOLS; with chromic CAMBISOLS and Rock Outcrops)

SOILS ON UPLANDS, UNDIFFERENTIATED LEVELS

Soils developed on basic igneous rocks (basalts, etc.) with predominant volcanic ash influence

197 U h = well drained, deep to very deep, dark reddish brown to dark red, firm clay; with inclusions of imperfectly drained, moderately deep, dark greyish brown clay (nito-ferric/chromic LUVISOLS; with gleyic LUVISOLS, partly lithic or pisoferric phase)

SOILS ON NON-DISSECTED EROSIONAL PLAINS

Soils developed on basic igneous rocks (basalts, etc.)

220 Pn x, m–h = well drained, shallow, very dark reddish brown, slightly calcareous, stony and bouldery, clay loam to clay (chromic CAMBISOLS, bouldery and lithic phase)

Soils developed on Basement System rocks, rich in ferromagnesian minerals

229 Pn m = well drained, moderately deep, dark reddish brown, firm, slightly calcareous, sandy clay loam (chromic LUVISOLS and ortho-luvic PHAEOZEMS)

Soils developed on undifferentiated Basement System rocks

233 Pn m–h = well drained, moderately deep to deep, dark red to strong brown, friable to firm, sandy clay loam to clay (ferralo-chromic/orthic LUVISOLS)

SOILS ON DISSECTED EROSIONAL PLAINS

Soils developed on undifferentiated Basement System rocks

254 Pd x, m = complex of well drained, shallow to moderately deep, dark red to yellowish brown, non to moderately calcareous, stony sandy clay loam, over petrocalcic material or quartz gravel (calcic CAMBISOLS, lithic or petrocalcic phase; with chromic LUVISOLS, petric phase)

SOILS ON BOTTOMLANDS

Soils developed on infill mainly from undifferentiated Basement System rocks

349 B h = imperfectly drained to poorly drained, very deep, brown to dark brown, very firm, slightly calcareous, strongly sodic clay (orthic SOLONETZ)

SOILS ON SWAMPS

369 S = poorly drained to very poorly drained, very deep, dark greyish brown to dark olive grey, firm to very firm, strongly calcareous,
h strongly saline and strongly sodic clay; in many places with fragipans at various depths (gleyic SOLONCHAKS, sodic phase and partly fragipan phase)

SOILS ON LAVA FLOWS

376 La = excessively drained, exceedingly bouldery to stony, extremely rocky land
x (Bouldery and Rock Outcrops)

SOILS ON MINOR VALLEYS

384 V = complex of well drained to imperfectly drained, shallow to moderately deep, dark reddish brown to very dark greyish brown,
x, h firm, slightly to moderately calcareous, rocky, stony, or gravelly clay

1) Soil texture – classes

h	=	heavy
l	=	light
m	=	medium
x	=	stony or bouldery
v	=	varying texture
m–h	=	medium to heavy
m, h	=	medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-Climatic Zone Map of Kenya, scale 1 : 1 000 000. Expl. Soil Survey Rep. E 1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

The population of the Laikipia District was nearly 135,000 people at the time of the Census in September 1979 (Table 4). Of this figure almost 19,000 people lived in the only township of the area, Nanyuki, i.e. 86 % of the total population (115,538) depended entirely on agriculture, mainly livestock (Table 4). 808,700 ha agricultural land out of a total rural area of 971,500 ha were available for these people (Table 6), i.e. an average household of 4.42 people had 33.68 ha, with 7.09 ha available per person. That seems quite a lot in comparison to other districts (e.g. Nyeri), but the natural conditions here are such that much more land is needed to support a family. Because of the orographic and climatic situation, the Ranching Zones LH 5 (with 40 % of the "agricultural" land) and UM 6 (with 29 %) are predominant. In former days, big ranches were found in this area, but since the seventies it is quite densely populated and overgrazing caused by overstocking is common. Consequently, soil erosion and degradation are becoming more and more of a problem. This is especially true for the Ngarua location where many new settlements have been founded and attempts made in this dry area with agriculture. Grazing still plays an important role here, so that overstocking resulting in soil erosion has destroyed the natural conditions of the soil to a high degree. In the Mukogondo division the problem of oversettlement is crucial.

The Marmanet location, with UH 2 and UH 3, is an exception within the district. In this settled forest areas, only 3.49 ha per household or 0.67 ha per person were available (Table 6). This shows that even in this relatively productive area the population pressure was high in 1979 and will be even more intense now.

LAIKIPIA DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division without township	Male	Female	Total	Number of households	Square kilometers	Density
Naromoru	4806	3929	8735	2319	1567	5
Nanyuki Loldaiga	6533	5538	12071	2811	1459	8
Nanyuki Township	10549	8437	18986	5854	133	141
Central Division	21888	17904	39792	10984	3161	12
Rumuruti	11537	11055	22592	4839	3060	7
Marmanet	13141	12546	25687	4895	454	56
Rumuruti Division	24678	23601	48279	9734	3514	13
Mukogodo	2390	2133	4523	987	466	9
Ilngwesi	1145	1285	2430	542	264	9
Ilindingiri	2312	2320	4632	957	474	9
Mukogodo Division	5847	5738	11585	2486	1205	9
Ngarua	17135	17733	34868	7077	1098	31
Ngarua Division	17135	17733	34868	7077	1098	31
Laikipia District	69548	64976	134524	30281	9718	13

LAIKIPIA DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Naromoru	2313	2.26	0.78	0.36	0.37	3.77
Nanyuki Loldaiga	2806	2.43	0.95	0.47	0.34	4.19
Nanyuki Township	5820	2.02	0.47	0.34	0.35	3.18
Division Central	10939	2.18	0.66	0.38	0.35	3.57
Location:						
Rumuti	4856	2.64	1.14	0.53	0.31	4.63
Marmanet	4897	2.85	1.50	0.58	0.32	5.24
Division Rumuruti	9753	2.74	1.33	0.56	0.32	4.94
Location:						
Mukogodo	989	2.60	1.17	0.38	0.43	4.57
Ilngwesi	541	2.55	1.14	0.62	0.18	4.49
Ilngigiri	956	2.79	1.19	0.48	0.38	4.84
Division Mukogodo	2486	2.65	1.19	0.47	0.35	4.66
Location Ngarua	7079	2.65	1.51	0.54	0.23	4.92
Division Ngarua	7079	2.65	1.51	0.54	0.23	4.92
DISTRICT: LAIKIPIA	30257	2.51	1.11	0.48	0.31	4.42

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per households as well

LAIKIPIA DISTRICT

TABLE 6: **AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON** [1)]

	in '00 ha = sqkm					in '00 ha = sqkm										in ha	
Location/Division without townships	Area total Census 79	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps	Non-agricultural land: Others (roads, homesteads, rivers..)	Agricultural land	Area in agro-ecological zones AEZ: UH 2	UH 3	LH 2	LH 3	LH 4	LH 5	UM 4	UM 5	UM 6	LM 6	Agric. land per household	Agric. land per person
Naromoru	1826 (1567)[2)]			157	1 669		11			95	850		449	264		71.97	19.11
Nanyuki Loldaiga	1459	39		146	1 274					104	518		311	341		45.32	10.55
Central Division	3285 (3028)[2)]	39		303	2 943		11			199	1 368		760	605		58.65	14.83
Rumuruti	3690 (3060)[2)]	7	F. 47	306	3 330		5		38	226	1 685	10	241	1 125		68.81	14.74
Marmanet	438		F.222	45	171	53	118									3.49	0.67
Rumuruti Division	4128 (3514)[2)]	7	269	351	3 501	53	123		38	226	1 685	10	241	1 125		36.15	7.71
Mukogodo	466	37	F.195	47	187								8	104	75	18.85	4.13
Ilngwesi	264		F. 43	26	195					7	26			105	57	35.98	8.02
Ilindingiri	474	19		47	408									408		42.63	8.81
Mukogodo Division	1204	56	238	120	790					7	26		8	617	132	32.52	6.99
Ngarua	1098	29	F.106	110	853			22	196	390	176	55	14			12.05	2.45
Ngarua Division	1098	29	F.106	110	853			22	196	390	176	55	14			12.05	2.45
Total rural area	9715	131	613	884	8 087	53	134	22	234	822	3 255	65	1 023	2 347	132	33.68	7.09

1) For official land statistics see supplementary publication to FM-Handbook, Vol. IIIA: Agriculture Land Statistics

2) ( ) = Census areas differing from measured areas in older maps

AGRICULTURAL STATISTICS

PRODUCTION OF MAJOR CASH CROPS

LAIKIPIA DISTRICT

TABLE 7: **PYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[a)]

Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	20	12	13	14	13
Pyrethrin content %	1.5	1.4	1.5	1.6	1.4

a) Source: Pyrethrum Board

STATISTICS OF MEDIUM TO LARGE FARMS

The Laikipia district is basically a ranching region. Some agriculture has been developed along the slopes of Mt. Kenya and the Aberdare Mountains, mostly by smallholders. While smallholders try a kind of mixed farming, planting maize and keeping dairy cows, the mainstay of the large enterprises are beef cattle and only a very few plant wheat and barley on suitable pockets of land.

More recently, large commonly owned ranches have been subdivided into individual smallholdings, whose owners practise mixed farming. The combination of poor soils and unsuitable climate makes economically successful mixed farming impossible with the given technology. The figures shown in the tables reflect the ranching character of the district.

TABLE 8: **DISTRIBUTION OF LAND BY HOLDING SIZE**
Medium–Large Farms a)

Size Group in ha	Number of Holdings in Size Group															
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
- 19	21	21	22	22	21											
20 - 49	18	17	17	17	16											
50 - 99	5	6	5	7	5											
100 - 199	10	8	10	10	11											
200 - 299	7	7	6	7	8											
300 - 399	1	1	2	1	2											
400 - 499	6	7	7	8	8											
500 - 999	25	25	25	23	19											
1,000 - 1,999	15	17	19	19	17											
2,000 - 3,999	24	20	19	20	20											
4,000 - 19,999	34	35	37	37	35											
20,000 - and over	10	10	10	9	10											

TABLE 9: **MAJOR FARM MACHINERY AND IMPLEMENTS ON FARMS**

Machinery/Implements	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Farm Tractors	258	266	220	229	189											
Combine Harvesters	14	16	13	9	16											
Plough & Harrow	338	283	274	285	196											
Cultivators & Tooth Harrow	136	86	88	89	78											
Planters & Sprayers	140	95	69	90	60											

a) farms above 20 ha in size
Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi.

TABLE 10: LAND USE

Medium–Large Farms[a)]

Land Under	In '000 ha								Percent							
	1975	1976	1977	1978	1979	1980	1981	1982	1975	1976	1977	1978	1979	1980	1981	1982
Temporary Crops	12.8	10.7	13.2	18.2	12.4				2	1	2	2	2			
Temporary Leys & Meadows	6.0	3.6	12.6	13.8	11.4				1	1	2	2	2			
Temporary Fallow Land	6.6	0.5	0.9	4.4	5.3				1	-	-	-	1			
Subtotal	25.4	14.8	26.7	36.4	29.1				4	2	4	4	5			
Permanent Crops:																
Permanent Meadows (natural pasture)	702.3	705.0	690.5	669.4	678.8				93	93	91	89	87			
Subtotal	702.3	705.0	690.5	669.4	678.8				93	93	91	89	87			
Permanent Crops (incl. fruit trees)	0.3	0.3	0.3	0.4	0.4				-	-	-	-	-			
Forest Land	17.2	19.7	20.0	27.0	16.3				2	3	3	4	2			
Other Land	7.2	14.4	16.9	20.6	47.0				1	2	2	3	6			
Subtotal	24.7	34.4	37.2	48.0	63.7				3	5	5	7	8			
TOTAL	752.4	754.2	754.4	753.8	771.6				100	100	100	100	100			

Land Under	In '000 ha								Percent							
	1983	1984	1985	1986	1987	1988	1989	1990	1983	1984	1985	1986	1987	1988	1989	1990
Temporary Crops																
Temporary Leys & Meadows																
Temporary Fallow Land																
Subtotal																
Permanent Crops:																
Permanent Meadows (natural pasture)																
Subtotal																
Permanent Crops (incl. fruit trees)																
Forest Land																
Other Land																
Subtotal																
TOTAL																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi.

TABLE 11: **CROPPING PATTERN**
Medium–Large Farms[a)]

Land under:	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Cereals (in '000 ha)																
Maize	2.1	1.5	2.1	1.6	0.9											
Wheat	2.0	1.0	1.8	1.5	1.1											
Barley	1.6	1.2	0.7	0.7	0.5											
Oats	0.1	0.3	0.3	-	0.3											
Others	-	-	-	-	-											
Total	5.8	4.0	4.9	3.8	2.8											
Grassing/Fodder Crops (in ha)																
Leys[b)]	-	-	-	-	11374											
Nat. Pasture[b)]	-	-	-	-	5268											
Lucerne	107	74	58	48	35											
Silage Crops	311	268	248	309	282											
Others	241	196	187	91	86											
Total	659	538	493	448	17045											
Vegetables/Root Crops (in ha)																
Potatoes	106	157	165	69	135											
Tomatoes	-	2	-	1	3											
Beans & Peas	216	305	416	286	316											
Onions	-	-	2	1	2											
Others	22	13	16	16	6											
Total	344	477	599	373	462											

a) farms above 20 ha in size b) 1975–78 not recorded

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi.

TABLE 12: NUMBER OF LIVESTOCK KEPT ON FARMS (IN '000 HEAD)

Medium–Large Farms[a)]

Kind of Livestock	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Dairy Cattle:																
Cows	11.2	12.0	10.5	8.7	12.5											
Heifer & Heifer Calves	6.7	7.3	5.1	5.1	7.7											
Stud Bulls & Bull "	0.7	4.7	3.7	1.0	1.0											
Total	18.3	24.0	19.3	14.8	21.2											
Beef Cattle:																
Cows	45.0	57.1	56.9	51.4	48.0											
Heifer & Heifer Calves	35.2	33.0	33.0	34.0	30.2											
Other Beef Cattle	65.8	70.5	79.9	59.8	54.2											
Total	146.0	160.6	169.8	145.2	132.4											
Sheep:																
Ewes	26.1	33.6	34.0	28.1	25.1											
Rams	1.5	2.6	2.1	1.3	1.3											
Lambs	12.7	12.7	14.3	12.1	15.6											
Others	22.0	21.7	17.1	24.7	24.6											
Total	62.3	70.6	67.5	66.2	66.6											
Pigs:																
Breeding Sows	0.2	0.2	0.1	0.1	0.2											
Breeding Boars	-	-	-	-	0.3											
Others	1.5	1.2	0.7	0.5	0.6											
Total	1.7	1.4	0.8	0.6	1.1											
Poultry:																
Breeding Stock	1.1	0.5	1.2	1.6	1.7											
Other Poultry	1.0	0.3	1.8	2.2	0.4											
Total	2.1	0.8	3.0	3.8	2.1											

a) farrms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi.

TABLE 13: HERD AND FLOCK SIZES

Medium–Large Farms[a)]

Number of Herds and Flocks in Herd Size Groups

Stock	Sheep: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
	Cattle: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78
Dairy Cattle	27	21	22	20	12	11	11	6	18	18	17	18	11	5	6	7	1	5	2	3	5	5	6	4	16	15	16	14	11	16	11	6
Beef Cattle	11		5	5	5		6	2	7		5	7	5		2	2	3		3	2	3			3	9		12	10	70		67	54
Sheep	12	12	16	6	4	5	3	1	10	6	8	10	7	7	3	5	4	3	4	4					5	10	10	5	34	32	30	25

Stock	Sheep: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
	Cattle: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82
Dairy Cattle	22				12				11				6				9				1				10				10			
Beef Cattle	12				7				5				4				4				1				8				51			
Sheep	7				7				7				7				5				11				8				19			

Stock	Sheep: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
	Cattle 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86
Dairy Cattle																																
Beef Cattle																																
Sheep																																

Stock	Sheep: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
	Cattle: 1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90
Dairy Cattle																																
Beef Cattle																																
Sheep																																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi.

TABLE 14: LIVESTOCK PRODUCTION, SALES AND CONSUMPTION ON FARM

Medium–Large Farms[a)]

Livestock	Produce	Unit	Year							
			1975	1976	1977	1978	1979	1980	1981	1982
Dairy	Milk Production, Total	'000 Litre	9600	8351	9723	7688	8312			
	Milk sold off farm	'000 Litre	-	6971	8718	6376	7496			
	Cattle	'000 Head	2.7	0.7	4.7	0.7				
Beef	Sales for slaughter and consumed on farm	'000 Head	14.1	24.9	31.8	17.3	17.8			
	Sales for breeding and fattening	'000 Head	17.8	17.0	16.8	14.8	11.5			
Sheep	Total Sales and consumed on farm	'000 Head	13.6	14.6	10.7	13.6	10.3			
	Wool	'000 kg	177.2	92.3	114.0	147.0	111.5			
Livestock	Produce	Unit	Year							
			1983	1984	1985	1986	1987	1988	1989	1990
Dairy	Milk Production, Total	'000 Litre								
	Milk sold off farm	'000 Litre								
	Cattle	'000 Head								
Beef	Sales for slaughter and consumed on farm	'000 Head								
	Sales for breeding and fattening	'000 Head								
Sheep	Total Sales and consumed on farm	'000 Head								
	Wool	'000 kg								

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

SAMBURU DISTRICT

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Agricultural Statistics

Not available

[1] The meteorological data available are not yet sufficient to produce the table: Temperature data
[2] Table AEZ-Land Area not yet prepared because of the preliminary character of the AEZ Map

NATURAL POTENTIAL

INTRODUCTION

Up to now, Samburu has not been considered as a district with areas suitable for agriculture and for this reason no agricultural statistics or farm management information exist. However, since 1981 the district has become a valuable wheat producer. On the Lesiolo Plateau, at 2 400 m, almost a 1 000 ha of wheat were cultivated producing about 30 000 bags in 1982, and the area may be doubled.

On the lower parts of the plateau and in the hills around Maralal, some cultivation of maize, beans and potatoes has taken place in the last couple of years with marginal results. Although the annual average of 600 mm – 750 mm seems promising, its distribution in three weak peaks throughout the year is a disadvantage for growing crops (see Diagram Maralal). This could be improved to a certain extent by conserving the water from the first rains and planting in the second. The third rains are too weak and too unreliable for any crop.

Other areas which under certain conditions may be suitable for cropping are the foothills of the Oldoinyo Lenkiyio (Mathews Range) and of the Ndoto, Alimision and Nyiro Mountains and some small plateaus on these ranges, excluding Forest Reserves. These higher areas are small „green islands“ in a semi-desert. With very few exceptions, it is not advisable to cut down the forests there, as they are important for the water supply to the rivers and vital for the humans, livestock and wild animals in the semi-desert beneath, which is in fact overstocked mainly due to over-population. Additional cultivation is necessary for the pastoralists where ever it ist possible. The footslopes (mainly Lower Midland Livestock-Millet Zone LM 5) present certain possibilities without destroying the natural resources, if runoff is prevented by proper methods of contour ridging. In these eastern areas of the district, the rainfall pattern shows the bimodal characteristics of East Kenya, suitable for very early maturing varieties of bulrush millet and minor millets.

Even in the almost driest areas of the district around Baragoi, a certain amount of additional cultivation with water concentration is not out of the question (see Diagram Baragoi), and emergency fodder crops like saltbush (Atriplex nummularia) should be planted for the livestock.

SAMBURU DISTRICT

TABLE 1: RAINFALL FIGURES FROM VARIOUS STATIONS
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Monthly rainfall in mm: Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
8836000	Maralal, Distr.	18	Average	604	16	23	39	80	63	46	75	98	30	45	64	25
1 945 m	Office		60 % rel.[1]	543	2	6	22	68	42	28	58	82	13	24	34	6
8836001	Baragoi, Div. Off.	37	Av.	559	35	36	67	101	60	23	20	22	17	52	88	38
1 370 m			60 %	503	20	10	44	78	47	0	0	3	0	24	63	26
8937018	Wamba, Div. Off.	28	Av.	689	17	10	78	181	58	6	15	6	6	61	179	71
1 500 m			60 %	550	11	5	54	139	45	0	0	1	0	35	138	48
8937035	Archer's Post	29	Av.	365	6	12	37	85	41	2	5	5	3	31	99	39
862 m			60 %	245	0	0	21	58	26	0	0	0	0	18	69	22

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

SAMBURU DISTRICT

TABLE 2: CLIMATE IN THE AGRO-ECOLOGICAL ZONES

Agro-Ecological Zones	Subzones	Altitudes in m	Annual mean temperatures in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains in days	2nd rains in days	Total[2] in days
UH 2 Pyrethrum-Wheat Zone	m i vs/s	Very small, here Forest Reserve							
LH 2 Wheat/Maize Pyrethrum Zone	m i vs/s m/s + vs/s	Very small, here Forest Reserve							
LH 3 Wheat/(Maize) -Barley Zone	m i vs			800–900	500–600	150–200	140–155	55–65	–
	m + i	1 850–2 400	18.0–15.0	700–800	500–600	100–150	135–150	–	–
	m/s + vs			780–900	250–400	200–250	115–135	55–65	–
LH 4 Cattle-Sheep-Barley Zone	(m/s) + i			650–700	400–500	100–150	115–135	–	–
	f s + vs			600–780	250–350	150–200	75–115	55–65	–
	(vs ⌢ s) + (vs)	1 850–2 200	18.0–16.0	620–720	400–500	100–120	130–150[5]	55–65	–
	i ⌢ (s/vs) + i			600–700	300–400	50–100	75– 85	–	–
LH 5 L. Highland Ranching Zone	t r	1 800–1 900	18.3–17.7	550–700	230–400[4]	50–100	–	–	–
UM 3 Marginal Coffee Zone	s/m + vs/s	Very small, here Forest Reserve							
UM 4 Sunflower-Maize Zone	(l)			Very small, see Baringo District					
	f s + vs	1 500–1 900	21.0–19.2	800–900	250–450	150–250	75–115	50–60	–
UM 5 Livestock-Sorghum Zone	(m/l) i	1 500–1 800	21.0–19.2	500–720	400–450[3]	40–150	155–175	–	–
	f vs + vs			600–750	150–280	150–200	50– 85	50–55	–
UM 6 U. Midland Ranching Zone	t r	1 500– 1 800	21.0–19.2	480–550	200–250	50–120	–	–	–
	b r			450–600	150–200	50–150	–	–	–
LM 5 L. Midland Live-stock Millet Zone	vs/s + vs			680–800	200–250	160–200	55– 75	45–55	–
	(vs ⌢ vs/s) i	1 000–1 500	24.0–21.0	550–650	350–450[4]	<50	100–120	–	–
	vs + vs			450–700	150–200	150–180	45– 75	–	–
LM 6 L. Midland Ranching Zone	b r	850–1 500	24.4–21.0	380–600	80–150	60–150	–	–	–
	u r i			400–500	100–200	<50	–	–	–
LM 7 L. Midland Nom. Zone	b r	850–1 250	24.4–21.0	300–400	50–100	<60	–	–	–
IL 7 Lowland Nom. Zone	b r	300– 900	More than 24°	<350	<80	<60	–	–	–

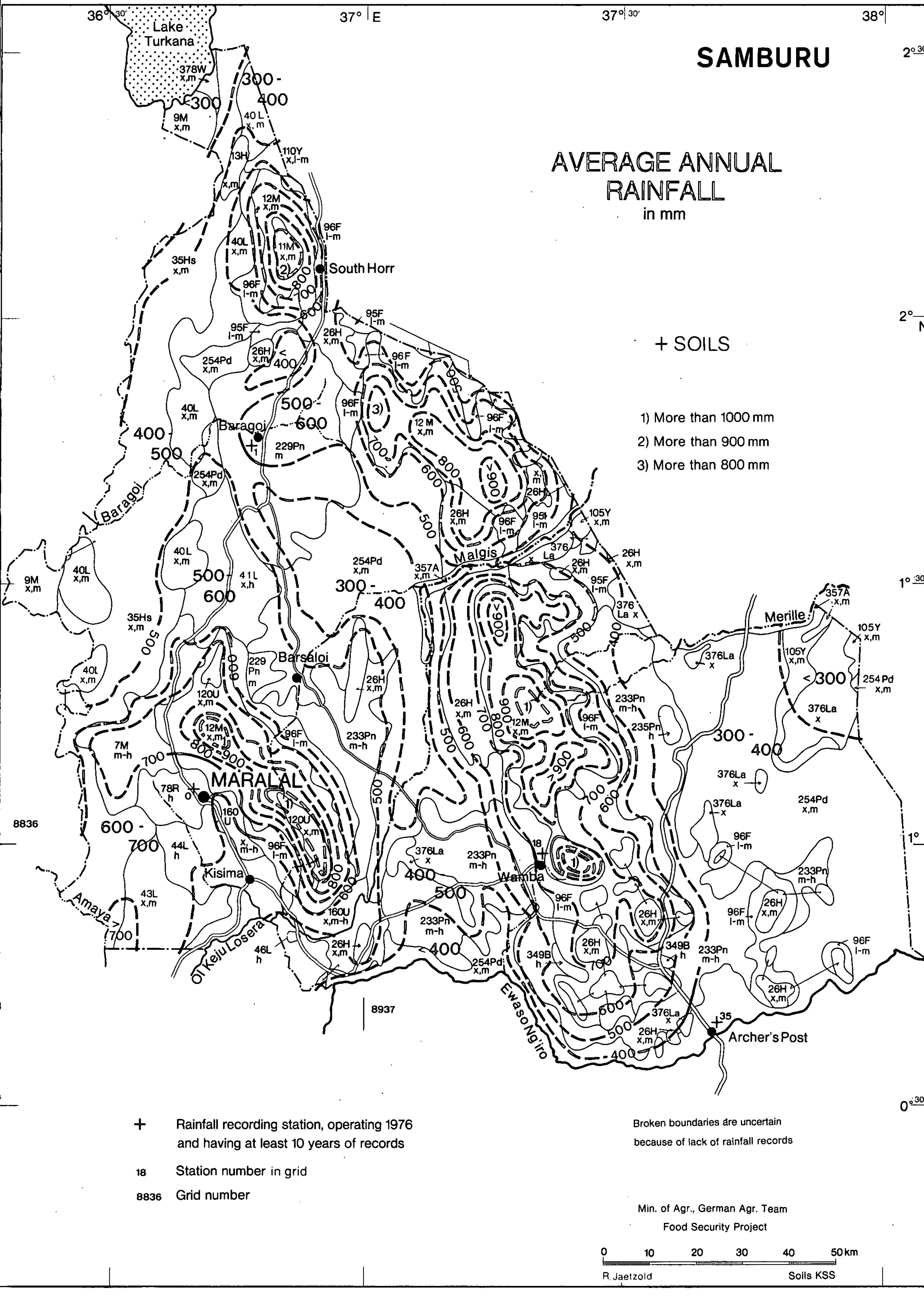
1) Amounts surpassed in at least 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants.

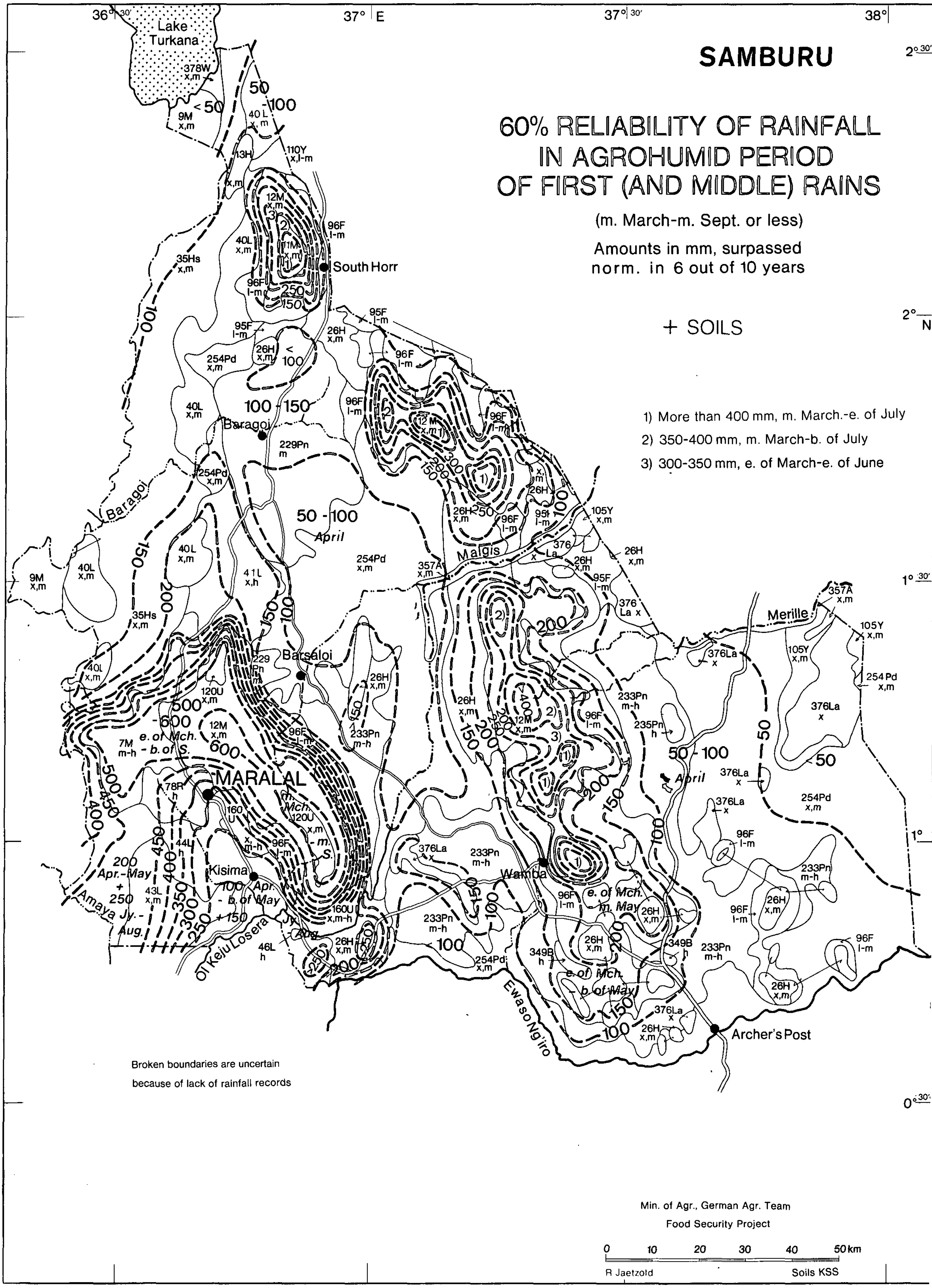
2) Only added if rainfalls continue at least for survival of annual crops from first to second rains.

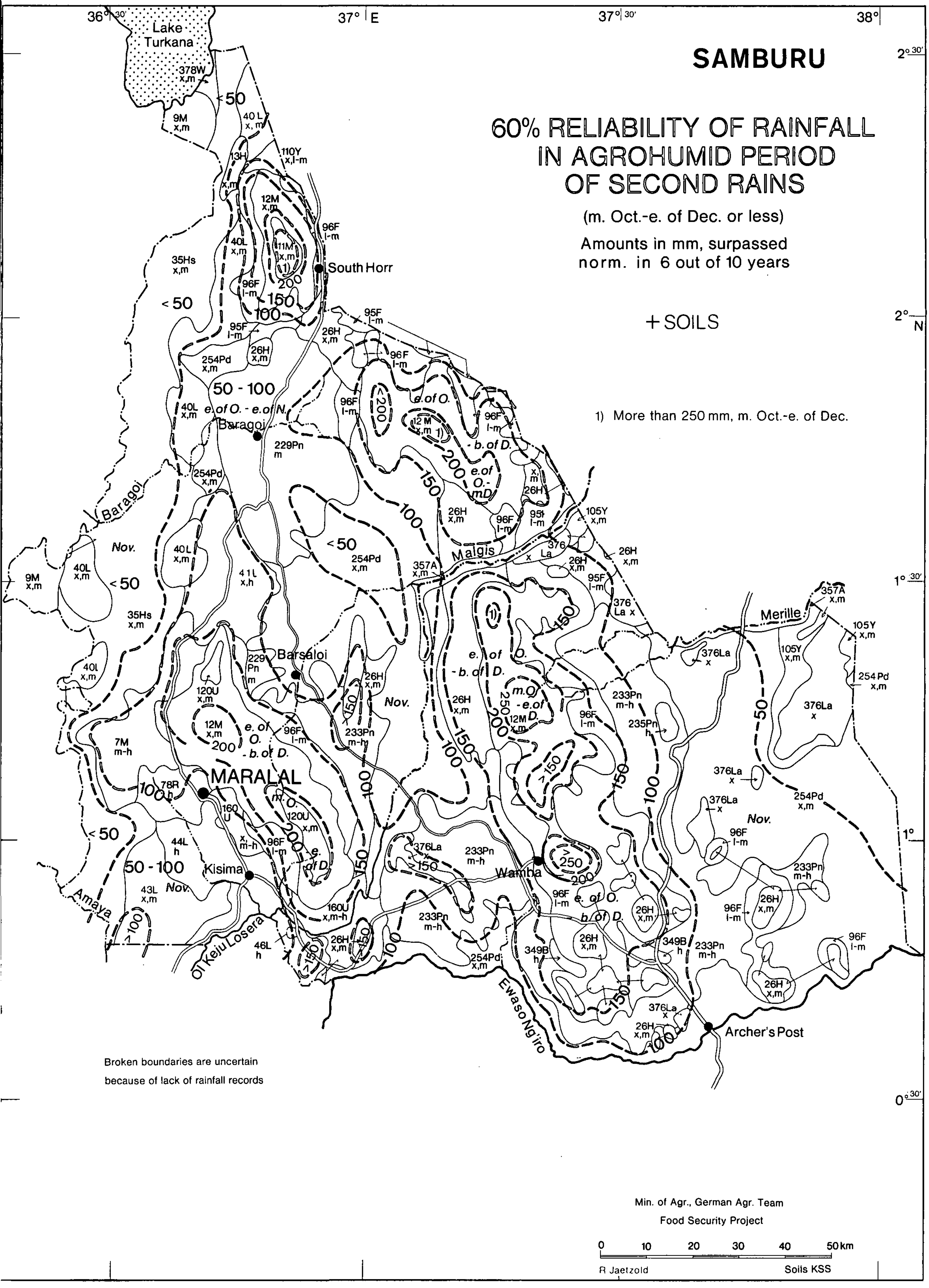
3) 200 mm April-May + 250 mm July-August

4) 150-200 mm April-May + 200-250 mm July-August

5) Not continuously


SAMBURU
AVERAGE ANNUAL RAINFALL
in mm
+ SOILS
1) More than 1000 mm
2) More than 900 mm
3) More than 800 mm
Lake Turkana
South Horr
Baragoi
Malgis
Merille
Barsaloi
MARALAL
Kisima
Wamba
Archer's Post
Amaya
Ol Keju Losera
Ewaso Ng'iro
36°30'
37° E
37°30'
38°
2°30'
2° N
1°30'
1°
0°30'
8836
8937
+ Rainfall recording station, operating 1976 and having at least 10 years of records
18 Station number in grid
8836 Grid number
Broken boundaries are uncertain because of lack of rainfall records
Min. of Agr., German Agr. Team
Food Security Project
0 10 20 30 40 50 km
R. Jaetzold
Soils KSS


SAMBURU
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF FIRST (AND MIDDLE) RAINS
(m. March-m. Sept. or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+ SOILS
1) More than 400 mm, m. March.-e. of July
2) 350-400 mm, m. March-b. of July
3) 300-350 mm, e. of March-e. of June
Lake Turkana
South Horr
Baragoi
Barsaloi
MARALAL
Kisima
Wamba
Archer's Post
Merille
Malgis
Ewaso Ng'iro
Ol Keju Losera
Broken boundaries are uncertain because of lack of rainfall records
Min. of Agr., German Agr. Team
Food Security Project
0 10 20 30 40 50 km
R Jaetzold
Soils KSS



SAMBURU
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RAINS
(m. Oct.-e. of Dec. or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+ SOILS
1) More than 250 mm, m. Oct.-e. of Dec.
Broken boundaries are uncertain because of lack of rainfall records
Min. of Agr., German Agr. Team
Food Security Project
0 10 20 30 40 50 km
R Jaetzold
Soils KSS
36° 30'
37° E
37° 30'
38°
2° 30'
2° N
1° 30'
1°
0° 30'
Lake Turkana
South Horr
Baragoi
Barsaloi
Malgis
Merille
MARALAL
Kisima
Wamba
Archer's Post
Ewaso Ng'iro
Ol Keju Losera
Amaya
50 - 100
e. of O. - e. of N.
< 50
Nov.


SAMBURU
AGRO - ECOLOGICAL ZONES + SOILS
1) UH 2 m i vs/s
2) LH 4 fs + vs
3) UM 4 (i)
4) LH 4 (vs – s) + (vs)
5) LH 2 m/s + vs/s
6) UM 3 s/m + vs/s
7) UM 4 fs + vs
8) UM 5 fvs + vs
9) LM 5 vs/s + vs
10) LM 5 vs + vs
11) LH 3 m/s + vs
12) LH 2 m i vs/s
Lake Turkana
South Horr
Baragoi
Barsaloi
MARALAL
Kisima
Wamba
Merille
Archer's Post
Malgis
Amaya
Ol Keju Losera
Ewaso Ng'iro
Lower Midland Ranching Zone
Lower Midland Ranching Zone
Lower Midland Ranching Zone
Lowland Nomadism Zone
36°
37° E
37°
38°
3°
2° N
1°
1°
0°
Forest Reserve
Steep Slopes, unsuitable for cultivation (not marked in For. Res. and Ranching or Nomadism Zones)
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
Min. of Agr., German Agr. Team
Food Security Project
0 10 20 30 40 50 km
AEZ R. Jaetzold '83 (prelim.)
Soils KSS

AGRO-ECOLOGICAL ZONES

UH = *UPPER HIGHLAND ZONES*

UH 2 = *P y r e t h r u m - W h e a t Z o n e*

Very small and steep, Forest Reserve

LH = *LOWER HIGHLAND ZONES*

LH 2 = *W h e a t / M a i z e - P y r e t h r u m Z o n e*

Very small and very valuable timber area, therefore Forest Reserve

LH 3 = *W h e a t / (M a i z e)* [1] *- B a r l e y Z o n e*

LH 3 m i vs = *Wheat/(Maize)-Barley Zone with a medium cropping season, intermediate rains, and a very short one*

Very valuable timber area, therefore Forest Reserve

LH 3 m + i = *Wheat/(Maize)*[1]*-Barley Zone with a medium cropping season and intermediate rains and intermediate rains*

G o o d y i e l d p o t e n t i a l (av. more than 60 % of the optimum)
1st rains, start norm. end of March: E. mat. wheat like Kenya Tembo and other varieties of this group (see Vol. II A, p. 34; end of Apr. – b. of S.), m. mat. wheat like K. Leopard a. o. var. (m. Apr. – m. S.); m. mat. Durum wheat, e. mat. barley like Tumaini, m. mat. barley like Proctor; potatoes; m. mat. sunflower like Vympel; cabbages, kales, spinach, artichocs, gourgettes, shallots, silverbeet, turnips

F a i r y i e l d p o t e n t i a l (av. 40–60 % of the opt.)
1st rains: M. mat. peas, e. mat. beans like Canadian Wonder; m. mat. rapeseed, linseed; carrots, cauliflower, beetroot, leek, rampion
Middle rains, start indistinctly end of June: E. mat. peas
Whole year: Black wattle

P o o r y i e l d p o t e n t i a l (av. 20–40 % of the opt.)
1st rains: Late mat. maize like H 611; tomatoes
2nd resp. 3rd rains, start norm. m. O.: Too weak for crops

P a s t u r e a n d f o r a g e
2–3 ha/LU on grassland with red oats grass (Themeda triandra) predominant between forest patches (mainly in valleys). Subterranean clover and Lotononis as add. forage for dairy cows

LH 3 m/s + vs = *Wheat/(Maize)-Barley Zone with a medium cropping season and a very short one*

Small and steep, mainly Forest Reserve

LH 4 = *C a t t l e - S h e e p - B a r l e y Z o n e*

LH 4 (m/s) + i = *Cattle-Sheep-Barley Zone with a (weak) medium to short cropping season and intermediate rains*

F a i r y i e l d p o t e n t i a l
1st rains, start norm. end of March: E. mat. barley like Tumaini for malting, Amani for stockfeed; e. mat. beans like Rosecoco; potatoes, kales[2], shallots[2], artichocs
Middle rains, start norm. end of June: V. e. mat. barley

[1] Wheat or maize depending on farm scale and local climate. Here wheat more advisable because of the chance of large scale farming and due to the danger of cold nights (which harm maize more than wheat)
[2] Better in valleys

P o o r   y i e l d   p o t e n t i a l (av. 20–40 % of the opt.)
1st rains: M. mat. maize like H 622
2nd resp. 3rd rains, start norm. m. O.: Too weak for crops

P a s t u r e   a n d   f o r a g e
3–4 ha/LU on nat. grassland with scattered trees; subterr. clover and e. or v. e. mat. barley as add. forage

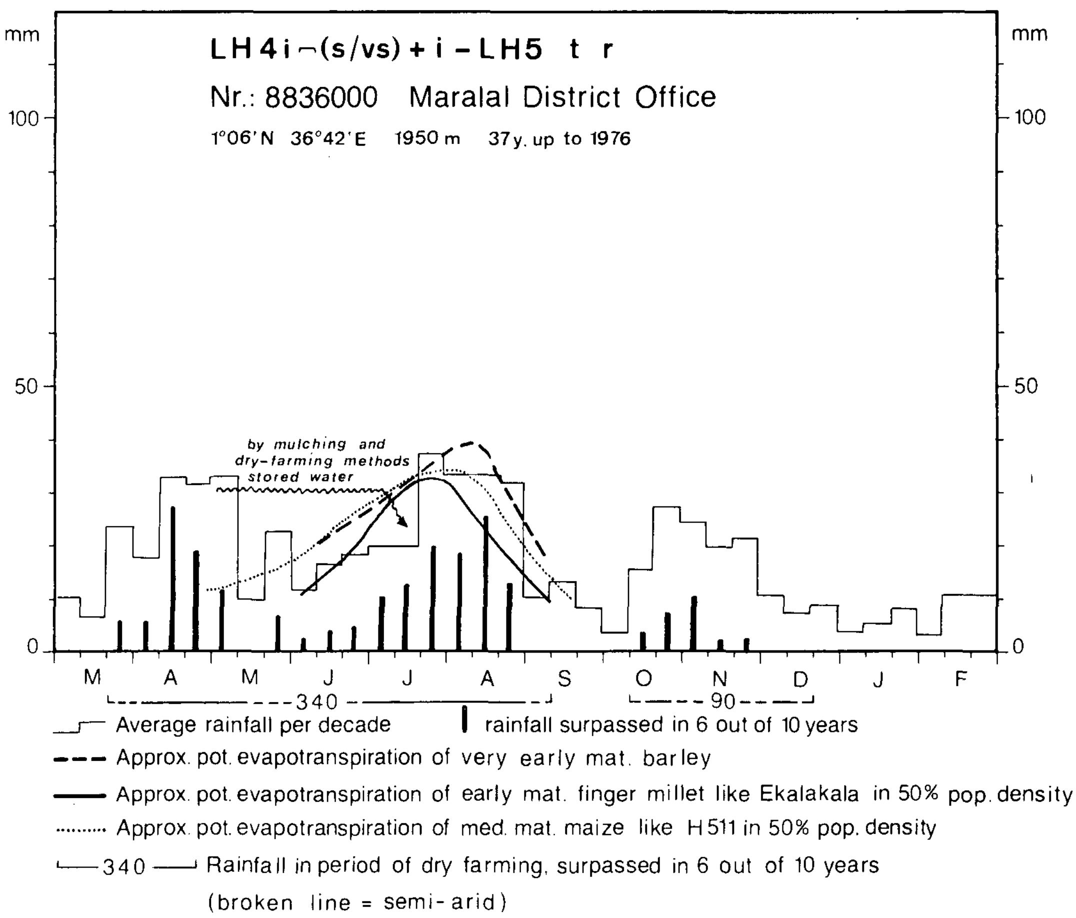
LH 4 = Cattle-Sheep-Barley Zone
i ⌐ (s/vs) + i — with intermediate rains followed by a (weak) short to very short cropping season and intermediate rains

(see Diagram Maralal)

F a i r   y i e l d   p o t e n t i a l
Middle rains, start norm. end of June: V. e. mat. barley[3], e. mat. barley like Amani[3] (end of May–Sept.); e. mat. beans like Mexican 142[3]

P o o r   y i e l d   p o t e n t i a l
1st rains, start norm. end of March (to 2nd r.): M. mat maize like H 511 (m. of Apr.–S.)[4] [5]
Middle rains: E. mat. finger millet like Ekalakala (in half plant population density); potatoes[3] shallots
2nd resp. 3rd rains, start norm. m. O.: Too weak for crops

P a s t u r e   a n d   f o r a g e
4–5 ha/LU on nat. grassland, subterr. clover and e. or v. e. mat. barley as add. forage



LH 4 = Lower Highland Cattle-Sheep-Barley Zone
(vs ⌐ s) + (vs) — with a (weak) very short cropping season followed by a (weak) short one, and a (weak) very short cropping season

Very small, potential see Laikipia District

3) If moisture from rains in April and May is preserved by dry farming techniques: Rain during first rainy season should be stored by contour ploughing resp. harrowing and stubble mulching for cultivation in main rainy season
4) Mulching after seeding recommended
5) Half plant population density and runoff-catching (water concentrating) agriculture recommended (fig. 1)

LH 4 = *Lower Highland Cattle-Sheep-Barley Zone*
f s + vs *with a fully short cropping season and a very short one*

Small area and steep slopes. Cultivation of e. mat. barley like Tumaini in pockets of good soils during first rains possible

LH 5 *Lower Highland Ranching Zone*

LH 5 = *Lower Highland Ranching Zone*
t r *with trimodal rainfall*

Not suitable for rain-fed agriculture

Pasture and forage
5–6 ha/LU on short grass highland savanna; down to 4 ha with fenced rotational grazing; no proper forage up to now

UM = *UPPER MIDLAND ZONES*

UM 3 = *Marginal Coffee Zone*

Very small and steep slopes. Forest Reserve

UM 4 = *Sunflower-Maize Zone*

Very small and steep slopes, cultivation in pockets only (e. mat. maize like Katumani comp. B)

UM 5 = *Livestock-Sorghum Zone*
(m/l) i *with a (weak) medium to long cropping season and intermediate rains*

Small and steep slopes, cultivation in pockets and near Amaya River only. Potential see Baringo District

UM 5 = *Livestock-Sorghum Zone*
f vs + *with a fully very short cropping season*
vs *and a very short one*

Fair yield potential
1st rains, start norm. end of March: V. e. mat. sorghum like IS 8595, v. e. mat. foxtail millet, v. e. mat. barley; rai (oilseed Brassica juncea, v. e. mat. var. from Central Arid Zone Res. Inst., Jodhpur)
2nd rains, start norm. m. Oct.: V. e. mat. dwarf sorghum, v. e. mat. foxtail millet
Whole year: Marama beans[6)]

Poor yield potential
1st rains: Dryland comp. maize (Katumani); v. e. mat. beans like Mwezi moja beans
2nd rains: V. e. mat. beans, rai

Pasture and forage
More than 5 ha/LU in nat. short grass-thornbush savanna; with hay of moth beans or barrel medicago and planted salt-bushes (Atriplex nummularia), Gao trees (Acacia albida, on good soils), Algarrobo (Prosopis chilensis) much higher stocking rates. Reseeding with buffel-grass (Chenchrus ciliaris)

LM = *LOWER MIDLAND ZONES*

LM 5 = *Livestock-Millet Zone*

LM 5 = *Livestock-Millet Zone*
vs/s *with a very short to short cropping season*
+ vs *and a very short one*

(see Diagram Wamba, Div. Office)

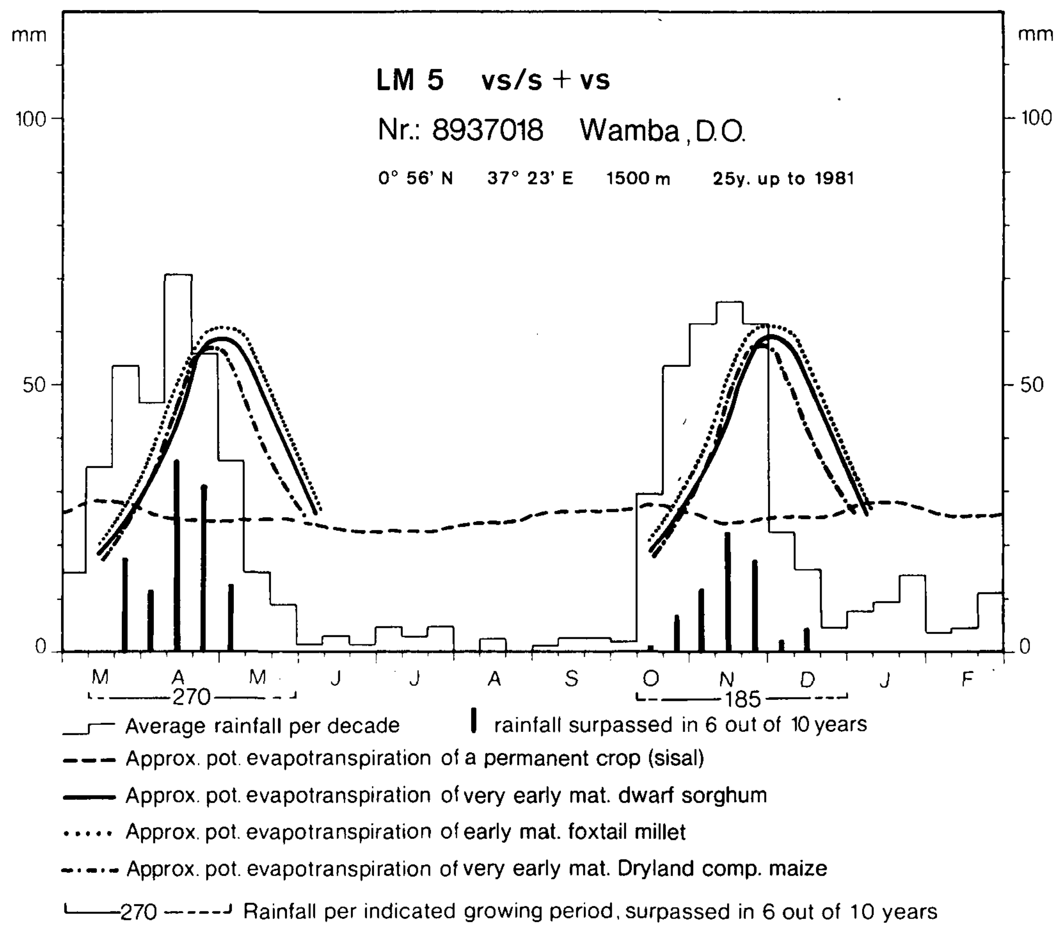
Good yield potential
1st rains, start norm. end of March: V. e. mat. sorghum like IS 8595, e. mat. foxtail millet, e. mat. proso millet like Serere I, v. e. mat. hog millet; rai, green grams, moth beans

6) Still experimental. Eatable tubers after some years, nutritious seeds

2nd rains, start norm. m. Oct.: V. e. mat. foxtail or hog millet
Whole year: Buffalo gourds (light soils)[6], Marama beans[6], jojoba

Fair yield potential
1st rains: Dryland comp. maize (from Katumani) on good soils[5], v. e. mat. bulrush millet; v. e. mat. beans like mwezi moja beans, v. e. mat. cowpeas, v. e. mat. tepary beans, v. e. mat. bambarra groundnuts, chick peas (late planted on heavy black soil), black grams
2nd rains: E. mat. foxtail millet like 1 Se 285, e. mat. proso millet, v. e. mat. sorghum like IS 8595, v. e. mat. bulrush millet; green grams, moth beans, v. e. mat. cowpeas, v. e. mat. tepary beans, v. e. mat. bambarra groundnuts, chick peas, rai,
2nd to 1st rains: Pigeon peas and ratoon sorghum with runoff-catching agriculture (fig. 1)

Pasture and forage
5–7 ha/LU on short grass savanna, 7–10 ha/LU or more if denuded. Much higher stocking rate with planted salt-bushes (Atriplex nummularia, on deep soils A. halimus), jojoba and other fodder shrubs and trees as in UM 5, silage of fodder sorghum and hay of moth beans or cowpeas. Reseeding with buffel-grass (Cenchrus ciliaris). Opuntia var. without prickles (also as vegetable and fruit)



LM 5 vs + vs = *Livestock-Millet Zone with two very short cropping seasons*

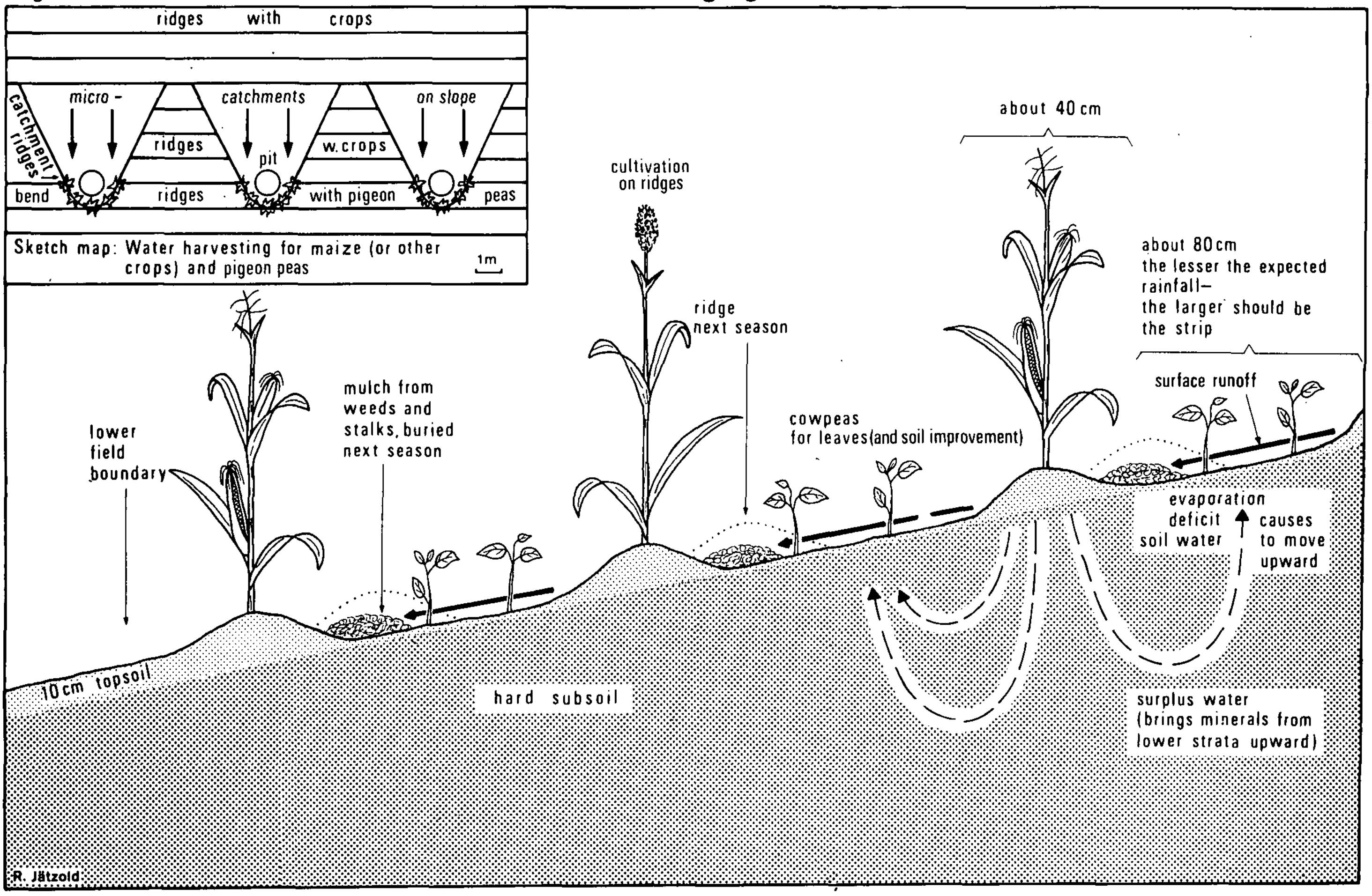
Good yield potential
1st rains, start norm. end of March: V. e. mat. foxtail or hog millet (~ 60 %)
2nd rains, start norm. end of Oct.: The same

Fair yield potential[5]
1st or 2nd rains: E. mat. foxtail millet like 1 Se 285, e. mat. proso millet, v. e. mat. sorghum like IS 8595, v. e. mat. bulrush millet; green grams, moth beans, v. e. mat. cowpeas, v. e. mat. tepary beans, v. e. mat. bambarra groundnuts, chick peas (late planted on heavy black soil), rai
2nd to 1st rains: Pigeon peas with runoff-catching techniques (Fig. 1)
Whole year, best planting time end of Oct.: Buffalo gourds (light soils)[6], Marama beans[6], ye-eb nuts (below 1 000 m)[7], jojoba

Poor yield potential
1st or 2nd rains: Dryland comp. maize; v. e. mat. beans like mwezi moja beans. Both crops and v. e. mat. sorghum, cowpeas etc. fair to good potential with runoff-catching techniques

7) Cordeauxia edulis from Somalia

Fig. 1 **Runoff-catching agriculture**



for areas with 300-400 mm average precipitation per rainy season

Pasture and forage
6–8 ha/LU on short grass savanna, 8–12 ha/LU or more if denuded. Much higher stocking rate with planted salt-bushes (Atriplex nummularia, on deep soils A. halimus), jojoba and other fodder shrubs and trees as in UM 5, silage of fodder sorghum and hay of moth beans or cowpeas. Reseeding with buffel-grass (Cenchrus ciliaris)

LM 5 (vs ⌐ s/vs) i = *Livestock-Millet Zone with a (weak) very short cropping season followed by a (weak) short to very short one and intermediate rains*

Steep slopes and stony soils, potential for pockets of cultivation see Baringo District

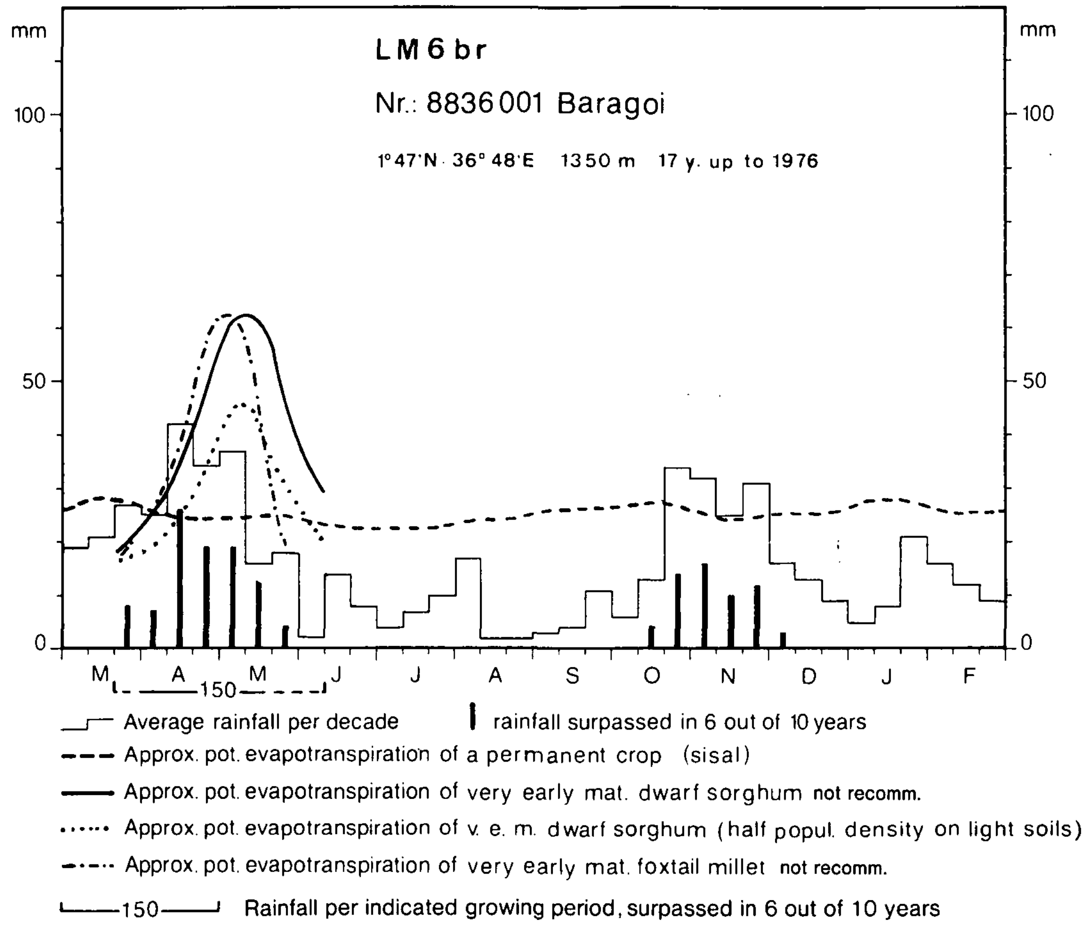
LM 6 b r = *Lower Midland Ranching Zone with bimodal rainfall*

(see Diagram Baragoi)

Rain-fed agriculture with runoff-catching or water concentration techniques resp. on wet places, suitable crops see LM 5 vs + vs. Marginal chance without these techniques for v. e. mat. sorghum in half plant population density. Ye-eb nuts (below 1 000 m), buffalo gourds[6] and Marama beans[6] may thrive without special techniques

Pasture and forage
More than 12 ha/LU on denuded dry thornbush savanna and semi-desert. Improvable by planting fodder shrubs and grasses with runoff-catching techniques (see fig. 2)[8]; chick peas (planted at the end of good rainy seasons on heavy black soil) for fodder or sometimes pulses

[8] Buffel-grass (Cenchrus ciliaris), Masai love grass (Eragrostis superba), horse tamarind (Leucaena leucocephala), salt-bush (Atriplex nummularia), Mesquite (Prosopis juliflora), Algarrobo (Pr. chilensis), Acacia haloserices (salt tolerant)



LM 6 u r i = *Lower Midland Ranching Zone with unimodal rainfall*

Small areas, potential see Baringo District, but many places too slopy for camels

LM 7 = *Lower Midland Nomadism Zone*

LM 7 b r = *Lower Midland Nomadism Zone with bimodal rainfall*

More than 20 ha/LU on desert shrub. Camels and goats thrive better than cattle. Semi-nomadism best adapted land use.
Suitable grasses for reseeding denuded areas: Tetrapogon villosus (perennial) and Eragrostis cilianensis (annual)

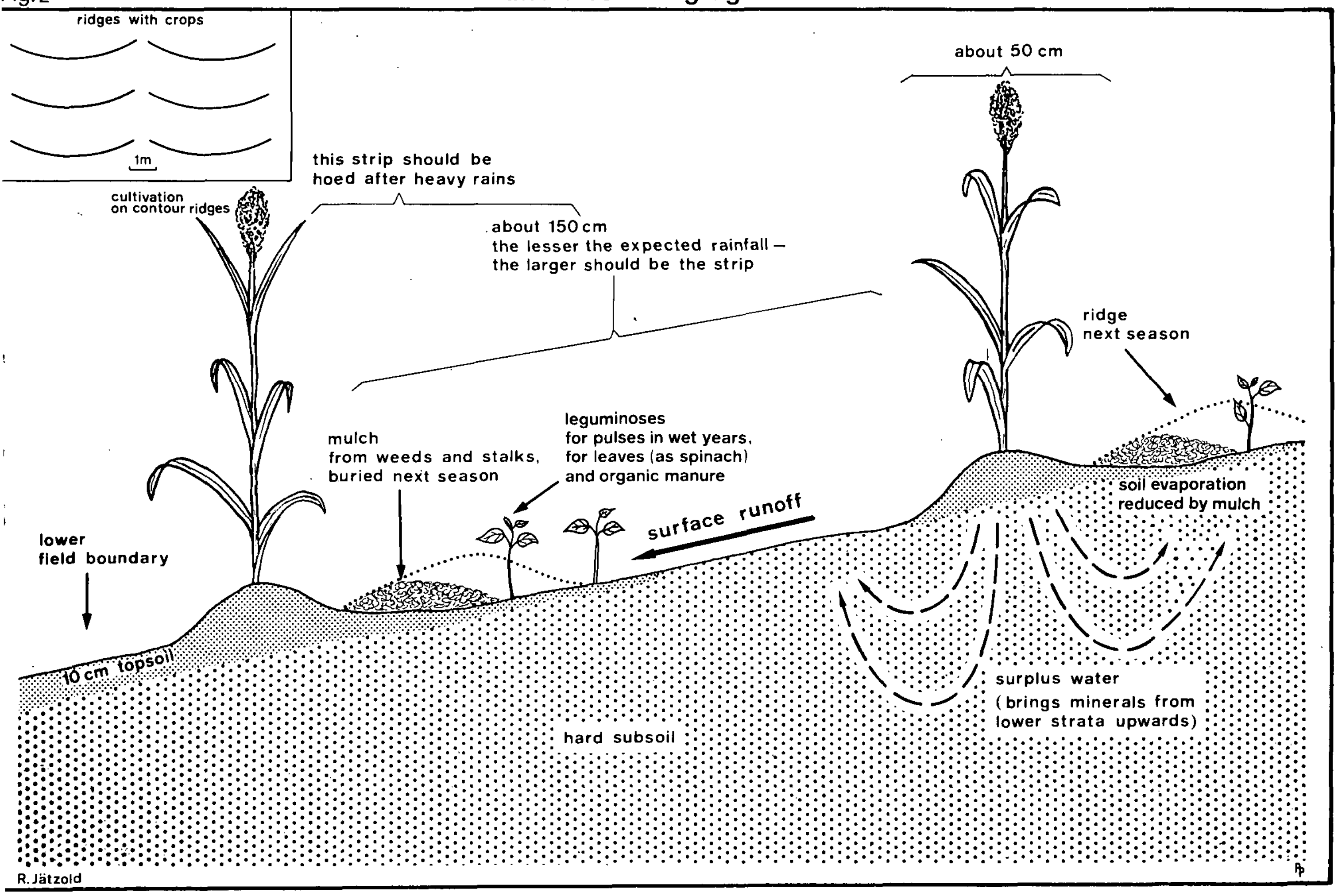
IL = *INNER LOWLAND ZONES*

IL 7 = *Inner Lowland Nomadism Zone*

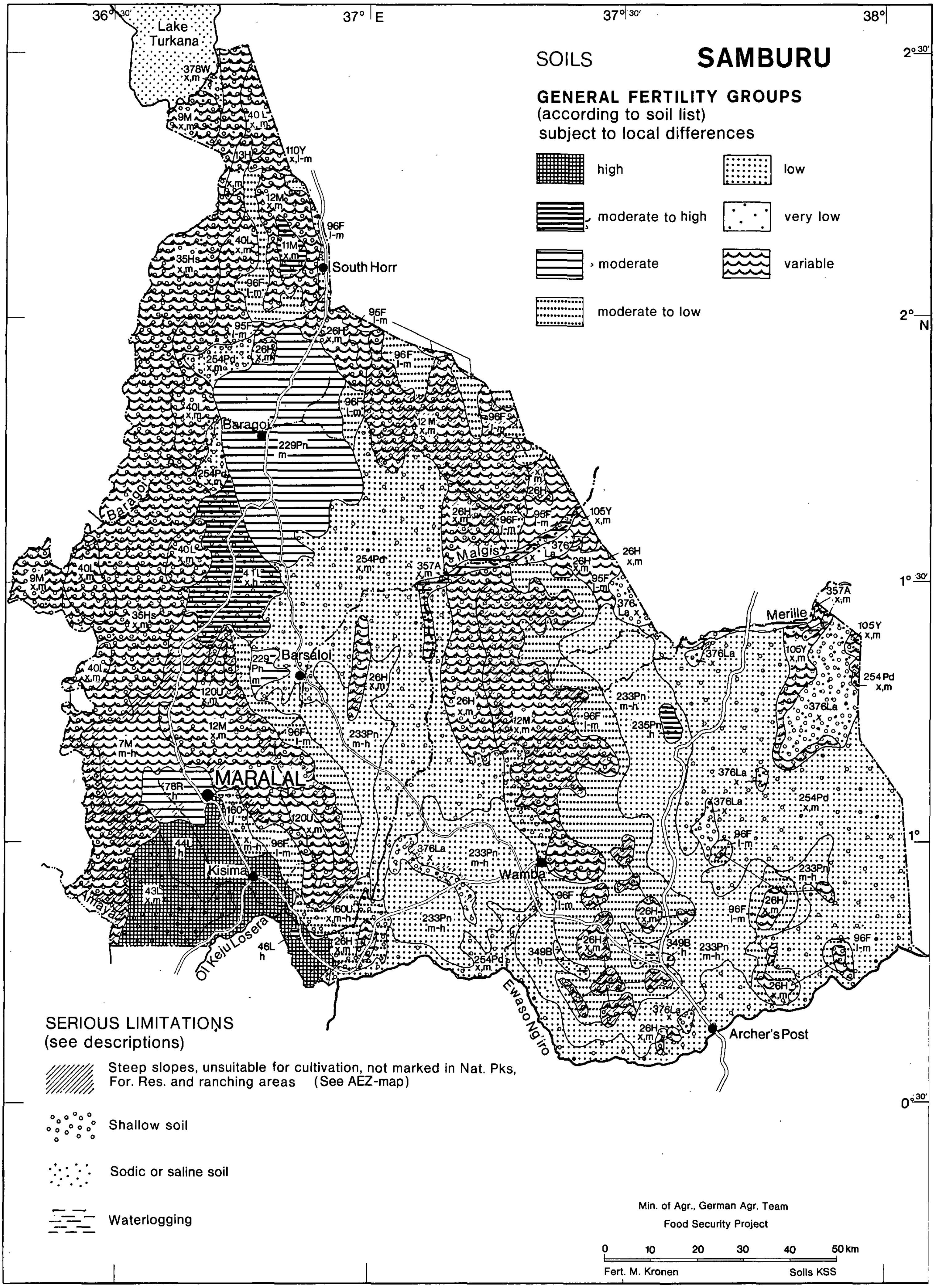
IL 7 b r = *Inner Lowland Nomadism Zone with bimodal rainfall*

More than 25 ha/LU on desert shrubs. Camels thrive better than cattle. Semi-nomadism best adapted land use.
Suitable grasses for reseeding denuded areas: Tetrapogon villosus (perennial) and Eragrostis cilianensis (annual)

Fig. 2 **Runoff-catching agriculture**



for areas with 200-300 mm average precipitation per rainy season



SOILS
SAMBURU
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
moderate to high
moderate
moderate to low
low
very low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Sodic or saline soil
Waterlogging
Min. of Agr., German Agr. Team
Food Security Project
0 10 20 30 40 50 km
Fert. M. Kronen
Soils KSS
Lake Turkana
South Horr
Baragoi
Barsaloi
MARALAL
Kisima
Wamba
Archer's Post
Merille
Malgis
Ewaso Ng'iro
Ol Keju Losera
36°
37° E
37° 30'
38°
2° 30'
2° N
1° 30'
1°
0° 30'

SOIL DISTRIBUTION, FERTILITY, AND MAJOR CHARACTERISTICS

The soil map of Samburu district and its key are – as with the other districts – taken from the Exploratory Soil Map of Kenya (Sombroek et al., 1982)[1], only the mapping unit codes are simplified. The function of the soil map is to provide a general picture of the soils of the district. The map should therefore be used to indicate where further soil investigations are worthwhile, and should not be used for farm planning.

A summary of the main soil features of the district follows:

The wetter parts consist mainly of soils of the mapping units 11 M, 12 M and 26 H, with 7 M and 78 R occurring in the Maralal area only. The M and H units have predominantly steep slopes and shallow to moderately deep, stony soils. They are therefore generally unsuitable for agricultural purposes, though in places soils with appropriate depth and topography may occur. The unit 78 R is an area of volcanic footridges with variable slopes and predominantly deep soils. Apart from the deeply incised valleys which comprise some 30 % of the land in this unit, this area seems agriculturally the most promising of the district.

In the transition region between the wetter and the drier parts of the district, the footslope units 96 F and 95 F occur. They also have variable slopes but predominantly deep soils. They are probably too dry for rainfed agriculture but in places suitable conditions may exist for water harvesting (runoff catching agriculture).

The drier parts of the district consist of dissected plains with shallow to moderately deep stony soils (254 Pd), non-dissected plains with moderately deep sandy clay loam soils (229 Pn and 233 Pn), all of which are non-saline and non-sodic, but which have lost their topsoil due to overgrazing; plateaus with stony/bouldery and saline/sodic soils (40 L and 41 L) or shallow to moderately deep soils with a humic topsoil (43 L). The western edge of the district consists of the step-faulted scarp of the Rift Valley with generally shallow, stony and saline soils (35 Hs).

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

7 M = well drained, shallow to moderately deep, dark reddish brown to dark brown, rocky and bouldery, clay loam to clay; in places
x, m–h[2] with humic topsoil (nito-chromic CAMBISOLS; with haplic PHAEOZEMS, lithic plase, LITHOSOLS, eutric REGOSOLS and Rock Outcrops)

Soils developed on ashes and other pyroclastic rocks of recent volcanoes

9 M = somewhat excessively drained, shallow to moderately deep, brown to dark brown, firm and slightly smeary, strongly calcare-
x, m ous, gravelly to stony clay loam; in many places saline and/or sodic and with inclusions of lava fields (andocalcaric REGOSOLS)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

11 M = well drained, moderately deep, reddish brown to brown, friable, stony sandy clay loam, with humic topsoil (humic CAMBI-
x, m SOLS: with eutric REGOSOLS and Rock Outcrops)

12 M = somewhat excessively drained, shallow to moderately deep, reddish brown, friable, rocky and stony, sandy clay loam (eutric
x, m CAMBISOLS with LITHOSOLS, eutric REGOSOLS and Rock Outcrops)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

13 H = well drained, shallow, dark reddish brown, friable, very calcareous, bouldery or stony, loam to clay loam; in many places
x, m saline (LITHOSOLS; with calcic XEROSOLS, bouldery and saline phase and Rock Outcrops)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

26 H = somewhat excessively drained, shallow, reddish brown, friable, rocky or stony, sandy clay loam (eutric REGOSOLS; with
x, m Rock Outcrops and calcic CAMBISOLS)

SOILS ON STEP-FAULTED SCARPS OF THE RIFT VALLEY

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

35 Hs = predominantly well drained, shallow, dark reddish brown, friable, strongly calcareous, rocky or stony, clay loam; in many
x, m places saline (LITHOSOLS; with Rock Outcrops and XEROSOLS, bouldery and saline phase)

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older, basic tuffs included)

40 L x, m = well drained, shallow to moderately deep, dark reddish brown, firm, strongly calcareous clay loam, with stony to bouldery surface, partly saline and/or sodic (calcic XEROSOLS, boulder-mantle and saline-sodic phase)

41 L x, h = well drained, shallow, brown, firm gravelly clay; with stony to bouldery surface (chromic CAMBISOLS, lithic and boulder-mantle phase)

43 L m, x = well drained, shallow to moderately deep, reddish brown, firm clay loam; with humic topsoils (chromo-luvic PHAEOZEMS, partly lithic phase)

44 L h = well drained, moderately deep to deep, dark brown, firm clay, with thick humic topsoil (ortho-luvic PHAEOZEMS)

46 L h = imperfectly drained, deep, very dark greyish brown, very firm, cracking clay (chromic VERTISOLS)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

78 R h = well drained, extremely deep, dusky red to dark reddish brown, friable clay; with inclusions of well drained, moderately deep, dark red to dark reddish brown, friable clay over rock, pisoferric material (eutric NITOSOLS; with nito-chromic CAMBISOLS and chromic ACRISOLS, partly pisoferric or petroferric phase)

SOILS ON FOOTSLOPES

Soils developed on colluvium from undifferentiated Basement System rocks

95 F l—m = well drained, very deep, brown, friable, slightly to moderately calcareous, coarse loamy sand to sandy clay loam (haplic XEROSOLS; with calcaric ARENOSOLS)

96 F l—m = well drained, very deep, yellowish red to dark reddish brown, friable, coarse loamy sand to sandy clay loam (chromic LUVISOLS; with rhodic FERRALSOLS and luvic/ferralic ARENOSOLS)

SOILS ON PIEDMONT PLAINS

Soils developed on alluvium from Tertiary/Quaternary volcanic rock (mainly basalts)

105 Y m, x = moderately well drained, very deep, dark brown to greyish brown, predominantly strongly calcareous, moderately to strong saline and often sodic, firm, fine sandy loam to clay loam; with a stony surface (orthic SOLONCHAKS, stone-mantle phase)

Soils developed on alluvium from undifferentiated Basement System rocks

110 Y x, l—m = moderately well drained, very deep, dark yellowish brown to strong brown, friable, slightly to moderately calcareous and slightly sodic, loamy sand to sandy clay loam (haplic XEROSOLS, sodic phase; with calcaro-cambic ARENOSOLS)

SOILS ON UPPER-LEVEL UPLANDS

Soils developed on undifferentiated Basement System rocks

120 U x, m = complex of:
- well drained, shallow, black to very dark brown, acid humic, very friable loam; in places rocky (RANKER)
- well drained, moderately deep, dark brown, friable clay loam, with a very thick acid humic topsoil (humic CAMBISOLS)

SOILS ON MIDDLE-LEVEL UPLANDS

Soils developed on undifferentiated Basement System rocks

160 U m—x, h = well drained, shallow to moderately deep, strong brown to brown, firm, gravelly to stony, sandy clay to clay loam, over soft rock (orthic LUVISOLS, partly paralithic phase)

SOILS ON NON-DISSECTED EROSIONAL PLAINS

Soils developed on Basement System rocks rich in ferromagnesian minerals

229 Pn m = well drained, moderately deep, dark reddish brown, firm, slightly calcareous, sandy clay loam (chromic LUVISOLS and ortho-luvic PHAEOZEMS)

Soils developed on undifferentiated Basement System rocks

233 Pn m—h = well drained, moderately deep to deep, dark red to strong brown, friable to firm, sandy clay loam to clay (ferralo-chromic/orthic LUVISOLS)

235 Pn h = imperfectly drained, deep, black to very dark grey, very firm, slightly to moderately sodic, cracking clay (pellic VERTISOLS, sodic phase)

SOILS ON DISSECTED EROSIONAL PLAINS

Soils developed on undifferentiated Basement System rocks

254 Pd x, m = complex of well drained, shallow to moderately deep, dark red to yellowish brown, non to moderately calcareous, stony sandy clay loam, over petrocalcic material or quartz gravel (calcic CAMBISOLS, lithic or petrocalcic phase; with chromic LUVISOLS, petric phase)

SOILS ON BOTTOMLANDS

Soils developed on infill from limestones

340 B m = poorly drained, deep, very dark grey to very dark brown, firm, moderately to strongly calcareous, clay loam to clay, with humic topsoil (haplic CHERNOZEMS)

Soils developed on infill mainly from undifferentiated Basement System rocks

349 B h = imperfectly drained to poorly drained, very deep, brown to dark brown, very firm, slightly calcareous, strongly sodic clay (orthic SOLONETZ)

SOILS ON FLOODPLAINS

Soils developed on sediments from various sources (recent floodplains)

357 A x, m = well drained to imperfectly drained, very deep, brown to dark brown, friable, slightly calcareous, nucaceous, sandy loam to clay loam; in places with a saline-sodic deeper subsoil (eutric FLUVISOLS)

SOILS ON LAVA FLOWS

376 La x = excessively drained, exceedingly bouldery to stony, extremely rocky land (Boulders and Rock Outcrops)

BADLANDS

Badlands developed on various older lacustrine and volcanic rocks

378 W x, m = excessively drained, reddish brown, strongly calcareous, slightly to moderately saline and strongly sodic, silt loam to clay loam of varying depth; strongly eroding and often with gravel or stone surface (SOLONETZ, undifferentiated; with calcic XEROSOLS, LITHOSOLS, a.o.; stonemantle phase)

1) SOMBROEK, W.G., H.M.H. BRAUN und B.J.A. van der POUW 1982: The Exploratory Soil Map and Agro-climatic Zone Map of Kenya, 1980, scale 1 : 1.000.000. Expl. Soil Survey Report E1, Kenya Soil Survey, Nairobi

2) Soil texture-classes

- h = heavy
- l = light
- m = medium
- x = stony or bouldery
- v = varying texture
- m–h = medium to heavy
- m, h = medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Introduction by H.M.H. Braun, soil description from Kenya Soil Survey.[1] See this map also for colours; symbols simplified here.

POPULATION AND LAND

In 1979, (the year of the last population Census of Kenya), 77,000 people lived in the Samburu District. Of this figure, about 55,000 were fully dependent on livestock, 10,230, people lived in Maralal and 11,800 in the 20 trading centres of the district where there are other possibilities of earning a living. Most of these people also own livestock and many of them are dependent on it.

Altogether an estimated 70,000 people made a living from livestock. At the time of publication of this handbook (1983), this figure had already risen to over 80,000. The area available for grazing is about 15,000 sq.km, i.e. in this arid grazing region, the average population density is more than 5 persons per sq.km.[1] The average stocking rate is estimated at around 6 LU per sq.km, but for a decent livelihood, much more than one livestock unit (here 300 kg) per person is necessary. This indicates severe overpopulation. Development of supplementary cultivation on the small, suitable areas and increased fodder production may improve the population carrying capacity and provide a short breathing space in which the population growth rate could be reduced. Otherwise serious destruction of the environment and famine will be unavoidable.

1) These average figures have to be differentiated in the divisions and locations (see table 3).

SAMBURU DISTRICT

TABLE 3: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Sukuta Marmar	3 672	4 031	7 703	1 580	802	9
Poro	1 600	1 683	3 283	650	780	4
Maralal	7 820	7 677	15 497	3 664	598	25
Lodokejek	3 870	4 400	8 270	1 867	771	10
Lorroki Division	16 962	17 791	34 753	7 761	2 951	11
Wamba	2 602	2 658	5 260	1 126	1 771	2
Ngilai	2 898	3 232	6 130	1 374	3 624	1
Lodungokwe	1 600	2 153	3 753	850	867	4
Wamba Division	8 916	9 848	18 764	4 321	9 096	2
Marti	2 260	2 619	4 879	765	1 593	3
Ndoto	2 787	2 947	5 734	1 216	908	6
Kowop	1 853	1 982	3 835	686	993	3
Nyiro	1 698	1 632	3 330	699	828	4
Elbarta	2 516	3 097	5 613	1 266	1 152	4
Baragoi Division	11 114	122 277	23 391	4 632	5 474	4
Samburu District	36 992	39 916	76 908	16 714	17 521	4

SAMBURU DISTRICT

TABLE 4: COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family[b)]			Non-Relatives	Persons per Households total[b)]
		Adults >15 years	Children <15 years	Other Relatives		
Location:						
Sukulu Marmar	1523	1.37	2.51	0.47	0.28	4.63
Soro	648	1.74	2.58	0.46	0.28	5.06
Maralal	3660	1.82	1.94	0.37	0.27	4.40
Lodokejek	1851	1.82	2.33	0.30	0.23	4.68
Division: Lorroki	7732	1.64	2.20	0.39	0.26	4.49
Location:						
Wamba	1124	1.35	2.19	0.61	0.52	4.71
Ngalai	1372	1.71	2.12	0.31	0.31	4.45
Ewaso	963	1.28	1.73	0.35	0.38	3.74
Lodungokwe	849	1.47	2.14	0.54	0.29	4.41
Division: Wamba	4308	1.47	2.06	0.44	0.37	4.34
Location:						
Marti	757	1.73	3.18	0.52	1.00	6.43
Ndoto	1218	1.85	2.34	0.30	0.21	4.70
Kowop	681	2.37	2.39	0.29	0.57	5.62
Nyiro	701	1.68	2.21	0.40	0.45	4.74
Elbarta	1263	1.30	2.16	0.40	0.56	4.42
Division: Baragoi	4620	1.73	2.42	0.38	0.52	5.02
Samburu District	16660	1.62	2.22	0.40	0.37	4.61

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per households as well

TABLE 5: AEZ-LAND AREA

Not yet prepared because of the preliminary character of the AEZ map

AGRICULTURAL STATISTICS

Not available

NAKURU DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

Nakuru District covers the highest part of the Rift Valley and includes the bordering escarpments and plateaus. The western plateau, (the Mau Hills above the Mau Escarpment) rises to nearly 3 000 m within the district territory. The climate is cold and wet with a mean temperature of 10–15°C and annual average rainfall of about 1 200–1 400 mm. The area belongs mainly to Agro-Ecological Zone UH 1, is excellent sheep country and to a lesser extent also good for dairy. This zone is also found on the eastern plateau, but mainly outside Nakuru District.

The western escarpment bordering the Rift Valley floor is clearly divided into two levels, with a small but long plateau at an elevation of about 2 300 m stretching from Molo to Njoro. This is mainly a Wheat/Maize-Pyrethrum Zone, LH 2. The higher parts form the Wheat-Pyrethrum Zone UH 2 because maize there is affected by cold weather and frosts.

At slightly lower altitudes, it is too dry for pyrethrum but still good for wheat and malt barley, the Wheat-Barley Zone LH 3, which is mainly situated between 2 100 and 2 300 m. We find LH 3 and UH 2 also on the old volcanic ridge of Eburu. On the floor of the Rift Valley, wheat is only promising on the highest parts (near the escarpments north of Nakuru or around Menengai Volcano), otherwise it is too dry or too hot. Where it is too dry, a Livestock-Barley Zone LH 4 borders LH 3. Here ranching is the most important enterprise. The zone is better suited for fodder than to malt barley. Nowadays, however, this forage crop is scarcely cultivated because sufficient cheaper grazing is still available.

From the culmination of the Rift Valley near Menengai, the floor slopes gently down towards Nakuru in the south and towards Mogotio in the north. These areas have still some maize and sunflower potential (UM 4), but are not so favourable for these crops as the Kitale area, for example, because of the predominantly weak performance of the rainy season. Therefore, sisal is a safer crop, although the altitude is close to the upper limit for sisal. This zone stretches to the potential Livestock-Sorghum Zone UM 5 for the same reason (low and unreliable rainfall). The annual average rainfall is still 800–900 mm, but the 60 % reliability of the first rains is only 200–240 mm, and of the second rains only 250–300 mm. Between both seasons there are some middle rains, but they are scattered and also unreliable (July–August 210 mm, 60 % probability 170 mm).

In the slightly lower areas between Hyrax Hill and Longonot, scattered distribution of rainfall (see Diagram on Gilgil) makes additional irrigation essential for successful cultivation of crops. This is therefore a Ranching Zone. Irrigated crops are found around Lake Naivasha.

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
8936004	Subukia	42	Average	943	17	25	42	138	132	76	133	159	70	46	58	46
1 676 m			60 % rel.[1)]	845	6	4	14	93	108	50	120	136	52	36	30	18
9035000	Ogilgei Farm	54	Av.	892	25	34	61	127	114	81	102	122	64	45	74	43
2 163 m			60 %	800	6	12	33	103	84	58	89	112	45	32	52	25
9035002	Londiani Forest	68	Av.	1 182	36	42	79	161	150	124	148	172	96	58	62	54
2 316 m	Station		60 %	1 060	9	22	35	132	130	107	135	149	84	42	33	28
9035011	Elburgon For. Station	59	Av.	1 076	32	44	78	152	123	86	130	129	78	68	92	63
2 377 m			60 %	960	10	13	39	126	87	61	103	110	55	49	55	30
9035018	Molo Station	70	Av.	1 171	33	47	90	170	131	107	131	165	90	56	91	61
2 458 m			60 %	943	5	14	38	117	98	69	92	121	45	37	48	27
9035021	Njoro; Plant Breeding	47	Av.	931	27	35	65	133	117	77	106	127	67	53	77	47
2 160 m	Station		60 %	832	9	16	40	116	86	62	94	109	50	43	51	29
9035022	Kampiga Molo Rongai	46	Av.	892	21	25	64	139	125	68	117	106	65	53	69	42
1 936 m			60 %	800	7	3	22	120	97	49	102	76	58	44	38	22
9035031	Mariashoni Timber	47	Av.	1 233	37	52	88	178	133	98	149	171	82	68	107	76
2 776 m	Co. Ltd.		60 %	1 105	20	23	60	141	109	85	119	138	60	59	73	33
9035038	Mau Summit Station	41	Av.	1 025	25	39	58	147	116	98	134	161	84	45	66	51
2 537 m			60 %	920	6	12	40	112	90	73	123	146	69	39	36	14
9035064	Upper Rongai, Dela-	46	Av.	999	34	30	80	158	118	73	136	114	72	51	79	55
1 981 m	mere S.D.		60 %	892	10	12	47	138	78	62	121	102	51	38	49	25
9035067	Keringet Estate	37	Av.	1 222	39	42	66	137	139	114	151	213	109	74	88	50
2 697 m			60 %	1 100	5	10	21	85	118	87	120	167	87	50	55	23
9035073	Gogar Farms, Rongai	45	Av.	928	26	31	64	144	114	76	120	115	68	50	71	49
1 890 m			60 %	832	6	10	32	118	82	65	94	102	48	36	43	24

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
9035092	Njoro, Egerton	28	Av.	1 012	33	37	61	150	123	81	105	138	80	61	90	53
2 238 m	Agricult. College		60 %	908	15	18	38	129	91	66	93	115	61	50	62	34
9035093	Molo, Pyrethrum	28	Av.	1 177	43	39	66	176	129	100	134	169	94	59	96	70
2 500 m	Exp. Station		60 %	946	15	12	40	121	96	62	93	124	49	39	51	35
9035129	Molo, Marindas	25	Av.	1 209	44	45	71	166	127	97	139	208	97	60	87	64
2 804 m	Farm		60 %	1 086	28	31	38	115	68	80	121	164	65	39	53	13
9035240	Londiani, Keresoi	14	Av. 2)	1 707	76	63	113	185	195	193	223	244	160	87	87	76
2 680 m	For. St.															
9036000	Kijabe Hill Estate	49	Av.	1 108	30	28	54	132	155	104	161	182	96	56	63	48
2 057 m			60 %	994	5	5	8	93	128	79	132	159	80	38	33	18
9036002	Naivasha, D.O.	63	Av.	634	25	40	51	123	76	41	35	44	46	53	63	38
1 900 m			60 %	570	15	21	28	104	47	27	14	31	32	37	51	25
9036004	Ol Punyata	43	Av.	1 010	22	31	75	145	137	79	127	128	79	68	71	50
1 655 m			60 %	900	6	8	24	114	107	69	94	101	64	57	47	21
9036008	Highlands	32	Av.	861	20	23	58	135	120	78	91	98	72	58	60	50
1 905 m			60 %	717	3	5	22	96	93	54	71	76	54	44	47	26
9036010	Solai, Ol Bonata	56	Av.	1 024	20	31	62	157	143	82	126	113	87	80	81	41
1 829 m			60 %	920	6	7	30	130	122	65	92	93	65	63	53	23
9036011	Kedong Valley	46	Av.	710	45	42	76	175	130	33	17	19	20	34	55	65
1 890 m			60 %	606	23	20	50	126	76	15	6	9	9	20	34	37
9036020	Nakuru, Railway	66	Av.	807	21	31	53	134	112	66	88	100	62	52	51	38
1 850 m	Station		60 %	725	8	11	30	103	90	60	65	76	40	43	41	15
9036021	Nakuru, D.C.	30	Av.	843	16	24	60	127	107	80	109	110	67	54	60	30
1 836 m			60 %	753	6	9	27	110	84	66	94	82	45	43	41	19
9036032	Bahati For. Station	44	Av.	1 227	21	36	51	142	195	119	137	165	115	110	91	46
2 408 m			60 %	1 100	9	9	31	120	158	88	117	141	89	91	39	20
9036034	Gilgil, Railway	38	Av.	646	22	28	54	98	75	53	60	66	38	43	58	41
2 006 m	Station		60 %	549	7	13	25	75	43	29	40	41	13	42	49	21
9036059	Naivasha, Kangari	41	Av.	666	37	41	47	114	109	45	39	53	25	45	64	48
1 981 m	Farm		60 %	584	21	9	31	54	67	21	18	28	13	31	42	15
9036076	Glanjoro Farm Ltd.	51	Av.	918	20	34	60	134	129	84	98	120	74	54	72	38
1 920 m			60 %	820	5	14	39	108	92	61	82	104	48	39	54	26
9036081	Naivasha, Vet. Exp.	39	Av.	729	36	33	60	121	103	52	44	54	46	63	71	47
1 829 m	Station		60 %	657	26	26	54	85	62	42	25	35	40	58	73	29
9036109	Naivasha, Marula	35	Av.	653	32	35	43	107	93	38	43	56	35	54	71	48
2 042 m	Estates Ltd.		60 %	586	17	15	41	82	39	25	19	43	24	46	46	22
9036124	Eburu Settlement	42	Av.	802	29	37	66	145	117	69	65	73	43	46	63	49
2 438 m	Olobonge		60 %	636	13	5	7	102	60	46	34	41	36	24	33	20
9036147	Soysambu Est.	39	Av.	696	25	27	39	98	86	52	62	85	56	51	71	45
1 849 m	Elmenteita		60 %	620	16	9	33	70	63	46	40	66	29	42	39	21
9036150	Gilgil, Arthur Cole	49	Av.	711	22	38	56	116	83	44	49	64	40	55	86	58
2 134 m	Ltd.		60 %	615	5	12	38	78	61	33	37	57	14	43	54	26
9036151	Subukia Experimental	27	Av.	1 253	38	46	66	165	193	92	120	163	95	94	116	66
2 134 m	Pyrethrum Station		60 %	1 125	13	14	58	145	175	68	71	127	54	77	82	27
9036179	Naivasha Korongo	27	Av.	667	27	38	49	116	108	57	50	50	36	44	52	41
1 890 m	Farm		60 %	572	7	7	25	68	65	36	36	48	16	27	28	7
9036198	Nakuru, Hatfield	29	Av.	1 001	25	37	68	142	119	87	87	103	81	86	113	53
1 945 m			60 %	901	12	2	35	104	99	65	63	90	51	68	73	28
9036214	Longonot Farm	27	Av.	680	30	47	56	125	97	34	31	36	47	54	65	58
1 890 m			60 %	594	13	16	30	91	52	24	9	26	35	45	37	17
9036261	Nakuru, Met. Stat.	9	Av. 2)	936	34	45	88	141	110	70	93	98	95	64	66	31
1 880 m																

2) No reliability calculations for stations having less than 20 years of records

NAKURU DISTRICT

TABLE 2: **TEMPERATURE DATA**

No. and altitude	Name of Station	AEZ[1]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
				Temperature in C°													
9035021	Njoro,	LH	Mean max.	24.9	25.9	25.9	24.0	23.3	22.6	21.7	21.7	23.2	23.8	22.8	23.3	23.6	
2 160 m	Plant	3	Mean temp.	16.1	16.8	17.2	16.7	16.0	15.0	14.5	14.5	15.0	15.6	15.5	15.6	15.7	28
	Breeding	lp	Mean min.	7.4	7.7	8.5	9.4	8.7	7.5	7.4	7.3	6.9	7.4	8.2	7.9	7.9	
	Station		Abs. min.	2.8	3.9	4.4	4.4	4.4	2.2	1.7	1.7	1.7	2.8	2.2	3.3	1.7	
9035092	Njoro,	LH	Mean max.	23.3	23.9	24.0	21.9	21.6	21.1	20.2	20.2	21.7	22.2	20.8	21.6	21.9	
2 238 m	Egerton	2–3	Mean temp.	15.6	15.7	16.1	15.6	15.3	14.2	13.7	13.7	14.3	14.9	14.6	14.7	14.9	16
	College	hp	Mean min.	7.6	7.5	8.3	9.4	9.0	7.4	7.3	7.3	6.9	7.6	8.4	7.9	7.9	
			Abs. min.	3.3	3.3	3.9	5.0	4.4	2.8	3.3	2.8	3.3	2.8	4.4	3.3	2.8	
9035093	Molo,	UH	Mean max.	21.9	22.6	22.8	21.0	20.4	19.7	18.6	18.8	20.3	20.9	20.0	20.4	20.6	
2 500 m	Pyrethrum	2	Mean temp.	14.1	14.3	13.8	14.7	14.2	13.2	12.7	12.8	13.2	13.7	13.7	13.8	13.7	23
	Exp.	lp	Mean min.	6.4	6.1	6.9	8.5	7.9	6.7	6.8	6.8	6.1	6.5	7.5	7.2	6.9	
	Station		Abs. min.	1.1	1.1	2.2	4.3	2.8	1.7	1.7	0.6	2.3	2.5	1.4	1.7	0.6	
9035129	Molo,	UH	Mean max.	19.4	20.2	20.6	19.2	18.6	17.8	16.7	16.7	18.0	18.5	18.2	18.3	18.5	
2 804 m	Grasslands	2	Mean temp.	12.8	13.3	13.8	13.2	12.8	11.6	11.0	11.2	11.8	12.5	12.5	12.5	12.4	19
	Research	hp	Mean min.	6.2	6.4	7.0	7.2	7.1	5.4	5.3	5.7	7.5	6.6	6.9	6.8	6.4	
	Station		Abs. min.	–0.6	–0.6	1.7	0.6	1.1	–1.1	0.6	0.6	1.0	1.9	1.7	1.7	–1.1	
9036021	Nakuru	UM	Mean max.	28.4	29.4	28.9	26.7	25.6	25.0	24.1	24.3	25.9	26.4	25.8	26.5	26.4	
1 836 m	D.C.	4	Mean temp.	18.5	19.3	19.5	19.1	18.5	17.8	17.2	17.2	17.5	17.7	17.7	17.4	18.2	25
	(operating	hp	Mean min.	8.7	9.2	10.2	11.6	11.5	10.6	10.4	10.2	9.1	9.1	9.6	9.4	10.0	
	to 1956)		Abs. min.	3.3	3.6	5.0	6.7	6.1	5.6	5.2	5.0	5.4	5.1	5.0	4.4	3.3	
9036081	Naivasha,	LH	Mean max.	27.7	28.3	27.8	26.3	25.1	24.7	24.7	24.6	25.7	26.1	25.5	25.7	26.0	
1 829 m	Vet. Exp.	5	Mean temp.	17.5	17.5	17.8	17.3	16.9	16.3	15.9	16.1	16.3	16.8	16.6	16.7	16.8	20
	Station	lp	Mean min.	7.3	6.8	7.9	8.4	8.8	8.0	7.2	7.7	7.0	7.6	7.8	7.7	7.7	
			Abs. min.	2.8	2.8	4.4	2.2	3.3	2.2	2.2	2.8	1.7	4.4	3.3	4.4	1.7	
9036281	Naivasha,	LH	Mean max.	26.3	26.8	25.5	24.2	23.2	22.6	22.7	23.8	24.3	24.8	23.5	25.5	24.4	
1 936 m	Water	5	Mean temp.	16.8	17.6	17.3	17.0	16.2	15.1	15.1	15.6	15.5	16.6	16.2	16.3	16.3	7
	Develop-	lp	Mean min.	7.3	8.4	9.2	9.8	9.2	7.7	7.6	7.4	6.8	8.5	8.9	7.2	8.2	
	ment		Abs. min.	2.3	3.5	4.9	4.6	4.6	3.3	3.0	2.0	2.8	2.0	5.2	2.0	2.0	
9036151	Subukia,	LH	Mean max.	24.4	25.3	25.4	23.6	22.8	22.4	21.7	21.9	22.8	23.1	22.3	22.9	23.2	
2 134 m	Agricultural	2	Mean temp.	16.9	17.6	17.9	17.1	16.4	15.8	15.5	15.5	15.6	15.8	15.9	16.3	16.3	22
	Exp.	lp	Mean min.	9.4	10.0	10.4	10.6	10.0	9.2	9.4	9.2	8.3	8.6	9.6	9.7	9.5	
	Station		Abs. min.	3.9	4.1	4.4	5.6	5.0	4.4	3.7	4.3	4.5	5.0	4.4	4.4	3.7	
9036261	Nakuru,	LH	Mean max.	27.1	27.9	27.3	24.7	24.6	24.2	23.6	24.0	25.4	24.8	23.7	25.4	25.2	
1 880 m	Met.	3	Mean temp.	17.1	18.4	18.5	18.1	17.5	16.7	16.8	16.6	16.7	16.9	16.7	16.2	17.2	5
	Station	lp	Mean min.	7.1	8.9	9.7	11.6	10.5	9.2	10.0	9.3	8.0	9.0	9.8	8.0	9.3	
			Abs. min.	1.5	2.2	5.0	6.0	5.5	3.8	5.0	4.4	4.4	4.7	4.6	3.4	1.5	

[1] AEZ = Agro-ecological zone; lp = lower places, hp = higher places within the zone

NAKURU DISTRICT

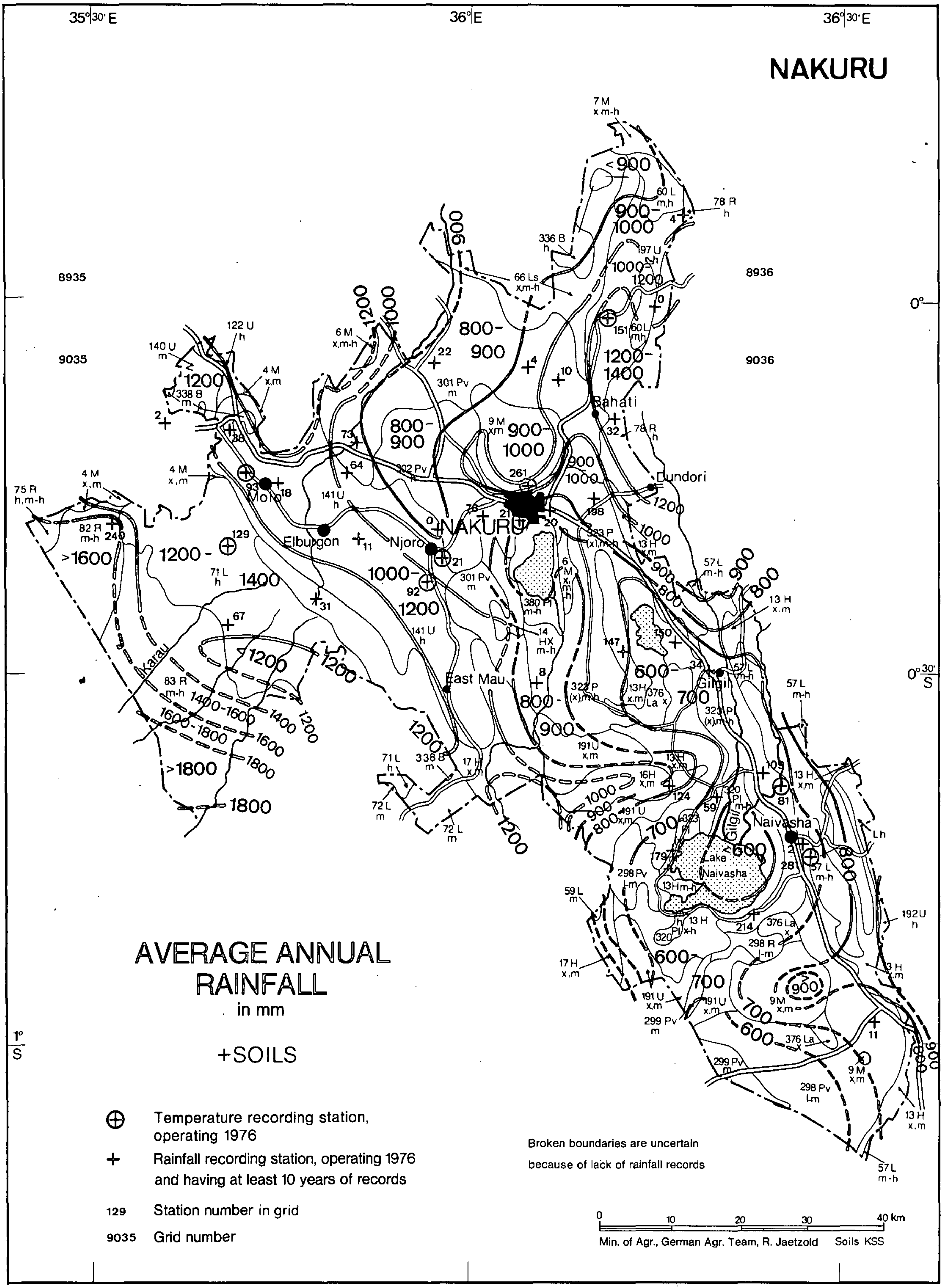
TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1)] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2)] in days	2nd rains in days	Total[3)] in days
TA I Cattle-Sheep Zone		2 980–3 050	10.5– 9.9	1 200–1 400	400–500	600–700			
UH 0 Forest Zone		2 400–2 970	14.5–10.6	1 200–1 900	400–850	600–700	100 or more	240–250	340–350
UH 1 Sheep-Dairy Zone	vl i or two	2 400–2 970	14.5–10.6	1 200–1 800	400–800	600–700	100 or more	240–250	340–350
	vl i				Small, potential almost as above				
UH 2 Wheat-Pyrethrum Zone	vl i or two	2 580–2 800	13.7–12.0	1 100–1 400	300–500	450–650	100 or more	170–200	270–300
	vl/l				Very small, see Nyandarua District				
UH 3 Wheat-Barley Zone	l/vl	2 310–2 580	14.9–13.7		Very small, see Nyandarua District				
	(l/vl)				Very small, see Nyandarua District				
	m i (vs/s) i				Very small, see Nyandarua District				
LH 2 Wheat/Maize-Pyrethrum Zone	vl or two	2 070–2 400	16.7–14.5	1 000–1 100	250–300	450–550	100 or more	180–190	280–290
	vl/l or two			1 200–1 400	350–400	500–600	100 or more	170–185	270–285
LH 3 Wheat/(Maize)-Barley Zone	vl/l or two	1 890–2 190	17.5–15.7	850–1 100	250–300	350–500	90 or more	150–160	240–250
	(l/vl)			850– 950	230–250	350–450	90 or more	130–140	220–230
LH 4 Cattle-Sheep-Barley Zone	(l)	1 890–2 010	17.5–16.6	800– 900	200–300	350–500	80 or more	120–130	200–210
	(s/m) i (vs)			700– 800	230–300	130–200	100–110	55– 65	155–175
LH 5 Lower Highland Ranching Zone	u r i	1 840–2 010	17.8–16.6	700– 800	150–200	100–230			
	b r			650– 700	150–200	100–150			
UM 3 Marginal Coffee Zone	vl/l or two	1 830–1 950	18.5–17.5	1 000–1 200	300–350	500–600	90 or more	150–160	240–250
UM 4 Sunflower-Maize Zone	l/vl or two	1 600–1 830	21.0–18.6	950–1 100	250–320	400–500	80 or more	140–150	220–230
	(l) or two			850–1 000	250–300	350–450	70 or more	140–150	210–220
	(l/m) i or two			800– 900	220–250	280–300	90 or more	85–105	175–195
UM 5 Livestock-Sorghum Zone	(m/l) i	1 660–1 890	19.6–18.3	700– 950	150–250	200–380	90 or more	65– 85	155–175
	(s) i + i			750– 850	150–200	150–300	80 or more	30– 50	
	s + i				Very small, figures almost the same as above				
	(s/vs) + i			650– 750	150–250	100–200	70 or more	30– 40	
	(vs/s) + i			600– 700	150–200	50–150	60 or more	20– 30	
UM 6 Upper Midland Ranching Zone	u r i	1 620–1 820	19.8–18.5	600– 700	120–190	100–150			
	b r			550– 700	150–200	50–100			

1) Amounts in mm, surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants.

2) More if growing cycle of cultivated plants continues into the period of second rains.

3) Only added, if rainfall continues at least for survival (> 0.2 E_o) of most long term crops.



AVERAGE ANNUAL RAINFALL

in mm

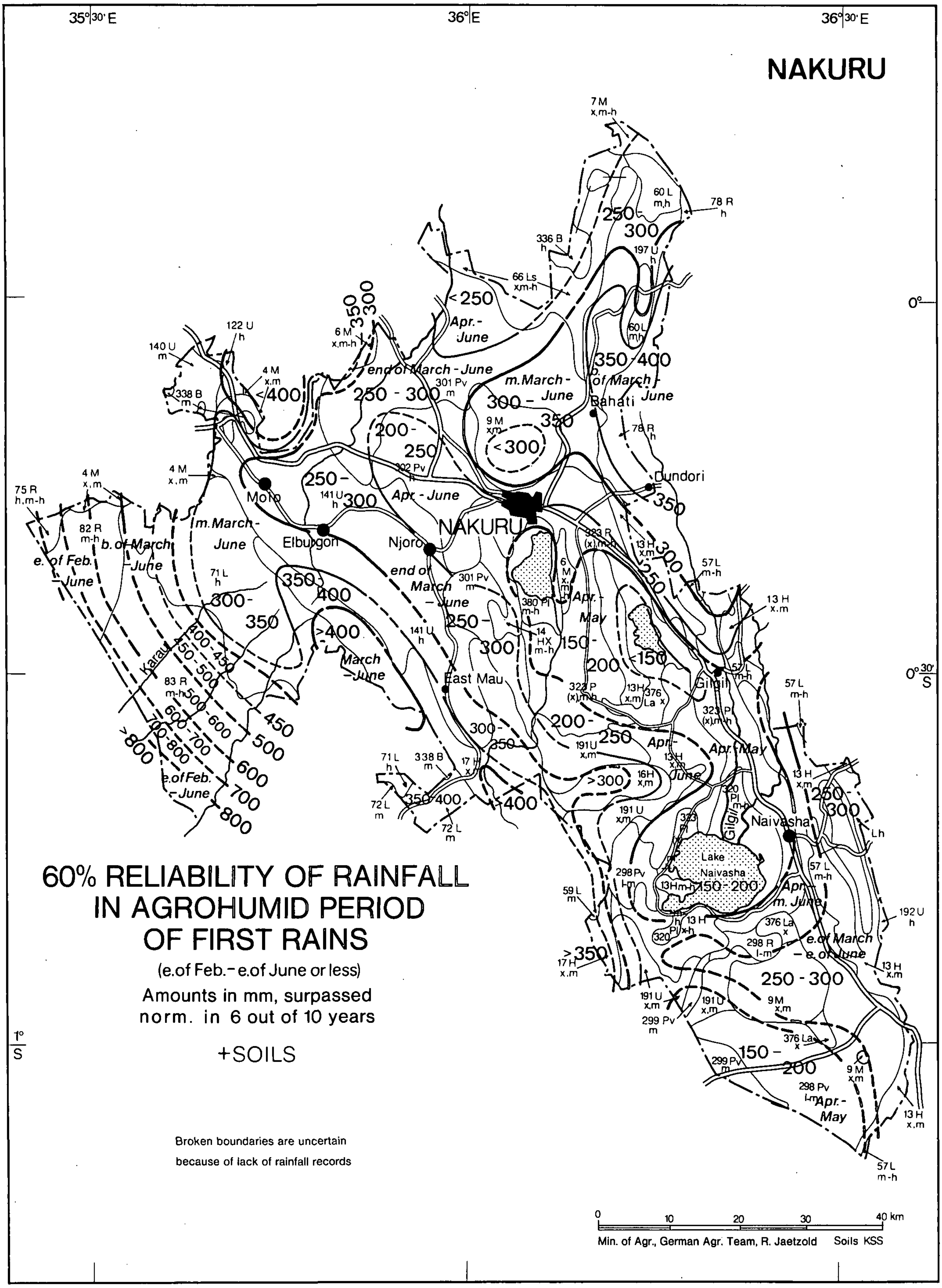
+SOILS

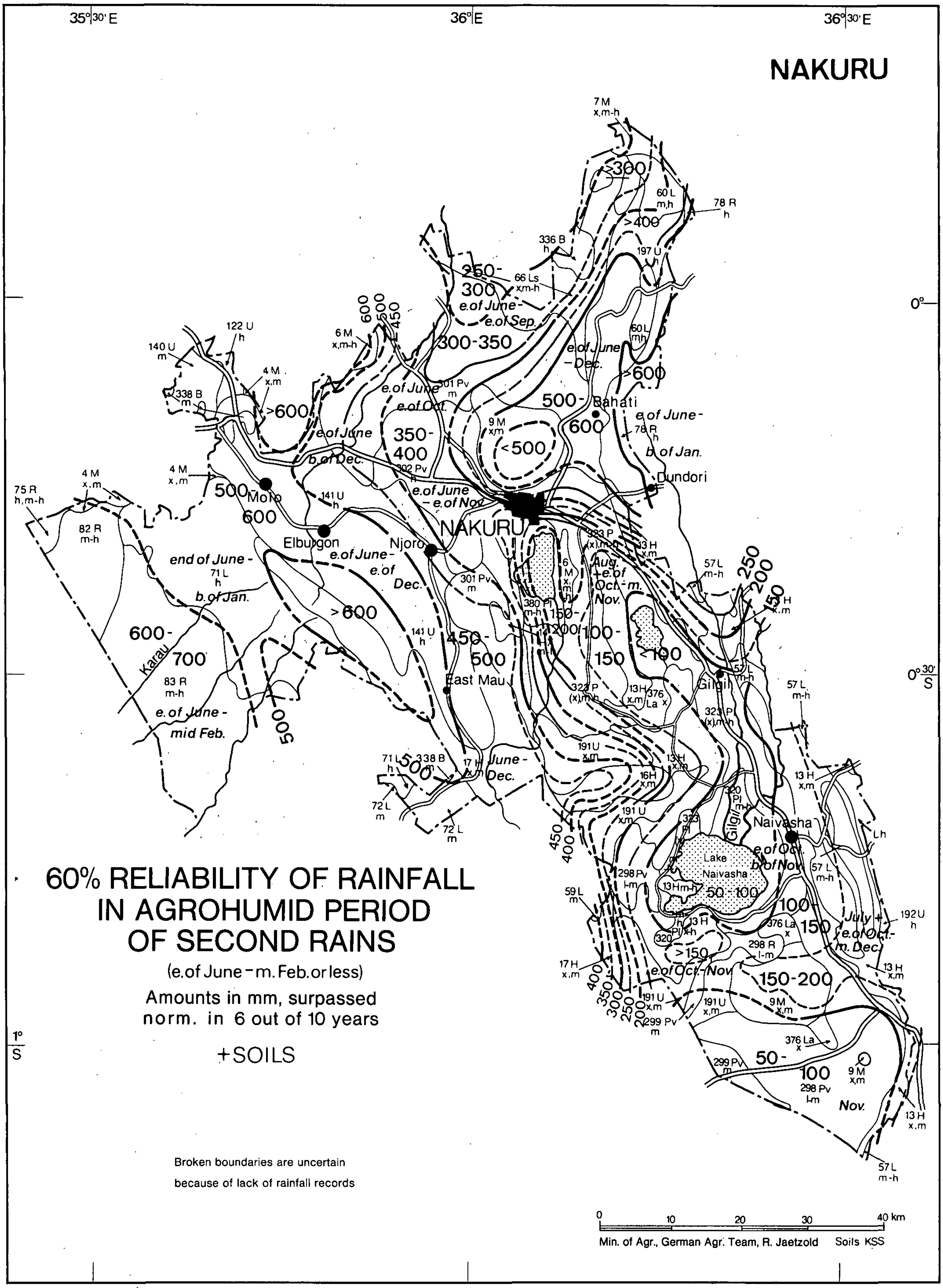
⊕ Temperature recording station, operating 1976

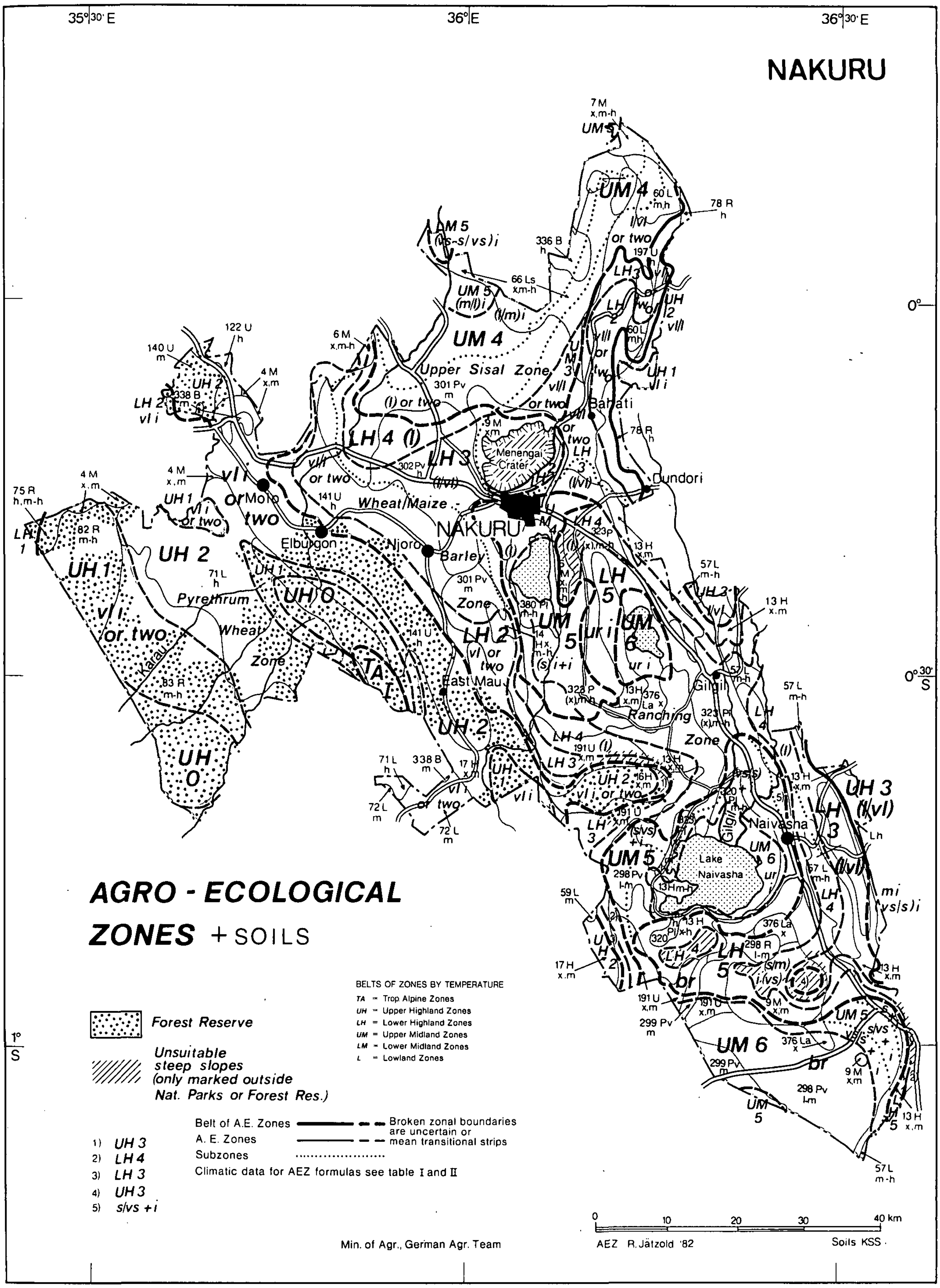
+ Rainfall recording station, operating 1976 and having at least 10 years of records

129 Station number in grid

9035 Grid number


NAKURU
35°30' E
36° E
36°30' E
0°
0°30' S
1° S
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF FIRST RAINS
(e.of Feb.- e.of June or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+SOILS
Broken boundaries are uncertain
because of lack of rainfall records
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold
Soils KSS
Molo
Elburgon
Njoro
NAKURU
Bahati
Dundori
Gilgil
East Mau
Naivasha
Lake Naivasha
Karau
Gilgil
end of March - June
m.March - June
b. of March - June
Apr. - June
Apr. - May
e. of Feb. - June
e.of March - e. of June
m. June


NAKURU
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RAINS
(e.of June - m. Feb. or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+SOILS
Broken boundaries are uncertain because of lack of rainfall records
35°30' E
36° E
36°30' E
0°
0°30' S
1° S
0 10 20 30 40 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS
Nakuru
Bahati
Dundori
Molo
Elburgon
Njoro
East Mau
Gilgil
Naivasha
Lake Naivasha
Karau



NAKURU
35°30' E
36°E
36°30' E
0°
0°30' S
1° S
AGRO - ECOLOGICAL ZONES + SOILS
Forest Reserve
Unsuitable steep slopes (only marked outside Nat. Parks or Forest Res.)
BELTS OF ZONES BY TEMPERATURE
TA = Trop Alpine Zones
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
L = Lowland Zones
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
1) UH 3
2) LH 4
3) LH 3
4) UH 3
5) s/vs + i
0 10 20 30 40 km
Min. of Agr., German Agr. Team
AEZ R. Jätzold '82
Soils KSS
Menengai Crater
NAKURU
Bahati
Dundori
Molo
Elburgon
Njoro
East Mau
Gilgil
Naivasha
Lake Naivasha
Upper Sisal Zone
Wheat/Maize
Barley
Pyrethrum
Wheat Zone
Ranching Zone
Karau

AGRO-ECOLOGICAL ZONES

TA = *TROPICAL-ALPINE ZONES*

TA I = *Cattle and Sheep Zone*

High altitude grasslands at about 3 000 m. Very suitable for Corriedale sheep, fairly suited for cattle and Merino sheep

UH = *UPPER HIGHLAND ZONES*

UH 0 = *Forest Zone*

UH 1 = *Sheep and Dairy Zone*

UH 1 vl i or two = *Sheep-Dairy Zone with a very long*[1] *cropping season, dividable in two variable cropping seasons*

Here mainly forest reserve

Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd rains), start norm. March[1]: Oats (April–S.); peas, potatoes; m. mat. rapeseed (~60 %); cabbage, carrots, kohlrabi, celery, endive, rampion, leek, radish
2nd rains, start norm. end of June[1]: The same but normally crops of first rains not yet ready; planting from end of August onward yield expectations only fair
Whole year: Kales

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Triticale, late or very late mat. maize like H 611, High alt. comp. or Cuzco in frost free lower places, higher places very marginal
2nd rains: M. mat. wheat like K. Leopard a. o. var. (June/Jy.–D./Jan.), m. mat. barley like Proctor; 3rd crop of potatoes (N.–F., ~40 %, on microclimatic frostfree slopes)
Whole year, best planting time end of March: Pyrethrum (50–60 %), strawberries

Pasture and forage
>0.8 ha/LU (lower places) to 1.2 ha/LU (drier upper places) on sec. pasture of Kikuyu grass, very suitable for Corriedale sheep, up to 2 700 m also for grade dairy cows and Merino; rye grass (Lolium perenne) to improve pasture for dairy (not to combine with wheat growing); Kenya white clover and rapeseed foliage as add. forage

UH 1 vl i = *Sheep and Dairy Zone with a very long cropping season and intermediate rains*

Small, potential almost the same as above, but rainy season still lesser divided, rainfall nearly trimodal

UH 2 = *Wheat-Pyrethrum Zone*

UH 2 vl i or two = *Wheat-Pyrethrum Zone with a very long cropping season, dividable in two variable cropping seasons*

(See Diagr. Molo)

Good yield potential
1st rains (to 2nd r.), start norm. end of March: Late or medium mat. wheat like Kenya Bongo or K. Kongoni (70–80 %, May–N./D.) a. o. var. (R 200), l. mat. triticale (Apr.–O.), m. mat. barley (May–S./O.), oats; lima beans, horse beans, peas (~60 %), potatoes (March–July); m. mat. rapeseed (Apr./May–S); cabbages (nearly 80 %), kales, carrots (nearly 80 %), kohlrabi, celery, endive, rampion, leek, radish
2nd rains, start norm. b. of July: Oats, m. m. barley like Proctor; e. mat. rapeseed; peas, and the above vegetables excl. kohlrabi, but if planted from mid August onward only fair expectations
Whole year: Pyrethrum, strawberries

[1] Start and end of rainy seasons in whole district not very distinct, especially second rains, in some places there is even a third peak. So planting times are variable according to crops and their rotation.

Fair yield potential

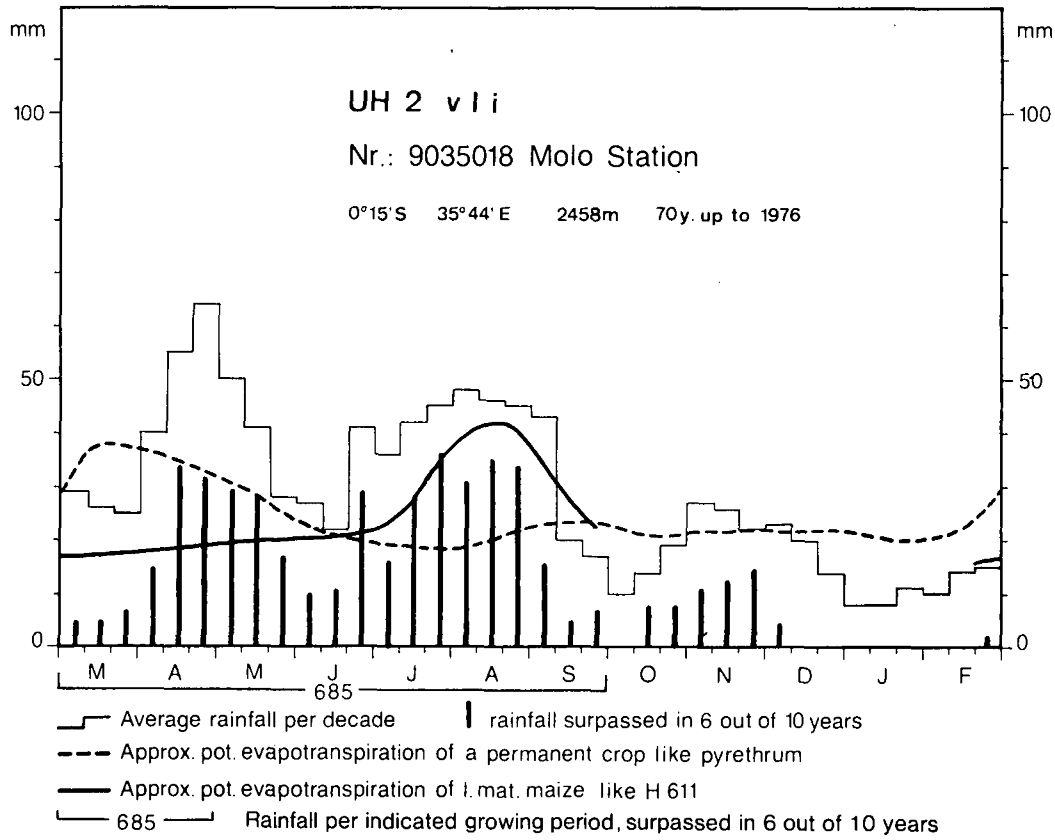
1st rains: Very late mat. maize like H 611, High alt. comp. or Cuzco (risk by frosts in valleys and on higher plateaus)

2nd rains: Potatoes (Au.–N., 50–60 %), kohlrabi

Whole year: Plums, pears, apples (below 2 600 m)

Pasture and forage

About 0.8 ha/LU on sec. pasture of Kikuyu and tufted grass (if not overgrazed, otherwise Kikuyu grass is disappearing), suitable for Merino and Corriedale sheep and grade dairy cows; rye grass to improve pasture for dairy (not to combine with wheat cultivation) down to about 0.5 ha/LU with Kenya white clover and lucerne as add. forage, maize for silage in lower places



UH 2 = *Pyrethrum-Wheat Zone*
vl/l *with a very long to long cropping season*

Very small, potential see Nyandarua District

UH 3 = *Wheat-Barley Zone*

UH 3 = *Wheat-Barley Zone*
l/vl *with a long to very long cropping season*

Very small, potential see Nyandarua District

UH 3 = *Wheat-Barley Zone*
(l/vl) *with a (weak) long to very long cropping season*

Very small, potential see Nyandarua District

UH 3 = *Wheat-Barley Zone*
m i *with a medium cropping season, intermediate rains,*
(vs/s)i *a (weak) very short to short one and intermediate rains*

Very small, potential see Nyandarua District

LH = LOWER HIGHLAND ZONES

LH 2 = Wheat/Maize[2] - Pyrethrum Zone

LH 2 vl or two = Wheat/Maize-Pyrethrum Zone with a very long cropping season, dividable in two variable cropping seasons

Good yield potential
1st rains, start norm. mid March: M. or late mat. wheat like Kenya Bongo (60–70 %, Apr./May–O./N.), late mat. maize like H 611–614 (Mch./Apr.–N./D., 80 % on deep soils); peas, horse beans; potatoes (Apr.–Aug.); sunflower Kenya White (60–70 %), linseed, rapeseed; cabbages, kales, cauliflower, carrots, beetroot, spinach, celery, lettuce
2nd rains, start norm. end of June: M. mat. barley like Proctor (June–O.); linseed; kales, cauliflower, carrots, beetroot, spinach, tomatoes, celery
Whole year: Black Wattle, New Zealand flax

Fair yield potential
1st rains: Finger millet; m. mat. beans like Cuarentino (lower places), lima beans (also higher places); leek, tomatoes, onions
2nd rains: Peas, potatoes (S.–D./J.); cabbages, onions, lettuce
Whole year: Pyrethrum, tea; apples, pears and plums above 2 200 m; strawberries

Pasture and forage
Around 1.2 ha/LU on highland savanna of Kikuyu, red oats and tufted grass[3] between Cedar forest remnants; obout 0.6 ha on art. pasture of Nandi Setaria > 2 000 m or Rhodes grass < 2 000 m; suitable for grade dairy cows; Silver leaf desmodium best add. forage

LH 2 vl/l or two = Wheat/Maize-Pyrethrum Zone with a very long to long cropping season, dividable in two variable cropping seasons

Almost the same potential as LH 2 vl less about 5 %, pyrethrum and wheat Kenya Bongo less suitable (–10 %)

LH 3 = Wheat/(Maize) - Barley Zone

LH 3 vl/l or two = Wheat/Maize-Barley Zone with a very long to long cropping season, dividable in two variable cropping seasons

(See Diagr. Njoro)

Good yield potential
1st rains, start norm. b. of March: M. mat. wheat like R 200, K. Tembo or other varieties (Mch./Apr.–S., 70–80 %), m. mat. durum wheat, late mat. triticale, m. mat. barley like Kenya Research, late mat. maize H 611 (higher places), H 612–614 (lower places); peas, linseed, rapeseed, late mat. sunflower like Kenya white (bird problems); cabbages, kales
2nd rains, start indistinctly around Jy./Aug.: M. mat. barley (Aug.–D.)
Whole year: Black wattle

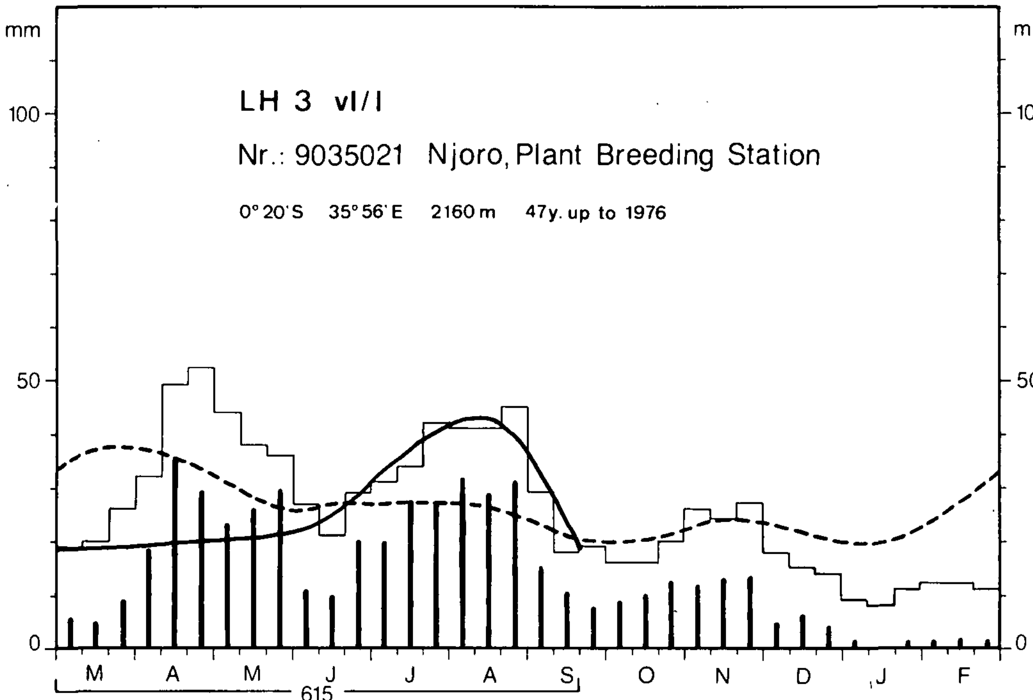
Fair yield potential
1st rains: Potatoes; beans, cauliflower, beetroot, onions, carrots
2nd rains: M. mat. wheat (Aug.–end of D.); beans on lower places, lima beans; tomatoes, beetroot
Whole year: Avocadoes (lower places), strawberries, peaches

Pasture and forage
Around 1.4 ha/LU on highland savanna; about 1 ha/LU on art. pasture of Nandi setaria between 2 050 and 2 200 m, or Rhodes grass below that; feeding Rhodes grass, subterr. clover, Lotononis, maize silage and fodder barley down to about 0.25 ha/LU (in lower places); suited for grade dairy cows and grade cattle

LH 3 (l/vl) = Wheat/(Maize)-Barley Zone with a (weak) long to very long cropping season

Good yield potential
1st rains, start norm. b. of April: M. mat. wheat (Apr.–S., 60–70 %), m. mat. barley (60–70 %)
Whole year: Black wattle (deep soils)

[2] Wheat or Maize depending on farm scale and topography
[3] The bad tufted grasses Eleusine jaegeri and Pennisetum schimperi are expanding if the areas are overgrazed



Average rainfall per decade | rainfall surpassed in 6 out of 10 years
--- Approx. pot. evapotranspiration of a permanent crop like pyrethrum
—— Approx. pot. evapotranspiration of l. mat. maize like H 612
└── 615 ──┘ Rainfall per indicated growing period, surpassed in 6 out of 10 years

Fair yield potential
1st rains: Late mat. Maize H 612–614 (A.–O./N., marginal on shallow soils); peas; linseed, late mat. sunflower like Kenya White; cabbages and other vegetables

Pasture and forage
About 1.5–2 ha/LU on nat. pasture of red oats and wire grass; down to 1.2 ha/LU on art. pasture of Nandi Setaria between 2 000 and 2 180 m, below 2 000 m Rhodes grass (var. Mbarara); suited for grade cattle; subterranean clover and fodder barley like B 106 as add. forage

LH 4 = *Cattle-Sheep-Barley Zone*

LH 4 (l) = *Cattle-Sheep-Barley Zone with a (weak) long cropping season*

Fair yield potential
1st rains, start norm. b. of April: M. mat. fodder barley (other crops mostly marginal, esp. maize).

The variability of rainfall is so high that crop failures occur from time to time. Ranching is therefore more advisable

Pasture and forage
More than 2 ha/LU on nat. pasture of short grass highland savanna; down to 1.4 ha/LU on art. pasture of Rhodes grass (var. Elmba most recommended); suited for grade cattle; subterr. clover and m. mat. fodder barley as add. forage

LH 4 (m/s) i(vs) = *Cattle-Sheep-Barley Zone with a (weak) medium to short cropping season, intermeditate rains, and a (weak) very short one*

Potential nearly the same as above, but e. mat. barley and var. Boma of Rhodes grass more suited

LH 4 s/m + (vs) = *Cattle-Sheep-Barley zone with a short to medium cropping season and a (weak) very short one*

Potential nearly the same as above, but smaller grazing capacity

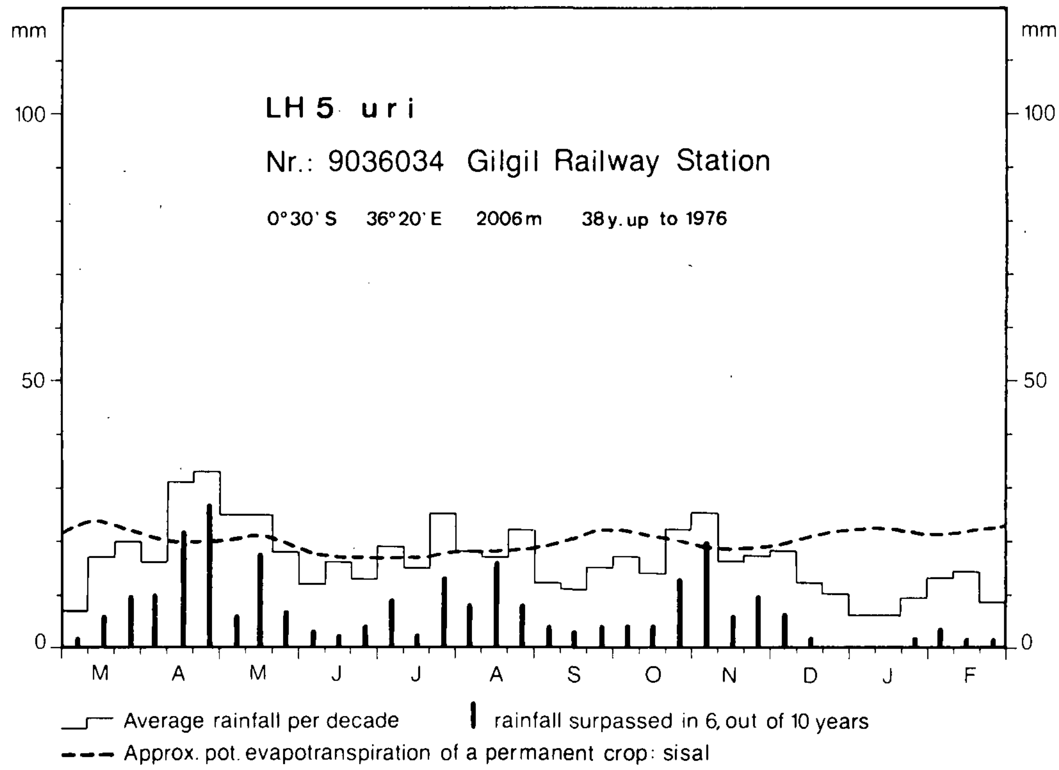
LH 5 = *Lower Highland Ranching Zone*

LH 5 = Lower Highland Ranching Zone
u r i with unimodal rainfall and intermediate rains

(See Diagr. Gilgil)

Not suited for rainfed agriculture except v. e. mat. barley (on good soils in higher places, fair to poor results)

Pasture and forage
About 3 ha/LU on highland short grass savanna; down to about 2 ha/LU on artifical pasture with Rhodes grass, with supplementary irrigation 1.2 ha/LU



LH 5 = Lower Highland Ranching Zone
b r with bimodal rainfall

Potential nearly the same as above, but chances for v. e. mat. barley only if seeding starts beginning to mid April. To establish Rhodes grass pasture is more difficult, and it is less stockable

UM = UPPER MIDLAND ZONES

UM 3 = Marginal Coffee Zone

UM 3 = Marginal Coffee Zone
vl/l with a very long to long cropping season,
or two dividable in two variable cropping seasons

Small area, situated on upper altitude limit of coffee cultivation

Good yield potential
1st rains, start norm. end of March: Late mat. maize like H 613–614 (~60 %), finger millet; m. mat. beans, lima beans; sweet potatoes, potatoes; late and m. mat. sunflower like Comet; cabbages, kales, egg plants
2nd rains, start indistinctly end of June: Beans, potatoes; onions (on light soils)
Whole year: Citrus on deep soils, castor, Macadamia nuts, guavas

Fair yield potential
1st rains: Cold tolerant sorghum
2nd rains: Sweet potatoes
Whole year, best planting time b. of April: Arabica coffee (on deep soils with good husbandry, esp. mulching, otherwise poor)

Pasture and forage
Around 1.2 ha/LU on sec. highland savanna; about 0.8 ha/LU on art. pasture of Rhodes grass; feeding Bana & Napier grass, Lotononis and barrel medicago down to about 0.25 ha/LU; suitable for grade cattle, for grade dairy cows with mentioned additional forage

UM 4 = Sunflower-Maize Zone or Upper Sisal Zone[4)]

UM 4 l/vl or two = Sunflower-Maize Zone with a long to very long cropping season, dividable in two variable cropping seasons

Good yield potential
1st rains, start norm. end of March: Late mat. maize like H 613–614 (~60 %), m. mat. maize like H 622 & 632, cold tol. sorghum (70–80 %, Apr.–S.); late mat. sunflower like Kenya White (~60 %); m. and late mat. beans
2nd rains, start indistinctly around end of June: E. mat. sunflower
Whole year: Sisal, Eucalyptus trees

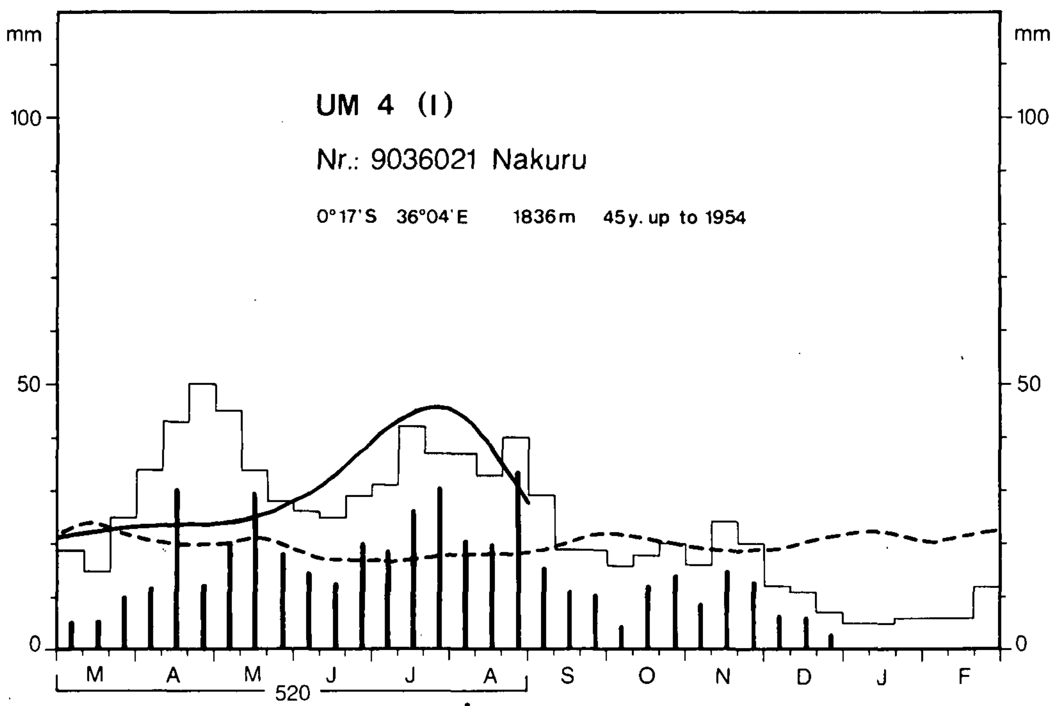
Fair yield potential
1st rains: Finger millet (50–60 %); pigeon peas (lower places, end of March–D.); potatoes, sweet pot.; egg plants, cabbages, kales
2nd rains: E. mat. beans; potatoes, sweet pot.; e. mat. sunflower, e. mat. soya beans; onions
Whole year: Pawpaws, mangoes

Pasture and forage
Around 1.5 ha/LU on undestroyed nat. pasture of highland savanna; about 1 ha/LU on art. pasture of Rhodes grass; down to about 0.35 ha/LU feeding Bana or Napier grass and barrel medicago, esp. for dairy cows; grazing area suitable for grade cattle

UM 4 (l) or two = Sunflower-Maize Zone or Upper Sisal Zone with a (weak) long cropping season, dividable in two variable cropping seasons

(See Diagr. Nakuru)

Almost the same potential as UM 4 l/vl less 10 % yield expectation of maize and sunflower, 5 % less of other crops. Stocking rates around 2 ha/LU; var. H 612 better



Average rainfall per decade — rainfall surpassed in 6 out of 10 years
--- Approx. pot. evapotranspiration of a permanent crop : sisal
— Approx. pot. evapotranspiration of l. mat. maize like H 612
520 Rainfall per indicated growing period, surpassed in 6 out of 10 years

4) Sisal in drier subzones with weak rainy seasons and on soils with little water holding capacity; large scale cultivation

UM 4 = *Sunflower-Maize Zone or Upper Sisal Zone*
(l/m)i *with a (weak) long to medium cropping season and intermediate rains,*
or two *dividable in two variable cropping seasons and i. r.*

Small, potential see Baringo District. Here in large scale farms sisal more suited than there. Stocking rate > 3 ha/LU

UM 5 = *Livestock-Sorghum Zone*

UM 5 = *Livestock-Sorghum Zone*
(m/l)i *with a (weak) medium to long cropping season and intermediate rains*

Very small, potential see Baringo District

UM 5 = *Livestock-Sorghum Zone*
(s) i+i *with a (weak) short cropping season, intermediate rains*
and a second period of intermediate rains

No good yield potential except with add. irrigation (partly possible)

Fair yield potential
1st rains, start norm. b. of April: Cold tol. sorghum (Apr.–Aug.)
Whole year: Sisal, Marama beans

Pasture and forage
2.5–4.5 ha/LU on short grass highland savanna, down to about 1.2 ha/LU on artificial pasture of Rhodes grass with hedges of salt bushes (Atriplex nummularia) and Mesquite (Prosopis juliflora)

UM 5 = *Livestock-Sorghum Zone*
s + i *with a short cropping season and intermediate rains*

Very small. Potential almost the same as above plus e. mat. maize (40–50 %) and v. e. mat. beans

UM 5 = *Livestock-Sorghum Zone*
(s/vs) *with a (weak) short to very short cropping season*
+ i *and intermediate rains*

No good yield potential

Fair yield potential
1st rains, start norm. mid April: Dwarf sorghum (40–50 %)
Whole year: Sisal (40–50 %), Marama beans[5)]

Pasture and forage
More than 2.8 ha/LU on short grass highland savanna, less if near groundwater; art. pasture and forage almost as above

UM 5 = *Livestock-Sorghum Zone*
(vs/s) *with a (weak) very short to short cropping season*
+ i *and intermediate rains*

Nearly the same potential as above less 5 % in yield expectations and about 10 % in stocking rates

UM 6 = *Upper Midlands Ranching Zone*

UM 6 = *Upper Midlands Ranching Zone*
u r i *with unimodal rainfall and intermediate rains*

Rain-fed agriculture uneconomical. With irrigation good potential for vegetables

Pasture and forage
More than 3.5 ha/LU on open short grass highland savanna; with palatable shrubs like salt bush higher capacity. Near Lake Naivasha supplementary irrigation easy, then cold tolerant sorghum and Columbus grass recommended

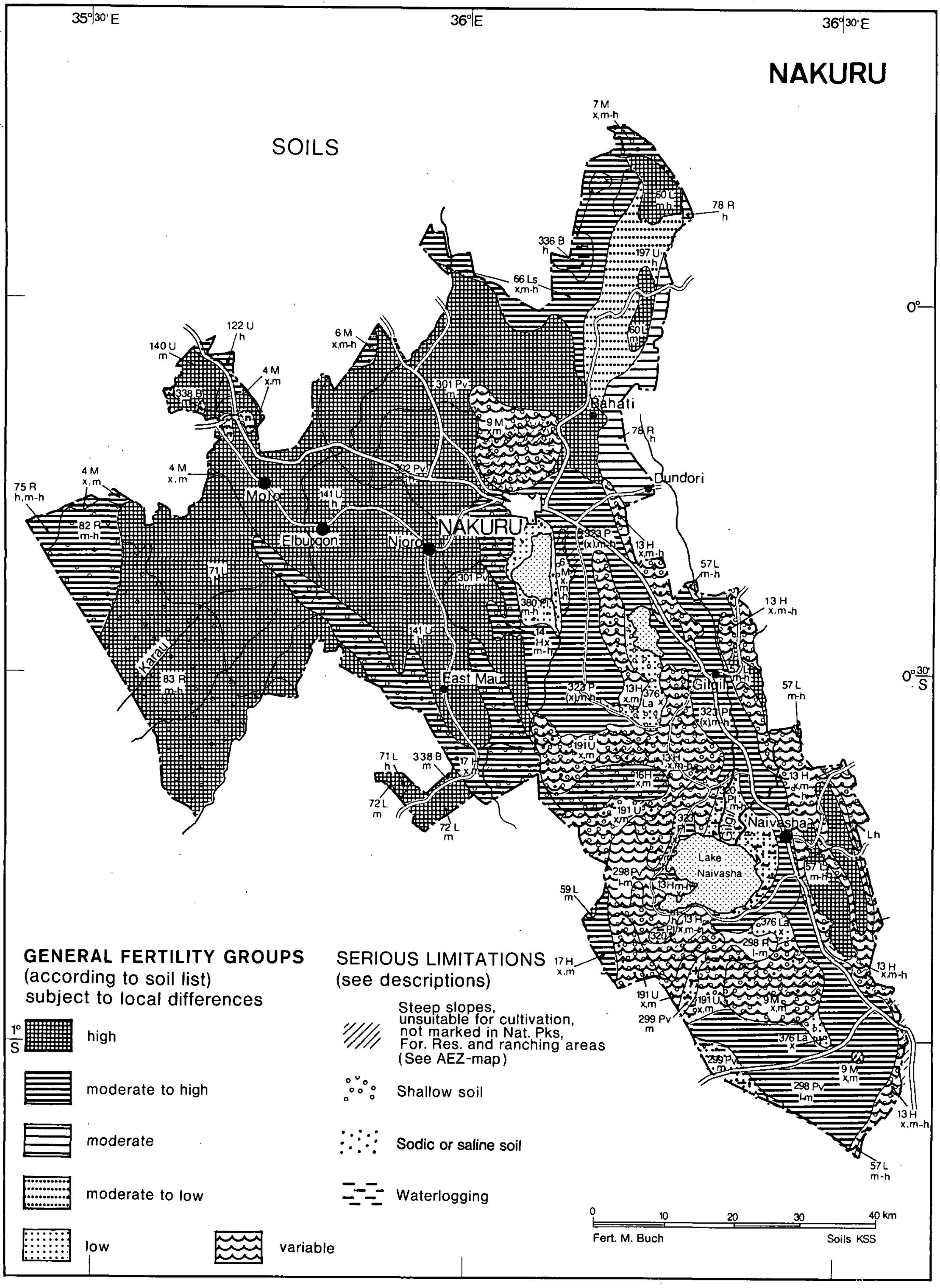
5) Edible tubers and seeds. Still experimental

UM 6 b r	=	*Upper Midlands Ranching Zone with bimodal rainfall*

Here no relevant difference to UM 6 u r i; more than 4 ha/LU

LM	=	*LOWER MIDLAND ZONES*
LM 5	=	*Lower Midland Livestock-Millet Zone*
LM 5 (vs – s/vs) i	=	*Lower Midland Livestock-Millet Zone with a (weak) very short cropping season followed by a (weak) short to very short one and intermediate rains*

Very small and unimportant, potential see Baringo District



35°30' E
36° E
36°30' E
NAKURU
SOILS
0°
0°30' S
1° S
Molo
Elburgon
Njoro
NAKURU
Bahati
Dundori
East Mau
Gilgil
Naivasha
Lake Naivasha
Karati
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
moderate to high
moderate
moderate to low
low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Sodic or saline soil
Waterlogging
0 10 20 30 40 km
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

Nakuru District is part of the central Rift Valley and includes several lakes, viz., Nakuru, Elmenteita and Naivasha. In addition, three extinct volcanoes rise above the volcanic plains and uplands, i.e. Menengai, Longonot and Suswa. East and west of the plains, escarpments mark the transition to higher plains and footridges. The Mau escarpment is the most imposing scarp. The underlying rock is volcanic but varies according to its age. In some areas, there are geysers where hydrothermal energy may be developed for generation of electricity (Hells Gate in the Naivasha area).

On the volcanoes, soils of units 9 M, 298 Pv and 376 La occur, lava fields may be included. Smaller areas are occupied by soils of units 4 M, 6 M and 7 M with inclusions of lava vents and have moderate to high fertility.

A variety of soils occur on the hills and minor scarps. The most extensive areas are those of units 13 H and 16 H. In addition, unit 17 H with a humic topsoil occurs. Associated with the escarpment are a number of plateaus on either side of the Rift Valley. Unit 57 L, of high fertility, occurs frequently. Unit 71 L, of high fertility, is found in large areas, and also unit 66 Ls of moderate to high or variable fertility. Northeast of Nakuru, unit 60 L with a very thick humic topsoil occurs.

Some of the higher ground in the Rift Valley has been described as uplands. In the Molo area, northeast and west of Nakuru, unit 141 U of high fertility is common. Unit 191 U of variable fertility is associated with the hills. Smaller areas are composed of soils of units 197 U with a humic topsoil and 338 B of low to moderate fertility.

Lacustrine plains are common around the lakes. Here, the soils of unit 320 Pl have a low fertility. Associated with this unit are soils of unit 323 Pl, of moderate to high fertility. They may have a humic topsoil. Smaller areas of the volcanic plains, south of Longonot and Suswa are composed of unit 299 Pv.

Bottomlands occur within some of the plateaus, e.g. unit 338 B of low to moderate fertility. In the extreme north of Nakuru District, some areas with unit 336 B of moderate to high fertility are found.

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

4 M
x, m[1)] = well drained, shallow to moderately deep, dark reddish brown, friable, humic, rocky and stony clay loam (nito-humic CAMBISOLS, rocky phase)

6 M
x, m–h = well drained, very deep, dark reddish brown to dark brown, very friable and smeary, clay loam to clay, with thick, acid humic topsoil; in places shallow to moderately deep and rocky (humic ANDOSOLS, partly lithic phase)

7 M
x, m–h = well drained, shallow to moderately deep, dark reddish brown to dark brown; rocky and bouldery, clay loam to clay; in places with humic topsoil (nito-chromic CAMBISOLS; with haplic PHAEOZEMS, lithic phase, LITHOSOLS, eutric REGOSOLS and Rock Outcrops)

Soils developed on ashes and other pyroclastic rocks of recent volcanoes

9 M
x, m = somewhat excessively drained, shallow to moderately deep, brown to dark brown, firm and slightly smeary, strongly calcareous, gravelly to stony clay loam; in many places saline and/or sodic and with inclusions of lava fields (ando-calcaric REGOSOLS)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

13 H
x, m = well drained, shallow, dark reddish brown, friable, very calcareous, bouldery or stony, loam to clay loam; in many places saline (LITHOSOLS; with calcic XEROSOLS, bouldery and saline phase and Rock Outcrops)

14 H
x, m–h = complex of well drained to moderately well drained, shallow to moderately deep, dark brown, firm, stony, clay loam to clay; in places with humic topsoil (eutric REGOSOLS; with verto-luvic PHAEOZEMS, partly lithic phase)

Soils developed on ashes and other pyroclastic rocks of recent volcanoes

16 H
x, m = somewhat excessively drained, shallow dark brown to brown, friable and slightly smeary, rocky and stony clay loam (ando-eutric CAMBISOLS, lithic and stony phase; with Rock Outcrops)

17 H
x, m = complex of:
- well drained, deep to very deep, dark brown to greyish brown, friable and smeary clay loam, with thick humic topsoil (mollic ANDOSOLS)
- somewhat excessively drained, shallow dark brown to brown, friable and slightly smeary, rocky and stony clay loam (ando-eutric CAMBISOLS, lithic and stony phase; with Rock Outcrops)

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on volcanic ashes and other pyroclastics of recent volcanoes

57 L
m–h = well drained, moderately deep to very deep, dark brown, friable and slightly smeary, clay loam to clay (ando-luvic PHAEOZEMS)

59 L
m = well drained, deep to very deep, very dark greyish brown, friable and smeary, loam to clay loam, with a thick humic topsoil (mollic ANDOSOLS)

60 L
m, h = complex of:
- well drained, deep to very deep, very dark greyish brown to dark brown, friable and slightly smeary clay loam (ando-luvic PHAEOZEMS)
- imperfectly drained, deep, very dark greyish brown to black, firm, moderately calcareous, slightly cracking clay (verto-luvic PHAEOZEMS)

SOILS ON STEP-FAULTED FLOOR OF THE RIFT VALLEY

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older basic tuffs included)

66 Ls x, m–h = well drained, moderately deep, dark reddish brown to reddish brown, friable to firm and slightly smeary, bouldery and stony, clay loam to clay; in places calcareous (ando-chromic CAMBISOLS, bouldery phase; with calcic XEROSOLS)

SOILS ON PLATEAU/UPPER-LEVEL UPLAND TRANSITIONS

Soils developed on ashes and other pyroclastic rocks from recent volcanoes

71 L h = well drained, deep to very deep, dark brown, friable and smeary, sandy clay to clay, with acid humic topsoil (humic ANDOSOLS)

72 L m = well drained, deep to very deep, very dark greyish brown, friable and smeary, clay loam, with thick humic topsoil (mollic ANDOSOLS)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

75 R m–h = association of:
- well drained, extremely deep, dark reddish brown, friable clay, with acid humic topsoil; on interfluves (humic NITOSOLS)
- well drained, shallow to moderately deep, dark reddish brown to dark brown, friable clay loam to clay, with acid humic topsoil; on valley sides (humic CAMBISOLS, partly lithic phase)

78 R h = well drained, extremely deep, dusky red to dark reddish brown, friable clay; with inclusions of well drained, moderately deep, dark red to dark reddish brown, friable clay over rock, pisoferric or petroferric material (eutric NITOSOLS; with nito-chromic ACRISOLS, partly pisoferric or petroferric phase)

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included) and with volcanic ash admixture

82 R m–h = association of:
- well drained, extremely deep, dark reddish brown, friable and slightly smeary clay, with acid humic topsoil; on interfluves (ando-humic NITOSOLS)
- well drained, shallow to moderately deep, dark brown, friable, clay loam to clay, with acid humic topsoil; on valley sides (humic CAMBISOLS, partly lithic phase)

Soils developed on ashes and other pyroclastic rocks from recent volcanoes

83 R m–h = association of:
- well drained, very deep, dark reddish brown, very friable and smeary, sandy clay loam to clay, with thick humic topsoil; on interfluves (mollic ANDOSOLS)

SOILS ON UPPER MIDDLE-LEVEL UPLANDS

Soils developed on various rocks and on volcanic ash admixture

140 U m = moderately well drained, moderately deep, reddish brown to red, firm clay loam, with humic topsoil (ando-luvic PHAEOZEMS)

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on ashes and other pyroclastic rocks from recent volcanoes

141 U h = well drained, deep to very deep, dark reddish brown, friable and smeary, silty clay to clay, with humic topsoil (mollic ANDOSOLS)

SOILS ON UPLANDS, UNDIFFERENTIATED LEVELS

Soils developed on undifferentiated volcanic rocks (mainly basalts)

191 U x, m = well drained, shallow, dark brown, friable, strongly calcareous, stony loam, often strongly saline and moderately sodic; with stone mantle (desert pavement); (dissected older piedmont plain) (calcaric REGOSOLS, stone-mantle and saline-sodic phase)

Soils developed on basic igneous rocks (basalts, etc.) with predominant volcanic ash influence

197 U h = well drained, deep to very deep, dark reddish brown to dark red, firm clay; with inclusions of imperfectly drained, moderately deep, dark greyish brown clay (nito-ferric/chromic LUVISOLS; with gleyic LUVISOLS, partly lithic or pisoferric phase)

SOILS ON VOLCANIC PLAINS

Soils developed on ashes and pumice from recent volcanoes

298 Pv l–m = excessively drained to well drained, very deep, dark greyish brown to olive grey, loose to very friable, stratified, calcareous, fine sand to fine sandy loam or silt (ando-calcaric REGOSOLS)

299 Pv m = imperfectly drained, very deep, yellowish brown to olive grey, friable, slightly saline and slightly sodic, sandy loam to silt loam, with a brittle and strongly sodic deeper subsoil ((ando-) gleyic SOLONETZ, saline and fragipan phase)

301 Pv m = well drained, moderately deep to deep, brown to dark brown, very friable, loam to sandy clay loam (vitric Andosols)

302 Pv = as 301 but heavy clay loam

SOILS ON COASTAL PLAINS

Soils developed on lower-level lagoonal deposits

307 Pc h = imperfectly to poorly drained, very deep, grey to brown, mottled, very firm clay (hardpan), slightly calcareous and strongly saline and sodic throughout or in deeper suboil (gleyic SOLONETZ; with gleyic or verto-luvic PHAEOZEMS, saline-sodic phase)

SOILS ON LACUSTRINE PLAINS

Soils developed on sediments from volcanic ashes and other sources

320 Pl m—h = imperfectly drained to poorly drained, very deep, dark greyish brown to dark brown, firm to very firm, slightly to moderately calcareous, slightly to moderately saline, but moderately to strongly sodic, silt loam to clay, often with humic topsoil (subrecent lake sides of the central Rift Valley) (SOLONETZ, undifferentiated, saline phase)

Soils developed on sediments mainly from volcanic ashes (Gamblian lake of the Central Rift Valley)

323 Pl m—h = complex of:
- well drained, moderately deep to deep, dark brown, friable and slightly smeary, fine gravelly, sandy clay loam to sandy clay, with humic topsoil (ando-haplic PHAEOZEMS)
- imperfectly drained, moderately deep to deep, strong brown, mottled, firm and brittle, sandy clay to clay (gleyic CAMBISOLS, fragipan phase)

SOILS ON BOTTOMLANDS

Soils developed on infill from undifferentiated volcanic rocks

336 B h = imperfectly drained, deep, dark brown to olive grey, firm to very firm clay soils of varying calcareousness, salinity and sodicity; in many places cracking (VERTISOLS ans SOLONCHAKS, undifferentiated)

Soils developed on infill from volcanic ashes

338 B m = imperfectly drained to poorly drained, moderately deep, dark greyish brown, mottled, very firm clay loam (hardpan), abruptly underlying a topsoil of acid humic friable loam (humic PLANOSOLS)

SOILS ON LAVA FLOWS

376 La x = excessively drained, exceedingly bouldery to stony, extremely rocky land (Bouldery and Rock Outcrops)

1) Soil texture-classes

h = heavy
l = light
m = medium
x = stony or bouldery
v = varying texture
m-h = medium to heavy
m, h = medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-climatic Zone Map of Kenya, Scale 1:1 000 000. Expl. Soil Survey Rep. E1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

The results of the Census of September 1979 show that 522,709 people live in Nakuru District. Of this figure, more than 25 % (135,205 people) live in the 6 townships and 4 trading centres of the area, of which Nakuru Municipality[1] with more than 92,000 inhabitants is the most important town in the province (Table 4). The percentage of the urban population is comparatively high here and industry and tourism play a role that should not be underestimated. The natural features in this region (Lake Naivasha, Lake Nakuru, Lake Elmenteita, Menengai Crater, Longonot and Suswa) are considerable tourist attractions.

Nevertheless, livestock and agriculture play by far the most important part in the economy of the district. For 387,504 rural persons, a total rural area of 576,200 ha is available. That is not much but for a small farmer in the better areas, it is adequate. The Elburgon divison with only 1.18 ha per household and 0.26 ha per person (UH 1, UH 2, LH 2, LH3), is a good example of this.

In most areas of the district, however, the ecological conditions are rather unsuitable for arable farming and livestock is the main economic activity. In Kijabe location (mainly UM 6, UM 5 and LH 5) 31.34 ha per household and 6.78 ha per person were available, not much for ranching. To a certain extent the Nakuru District can be compared with the Laikipia District, as in both districts, ranching plays a most important role, although here the land pressure is stronger and the population density much higher.

This used to be a large-scale ranching area, and some ranches still exist today, but the main part of the area (especially former forests and large-scale farms) is quite densely populated now. Problems such as soil erosion and degradation as a direct consequence of too high stocking rates occur more and more. That is why an improvement of the overall land use and agricultural productivity is necessary in order to stop the steady destruction of the natural potential. This is very important because the population is still growing quickly, and as far as can be predicted, livestock and agriculture will remain the basis of the economy in the future.

[1] Not included are rural people living in the Municipality, but on the other hand there are some non-rural people outside in trading centres, schools etc.

NAKURU DISTRICT

TABLE 4: POPULATION PER LOCATION AND DIVISION
CENSUS 1979

Location/Division without township	Male	Female	Total	Number of households	Square kilometers	Density
Bahati	20083	21308	41391	8115	210	196
Solai	15288	14529	29817	6860	521	57
Subukia	16035	16943	32978	6466	285	115
Bahati Division	51406	52780	104186	21441	1017	102
Naivasha Township	6750	4741	11491	2856	10	1113
Naivasha	26600	23749	50349	12329	967	52
Kijabe	4835	4818	9653	2087	740	13
Gilgil	18733	16604	35337	8221	1039	34
Naivasha Division	50168	45171	95339	22637	2747	34
Molo/Mau Summit	16776	16784	33560	6678	195	171
Molo South	17226	16919	34145	6273	439	77
Rongai	17659	15754	33413	7002	565	59
Njoro	32794	33866	66660	13596	345	192
Elburgon	17068	16948	34016	7395	111	304
Mau Narok	8119	7735	15854	3912	159	99
Molo Division	109642	108006	217648	44856	1817	119
Olenguruone	6200	6485	12685	2433	108	116
Olenguruone Division	6200	6485	12685	2433	108	116
Nakuru Municipality	51301	41550	92851	23257	78	1184
Nakuru Municipality Division	51301	41550	92851	23257	78	1184
Nakuru District	268717	253992	522709	114624	5769	90

NAKURU DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15years	Other Relatives		
Location:						
Bahati	8140	2.77	1.49	0.61	0.21	5.08
Solai	6861	2.57	1.12	0.44	0.21	4.35
Subukia	6436	2.77	1.55	0.58	0.23	5.21
Division Subukia	21437	2.69	1.40	0.54	0.22	4.86
Location:						
Naivasha	12306	2.39	0.85	0.47	0.23	0.40
Kijabe	2079	2.71	2.39	0.63	0.25	4.64
Gilgil	8206	2.38	0.97	0.45	0.40	4.20
Division Naivasha	22591	2.40	0.93	0.48	0.29	4.09
Location:						
Molo/Mau Summit	6982	2.68	1.35	0.44	0.33	4.80
Molo South	6254	2.89	1.48	0.54	0.54	0.45
Rongai	6978	2.74	1.15	0.45	0.44	4.78
Njoro	13567	2.73	1.40	0.51	0.26	4.91
Elburgon	7393	3.26	0.68	0.47	0.17	4.58
Mau Narok	3905	2.40	1.19	0.33	0.14	4.06
Division Molo	45079	2.71	1.32	0.47	0.30	4.80
Location Olenguruone	2429	2.86	1.57	0.53	0.22	5.18
Division Olenguruone	2429	2.86	1.57	0.53	0.22	5.18
Location Nakuru Municipality	23142	2.32	0.63	0.50	0.40	3.84
Division Nakuru Municipality	23142	2.32	0.63	0.50	0.40	3.84
DISTRICT: NAKURU	114678	2.58	1.12	0.49	0.30	4.49

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per household as well

TABLE 6: AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON[1)]

Location/Division without townships	in '00 ha = skqm					in '00 ha = skqm												in ha	
	Area total Census '79	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps	Non-agricultural land: Others (roads, homesteads, rivers...)	Agricultural land	Area in agro-ecological zones AEZ: UH 1	UH 2	UH 3	LH 2	LH 3	LH 4	LH 4	UM 3	UM 4	UM 5	UM 6	LM 5	Agric. land per household	Agric. land per person
Bahati	210			34	176	9	24		46	63	25	4		5				2.17	0.43
Solai	521	4	L. 3	52	462					29			48	327	40		9	6.73	1.55
Subukia	285			34	251		4		67	50			1	127	2			3.88	0.76
Bahati Division	1 016	4	L. 3	120	889	9	28		113	142	25	4	49	459	42		9	4.26	0.91
Kijabe	740	12		74	654		1	25		59	36	102			142	289		31.34	6.78
Naivasha	959	20	L. 88	97	754		12	45		97	77	128			301	94		6.12	1.98
Naivasha Division	1 699	32	L. 88	171	1 408		13	70		156	113	230			443	383		18.73	4.38
Mau Summit	195		F. 5	25	165	9	121		21	14								2.47	0.49
Molo South	439			44	395	107	288											6.30	1.16
Rongai	565	34		57	474				4	132	190			148				6.77	1.42
Njoro	338			59	279		8		47	169				36	19			2.05	0.42
Elburgon	108			21	87	3	28		17	39								1.18	0.26
Mau Narok	259			26	233	27	165		20	17	3			1				5.96	1.63
Molo Division	1 904	34	F. 5	232	1 633	146	610		109	371	193			185	19			4.12	0.89
Olenguruone	108			13	95	93	2											3.90	0.75
Oleng. Division	108			13	95	93	2											3.90	0.75
Gilgil	1 035	8	F. 102 L. 17	104	804		12	27	3	63	156	348		18	124	53		12.99	3.06
Total rural area	5 762	78	215	640	4 829	248	665	97	225	732	487	582	49	662	628	436	9	4.63	1.00

1) For official land statistics see supplementary publication to FMHB, Vol. III A: Agriculture Land Statistics

AGRICULTURAL STATISTICS
AREA, PRODUCTION, YIELDS AND QUALITY OF MAJOR CASH CROPS

NAKURU DISTRICT

TABLE 7: **COFFEE**
AREA - PRODUCTION - YIELDS[a)]

Co-operatives - Nil

Estates

Name	Item	Unit	Year					
			74/75	75/76	76/77	77/78	78/79	79/80
Nakuru	Area	ha	2843	2843	2738	2946	2645	2745
	Production	t	1112	1686	1932	1718	1480	2427
	Yield	kg/ha	391	593	705	583	560	884

TABLE 8: **PYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[b)]

Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	1487	1712	1614	2039	2581
Pyrethrin content %	1.5	1.5	1.6	1.6	1.5

Sources: a) C.B.K.
b) Pyrethrum Board

STATISTICS[1)] OF MEDIUM TO LARGE FARMS

The Nakuru district includes ranching and mixed farming areas. Approximately 2,750 ha of coffee are cultivated in large units yielding approximately 750 kg of clean coffee per ha. The pyrethrum production of the district has increased by 50 % from 1975/76 to 1979/80 to 2,500 t of dried flowers p.a., but this originates mostly from small family farms.

The district was originally farmed by large-scale enterprises each comprising 500–600 ha. During 1973/74, roughly 450,000 ha were still cultivated in large units. It is however estimated that in future only 85,000 ha will be farmed by roughly 170 large-scale enterprises, and the rest of the area will be cultivated by smallholders owning about 2–5 ha of land.[2)]

Table 9 shows the legally registered farms only, and therefore does not reflect the above development tendency.[3)] When assessing the machinery figures shown on the same table, it is important to consider that Nakuru is a centre of private agricultural machinery contractors. One quarter of the land area is planted with leys and the rest with annual crops (table 11). Wheat and barley occupy 50 % of the annual crop area, while maize is planted on 10 % of the arable land only (table 12). Most of the dairy herds and sheep flocks comprise 25–100 head (table 13). The number of dairy stock and beef cattle kept in the district has remained fairly stable while there has been a small increase in sheep during the past (table 14). The yield figures compiled in the tables of the general part reflect the relatively high fertility of the soils of the district.

1) For more detailed and up to date information, see FMHB Vol. III/A and III/B; see also Land: Population ratio, table 6.
2) Large Farm Sector Study 1977
3) It is planned to carry out a more comprehensive farm management survey in the Rift Valley which should yield better data towards 1985/86.

TABLE 9: DISTRIBUTION OF LAND BY HOLDING SIZE
Medium–Large Farms[a)]

Size Group in ha	Number of Holdings in Size Group															
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
- 19	84	84	84	87	90											
20 - 49	68	79	82	83	111											
50 - 99	49	51	53	56	58											
100 - 199	95	92	93	92	119											
200 - 299	75	76	80	76	72											
300 - 399	63	66	62	64	67											
400 - 499	46	47	46	44	47											
500 - 999	122	121	123	127	126											
1,000 - 1,999	46	46	45	47	33											
2,000 - 3,999	28	27	27	27	26											
4,000 - 19,999	13	14	13	13	15											
20,000 - and over	1	1	1	1	-											

TABLE 10: MAJOR FARM MACHINERY AND IMPLEMENTS ON FARMS

Machinery/Implements	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Farm Tractors	1235	1161	1216	1258	1219											
Combine Harvesters	120	114	90	89	134											
Plough & Harrow	1628	1513	1426	1702	2020											
Cultivators & Tooth Harrow	608	557	606	566	604											
Planters & Sprayers	773	785	789	855	1077											

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

NAKURU DISTRICT

TABLE 11: **LAND USE**
Medium–Large Farms a)

Land Under	In '000 ha								Percent							
	1975	1976	1977	1978	1979	1980	1981	1982	1975	1976	1977	1978	1979	1980	1981	1982
Temporary Crops	89.7	97.1	101.0	98.6	97.6				19	21	21	21	20			
Temporary Leys & Meadows	31.0	23.7	23.4	23.9	29.8				7	5	5	5	6			
Temporary Fallow Land	5.6	7.9	6.3	13.9	8.1				1	2	1	3	2			
Subtotal	126.3	128.7	130.7	136.4	135.5				27	28	27	29	28			
Permanent Crops:																
Permanent Meadows (natural pasture)	282.5	284.4	295.0	266.6	246.8				60	60	63	56	52			
Subtotal	282.5	284.4	295.0	266.6	246.8				60	60	63	56	52			
Permanent Crops (incl. fruit trees)	21.1	21.6	9.1	7.9	10.3				5	5	2	2	2			
Forest Land	18.0	16.3	12.7	15.0	10.8				4	3	3	3	2			
Other Land	20.7	19.6	23.2	47.4	75.1				4	4	5	10	16			
Subtotal	59.8	57.5	45.0	70.3	96.2				13	12	10	15	20			
TOTAL	468.6	470.6	470.7	473.3	478.5				100	100	100	100	100			

Land Under	In '000 ha								Percent							
	1983	1984	1985	1986	1987	1988	1989	1990	1983	1984	1985	1986	1987	1988	1989	1990
Temporary Crops																
Temporary Leys & Meadows																
Temporary Fallow Land																
Subtotal																
Permanent Crops:																
Permanent Meadows (natural pasture)																
Subtotal																
Permanent Crops (inc. fruit trees)																
Forest Land																
Other Land																
Subtotal																
TOTAL																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 12: **CROPPING PATTERN**
Medium–Large Farms[a)]

Land under:	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Cereals (in '000 ha)																
Maize	7.6	11.1	11.7	7.6	5.5											
Wheat	29.7	29.4	32.1	31.1	27.2											
Barley	7.1	7.4	7.0	6.1	5.2											
Oats	2.6	2.4	2.3	2.4	2.3											
Others	0.4	0.4	0.2	0.6	0.5											
Total	47.4	50.7	53.3	47.8	40.7											
Grassing/Fodder Crops (in ha)																
Leys[b)]	-	-	-	-	29807											
Nat. Pasture	2825	2844	2950	2666	8054											
Lucerne	556	462	441	557	519											
Silage Crops	1605	851	1067	516	494											
Others	2066	1349	1766	2044	2283											
Total	7052	5506	6224	5783	41157											
Vegetables/Root Crops (in ha)																
Potatoes	189	247	170	186	358											
Tomatoes	78	93	55	64	63											
Beans & Peas	199	162	148	135	176											
Onions	52	77	91	57	78											
Others	185	273	229	186	160											
Total	703	852	693	628	835											

a) farms above 20 ha in size
Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 13: NUMBER OF LIVESTOCK KEPT ON FARMS (IN '000 HEAD)
Medium–Large Farms[a)]

Kind of Livestock	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Dairy Cattle:																
Cows	38.5	39.5	41.0	42.9	48.8											
Heifer & Heifer Calves	23.3	22.8	24.3	25.7	29.7											
Stud Bulls & Bull "	2.3	3.6	4.9	4.6	5.2											
Total	64.1	65.9	70.2	73.2	83.7											
Beef Cattle:																
Cows	25.6	25.4	22.4	27.5	28.6											
Heifer & Heifer Calves	16.6	15.7	17.7	16.6	17.8											
Other Beef Cattle	46.2	39.5	36.6	43.1	41.1											
Total	88.4	80.6	76.7	87.2	87.5											
Sheep:																
Ewes	64.3	48.9	45.0	42.6	54.9											
Rams	5.8	3.7	3.6	3.7	8.4											
Lambs	46.1	31.1	27.0	23.9	27.5											
Others	8.0	13.3	10.7	13.9	22.2											
Total	124.2	97.0	86.3	84.1	113.0											
Pigs:																
Breeding Sows	0.5	0.5	0.5	0.7	0.7											
Breeding Boars	0.1	0.3	-	0.1	0.2											
Others	3.0	1.4	1.8	1.1	0.9											
Total	3.6	2.2	2.3	1.9	1.8											
Poultry:																
Breeding Stock	6.5	4.3	3.7	7.4	16.6											
Other Poultry	30.7	31.9	38.9	40.2	20.8											
Total	37.2	36.2	42.6	47.6	37.4											

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

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TABLE 14: **HERD AND FLOCK SIZES**

Stock	Number of Herds and Flocks in Herd Size Group																															
Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78	'75	'76	'77	'78
Dairy Cattle	114	119	124	122	78	69	74	80	128	125	131	102	74	65	55	77	36	29	31	25	24	24	21	24	65	55	66	67	15	23	23	23
Beef Cattle	65	65	76	87	32	18	26	19	33	25	16	24	13	12	12	25	13	17	17	10	9	14	19	16	24	24	26	30	37	31	34	44
Sheep	61	66	74	66	40	37	28	26	24	20	37	26	9	9	11	7	12	13	15	15					22	25	30	29	47	53	40	44

Stock																																
Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82	'79	'80	'81	'82
Dairy Cattle	140				99				105				67				22				27				77				23			
Beef Cattle	68				35				22				12				17				11				29				36			
Sheep	73				38				30				15				12				38				26				33			

Stock																																
Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86	'83	'84	'85	'86
Dairy Cattle																																
Beef Cattle																																
Sheep																																

Stock																																
Sheep:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 499				500 - 999				1000 +			
Cattle:	1 - 24				25 - 49				50 - 99				100 - 149				150 - 199				200 - 249				250 - 499				500 +			
Year:	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90	'87	'88	'89	'90
Dairy Cattle																																
Beef Cattle																																
Sheep																																

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 15: LIVESTOCK PRODUCTION, SALES AND CONSUMPTION ON FARM
Medium–Large Farms[a)]

Livestock	Produce	Unit	Year							
			1975	1976	1977	1978	1979	1980	1981	1982
Dairy	Milk Production, Total	'000 Litre	42878	32105	42594	57351	44782			
	Milk sold off farm	'000 Litre	-	27175	38377	49332	41864			
	Cattle	'000 Head	1.8	4.6	5.5	11.0				
Beef	Sales for slaughter and consumed on farm	'000 Head	22.2	21.0	27.2	20.9	36.0			
	Sales for breeding and fattening	'000 Head	3.3	3.8	5.5	3.5	10.3			
Sheep	Total Sales and consumed on farm	'000 Head	34.2	19.0	25.5	22.6	29.0			
	Wool	'000 kg	416.3	239.3	183.2	181.3	225.7			

Livestock	Produce	Unit	Year							
			1983	1984	1985	1986	1987	1988	1989	1990
Dairy	Milk Production, Total	'000 Litre								
	Milk sold off farm	'000 Litre								
	Cattle	'000 Head								
Beef	Sales for slaughter and consumed on farm	'000 Head								
	Sales for breeding and fattening	'000 Head								
Sheep	Total Sales and consumed on farm	'000 Head								
	Wool	'000 kg								

a) farms above 20 ha in size

Source: Central Bureau of Statistics, Agricultural Census of Large Farms, P.O. Box 30266, Nairobi

TABLE 16 a: **PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES OUTPUT & NUTRIENT INPUT[1]**

		A.E.Z.: UH 2 PYRETHRUM/WHEAT ZONE				A.E.Z.:LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: LH 3 WHEAT/MAIZE-BARLEY ZONE			
		Vegt. Period 1st + 2nd: vli or two in Days,1st: 100 or more		2nd: 170-200	total: 270-300	vl or two 100 or more		180-190	280-290	vl/l or two 90 or more		150-160	240-250
		Soil: ANDOSOLS				ANDOSOLS				PHAEOZEMS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS Farmers in Production Level	%												
Yields [2]	kg	2,000			4,000	2,000			4,000	2,000			4,000
Fertilizer N	kg				111				111				111
P_2O_5	kg				55				55				55
K_2O	kg												
CROP: NAPIER/BANA GRASS Farmers in Production Level	%												
Yields [2]	kg					3,000			6,500	2,500			6,000
Fertilizer N	kg								194				194
P_2O_5	kg								97				97
K_2O													
CROP: PYRETHRUM Farmers in Production Level	%												
Yields	kg	700	500	800	1,200	700	500	800	1,200				
Fertilizer N	kg				12				12				
P_2O_5	kg				18				18				
K_2O	kg												
CROP: WHEAT Farmers in Production Level	%												
Yields	kg	1,200	1,200	2,500	2,800	1,500		2,500	3,200	1,500	1,500	2,500	3,200
Fertilizer N	kg			7	38			24	41			24	41
P_2O_5	kg			11	64			42	71			42	71
K_2O	kg												
CROP: BARLEY Farmers in Production Level	%												
Yields	kg	1,500	1,400	2,000	3,000	1,500	1,500	2,000	3,100	1,500	1,500	2,000	3,100
Fertilizer N	kg			10	30			22	48			22	48
P_2O_5	kg			20	60			38	84			38	84
K_2O	kg												
CROP: TRITICALE Farmers in Production Level	%												
Yields	kg	2,000		2,500	3,300	2,000		3,000	3,500	2,000		3,000	3,500
Fertilizer N	kg			15	33			30	50			30	50
P_2O_5	kg			18	46			38	60			38	60
K_2O	kg												

1) For Explanation see Vol. II A, p. 51

2) in kg TDN

NAKURU DISTRICT

TABLE 16 b: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES OUTPUT & NUTRIENT INPUT

		A.E.Z.: UH 2 PYRETHRUM/WHEAT ZONE				A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: LH 3 WHEAT/MAIZE-BARLEY ZONE			
Vegt. Period 1st + 2nd: in Days, 1st:		vl i or two 100 or more		2nd: 170-200	total: 270-300	vl or two 100 or more		180-190	280-290	vl/l or two 90 or more		150-160	240-250
Soil:		ANDOSOLS				ANDOSOLS				PHAEOZEMS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,400	2,600	4,000	5,500	2,400	2,700	4,000	6,000	2,400	2,500	3,500	4,500
Fertilizer N	kg		6	48	95		13	45	100		3	33	63
P_2O_5	kg		6	35	85		12	43	93		4	28	55
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg					800		1,200	2,500	700	600	1,100	2,300
Fertilizer N	kg							14	58			14	54
P_2O_5	kg							11	48			20	78
K_2O													
CROP: RAPESEED													
Farmers in Production Level	%												
Yields	kg	500	800	1,000	1,600	500	800	1,000	1,600	400		800	1,000
Fertilizer N	kg		30	50	110		30	50	110			40	60
P_2O_5	kg		30	50	110		30	50	110			40	60
K_2O	kg												
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	7,000	15,000	20,000	30,000	6,000		15,000	27,000				
Fertilizer N	kg		64	104	270			111	259				
P_2O_5	kg		72	117	300			126	295				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,000	14,000	28,000	45,000	3,000	10,000	20,000	25,000				
Fertilizer N	kg		84	196	332		56	136	176				
P_2O_5	kg		63	147	249		42	102	132				
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 16 c: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES OUTPUT & NUTRIENT INPUT[1]

		A.E.Z.: UM 4 SUNFLOWER/MAIZE ZONE											
		Vegt. Period 1st + 2nd: 1/vl or two in Days,1st: 8o or more		2nd: 14o-15o	total: 22o-23o								
		Soil: ANDOSOLS											
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields[2]	kg	1,200			2,400								
Fertilizer N	kg				66								
P_2O_5	kg				33								
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields[2]	kg	2,500			5,500								
Fertilizer N	kg				166								
P_2O_5	kg				83								
K_2O													
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,400	2,500	4,000	4,500								
Fertilizer N	kg		5	48	63								
P_2O_5	kg		5	42	55								
K_2O	kg												
CROP: SORGHUM (HIGH ALTITUDE)													
Farmers in Production Level	%												
Yields	kg	3,000		4,000	6,000								
Fertilizer N	kg			33	100								
P_2O_5	kg			25	75								
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	600	700	1,100	1,900								
Fertilizer N	kg		3	17	44								
P_2O_5	kg		4	19	49								
K_2O	kg												
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yields	kg	600	700	1,100	1,900								
Fertilizer N	kg		3	17	44								
P_2O_5	kg		4	19	49								
K_2O	kg												

1) For Explanations see Vol. II A, p. 51

2) in kg TDN

NAROK DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The Narok District is inhabited by the pastoral Masai whose agricultural neighbours, suffering from land shortages, often assume that there are vast areas of unused land for cropping. A look at the annual average rainfall (500 to 1 800 mm p.a.) seems promising but in fact, most of the suitable areas are near the borders only. In the centre of the district it is either too dry (with very unreliable rainfall, see Reliability Maps) or the soils are too infertile and shallow (see Soil Map).

The wetter zones near the border also have serious limitations: in the Sheep and Dairy Zone of the Upper Highlands (UH 1) cropping possibilities are poor apart from oats, potatoes and vegetables. A large part of this zone is still under forest and should remain so because of steep slopes, the danger of soil erosion, and as necessary water storage for the rivers flowing to the dry plains. The Forest Zone UH 0 means "forest only". There is also a need for reafforestation in the zones better suited for agriculture, like the Upper Highlands Pyrethrum-Wheat Zone UH 2 and the Wheat-Barley Zone UH 3. Over-intensive wheat production has already led to a loss of humus and topsoil in this area. This is especially severe because the depth of weathering is still low due to the young age of the volcanic ashes covering the soil on the slopes of the Mau Hills.

Another example of degradation of the natural potential by deforestation is the Trans Mara area. Climatically there is a potential for coffee and even for tea (UM 1–3 and LH 1), but due to the destruction of forests by encroaching grass fires, burnt by generations of pastoralists to increase the grazing possibilities, the soils are so degraded that in most places it is now impossible to plant these crops. But maize and sunflower (UM 4) and similar crops should grow well in places where the soil is still deep enough.

A fairly large area between the Nguruman Escarpment and the Loita Hills is still covered by forest but this area has no potential for tea or coffee. It is too high for coffee and too dry for tea (LH 2–3). Annual crops are also unsuitable here. The area is dissected with many steep slopes. The underground is a slowly weathering acid gneiss, therefore the soils are shallow and their nutrient content low. The humus of the forest would allow for a good yield in the first year but then the fertility would have gone and the valuable forest too. The Loita Hills also have shallow soils on infertile basement rocks. This reduces their climatic potential as a Wheat-Barley Zone (UH and LH 3) to an unimportant minimum. A little cultivation is possible on some foothills.

Westward down to the Mara it becomes drier, and those higher areas (if not steep) are a Livestock-Barley Zone (LH 4) similar to the areas around Narok. The annual average rainfall is still high, 730 to 800 mm, but it is not concentrated enough and is unreliable. The agrohumid period of the first rains covers 3 months and has a reliability of about 250 mm in 6 out of 10 years (the second rains about 150 only, see Diagram Narok). This is not enough for maize, but barley cultivation also faces problems. The crop has not the right malting qualities because of the dry conditions; the zone would be better for fodder barley. Some early maturing wheat varieties can be selected for cultivation here.

The transition zone to the lower parts (Loita Plains) is suited to sorghum to a certain extent (UM 5). The large central plains are too dry for agriculture, and are purely ranching zones (UM 6). Their potential has been overestimated in former times due to the relatively high annual rainfall of 500–700 mm. However, the rainfall is not concentrated, is unreliable too, and the evaporation is high, about 1 800 mm a year, due to dry winds and many hours of sunshine. The low "whistling thorns" indicate the low potential.

NAROK DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
9038085	Oleoguruone	32	Average	1 774	63	67	97	203	240	155	183	222	182	161	119	84
2 731 m	Settlement		60 % Rel.[1]	1 409	13	57	79	170	218	130	138	171	111	102	76	37
9035138	Lengetia Farm,	23	Av.	1 054	44	41	70	128	117	85	122	196	89	69	71	57
2 740 m	Mau Hills		60 %	980	14	12	52	84	103	66	107	132	77	57	42	25
9134011	Kilgoris, D.A.	24	Av.	1 487	105	127	152	181	144	121	61	107	123	85	140	144
1 950 m	Office		60 %	1 336	74	106	135	153	101	95	52	93	89	70	123	111
9135001	Narok, Met.	62	Av.	758	72	74	90	154	96	32	17	24	28	24	69	79
1 890 m	Station		60 %	680	41	48	59	102	54	21	7	9	17	15	38	50
9135008	Kaboson, Afr.G.	18	Av.	953	61	87	81	137	88	60	44	72	53	45	110	116
1 645 m	Ch. (Kericho D.)		60 %	840	45	69	79	131	59	44	23	43	34	20	46	74
9135002	Morijo, Loita	14	Av.	690	50	62	103	145	69	32	53	23	24	20	52	55
2 130 m	P. School															

1) These figures of rainfall reliability will be exceeded normally in 6 out of 10 years.

TABLE 2: **TEMPERATURE DATA**

No. and altitude	Name of Station	AEZ[1]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
				Temperature in °C													
9135001	Narok Met.	LH 4	Mean max.	26.5	26.9	26.3	24.4	22.6	21.8	21.6	22.4	24.6	25.9	25.4	25.6	24.5	
1 890 m	Station	lp	Mean temp.	17.1	17.4	17.5	17.6	16.9	15.4	14.7	15.0	15.9	16.7	16.6	16.7	16.5[2]	31
			Mean min.	7.8	7.9	8.7	10.9	11.3	9.0	7.9	7.7	7.2	7.6	7.9	7.9	8.5	
			Abs. min.	1.3	0.9	2.7	3.8	2.9	1.6	0.3	1.1	0.5	1.3	1.8	1.7	0.3	

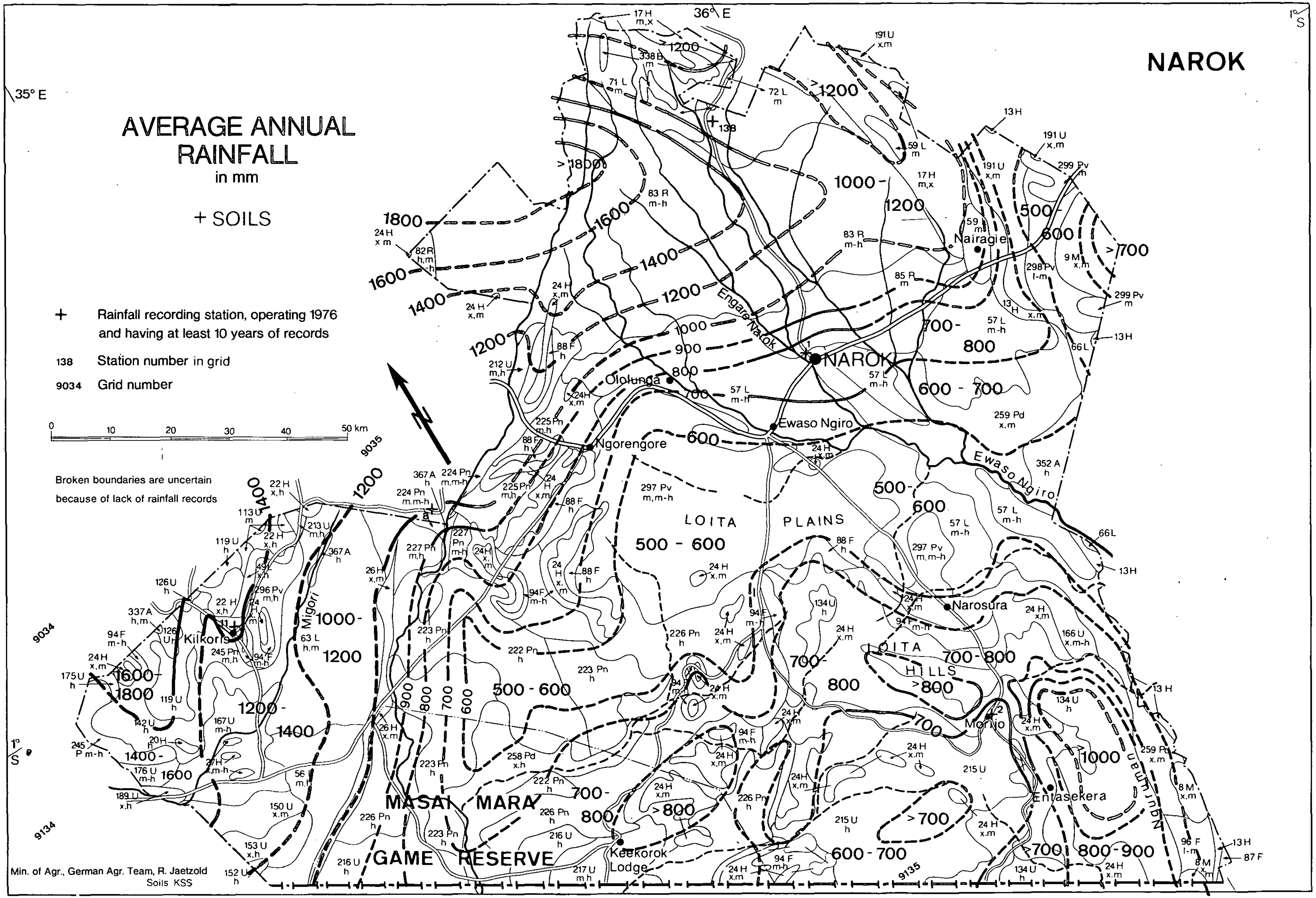
1) AEZ = Agro-Ecological zone; lp = lower places, hp = higher places within the zone
2) Low mean temperature due to low night temperatures (cold air floating down from Mau Hills during night)

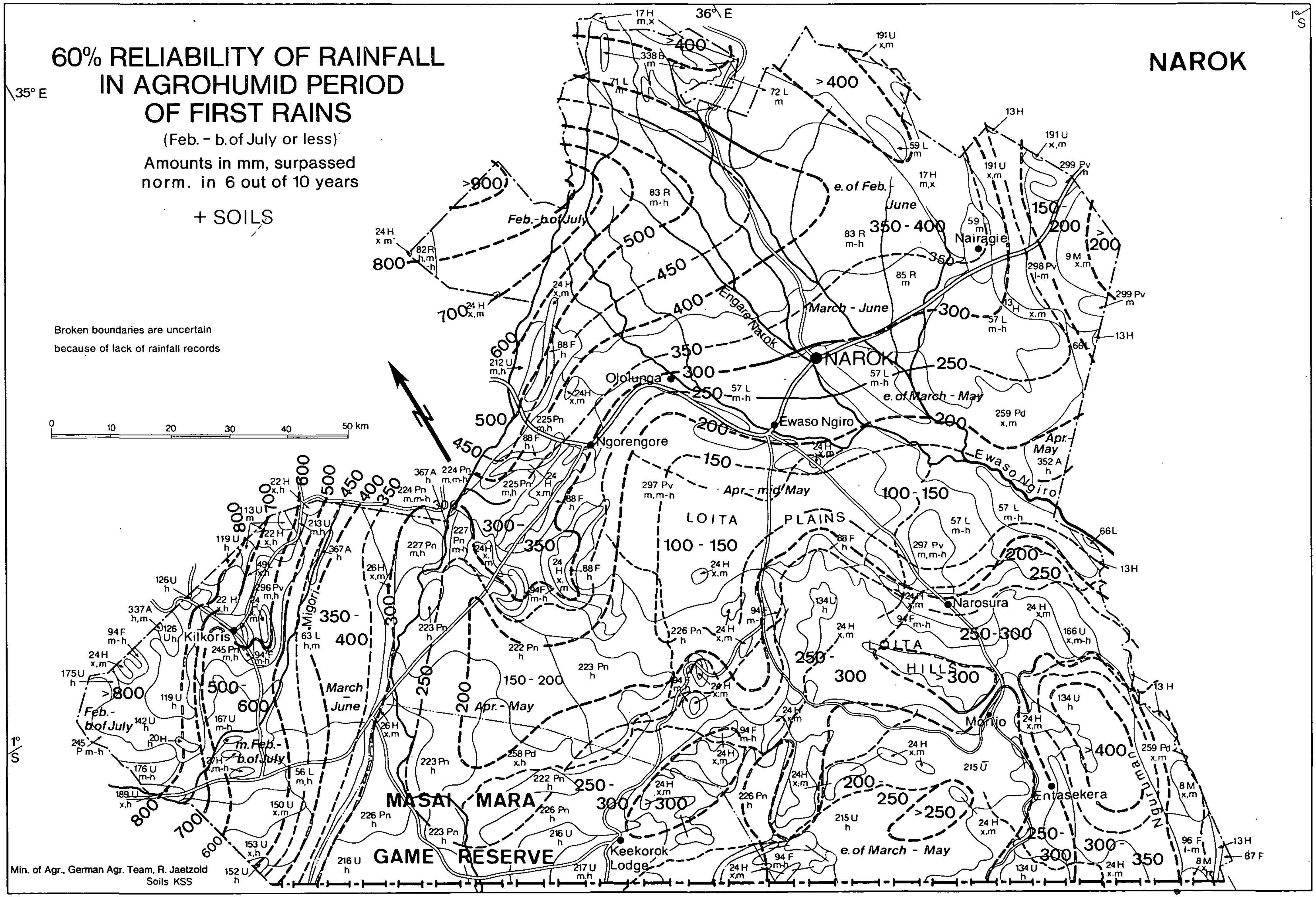
TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

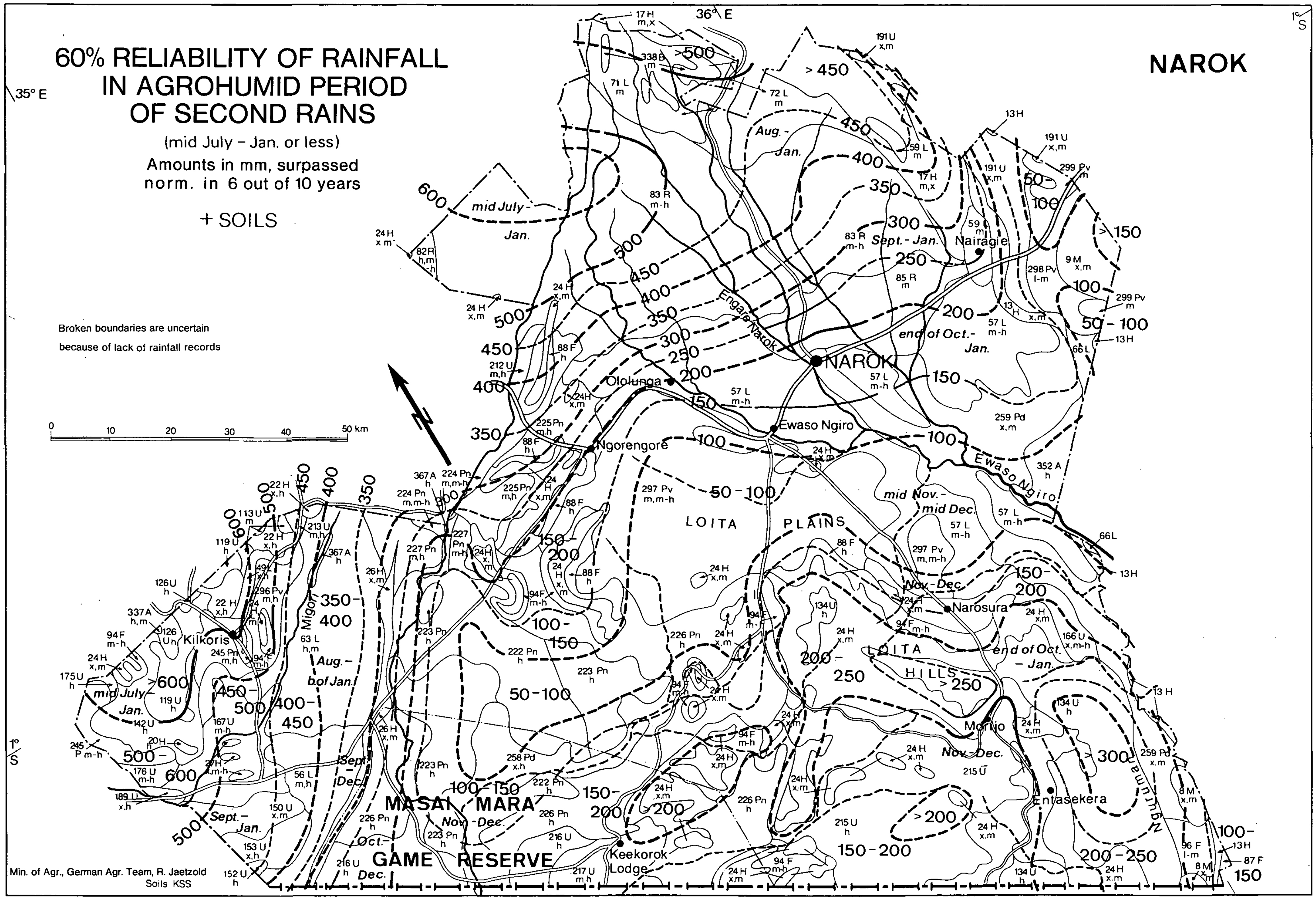
Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2] in days	2nd rains in days	Total[3] in days
TA I Sheep-Cattle Zone	–	2 980–3 040	10.4–10.0	1 200–1 400	400–500	500–600	Too cold		
UH 0 Forest Zone	–	2 280–2 440	14.7–13.9	1 800–2 000	850–950	600–700	Too wet		
UH 1 Sheep-Dairy Zone	vl i or two	2 280–2 970	14.7–10.5	1 500–1 800	500–850	580–650	120 or more	190–210	310–330
	p			1 700–1 900	650–800	520–600	130 or more	210–235	340–365
UH 2 Wheat-Pyrethrum Zone	vl i or two	2 280–2 970	14.7–10.5	1 100–1 800	400–600	350–550	120 or more	170–180	290–310
UH 3 Wheat-Barley Zone	vl or two	2 150–2 370	15.0–13.9	1 000–1 200	350–400	300–350	120 or more	160–170	280–300
LH 1 Tea-Dairy Zone	p or l ⌐ m	1 980–2 280	16.6–14.8	Very small, see Kisii District					
	p or two			Very small, see Kericho District					
	p or l ⌐ (m)			1 400–1 800	600–850	600–700	195 or more	180–195	340–365

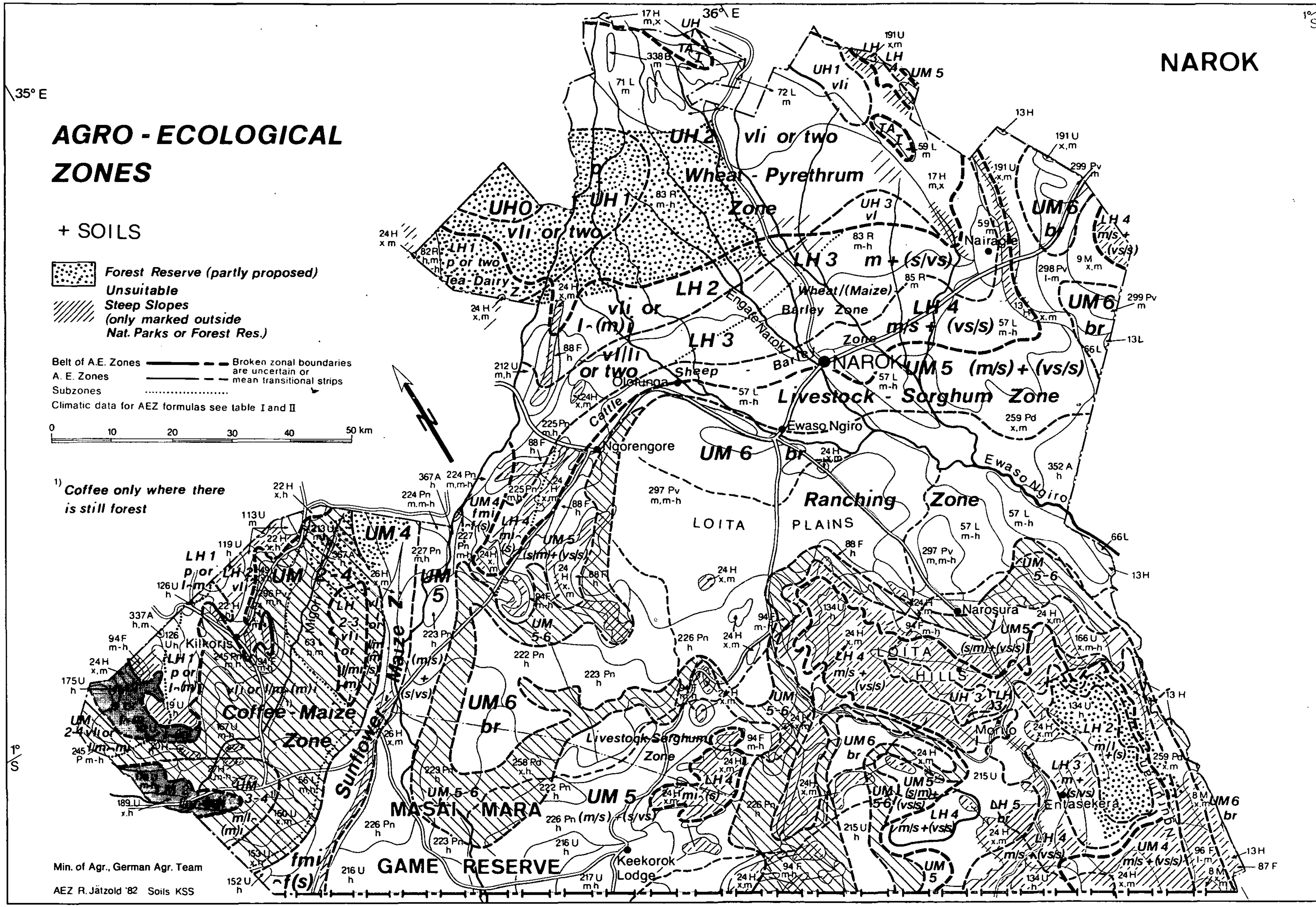
Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1)] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2)] in days	2nd rains in days	Total[3)] in days
LH 2 Maize/Wheat-Pyrethrum Zone	vl i or l ⌐ (m) i resp. l/m ⌐ (m) i	1 980–2 280	16.6–14.8	1 100–1 300	400–550	350–450	180 or more	130–150	320–360
	m/l + (s)			1 000–1 200	350–450	300–350	140–160	70– 80	–
LH 2–3 Transitional Zone	v/i or l/m i ⌐ (m)	1 850–1 890	17.4–17.2	1 000–1 200	350–400	350–400	170 or more	140–150	320–340
LH 3 Wheat/Maize-Barley Zone	vl/l i or two	1 850–2 150	17.4–15.0	900–1 100	350–450	250–350	150 or more	80–100	230–280
	m + (s/vs)			850–1 050	320–380	200–320	135–160	75–80	–
LH 4 Cattle-Sheep Barley Zone	m/s + (vs/s)	1 800–1 950	17.5–16.5	750–900	270–320	180–220	115–130	55–70	–
	m i ⌐ (s)			Very small and unimportant					
LH 5 Lower Highland Ranching Zone	b r	2 070–2 130	16.1–15.6	Not suitable for rainfed agriculture					
UM 1 Coffee-Tea Zone	p or l ⌐ m	1 460–1 640	20.0–18.9	Small, potential see Kisii District					
	p or l ⌐ (m)			Small, potential see Kisii District					
UM 2–3 Coffee Zone	vl i or l/m ⌐ m i	1 750–1 880	18.2–17.5	Very small, see South Nyanza District					
UM 2–4 Coffee-Maize Zone	vl i or l/m ⌐ (m) i	1 520–1 880	19.7–17.5	1 180–1 400	380–600	380–600	170 or more	120–140	290–330
	vl i or l/m ⌐ (m/s) i			1 000–1 200	320–500	320–450	170 or more	110–120	280–310
UM 4 Sunflower-Maize Zone	f m i ⌐ f(s)	1 760–1 820	17.9–17.6	900–1 100	350–450	220–380	120 or more	75–115	190–290
	m/s + (vs/s)			850–1 050	300–350	200–250	115–135	55–70	–
UM 3–4 (Coffee-) Maize Zone	m/l ⌐ (m) i	1 460–1 640	20.0–18.9	1 300–1 500	550–800	450–550	155–175	130–150	285–325
UM 5 Livestock-Sorghum Zone	(m/s) + (s/vs)	1 520–1 800	19.7–17.5	650–1 000	220–300	120–300	110–130	70–80	–
	(s/m) + (vs/s)			650–750	250–300	200–250	100–110	50–70	–
UM 5–6 Transition	5: f(s) + (vs/s)	1 500–1 770	19.9–17.7	600–850	200–250	100–150	70–110	50–60	–
UM 6 Upper Midland Ranching Zone	b r	1 500–1 770	19.9–17.7	500–650	100–200	50–100	45–60	40–50	–
LM 2 Marginal Sugar Cane Zone	l/m ⌐ (m) i	1 460–1 520	20.3–20.0	1 400–1 600	600–850	500–600	175–195	135–150	310–345

1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants.
2) More if growing cycle of cultivated plants continues into the period of second rains.
3) Only added if agro-humid conditions continue from 1st to 2nd rains.


NAROK
AVERAGE ANNUAL RAINFALL
in mm
+ SOILS
+ Rainfall recording station, operating 1976 and having at least 10 years of records
138 Station number in grid
9034 Grid number
0 10 20 30 40 50 km
Broken boundaries are uncertain because of lack of rainfall records
35° E
36° E
1° S
NAROK
Engare Narok
Ololunga
Ngorengore
Ewaso Ngiro
Nairagie
Narosura
Morijo
Entasekera
Kilkoris
Keekorok Lodge
Migori
Nguruman
LOITA PLAINS
LOITA HILLS
MASAI MARA GAME RESERVE
9035
9034
9134
9135
Min. of Agr., German Agr. Team, R. Jaetzold
Soils KSS


60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF FIRST RAINS
(Feb. - b. of July or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+ SOILS
NAROK
Broken boundaries are uncertain
because of lack of rainfall records
0 10 20 30 40 50 km
35° E
36° E
1° S
NAROK
Nairagie
Ololunga
Ngorengore
Ewaso Ngiro
Narosura
Morijo
Entasekera
Kilkoris
Keekorok Lodge
LOITA PLAINS
LOITA HILLS
MASAI MARA GAME RESERVE
Engare Narok
Ewaso Ngiro
Migori
Ngurumán
Feb.-b.of July
e. of Feb.-June
March - June
e. of March - May
Apr.- mid May
Apr.-May
March - June
m. Feb.- b. of July
Min. of Agr., German Agr. Team, R. Jaetzold
Soils KSS


60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF SECOND RAINS
(mid July – Jan. or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+ SOILS
NAROK
Broken boundaries are uncertain
because of lack of rainfall records
0 10 20 30 40 50 km
35° E
36° E
1° S
NAROK
Nairagie
Ololunga
Ewaso Ngiro
Ngorengore
Kilkoris
LOITA PLAINS
LOITA HILLS
Narosura
Morijo
Entasekera
Keekorok Lodge
MASAI MARA
GAME RESERVE
Engare Narok
Ewaso Ngiro
Migori
mid July – Jan.
Aug. – Jan.
Sept. – Jan.
end of Oct. – Jan.
mid Nov. – mid Dec.
Nov. – Dec.
Aug. – b of Jan.
Sept. – Dec.
Oct. – Dec.
Min. of Agr., German Agr. Team, R. Jaetzold
Soils KSS



NAROK
AGRO - ECOLOGICAL ZONES
+ SOILS
Forest Reserve (partly proposed)
Unsuitable
Steep Slopes (only marked outside Nat. Parks or Forest Res.)
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 10 20 30 40 50 km
1) Coffee only where there is still forest
Min. of Agr., German Agr. Team
AEZ R. Jätzold '82 Soils KSS
35° E
36° E
1° S
UH 2 vli or two
Wheat - Pyrethrum Zone
UHO vli or two
UH 1
LH 1 p or two
Tea-Dairy Z.
LH 2 vli or l-(m)i
LH 3 vl/li or two
Sheep
Cattle
LH 3 m + (s/vs)
Wheat/(Maize) Barley Zone
LH 4 m/s + (vs/s)
UM 5 (m/s) + (vs/s)
Livestock - Sorghum Zone
NAROK
Nairage
Olokurto
Ngorengore
Ewaso Ngiro
UM 6 br
Ranching Zone
LOITA PLAINS
LOITA HILLS
Narosura
Morijo
Entasekera
Kilkoris
Coffee - Maize Zone
Sunflower - Maize Zone
Livestock-Sorghum Zone
MASAI MARA GAME RESERVE
Keekorok Lodge
UM 5 (m/s) + (s/vs)
Engare Narok
Migori

AGRO-ECOLOGICAL ZONES

TA = TROPICAL-ALPINE ZONES

TA I = Tropical-Alpine Sheep and Cattle Zone

Very small. Natural grazing very well suitable for Corriedale sheep, less suitable for Merinos and cattle; dairy cows lower places only and good night shelter recommended

UH = UPPER HIGHLAND ZONES

UH 0 = Forest Zone

Very wet and steep, forest best land use

UH 1 = Sheep-Dairy Zone

UH 1 vl i or two = Sheep-Dairy Zone with a very long[1] cropping season, dividable in two variable cropping seasons

Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd r), start norm. March[1]: Oats (April–S.); Quinoa; peas, potatoes; m. mat. rapeseed (~ 60 %); cabbage, carrots, kohlrabi, celery, endive, rampion, leek, radish, spinach, cauliflower
2nd rains, start norm. indistinctly July[1]: The same but normally crops of first rains not yet ready; planting from end of August onward yield expectations only fair
Whole year: Strawberries, pinus trees

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Late mat. wheat like Kenya Bongo (~ 40 %), triticale, very late mat. maize like High alt. comp. or Cuzco in frost free lower places
2nd rains: M. mat. barley like Proctor 3rd crop of potatoes (N.–F., ~ 40 %, on microclimatic frost-free slopes)
Whole year, best planting time end of March: Pyrethrum (50–60 %)

Pasture and forage
Around 0.6 ha/LU (lower places) to 1.2 ha/LU (drier upper places) on sec. pasture of Kikuyu grass, very suitable for Merino and Corriedale sheep, up to 2 700 m also for grade dairy cows; rye grass (Lolium perenne) to improve pasture for dairy (not near wheat fields); lucerne and Kenya white clover as add. forage, also fodder oats and rapeseed herbage

UH 1 p = Sheep-Dairy Zone with permanent cropping possibilities

Potential almost as above but vegetables whole year round, 3rd crop of potatoes fair-good

UH 2 = Wheat-Pyrethrum Zone

UH 2 vl i or two = Wheat-Pyrethrum Zone with a very long cropping season, dividable in two variable cropping seasons

Good yield potential
1st rains (to 2nd r), start norm. end of March: Very late mat. maize like High alt. comp. or Cuzco (~ 60 %, in frost free lower places < 2 500 m); m. mat. wheat, late mat. wheat like Kenya Bongo (May–N./D.), l. mat. triticale (Apr.–O.), m. mat. barley (May–S./O.), oats (April–S.); peas (~ 60 %), potatoes (March–July); m. mat. rapeseed (Apr./May–S.); cabbages (nearly 80 %), kales, carrots (nearly 80 %), kohlrabi, celery, endive, rampion, leek, radish
2nd rains, start norm. b. of July: Oats, m. m. barley like Proctor; e. mat. rapeseed; peas and the above vegetables excl. kohlrabi, but if planted from mid August onward only fair expectations
Whole year: Pyrethrum, strawberries

Fair yield potential
1st rains: Maize varieties as above but higher places (2 500 to 2 700 m, risk by frosts in valleys)
2nd rains: Potatoes (Au.–N., 50–60 %), kohlrabi
Whole year: Plums, pears, apples (below 2 600 m)

[1] Start and end of rainy seasons in whole district not very distinct, especially second rains, in western places there is even a third peak. So planting times are variable according to crops and their rotation.

Pasture and forage
About 0.8 ha/LU on sec. pasture of Kikuyu and tufted grass (if not overgrazed, otherwise Kikuyu grass is disappearing) suitable for Merino sheep and grade dairy cows; rye grass to improve pasture for dairy, down to 0.5 ha/LU; lucerne as add. forage

UH 3 = *Wheat-Barley Zone*

UH 3 = *Wheat-Barley Zone*
vl or two *with a very long cropping season, dividable in two variable cropping seasons*

Good yield potential
1st rains, start March: Late mat. wheat like Kenya Bongo (Apr.–O.), late mat. barley, late mat. potatoes; peas (~ 60 %); rapeseed (~ 60 %),linseed or flax (~ 60 %); cabbages, cauliflower, kohlrabi
Whole year: New Zealand flax (below 2 500 m)

Fair yield potential
1st rains: High alt. comp. maize or Cuzco (~ 40 %, on frost free gentle slopes); carrots
2nd rains, start Oct.: V. e. mat. barley; e. mat. potatoes
Whole year: Pyrethrum, kales

Pasture and forage
About 1 ha/LU in open Cedar forest; Merino sheep and grade beef cattle do well; barley B 106 as add. forage; for grade dairy cows improved pasture and add. protein fodder like Kenya white clover

LH = *LOWER HIGHLAND ZONES*

LH 1 = *Tea-Dairy Zone*

LH 1 = *Tea-Dairy Zone*
p or *with permanent cropping possibilities,*
l ⌐ m *dividable in a long cropping season followed by a medium one*

Very small, see Kisii District

LH 1 = *Tea-Dairy Zone*
p or two *with permanent cropping possibilities, dividable in two cropping seasons*

Small, see Kericho District

LH 1 = *Tea-Dairy Zone*
p or *with permanent cropping possibilities,*
l ⌐ (m) *dividable in a long cropping season followed by a (weak) medium one*

(See Diagram Kilgoris, situated on the boundary to LH 2)

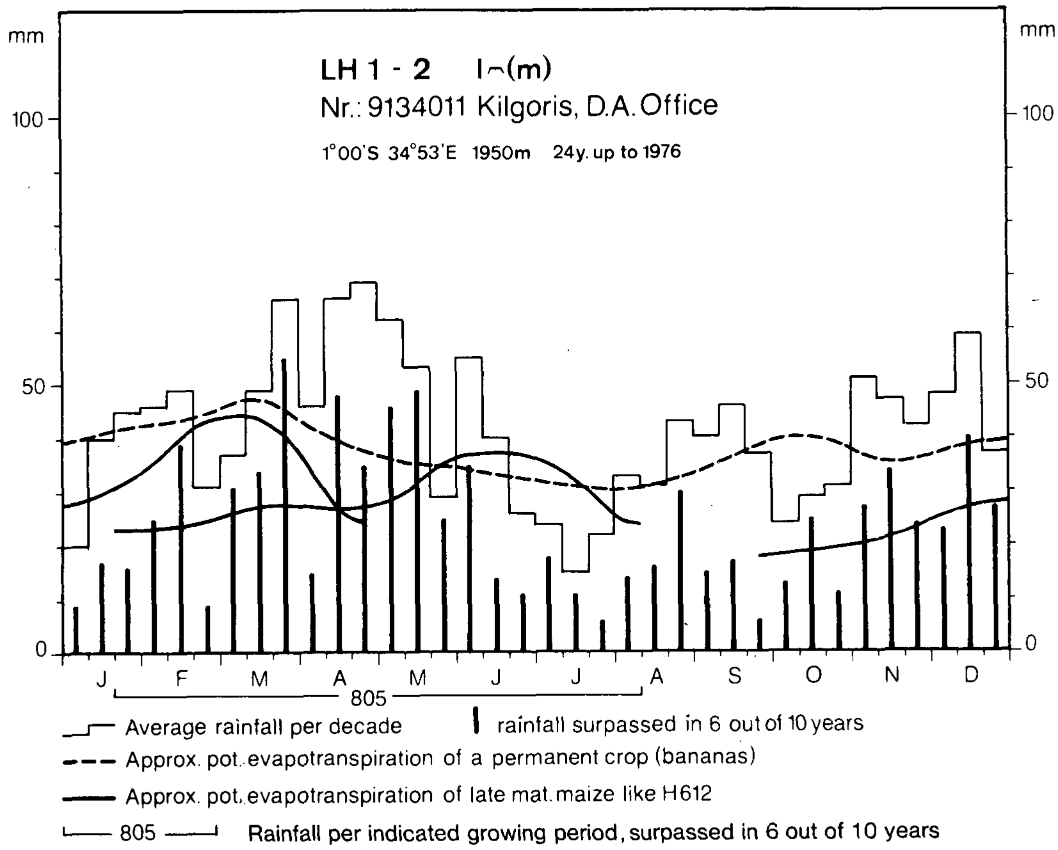
Good yield potential
1st rains, start indistinctly F.: Late mat. maize H 611, 612 (end of Jan.–S.); rapeseed; potatoes; peas; cabbages, carrots, spinach (70–80 %), leek, kales, kauliflower, beetroot, celery, lettuce, Swiss chard
2nd rains, start indistinctly around S.: Potatoes, carrots, kales
Whole year: Passion fruit

Fair yield potential
1st rains: Finger millet; beans (below 2 000 m); sweet potatoes; onions (mainly shallots)
2nd rains: Peas, beans; onions, leek
Whole year: Tea, pyrethrum

Pasture and forage
0.6–0.8 ha/LU on sec. pasture of Kikuyu and tufted grass, more ha/LU on degraded places; Nandi Setaria for better pasture, esp. for grade dairy cows; Louisiana white clover as add. forage

LH 2 = *Maize/Wheat-Pyrethrum Zone*

LH 2 = *Maize/Wheat-Pyrethrum Zone*
vl i or *with a very long cropping season and intermediate rains,*
l to l/m *dividable in a long resp. long to medium cropping season*
⌐ (m) i *followed by a (weak) medium one and i.r.*



Good yield potential

1st rains, start norm. F.: Late mat. wheat like Kenya Bongo, late mat. triticale, late mat. maize H 611, 612 (F.–S./O.); peas, horse beans; potatoes; late mat. sunflower like Kenya White, linseed, rapeseed (higher places); carrots, spinach

2nd rains, start indist. around Aug. (planting may be earlier or later): E. mat. wheat like K. Tembo (June–O.) and other varieties of this group (see Vol. II A, p. 34), m. mat. barley like K. Research (June–O.); potatoes, kales, beetroot, celery, carrots

Whole year: Black wattle

Fair yield potential

1st rains: Finger millet; m. mat. beans like Cuarentino; sweet potatoes; onions

2nd rains: Beans, peas; linseed; cabbages, onions, lettuce, cauliflower

Whole year: Pyrethrum (nearly 60 % but relat. low pyrethrine content); passion fruit, strawberries

Pasture and forage

0.8–1 ha/LU on sec. pasture of Kikuyu and tufted grass, more ha on degraded places; down to 0.6 ha/LU on art. pasture of Nandi Setaria or Rhodes grass; suitable for grade dairy cows; Louisiana white clover as add. forage

LH 2 m/l + (s) = *Wheat/Maize-Pyrethrum Zone with a medium to long and a (weak) short cropping season*

Very small; steep slopes, shallow and infertile soils. Only pockets suitable for cultivation. Forest best land use

LH 2–3 = *Wheat/Maize-Pyrethrum to Wheat/Maize-Barley Zone*

Transition between zones 2 and 3 but tending more to 3 because it is relatively low for pyrethrum (low pyrethrin content). On the other hand wheat and barley may be less economically than maize because of rust danger due to relatively warm and wet conditions. Potential of 3 less LH 3 vl i or two

LH 3 = *Wheat/Maize-Barley Zone*[2)]

LH 3 vl/l i or two = *Wheat/Maize-Barley Zone with a very long to long cropping season and intermediate rains, dividable in two variable cropping seasons (second weak) and i.r.*

2) Wheat or maize depending on farm scale, topography and local climate. W-Narok better suited for maize, E-Narok better for wheat

Good yield potential
1st rains (to 2nd rains), start around end of F.: M. mat. wheat like Africa Mayo or Kenya Leopard (Apr.–S.) and other var., late mat. like Kenya Bongo (Apr.–O.), on deep soils late mat. maize like H 611–614 (Mch.–S./O.), m. mat. barley like K. Research; peas (~ 60 %) linseed, late mat. sunflower like Kenya White; cabbages
2nd rains, start indistinctly around July: M. mat. wheat like Africa Mayo (June–D.) a. o. var.; m. mat. rapeseed (end of June–O.)
Whole year: Black wattle

Fair yield potential
1st rains: Horse beans; potatoes; rapeseed; kales, cauliflower, carrots, beetroot
2nd rains: Beans (lower places), horse beans; tomatoes, kales, beetroot
Whole year: Avocadoes (lower places)

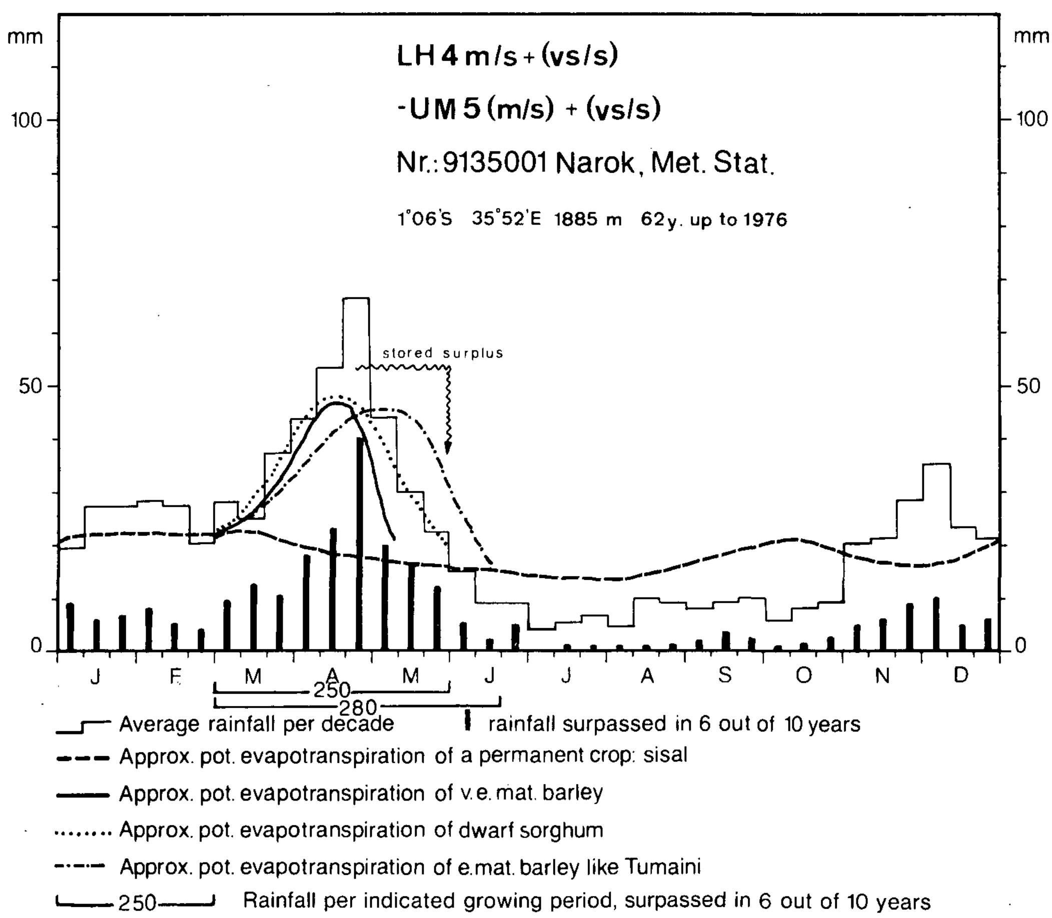
Pasture and forage
About 1.2 ha/LU on highland savanna of red oats and wire grass; more ha if degraded resp. covered by bush; about 0.7 ha on art. pasture of Nandi Setaria or Rhodes grass; suitable for grade dairy cows and grade cattle; subterranean clover or Lotononis as add. forage

LH 3 = Wheat/(Maize)-Barley Zone
m + (s/vs) with a medium and a (weak) short to very short cropping season

Normally no good yield potential due to infertile shallow soils

Fair yield potential
1st rains, start norm. end of March: M. mat. wheat like Africa Mayo or K. Tembo a. o. var., m. mat. barley, m. mat. maize (in deeper soils on pediments); peas; linseed, m. mat. sunflower like Vympel
2nd rains, start norm. end of O.: V. e. mat. barley

Pasture and forage
More than 2 ha/LU on highland savanna; art. pasture recommended only on pediments, there down to about 0.8 ha/LU with Rhodes grass var. Masaba or Elmba; for grade dairy cows subterr. clover best add. forage



LH 4 = C a t t l e - S h e e p - B a r l e y Z o n e

LH 4 = Cattle-Sheep-Barley Zone
m/s + with a medium to short
(vs/s) and a (weak) very short to short cropping season

(See Diagram Narok)

G o o d y i e l d p o t e n t i a l
1st rains, start norm. mid March: V. e. mat. barley

F a i r y i e l d p o t e n t i a l
1st rains: E. mat. barley like Tumaini (50–60 %), e. mat. wheat like Kenya Tembo

P o o r y i e l d p o t e n t i a l
2nd rains, start norm. b. of N. (to 1st rains): Maize H 611 (N.–June, 30–40 %), e. mat. barley (N.–F.), v. e. mat. by. (N.–b. of J.)

P a s t u r e a n d f o r a g e
1.3–2.5 ha/LU on open highland savanna with red oats grass predominant, about 0.8 ha/LU on art. pasture of Rhodes grass var. Elmba or Boma; suitable for grade cattle; e. mat. barley like Amani and subterr. clover as add. forage

LH 4 = Cattle-Sheep-Barley Zone
m i ⌐ (s) with a medium cropping season and intermediate rains followed by a (weak) short one

Very small, hilly, with shallow soils;
1st rains start b. of March, 2nd rains in S./O. Arable only on pediments, no good yield potential. M. mat. fodder barley in 1st. r. fair. More than 1.5 ha/LU on pediments with savanna, > 2 ha/LU on slopes with bushland

LH 5 = L o w e r H i g h l a n d R a n c h i n g Z o n e

LH 5 = Lower Highland Ranching Zone
b r with bimodal rainfall

Not suitable for rainfed agriculture

P a s t u r e a n d f o r a g e
More than 2.5 ha/LU on highland short grass savanna, no proper fodder crops

UM = UPPER MIDLAND ZONES

UM 1 = C o f f e e - T e a Z o n e

UM 1 = Coffee-Tea Zone
p or with permanent cropping possibilities,
l ⌐ m dividable in a long cropping season followed by a medium one

Small, potential see Kisii District

UM 1 = Coffee-Tea Zone
p or with permanent cropping possibilities,
l ⌐ (m) dividable in a long cropping season followed by a (weak) medium one

Small, potential see Kisii District UM 1 p or l ⌐ m, but very good potential there is only good here, good potential there in 2nd rains and tea is only fair here. Stocking rates around 0.8 ha/LU depending on degradation, down to about 0.15 ha/LU feeding Napier or Bana grass, banana leaves and stems, forage legumes and maize stalks

UM 2 = C o f f e e Z o n e[3)]

UM 2–4 = C o f f e e - M a i z e Z o n e

Transition and mixture (depending on soils and microclimate) of zones UM 2, 3 and 4

3) Unimodal rainfall distribution during the year and poor soils are not very suitable for coffee although it is wet enough. It is only recommended to plant coffee where there is still forest. This zone can have only the potential of zone UM 4 on degraded places. Good husbandry of coffee because of disease danger is very important too.

UM 2 = *Coffee Zone[3)]*
vl i *with a very long cropping season and intermediate rains,*
or l/m *dividable in a long to medium cropping season*
⌐ (m) i *followed by a (weak) medium one*

(Covers only about 20 % on good forest soils in UM 2–4; mainly UM 3 there)

Very good yield potential
1st rains (to 2nd r.), start indist. F./March: Maize H 612–614 (~ 80 % higher places, Mch.–S.), late mat. sorghum; cabbages, kales (both very good only in higher places)
Whole year, best planting time March: Castor

Good yield potential
1st rains: Maize H 622, 632 (70–80 %, lower places, Mch.–S.), finger millet; m. mat. beans (lower places)[4)]; sweet potatoes; late mat. sunflower like Kenya White (May–O.), m. mat. sfl. like HS 301 A, m. mat. soya beans; onions, spinach, tomatoes, cabbages and kales (lower places)
2nd rains, start around Aug.: E. mat. beans (~ 60 %, S.–D.); onions (on light soils)
Whole year: Macadamia nuts, bananas (in valleys), passion fruit, avocadoes, mountain pawpaws, guavas

Fair yield potential
1st rains: M. mat. wheat and barley (only near LH 2 in north-eastern higher places, May–S.); potatoes; pigeon peas (lower places)
2nd rains: Maize H 511–513 (50–60 %), 622, 632 (~ 50 %); potatoes, sweet potatoes; tomatoes
Whole year: Arabica coffee[3)], bananas (outside valleys), citrus; taro (in valleys), yams, pineapples (lower places)

Pasture and forage
0.6–1 ha/LU on sec. pasture, more ha if degraded; dairy cows around 0.5 ha/LU on art. pasture of Rhodes grass; down to about 0.15 ha/LU feeding Napier or Bana grass; banana leaves and others, esp. silverleaf (Desmodium uncinatum) as best fodder legume (for rotation)

UM 2 = *Coffee Zone[3)]*
vl i *with a very long cropping season and intermediate rains,*
or l/m *dividable in a long to medium cropping season*
⌐ (m/s) i *followed by a (weak) medium to short one and i.r.*

Potential for UM 2 almost as above less about 10 %. Small areas on good deep forest soils in UM 2–4 vl i or l/m ⌐ (m/s) between 1 600 and 1 800 m; mainly UM 4 there

UM 2–3 = *Coffee Zone[3)]*
vl i or *with a very long cropping season and intermediate rains,*
l/m ⌐ m i *dividable in a long to medium cropping season followed by a medium one and i.r.*

Very small, potential see South Nyanza District

UM 3 = *Marginal Coffee Zone, here (Coffee-)Maize Zone[3)]*

UM 3 = *Marginal Coffee Zone*
m/l ⌐ *with a medium to long cropping season*
(m) i *followed by a (weak) medium one and intermediate rains*

(occurs only in UM 3–4, depending on soils)

Good yield potential
1st rains, start norm. b. of March: Maize H 612–614 (higher places), H 511–512, 622, 632 (lower places), finger millet, m. mat. sorghum; m. mat. beans[4)], sweet potatoes; m. mat. sunflower like HS 301 A, late mat. like Kenya White (~ 60 %), soya beans; cabbages, kales, onions (on light soils), tomatoes, spinach
2nd rains, start norm. Aug./S.: V. e. mat. beans (~ 60 %); onions
Whole year: Castor, mountain pawpaws, Macadamia nuts, sisal, black wattle (higher places)

Fair yield potential
1st rains: Chick peas; potatoes (higher places)
2nd rains: Chick peas; potatoes (higher pl.), sweet potatoes; tomatoes
Whole year: Bananas (on deep soils), avocadoes, citrus[5)], pineapples (lower places)

[4)] Sometimes rotting because of too wet conditions
[5)] With add. irr. (D.–F.) well growing

Poor yield potential
Whole year: Arabica coffee, pyrethrum (higher places)

Pasture and forage
1–1.2 ha/LU on sec. pasture, more ha if degraded; about 0.6 ha/LU on art. pasture of Rhodes grass; down to 0.22 ha/LU feeding Bana or Napier grass and Silverleaf desmodium (Desmodium uncinatum) or Siratro as fodder legumes

UM 3	= *Marginal Coffee Zone*
vl i or	*with a very long cropping season and intermediate rains,*
l/m ⌐	*dividable in a long to medium cropping season*
(m/s) i	*followed by a (weak) medium to short one and i.r.*

Dominating in UM 2–4. Potential almost as UM 2 vl i or 1/m ⌐ (m/s) i but coffee mainly marginal because of diseases and unsuitable rainfall distribution during the year (the lack of contrasts between the seasons discourages flowering)

UM 3	= *Marginal Coffee Zone*
vl i or	*with a very long cropping season and intermediate rains,*
l/m ⌐	*dividable in a long to medium cropping season*
(m) i	*followed by a (weak) medium one and i.r.*

Occurs in UM 2–4. Potential almost as UM 3 m/l ⌐ (m) i

UM 4 = *Sunflower-Maize Zone*

UM 4	= *Sunflower-Maize Zone*
f m i ⌐	*with a fully medium cropping season and intermediate rains*
f (s)	*followed by a (weak) fully short one*

Good yield potential
1st rains, start norm. F./Mch.: M. mat. maize like H 512–514, 622, 633 (~ 60 %), m. mat. sorghum, finger millet (~ 60 %); beans, chick peas (~ 60 %); sweet potatoes; m. mat. sunflowers, m. mat. soya beans (~ 60 %); onions
Whole year: Sisal, castor

Fair yield potential
1st rains: Potatoes; tomatoes, cabbages, kales, spinach
2nd rains, start norm. Nov.: E. mat. sorghum, finger millet (~ 40 %); v. e. and e. mat. beans, chick peas
Whole year: Pineapples, mountain pawpaws (~ 40 %), Macadamia nuts

Pasture and forage
1–1.5 ha/LU on mixed savanna pasture, 1 ha on black soils; horse tamarind (Leucaena leucocephala) and saltbush (Atriplex nummularia) best suitable fodder shrubs on free draining soils, Siratro and moth bean vines as fodder legumes

UM 4	= *Sunflower-Maize Zone*
m/s +	*with a medium to short cropping season*
(vs/s)	*and a (weak) very short to short one*

Small; steep slopes, shallow and infertile soils on quartzite. No good yield potential except on patches in valleys

UM 3–4 = *(Coffee-) Maize Zone*

Because of relatively hot temperature, the quality and performance of Arabica coffee can be so poor that as main crops maize and sunflower (= zone 4) may suit better, also due to moisture conditions and degradation stages of the natural potential (see AEZ map of Trans Mara with vegetation. Min. of Agr., Nairobi)

UM 5 = *Livestock-Sorghum Zone*

UM 5	= *Livestock-Sorghum Zone*
(m/s) +	*with a (weak) medium to short cropping season*
(s/vs)	*and a (weak) short to very short one*

Good yield potential
1str rains, start norm. March: Safflor
Whole year: Sisal (~ 60 %)

Fair yield potential
1st rains: Cold tol. sorghum (higher places), e. mat. sorghum (lower places); e. mat. beans like Canadian Wonder or Mexican 142, chick peas; m. mat. sunflower like Vympel
2nd rains, start norm. end of Oct.: Dwarf sorghum; chick peas, rai (oilseed Brassica juncea, var. from Jodhpur)
Whole year: Buffalo gourds[6] (on light soils), Marama beans[6]

Pasture and forage
More than 1.5 ha/LU on open grassland with red oats grass (Themeda triandra) dominating; moth bean vines as fodder legume on deep soils, saltbush as fodder shrub on shallow soils

UM 5 (s/m) + (vs/s) = *Livestock-Sorghum Zone with a (weak) short to medium cropping season and a (weak) very short to short one*

Fair yield potential
1st rains, start norm. March: Dwarf sorghum; chick peas, v. e. mat. beans; safflor
Whole year: Buffalo gourds[6] (on light soils), Marama beans[6]

Pasture and forage
More than 2 ha/LU on open grassland; moth bean vines in first rains on deep soils; saltbush on shallow soils

UM 5 f (s) + (vs/s) = *Livestock-Sorghum Zone with a fully (weak) short cropping season and a (weak) very short to short one*

Partly on suitable soils and better watered places in UM 5–6. Potential almost as above but tending to poor yields. Stocking rate more than 3 ha/LU

UM 5–6 = *Transition between Livestock-Sorghum Zone and Ranching Zone*

Zone 6 is more and more dominating towards the plains, 5 mainly on pediments and places still covered by non-thorny high bush vegetation. More than 3.5 ha/LU

UM 6 = *Upper Midland Ranching Zone*

UM 6 b r = *Upper Midland Ranching Zone with bimodal rainfall*

No rainfed agriculture possible

Pasture and forage
More than 4 ha/LU on short grassplains and flute acacia savanna; saltbush to plant in areas with less suitable grassland conditions regarding soils

LM = *LOWER MIDLAND ZONES*

LM 2 = *Marginal Sugar Cane Zone*

LM 2 l/m – (m) i = *Marginal Sugar Cane Zone with a long to medium cropping season followed by a (weak) medium one and intermediate rains*

Very good yield potential
1st rains, start norm. end of Febr.: M. mat. sorghum, m. mat. bulrush millet (awned var.); sweet potatoes; m. mat. soya beans, e. mat. sunflower like 252; sweet pepper, chillies, pumpkins

Good yield potential
1st rains: M. mat. maize like H 511–513 (60–70 %), H 622 (~ 60 %), late mat. sorghum, finger millet; beans, pigeon peas, late mat. groundnuts (rosette resistant var.); m. mat. sunflower like HS 301 A, late mat. soya beans; tomatoes, onions

[6] Still experimental

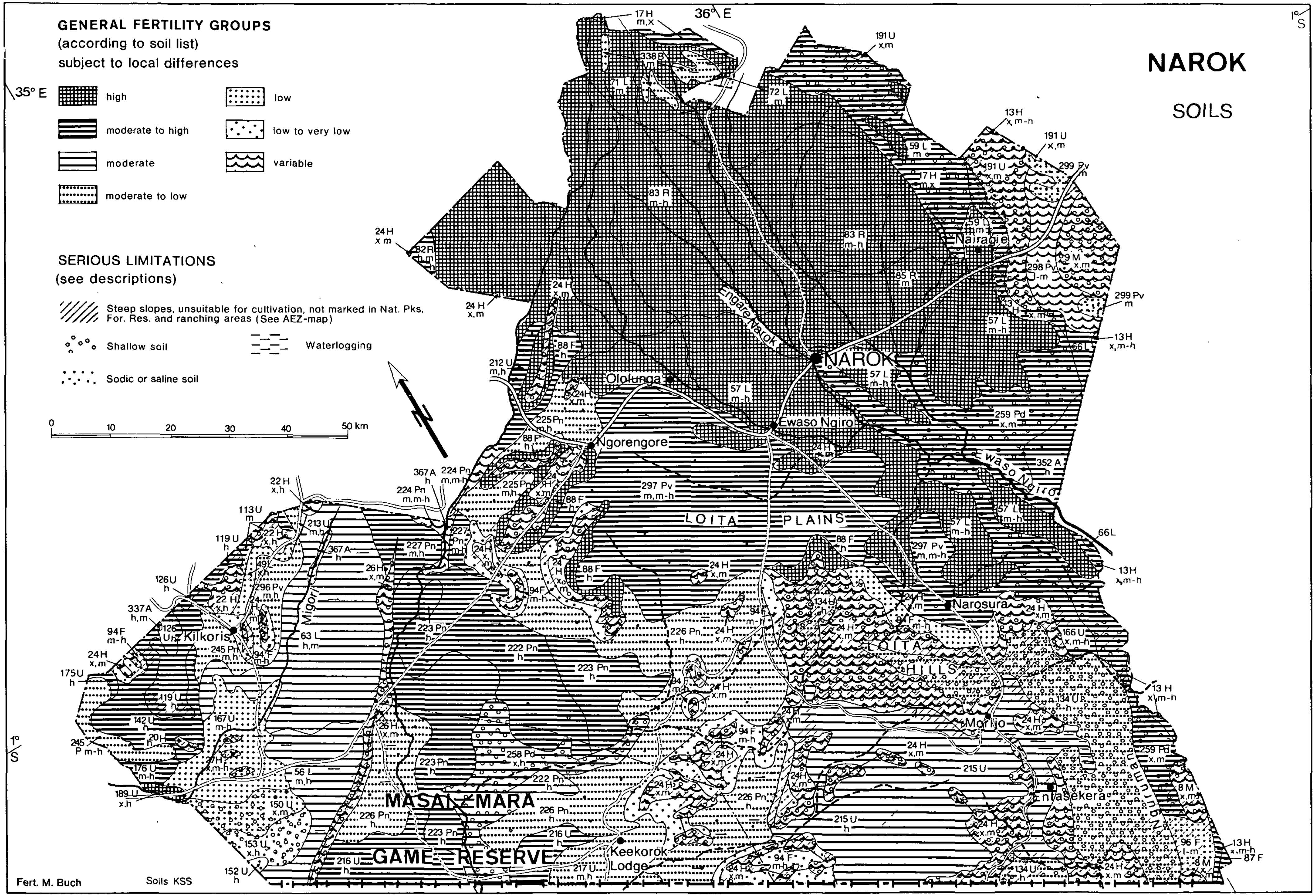
2nd rains, start indist. about end of Aug.: Green grams (up to 1 250 m); e. mat. sunflower (~ 60 %)
Whole year, best pl. time end of F.: Cassava, pawpaws (70–80 %), bananas (~ 60 %) on deep soils, yam beans, sisal

Fair yield potential

1st rains: Rice in mbugas, cowpeas; tobacco, cotton (50–60 %, low quality, danger of rain in open bolls); cabbages, kales, egg plants
2nd rains: M. mat. sorghum, m. mat. maize (40–50 %), bulrush millet (awned var.); beans (higher places), cowpeas (lower places), bambarra groundnuts (in light soils); sweet potatoes (~ 40 %)
3rd rains, start norm. end of Oct.: V. e. mat. minor millets (50–60 %), dwarf sorghum (40–50 %)
Whole year: Sugar cane, pineapples, sisal, citrus (low qual.), mangoes (endangered by fungus diseases)

Pasture and forage

0.6–1.2 ha/LU on sec. high grass savanna with Zebra grass (Hyparrhenia rufa) and Guinea grass (Panicum maximum); down to about 0.15 ha/LU feeding Napier or Bana grass, Banana leaves and forage legumes (Desmodium a. o.)


NAROK
SOILS
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
moderate to high
moderate
moderate to low
low
low to very low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Waterlogging
Sodic or saline soil
0 10 20 30 40 50 km
35° E
36° E
1° S
NAROK
Nairagie
Ololunga
Ewaso Ngiro
Ngorengore
Narosura
Morijo
Entasekera
Kilkoris
Keekorok Lodge
Engare Narok
Ewaso Ngiro
Migori
LOITA PLAINS
LOITA HILLS
MASAI MARA
GAME RESERVE
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The Mau escarpment is a most impressive scarp in the north Narok area. South of Narok, volcanic plains are extensive and include the Loita Plains.

A variety of soils occur on the hills and minor scarps (13 H, 16 H, 17 H, 20 H). They are of moderate to high fertility, if they are not too stony. Southeast of Bomet (Narok) the soils of the hills are very low in fertility (24 H). In the north Narok area, the most extensive units are 83 R, soils of high fertility. North of Narok the unit 85 R is also extensive. These soils have a humic topsoil and are of high fertility but they are very sensitive to erosion. The escarpment consists of a number of plateaus on the western side of the Rift Valley. Unit 57 L with a high fertility is found here.

On the footslopes, soils of unit 88 F have a humic topsoil and high fertility. The volcanic plain south of Narok is dominated by soils of units 222 Pn, 223 Pn, 297 Pv of a moderate to high fertility. Bottomlands occur within some of the plateaus. They have soils of a low to moderate fertility (unit 338 B). The alluvial plains consist of soil units 352 A which is of moderate to high fertility and 367 A of variable fertility.

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

8 M x, m[1)]	= well drained, shallow, dark brown, firm, rocky and stony, clay loam (eutric REGOSOLS; with Rock Outcrops)

Soils developed on ashes and other pyroclastic rocks of recent volcanoes

9 M x, m	= somewhat excessively drained, shallow to moderately deep, brown to dark brown, firm and slightly smeary, strongly calcareous, gravelly to stony clay loam; in many places saline and/or sodic and with inclusions of lava fields (ando-calcaric REGOSOLS)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

13 H x, m	= well drained, shallow, dark reddish brown, friable, very calcareous, bouldery or stony, loam to clay loam; in many places saline (LITHOSOLS; with calcic XEROSOLS, bouldery and saline phase and Rock Outcrops)

Soils developed on ashes and other pyroclastic rocks of recent volcanoes

16 H x, m—h	= somewhat excessively drained, shallow, dark brown to brown, friable and slightly smeary, rocky and stony clay loam (ando-eutric CAMBISOLS, lithic and stony phase; with Rock Outcrops)
17 H m, x	= complex of: — well drained, deep to very deep, dark brown to greyish brown, friable and smeary clay loam, with thick humic topsoil (mollic ANDOSOLS) — somewhat excessively drained, shallow, dark brown to brown, friable and slightly smeary, rocky and stony clay loam (ando-eutric CAMBISOLS, lithic and stony phase; with Rock Outcrops)

Soils developed on basic igneous rocks (serpentinites, basalts, nepheline phonolites; older basic tuffs included)

20 H x, h	= somewhat excessively drained, shallow to moderately deep, dark reddish brown, friable, gravelly clay, with acid humic topsoil (humic CAMBISOLS, partly paralithic phase)

Soils developed on acid igneous rocks (rhyolites, aplites), with recent volcanic ash admixture

22 H x, h	= somewhat excessively drained, shallow, dark reddish brown, friable, gravelly clay; in places with humic topsoil, partly acid (RANKERS; with ando-haplic PHAEOZEMS, lithic phase and LITHOSOLS)

Soils developed on quartzites

24 H x, m	= somewhat excessively drained, shallow, dark brown, very friable, rocky, sandy loam to clay loam; in many places with acid humic topsoil (RANKERS; with LITHOSOLS and Rock Outcrops)

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

26 H x, m	= somewhat excessively drained, shallow, reddish brown, friable, rocky or stony, sandy clay loam (eutric REGOSOLS; with Rock Outcrops and calcic CAMBISOLS)
27 H x, m—h	= complex of excessively drained to well drained, shallow, dark red to brown, friable sandy clay loam to clay; in many places rocky, bouldery and stony and in places with acid humic topsoil (dystric REGOSOLS; with LITHOSOLS, humic CAMBISOLS lithic phase and Rock Outcrops)

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older, basic tuffs included)

49 L x, h	= well drained, shallow to very deep, dark red, friable clay; in many places rocky and bouldery (nito-rhodic FERRALSOLS and nito-chromic CAMBISOLS, lithic and/or bouldery phase)
56 L m, h	imperfectly drained, very deep, very dark greyish brown to black, very firm, cracking clay, with a topsoil of friable, humic clay loam (verto-orthic GREYZEMS)

Soils developed on volcanic ashes and other pyroclastics of recent volcanoes

57 L m—h	= well drained, moderately deep to very deep, dark brown, friable and slightly smeary, clay loam to clay (ando-luvic PHAEOZEMS)
59 L m	= well drained, deep to very deep, very dark greyish brown, friable and smeary, loam to clay loam, with a thick humic topsoil (mollic ANDOSOLS)

Soils developed on biotite-hornblende granites, with volcanic ash admixture

63 L
h, m
= imperfectly drained, very deep, very dark greyish brown to black, very firm sandy clay, with a topsoil of friable, humic, sandy clay loam to clay loam (orthic GREYZEMS)

Soils developed on quartzites

64 L
h
= well drained, deep to very deep, reddish brown, friable clay, with acid humic topsoil (humic FERRALSOLS)

SOILS ON STEP-FAULTED FLOOR OF THE RIFT VALLEY

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older basic tuffs included)

66 L
x, m—h
= well drained, moderately deep, dark reddish brown to reddish brown, friable to firm and slightly smeary, bouldery and stony, clay loam to clay; in places calcareous (ando-chromic CAMBISOLS, bouldery phase; with calcic XEROSOLS)

SOILS ON PLATEAU/UPPER-LEVEL UPLAND TRANSITIONS

Soils developed on ashes and other pyroclastic rocks from recent volcanoes

72 L
m
= well drained, deep to very deep, very dark greyish brown, friable and smeary, clay loam, with thick humic topsoil (mollic ANDOSOLS)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included) and with volcanic ash admixture

82 R
h, m—h
= association of:
- well drained, extremeley deep, dark reddish brown, friable and slightly smeary clay, with acid humic topsoil; on interfluves (ando-humic NITOSOLS)
- well drained, shallow to moderately deep, dark brown, friable, clay loam to clay, with acid humic topsoil; on valley sides (humic CAMBISOLS, partly lithic phase)

Soils developed on ashes and other pyroclastic rocks from recent volcanoes

83 R
m—h
= association of:
- well drained, very deep, dark reddish brown, very friable and smeary, sandy clay loam to clay, with thick humic topsoil; on interfluves (mollic ANDOSOLS)
- well drained, shallow to moderately deep, dark brown to dark reddish brown, very friable and slightly smeary, clay loam to clay; on valley sides (ando-eutric CAMBISOLS, partly lithic phase)

85 R
m
= well drained, moderately deep to deep, dark yellowish brown, friable and smeary, sandy clay loam to clay loam, with humic topsoil (mollic ANDOSOLS)

SOILS ON FOOTSLOPES

Soils developed on colluvium from various volcanic rocks (mainly basalts)

87 F
h
= complex of well drained to moderately well drained, deep, reddish brown to very dark greyish brown, firm, sandy clay loam to clay; partly with humic topsoil and/or cracking; often moderately calcareous (LUVISOLS, undifferentiated, luvic PHAEOZEMS and chromic VERTISOLS)

Soils developed on colluvium from ashes and other pyroclastic rocks of recent volcanoes

88 F
h
= well drained to moderately well drained, very deep, dark brown, friable and slightly smeary clay, with humic topsoil (ando-luvic PHAEOZEMS)

Soils developed on colluvium from quartzites

94 F
m—h
= well drained, deep to very deep, reddish brown to yellowish red, friable, sandy loam to clay, often with acid humic topsoil (humic ACRISOLS; with luvic ARENOSOLS)

Soils developed on colluvium from undifferentiated Basement System rocks

96 F
l—m
= well drained, very deep, yellowish red to dark reddish brown, friable, coarse loamy sand to sandy clay loam (chromic LUVISOLS; with rhodic FERRALSOLS and luvic/ferralic ARENOSOLS)

SOILS ON UPPER-LEVEL UPLANDS

Soils developed on intermediate igneous rocks (syenites, trachytes, andesites), with volcanic ash admixture

119 U
h
= well drained, deep to extremely deep, reddish brown, friable clay, with thick humic topsoil ((dystro-) mollic NITOSOLS and chromo-luvic PHAEOZEMS)

SOILS ON UPPER MIDDLE-LEVEL UPLANDS

Soils developed on intermediate igneous rocks (syenites, andesites, etc.), with volcanic ash admixture

126 U
h
= well drained, extremely deep, reddish brown, friable clay, with thick humic topsoil ((dystro-) mollic NITOSOLS)

Soils developed on quartzites

134 U
h
= well drained, very deep, dark reddish brown, friable to firm, sandy clay to clay, with humic topsoil (chromo-luvic PHAEOZEMS)

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on basic igneous rocks (basalts, etc.)

142 U h = well drained, deep to extremely deep, dark red, friable clay, with thick humic topsoil (mollic NITOSOLS; with nito-luvic PHAEOZEMS)

Soils developed on acid igneous rocks (rhyolites, etc.)

148 U x, m—h = well drained, moderately deep to deep, reddish brown to brown, friable, gravelly clay loam to clay; in many places with a humic topsoil (chromo-luvic PHAEOZEMS and orthic LUVISOLS)

Soils developed on granites

150 U x, m = imperfectly drained, moderately deep, brown to dark yellowish brown, mottled, friable, gravelly sandy clay loam, in places rocky and shallow (gleyic ACRISOLS, partly paralithic and rocky phase)

Soils developed on biotite/hornblende granites

152 U h = well drained, very deep, reddish brown to red, friable clay, with thick acid humic topsoil (nito-humic FERRALSOLS)

153 U x, h = well drained, moderately deep to deep, yellowish red to red, friable to firm, clay, partly with acid humic topsoil; in places shallow and rocky (humic to chromic ACRISOLS; with LITHOSOLS and Rock Outcrops)

Soils developed on undifferentiated Basemant System rocks, with volcanic ash admixture

166 U x, m—h = well drained, moderately deep to deep, reddish brown to red, firm, stony sandy clay to clay loam, with humic topsoil (chromo-luvic PHAEOZEMS)

Soils developed on various rocks (Kavirondian sediments, often mudstones)

167 U m—h = imperfectly drained, moderately deep to deep, very dark greyish brown, firm, sandy clay loam to sandy clay; in places mottled and/or with humic topsoil (humic to gleyic ACRISOLS)

SOILS ON LOWER-LEVEL UPLANDS

Soils developed on acid igneous rocks

176 U m—h = complex of predominantly well drained, moderately deep to deep, reddish brown to brown, friable, gravelly clay loam to clay, often with a humic topsoil; in many places shallow over petroplinthite (chromo-luvic PHAEOZEMS and orthic and chromic LUVISOLS; with "murram cuirass" soils)

Soils developed on various rocks (Kavirondian sediments, often mudstones)

189 U x, h = moderately well drained, moderately deep, dark brown to dark greyish brown, friable gravelly clay, over petroplinthite, with humic topsoil; in places shallow over petroplinthite (haplic PHAEOZEMS, petro-ferric phase; with "murram cuirass" soils (10—40 %)

SOILS ON UPLANDS, UNDIFFERENTIATED LEVELS

Soils developed on undifferentiated volcanic rocks (mainly basalts)

191 U x, m = well drained, shallow, dark brown, friable, strongly calcareous, stony loam, often strongly saline and moderately sodic; with stone mantle (desert pavement); (dissected older piedmont plain) (calcaric REGOSOLS, stone-mantle and saline-sodic phase)

SOILS ON UPLAND-PLAIN TRANSITIONAL LANDS

Soils developed on basic igneous rocks (basalts, etc.) and with volcanic ash admixture

212 U m, h = association of:
- imperfectly drained, deep, very dark greyish brown to very dark grey, very firm clay, abruptly under-lying a topsoil of friable silty clay loam; on straight to convex slopes (eutric PLANOSOLS)
- imperfectly drained, deep, very dark greyish brown to very dark grey, very firm, cracking clay; in places sodic; on flat interfluves (chromic VERTISOLS)

Soils developed on acid igneous rocks (rhyolithes), with volcanic ash admixture

213 U m, h = association of:
- poorly drained, deep, very dark grey, very firm, cracking clay, often abruptly underlying a topsoil of friable humic loam on flat parts (eutric PLANOSOLS; with chromic VERTISOLS)
- well drained, moderately deep, dark reddish brown, firm clay loam, with humic topsoil; on slopes (chromo-luvic PHAEOZEMS)

Soils developed on biotite gneisses

215 U h = association of:
- imperfectly drained, moderately deep to deep, dark brown to dark grey, firm, sandy clay to clay; on convex to straight slopes (verto-eutric PLANOSOLS)
- imperfectly drained, very deep, very dark greyish brown to black, firm to very firm, cracking clay, with calcareous and sodic deeper subsoil; on concave slopes (pellic VERTISOLS, sodic phase)

Soils developed on biotite gneisses and with volcanic ash admixture

216 U h = imperfectly drained, deep, very dark greyish brown to black, firm clay, with sodic deeper subsoil (verto-luvic PHAEOZEMS, sodic phase)

217 U m, h = imperfectly drained, deep, dark greyish brown to dark grey, very firm, sandy clay to clay, abruptly underlying a topsoil of friable loam (euric PLANOSOLS)

SOILS ON NON-DISSECTED EROSIONAL PLAINS

Soils developed on basic igneous rocks (basalts, etc.) and with volcanic ash admixture

222 Pn h = imperfectly drained, deep, very dark greyish brown to black, very firm, cracking clay, with calcareous deeper subsoil; in places saline and sodic (*pellic* VERTISOLS, partly saline-sodic phase)

223 Pn h = imperfectly drained, deep, dark brown to dark grey, firm, sandy clay to clay (verto-eutric PLANOSOLS)

Soils developed on granites, with volcanic ash admixture

224 Pn m, m–h = imperfectly drained, deep, dark greyish brown, mottled, very firm, gravelly clay loam to clay, abruptly underlying a thick topsoil of friable loam (eutric PLANOSOLS)

Soils developed on granites, with predominant volcanic ash influence

225 Pn m, h = imperfectly drained, moderately deep, very dark greyish brown, very firm, slightly sodic, gravelly clay, abruptly underlying a topsoil of friable loam (solodic PLANOSOLS)

Soils developed on biotite gneisses, with volcanic ash admixture

226 Pn h = imperfectly drained, deep, brown to dark grey, firm clay, with calcareous and sodic deeper subsoil (verto-eutric PLANOSOLS, sodic phase)

227 Pn m, h = imperfectly drained, deep, very dark grey to very dark greyish brown, very firm clay (hardpan), with a topsoil of friable clay loam (verto-orthic GREYZEMS)

Soils developed on various rocks (Kavirondian sediments, often mudstones)

245 Pn m, h = complex of:
- poorly drained, deep, dark grey, mottled, firm clay, abruptly underlying a topsoil of friable silt loam (eutric PLANOSOLS)
- moderately well drained to imperfectly drained, shallow soils over petroplinthite ("murram cuirass" soils)

SOILS ON DISSECTED EROSIONAL PLAINS

Soils developed on biotite gneisses

258 Pd x, h = well drained to moderately well drained, shallow, dark brown to black, gravelly and stony clay (verto-luvic PHAEOZEMS, lithic and stony phase)

Soils developed on various volcanic rocks

259 Pd x, m = well drained, predominantly shallow, dark reddish brown to dark brown, friable to firm, sandy clay loam to clay loam; in places rocky (chromo-luvic PHAEOZEMS, lithic phase; with Rock Outcrops)

SOILS ON VOLCANIC PLAINS

Soils developed on ashes and pumice from recent volcanoes

296 Pv m, h = poorly drained, deep, black, very firm clay, abruptly underlying a topsoil of friable loam; with a calcareous deeper subsoil (eutric PLANOSOLS)

297 Pv m, m–h = imperfectly drained, moderately deep to deep, firm to very firm, slightly sodic, silty clay loam to clay, abruptly underlying a thick topsoil of friable silt loam to clay loam (solodic PLANOSOLS)

298 Pv l–m = excessively drained to well drained, very deep, dark greyish brown to olive grey, loose to very friable, stratified, calcareous, fine sand to fine sandy loam or silt (ando-calcaric REGOSOLS)

299 Pv m = imperfectly drained, very deep, yellowish brown to olive grey, friable, slightly saline and slightly sodic, sandy loam to silt loam, with a brittle and strongly sodic deeper subsoil ((ando-) gleyic SOLONETZ, saline and fragipan phase)

SOILS ON LACUSTRINE PLAINS

Soils developed on sediments from volcanic ashes and other sources

320 Pl h = imperfectly drained to poorly drained, very deep, dark greyish brown to dark brown, firm to very firm, slightly to moderately calcareous, slightly to moderately saline, but moderately to strongly sodic, silt loam to clay, often with humic topsoil (subrecent lake sides of the central Rift Valley) (SOLONETZ, undifferentiated, saline phase)

SOILS ON BOTTOMLANDS

Soils developed on infill from volcanic ashes

338 B m = imperfectly drained to poorly drained, moderately deep, dark greyish brown, mottled, very firm clay loam (hardpan), abruptly underlying a topsoil of acid humic friable loam (humic PLANOSOLS)

SOILS ON FLOODPLAINS

Soils developed on sediments mainly from volcanic ashes

352 A h = well drained to moderately well drained, very deep, dark greyish brown to yellowish brown, friable stratified, silty clay loam to clay; in places slightly to moderately saline and slightly to moderately sodic (eutric FLUVISOLS, partly saline-sodic phase)

Soils developed on sediments from various sources (recent floodplains)

367 A = poorly drained, deep, dark greyish brown, mottled, firm clay, with acid humic topsoil
h (humic GLEYSOLS)

SOILS ON SEASONAL SWAMPS

369 S = poorly drained to very poorly drained, very deep, dark greyish brown to dark olive grey, firm to very firm, strongly calcareous,
h strongly saline and strongly sodic clay; in many places with fragipans at various depths (gleyic SOLONCHAKS, sodic phase and partly fragipan phase)

1) Soil texture-classes

h	=	heavy
l	=	light
m	=	medium
x	=	stony or bouldery
v	=	varying texture
m–h	=	medium to heavy
m, h	=	medium and heavy (e. g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey:
Exploratory Soil Map and Agro-climatic Zone Map of Kenya, scale 1 : 1 000 000 Rep. E 1, Nairobi 1982. See this map also for colours. Symbols simplified here.

POPULATION AND LAND

The latest population statistics (Census of September 1979) show that a total of 210,306 people live on a rural area of 1,608,700 ha in the Narok District, of which 1,350,100 ha is suitable for ranching and a small part for agricultural land (Table 4 and 6). Only 9,242 people live in urban settlements, in the Narok townships (5,690 people) and Oldokurto (1,710 people) and in the Kilgoris trading centre (1,842 people, Table 4). Consequently, 95.5 % of the total population of the district rely on livestock, and some of them partly on agriculture. An average Masai household of 5.54 people had 33.49 ha available for livestock. This size is already marginal for ranching areas.

In some locations of the Narok District, land shortages occur e.g. in Emarti (3.50 ha per household/0.52 ha per person) and Moitanik (9.20 ha per household/1.53 ha per person), both situated in the Kilgoris Divsion (Table 6). This is due to some immigrants from the Kisii and Kipsigis tribes who have settled here and grow maize. In LH 1–2 and UM 2–4 the climatic conditions are suitable for maize cultivation.

In the Ildamat location, the land at the disposal of a family is below the minimum necessary in a ranching area due to the fact that here, a high percentage of land is used to grow wheat, as UH 2 and 3 are mainly found in this location.

In the Loita location, however, large areas (70.90 ha per household) are needed to support a family because in spite of relative climatic advantages, agriculture is often not possible as the soils (especially in LH 2 and 3) are extremely shallow and thus the sensitivity to soil erosion and degradation is very high. It is essential to maintain the 27,459 ha Forest Reserve. A similar problem exists in the Mau Division because the volcanic ashes there are young i.e. only weathered to a shallow depth, and the land is comparatively slopy.

In future, these factors must be carefully considered in any plans to improve the general situation, so that the natural potential is not destroyed by over-exploitation.

NAROK DISTRICT

TABLE 4: POPULATION PER LOCATION AND DIVISION
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Olokurto	5 324	5 235	10 559	1 749	960	10
Enabelbel	5 363	4 636	9 999	1 579	691	14
Upper Melili	3 370	3 502	6 872	1 391	358	19
Lower Melili	10 541	9 450	19 991 [1]	4 342 [2]	1 076	18
Ildamat	2 456	2 344	4 800	923	339	14
Keekonyokie	9 446	9 349	18 795	3 707	1 131	16
Mosiro	2 404	2 451	4 855	738	497	9
Mau Division	38 904	36 967	75 871	14 429	5 056	15
Ololungu	11 228	11 411	22 639	4 113	1 095	20
Lemek	8 544	8 284	16 828	3 004	2 613	6
Narosura	4 879	4 950	9 829	1 554	2 139	4
Naikara	4 096	4 475	8 571	1 569	1 368	6
Loita	3 336	3 031	6 367	1 048	1 307	4
Osupuko Division	32 083	32 151	64 234	11 288	8 525	7
Emarti	9 038	9 818	18 856	3 299	266	70
Moitanik	9 205	10 146	19 351	3 218	404	47
Uasin Gishu	5 408	5 804	11 212	1 733	470	23
Siria	10 089	10 693	20 782	3 780	1 392	14
Kilgoris Division	33 740	36 461	70 201	12 030	2 533	27
Narok District	104 727	105 579	210 306	37 747	16 115	13

[1] Figure includes 5 690 people of Narok Township (urban).

[2] Figure includes 1 578 households of Narok Township (urban).

NAROK DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Olokurto	1746	3.34	1.45	0.74	0.51	6.04
Enabelbel	1565	3.25	1.43	0.67	0.85	6.20
Upper Melili	1388	2.65	1.21	0.71	0.38	4.95
Lower Melili	4325	2.75	0.96	0.46	0.42	4.54
Iidamat	922	2.95	1.46	0.45	0.34	5.20
Keekanyokie	3703	2.91	1.48	0.39	0.27	5.05
Mosiro	738	3.86	1.58	0.77	0.36	6.58
Division Mau	14387	2.99	1.27	0.54	0.43	5.22
Location:						
Ololungu	4111	3.07	1.55	0.60	0.28	5.50
Lemek	2998	3.30	1.31	0.58	0.41	5.60
Narosura	1542	3.90	1.48	0.60	0.27	6.26
Naikara	1563	3.50	1.40	0.34	0.24	5.48
Loita	1049	3.84	1.53	0.45	0.31	6.05
Division Osupuko	11263	3.38	1.44	0.55	0.31	5.68
Location:						
Emarti	3333	3.21	1.69	0.41	0.34	5.66
Moitanik	3211	3.31	1.75	0.70	0.26	6.02
Uasin Gishu	1720	3.36	1.55	0.84	0.60	6.35
Siria	3783	3.04	1.42	0.45	0.57	5.49
Division Kilgoris	12047	3.20	1.61	0.56	0.43	5.80
DISTRICT: NAROK	37697	3.16	1.44	0.55	0.39	5.54

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per households as well

TABLE 6: AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON

Location/Division without townships	in '00 ha = sqkm: Area total Census 79	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps	Non-agricultural land: Others (roads, home-steads, rivers...)	Agri-cultural land	TA I	UH 1	UH 2	UH 3	LH 1	LH 2	LH 2–3	LH 3	LH 4	LH 5	UM 1	UM 2–3	UM 3–4	UM 4	UM 5	UM 5–6	UM 6	LM 1	LM 2	Agric. land in ha per household	Agric. land in ha per person
						in '00 ha = sqkm – Area in agro-ecological zones – AEZ																				
Olokurto	960		F. 782	96	82	25		57																	4.69	0.78
Enabelbel	691	76	F. 245	69	301						108		193												19.06	3.01
Upper Melili	358	34		39	288	18	23	107	23				92	24						1					20.70	4.19
Lower Melili	1 200 (1 076)2)	13		108	1 079		67	336	6		6		169	157						265		73			24.90	5.40
Ildamat	210 (339)2)	7		34	169			53	34				61	14						7					18.31	3.52
Keekanyokie	1 131	55		113	963			78	3		194			190						305		193			26.00	5.12
Mosiro	497	5		50	442									19						273		150			59.89	9.10
Mau Division	5 047	190	1 027	506	3 324	43	90	631	66		308		515	404						851		416			26.52	4.85
Ololungu	1 095	35	F. 75	110	875						178		215	75						50	17	340			21.27	3.87
Lemek	2 613	93		261	2 259								56	107					85	466	394	1 151			75.20	13.42
Narosura	2 139	166	F. 19	214	1 740						1		15	159					12	315	189	1 049			111.97	17.70
Naikara	1 368	244		117	1 007								3	135	21					229	423	196			64.18	11.75
Loita	1 307	159	F. 274	131	743						5		135	229	121				128	88		37			70.90	11.67
Osupuko Division	8 522	697	368	833	6 624						184		424	705	142				225	1 148	1 023	2 773			58.68	10.31
Emarti	266		F. 138	13	115														30	85					3.49	0.61
Moitanik	404	29	F. 39	40	296					25	76						195								9.20	1.53
Uasin Gishu	470	24		47	399					104	6					105	131	12					41		23.02	3.56
Siria	1 392	60	F. 35	139	1 158					9		32				19	643	150	224					81	30.63	5.57
Kilgoris Division	2 532	113	212	239	1 968					138	82	32				124	969	162	254	85			41	81	16.82	2.88
Total rural area	16 101	1 000	1 607	1 578	11 916	43	90	631	66	138	574	32	939	1 109	142	124	969	162	479	2 084	1 023	3 189	41	81	33.55	5.93

1) For official land statistics see supplementary publication to FM-Handbook, Vol. III A: Agriculture Land Statistics

( )2) Census areas differing from measured areas in older maps

3) Most of it is only ranching land

AGRICULTURAL STATISTICS[1)]

NAROK DISTRICT

TABLE 7: **PYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[a)]

Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	44	32	14	14	21
Pyrethrin content %	1.2	1.3	1.3	1.3	1.3

a) Source: Pyrethrum Board

1) For more detailed and up to date information, see FMHB Vol. III A
No Small Farm Survey
No calculation of production levels

SOUTH-EAST KAJIADO DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

Kajiado District consists almost entirely of ranching zones except for two very small strips near Ngong and Sultan Hamud, and a larger one on the foothills of Kilimanjaro in southeast Kajiado. The description of the Agro-Ecological Zones is therefore confined to this larger area which is suitable for agriculture.

In this area, LH 2 and 3 occur to a very limited extent but wheat and fodder barley can be extended. The Upper Midland Zones start only with zone UM 3 i.e. the Coffee Zone is small, marginal and confined to an area around Oloitokitok. In the Sunflower-Maize Zone UM 4, only early maturing varieties should be planted because the rains occur in two separate short seasons. The same conditions prevail for sorghum in the next drier zone UM 5.

The Lower Midland Zones start with zone 4 only, i.e. cotton is climatically also marginal. In addition the soils are often too stony for this crop and cannot retain enough moisture.

The Livestock-Millet Zone LM 5 is as yet uncultivated but early or very early maturing millet and sorghum varieties could be planted here.

SOUTH-EAST KAJIADO DISTRICT

TABLE 1: RAINFALL FIGURES FROM VARIOUS STATIONS
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
9237004 1 960 m	Loitokitok District Office	30	Av.	821	73	66	115	109	40	2	2	1	3	69	222	124
			60 %1)	732	29	30	70	68	14	0	0	0	0	27	198	120
9237022 1 870 m	Loitokitok, Outward Mountain School	16	Av.	943	71	80	131	155	26	18	2	4	8	41	220	159
9337094 1 120 m	Rombo Mission	16	Av.	807	54	63	115	152	33	7	5	22	15	53	165	91

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years

SOUTH-EAST KAJIADO DISTRICT

TABLE 2: TEMPERATURE DATA

No. and altitude	Name of Station	AEZ1)	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
9237022 1 870 m	Loitokitok, Outward M. School	UM 3 hp – LH 2 lp	Mean max.	23.3	23.6	23.4	22.3	21.5	19.9	19.2	19.1	21.7	23.1	22.4	22.2	21.8	6
			Mean temp.	17.4	17.8	17.4	16.9	15.9	14.2	13.8	14.0	14.8	16.2	16.9	16.9	16.0 2)	
			Mean min.	11.4	12.0	11.4	11.6	10.3	8.5	8.5	8.9	7.9	9.4	11.4	11.6	10.2	
			Abs. min.	6.6	8.2	7.5	8.0	6.4	5.0	5.0	1.1	4.9	4.2	7.8	8.5	1.1	

1) AEZ = Agro-ecological zone; lp = lower places; hp = higher places within the zone
2) Low mean temperatures due to microclimatic influences

SOUTH-EAST KAJIADO DISTRICT

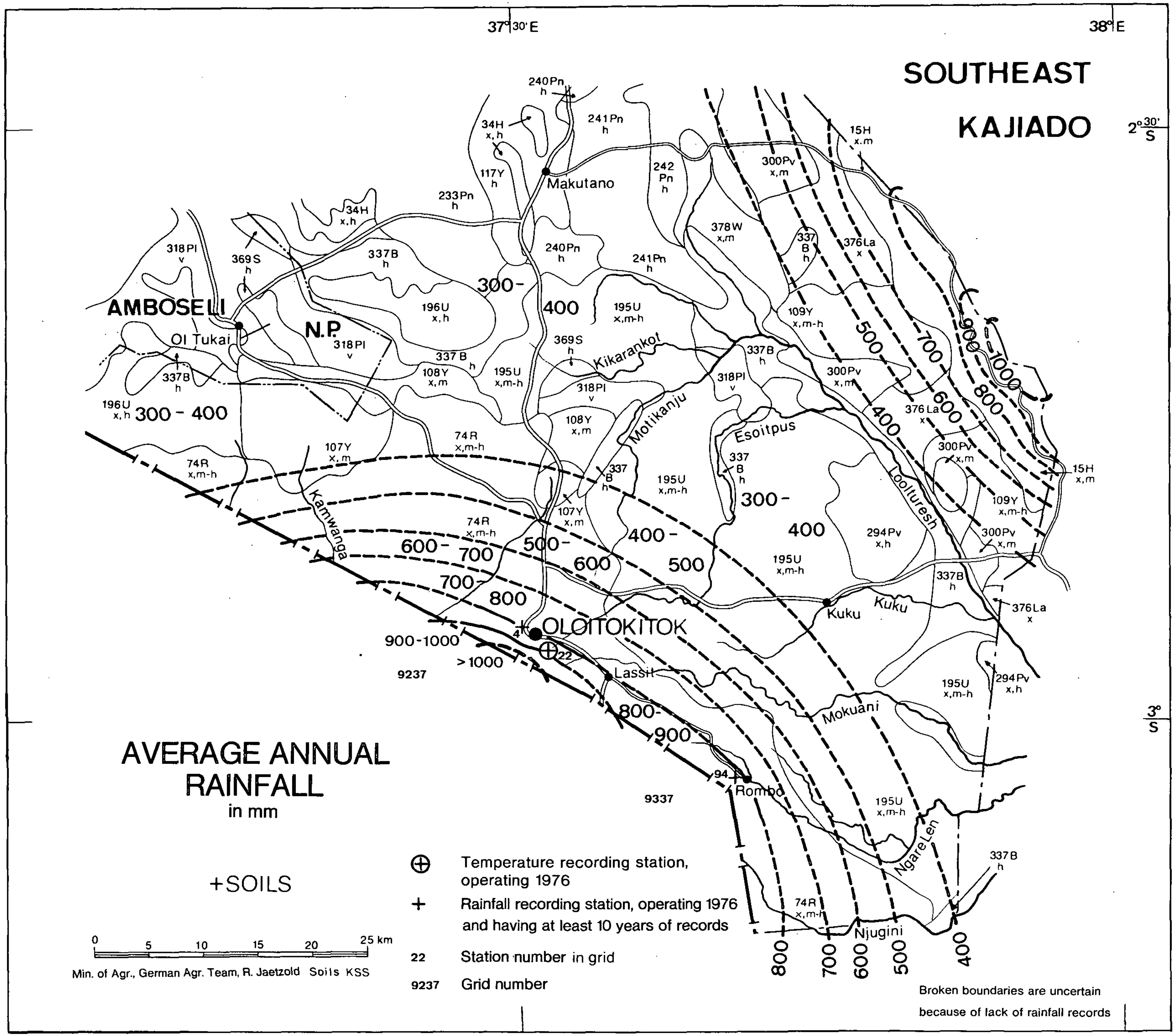
TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1)] 1st rains in mm	60 % reliability of rainfall[1)] 2nd rains in mm	60 % reliability of growing period 1st rains in days	60 % reliability of growing period 2nd rains in days	60 % reliability of growing period Total[2)] in days
LH 2 Wheat/Maize-Pyrethrum Zone	s/m + m	1 830–2 000	16.0–17.4	1 000–1 100	250–350	450–500	105–115	115–135	220–250[3)]
LH 3 Wheat/(Maize)-Barley Zone	s or s/m + m/s	1 830–1950	16.6–17.4	800–1 000	200–300	320–450	100–110	115–135	215–245[3)]
UM 3 Marginal Coffee Zone	s + m/s	1 760–1 830	17.5–18.0	800–1 000	200–250	370–440	85–105	115–135	200–240[3)]
UM 4 Sunflower-Maize Zone	s/vs + f s	1 430–1 760	18.0–19.0	700– 900	180–200	260–380	75–100	75–115	–
UM 5 Livestock Sorghum Zone	vs/s + vs/s	1 400–1 700	18.2–20.0	520– 720	160–180	180–260	65– 75	65– 75	–
LM 4 Marginal Cotton Zone	s/vs + s/vs	980–1 420	20.0–22.6	650– 850	160–180	250–330	75– 85	75– 85	150–170[3)]
LM 5 L. Midland Livestock-Millet Zone	vs/s + vs/s	970–1 390	20.1–22.7	420– 520	160–180	190–250	55– 75	55– 75	–
	vs/s + vs			520– 620	150–170	140–200	55– 75	45– 55	–
	vs + i			400– 500	140–160	130–180	45– 55	<45	–
LM 6 L. Midland Ranching Zone	b r	910–1 310	20.6–23.0	300– 450	100–150	100–150	–	–	–

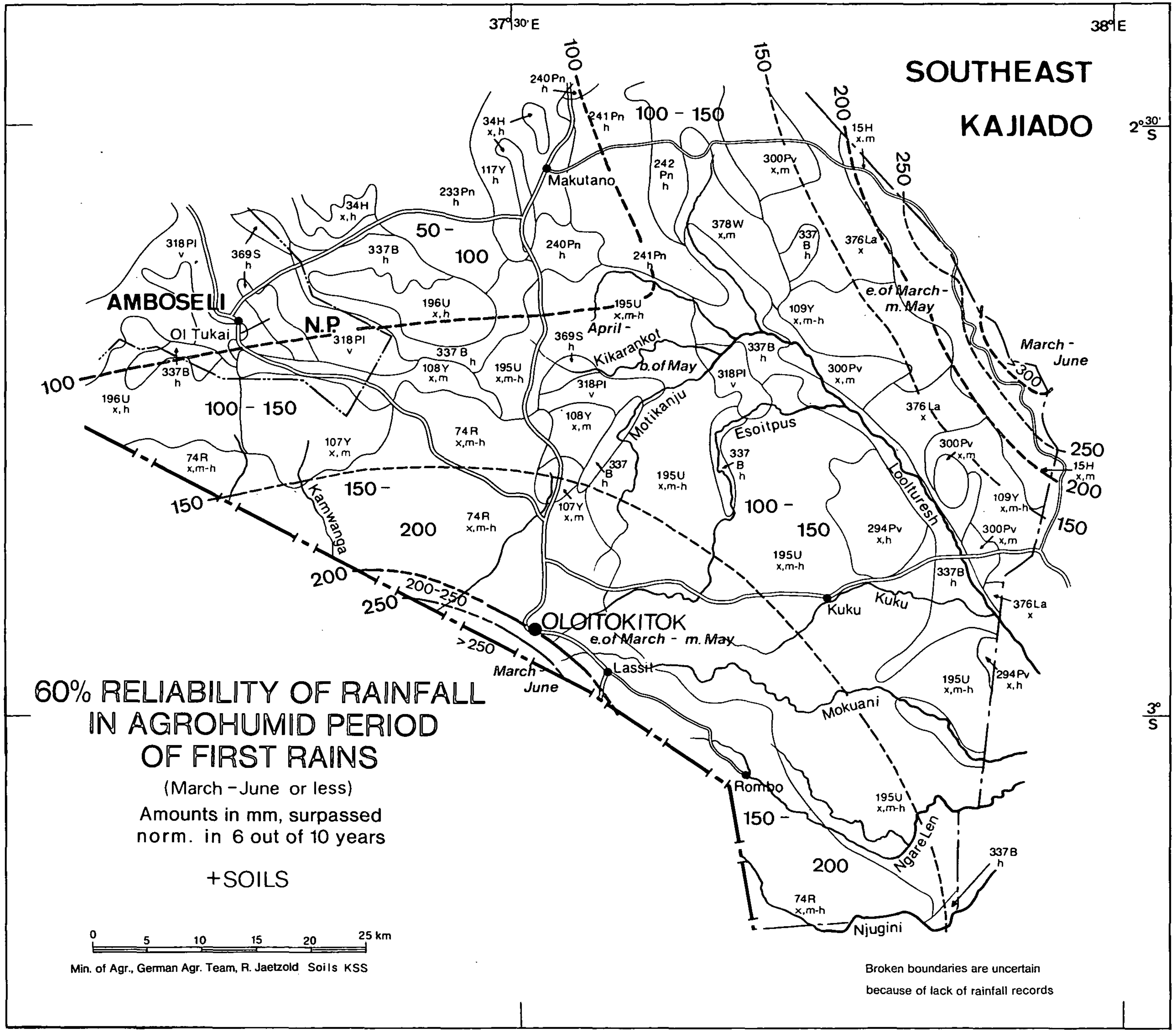
1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants

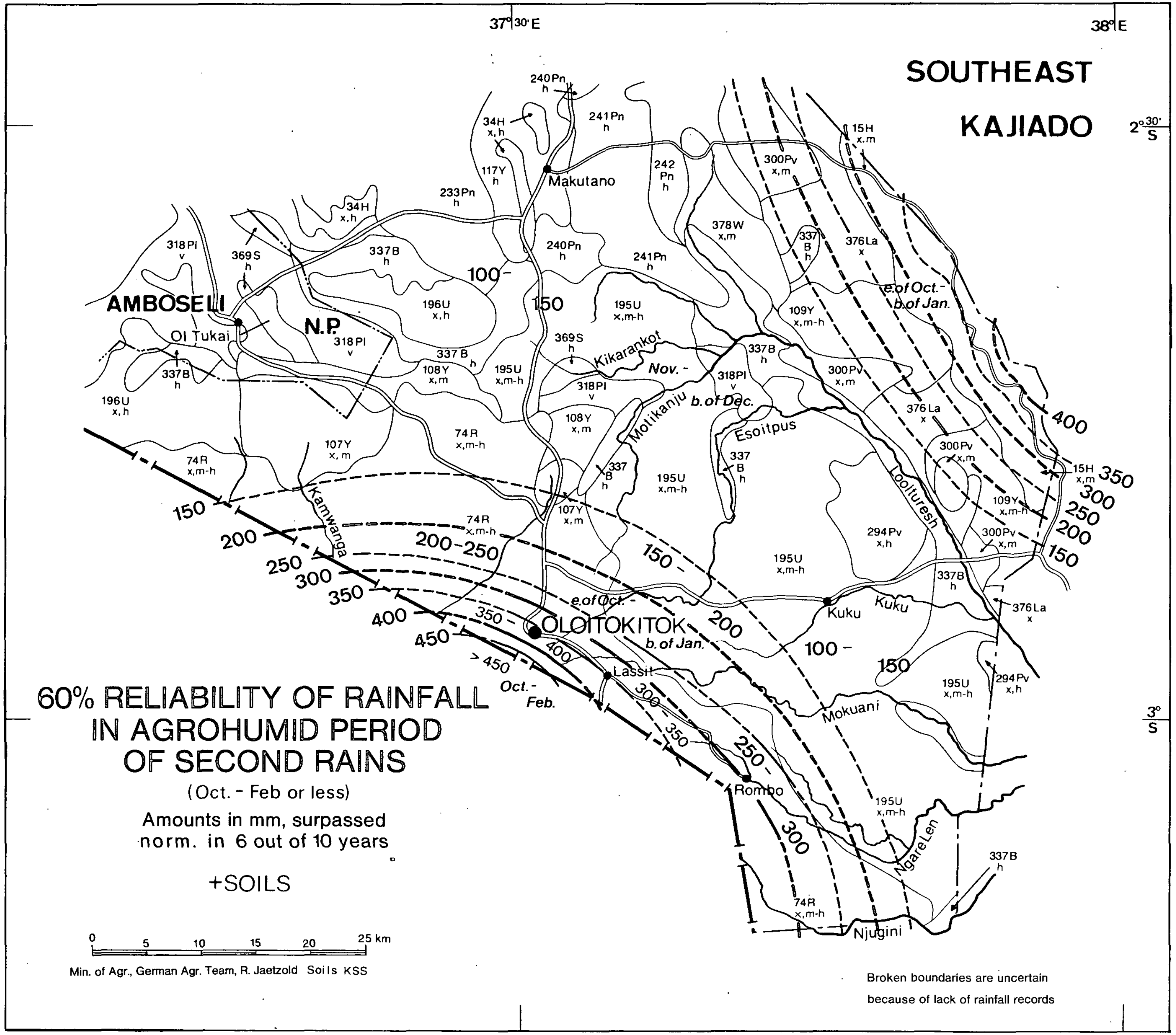
2) Only added if rainfall continues at least for survival (> 0.2 E_0) of most long term crops

3) There is a weak continuation of rainfall from the second rains to the first rains of the next year

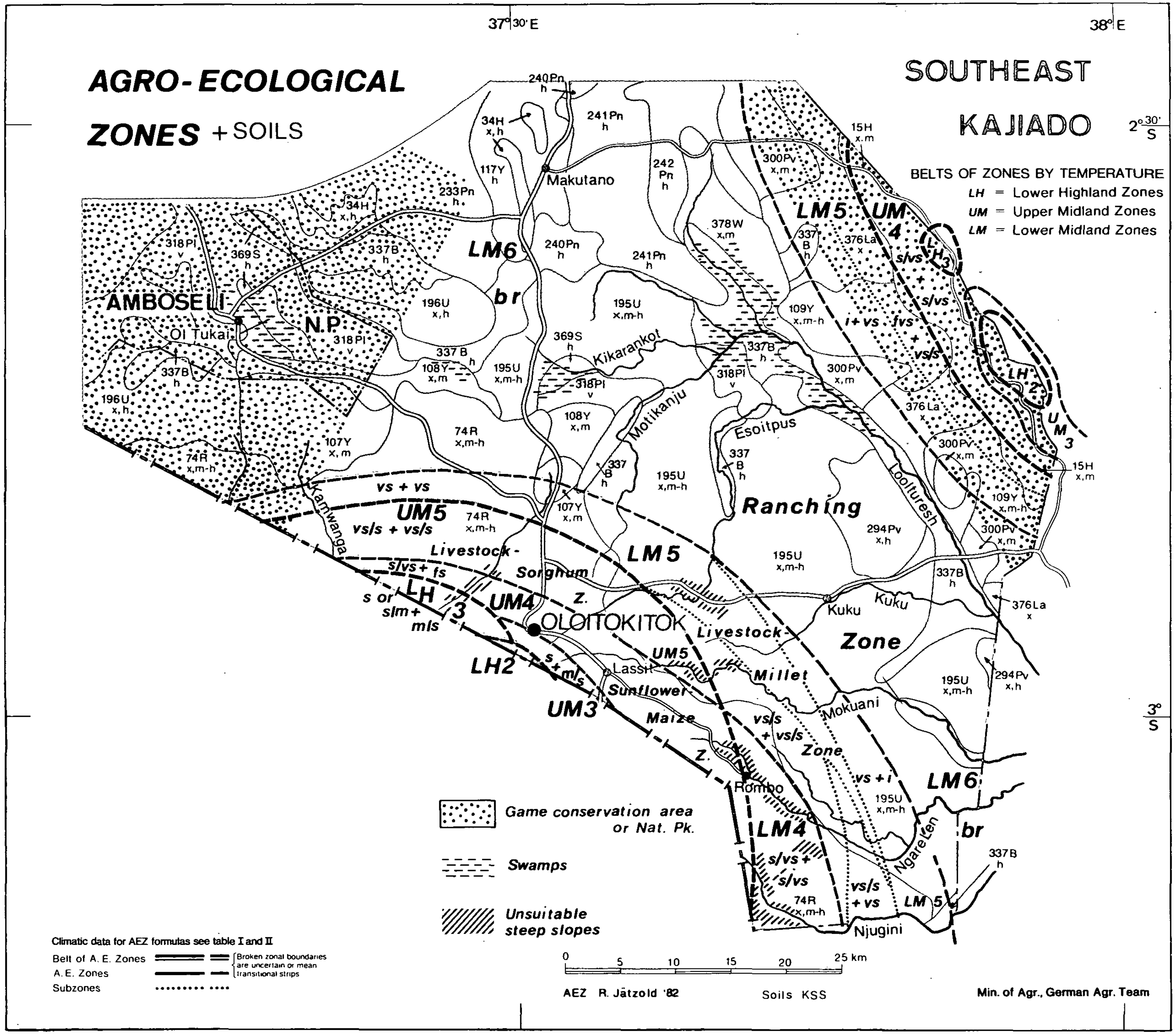


SOUTHEAST
KAJIADO
37°30'E
38°E
2°30' S
3° S
AMBOSELI
N.P.
Ol Tukai
Makutano
OLOITOKITOK
Lassit
Rombo
Kuku
Njugini
Kikarankot
Motikanju
Esoitpus
Looltureshi
Kamwanga
Mokuani
Ngare Len
300-400
300-
400
400-
500
500-
600
600-
700
700-
800
800-
900
900-1000
>1000
900-1000
800
700
600
500
400
9237
9337
AVERAGE ANNUAL
RAINFALL
in mm
+SOILS
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS
⊕ Temperature recording station, operating 1976
+ Rainfall recording station, operating 1976 and having at least 10 years of records
22 Station number in grid
9237 Grid number
Broken boundaries are uncertain because of lack of rainfall records


SOUTHEAST
KAJIADO
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF FIRST RAINS
(March - June or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+SOILS
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS
Broken boundaries are uncertain
because of lack of rainfall records
37°30' E
38° E
2°30' S
3° S
AMBOSELI
N.P.
Ol Tukai
Makutano
OLOITOKITOK
Lassit
Rombo
Kuku
Esoitpus
Kikarankot
Motikanju
Looituresh
Kamwanga
Mokuani
Ngare Len
Njugini
50 - 100
100 - 150
150 - 200
200 - 250
> 250
e. of March - m. May
April - b. of May
March - June



SOUTHEAST
KAJIADO
37°30'E
38°E
2°30' S
3° S
AMBOSELI
N.P.
Ol Tukai
Makutano
Kikarankot
Motikanju
Esoitpus
Loolturesh
Kamwanga
OLOITOKITOK
Lassit
Rombo
Kuku
Mokuani
Ngare Len
Njugini
e.of Oct.-
b.of Jan.
Nov.-
b. of Dec.
Oct.-
Feb.
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF SECOND RAINS
(Oct. - Feb or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+SOILS
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS
Broken boundaries are uncertain
because of lack of rainfall records


AGRO-ECOLOGICAL
ZONES + SOILS
SOUTHEAST
KAJIADO
37°30' E
38° E
2°30' S
3° S
BELTS OF ZONES BY TEMPERATURE
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
AMBOSELI N.P.
Ol Tukai
Makutano
Kikarankot
Motikanju
Esoitpus
Loolturesh
Kimwanga
OLOITOKITOK
Lassit
Kuku
Mokuani
Rombo
Ngareten
Njugini
Ranching
Livestock-Sorghum Z.
Livestock-Millet Zone
Sunflower-Maize Z.
Game conservation area or Nat. Pk.
Swamps
Unsuitable steep slopes
Climatic data for AEZ formulas see table I and II
Belt of A. E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
0 5 10 15 20 25 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team

AGRO-ECOLOGICAL ZONES

LH = LOWER HIGHLAND ZONES

LH 2 = W h e a t/M a i z e[1)] - P y r e t h r u m   Z o n e

LH 2 s/m + m = Wheat/Maize[1)]-Pyrethrum Zone with a short to medium and a medium cropping season

Very small but locally important as a food crop area

G o o d   y i e l d   p o t e n t i a l (Av. 60–80 % of the optimum)
1st rains, start norm. b. of March: M. mat. maize like H 511, e. mat. wheat and barley; peas, potatoes; nearly all vegetables
2nd rains, start norm. mid O.: Late mat. maize like H 612 (2nd to 1st r.), m. mat. maize like H 512, m. mat. wheat and barley; peas, potatoes; nearly all vegetables
Whole year: Pyrethrum, black wattle

F a i r   y i e l d   p o t e n t i a l (Av. 40–60 % of the opt.)
In both rains m. mat. beans (2nd r. better),
Whole year: Strawberries

P a s t u r e   a n d   f o r a g e
Too small and too valuable here for cattle, sheep and goats; they could feed in lower drier places

LH 3 = W h e a t/(M a i z e)[2)] - B a r l e y   Z o n e

LH 3 s or s/m + m/s = Wheat/(Maize)[2)]-Barley Zone with a short or short to medium cropping season and a medium to short one

Small, but nationally of some importance as a wheat area

G o o d   y i e l d   p o t e n t i a l
1st rains, start norm. mid March: E. mat. barley like Tumaini
2nd rains, start norm. mid O.: E. mat. wheat like Kenya Ngiri and other var., e. mat. barley

F a i r   y i e l d   p o t e n t i a l
In both rains e. mat. beans, kales, green onions

P a s t u r e   a n d   f o r a g e
Livestock should be restricted to bouldery or slopy areas not suitable for cultivation. E. mat. barley Amani and beans straw for add. feeding

UM = UPPER MIDLAND ZONES

UM 3 = M a r g i n a l   C o f f e e   Z o n e

UM 3 s + m/s = Marginal Coffee Zone with a short and a medium to short cropping season[3)]

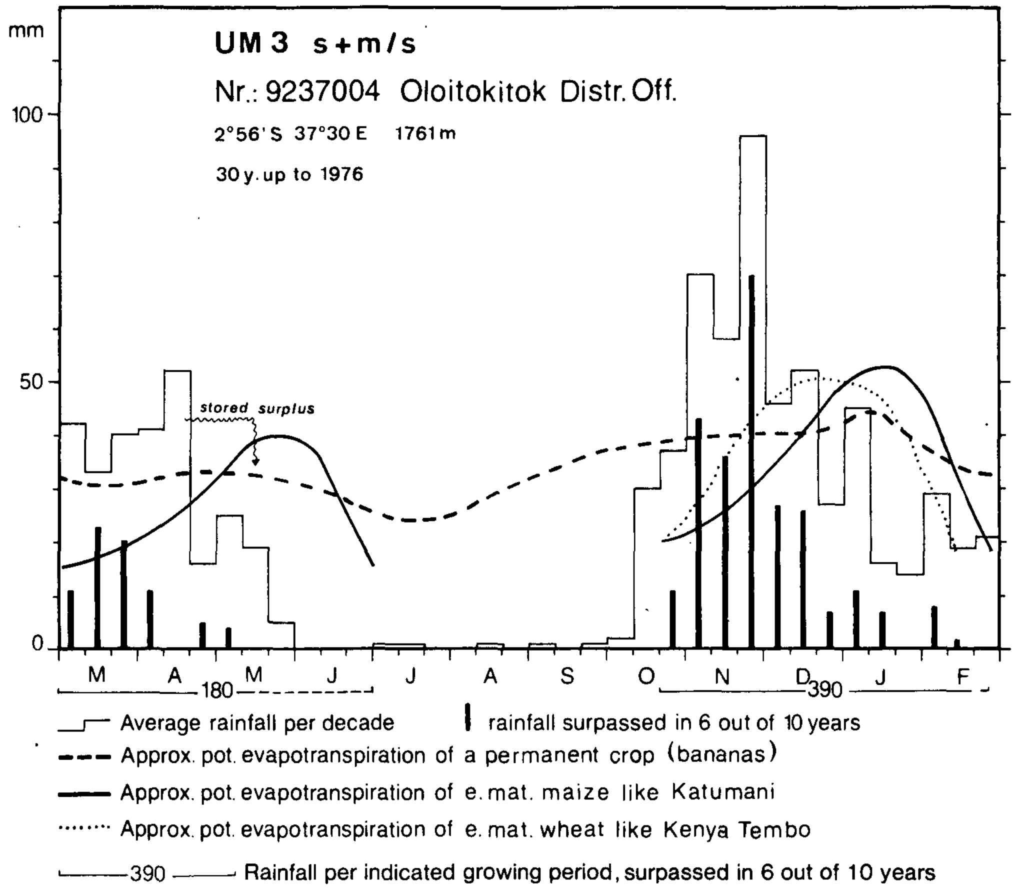
G o o d   y i e l d   p o t e n t i a l
1st rains, start norm. end of March: Dryland comp. maize (~ 60 %), e. mat. sorghum; onions, e. mat. cabbages
2nd rains, start norm. mid O.: E. mat. maize like Katumani comp. B, m. mat. sorghum, e. mat. finger millet; e. mat. beans, Dolichos beans; onions, cabbages, tomatoes, kales
Whole year: Pineapples, per. castor

F a i r   y i e l d   p o t e n t i a l
1st rains: Maize Katumani comp. B; e. mat. beans, sweet potatoes, pigeon peas; kales, tomatoes
2nd rains: M. mat. maize like H 511;
Whole year: Arabica coffee (fair on higher places, poor on lower places, there add. irr. profitable), pawpaws, citrus

1) Wheat or maize depending on farm scale, topography and microclimate. Here maize more suited due to small area, slopes and no nightly cold air accumulation

2) Due to drought danger and larger areas wheat more suited than maize

3) On medium soils; on heavy ones first season is of short to medium, second of medium length. Given potential refers to predominating heavy red loams.



P a s t u r e a n d f o r a g e
0.7–1.1 ha/LU on sec. high grass sav. of zebra grass (Hyparrhenia rufa), down to about 0.25 ha/LU feeding Napier and Bana grass plus legumes like siratro and leaves of horse tamarinds (Leucaena leucocephala)

UM 4 = *S u n f l o w e r - M a i z e Z o n e*

UM 4 s/vs + f s = *Sunflower-Maize Zone with a short to very short cropping season and a fully short one*[4)]

G o o d y i e l d p o t e n t i a l (on deep soils)
1st rains, start norm. mid March: E. mat. sorghum like Serena (higher places), v. e. mat. sorghum (lower pl.); mwezi moja beans, e. mat. cowpeas like Katuli (lower pl.); dwarf sunflower (lower pl.)
2nd rains, start norm. end of O.: Katumani maize (higher places), Dryland comp. maize (lower pl.), e. mat sorghum like 2 KX 17 (ratoon in following rainy season); mwezi moja beans, e. mat. cowpeas like Katuli (lower pl.); e. mat sunflower like Issanka (lower pl., bird protection necessary)
Whole year: Sisal

F a i r y i e l d p o t e n t i a l
1st r.: Dryland comp. maize; Dolichos beans, sweet potatoes; tomatoes, onions, e. mat. cabbages
2nd r.: E. mat. beans (higher places), dolichos beans, sweet potatoes; tomatoes, onions, cabbages
Whole year: Pineapples, cassava, castor

P a s t u r e a n d f o r a g e
1.2–2.5 ha/LU on undestroyed medium grass savanna, down to about 0.3 ha/LU feeding Bana grass, legumes like siratro (wetter places) or moth beans, leaves of horse tamarinds and salt bushes (Atriplex nummularia)

UM 4 s/vs + s/vs = *Sunflower-Maize Zone with two short to very short cropping seasons*

Area on Chyulu Hills. Game Reserve because of shallow soils and lack of water

4) Fully short means 75–114 days (higher places 95–114, lower places 75–94)

UM 5 = *Livestock-Sorghum Zone*

UM 5 vs/s + vs/s = *Livestock-Sorghum Zone with two very short to short cropping seasons*

No good yield potential

Fair yield potential

1st rains, start norm. mid March, or 2nd r., start norm. end of O.: V. e. mat. sorghum, e. mat. foxtail and proso millet, dwarf sunflower, rai (v. e. mat. oilseed Brassica juncea)

Pasture and forage

2–3 ha/LU on undestroyed short grass savanna; more dense stocking if planting salt bushes, Mesquite or Algarrobo (Prosopis juliflora or chilensis) for browsing and Gao trees (Acacia albida) mainly for pods as add. forage

LM = *LOWER MIDLAND ZONES*

LM 4 = *Marginal Cotton Zone*

LM 4 s/vs + s/vs = *Marginal Cotton Zone with two short to very short cropping seasons*

Good yield potential

1st rains, start norm. mid March, or 2nd rains, start norm. end of O.: Dryland comp. maize (on contour ridges)[5], v. e. mat. sorghum (70–80 %), e. mat. bulrush millet (awned var. recommended), e. mat. foxtail or proso millet (70–80 %); dwarf sunflower; v. e. mat. cowpeas, black and green grams, chick peas (late planted on h. black soils); v. e. mat. pumpkins

Whole year, best pl. time end of Oct.: Sisal, buffalo gourds (on sandy soils)[6], castor

Fair yield potential

1st or 2nd rains: Katumani maize (on contour ridges)[5], m. mat. sorghum; mwezi moja beans (50–60 %), e. mat. soya beans, dolichos beans, e. mat. bambarra groundnuts (light soils); sweet potatoes; e. mat. sunflower like Issanka; onions, tomatoes

Whole year: Cassava, jojoba

Pasture and forage

1.3–3 ha/LU on mixed medium grass sav. with red oats grass (Themeda triandra) predominant; if degraded well improvable by planting saltbush (Atriplex nummularia) and horse tamarind (Leucaena leucocephala) as palatable shrubs; add. forage: Glycine, siratro, moth bean vines, pods of Gao trees (Acacia albida)

LM 5 = *Lower Midlands Livestock-Millet Zone*

LM 5 vs/s + vs/s = *Lower Midlands Livestock-Millet Zone with two very short to short cropping seasons*

Good yield potential

1st rains, start norm. mid March, or 2nd r., start norm. end of O.: E. mat. foxtail and proso millet; v. e. mat. pumpkins

Whole year: Buffalo gourds[6] and Marama beans[6]

Fair yield potential

1st or 2nd rains: Dryland comp. maize (~ 40 %)[5], e. mat. bulrush millet (awned variety recommended), v. e. mat. sorghum; black and green grams, v. e. mat. cowpeas, v. e. mat. tepary beans, v. e. mat. moth beans, chick peas (on h. bl. soils late planted); dwarf sunflower, v. e. mat. bambarra groundnuts (light soils)

Whole year: Sisal, castor, jojoba

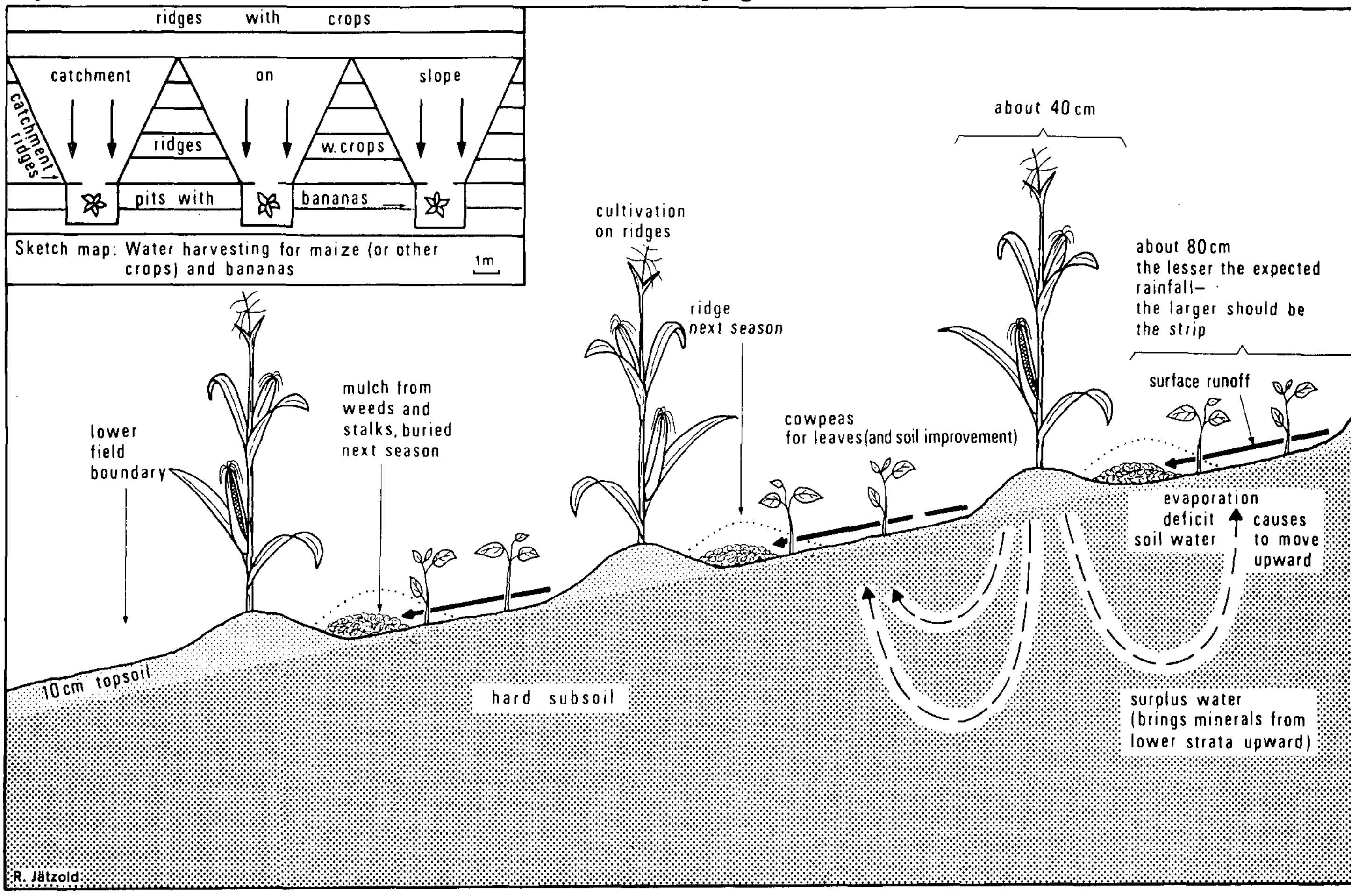
Pasture and forage

3–4.5 ha/LU; down to about 0.8 LU/ha with silage of fodder sorghum and hay of moth bean vines, Mesquite or Algarrobo (Prosopis juliflora or chilensis) and saltbush (Atriplex numm.) for browsing, Gao trees (Acacia albida) for pods. Opuntia var. without prickles (also as vegetable and fruit)

5) Yield improvable and risk of crop failure lowerable by runoff-catching agriculture (see fig. 1)

6) Still experimental

Fig. 1 **Runoff-catching agriculture**



for areas with 300-400 mm average precipitation per rainy season

LM 5 f vs + vs/s = *Lower Midlands Livestock-Millet Zone with a fully very short and a very short to short cropping season*

Area on Chyulu Hills. Game Reserve because of shallow soils and lack of water

LM 5 vs/s + vs = *Lower Midlands Livestock-Millet Zone with a very short to short and a very short cropping season*

Small, potential see Taita/Taveta

LM 5 vs + vs = *Livestock-Millet Zone with two very short cropping seasons*

Good yield potential
1st rains, start norm. end of March: V. e. mat. foxtail and hog millet
2nd rains, start norm. end of Oct.: The same
Whole year: Buffalo gourds, Marama beans

Fair yield potential
1st rains: E. mat. foxtail and proso millet, dwarf sorghum (~ 40 %); green grams, v. e. mat. moth beans, v. e. mat. tepary beans (40–50 %), v. e. mat. cowpeas (~ 40 %), chick peas (on h. bl. soils late planted); dwarf sunflower, v. e. mat. bambarra groundnuts (on light soils); v. e. mat. pumpkins
2nd rains: The same but less risky
Whole year: Sisal, castor, jojoba, Vigna lobatifolia[6)]

Pasture and forage
3.5–5 ha/LU on undestroyed nat. pasture, more if soils are stony; improvable as in LM 5 vs/s + vs/s

LM 5 = *Lower Midland Livestock-Millet Zone*
vs + i *with a very short cropping season and intermediate rains*

Good yield potential
First rains, start norm. end of March: V. e. mat. foxtail or hog millet
Whole year: Buffalo gourds[6] (on sandy soils), Marama beans[6]

Fair to poor yield potential
First rains: V. e. mat. sorghum (~ 40 %), e. mat. bulrush millet[5]; green grams, moth beans, cowpeas for spinach; dwarf sunflower, v. e. mat. bambarra groundnuts (light soils)

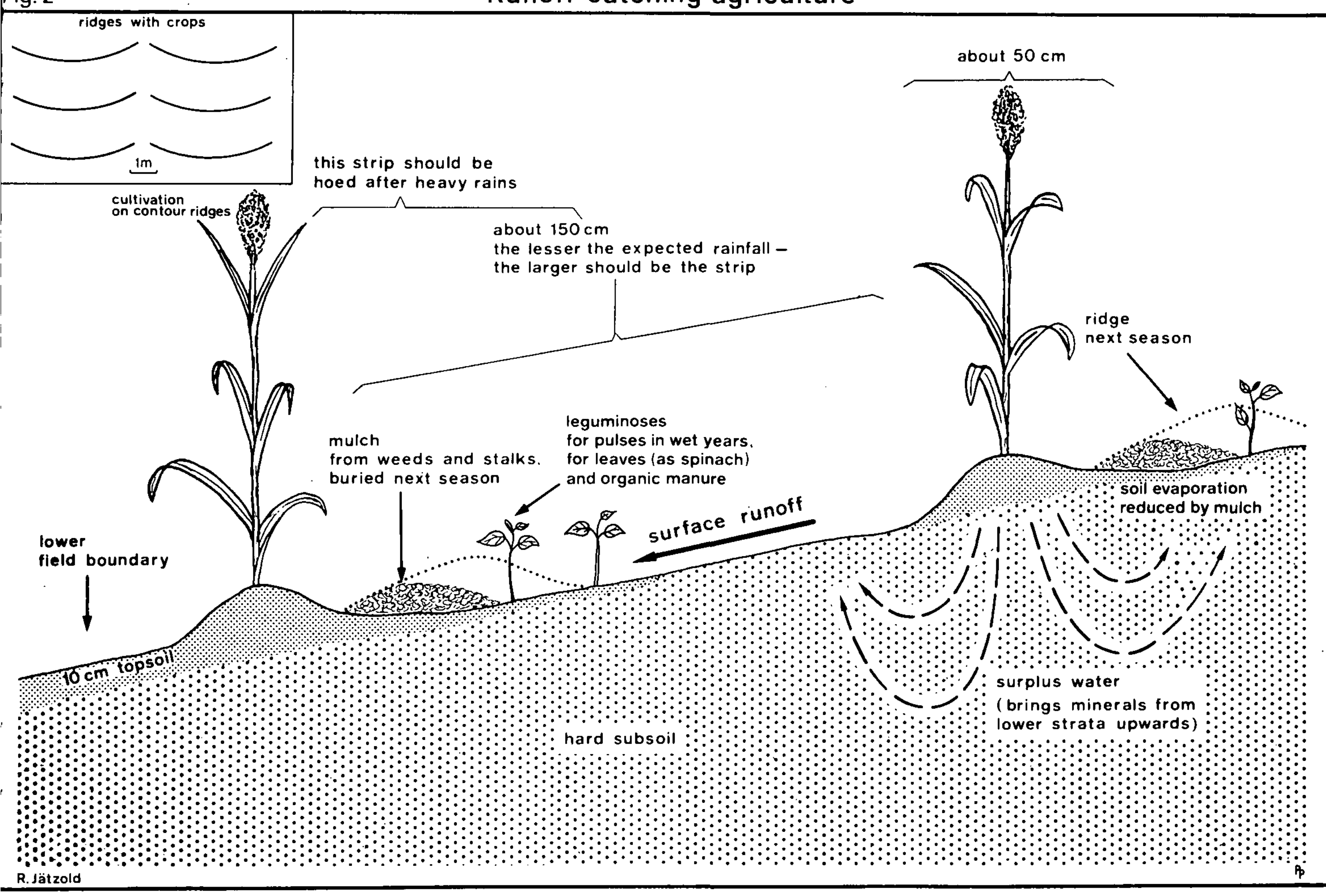
Pasture and forage
4–5 ha/LU; forage see LM 5 vs/s + vs/s

LM 6 = *Lower Midland Ranching Zone*

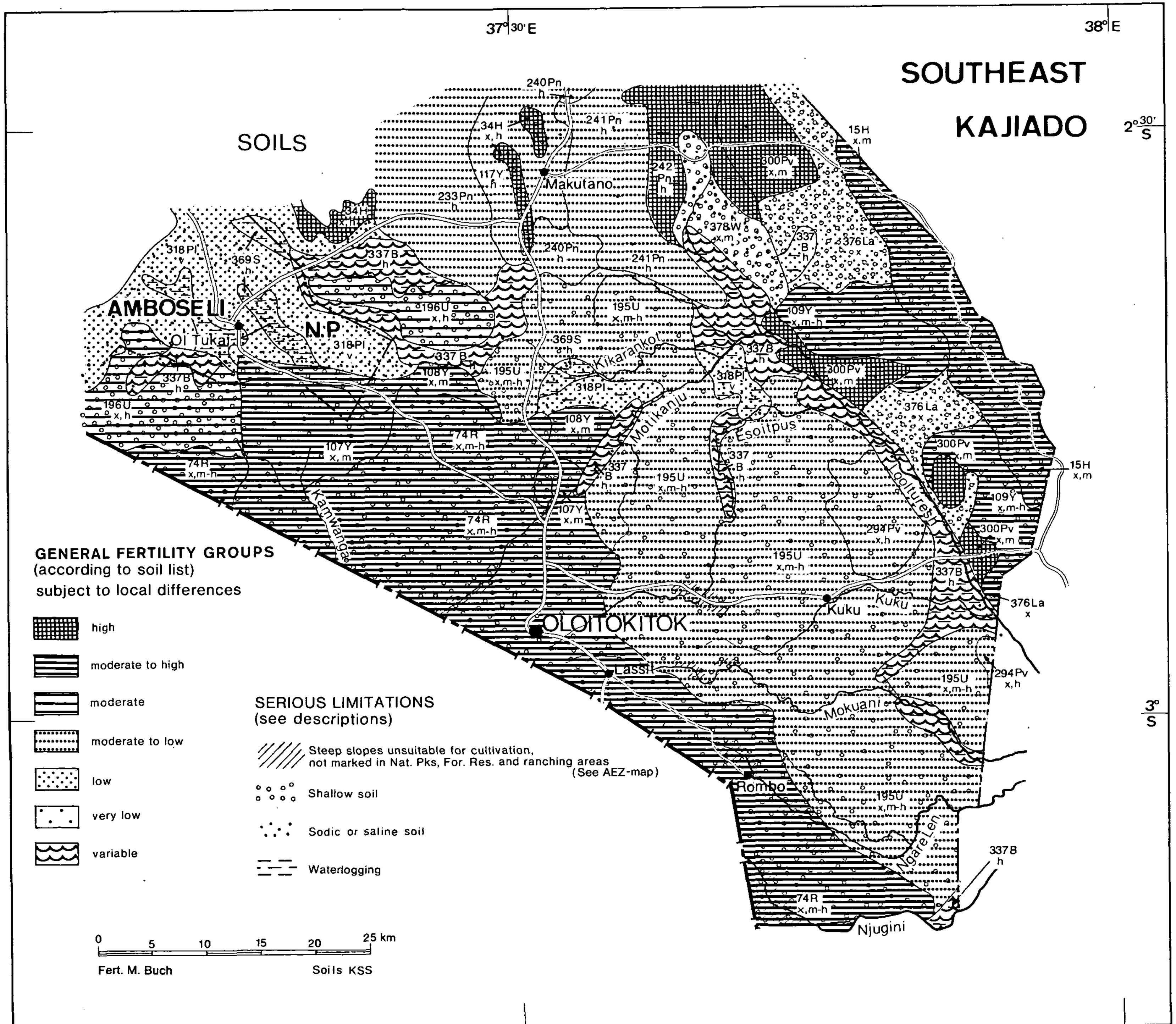
LM 6 = *Lower Midland Ranching Zone*
b r *with bimodal rainfall*

No rainfed agriculture possible except with runoff-catching techniques (see fig. 2). More than 5 ha/LU on short grass savanna or light bushland

Fig. 2 **Runoff-catching agriculture**



for areas with 200-300 mm average precipitation per rainy season



SOUTHEAST
KAJIADO
SOILS
37°30'E
38°E
2°30' S
3° S
AMBOSELI N.P.
Ol Tukai
Makutano
OLOITOKITOK
Kuku
Lassit
Rombo
Kikarankot
Motikanju
Esoitpus
Kamwanga
Kuku
Mokuani
Ngare Len
Njugini
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
moderate to high
moderate
moderate to low
low
very low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes unsuitable for cultivation,
not marked in Nat. Pks, For. Res. and ranching areas
(See AEZ-map)
Shallow soil
Sodic or saline soil
Waterlogging
0 5 10 15 20 25 km
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The physiography of southeastern Kajiado District consists of the volcanic ridges and uplands of Kilimanjaro. In the northeast, the Chyulu Range has influenced the topography so that volcanic plains and lava flows occur. Piedmont plains dominate east of Amboseli, with lacustrine plains around Lake Amboseli.

In the Chyulu Hills, moderately to highly fertile soils occur (15 H) but the majority of these soils are not yet sufficiently weathered and have a low water retention capacity. Soils on volcanic footridges occupy the southwestern and southern part of the district (unit 74 R) and are of moderate to high fertility. Soils of units 107 Y, 108 Y and 109 Y are of the same fertility, found on the piedmont plains in the western region.

The dominating soils in the centre of the district are upland soils of low to moderate fertility (unit 195 U). The northern region consists of soils on non-dissected erosional plains (map units 233 Pn, 240 Pn, 241 Pn, 242 Pn). In general, they are of low to moderate fertility, apart from unit 242 Pn which is of high fertility.

On volcanic plains around the Chyulu Range, soils of unit 300 Pv occur which could be of high fertility if the area was not so dry. Bottomlands with soils of variable fertility are found (unit 337 B) along the Loolturesh River. In the north of the district, soils of low fertility occur on the badlands.

As the soils are extremely shallow, likelihood of soil erosion and degradation is very high and the Forest Reserves must be kept at all costs.

SOILS ON HILLS AND MINOR SCARPS

Soils developed on ashes and other pyroclastic rocks of recent volcanoes

15 H
x, m[1] = well drained, moderately deep to deep, black, very friable and smeary, very gravelly loam, with humic topsoil (mollic ANDOSOLS)

Soils developed on limestones and calcitic mudstones (crystalline limestones)

34 H
x, h = somewhat excessively drained, shallow, dark grey, firm, moderately calcareous, stony clay (orthic RENDZINAS)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

74 R
x, m-h = well drained, shallow to very deep, dusky red to dark brown, friable, rocky, bouldery, stony or gravelly, silty clay loam to clay (nito-chromic CAMBISOLS and eutric CAMBISOLS, lithic and bouldery phase)

SOILS ON PIEDMONT PLAINS

Soils developed on alluvium from Tertiary/Quarternary volcanic rocks (mainly basalts)

107 Y
x, m = well drained, deep to very deep, dark brown, very friable, clay loam to gravelly clay loam (eutric CAMBISOLS)

108 Y
x, m = well drained, moderately deep to very deep, dark brown, very friable, moderately calcareous, gravelly clay loam, with slightly saline and sodic deeper subsoil; in places over petrocalcic material (calcic CAMBISOLS, salinesodic phase)

Soils developed on alluvium from volcanic ashes and other pyroclastic rocks of recent volcanoes

109 Y
x, m-h = well drained, shallow to deep, greyish brown to black, very friable and smeary, rocky or bouldery, gravelly sandy clay loam to clay (mollic ANDOSOLS, rocky phase and haplic CHERNOZEMS, stony and partly lithic phase)

SOILS ON UPLANDS, UNDIFFERENTIATED LEVELS

Soils developed on basic igneous rocks (basalts, etc.)

195 Y
x, m-h = association of:
- well drained, deep to very deep, dusky red to dark reddish brown, friable, stony clay loam to clay (chromic LUVISOLS; stony phase)
- imperfectly drained, deep to very deep, dark brown to very dark greyish brown, firm, calcareous, saline and sodic, stony, cracking clay (verto-luvic PHAEOZEMS, stony and saline-sodic phase)

196 Y
x, h = well drained, shallow to moderately deep, dark greyish brown, friable to firm, calcareous, very rocky and bouldery clay (calcic CAMBISOLS, lithic and bouldery phase)

SOILS ON NON-DISSECTED EROSIONAL PLAINS

Soils developed on undifferentiated Basement System rocks

233 Pn
h = well drained, moderately deep to deep, dark red to strong brown, friable to firm, sandy clay loam to clay (ferralochromic/orthic LUVISOLS)

Soils developed on undifferentiated Basement System rocks, with volcanic ash admixture

240 Pn
h = well drained, moderately deep to very deep, dusky red to dark brown, friable to firm, sandy clay loam to clay (ferric LUVISOLS)

Soils developed on undifferentiated Basement System rocks with predominant volcanic ash influence

241 Pn h = moderately well drained, very deep, dark reddish brown to dark brown, firm, strongly calcareous, slightly saline and moderately sodic, slightly cracking clay (vertic LUVISOLS, saline-sodic phase)

242 Pn h = imperfectly drained, very deep, very dark greyish brown, very firm, moderately calcareous, slightly saline and moderately sodic, slightly cracking clay (verto-luvic PHAEOZEMS, saline-sodic phase)

SOILS ON VOLCANIC PLAINS

Soils developed on alluvium from early Pleistocene olivine basalts (and pyroclastic rocks)

294 Pv x, h = well drained, very deep, dark red, friable, stony and bouldery clay (chromic LUVISOLS, bouldery phase)

Soils developed on ashes and pumice from recent volcanoes

300 Pv x, m[1)] = somewhat excessively drained, very deep, strong brown to dark yellowish brown, very friable and smeary, slightly sodic, gravelly sandy clay loam (mollic ANDOSOLS, sodic phase)

SOILS ON LACUSTRINE PLAINS

Soils developed on sediments from volcanic ashes and other sources

318 Pl v = complex of moderately well drained to imperfectly drained, shallow to deep, strongly calcareous, strongly saline and strongly sodic soils of varying colour, consistence and texture; over pisocalcic or petrocalcic material (higher level of Amboseli) (orthic SOLONCHAKS and orthic SOLONETZ, petrocalcic phase)

SOILS ON BOTTOMLANDS

Soils developed on infill from undifferentiated volcanic rocks

337 B h = imperfectly drained, very deep, dark brown to dark grey, firm, slightly to moderately saline, moderately sodic, cracking clay; in many places calcareous (chromic and pellic VERTISOLS, saline-sodic phase)

SOILS ON SWAMPS

369 S h = poorly drained to very poorly drained, very deep, dark greyish brown to dark olivine grey, firm to very firm, strongly calcareous, strongly saline and strongly sodic clay; in many places with fragipans at various depths (gleyic SOLONCHAKS, sodic phase and partly fragipan phase)

SOILS ON LAVA FLOWS

376 La x = excessively drained, exceedingly bouldery to stony, extremely rocky land (Bouldery and Rock Outcrops)

SOILS ON BADLANDS

Badlands developed on various older lacustrine and volcanic rocks

378 W x, m = excessively drained, reddish brown, strongly calcareous, slightly to moderatley saline and strongly sodic, silt loam to clay loam of varying depth; strongly eroding and often with gravel or stone surface (SOLONETZ, undifferentiated; with calcic XEROSOLS, LITHOSOLS, a.o.; stonemantle phase)

1) Soil texture-classes

h = heavy
l = light
m = medium
x = stony or bouldery
v = varying texture
m-h = medium to heavy
m, h = medium and heavy (e. g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-Climatic Zone Map of Kenya, scale 1 : 1 000 000. Expl. Soil Survey Rep. E 1, Nairobi 1982.
See this map also for colours; symbols simplified here.

POPULATION AND LAND

In 1979 (the year of the last population Census in Kenya), more than 149,000 people lived in the Kajiado District. Of this figure, 14,179 were not fully dependent on livestock and agriculture, as they lived in the 2 townships and 3 trading centres of the area. Nevertheless, the Kajiado District is primarily a large ranching area, with very little arable land. For this reason, the agro-ecological zonations are given in table 6 for the south-eastern part of Kajiado District only.

Conditions are suitable for farming in 3 locations of the Loitokitok Division and even here LM 5 and LM 6 predominate (84.6 %, table 6). 29.7 % of the total population of the Kajiado District lives in the measured area (29.2 % of the District area). For these people, a total rural area of 572,400 ha is available, of which 333,000 ha is described as agricultural land in table 6, although most of it is only ranching land, i.e. 51.14 ha are available per household (5.9 people on the average) and 8.40 ha per person. This comparatively large holding is necessary because agriculture is only possible in a limited area on the foothills of Kilimanjaro, and the economic activities are still mainly concentrated on livestock. In UM 5 and LM 5, however, some possibilities for agriculture are still underexploited. Here the cultivation of carefully chosen varieties of quick-growing sorghum and millets is necessary to provide a subsistence crop for the growing population because the grazing possibilities are already fully exploited, in some places even overused.

KAJIADO DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Odo Mongi	11 640	11 632	23 272	4 075	1 763	13
Orok Kiteng	4 349	4 237	8 586	1 493	1 358	6
Entonet	5 577	5 346	10 923	1 599	2 604	4
Loitokitok Division	21 566	21 215	42 781	7 167	5 726	7
Ngong	15 495	14 549	30 044	6 643	141	212
Keekonyokie	7 514	8 122	15 636	3 133	3 270	4
Ngong Division	23 009	22 671	45 680	9 776	3 412	13
Ildamat	2 930	2 562	5 492	1 478	505	10
Purko	888	920	1 808	300	204	8
Dalalekutuk	2 624	2 977	5 601	888	741	7
Matapato	3 638	3 897	7 535	1 472	1 322	5
Namanga	4 467	4 612	9 079	1 773	1 261	7
Loodokilani	2 722	2 685	5 407	1 041	1 720	3
Magadi	5 031	4 550	9 581	1 923	1 921	4
South Kaputei	2 932	2 894	5 826	1 087	1 293	4
North Kaputei	5 330	4 885	10 215	1 666	1 496	6
Central Division	30 562	29 982	60 544	11 628	10 466	5
Kajiado District	75 137	73 868	149 005	28 571	19 605	7

KAJIADO DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	Nó. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Odo Mongi	4052	3.15	1.47	0.69	0.36	5.67
Orok Kiteng	1506	3.10	1.40	0.75	0.44	5.69
Entonet	1627	3.66	1.59	0.70	0.55	6.52
Div. Loitokitok	7189	3.26	1.48	0.71	0.42	5.86
Ngong	6664	2.55	1.10	0.55	0.30	4.50
Keekonyokie	3122	2.78	1.19	0.66	0.37	4.99
Division Ngong	4786	2.63	1.12	0.58	0.32	4.65
Location:						
Ildamat	1467	2.28	0.68	0.42	0.30	3.68
Purko	301	3.51	1.66	0.46	0.38	6.01
Dalalekutuk	882	3.25	1.72	1.05	0.33	6.35
Malapato	1464	2.86	1.34	0.47	0.46	5.13
Namanga	1771	2.86	1.22	0.60	0.43	5.11
Loodokilani	1041	2.94	1.38	0.48	0.40	5.19
Magadi	1912	2.89	1.17	0.54	0.32	4.92
South Kaputei	1119	3.01	1.36	0.59	0.25	5.20
North Kaputei	1648	3.29	1.53	0.62	0.39	5.83
Division Central	11605	2.93	1.27	0.57	0.36	5.14
DISTRICT: KAJIADO	28576	2.90	1.28	0.61	0.36	5.15

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per household as well.

TABLE 6: **AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON**

Location/Division	in '00 ha = sqkm					in '00 ha = sqkm								in ha	
	Area total Census '79	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., swamps, lakes	Non-agricultural land: Others (roads, rivers, home-steads ...)	Agri-cultural Land	Area in agro-ecological zones AEZ: LH 2	LH 3	UM 3	UM 4	UM 5	LM 4	LM 5	LM 6	Agric. land per holding	Agric. land per person
Odo Mongi	1819 (1763)[1)]	40	sw. 56	176	1 547	3		23	126	69	104	430	792	32.96	6.64
Orok Kiteng	1079 (1358)		sw. 49	136	894		10		13	37		83	751	59.87	10.41
Entonet	1501 (2604)		sw. 11 N.P. 341	260	885		13		19	95		48	714	55.55	8.14
Loitokitok	4399 (5725)	40	457	572	3 330	3	23	23	158	201	104	561	2 257	51.14	8.40

1) ( ) = Census areas differing from measured areas in older maps.

For official land statistics see supplementary publication to FMHB Vol. III A: Agricultural Land Statistics

AGRICULTURAL STATISTICS

Small areas are cultivated with coffee and pyrethrum near Loitokitok. For more detailed and up to date information, see FMHB, Vol. III/A.

KAJIADO DISTRICT

TABLE 7: **PRYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[a)]

Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	0.58	0.40	0.10	0.17	0.10
Pyrethrin content %	1.3	1.2	1.2	1.2	1.4

a) Source: Pyrethrum Board

No Small Farm Survey

CENTRAL PROVINCE

NYANDARUA DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The Nyandarua District consists mainly of the Kinangop Plateau and the Ol Kalou Salient. Both areas are parts of the Rift Valley Province and are situated in the rain-shadow of the Nyandarua Range. For this reason the rains decrease rapidly from east to west, with the annual average diminishing from more than 1 400 mm at the foot of the Range to 700 mm in the Malewa Valley.

The difference in the 60 % reliability of rainfall[1] during the agrohumid periods is even greater, from more than 1 000 mm to less than 300 mm in the first rains, 600 to 100 mm in the second rains. The reason is that the rains become more scattered throughout the year and are not concentrated enough to create long pronounced agro-humid periods. The number of agro-humid decades (10 day periods), i.e. growing periods for cultivated plants, decreases from 36 on the southeastern border of the district to less than 5 on the lowest point in the west.

On the southeastern side of the Kinangop Plateau there are two main peaks of rainfall, one in April–May and one in October (see Diagram Sasumua, p. 11), and there is enough rain or mist in most of the other months. The humid period lasts normally from March to December/January. The reliability of these rains is so high that in four out of five years the months April–November have sufficient moisture for the successful growing of crops, and even permanent crops like pyrethrum do well.

However, a few kilometers westward the picture is quite different (see Diagram North Kinangop, p. 12). The additional rains caused by the upward flow of the easterly trade winds cease and the two rainy seasons are not so pronounced. The months July/August and January/February can be really dry, because the area lies in the rain-shadow. Fortunately, in normal years there is so much moisture in the soil that deep rooting crops get still sufficient water, but dry years make pyrethrum cultivation difficult, as the columns in the diagram indicate.

Towards the western rim of the plateau, the main rainy season becomes so short (March to May), that soil moisture is not sufficient to last beyond June. August can be dry below the wilting point as the middle rains are very weak. The second rains (or, if the small middle rains are called "second rains", the third rains) which cause slightly sub-humid conditions from November to December are also uncertain and not heavy enough to ensure successful cultivation. Therefore permanent crops or a second crop are not advisable here.

The northern areas, the Ol Kalou Salient, show a remarkable contrast to the other rainfall areas (see Diagram Ol Kalou, p. 14). The instability of the air near the equator causes rain especially from July to September, between the sub-humid periods April–June and November. For annual crops it would be better to have the high water surplus first, and for permanent ones the dry season is too dry (< 0.2 E^{o} December–February).

The main climatic problem is the low night temperature. Cold air, generated during clear nights on the moorlands of the Nyandarua Range, flows down to the Kinangop Plateau and Ol Kalou Salient, causing night frosts nearly every month which makes maize cultivation too hazardous. Only the western parts of the plateaus, further away from the Nyandarua Range and where valleys give an outlet to this stream of cold air, have some months free of frost but there it is often too dry for maize. Absolute minimum temperatures are shown on table 2. Near the ground the temperatures can be up to 3.5°C lower than the given figures. Micro-climate is important, so that mixed areas between LH (no frost) and UH (with frosts) occur. Frost temperatures last only a few hours before sunrise. For special crops like sensitive vegetables or strawberries, simple protection with sheets of plastic would be sufficient.

The main soil problem on the Kinangop Plateau and in the Ol Kalou Salient is waterlogging (see Soil Map and description).[2]

The best area of the district lies west of the Ol Kalou Salient. It is a hilly upland in the Rift Valley of sufficiently high altitude to catch enough rain to meet the requirements of agro-ecological zones UH 1, 2, and LH 2.

[1] The amounts will be surpassed normally in 6 out of 10 years.

[2] More detailed information in RACHILO, J.R.: Soil Conditions in the Kinangop Area. Kenya Soil Survey, Site Eval. rep. no. 34. Nairobi 1978

NYANDARUA DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Monthly rainfall in mm Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
8936015	Nyahururu, K.C.C.	35	Average	968	33	38	55	117	92	86	131	152	68	42	82	71
2 354 m			60 % Rel.[1]	992	0	2	14	71	57	46	84	98	59	14	14	12
8936023	South Marmanet,	34	Av.	1 039	35	41	62	127	95	94	137	172	67	43	83	82
2 310 m	Forest Station															
9036025	N. Kinangop,	57	Av.	1 123	41	61	75	144	167	92	71	93	106	99	106	71
2 624 m	Forest Station		60 %	1 010	23	28	60	114	123	64	51	68	82	77	85	47
9036029	Gilgil, Kwetu Farm	53	Av.	953	25	28	56	138	124	88	97	119	74	74	83	47
2 341 m			60 %	850	7	7	29	108	102	68	81	99	54	64	65	24
9036031	Carnell, Longonot	31	Av.	1 096	65	64	112	202	166	60	38	58	56	82	107	87
2 432 m			60 %	986	35	36	80	176	150	45	30	44	40	52	87	52
9036055	Ol Kalou,	36	Av.	774	29	14	34	88	88	83	91	127	61	52	76	30
2 361 m	Railway Station		60 %	690	5	0	14	63	70	52	76	110	48	37	43	5
9036065	Naivasha,	47	Av.	838	54	60	88	158	109	42	29	42	48	58	84	67
2 432 m	Nanga Gerri		60 %	750	29	35	70	124	80	31	18	33	35	42	59	32
9036116	Deighton Downs	48	Av.	783	31	29	68	96	59	56	102	106	42	40	82	73
2 128 m	Airstrip		60 %	702	6	12	37	79	39	41	81	79	32	19	50	39
9036135	Ol Joro Orok,	29	Av.	977	36	36	47	106	109	93	146	160	71	42	69	61
2 371 m	Agr. Exp. Station		60 %	817	9	16	36	54	76	69	131	138	61	30	52	27
9036138	Ol Bolossat	27	Av.	1 055	33	34	51	99	128	102	160	174	76	46	88	63
2 371 m	Forest Reserve		60 %	927	5	9	37	73	103	59	128	139	60	30	51	20
9036188	Kinangop, Sasumua	26	Av.	1 620	79	97	155	325	254	86	64	65	57	149	199	90
2 475 m	Dam		60 %	1 450	50	76	93	275	216	75	46	46	43	105	153	57

1) These figures for rainfall reliability should be exceeded normally in 6 out of 10 years.

NYANDARUA DISTRICT

TABLE 2: TEMPERATURE DATA

No. and altitude	Name of Station	AEZ[1)]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
				Temperature in C°													
9036036	Kinangop	UH	Mean max.	21.6	21.9	21.6	19.4	16.9	16.7	16.6	16.4	19.2	19.3	18.9	19.3	19.9	
2 545 m	Mtarakwa	1	Mean temp.	12.2	13.5	13.7	13.5	12.3	11.9	11.3	11.1	12.0	12.9	12.7	12.3	12.4	7
	Farm	lp	Mean min.	2.7	5.1	5.7	7.6	7.6	6.0	5.9	5.8	4.8	6.4	6.5	5.2	5.8	
	(operating to 1939)		Abs. min.	–0.6	–1.1	–0.6	1.1	1.7	2.2	0.6	–1.7	–1.7	–1.1	–1.1	–0.6	–1.7	
9036053	Naivasha,	UH	Mean max.	25.3	25.8	25.9	23.1	22.0	21.3	20.1	20.2	22.8	22.2	22.4	23.5	22.9	
2 520 m	Mkungi	2	Mean temp.	15.7	15.8	16.3	15.2	14.5	13.3	12.9	13.2	14.6	14.3	14.4	14.6	14.6	5
	Estate	lp	Mean min.	6.1	5.8	6.6	7.2	6.9	5.3	5.7	6.1	6.3	6.3	6.3	5.7	6.2	
	(operating to 1962)		Abs. min.	2.2	–1.1	2.2	3.9	3.3	2.2	1.7	1.1	3.3	3.3	2.2	2.2	–1.1	
9036135	Ol Joro Orok,	UH	Mean max.	22.3	23.2	23.3	22.0	21.7	20.7	19.3	19.2	20.8	21.3	20.2	20.5	21.2	
2 371 m	Agr. Exp.	2–3	Mean temp.	13.9	14.4	15.0	14.9	14.2	13.2	12.8	12.8	12.8	13.6	13.8	13.6	13.8	24
	Station	lp	Mean min.	5.5	5.5	6.7	7.7	6.7	5.6	6.3	6.3	4.7	5.8	7.4	6.9	6.3	
			Abs. min.	–0.8	–1.3	0.6	1.7	0.0	–0.3	–0.7	0.3	–0.3	–1.1	0.1	–0.6	–1.3	
9036164	Njabini	UH	Mean max.	19.4	20.1	19.8	18.2	17.5	16.6	15.5	15.9	16.8	17.4	17.5	18.3	17.7	
2 590 m	Forest	1	Mean temp.	11.5	11.9	12.7	13.0	12.2	10.9	10.3	10.4	10.7	11.8	12.1	11.5	11.7	10
	Station	hp	Mean min.	3.6	3.7	5.6	7.8	6.9	5.2	5.1	4.8	4.6	6.2	6.8	4.7	5.7	
			Abs. min.	–1.4	–1.1	0.8	2.4	0.8	–1.1	–2.2	–0.6	–1.4	–1.1	0.4	0.0	–2.2	
9036188	Sasumua	UH	Mean max.	23.7	24.8	23.8	21.5	20.2	19.4	17.9	18.6	20.9	22.1	21.6	22.9	21.4	
2 475 m	Dam	1	Mean temp.	15.1	15.6	15.9	15.6	14.8	13.5	12.5	13.0	14.0	15.3	15.1	15.2	14.6	16
		lp	Mean min.	6.4	6.4	8.0	9.7	9.4	7.5	7.1	7.4	7.1	8.4	8.6	7.4	7.8	
			Abs. min.	0.0	0.0	1.1	3.9	2.8	1.1	0.0	0.6	1.0	2.2	1.1	1.0	0.0	
9036241	Geta Forest	UH	Mean max.	19.7	20.4	20.1	18.7	18.0	17.3	16.3	16.5	17.6	18.2	18.1	19.1	18.3	
2 590 m	Station	2	Mean temp.	12.2	12.6	12.9	12.7	12.2	11.1	10.7	10.8	11.3	12.2	12.2	12.0	11.9	11
		hp	Mean min.	4.7	4.7	5.7	6.6	6.3	4.8	5.0	5.1	4.9	6.2	6.2	4.8	5.4	
			Abs. min.	–1.1	–1.1	–0.6	1.1	1.0	–1.1	1.1	1.0	2.0	1.1	2.0	–1.1	–1.1	

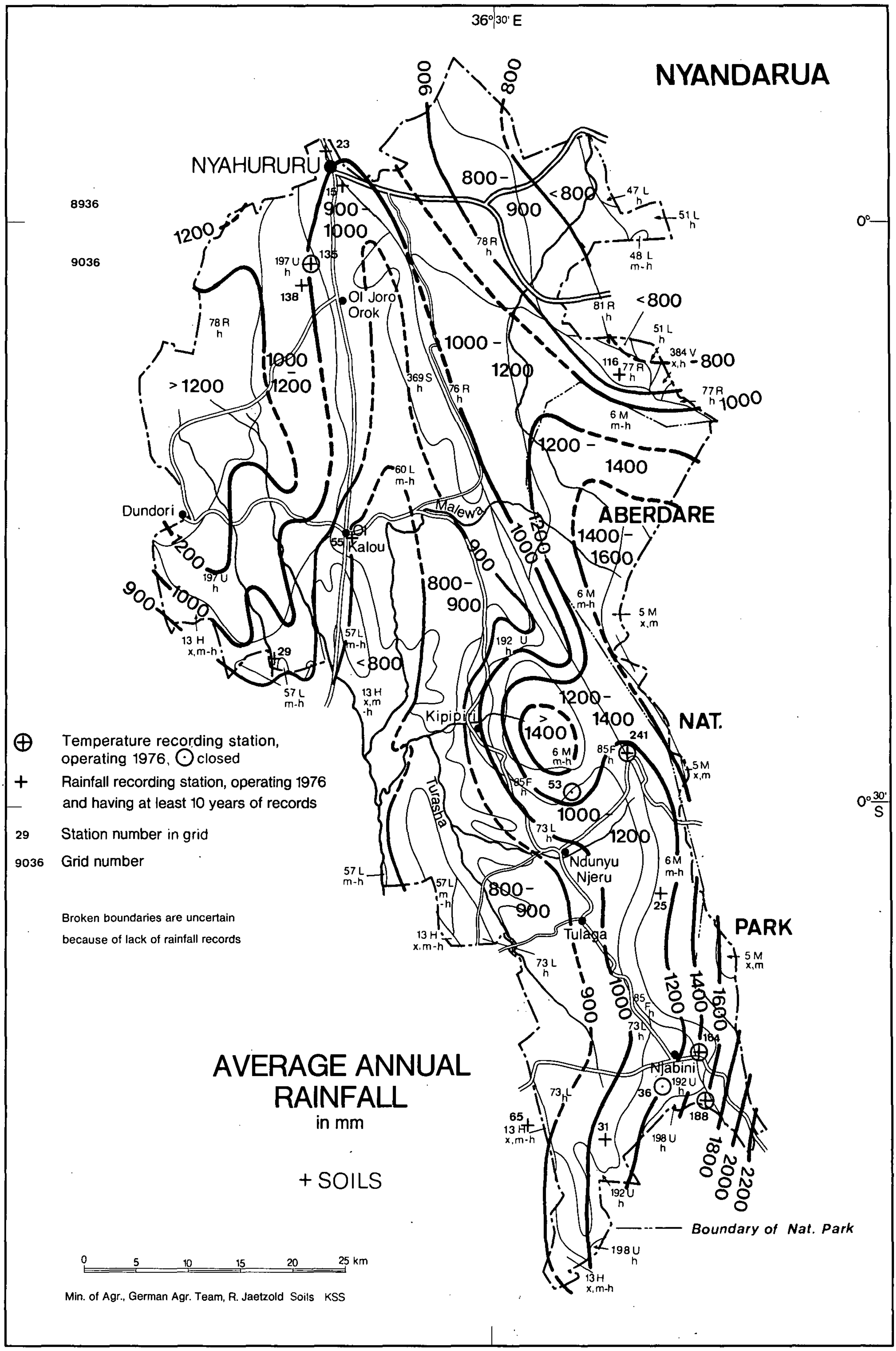
1) AEZ = Agro-ecological zone; lp = lower places, hp = higher places within the zone

NYANDARUA DISTRICT

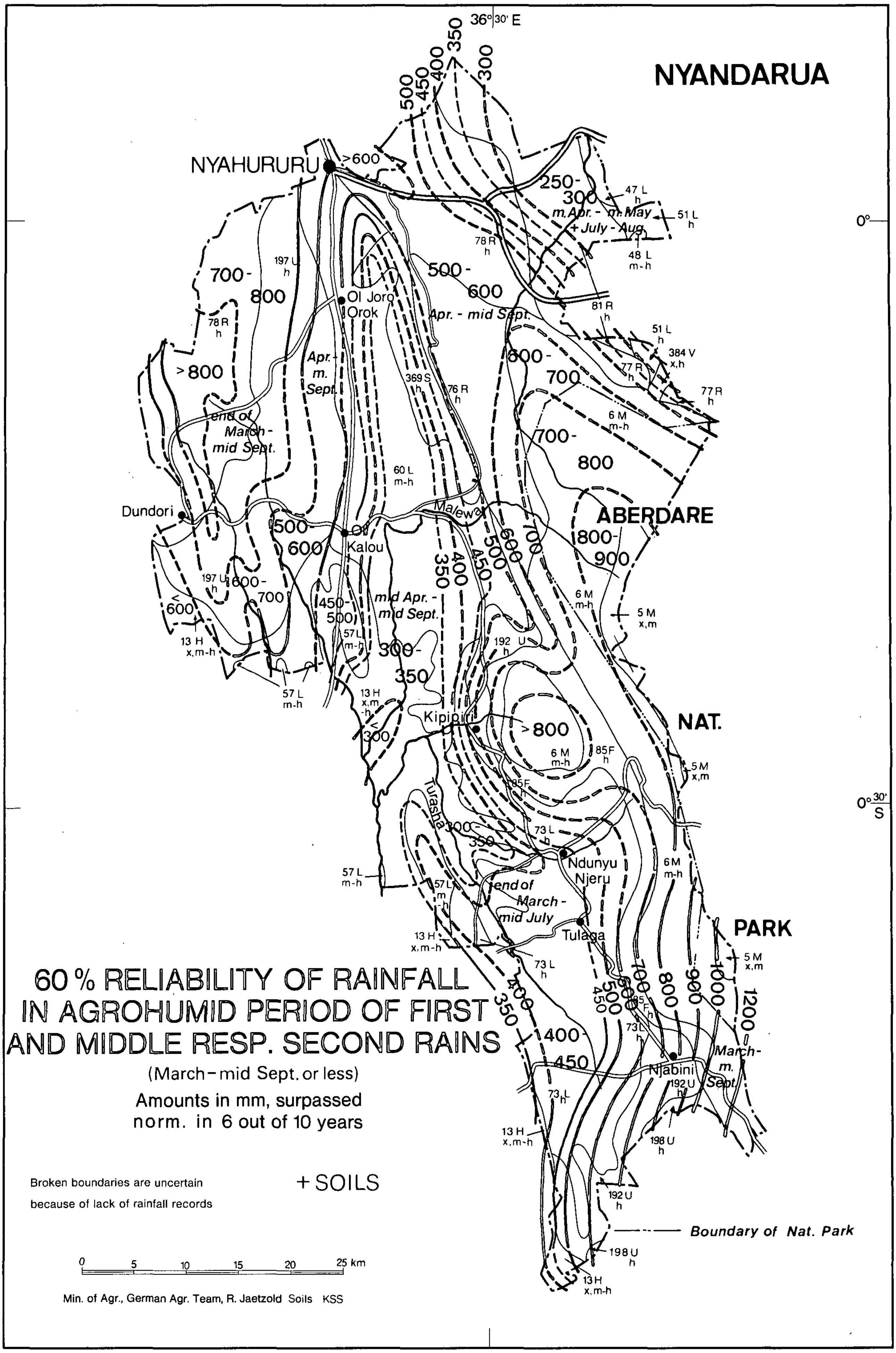
TABLE 3: CLIMATE IN THE AGRO-ECOLOGICAL ZONES

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2] in days	2nd rains in days	Total[3] in days
TA I + II		National Park, limited grazing potential							
UH 0 Forest Zone		2 740–3 000	11.5–10.0	1 500–2 200	1 000–1 300	600–700	200 or more	160–165	360–365
UH 1	p or l/vl ⌢ m			1 150–1 600	750–1 000	300–550	200 or more	150–160	350–360
Sheep and	l/vl ⌢ m	2 400–3 000	14.6–10.0	Steep slopes, Forest Reserve or National Park					
Dairy Zone	vl i			Small, see Nakuru Distrikt					
UH 2	vl i or two			1 000–1 200	600– 750	200–300	190 or more	140–150	330–340
Pyrethrum -	l i m/s	2 400–3 000	14.6–10.0	950–1 100	450– 600	200–400	190 or more	120–130	310–320
Wheat Zone	vl/l or two			950–1 100	500– 650	180–220	180 or more	110–120	290–300
UH 3	l/vl			900–1 100	500– 650	130–200	170 or more	100–110	270–280
Whear-Barley	(l/vl)	2 370–2 430	14.7–13.7	850–1 050	350– 550	120–180	170 or more	90–100	260–270
Zone	(l) i (vs/s) i			800–1 100	500– 600	150–180	160 or more	70– 90	230–250
UH 4 Ranching Zone	u r i	2 280–2 370	14.9–13.5	850– 950	300– 450[4]	100–150	–	–	–
LH 3 Wheat/(Maize)- Barley Zone	(l/vl)	2 250–2 280	15.2–15.0	800– 900	500– 550	130–180	150 or more	60– 70	210–220
	(l/m) i (vs/s)			850– 950	450– 600	150–200	150 or more	60– 70	210–220
LH 4 Cattle-Sheep Barley Zone	(l)	2 190–2 280	15.6–15.0	800– 900	300– 400	90–150	140 or more	60– 70	200–210
	(vs)⌢(s/m)+(vs)			800– 900	350– 450	100–150	90 or more	30– 40	–
LH 5	u r i			700– 750	250– 300[5]	50–100	–	–	–
Lower Highland Ranching Zone	t r	2 070–2 190	16.6–15.6	750– 850	250– 350[5]	50–100	–	–	–

1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants.
2) More if growing cycle of cultivated plants continues into the period of second rains.
3) Only added if rainfall continues at least for survival ($>0.2\ E_o$) of most long term crops.
4) No cultivation due to frequent night frosts.
5) Unsuitable distribution for crops.



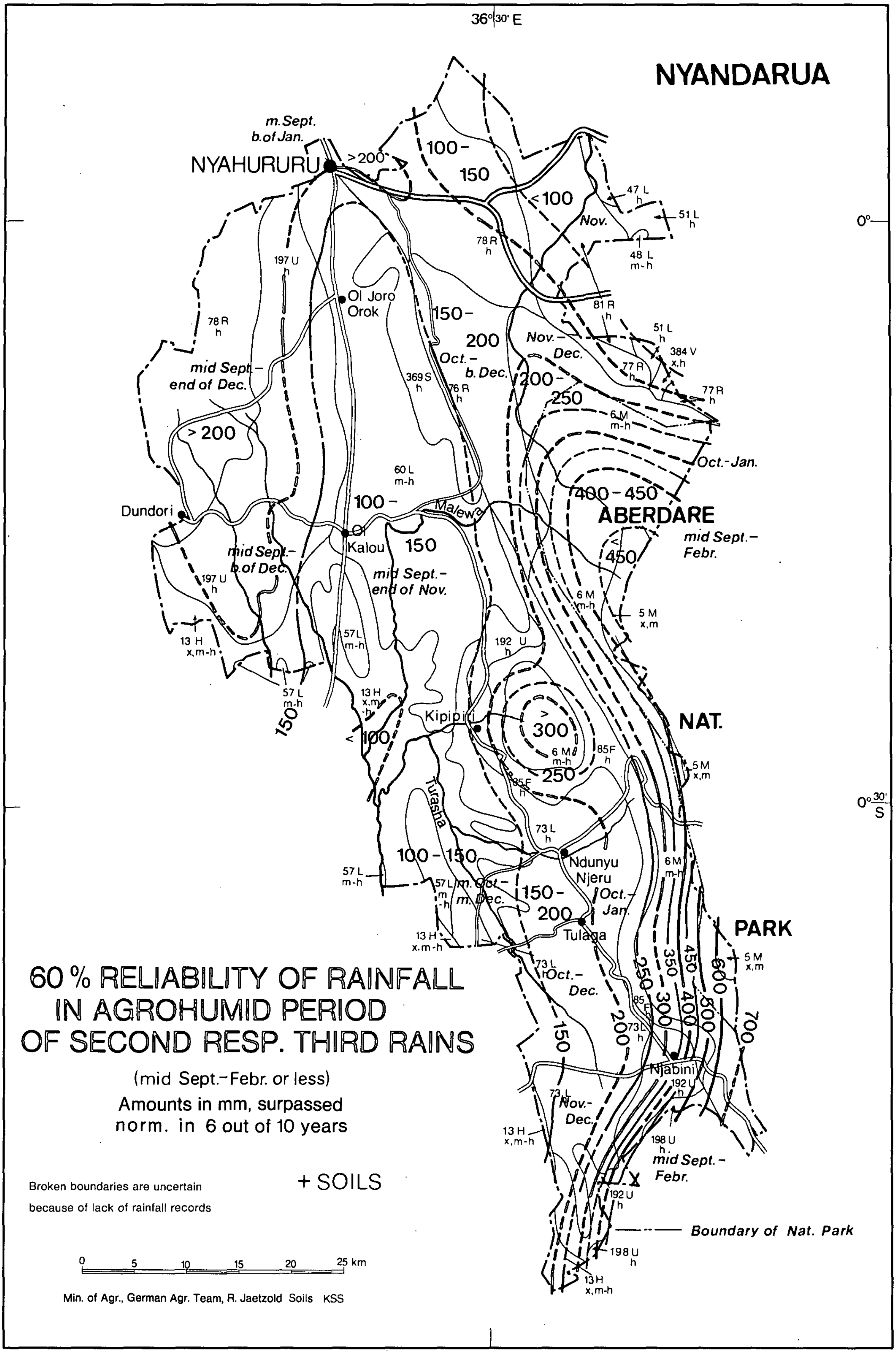
NYANDARUA
36°30' E
0°
0°30' S
8936
9036
NYAHURURU
Ol Joro Orok
Dundori
Ol Kalou
Malewa
Kipipiri
Turasha
Ndunyu Njeru
Tulaga
Njabini
ABERDARE
NAT.
PARK
Temperature recording station, operating 1976, closed
Rainfall recording station, operating 1976 and having at least 10 years of records
29 Station number in grid
9036 Grid number
Broken boundaries are uncertain because of lack of rainfall records
Boundary of Nat. Park
AVERAGE ANNUAL RAINFALL
in mm
+ SOILS
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



60 % RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF FIRST AND MIDDLE RESP. SECOND RAINS

(March - mid Sept. or less)

Amounts in mm, surpassed norm. in 6 out of 10 years



60 % RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RESP. THIRD RAINS

(mid Sept.–Febr. or less)

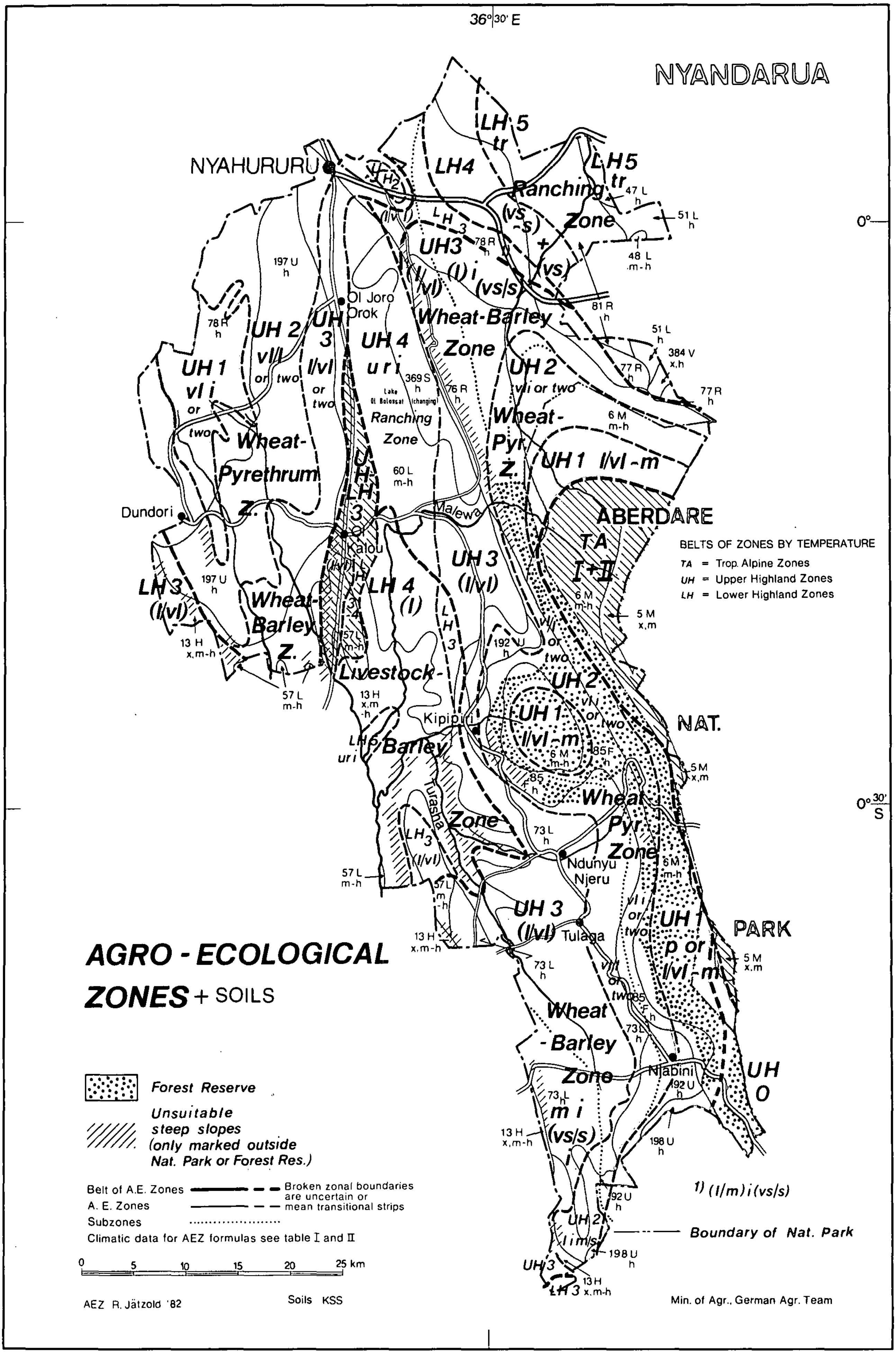
Amounts in mm, surpassed norm. in 6 out of 10 years

Broken boundaries are uncertain because of lack of rainfall records

+ SOILS

0 5 10 15 20 25 km

Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



36°30' E
NYANDARUA
NYAHURURU
Ol Joro Orok
Dundori
Ol Kalou
Kipipiri
Ndunyu Njeru
Tulaga
Njabini
Malewa
Turasha
LH 5 tr
LH 4
LH5 tr
Ranching Zone
UH3 (l) i (vs/s)
Wheat-Barley Zone
UH 2 vl/l or two
UH 3 l/vl or two
UH 4 u r i
Lake Ol Bolossat (changing)
Ranching Zone
UH 1 vl i or two
Wheat-Pyrethrum Z.
UH 2 vl i or two
Wheat-Pyr. Z.
UH 1 l/vl-m
ABERDARE
TA I+II
BELTS OF ZONES BY TEMPERATURE
TA = Trop. Alpine Zones
UH = Upper Highland Zones
LH = Lower Highland Zones
UH 3 (l/vl)
LH 4 (l)
LH 3 (l/vl)
Wheat-Barley Z.
Livestock-Barley Zone
UH 1 l/vl-m
Wheat Pyr. Zone
NAT.
PARK
UH 3 (l/vl)
UH 1 p or l/vl-m
Wheat-Barley Zone
m i (vs/s)
UH 0
UH 2 l i m/s
1) (l/m) i (vs/s)
Boundary of Nat. Park
0°
0°30' S
AGRO - ECOLOGICAL ZONES + SOILS
Forest Reserve
Unsuitable steep slopes (only marked outside Nat. Park or Forest Res.)
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 5 10 15 20 25 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team

AGRO-ECOLOGICAL ZONES

TA = TROPICAL-ALPINE ZONES

TA I + II = Tropical-Alpine Moor- and Heathlands

Here National Park
Limited grazing potential

UH = UPPER HIGHLAND ZONES

UH 0 = Forest Zone

UH 1 = Sheep and Dairy Zone

UH 1 p or l/vl ⌐ m = Sheep and Dairy Zone with permanent cropping possibilities, dividable in a long to very long cropping season followed by a medium one

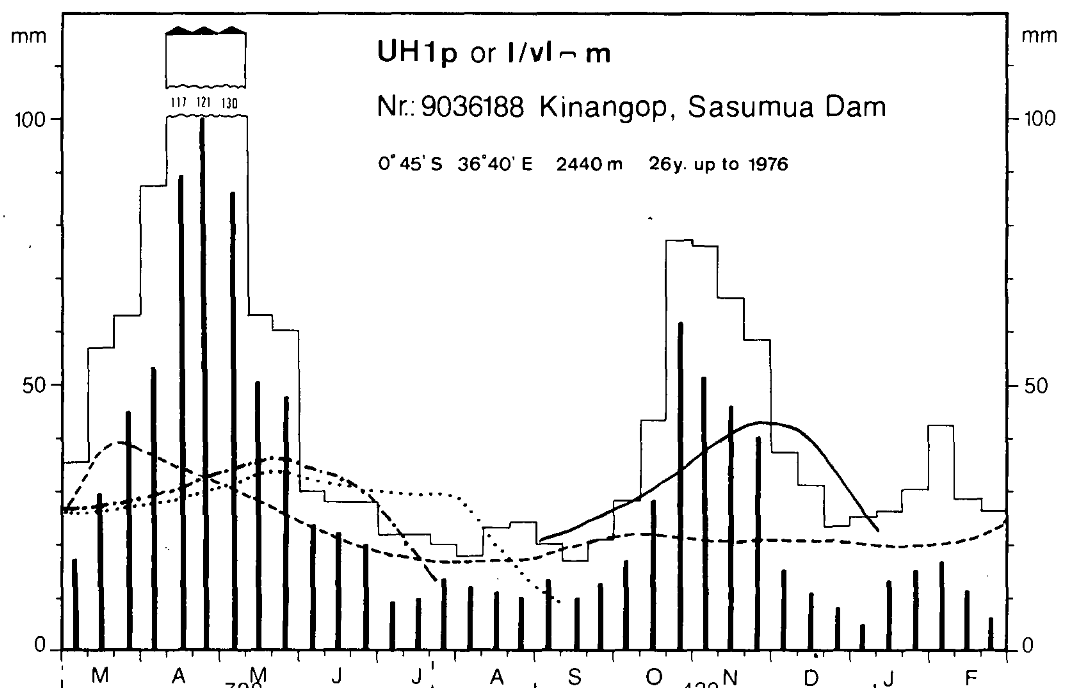
(See Diagram Kinangop, Sasumua Dam)

Upper places very steep and too important as a catchment area, therefore Forest Reserve or Nat. Park. Small strip of outside lower places cleared, there:

Good yield potential (av. 60–80 % of the optimum)
1st rains, start norm. mid March: Oats (Apr.–S., ~ 60 %); peas, potatoes[1]; late mat. rapeseed (~ 60 %); cabbage, carrots, kohlrabi, celery, radish, endive, rampion, leek, spinach
2nd rains, start norm. mid Oct.: Oats (Oct.–F.); peas, potatoes[1]; med. mat. rapeseed; vegetables

Fair yield potential (av. 40–60 % of the optimum)
1st rains to 2nd r.: Very late mat. maize like High alt. comp.[3], late mat. triticale
2nd rains: Medium mat. triticale (b. of S.–m. Jan.), m. mat. wheat

Pasture and forage
About 0.6 ha/LU on sec. pasture of Kikuyu grass; very suitable for grade dairy cows (but transportation of milk difficult because of the bumpy roads); rye grass (Lolium perenne) and Kenya white clover to improve pasture; fodder oats



Average rainfall per decade   rainfall surpassed in 6 out of 10 years
Approx. pot. evapotranspiration of a permanent crop (pyrethrum)
Approx. pot. evapotranspiration of med. mat. wheat like Africa Mayo
Approx. pot. evapotranspiration of late mat. wheat like Kenya Bongo
Approx. pot. evapotranspiration of oats
790 Rainfall per indicated growing period, surpassed in 6 out of 10 years

UH 1 = *Sheep and Dairy Zone*
l/vl *with a long to very long cropping season*
⌐ m *followed by a medium one*

Steep slopes, Forest Reserve or National Park

UH 1 = *Sheep and Dairy Zone*
vl i *with a very long cropping season and intermediate rains*

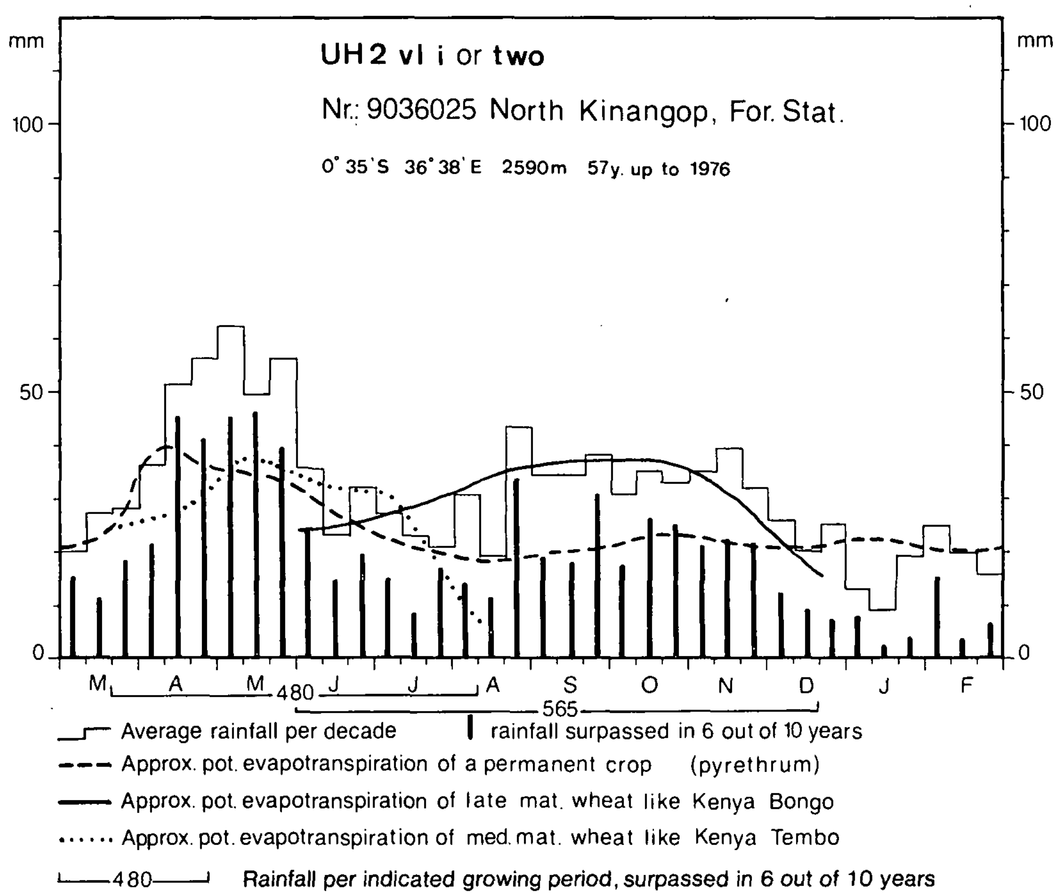
Small, see Nakuru District

UH 2 = *P y r e t h r u m - W h e a t Z o n e*

UH 2 = *Pyrethrum-Wheat Zone*
vl i *with a very long cropping season and intermediate rains,*
or two *dividable in two variable cropping seasons and i.r.*

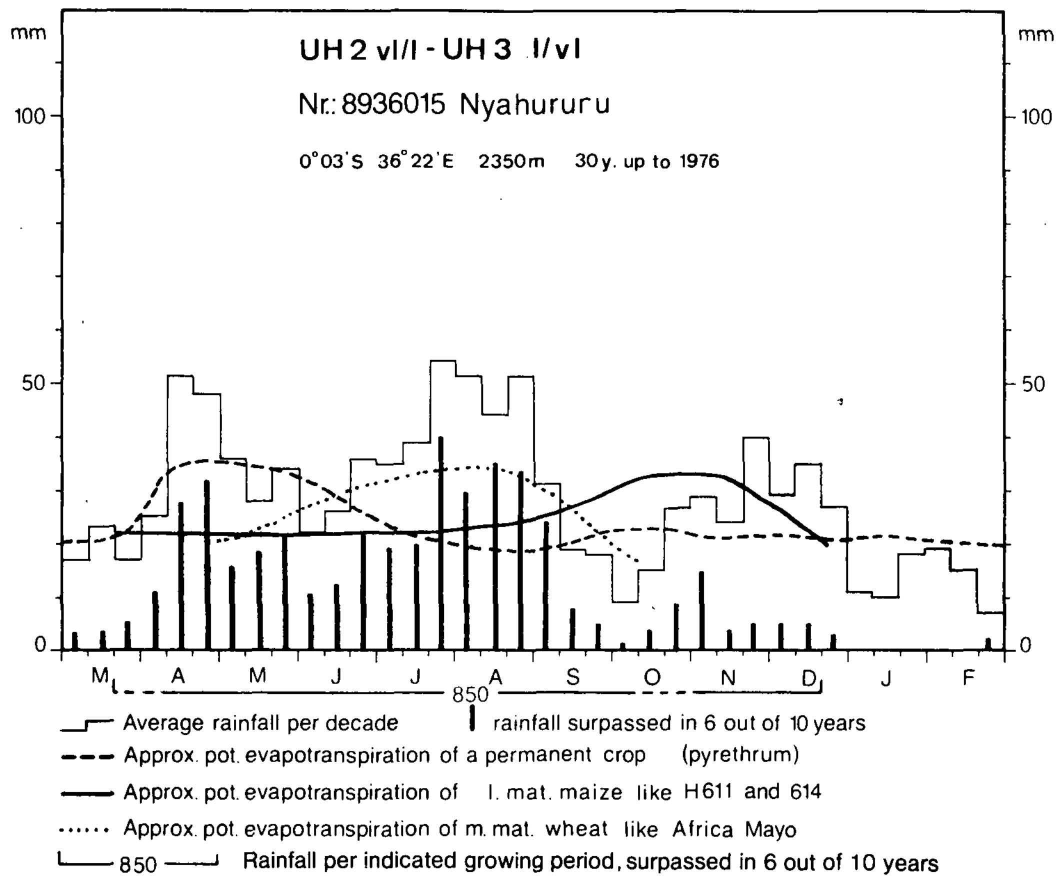
(See Diagram N-Kinangop)

G o o d y i e l d p o t e n t i a l
1st rains, start norm. end of March: Triticale, oats; horse beans (below 2 700 m), peas; late mat. potatoes[4]; rapeseed; cabbages, kales, carrots (70–80 %), kohlrabi, celery, endive, rampion, leek, radish, spinach
2nd rains, start indistinctly around August: Oats, l. mat. wheat[3] like K. Bongo (b. of June–e. of D.), m. mat. barley like Proctor; peas; rapeseed; cabbages, kales, carrots, celery, endive, rampion, leek, radish
Whole year, best planting time March/April: Pyrethrum (70–80 %); rhubarb



F a i r y i e l d p o t e n t i a l
1st rains: Very late mat. maize like High alt. comp. or Cuzco (Mch./Apr.–Jan.) on frost-free slopes, late mat. wheat[3]
2nd rains: E. mat. wheat; potatoes; kohlrabi, spinach
Whole year: Pears, plums, apples below 2 600 m

P a s t u r e a n d f o r a g e
0.6–0.9 ha/LU on sec. pasture of Kikuyu and tufted grass[2]; Merino and Corriedale sheep best above 2 700 m, grade dairy cows below that; rye grass (Lolium perenne)[6], tall fescue (Festuca arundinacea) and cocksfoot (Dactylis glomerata) to improve pasture, Kenya white clover for dairy cows



UH 2 = Pyrethrum-Wheat Zone
l i with a long cropping season, intermediate rains,
m/s and a medium to short cropping season

Almost the same as UH 2 vl i because mists are bridging the two rainy seasons

UH 2 = Pyrethrum-Wheat Zone
vl/l with a very long to long or two cropping seasons
or two

(see Diagram Nyahururu)

On the Kinangop plateau extended water-logging soils and frosts are excluding several crops

Good yield potential

1st rains, start norm. end of March: M. mat. wheat like Africa Mayo and other varieties of this group (see crop list, Vol. II A)[3] [5] (b. of May–m. O.), late mat. wheat like Kenya Bongo[3], triticale, m. mat. barley like Proctor; peas[3], horse beans (below 2 700 m); rapeseed; potatoes[3] [4]; carrots, cabbages, celery, endive, rampion, leek, raddish, kohlrabi, kales, spinach

2nd rains, start indistinctly around June/July: E. mat. wheat like K. Tembo and other var.; potatoes; carrots, celery, endive, rampion, leek, radish, kales

Whole year: Pyrethrum

Fair yield potential

2nd rains: Peas, rapeseed; cabbages, kohlrabi

Whole year: Pears, plums, apples < 2 600 m (like most other crops not on the water-logging soils of the Kinangop Plateau)

Poor yield potential

1st rains: High alt. maize like Cuzco on frost-free places

Pasture and forage

Suitable for Merino sheep and grade dairy cows; around 1 ha/LU on sec. pasture of Kikuyu and tufted grass[2]; perennial rye grass[6] for improving pasture on suitable soils

UH 3 = *W h e a t - B a r l e y Z o n e*

UH 3 l/vl or two = *Wheat-Barley Zone with a very long cropping season, dividable in two variable cropping seasons*

G o o d y i e l d p o t e n t i a l
1st rains, start norm. end of March: Late mat. wheat like Kenya Bongo (April–Oct./N.), m. mat wheat like Fahari and o. var. (May–O./N.), m. mat. barley like Proctor (June–N.), m. mat. triticale (Apr.–S., 60–70 %); seed peas (Mch.–June/Jy., about 60 %), potatoes (Mch.–Jy.); rapeseed (Apr./May–b. of S., 60–70 %), linseed or flax; green onions (shallots); cabbages, cauliflower, kohlrabi
Whole year: New Zealand flax (below 2 500 m)

F a i r y i e l d p o t e n t i a l
1st rains: Very late mat. maize like High alt. comp. or Cuzco (all only on microclimatic frost-free places, ~ 40 %), oats (Apr.–b. of S.); m. mat. sunflower like Comet (lower frost free places); carrots, kales, celeri, endive, rampion, leek, radish
2nd rains, start around August but no distinct dry period before that: E. mat. barley; potatoes[4] and e. mat. vegetables
Whole year: Pyrethrum

P a s t u r e a n d f o r a g e
More than 1 ha/LU on sec. pasture of mixed grasses; suitable for grade beef cattle, dairy cows and Merino sheep; barley B 106 for stockfeed; rye grass[6], cocksfoot and tall fescue to improve pasture; subterranean and Kenya white clover for dairy cows

UH 3 (l/vl) = *Wheat-Barley Zone with a (weak) long to very long cropping season*

(See Diagram Ol Kalou)

G o o d y i e l d p o t e n t i a l
1st rains, start norm. end of March: Barley like Proctor, late mat. wheat Kenya Bongo[3] (~ 60 %), m. mat. wheat (May–b. of O.); potatoes (~ 60 %)[4]

F a i r y i e l d p o t e n t i a l
1st rains: Peas; rapeseed, linseed, flax; cabbage, kales (to 2nd r.), carrots, kohlrabi, cauliflower
2nd rains, start indistinctly around July (with a third very small peak in O.): Potatoes (frost-free places), carrots
Whole year: Pyrethrum; New Zealand flax (below 2 500 m)

P o o r y i e l d p o t e n t i a l
1st rains: Very late mat. maize like High alt. comp.
2nd rains: Cabbage, cauliflower, kohlrabi

P a s t u r e a n d f o r a g e
Moor and grassland, well suited for Merino sheep, less for grade beef cattle and dairy cows; around 1.5 ha/LU on nat. pasture of mixed grasses

UH 3 (l) i (vs/s) = *Wheat-Barley Zone with a (weak) long cropping season, intermediate rains, and a (weak) very short to short one*

No reliable good yield potential

F a i r y i e l d p o t e n t i a l
1st rains, start norm. mid March: E. and m. mat. wheat, m. mat. barley like Proctor; potatoes
Whole year: Pyrethrum (on deep soils)

P a s t u r e a n d f o r a g e
About 1.5–2 ha/LU on nat. pasture, 0.9–1.5 ha/LU on art. pasture of rye grass[6]; subterranean or Kenya white clover and barley Amani for additional forage; well suitable for Merino sheep and grade beef cattle

UH 3 = *Wheat-Barley Zone*
m i *with a medium cropping season, intermediate rains,*
(vs/s) i *and a (weak) very short to short one*

(See Diagram Naiv., Nanga Gerri)

No reliable good yield potential. Many places waterlogged

Fair yield potential
1st rains, start norm. March: E. and m. mat. wheat, m. mat. barley like proctor; linseed; potatoes, peas, cabbages, carrots
Whole year: Pyrethrum (like other crops on deep, free draining soils)

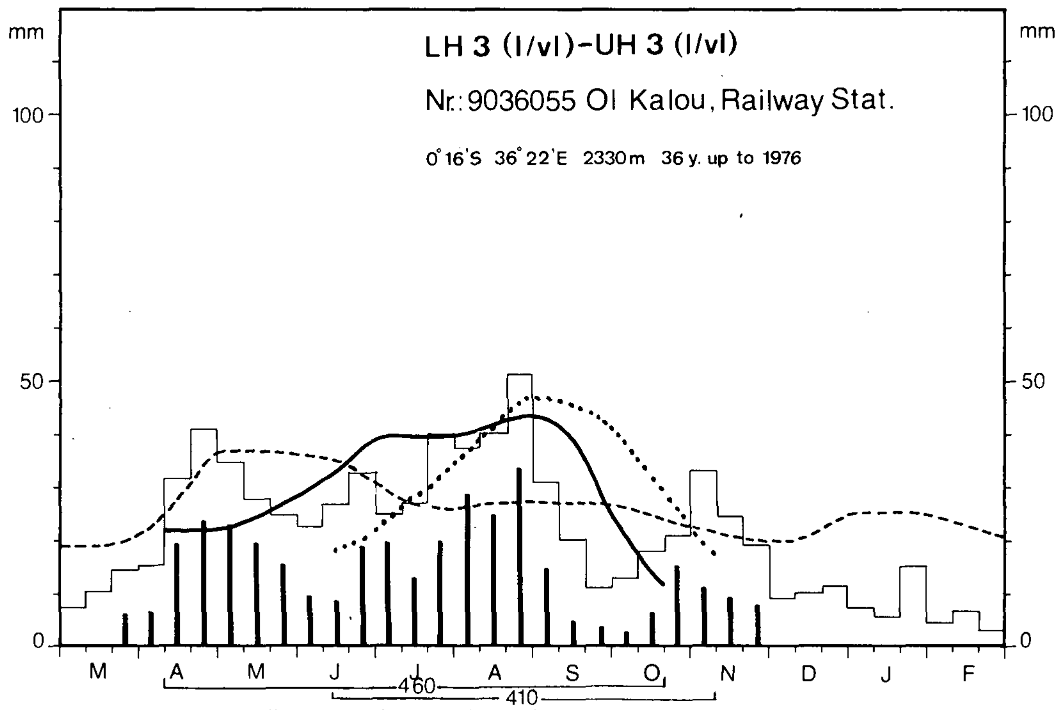
Pasture and forage
About 1.5–2 ha/LU on nat. pasture, 1–1.5 ha/LU on art. pasture of rye grass[6] or cocksfoot; subterr. or Kenya white clover and barley Amani for add. forage; Merino sheep, dairy cows and grade beef cattle

UH 4 = *Upper Highland Ranching Zone*

UH 4 = *Upper Highland Ranching Zone*
u r i *with unimodal rainfall and intermediate rains*

Not suited for agriculture due to low rainfall and frequent night frosts. Some chances with frost resistant crops and varieties from Bolivia or Peru

Grassland and forage
More than 2 ha/LU on natural grassland



Average rainfall per decade — rainfall surpassed in 6 out of 10 years
--- Approx. pot. evapotranspiration of a permanent crop (pyrethrum)
—— Approx. pot. evapotranspiration of late mat. wheat like Kenya Bongo
······ Approx. pot. evapotranspiration of med. mat. wheat like Kenya Tembo
└── 460 ──┘ Rainfall per indicated growing period, surpassed in 6 out of 10 years

LH = *LOWER HIGHLAND ZONES*

LH 3 = *Wheat/(Maize)-Barley Zone*

LH 3 = *Wheat/(Maize)-Barley Zone*
(l/vl) *with a (weak) long to very long cropping season[7]*

(See Diagram Ol Kalou)

Good yield potential

1st rains, start norm. e. of March/mid April: Late mat. wheat like Kenya Bongo, m. mat. barley like Kenya Research; potatoes (e. of March–July)

Fair yield potential

1st rains: Maize H 611 a. o. var.; peas, rapeseed, linseed or flax, sunflower Kenya White (50–60 %); cabbage, kales, carrots, cauliflower, beetroot, spinach

2nd rains, start norm. end of June/Jy.: E. mat. wheat like Kenya Tembo (b. of June–b. of N.) a. o. var., e. mat. barley like Tumaini; beans (lower places); rapeseed; potatoes; tomatoes, kales, beetroot

Whole year: Black wattle

Pasture and forage

Good for grade beef cattle and Merino sheep. Around 1.5 ha/LU on nat. grassland; 0.7–1.2 ha/LU on art. pasture of Nandi Setaria; barley B 106 for stockfeed

LH 3 (l/m) i (vs/s) = *Wheat/(Maize)-Barley Zone with a (weak) long to medium cropping season, intermediate rains, and a (weak) very short to short one*

Potential almost the same as above but no late mat. wheat, and all planting only first rains

LH 4 = *Cattle-Sheep-Barley Zone*

LH 4 (l) = *Cattle-Sheep-Barley Zone with a (weak) long cropping season*

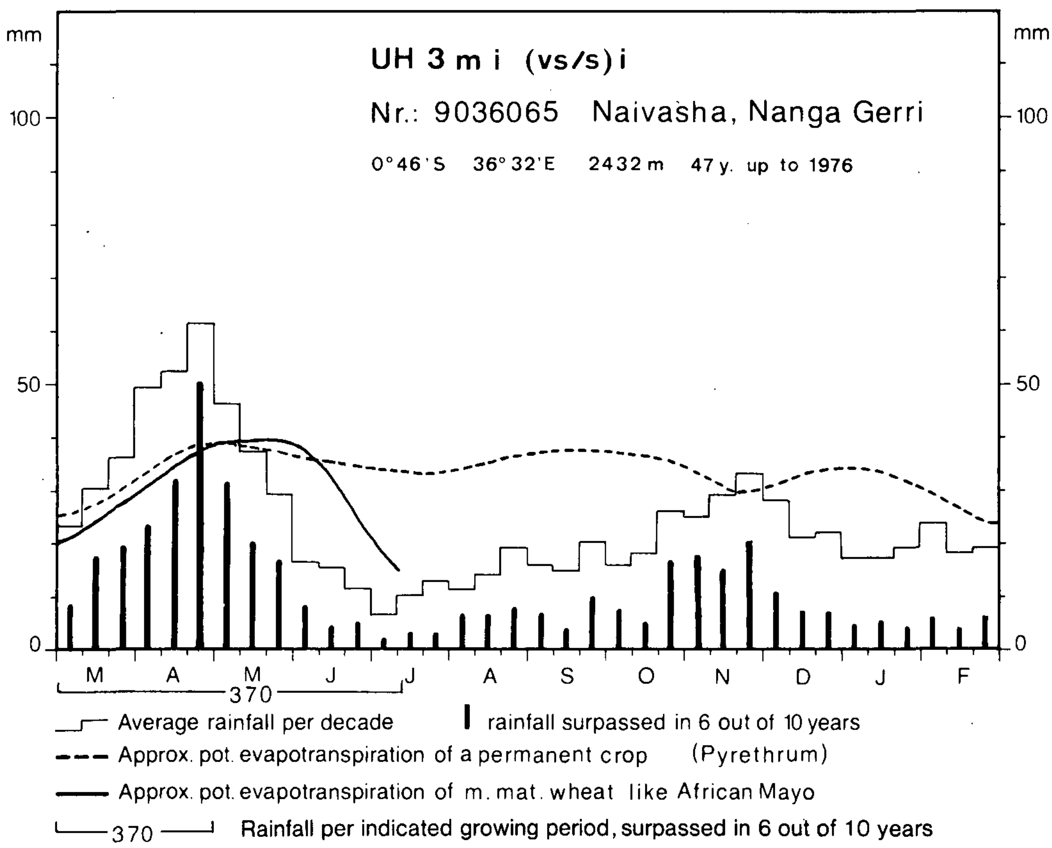
Fair yield potential

1st rains, start norm. b. of April: Late mat. wheat like Kenya Bongo, m. mat. barley like Proctor; potatoes; sunflower Kenya White (40–50 %); rapeseed as vegetable

2nd rains, start norm. end of June: E. mat. wheat like Kenya Tembo (~ 40 %) a. o. var., e. mat. barley like Tumaini; potatoes, tomatoes, green onions

Pasture and forage

About 2–3 ha/LU on nat. grassland; barley Amani or subterranean clover as add. forage for high grade cattle



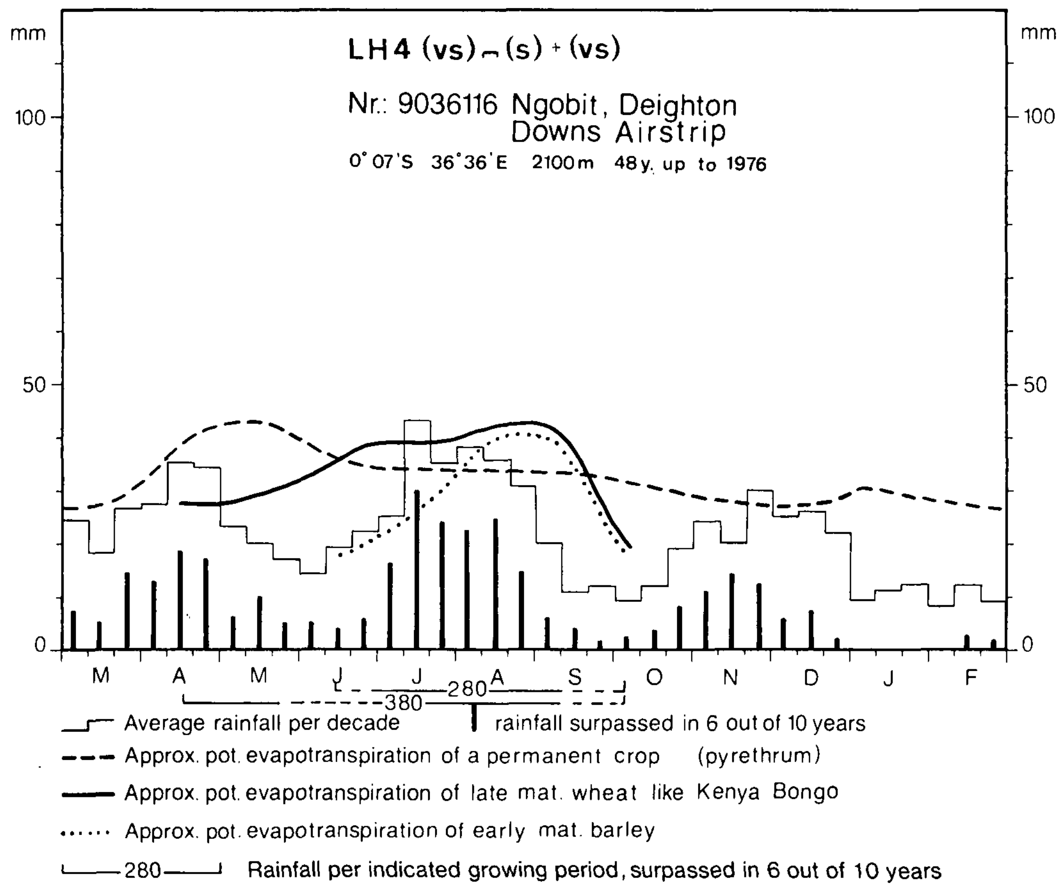
LH 4	= *Cattle-Sheep-Barley Zone*
(vs) ⌐	*with a (weak) very short cropping season,*
(s/m) +	*followed by a (weak) short to medium one*
(vs)	*and a (weak) very short cropping season*

(See Diagram Ngobit, Deighton Downs)

F a i r   y i e l d   p o t e n t i a l
1st rains, start norm. end of March: Not sufficient for crops
2nd rains, start norm. mid June: E. mat. barley like Tumaini; rapeseed as vegetable

P o o r   y i e l d   p o t e n t i a l
1st rains: Late mat. wheat like Kenya Bongo (to 2nd r.)
2nd rains: E. mat. wheat like K. Ngiri a. o. var.; green onions

P a s t u r e   a n d   f o r a g e
3–5 ha/LU on nat. grassland; subterr. clover as add. forage for high grade cattle



LH 5 = *L o w e r   H i g h l a n d   R a n c h i n g   Z o n e*

LH 5	= *Lower Highland Ranching Zone*
t r	*with trimodal rainfall*

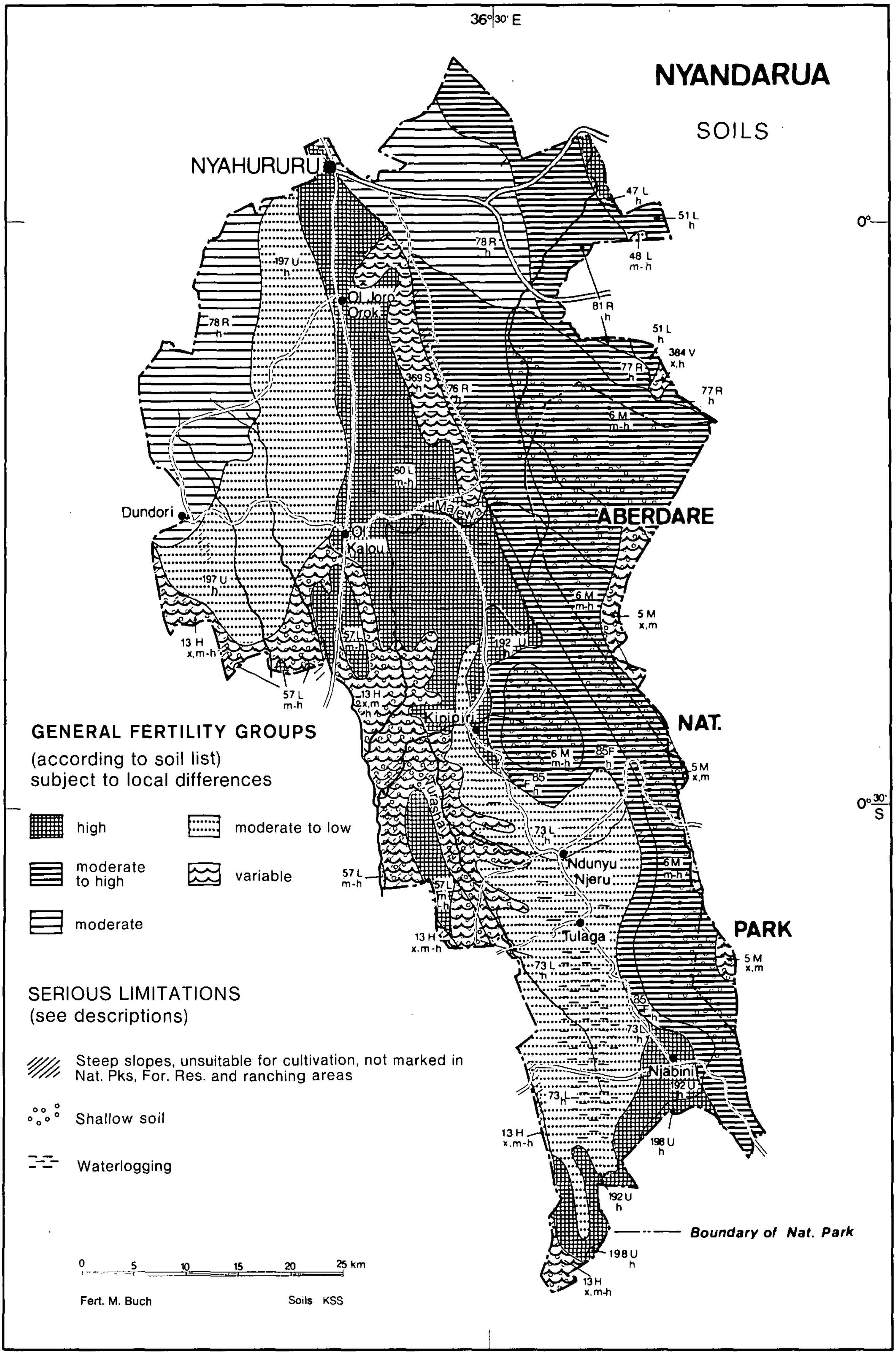
Not suitable for rain-fed agriculture (except of v. e. mat. barley)

P a s t u r e   a n d   f o r a g e
Normally 5–6 ha/LU on nat. short grass savanna. No proper forage

LH 5	= *Lower Highland Ranching Zone*
u r i	*with unimodal rainfall and intermediate rains*

Almost the same as above but forage or hay important for bridging longer dry season

1) Spraying against fungus diseases important
2) The bad tufted grass Eleusine jeageri and Pennisetum schimperi are expanding if the areas are overgrazed
3) Sometimes frost damage, esp. S.–F., local micro-relief important.(Lakes of cold air)
4) Blight resistant varieties important
5) Med. mat. varieties fit better into the moisture supply than late mat. ones
6) Not in wheat areas because it is a bad weed
7) LH 3–UH 3, depending on microclimate, inversion makes bottomlands full of cold air during night.



36°30' E
NYANDARUA
SOILS
NYAHURURU
Ol Joro Orok
Dundori
Ol Kalou
Malewa
Kipipiri
Turasha
Ndunyu Njeru
Tulaga
Njabini
ABERDARE
NAT.
PARK
0°
0°30' S
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
moderate to high
moderate
moderate to low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas
Shallow soil
Waterlogging
Boundary of Nat. Park
0 5 10 15 20 25 km
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The physiography of the Nyandarua District is dominated by the Nyandarua (Aberdare) Range in the west. The landscape consists of undulating to rolling topography, the volcanic foothills of Mt. Kenya. The plateaus mostly occur in the central and southern part of the district. Miscellaneous land types and swampy areas occur east and southeast of Ol Joro Orok.

The highest parts of the mountains contain soils of unit 5 M which are of moderate to high fertility but it is too cold for any cultivation. On slightly lower altitudes, soils with a humic topsoil and of high fertility are found (unit 6 M). Soils of the hills are generally variably fertile (unit 13 H). The uplands in the southern part of the district have a humic topsoil (unit 192 U) and are highly fertile.

On the plateaus, various soils are found: in the northern part, unit 60 L, composed of highly fertile soils and in the southern part, different types of heavy plateau soils with very poor drainage and moderate to low fertility (73 L). In the western part, soil unit 57 L with soils of high fertility is found.

On the lower areas, valley soils (unit 384 V) are typical in minor valleys.

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

5 M = imperfectly drained, shallow to moderately deep, dark greyish brown, very friable, acid humic to peaty, loam to clay loam, with
m, x[1] rock outcrops and ice in the highest parts (dystric HISTOSOLS, lithic phase; with LITHOSOLS, rock outcrops and ice)

6 M = well drained, very deep, dark reddish brown to dark brown, very friable and smeary, clay loam to clay, with thick, acid humic
m–h topsoil; in places shallow to moderately deep and rocky (humic ANDOSOLS, partly lithic phase)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

13 H = well drained, shallow, dark reddish brown, friable, very calcareous, bouldery or stony, loam to clay loam; in many places saline
x, m–h (LITHOSOLS; with calcic XEROSOLS, bouldery and saline phase and Rock Outcrops)

SOILS ON PLATEAUS AND HIGH-LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older basic tuffs included)

48 L = imperfectly drained, deep, dark greyish brown, firm clay (hardpan), abruptly underlying a topsoil of sandy clay loam (eutric
h, m PLANOSOLS)

51 L = moderately well drained, very deep, dark greyish brown, firm clay
h (verto-luvic PHAEOZEMS; with eutric PLANOSOLS)

Soils developed on volcanic ashes and other pyroclastics of recent volcanoes

57 L = well drained, moderately deep to very deep, dark brown, friable and slightly smeary, clay loam to clay
m–h (ando-luvic PHAEOZEMS)

60 L = Complex of: – well drained, deep to very deep, very dark greyish brown to dark brown, friable and slightly smeary clay loam
m–h (ando-luvic PHAEOZEMS)
– imperfectly drained, deep, very dark greyish brown to black, firm, moderately calcareous, slightly cracking clay (verto-luvic PHAEOZEMS)

73 L = imperfectly drained, deep, very dark greyish brown, mottled, firm clay, abruptly underlying a thick topsoil of friable silty clay
h loam (solodic PLANOSOLS)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

76 R = well drained, extremely deep, dark reddish brown to dark brown, friable and slightly smeary clay, with acid humic topsoil
h (ando-humic NITOSOLS; with humic ANDOSOLS)

77 R = well drained, extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil
h (humic NITOSOLS)

78 R = well drained, extremely deep, dusky red to dark reddish brown, friable clay; with inclusions of well drained, moderately deep,
h dark red to dark reddish brown, friable clay over rock, pisoferric or petroferric material (eutric NITOSOLS; with nito-chromic CAMBISOLS and chromic ACRISOLS, partly pisoferric or petroferric phase)

81 R = well drained, moderately deep to deep, dark reddish brown, friable to firm clay, with humic topsoil
h (chromo-luvic PHAEOZEMS)

SOILS ON FOOTSLOPES

Soils developed on colluvium from various volcanic rocks (mainly basalts)

85 F = well drained, deep to very deep, reddish brown, friable clay, with an acid humic topsoil
h (ando-humic ACRISOLS)

SOILS ON UPLANDS

Soils developed on undifferentiated volcanic rocks (mainly basalts)

192 U h = well drained, very deep, dark reddish brown to very dark greyish brown, friable and slightly smeary clay, with humic topsoil (ando-luvic PHAEOZEMS)

Soils developed on basic igneous rocks (basalts, etc.) with predominant volcanic ash influence

197 U h = well drained, deep to very deep, dark reddish brown to dark red, firm clay; with inclusions of imperfectly drained, moderately deep, dark greyish brown clay (nito-ferric/chromic LUVISOLS; with gleyic LUVISOLS, partly lithic or pisoferric phase)

SOILS ON SWAMPS

369 S h = poorly drained to very poorly drained, very deep, dark greyish brown to dark olive grey, firm to very firm, strongly calcareous, strongly saline and strongly sodic clays; in many places with fragipans at various depths (gleyic SOLONCHAKS, sodic phase and partly fragipan phase)

SOILS IN MINOR VALLEYS

384 V x, h = complex of well drained to imperfectly drained, shallow to moderately deep, dark reddish brown to very dark greyish brown, firm, slightly to moderately calcareous, rocky, stony, or gravelly clay

1) Soil texture-classes

h = heavy
l = light
m = medium
x = stony or bouldery
v = varying texture
m–h = medium to heavy
m, h = medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-climatic Zone Map of Kenya, Scale 1:1 000 000. Expl. Soil Survey Rep. E 1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

According to the last population Census in September 1979, the total population of the Nyandarua District was 233,302 people, of whom not more than 11,277 lived in the township Nyandarua and in the trading centre Ol Kalou, the only urban settlements. The rural population thus consisted of 220,114 persons, for whom a total rural area of 267,200 ha was available and 208,500 ha were suitable for agriculture or livestock (Table 6). For an average household (5.36 people) statistically 5.33 ha of land were available, about 1 ha per person.

Most of the area consists of UH 2 (Pyrethrum/Wheat Zone) and UH 3 (Wheat/Barley Zone), nearly 60 % of the district area, or 124,800 ha. In this part of the country, former large farms have been subdivided and now mixed farms of a relatively small size are the norm, often too small to be economically viable.

In the better zones where agriculture plays an important role, actual farm size is mostly still sufficient for a small farmer to do fairly well, but in those areas where livestock predominates, more land would be needed per family. Roughly speaking, it may be said that the productivity of one unit of 2 ha in UH 2 is comparable with one of 4 ha in LH 3 and one of more than 12 ha in UH 4.

In the Nyandarua District, quite a number of problems occur with agriculture and livestock in addition to the land pressure. They range from frosts and dryness to other restrictive factors such as swampy areas. It would be advisable here to take measures against overstocking and its consequences in order not to destroy the natural potential. The remaining forest reserves of the district should also be preserved.

NYANDARUA DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Ndundori	10 544	10 977	21 521	3 816	210	102
Rupii	5 165	5 328	10 493	1 855	128	81
Ol Kalou	7 481	7 123	14 604	2 872	268	54
Ol Kalou Division	23 190	23 428	46 618	8 543	607	76
Ndaragwa	11 577	11 705	23 282	4 296	387	60
Ol Joro Orok	12 715	13 196	25 911	4 634	381	67
Leshau	9 852	10 764	20 616	3 815	185	111
Northern Division	34 144	35 665	69 809	12 745	954	73
South Kinangop	9 328	9 460	18 788	3 404	155	120
North Kinangop	10 773	11 430	22 203	3 795	260	85
Nagumu	9 928	10 280	20 208	3 435	190	106
Kinangop Division	30 029	31 170	61 199	10 634	606	100
Wanjohi	5 790	6 210	12 000	1 939	203	58
Kipipiri	9 779	10 733	20 512	3 511	244	83
Geta	5 736	6 151	11 887	2 358	61	194
Nyahururu Township	6 188	5 089	11 277	3 467	17	642
Kipipiri Division	27 493	28 183	55 676	11 275	526	105
Nyandarua District	114 856	118 446	233 302	43 197	3 528	66

NYANDARUA DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Household total b)
		Adults 14 years	Children 14 years	Other Relatives		
Location:						
Ndundori	3863	2.98	1.92	0.50	0.16	5.57
Rurii	1847	3.08	1.81	0.57	0.21	5.68
Ol Kalou	2920	2.80	1.48	0.44	0.24	4.96
Division Ol Kalou	8630	2.95	1.75	0.50	0.20	5.39
Location:						
Ndaragwa	4298	2.86	1.76	0.59	0.20	5.41
Ol Joro Orok	4618	2.98	1.80	0.63	0.20	5.61
Leshau	3813	2.78	1.78	0.64	0.20	5.41
Division Northern	12729	2.91	1.75	0.62	0.20	5.48
Location:						
South Kinangop	3400	3.06	1.84	0.43	0.20	5.53
North Kinangop	3781	3.12	2.12	0.40	0.17	5.82
Magumu	3436	2.19	2.05	0.42	0.22	5.88
Division Kinangop	10617	3.14	1.99	0.42	0.20	5.75
Location :						
Wanjohi	1937	3.26	2.17	0.58	0.18	6.18
Kipipiri	3609	3.00	2.05	0.47	0.16	5.68
Geta	2356	2.81	1.72	0.42	0.09	5.04
Nyahururu Township	3454	2.00	0.46	0.35	0.25	3.06
Divsion Kipipiri	11356	2.75	1.47	0.44	0.18	4.84
DISTRICT NYANDARUA	43332	2.92	1.74	0.50	0.19	5.36

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per household as well.

NYANDARUA DISTRICT

TABLE 6: **AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON**

Location/Division without townships	in '00 ha = sqkm					in '00 ha = sqkm									in ha	
	Area total	Non-agricultural land			Agri-cultural land	Area in agro-ecological zones AEZ									Agric. land per	
	Census 79	Unsuit. steep slopes	Forest Res., lakes, swamps	Others (roads, home-steads, rivers...)		UH 1	UH 2	UH 3	UH 4	LH 3	LH3–LH 4	LH 4	LH 5	UH–LH 3	house-hold	person
Ndundori	210			21	189	59	108			22					7.53	1.22
Rurii	128		Sw. 1 L. 3	13	111		32	32	25					22	5.98	1.06
Ol Kalou	268	15		27	226	4	29	80	6	3	21	44	16	23	7.87	1.55
Ol Kalou Division	606	15	4	61	526	63	169	112	31	25	21	44	16	45	6.27	1.16
Ndaragwa	387	11	F. 91 Sw. 5 L. 7	39	234	1	54	74	2	9		49	45		5.45	1.01
Ol Joro Orok	381		Sw. 26 L. 7	38	310	25	150	62	65					8	6.69	1.20
Leshau	185	1	F. 2 Sw. 5	20	157		3	20	2	42		61	29		4.12	0.76
Northern Division	953	12	143	97	701	26	207	156	69	51		110	74	8	5.42	0.99
South Kinangop	155	3		19	133	20	63	50							3.91	0.71
North Kinangop	260	4		26	230	12	87	124				7			6.06	1.04
Magumu	190	4	Sw. 6	19	161	30	49	79		3					4.69	0.80
Kinangop Division	605	11	6	64	524	62	199	253		3		7			4.89	0.85
Wanjohi	203	10	Sw. 27	20	146		14	87	1	17		25	2		7.53	1.22
Kipipiri	244	31	Sw. 1	24	188		23	28		30		102	5		5.35	0.92
Geta	61		F. 61													
Kipipiri Division	508	41	89	44	334		37	115	1	47		127	7		6.44	1.07
Total rural area	2 672	79	242	266	2 085	151	612	636	101	126	21	288	97	53	5.33	0.95

1) For official land statistics see supplementary publication to FM-Handbook, Vol. IIIA: Agriculture Land Statistics

AGRICULTURAL STATISTICS[1)]

The farms of the district are the result of a post-Independence settlement and thus are very uniform in size and organisation. Besides food crops and livestock products, the major cash crop is pyrethrum of which roughly 1,000 t of dried flowers – with the very good pyrethrin content of 1.5 % – are produced annually.

NYANDARUA DISTRICT

TABLE 7: **PYRETHRUM**
Trends in Production and Quality[a)]

Item	Year				
	1975/76	1976/77	1977/78	1978/79	1979/80
Production in t dried flowers	1,205.4	999.0	837.8	828.4	955.1
Pyrethrum Content %	1.45	1.48	1.52	1.55	1.45

a) Source: Pyrethrum Board

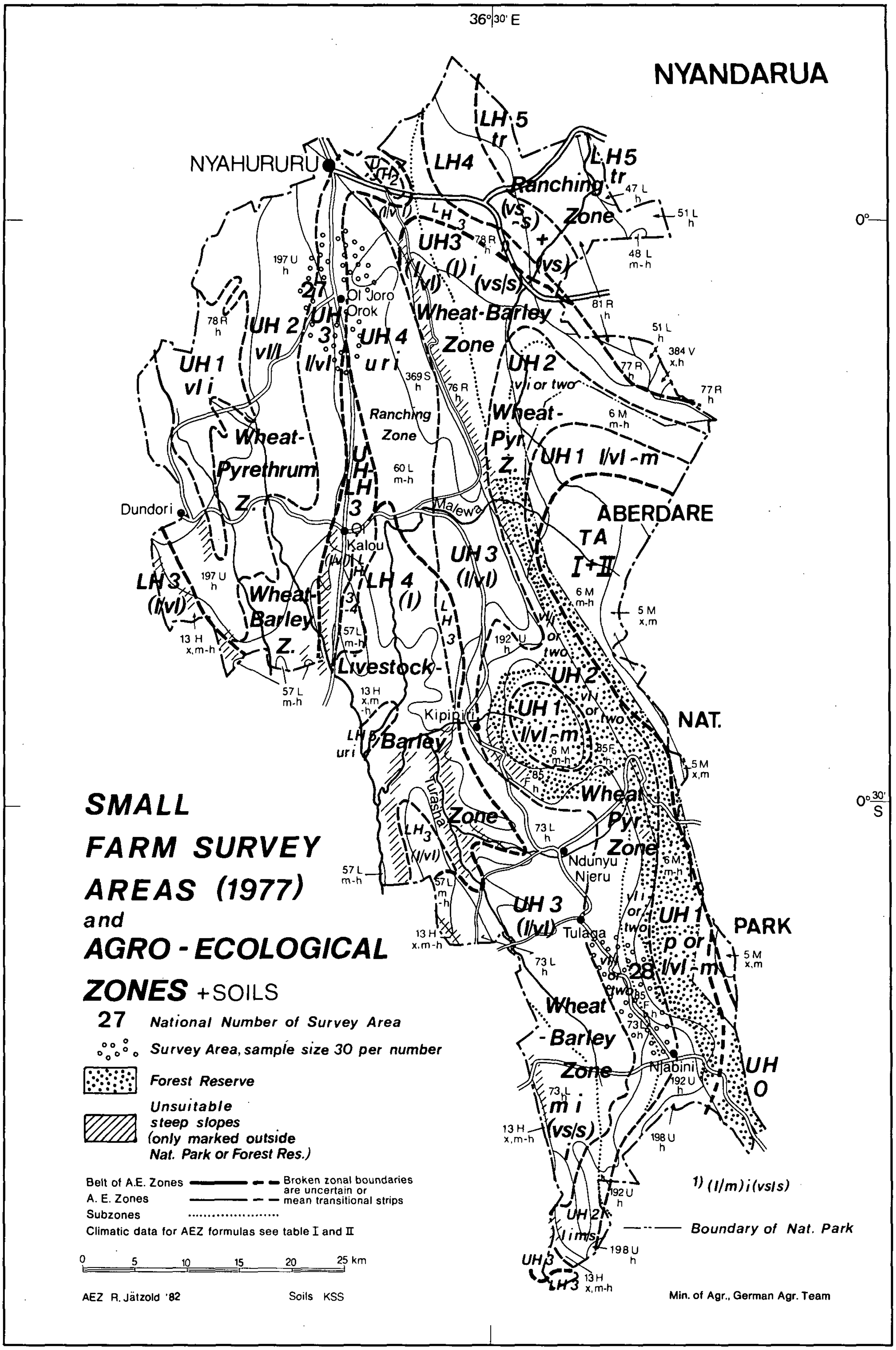
SMALL FARM SURVEY (SFS)[1)]

The SFS was carried out in the Ol Joro Orok (AEZ UH 2–4 (– LH 3)) and in the South Kinangop-Tuluga (AEZ UH 2) regions. The farms plant between 15–20 % of their land with annual crops, 80 % of their cattle is of improved stock and nearly every farmer uses some fertilizer (table 8 & 9). Maize and wheat are the most important food crops planted; the high proportion of pyrethrum, roughly 20 % of the crop area, indicates the suitability of this crop for the district.[2)] Potatoes and cabbages are grown on approximately 10 % of the arable land area (table 10). It is remarkable that 50 % of the grazing LU are sheep; the portion of male cattle is – at roughly 10 % – low (table 11). The yields harvested from annual crops are low; the amount of fertilizer applied to vegetables and potatoes is, however, considerable, but plant protection is practically unknown (table 11). Half of the maize and beans harvested is consumed on the farms (AEZ UH 2–3), while in the southern part of the district nearly 100 % of it is used on the farm. All other crops are sold to the marketing boards and/or on the local market and are exported from the district – vegetables and potatoes are mainly sent to Nairobi (table 13). The operations and the distribution of farming activities demonstrate clearly that pyrethrum is an ideal crop for small-scale farmers, while the land preparation for wheat shows the difficulties farmers face with mechanised enterprises (graph 14); the yields of some crops could still be doubled (table 15).

The farm organisation and the climate of the district are very suitable for mixed farming (pasture, wheat, potatoes, vegetables). Output increases depend largely on an increase of labour productivity, i.e. the introduction of suitable machines for field work. Large investments are required for drainage operations in the southern part of the district in order to improve the drainage of the large Planosols region. Improvement of the infrastructure is also necessary.

1) Fore more detailed and up to date information, see FMHB vol. III A and B

2) The proportion is far above district average, because the farmers included in the sample were selected from the pyrethrum purchasing co-operatives register.



36°|30' E
NYANDARUA
NYAHURURU
Ol Joro Orok
Dundori
Ol Kalou
Kipipiri
Ndunyu Njeru
Tulaga
Njabini
ABERDARE
NAT.
PARK
Ranching Zone
Wheat-Barley Zone
Wheat-Pyrethrum Z.
Livestock-Barley Zone
Wheat-Pyr. Zone
Wheat-Barley Zone
Malewa
Turasha
0°
0°30' S
SMALL FARM SURVEY AREAS (1977) and AGRO-ECOLOGICAL ZONES +SOILS
27 National Number of Survey Area
Survey Area, sample size 30 per number
Forest Reserve
Unsuitable steep slopes (only marked outside Nat. Park or Forest Res.)
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 5 10 15 20 25 km
1) (l/m) i (vs/s)
Boundary of Nat. Park
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team

TABLE 8a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group small	medium	large
Farm Size Total	ha		10.5	17.9
Land Use: Annual Crops[1)] First Season				
Maize	ha		0.8	1.4
English Potatoes	ha		0.3	0.3
Wheat/Barley	ha		0.1	0.3
Vegetables	ha		0.4	0.1
	ha			
Total	ha		1.6	2.1
Second Season[1)]				
English Potatoes	ha		0.2	0.1
Cabbage & other Vegetables	ha			0.2
	ha			
Total	ha		0.2	0.3
Permanent Crops[1)]				
Pyrethrum	ha		0.6	0.9
	ha			
	ha			
	ha			
Portion of total	%		6 %	5 %
Grazing & Forage	ha		7.2	12.5
portion of total	%		69 %	70 %
Other Land Use	ha		1.1	2.4
Livestock on Farm:				
Cattle: local	LU		1.1	0.7
improved	LU		6.8	7.7
Sheep & Goats	LU		1.0	0.9
Total	LU		8.9	9.3

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group small	medium	large
Farming Intensity:				
Cropping Intensity	-		0.2	0.2
Portion of improved cattle kept	%		86 %	92 %
Portion of Farmers owning a Plough	%		40 %	10 %
Labour on Farm:				
Family Adults	persons		2.6	2.5
Perm. Hired Labour	"		0.8	0.7
Children > 14 years	"		2.4	3.8
Persons living on Farm[2)] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.32	0.27	2.47
Children < 14 years	"	3.14	-	3.14
Subsistence Units	SU	4.20	0.27	4.47
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1538	2479	
English Potatoes	kg	255	83	
Cabbage	kg	30	3	
Groundnuts	kg	9	14	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Groundnuts

1) Major crops only considered

2) Based on 1979 Census figures

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	5,6	9.1	21.9
Land Use: Annual Crops 1) First Season				
Maize	ha	o.2	o.2	o.5
English Potatoes	ha	o.3	o.5	o.5
Cabbage & other Vegetables	ha	o.5	o.3	o.7
Wheat	ha	-	o.9	o.5
Others	ha	-	o.2	o.1
Total	ha	1.o	2.1	2.3
Second Season 1)				
English Potatoes	ha	o.3	o.4	o.5
Cabbage	ha	o.1	o.2	o.5
Other Veget.	ha	o.2	o.2	o.2
Total	ha	o.6	o.8	1.2
Permanent Crops 1)				
Pyrethrum	ha	o.2	o.4	o.1
	ha			
	ha			
	ha			
Portion of total	%	4 %	4 %	-
Grazing & Forage	ha	3.6	5.5	18.1
portion of total	%	64 %	6o %	83 %
Other Land Use	ha	o.8	1.1	1.4
Livestock on Farm:				
Cattle: local	LU	-	1.o	2.5
improved	LU	5.5	6.4	8.2
Sheep & Goats	LU	o.4	1.2	1.8
Total	LU	5.9	8.6	12.5

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.3	o.4	o.2
Portion of improved cattle kept	%	-	86 %	77 %
Portion of Farmers owning a Plough	%			
Labour on Farm:				
Family Adults	persons	1.9	3.o	2.7
Perm. Hired Labour	"	o.1	o.2	-
Children > 14 years	"	2.1	3.2	2.3
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	1.87	o.2	2.o7
Children < 14 years	"	3.1o	-	3.1o
Subsistence Units	SU	3.73	o.2	3.93
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1191	23o4	
English Potatoes	kg	51o	198	
Cabbage	kg	413	5o	
	kg			
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated:

1) Major crops only considered
2) Based on 1979 Census figures

NYANDARUA DISTRICT

TABLE 9a: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: UH 2–4 (–LH 3)

Survey Area 27

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children >14 No.
Avg. 0	14.0	22.0	1.0	2.5	0.8	3.1
Avg. 1	14.0	22.8	1.9	2.5	1.4	4.0
Up. Qu.	17.2	26.0	1.0	3.0	1.0	5.0
Lo. Qu.	9.6	15.0	-	2.0	-	1.0

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	2.0	15	0.8	6	9.1	69	0.6	4	0.5	4	0.3	3
Avg. 1	2.0	14	0.9	7	9.1	65	0.7	5	1.0	7	0.3	2
Up. Qu.	2.4	20	1.0	6	11.4	78	0.8	7	0.8	5	0.4	3
Lo. Qu.	1.0	9	0.1	1	6.4	53	0.2	1	-	-	0.1	1
Total	58.6		23.2		273.6		17.6		14.3		10.3	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	0.9	0.7	0.9	79.3
Avg. 1			0.9	89.7
Up. Qu.	1.2	1.0	1.3	94.1
Lo. Qu.	0.7	0.5	0.6	84.3

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	50.6	1.8	0.4	7.4	0.3	-	-	-	-	0.2	-	-	-
Avg. 1	60.0	3.6	2.5	8.4	2.2	0.3	-	-	-	0.4	0.4	-	-
Up. Qu.	85.7	2.2	-	9.8	-	-	-	-	-	0.3	-	-	-
Lo. Qu.	42.9	-	-	2.7	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

NYANDARUA DISTRICT

TABLE 9b: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: UH 2

Survey Area 28

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm. Hrd. Labourers	Children >14 No.
Avg. 0	9.0	19.6	0.2	2.5	0.1	2.6
Avg. 1	9.0	20.3	1.4	2.6	1.0	3.0
Up. Qu.	9.9	28.0	-	3.0	-	4.0
Lo. Qu.	6.0	11.0	-	2.0	-	1.0

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	1.7	19	0.3	4	5.5	63	0.5	6	0.6	7	0.2	2
Avg. 1	1.7	18	0.5	5	5.5	59	0.7	7	0.9	9	0.2	2
Up. Qu.	2.2	23	0.4	6	6.0	69	0.8	9	0.8	8	0.2	3
Lo. Qu.	0.6	9	-	-	2.8	47	-	-	-	-	0.1	1
Total	50.1		9.6		165.9		14.8		18.3		5.3	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.1	0.9	1.3	79.0
Avg. 1			1.3	88.8
Up. Qu.	1.5	1.3	2.2	100.0
Lo. Qu.	0.8	0.6	1.1	64.1

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	19.4	0.6	0.1	12.0	-	-	-	0.1	-	0.1	-	0.1	-
Avg. 1	36.1	10.1	2.8	16.6	-	-	-	0.7	-	0.3	1.8	1.2	-
Up. Qu.	28.6	-	-	17.2	-	-	-	-	-	0.1	-	-	-
Lo. Qu.	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

NYANDARUA DISTRICT

TABLE 10a: **CROPPING PATTERN**

AEZ: UH 2–4 (–LH 3)

Survey Area 27

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	1.2	1.3	1.40	0.60	35.8	44.8
Wheat	0.2	2.8	0.00	0.00	5.6	7.0
Groundnuts	0.0	0.4	0.00	0.00	1.2	1.5
Engl. Potatoes	0.3	0.4	0.40	0.00	8.2	10.3
Cabbage	0.0	0.1	0.00	0.00	0.2	0.3
Pyrethrum	0.7	0.8	1.00	0.12	20.0	25.0
Others	0.2	1.7	0.00	0.00	6.8	8.5
Maize & Others	0.0	0.6	0.00	0.00	1.2	1.5
Maize int.oth.	0.0	0.8	0.00	0.00	0.8	1.0
Total					79.8	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Engl. Potatoes	0.1	0.3	0.20	0.00	4.0	15.0
Cabbage	0.0	0.1	0.00	0.00	0.1	0.4
Pyrethrum	0.7	0.8	1.00	0.12	20.0	74.3
Others	0.1	0.6	0.00	0.00	2.8	10.3
Total					26.9	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Total					0.0	0.0

Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
UP.Qu./Lo.Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

NYANDARUA DISTRICT

TABLE 10b: **CROPPING PATTERN**

AEZ: UH 2

Survey Area 28

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.2	0.6	0.60	0.00	6.6	11.1
Wheat	0.5	2.4	0.00	0.00	14.4	24.1
Engl. Potatoes	0.4	0.6	0.80	0.00	12.8	21.4
Cabbage	0.2	0.5	0.40	0.00	5.6	9.4
Others	0.1	0.5	0.00	0.00	2.8	4.6
Pyrethrum	0.3	0.5	0.40	0.00	9.4	15.8
Others	0.2	0.4	0.40	0.00	7.3	12.2
Maize & Others	0.0	0.8	0.00	0.00	0.8	1.3
Total					59.7	100.0

Second Rains
Annual & Semipermenent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Engl. Potatoes	0.4	0.6	0.80	0.00	11.5	36.7
Cabbage	0.2	0.7	0.16	0.00	4.6	14.5
Others	0.0	0.5	0.00	0.00	1.0	3.2
Pyrethrum	0.3	0.5	0.40	0.00	9.4	30.1
Others	0.2	0.4	0.20	0.00	4.8	15.4
Total					31.4	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Total					0.0	0.0

Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up.Qu./Lo.Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

TABLE 11a: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: UH 2–4 (–LH 3)

Dec. '77, Survey Area 27

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.43	0.07	-	2.00				0.62			0.62
	Upper Qu.	-	-	-	3				0.8			0.8
1 - 2 years,	Average	0.50	0.20	0.10	1.93				1.37			1.37
	Upper Qu.	1	-	-	3				2.0			2.0
Over 2 years,	Average	0.03	0.07	0.13		5.03			5.22			5.22
	Upper Qu.	-	-	-		6			6.0			6.0
Subtotal(improved)	Total	29	10	7	118	151			216.4			216.4
	Average	0.97	0.33	0.23	3.93	5.03			7.21			7.21
	Upper Qu.	2	-	-	5	6			9.5			-
	Lower Qu.	-	-	-	3	2			3.8			-
LU Male Cattle =		9.9 % of total cattle,				Calves + Heifers =			78.1 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.17	-	-	0.27		2.20	0.03	0.31	-		0.31
	Upper Qu.	-	-	-	-		4	-	0.4	-		0.4
1 - 2 years,	Average	-	-	-	0.07				0.03			0.03
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	-	-	0.13		1.07	7.57	0.03	1.54	-	16.13	1.54
	Upper Qu.	-	-	-		-	10	-	0.3	-	10	0.3
Subtotal (unimp.)	Total	5	-	4	10	32	293	2	56.4	-	484	56.4
	Average	0.17	-	0.13	0.33	1.07	9.77	0.07	1.88	-	16.13	1.88
	Upper Qu.	-	-	-	-	-	12	-	1.3	-	25	1.3
	Lower Qu.	-	-	-	-	-	5	-	0.5	-	10	0.5
LU Male Cattle =		13.4 % of total cattle,				Calves + Heifers =			31.3 % of dairy cows			
LU Goats + Sheep =		52.3 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	34	10	11	128	183	293	2	272.8	-	484	272.8
	Average	1.13	0.33	0.37	4.27	6.10	9.77	0.07	9.09	-	16.13	9.09
	Upper Qu.	2	-	-	5	8	12	-	11.7	-	25	1.3
	Lower Qu.	-	-	-	3	4	5	-	4.8	-	10	0.5
LU Male Cattle =		10.3 % of total cattle,				Calves + Heifers =			69.9 % of dairy cows			
LU Goats + Sheep =		10.8 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs. 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs. 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11b: **HERD COMPOSITION (GRAZING LIVESTOCK)**
– in Head & Livestock Units –

AEZ: UH 2 | Dec. '77, Survey Area 28

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.63	0.03	-	1.40				0.52			0.52
	Upper Qu.	1	-	-	2				0.8			0.8
1 - 2 years,	Average	0.90	0.10	-	1.53				1.27			1.27
	Upper Qu.	1	-	-	3				2.0			2.0
Over 2 years,	Average	-	0.30	-		4.17			4.41			4.41
	Upper Qu.	-	-	-		6			6.0			6.0
Subtotal(improved)	Total	46	13	-	88	125			185.7			185.7
	Average	1.53	0.43	-	2.93	4.17			6.19			6.19
	Upper Qu.	2	-	-	5	6			9.8			-
	Lower Qu.	-	-	-	1	2			2.8			-
LU Male Cattle =		14.6 % of total cattle,				Calves + Heifers =			70.4 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.13	0.03	-	0.20		2.33	0.03	0.31	-		0.31
	Upper Qu.	-	-	-	-		5	-	0.5	-		0.5
1 - 2 years,	Average	0.07	-	-	0.30				0.16			0.16
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	-	-	-		0.77	6.67	0.03	1.17	-	8.07	1.17
	Upper Qu.	-	-	-		-	9	-	-	-	5	-
Subtotal (unimp.)	Total	6	1	-	15	23	270	2	49.3	-	242	49.3
	Average	0.20	0.03	-	0.50	0.77	9.00	0.07	1.64	-	8.07	1.64
	Upper Qu.	-	-	-	-	-	15	-	2.4	-	10	2.4
	Lower Qu.	-	-	-	-	-	-	-	-	-	5	-
LU Male Cattle =		8.6 % of total cattle,				Calves + Heifers =			65.2 % of dairy cows			
LU Goats + Sheep =		55.2 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	52	14	-	103	148	270	2	235.0	-	242	235.0
	Average	1.73	0.47	-	3.43	4.93	9.00	0.07	7.83	-	8.07	7.83
	Upper Qu.	3	-	-	5	7	15	-	11.1	-	10	2.4
	Lower Qu.	1	-	-	2	3	-	-	3.1	-	5	-
LU Male Cattle =		14.0 % of total cattle,				Calves + Heifers =			69.6 % of dairy cows			
LU Goats + Sheep =		11.6 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs. 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs. 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

NYANDARUA DISTRICT

TABLE 12a: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: UH 2–4 (–LH 3)

Survey Area 27

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	89	5	45	-	-	2	-	2,868
	UpQu	100	11	58	-	-	4	-	2,700
	LoQu	100	-	29	-	-	-	-	1,125
Wheat	Avg.	-	25	54	-	-	-	-	1,688
Engl. Potatoes	Avg.	14	24	82	1	-	-	-	6,542
	UpQu	-	25	115	-	-	-	-	10,000
	LoQu	-	-	1	-	-	-	-	2,800
Cabbage	Avg.	100	19	48	-	-	6	-	4,167
Second Rains									
Engl. Potatoes	Avg.	-	25	99	-	-	-	-	5,058
	UpQu	-	23	115	-	-	-	-	6,000
	LoQu	-	-	29	-	-	-	-	2,800
Cabbage	Avg.	100	19	48	-	-	13	13	2,675
Perennial Crops									
Pyrethrum	Avg.	-	4	9	-	-	-	-	1,754
	UpQu	-	-	-	-	-	-	-	1,750
	LoQu	-	-	-	-	-	-	-	750

NYANDARUA DISTRICT

TABLE 12b: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: UH 2

Survey Area 28

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	58	-	18	-	0.07	-	-	1,041
	UpQu	100	-	18	-	-	-	-	1,200
	LoQu	-	-	-	-	-	-	-	675
Wheat	Avg.	-	-	53	-	-	-	-	1,141
	UpQu	-	-	58	-	-	-	-	1,350
	LoQu	-	-	-	-	-	-	-	-
Engl. Potatoes	Avg.	18	6	57	-	0.75	1	-	12,866
	UpQu	-	-	115	-	-	-	-	15,000
	LoQu	-	-	-	-	-	-	-	5,000
Cabbage	Avg.	75	-	119	-	0.13	-	1	15,863
	UpQu	100	-	86	-	-	-	-	18,000
	LoQu	-	-	-	-	-	-	-	5,000
Second Rains									
Engl. Potatoes	Avg.	7	-	55	-	1.33	2	2	14,133
	UpQu	-	-	115	-	-	-	-	12,000
	LoQu	-	-	-	-	-	-	-	2,250
Cabbage	Avg.	63	-	52	-	0.25	-	-	18,734
	UpQu	100	-	86	-	-	-	-	30,000
	LoQu	-	-	-	-	-	-	-	6,500
Perennial Crops									
Pyrethrum	Avg.	-	5	-	-	-	1	-	1,472
	UpQu	-	-	-	-	-	-	-	2,000
	LoQu	-	-	-	-	-	-	-	750

NYANDARUA DISTRICT

TABLE 13a: **DISPOSAL OF CROPS**

AEZ: UH 2–4 (–LH 3)

Survey Area 27

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	65,710	14,220	22	9,000	14	42,490	65
Maize & Others	2,645	450	17	780	29	1,415	53
Maize int.oth.	5,400	0	0	2,250	42	3,150	58
Groundnuts	1,065	540	51	270	25	255	24
Engl. Potatoes	49,220	3,000	6	22,370	45	23,850	48
Wheat	16,200	16,200	100	0	0	0	0
Cabbage	160	0	0	0	0	160	100
Second Rains							
Engl. Potatoes	21,490	0	0	9,950	46	11,540	54
Cabbage	1,442	0	0	700	49	742	51
			Permanent Crops				
Pyrethrum	880	880	100	0	0	0	0

NYANDARUA DISTRICT

TABLE 13b: **DISPOSAL OF CROPS**

AEZ: UH 2

Survey Area 28

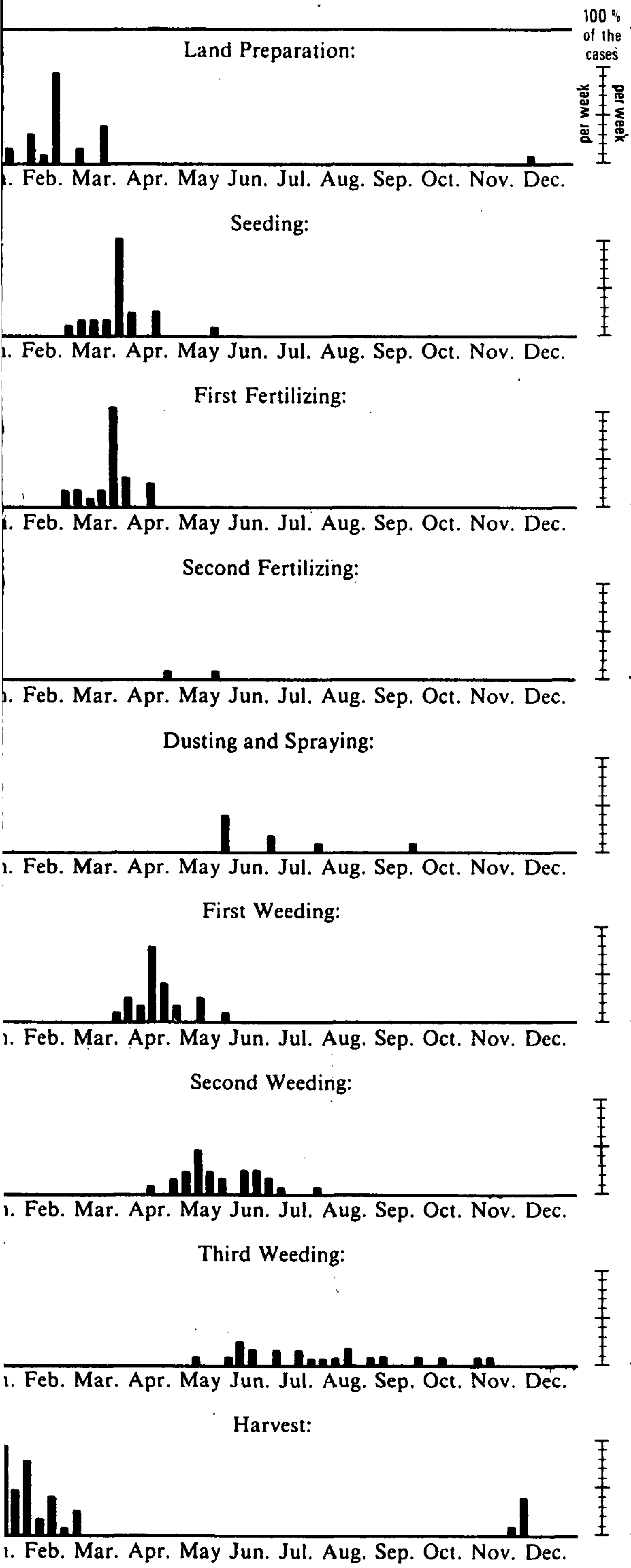
Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	5,195	0	0	180	3	5,015	97
Maize & Beans	720	0	0	0	0	720	100
Maize & Others	1,640	0	0	1,460	89	180	11
Engl. Potatoes	218,695	841	0	73,210	33	144,644	66
Wheat	5,430	3,290	61	0	0	2,140	39
Cabbage	82,400	0	0	73,840	90	8,560	10
Others	50,220	3,000	6	46,120	92	1,100	2
Second Rains							
Engl. Potatoes	142,350	841	1	46,440	33	95,069	67
Wheat	7,500	7,500	100	0	0	0	0
Cabbage	67,150	0	0	63,330	94	3,820	6
Others	44,450	3,000	7	40,450	91	1,000	2
			Permanent Crops				
Cassava	90	0	0	90	100	0	0

NDARUA DISTRICT

BLE 14a: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 Maize Cases: 28

UH 2–4 (–LH 3) Survey Area 27 Sample Size: 30

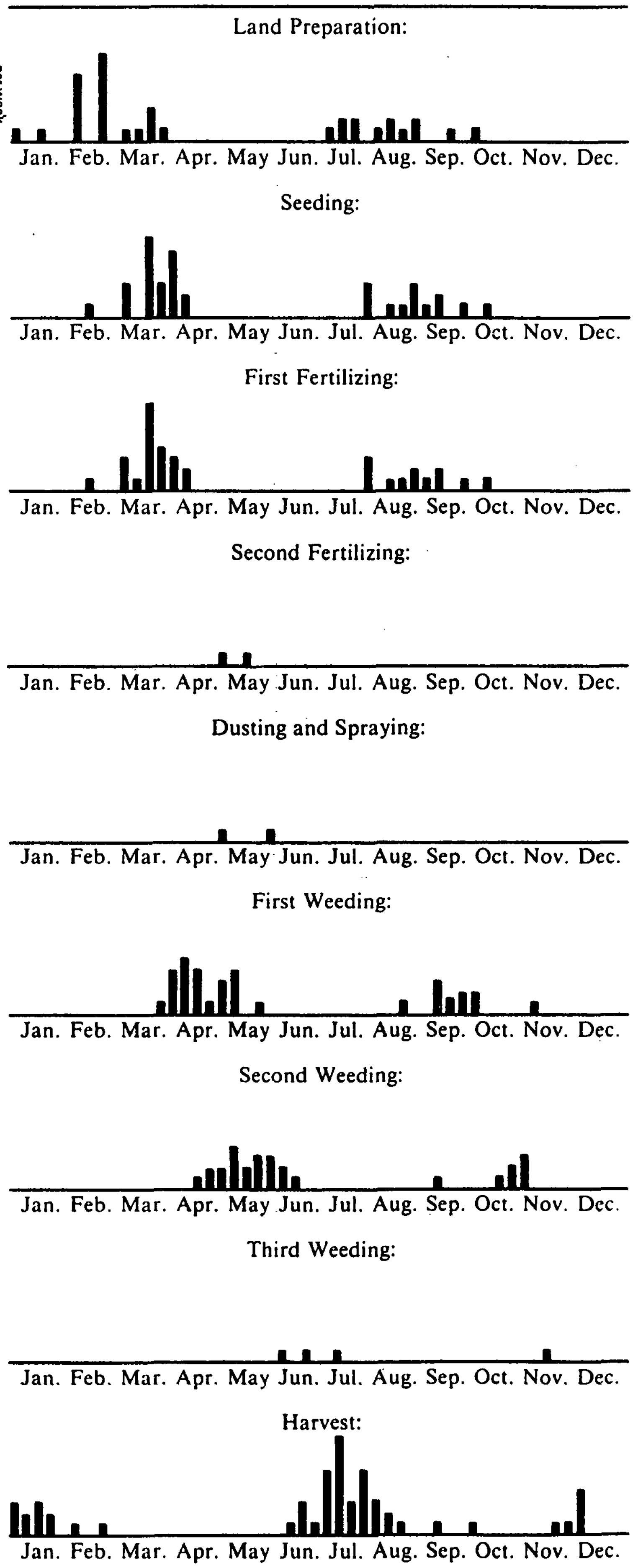


NYANDARUA DISTRICT

TABLE 14b: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 35[1)]

AEZ: UH 2–4 (–LH 3) Survey Area 27 Sample Size: 30



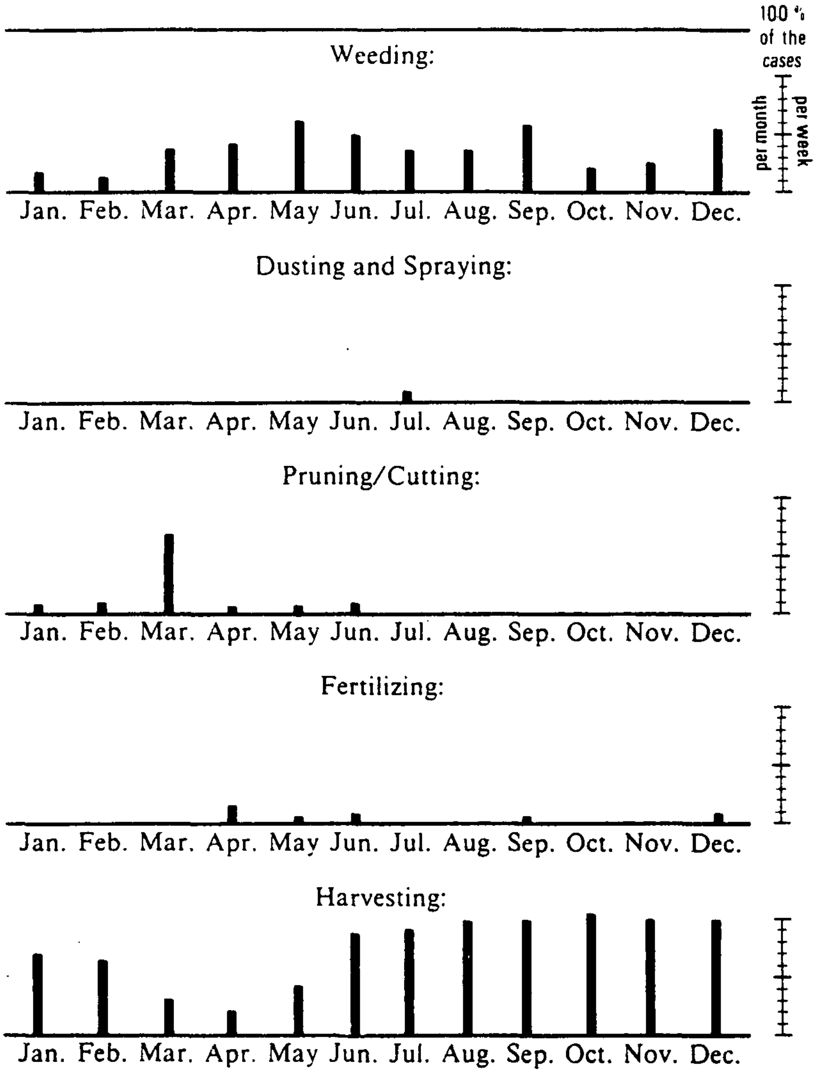
1) Maximum 30 per crop and season

NYANDARUA DISTRICT

TABLE 14c: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 52 | **Pyrethrum** | Cases: 26

AEZ: UH 2–4 (–LH 3) | Survey Area 27 | Sample Size: 30

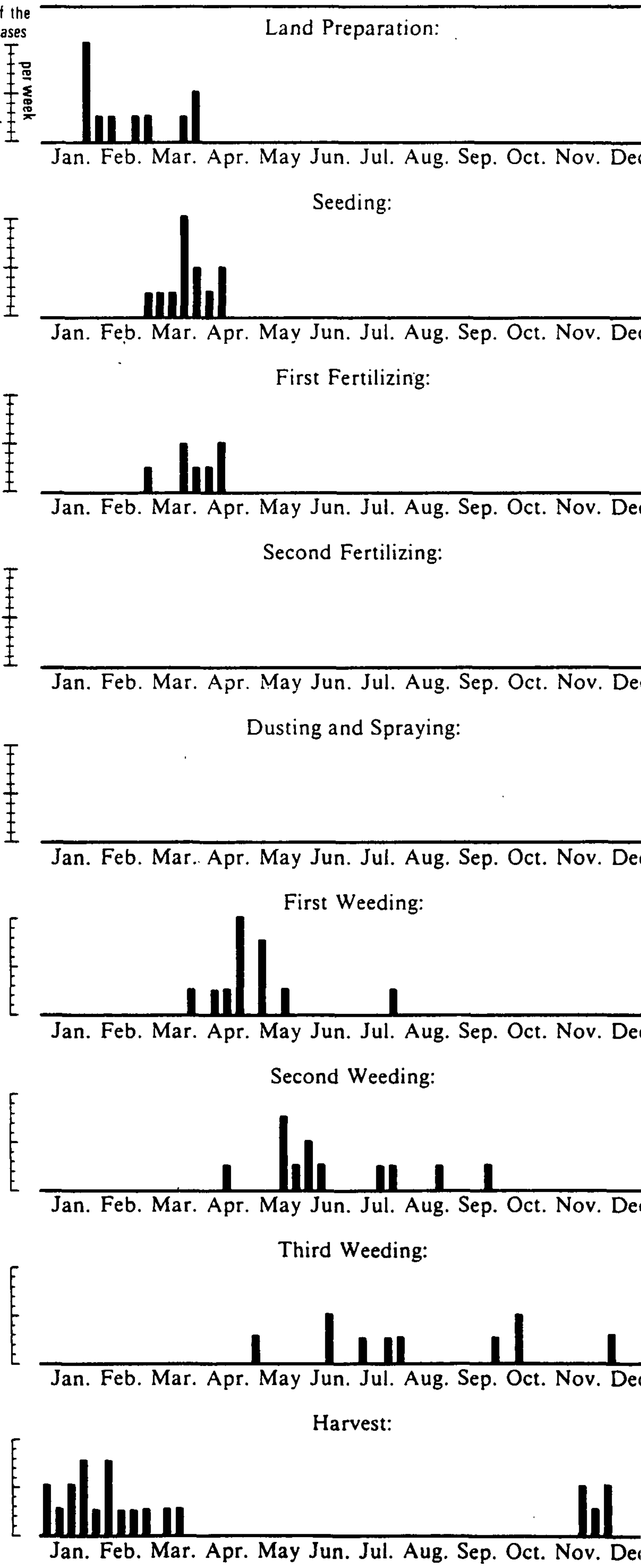


NYANDARUA DISTRICT

TABLE 14d: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 | **Maize** | Cases: 12

AEZ: UH 2 | Survey Area 28 | Sample Size: 3

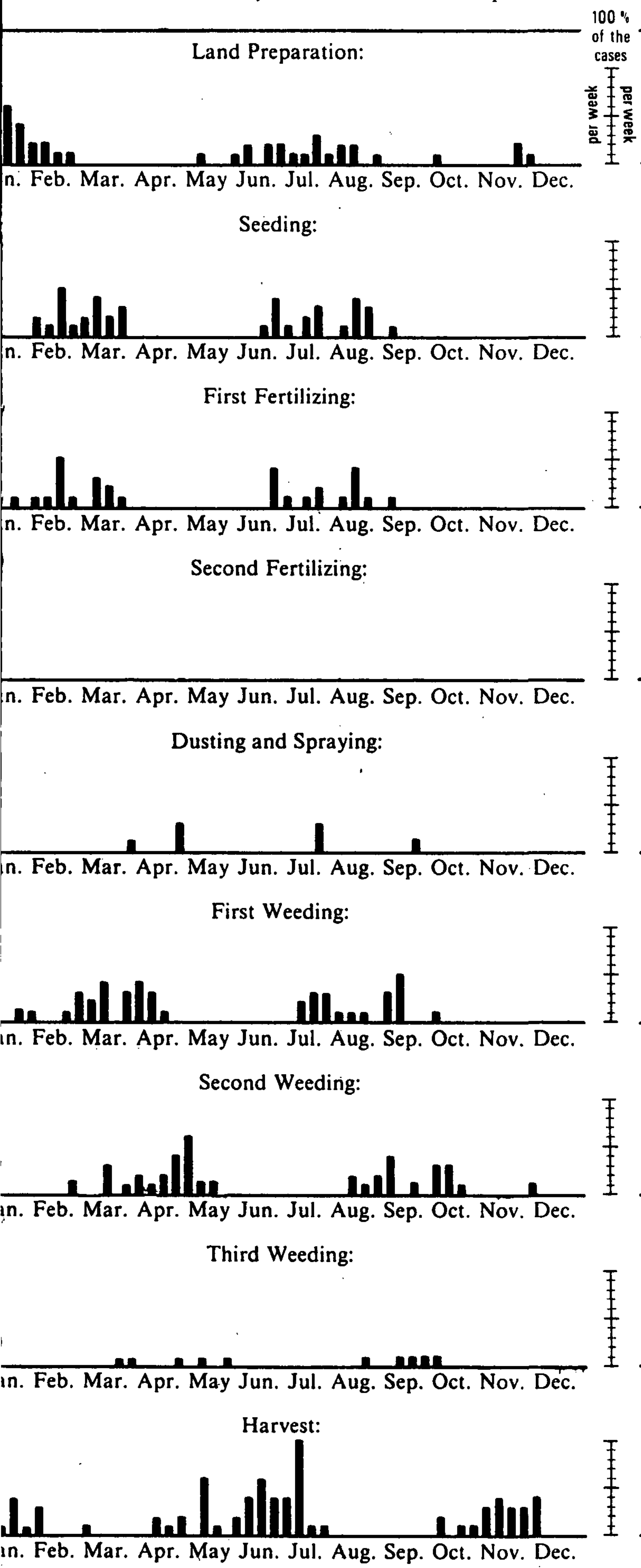


ANDARUA DISTRICT

BLE 14e: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 43[1]

Z: UH 2 Survey Area 28 Sample Size: 30



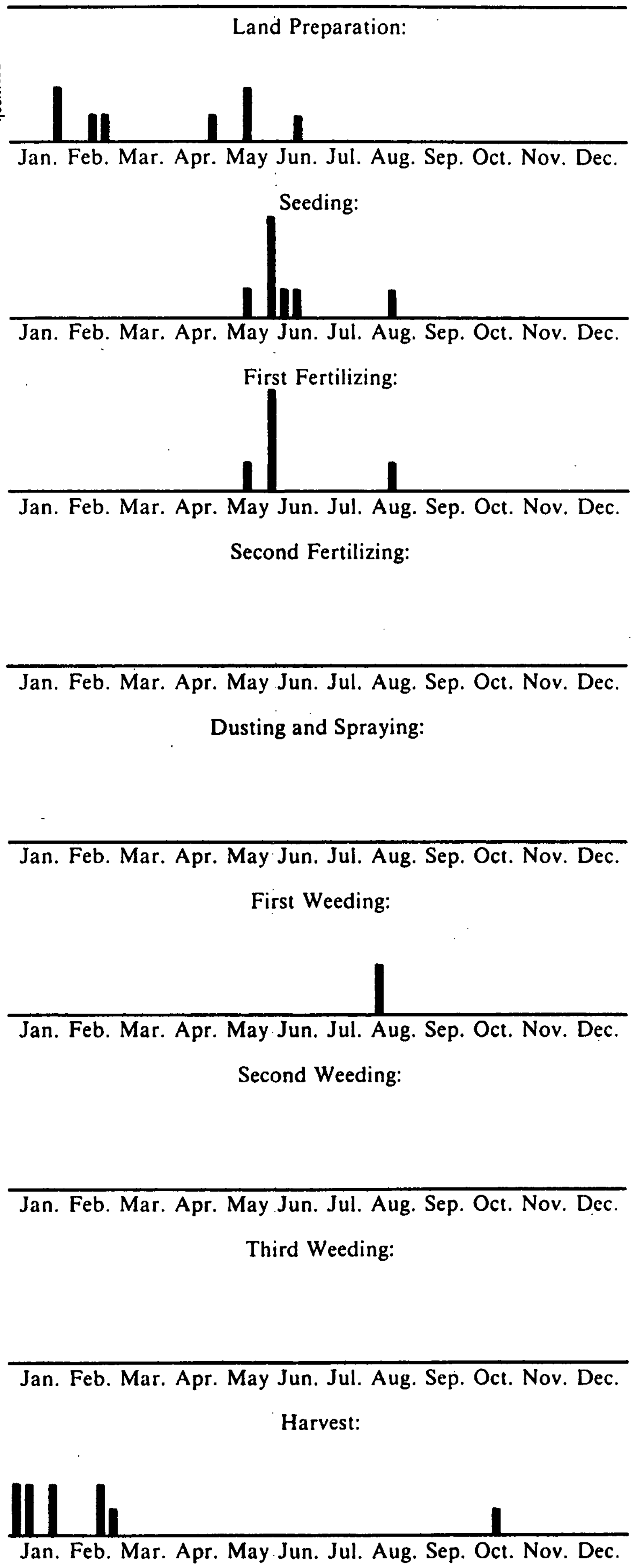
[1] Maximum 30 per crop and season

NYANDARUA DISTRICT

TABLE 14f: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 36 **Wheat** Cases: 8

AEZ: UH 2 Survey Area 28 Sample Size: 30

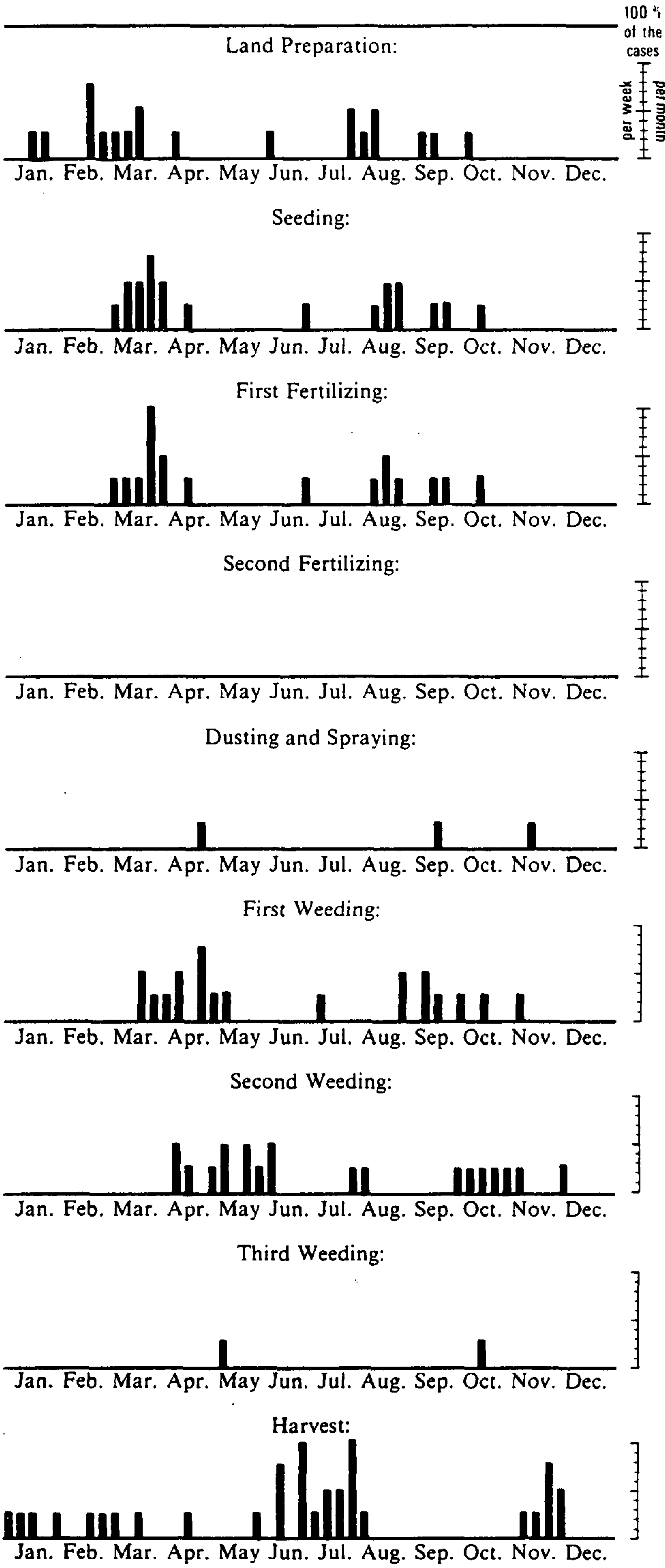


NYANDARUA DISTRICT

TABLE 14h: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 52 **Pyrethrum** Cases: 20

AEZ: UH 2 Survey Area 28 Sample Size: 30



NYANDARUA DISTRICT

TABLE 14g: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 40 **Cabbage** Cases: 20

AEZ: UH 2 Survey Area 28 Sample Size: 3

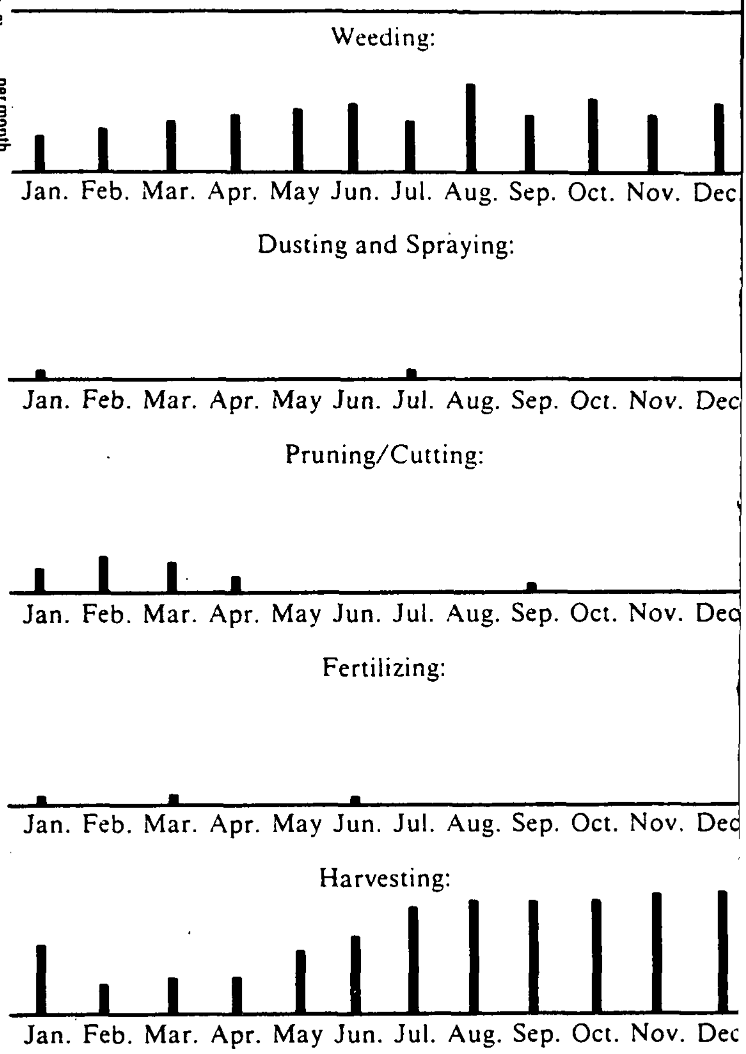


TABLE 15a: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT[1)]

		A.E.Z.: UH 1 SHEEP – DAIRY ZONE				A.E.Z.: UH 2 PYRETHRUM-WHEAT ZONE							
		Vegt. Period 1st + 2nd: p or 1/vl-m in Days, 1st: 200 or more		2nd: 15o-16o	total: 35o-36o	vli or two 19o or more		14o-15o	33o-34o				
		Soil: PLANOSOLS				PHAEOZEMS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	3,000			6,000	1,800			3,200				
Fertilizer N	kg				166				77				
P_2O_5	kg				83				38				
K_2O	kg												
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg					660	800	1,000	1,800				
Fertilizer N	kg						4	9	29				
P_2O_5	kg						5	12	41				
K_2O													
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg					2,500	1,500	2,000	2,800				
Fertilizer N	kg								8				
P_2O_5	kg								12				
K_2O	kg												
CROP: BARLEY													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: OATS													
Farmers in Production Level	%												
Yields	kg	1,800		1,800	2,500	2,500		2,000	2,700				
Fertilizer N	kg				20				6				
P_2O_5	kg				30				11				
K_2O	kg												
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

1) for explanations see Vol. II A, p. 51   2) in kg TDN

TABLE 15b: **PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES**

OUTPUT & NUTRIENT INPUT

		A.E.Z.: UH 1 SHEEP – DAIRY ZONE				A.E.Z.: UH 2 PYRETHRUM-WHEAT ZONE							
		Vegt. Period 1st + 2nd: p or 1/vl¬m in Days,1st: 200 or more		2nd: 150-160	total: 350-360	vli or two 190 or more		140-150	330-340				
		Soil: PLANOSOLS				PHAEOZEMS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: RAPESEED													
Farmers in Production Level	%												
Yields	kg	500		1,400	2,200	570	800	1,400	2,200				
Fertilizer N	kg			90	17		20	80	160				
P_2O_5	kg			63	119		16	58	114				
K_2O	kg												
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg					8,000	6,000	20,000	40,000				
Fertilizer N	kg							100	256				
P_2O_5	kg							84	225				
K_2O													
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,500	4,000	18,000	40,000	5,000	5,000	15,000	40,000				
Fertilizer N	kg			95	249			70	245				
P_2O_5	kg			81	213			40	213				
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15c: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT[1)]

		A.E.Z.: LH 3 WHEAT/(MAIZE)-BARLEY ZONE				A.E.Z.: LH 4 CATTLE-SHEEP-BARLEY ZONE							
		Vegt. Period 1st + 2nd: (1/vl) in Days, 1st: 15o or more		2nd: 6o-7o	total: 21o-22o	(1) 14o or more		6o-7o	2oo-21o				
		Soil: PLANOSOLS				PHAEOZEMS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	1,800			3,600	1,500			3,000				
Fertilizer N	kg				100				83				
P_2O_5	kg				50				41				
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields 2)	kg	2,700			6,000	2,700			3,500				
Fertilizer N	kg				183				44				
P_2O_5	kg				91				22				
K_2O													
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg	660	400	600	900								
Fertilizer N	kg				6								
P_2O_5	kg				9								
K_2O	kg												
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg	2,500	1,500	2,000	2,200	800		1,000	1,500				
Fertilizer N	kg							5	17				
P_2O_5	kg							8	29				
K_2O	kg												
CROP: BARLEY													
Farmers in Production Level	%												
Yields	kg	2,800	1,500	2,000	3,000	800		1,200	1,800				
Fertilizer N	kg				5				24				
P_2O_5	kg				8				41				
K_2O	kg												
CROP: TRITICALE													
Farmers in Production Level	%												
Yields	kg	2,800		3,000	4,000								
Fertilizer N	kg			5	29								
P_2O_5	kg			6	34								
K_2O	kg												

1) for explanations see Vol. II A, p. 51 2) in kg TDN

TABLE 15d: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES

OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 3 WHEAT/(MAIZE)-BARLEY ZONE				A.E.Z.: LH 4 CATTLE-SHEEP-BARLEY ZONE							
Vegt. Period 1st + 2nd: in Days, 1st:		(1/vl) 15o or more		2nd: 6o-7o	total: 21o-22o	(1) 14o or more		6o-7o	2oo-21o				
Soil:		PLANOSOLS				PHAEOZEMS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg					950		800	900				
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: RAPESEED													
Farmers in Production Level	%												
Yields	kg	570	800	1,400	2,200								
Fertilizer N	kg		23	83	163								
P_2O_5	kg		23	83	163								
K_2O													
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	8,000	6,000	17,000	25,000	5,000		10,000	14,000				
Fertilizer N	kg			100	170			40	72				
P_2O_5	kg			63	119			35	63				
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

KIAMBU DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The Agro-Ecological Zones of the Kiambu District extend in a typical pattern along the eastern slopes of the Nyandarua (Aberdare) Range parallel to the isohypses. The Marginal Cotton Zone (LM 4) ends at about 1 350 m. The Sunflower-Maize Zone (UM 4) starts immediately above it, except for the areas in the rain shadow of the Kamba Hills, where maize growing is feasible only above 1 450 m in the northeast and above 1 550 m in the southeast. This omits the Athi Plains, which are Livestock-Sorghum Zone (Um 5). The same tendency towards increasing dryness is oberserved on the lower coffee margin, which rises from 1 530 m near Thika to about 1 630 m near Nairobi. The Marginal Coffee Zone (UM 3) obtains good yields with additional irrigation. This is not necessary in the Main Coffee Zone (UM 2) because normally there is enough rainfall above 1 570 m in the northeast and above 1 740 m in the southwest.

The potential for tea also exists in the present coffee area at about 1 800 m near Muranga District. Due to the southeastward – but also southwestward – decreasing rainfall, tea growing is possible around Githunguri only above 1 950 m, and at the southwestern end of the Tea-Dairy Zone (LH 1) near Limuru at 2 200 m, therefore leaving a gap between coffee and tea which is mainly filled by maize cultivation although there is potential for pyrethrum and for vegetables in valleys (Maize/Wheat-Pyrethrum Zone LH 2). The word "wheat" in that zone refers to the general zonation, but here, topography and farm scale are not suitable for it. A similar problem regarding terminology occurs in the Sheep-Dairy Zone above the upper tea limit (2 300 m), which got its name from the Molo area. Here it is forest reserve or cultivated with vegetables which are the mainstay of farming here, due to the smallness of the farms and their favourable situation to Nairobi markets.

In the rain shadow of the Nyandarua Range and the Rift Valley escarpment, the potential decreases gradually down to the Ranching Zone (UM 6).

KIAMBU DISTRICT

TABLE 1: RAINFALL FIGURES FROM VARIOUS STATIONS
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
9036061	Kerita For. Station	45	Average[1)]	1 375	80	68	116	318	226	70	49	61	45	105	164	93
2 438 m			60 % rel.	1 236	34	34	95	253	163	37	33	25	24	61	106	58
9036160	Matathia Station	24	Av.	1 192	55	50	96	314	253	44	20	39	28	67	164	91
2 288 m			60 %	840	1	14	70	185	159	23	3	22	14	22	125	60
9036191	Kerita, Kinale	29	Av.	1 296	67	72	118	290	230	62	39	42	38	91	157	90
2 591 m			60 %	1 159	43	46	91	245	170	51	23	31	27	78	119	63
9036250	Kaimae For. Station	17	Av.	1 466	75	75	129	318	244	63	42	51	72	105	206	95
2 591 m																
9136005	Ruiru Power Station	24	Av.	845	43	30	118	24	118	26	22	19	20	56	119	63
1 555 m																
9136006	Kiltannor Estate	55	Av.	922	49	50	86	211	156	45	18	21	21	56	134	75
1 737 m			60 %	775	22	13	51	177	106	18	7	11	11	26	96	34
9136007	Ruiru, Sukari Factory	46	Av.	753	37	37	79	165	121	31	14	16	18	47	121	68
1 570 m			60 %	650	8	12	52	145	74	14	4	5	4	30	88	39
9136008	Kabete Train. School	40	Av.	1 046	53	93	116	238	203	41	20	24	29	67	198	93
1 829 m																
9136022	Uplands, Lari Forest	69	Av.	1 409	59	66	141	329	269	64	34	40	41	98	170	150
2 415 m	Station		60 %	1 217	34	23	81	258	223	45	23	26	26	65	130	55
9136028	Kiambu, District	68	Av.	1 014	46	46	98	226	168	53	28	25	35	67	139	83
1 767 m	Office		60 %	906	16	14	68	190	120	33	12	18	16	44	109	53
9136029	Thika, Karamaini	63	Av.	929	35	41	106	226	139	37	87	24	23	68	144	69
1 555 m																
9136031	Ruiru, Iganjo Farm	46	Av.	813	36	35	88	200	132	31	16	22	23	67	134	78
1 615 m																

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years (calculated only for a geographically selected number of stations).

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
9136032 1 890 m	Kiambu, Kach. Ltd.	44	Av.	1 337	52	53	130	299	252	62	25	44	42	87	190	97
9136035 2 347 m	Limuru, Mab. Factory	46	Av.	1 320	64	55	117	305	248	65	29	42	45	87	165	99
9136042 2 237 m	Limuru Railway Station	44	Av.	1 016	51	47	89	259	204	48	18	26	26	55	124	71
			60 %	908	32	22	43	241	125	30	4	7	15	46	89	34
9136049 1 945 m	Ruiru, Dam	40	Av.	1 474	56	53	133	343	275	65	37	49	45	106	203	107
9136053 1 555 m	Ruiru, Tatu Estate	39	Av.	906	39	43	70	205	164	40	21	19	19	57	130	79
9136054 1 707 m	Kiambu, Kianjibbi	60	Av.	1 065	44	48	113	246	177	48	26	31	31	72	148	84
9136060 1 707 m	Kiambu, Anmer Estate	39	Av.	1 167	64	51	92	227	235	44	38	29	27	78	187	96
			60 %	1 044	40	20	62	192	159	24	17	19	16	47	134	44
9136063 1 707 m	Gatundu Agric. Office	37	Av.	1 134	43	44	90	276	212	44	29	36	30	77	169	86
			60 %	1 027	35	19	62	221	172	32	16	14	21	65	161	54
9136064 1 999 m	Githunguri, Agric. Office	36	Av.	1 367	47	46	118	316	267	62	37	48	44	95	99	98
			60 %	1 231	40	25	78	280	172	45	29	36	26	63	80	55
9136084 1 603 m	Jacaranda Coffee Research Station	31	Av.	1 063	49	41	101	244	197	46	24	32	31	68	148	82
9136089 1 674 m	Ruiru, Kahawa Estate	53	Av.	1 001	39	42	108	234	174	42	24	27	21	67	121	76
9136121 2 095 m	Muguga, E.A.A.F.R.O.	25	Av.	954	59	48	72	204	170	44	25	24	27	56	142	85
			60 %	803	17	34	43	144	96	31	11	15	18	32	89	50
9137018 1 494 m	Thika, District Office	46	Av.	797	37	43	89	185	94	29	13	18	15	59	144	71
			60 %	713	15	12	60	146	62	15	4	7	3	34	133	45
9137019 1 463 m	Ruiru, Juja Sisal Farm	51	Av.	722	27	36	100	164	91	19	9	8	10	46	143	68
			60 %	542	8	11	37	117	45	4	2	1	0	19	102	29
9137072 1 463 m	Thika, Water Supply	24	Av.	875	43	48	105	204	118	24	15	20	17	62	158	32
9137083 1 463 m	Ruiru, Juja Sisal Est. (Borehole)	14	Av.	736	40	42	78	156	110	14	10	3	6	46	164	72

TABLE 2: TEMPERATURE DATA

No. and altitude	Name of Station	AEZ[1)]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
				Temperature in °C													
9036230	Mangu	UM	Mean max.	20.9	22.3	22.9	21.1	21.6	20.9	20.3	20.5	21.5	21.6	20.3	20.3	21.2	
1 670 m	St. Francis	2	Mean temp.	18.0	18.1	19.2	18.3	18.4	17.2	16.7	17.0	17.4	18.1	17.2	17.4	17.8	13
	School	hp	Mean min.	15.2	14.0	15.5	15.5	15.2	13.6	13.1	13.6	13.4	14.7	14.2	14.6	14.4	
			Abs. min.	8.9	8.9	6.7	6.7	5.6	10.0	8.3	10.0	10.0	4.4	5.6	8.9	4.4	
9136022	Uplands	UH	Mean max.	19.8	21.6	21.4	19.3	18.7	17.5	17.5	16.9	18.3	19.8	18.7	18.3	19.0	
2 415 m	Forest	1	Mean temp.	15.0	16.0	16.1	15.2	14.5	13.2	12.8	12.5	13.8	15.0	14.4	14.2	14.4	7
	Station	lp	Mean min.	10.3	10.4	10.8	11.1	10.3	9.0	8.2	8.1	9.4	10.2	10.2	10.1	9.8	
			Abs. min.	5.6	6.4	5.5	5.8	6.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	4.4	
9136084	Jacaranda	UM	Mean max.	26.2	27.7	27.2	25.4	24.2	23.2	22.4	22.6	24.9	26.1	24.3	24.4	24.9	
1 603 m	Coffee	3–	Mean temp.	19.3	20.0	20.4	20.1	19.3	17.7	16.8	17.1	18.4	19.7	19.2	18.8	18.9	23
	Research	2	Mean min.	12.4	12.4	13.7	14.9	14.4	12.3	11.3	11.7	11.9	13.4	14.1	13.2	13.0	
	Station		Abs. min.	7.2	6.4	9.4	10.6	8.6	5.7	4.7	4.0	5.6	7.2	8.1	6.1	4.0	
9136121	Muguga	LH	Mean max.	22.5	23.3	23.2	21.3	19.8	19.0	18.2	18.8	20.9	21.9	20.5	21.1	20.9	
2 095 m	E.A.A.F.R.O.	3	Mean temp.	16.8	17.3	17.7	16.9	15.7	14.3	13.4	13.8	15.1	16.5	16.1	16.1	15.8	16
		lp	Mean min.	11.1	11.4	12.3	12.5	11.6	9.6	8.6	8.9	9.4	11.1	11.7	11.2	10.8	
			Abs. min.	5.6	6.5	9.2	9.5	5.6	3.9	1.9	2.9	3.0	6.9	6.8	4.5	1.9	

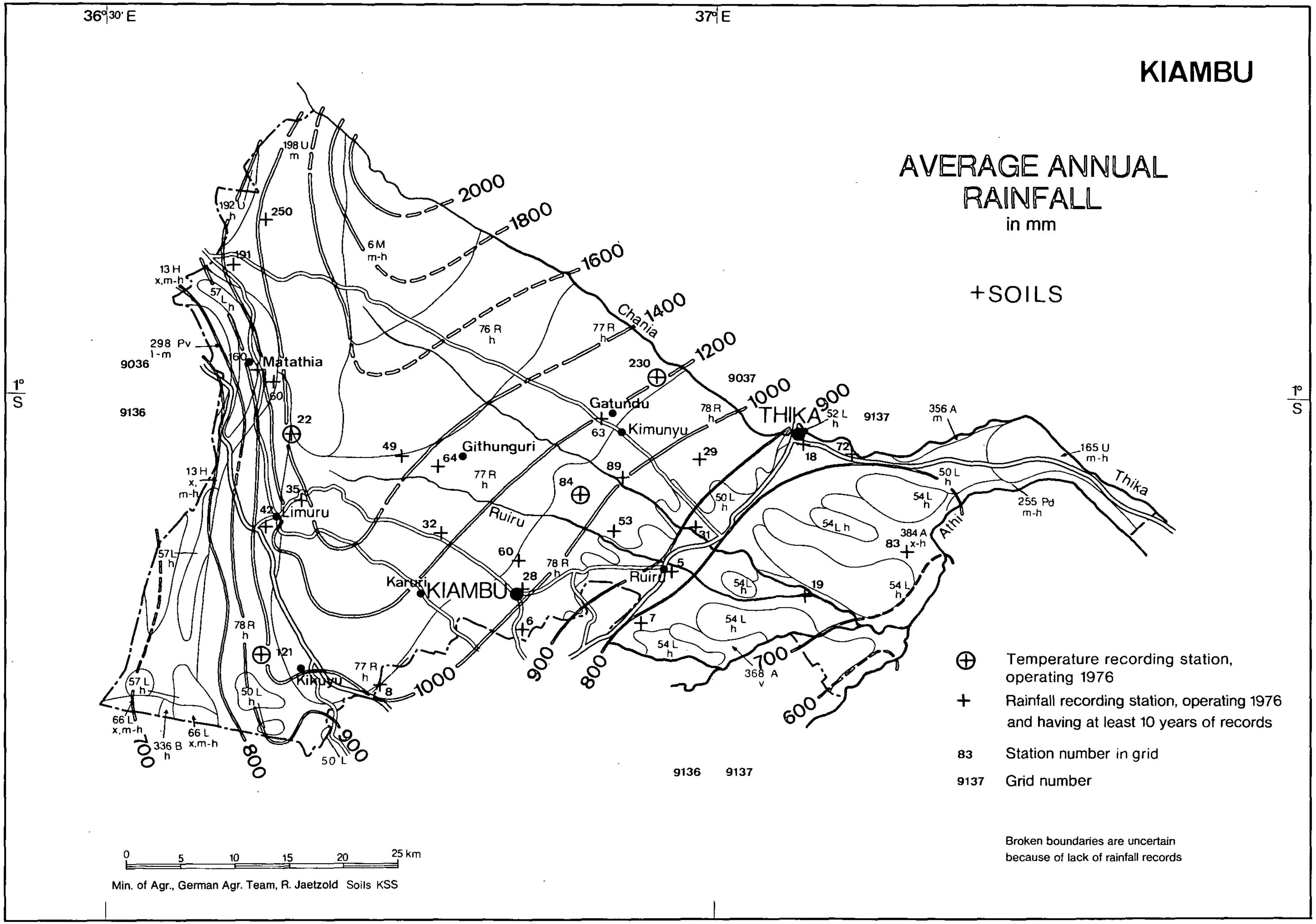
1) AEZ = Agro-Ecological Zone; lp = lower places, hp = higher places within the zone.

KIAMBU DISTRICT

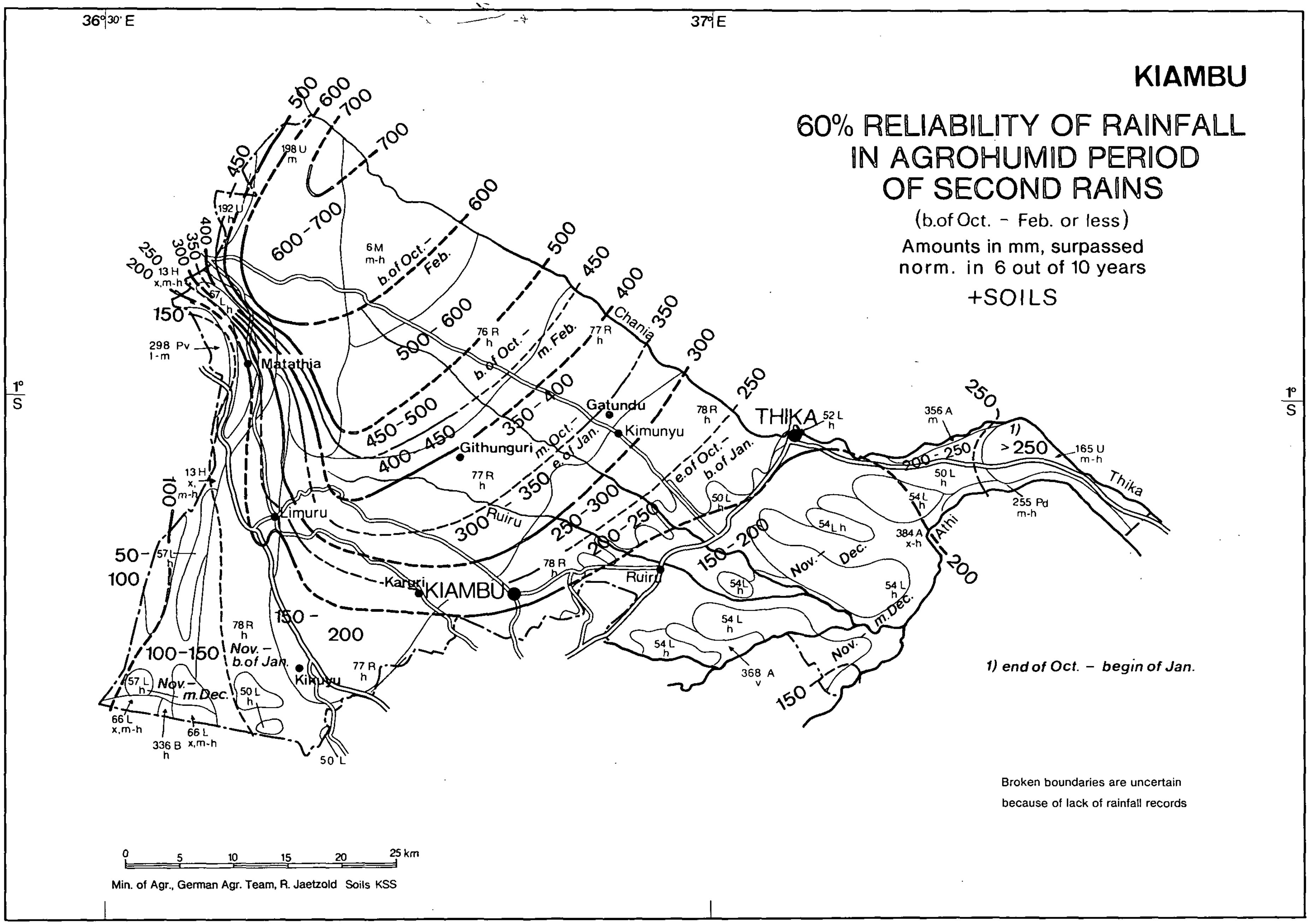
TABLE 3: CLIMATE IN THE AGRO-ECOLOGICAL ZONES

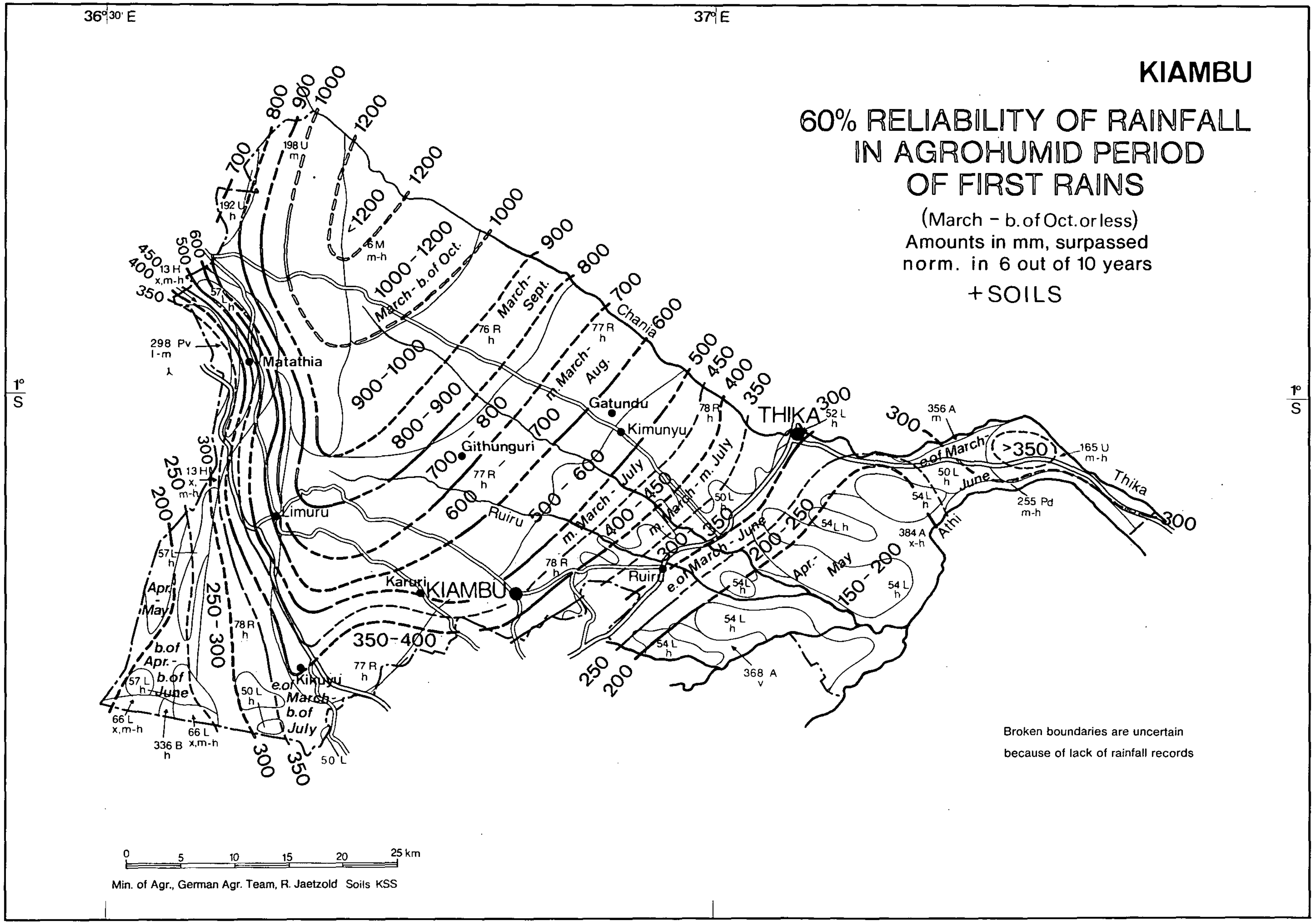
Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1] 1st rains *in mm*	2nd rains *in mm*	60 % reliability of growing period 1st rains[2] *in days*	2nd rains *in days*	Total[3] *in days*
UH 0 Forest Zone		Forest Reserve							
UH 1 Sheep and Dairy Zone	p or l/vl ⌒ m	2 280–2 550	15.2–13.5	1 200–2 000	900–1 100	400–620	220 or more	135–145	355–365
	l/vl ⌒ m			1 200–1 600	700– 900	250–450	220 or more	130–140	350–360
UH 2 Pyrethrum-Wheat Zone	l i m/s	Very small, see Nyandarua District							
LH 1 Tea-Dairy Zone	p or l/vl ⌒ m	1 820–2 280	18.0–15.2	1 500–2 000	850–1 100	470–600	220 or more	135–145	355–365
	f l i m			1 300–1 500	700– 850	250–470	210 or more	130–140	340–350
LH 2 Wheat/Maize-Pyrethrum Zone	m + (s/m)	1 980–2 280	17.6–15.2	1 100–1 300	500– 700	170–280	140–150	105–120	–
	m/s + (s)			900–1 200	400– 500	150–220	115–135	85–100	–
LH 3 Wheat/(Maize)-Barley Zone	s/m + (s/vs)	1 950–2 070	17.4–16.4	900–1 200	350– 450	150–200	105–115	75– 80	–
	s/m + (vs/s)			800–1 000	280– 360	150–180	105–115	65– 70	–
LH 4 Cattle-Sheep-Barley Zone	s + (vs)	Small transitional strips							
LH 5 Lower Highland Ranching Zone	b r	Small, not suitable for rain-fed agriculture							
UM 1 Coffee-Tea Zone	f l i m	1 700–1 820	18.7–18.0	1 300–1 600	700– 850	400–480	180 or more	130–140	310–330
UM 2 Main Coffee Zone	m/l i m/s	1 580–1760	19.5–18.4	1 100–1 400	520– 700	300–400	160 or more	115–135	275–300
	m + s/m			1 000–1 300	480– 680	250–380	135–155	105–115	–
UM 3 Marginal Coffee Zone	m/s + s	1 520–1580	19.9–19.5	900–1 100	300– 480	210–280	115–135	85–105	–
	m/s + s/vs			800–1 200	300– 470	190–250	115–135	75– 85	–
UM 4 Sunflower Maize Zone	s/m + s	1 360–1 520	20.7–19.9	800– 900	350– 400	250–300	105–115	85–105	–
	s/m + (s/vs)			780– 880	300– 350	180–200	105–115	75– 80	–
	s + s			770– 870	260– 300	190–220	90–105	85–100	–
	s + s/vs			760– 850	250– 290	180–210	85–105	75– 85	–
	s + (vs/s)			750– 800	240– 280	150–180	85–100	65– 70	–
	s/vs + (vs/s)			730– 780	200– 250	150–170	75– 85	65– 70	–
UM 5 Livestock-Sorghum Zone	vs/s + vs	1 360–1 520	20.9–19.9	600– 730	170– 200	150–160	65– 75	50– 65	–
LM 4 Marginal Cotton Zone	s/vs + s/vs	1 200–1 360	21.9–20.9	800– 900	250– 320	200–250	75– 85	75– 85	–

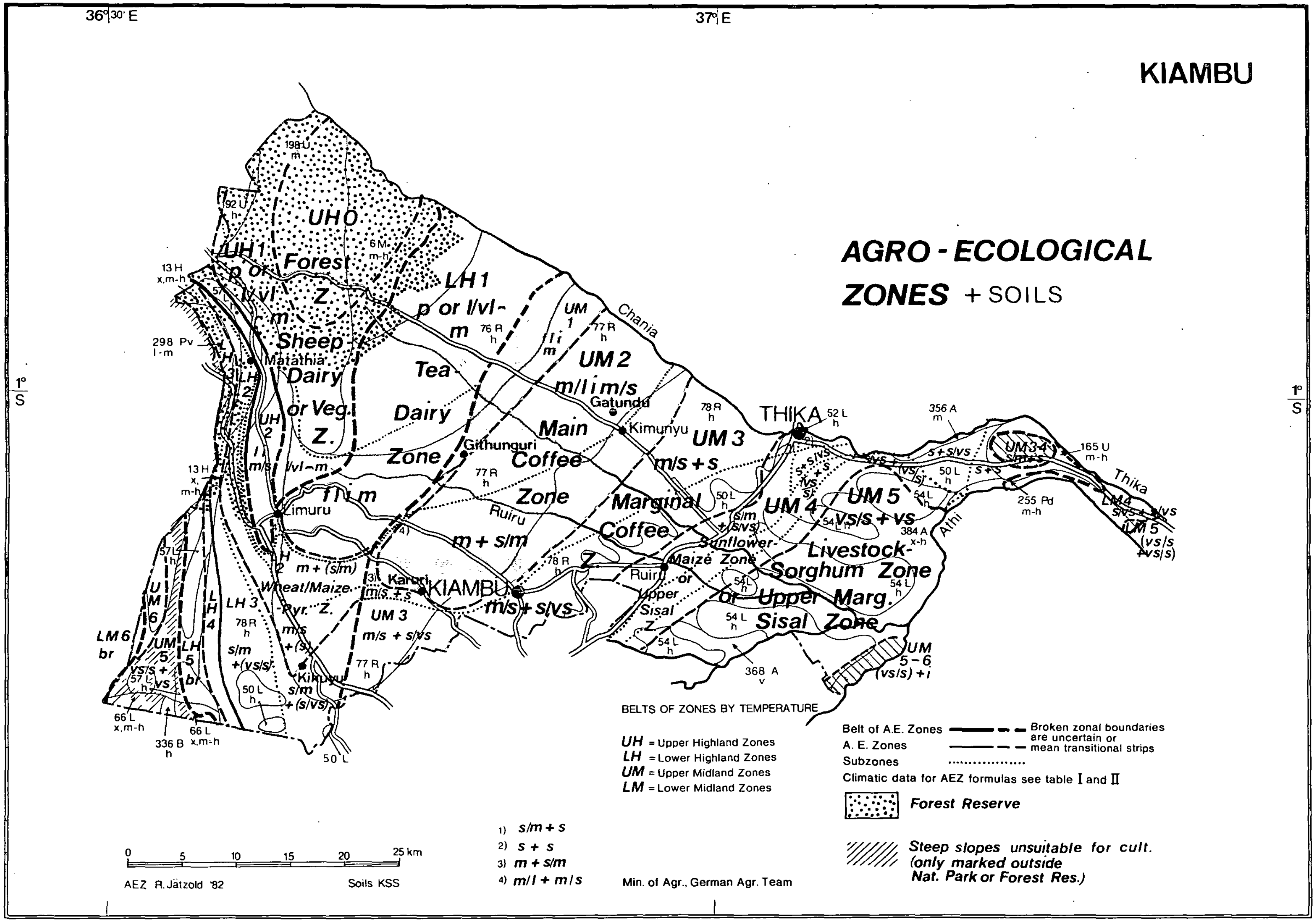
1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants.
2) More if growing cycle of cultivated plants continues into the period of second rains.
3) Only added if rainfall continues at least for survival (> 0.2 E_o) of most long term crops.



36°30' E
37° E
KIAMBU
AVERAGE ANNUAL
RAINFALL
in mm
+SOILS
1° S
2000
1800
1600
1400
1200
1000
900
800
700
600
Chania
Ruiru
Thika
Athi
Matathia
Limuru
Kikuyu
Karuri
KIAMBU
Githunguri
Gatundu
Kimunyu
Ruiru
THIKA
9036
9136
9037
9137
Temperature recording station, operating 1976
Rainfall recording station, operating 1976 and having at least 10 years of records
83 Station number in grid
9137 Grid number
Broken boundaries are uncertain because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


KIAMBU
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RAINS
(b.of Oct. - Feb. or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+SOILS
36°30' E
37° E
1° S
Matathia
Limuru
Githunguri
Gatundu
Kimunyu
THIKA
KIAMBU
Karuri
Ruiru
Kikuyu
Chania
Ruiru
Thika
Athi
b.of Oct.- Feb.
b.of Oct.- m.Feb.
m.Oct.- e.of Jan.
e.of Oct.- b.of Jan.
Nov.- Dec.
Nov.- m.Dec.
Nov.- b.of Jan.
1) >250
1) end of Oct. - begin of Jan.
Broken boundaries are uncertain because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


36°30' E
37° E
1° S
KIAMBU
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF FIRST RAINS
(March - b. of Oct. or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+SOILS
Matathia
Gatundu
Kimunyu
THIKA
Githunguri
Limuru
Karuri
KIAMBU
Ruiru
Kikuyu
Chania
Ruiru
Thika
Athi
March - b. of Oct.
March - Sept.
m. March - Aug.
m. March - July
m. March - m. July
m. March - June
e. of March - June
e. of March - June
Apr. - May
b. of Apr. - b. of June
e. of March - b. of July
1000 - 1200
900 - 1000
800 - 900
500 - 600
400 - 450
200 - 250
150 - 200
250 - 300
350 - 400
>350
Broken boundaries are uncertain because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



KIAMBU
AGRO - ECOLOGICAL ZONES + SOILS
36°30' E
37° E
1° S
UHO Forest Z.
UH1 p or l/vl m
Sheep Dairy or Veg. Z.
LH1 p or l/vl-m
Tea Dairy Zone
UM 1 l i m
UM 2 m/l i m/s
Main Coffee Zone
m + s/m
UM 3 m/s + s
Marginal Coffee Z.
UM 4 Sunflower-Maize Zone
UM 5 vs/s + vs
Livestock-Sorghum Zone or Upper Marg. Sisal Zone
UM 3 m/s + s/vs
LH 3 Wheat/Maize-Pyr. Z.
LM 6 br
UM 5-6 (vs/s) + i
THIKA
KIAMBU
Gatundu
Kimunyu
Githunguri
Limuru
Matathia
Karuri
Ruiru
Kikuyu
Chania
Thika
Athi
BELTS OF ZONES BY TEMPERATURE
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
Forest Reserve
Steep slopes unsuitable for cult. (only marked outside Nat. Park or Forest Res.)
1) s/m + s
2) s + s
3) m + s/m
4) m/l + m/s
0 5 10 15 20 25 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team

AGRO-ECOLOGICAL ZONES

UH = UPPER HIGHLAND ZONES

UH 0 = Forest Zone

UH 1 = Sheep and Dairy Zone

UH 1 p or l/vl ⌐ m = Sheep and Dairy Zone or Vegetable Zone with permanent cropping possibilities, dividable in a long to very long cropping season followed by a medium one

Upper places very wet, steep and too important as a catchment area, therefore Forest Reserve. Small strips in lower places cleared, there:

Good yield potential (av. 60–80 % of the optimum)
1st rains, start norm. mid March: Oats (Apr.–S.); horse beans, peas, tarwi, potatoes[1]; late mat. rapeseed; cabbage, kales, carrots, kohlrabi, celery, radish, endive, rampion, leek
2nd rains, start norm. mid Oct.: Oats (Oct.–F.); peas, potatoes[1]; med. mat. rapeseed, vegetables as in 1st r.

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Very late mat. maize like H 611 (lower places), late mat. triticale
2nd rains: Med. mat. triticale
Whole year: Pyrethrum; pears, plums

Pasture and forage
About 0.6 ha/LU on sec. pasture of Kikuyu grass; very suitable for grade dairy cows; rye grass (Lolium perenne) and Kenya white clover to improve pasture

UH 1 l/vl ⌐ m = Sheep and Dairy Zone with a long to very long cropping season followed by a medium one

Potential almost the same as above but oats 2nd rains fair

UH 2 = Pyrethrum-Wheat Zone

UH 2 l i m/s = Pyrethrum-Wheat Zone with a long cropping season, intermediate rains, and a medium to short one

Very small, potential see Nyandarua District UH 2 vl i (almost the same because mists are bridging the two rainy seasons)

LH = LOWER HIGHLAND ZONES

LH 1 = Tea-Dairy Zone

LH 1 p or l/vl ⌐ m = Tea-Dairy Zone with permanent cropping possibilities, dividable in a long to very long cropping season followed by a medium one

Very good yield potential (av. above 80 % of the optimum)
1st rains, start norm. mid March: Peas, cabbages, lettuce
2nd rains, start norm. mid Oct.: Peas

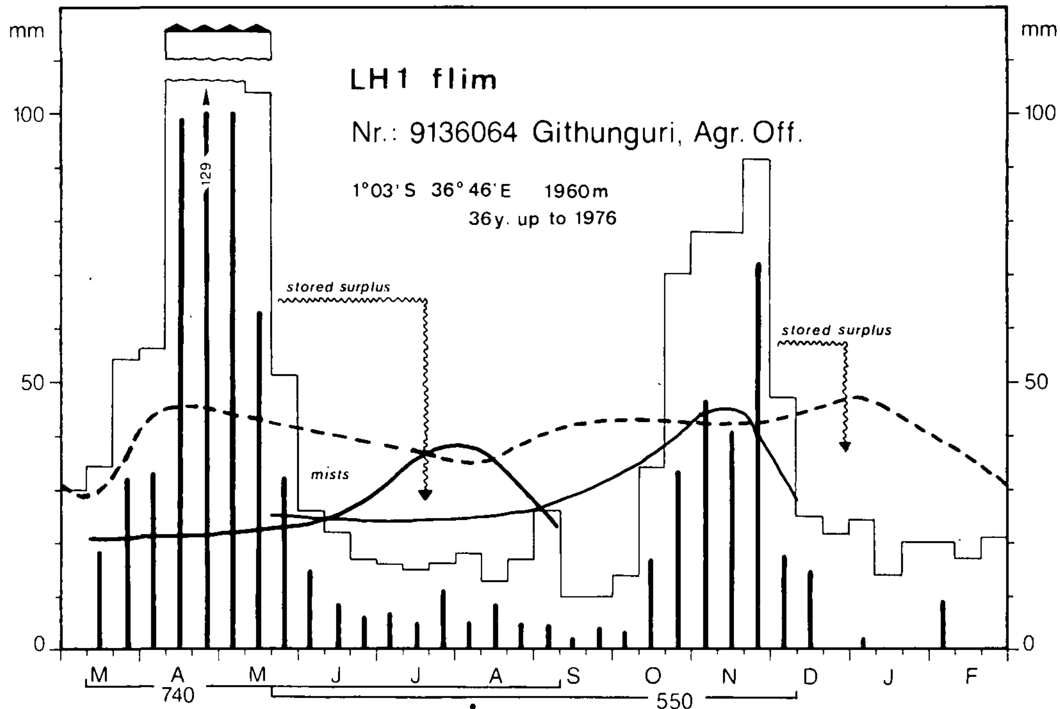
Good yield potential (av. 60–80 % of the optimum)
1st rains: Lima beans, carrots, leek, kales, endive
2nd rains: Potatoes (S.–Jan); cabbages, carrots, kales, lettuce
Whole year, best planting time mid March: Tea (high quality), loquats, passion fruit (lower places)

Fair yield potential (av. 40–60 % of the optimum)
1st rains (to 2nd r.): Maize H 612–614 (May–D.); beans (2 times, 2nd end of July–N.)[2], potatoes (March–July/Aug.)[1]
2nd rains: Beans, leek
Whole year: Pyrethrum (higher places), plums

Pasture and forage
About 0.5 ha/LU on sec. pasture of Kikuyu grass, suitable for grade dairy cows; clover for higher productivity

LH 1 = Tea-Dairy Zone
f l i m with a fully long cropping season, intermediate rains, and a medium one

Potential almost the same as LH 1 p because of predominating heavy soils with good water storage capacity



Average rainfall per decade; rainfall surpassed in 6 out of 10 years
--- Approx. pot. evapotranspiration of a permanent crop (tea)
— Approx. pot. evapotranspiration of late mat. maize like H 612
740 Rainfall per indicated growing period, surpassed in 6 out of 10 years

LH 2 = Wheat/Maize[3)] - Pyrethrum Zone

LH 2 = Wheat/Maize-Pyrethrum Zone
m + (s/m) with a medium cropping season and a (weak) short to medium one

Good yield potential
1st rains, start norm. end of March: M. mat. wheat like Afr. Mayo and other var., m. mat. Durum wheat, m. mat. triticale, m. mat. barley; peas, potatoes; sunflower Kenya White, linseed; nearly all vegetables
2nd rains, start norm. end of O.: V. e. mat. barley
Whole year: Pyrethrum (higher places), black wattle

Fair yield potential
1st rains: Maize H 611, lower places H 612 and beans; rapeseed (higher places), bonavist beans (up to 2 100 m)
2nd rains: Very early mat. beans and peas
Whole year: Pyrethrum (lower places); apples, pears and plums (all higher places), strawberries

Pasture and forage
0.7–1.1 ha/LU on sec. pasture of Kikuyu grass; down to 0.5 ha/LU with Napier grass up to 2 000 m, Nandi Setaria above that, green maize (silage for 2nd dry season), fodder beets, Louisiana white clover

LH 2 = Wheat/Maize-Pyrethrum Zone
m/s + (s) with a medium to short and a (weak) short cropping season

Potential almost the same as above but e. mat. wheat like Kenya Ngiri better, pyrethrum higher places also fair; stocking rates about 10 % less

LH 3 = Wheat/(Maize) - Barley Zone

LH 3 = Wheat/(Maize)-Barley Zone
s/m+(s/vs) with a short to medium and a (weak) short to very short cropping season

Transitional strip, potential between LH 2 m/s + (s) and the next subzone

LH 3 = Wheat(Maize)-Barley Zone
s/m+(vs/s) with a short to medium and a (weak) very short to short cropping season

Good yield potential
1st rains, start norm. end of March: V. e. mat. barley

Fair yield potential
1st rains: E. mat. wheat like Kenya Ngiri and other varieties of this group, e. mat. barley like Tumaini, e. mat. maize; e. mat. peas and beans, e. mat. potatoes; m. mat. sunflower like Vympel (lower pl.)
2nd rains, start norm. end of O.: V. e. mat. barley
Whole year: Black wattle

Pasture and forage
0.9–1.8 ha/LU on sec. grassland, 0.7–1 ha/LU on art. pasture of Nandi setaria. Barley Amani and subterr. clover for add. forage

LH 4 = Cattle-Sheep-Barley Zone

Small transitional strip, potential about 20 % less than LH 3 s/m + (vs/s)

LH 5 = Lower Highland Ranching Zone

LH 5 = Lower Highland Ranching Zone
b r with bimodal rainfall

Small, not suitable for rain-fed agriculture (except for v. e. mat. barley, 1st r. fair)

Pasture and forage
Normally 4–6 ha/LU on nat. short grass savanna; no proper forage; severe erosion danger if overgrazed; on eroded places and rocky soils stocking rate much less

UM = UPPER MIDLAND ZONES

UM 1 = Coffee-Tea Zone

UM 1 = Coffee-Tea Zone
f l i m with a fully long cropping season, intermediate rains, and a medium one

Very good yield potential
1st rains, start norm. mid March: Lima beans, cabbages, kales
2nd rains, start norm. mid Oct.: Beans (Aug.–D./J.)
Whole year, best planting time mid March: Passion fruit, black wattle

Good yield potential
1st rains: Late mat. maize H 612–614, finger millet; sweet potatoes; late mat. sunflower like Kenya White; onions, lettuce
2nd rains: Sweet potatoes; e. mat. sunflower like 252 (lower places), m. mat. like HS 301 A (higher pl.); cabbages (Aug.–D.), kales, onions, tomatoes
Whole year: Tea (higher places), Arabica coffee (lower places); bananas, mountain pawpaws, yams, loquats, avocadoes

Fair yield potential
1st rains: Cold tol. sorghum, Meru foxtail millet (July–O.); sweet potatoes, beans; tomatoes, lettuce
2nd rains: M. mat. maize like H 511 & 512 (S.–Jan.), late mat. H 612–614 (Jy.–Jan.), cold tol. sorghum (Aug.–F.), finger millet; potatoes (Aug.–D.)
Whole year: Arabica coffee (higher places, above 1 900 m even marginal), tea (lower places), pineapples, citrus, taro[7)]

Pasture and forage
0.5–0.7 ha/LU on sec. pasture of Kikuyu grass; down to about 0.15 ha/LU feeding Napier grass, banana stems and leaves, sweet potato vines, maize stalks

UM 2 = Main Coffee Zone

UM 2 m/l i m/s = Main Coffee Zone with a medium to long cropping season, intermediate rains, and a medium to short one[4]

Very good yield potential
1st rains, start norm. mid March: M. mat. sunflower like Hybrid S 301 A
2nd rains, start norm. mid Oct.: Beans (S./O.–Jan./F.)
Whole year, best pl. time mid March: Arabica coffee (~ 80 %), loquats, mountain pawpaws

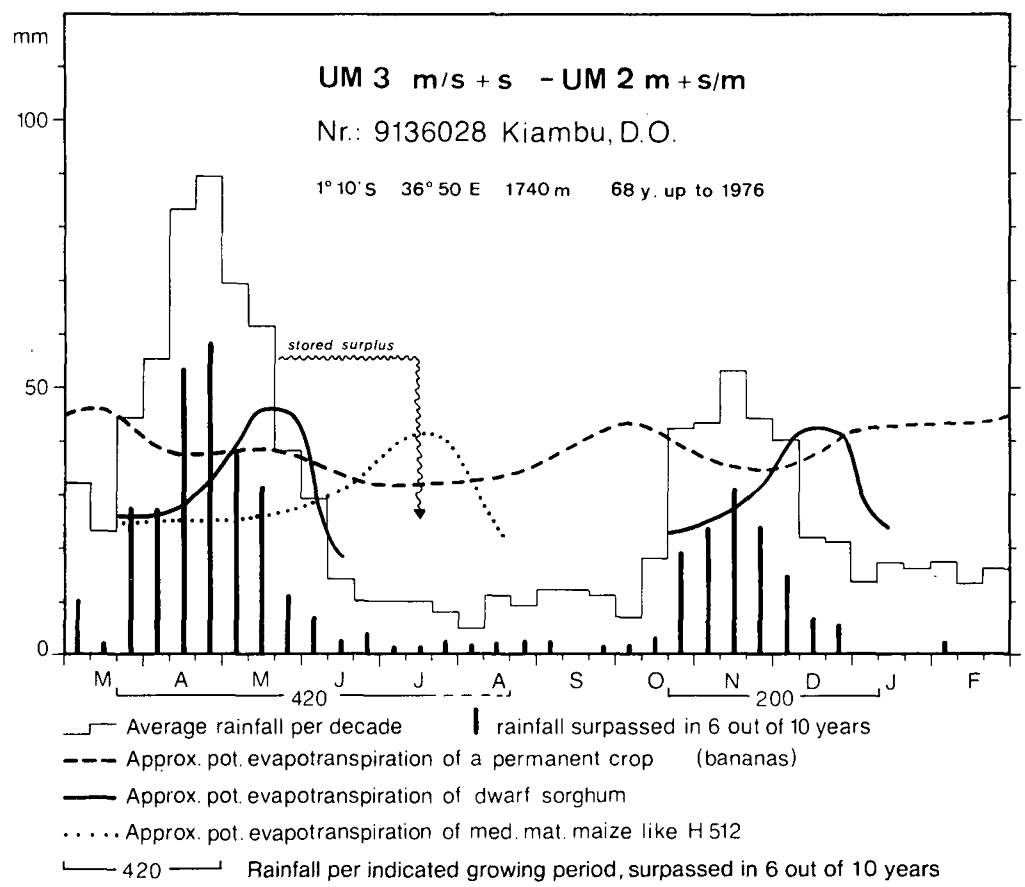
Good yield potential
1st rains: M. mat. maize like H 511 & 512, ratoon of sorghum (lower pl.); beans, potatoes[1], sweet pot.; cabbages, kales, tomatoes[7], onions
2nd rains: E. mat. maize like Katumani comp. B, e. mat. foxtail millet e. mat. sorghum like 2 KX 17; sweet potatoes (Aug./S.–Jan.); e. mat. sunflower like Issanka (< 1 500 m); kales, cabbages[7], onions, tomatoes[7]
Whole year: Bananas, citrus, avocadoes, passion fruit, pineapples, taro in valleys

Fair yield potential
2nd rains: M. mat. local maize (Aug./S.–J./F.), finger millet; e. mat. potatoes
Whole year: Cassava (lower places), sugar cane (lower and wet places)[7]

Pasture and forage
0.6–1.0 ha/LU on sec. pasture, but land too valuable for grazing; down to about 0.2 ha/LU feeding Napier or Bana grass, banana leaves a. o. forage

UM 2 m + s/m = Main Coffee Zone with a medium cropping season and a short to medium one

Potential and stocking rates almost the same as UM 2 m/l i m/s less about 10 % because of more intensive drought; all vegetables better in valleys, coffee yields good



UM 3 = Marginal Coffee Zone

UM 3 m/s + s = Marginal Coffee Zone with a medium to short and a short cropping season[5]

Good yield potential
1st rains, start norm. mid to end of March: E. mat. maize like Katumani comp. B[6], ratoon of e. mat. sorghum; sunflower Issanka (< 1 500 m); v. e. mat. beans; onions, cabbages

2nd rains, start norm. mid Oct.: E. mat. foxtail millet; v. e. mat. sorghum like IS 8595
Whole year: Pineapples (best planting time end of March), Macadamia nuts, perennial castor

Fair yield potential
1st rains: Maize H 511 or 512 (50–60 %)[6], m. mat. finger millet; e. & m. mat. beans, sweet potatoes; kales, tomatoes
2nd rains: Katumani maize, e. mat. sorghum (almost 60 %); v. e. mat. beans; sunflower Issanka, cabbages[7], kales[7], tomatoes[7]
Whole year: Arabica coffee (lower places poor, add. irrigation profitable), bananas (lower places marginal)[7], citrus[7], pawpaws, cassava

Pasture and forage
0.7–1.1 ha/LU on sec. high grass savanna with zebra grass (Hyparrhenia rufa) predom.; down to about 0.25 ha/LU feeding Napier or better Bana grass, glycine a. o. forage

UM 3 = Marginal Coffee Zone
m/s + s/vs with a medium to short and a short to very short cropping season[8]

Good yield potential
1st rains, start norm. mid to end of March: Katumani maize, e. mat. sorghum; v. e. mat. beans; sunflower Issanka (< 1 500 m); onions, cabbages[7]
2nd rains, start norm. end of O.: E. mat. foxtail millet
Whole year: Pineapples, Macadamia nuts

Fair yield potential
1st rains: Almost the same as UM 3 m/s + s, maize H 512 ~ 10 % less
2nd rains: Dryland comp. maize, e. mat. sorghum like 2 KX 17, v. e. mat. sorghum like IS 8595 (50–60 %); v. e. mat. beans; e. mat. cabbages
Whole year: Almost the same as UM 3 m/s + s but a bit more marginal

Pasture and forage
Almost the same as UM 3 m/s + s but stocking rates are about 10 % lower

UM 4 = Sunflower-Maize Zone or Upper Sisal Zone[10]

UM 4 = Sunflower-Maize Zone
s/m + s with a short to medium and a short cropping season

Very small, potential see Muranga District

UM 4 = Sunflower-Maize Zone
s/m+(s/vs) with a short to medium and a (weak) short to very short cropping season[9]

Good yield potential
1st rains, start norm. mid to end of March: Katumani maize[6] (~ 60 %), e. mat. sorghum like 2 KX 17; mwezi moja beans; e. mat. sunflower
Whole year: Sisal

Fair yield potential
1st rains: Maize H 511 or 12 (~ 40 %)[6], finger millet; dolichos beans, e. mat. beans, sweet pot.; Virg. tobacco; tomatoes, onions, cabbages
2nd rains, start norm. end of O.: E. mat. foxtail millet; mwezi moja beans, l. mat. pigeon peas (to 1st r.), dwarf sunflower
Whole year: Cassava, pineapples, castor

Pasture and forage
0.9–1.5 ha/LU on nat. sav. with zebra grass (Hyparrhenia rufa) predom.; down to about 0.3 ha/LU feeding Bana grass, siratro (Macroptilium atropurpureum), horse tamarind (Leucaena leucocephala) and silage (of green maize or green fodder sorghum)

UM 4 = Sunflower-Maize Zone
s + s with two short cropping seasons

Small, potential see Muranga District

UM 4 = Sunflower-Maize Zone
s + s/vs with a short and a short to very short cropping season

Small, potential see Muranga District

UM 4 = Sunflower-Maize Zone
s + (vs/s) with a short cropping season and a (weak) very short to short one[11)]

Good yield potential
1st rains, start norm. mid to end of March: Dryland comp. maize (60–70 %), e. mat. sorghum like Serena; mwezi moja beans (~ 60 %); dwarf sunflower
Whole year: Sisal

Fair yield potential
1st rains: Katumani maize comp. B, e. mat. finger millet, e. mat. foxtail and proso millet (lower pl.); dolichos beans, e. mat. beans (~ 40 %), chick peas (late planted on heavy black soils), cowpeas; sweet pot. (40–50 %); tomatoes, onions, e. mat. cabbage like sugar loaf
2nd rains, start norm. end of O.: E. mat. foxtail millet; l. mat. pigeon peas (~ 40 %, from 2nd to 1st r.); dwarf sunflower
Whole year: Cassava (almost poor yields), castor

Pasture and forage
1.5–2 ha/LU on mixed savanna; down to about 0.35 ha/LU feeding bana grass, horse tamarind and saltbush (Atriplex nummularia)

UM 4 = Sunflower-Maize Zone
s/vs+(vs/s) with a short to very short and a (weak) very short to short one

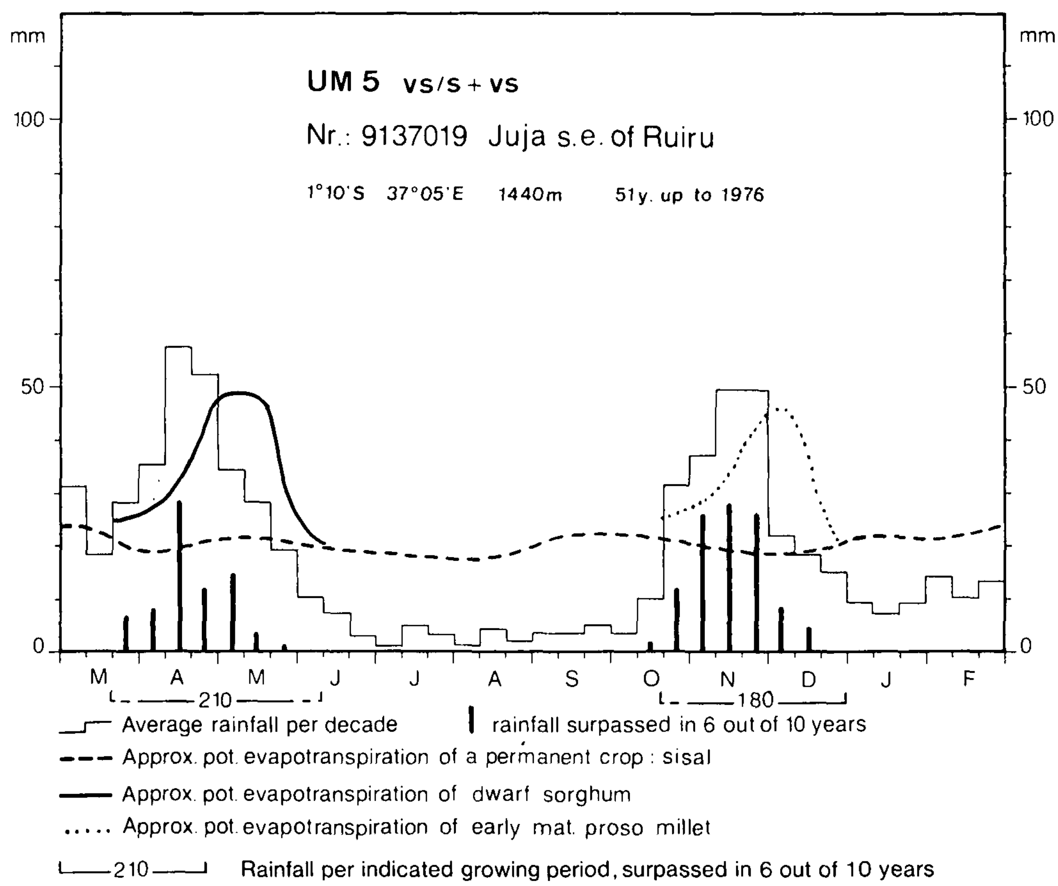
Transitional strip. Potential almost the same as UM 4 s + (vs/s) but Dryland comp. maize and mwezi moja beans only fair, some crops with fair yield expectations there have here only poor ones; stocking rates about 10 % less

UM 5 = Livestock-Sorghum Zone

UM 5 = Livestock-Sorghum Zone
vs/s + vs with a very short to short and a very short cropping season

No good yield potential

Fair yield potential
1st rains, start norm. end of March: V. e. mat. sorghum like IS 8595, v. e. mat. barley (higher pl.), e. mat. foxtail and proso millet (lower places); dwarf sunflower, rai (oilseed Brassica juncea)
2nd rains, start norm. b. of Nov.: V. e. mat. foxtail millet (lower pl.), v. e. mat. barley (higher pl.)



Poor yield potential
1st rains: Dryland comp. maize (30–40 %), Katumani comp. B (20–30 %); mwezi moja beans

Pasture and forage
1.6–3 ha/LU on short grass savanna with red oats grass (Themeda triandra) predominant. Saltbush (Atriplex nummularia), Mesquite or Algarrobo (Prosopis juliflora or chilensis) and Gao tree (Acacia albida) for browsing and pods. Opuntia var. without prickles (also as vegetable and fruit)

LM = LOWER MIDLAND ZONES

LM 4 = Marginal Cotton Zone

LM 4 s/vs+s/vs = Marginal Cotton Zone with two short to very short cropping seasons

Good yield potential
1st rains, start norm. end of March: Dryland comp. maize (on contour ridges), e. mat. sorghum like Serena, v. e. mat. like IS 8595, ratoon of e. mat. sorghum, e. mat. bulrush millet (awned var. preferred), e. mat. foxtail or proso millet (70–80 %); dwarf sunflower, mwezi moja beans (~ 60 %), e. mat. cowpeas like Katuli, black and green grams, chick peas (late planted on h. black soils); v. e. mat. pumkins
2nd rains, start norm. end of Oct.: The same and e. mat. sorghum like 2 KX 17 for ratoon (2nd to 1st r.)
Whole year, best pl. time end of Oct.: Sisal, jojoba, buffalo gourds (on sandy soils)[12], Marama beans[12], Vigna[12], per. castor like C 15

Fair yield potential
1st rains: Katumani maize comp. B (on contour ridges), m. mat. sorghum; e. mat. beans, e. mat. soya beans, dolichos beans, e. mat. bambarra groundnuts (light soils); sweet potatoes; e. mat. sunflower like Issanka; onions, tomatoes

2nd rains: The same and cotton bimodal var. (O.–Aug., on good soils, otherwise poor), l. mat. pigeon peas (O.–S.)
Whole year: Macadamia nuts, cassava

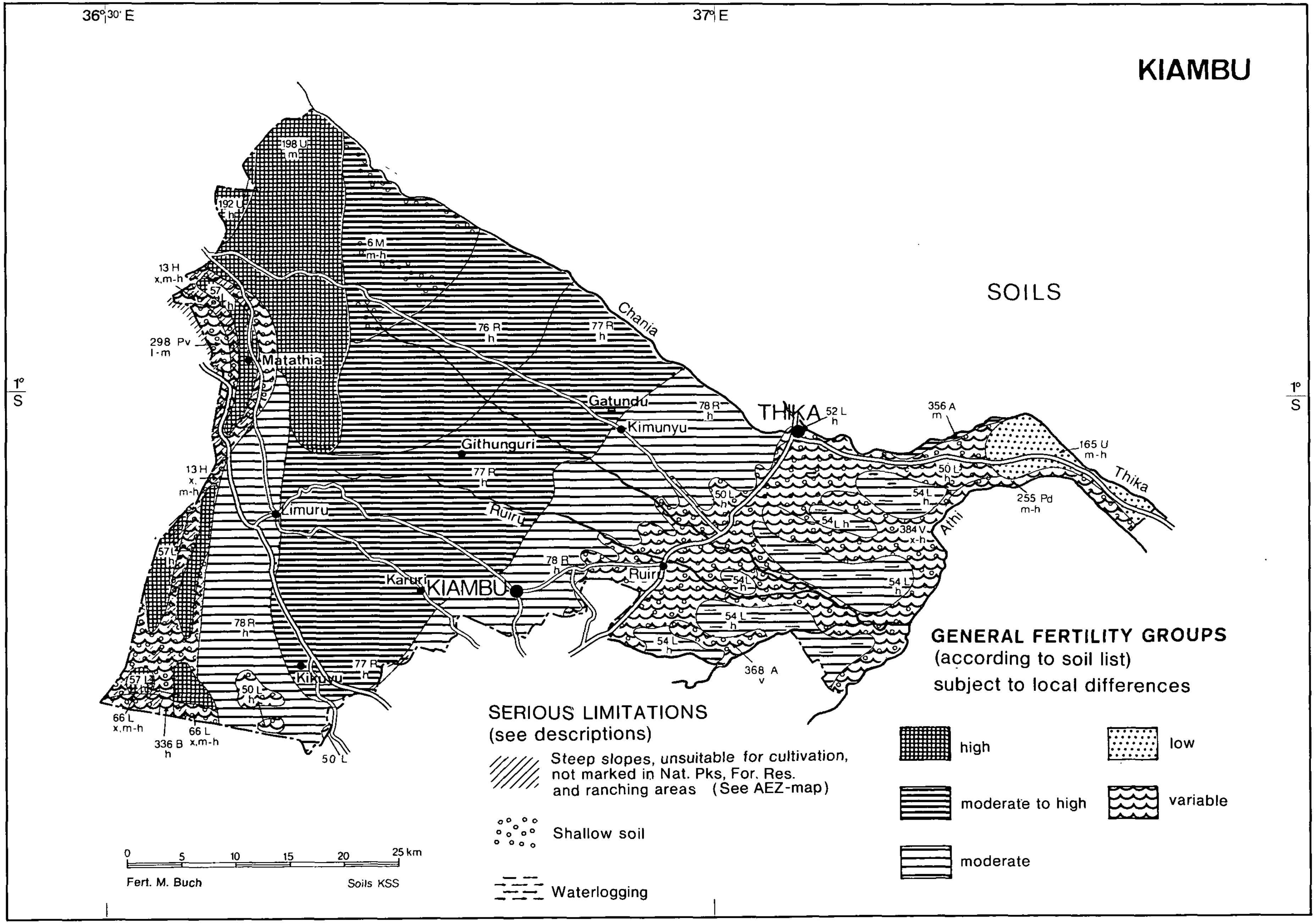
Pasture and forage
1.5–3.5 ha/LU on mixed medium grass savanna with red oats grass (Themeda triandra) predominant; if degraded reseeding with Masai love grass (Eragrostis superba), buffel grass (Cenchrus ciliaris), Makueni guinea, and planting saltbushes (Atriplex nummularia), horse tamarind (Leucaena leucoc.) and Mesquite (Prosopis juliflora) as palatable shrubs; add. forage: Vines of fast growing legumes like moth beans, pods of Gao trees (applering acacias, Ac. albida), silage of green fodder sorghum

LM 5 = Livestock-Millet Zone

LM 5 vs/s+vs/s = Livestock-Millet Zone with two very short to short cropping seasons

Very small, potential see Machakos District

1) Spraying against fungus diseases important, esp. in first rains. In UH microclimatic risk of frosts
2) Sometimes (esp. in 1st rains) rotting because of too wet conditions, lower places better
3) Wheat or maize depending on farm scale and topography. Here maize more advisable
4) On medium soils; on heavy soils there is a long to medium and a medium to short cropping season. Given potential refers to predominating heavy red loams
5) On medium soils; on heavy soils first cropping season has a medium length, second a short to medium. Potential refers to predominating heavy red loams
6) Although Katumani has climatically a good yield potential, it may be on deep soils more advisable to plant H 511 or 12 because of its higher productivity
7) Better in valleys
8) On medium soils; on heavy soils first cropping season has a medium length, second a short one. Potential refers to predom. heavy red loams
9) On medium soils; on heavy soils first season has a m/s, second season short length. Potential refers to heavy soils in valleys (if not water-logged); there are shallow soils on ridges which have only grazing potential
10) Sisal recommended for large scale plantations only
11) On heavy soils first season has one decade more length. Potential refers to heavy soils in valleys and on plains. There are strips of shallow soils and waterlogged places which have only grazing potential (if not meliorated)
12) Still experimental


36°30' E
37° E
KIAMBU
SOILS
1° S
1° S
198 U m
192 L h
6 M m-h
13 H x,m-h
57 h
298 Pv l-m
Matathia
76 R h
77 R h
Chania
Gatundu
78 R h
THIKA
52 L h
Kimunyu
Githunguri
77 R h
13 H x, m-h
Limuru
Ruiru
356 A m
165 U m-h
Thika
50 L h
54 L h
255 Pd m-h
Athi
384 V x-h
78 R h
Ruiru
54 L h
Karuri
KIAMBU
57 L h
78 R h
54 L h
54 L h
368 A v
77 R h
Kikuyu
50 L h
57 L h
66 L x,m-h
66 L x,m-h
336 B h
50 L
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
low
moderate to high
variable
moderate
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Waterlogging
0 5 10 15 20 25 km
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The physiography of the nortwestern part of the district is influenced by the Nyandarua Range. The central landscape consists of undulating to rolling countryside (volcanic foothill ridges). The soils of this area (units 76 R and 77 R) are moderately to highly fertile.

On the mountains, soils with a humic topsoil and with a moderate to high fertility are found (unit 6 M) if they are normally developed. They may be shallow or leached and very acid (ph 3.5–4.5). Soils of the hills (13 H) are generally variably fertile and can only be found in the western part of the district. Fertile upland soils occur in the western part, (192 U, 198 U), others of moderate to low fertility in the very eastern part of Kiambu district (165 U).

East of Ruiru, the plateaus have soils of variable fertility (unit 50 L). Soils of unit 54 L are better but imperfectly drained.

On the lower topographical sites, soils which have developed on alluvium (unit 368 A) are found. They are moderately to highly fertile. The soils of map unit 384 V which have developed in minor valleys also occur.

SOILS ON MOUNTAINS

Soils developed on olivine basalts and ashes of major older volcanoes

6 M
m–h[1) = well drained, very deep, dark reddish brown to dark brown, very friable and smeary, clay loam to clay, with thick, acid humic topsoil; in places shallow to moderately deep and rocky (humic ANDOSOLS, partly lithic phase)

Soils developed on ashes and other pyroclastic rocks of recent volcanoes

9 M
x, m = somewhat excessively drained, shallow to moderately deep, brown to dark brown, firm and slightly smeary, strongly calcareous, gravelly to stony clay loam; in many places saline and/or sodic and with inclusions of lava fields (ando-calcaric REGOSOLS)

SOILS ON HILLS

Soils developed on undifferentiated Tertiary volcanic rocks (olivine basalts, rhyolites, andesites)

13 H
x, m = well drained, shallow, dark reddish brown, friable, very calcareous, bouldery or stony, loam to clay loam; in many places saline (LITHOSOLS; with calcic XEROSOLS, bouldery and saline phase and Rock Outcrops)

SOILS ON PLATEAUS AND HIGH LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older basic tuffs included)

50 L
x, h = complex of:
- moderately well drained, shallow, yellowish red to dark yellowish brown, friable, gravelly clay over petroplinthite or rock (50–70 %) (murram cuirass soils, with some LITHOSOLS)
- poorly drained, deep to very deep, dark brown to very dark greyish brown, mottled, firm to very firm, cracking clay; in places moderately deep to deep over petroplinthite (VERTISOLS, undifferentiated and vertic GLEYOSOLS)

52 L
h = well drained, very deep, dark red, very friable clay (nitorhodic FERRALSOLS)

54 L
x, h = imperfectly drained, very deep, dark grey to black, firm to very firm, bouldery and stony, cracking clay; in places with calcareous, slightly saline deeper subsoil (pellic VERTISOLS, stony phase and partly saline phase)

Soils developed on volcanic ashes and other pyroclastics of recent volcanoes

57 L
m–h = well drained, moderately deep to very deep, dark brown, friable and slightly smeary, clay loam to clay (ando-luvic PHAEOZEMS)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

76 R
h = well drained, extremely deep, dark reddish brown to dark brown, friable and slightly smeary clay, with acid humic topsoil (ando-humic NITOSOLS; with humic ANDOSOLS)

77 R
h = well drained, extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil (humic NITOSOLS)

78 R
h = well drained, extremely deep, dusky red to dark reddish brown, friable clay; with inclusions of well drained, moderately deep, dark red to dark reddish brown, friable clay over rock, pisoferric or petroferric material (eutric NITOSOLS; with nito-chromic CAMBISOLS and chromic ACRISOLS, partly pisoferric or petroferric phase)

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on undifferentiated Basement System rocks

165 U
m–h = well drained, moderately deep to deep, dark red to yellowish red, friable, sandy clay loam to clay (rhodic and orthic FERRALSOLS; with ferralo-chromic/orthic/ferric ACRISOLS)

SOILS ON HIGH LEVEL UPLANDS

Soils developed on undifferentiated volcanic rocks (mainly basalts)

192 U h = well drained, very deep, dark reddish brown to very dark greyish brown, friable and slightly smeary clay, with humic topsoil (ando-luvic PHAEOZEMS)

Soils developed on pyroclastic rocks

198 U m = well drained, very deep, dark reddish brown to dark brown, very friable and smeary, silty clay loam, with humic topsoil (mollic ANDOSOLS)

SOILS ON DISSECTED EROSIONAL PLAINS

Soils developed on undifferentiated Basement System rocks

255 Pd x, l–h = well drained, shallow, dark red to yellowish red, stony loamy sand to clay (chromic CAMBISOLS, paralithic and stony phase; with ferralic ARENOSOLS, lithic phase)

SOILS ON VOLCANIC PLAINS

Soils developed on ashes and pumice from recent volcanoes

298 Pv l–m = excessively drained to well drained, very deep, dark greyish brown to olive grey, loose to very friable, stratified, calcareous, fine sand to sandy loam or silt (ando-calcaric REGOSOLS)

SOILS ON FLOODPLAINS

Soils developed on sediments mainly from crystalline Basement System rocks

356 A m = well drained to imperfectly drained, very deep, brown to dark brown, friable, slightly calcareous, micaceous, sandy loam to clay loam; in places with a saline-sodic deeper subsoil (eutric FLUVISOLS)

Soils developed on sediments from various sources (recent floodplains)

362 A m, h = imperfectly drained, very deep, dark brown, firm, strongly calcareous, moderately saline and strongly sodic clay, with a topsoil of sandy clay loam (calcic LUVISOLS, saline-sodic phase)

SOILS IN VALLEYS

Minor valley soils

384 V x–h = complex of well drained to imperfectly drained, shallow to moderately deep, dark reddish brown to very dark greyish brown, firm, slightly to moderately calcareous, rocky, stony or gravelly clay

1) Soil texture-classes

h = heavy
l = light
m = medium
x = stony or bouldery
v = varying texture
m–h = medium to heavy
m, h = medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey:
Exploratory Soil Map and Agro-climatic Zone Map of Kenya, scale 1 : 1 000 000. Expl. Soil Survey Rep. E1, Nairobi 1982.
See this map also for colours; symbols simplified here.

POPULATION AND LAND

The last population Census (1979) showed that Kiambu District is very densely populated, with 686,290 people living on 193,500 ha (Table 4). A little over 55,000 people (8.1 %) were registered in the 3 townships and 4 trading centres of this administrative area. Thika Municipality with 41,324 people is the biggest urban settlement. About 75 % (142,200 ha) of the total rural area of 193,500 ha is suitable for agriculture (Table 6), i.e. only one quarter of an ha was available per person, statistically, an average household of 4.80 people had 1.13 ha. In some location, even smaller farms occur: Kinoo, with 0.30 ha per household/0.06 per person, and Kiambaa with 0.37 ha per household/0.07 ha per person. Even for the farms which can grow cash crops such as coffee and tea (in UM 1, UM 2, UM 3, LH 1), such a small unit is too marginal to support a family. The situation is slightly better for horticulture which is very often found in the wetter part of the district; nearly all kinds of vegetables can be cultivated here. This is quite profitable, because the district is situated within a reasonable distance from Nairobi which also provides jobs and an additional cash income for some smallholders.

KIAMBU DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Kiamba	26 995	28 042	55 037	10 891	55	984
Kiambaa Settled Area	9 677	7 532	17 209	4 686	105	163
Ndumberi	13 574	14 570	28 144	5 241	29	969
Kiambu Township	1 982	1 687	3 669	1 040	1	2 183
Kiambaa Division	52 228	51 831	104 059	21 858	191	542
Ng'enda	25 562	28 600	54 162	9 887	88	615
Kiganjo	18 617	20 053	38 670	7 137	97	394
Chania	15 887	16 643	32 530	5 768	82	396
Ndarugu	12 946	14 063	27 009	4 770	118	227
Gatundu Division	73 012	79 359	152 371	27 562	386	393
Limuru	13 700	13 936	27 636	5 604	58	472
Lari	17 003	17 642	34 645	6 995	190	181
Tigoni	11 152	8 547	19 699	5 938	99	197
Ngecha	6 432	6 915	13 347	2 596	18	718
Ndeiya	7 065	7 821	14 886	2 855	96	153
Limuru Division	55 352	54 861	110 213	23 988	464	237
Ruiru	12 550	9 909	22 459	6 100	134	167
Thika	4 227	3 505	7 732	2 235	91	84
Juja	10 886	8 552	19 438	5 471	257	75
Thika Municipality	23 804	17 520	41 324	11 882	92	447
Thika Division	51 467	39 486	90 953	25 688	575	157
Githunguri	34 206	36 054	70 260	13 207	109	640
Gatamaiyu	11 273	12 180	23 453	4 122	90	257
Komothai	12 610	13 225	25 835	4 625	52	489
Githunguri Division	58 089	61 459	119 548	21 954	253	471
Kabete	15 402	15 466	30 868	5 706	34	893
Kapai	9 081	9 713	18 794	3 481	33	559
Muguga	10 273	10 829	21 102	4 119	29	704
Kinoo	10 521	10 571	21 092	4 190	26	788
Kikuyu	8 941	8 349	17 290	3 755	45	378
Kikuyu Division	54 218	54 928	109 146	21 251	170	639
Kiambu District	344 366	341 924	686 290	142 301	2 448	280

KIAMBU DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 yeara	Other Relatives		
Location:						
Kiambaa	10874	2.94	1.41	0.41	0.31	5.06
Kiambaa Settled Area	4672	2.26	0.66	0.21	0.53	3.67
Ndumberi	5224	3.05	1.50	0.51	0.29	5.35
Kiambu Township	1015	2.03	0.38	0.35	0.44	3.20
Division Kiambaa	21785	2.79	1.20	0.39	0.36	4.74
Location:						
Ng'enda	9858	3.01	1.73	0.52	0.20	5.46
Kiganjo	7117	3.13	1.71	0.42	0.18	5.43
Chania	5757	3.19	1.78	0.50	0.17	5.65
Ndarugu	4791	3.23	1.86	0.35	0.21	5.64
Division Gatundu	27523	3.14	1.77	0.46	0.19	5.52
Location:						
Limuru	5596	2.78	1.29	0.45	0.43	4.94
Lari	6976	2.81	1.49	0.42	0.23	4.96
Tigoni	5930	2.18	0.53	0.20	0.34	3.25
Ngecha	2601	3.01	1.51	0.42	0.23	5.13
Ndeiya	2851	2.87	1.71	0.44	0.22	5.22
Division Limuru	23954	2.68	1.23	0.38	0.30	4.58
Location:						
Ruiru	6141	2.24	0.61	0.34	0.43	3.62
Thika	2230	2.23	0.68	0.30	0.26	3.47
Juja	5473	216	0.69	0.34	0.36	3.55
Thika Municipality	11851	2.03	0.35	0.33	0.65	3.36
Division Thika	25695	2.14	0.50	0.33	0.50	3.47
Location:						
Githunguri	13182	3.04	1.62	0.46	0.20	5.32
Gatamaiyu	4134	3.16	1.83	0.52	0.15	5.67
Komothai	4608	3.20	1.66	0.50	0.25	5.60
Division Githunguri	21924	3.10	1.66	0.48	0.20	5.45
Location:						
Kabete	5736	3.21	1.47	0.52	0.17	5.38
Karai	3480	3.07	1.68	0.54	0.11	5.40
Muguga	4105	2.96	1.47	0.49	0.20	5.11
Kinoo	4242	2.94	1.21	0.56	0.22	4.93
Kikuyu	3737	2.72	1.07	0.51	0.27	4.57
Division Kikuyu	21300	3.00	1.38	0.52	0.19	5.10
DISTIRCT: KIAMBU	142181	2.81	1.27	0.42	0.29	4.80

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per households as well

AND PER
HOUSEHOLD AND PERSON[1)]

Location/Division without townships	Area total Census 79 (in '00 ha = sqkm)	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps	Non-agricultural land: Others (roads, homesteads, rivers...)	Agricultural land	UH 1	UH 2	UH 3	LH 1	LH 2	LH 3	LH 4	LH 5	UM 1	UM 2	UM 3	UM 3–4	UM 4	UM 5	Agric. land per household (in ha)	Agric. land per person (in ha)
						Area in agro-ecological zones AEZ (in '00 ha = sqkm)															
Kiambaa	55			14	41										15	26				0.37	0.07
Kiambaa Settled Area	105			18	87				1						68	18				1.80	0.50
Ndumberi	29			7	22		19	3												0.42	0.08
Kiambaa Division	189			39	150		19	3	1						83	44				0,86	0.22
Ng'enda	88			20	68										66	2				0.70	0.13
Kiganyo	97			20	77				22					26	29					1.00	0.20
Chania	82			16	66				15					29	22					1.11	0.20
Ndarugu	118			20	98				48					50						2.00	0.36
Gatundu Division	386			76	309				85					105	117	2				1.20	0.22
Limuru	58			12	46	5	18			20	3									0.82	0.16
Lari	190	5	172	2	11	5	4			2										0.15	0.03
Tigoni	99			18	81	15				27	10				15	14				1.35	0.41
Ngecha	18			4	14					14										0.54	0.10
Ndeiya[2)]	96	7		12	77					4	30	16	27							2.30	0.45
Limuru Division	461	12	172	48	229	25	22			67	43	16	27		15	14				1.01	0.22
Ruiru	134			22	112										8	22		31	51	1.84	0.50
Thika	91			12	79												15	64		3.50	1.00
Juja	257			33	224										9	69		50	96	4.09	1.15
Thika Division	482			67	415										17	91	15	145	147	3.01	0.84
Githunguri	109			25	84	3			31					4	43	3				0.63	0.12
Gatamaiyu	90			16	74	11			60					3						1.80	0.32
Komothai	52			10	42				5					8	29					0.91	0.16
Githunguri Division	253			51	200	14			96					15	72	3				0.94	0.17
Kabete	34			8	26					6	5					15				0.50	0.09
Karai[2)]	33		3	7	23						22	1								0.60	0.12
Muguga	29		10	7	22					9	7					6				0.50	0.10
Kinoo	26		10	4	12						8					4				0.30	0.06
Kikuyu	45			9	36					10	26									1.00	0.20
Kikuyu Division	167		13	35	119					25	68	1				25				0.58	0.11
Total rural area[2)]	1 935	12	185	316	1 422	39	41	3	182	92	111	17	27	120	304	179	15	145	147	1.13	0.23

1) For official land statistics see supplementary publication to FM-Handbook, Vol. III A: Agriculture Land Statistics
2) Without grazing areas in the West

AGRICULTURAL STATISTICS[1)]

The combination of good soils, suitable climate, well-developed infrastructure and the proximity to the country's main market, Nairobi, makes the Kiambu district the most economic farming region of the country.

Approximately 5,000 ha of **tea** is grown by family farms each cultivating roughly 0.50 ha. The average yield is 3,200 kg of green leaves per ha p.a.; 3,100 ha of tea is grown by large estates; the average yield in these plantations is 8,000 kg/ha of green leaves. Small farmers own 8,300 ha of **coffee**, roughly 0.35 ha per farm, and harvest approximately 770 kg of clean coffee per ha, while the plantation sector owns 16,000 ha of coffee which produces about 1,600 kg/ha. Practically all estates irrigate their crop. About 500 t of **pyrethrum** is produced by smallholders – the pyrethrin content is good at 1.4 %.

1) For more up to date statistics, see FMHB Vol. III/A

TABLE 7a: TEA
AREA – PRODUCTION – GROWERS – YIELDS – RETURNS[a)]

Small Farmers

Division	Item	Unit	Year				
			1975/76	1976/77	1977/78	1978/79	1979/80
Gatundu	Area	ha	2,279	2,444	2,540	2,630	2,730
	Production	t	3,988	5,733	7,592	8,475	7,222
	Value	'000 Shs	6,380	20,810	18,829	23,053	25,710
	Growers	No	4,572	5,078	5,246	5,336	5,435
	Yield per ha	kg	1,750	2,346	2,989	3,222	2,645
	Value per ha	Shs	2,799	8,515	7,685	8,765	9,416
	Area per Grower	ha	0.50	0.48	0.48	0.49	0.50
	Returns per Grower	Shs	1,395	4,098	3,589	4,320	4,730
Githunguri	Area	ha	1,654	1,716	1,770	1,850	1,932
	Production	t	4,041	5,135	6,876	7,773	6,389
	Value	'000 Shs	5,900	16,945	17,535	18,423	18,527
	Growers	No	3,334	3,639	3,757	3,869	3,977
	Yield per ha	kg	2,443	2,992	3,885	4,201	3,307
	Value per ha	Shs	3,567	9,875	9,907	9,861	9,590
	Area per Grower	ha	0.50	0.47	0.47	0.48	0.49
	Returns per Grower	Shs	1,770	4,657	4,667	4,762	4,659
Limuru	Area	ha	116	116	117	127	129
	Production	t	121	148	215	222	1,744
	Value	'000 Shs	176	487	549	527	505
	Growers	No	195	203	206	215	217
	Yield per ha	kg	1,043	1,276	1,839	1,748	13,519
	Value per ha	Shs	1,517	4,198	4,692	4,150	3,915
	Area per Grower	ha	0.59	0.57	0.57	0.59	0.59
	Returns per Grower	Shs	903	2,399	2,665	2,451	2,327

a) Source: KTDA

KIAMBU DISTRICT

TABLE 7b: **COFFEE**
AREA – PRODUCTION – YIELDS[a)]

Co-operatives

Item	Unit	Year					
		74/75	75/76	76/77	77/78	78/79	79/80
Area	ha	6167	6167	6167	6167	6300	8338
Production	t	3011	5384	5037	5911	4850	6432
Yield	kg/ha	488	872	817	958	770	771

Estates

Name	Item	Unit	Year					
			74/75	75/76	76/77	77/78	78/79	79/80
Kiambu	Area	ha	5177	5177	5008	5394	7620	5966
	Production	t	5013	9624	9652	7999	7723	7921
	Yield	kg/ha	968	1859	1927	1483	1014	1328
Kabete	Area	ha	581	581	490	592	560	624
	Production	t	469	576	689	615	497	436
	Yield	kg/ha	807	991	1406	1039	888	699
Ruiru	Area	ha	4680	4680	4665	4695	4800	4765
	Production	t	6858	7970	9068	6939	6236	9171
	Yield	kg/ha	1465	1703	1944	1478	1299	1925
Thika	Area	ha					5320	5107
	Production	t					4856	8724
	Yield	kg/ha					913	1708

KIAMBU DISTRICT

TABLE 7c: **PYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[b)]

Item	Year				
	75/76	76/77	77/78	78/79	79/80
Production in t dried flowers	771	533	681	506	501
Pyrethrin content %	1.4	1.3	1.3	1.4	1.3

Sources: a) C.B.K.
b) Pyrethrum Board

SMALL FARM SURVEY (SFS)[1]

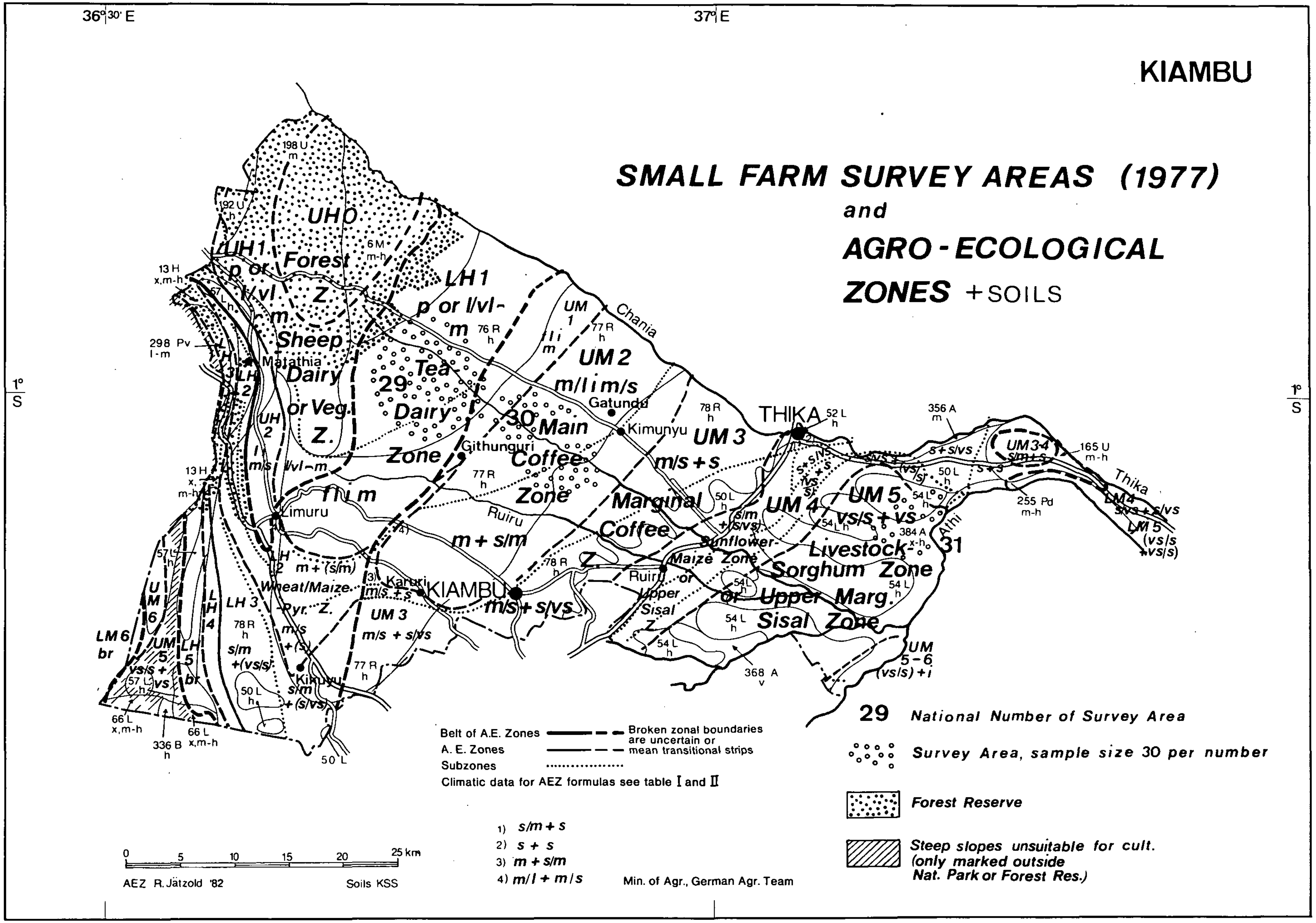
The Small Farm Survey was carried out in the Kamburu (AEZ LH 1 (–UM 1)), Kiamwangi (AEZ UM (1–) 2) and the Kilima-Mbogo (AEZ UM 4–5), regions. Farming in AEZ UM 4–5 is hampered by the unsuitable climate and also by infertile soils, and therefore only economic in small pockets which enjoy somewhat better natural conditions. The comments below refer exclusively to AEZ LH 1 and UM 1–2.

The farmers own 3 ha of land,[2] of which roughly one-third is used for annual crops, one-third planted with perennials, and one-third used for grazing and forage production. The arable land is cropped intensively, 1.4 (LH 1) and 1.7 times (UM 1–2) per year. The stocking rate, with approximately 6 LU/ha, is extremely high, but it should be noted that zero grazing and purchasing of animal feed is very common. Roughly 70 % of all cattle are dairy stock. The high amounts of fertilizers applied indicate that farmers are well informed on crop husbandry and that its use is economic (Table 8 & 9). The staple food, maize & beans, is planted on roughly 55 % of the annual crop area, while a number of different vegetables and fruit are planted on the remaining area in particular during the second rains (Table 10). The proportion of sheep and goats still accounts for roughly 20 % of the total LU, which is mainly a result of the good markets for small stock in the region (Table 11). The yields harvested from annual crops are comparatively low, despite the widespread use of fertilizer, which indicates the decline of natural soil fertility in intensively cropped lands (Table 12). All crops are sold on the local market with the exception of maize and beans which are consumed by the farmer's family (Table 13). Although there may be some increased labour demand during planting time, there are no pronounced overall labour peaks on these farm types. From the widespread planting times for maize for example, one might conclude that the rainfall pattern permits such unusual practices, but also that annual food crops are regarded as being of lesser importance than cash crops, thus they are planted when time permits (graph 14). The production potential for annual food crops like maize is fairly limited, but large for vegetables, root and perennial crops (Table 15).

The farmers of the Kiambu district enjoy a greater competitive advantage over most farming regions of Kenya. It is most important to arrest the quickly declining soil fertility by increasing the use of organic manure, compost, etc. Intensive mixed farming practising zero grazing and expanding the horticultural crop area will continue to secure a good income for the farmer in future. There is need for specialist extension advice in horticulture and plant protection.

1) For more detailed information, see FMHB Vol. III/B, farm models

2) The holding sizes do not reflect population/land ratio, but much of the population has some kind of non-agricultural occupation. See also table 6 for holding sizes.


KIAMBU
SMALL FARM SURVEY AREAS (1977)
and
AGRO-ECOLOGICAL
ZONES +SOILS
36°30' E
37° E
1° S
THIKA
KIAMBU
Limuru
Gatundu
Kimunyu
Githunguri
Matathia
Karuri
Kikuyu
Ruiru
Chania
Thika
Athi
UHO Forest Z.
LH 1 p or l/vl-m Sheep Dairy or Veg. Z.
LH 1 p or l/vl-m
29 Tea Dairy Zone
30 Main Coffee Zone
UM 2 m/l i m/s
UM 3 m/s + s
Marginal Coffee Z.
UM 4 Sunflower-Maize Zone
Ruiru or Upper Sisal Z.
UM 5 vs/s + vs Livestock-Sorghum Zone or Upper Marg. Sisal Zone
31
LH 2 m + (s/m) Wheat/Maize-Pyr. Z.
UM 3 m/s + s/vs
m/s + s/vs
m + s/m
LM 6 br
29 National Number of Survey Area
Survey Area, sample size 30 per number
Forest Reserve
Steep slopes unsuitable for cult. (only marked outside Nat. Park or Forest Res.)
Belt of A.E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
1) s/m + s
2) s + s
3) m + s/m
4) m/l + m/s
0 5 10 15 20 25 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team

AEZ: LH1 (– UM1)

TABLE 8a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 29

Item	Unit	Farm Size & Land Use, Livestock on Farm, Farm Size Group: small	medium	large
Farm Size Total	ha	1.4	2.8	6.0
Land Use: Annual Crops[1)] First Season			0.1	
Maize	ha	0.2	0.4	0.6
Maize & Beans	ha	0.2	0.1	0.3
Beans	ha	0.1	-	-
English Potatoes	ha	-	0.1	-
Others	ha	-	-	0.3
Total	ha	0.5	0.7	1.2
Second Season[1)]				
Maize	ha	0.2	0.2	0.1
Maize & Beans	ha	0.1	0.1	-
Beans	ha	0.1	0.1	-
Others	ha	-	0.1	0.3
Total	ha	0.4	0.5	0.4
Permanent Crops[1)]				
Pyrethrum	ha	0.1	0.3	0.4
Tea	ha	0.2	0.3	0.5
Coffee	ha	0.1	0.4	0.1
	ha			
Portion of total	%	29 %	36 %	22 %
Grazing & Forage	ha	0.4	0.9	1.3
portion of total	%	29 %	32 %	22 %
Other Land Use	ha	0.1	0.2	2.2
Livestock on Farm:				
Cattle: local	LU	1.7	-	-
improved	LU	2.6	2.8	4.2
Sheep & Goats	LU	1.1	0.4	0.9
Total	LU	5.4	3.2	5.1

Item	Unit	Intensity, Labour/Persons on Farm, Home Consumption, Farm Size Group: small	medium	large
Farming Intensity:				
Cropping Intensity	-	0.9	0.8	0.5
Portion of improved cattle kept	%	60 %	100 %	100 %
Portion of Farmers owning a Plough	%	-	-	-
Labour on Farm:				
Family Adults	persons	2.3	3.1	3.0
Perm. Hired Labour	"	0.2	0.2	-
Children > 14 years	"	2.6	1.0	3.0
Persons living on Farm[2)] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	1.88	0.24	2.12
Children < 14 years	"	2.99	-	2.99
Subsistence Units	SU	3.67	0.24	3.91
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1029	1990	
Beans	kg	129	246	
English Potatoes	kg	292	114	
Cabbage	kg	103	12	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Maize & Sorghum, Cabbage, Tomatoes, Sweet Potatoes,

1) Major crops only considered

2) Based on 1979 Census figures

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group small	medium	large
Farm Size Total	ha	o.9	2.o	6.5
Land Use: Annual Crops[1] First Season				o.1
Maize	ha	o.2	o.3	1.1
Beans	ha	o.1	o.1	o.2
Maize & Beans	ha	o.1	o.2	-
English Potatoes	ha	-	o.1	o.2
Others	ha	-	-	o.3
Total	ha	o.4	o.7	1.9
Second Season[1]				
Maize	ha	o.1	o.2	o.4
English Potatoes	ha	o.1	o.2	o.4
Maize & Beans	ha	o.1	o.1	o.5
Others	ha	-	o.1	o.4
Total	ha	o.3	o.6	1.7
Permanent Crops[1]				
Coffee	ha	o.3	o.7	1.1
Tea	ha	o.1	-	o.1
Bananas	ha	-	o.1	-
Passion Fruit	ha	-	-	o.1
Portion of total	%	44 %	4o %	2o %
Grazing & Forage	ha	o.1	o.3	1.5
portion of total	%	11 %	15 %	13 %
Other Land Use	ha	-	o.2	1.8
Livestock on Farm:				
Cattle: local	LU	o.1	-	-
improved	LU	1.3	1.7	2.6
Sheep & Goats	LU	o.4	o.4	o.7
Total	LU	1.8	2.1	3.3

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group small	medium	large
Farming Intensity:				
Cropping Intensity	-	1.2	1.1	o.8
Portion of improved cattle kept	%	93 %	-	-
Portion of Farmers owning a Plough	%	-	-	-
Labour on Farm:				
Family Adults	persons	2.o	3.1	1.9
Perm. Hired Labour	"	-	o.1	o.7
Children > 14 years	"	1.5	2.9	3.6
Persons living on Farm[2] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.o3	o.33	2.36
Children < 14 years	"	2.94	-	2.94
Subsistence Units	SU	3.79	o.33	4.12
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1115	2157	
Beans	kg	126	24o	
English Potatoes	kg	485	189	
Cabbage	kg	12	1	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Cabbage, Sweet Potatoes, Groundnuts, Sugarcane, Macadamia nuts

1) Major crops only considered
2) Based on 1979 Census figures

AEZ: UM 4–5

TABLE 8c: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 31

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group small	medium	large
Farm Size Total	ha	1.9	3.7	6.0
Land Use: Annual Crops 1) First Season			0.1	
Maize	ha	0.5	0.3	-
Maize & Beans	ha	0.1	0.5	0.6
Tobacco	ha	0.2	-	1.3
Beans	ha	-	0.2	-
Others	ha	-	0.1	0.5
Total	ha	0.8	1.2	2.4
Second Season 1)				
Maize	ha	0.4	0.1	0.7
Maize & Beans	ha	0.1	0.3	1.6
English Potatoes	ha	0.1	-	0.1
Others	ha	-	0.1	-
Total	ha	0.6	0.5	2.4
Permanent Crops 1)				
	ha			
	ha			
	ha			
	ha			
Portion of total	%			
Grazing & Forage	ha	0.7	2.0	2.1
portion of total	%	37 %	54 %	35 %
Other Land Use	ha	0.4	0.5	0.5
Livestock on Farm:				
Cattle: local	LU	0.4	1.1	0.4
improved	LU	0.6	0.1	1.2
Sheep & Goats	LU	0.5	0.9	1.0
Total	LU	1.5	2.1	2.6

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group small	medium	large
Farming Intensity:				
Cropping Intensity	-	0.7	0.5	0.8
Portion of improved cattle kept	%	60 %	8 %	75 %
Portion of Farmers owning a Plough	%	-	10 %	-
Labour on Farm:				
Family Adults	persons	1.9	2.1	1.3
Perm. Hired Labour	"	0.1	-	-
Children > 14 years	"	0.8	1.1	4.3
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.27	0.34	2.61
Children < 14 years	"	2.70	-	2.70
Subsistence Units	SU	3.89	0.34	4.23
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	993	1921	
Beans	kg	195	372	
English Potatoes	kg	268	105	
Cabbage	kg	18	2	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Sweet Potatoes, Pigeon Peas, Cabbage, Tomatoes, Bananas, Cotton

1) Major crops only considered

2) Based on 1979 Census figures

KIAMBU DISTRICT

TABLE 9a: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: LH 1 (– UM 1)

Survey Area 29

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	2.9	14.8	0.8	2.8	0.1	2.0
Avg. 1	2.9	15.3	1.7	3.0	1.0	3.5
Up. Qu.	3.6	13.0	1.0	3.0	-	3.0
Lo. Qu.	1.8	5.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	0.7	22	1.3	42	0.5	17	0.2	7	0.1	5	0.2	8
Avg. 1	0.7	18	1.4	35	0.7	18	0.4	11	0.5	12	0.3	7
Up. Qu.	0.8	37	0.9	34	0.8	25	0.4	15	0.1	4	0.4	13
Lo. Qu.	0.4	17	0.3	15	0.1	6	-	-	-	-	0.1	6
Total	20.6		39.8		16.2		7.1		4.4		7.2	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate Farm Land LU/ha	Stocking Rate Pasture & Forage LU/ha	Improved Cattle % of total
Avg. 0	1.4	1.5	5.6	68.2
Avg. 1			5.6	72.2
Up. Qu.	2.0	1.5	7.7	88.2
Lo. Qu.	1.0	0.7	2.3	37.0

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	42.8	7.6	8.6	19.5	4.7	-	0.4	-	-	0.3	-	0.1	0.9
Avg. 1	52.1	12.2	13.5	25.3	8.1	-	1.8	0.4	0.9	1.0	1.1	0.4	4.6
Up. Qu.	83.3	11.7	16.3	24.0	9.1	-	-	-	-	0.6	-	-	-
Lo. Qu.	-	-	-	1.9	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

KIAMBU DISTRICT

TABLE 9b: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: UM (1–) 2 — Survey Area 30

Range	Assets: Land ha	Assets: Livestock head	Assets: Equipment pieces	People on Farm: Family Adults	People on Farm: Perm.Hrd. Labourers	People on Farm: Children > 14 No.
Avg. 0	2.6	6.6	0.6	2.2	0.2	2.1
Avg. 1	2.6	7.2	1.2	2.4	1.7	3.2
Up. Qu.	2.4	10.0	1.0	3.0	-	4.0
Lo. Qu.	0.8	3.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	0.8	41	0.6	31	0.2	12	0.1	5	0.1	3	0.2	9
Avg. 1	0.8	30	0.7	24	0.6	22	0.3	9	0.2	7	0.2	8
Up. Qu.	1.0	50	0.8	48	0.2	9	0.2	6	0.1	3	0.2	11
Lo. Qu.	0.3	24	0.3	22	-	-	-	-	-	-	-	4
Total	23.7		17.7		6.8		2.8		1.5		5.3	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate: Farm Land LU/ha	Stocking Rate: Pasture & Forage LU/ha	Improved Cattle % of total
Avg. 0	1.7	0.9	6.6	76.5
Avg. 1			3.9	79.3
Up. Qu.	2.0	2.4	2.6	93.8
Lo. Qu.	1.4	0.5	-	62.5

Inputs Applied

Range	Improved Seed Used % of area AC	Fertilizer Applied pure nutrient kg/ha: N AC	N PC	P_2O_5 AC	P_2O_5 PC	K_2O AC	K_2O PC	Manure Applied t/ha AC	Manure PC	Plant Protection: Insecticide kg/ha AC	Insecticide PC	Fungicide kg/ha AC	Fungicide PC
Avg. 0	42.0	18.1	15.2	45.0	4.2	-	-	-	-	1.8	1.1	0.9	4.2
Avg. 1	55.3	18.3	15.7	48.2	14.5	-	-	-	0.1	2.7	10.7	2.0	5.9
Up. Qu.	25.0	27.6	39.0	70.5	8.7	-	-	-	-	4.1	-	2.2	9.2
Lo. Qu.	-	7.0	6.5	14.0	-	-	-	-	-	0.1	-	-	0.8

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

KIAMBU DISTRICT

TABLE 9c: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: UM 4–5

Survey Area 31

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	3.2	9.2	0.1	1.9	-	1.3
Avg. 1	3.2	10.6	1.5	1.9	1.0	2.6
Up. Qu.	4.0	14.0	-	2.0	-	3.0
Lo. Qu.	2.0	2.0	-	1.0	-	-

Land Use

Range	Annual ha	Crops %	Perm. ha	Crops %	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	1.2	38	-	-	1.4	45	-	1	0.2	7	0.3	9
Avg. 1	1.2	25	0.4	8	1.8	37	0.3	7	0.7	15	0.3	7
Up. Qu.	1.7	60	-	-	2.3	62	-	-	0.2	9	0.3	15
Lo. Qu.	0.7	20	-	-	0.2	14	-	-	-	-	0.1	2
Total	35.7		0.4		42.8		1.0		6.4		8.6	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.4	0.6	1.2	17.2
Avg. 1			1.1	76.1
Up. Qu.	2.0	0.8	1.8	-
Lo. Qu.	1.0	0.1	0.2	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	46.1	3.0	-	2.3	-	0.4	-	-	-	0.7	-	-	-
Avg. 1	50.2	13.7	-	6.8	-	10.6	-	-	-	1.7	-	0.3	-
Up. Qu.	76.2	0.9	-	2.3	-	-	-	-	-	0.7	-	-	-
Lo. Qu.	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms

Avg. 1 = average of all farms excluding zero entries

Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm, 50 % of all sample cases lie between these points

AC = Annual Crops

PC = Perennial Crops

KIAMBU DISTRICT

TABLE 10a: **CROPPING PATTERN**

AEZ: LH 1 (– UM 1)

Survey Area 29

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.4	0.6	0.60	0.00	10.7	36.3
Maize IPC	0.0	0.1	0.00	0.00	0.1	0.4
Beans	0.0	0.2	0.00	0.00	0.8	2.8
Engl. Potatoes	0.1	0.2	0.12	0.00	1.9	6.5
Cabbage	0.0	0.2	0.00	0.00	0.8	2.6
Tomatoes	0.0	0.2	0.00	0.00	0.6	1.9
Pyrethrum	0.2	0.3	0.28	0.00	5.6	19.1
Passionfruit	0.1	0.8	0.00	0.00	2.5	8.5
Maize & Sorgm	0.0	0.0	0.00	0.00	0.0	0.1
Maize & Beans	0.2	0.5	0.40	0.00	5.6	18.8
Maize & Others	0.0	0.3	0.00	0.00	0.9	3.0
Total					29.6	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.2	0.4	0.28	0.00	4.6	21.7
Beans	0.1	0.3	0.12	0.00	2.4	11.3
Engl. Potatoes	0.1	0.4	0.12	0.00	2.6	12.3
Cabbage	0.0	0.1	0.00	0.00	0.6	2.6
Tomatoes	0.0	0.1	0.00	0.00	0.2	1.1
Sweet Potatoes	0.0	0.4	0.00	0.00	0.4	1.9
Pyrethrum	0.2	0.3	0.28	0.00	5.6	26.7
Passionfruit	0.1	0.8	0.00	0.00	2.5	11.9
Others	0.0	0.4	0.00	0.00	0.4	1.9
Maize & Beans	0.0	0.2	0.00	0.00	1.3	6.2
Maize & Others	0.0	0.2	0.00	0.00	0.5	2.3
Total					21.2	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.1	0.00	0.00	0.1	1.0
Coffee	0.1	0.5	0.28	0.00	4.3	36.9
Tea	0.2	0.5	0.44	0.00	7.2	62.1
Total					11.6	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo.Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

KIAMBU DISTRICT

TABLE 10b: **CROPPING PATTERN**

AEZ: UM (1–) 2

Survey Area 30

First Rains
Annual & Semipermanent Crops

Crop	Average 0	Average 1	Upper Quartile	Lower Quartile	Total Sample Area	
	ha	ha	ha	ha	ha	%
Maize	0.4	0.6	0.40	0.00	11.5	46.1
Maize IPC	0.0	0.5	0.00	0.00	1.1	4.3
Beans	0.1	0.2	0.12	0.00	2.4	9.6
Groundnuts IPC	0.0	0.2	0.00	0.00	0.2	0.8
Engl. Potatoes	0.1	0.3	0.04	0.00	2.3	9.2
Cabbage	0.0	0.2	0.00	0.00	0.6	2.3
Tomatoes	0.0	0.6	0.00	0.00	0.6	2.6
Sweet Potatoes	0.0	0.1	0.00	0.00	0.2	1.0
Sugarcane	0.0	0.1	0.00	0.00	0.1	0.5
Passionfruit	0.0	0.6	0.00	0.00	0.6	2.4
Others	0.0	0.8	0.00	0.00	0.8	3.2
Maize & Beans	0.1	0.3	0.00	0.00	2.4	9.5
Maize & Others	0.1	0.4	0.00	0.00	2.1	8.5
Total					24.9	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0	Average 1	Upper Quartile	Lower Quartile	Total Sample Area	
	ha	ha	ha	ha	ha	%
Maize	0.1	0.3	0.20	0.00	4.0	24.2
Maize IPC	0.0	0.3	0.00	0.00	0.7	4.1
Beans	0.1	0.2	0.00	0.00	1.7	10.4
Beans IPC	0.0	0.8	0.00	0.00	0.8	4.8
Engl. Potatoes	0.2	0.3	0.20	0.00	4.4	26.3
Cabbage	0.0	0.3	0.00	0.00	0.6	3.4
Sugarcane	0.0	0.1	0.00	0.00	0.1	0.7
Passionfruit	0.0	0.6	0.00	0.00	0.6	3.6
Maize & Beans	0.1	0.5	0.00	0.00	3.7	22.5
Total					16.6	100.0

Permanent Crops

Crop	Average 0	Average 1	Upper Quartile	Lower Quartile	Total Sample Area	
	ha	ha	ha	ha	ha	%
Cookng Bananas	0.0	0.3	0.00	0.00	0.8	4.3
Coffee	0.6	0.7	0.80	0.00	15.9	86.3
Macademia Nuts	0.0	0.1	0.00	0.00	0.1	0.7
Tea	0.1	0.5	0.00	0.00	1.6	8.7
Total					18.4	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo.Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

KIAMBU DISTRICT

TABLE 10c: **CROPPING PATTERN**

AEZ: UM 4–5

Survey Area 31

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.4	0.6	0.68	0.00	11.5	35.3
Beans	0.1	0.7	0.00	0.00	2.1	6.5
Pigeonpeas	0.0	0.1	0.00	0.00	0.1	0.2
Engl. Potatoes	0.0	0.3	0.00	0.00	1.0	3.1
Cabbage	0.0	0.1	0.00	0.00	0.1	0.4
Cotton	0.0	0.3	0.00	0.00	0.8	2.5
Tobacco	0.1	0.4	0.00	0.00	2.6	8.0
Sweet Potatoes	0.0	0.1	0.00	0.00	0.1	0.4
Others	0.0	0.3	0.00	0.00	0.3	0.9
Maize & Beans	0.4	1.0	0.80	0.00	12.3	37.9
Maize & Others	0.0	1.2	0.00	0.00	1.2	3.7
Maize int.oth.	0.0	0.4	0.00	0.00	0.4	1.2
Total					32.5	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.3	0.6	0.60	0.00	8.8	39.9
Beans	0.0	0.6	0.00	0.00	1.1	5.1
Engl. Potatoes	0.0	0.4	0.00	0.00	1.1	4.9
Tomatoes	0.0	0.1	0.00	0.00	0.1	0.5
Cotton	0.0	0.1	0.00	0.00	0.1	0.5
Others	0.0	0.5	0.00	0.00	0.5	2.4
Maize & Beans	0.3	0.9	0.80	0.00	10.3	46.7
Total					22.1	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.4	0.00	0.00	0.4	100.0
Total					0.4	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo.Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

TABLE 11a: **HERD COMPOSITION (GRAZING LIVESTOCK)**
– in Head & Livestock Units –

AEZ: LH 1 (–UM 1)

Aug. '77, Survey Area 29

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.87	0.03	-	0.37				0.32			0.32
	Upper Qu.	1	-	-	-				0.3			0.3
1 - 2 years,	Average	0.13	0.03	-	0.73				0.45			0.45
	Upper Qu.	-	-	-	1				0.5			0.5
Over 2 years,	Average	0.43	-	-		1.87			2.21			2.21
	Upper Qu.	-	-	-		3			3.0			3.0
Subtotal(improved)	Total	43	2	-	33	56			89.4			89.4
	Average	1.43	0.07	-	1.10	1.87			2.98			2.98
	Upper Qu.	1	-	-	2	3			3.3			-
	Lower Qu.	-	-	-	-	-			0.5			-
LU Male Cattle	=	22.0 % of total cattle,				Calves + Heifers	=		58.9 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	2.37	-	-	0.07		2.57	0.77	0.82	-		0.82
	Upper Qu.	-	-	-	-		2	-	0.2	-		0.2
1 - 2 years,	Average	-	-	-	0.10				0.05			0.05
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	-	-	-		0.13	3.17	1.20	0.52	-	17.20	0.52
	Upper Qu.	-	-	-		-	4	2	0.1	-	3	0.1
Subtotal (unimp.)	Total	71	-	-	5	4	172	59	41.7	-	516	41.7
	Average	2.37	-	-	0.17	0.13	5.73	1.97	1.39	-	17.20	1.39
	Upper Qu.	-	-	-	-	-	6	2	0.9	-	10	0.9
	Lower Qu.	-	-	-	-	-	2	-	0.2	-	3	0.2
LU Male Cattle	=	76.5 % of total cattle,				Calves + Heifers	=		125.0 % of dairy cows			
LU Goats + Sheep	=	55.5 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	114	2	-	38	60	172	59	131.1	-	516	131.1
	Average	3.80	0.07	-	1.27	2.00	5.73	1.97	4.37	-	17.20	4.37
	Upper Qu.	1	-	-	2	3	6	2	4.7	-	10	0.9
	Lower Qu.	-	-	-	-	-	2	-	0.9	-	3	0.2
LU Male Cattle	=	31.4 % of total cattle,				Calves + Heifers	=		63.3 % of dairy cows			
LU Goats + Sheep	=	17.6 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11b: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: UM (1–)2

Aug. '77, Survey Area 30

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.18	-	-	0.25				0.11			0.11
Upper Qu.	-	-	-	-				-			-
1 - 2 years, Average	0.18	-	-	0.32				0.25			0.25
Upper Qu.	-	-	-	1				0.5			0.5
Over 2 years, Average	0.07	-	-		1.32			1.38			1.38
Upper Qu.	-	-	-		2			2.0			2.0
Subtotal(improved) Total	12	-	-	16	37			48.6			48.6
Average	0.43	-	-	0.57	1.32			1.74			1.74
Upper Qu.	1	-	-	1	2			2.0			-
Lower Qu.	-	-	-	-	-			0.5			-
LU Male Cattle =	11.0 % of total cattle,				Calves + Heifers =			43.2 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	-	-	-	-		1.07	0.43	0.15	-		0.15
Upper Qu.	-	-	-	-		2	1	0.3	-		0.3
1 - 2 years, Average	-	-	-	-				-			-
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	-	-	-		0.07	1.86	1.50	0.38	-	7.46	0.38
Upper Qu.	-	-	-		-	3	3	-	-	2	-
Subtotal (unimp.) Total	-	-	-	-	2	82	54	14.9	-	209	14.9
Average	-	-	-	-	0.07	2.93	1.93	0.53	-	7.46	0.53
Upper Qu.	-	-	-	-	-	3	3	0.8	-	10	0.8
Lower Qu.	-	-	-	-	-	-	-	0.1	-	2	0.1
LU Male Cattle =	0.0 % of total cattle,				Calves + Heifers =			0.0 % of dairy cows			
LU Goats + Sheep =	91.3 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	12	-	-	16	39	82	54	63.5	-	209	63.5
Average	0.43	-	-	0.57	1.39	2.93	1.93	2.27	-	7.46	2.27
Upper Qu.	1	-	-	1	2	3	3	2.3	-	10	0.8
Lower Qu.	-	-	-	-	-	-	-	1.1	-	1	0.1
LU Male Cattle =	10.7 % of total cattle,				Calves + Heifers =			41.0 % of dairy cows			
LU Goats + Sheep =	21.4 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11c: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: UM 4–5

Aug. '77, Survey Area 31

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.03	-	-	0.07				0.02			0.02
Upper Qu.	-	-	-	-				-			-
1 - 2 years, Average	0.10	-	-	-				0.05			0.05
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	-	-	-		0.23			0.23			0.23
Upper Qu.	-	-	-		-			-			-
Subtotal(improved) Total	4	-	-	2	7			9.3			9.3
Average	0.13	-	-	0.07	0.23			0.31			0.31
Upper Qu.	-	-	-	-	-			-			-
Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =	18.9 % of total cattle,				Calves + Heifers =			28.6 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	0.17	-	-	0.20		1.10	1.47	0.33	-		0.33
Upper Qu.	-	-	-	-		2	3	0.5	-		0.5
1 - 2 years, Average	0.07	-	-	0.27				0.15			0.15
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	0.03	0.03	-		0.77	2.03	2.63	1.01	-	10.17	1.01
Upper Qu.	-	-	-		1	2	3	-	-	3	-
Subtotal (unimp.) Total	8	1	-	14	23	94	123	44.7	-	305	44.7
Average	0.27	0.03	-	0.47	0.77	3.13	4.10	1.49	-	10.17	1.49
Upper Qu.	-	-	-	-	1	4	5	1.8	-	14	1.8
Lower Qu.	-	-	-	-	-	-	-	0.3	-	3	0.3
LU Male Cattle =	13.9 % of total cattle,				Calves + Heifers =			60.9 % of dairy cows			
LU Goats + Sheep =	48.6 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	12	1	-	16	30	94	123	53.9	-	305	53.9
Average	0.40	0.03	-	0.53	1.00	3.13	4.10	1.80	-	10.17	1.80
Upper Qu.	1	-	-	1	1	4	5	2.0	-	14	1.8
Lower Qu.	-	-	-	-	-	-	-	0.3	-	3	0.3
LU Male Cattle =	15.4 % of total cattle,				Calves + Heifers =			53.3 % of dairy cows			
LU Goats + Sheep =	40.3 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

KIAMBU DISTRICT

TABLE 12a: **INPUTS & YIELDS OF MAJOR CASH CROPS**

AEZ: LH 1 (– UM 1) Survey Area 29

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	71	11	33	-	0.03	1	-	2,596
	UpQu	100	18	46	-	-	-	-	2,250
	LoQu	-	-	-	-	-	-	-	1,038
Engl. Potatoes	Avg.	10	16	42	-	0.08	-	-	3,327
	UpQu	-	23	58	-	-	-	-	3,200
	LoQu	-	-	-	-	-	-	-	567
Maize & Beans									
Maize	Avg.	55	3	21	-	-	-	-	1,318
Beans	Avg.	9	-	2	-	-	-	-	315
Maize	UpQu	100	-	48	-	-	-	-	2,250
Beans	UpQu	-	-	7	-	-	-	-	563
Maize	LoQu	-	-	-	-	-	-	-	400
Beans	LoQu	-	-	-	-	-	-	-	83
Second Rains									
Maize	Avg.	50	73	192	-	0.31	4	4	1,460
	UpQu	100	23	82	-	-	7	7	1,875
	LoQu	-	-	-	-	-	-	-	643
Engl. Potatoes	Avg.	17	15	30	-	-	3	16	2,535
	UpQu	-	15	38	-	-	-	5	2,727
	LoQu	-	-	-	-	-	-	-	917
Cabbage	Avg.	67	3	6	-	-	2	2	3,389
Perennial Crops									
Pyrethrum	Avg.	-	-	22	-	-	-	-	877
	UpQu	-	-	23	-	-	-	-	900
	LoQu	-	-	-	-	-	-	-	357
Passionfruit	Avg.	-	11	-	-	-	-	3	1,750
Coffee	Avg.	-	88	68	-	0.63	-	20	5,080
	UpQu	-	150	82	-	-	-	13	5,662
	LoQu	-	-	-	-	-	-	-	-
Tea	Avg.	-	57	17	4	-	-	-	5,449
	UpQu	-	98	26	-	-	-	-	5,050
	LoQu	-	-	-	-	-	-	-	2,500

KIAMBU DISTRICT

TABLE 12b: **INPUTS & YIELDS OF MAJOR CASH CROPS**

AEZ: UM (1–) 2

Survey Area 30

Crop		Inputs							Yield
		Improved Seed	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	74	30	57	-	-	3	-	1,680
	UpQu	100	45	82	-	-	4	-	2,667
	LoQu	-	11	23	-	-	-	-	900
Beans	Avg.	33	41	106	-	-	-	-	1,290
	UpQu	100	75	192	-	-	-	-	2,000
	LoQu	-	6	15	-	-	-	-	500
Engl. Potatoes	Avg.	20	62	158	-	-	-	21	5,012
	UpQu	-	90	230	-	-	-	10	7,500
	LoQu	-	30	77	-	-	-	-	2,313
Cabbage	Avg.	100	-	240	-	-	3	-	13,363
Tomatoes	Avg.	-	-	-	-	-	1	-	12,344
Sweet Potatoes	Avg.	-	-	-	-	-	-	-	2,500
Maize & Beans									
Maize	Avg.	20	20	50	-	-	6	-	1,310
Beans	Avg.	20	8	20	-	-	2	-	737
Maize	UpQu	-	26	66	-	-	7	-	1,286
Beans	UpQu	-	8	20	-	-	-	-	604
Maize	LoQu	-	-	-	-	-	1	-	571
Beans	LoQu	-	-	-	-	-	-	-	107
Second Rains									
Maize	Avg.	56	25	64	-	-	11	11	3,282
	UpQu	100	32	82	-	-	10	10	2,667
	LoQu	-	14	35	-	-	3	3	1,125
Beans	Avg.	25	41	104	-	-	-	-	1,031
	UpQu	-	45	115	-	-	-	-	1,400
	LoQu	-	18	46	-	-	-	-	450
Engl. Potatoes	Avg.	6	57	146	-	-	7	34	4,138
	UpQu	-	68	173	-	-	-	50	5,000
	LoQu	-	23	58	-	-	-	7	2,500
Perennial Crops									
Cookng Bananas	Avg.	-	-	-	-	0.24	-	-	7,145
	UpQu	-	-	-	-	-	-	-	5,000
	LoQu	-	-	-	-	-	-	-	-
Coffee	Avg.	-	63	24	-	-	6	27	9,211
	UpQu	-	93	50	-	-	3	25	11,364
	LoQu	-	33	-	-	-	-	5	5,500

KIAMBU DISTRICT

TABLE 12c: **INPUTS & YIELDS OF MAJOR CASH CROPS**

AEZ: UM 4–5

Survey Area 31

Crop		Inputs							Yield
		Imp-roved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fung-icide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	63	5	3	1	-	1	-	846
	UpQu	100	-	-	-	-	-	-	1,350
	LoQu	-	-	-	-	-	-	-	300
Beans	Avg.	-	-	1	-	-	-	-	421
	UpQu	-	-	-	-	-	-	-	600
	LoQu	-	-	-	-	-	-	-	-
Pigeon Peas	Avg.	-	-	-	-	-	-	-	500
Engl. Potatoes	Avg.	33	8	19	-	-	3	-	4,000
Maize & Beans									
Maize	Avg.	69	2	7	-	-	-	-	713
Beans	Avg.	6	-	-	-	-	-	-	321
Maize	UpQu	100	6	15	-	-	-	-	900
Beans	UpQu	-	-	-	-	-	-	-	467
Maize	LoQu	-	-	-	-	-	-	-	441
Beans	LoQu	-	-	-	-	-	-	-	200
Second Rains									
Maize	Avg.	67	4	7	1	-	2	2	588
	UpQu	100	-	4	-	-	-	-	964
	LoQu	-	-	-	-	-	-	-	150
Cotton	Avg.	100	-	-	-	-	7	7	476
	UpQu	100	-	-	-	-	6	6	300
	LoQu	100	-	-	-	-	-	-	-
Maize & Beans									
Maize	Avg.	55	-	1	-	-	-	-	468
Beans	Avg.	18	-	-	-	-	-	-	193
Maize	UpQu	100	-	-	-	-	-	-	583
Beans	UpQu	-	-	-	-	-	-	-	300
Maize	LoQu	-	-	-	-	-	-	-	225
Beans	LoQu	-	-	-	-	-	-	-	80
Perennial Crops									
Cookng Bananas	Avg.	-	-	-	-	-	-	-	2,500

KIAMBU DISTRICT

TABLE 13a: **DISPOSAL OF CROPS**

AEZ: LH 1 (– UM 1)

Survey Area 29

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	20,880	0	0	3,210	15	17,670	85
Maize & Beans	7,605	0	0	1,250	16	6,355	84
Maize & Others	1,920	0	0	820	43	1,100	57
Maize int.oth.	160	0	0	0	0	160	100
Beans	1,570	0	0	480	31	1,090	69
Engl. Potatoes	8,170	0	0	3,340	41	4,830	59
Cabbage	8,000	0	0	5,330	67	2,670	33
Tomatoes	8,000	0	0	8,000	100	0	0
Second Rains							
Maize	6,265	0	0	1,260	20	5,005	80
Maize & Beans	2,685	0	0	830	31	1,855	69
Maize & Others	890	0	0	120	13	770	87
Beans	1,525	0	0	400	26	1,125	74
Engl. Potatoes	6,380	0	0	2,440	38	3,940	62
Cabbage	2,070	0	0	1,640	79	430	21
Tomatoes	10,750	0	0	10,550	98	200	2
		Permanent Crops					
Passionfruit	800	800	100	0	0	0	0

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TABLE 13b: **DISPOSAL OF CROPS**

AEZ: UM (1–) 2

Survey Area 30

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	20,940	1,600	8	10,530	50	8,810	42
Maize & Beans	3,315	0	0	340	10	2,975	90
Maize & Others	13,630	0	0	8,440	62	5,190	38
Maize IPC	540	0	0	180	33	360	67
Beans	1,625	0	0	160	10	1,465	90
Engl. Potatoes	11,260	0	0	12,380	110	-1,120	-10
Sweet Potatoes	200	80	40	100	50	20	10
Cabbage	3,850	0	0	3,500	91	350	9
Tomatoes	4,600	0	0	4,600	100	0	0
Second Rains							
Maize	16,470	0	0	970	6	15,500	94
Maize & Beans	3,947	0	0	1,660	42	2,287	58
Maize & Others	320	0	0	0	0	320	100
Maize IPC	250	0	0	90	36	160	64
Beans	1,410	0	0	200	14	1,210	86
Beans IPC	60	0	0	0	0	60	100
Engl. Potatoes	17,820	0	0	96,080	539	-78,260	-439
		Permanent Crops					
Nil							

KIAMBU DISTRICT

TABLE 13c: **DISPOSAL OF CROPS**

AEZ: UM 4–5

Survey Area 31

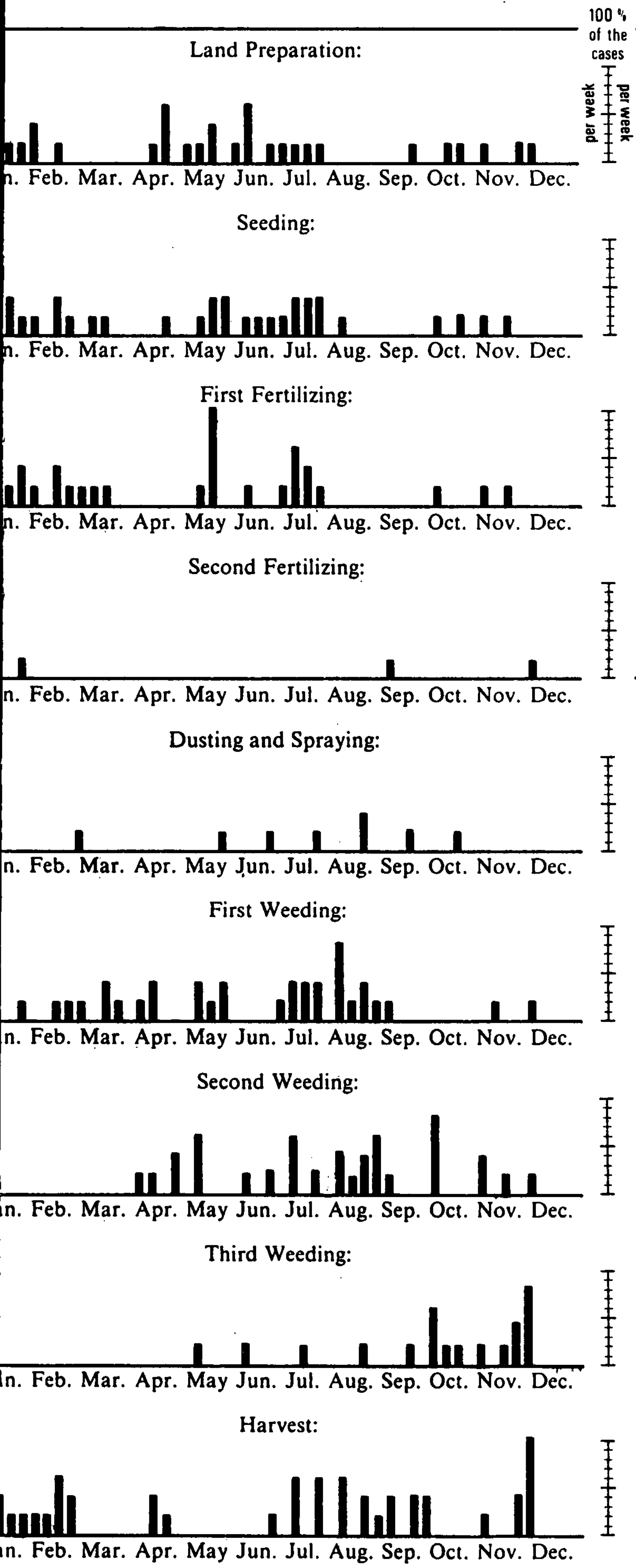
Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	7,256	0	0	1,130	16	6,126	84
Maize & Beans	11,173	0	0	3,440	31	7,733	69
Maize & Others	585	0	0	0	0	585	100
Maize int.oth.	180	0	0	0	0	180	100
Beans	898	0	0	320	36	578	64
Engl. Potatoes	2,850	0	0	500	18	2,350	82
Tobacco	90	90	100	0	0	0	0
Cabbage	700	0	0	350	50	350	50
Tomatoes	2,400	0	0	2,400	100	0	0
Second Rains							
Maize	3,480	0	0	270	8	3,210	92
Maize & Beans	4,276	0	0	240	6	4,036	94
Maize int.oth.	70	0	0	0	0	70	100
Beans	880	0	0	0	0	880	100
Engl. Potatoes	3,530	0	0	640	18	2,890	82
Cotton	406	406	100	0	0	0	0
Tobacco	2,115	790	37	0	0	1,325	63
Permanent Crops							
Pigeonpeas	40	0	0	0	0	40	100

MBU DISTRICT

BLE 14a: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 33[1)]

: LH 1 (–UM 1) Survey Area 29 Sample Size: 30



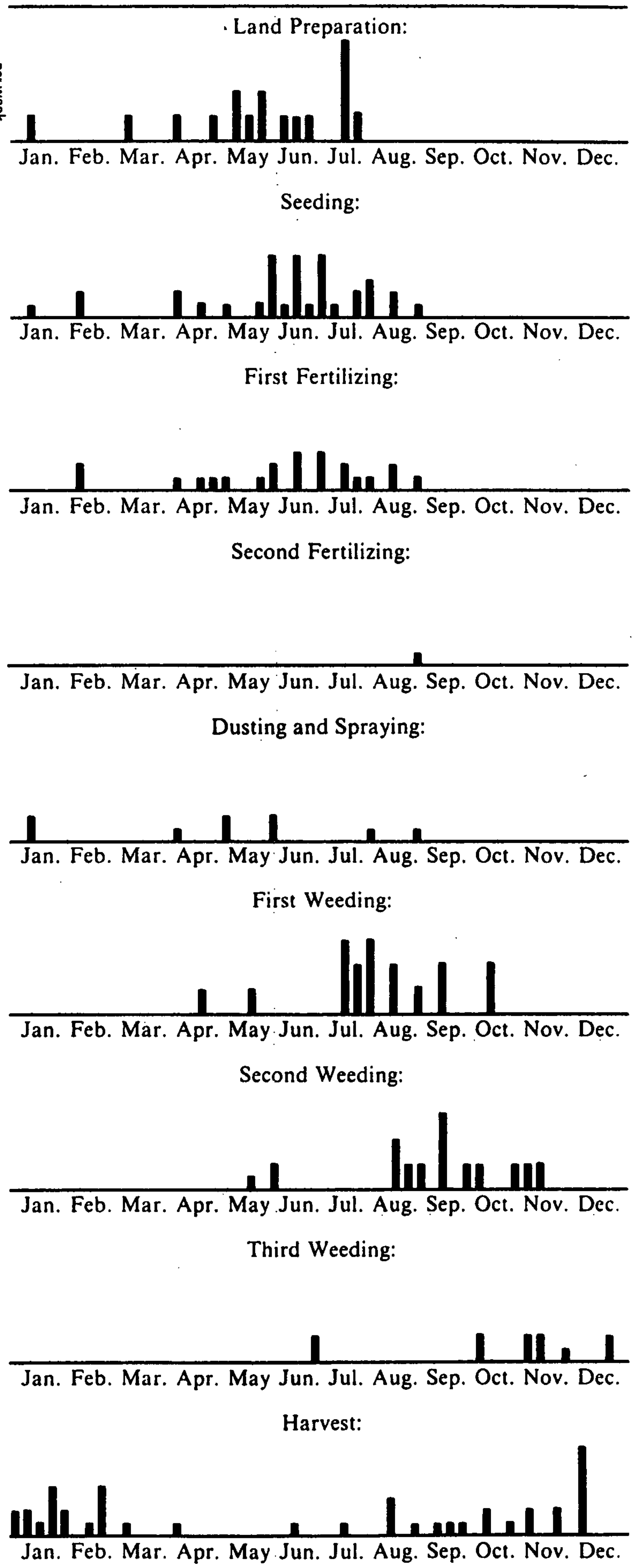
Maximum 30 per crop and season

KIAMBU DISTRICT

TABLE 14b: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 34[1)]

AEZ: LH 1 (– UM 1) Survey Area 29 Sample Size: 30



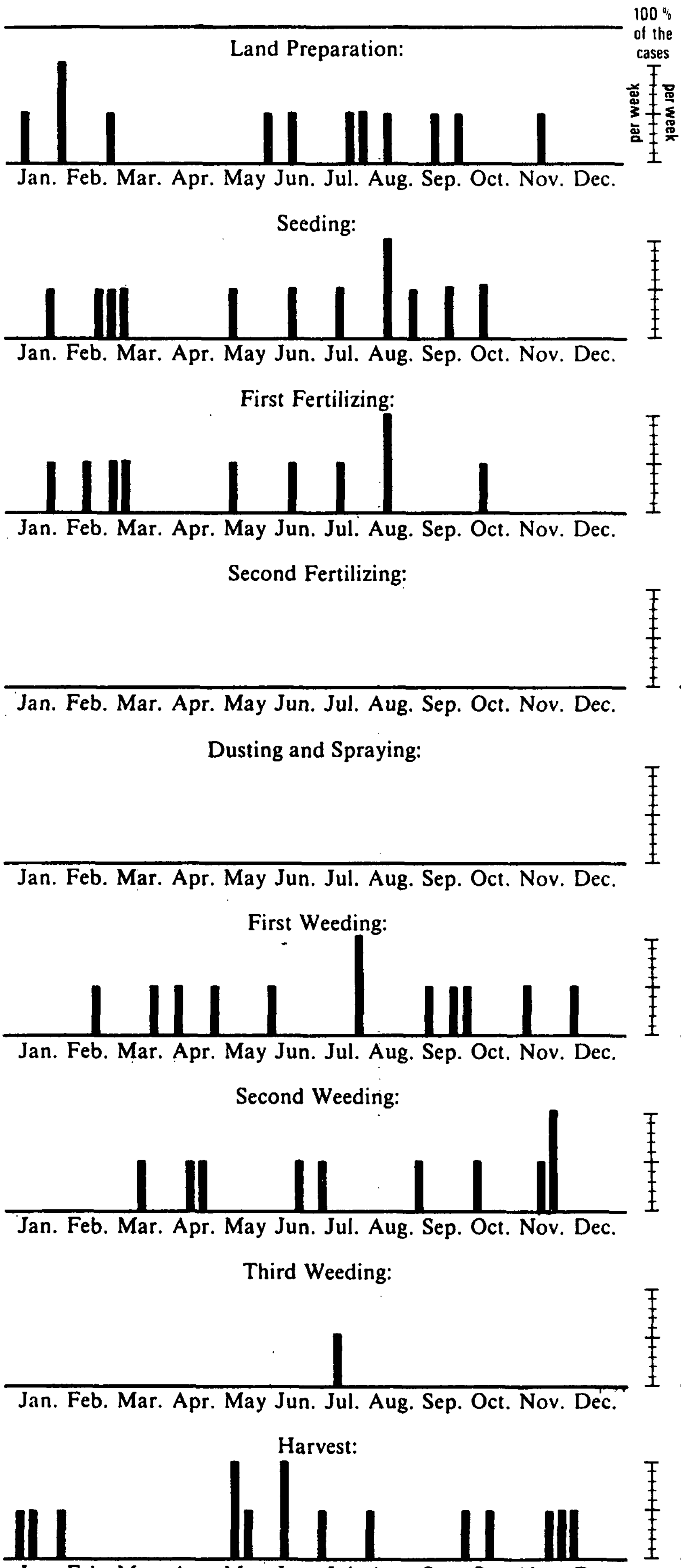
1) Maximum 30 per crop and season

KIAMBU DISTRICT

TABLE 14c: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 **Beans** Cases: 12

AEZ: LH 1 (– UM 1) Survey Area 29 Sample Size: 30

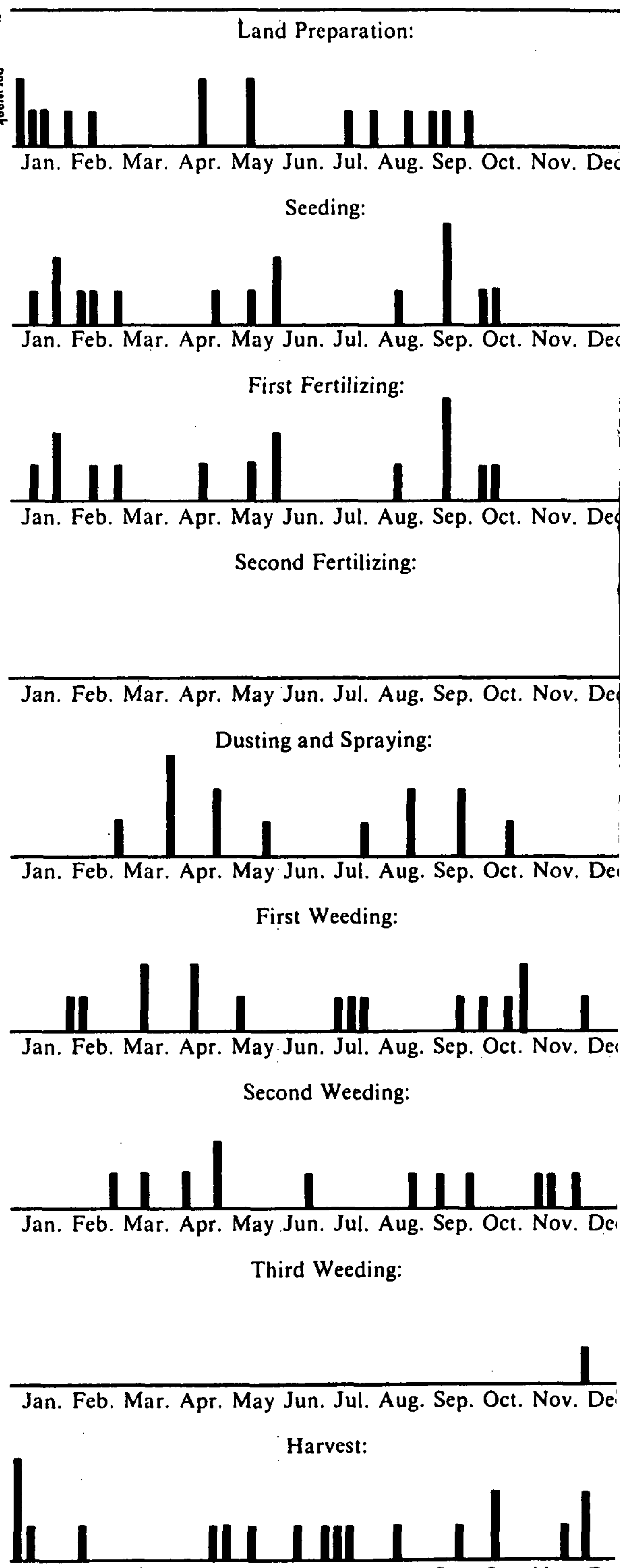


KIAMBU DISTRICT

TABLE 14d: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 16

AEZ: LH 1 (– UM 1) Survey Area 29 Sample Size: 3

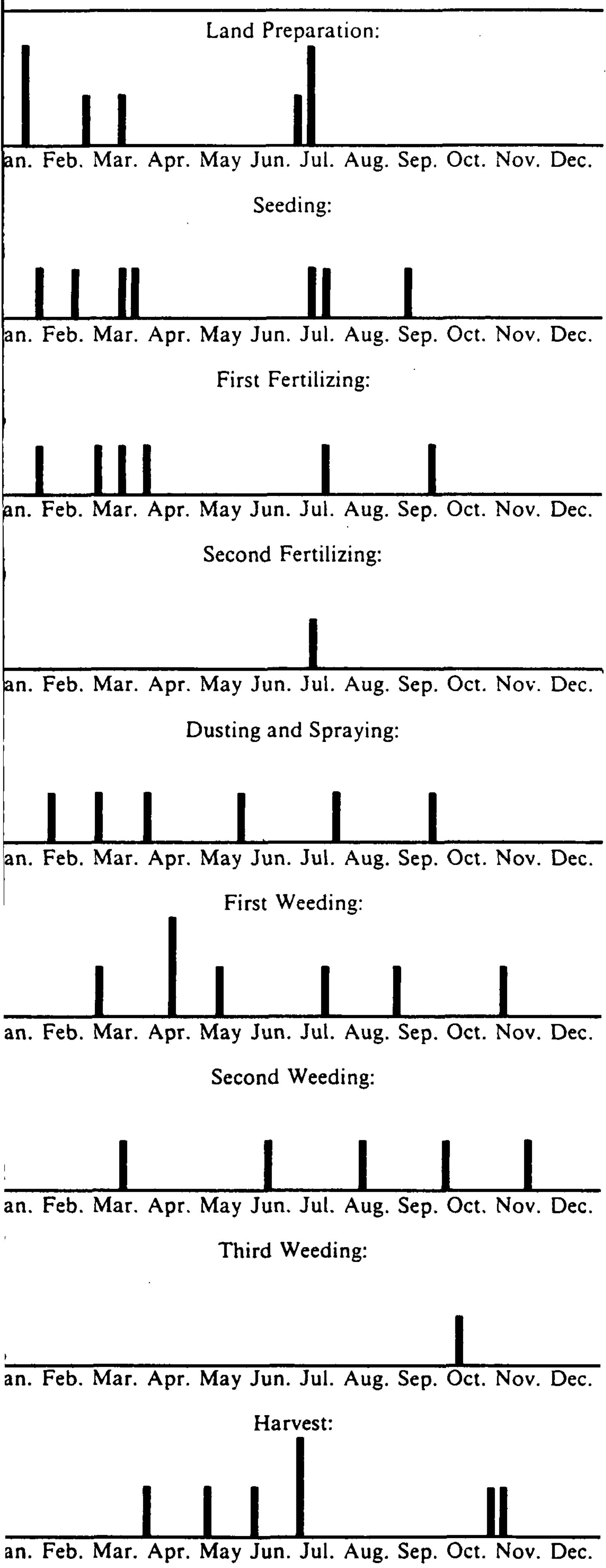


IAMBU DISTRICT

'ABLE 14e: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 40 **Cabbage** Cases: 7

EZ: LH 1 (– UM 1) Survey Area 29 Sample Size: 30

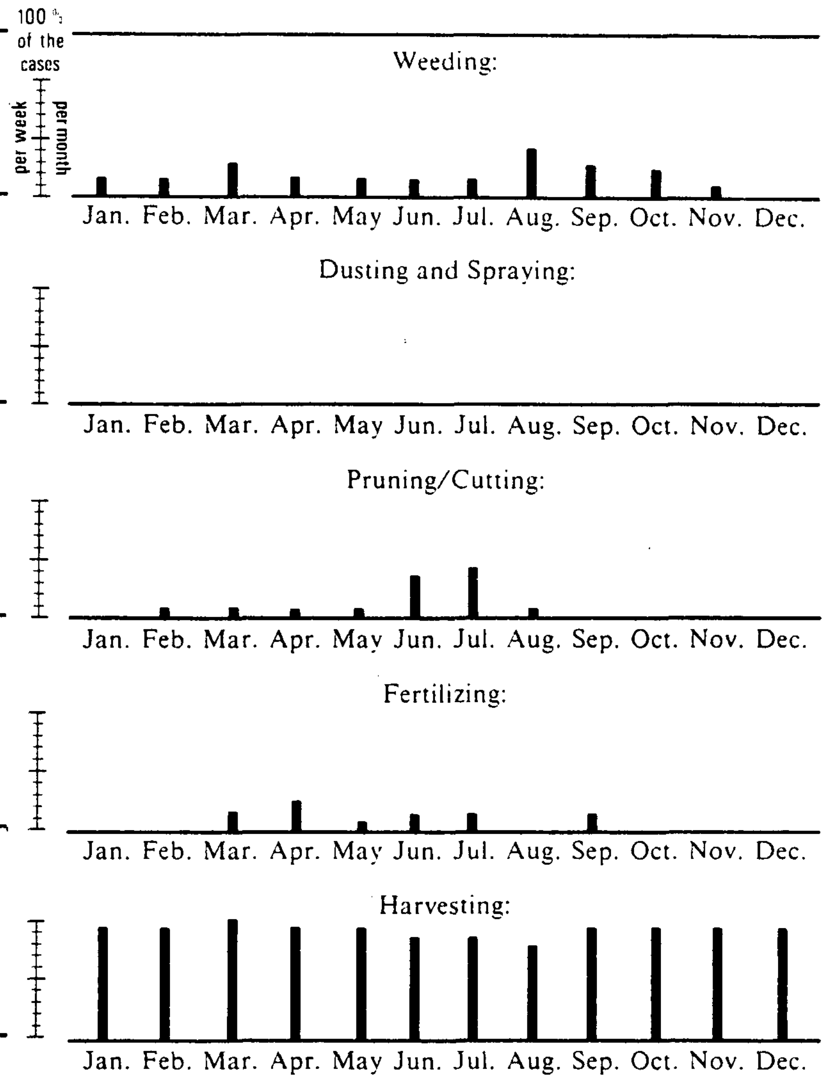


KIAMBU DISTRICT

TABLE 14f: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 **Tea** Cases: 15

AEZ: LH 1 (– UM 1) Survey Area 29 Sample Size: 30

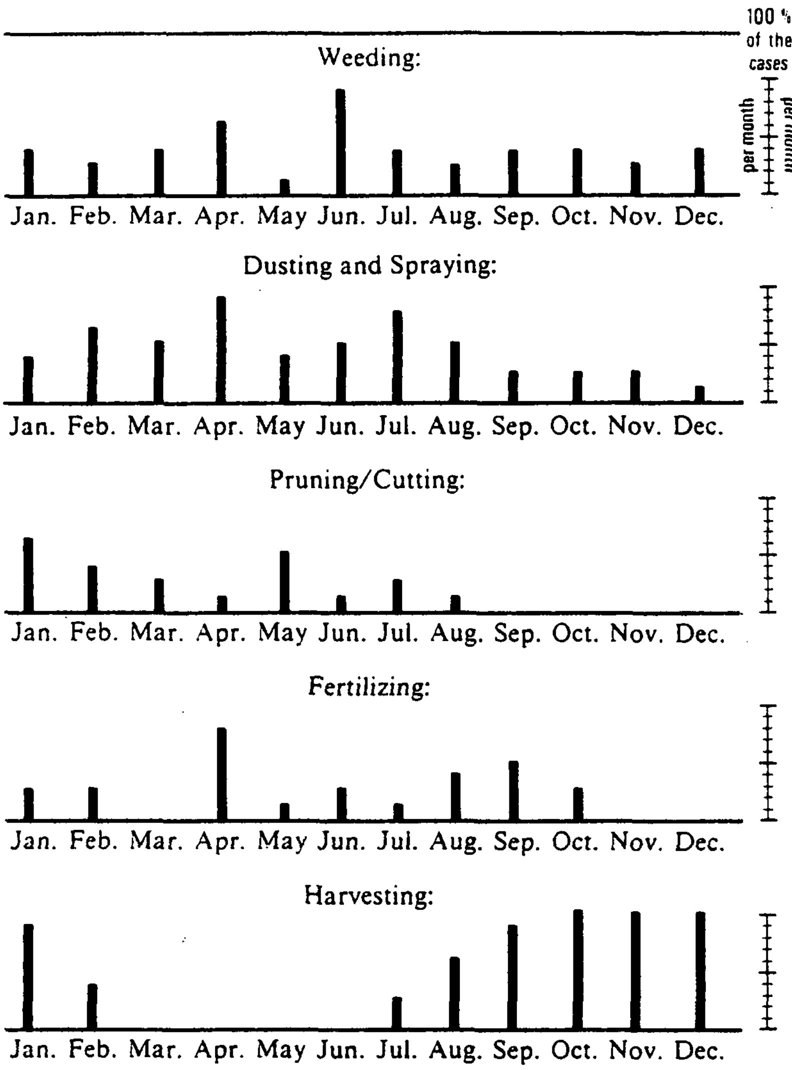


KIAMBU DISTRICT

TABLE 14g: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 **Coffee** Cases: 10

AEZ: LH 1 (– UM 1) Survey Area 29 Sample Size: 30

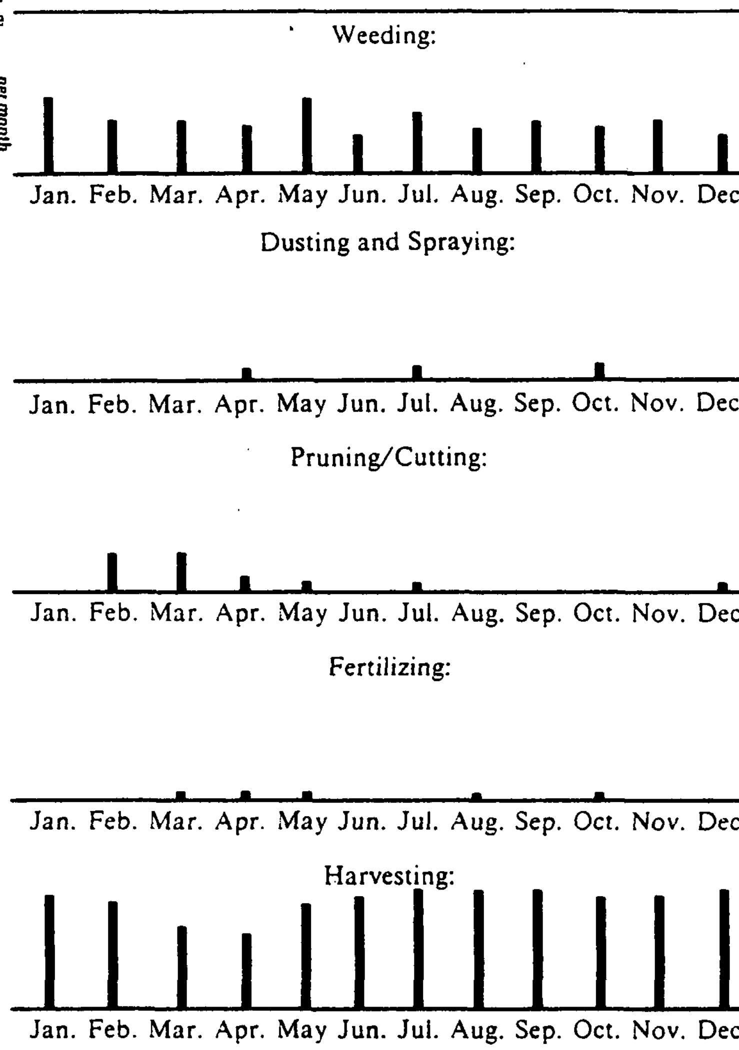


KIAMBU DISTRICT

TABLE 14h: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 52 **Pyrethrum** Cases: 17

AEZ: LH 1 (– UM 1) Survey Area 29 Sample Size: 30

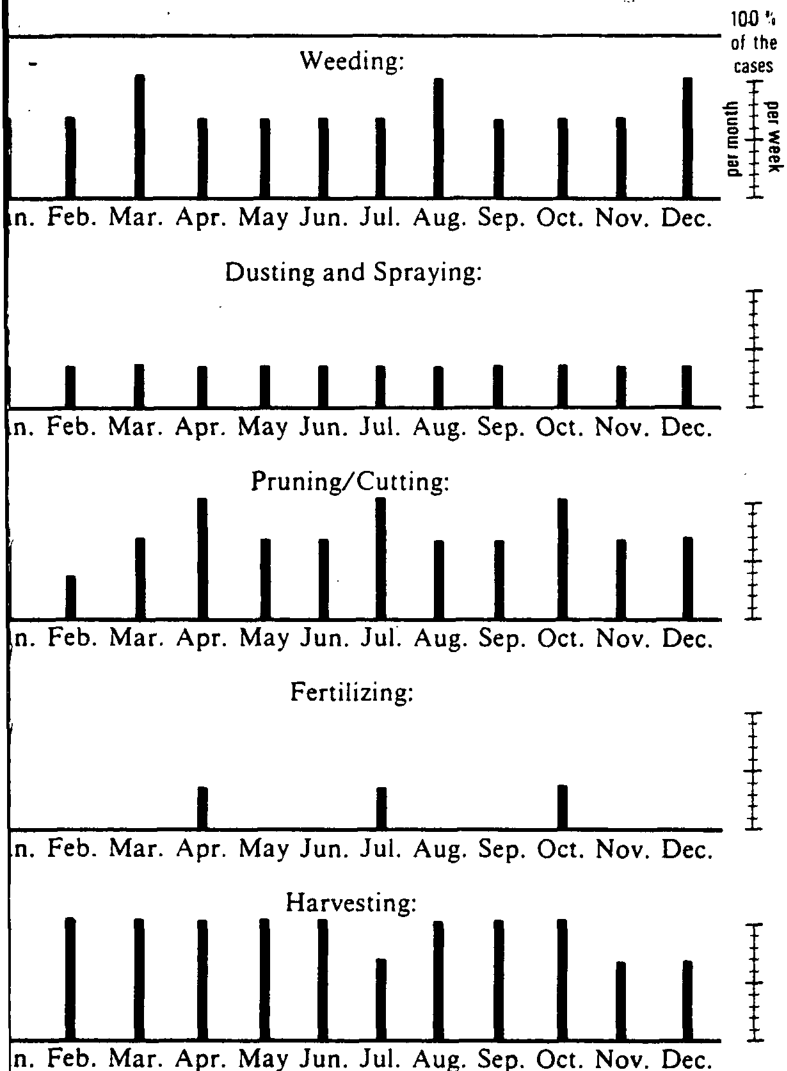


AMBU DISTRICT

TABLE 14i: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 54 **Passion fruit** Cases: 3

Z: LH 1 (– UM 1) Survey Area 29 Sample Size: 30

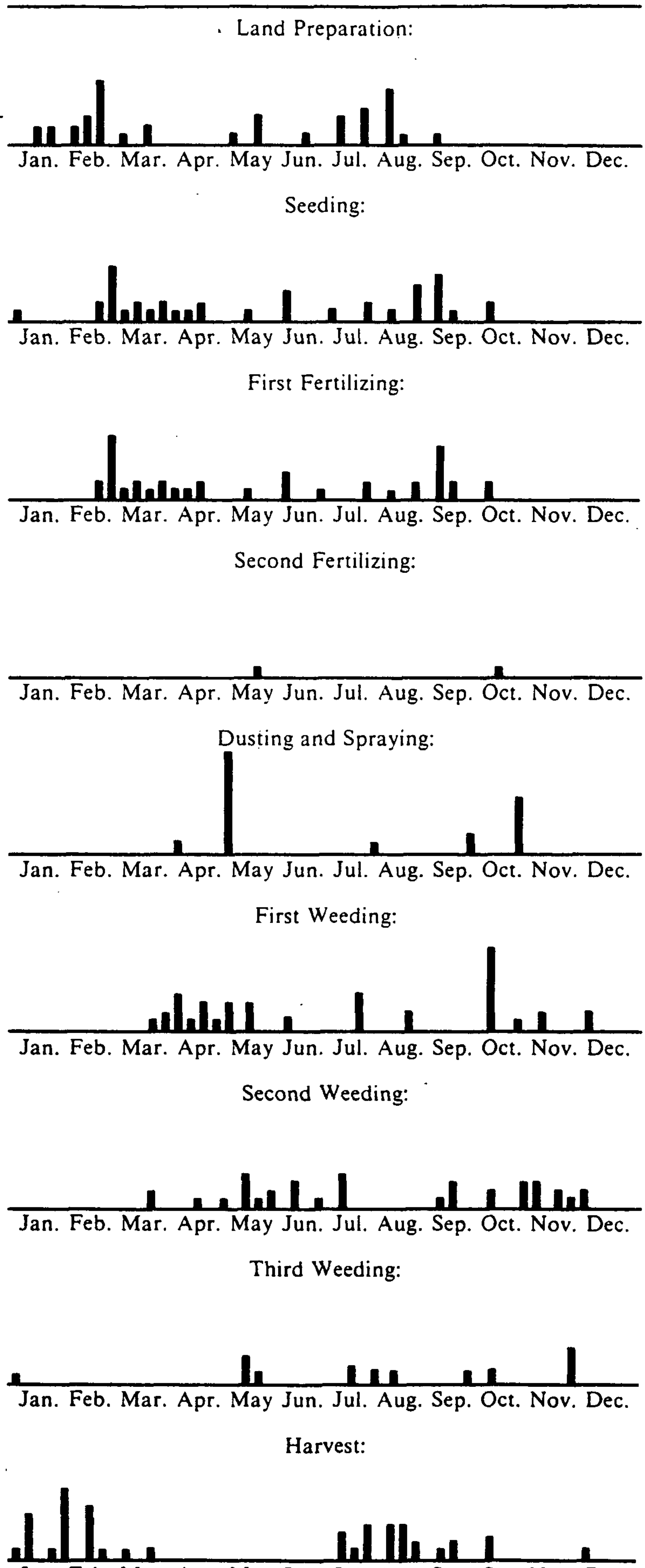


KIAMBU DISTRICT

TABLE 14j: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 39[1)]

AEZ: UM (1–) 2 Survey Area 30 Sample Size: 28



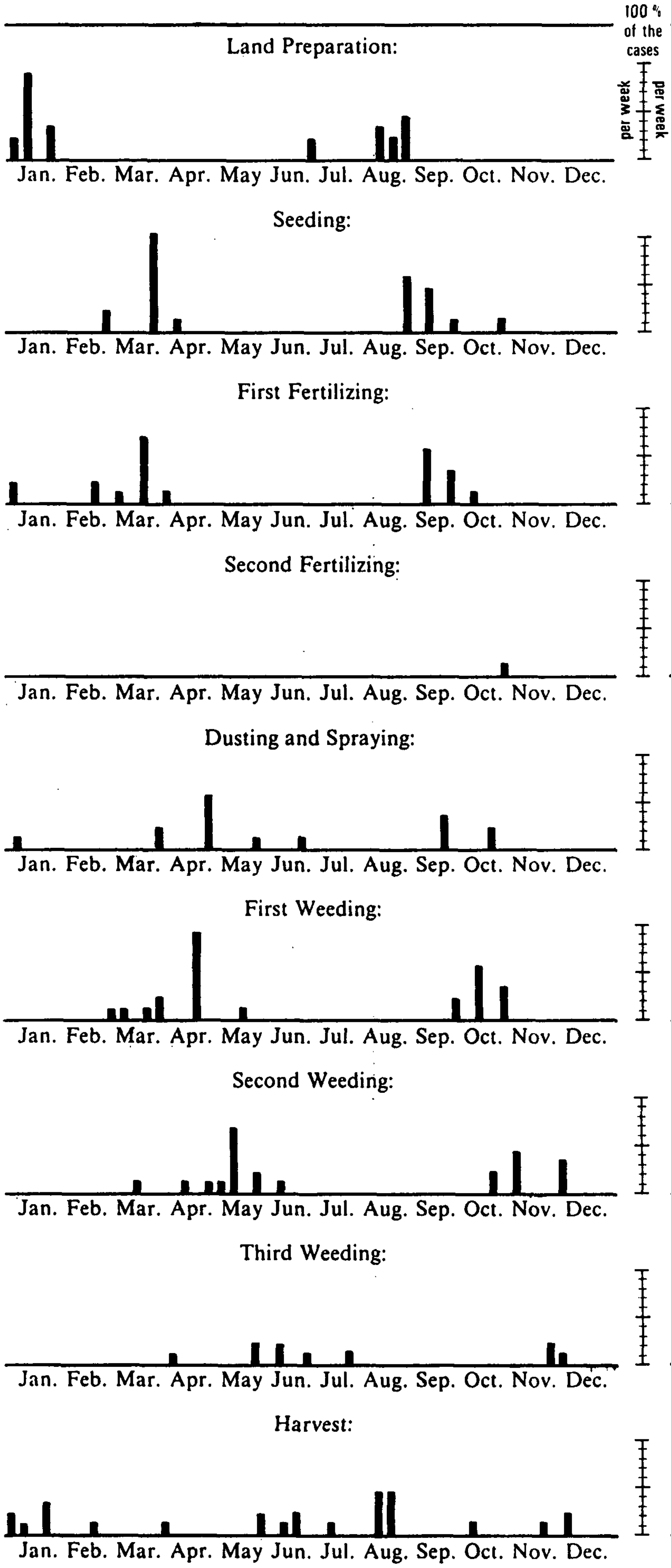
1) Maximum 28 per crop and season

KIAMBU DISTRICT

TABLE 14k: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 24

AEZ: UM (1–) 2 Survey Area 30 Sample Size: 28

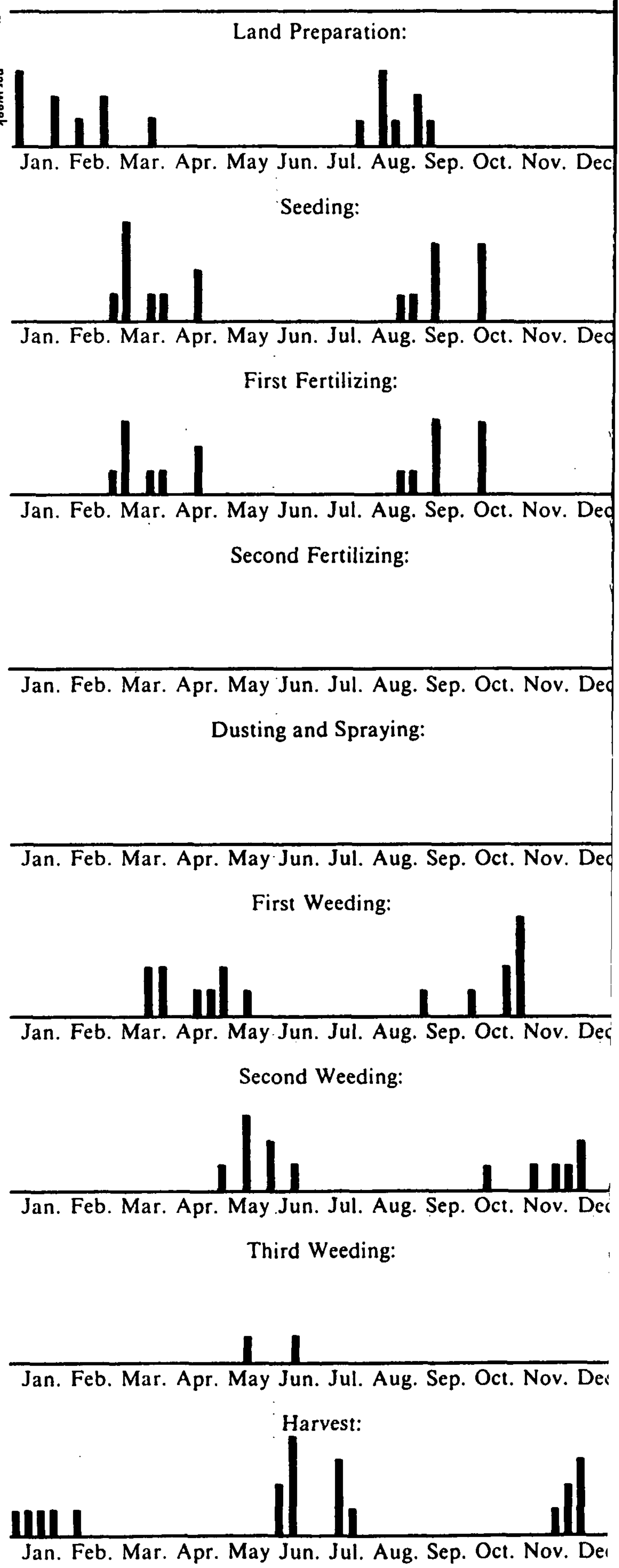


KIAMBU DISTRICT

TABLE 14l: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 **Beans** Cases: 17

AEZ: UM (1–) 2 Survey Area 30 Sample Size:

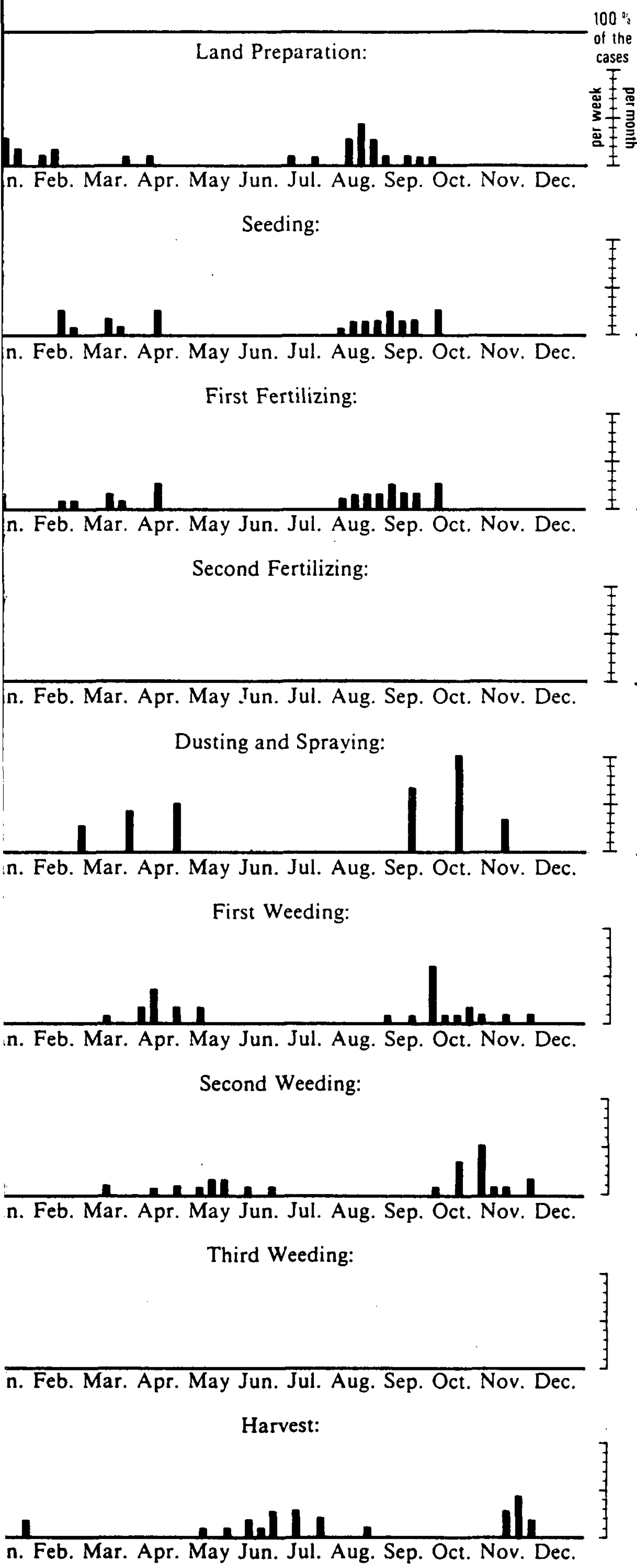


AMBU DISTRICT

BLE 14m: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 27

Z: UM (1–) 2 Survey Area 30 Sample Size: 28

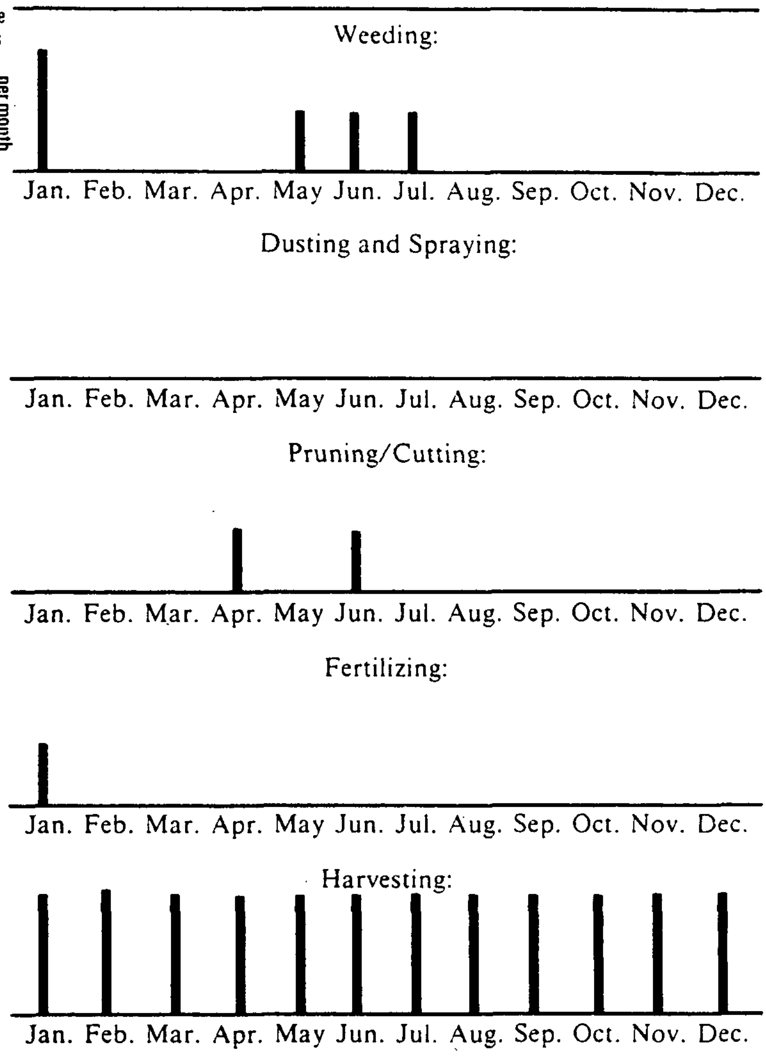


KIAMBU DISTRICT

TABLE 14n: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 **Tea** Cases: 2

AEZ: UM (1–) 2 Survey Area 30 Sample Size: 28

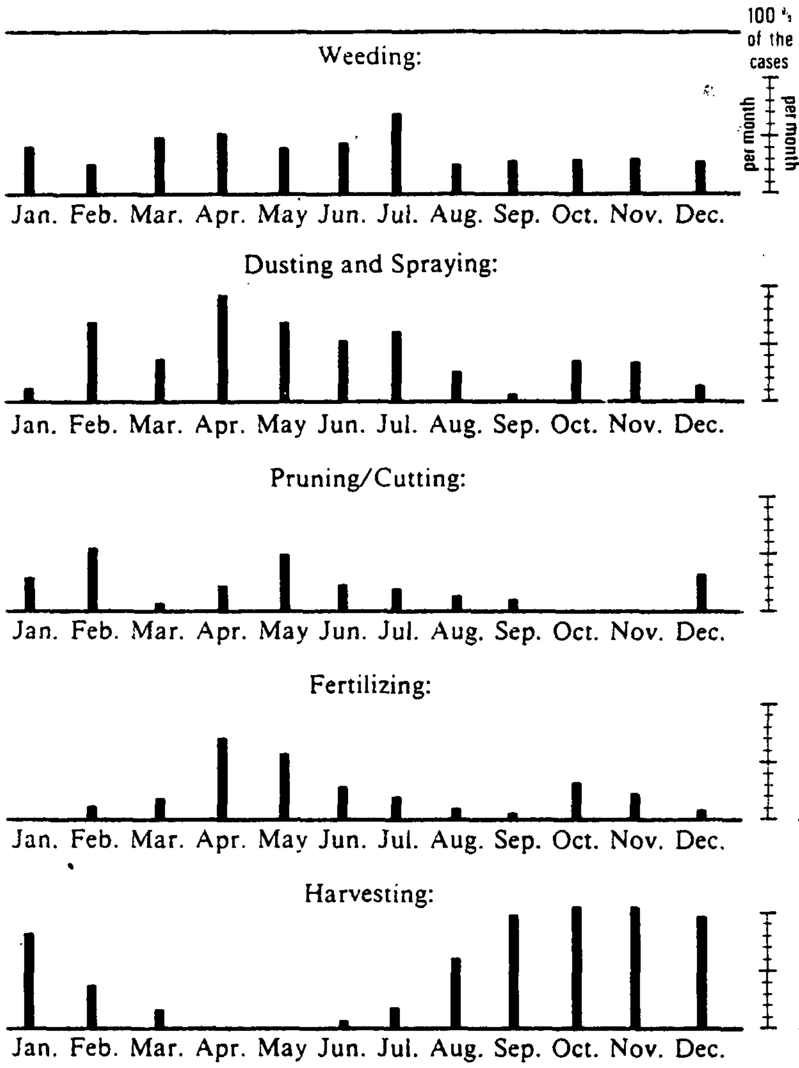


KIAMBU DISTRICT

TABLE 14o: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 **Coffee** Cases: 28

AEZ: UM (1−) 2 Survey Area 30 Sample Size: 28

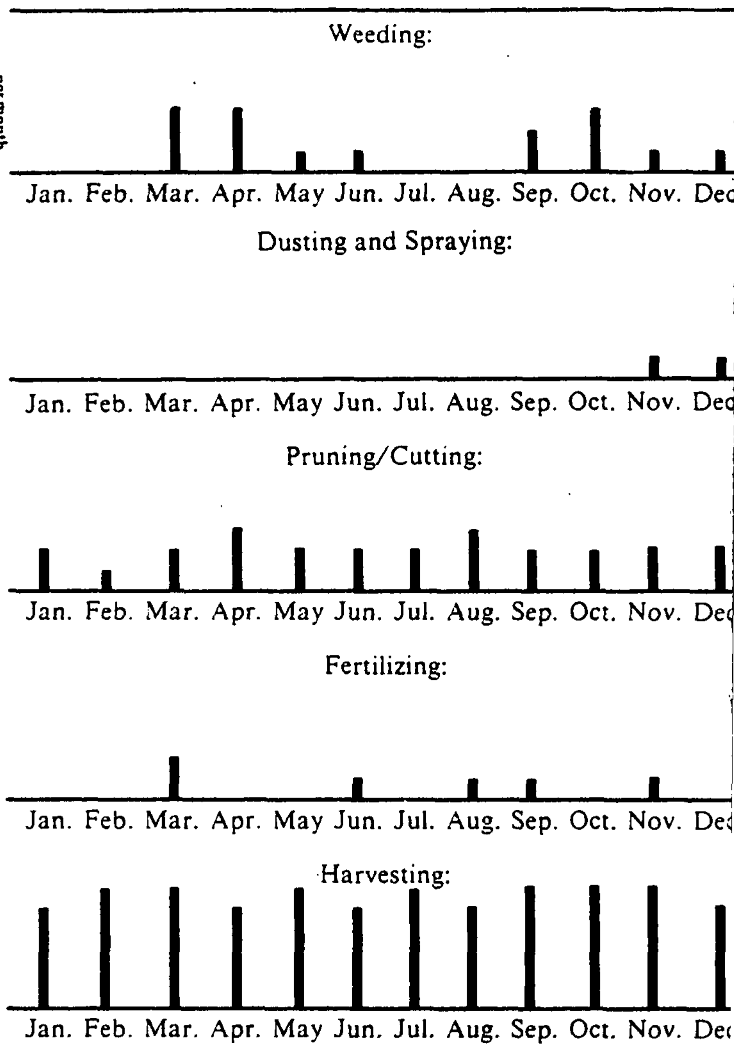


KIAMBU DISTRICT

TABLE 14p: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 56 **Cooking Bananas** Cases: 7

AEZ: UM (1−) 2 Survey Area 30 Sample Size: 2

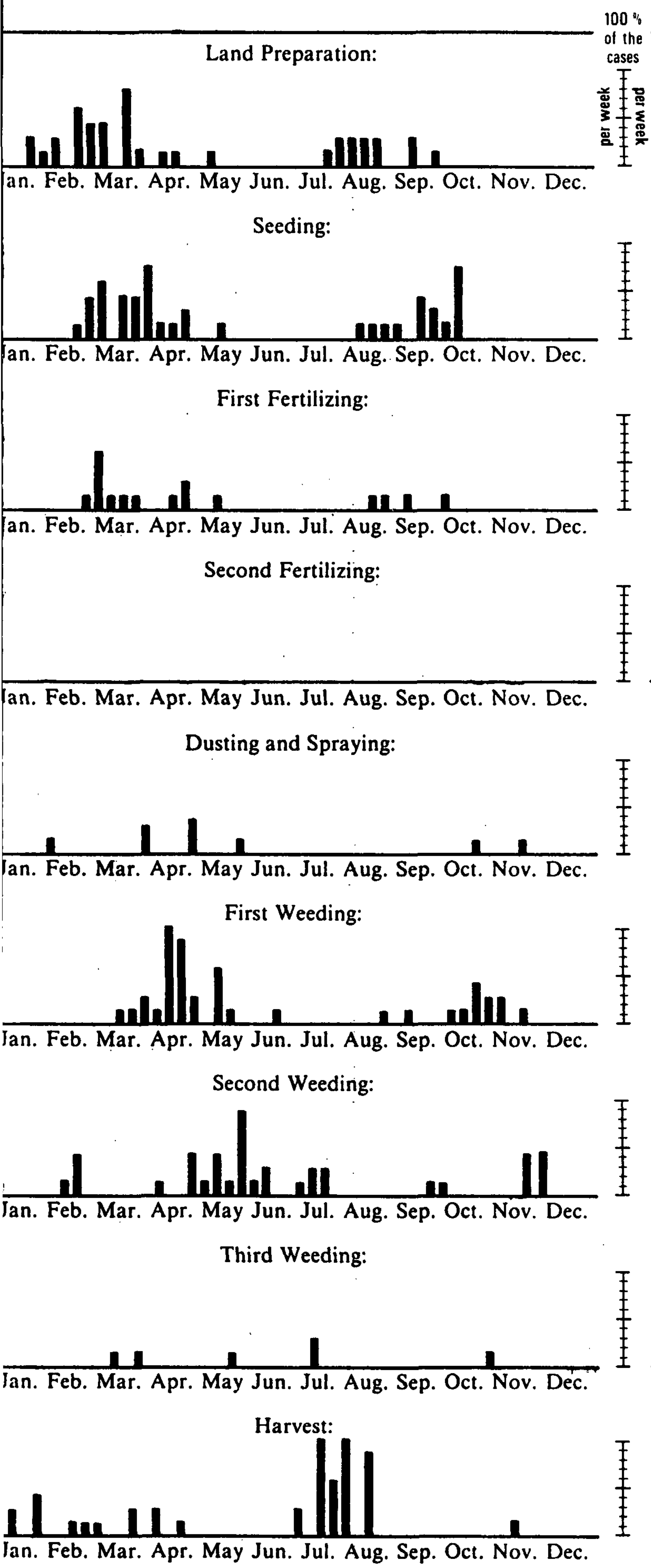


AMBU DISTRICT

ABLE 14q: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 39[1)]

Z: UM 4–5 Survey Area 31 Sample Size: 30



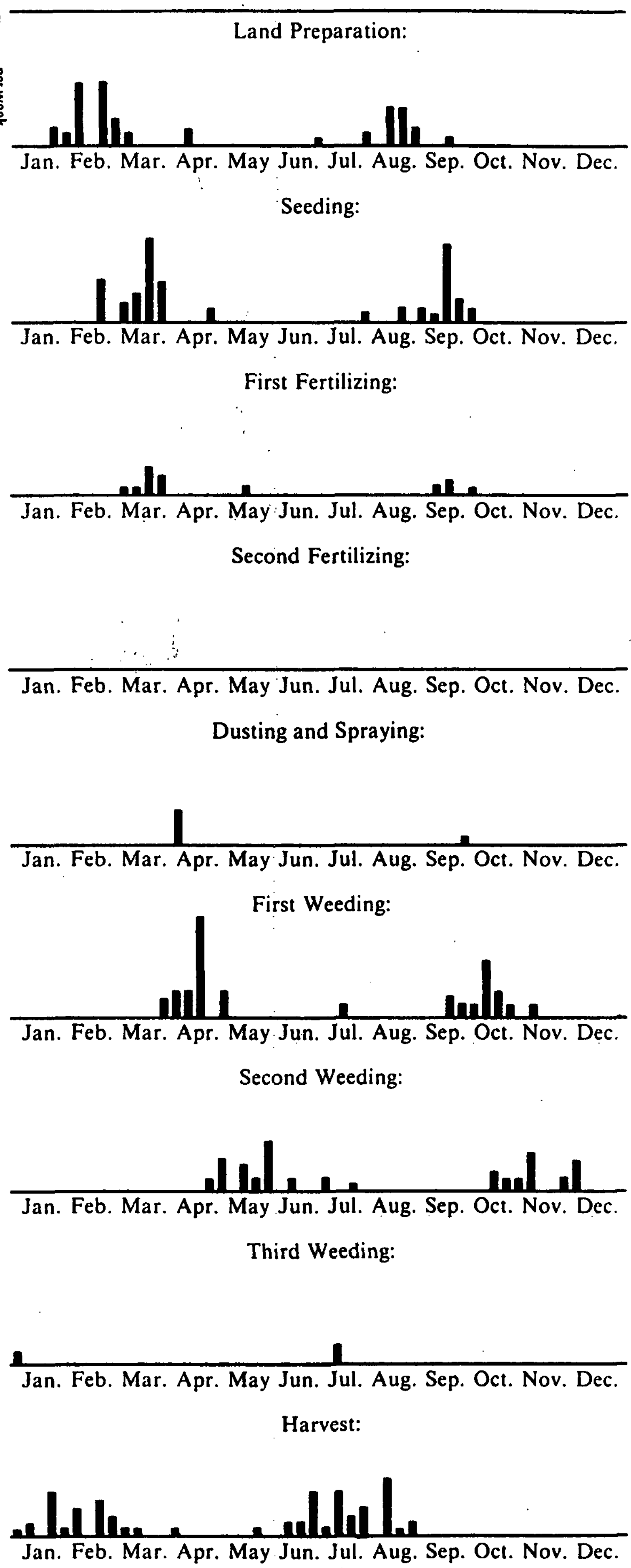
1) Maximum 30 per crop and season

KIAMBU DISTRICT

TABLE 14r: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 57[1)]

AEZ: UM 4–5 Survey Area 31 Sample Size: 30



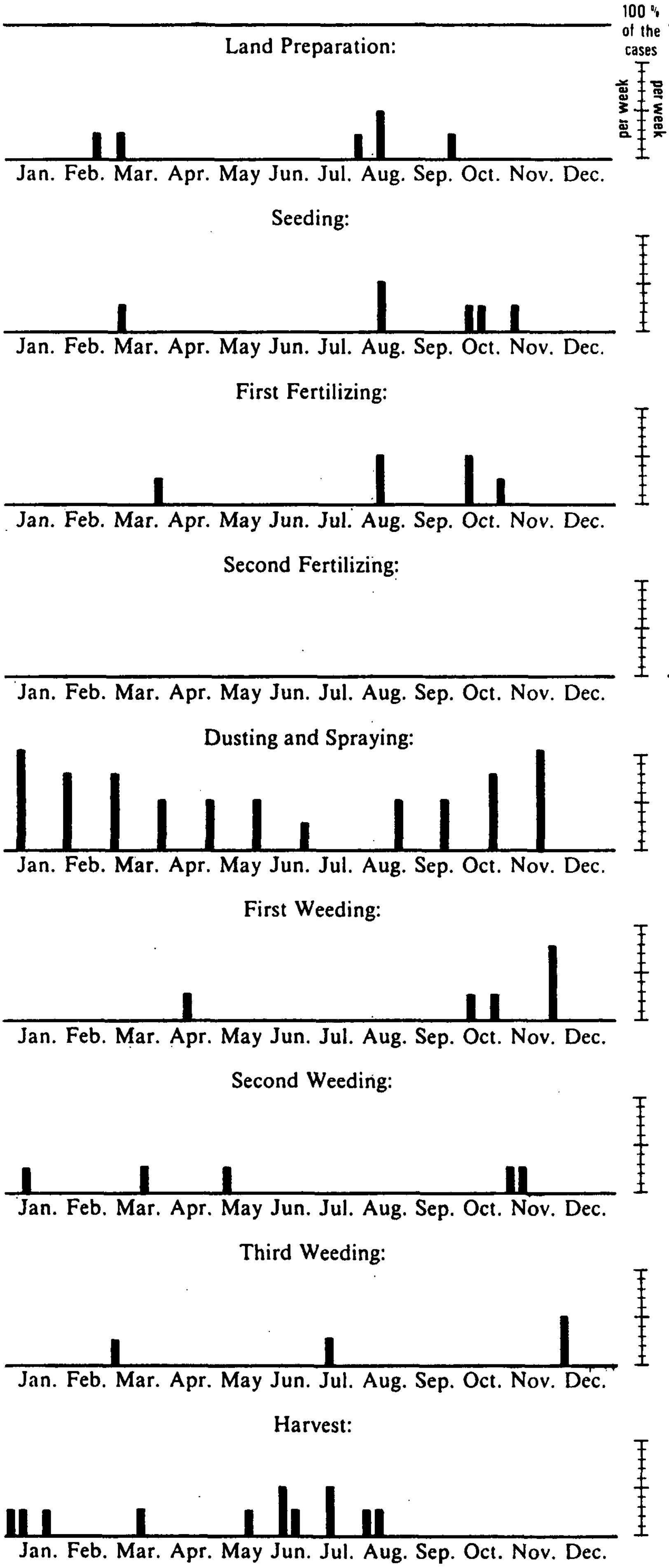
1) Maximum 30 per crop and season

KIAMBU DISTRICT

TABLE 14s: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 39 **Tobacco** Cases: 6

AEZ: UM 4–5 Survey Area 31 Sample Size: 30



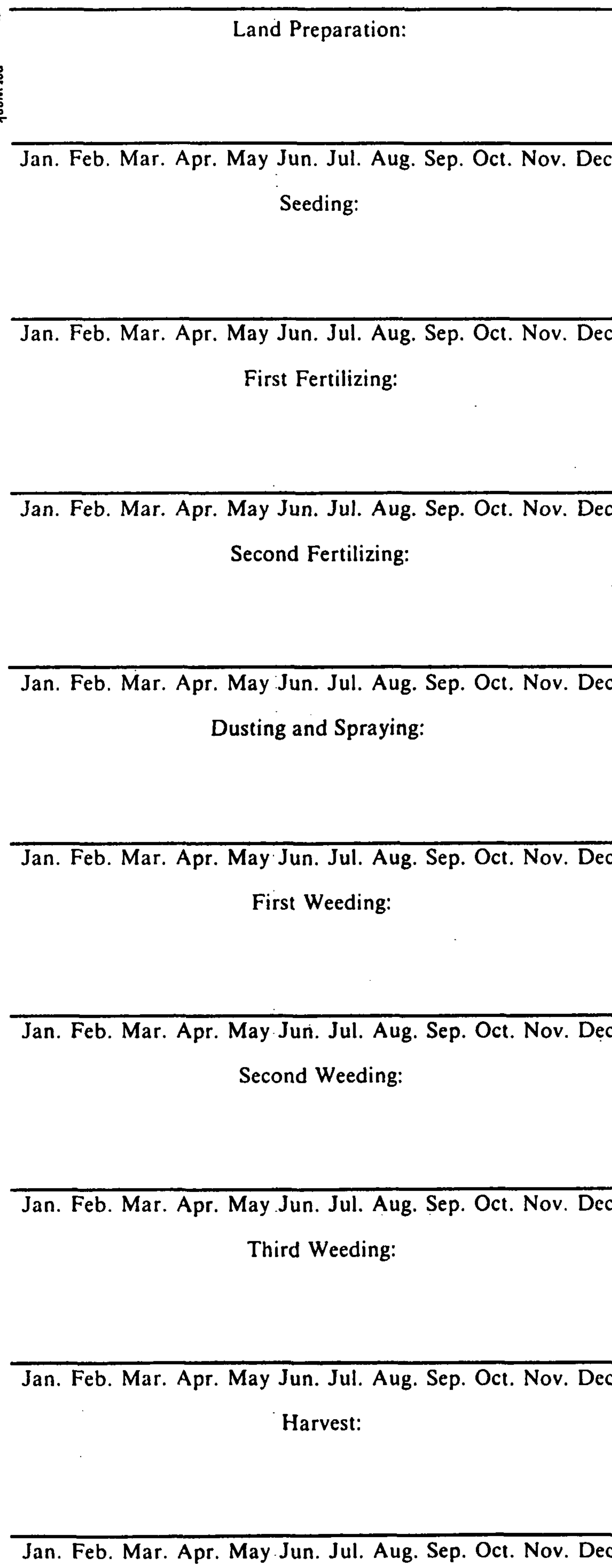


TABLE 15a: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT[1)]

		A.E.Z.: LH 1 TEA-DAIRY ZONE				A.E.Z.:LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: UM 1 COFFEE-TEA ZONE			
		Vegt. Period 1st + 2nd: in Days, 1st: p or 1/vl-m 22o or more		2nd: 135-145	total: 355-365	m + (s/m) 14o-15o		1o5-12o		f lim 18o or more		13o-14o	31o-33o
		Soil: ANDOSOLS				NITOSOLS				ANDOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	3,000			6,000	2,400			4,800	2,400			5,000
Fertilizer N	kg				166				133				144
P_2O_5	kg				83				66				72
K_2O	kg												
CROP: NAPIER GRASS													
Farmers in Production Level	%												
Yields 2)	kg	4,100			9,100	2,400			4,800	4,800			10,000
Fertilizer N	kg				277				133				288
P_2O_5	kg				138				66				144
K_2O													
CROP: TEA													
Farmers in Production Level	%												
Yields	kg	2,300	4,500	7,000	10,000								
Fertilizer N	kg		73	156	308								
P_2O_5	kg		15	30	60								
K_2O	kg		15	30	60								
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg	550	400	700	900	660	400	900	1,200				
Fertilizer N	kg			4	9			6	14				
P_2O_5	kg			5	13			9	19				
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg	4,000	20,000	28,000									
Fertilizer N	kg		225	338									
P_2O_5	kg		225	338									
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

1) for explanations see Vol. IIA, p. 51 2) in kg TDN

KIAMBU DISTRICT

TABLE 15b: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 1 TEA-DAIRY ZONE				A.E.Z.:LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				A.E.Z.: UM 1 COFFEE-TEA ZONE			
		Vegt. Period 1st + 2nd: p or 1/vl-m in Days,1st: 22o or more		2nd: 135-145	total: 355-365	m + (s/m) 14o-15o		1o5-12o		f lim 18o or more		13o-14o	31o-33o
		Soil: ANDOSOLS				NITOSOLS				ANDOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,400	2,000	2,700	3,800	2,200	2,000	3,000	4,000	2,400	2,000	2,700	3,800
Fertilizer N	kg			8	35			21	71			8	35
P_2O_5	kg			5	22			15	50			5	22
K_2O	kg												
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg									2,200		3,000/600	4,000/600
Fertilizer N	kg											49	74
P_2O_5	kg											31	47
K_2O													
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	6.500	7,000	20,000	30,000	6,000	8,000	20,000	35,000				
Fertilizer N	kg		4	108	188		16	112	232				
P_2O_5	kg		3	81	141		12	84	174				
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg									5,000	7,000	14,000	30,000
Fertilizer N	kg										16	72	200
P_2O_5	kg										14	63	176
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,100	6,000	20,000	40,000								
Fertilizer N	kg		13	111	251								
P_2O_5	kg		8	63	144								
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15c: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICLA ZONES OUTPUT & NUTRIENT INPUT[1)]

		A.E.Z.: UM 2 MAIN COFFEE ZONE				A.E.Z.: UM 3 MARGINAL COFFEE ZONE				A.E.Z.: UM 4 SUNFLOWER-MAIZE ZONE			
		Vegt. Period 1st + 2nd: m + s/m in Days, 1st: 135-155		2nd: 105-115	total: —	m/s + s/vs 115-135		75-85		s/m + (s/vs) 105-115		75-80	
		Soil: NITOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	2,000			3,800	1,300			2,700	1,000			2,000
Fertilizer N	kg				100				77				18
P_2O_5	kg				50				38				9
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields 2)	kg	4,000			8,500	2,500			5,000	2,100			4,000
Fertilizer N	kg				250				138				105
P_2O_5	kg				120				69				52
K_2O													
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg		700	1,300	1,800		400	700	1,000				
Fertilizer N	kg		70	130	180		40	70	100				
P_2O_5	kg		90	100	100		90	90	100				
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%	-											
Yields	kg	3,400		18,000	20,000								
Fertilizer N	kg			204	232								
P_2O_5	kg			302	349								
K_2O	kg												
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg	7,000	6,000	14,000	25,000	5,000	3,000	6,000	9,000				
Fertilizer N	kg			105	270			15					
P_2O_5	kg			42	108			6	60				
K_2O	kg								24				
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

1) for explanations see Vol. IIA, p. 51 2) in kg TDN

TABLE 15d: **PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES**
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 2 MAIN COFFEE ZONE				A.E.Z.: UM 3 MARGINAL COFFEE ZONE				A.E.Z.: UM 4 SUNFLOWER-MAIZE ZONE			
		Vegt. Period 1st + 2nd: m + s/m in Days, 1st: 135-155		2nd: 1o5-115	total: —	m/s + s/vs 115-135		75-85		s/m + (s/vs) 1o5-115		75-8o	
		Soil: NITOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,000	2,200	3,000	4,000	1,900	1,500	2,500	2,600	1,400	1,400	2,000	2,200
Fertilizer N	kg		5	30	55			15	18			15	20
P_2O_5	kg		4	22	40			14	17			14	19
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg					2,400	2,500	2,800	3,000	1,900	1,400	2,000	2,500
Fertilizer N	kg						5	14	20			5	20
P_2O_5	kg						5	12	18			5	18
K_2O													
CROP: MAIZE & BEANS													
Farmers in Production Level	%												
Yields	kg	2,000	2,200/200	3,000/400	4,000/400	1,900		2,500/300	2,600/300				
Fertilizer N	kg		15	49	74			19	32				
P_2O_5	kg		10	34	52			10	23				
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg	1,100	350	1,500	1,800	850	400	1,500	1,600	800	500	800	1,000
Fertilizer N	kg			24	42			31	36				10
P_2O_5	kg			12	21			13	15				6
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	1,100	500	600	1,600	950	400	600	1,100	700	300	600	700
Fertilizer N	kg				17				5				-
P_2O_5	kg				21				6				-
K_2O	kg												
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	4,000	6,000	12,000	18,000								
Fertilizer N	kg		16	64	112								
P_2O_5	kg		18	73	128								
K_2O	kg												

TABLE 15e: **PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES**
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 2 MAIN COFFEE ZONE				A.E.Z.: UM 3 MARGINAL COFFEE ZONE				A.E.Z.: UM 4 SUNFLOWER-MAIZE ZONE			
		Vegt. Period 1st + 2nd: m + s/m in Days, 1st: 135-155		2nd: 105-115	total: —	m/s + s/vs 115-135		75-85		s/m + (s/vs) 105-115		75-80	
		Soil: NITOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	8,000	8,000	16,000	30,000								
Fertilizer N	kg			64	176								
P_2O_5	kg			56	154								
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,000	6,000	15,000	26,000	3,500	5,000	12,000	22,000				
Fertilizer N	kg		8	44	88		11	60	130				
P_2O_5	kg		12	66	132		11	60	130				
K_2O													
CROP: CASSAVA													
Farmers in Production Level	%												
Yields	kg					3,500		5,000	9,000	3,500	3,000	6,000	8,000
Fertilizer N	kg							4	22			10	18
P_2O_5	kg							6	32			15	27
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

MURANG'A DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

Murang'a District, on the eastern slopes of the Nyandarua Range, shows an increase in rainfall and in the length of the agro-humid period which is characteristic of increasing altitudes, due to the effect of the south-eastern trade winds. The annual average rainfall reaches a maximum of 2 700 mm at 2 500 m. From this altitude up to the forest line and down to about 2 150 m, it is so wet, cold and steep that the area is not recommended for agriculture (UH 0). A strip of UH 1 extends further down to the frost line and the 15° C isotherme, (here due to heavy cloud cover exceptionally low at about 2 050 m) and generally known as the Sheep and Dairy Zone, though in view of the population pressure, vegetable cultivation would be more appropriate.

The next zones are found in descending order on the eastern slopes of the Nyandarua Range: the Tea-Dairy Zone LH 1, the Coffee-Tea Zone UM 1, the Main Coffee Zone UM 2, the Marginal Coffee Zone UM 3, and the Sunflower-Maize Zone UM 4 which is partly a sisal and pineapple zone due to large estates. A strip of UM 3–4 occurs towards the east in the Kakuzi Hills, although on less suitable soils which are very marginal for coffee. Additional irrigation is essential here.

Down on the plains where cotton production is feasible – the upper limit is already about 1 300 m due to reduced insolation because of extended cloudiness – the climate is so dry (annual average 800–900 mm) that the good Cotton Zone LM 3 is little more than a transitional strip to the Marginal Cotton Zone LM 4.

MURANG'A DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**

having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
9036052	Githumu, Sec.	25	Av.	1 680	47	54	115	392	312	82	54	60	57	146	298	124
2 130 m	School		60 % rel.[1]	1 373	21	8	77	111	223	26	24	6	4	13	245	73
9036104	Murinanga	36	Av.	1 718	50	48	127	419	320	67	49	64	45	152	271	107
1 760 m			60 %	1 594	24	12	68	250	244	45	33	41	34	86	186	65
9036106	Kanyenyeini	35	Av.	2 051	80	52	131	451	398	97	76	92	72	200	297	133
2 005 m			60 %	1 922	48	37	105	301	357	79	58	66	52	175	206	88
9036212	Gituamba	12	Av.	2 003	71	48	113	416	311	101	67	85	75	217	272	145
2 130 m	Exp. Farm															
9036220	Thika, Kajuga	21	Av.	1 490	58	55	130	335	253	63	45	39	42	142	228	100
1 520 m	Farm		60 %	1 393	26	31	75	274	189	44	26	28	23	90	163	48
9036233	Kimakia Forest	19	Av.	2 257	96	95	205	466	392	118	46	86	70	246	395	137
2 435 m	Station		60 %	2 113	51	65	135	359	352	96	78	70	63	184	241	87
9036248	Njiri High School	14	Av.	2 370	66	91	185	502	423	72	73	80	60	245	403	171
2 130 m																
9026259	Gatere Forest Stat.	13	Av.	2 693	111	135	223	249	493	153	111	106	83	248	340	150
2 590 m																
9037001	Makuyu Sisal Ltd.	54	Av.	965	40	34	100	246	130	24	13	12	16	78	184	87
1 535 m			60 %	854	18	8	75	206	79	9	6	7	2	45	154	45
9037005	Thika, Gethumbwini	52	Av.	1 065	39	43	115	260	154	37	23	22	30	83	167	93
1 520 m	Est.		60 %	962	14	13	62	220	110	19	10	15	10	51	124	51
9037007	Murang'a District	73	Av.	1 175	29	36	92	320	203	50	21	26	28	117	179	74
1 275 m	Office		60 %	1 053	9	8	51	285	145	22	12	14	12	67	139	34
9037010	Muthuri Est.	49	Av.	972	33	35	105	232	149	37	22	27	32	73	140	88
1 550 m			60 %	929	15	8	60	198	98	19	11	17	14	50	121	43
9037016	Mitubiri, Kitito	44	Av.	1 076	57	43	124	244	128	21	7	7	16	99	229	101
1 460 m	Coffee Est.		60 %	968	27	18	94	174	41	8	1	0	3	49	156	68
9037018	Swift & Ruther-	41	Av.	1 051	37	45	112	275	154	22	7	12	11	81	197	98
1 370 m	ford Est.		60 %	903	31	17	52	216	96	8	3	3	3	65	142	48
9037028	Makuyu, Kithumu	52	Av.	1 033	43	38	113	256	134	20	8	10	11	82	210	108
1 490 m	Estate		60 %	871	15	8	69	219	88	8	3	3	4	48	171	43

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					Monthly rainfall in mm											
9037037	Murang'a, Tana	44	Av.	995	44	37	81	223	183	23	13	21	13	101	197	61
1 060 m	Power Stat.		60 %	767	20	12	60	225	101	9	2	5	3	50	175	36
9037042	Murang'a, Kahuhia	33	Av.	1 611	47	48	132	416	312	52	47	56	38	142	245	85
1 630 m	High School		60 %	1 506	23	38	52	291	215	50	49	18	31	86	209	36
9037044	Makuyu, Karatina	34	Av.	1 042	39	42	110	211	172	23	14	17	17	79	188	83
1 460 m	Est.		60 %	887	24	15	61	181	102	9	5	4	5	44	154	40
9037063	Murang'a, Gateigoro	28	Av.	1 571	46	40	134	412	280	45	40	54	38	151	237	79
1 520 m	Afr. School															
9037130	Thika, Horticult.	20	Av.	1 018	50	48	129	266	186	26	21	27	10	76	164	74
1 600 m	Research St.															
9137002	Thika, Saasa	60	Av.	801	34	32	96	189	100	17	7	12	12	68	156	78
1 470 m			60 %	696	14	6	60	163	61	10	3	4	2	36	133	43
9137006	Nanga Estate	54	Av.	889	41	36	103	216	95	17	8	10	13	76	179	95
1 520 m			60 %	817	14	8	64	186	52	6	2	4	3	36	145	59

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

TABLE 2: **TEMPERATURE DATA**

No. and altitude	Name of Station	AEZ[1]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
				Temperature in C°													
9036233	Kimakia	UH	Mean max.	20.1	20.6	20.1	18.6	17.5	16.5	14.7	14.9	17.3	18.3	17.7	19.0	17.9	
2 435 m	Forest	0	Mean temp.	13.5	14.0	14.3	14.1	13.3	12.0	11.0	11.0	12.1	13.4	13.3	13.2	12.9	13
	Station		Mean min.	6.8	7.3	8.4	9.6	9.0	7.5	7.2	7.1	6.8	8.4	8.9	7.3	7.9	
			Abs. min.	0.6	1.1	2.7	4.2	4.9	1.4	1.7	1.1	2.2	2.8	3.3	2.8	0.6	
9036235	Gakoe	UH	Mean max.	20.7	21.8	21.5	19.9	19.2	18.4	17.1	16.8	18.6	18.9	19.2	19.6	19.3	
2 160 m	Forest	0	Mean temp.	14.2	14.5	15.6	15.0	14.6	13.3	12.0	12.3	13.2	14.1	14.5	14.0	13.9	6
	Station	lp	Mean min.	7.6	7.1	9.6	10.0	9.9	8.1	6.9	7.7	7.8	9.3	9.8	8.4	8.5	
	(operating		Abs. min.	0.0	–1.1	3.9	4.4	1.1	–1.1	0.0	1.7	–0.6	3.9	3.3	2.8	–1.1	
	to 1964)																
9036259	Gatare	UH	Mean max.	17.6	18.6	18.4	17.1	17.0	16.6	14.9	15.1	17.6	17.9	17.1	18.7	17.2	
2 590 m	Forest	0	Mean temp.	12.4	13.2	13.3	12.9	12.8	11.8	10.8	10.9	12.0	12.6	12.5	13.0	12.3	6
	Station		Mean min.	7.1	7.7	8.1	8.6	8.6	6.9	6.7	6.6	6.3	7.3	7.9	7.2	7.4	
			Abs. min.	4.4	4.6	5.6	6.1	4.9	3.1	2.9	2.8	3.1	4.8	5.6	4.4	2.8	
9037018	Punda Mi-	UM	Mean max.	28.2	29.6	29.6	27.6	26.2	24.7	24.3	24.3	27.6	27.9	26.3	26.1	26.9	
1 370 m	lia Estate	4	Mean temp.	20.5	21.8	22.7	21.8	20.9	19.1	18.4	18.6	20.5	21.5	20.8	20.2	20.6	8
	(operating	lp	Mean min.	12.8	14.0	15.7	15.9	15.5	13.4	12.5	12.8	13.4	15.1	15.2	14.2	14.2	
	to 1940)		Abs. min	8.9	9.4	10.0	12.8	10.6	7.8	7.8	6.7	8.3	11.7	12.2	10.6	6.7	
9037037	Tana	LM	Mean max.	29.6	31.2	30.6	28.7	27.8	27.1	26.3	26.4	29.2	30.2	28.3	28.3	28.6	
1 060 m	Power	4	Mean temp.	21.8	23.4	23.9	23.3	22.3	21.6	20.6	20.8	22.5	23.8	22.7	23.0	22.3	7
	Station		Mean min.	13.9	15.6	17.1	17.8	16.8	15.6	14.8	15.1	15.7	17.4	17.1	15.6	16.0	
			Abs. min.	5.6	10.6	12.2	10.0	8.3	9.2	8.2	6.7	8.6	9.4	9.2	7.5	5.6	
9037042	Kahuhia	UM	Mean max.	27.1	29.7	20.1	27.7	27.2	26.1	23.7	23.5	26.1	27.5	26.6	24.8	26.7	
1 630 m	School	2	Mean temp.	20.4	22.2	22.9	21.9	21.4	20.2	18.3	18.3	18.7	21.2	21.0	19.7	20.7	5
	(operating		Mean min.	14.6	14.7	15.7	16.1	15.5	14.2	12.9	13.0	13.3	14.8	15.3	14.5	14.6	
	to 1961)		Abs. min.	11.1	7.2	12.2	11.1	12.2	11.1	10.0	10.6	10.6	11.1	12.8	11.7	7.2	
9037130	Thika,	UM	Mean max.	26.1	27.4	27.2	25.2	24.2	23.5	22.5	22.9	25.3	26.2	24.4	25.1	25.0	
1 600 m	Horticul-	3	Mean temp.	19.2	20.1	20.7	20.3	19.5	18.2	17.3	17.5	18.3	20.2	19.7	19.4	19.2	7
	tural Re-	lp	Mean min.	12.3	12.8	14.2	15.4	14.7	12.8	12.1	12.0	12.2	14.2	14.9	13.7	13.4	
	search Sta-		Abs. min.	5.6	6.1	8.9	12.2	8.9	7.2	6.7	5.6	6.7	8.9	11.1	8.9	5.6	
	tion																
9137048	Thika, Si-	UM	Mean max.	27.4	28.8	28.6	26.8	25.6	24.8	23.4	23.8	26.5	27.4	25.7	25.8	26.2	
1 460 m	sal Re-	4	Mean temp.	19.7	20.4	21.3	21.2	20.3	18.9	17.8	18.1	19.7	20.7	20.2	19.7	19.8	28
	search Sta-	lp	Mean min.	12.0	11.9	13.9	15.5	15.0	12.9	12.2	12.4	12.8	14.0	14.6	13.6	13.4	
	tion		Abs. min.	5.6	6.1	7.2	10.0	8.3	5.3	5.0	6.0	4.4	6.1	8.6	6.7	4.4	

1) AEZ = Agro-ecological zone; lp = lower places, hp = higher places within the zone

MURANG'A DISTRICT

TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

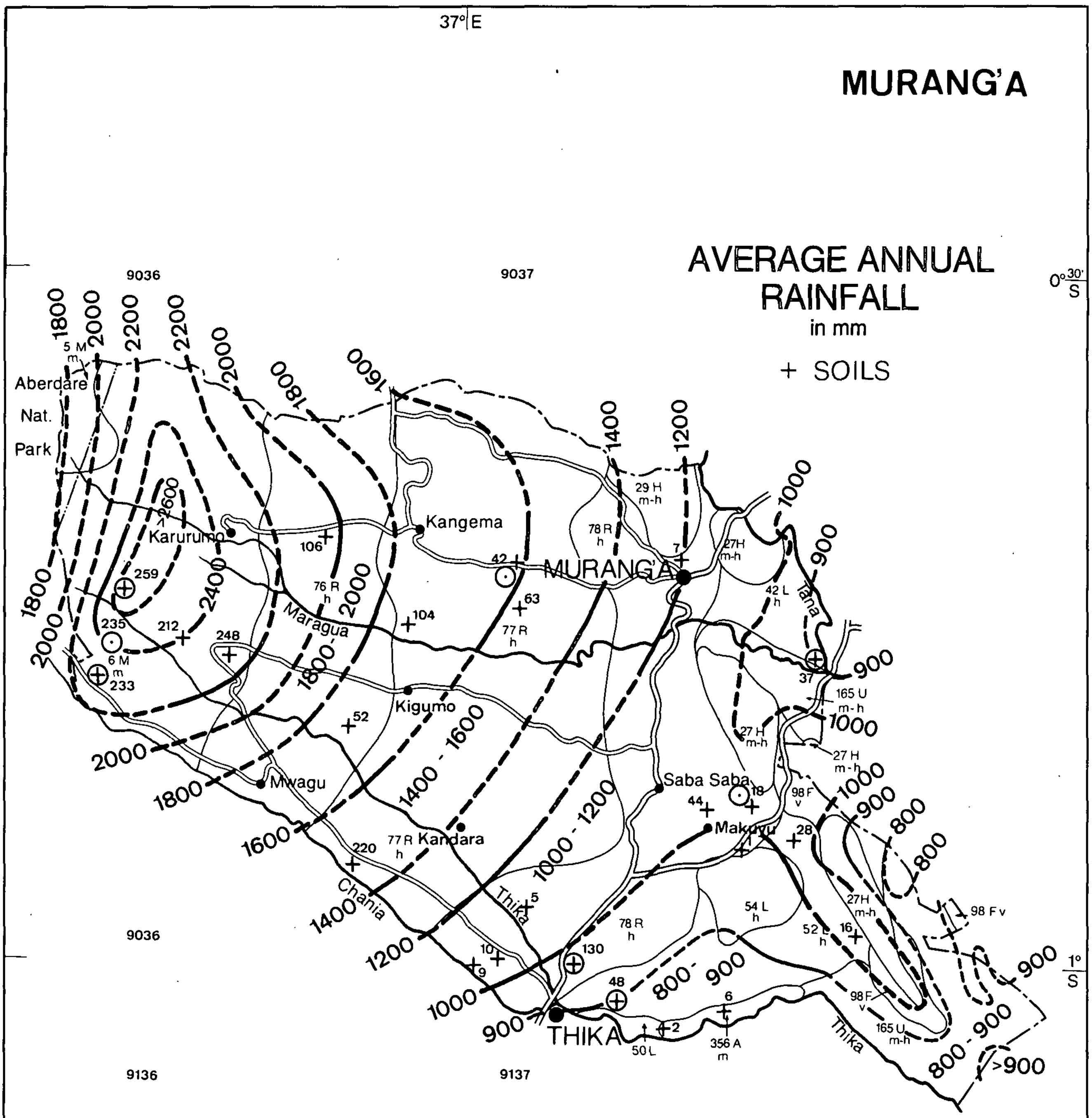
Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1)] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2)] in days	2nd rains in days	Total[3)] in days
TA I + II Tropical Alpine Zones		National Park							
UH 0 Forest Zone		Forest Reserve							
UH 1 Sheep and Dairy Zone	p or l/vl ⌐ m	2 130–2 430	14.9–13.0	2 200–2 500	1 100–1 400	650–700	210 or more	140–155	350–365
LH 1 Tea – Dairy Zone	p or l/vl ⌐ m	1 730–2 130	18.0–15.0	1 700–2 400	850–1 300	480–680	210 or more	140–155	350–365
UM 1 Coffee – Tea Zone	p or f l ⌐ m f l i m	1 670–1 800	18.8–18.0	1 700–1 900 1 500–1 700	800–1 100 700– 900	500–580 400–520	210 or more 180 or more	140–155 130–140	350–365 310–340
UM 2 Main Coffee Zone	m/l i m/s m + s/m	1 500–1 670	19.7–18.8	1 300–1 620 1 180–1 400	550– 820 450– 650	320–480 280–400	160 or more 130–160	110–130 105–115	270–300 –
UM 3 Marginal Coffee Zone	m/s + s s/m + s/m	1 340–1 500	20.7–19.7	900–1 350 900– 950	350– 650 350– 410	230–380 260–310	110–130 105–115	90–100 100–110	– –
UM 4 Sunflower – Maize Zone	s/m + s s + s s + s/vs	1 340–1 520	20.7–19.5	900–1 100 850– 950 800– 850	320– 450 280– 380 200– 280	230–300 220–280 200–230	100–110 90–105 85–100	90–100 90–100 75– 85	– – –
LM 3 Cotton Zone	s/m + s s + s	1 160–1 340	21.7–20.8	Very small, see Kirinyaga District 980–1 100	 390– 490	 270–320	 85–105	 85–100	 –
LM 4 Marginal Cotton Zone	s + s/vs s/vs + s/vs s/vs + vs/s	1 060–1 160	22.3–21.7	900–1 000 790– 980 Very small, see Kirinyaga District	350– 450 320– 400	230–280 250–300	85–100 75– 85	75– 85 75– 85	– –

1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants.

2) More if growing cycle of cultivated plants continues into the period of second rains.

3) Only added if rainfall continues at least for survival (> 0.2 E_0) of most long term crops.

MURANG'A



⊕ Temperature recording station, operating 1976, ⊙ closed

\+ Rainfall recording station, operating 1976 and having at least 10 years of records

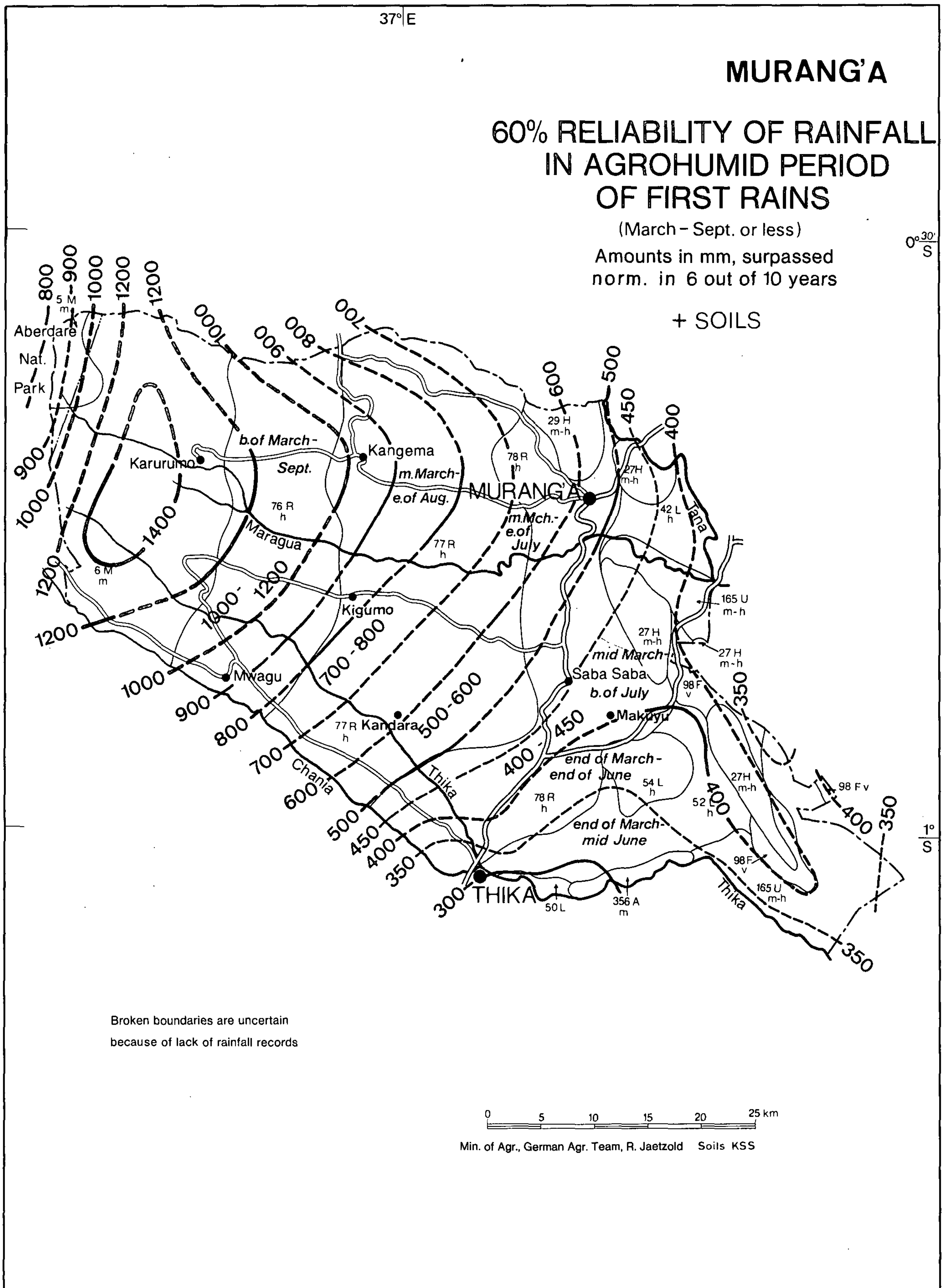
5 Station number in grid

9036 Grid number

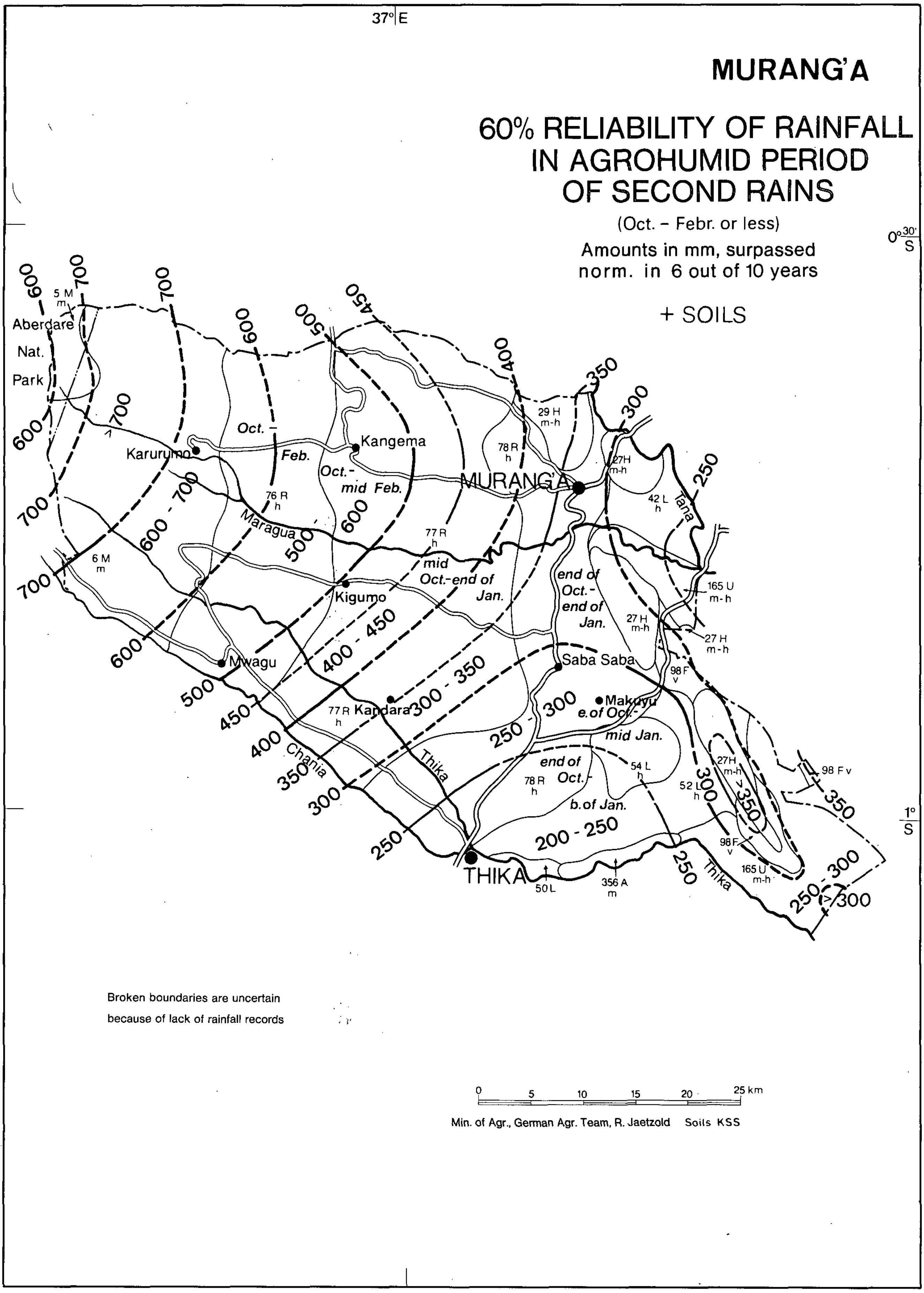
0 5 10 15 20 25 km

Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS

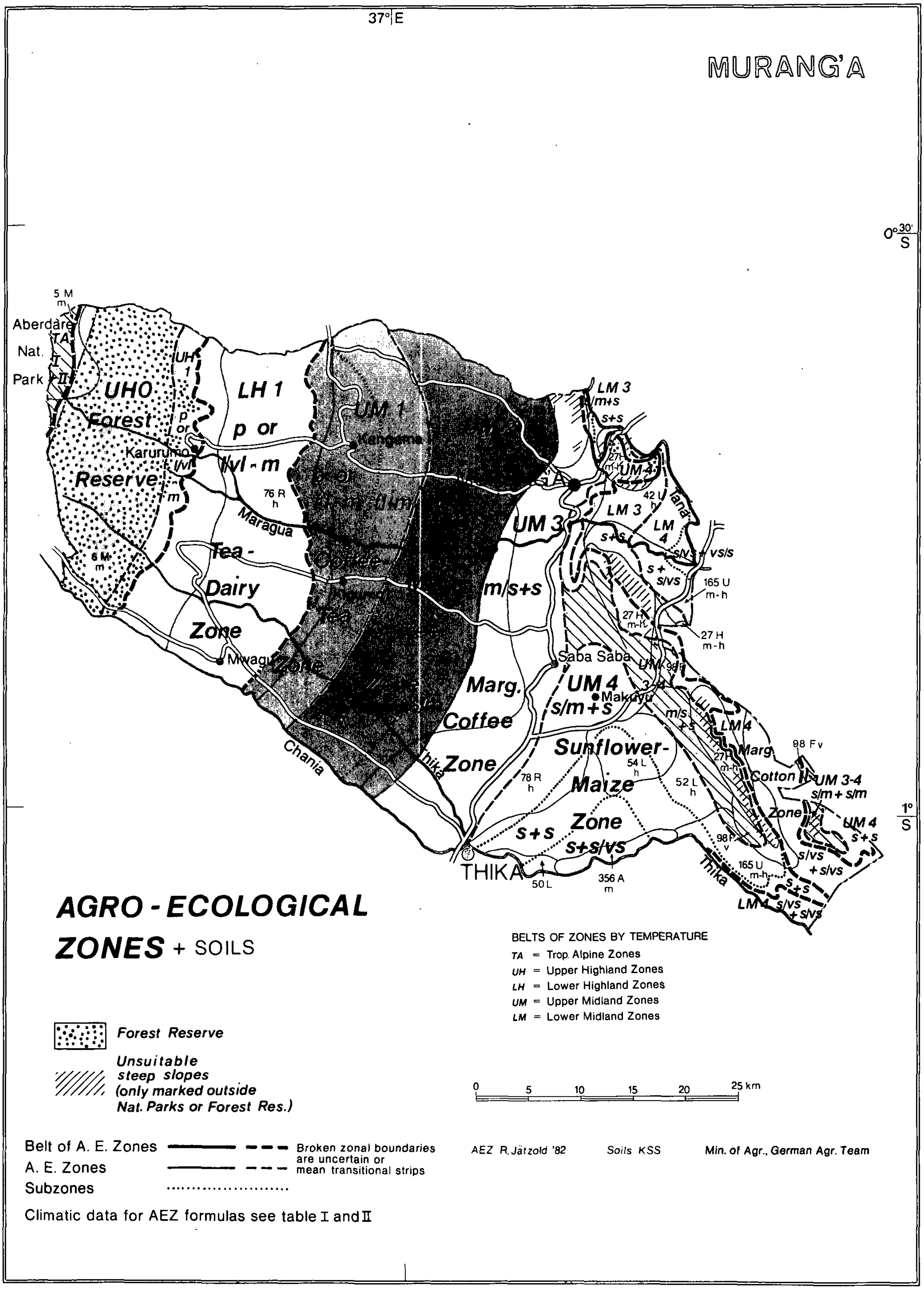
Broken boundaries are uncertain because of lack of rainfall records



MURANG'A
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF FIRST RAINS
(March - Sept. or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+ SOILS
37° E
0°30' S
1° S
Aberdare Nat. Park
Karurumo
Kangema
MURANG'A
Kigumo
Mwagu
Kandara
Saba Saba
Makuyu
THIKA
Maragua
Chania
Thika
Tana
b.of March - Sept.
m.March - e.of Aug.
m.Mch.- e.of July
mid March - b.of July
end of March - end of June
end of March - mid June
Broken boundaries are uncertain because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



37° E
MURANG'A
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF SECOND RAINS
(Oct. - Febr. or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+ SOILS
0°30' S
1° S
Aberdare Nat. Park
Karurumo
Kangema
MURANG'A
Kigumo
Mwagu
Kandara
Saba Saba
Makuyu
THIKA
Maragua
Chania
Thika
Tana
Oct. - Feb.
Oct. - mid Feb.
mid Oct.-end of Jan.
end of Oct.- end of Jan.
e. of Oct.- mid Jan.
end of Oct.- b. of Jan.
Broken boundaries are uncertain
because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



37°E
MURANG'A
0°30' S
1° S
Aberdare Nat. Park
UHO Forest Reserve
LH 1 p or l/vl - m
Tea - Dairy Zone
UM 1
Coffee - Tea Zone
UM 3 m/s+s
Marg. Coffee Zone
UM 4 s/m + s
Sunflower- Maize Zone
s+s
s+s/vs
LM 3
LM 4
Marg. Cotton Zone
UM 3-4 s/m + s/m
Kangema
Karurumo
Maragua
Saba Saba
Makuyu
Chania
Thika
THIKA
AGRO - ECOLOGICAL ZONES + SOILS
Forest Reserve
Unsuitable steep slopes (only marked outside Nat. Parks or Forest Res.)
Belt of A. E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
BELTS OF ZONES BY TEMPERATURE
TA = Trop. Alpine Zones
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
0 5 10 15 20 25 km
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team

AGRO-ECOLOGICAL ZONES

TA = *TROPICAL-ALPINE ZONES*

TA I + II = *Tropical-Alpine Moor- and Heathlands*

Here National Park
Limited grazing potential

UH = *UPPER HIGHLAND ZONES*

UH 0 = *Forest Zone*

UH 1 = *Sheep and Dairy Zone*

UH 1 p or l/vl ⌐ m = *Sheep and Dairy Zone or Vegetable Zone with permanent cropping possibilities, dividable in a long to very long cropping season followed by a medium one*

Upper places very steep and too important as a catchment area, therefore Forest Reserve or Nat. Park. Small strip of outside lower places cleared, there:

Good yield potential (av. 60–80 % of the optimum)
1st rains, start norm. mid March: Oats (Apr.–S.); horse beans, peas, tarwi, potatoes[1)]; late mat. rapeseed; cabbage, carrots, kohlrabi, celery, radish, endive, rampion, leek
2nd rains, start norm. mid Oct.: Oats (Oct.–F.); peas, potatoes[1)]; med mat. rapeseed, vegetables as in 1st r.

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Very late mat. maize like H 611 (lower places), late mat. triticale
2nd rains: Med. mat. triticale
Whole year: Pyrethrum, pears, plums

Pasture and forage
About 0.5 ha/LU on sec. pasture of Kikuyu grass; very suitable for grade dairy cows; rye grass (Lolium perenne) and Kenya white clover to improve pasture

LH = *LOWER HIGHLAND ZONES*

LH 1 = *Tea-Dairy Zone*

LH 1 p or l/vl ⌐ m = *Tea-Dairy Zone with permanent cropping possibilities, dividable in a long to very long cropping season followed by a medium one*

Very good yield potential (av. over 80 % of the optimum)
1st rains, start norm. mid March: Peas, cabbages, lettuce
2nd rains, start norm. b. of Oct.: Peas

Good yield potential (av. 60–80 % of the optimum)
1st rains (to 2nd r.): Late mat. maize H 612–614, 625 ($\sim$ 60 %, best planting time June–D./Jan.); Lima beans, carrots, leek, kales, endive
2nd rains: Potatoes (m. S.–m. Jan.); cabbages, carrots, kales, lettuce
Whole year, best planting time mid March: Tea (high quality), loquats, passion fruit (lower places)

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Beans[2)] (two times, 2nd time in Gathano rains July–O.)[6)]; potatoes (e. of F.–Jy.)
2nd rains: Beans, leek
Whole year: Pyrethrum (too wet), plums

Pasture and forage
About 0.5 ha/LU on sec. pasture of Kikuyu grass, suitable for grade dairy cows; clover for higher productivity

1) Spraying against fungus diseases important
2) In first rains sometimes rotting because of too wet conditions

UM = *UPPER MIDLAND ZONES*

UM 1 = *Coffee-Tea Zone*

UM 1 p or f l ⌐ m = *Coffee-Tea Zone with permanent cropping possibilities, dividable in a fully long cropping season followed by a medium one*

Small, potential almost as UM 1 f l i m on heavy soils but taro good, and for beans sometimes too wet. Stocking rate around 0.5 ha/LU

UM 1 f l i m = *Coffee-Tea Zone with a fully long cropping season, intermediate rains, and a medium one*[3]

Very good yield potential
1st rains, start norm. mid March: Lima beans, cabbages, kales
2nd rains, start norm. mid Oct.: Beans (Aug.–D./J.)
Whole year, best planting time mid March: Passion fruit, black wattle

Good yield potential
1st rains: Late mat. maize H 612–614, finger millet[4]; potatoes[1], late mat. sunflower like Kenya White; onions
2nd rains: Sweet potatoes; m. mat. sunflower like Hybrid S 301 A, cabbages (Aug–D.), kales, onions, tomatoes[6]
Whole year: Tea, Arabica coffee, bananas, mountain pawpaws, yams, loquats, avocadoes, arrowroots[6]

Fair yield potential
1st rains: Cold tol. sorghum, m. mat. foxtail millet (July–O., seeds Meru District); sweet potatoes, beans; tomatoes[6]
2nd rains: M. mat. maize like H 511 & 512 (S.–Jan.), late mat. H 612–614 (Jy.–Jan.), cold tol. sorghum (Aug.–F.), finger millet; potatoes (Aug.–D.)
Whole year: Citrus, taro[6], pineapples (lower pl.)

Pasture and forage
0.5–0.7 ha/LU on sec. pasture of Kikuyu grass; down to about 0.15 ha/LU feeding Napier grass, banana stems and leaves, sweet potato vines, maize stalks. Zero grazing recommended because land is so scarce

UM 2 = *Main Coffee Zone*

UM 2 m/l i m/s = *Main Coffee Zone with a medium to long cropping season, intermediate rains, and a medium to short one*[5]

Very good yield potential
1st rains, start norm. mid March: M. mat. sunflower like H S 301 A
2nd rains, start norm. mid Oct.: Beans (S./O.–Jan./F.)
Whole year, best pl. time mid March: Arabica coffee (~ 80 %), loquats, mountain pawpaws

Good yield potential
1st rains: M. mat. maize H 511 & 512, ratoon of sorghum (lower pl.); beans, potatoes[1], sweet potatoes; cabbages, kales, tomatoes[6], onions
2nd rains: E. mat. maize like Katumani comp. B, e. mat. foxtail millet, e. mat. sorghum like 2 KX 17; sweet potatoes (Aug./S.–Jan.); e. mat. sunflower like H S 345 (~ 1 500 m); kales, cabbages, onions, tomatoes[6]
Whole year: Bananas, citrus, avocadoes, passion fruit, pineapples, taro in valleys, arrowroots[6]

Fair yield potential
2nd rains: M. mat. local maize (Aug./S.–J./F.), finger millet; e. mat. potatoes
Whole year: Cassava (lower places), sugar cane (lower and wet places)

Pasture and forage
0.6–0.9 ha/LU on sec. pasture of star grass (Cynodon dactylon) but land too valuable for grazing; down to about 0.2 ha/LU feeding Napier or Bana grass with banana leaves and other forage

3) On medium soils; on heavy soils permanent cropping possibilities. Given potential refers to predom. heavy red loams
4) Protection against fungus diseases important
5) On medium soils; on heavy soils there is a long to medium and a medium to short cropping season. Given potential refers to predominating heavy red loams
6) Better in valleys

UM 2 = *Main Coffee Zone*
m + s/m *with a medium cropping season and a short to medium one*

Potential almost the same as UM 2 m/l i m/s less about 10 % of perennial or late maturing crops and of stocking rates because of more intensive drought; all vegetables better in valleys, coffee yields good

UM 3 = *Marginal Coffee Zone (here Coffee-Maize Zone)*

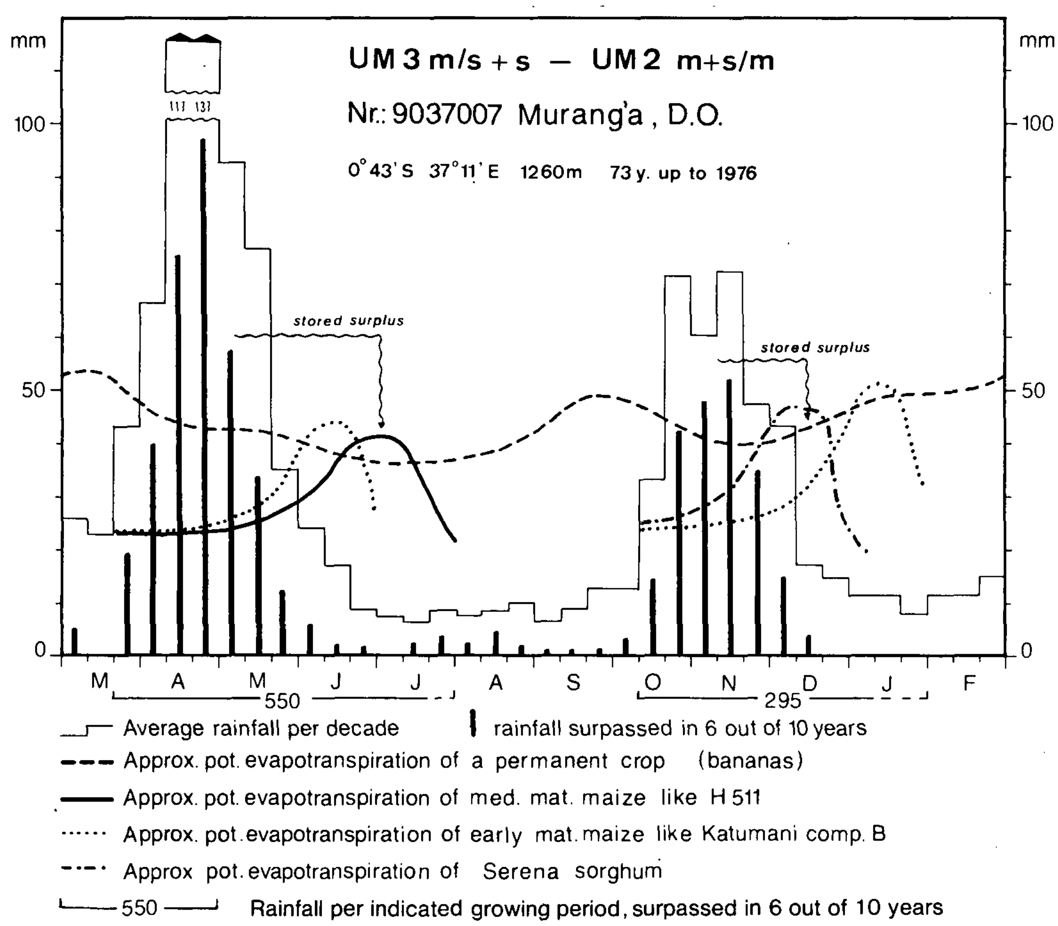
UM 3 = *Marginal Coffee Zone*
m/s + s *with a medium to short and a short cropping season*[7)]

(see Diagram Muranga)

Good yield potential
1st rains, start norm. mid to end of March: E. mat. maize like Katumani comp. B (lower places), m. mat. like H 511 or 512 (higher places), ratoon of e. mat. sorghum; e. mat. beans; e. mat. sunflower like H S 345 (< 1 500 m); onions, cabbages
2nd rains, start norm. mid Oct.: E. mat. foxtail millet, e. mat. sorghum like 2 KX 17, v. e. mat. sorghum like IS 8595; sunflower Issanka
Whole year: Pineapples (best planting time end of March), Macadamia nuts, per. castor

Fair yield potential
1st rains: Maize H 511 (lower places), m. mat. finger millet; m. mat. beans; sweet potatoes; kales, tomatoes[6)]
2nd rains: Katumani maize; e. mat. beans; e. mat. cabbages[6)], kales[6)], tomatoes[6)]
Whole year: Arabica coffee (lower places poor, there add. irrigation profitable); bananas (lower places marginal)[6)], citrus, pawpaws, cassava, pigeon peas (lower places)

Pasture and forage
0.7–1.1 ha/LU on sec. high grass savanna with zebra grass (Hyparrhenia rufa) predom.; down to about 0.25 ha/LU feeding Napier or Bana grass, glycine, maize stalks, sweet potato vines and other forage



UM 3 = *Marginal Coffee Zone*
s/m+s/m *with two short to medium cropping seasons*

Very small and transitional to UM 4, potential see Machakos District

7) On medium soils; on heavy soils first cropping season has a medium length, second a short to medium. Potential refers to predominating heavy red loams

8) Sisal recommended for large scale plantations only

UM 4 = *Sunflower-Maize Zone or Upper Sisal Zone*[8)]

UM 4 s/m + s = *Sunflower-Maize Zone with a short to medium and a short cropping season*[9)]

(see Diagram Makuyu Sisal Estate)

Good yield potential

1st rains, start norm. mid to end of March: E. mat. maize like Katumani comp. B, e. mat. sorghum like Serena; ratoon of e. mat. sorghum; mwezi moja beans; e. mat. sunflower like Issanka

2nd rains, start norm. mid Oct.: Dryl. comp. maize; v. e. mat. sorghum; sunflower like Issanka

Whole year, best pl. time end of Oct.: Sisal

Fair yield potential

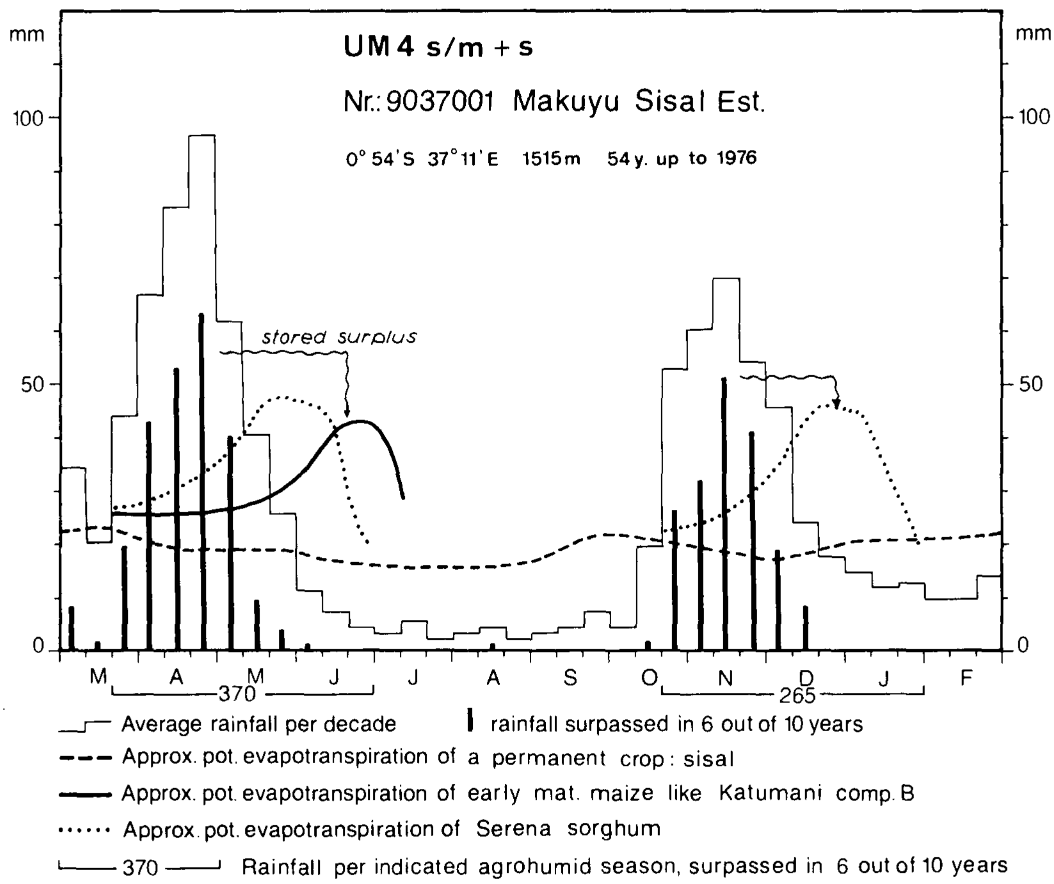
1st rains: Finger millet; dolichos beans; sweet potatoes; Virg. tobacco; tomatoes[6)], onions, cabbages[6)]

2nd rains: Katumani maize, e. mat. sorghum like 2 KX 17; mwezi moja beans (50–60 %)

Whole year: Cassava, castor, pineapples[10)]

Pasture and forage

0.9–1.3 ha/LU on high grass savanna with zebra grass (Hyparrhenia rufa) predominant; down to 0.28 ha/LU feeding Bana grass, siratro (Macroptilium atropurpureum), horse tamarind (Leucaena leucocephala), maize stalks and silage (of green maize or green fodder sorghum)



UM 4 s + s = *Sunflower-Maize Zone with two short cropping seasons*[9)]

Crop potential almost the same as UM 4 s/m + s less about 10 % yield expectations, but Maize H 511 not recommended except on very suitable soils. Stocking rates 0.9–1.5 ha/LU

UM 4 s + s/vs = *Sunflower-Maize Zone with a short and a short to very short cropping season*[9)]

Good yield potential

1st rains, start norm. m./e. of March: Dryland comp. maize, v. e. mat. sorghum, e. mat. sorghum like Serena (60–70 %); mwezi moja beans, e. mat. cowpeas like Katuli (lower places); dwarf sunflower (lower pl.), e. mat. sunflower like Issanka

2nd rains, start norm. end of O.: V. e. mat. sorghum like IS 8595, e. mat. foxtail and proso millet (lower pl.)

Whole year: Sisal

9) On medium soils; on heavy soils vegetation (growing) periods last about half a month more in 1st r., one decade in 2nd r. Potential refers to predominating heavy clays except on slopes. There, full potential could be reached by contour ridging (matuta system)

Fair yield potential
1st rains: Katumani maize; dolichos beans, e. mat. beans; sweet potatoes; Virg. tobacco with seedbed irrigation; tomatoes, onions, e. mat. cabbages
2nd rains: Dryland comp. maize; mwezi moja beans; dwarf sunflower
Whole year: Cassava, pineapples[10], castor

Pasture and forage
1–1.6 ha/LU on medium to high grass savanna; down to 0.3 ha/LU feeding Bana grass, siratro, horse tamarind and saltbush (Atriplex nummularia)

LM = LOWER MIDLAND ZONES

LM 3 = Cotton Zone

LM 3 s/m + s = Cotton Zone with a short to medium and a short cropping season

Very small, potential see Kirinyaga District

LM 3 s + s = Cotton Zone with two short cropping seasons[11]

Very good yield potential
2nd rains, start norm. mid Oct.: E. mat. proso millet like Serere I

Good yield potential
1st rains, start norm. end of March: Katumani maize, ratoon of e. mat. sorghum like 2 KX 17, e. mat. bulrush millet (awned var.), e. mat. foxtail millet (nearly 80 %); e. mat. beans, cowpeas, chick peas on h. black soils, green grams; e. mat. sunflower like Issanka
2nd rains: E. mat. sorghum like 2 KX 17, e. mat. bulrush millet; green grams, cowpeas, pigeon peas (O.–S.); cotton bimodal var. on good, well drained heavy soils (b. of O.–Aug., ~ 60 %), dwarf sunflower
Whole year, best planting time end of Oct.: Sisal, castor

Fair yield potential
1st rains: M. mat. maize H 511, dolichos beans (50–60 %), groundnuts in light soils, e. mat. soya beans; sweet potatoes, virginia tobacco; tomatoes, onions
2nd rains: Dryland comp. maize (50–60 %), Katumani maize; dolichos beans, mwezi moja beans; cotton bim. var. on med. soils, sunflower like Issanka
Whole year: Cassava, pineapples, mangoes, Macadamia nuts

Poor yield potential
2nd rains: Virg. tobacco (better with seedbed irrigation); e. mat. sweet potatoes
Whole year: Citrus

Pasture and forage
0.9–1.5 ha/LU on high grass savanna with Zebra grass (Hyparrhenia rufa) predominant; down to 0.28 ha/LU feeding Bana grass a.o. forage

LM 4 = Marginal Cotton Zone

LM 4 s + s/vs = Marginal Cotton Zone with a short and a short to very short cropping season

Small, potential almost the same as LM 3 s + s but cotton marginal (except on very suitable soils) and stocking rates a little bit lower

LM 4 s/vs+s/vs = Marginal Cotton Zone with two short to very short cropping seasons

Good yield potential
1st rains, start norm. end of March: Dryland comp. maize (on contour ridges), ratoon of e. mat. sorghum like 2 KX 17 or v. e. mat. like IS 8595 (70–80 %), e. mat. bulrush millet (awned var. preferred), e. mat. foxtail or proso millet (70–80 %); v. e. mat. beans like mwezi moja, e. mat. cowpeas like Katuli, black and green grams, chick peas (late planted on h. black soils); v. e. mat. dwarf sunflower, rai (oilseed); v. e. mat. pumpkins

10) Good or very good with add. irrigation
11) On medium soils; on heavy soils first cropping season has a short to medium length. Given potential refers to predominating heavy soils

2nd rains, start norm. end of Oct.: The same but planting sorghum (for ratoon in next r.)
Whole year, best pl. time end of Oct.: Sisal, jojoba, buffalo gourds (on sandy soils) and Marama beans (both still experimental), Vigna, per. castor like C–15

Fair yield potential
1st rains: Katumani maize (on contour ridges); e. mat. beans, e. mat. soya beans, dolichos beans, e. mat. bambarra groundnuts (light soils); sweet potatoes; e. mat. sunflower like Issanka; onions, tomatoes
2nd rains: The same and cotton bimodal var. (O.–Aug., on good soils, otherwise poor); late mat. pigeon peas (O.–S.)
Whole year: Macadamia nuts, cassava

Pasture and forage
1.5–3.5 ha/LU on mixed medium grass savanna with Makueni guinea (Panicum maximum) and red oats grass (Themeda triandra) predominant; if degraded reseeding with Masai love grass (Eragrostis superba), buffel grass (Cenchrus ciliaris) and Makueni guinea, and planting saltbushes (Atriplex nummularia), horse tamarinds (Leucaena leucocephala) and Mesquite (Prosopis juliflora) as palatable shrubs, and applering acacias (Gao tree, Ac. albida) for pods and leaves; add. forage: Silage of green fodder sorghum, vines of moth beans, and other fodder crops

LM 4 = Marginal Cotton Zone
s/vs+vs/s with a short to very short and a very short to short cropping season

Very small, potential see Kirinyaga District

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The physiography in the western part of the district is dominated by the Nyandarua Range, the eastern part by ridges of Basement rocks. The central part consists of undulating to rolling topography (volcanic foothill ridges).

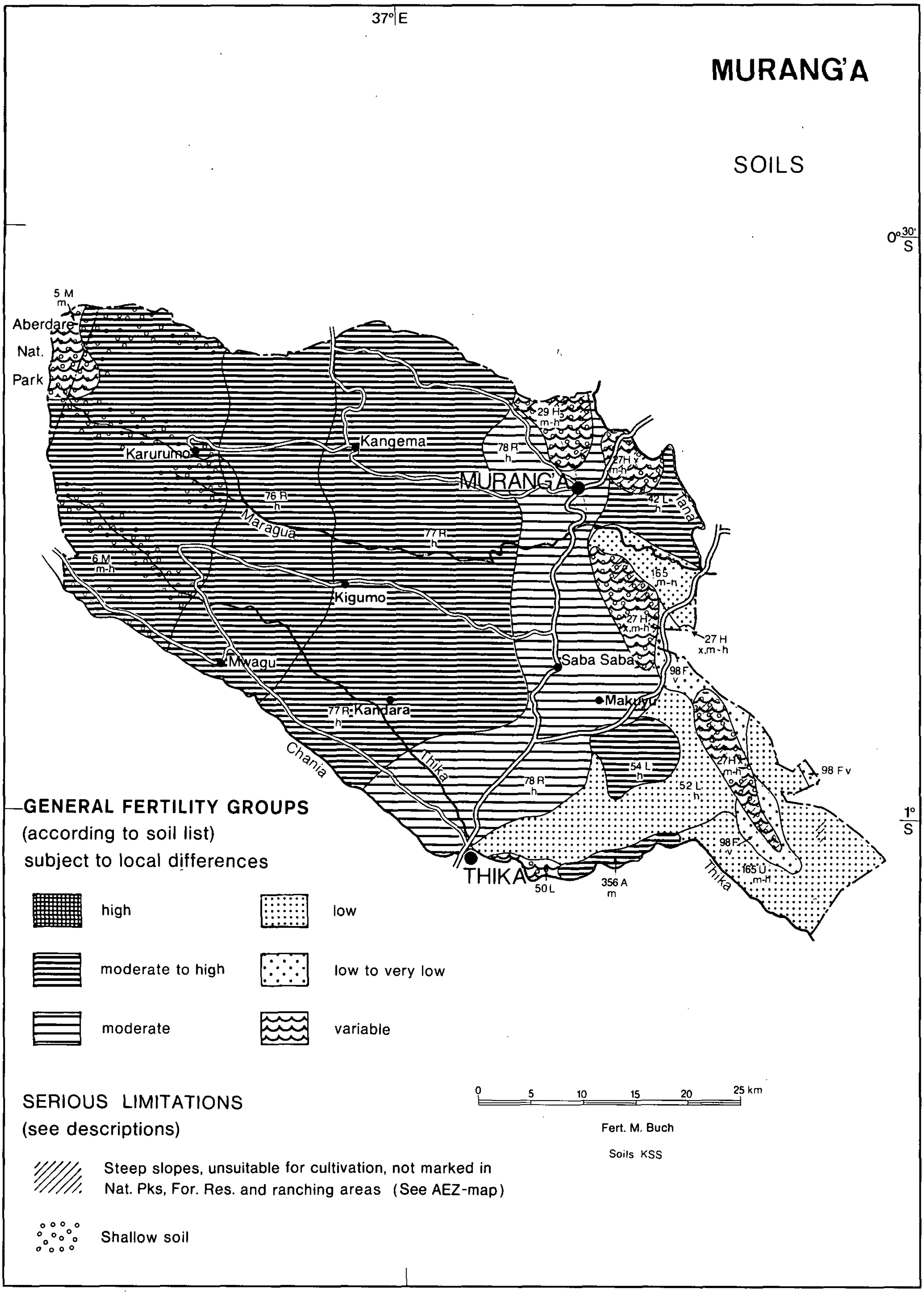
The highest parts of the area contain soils of unit 5 M which have a variable fertility but it is too cold for any land use. At a slightly lower altitude, soils with a humic topsoil and of moderate to high fertility are found (unit 6 M). They may be leached and very acid (ph 3.5–4.5) or shallow.

Hill soils occur in the northeastern and southeastern parts of Murang'a District (units 27 H and 29 H), and are of variable (27 H) or moderate to high fertility.

The major part of the district, the volcanic foothills landscape, has soils with a variable topsoil, but often fairly rich in organic matter (unit 77 R) and of moderate to high fertility.

On the eastern and southeastern uplands (unit 165 U) the soils are of low fertility because they are non-volcanic. On the plateaus, various soils occur: In the northeastern part, soils of unit 42 L, of moderate to high fertility, in the southern area, soils of unit 54 L also of moderate to high fertility.

At the southern boundary of the district, east of Thika, soils occur on footplains which are of moderate to high fertility (unit 356 A).



37° E
MURANG'A
SOILS
0° 30' S
1° S
5 M m
Aberdare Nat. Park
Karurumo
Kangema
MURANG'A
Kigumo
Mwagu
Kandara
Saba Saba
Makuyu
THIKA
Maragua
Chania
Thika
Tana
29 H m-h
78 R h
27 H m-h
42 L h
76 R h
77 R h
6 M m-h
165 m-h
27 H x,m-h
98 F v
54 L h
52 L h
98 F v
27 H m-h
165 U m-H
50 L
356 A m
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
low
moderate to high
low to very low
moderate
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
0 5 10 15 20 25 km
Fert. M. Buch
Soils KSS

SOILS ON MOUNTAINS AND MAJOR SCARPS

Soils developed on olivine basalts and ashes of major older volcanoes

5 M m[1]	=	imperfectly drained, shallow to moderately deep, dark greyish brown, very friable, acid humic to peaty, loam to clay loam, with rock outcrops and ice in the highest parts (dystric HISTOSOLS, lithic phase; with LITHOSOLS, rock outcrops and ice)
6 M m–h	=	well drained, very deep, dark reddish brown to dark brown, very friable and smeary, clay loam to clay, with thick, acid humic topsoil; in places shallow to moderately deep and rocky (humic ANDOSOLS, partly lithic phase)

SOILS ON HILLS AND MINOR SCARPS

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

27 H m–h	=	complex of excessively drained to well drained, shallow, dark red to brown, friable, sandy clay loam to clay; in many places rocky, bouldery and stony and in places with acid humic topsoil (dystric REGOSOL; with LITHOSOL, humic CAMBISOLS lithic phase and Rock Outcrops)
29 H m–h	=	somewhat excessively drained, predominantly moderately deep, red, very friable, sandy clay loam to sandy clay; in places rocky (ferralic CAMBISOLS; with rhodic or orthic FERRALSOLS and Rock Outcrops)

SOILS ON PLATEAUS AND HIGH LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older basic tuffs included)

42 L h	=	well drained, very deep, dark reddish brown to dark brown, friable to firm, slightly cracking clay; in places with humic topsoil (verto-eutric NITOSOLS; with mollic NITOSOLS)
52 L h	=	well drained, very deep, dark red, very friable clay (nito-rhodic FERRALSOLS)
54 L x, h	=	imperfectly drained, very deep, dark grey to black, firm to very firm, bouldery and stony, cracking clay; in places with calcareous, slightly saline deeper subsoil (pellic VERTISOLS, stony phase and partly saline phase)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

76 R h	=	well drained, extremely deep, dark reddish brown to dark brown, friable and slightly smeary clay, with acid humic topsoil (ando-humic NITOSOLS; with humic ANDOSOLS)
77 R h	=	well drained, extemely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil (humic NITOSOLS)
78 R h	=	well drained, extremely deep, dusky red to dark reddish brown, friable clay; with inclusions of well drained, moderately deep, dark red to dark reddish brown, friable clay over rock, pisoferric or petroferric material (eutric NITOSOLS; with nito-chromic CAMBISOLS and chromic ACRISOLS, partly pisoferric or petroferric phase)

SOILS ON FOOTSLOPES

Soils developed on colluvium from undifferentiated Basement System rocks

98 F v	=	complex of well drained, deep to very deep, dark reddish brown to dark yellowish brown soils of varying consistence and texture, in places gravelly and stratified (ferralic ARENOSOLS; with ferralo-chromic/orthic LUVISOLS)

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on undifferentiated Basement System rocks

165 U m–h	=	well drained, moderately deep to deep, dark red to yellowish red, friable, sandy clay loam to clay (rhodic and orthic FERRALSOLS; with ferralo-chromic/orthic/ferric ACRISOLS)

SOILS ON FOOTPLAINS

Soils developed on sediments mainly from crystalline Basement System rocks

356 A m	=	well drained to imperfectly drained, very deep, brown to dark brown, friable, slightly calcareous, micaceous, sandy loam to clay loam; in places with a saline-sodic deeper subsoil (eutric FLUVISOLS)

1) Soil texture-classes

h	=	heavy
l	=	light
m	=	medium
x	=	stony or bouldery
v	=	varying texture
m–h	=	medium to heavy
m, h	=	medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey:
Exploratory Soil Map and Agro-climatic Zone Map of Kenya, scale 1:1.000.000. Expl. Soil Survey Rep. E1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

The total population of the Murang'a District was 648,333 people at the time of the last Census in September 1979 (Table 4). Approximately 20,000 people (3.12 % of the total) lived in Murang'a township and in the 3 trading centres of the district, i.e. the majority depends on agriculture for a living. As this district is mostly suitable for high quality cash crops, it is not surprising that the farm sizes are in general relatively small. The relevant zones are LH 1 (Tea-Dairy Zone, 34,400 ha), UM 1 (Coffee-Tea Zone, 26,100 ha), and UM 2 (Main Coffee Zone, 30,700 ha), which cover more than 50 % of the total agricultural land of 180,800 ha (= 81.6 % of the total rural area of 221,600 ha). A further 38 % is assigned to UM 3 (Marginal Coffee Zone) and UM 4 (Sunflower-Maize Zone).

As regards farm size, the statistics show that an average household of 5 people had only 1.46 ha, i.e. 0.29 ha per person, but this varies, e.g. in Weithaga location (UM 1 and UM 2) it is half the average, 0.72 ha per household and 0.14 ha per person. Although the agro-ecological conditions here allow extremely intensive cultivation of cash crops, this figure is near the ultimate limit for a small farm. In Kakuzi location, however, where UM 3 and UM 4 predominate, 4.60 ha per household and 1.10 ha per person are not excessive because the potential is lower.

The population pressure is not as extreme as in Kiambu District, but intensification of food crop cultivation and planting of horticultural crops is absolutely necessary in order to get a maximum of food output per area unit. This should help to arrest the increasing dependence of the district population on food 'imports', a fact which can have disastrous results during times of low prices for the (exported) cash crops like coffee and tea, the main source of income in this district.

MURANG'A DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Kandara	10 018	10 780	20 798	3 638	104	199
Ruchu	12 955	13 837	26 792	4 833	68	393
Gaichanjiru	17 440	19 647	37 087	7 032	76	486
Muruka	24 798	26 860	51 658	9 546	89	576
Gatanga	21 717	23 669	45 386	8 172	83	545
Kandara Division	86 928	94 793	181 721	33 221	421	430
Kinyona	11 845	12 860	24 705	4 662	152	161
Muthithi	15 156	16 898	32 054	6 074	75	421
Kamahuha	7 661	8 097	15 758	3 373	48	324
Kigumo	12 782	14 394	27 176	5 387	45	600
Nginda	17 196	18 227	35 423	7 339	115	306
Kigumo Division	64 640	70 476	135 116	26 835	438	308
Kiru	17 233	19 452	36 685	6 992	81	447
Kiriti	12 404	14 541	26 945	5 119	86	312
Gitugi	9 841	11 402	21 243	3 960	48	437
Iyego	13 745	16 045	29 790	6 201	60	493
Kanyenyaini	8 715	9 534	18 249	3 673	64	281
Kangema Division	61 938	70 974	132 912	25 945	341	388
Mugoiri	24 422	27 085	51 507	9 832	119	431
Mbiri	3 825	4 241	8 066	1 542	27	298
Gikindu	4 277	4 746	9 023	1 957	81	111
Gaturi	12 358	13 800	26 158	5 167	103	253
Weithaga	13 331	14 807	28 138	5 292	50	561
Murang'a township	7 721	7 569	15 290	4 067	26	576
Kiharu Division	65 934	72 248	138 182	27 857	407	339
Makuyu	7 906	7 770	15 676	3 802	134	116
Kakuzi	7 998	7 749	15 747	3 757	203	77
Mitumbiri	9 520	7 457	16 977	5 402	223	75
Ithanga	5 768	6 234	12 002	2 419	82	144
Makuyu Division	31 192	29 210	60 402	15 380	643	93
Murang'a District	310 632	337 701	648 333	129 238	2 476	261

MURANG'A DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children < 15 years	Other Relatives		
Location:						
Kandara	3638	3.19	1.78	0.45	0.27	5.69
Ruchu	4857	3.10	1.75	0.42	0.21	5.48
Gaichanjiru	7038	2.95	1.44	0.46	0.22	5.25
Muruka	9569	3.09	1.70	0.46	0.14	5.39
Gatanga	8172	3.13	1.80	0.43	0.19	5.55
Division: Kandara	33274	3.09	1.71	0.45	0.19	5.45
Location:						
Kinyona	4646	3.03	1.64	0.43	0.20	5.30
Muthithi	6084	2.96	1.68	0.44	0.19	5.27
Kamahuha	3358	2.72	1.26	0.41	0.25	4.65
Kigumo	5386	2.91	1.63	0.39	0.12	5.04
Nginda	7307	2.88	1.42	0.38	0.16	4.84
Division Kigumo	26781	2.90	1.55	0.41	0.18	5.03
Location:						
Kiriti	5108	2.83	1.68	0.63	0.14	5.27
Gitugi	3960	2.85	1.62	0.69	0.20	5.36
Iyego	6199	2.76	1.48	0.45	0.12	4.80
Kanyenyaini	3677	2.80	1.50	0.50	0.16	4.96
Division: Kangema	25963	2.87	1.53	0.57	0.15	5.12
Location:						
Mugoiri	9823	2.93	1.60	0.57	0.14	5.24
Mbiri	1539	2.85	1.53	0.69	0.18	5.24
Gikindu	1957	2.59	0.47	0.54	0.24	4.61
Gaturi	5174	2.79	1.56	0.51	0.18	5.05
Weithaga	5289	2.96	1.65	0.58	0.13	5.31
Murang'a Township	4059	2.20	0.65	0.36	0.36	3.58
Division: Kiharu	27841	2.78	1.43	0.54	0.19	4.93
Location:						
Makuyu	3807	2.45	1.02	0.46	0.18	4.12
Kakuzi	3808	2.47	1.03	0.44	0.19	4.13
Mitumbiri	5405	2.08	0.51	0.21	0.34	3.14
Ithanga	2413	2.70	1.40	0.62	0.26	4.97
Division : Makuyu	15433	2.37	0.89	0.39	0.25	3.91
DISTRICT: MURANG'A	129292	2.83	1.51	0.48	0.19	5.00

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per households as well

TABLE 6: AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON[1)]

Location/Division without townships	in '00 ha = sqkm					in '00 ha = sqkm									in ha	
	Area total Census 79	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps	Non-agricultural land: Others (roads, home-steads, rivers...)	Agri-cultural land	Area in agro-ecological zones AEZ: UH 1	LH 1	UM 1	UM 2	UM 3	UM 3–4	UM 4	LM 3	LM 4	Agric. land per household	person
Kandara	104			18	86	1	78	7							2.36	0.41
Rucho	68			12	56		25	27	4						1.16	0.21
Gaichanjiru	76			15	61				20	41					0.87	0.16
Muruka	89			18	71				44	27					0.74	0.14
Gatanga	83			16	67		2	12	50	3					0.82	0.15
Kandara Divsion	420			79	341	1	105	46	118	71					1.03	0.19
Kinyona	152			15	137	19	108	10							2.93	0.55
Muthithi	75			15	60				20	40					0.99	0.19
Kamahuha	48		F. 2	9	37					4	12	20	1		1.10	0.23
Kigumo	45			9	36			25	11						0.67	0.13
Nginda	115			21	94				26	30		23	11	4	1.28	0.27
Kigumo Division	435		2	69	364	19	108	35	57	74	12	43	12	4	1.40	0.28
Kiru	81			16	65	2	18	45							0.93	0.18
Kiriti	86			15	71	13	50	8							1.39	0.26
Gitugi	48			10	38			26	12						0.96	0.18
Iyego	60			12	48			33	15						0.77	0.16
Kanyenyaini	64			11	53	14	38	1							1.44	0.29
Kangema Division	339			64	275	29	106	113	27						1.06	0.21
Mugoiri	119			24	95		25	39	31						0.97	0.18
Mbiri	27			5	22				9	12		1			1.43	0.27
Gikindu	81	6	F. 6	11	58							5	25	28	2.96	0.64
Gaturi	103		F. 2	19	82			8	47	19			8		1.59	0.31
Weithaga	50		F. 2	10	38			20	18						0.72	0.14
Kiharu Division	380	6	F. 10	69	295		25	67	105	31		6	33	28	1.24	0.24
Makuyu	134	7		20	107					7	19	60	6	15	2.81	0.68
Kakuzi	203	10		20	173						40	105		28	4.60	1.10
Mitumbiri	223			29	194					58		136			3.59	1.14
Ithanga	82	11		12	59						4	17		38	2.44	0.49
Makuyu Division	642	28		81	533					65	63	318	6	81	3.62	0.91
Total rural area	2 216	34	12	362	1 808	49	344	261	307	241	75	367	51	113	1.46	0.29

1) For official land statistics see supplementary publication to FMHB, Vol. III A: Agriculture Land Statistics

AGRICULTURAL STATISTICS[1)]

This district, although comparatively small in size, produces a relatively large amount of the country's major export commodities. Roughly 8,600 ha of **tea** is grown in small family farms, each owning approximately 0.45 ha, yielding 2,300 kg of green leaves per ha p.a.. **Coffee** is produced on 13,000 ha (0.25 ha per farm), producing 900 kg of clean coffee per ha/year – one of the highest coffee yields in Kenya. In addition, 1,700 t of dried **pyrethrum** flowers (containing 1.6 % pyrethrin) are produced within the district p.a.. There are also 3,000 ha of coffee grown under irrigation by large estates, producing 1,200 kg of clean coffee per ha/year.

1) For more detailed and up to date information, see FMHB Vol. III/A

MURANG'A DISTRICT

TABLE 7a: **TEA**

AREA – PRODUCTION – GROWERS – YIELDS – RETURNS[a)]

Division	Item	Unit	Year				
			1975/76	1976/77	1977/78	1978/79	1979/80
Kandara	Area	ha	1,450	1,615	1,812	1,984	2,166
	Production	t	2,671	4,550	5,321	6,133	5,061
	Value	'000 Shs	4,434	15,878	12,238	14,289	15,184
	Growers	No	3,069	3,469	3,812	4,081	4,210
	Yield per ha	kg	1,842	2,817	2,936	3,091	2,337
	Value per ha	Shs	3,060	9,831	6,754	7,202	7,010
	Area per Grower	ha	0.47	0.47	0.48	0.49	0.51
	Returns per Grower	Shs	1,445	4,577	3,210	3,501	3,607
Kangema	Area	ha	2,586	2,848	3,183	3,104	3,188
	Production	t	5,234	8,802	9,448	10,253	8,758
	Value	'000 Shs	8,270	28,781	24,470	25,633	27,413
	Growers	No	6,464	7,121	7,865	8,279	8,564
	Yield per ha	kg	2,024	3,091	2,968	3,303	2,747
	Value per ha	Shs	3,198	10,106	7,797	8,258	8,599
	Area per Grower	ha	0.40	0.40	0.40	0.37	0.37
	Returns per Grower	Shs	3,198	4,042	3,111	3,096	3,200
Kigumo	Area	ha	1,500	1,710	1,967	2,136	2,180
	Production	t	3,142	5,259	5,793	6,482	5,299
	Value	'000 Shs	5,216	18,353	13,324	15,103	15,898
	Growers	No	3,592	4,173	4,673	4,938	5,001
	Yield per ha	kg	2,095	3,075	2,945	3,035	2,430
	Value per ha	Shs	3,477	10,734	6,774	7,071	7,293
	Area per Grower	ha	0.42	0.41	0.42	0.43	0.44
	Returns per Grower	Shs	1,452	4,398	2,851	3,059	3,179
Kiharu	Area	ha	792	864	963	1,001	1,062
	Production	t	2,056	3,294	3,367	3,569	3,236
	Value	'000 Shs	3,413	11,786	7,745	8,315	9,707
	Growers	No	1,979	2,217	2,411	2,470	2,598
	Yield per ha	kg	2,596	3,813	3,497	3,565	3,047
	Value per ha	Shs	4,309	13,641	8,043	8,307	9,140
	Area per Grower	ha	0.40	0.39	0.40	0.41	0.41
	Returns per Grower	Shs	1,725	5,316	3,212	3,366	3,736

a) Source: K.T.D.A.

MURANG'A DISTRICT

TABLE 7b: **COFFEE**
AREA – PRODUCTION – YIELDS[a)]

Co-operatives

Item	Unit	Year					
		74/75	75/76	76/77	77/78	78/79	79/80
Area	ha	8536	8536	8536	8536	9400	12563
Production	t	5727	6521	10355	8769	8000	11264
Yield	kg/ha	671	764	1213	1027	851	897

Estates

Name	Item	Unit	Year					
			74/75	75/76	76/77	77/78	78/79	79/80
Mitubiri	Area	ha	1560	1560	1558	1566	1660	1715
	Production	t	1811	2838	2510	2739	1498	2676
	Yield	kg/ha	1161	1819	1611	1749	902	1560
Makuyu	Area	ha	1222	1222	1209	1247	1380	1249
	Production	t	999	1298	1558	1386	814	1131
	Yield	kg/ha	818	1062	1314	1111	590	906

TABLE 7c: **PYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[b)]

Item	Year				
	75/76	76/77	77/78	78/79	79/80
Production in t dried flowers	12.4	8.0	2.4	1.6	1.6
Pyrethrin content %	1.6	1.6	1.6	1.7	1.6

Sources: a) C.B.K.
b) Pyrethrum Board

SMALL FARM SURVEY (SFS)[1)]

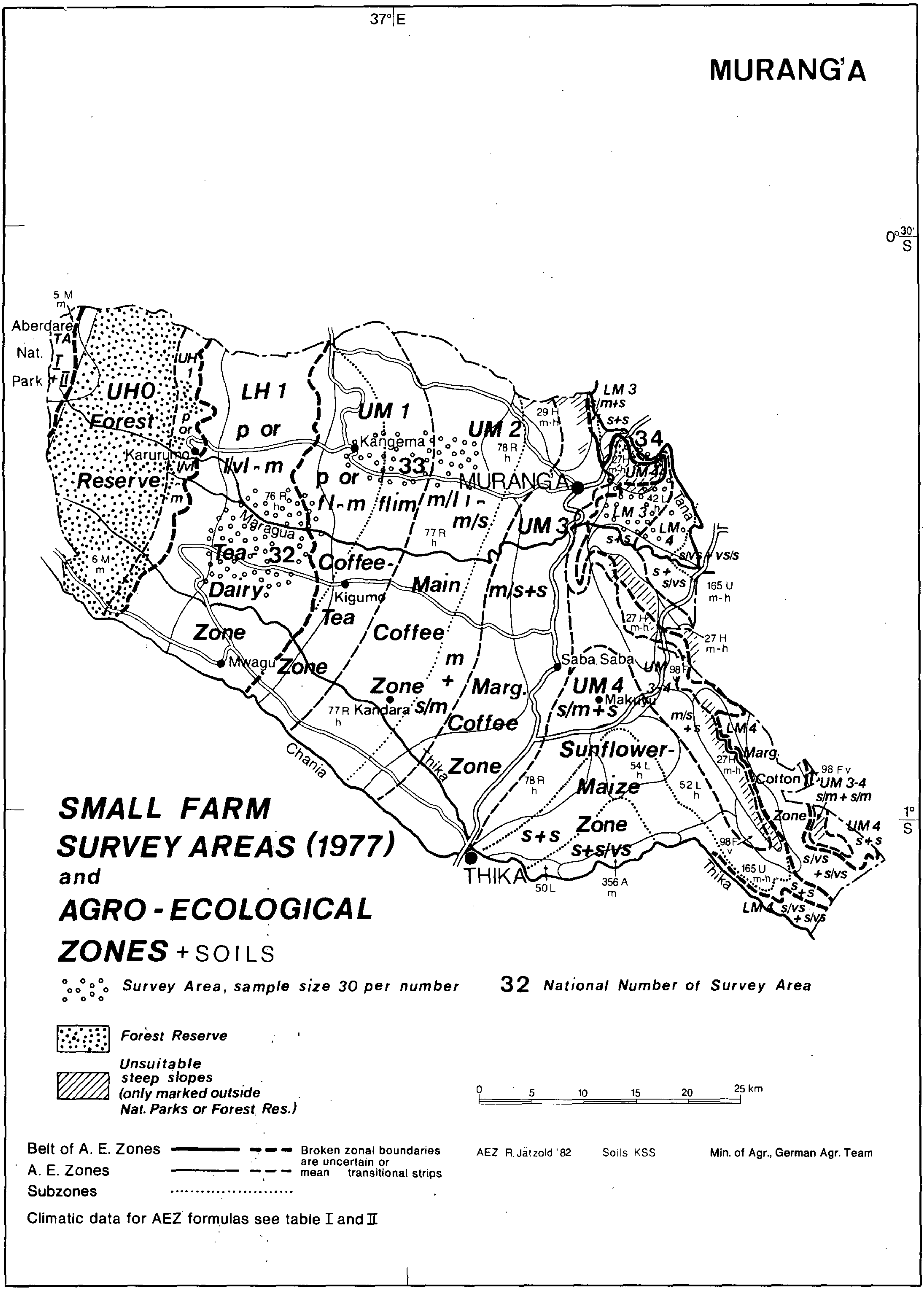
More than 75 % of the district's soils are relatively fertile Andosols (covering roughly the AEZ UM 1–4) regions. These soils, combined with the good climate of these AEZ, are the basis for highly productive small-scale farming.

The SFS was carried out in the Ikumbi (AEZ LH 1 (–UM 1)) to Mukangu (AEZ UM 1–2), and Muranga-Kamberua (AEZ LM 3–4 (+ UM 4)) areas. The sizes of the farms are: 3.1 ha LH 1, 1.6 ha UM 1, 3.0 ha LM 3–4.[2)] The LH 1 farmers planted 16 % of their land with annual crops and 16 % with perennials, and kept 50 % under pasture. The very small farms of the UM 1 region planted 33 % of their land area with annual crops, used 19 % for perennials and 19 % for pasture, while in the 'low potential' region of AEZ LM 3–4 30 % of the land was planted with annual crops and the rest left for grazing. The cropping intensity was 1.2, 1.7 and 1.6 crops p.a. The stocking rates are comparatively high, and in AEZ UM 1 are a result of considerable cattle feed purchases and, in LM 4, supported by off-farm grazing. Substantial amounts of fertilizer are used for annual and perennial crops in the LH 1 and UM 1 areas (table 8 & 9). Almost the total annual crop area is needed for food production (in LH 1 and UM 1), but in LM 3–4 11 % of the land is planted with cotton (table 10). Improved cattle are kept in LH 1 (80 %) and UM 1 (50 %) only, while the proportion of goats/sheep is 10 %, 20 % and 30 % respectively (table 11). The yields of annual crops are low in all three regions despite the use of fertilizer (table 12). All staple food produced is consumed within the district - in fact the area depends increasingly on food imports from other regions (table 13). The output and nutrient input table indicates that there is limited potential for maize, but large parts of the district are suitable for beans and in particular root crops (table 15).

It is clear from the high yields harvested from the cash crops that the farmers are well aware of the economic basis of the area and, most important, for the national economy. On the other hand, the low yields of staple food crops indicate that these crops receive much less attention and that soil fertility has already reached an extremely low level. Population increase automatically forces the farmer to expand and intensify coffee, tea, etc. at the expense of the food crop area, making the population even more dependent on imports from other regions. This may have disastrous effects during periods of extremely low cash crop prices. It is therefore necessary: (a) to promote staple food crops which produce a very high output of calories per area unit, e.g. sweet potatoes, for human consumption and/or cattle, and increase the forage (TDN) production through planting of Napier/Bana grass, and, (b) to aim for a continuous increase of biomass production (via high N-nutrient applications) in order to restore and improve soil fertility, the nutrient cycle within the farm and guarantee that not less than two-thirds of the staple food required by the people of the district is produced on its farm.

1) For more detailed and up to date information, see FMHB Vol. III/B

2) For average holding sizes, see also table 6


MURANG'A
37° E
0° 30' S
1° S
SMALL FARM SURVEY AREAS (1977) and AGRO - ECOLOGICAL ZONES + SOILS
Aberdare Nat. Park
UHO Forest Reserve
Karurumo
LH 1 p or l/vl - m
UM 1 p or fl - m
UM 2 flim/ m/l i - m/s
UM 3 m/s+s
Kangema
MURANGA
Maragua
Tea-Dairy Zone
Coffee-Tea Zone
Main Coffee Zone
Marg. Coffee Zone
Sunflower-Maize Zone
Kigumo
Mwagu
Kandara
Saba Saba
Makuyu
UM 4 s/m+s
LM 3
LM 4
Marg. Cotton Zone
UM 3-4 s/m + s/m
Chania
Thika
Tana
THIKA
Survey Area, sample size 30 per number
32 National Number of Survey Area
Forest Reserve
Unsuitable steep slopes (only marked outside Nat. Parks or Forest Res.)
0 5 10 15 20 25 km
Belt of A. E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
AEZ R. Jätzold '82
Soils KSS
Min. of Agr., German Agr. Team
Climatic data for AEZ formulas see table I and II

MURANG'A DISTRICT
AEZ: LH 1 (–UM 1)

TABLE 8a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 32

Item	Unit	Farm Size & Land Use, Livestock on Farm, Farm Size Group: small	medium	large
Farm Size Total	ha	1.3	3.o	7.9
Land Use: Annual Crops[1] First Season				
Maize	ha	o.1	o.1	o.7
Maize & Beans	ha	o.3	o.4	o.1
English Potatoes	ha	o.1	-	o.1
Cabbage	ha	-	o.1	o.1
Others	ha	-	-	-
Total	ha	o.5	o.6	1.o
Second Season[1]				
Maize & Beans	ha	o.3	-	-
English Potatoes	ha	-	o.1	-
Maize	ha	-	-	o.1
Total	ha	o.3	o.1	o.1
Permanent Crops[1]				
Tea	ha	o.4	o.7	o.8
Coffee	ha	-	-	-
Passion Fruit	ha	-	o.1	-
	ha			
Portion of total	%	31 %	27 %	1o %
Grazing & Forage	ha	o.3	1.1	4.7
portion of total	%	23 %	37 %	92 %
Other Land Use	ha	o.1	o.5	1.4
Livestock on Farm:				
Cattle: local	LU	o.2	o.3	o.2
improved	LU	o.9	3.5	7.6
Sheep & Goats	LU	o.2	o.4	1.o
Total	LU	1.3	4.2	8.8

Item	Unit	Intensity, Labour/Persons on Farm, Home Consumption, Farm Size Group: small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.9	o.5	o.2
Portion of improved cattle kept	%	82 %	92 %	97 %
Portion of Farmers owning a Plough	%	-	-	-
Labour on Farm:				
Family Adults	persons	1.8	2.7	2.7
Perm. Hired Labour	"	o.1	o.1	o.5
Children > 14 years	"	1.4	1.2	2.5
Persons living on Farm[2] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.o5	o.2o	2.25
Children < 14 years	"	3.15	-	3.15
Subsistence Units	SU	3.94	o.2o	4.14
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1o53	2o37	
Beans	kg	14o	267	
English Potatoes	kg	187	73	
Cabbage	kg	197	24	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Beans, Sweet Potatoes, Arrowroots, Bananas, Cabbage

1) Major crops only considered

2) Based on 1979 Census figures

TABLE 8b: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	1.o	1.8	3.4
Land Use: Annual Crops 1) First Season				
Maize	ha	o.1	o.4	o.3
Maize & Beans	ha	o.3	o.3	o.4
Beans	ha	-	o.2	o.1
English Potatoes	ha	-	-	o.1
Others	ha			
Total	ha	o.4	o.9	o.9
Second Season 1)				
Maize	ha	o.1	o.4	o.3
Maize & Beans	ha	o.2	o.3	o.1
Beans	ha	-	o.2	o.3
English Potatoes	ha	-	-	o.1
Total	ha	o.3	o.9	o.8
Permanent Crops 1)				
Coffee	ha	o.2	o.2	o.6
Bananas	ha	-	o.1	o.2
	ha			
	ha			
Portion of total	%	2o %	17 %	24 %
Grazing & Forage	ha	o.3	o.5	1.o
portion of total	%	3o %	28 %	29 %
Other Land Use	ha	o.1	o.1	o.7
Livestock on Farm:				
Cattle: local	LU	1.o	o.3	-
improved	LU	1.2	1.4	1.9
Sheep & Goats	LU	o.6	o.4	o.4
Total	LU	2.8	2.1	2.3

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.9	1.2	o.7
Portion of improved cattle kept	%	55 %	82 %	-
Portion of Farmers owning a Plough	%	-	-	-
Labour on Farm:				
Family Adults	persons	2.1	3.o	3.o
Perm. Hired Labour	"	o.1	-	-
Children > 14 years	"	1.4	4.1	5.o
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.13	o.3o	2.43
Children < 14 years	"	3.o1	-	3.o1
Subsistence Units	SU	3.93	o.3o	4.23
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	973	1882	
Beans	kg	264	5o3	
English Potatoes	kg	43	17	
Sweet Potatoes	kg	5	3	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Sweet Potatoes, Arrowroots, Cabbage

1) Major crops only considered
2) Based on 1979 Census figures

MURANG'A DISTRICT
AEZ: LM 3–4 (+ UM 4)

TABLE 8c: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 34

Item	Unit	Farm Size & Land Use / Livestock on Farm / Farm Size Group		
		small	medium	large
Farm Size Total	ha	1.2	2.9	6.4
Land Use: Annual Crops[1]				
First Season				
Maize	ha	o.2	o.9	o.7
Maize & Beans	ha	o.5	o.5	o.5
Cotton	ha	o.2	o.1	o.1
Maize & Cowpeas	ha	-	o.2	o.1
Others	ha	-	o.4	o.1
Total	ha	o.9	2.1	1.5
Second Season[1]				
Maize	ha	o.3	o.6	o.3
Maize & Beans	ha	o.3	o.4	o.9
Beans	ha	o.1	-	-
Others		-	o.4	o.1
Total	ha	o.7	1.4	1.3
Permanent Crops[1]				
Coffee	ha			
	ha			
	ha			
	ha			
Portion of total	%			2 %
Grazing & Forage	ha	o.2	o.7	4.3
portion of total	%	17 %	24 %	67 %
Other Land Use	ha	o.1	o.1	o.5
Livestock on Farm:				
Cattle: local	LU	1.5	2.2	4.1
improved	LU	o.1	o.5	o.6
Sheep & Goats	LU	o.7	2.4	o.8
Total	LU	2.3	5.1	5.5

Item	Unit	Intensity, Labour/Persons on Farm / Home Consumption / Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	1.3	1.2	o.5
Portion of improved cattle kept	%	6 %	19 %	13 %
Portion of Farmers owning a Plough	%	-	3o %	-
Labour on Farm:				
Family Adults	persons	2.o	2.8	2.5
Perm. Hired Labour	"	o.2	o.1	o.3
Children > 14 years	"	o.6	1.o	2.4
Persons living on Farm[2] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	1.89	o.11	2.oo
Children < 14 years	"	2.77	-	2.77
Subsistence Units	SU	3.55	o.11	3.66
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1oo5	1944	
Beans	kg	238	454	
English Potatoes	kg	145	57	
Cowpeas	kg	34	67	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Cowpeas, Pigeon Peas, Sunflower, English Potatoes, Cassava

1) Major crops only considered
2) Based on 1979 Census figures

MURANG'A DISTRICT

TABLE 9a: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: LH 1 (– UM 1)

Survey Area 32

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	3.1	8.7	0.4	2.2	0.2	1.6
Avg. 1	3.1	9.7	1.2	2.4	1.3	3.9
Up. Qu.	3.4	10.0	1.0	2.0	-	2.0
Lo. Qu.	1.5	3.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	%	Perm. Crops ha	%	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	0.6	22	0.6	22	1.3	47	-	2	0.1	3	0.1	5
Avg. 1	0.6	16	0.6	16	1.9	50	0.2	5	0.3	7	0.2	5
Up. Qu.	0.7	39	0.8	39	1.9	48	0.1	3	-	3	0.2	8
Lo. Qu.	0.4	15	0.4	14	-	-	-	-	-	-	-	1
Total	18.7		18.7		40.2		1.5		2.2		4.0	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.2	1.2	2.6	82.2
Avg. 1			2.4	87.6
Up. Qu.	1.0	1.8	4.6	94.9
Lo. Qu.	1.0	0.5	-	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	53.4	2.6	10.9	4.2	1.6	-	1.1	-	-	0.4	-	0.1	0.1
Avg. 1	62.9	7.8	12.8	6.9	3.7	-	2.7	0.1	0.2	1.7	0.4	1.0	1.1
Up. Qu.	100.0	7.0	20.3	8.8	0.4	-	1.9	-	-	0.6	-	-	-
Lo. Qu.	-	-	5.9	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

MURANG'A DISTRICT

TABLE 9b: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: UM 1–2

Survey Area 33

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children >14 No.
Avg. 0	1.6	10.3	0.6	2.5	-	2.7
Avg. 1	1.6	11.4	1.4	2.6	1.0	3.7
Up. Qu.	1.8	7.0	1.0	3.0	-	3.0
Lo. Qu.	0.9	3.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	%	Perm. Crops ha	%	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	0.6	41	0.3	22	0.3	19	0.1	8	-	3	0.1	7
Avg. 1	0.6	33	0.4	19	0.4	19	0.2	11	0.2	11	0.1	6
Up. Qu.	0.8	59	0.4	30	0.4	21	0.1	11	-	-	0.1	10
Lo. Qu.	0.3	26	0.2	14	0.1	10	-	-	-	-	0.1	5
Total	18.6		9.9		8.9		3.8		1.2		3.3	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.7	1.6	6.0	53.4
Avg. 1			5.9	77.9
Up. Qu.	2.0	2.1	11.0	88.2
Lo. Qu.	1.4	0.6	2.0	49.0

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	45.4	7.2	15.6	24.5	1.9	-	-	0.5	0.1	2.4	0.5	0.1	9.5
Avg. 1	49.3	19.9	21.7	31.3	20.5	-	-	2.3	0.5	3.2	1.1	1.0	9.8
Up. Qu.	100.0	10.8	21.7	46.0	-	-	-	-	0.3	4.0	0.9	-	20.0
Lo. Qu.	-	-	3.7	-	-	-	-	-	-	0.7	-	-	5.8

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

MURANG'A DISTRICT

TABLE 9c: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: LM 3–4 (+ UM 4)

Survey Area 34

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	3.0	17.1	0.3	2.3	0.2	1.2
Avg. 1	3.0	17.7	1.5	2.4	1.0	2.3
Up. Qu.	4.0	25.0	-	3.0	-	2.0
Lo. Qu.	1.2	8.0	-	2.0	-	-

Land Use

Range	Annual ha	Crops %	Perm. ha	Crops %	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	1.4	45	-	1	1.4	45	-	2	0.1	3	0.1	4
Avg. 1	1.4	31	0.2	5	1.9	43	0.4	9	0.4	9	0.2	3
Up. Qu.	2.0	80	-	-	2.4	52	-	-	-	-	0.2	6
Lo. Qu.	0.8	29	-	-	-	-	-	-	-	-	-	3
Total	41.1		0.6		40.9		1.5		2.7		3.8	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.6	1.3	2.8	9.1
Avg. 1			2.3	28.0
Up. Qu.	2.0	2.8	6.0	-
Lo. Qu.	1.5	0.4	-	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P2O5		K2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	34.8	0.7	0.1	1.9	-	-	-	-	-	0.4	-	-	-
Avg. 1	47.7	5.5	6.5	9.0	-	-	-	0.4	-	1.0	-	-	0.2
Up. Qu.	-	-	-	-	-	-	-	-	-	0.6	-	-	-
Lo. Qu.	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

MURANG'A DISTRICT

TABLE 10a: **CROPPING PATTERN**

AEZ: LH 1 (– UM 1)

Survey Area 32

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.2	0.5	0.40	0.00	6.8	37.6
Beans	0.0	0.1	0.00	0.00	0.1	0.7
Engl. Potatoes	0.0	0.2	0.00	0.00	1.0	5.8
Cabbage	0.0	0.2	0.00	0.00	1.1	6.2
Passionfruit	0.0	0.2	0.00	0.00	0.9	5.1
Maize & Beans	0.2	0.5	0.40	0.00	7.1	39.4
Maize & Others	0.0	0.2	0.00	0.00	0.7	4.0
Maize int.oth.	0.0	0.2	0.00	0.00	0.2	1.1
Total					18.0	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.0	0.4	0.00	0.00	0.8	24.4
Engl. Potatoes	0.0	0.3	0.00	0.00	0.5	15.9
Cabbage	0.0	0.1	0.00	0.00	0.1	3.7
Passionfruit	0.0	0.2	0.00	0.00	0.9	28.0
Maize & Beans	0.0	0.5	0.00	0.00	0.5	15.9
Maize & Others	0.0	0.4	0.00	0.00	0.4	12.2
Total					3.3	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.1	0.00	0.00	0.1	0.7
Coffee	0.0	0.2	0.00	0.00	0.9	5.2
Tea	0.6	0.6	0.80	0.24	16.8	94.2
Total					17.8	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

MURANG'A DISTRICT

TABLE 10b: **CROPPING PATTERN**

AEZ: UM 1–2

Survey Area 33

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.2	0.4	0.40	0.00	6.0	32.3
Beans	0.1	0.3	0.20	0.00	2.9	15.5
Engl. Potatoes	0.0	0.2	0.00	0.00	0.3	1.7
Arrow Roots	0.0	0.1	0.00	0.00	0.1	0.4
Sweet Pot. IPC	0.0	0.1	0.00	0.00	0.1	0.6
Maize & Beans	0.3	0.5	0.52	0.00	8.6	46.2
Maize & Others	0.0	0.6	0.00	0.00	0.6	3.2
Total					18.6	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.2	0.5	0.40	0.00	5.4	35.0
Beans	0.1	0.4	0.20	0.00	3.2	20.7
Engl. Potatoes	0.0	0.2	0.00	0.00	0.3	2.1
Maize & Beans	0.2	0.4	0.40	0.00	6.1	39.6
Total					15.4	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.1	0.3	0.00	0.00	1.6	16.7
Coffee	0.3	0.3	0.28	0.12	7.8	83.3
Total					9.3	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

MURANG'A DISTRICT

TABLE 10c: **CROPPING PATTERN**

AEZ: LM 3–4 (+ UM 4)

Survey Area 34

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.5	1.0	0.88	0.00	15.2	38.9
Cowpeas	0.0	0.2	0.00	0.00	0.5	1.2
Pigeonpeas	0.0	0.2	0.00	0.00	0.2	0.5
Sunflower	0.0	0.4	0.00	0.00	0.7	1.8
Engl. Potatoes	0.0	0.2	0.00	0.00	0.4	1.0
Cotton	0.1	0.4	0.32	0.00	4.3	11.0
Cassava	0.0	0.0	0.00	0.00	0.0	0.1
Maize & Beans	0.4	0.8	0.80	0.00	12.4	31.7
Maize & Cowps	0.1	0.8	0.00	0.00	2.3	5.8
Maize & Others	0.1	1.0	0.00	0.00	3.1	7.9
Total					39.1	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.4	0.9	0.80	0.00	12.3	39.6
Beans	0.0	0.2	0.00	0.00	0.2	0.8
Cowpeas	0.0	0.2	0.00	0.00	0.4	1.3
Sunflower	0.0	0.4	0.00	0.00	0.7	2.3
Engl. Potatoes	0.0	0.2	0.00	0.00	0.4	1.3
Cassava	0.0	0.0	0.00	0.00	0.0	0.1
Maize & Beans	0.5	0.8	1.00	0.00	13.7	44.1
Maize & Cowps	0.0	1.0	0.00	0.00	1.0	3.2
Maize & Others	0.1	2.3	0.00	0.00	2.3	7.3
Total					31.1	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.4	0.00	0.00	0.4	76.9
Coffee	0.0	0.1	0.00	0.00	0.1	23.1
Total					0.5	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

TABLE 11a: HERD COMPOSITION (GRAZING LIVESTOCK)

– in Head & Livestock Units –

AEZ: LH 1 (– UM 1)

Aug. '77, Survey Area 32

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.33	-	-	0.37				0.17			0.17
	Upper Qu.	-	-	-	1				0.3			0.3
1 - 2 years,	Average	0.40	0.07	-	0.63				0.55			0.55
	Upper Qu.	-	-	-	1				0.5			0.5
Over 2 years,	Average	0.23	0.13	-		1.97			2.26			2.26
	Upper Qu.	-	-	-		4			4.0			4.0
Subtotal(improved)	Total	29	6	-	30	59			89.6			89.6
	Average	0.97	0.20	-	1.00	1.97			2.98			2.98
	Upper Qu.	1	-	-	1	4			5.6			-
	Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =		20.4 % of total cattle,				Calves + Heifers =			50.8 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.07	-	-	0.03		0.67	0.37	0.12	0.10		0.14
	Upper Qu.	-	-	-	-		1	-	0.1	-		0.1
1 - 2 years,	Average	-	-	-	0.03				0.01			0.01
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	-	-	-		0.33	2.13	0.80	0.51	0.07	4.37	0.52
	Upper Qu.	-	-	-		-	3	1	-	-	1	-
Subtotal (unimp.)	Total	2	-	-	2	10	84	35	19.5	5	131	20.2
	Average	0.07	-	-	0.07	0.33	2.80	1.17	0.65	0.17	4.37	0.67
	Upper Qu.	-	-	-	-	-	4	1	1.1	-	6	1.1
	Lower Qu.	-	-	-	-	-	-	-	-	-	1	-
LU Male Cattle =		5.3 % of total cattle,				Calves + Heifers =			20.0 % of dairy cows			
LU Goats + Sheep =		61.2 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	31	6	-	32	69	84	35	109.0	5	131	109.8
	Average	1.03	0.20	-	1.07	2.30	2.30	1.17	3.63	0.17	4.37	3.66
	Upper Qu.	2	-	-	1	4	4	1	5.8	-	6	1.1
	Lower Qu.	-	-	-	-	-	-	-	1.0	-	1	-
LU Male Cattle =		19.3 % of total cattle,				Calves + Heifers =			46.4 % of dairy cows			
LU Goats + Sheep =		10.9 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11b: HERD COMPOSITION (GRAZING LIVESTOCK)

– in Head & Livestock Units –

AEZ: UM 1–2 | Jan. '78, Survey Area 33

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.20	-	-	0.20				0.10			0.10
Upper Qu.	-	-	-	-				-			-
1 - 2 years, Average	0.23	-	-	0.47				0.35			0.35
Upper Qu.	-	-	-	1				0.5			0.5
Over 2 years, Average	-	-	-		0.90			0.90			0.90
Upper Qu.	-	-	-		2			2.0			2.0
Subtotal(improved) Total	13	-	-	20	27			40.5			40.5
Average	0.43	-	-	0.67	0.90			1.35			1.35
Upper Qu.	1	-	-	1	2			2.3			-
Lower Qu.	-	-	-	-	-			0.5			-
LU Male Cattle =	12.3 % of total cattle,				Calves + Heifers =			74.1 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	2.67	-	-	-		0.70	1.63	0.77	0.03		0.77
Upper Qu.	-	-	-	-		1	1	0.2	-		0.2
1 - 2 years, Average	-	-	-	-				-			-
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	-	-	-		0.17	1.70	1.33	0.41	0.03	7.93	0.42
Upper Qu.	-	-	-		-	2	2	-	-	3	-
Subtotal (unimp.) Total	80	-	-	-	5	72	89	35.4	2	238	35.7
Average	2.67	-	-	-	0.17	2.40	2.97	1.18	0.07	7.93	1.19
Upper Qu.	-	-	-	-	-	3	4	0.5	-	10	0.5
Lower Qu.	-	-	-	-	-	-	-	0.2	-	3	0.2
LU Male Cattle =	83.1 % of total cattle,				Calves + Heifers =			0.0 % of dairy cows			
LU Goats + Sheep =	45.5 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	93	-	-	20	32	72	89	75.9	2	238	76.2
Average	3.10	-	-	0.67	1.07	2.40	2.97	2.53	0.07	7.93	2.54
Upper Qu.	1	-	-	1	2	3	4	2.7	-	10	0.5
Lower Qu.	-	-	-	-	-	-	-	1.0	-	3	0.2
LU Male Cattle =	35.1 % of total cattle,				Calves + Heifers =			62.5 % of dairy cows.			
LU Goats + Sheep =	21.2 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11c: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: LM 3–4 (+ UM 4) | Aug. '77, Survey Area 34

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	–	–	–	0.03				0.01			0.01
Upper Qu.	–	–	–	–				–			–
1 – 2 years, Average	0.10	–	–	–				0.05			0.05
Upper Qu.	–	–	–	–				–			–
Over 2 years, Average	–	–	–		0.30			0.30			0.30
Upper Qu.	–	–	–		–			–			–
Subtotal(improved) Total	3	–	–	1	9			10.8			10.8
Average	0.10	–	–	0.03	0.30			0.36			0.36
Upper Qu.	–	–	–	–	–			–			–
Lower Qu.	–	–	–	–	–			–			–
LU Male Cattle =	14.0 % of total cattle,				Calves + Heifers =			11.1 % of dairy cows.			
Unimproved Livestock:											
Under 1 year, Average	0.43	–	–	0.60		0.87	3.20	0.61	–		0.61
Upper Qu.	–	–	–	1		2	4	0.8	–		0.8
1 – 2 years, Average	0.30	–	–	0.63				0.42			0.42
Upper Qu.	–	–	–	1				0.5			0.5
Over 2 years, Average	0.27	–	0.23		2.20	1.43	6.50	2.55	–	11.63	2.55
Upper Qu.	–	–	–		3	3	7	0.2	–	5	0.2
Subtotal (unimp.) Total	30	–	7	37	66	69	291	107.5	–	349	107.5
Average	1.00	–	0.23	1.23	2.20	2.30	9.70	3.58	–	11.63	3.58
Upper Qu.	2	–	–	2	3	5	11	3.6	–	15	3.6
Lower Qu.	–	–	–	–	–	–	4	1.3	–	5	1.3
LU Male Cattle =	23.0 % of total cattle,				Calves + Heifers =			56.1 % of dairy cows			
LU Goats + Sheep =	33.5 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	33	–	7	38	75	69	291	118.2	–	349	118.2
Average	1.10	–	0.23	1.27	2.50	2.30	9.70	3.94	–	11.63	3.94
Upper Qu.	2	–	–	2	3	5	11	4.7	–	15	3.6
Lower Qu.	–	–	–	–	–	–	4	1.3	–	5	1.3
LU Male Cattle =	21.8 % of total cattle,				Calves + Heifers =			50.7 % of dairy cows			
LU Goats + Sheep =	30.5 % of total Grazing Livestock Units										

Livestock Unit (LU) key:
- Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
- Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
- Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

MURANG'A DISTRICT

TABLE 12a: INPUTS & YIELDS OF MAJOR CROPS

AEZ: LH (–UM 1) Survey Area 32

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	53	8	16	-	0.03	2	-	1,226
	UpQu	100	11	28	-	-	-	-	2,250
	LoQu	-	-	-	-	-	-	-	313
Engl. Potatoes	Avg.	-	1	3	-	0.06	-	7	2,226
	UpQu	-	-	-	-	-	-	8	3,175
	LoQu	-	-	-	-	-	-	-	75
Cabbage	Avg.	80	21	26	-	0.67	10	-	9,254
	UpQu	100	38	29	-	-	17	-	12,500
	LoQu	-	-	-	-	-	-	-	675
Second Rains									
Engl. Potatoes	Avg.	-	-	-	-	-	-	8	5,833
Cabbage	Avg.	100	54	29	-	-	12	12	11,717
Maize & Beans									
Maize	Avg.	86	9	11	-	0.07	-	-	1,411
Beans	Avg.	29	-	-	-	-	-	-	180
Maize	UpQu	100	33	15	-	-	-	-	1,625
Beans	UpQu	100	-	-	-	-	-	-	231
Maize	LoQu	100	-	-	-	-	-	-	1,000
Beans	LoQu	-	-	-	-	-	-	-	113
Perennial Crops									
Passionfruit	Avg.	-	14	36	-	0.45	-	6	13,833
	UpQu	-	-	-	-	-	-	-	24,000
	LoQu	-	-	-	-	-	-	-	-
Coffee	Avg.	-	30	-	-	0.73	3	7	3,833
	UpQu	-	54	-	-	-	3	10	5,500
	LoQu	-	-	-	-	-	-	-	-
Tea	Avg.	-	52	10	6	-	-	-	3,180
	UpQu	-	94	3	14	-	-	-	5,000
	LoQu	-	-	-	-	-	-	-	-

MURANG'A DISTRICT

TABLE 12b: INPUTS & YIELDS OF MAJOR CROPS

AEZ: UM 1–2 Survey Area 33

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	87	11	48	-	-	5	-	1,785
	UpQu	100	23	68	-	-	10	-	2,250
	LoQu	100	-	8	-	-	-	-	900
Maize & Beans									
Maize	Avg.	81	6	38	-	0.58	4	-	2,513
Beans	Avg.	-	-	-	-	-	-	-	682
Maize	UpQu	100	-	58	-	0.04	7	-	3,375
Beans	UpQu	-	-	-	-	-	-	-	923
Maize	LoQu	100	-	-	-	-	-	-	1,125
Beans	LoQu	-	-	-	-	-	-	-	400
Second Rains									
Maize	Avg.	77	13	40	-	-	9	9	1,795
	UpQu	100	23	58	-	-	17	17	2,625
	LoQu	-	-	-	-	-	-	-	675
Beans	Avg.	-	8	3	-	0.43	-	-	802
	UpQu	-	-	-	-	-	-	-	1,125
	LoQu	-	-	-	-	-	-	-	267
Engl. Potatoes	Avg.	-	-	77	-	-	-	13	3,833
Maize & Beans									
Maize	Avg.	87	8	37	-	2.95	10	10	2,148
Beans	Avg.	-	-	-	-	-	-	-	553
Maize	UpQu	100	-	58	-	0.31	14	14	3,263
Beans	UpQu	-	-	-	-	-	-	-	800
Maize	LoQu	100	-	-	-	-	-	-	1,200
Beans	LoQu	-	-	-	-	-	-	-	300
Perennial Crops									
Coffee	Avg.	-	63	5	-	0.61	3	49	8,381
	UpQu	-	108	-	-	0.70	6	84	12,417
	LoQu	-	-	-	-	-	-	20	4,375

MURANG'A DISTRICT

TABLE 12c: INPUTS & YIELDS OF MAJOR CROPS

AEZ: LM 3–4 (+ UM 4) Survey Area 34

Crop		Inputs							Yield
		Imp-roved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fung-icide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	47	2	8	-	-	-	-	1,119
	UpQu	100	-	-	-	-	-	-	1,406
	LoQu	-	-	-	-	-	-	-	614
Cotton	Avg.	33	11	-	-	-	1	-	1,633
Maize & Beans									
Maize	Avg.	54	-	1	-	0.13	1	-	1,194
Beans	Avg.	-	-	-	-	0.08	-	-	332
Maize	UpQu	100	-	-	-	-	-	-	1,731
Beans	UpQu	-	-	-	-	-	-	-	308
Maize	LoQu	-	-	-	-	-	-	-	608
Beans	LoQu	-	-	-	-	-	-	-	100
Second Rains									
Maize	Avg.	46	1	7	-	0.13	3	3	920
	UpQu	100	-	-	-	-	3	3	1,333
	LoQu	-	-	-	-	-	-	-	375
Beans	Avg.	-	-	36	-	-	-	-	438
Cowpeas	Avg.	-	-	-	-	-	-	-	625
Sunflower	Avg.	100	-	-	-	0.83	-	-	1,742
Cotton	Avg.	78	-	-	-	-	8	8	753
	UpQu	100	-	-	-	-	10	10	808
	LoQu	-	-	-	-	-	-	-	-
Maize & Beans									
Maize	Avg.	35	-	1	-	-	1	1	756
Beans	Avg.	-	-	-	-	-	-	-	220
Maize	UpQu	100	-	-	-	-	-	-	1,385
Beans	UpQu	-	-	-	-	-	-	-	231
Maize	LoQu	-	-	-	-	-	-	-	300
Beans	LoQu	-	-	-	-	-	-	-	100
Perennial Crops									

MURANG'A DISTRICT

TABLE 13a: DISPOSAL OF CROPS

AEZ: LH 1 (– UM 1) Survey Area 32

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	6,831	0	0	900	13	5,931	87
Maize & Beans	6,760	0	0	615	9	6,145	91
Maize & Others	779	0	0	0	0	779	100
Maize int.oth.	950	0	0	250	26	700	74
Beans	18	0	0	0	0	18	100
Engl. Potatoes	3,392	0	0	400	12	2,992	88
Cabbage	9,170	0	0	5,690	62	3,480	38
Second Rains							
Maize	1,068	0	0	0	0	1,068	100
Maize & Beans	6,343	0	0	350	6	5,993	94
Maize & Others	836	0	0	0	0	836	100
Engl. Potatoes	700	0	0	400	57	300	43
Cabbage	1,406	0	0	1,400	100	6	0
	Permanent Crops						
Tea	2,700	2,700	100	0	0	0	0

MURANG'A DISTRICT

TABLE 13b: DISPOSAL OF CROPS

AEZ: UM 1–2 Survey Area 33

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	13,025	0	0	4,390	34	8,635	66
Maize & Beans	23,005	0	0	4,680	20	18,325	80
Maize & Others	2,010	0	0	0	0	2,010	100
Beans	2,040	0	0	0	0	2,040	100
Engl. Potatoes	1,600	0	0	900	56	700	44
Sweet Pot. IPC	500	0	0	350	70	150	30
Second Rains							
Maize	10,484	0	0	4,220	40	6,264	60
Maize & Beans	15,411	0	0	4,930	32	10,481	68
Beans	3,345	0	0	400	12	2,945	88
Engl. Potatoes	1,200	0	0	600	50	600	50
	Permanent Crops						
Nil							

MURANG'A DISTRICT

TABLE 13c: DISPOSAL OF CROPS

AEZ: LM 3–4 (+ UM 4) Survey Area 34

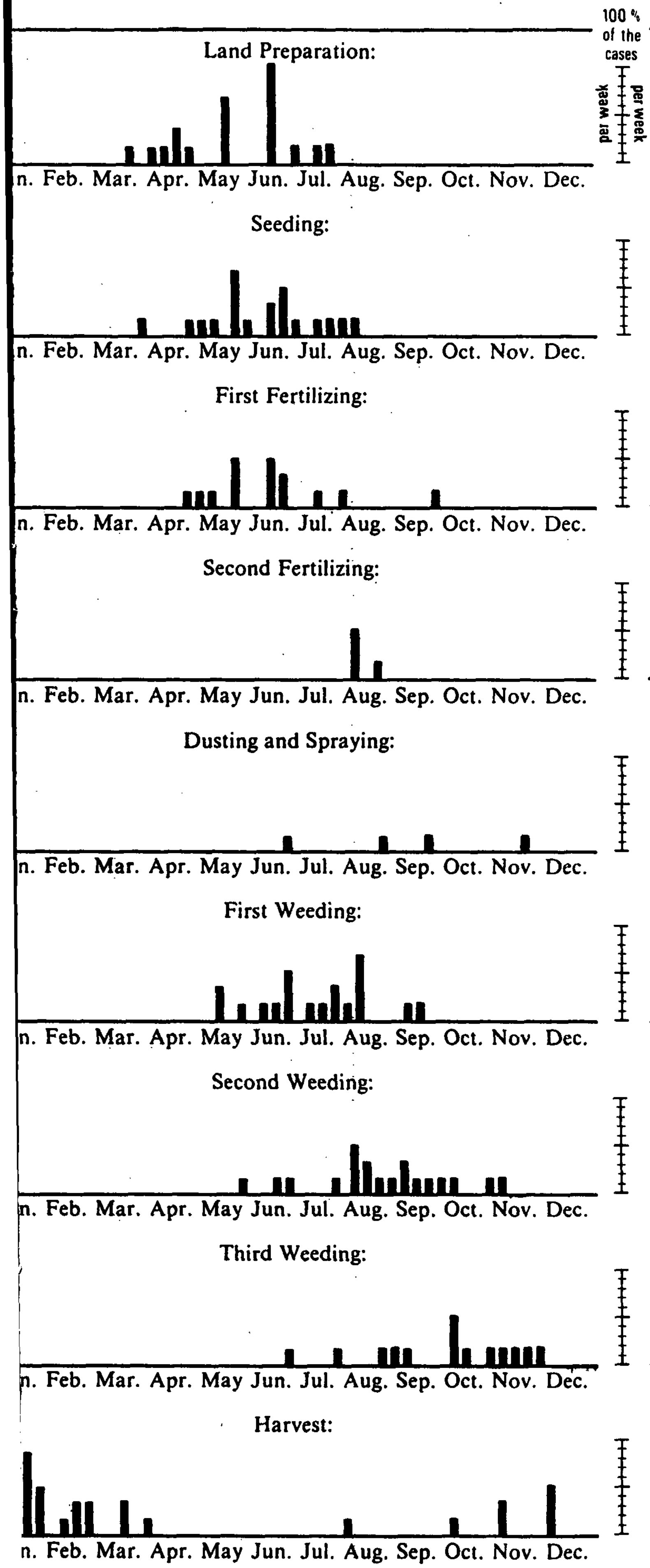
Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	12,935	0	0	5,450	42	7,485	58
Maize & Beans	15,519	0	0	4,590	30	10,929	70
Maize & FMilt	1,002	70,000	6,986	0	0	-68,998	-6,886
Maize & Cowps	2,843	0	0	1,200	42	1,643	58
Maize & Others	1,898	0	0	458	24	1,440	76
Beans	1,800	0	0	0	0	1,800	100
Cowpeas	410	0	0	0	0	410	100
Engl. Potatoes	5,480	0	0	2,700	49	2,780	51
Sunflower	570	450	79	120	21	0	0
Cotton	1,052	800	76	0	0	252	24
Second Rains							
Maize	7,499	0	0	2,400	32	5,099	68
Maize & Beans	10,403	0	0	3,240	31	7,163	69
Maize & Cowps	585	0	0	360	62	225	38
Maize & Others	750	0	0	210	28	540	72
Beans	1,710	0	0	0	0	1,710	100
Cowpeas	250	0	0	0	0	250	100
Engl. Potatoes	3,060	0	0	1,500	49	1,560	51
Sunflower	490	600	122	90	18	-200	-41
Cotton	3,303	3,003	91	0	0	300	9
			Permanent Crops				
Nil							

JRANG'A DISTRICT

ABLE 14a: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 Maize Cases: 19

Z: LH 1 (– UM 1) Survey Area 32 Sample Size: 30

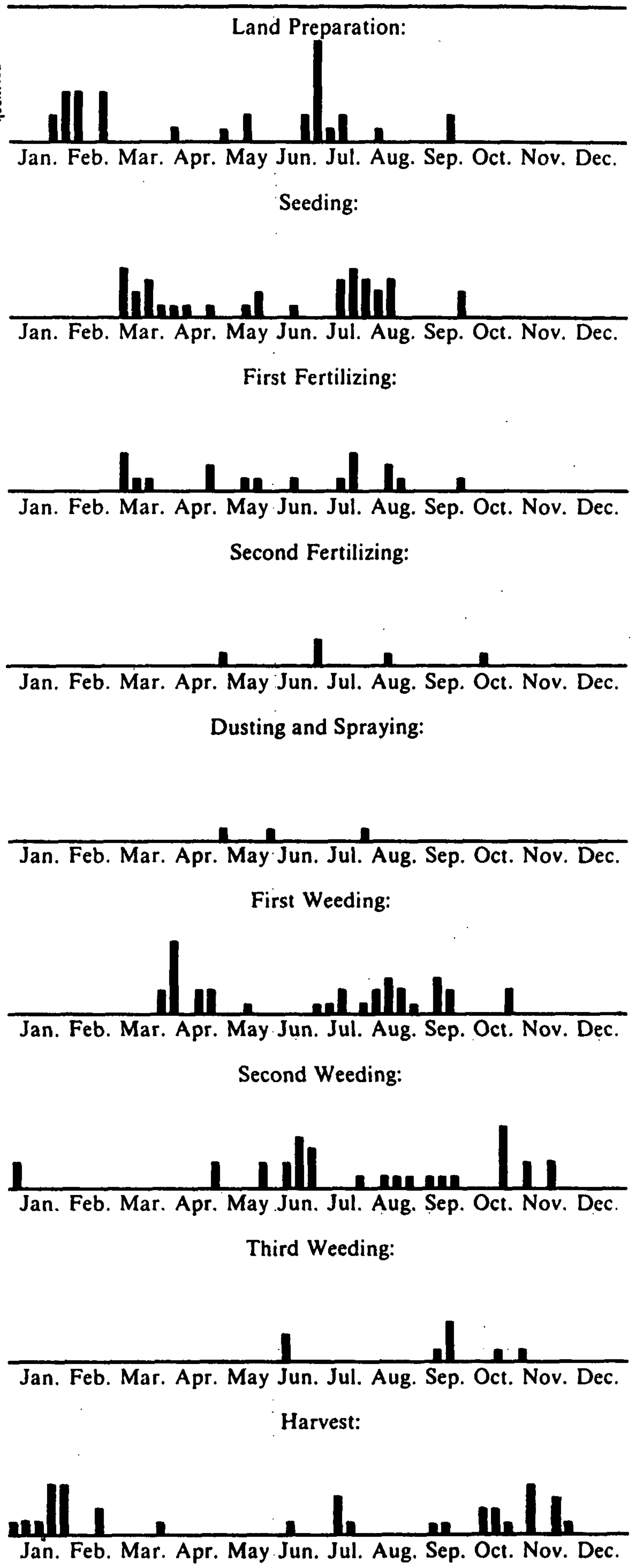


MURANG'A DISTRICT

TABLE 14b: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 34[1)]

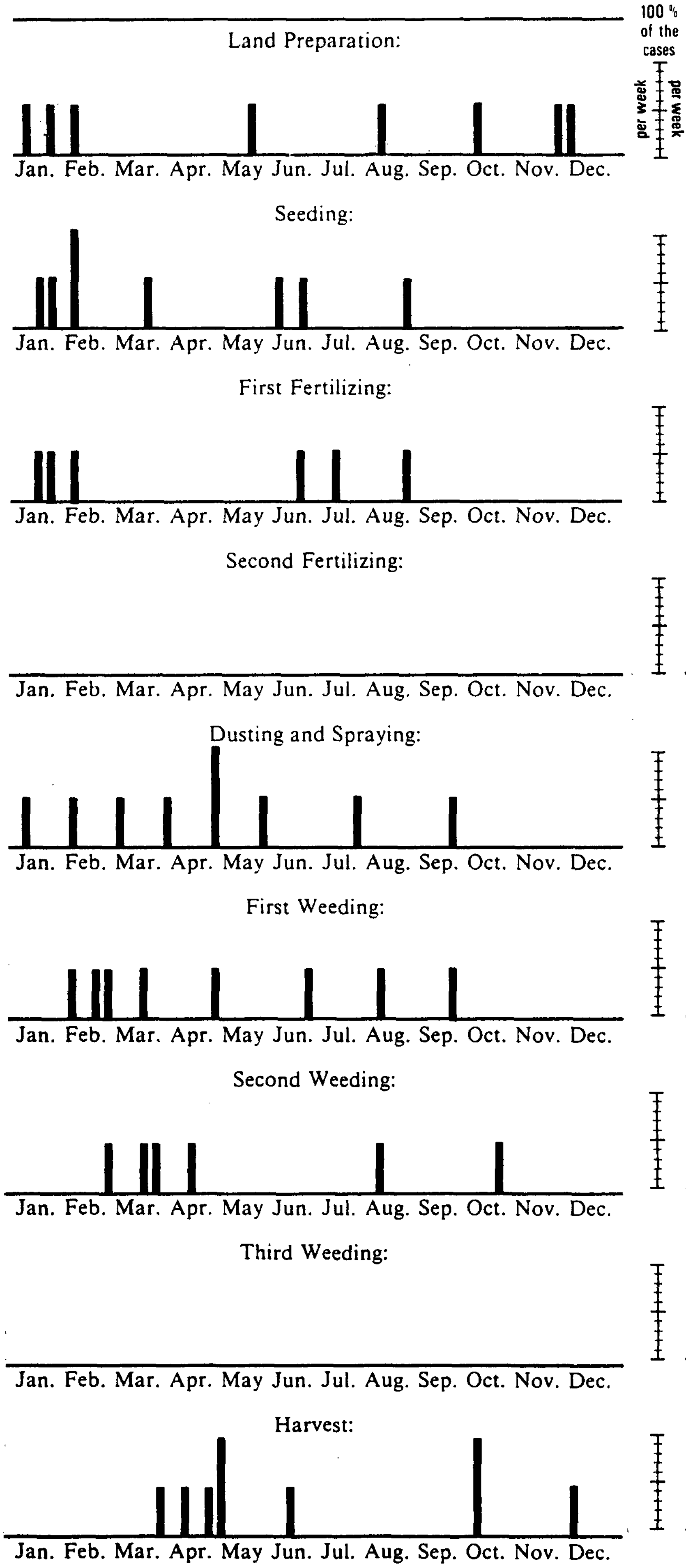
AEZ: LH 1 (– UM 1) Survey Area 32 Sample Size: 30



1) Maximum 30 per crop and season

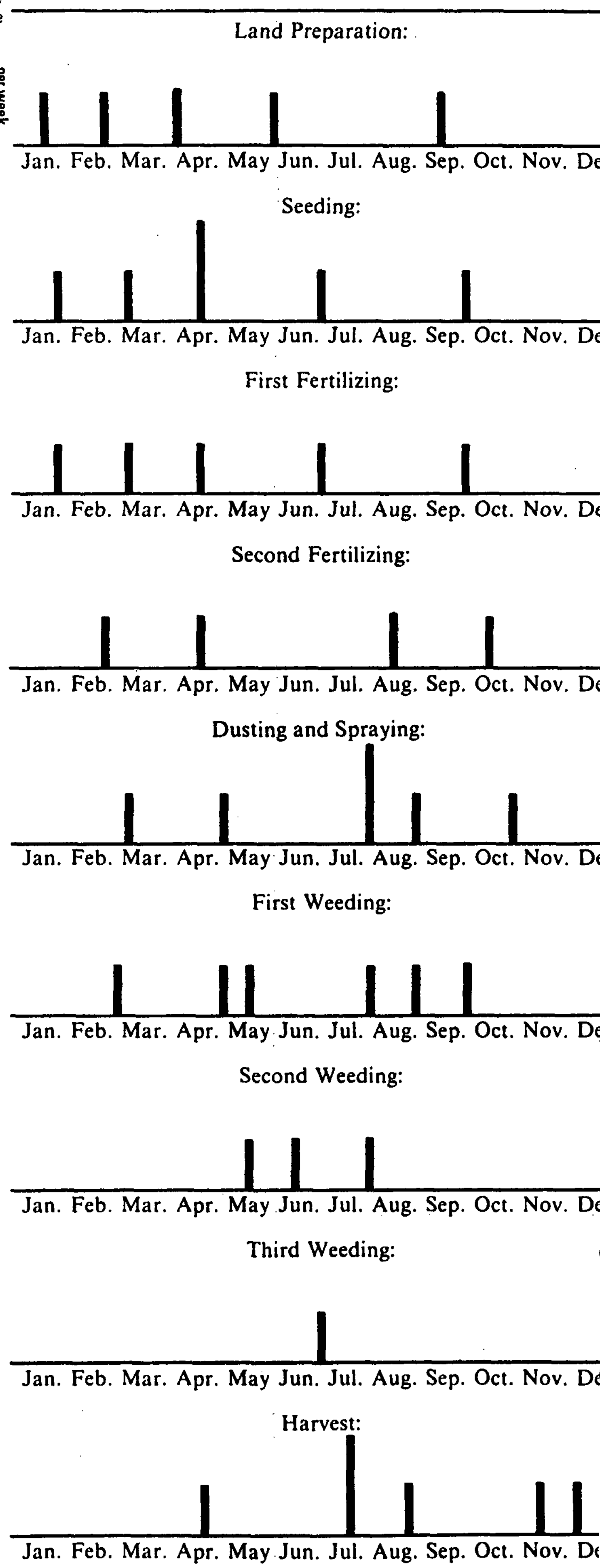
MURANG'A DISTRICT

TABLE 14c: **DISTRIBUTION OF FARMING ACTIVITIES**
Crop 28 **Engl. Potatoes** Cases: 8
AEZ: LH 1 (– UM 1) Survey Area 32 Sample Size: 30



MURANG'A DISTRICT

TABLE 14d: **DISTRIBUTION OF FARMING ACTIVITIES**
Crop 40 **Cabbage** Cases: 6
AEZ: LH 1 (– UM 1) Survey Area 32 Sample Size:

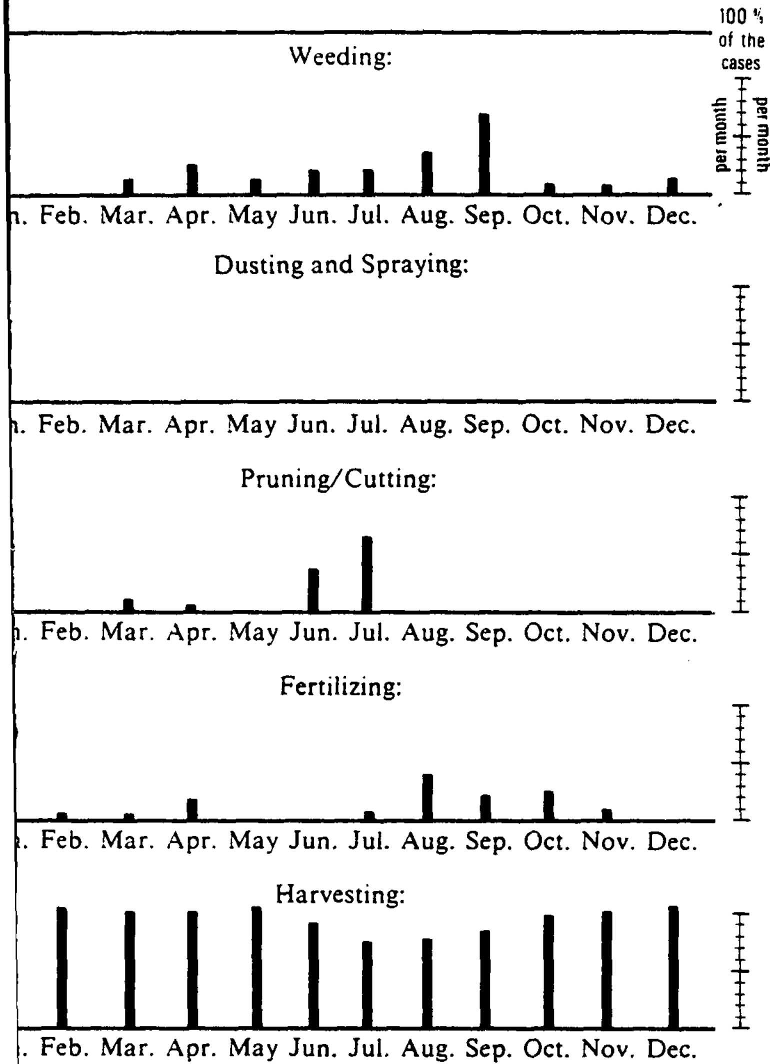


RANG'A DISTRICT

BLE 14e: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 Tea Cases: 30

Z: LH 1 (– UM 1) Survey Area 32 Sample Size: 30

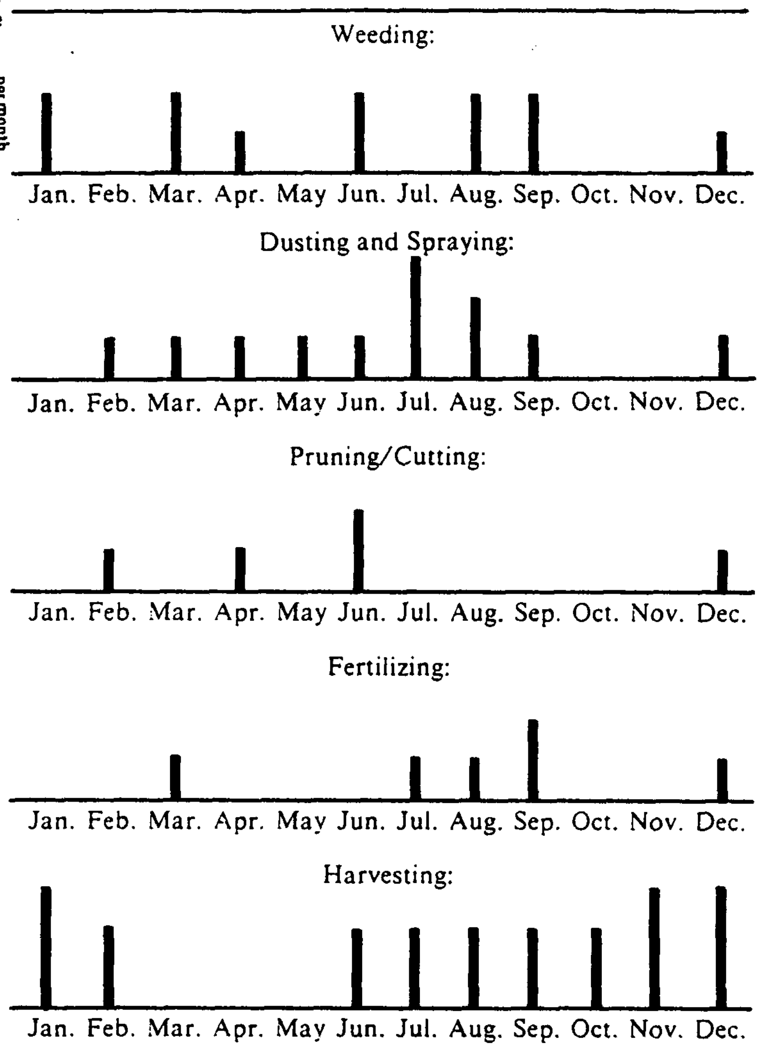


MURANG'A DISTRICT

TABLE 14f: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 Coffee Cases: 4

AEZ: LH 1 (– UM 1) Survey Area 32 Sample Size: 30

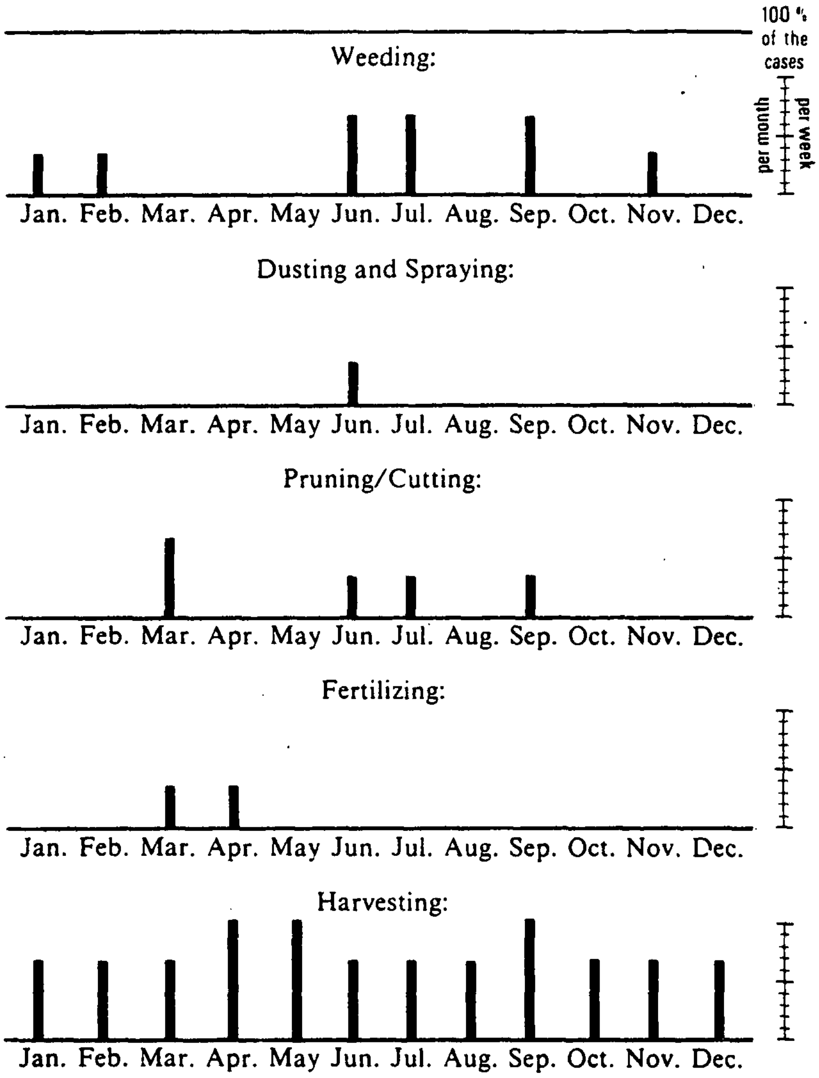


MURANG'A DISTRICT

TABLE 14g: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 54 **Passionfruit** Cases: 4

AEZ: LH 1 (– UM 1) Survey Area 32 Sample Size: 30

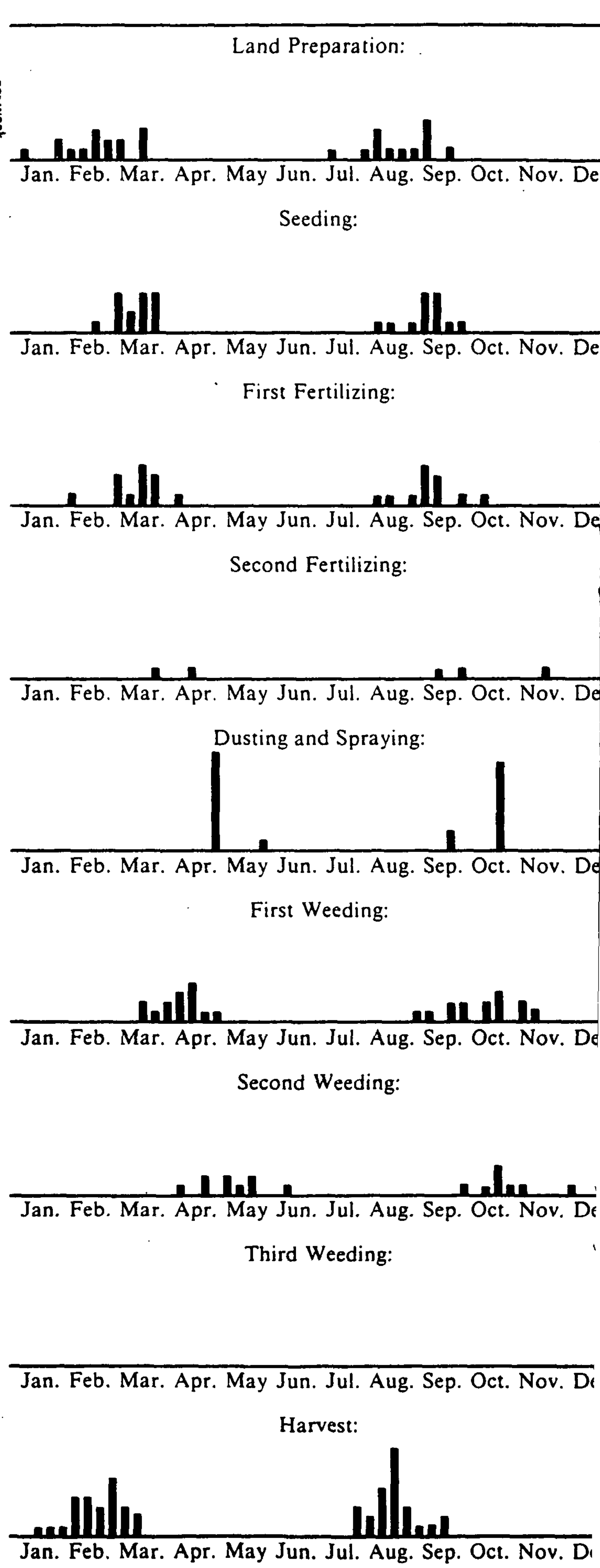


MURANG'A DISTRICT

TABLE 14h: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 28

AEZ: UM 1–2 Survey Area 33 Sample Size:

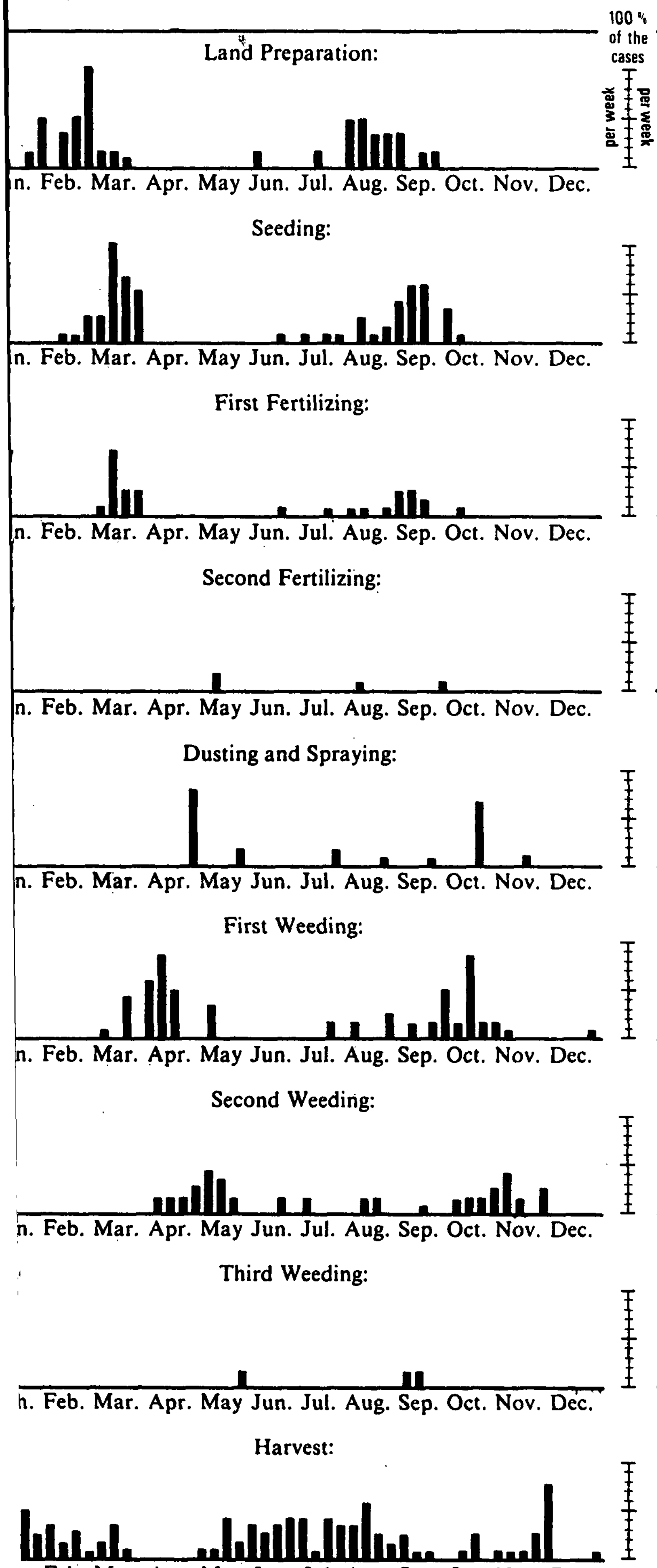


RANG'A DISTRICT

ABLE 14i: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 60[1)]

Z: UM 1–2 Survey Area 33 Sample Size: 30



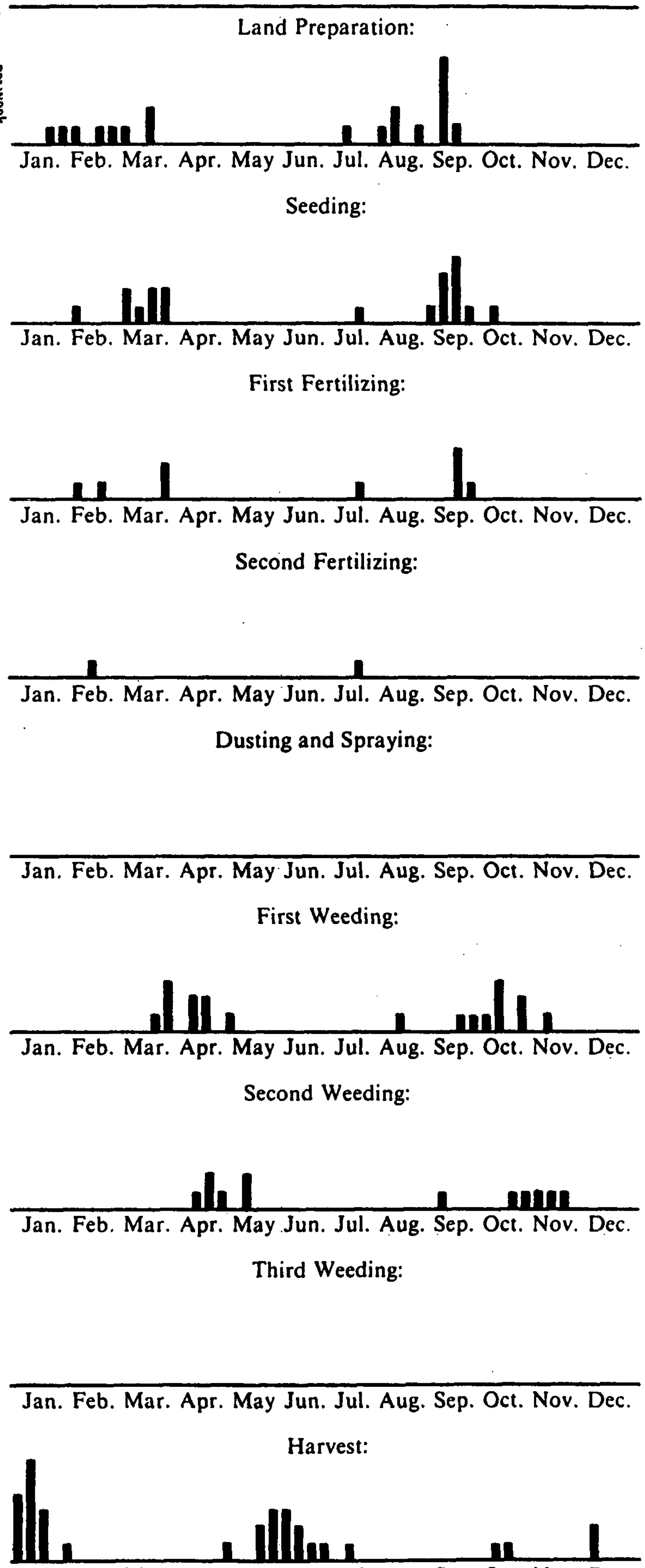
1) Maximum 30 per crop and season

MURANG'A DISTRICT

TABLE 14j: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 Beans Cases 19

AEZ: UM 1–2 Survey Area 33 Sample Size: 30

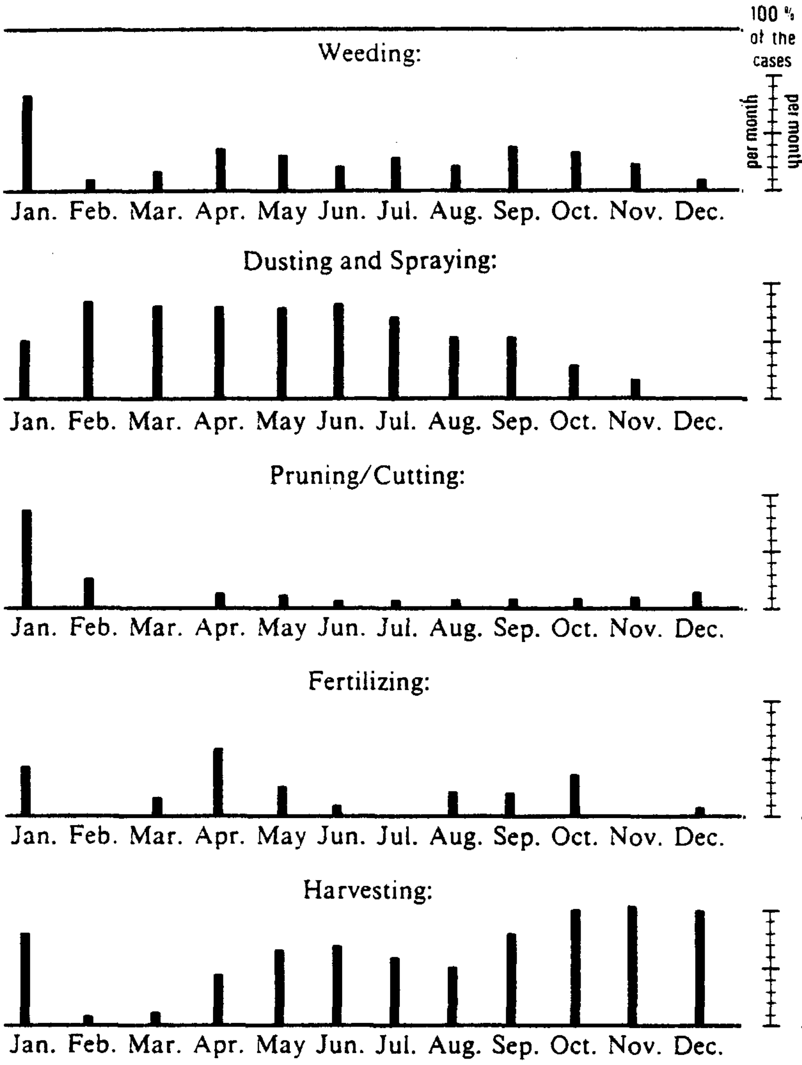


MURANG'A DISTRICT

TABLE 14k: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 Coffee Cases: 30

AEZ: UM 1–2 Survey Area 33 Sample Size: 30

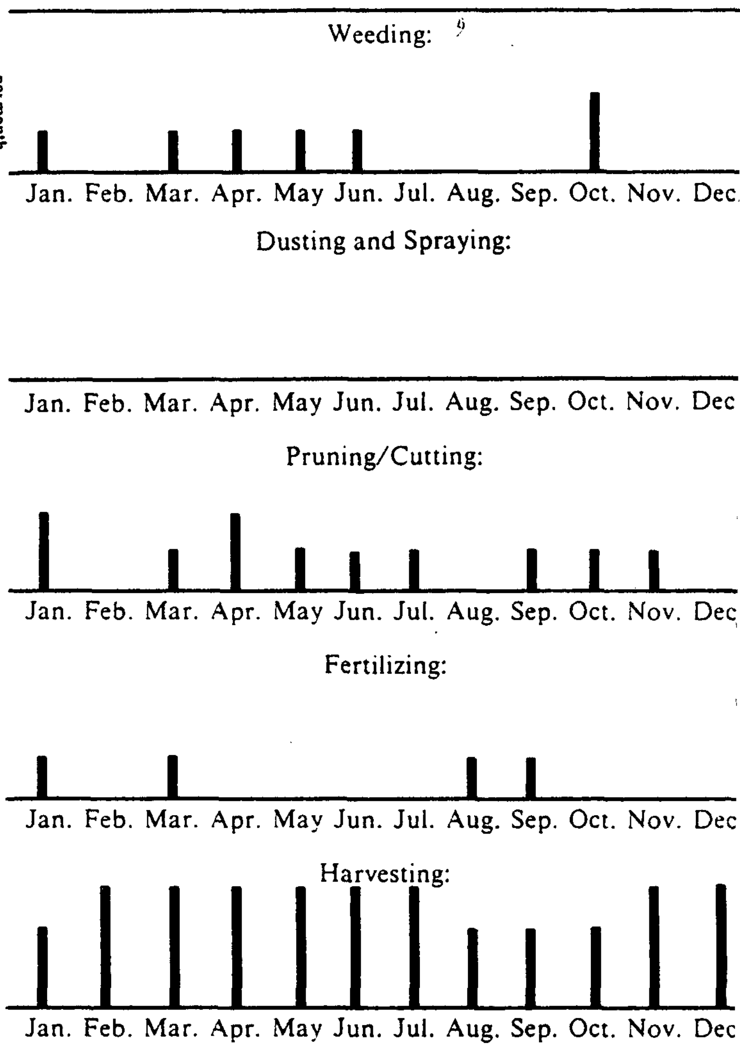


MURANG'A DISTRICT

TABLE 14 l: **DISTRIBUTION OF FARMING ACTIVITIES**

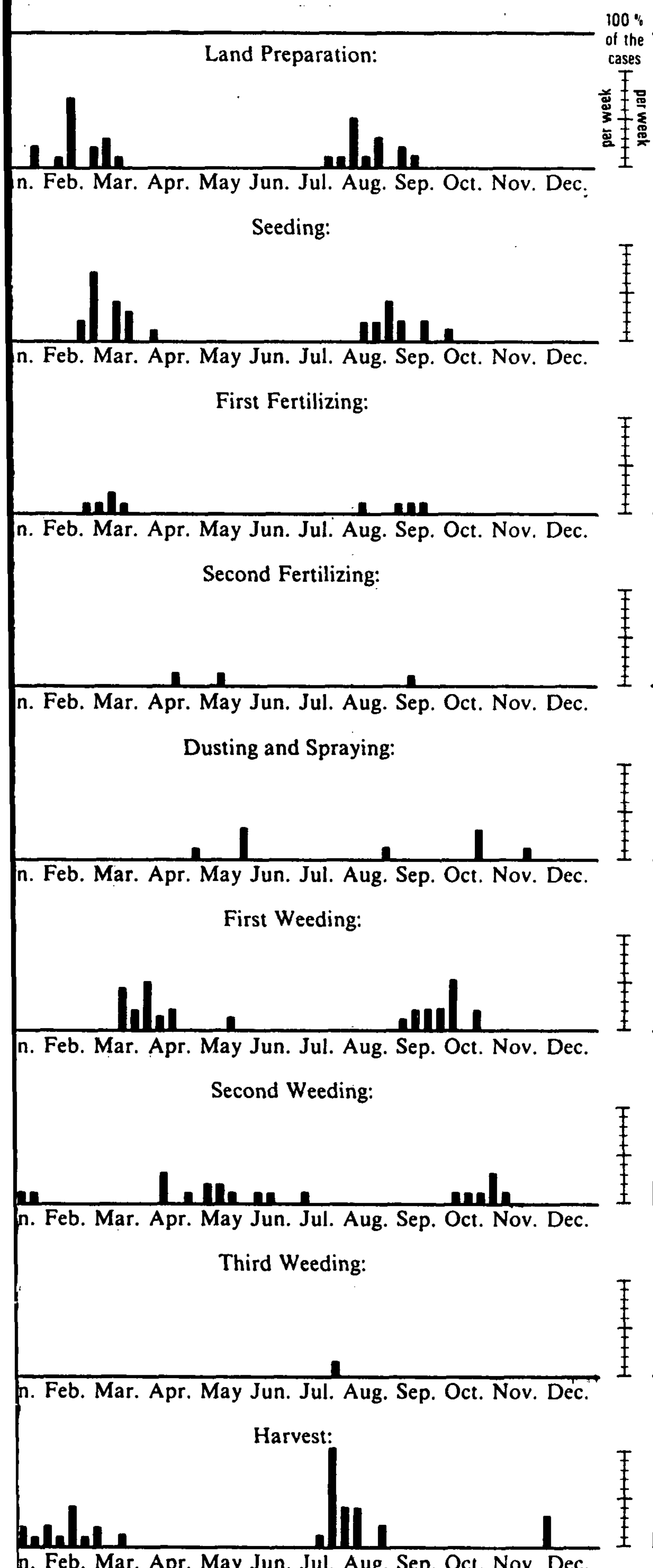
Crop 56 **Cooking Bananas** Cases: 4

AEZ: UM 1–2 Survey Area 33 Sample Size: 30



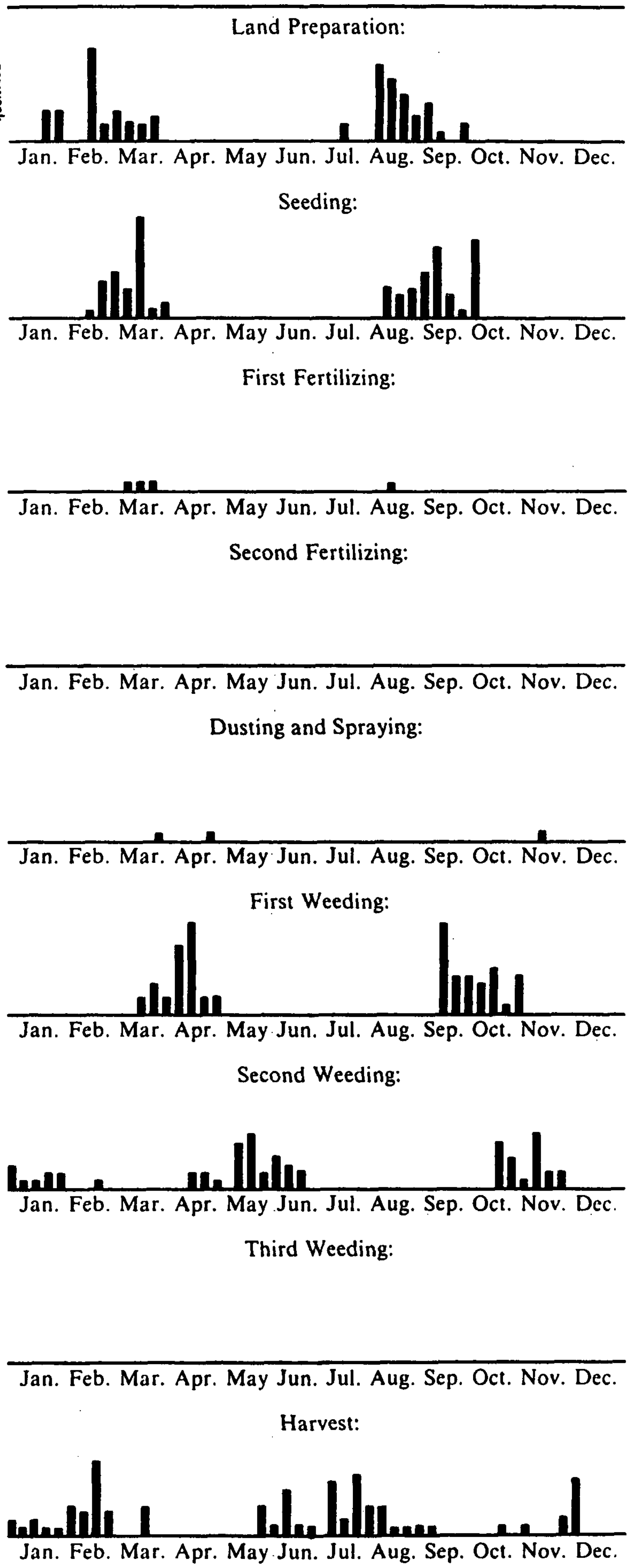
RANG'A DISTRICT

BLE 14m: DISTRIBUTION OF FARMING ACTIVITIES
Crop 1 Maize Cases: 30
Z: LM 3–4 (+ UM 4) Survey Area 34 Sample Size: 30



MURANG'A DISTRICT

TABLE 14n: DISTRIBUTION OF FARMING ACTIVITIES
Crop 2 Maize & Beans Cases: 60[1)]
AEZ: LM 3–4 (+ UM 4) Survey Area 34 Sample Size: 30



1) Maximum 30 per crop and season

MURANG'A DISTRICT

TABLE 14o: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 35 Cotton Cases: 12

AEZ: LM 3–4 (+ UM 4) Survey Area 34 Sample Size: 30

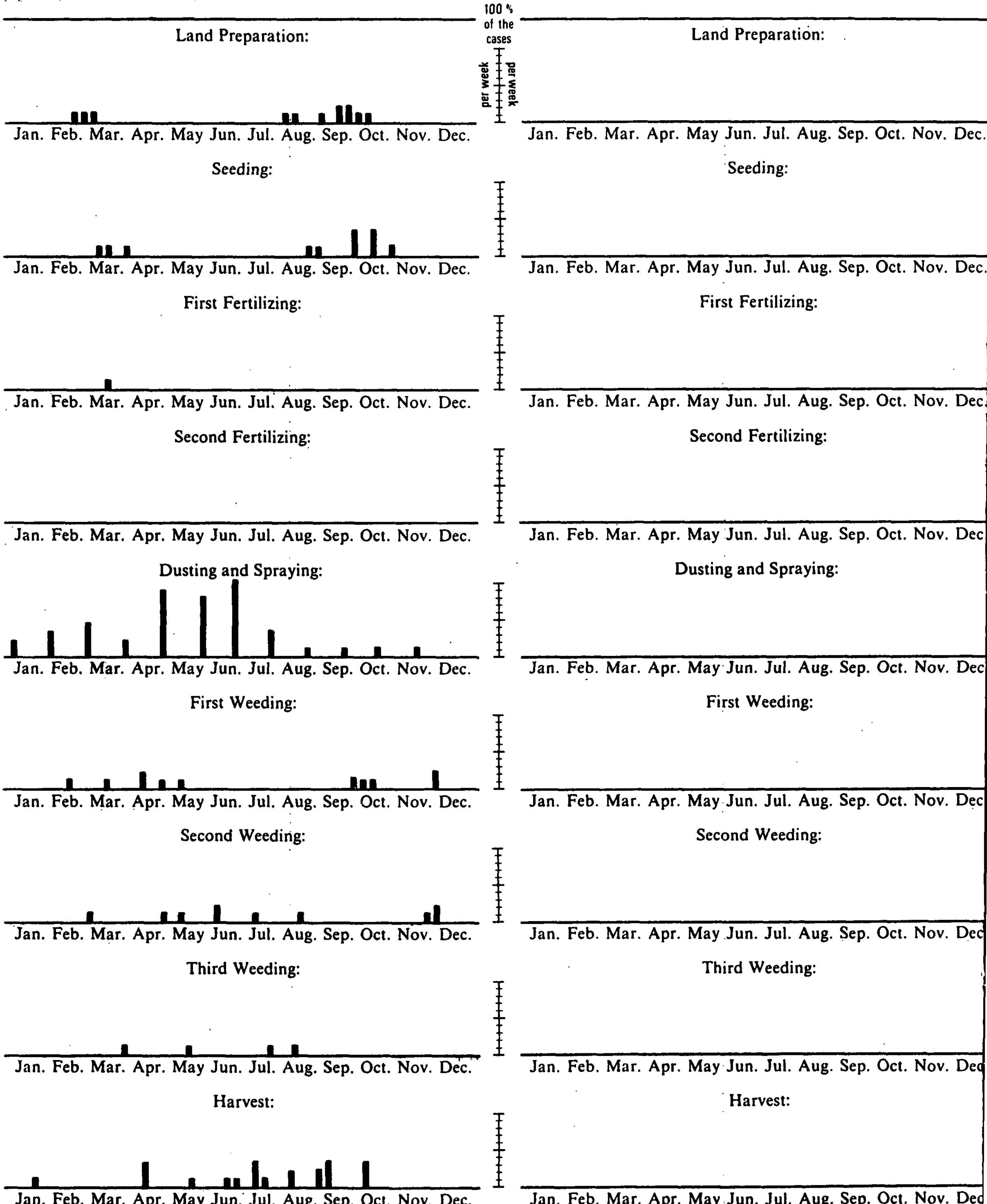


TABLE 15a: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES OUTPUT & NUTRIENT INPUT[1)]

		A.E.Z.: UH 1 SHEEP AND DAIRY ZONE				LH 1 TEA-DAIRY ZONE							
		Vegt. Period 1st + 2nd: p or 1/vl-m in Days,1st: 21o or more		2nd: 14o-155	total: 35o-365	p or 1/vl-m 21o or more		14o-155	35o-365				
		Soil: ANDOSOLS				ANDOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	3,000			5,000	3,000			6,000				
Fertilizer N	kg				111				166				
P_2O_5	kg				55				83				
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields 2)	kg	-			-	4,100			8,000				
Fertilizer N	kg								216				
P_2O_5	kg								108				
K_2O													
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg				550	400	800	1,000					
Fertilizer N	kg						6	11					
P_2O_5	kg						9	16					
K_2O	kg												
CROP: TEA													
Farmers in Production Level	%												
Yields	kg				2,300	3,000	6,000	8,000					
Fertilizer N	kg					23	148	228					
P_2O_5	kg					5	29	45					
K_2O	kg					5	29	45					
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg					3,000	-	10,000	18,000				
Fertilizer N	kg							98	210				
P_2O_5	kg							98	210				
K_2O	kg												
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,400	1,700	3,000	4,500	2,500	2,000	2,700	3,800				
Fertilizer N	kg			15	53			5	33				
P_2O_5	kg			10	34			3	21				
K_2O	kg												

1) for explanations see Vol. II A, p. 51 2) in kg TDN

TABLE 15b: **PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES**
OUTPUT & NUTRIENT INPUT

	A.E.Z.: UH 1 SHEEP AND DAIRY ZONE					LH 1 TEA-DAIRY ZONE							
	Vegt. Period 1st + 2nd: in Days,1st: p or 1/vl-m 21o or more			2nd: 14o-155	total: 35o-365	p or 1/vl-m 21o or more		14o-155	35o-365				
	Soil: ANDOSOLS					ANDOSOLS							
	Unit	**Without Fertilizer**	**Production Level I**	**II**	**III**	**Without Fertilizer**	**Production Level I**	**II**	**III**	**Without Fertilizer**	**Production Level I**	**II**	**III**
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg					6,500	4,000	18,000	30,000				
Fertilizer N	kg							92	188				
P_2O_5	kg							69	141				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%	4,500	4,000	15,000	35,000	4,200	4,000	16,000	35,000				
Yields	kg			74	214			83	216				
Fertilizer N	kg			42	122			42	123				
P_2O_5	kg												
K_2O													
CROP: RAPE SEED													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: TRITICALE													
Farmers in Production Level	%												
Yields	kg	2,500		2,300	3,000								
Fertilizer N	kg				12								
P_2O_5	kg				14								
K_2O	kg												
CROP: OATS													
Farmers in Production Level	%												
Yields	kg	2,000		2,500	2,500								
Fertilizer N	kg			15	15								
P_2O_5	kg			24	24								
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15c: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT[1)]

		A.E.Z.: UM 1 COFFEE-TEA ZONE				UM 2 MAIN COFFEE ZONE				UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: in Days, 1st: f lim 180 or more		2nd: 130-140 total: 310-340		m/l i m/s 160 or more		110-130 270-300		m/s + s 110-130		90-100 —	
		Soil: ANDOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	2,400			4,800	1,900			3,800	1,300			2,700
Fertilizer N	kg				133				105				77
P_2O_5	kg				66				52				38
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields 2)	kg	5,000			10,000	3,900			8,500	2,500			5,000
Fertilizer N	kg				277				255				138
P_2O_5	kg				138				127				69
K_2O													
CROP: TEA													
Farmers in Production Level	%												
Yields	kg	2,300	3,000	6,000	7,000								
Fertilizer N	kg		23	90	188								
P_2O_5	kg		5	18	38								
K_2O	kg		5	18	38								
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg		800	1,100	1,300		1,000	1,400	2,000		500	700	900
Fertilizer N	kg		80	110	130		100	140	200		50	70	99
P_2O_5	kg		90	100	100		100	100	100		90	90	100
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg	3,000		10,000	14,000			10,000	16,000				
Fertilizer N	kg			98	154			98	182				
P_2O_5	kg			147	200			147	273				
K_2O	kg												
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg	8,000	10,000	18,000	30,000	7,500	10,000	15,000	28,000	6,000	4,000	8,000	12,000
Fertilizer N	kg		30	150	330		38	113	308			30	90
P_2O_5	kg		8	40	88		15	45	123			12	36
K_2O	kg												

1) for explanations see Vol. II A, p. 51 2) in kg TDN

TABLE 15d: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 1 COFFEE-TEA ZONE				UM 2 MAIN COFFEE ZONE				UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: f lim in Days, 1st: 18o or more		2nd: 13o-14o	total: 31o-34o	m/l i m/s 16o or more		11o-13o	27o-30o	m/s + s 11o-13o		9o-1oo	—
		Soil: ANDOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,200	1,800	3,000	4,000	1,900	1,800	3,000	4,000	1,600	1,600	2,500	2,600
Fertilizer N	kg			20	45			28	53			23	25
P_2O_5	kg			13	29			20	38			22	24
K_2O	kg												
CROP: MAIZE AND BEANS													
Farmers in Production Level	%												
Yields	kg	2,200		3000/600	4000/600	1,900		3000/500	4000/600	1,600		2500/400	2600/400
Fertilizer N	kg			49	74			52	82			42	44
P_2O_5	kg			31	47			35	56			30	32
K_2O													
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg					1,000	400	1,700	1,900	700	400	1,500	1,600
Fertilizer N	kg							42	54			38	54
P_2O_5	kg							21	27			16	27
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	900	800	1,200	1,800	1,000	650	1,000	1,700	850	500	900	1,200
Fertilizer N	kg			10	31				24			2	12
P_2O_5	kg			8	25				29			2	15
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg									2,600	2,500	2,800	3,000
Fertilizer N	kg											10	14
P_2O_5	kg											7	10
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15e: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 1 COFFEE-TEA ZONE				UM 2 MAIN COFFEE ZONE				UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: f lim in Days,1st: 180 or more		2nd: 130-140	total: 310-340	m/l i m/s 160 or more		110-130	270-300	m/s + s 110-130		90-100	—
		Soil: ANDOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg		5,300	11,000	24,000	3,500	5,300	11,000	24,000				
Fertilizer N	kg	6,400		37	141		14	60	164				
P_2O_5	kg			28	106		16	68	185				
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	7,000	8,000	14,000	35,000	7,000	8,000	15,000	30,000				
Fertilizer N	kg		8	64	224		8	64	184				
P_2O_5	kg		4	32	112		7	56	161				
K_2O													
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg					3,700	6,000	14,000	28,000	3,000	5,000	10,000	25,000
Fertilizer N	kg						9	41	97		14	49	154
P_2O_5	kg						14	62	146		14	49	154
K_2O	kg												
CROP: CASSAVA													
Farmers in Production Level	%												
Yields	kg									5,000		6,000	10,000
Fertilizer N	kg											4	20
P_2O_5	kg											6	30
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15f: **PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES**
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 4 SUNFLOWER-MAIZE ZONE											
		Vegt. Period 1st + 2nd: s/m + s **in Days, 1st:** 1oo-11o		2nd: 9o-1oo	total: —								
		Soil: NITOSOLS											
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE													
Farmers in Production Level	%												
Yields	kg	1,200			2,400								
Fertilizer N	kg				66								
P_2O_5	kg				33								
K_2O	kg												
CROP: BANA GRASS													
Farmers in Production Level	%												
Yields	kg	2,200			4,800								
Fertilizer N	kg				144								
P_2O_5	kg				72								
K_2O													
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	1,600	1,400	2,000	2,200								
Fertilizer N	kg			10	15								
P_2O_5	kg			9	14								
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg	2,100	1,800	2,200	2,800								
Fertilizer N	kg			5	22								
P_2O_5	kg			5	20								
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg	850	550	800	1,000								
Fertilizer N	kg				7								
P_2O_5	kg				6								
K_2O	kg												
CROP: MAIZE AND BEANS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15g: **PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES OUTPUT & NUTRIENT INPUT**

		A.E.Z.: UM 4 SUNFLOWER-MAIZE ZONE											
		Vegt. Period 1st + 2nd: s/m + s **in Days, 1st:** 100-110		2nd: 90-100	total: —								
		Soil: NITOSOLS											
	Unit	**Without Fertilizer**	**Production Level I**	**II**	**III**	**Without Fertilizer**	**Production Level I**	**II**	**III**	**Without Fertilizer**	**Production Level I**	**II**	**III**
CROP: SUNFLOWER													
Farmers in Production Level	**%**												
Yields	**kg**	750	400	700	900								
Fertilizer N	**kg**				5								
P_2O_5	**kg**				6								
K_2O	**kg**												
CROP: SWEET POTATOES													
Farmers in Production Level	**%**												
Yields	**kg**	4,000	2,500	5,000	8,000								
Fertilizer N	**kg**			8	32								
P_2O_5	**kg**			7	28								
K_2O													
CROP: CASSAVA													
Farmers in Production Level	**%**												
Yields	**kg**	4,000	3,500	5,000	8,000								
Fertilizer N	**kg**			4	16								
P_2O_5	**kg**			7	28								
K_2O	**kg**												
CROP:													
Farmers in Production Level	**%**												
Yields	**kg**												
Fertilizer N	**kg**												
P_2O_5	**kg**												
K_2O	**kg**												
CROP:													
Farmers in Production Level	**%**												
Yields	**kg**												
Fertilizer N	**kg**												
P_2O_5	**kg**												
K_2O	**kg**												
CROP:													
Farmers in Production Level	**%**												
Yields	**kg**												
Fertilizer N	**kg**												
P_2O_5	**kg**												
K_2O	**kg**												

NYERI DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

Nyeri District comprises the most western part of the moist windward side of Mt. Kenya, the drier western leeward side of this giant extinct volcano, the borders of the semi-arid Laikipia Plateau (in the rain shadow area), and the moist windward eastern slope of the Nyandarua Range. Therefore the contrasts in the natural potential are tremendous. The average annual rainfall ranges from 2 200 mm on the most easterly exposed edge of the Nyandarua Range to 700 mm on the Laikipia Plateau.

The contrasts in the reliability of the rains are even higher, from 1 200 mm to 160 mm in the first rains and 600 to 150 mm in the second rains. The reason is not only the rain shadow but also a lesser concentration of the convectional rains.

In the wet areas, the south-easterly trade winds are forced up by the mountains, causing frequent mists and sometimes drizzle above 1 500 m during the months June-September which are the so-called long dry season at lower altitudes. In the second dry season, January-February, a dry wind blows from the northeast, from the Somalian deserts. Nevertheless, in the higher areas there is still enough moisture in the soil to enable permanent cropping possibilities in the zones UH 1 and LH 1.

Towards the Laikipia Plateau, the Lower Highland Zones become drier and LH 2, 3, and 4 are relatively small strips. The rainfall pattern becomes trimodal here, with middle rains in July-August intruding from the west. This is good for ranching in zone LH 5 but the rains are normally not heavy enough and are too short for cultivation. With dry farming techniques like those used in the western United States, it may be possible to preserve the moisture from the first rains so that it can be added to the middle rains to get an early maturing crop.

On the windward sides, the middle rains disappear and the typical rainfall pattern of eastern Kenya, i.e. two distinctive rainy seasons, predominate. These seasons become shorter downhill from the Tea-Coffee Zone UM 1 with a long and a medium growing period, to the Sunflower-Maize Zone UM 4 with a short to medium (1st rains) and a short to very short growing period (2nd rains) (= cropping season).

NYERI DISTRICT

TABLE 1: TEMPERATURE DATA

No. and altitude	Name of Station	AEZ[1)]	Kind of records	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
9037158	Sagana	LH	Mean max.	24.6	25.4	24.9	24.0	22.4	21.0	20.2	21.1	23.7	24.3	23.4	24.2	23.3	
1 830 m	State	2	Mean temp.	16.4	16.6	16.4	17.7	16.9	15.5	15.2	15.6	16.9	17.6	16.1	16.2	16.5	4
	Lodge	lp	Mean min.	8.2	7.9	7.9	11.4	11.4	10.1	10.2	10.2	10.2	11.0	9.8	8.2	9.7	
			Abs. min.	2.0	2.4	1.5	2.2	5.0	3.0	3.8	4.8	4.0	5.6	5.5	1.5	1.5	

1) AEZ = Agro-ecological zone; lp = lower places within the zone

NYERI DISTRICT

TABLE 2: **RAINFALL FIGURES FROM VARIOUS STATIONS**
having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Monthly rainfall in mm Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
9036017	Nyeri, M.O.W.	71	Average	904	51	46	68	167	157	30	37	38	33	92	109	77
1 829 m			60 % rel.[1)]	810	31	29	47	137	123	20	28	28	16	65	94	60
9036072	Mweiga Estate	40	Av.	898	65	52	70	159	103	28	41	40	24	97	129	91
1 890 m			60 %	773	47	35	39	127	84	25	29	29	13	71	111	76
9036128	Othaya	31	Av.	1 401	42	37	74	320	293	57	52	63	53	169	172	70
1 829 m			60 %	1 228	27	26	55	260	20	45	33	44	28	137	138	43
9036144	Mweiga, Monte Carlo	28	Av.	844	57	49	65	146	98	23	30	36	23	77	130	111
1 920 m	Ranch		60 %	661	43	46	46	128	83	11	16	19	10	58	114	72
9036157	Kiandongoro	27	Av.	1 795	94	80	99	358	333	88	88	87	67	178	205	127
2 377 m			60 %	1 620	69	61	70	281	305	81	70	69	52	123	156	98
9036247	Kabage Forest	17	Av.	1 367	68	61	107	247	150	61	61	70	52	139	205	97
2 286 m	Station															
9036270	Uaso Nyiro Settlement	11	Av.	895	67	74	134	145	86	54	34	25	21	66	112	80
2 043 m	Scheme															
9036271	Aberdare Nat. Park;	15	Av.	2 230	90	97	202	355	328	93	101	130	113	302	294	126
3 076 m	Kiandongoro Gate															
9037002	Karatina, Tumu Tumu	47	Av.	1 152	31	22	74	275	251	37	29	35	38	138	154	68
1 814 m	Mission		60 %	1 030	15	12	37	187	202	25	22	23	18	80	115	49
9037015	Ragati Forest	37	Av.	1 406	64	72	95	272	228	67	47	43	44	137	211	127
2 012 m	Station		60 %	1 266	33	38	70	215	171	51	25	25	15	56	152	90
9037060	Nanyuki Forest	28	Av.	1 020	44	26	73	182	112	43	54	67	63	128	44	82
2 317 m	Station															
9037064	Naro Moru, Forest	20	Av.	893	63	37	84	159	76	21	36	36	85	104	148	90
2 134 m	Farm															
9037069	Hombe Forest	23	Av.	1 190	64	52	115	222	154	27	28	24	25	131	217	132
2 134 m	Station		60 %	959	54	43	63	159	97	24	12	14	13	82	165	83
9037075	Karatina, Chehe	24	Av.	1 610	59	57	88	290	322	80	68	60	81	178	213	117
2 100 m	Forest Station		60 %	1 470	37	27	56	254	247	52	55	43	44	106	149	93
9037099	Karatina, Kagochi	22	Av.	1 240	49	53	103	235	194	35	30	33	32	185	189	104
1 981 m																
9037100	Karatina, Kiamachimbi	17	Av.	1 261	51	48	56	262	270	37	33	45	26	132	186	120
1 798 m	Farm															
9037120	Kabaru Forest	18	Av.	1 253	71	61	128	207	110	25	28	20	26	121	352	106
2 271 m	Station															
9037125	Burguret For. Guard	15	Av.	878	42	60	102	138	67	36	18	53	35	108	148	73
1 951 m	Post															
9037139	Naro Moru, Settlement	10	Av.	855	38	107	111	161	58	9	31	30	24	80	141	67
2 057 m	Scheme															

1) These figures of rainfall reliability should be exceeded normally in 6 out of 10 years.

NYERI DISTRICT

TABLE 3: CLIMATE IN THE AGRO-ECOLOGICAL ZONES

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1)] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2)] in days	2nd rains in days	Total[3)] in days
TA 0 Rocks and Glaciers		National Park							
TA I + II Tropical-Alpine Moor and Heathlands		National Park							
UH 0 Forest Zone		Forest Reserve							
UH 1 Sheep-Dairy Zone	p or l/vl ⌐ m	2 070–2 400	15.0–12.8	1 080–2 000	450–1 000	330–690	220 or more	130–140	350–360
	l/vl ⌐ m			Steep and important as a catchment area					
UH 2 Pyrethrum-Wheat Zone	vl i or two	2 130–2 380	14.7–13.2	1 100–1 200	450–500	270–300	210 or more	110–130	320–350
	l or l/m i m/s			950–1 200	480–680	280–400	200 or more	110–130	310–330
UH 3 Upper Wheat-Barley Zone	(l/m) i f (s)	2 130–2 200	14.7–14.3	900–1 050	320–480	230–330	180 or more	75–115	255–295
LH 1 Tea Dairy Zone	l/vl ⌐ m	1 950–2 070	15.8–15.1	1 400–1 800	600–1 000	480–550	220 or more	120–140	330–360
	p or l/vl ⌐ m			1 600–2 000	750–1 000	480–650	220 or more	130–140	340–360
	f l i m			1 200–1 700	450–900	400–540	200 or more	130–140	330–340
LH 2 Wheat/Maize-Pyrethrum Zone	l/m i m.	1 830–2 100	16.6–14.5	950–1 050	350–450	320–350	180 or more	120–140	310–330
	m/l + m/s			900–1 000	350–450	330–430	160 or more	115–130	–
LH 3 Wheat/(Maize)-Barley Zone	f (m) i f (s)	1 980–2 130	15.6–14.5	850–1 000	300–450	250–400	150 or more	75–115	225–265
	f (m) i (s/vs)			850–950	320–450	200–280	150 or more	70–80	220–230
	(m/s) i (vs/s)			800–900	250–360	200–230	130 or more	65–70	195–200
	(m/s) i (s/vs)			800–950	270–380	180–250	130 or more	75–80	205–210
LH 4 Cattle-Sheep-Barley Zone	(m/s) i (s/m)	1 800–1 980	16.9–15.6	770–820	220–400	250–280	130 or more	105–110	235–240
	s i (s/m)			800–880	200–250	250–280	100 or more	105–110	205–210
	(s/m) i (vs/s)			770–900	250–330	180–260	110 or more	65–70	175–180
	i (s/m)+(vs/s)			850–950	280–340	250–270	110 or more	65–70	–
	(vs)⌐(s)+(vs)			900–1 000	330–400	220–280	80 or more	55–65	–
LH 5 Lower Highland Ranching Zone	b r i	1 890–1 950	16.2–15.8	650–850	160-280[4)]	150–260[4)]	–	–	–
UM 1 Coffee-Tea Zone	f l i m	1 710–1 780	17.8–17.5	1 100–1 600	400–800	340–450	180 or more	120–140	200–220
UM 2 Main Coffee Zone	m/l i m/s	1 460–1 710	19.3–17.8	950–1 500	400–700	280–430	160 or more	115–130	175–190
	m + s/m			950–1 400	350–550	270–350	150 or more	105–110	–
UM 3 Marginal Coffee Zone	m/s + s	1 220–1 780	20.8–17.5	870–1 000	250–450	250–320	120 – 135	85–100	–
UM 4 Sunflower-Maize Zone	s/m + s	1 580–1 780	18.6–17.5	850–900	250–350	250–300	105 – 115	85–100	–
	s/m + s/vs			800–870	250–300	230–270	105 – 110	75–80	–

1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants.

2) More if growing cycle of cultivated plants continues into the period of second rains.

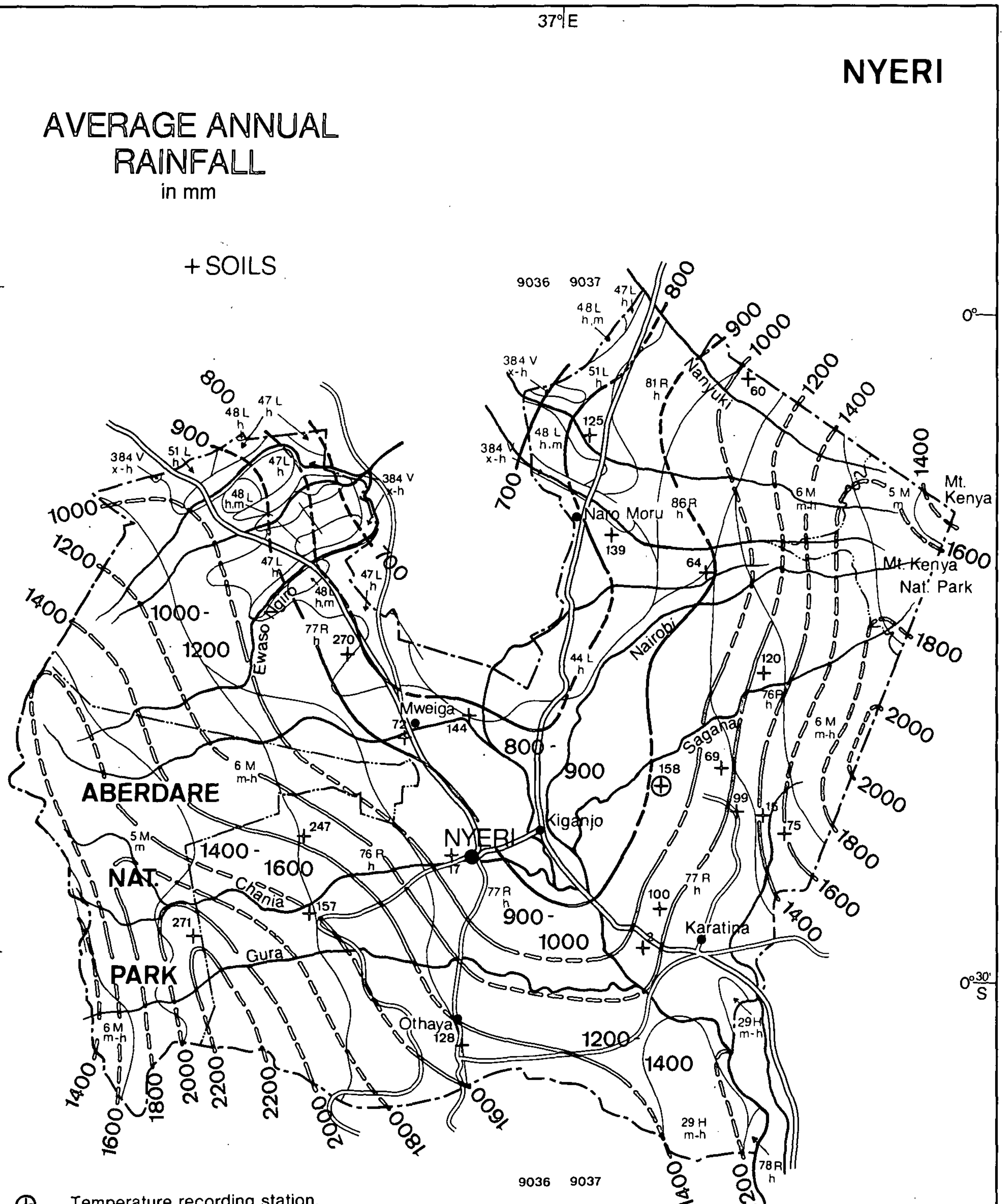
3) Only added if rainfall continues at least for survival ($> 0.2\ E_0$) of most long term crops.

4) No continuous growing period.

NYERI

AVERAGE ANNUAL RAINFALL
in mm

+ SOILS



⊕ Temperature recording station, operating 1976

+ Rainfall recording station, operating 1976 and having at least 10 years of records

271 Station number in grid

9036 Grid number

Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS

Broken boundaries are uncertain because of lack of rainfall records

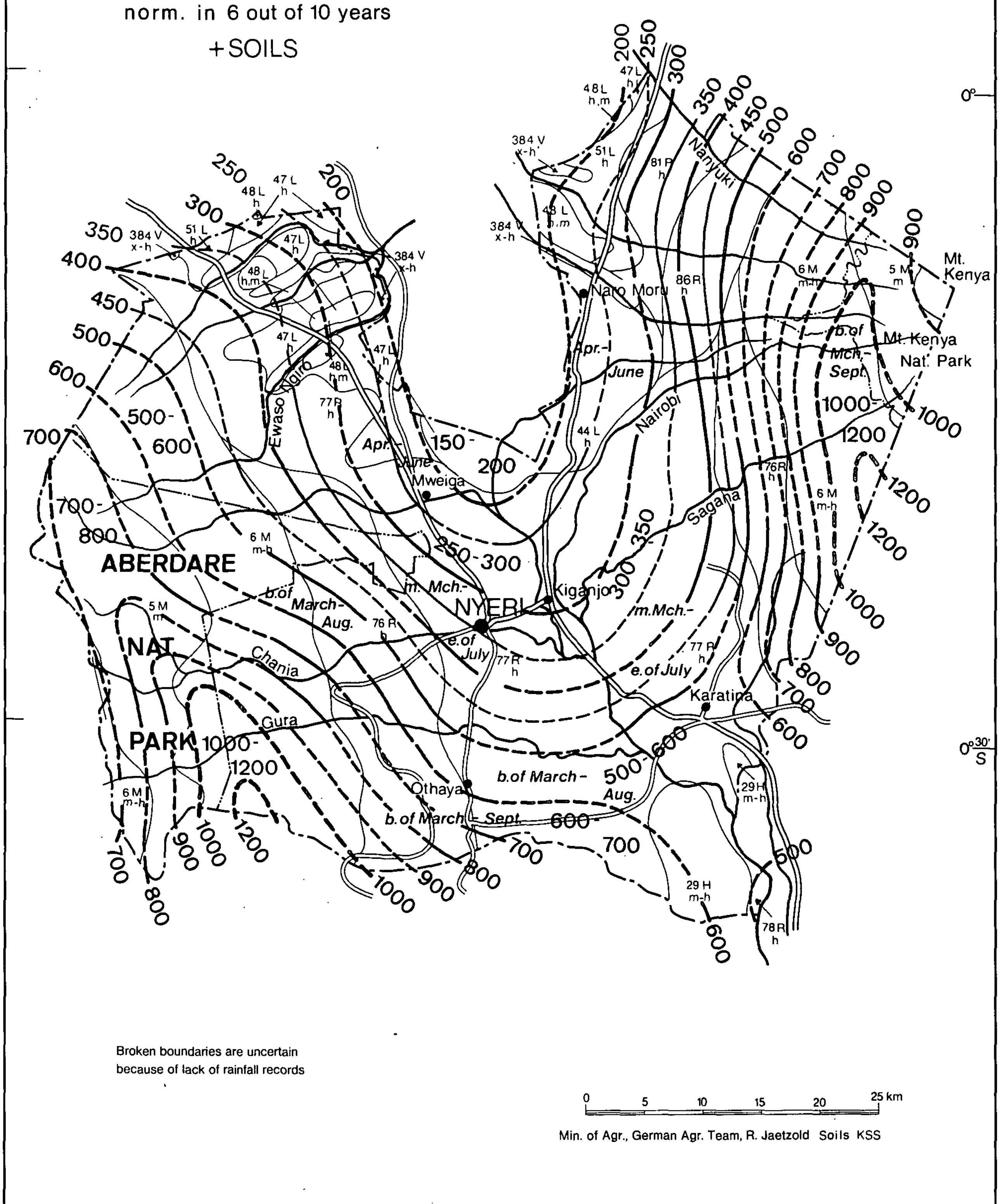
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF FIRST RAINS

(March - Sept. or less)

Amounts in mm, surpassed norm. in 6 out of 10 years

+SOILS

NYERI



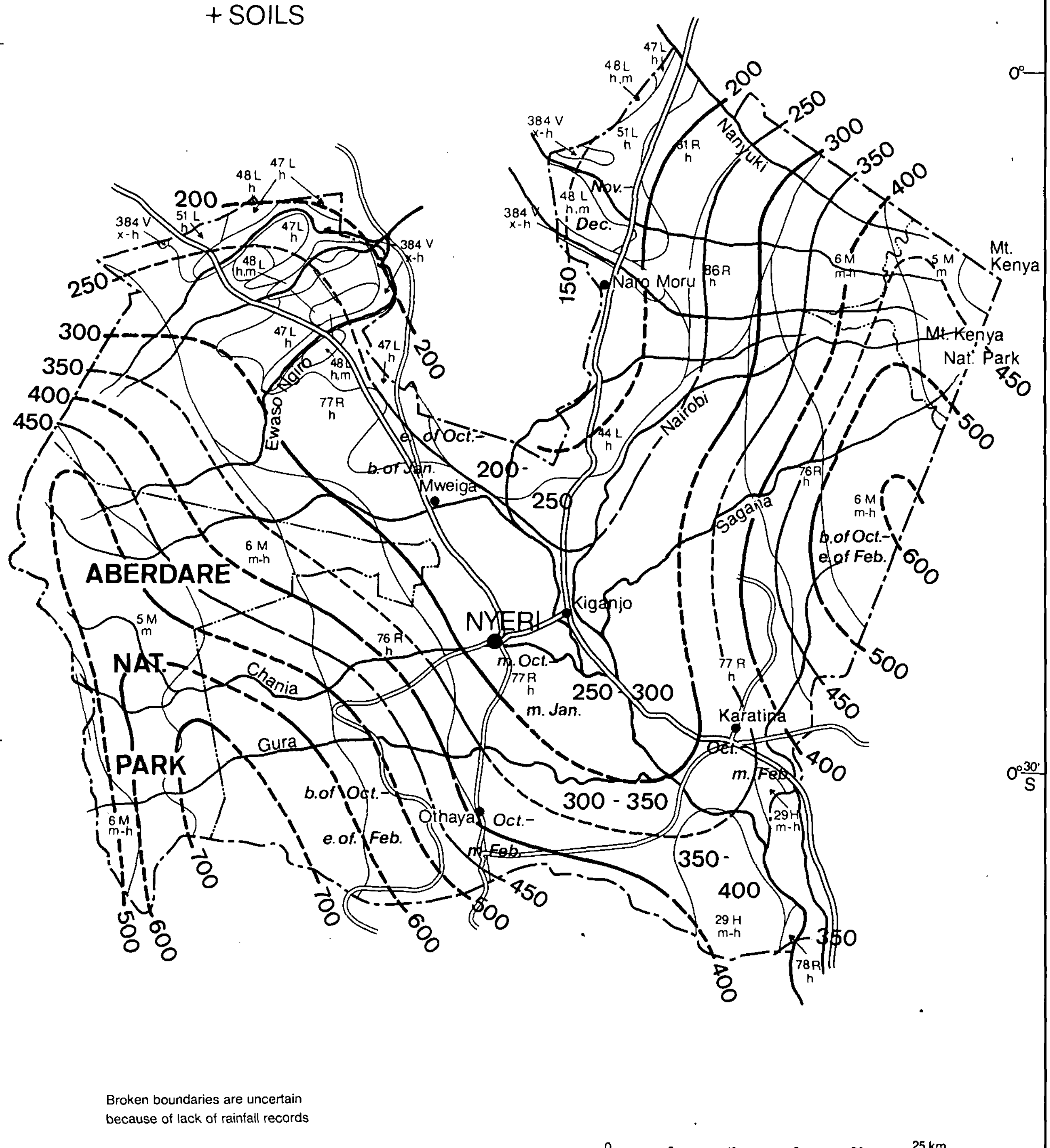
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF SECOND RAINS

(Oct. - Feb. or less)

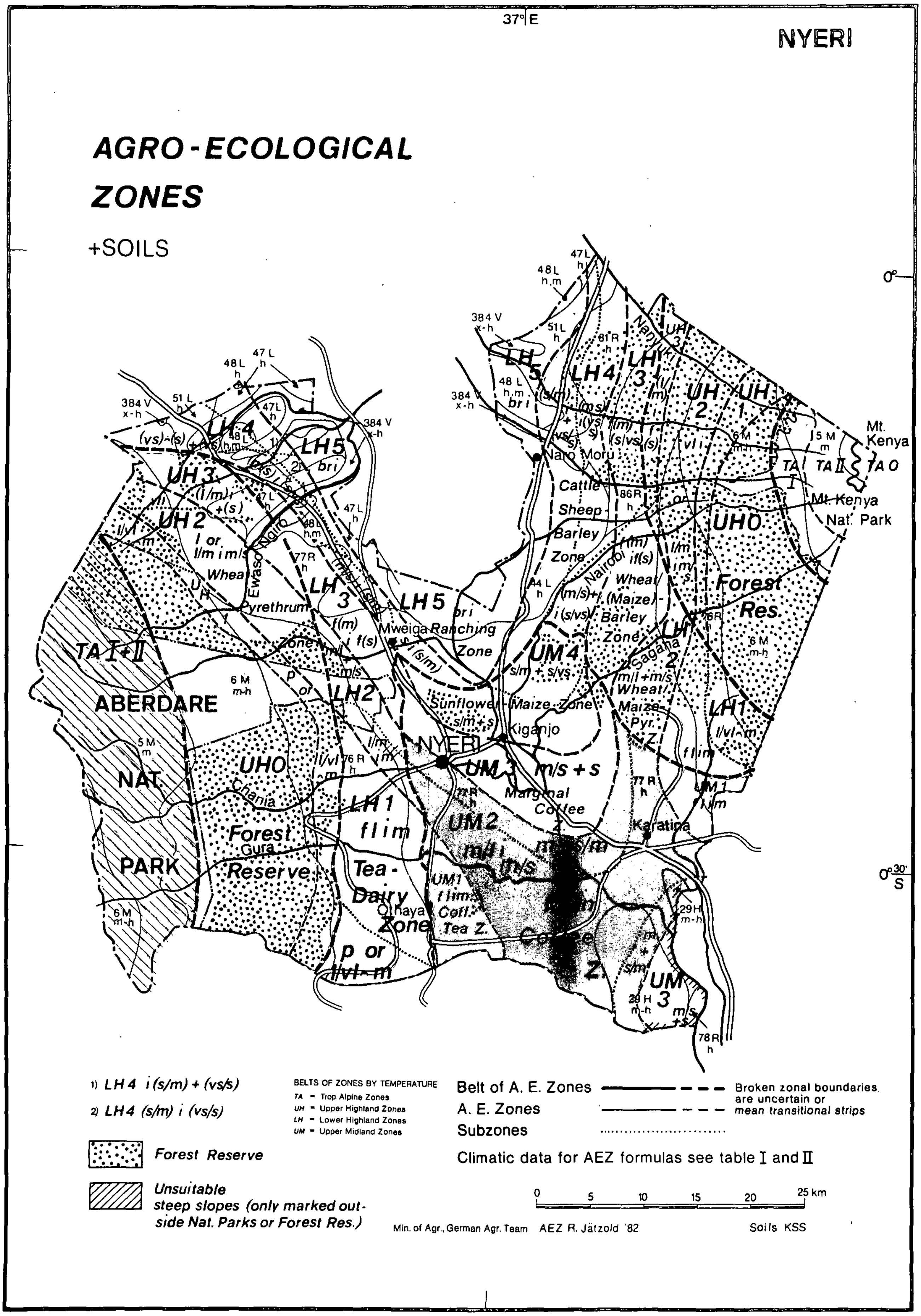
Amounts in mm, surpassed norm. in 6 out of 10 years

+ SOILS

NYERI



Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


NYERI
AGRO-ECOLOGICAL ZONES
+SOILS
37° E
0°
0°30' S
ABERDARE NAT. PARK
Forest Reserve
Mt. Kenya Nat. Park
Mt. Kenya
NYERI
Naro Moru
Mweiga
Kiganjo
Karatina
Othaya
1) LH 4 i (s/m) + (vs/s)
2) LH 4 (s/m) i (vs/s)
Forest Reserve
Unsuitable steep slopes (only marked outside Nat. Parks or Forest Res.)
BELTS OF ZONES BY TEMPERATURE
TA = Trop Alpine Zones
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
Belt of A. E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team AEZ R. Jätzold '82
Soils KSS

AGRO-ECOLOGICAL ZONES

TA = *TROPICAL-ALPINE ZONES*

TA 0 = *Rocks and Glaciers*

TA I + II = *Tropical-Alpine Moor- and Heathlands*

Here National Park
Limited grazing potential

UH = *UPPER HIGHLAND ZONES*

UH 0 = *Forest Zone*

UH 1 = *Sheep and Dairy Zone*

UH 1 p or l/vl ⌐ m = *Sheep and Dairy Zone with permanent cropping possibilities, dividable in a long to very long cropping season followed by a medium one*

Upper places very steep and too important as a catchment area, therefore Forest Reserve or Nat. Park. Small strip of outside lower places cleared, there:

Good yield potential (av. 60–80 % of the optimum)
1st rains, start norm. mid March: Oats (Apr.–S.); peas, potatoes[1] (m. S.–m. Jan.); late mat. rapeseed; cabbage, carrots, kohlrabi, celery, radish, endive, rampion, leek
2nd rains, start norm. b./mid Oct.: Oats (Oct.–F.); peas, potatoes[1]; med. mat. rapeseed, vegetables

Fair yield potential (av. 40–60 % of the optimum)
1st to 2nd rains: Late mat. maize like H 611 (frost-free lower slopes), late mat. triticale
2nd rains: Med. mat. triticale

Pasture and forage
About 0.5 ha/LU on sec. pasture of Kikuyu grass; very suitable for grade dairy cows; rye grass (Lolium perenne) and Kenya white clover to improve pasture

UH 1 l/vl ⌐ m = *Sheep and Dairy Zone with a long to very long cropping season, followed by a medium one*

Too steep and too important as a catchment area, therefore not cleared (Forest Reserve and National Park)

UH 2 = *Pyrethrum-Wheat Zone*

UH 2 vl i or two = *Pyrethrum-Wheat Zone with a very long cropping season and intermediate rains, dividable in two variable cropping seasons and i.r.*

Very small, potential see Nyandarua District

UH 2 l or l/m i m/s = *Pyrethrum-Wheat Zone with a long or long to medium cropping season, intermediate rains, and a medium to short one*

Good yield potential
1st rains, start norm. mid March: M. mat. wheat like R 199 and other var., late mat. wheat like Kenya Bongo, m. mat. barley; peas, horse beans; potatoes[1]; rapeseed; cabbages, kales, carrots, kohlrabi, celery, endive, rampion, leek, radish
2nd rains, start norm. b./mid O.: E. mat. barley; potatoes (Aug./S.–Jan./F.); peas, cabbages, kales, carrots, celery, endive, rampion, radish

Whole year: Pyrethrum

Fair yield potential
1st to 2nd rains: Late mat. maize like High alt. composite or Cuzco, H 611 (frost-free lower places)
2nd to 1st rains: Maize as above, but 50–60 % (lower places H 611, N.–Aug.); kohlrabi
Whole year: Pears, plums, apples (below 2 600 m)

Pasture and forage
About 0.8 ha/LU on sec. pasture of Kikuyu grass with not too much tufted grass[2)], improvable with rye grass (Lolium perenne) outside wheat areas; for Merino sheep and dairy cows very well suited; oats and Kenya white clover for forage

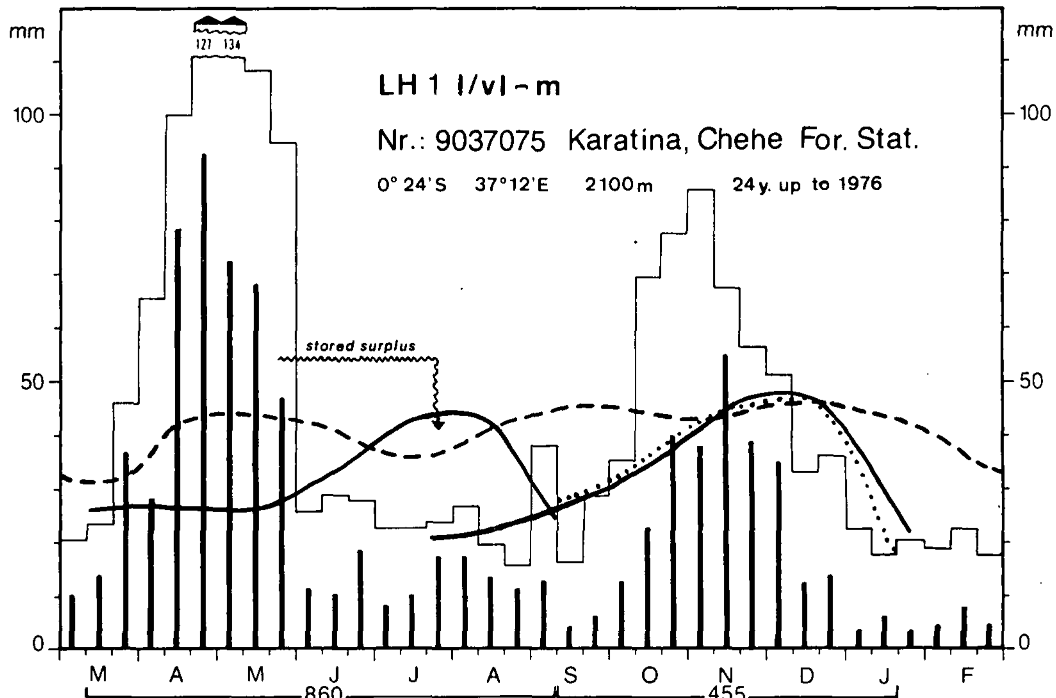
UH 3 = *Upper Wheat-Barley Zone*

UH 3 (l/m) i f(s) = *Upper Wheat-Barley Zone with a (weak) long to medium cropping season, intermediate rains, and a (weak) fully short one*

No reliable good yield potential

Fair yield potential
1st rains, start norm. mid March: Late mat. wheat like Kenya Bongo, barley like Proctor; potatoes
Whole year: Pyrethrum (on deep soils)

Pasture and forage
1–2 ha/LU on sec. pasture Kenya white clover and barley Amani for additional forage; well suitable for Merino sheep and grade beef cattle



LH = *LOWER HIGHLAND ZONES*

LH 1 = *Tea-Dairy Zone*

LH 1 l/vl – m = *Tea-Dairy Zone with a long to very long cropping season followed by a medium one*[3)]

(See Diagram Kar. Chehe)

Very good yield potential (av. over 80 % of the optimum)
1st rains, start norm. mid March: Peas, cabbages, lettuce
2nd rains, start norm. mid Oct.: Peas

Good yield potential
1st rains: Potatoes (e. of F.–July)[1)], carrots, leek, spinach, endive
Middle rains (Gathano rains, July–Aug.): Potatoes (Jy.–O.)
2nd rains: Potatoes (m. S.–m. Jan.); cabbages, carrots, spinach
Whole year, best planting time mid March: Tea (high quality), kales, loquats

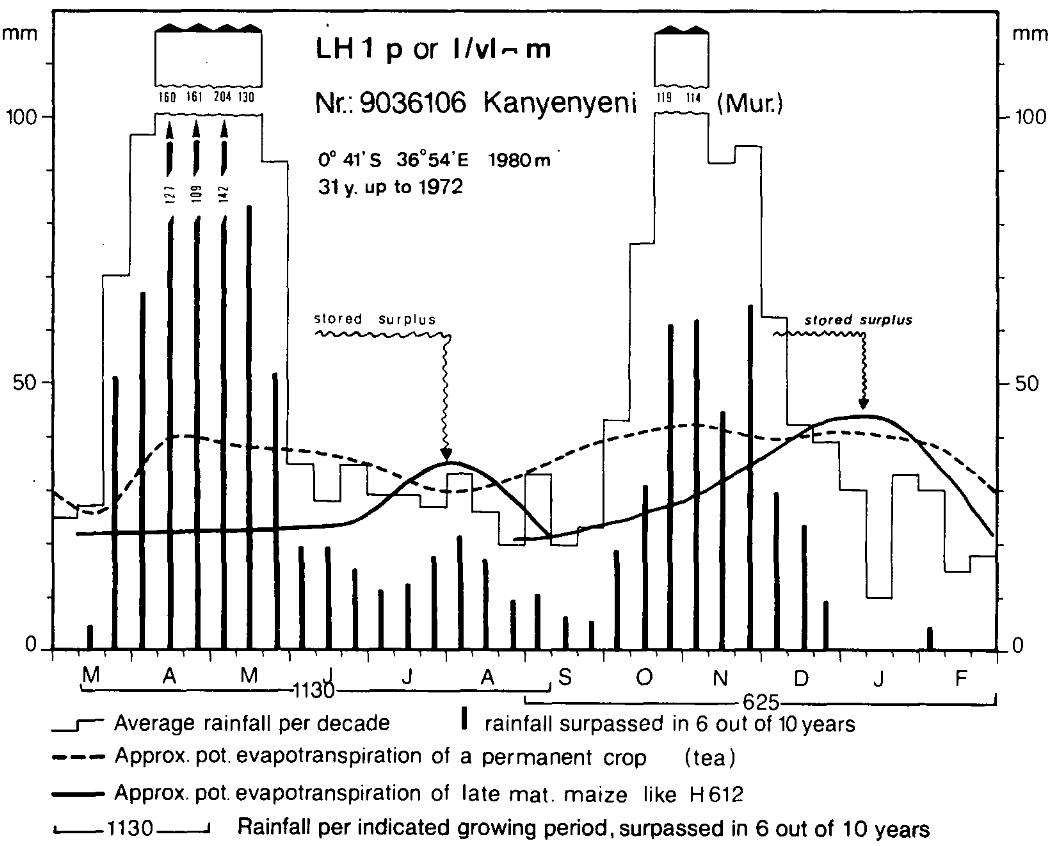
Fair yield potential
1st rains: Maize H 611–614 (danger of soil erosion); beans (lower places, 2nd time end of July–b. of N. ~40 %)
2nd rains: Maize H 613–14; (lower places, end of July–Jan.); beans; leek, lettuce
Whole year: Pyrethrum (too wet), plums

Pasture and forage
Around 0.4 ha/LU on sec. pasture of Kikuyu grass, well suitable for grade dairy cows; clover for higher productivity

LH 1 p or l/vl ⌐ m = *Tea-Dairy Zone with permanent cropping possibilities, dividable in a long to very long cropping season followed by a medium one*

(See Diagram Kanyenyeni)

Small, potential see Muranga District



LH 1 f l i m = *Tea-Dairy Zone with a fully long cropping season, intermediate rains, and a medium one*

Small, potential almost as LH 1 l/vl ⌐ m; 2nd maize planting end of June (harvest Jan.–March), beans good yields if planted S./O.–Jan., tea in northern lower places only fair

LH 2 = *Wheat/Maize-Pyrethrum Zone*

LH 2 l/m i m = *Wheat/Maize-Pyrethrum Zone with a long to medium cropping season, intermediate rains, and a medium one*

Small, potential almost as LH 2 m/l+m/s but wheat due to dissected topography and relatively high humidity not advisable; maize Mch.–O., e. of Jy.–Jan., O.–Jy. (lower places 613–614 good), fair to poor yields for tea. Stocking rates up to 20 % higher

LH 2 m/l + m/s = *Wheat/Maize-Pyrethrum Zone with a medium to long and a medium to short cropping season*

Good yield potential
1st rains, start norm. mid March: M. mat. wheat like Kenya Leopard and other varieties of this group, m. mat. barley like K. Research; sunflower Kenya White, rapeseed; potatoes, peas, nearly all vegetables
2nd rains, start mid O.: E. mat. wheat and barley; e. mat. vegetables
Whole year: Pyrethrum (60–70 %), black wattle

Fair yield potential
1st rains: Maize H 611, lower places 612–614 and beans; rapeseed (higher places)
2nd rains: Maize H 613–614 (O.–Jy.); beans, peas; potatoes
Whole year: Apples, pears and plums higher places, peaches lower ones; strawberries

Pasture and forage
0.6–1.2 ha/LU on sec. pasture of Kikuyu grass; down to 0.4 ha/LU with Napier grass up to 2 000 m, Nandi Setaria above that, and green maize, maize stalks, fodder beets, Louisiana white clover

LH 3 = Wheat/Maize-Barley Zone

LH 3 f (m) i f (s) = Wheat/(Maize)-Barley Zone with a (weak) fully medium to cropping season, intermediate rains, and a (weak) fully short one

Good yield potential
1st rains, start norm. mid/end of March: E. mat. wheat like Kenya Paa a. o. e. and m. mat. varieties, late mat. wheat like Kenya Bongo (end of F./b. of Mch.–S., ~ 60 %), m. mat. barley like K. Research

Fair yield potential
1st rains: Maize H 611–13 (~ 40 %, near valleys), H 511 (hilly places); beans in lower places, peas; linseed, late mat. sunflower like Kenya white; m. mat. potatoes like Kenya Akiba; shallots
2nd rains, start mid O.: Maize H 511–12 (end of N.–May/June), v. e. mat. barley; e. mat beans (~ 40 %); onions
Whole year: Avocadoes in lower places, kales

Pasture and forage
1–2 ha/LU on nat. grassland; 0.7–1.5 ha/LU on art. pasture of Rhodes grass or in higher places Nandi Setaria; barley Amani or B 106 in 1st rains for stockfeed

LH 3 f (m) i (s/vs) = Wheat/(Maize)-Barley Zone with a (weak) fully medium cropping season, intermediate rains, and a (weak) short to very short one

Potential almost the same as above, but v. e. mat. barley 2nd r. only about 40 %, beans and onions poor; stocking rates about 10 % lower

LH 4 = Cattle-Sheep-Barley Zone

LH 4 (m/s) i (vs/s) = Cattle-Sheep-Barley Zone with a (weak) medium to short cropping season, intermediate rains, and a (weak) very short to short one

Fair yield potential
1st rains, start norm. end of March: E. or m. mat. barley (50–60 %), e. or m. mat. wheat; shallots (green onions)

Poor yield potential
1st rains: Late mat. maize like H 612–614, m. mat. H 511–512 (30–40 %)[4)]
2nd rains, start norm. end of O.: Maize H 511–512 (e. of N.–June), v. e. mat. barley

Pasture and forage
2–4 ha/LU on nat. grassland, up to 2 000 m improvable with Rhodes grass; fodder barley B 106 (first rains)

LH 4 (m/s) i (s/vs) = Cattle-Sheep-Barley Zone with a (weak) medium to short cropping season, intermediate rains, and a (weak) short to very short one

Fair yield potential
1st rains, start norm. e. of Mch.: E. mat. barley, e. mat. wheat (40–50 %); shallots
2nd rains, start norm. e. of O.: V. e. mat. barley

Poor yield potential
In both rains almost as LH 4 (m/s) i (vs/s)

Pasture and forage
2–4 ha/LU on nat. or sec. grassland; e. mat. fodder barley like Amani (1st rains)

LH 4 (m/s) i (s/m) = *Cattle-Sheep-Barley Zone with a (weak) medium to short cropping season, intermediate rains, and a (weak) short to medium one*

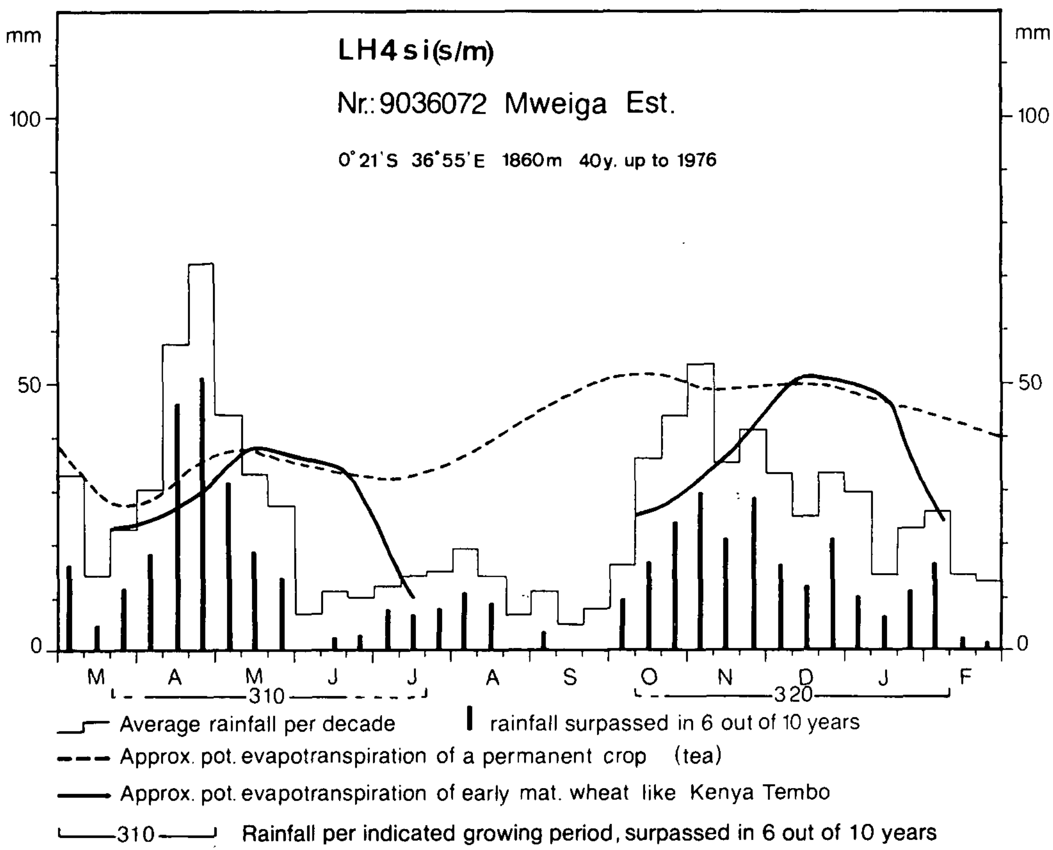
Transitional strip, potential in first rains as LH 4 (m/s) i (s/vs), in second rains almost as LH 4 s i s/m (less 10 %)

LH 4 s i (s/m) = *Cattle-Sheep-Barley Zone with a short cropping season, intermediate rains, and a (weak) short to medium one*

(See Diagram Mweiga Estate; curves of tea and wheat for comparison only to estimate the water deficit)

F a i r   y i e l d   p o t e n t i a l
1st rains, start norm. b. of April: E. mat. barley, v. e. mat. beans
2nd rains, start norm. e. of O.: E. mat. barley (50–60 %), e. mat. sunflower (50–60 %), e. mat. beans; shallots

P a s t u r e   a n d   f o r a g e
1.8–4 ha/LU on nat. or sec. grassland; fodder barley Amani (both rains)



LH 4 (s/m) i (vs/s) = *Cattle-Sheep-Barley Zone with a (weak) short to medium cropping season, intermediate rains, a (weak) very short one*

F a i r   y i e l d   p o t e n t i a l
1st rains, start norm. b. of April: E. mat. barley like Tumaini

P o o r   y i e l d   p o t e n t i a l
1st rains: E. mat. wheat like Kenya Ngiri; green onions
2nd rains, start norm. end of O.: V. e. mat. barley

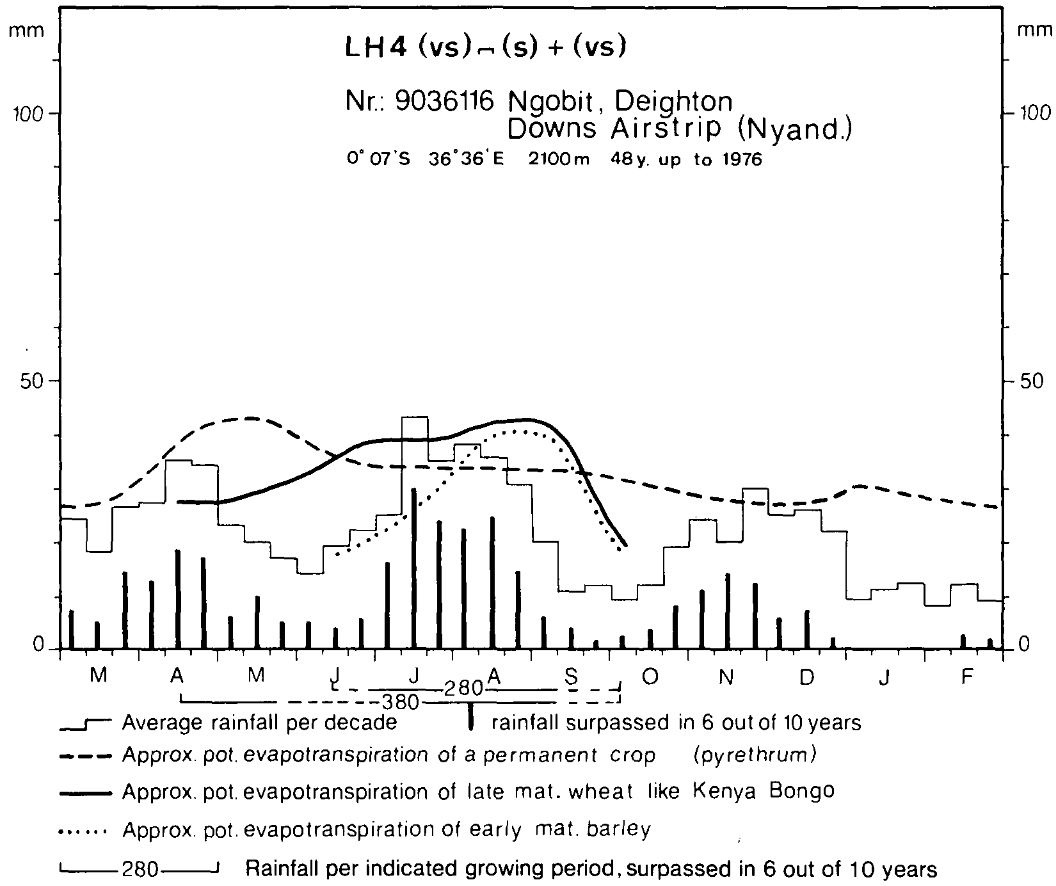
P a s t u r e   a n d   f o r a g e
3–5 ha/LU on nat. grassland, subterr. clover as add. forage

LH 4 i (s/m) + (vs/s) = *Cattle-Sheep-Barley Zone with intermediate first rains, a (weak) short to medium cropping season, and a (weak) very short to short one*

Almost the same potential as LH 4 (s/m) i (vs/s) but planting starts later towards middle rains (June). Plowing nevertheless early to preserve water from first rains

LH 4 = *Cattle-Sheep-Barley Zone*
(vs) ⌐ (s) + (vs) *with a (weak) very short cropping season, followed by a (weak) short one, and a (weak) very short one*

(See Diagram Ngobit, Deighton Downs Airstrip; curves of pyrethrum and wheat K. Bongo for comparison only)



Almost the same potential as LH 4 (s/m) i (vs/s), but start of main rains and planting mid June; rapeseed leaves as vegetable. Yields improvable if water of first rains is conserved by contour ploughing and mulching

LH 5 = *Lower Highland Ranching Zone*

LH 5 bri = *Lower Highland Ranching Zone with bimodal rainfall and intermediate rains*

Not or only marginally suitable for rain-fed agriculture

Pasture and forage
Normally 4–5 ha/LU on nat. Themeda grassland if well managed. No proper forage. Suitable for grade cattle

UM = *UPPER MIDLAND ZONES*

UM 1 = *Coffee-Tea Zone*

UM 1 flim = *Coffee-Tea Zone with a fully long cropping season, intermediate rains, and a medium one*

Very good yield potential
1st rains, start norm. mid March: Lima beans; cabbages, kales
2nd rains, start norm. mid Oct.: Beans (Aug.–D./Jan.)
Whole year, best planting time mid March: Passion fruit, black wattle

Good yield potential
1st rains: Late mat. maize H 612–614, finger millet; potatoes, sweet potatoes (lower pl.); sunflower Kenya White; onions
2nd rains: Sweet potatoes; e. mat. sunflower like 252 (lower places), m. mat. like HS 301 A (higher pl.); cabbages (Aug.–D.), onions, tomatoes
Whole year: Tea (higher pl.), Arabica coffee (lower places), bananas, mountain pawpaws, yams, loquats, avocadoes, kales, arrowroots

Fair yield potential
1st rains: Cold tol. sorghum, foxtail millet (July–O.); sweet potatoes (higher pl.)
2nd rains: Maize H 612 (Aug.–Jan.), H 511 & 512 (S.–Jan.), cold tol. sorghum (Aug.–F.), finger millet; potatoes (Aug.–D.)
Whole year: Arabica coffee (higher places), tea (lower pl.), pineapples, Citrus, taro

Pasture and forage
0.5–0.7 ha/LU on sec. pasture of Kikuyu grass but land too valuable for grazing; down to about 0.15 ha/LU feeding Napier grass, banana stems and leaves, sweet potato vines, maize stalks

UM 2 = Main Coffee Zone

UM 2 = Main Coffee Zone
m/l i with a medium to long cropping season, intermediate rains,
m/s and a medium to short one[5]

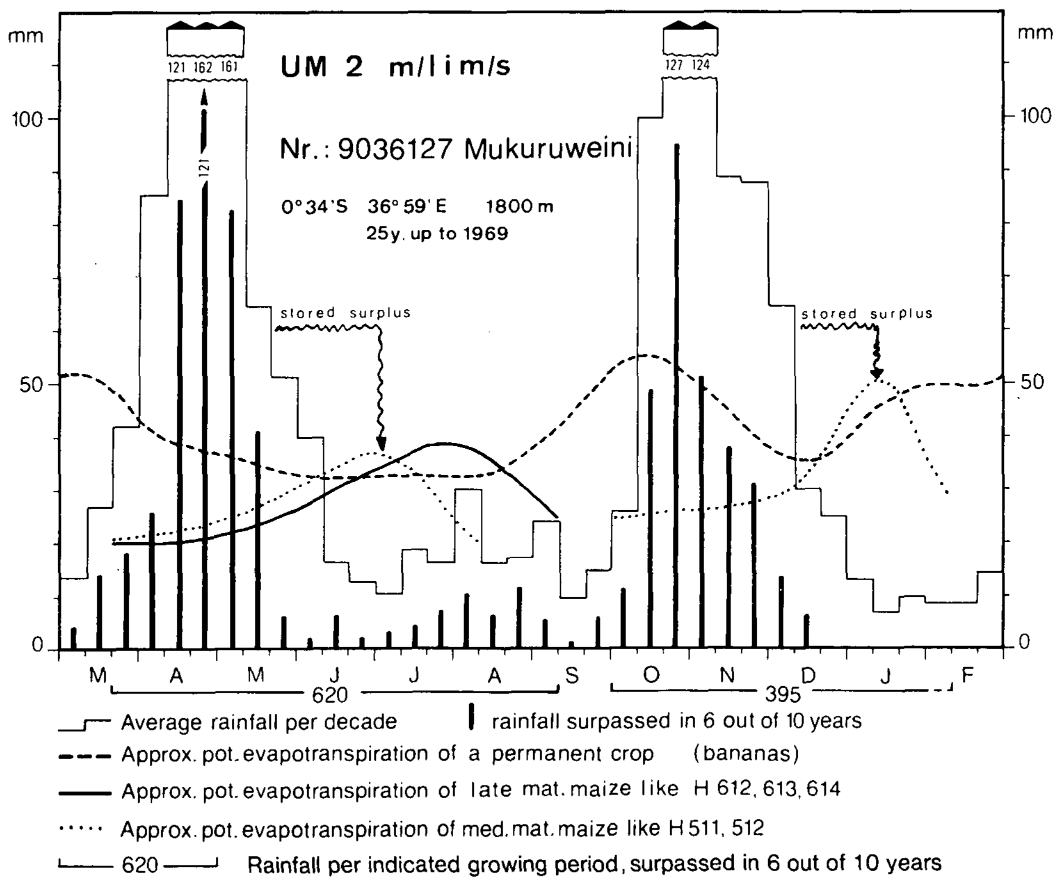
(See Diagram Mukuruweini)

Very good yield potential
1st rains, start norm. mid March: M. mat. sunflower like Hybrid S 301 A
2nd rains, start norm. mid Oct.: Beans (S./O.–Jan./F.)
Whole year, best pl. time mid March: Arabica coffee (~ 80 %), loquats, mountain pawpaws

Good yield potential
1st rains: M. mat. maize like H 511 & 512, ratoon of sorghum (lower pl.); beans, potatoes[1], sweet pot.; cabbages, kales, tomatoes[8], onions
2nd rains: E. mat. maize like Katumani comp. B[7], e. mat. foxtail millet, v. e. mat. sorghum like 2 KX 17; sweet potatoes (Aug./S.–Jan.); e. mat. sunflower like Issanka (< 1 500 m); kales, cabbages[8], onions, tomatoes[8]
Whole year: Bananas, citrus, avocadoes, passion fruit, pineapples, taro in valleys, arrowroots

Fair yield potential
2nd rains: M. mat. local maize or H 511 (Aug./S.–J./F.)[7], finger millet; e. mat. potatoes
Whole year: Cassava (lower places), sugar cane (lower and wet places)[8]

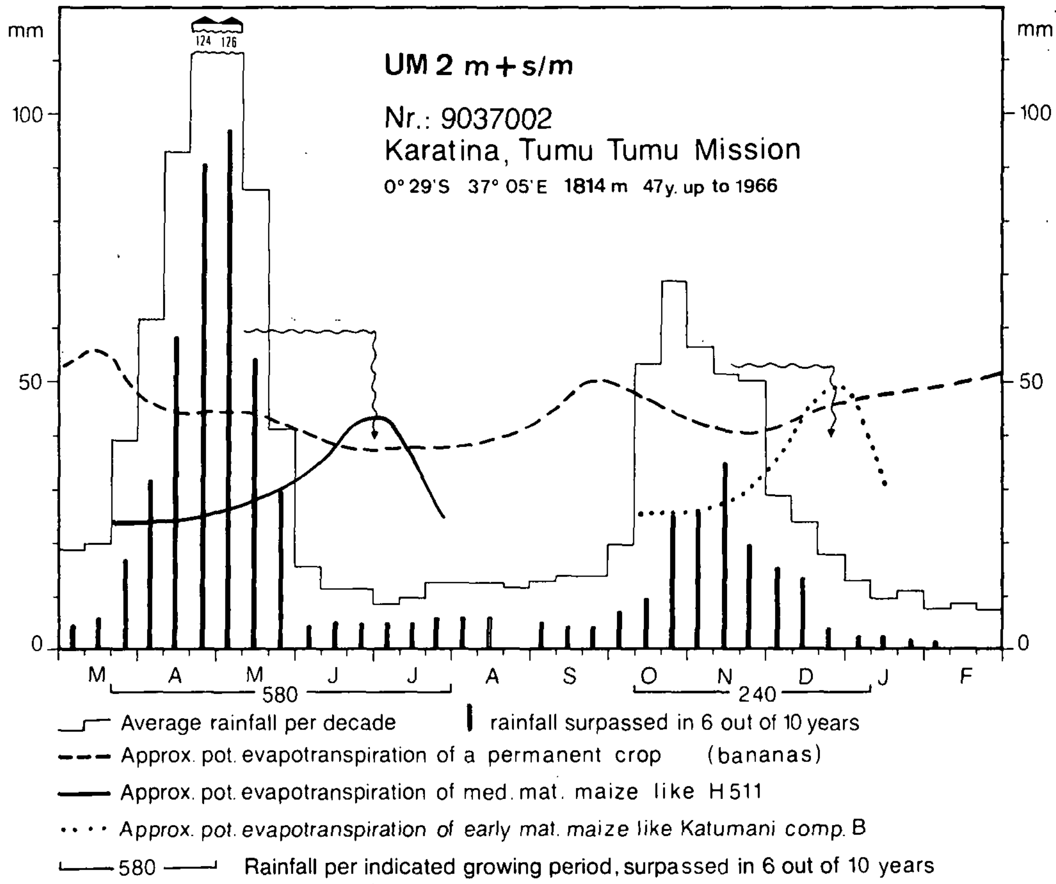
Pasture and forage
0.6–1.0 ha/LU on sec. pasture, but land too valuable for grazing; down to about 0.2 ha/LU feeding Napier or Bana grass, banana leaves a. o. forage



UM 2 = Main Coffee Zone
m + s/m with a medium cropping season and a short to medium one

(See Diagram Tumu Tumu)

Potential and stocking rates almost the same as UM 2 m/l i m/s less about 10 % because of more intensive drought; all vegetables better in valleys, coffee yields good



UM 3 = Marginal Coffee Zone

UM 3 = Marginal Coffee Zone
m/s + s with a medium to short and a short cropping season[6]

Good yield potential
1st rains, start norm. mid to end of March: E. mat. maize like Katumani comp. B[7], ratoon of e. mat. sorghum; sunflower like HS 345 (< 1 500 m); e. mat. beans; onions, cabbages
2nd rains, start norm. mid Oct.: E. mat. foxtail millet; v. e. mat. sorghum like IS 8595; sunflower Issanka, v. e. mat. beans
Whole year: Pineapples (best planting time end of March), Macadamia nuts, perennial castor

Fair yield potential
1st rains: Maize H 511 or 512 (50–60 %)[7], m. mat. finger millet; e. & m. mat. beans, sweet potatoes; kales, tomatoes
2nd rains: Katumani maize, e. mat. sorghum (almost 60 %); e. mat. beans; sunflower Issanka, cabbages[8], kales[8], tomatoes[8]
Whole year: Arabica coffee (lower places poor, add. irrigation profitable), bananas (lower places marginal)[8], citrus[8], pawpaws, cassava

Pasture and forage
0.7–1.1 ha/LU on sec. high grass savanna with zebra grass (Hyparrhenia rufa) predom.; down to about 0.25 ha/LU feeding Napier or better Bana grass, glycine a. o. forage

UM 3 = Marginal Coffee Zone
m/s + s/vs with a medium to short and a short to very short cropping season

Good yield potential
1st rains, start norm. mid to end of March: Katumani maize, e. mat. sorghum; v. e. mat. beans; sunflower Issanka (< 1 500 m); onions, cabbages[8]
2nd rains, start norm. end of O.: E. mat. foxtail millet
Whole year: Pineapples, Macadamia nuts

Fair yield potential
1st rains: Almost the same as UM 3 m/s + s, maize H 512 ~ 10 % less
2nd rains: Dryland comp. maize, e. mat. sorghum like 2 KX 17, v. e. mat. sorghum like IS 8595 (50–60 %); v. e. mat. beans; e. mat. cabbages
Whole year: Almost the same as UM 3 m/s + s but a bit more marginal

Pasture and forage
Almost the same as UM 3 m/s + s but stocking rates are about 10 % lower

UM 4 = Sunflower-Maize Zone

UM 4 s/m + s = Sunflower-Maize Zone with a short to medium and a short cropping season[9)]

Good yield potential
1st rains, start norm. mid to end of March: Katumani maize, cold tol. e. mat. sorghum, ratoon of e. mat. sorghum; mwezi moja beans; e. mat. sunflower
2nd rains, start norm. mid of Oct.: v. e. mat. sorghum; sunflower Issanka (lower places)
Whole year, best planting time end of Oct.: Sisal

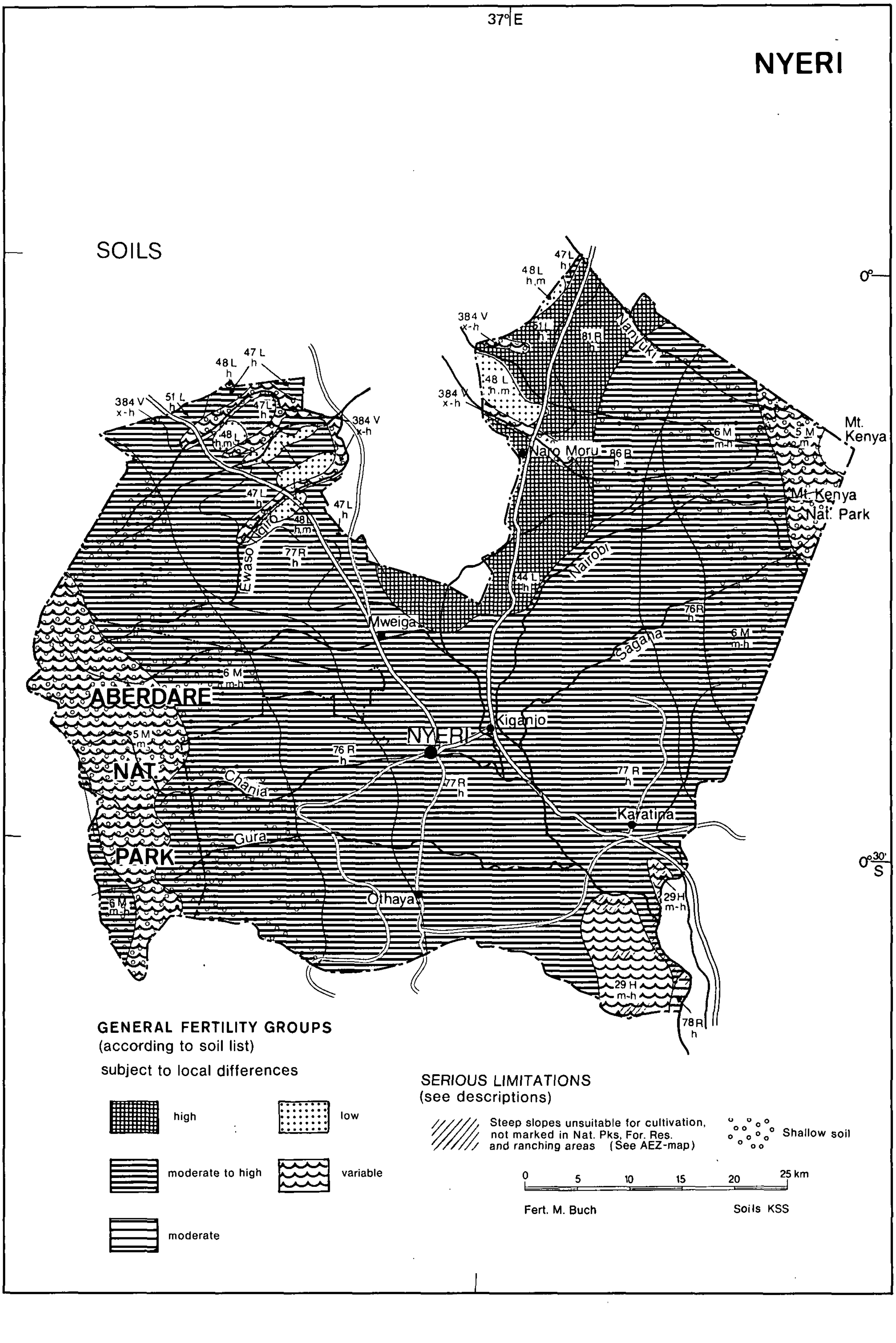
Fair yield potential
1st rains: Maize H 511, finger millet; dolichos beans; potatoes (higher places), sweet potatoes; Virg. tobacco; (lower places); tomatoes, onions
2nd rains: Katumani maize, e. mat. sorghum like 2 KX 17; mwezi moja beans
Whole year: Cassava, castor, pineapples

Pasture and forage
0.8–1.2 ha/LU on high grass savanna with zebra grass (Hyparrhenia rufa) predominant; down to about 0.28 ha/LU feeding Bana grass, siratro (Macroptilium atropurpureum), horse tamarind (Leucaena leucocephala) a. o.

UM 4 s/m + s/vs = Sunflower-Maize Zone with a short to medium and a short to very short cropping season

Almost the same potential as s/m + s, but sunflower Issanka 2nd rains only fair; stocking rates are about 10 % less

1) Spraying against fungus diseases important
2) The bad tufted grasses Eleusine jaegeri and Pennisetum schimperi are expanding if the areas are overgrazed
3) On medium soils; on heavy soils permanent cropping possibilities. Given potential refers to predominating heavy red loams
4) A medium maturing variety for this rel. high altitude would be better but is not yet available
5) On medium soils; on heavy soils first cropping season has a long to medium length, second a medium one. Potential refers to predominating heavy red loams
6) On medium soils; on heavy soils first cropping season has a medium length, higher places even medium to long. Given potential refers to predominating heavy red loams
7) Although Katumani has climatically a good yield potential, it may be on deep soils more advisable to plant H 511 or 12 because of its higher productivity
8) Better in valleys
9) On medium soils; on heavy soils veg. (growing) period 1st rains has a medium to short length, 2nd rains short to medium. Potential refers to predom. heavy red loams



37° E
NYERI
SOILS
0°
0°30' S
Mt. Kenya
Mt. Kenya Nat. Park
ABERDARE NAT. PARK
Naro Moru
Mweiga
NYERI
Kiganjo
Karatina
Othaya
Nanyuki
Nairobi
Sagana
Chania
Gura
Ewaso Ngiro
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
high
low
moderate to high
variable
moderate
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
0 5 10 15 20 25 km
Fert. M. Buch
Soils KSS

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

The physiography of Nyeri District is dominated by the Nyandarua Range in the east and Mt. Kenya in the northwest. The large central part is made up of undulating to rolling topography (volcanic foothill ridges), with plateaus in the western part of the district. The bedrock consists of volcanic rocks.

On the highest parts of the mountains, soils of unit 5 M of moderate to high fertility occur but it is too cold for any land use. At a slightly lower altitude, soils with a humic topsoil and a moderately high fertility are found (unit 6 M). They may be shallow or leached.

Hill soils occur in the southeastern part of the district (unit 29 H) which are moderately to highly fertile but varying.

The major part of the district, consisting of volcanic foothills, has soils with a variable topsoil, but often fairly rich in organic matter (unit 77 R) and moderately to highly fertile.

On the plateaus, various soils are found: in the northern and northwestern part of the district, soils of units 47 L, 48 L and 51 L occur. Soils of unit 47 L are moderately to highly fertile, soils of unit 48 L are of low fertility, and soils of unit 51 L of high fertility.

On the lower topographical sites, soils which have developed in minor valleys (unit 384 V) are found.

SOILS ON MOUNTAINS

Soils developed on olivine basalts and ashes of Mt. Kenya

5 M = imperfectly drained, shallow to moderately deep, dark greyish brown, very friable, acid humic to peaty, loam to clay loam, with
m[1] rock outcrops and ice in the highest parts (dystric HISTOSOLS, lithic phase; with LITHOSOLS, rock outcrops and ice)

6 M = well drained, very deep, dark reddish brown to dark brown, very friable and smeary, clay loam to clay, with thick, acid humic
m–h topsoil; in places shallow to moderately deep and rocky (humic ANDOSOLS, partly lithic phase)

SOILS ON HILLS

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

29 H = somewhat excessively drained, predominantly moderately deep, red, very friable, sandy clay loam to sandy clay; in places rocky
m–h (ferralic CAMBISOLS; with rhodic or orthic FERRALSOLS and ROCK OUTCROPS)

SOILS ON PLATEAUS AND HIGH LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older basic tuffs included)

44 L = well drained, moderately deep to deep, dark brown, firm clay, with thick humic topsoil
h (ortho-luvic PHAEOZEMS)

47 L = imperfectly drained, deep, black to dark grey, very firm, slightly to strong cracking clay (pellic VERTISOLS and verto-luvic
h PHAEOZEMS)

48 L = imperfectly drained, deep, dark greyish brown, firm clay (hardpan), abruptly underlying a topsoil of sandy clay loam (eutric
m, h PLANOSOLS)

51 L = moderately well drained, very deep, dark greyish brown, firm clay
h (verto-luvic PHAEOZEMS; with eutric PLANOSOLS)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

76 R = well drained, extremely deep, dark reddish brown to dark brown, friable and slightly smeary clay, with acid humic topsoil (ando-
h humic NITOSOLS; with humic ANDOSOLS)

77 R = well drained, extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil
h (humic NITOSOLS)

78 R = well drained, extremely deep, dusky red to dark reddish brown, friable clay; with inclusions of well drained, moderately deep,
h dark red to dark reddish brown, friable clay over rock, pisoferric or petroferric material (eutric NITOSOLS; with nito-chromic CAMBISOLS and chromic ACRISOLS, partly pisoferric or petroferric phase)

81 R = well drained, moderately deep to deep, dark reddish brown, friable to firm clay, with humic topsoil
h (chromo-luvic PHAEOZEMS)

86 R = well drained, moderately deep to very deep, dark reddish brown, friable to firm clay (nito-ferric LUVISOLS; with humic NITO-
h SOLS)

VALLEY SOILS

Soils in minor valleys

384 V = complex of well drained to imperfectly drained, shallow to moderately deep, dark reddish brown to very dark greyish brown,
x–h firm, slightly to moderately calcareous, rocky, stony, or gravelly clay

1) Soil texture-classes

h	=	heavy
l	=	light
m	=	medium
x	=	stony or bouldary
v	=	varying texture
m–h	=	medium to heavy
m, h	=	medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey: Exploratory Soil Map and Agro-climatic Zones Map of Kenya, scale 1 : 1 000 000. Expl. Soil Survey Rep. E1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

The last population Census of September 1979 showed that Nyeri District is densely populated with 148 people per sq km. 485,000 people lived on a total rural area of 201,000 ha, of which 158,900 ha (79 %) were suitable for agriculture or livestock (Table 4 and 6). According to the statistics, 1.80 ha per average household was available. The average household consisted of 4.90 people, thus 0.35 ha were available per person.

About 40,000 people (8.4 % of the total) lived in urban settlements (Nyeri and Karatina township with 38,733 people, and Othaya trading centre with 2,159 people), but apart from administration, trade, and schools there are very few income possibilities for the population besides agriculture. Livestock is the economic basis in the Lower Ranching Zone (LH 5), where large commercial ranches are still found. Where LH 5 occurs (Gatarakwa Location, Table 6), the average size is comparatively bigger (9.22 ha per household). Nevertheless this is already high when regarding the lower potential here. The new small farmers there face difficulties in arable farming.

In those zones where cash crops such as coffee and tea are successfully cultivated (UM 1, UM 2, UM 3, LH 1), plots of 1.00 ha per household can be sufficient for a small farmer to earn a living. Most of the locations, however, did not come up to this limit: Konyu, for example, had only 0.69 ha per household, which reflects high population pressure.

NYERI DISTRICT

TABLE 4: POPULATION PER LOCATION AND DIVISION
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Naromoru	12 559	11 754	24 313	5 843	332	73
Kabaru	7 218	7 362	14 580	3 013	156	93
Kieni East Division	19 777	19 116	38 893	8 856	488	79
Mweiga	13 173	13 558	26 731	5 347	282	94
Gatarakwa	7 363	7 317	14 680	2 744	264	55
Kieni West Division	20 536	20 875	41 411	8 091	546	75
Muhito	12 780	14 871	27 651	5 625	49	562
Gikondi	7 896	9 071	16 967	3 476	38	445
Lower Muhito	3 012	3 177	6 189	1 234	31	196
Githi	10 157	11 324	21 481	4 225	60	353
Mukurweini Division	33 845	38 443	72 288	14 560	179	402
Iriaini	10 104	10 918	21 022	4 039	48	431
Konyu	15 689	16 492	32 181	6 596	57	556
Kirimukuyu	12 632	14 307	26 939	5 031	55	485
Ruguru	12 485	13 923	26 408	4 969	89	295
Magutu	9 914	10 895	20 809	4 118	72	285
Mathira Division	60 824	66 535	127 359	24 753	324	392
Aguthi	15 116	17 506	32 622	6 427	73	442
Tetu	9 887	11 162	21 049	3 949	64	328
Muhoya's	6 422	7 257	13 679	2 642	72	187
Thegenge	16 297	18 626	34 923	6 692	99	349
Nyeri Township	19 247	16 506	35 753	9 527	71	497
Tetu Division	66 969	71 057	138 026	29 237	382	360
Othaya	15 837	17 449	33 286	6 289	76	432
Chinga	7 886	8 805	16 691	2 920	50	330
Mahiga	8 731	9 792	18 523	3 516	43	426
Othaya Division	32 454	36 046	68 500	12 725	170	401
Nyeri District	234 405	252 072	486 477	98 222	3 284	148

NYERI DISTRICT

TABLE 5: COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION[a)]

LOCATION/DIVISION	No. of Household total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adult >15 years	Children <15 years	Other Relatives		
Location:						
Naromoru	5832	2.42	1.02	0.41	0.28	4.14
Kabaru	3011	2.70	1.40	0.46	0.29	4.84
Division: Kieni East	8843	2.52	1.14	0.43	0.28	4.38
Location:						
Mweiga	5343	2.76	1.48	0.38	0.36	4.99
Gatarakwa	2737	2.80	1.66	0.54	0.36	5.36
Division: Kieni West	8080	2.79	1.52	0.43	0.36	5.11
Location:						
Muhito	5628	2.79	1.46	0.55	0.11	4.91
Gikondi	3472	2.73	1.55	0.49	0.11	4.89
Lower Muhito	1232	2.85	1.56	0.55	0.06	5.02
Githi	4221	2.94	1.46	0.56	0.08	5.07
Division: Mukurweini	14553	2.84	1.49	0.54	0.10	4.96
Location:						
Iriaini	4056	2.96	1.48	0.60	0.14	5.18
Konyu	6611	2.80	1.27	0.58	0.15	4.79
Kirimukuyu	5013	2.98	1.53	0.76	0.07	5.30
Ruguru	4998	2.83	1.64	0.62	0.16	5.26
Magutu	4110	2.83	1.51	0.64	0.08	5.06
Division: Mathira	24788	2.87	1.47	0.64	0.12	5.10
Location:						
Aguthi	6428	2.82	1.54	0.55	0.16	5.07
Muhoya's	2644	2.81	1.55	0.67	0.15	5.17
Thegenge	6693	2.96	1.64	0.50	0.11	5.22
Nyeri Township	9567	2.21	0.89	0.37	0.27	3.42
Division: Tetu	29274	2.70	1.23	0.50	0.18	4.61
Location:						
Othaya	6267	2.91	1.60	0.68	0.08	5.27
Chinga	2916	3.04	1.72	0.79	0.14	5.68
Mahiga	3512	2.95	1.59	0.64	0.08	5.27
Division: Othaya	12695	2.95	1.62	0.69	0.10	5.36
DISTRICT: NYERI	98233	2.79	1.39	0.55	0.17	4.90

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, include one and two persons per households as well

TABLE 6: AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON

Location/Division without townships	Area total Census 79	Non-agricultural land: Unsuit. steep slopes	Non-agricultural land: Forest Res., lakes, swamps	Non-agricultural land: Others (roads, homesteads, rivers...)	Agricultural land	UH 1	UH 2	UH 3	LH 1	LH 2	LH 3	LH 4	LH 5	UM 1	UM 2	UM 3	UM 4	Agric. land per household	Agric. land per person
	in '00 ha = sqkm					in '00 ha = sqkm; Area in agro-ecological zones (AEZ)												in ha	
Naromoru	332			33	299			10			21	175	89				4	5.11	1.23
Kabaru	156	3		16	137		6	6			45	26					54	4.55	0.94
Kieni East Division	488	3		49	436		6	16			66	201	89				58	4.83	1.09
Mweiga	282	1		28	253	15	35	14		7	57	53	72					4.73	0.95
Gatarakwa	264		F. 35	26	203		54	29			7	65	48					9.22	1.38
Kieni West Division	546	1	35	54	456	15	89	43		7	64	118	120					6.97	1.16
Muhito	49			10	39									3	36			0.69	0.14
Gikondi	38			8	30									2	28			0.86	0.18
Lower Muhito	31			5	26										2	24		2.11	0.42
Githi	60			12	48										44	4		1.14	0.22
Mukurweini Division	178			35	143									5	110	28		1.20	0.24
Iriaini	48			10	38				5					17	16			0.94	0.18
Konyu	57			11	46										45	1		0.69	0.14
Kirimukuyu	55			11	44										27	17		0.87	0.16
Ruguru	89			18	71					13	2					39	17	1.43	0.27
Magutu	72	3	F. 20	14	35				25					7	3			0.85	0.17
Mathira Division	321	3	20	64	234				30	13	2			24	91	57	17	0.96	0.18
Aguthi	73			15	58										44	14		0.90	0.17
Tetu	64			13	51	5			33	9					4			1.29	0.24
Muhoya's	72		F. 37	11	24	4			10	8	1				1			0.91	0.18
Thegenge	99		F. 26	20	53	2			25					2	24			0.79	0.15
Tetu Division	308		63	59	186	11			68	17	1			2	73	14		0.97	0.19
Othaya	76		F. 1	15	60	1			34					18	7			0.95	0.18
Chinga	50			10	40	2			34					4				1.37	0.24
Mahiga	43			9	34	3			23					8				0.97	0.18
Othaya Division	169		1	34	134	6			91					30	7			1.10	0.20
Total rural area	2 010	7	119	295	1 589	32	95	59	189	37	133	319	209	61	281	99	75	1.80	0 35

1) For official land statistics see supplementary publication to FMHB Vol. III A: Agriculture Land Statistics

AGRICULTURAL STATISTICS[1)]

The farming structures in the Nyeri area are very similar to those of the Murang'a district. Three export cash crops provide the economic basis for the district's population.

Tea is planted on roughly 5,000 ha yielding 3,500 kg of green leaves per ha p.a. The area per holding of tea-growing family farms is 0.40 ha. Smallholder **coffee** covers an area of 7,500 ha and produces 870 kg of clean coffee per ha, each of the coffee producing farmers owns approximately 0.20 ha. The **pyrethrum** production of the district is 1,500 t of dried flowers p.a. The pyrethrin content is 1.5 %. There are also 1,300 ha of estate coffee plantations producing 870 kg of clean coffee p.a.

1) For more detailed and up to date information, see FMHB Vol. III/A

NYERI DISTRICT

TABLE 7a: **TEA**
AREA – PRODUCTION – GROWERS – YIELDS – RETURNS[a)]

Small Farmers

Division	Item	Unit	Year				
			1975/76	1976/77	1977/78	1978/79	1979/80
Mathira	Area	ha	1,139	1,217	1,293	1,421	1,462
	Production	t	4,271	6,093	7,447	7,737	5,861
	Value	'000 Shs	7,816	21,264	16,459	16,247	18,807
	Growers	No	3,246	3,443	3,568	3,773	3,802
	Yield per ha	kg	3,702	5,007	5,760	5,445	4,009
	Value per ha	Shs	6,862	17,472	12,729	11,433	12,864
	Area per Grower	ha	0.35	0.35	0.36	0.37	0.38
	Returns per Grower	Shs	2,408	6,176	4,613	4,306	4,947
North Tetu	Area	ha	580	654	880	793	831
	Production	t	1,070	1,474	1,720	1,959	1,445
	Value	'000 Shs	1,959	5,041	3,940	4,779	4,320
	Growers	No	1,771	2,026	2,123	2,257	2,274
	Yield per ha	kg	1,845	2,254	1,955	2,470	1,739
	Value per ha	Shs	3,378	7,708	4,477	6,026	5,199
	Area per Grower	ha	0.33	0.32	0.41	0.35	0.37
	Returns per Grower	Shs	1,106	2,488	1,856	2,117	1,900
Othaya	Area	ha	2,052	2,238	2,332	2,553	2,617
	Production	t	7,450	11,431	11,596	12,829	10,125
	Value	'000 Shs	13,633	39,094	26,554	31,304	30,273
	Growers	No	5,071	5,606	5,893	6,058	6,129
	Yield per ha	kg	3,631	5,108	5,693	5,025	3,869
	Value per ha	Shs	6,643	17,468	11,386	12,262	11,568
	Area per Grower	ha	0.40	0.40	0.40	0.42	0.43
	Returns per Grower	Shs	2,688	6,974	4,506	5,167	4,939

a) Source: K.T.D.A.

NYERI DISTRICT

TABLE 7b: **COFFEE**
AREA – PRODUCTION – YIELDS[a)]

Co-operatives

Item	Unit	Year					
		74/75	75/76	76/77	77/78	78/79	79/80
Area	ha	6085	6085	6085	6085	6200	7500
Production	t	2743	3786	6044	5449	5520	6550
Yield	kg/ha	451	622	993	895	890	873

Estates

Name	Item	Unit	Year				
			75/76	76/77	77/78	78/79	79/80
Nyeri	Area	ha	1228	1135	2666	1480	1342
	Production	t	1224	1391	1428	1038	1166
	Yield	kg/ha	997	1226	536	701	869

TABLE 7c: **PYRETHRUM**
TRENDS IN PRODUCTION AND QUALITY[b)]

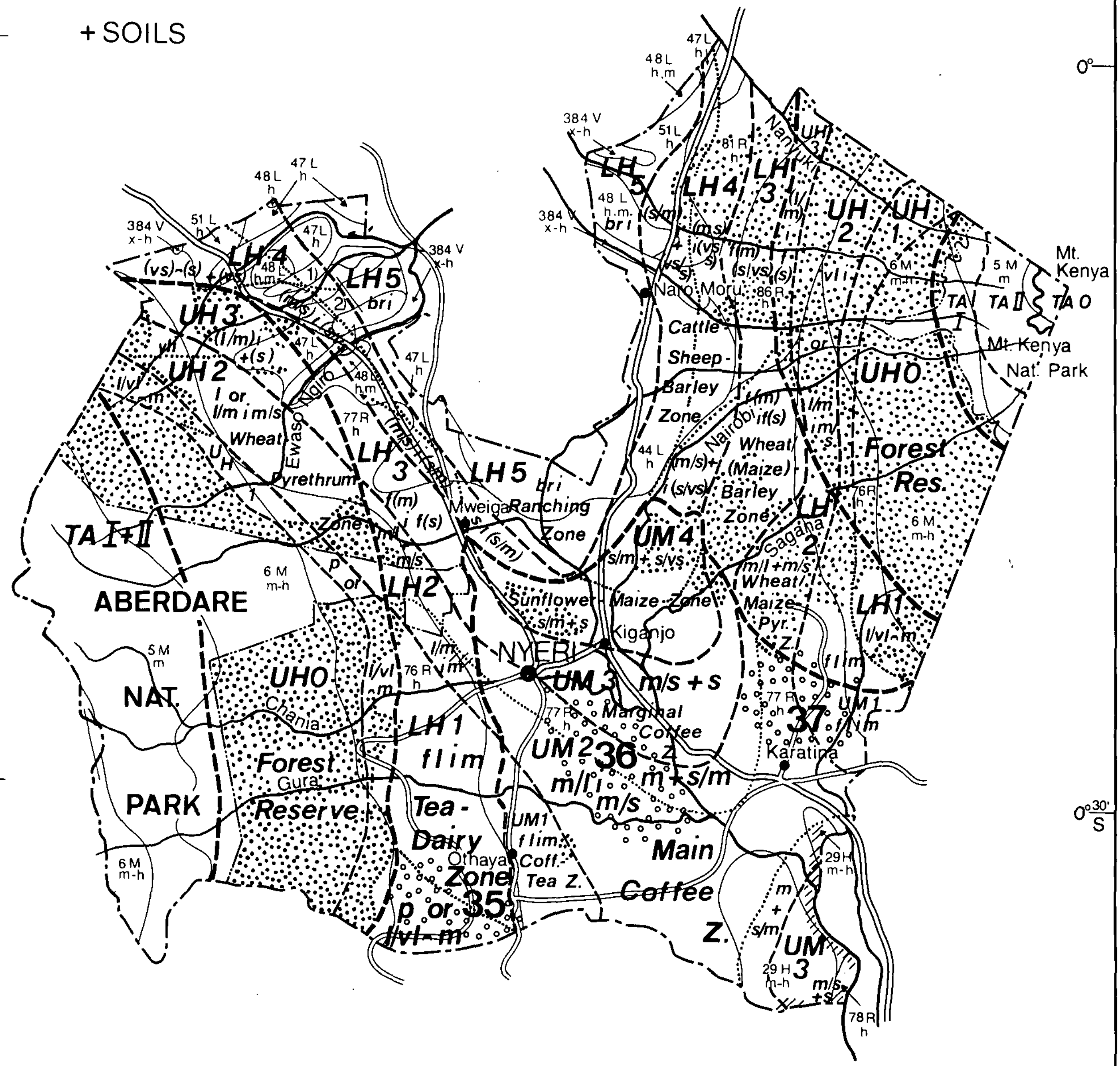
Item	Year				
	75/76	76/77	77/78	78/79	79/80
Production in t dried flowers	153	114	71	43	41
Pyrethrin content %	1.3	1.4	1.4	1.5	1.4

Sources: a) C.B.K.
b) Pyrethrum Board

SMALL FARM SURVEY AREAS (1977) and AGRO-ECOLOGICAL ZONES

NYERI

+ SOILS



1) LH4 i (s/m) + (vs/s)

2) LH4 (s/m) i (vs/s)

Forest Reserve

Unsuitable steep slopes (only marked outside Nat. Parks or Forest Res.)

36 National Number of Survey Area

Survey Area, sample size 30 per number

Belt of A. E. Zones — Broken zonal boundaries are uncertain or mean transitional strips

A. E. Zones

Subzones

Climatic data for AEZ formulas see table I and II

0 5 10 15 20 25 km

AEZ R. Jätzold '82

Soils KSS

SMALL FARM SURVEY (SFS)[1)]

More than 85 % of the district enjoys ideal natural conditions for small-scale farming. Suitable soils and good rainfall combined with a well developed infrastructure are the basis for highly productive family farms.

The SFS was carried out on three locations: Kairuthi-Gichichu AEZ LH 1 + UM 1 Aberdare region, Gaikaibii AEZ LH 1 + UM 1 –2 Mt. Kenya region, and in the Gititu area AEZ UM 2–3. The comparatively small region of LH 4–5 was neglected because of its limited suitability for small-scale farming.

The farm sizes were 2.8 LH 1 + UM 1–2 (Ab.), 2.1 LH 1 + UM 1 (Mt. K.) and 2.7 ha UM 2–3.[2)] The land use in the Lower Highlands farms is very uniform – roughly 25 % is planted with annual crops, 20 % with perennial crops, and 25 % used for pasture. The proportion of perennial crops is lower in the UM 3 farms, but approximately 10 % only. A remarkably high pro portion of land is planted with forage (Napier/Bana grass) which indicates that most farmers already practise semi-zero or zero grazing systems. The farmers plant between 1.2 and 1.4 crops p.a., the stocking rate ranges from 2.7 to 4.8 LU/ha and practically all farmers use fertilizer and practise plant protection, in particular on perennial crops (table 8 & 9). Almost all an nual crop area is planted with staple food crops (80–90 %) but the area under potatoes (10–15 %) is also considerable (table 10). Roughly 10 % of the grazing LU are sheep and goats, while the proportion of male cattle is as low as 5 % which shows that milk production is a major source of income (table 11). Despite remarkably high amounts of fertilizer applied to staple food crops their yields are low, an indication of the extent to which the natural fertility of the soils has been exploited (table 12). All food produced in consumed within the Nyeri district; in fact, increasing amounts of staple foods like maize have to be 'imported' (table 13). More or less all farm work is done by hand which explains partly the relatively long period required for field preparation, but it also indicates that work in cash crops enjoys priority on the farms and food crops are almost exclusively planted for home consumption only (graphs table 14). Table 15 shows that there is still scope for yield increases, but these additional yields must be 'bought' with high fertilizer application rates.

The major problem faced by the farming community of the district is the low and rapidly declining natural soil fertility and their increasing dependence on outside sources for staple food. The area available for food production will continue to shrink in line with the farm sizes in future. There can be no doubt that the three major cash crops grown are the economic basis for the district's population and are very important for the national economy – the increased dependence on food 'imports' can however have very negative effects during times of low cash crop prices. Whilst cash crop cultivation has its own momentum, food production needs to be supported. The promotion and/or introduction of crops which produce a high food output per area unit, like sweet potatoes, for human consumption, and forages like Napier/Bana grass, for livestock, is most important. Increased biomass production (via high N-fertilizer application rates) is needed to restore and improve the soil fertility and the nutrient cycle within the farm. The aim should be that not less than two-thirds of the staple food needed in the district is produced by the farmers of the district. The farmers are aware of the basic production principles and the economics of fertilizer use. Specialised extension advice is required and a strengthening of the underlying economics of the dairy enterprise is advisable.

1) For more detailed and up to date information, see FMHB Vol. III/B

2) Roughly twice as big as the arithmetical land/holding ratio; for additional information, see table 6

NYERI DISTRICT
AEZ: LH 1 + UM 1

TABLE 8a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 35

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	1.2	2.6	6.2
Land Use: Annual Crops[1] First Season				
Maize	ha	o.1	o.1	-
Maize & Beans	ha	o.3	o.7	1.1
English Potatoes	ha	-	-	o.1
Beans	ha	-	-	-
Others	ha	-	-	-
Total	ha	o.4	o.8	1.2
Second Season[1] Beans	ha	o.1	o.2	o.3
English Potatoes	ha	-	-	o.1
	ha			
Total	ha	o.1	o.2	o.4
Permanent Crops[1] Coffee	ha	o.1	o.2	o.5
Tea	ha	o.3	o.3	o.6
Pyrethrum	ha	-	o.1	o.1
	ha			
Portion of total	%	33 %	23 %	19 %
Grazing & Forage	ha	o.4	o.8	2.9
portion of total	%	33 %	31 %	47 %
Other Land Use	ha	-	o.4	o.9
Livestock on Farm:				
Cattle: local	LU	o.1	o.2	-
improved	LU	2.o	2.8	9.2
Sheep & Goats	LU	o.3	o.4	o.8
Total	LU	2.4	3.4	1o.o

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.8	o.6	o.5
Portion of improved cattle kept	%	95 %	93 %	-
Portion of Farmers owning a Plough	%	-	-	-
Labour on Farm:				
Family Adults	persons	2.2	3.1	2.8
Perm. Hired Labour	"	o.1	-	o.3
Children > 14 years	"	1.4	2.7	2.o
Persons living on Farm[2] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.22	o.o3	2.25
Children < 14 years	"	3.14	-	3.14
Subsistence Units	SU	4.1o	o.o3	4.13
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1134	2193	
Beans	kg	38	72	
English Potatoes	kg	284	11o	
Sweet Potatoes	kg	34	23	
	kg			
	kg			
	kg			
	kg			

Other crops cultivated: Sweet potatoes, Tobacco, Bananas

1) Major crops only considered

2) Based on 1979 Census figures

TABLE 8b: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Item	Unit	Farm Size & Land Use, Livestock on Farm, Farm Size Group: small	medium	large
Farm Size Total	ha	1.1	2.8	6.4
Land Use: Annual Crops 1)				
First Season				
Maize	ha	o.2	o.2	o.6
Maize & Beans	ha	o.2	o.6	o.6
Beans	ha	-	o.1	o.1
English Potatoes	ha	o.1	o.3	-
Others	ha	-	-	o.1
Total	ha	o.5	1.2	1.4
Second Season 1)				
Beans	ha	o.2	o.5	o.5
English Potatoes	ha	o.1	o.2	o.2
Maize & Beans	ha	-	o.1	-
Others	ha	-	-	o.1
Total	ha	o.3	o.8	o.8
Permanent Crops 1)				
Coffee	ha	o.2	o.3	o.7
Bananas	ha	-	-	-
	ha			
	ha			
Portion of total	%	8 %	11 %	11 %
Grazing & Forage	ha	o.3	o.9	3.7
portion of total	%	27 %	32 %	58 %
Other Land Use	ha	o.1	o.4	o.6
Livestock on Farm:				
Cattle: local	LU	o.1	o.3	2.7
improved	LU	1.3	2.9	2.5
Sheep & Goats	LU	o.4	o.4	o.4
Total	LU	1.8	3.6	5.6

Item	Unit	Intensity, Labour/Persons on Farm, Home Consumption, Farm Size Group: small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.9	o.8	o.5
Portion of improved cattle kept	%	93 %	91 %	48 %
Portion of Farmers owning a Plough	%	-	-	-
Labour on Farm:				
Family Adults	persons	2.6	2.4	2.5
Perm. Hired Labour	"	o.1	o.2	o.3
Children > 14 years	"	2.4	3.9	1.7
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	1.98	o.1	2.o8
Children < 14 years	"	2.85	-	2.85
Subsistence Units	SU	3.69	o.1	3.79
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1o73	2o75	
Beans	kg	179	341	
English Potatoes	kg	542	211	
Cabbage	kg	4o	5	
Cooking Bananas	kg	3	1	
	kg			
	kg			
	kg			

1) Major crops only considered
2) Based on 1979 Census figures

TABLE 8c: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

AEZ: LH 1 + UM 1–2

Survey Area 37

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	1.1	1.9	3.6
Land Use: Annual Crops1) First Season				
Maize	ha	o.2	o.2	o.6
Maize & Beans	ha	o.3	o.3	o.2
English Potatoes	ha	-	-	o.1
Beans	ha	-	o.2	o.1
Cabbage	ha			
Total	ha	o.5	o.7	1.o
Second Season1)				
Maize	ha	-	o.1	o.3
Maize & Beans	ha	o.1	o.1	-
Beans	ha	o.2	o.1	o.2
Cabbage	ha	-	o.1	-
Total	ha	o.3	o.4	o.5
Permanent Crops1)				
Coffee	ha	o.1	o.1	-
Tea	ha	o.1	o.1	o.8
	ha			
	ha			
Portion of total	%	18 %	11 %	22 %
Grazing & Forage	ha	o.4	o.8	1.3
portion of total	%	36 %	48 %	36 %
Other Land Use	ha	-	o.2	o.5
Livestock on Farm:				
Cattle: local	LU	o.2	-	o.1
improved	LU	2.5	3.4	2.7
Sheep & Goats	LU	o.4	o.3	o.3
Total	LU	3.1	3.7	3.1

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	o.9	o.7	o.6
Portion of improved cattle kept	%	93 %	-	96 %
Portion of Farmers owning a Plough	%			
Labour on Farm:				
Family Adults	persons	2.4	2.o	2.4
Perm. Hired Labour	"	-	-	o.6
Children > 14 years	"	2.o	1.5	2.8
Persons living on Farm2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.16	o.1	2.26
Children < 14 years	"	3.14	-	3.14
Subsistence Units	SU	4.o4	o.1	4.14
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1o38	2oo8	
Beans	kg	17o	324	
English Potatoes	kg	328	128	
Cabbage	kg	55	7	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Sweet Potatoes

1) Major crops only considered

2) Based on 1979 Census figures

NYERI DISTRICT

TABLE 9a: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: LH 1 + UM 1

Survey Area 35

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	2.8	10.5	0.6	2.7	0.1	2.0
Avg. 1	2.8	11.3	1.6	2.8	1.0	3.6
Up. Qu.	3.5	11.0	1.0	3.0	-	4.0
Lo. Qu.	1.4	3.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	%	Perm. Crops ha	%	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	0.7	27	0.6	24	0.8	28	0.3	13	0.1	2	0.1	6
Avg. 1	0.7	23	0.7	22	0.8	27	0.4	13	0.3	10	0.2	5
Up. Qu.	0.9	40	0.8	35	0.8	30	0.4	20	-	-	0.2	7
Lo. Qu.	0.3	16	0.3	18	0.2	13	0.1	6	-	-	0.1	3
Total	21.4		19.3		22.5		10.2		1.5		4.4	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.2	1.6	4.0	87.1
Avg. 1			4.0	89.8
Up. Qu.	1.5	2.1	6.6	94.9
Lo. Qu.	1.0	0.7	2.2	81.0

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	43.4	3.6	13.1	7.1	4.1	-	0.6	-	-	0.8	2.8	0.1	1.9
Avg. 1	46.0	7.7	18.9	8.8	12.3	0.1	4.6	0.1	0.4	6.3	8.2	1.2	3.8
Up. Qu.	100.0	8.5	25.0	10.0	0.7	-	-	-	-	-	1.7	-	3.6
Lo. Qu.	6.0	-	5.9	3.8	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

NYERI DISTRICT

TABLE 9b: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: UM 2–3 | Survey Area 36

Range	Assets: Land ha	Assets: Livestock head	Assets: Equipment pieces	People on Farm: Family Adults	People on Farm: Perm.Hrd. Labourers	People on Farm: Children >14 No.
Avg. 0	2.7	9.6	1.1	2.5	0.2	2.7
Avg. 1	2.7	9.6	1.8	2.5	1.0	3.3
Up. Qu.	3.5	15.0	2.0	3.0	-	4.0
Lo. Qu.	1.1	4.0	-	2.0	-	1.0

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	0.9	34	0.3	12	0.8	29	0.4	14	0.1	5	0.1	5
Avg. 1	0.9	26	0.4	10	0.9	26	0.5	14	0.7	20	0.1	4
Up. Qu.	1.4	53	0.4	18	0.8	31	0.4	18	-	-	0.2	10
Lo. Qu.	0.4	27	0.2	10	0.2	13	0.1	5	-	-	0.1	3
Total	27.6		9.5		23.7		11.6		4.3		4.0	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate: Farm Land LU/ha	Stocking Rate: Pasture & Forage LU/ha	Improved Cattle % of total
Avg. 0	1.4	1.1	2.7	65.6
Avg. 1			2.7	90.4
Up. Qu.	2.0	1.7	6.4	94.1
Lo. Qu.	1.3	0.8	2.0	-

Inputs Applied

Range	Improved Seed Used % of area AC	Fertilizer Applied pure nutrient kg/ha: N AC	N PC	P_2O_5 AC	P_2O_5 PC	K_2O AC	K_2O PC	Manure Applied t/ha AC	Manure PC	Plant Protection: Insecticide kg/ha AC	Insecticide PC	Fungicide kg/ha AC	Fungicide PC
Avg. 0	65.6	4.4	6.5	13.2	0.4	-	-	-	-	1.2	2.2	0.3	4.6
Avg. 1	65.6	6.4	8.1	15.4	9.0	0.1	-	0.1	0.2	1.8	4.9	0.6	5.4
Up. Qu.	100.0	8.1	15.5	26.1	-	-	-	-	-	1.8	1.6	0.4	10.4
Lo. Qu.	50.0	-	-	0.9	-	-	-	-	-	-	-	-	0.9

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

NYERI DISTRICT

TABLE 9c: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: LH 1 + UM 1–2

Survey Area 37

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children >14 No.
Avg. 0	2.1	6.9	0.7	2.2	0.2	2.0
Avg. 1	2.1	7.4	1.3	2.4	1.3	2.7
Up. Qu.	3.0	11.0	1.0	3.0	-	3.0
Lo. Qu.	1.2	3.0	-	2.0	-	1.0

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	0.7	37	0.4	19	0.5	24	0.2	11	-	2	0.1	7
Avg. 1	0.7	29	0.5	19	0.5	21	0.3	12	0.3	13	0.1	5
Up. Qu.	1.0	50	0.5	25	0.6	29	0.3	17	-	-	0.1	7
Lo. Qu.	0.4	29	0.1	10	0.1	9	-	3	-	-	-	3
Total	20.8		10.6		13.5		6.4		1.3		3.7	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.4	1.6	4.8	86.1
Avg. 1			4.8	90.1
Up. Qu.	2.0	3.2	10.2	100.0
Lo. Qu.	1.1	0.6	1.8	75.8

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	62.4	5.4	10.9	7.6	1.2	-	1.5	0.1	-	0.8	0.3	0.5	1.4
Avg. 1	66.8	14.8	17.7	18.9	3.4	-	4.9	0.3	0.1	2.4	3.7	1.3	4.5
Up. Qu.	72.7	10.0	17.4	16.4	0.4	-	2.7	-	-	1.1	-	0.6	2.8
Lo. Qu.	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of farms, excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

NYERI DISTRICT

TABLE 10a: **CROPPING PATTERN**

AEZ: LH 1 + UM 1

Survey Area 35

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.1	0.5	0.00	0.00	1.8	8.2
Beans	0.0	0.1	0.00	0.00	0.2	0.9
Engl. Potatoes	0.0	0.2	0.00	0.00	1.4	6.4
Tobacco	0.0	0.1	0.00	0.00	0.1	0.4
Sweet Potatoes	0.0	0.2	0.00	0.00	0.3	1.5
Pyrethrum	0.0	0.3	0.00	0.00	0.7	3.1
Maize & Beans	0.6	0.7	0.80	0.20	17.4	79.6
Total					21.9	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.0	0.1	0.00	0.00	0.1	1.1
Beans	0.2	0.5	0.40	0.00	5.2	73.3
Engl. Potatoes	0.0	0.2	0.00	0.00	1.1	15.3
Pyrethrum	0.0	0.3	0.00	0.00	0.7	9.7
Maize & Beans	0.0	0.0	0.00	0.00	0.0	0.6
Total					7.0	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.1	0.00	0.00	0.1	0.7
Coffee	0.3	0.4	0.40	0.00	7.8	44.1
Tea	0.3	0.6	0.72	0.00	9.8	55.2
Total					17.8	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

NYERI DISTRICT

TABLE 10b: **CROPPING PATTERN**

AEZ: UM 2–3

Survey Area 36

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.3	0.8	0.60	0.00	8.4	31.3
Maize IPC	0.0	0.4	0.00	0.00	0.4	1.5
Beans	0.0	0.2	0.00	0.00	1.3	4.9
Engl. Potatoes	0.1	0.2	0.20	0.00	3.2	11.9
Cabbage	0.0	0.4	0.00	0.00	0.4	1.5
Maize & Beans	0.4	0.7	0.80	0.00	13.2	49.0
Total					26.9	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Beans	0.4	0.4	0.40	0.12	11.2	68.2
Engl. Potatoes	0.1	0.2	0.20	0.00	3.9	24.0
Cabbage	0.0	0.4	0.00	0.00	0.4	2.4
Maize & Beans	0.0	0.4	0.00	0.00	0.9	5.4
Total					16.4	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.4	0.00	0.00	0.4	4.3
Coffee	0.3	0.3	0.44	0.12	8.9	95.7
Total					9.3	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

NYERI DISTRICT

TABLE 10c: **CROPPING PATTERN**

AEZ: LH 1 + UM 1–2

Survey Area 37

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.3	0.6	0.40	0.00	8.7	42.3
Beans	0.1	0.3	0.00	0.00	2.0	9.9
Engl. Potatoes	0.1	0.2	0.12	0.00	1.9	9.4
Cabbage	0.0	0.2	0.00	0.00	0.7	3.5
Sweet Potatoes	0.0	0.1	0.00	0.00	0.1	0.6
Sweet Pot. IPC	0.0	0.0	0.00	0.00	0.0	0.2
Maize & Beans	0.2	0.6	0.40	0.00	6.9	33.5
Maize & Others	0.0	0.1	0.00	0.00	0.1	0.6
Total					20.5	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.1	0.5	0.12	0.00	3.9	37.4
Beans	0.1	0.4	0.12	0.00	3.4	32.1
Engl. Potatoes	0.0	0.1	0.00	0.00	1.0	9.5
Cabbage	0.0	0.2	0.00	0.00	0.7	6.5
Others	0.0	0.1	0.00	0.00	0.1	1.1
Maize & Beans	0.0	0.7	0.00	0.00	1.4	13.4
Total					10.5	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Coffee	0.1	0.2	0.12	0.00	2.1	18.2
Tea	0.3	0.6	0.48	0.00	9.3	81.8
Total					11.4	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

TABLE 11a: HERD COMPOSITION (GRAZING LIVESTOCK)

– in Head & Livestock Units –

AEZ: LH 1 + UM 1 | Dec. '77, Survey Area 35

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.33	0.03	-	0.83				0.30			0.30
	Upper Qu.	1	-	-	1				0.5			0.5
1 - 2 years,	Average	0.23	-	-	1.03				0.63			0.63
	Upper Qu.	-	-	-	2				1.0			1.0
Over 2 years,	Average	0.07	-	-		2.80			2.85			2.85
	Upper Qu.	-	-	-		3			3.0			3.0
Subtotal(improved)	Total	19	1	-	56	84			113.6			113.6
	Average	0.63	0.03	-	1.87	2.80			3.79			3.79
	Upper Qu.	1	-	-	3	3			3.8			-
	Lower Qu.	-	-	-	-	1			1.3			-
LU Male Cattle =		6.9 % of total cattle,				Calves + Heifers =			66.7 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.03	-	-	0.10		1.13	0.40	0.18	-		0.18
	Upper Qu.	-	-	-	-		1	-	0.1	-		0.1
1 - 2 years,	Average	-	-	-	-				-			-
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	-	-	-		0.17	2.27	0.43	0.38	0.67	6.17	0.48
	Upper Qu.	-	-	-		-	3	-	-	-	1	-
Subtotal (unimp.)	Total	1	-	-	3	5	102	25	16.8	20	185	19.8
	Average	0.03	-	-	0.10	0.17	3.40	0.83	0.56	0.67	6.17	0.66
	Upper Qu.	-	-	-	-	-	4	-	0.6	-	10	1.0
	Lower Qu.	-	-	-	-	-	-	-	-	-	1	-
LU Male Cattle =		4.9 % of total cattle,				Calves + Heifers =			60.0 % of dairy cows			
LU Goats + Sheep =		75.8 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	20	1	-	59	89	102	25	130.4	20	185	133.4
	Average	0.67	0.03	-	1.97	2.97	3.40	0.83	4.34	0.67	6.17	4.44
	Upper Qu.	1	-	-	3	3	4	-	4.3	-	10	1.0
	Lower Qu.	-	-	-	-	1	-	-	1.8	-	1	-
LU Male Cattle =		6.8 % of total cattle,				Calves + Heifers =			66.3 % of dairy cows			
LU Goats + Sheep =		9.7 % of total Grazing Livestock Units										

Livestock Unit (LU) key:
- Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
- Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
- Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11b: HERD COMPOSITION (GRAZING LIVESTOCK)
– in Head & Livestock Units –

AEZ: UM 2–3 | Dec. '77, Survey Area 36

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.10	-	-	0.77				0.22			0.22
Upper Qu.	-	-	-	1				0.3			0.3
1 - 2 years, Average	0.07	0.07	-	0.57				0.35			0.35
Upper Qu.	-	-	-	1				0.5			0.5
Over 2 years, Average	-	0.03	-		1.47			1.49			1.49
Upper Qu.	-	-	-		2			2.0			2.0
Subtotal (improved) Total	5	3	-	40	44			61.8			61.8
Average	0.17	0.10	-	1.33	1.47			2.06			2.06
Upper Qu.	-	-	-	2	2			3.5			-
Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =	5.7 % of total cattle,				Calves + Heifers =			90.9 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	0.20	-	-	0.27		0.77	0.63	0.23	0.93		0.37
Upper Qu.	-	-	-	-		1	1	0.2	-		0.2
1 - 2 years, Average	-	-	-	0.10				0.05			0.05
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	-	-	-		0.87	1.47	0.93	0.80	0.37	11.03	0.86
Upper Qu.	-	-	-		-	2	1	-	-	-	-
Subtotal (unimp.) Total	6	-	-	11	26	67	47	32.5	39	331	38.3
Average	0.20	-	-	0.37	0.87	2.23	1.57	1.08	1.30	11.03	1.28
Upper Qu.	-	-	-	-	-	3	2	1.1	-	18	1.1
Lower Qu.	-	-	-	-	-	-	-	0.2	-	-	0.2
LU Male Cattle =	5.7 % of total cattle,				Calves + Heifers =			42.3 % of dairy cows			
LU Goats + Sheep =	35.1 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	11	3	-	51	70	67	47	94.3	39	331	100.1
Average	0.37	0.10	-	1.70	2.33	2.23	1.57	3.14	1.30	11.03	3.34
Upper Qu.	1	-	-	3	3	3	2	5.0	-	18	1.1
Lower Qu.	-	-	-	1	1	-	-	0.9	-	-	0.2
LU Male Cattle =	5.7 % of total cattle,				Calves + Heifers =			72.9 % of dairy cows			
LU Goats + Sheep =	12.1 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11c: HERD COMPOSITION (GRAZING LIVESTOCK)

– in Head & Livestock Units –

AEZ: LH 1 + UM 1–2

Dec. '77, Survey Area 37

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.17	–	–	0.90				0.27			0.27
	Upper Qu.	–	–	–	1				0.3			0.3
1 – 2 years,	Average	0.10	–	–	0.59				0.34			0.34
	Upper Qu.	–	–	–	1				0.5			0.5
Over 2 years,	Average	0.07	–	–		2.14			2.19			2.19
	Upper Qu.	–	–	–		3			3.0			3.0
Subtotal (improved)	Total	10	–	–	43	62			81.4			81.4
	Average	0.34	–	–	1.48	2.14			2.81			2.81
	Upper Qu.	1	–	–	2	3			4.3			–
	Lower Qu.	–	–	–	–	1			1.3			–
LU Male Cattle =		5.3 % of total cattle,				Calves + Heifers =			69.4 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	–	–	–	0.07		1.03	0.14	0.13	–		0.13
	Upper Qu.	–	–	–	–		2	–	0.2	–		0.2
1 – 2 years,	Average	–	–	–	–				–			–
	Upper Qu.	–	–	–	–				–			–
Over 2 years,	Average	–	–	–		0.17	2.03	0.07	0.32	0.03	7.52	0.33
	Upper Qu.	–	–	–		–	3	–	–	–	–	–
Subtotal (unimp.)	Total	–	–	–	2	5	89	6	13.2	1	218	13.3
	Average	–	–	–	0.07	0.17	3.07	0.21	0.45	0.03	7.52	0.46
	Upper Qu.	–	–	–	–	–	5	–	0.5	–	12	0.5
	Lower Qu.	–	–	–	–	–	–	–	–	–	–	–
LU Male Cattle =		0.0 % of total cattle,				Calves + Heifers =			40.0 % of dairy cows			
LU Goats + Sheep =		72.2 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	10	–	–	45	67	89	6	94.5	1	218	94.7
	Average	0.34	–	–	1.55	2.31	3.07	0.21	3.26	0.03	7.52	3.26
	Upper Qu.	1	–	–	2	3	5	–	4.3	–	12	0.5
	Lower Qu.	–	–	–	–	1	–	–	1.3	–	–	–
LU Male Cattle =		5.1 % of total cattle,				Calves + Heifers =			67.2 % of dairy cows			
LU Goats + Sheep =		10.1 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

NYERI DISTRICT

TABLE 12a: INPUTS & YIELDS OF MAJOR CROPS

AEZ: LH 1 + UM 1

Survey Area 35

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Engl. Potatoes	Avg.	67	58	77	-	0.56	-	3	8,942
	UpQu	100	17	83	-	-	-	3	5,000
	LoQu	-	-	-	-	-	-	-	1,250
Sweet Potatoes	Avg.	-	-	-	-	-	-	-	3,625
Maize & Beans									
Maize	Avg.	92	24	36	-	0.02	5	-	1,741
Beans	Avg.	-	-	-	-	-	-	-	655
Maize	UpQu	100	25	38	-	-	..	-	1,875
Beans	UpQu	-	-	-	-	-	-	-	667
Maize	LoQu	100	-	12	-	-	-	-	900
Beans	LoQu	-	-	-	-	-	-	-	200
Second Rains									
Beans	Avg.	-	-	-	-	-	-	-	1,049
	UpQu	-	-	-	-	-	-	-	1,025
	LoQu	-	-	-	-	-	-	-	225
Engl. Potatoes	Avg.	67	58	77	-	0.76	-	7	7,386
	UpQu	100	17	83	-	-	-	5	4,400
	LoQu	-	-	-	-	-	-	-	833
Perennial Crops									
Pyrethrum	Avg.	-	16	-	-	-	-	-	1,500
Coffee	Avg.	-	72	35	-	0.15	18	23	10,738
	UpQu	-	117	-	-	-	40	38	15,000
	LoQu	-	-	-	-	-	-	-	6,250
Tea	Avg.	-	32	10	3	0.03	7	-	4,984
	UpQu	-	63	2	6	-	-	-	7,813
	LoQu	-	-	-	-	-	-	-	2,000

NYERI DISTRICT

TABLE 12b: INPUTS & YIELDS OF MAJOR CROPS

AEZ: UM 2–3 Survey Area 36

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	100	11	22	-	-	4	-	2,712
	UpQu	100	25	38	-	-	6	-	3,750
	LoQu	100	-	-	-	-	-	-	1,620
Beans	Avg.	-	17	46	-	-	3	-	909
	UpQu	-	-	25	-	-	-	-	800
	LoQu	-	-	-	-	-	-	-	320
Engl. Potatoes	Avg.	13	35	50	-	0.14	1	4	5,734
	UpQu	-	45	115	-	-	-	4	7,500
	LoQu	-	-	-	-	-	-	-	2,083
Cabbage	Avg.	100	14	69	-	-	1	-	10,000
Maize & Beans									
Maize	Avg.	100	8	25	-	0.01	3	-	1,982
Beans	Avg.	5	1	3	-	-	-	-	376
Maize	UpQu	100	17	38	-	-	8	-	2,700
Beans	UpQu	-	-	-	-	-	-	-	450
Maize	LoQu	100	-	-	-	-	-	-	1,350
Beans	LoQu	-	-	-	-	-	-	-	169
Second Rains									
Beans	Avg.	-	4	12	-	0.10	1	1	691
	UpQu	-	-	1	-	-	-	-	1,200
	LoQu	-	-	-	-	-	-	-	300
Engl. Potatoes	Avg.	16	29	48	-	0.14	2	16	5,196
	UpQu	-	30	96	-	-	-	33	7,200
	LoQu	-	-	-	-	-	-	-	1,250
Cabbage	Avg.	100	14	69	-	-	1	1	9,000
Perennial Crops									
Coffee	Avg.	-	58	13	-	0.26	45	63	15,151
	UpQu	-	93	-	-	-	19	75	15,830
	LoQu	-	-	-	-	-	-	8	5,625

NYERI DISTRICT

TABLE 12c: INPUTS & YIELDS OF MAJOR CROPS

AEZ: LH 1 + UM 1–2

Survey Area 37

Crop		Inputs							Yield
		Imp-roved Seeds	Nutrients				Chemicals		
			N	P2O5	K2O	Manure	Insec.	Fung-icide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	94	16	18	-	0.10	1	-	1,984
	UpQu	100	25	25	-	-	-	-	2,250
	LoQu	100	-	-	-	-	-	-	1,125
Engl. Potatoes	Avg.	18	12	34	-	0.03	1	14	5,102
	UpQu	-	-	58	-	-	-	13	4,286
	LoQu	-	-	-	-	-	-	-	3,000
Cabbage	Avg.	100	22	-	-	0.50	-	-	21,333
Maize & Beans									
Maize	Avg.	91	1	23	-	0.15	7	-	1,496
Beans	Avg.	-	-	-	-	-	-	-	316
Maize	UpQu	100	-	58	-	0.50	13	-	1,800
Beans	UpQu	-	-	-	-	-	-	-	375
Maize	LoQu	100	-	-	-	-	-	-	1,125
Beans	LoQu	-	-	-	-	-	-	-	225
Second Rains									
Maize	Avg.	100	8	18	-	0.60	5	5	1,319
	UpQu	100	-	13	-	0.50	5	5	1,500
	LoQu	100	-	-	-	-	-	-	563
Beans	Avg.	-	-	-	-	-	-	3	687
	UpQu	-	-	-	-	-	-	-	519
	LoQu	-	-	-	-	-	-	-	300
Engl. Potatoes	Avg.	13	3	19	-	0.16	-	11	3,913
	UpQu	-	-	18	-	-	-	10	4,000
	LoQu	-	-	-	-	-	-	-	2,500
Cabbage	Avg.	100	-	-	-	0.38	-	-	6,500
Perennial Crops									
Coffee	Avg.	-	61	29	-	0.17	12	45	6,751
	UpQu	-	81	-	-	-	29	57	8,333
	LoQu	-	16	-	-	-	-	13	5,200
Tea	Avg.	-	62	3	11	0.08	-	-	6,977
	UpQu	-	104	2	21	-	-	-	8,333
	LoQu	-	-	-	-	-	-	-	3,333

NYERI DISTRICT

TABLE 13a: DISPOSAL OF CROPS

AEZ: LH 1 + UM 1

Survey Area 35

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	3,510	0	0	180	5	3,330	95
Maize & Beans	29,960	0	0	11,820	39	18,140	61
Beans	315	0	0	160	51	155	49
Engl. Potatoes	5,530	0	0	2,780	50	2,750	50
Sweet Potatoes	1,050	0	0	470	45	580	55
Second Rains							
Maize	180	0	0	0	0	180	100
Maize & Beans	1,010	0	0	0	0	1,010	100
Beans	3,200	0	0	900	28	2,300	72
Engl. Potatoes	4,730	0	0	2,780	59	1,950	41
	Permanent Crops						
Nil							

NYERI DISTRICT

TABLE 13b: DISPOSAL OF CROPS

AEZ: UM 2–3

Survey Area 36

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	17,370	0	0	5,670	33	11,700	67
Maize & Beans	31,028	3,330	11	3,405	11	24,293	78
Maize IPC	630	0	0	270	43	360	57
Beans	5,604	0	0	3,462	62	2,142	38
Engl. Potatoes	15,200	0	0	2,960	19	12,240	81
Cabbage	4,000	0	0	3,000	75	1,000	25
Second Rains							
Maize & Beans	1,055	0	0	180	17	875	83
Beans	5,394	0	0	1,200	22	4,194	78
Engl. Potatoes	12,450	0	0	2,440	20	10,010	80
Cabbage	3,600	0	0	3,400	94	200	6
	Permanent Crops						
Cookng Bananas	400	0	0	300	75	100	25

NYERI DISTRICT

TABLE 13c: DISPOSAL OF CROPS

AEZ: LH 1 + UM 1–2 Survey Area 37

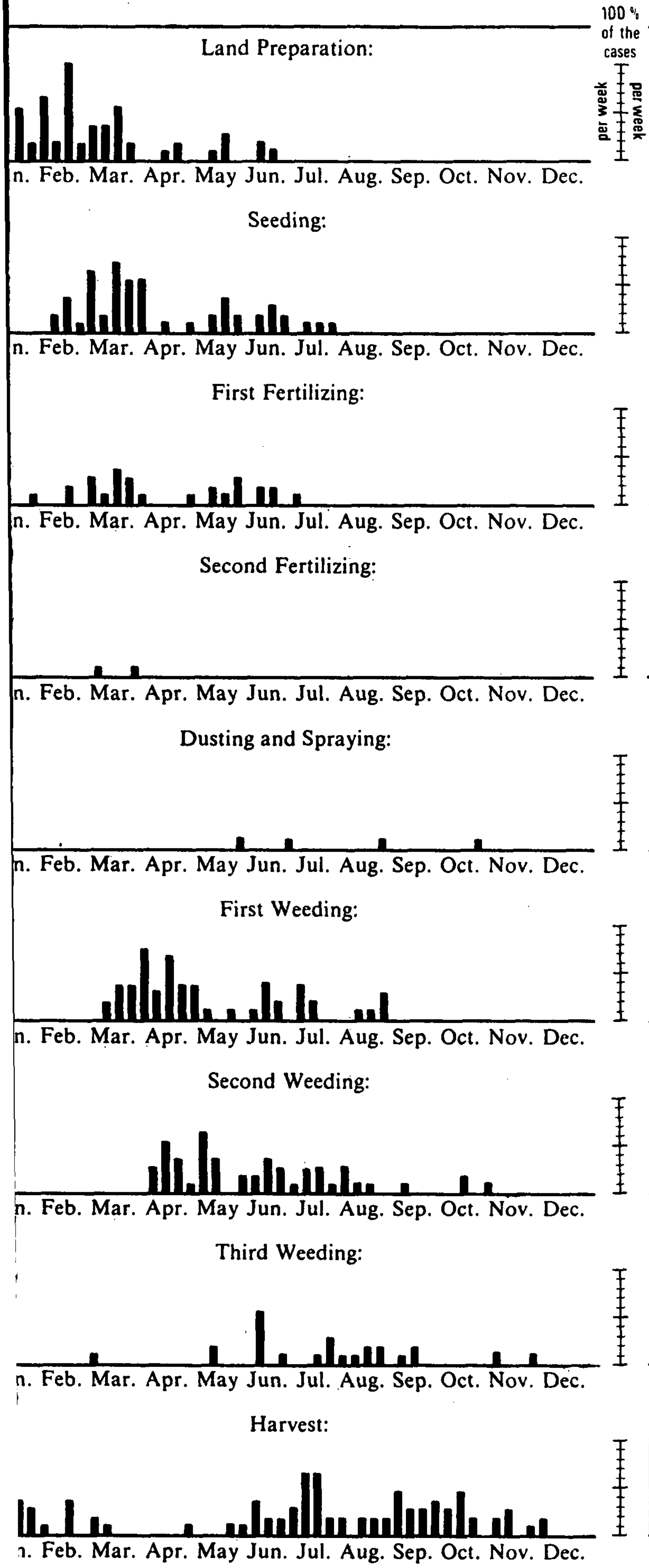
Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	19,865	30,000	151	6,730	34	-16,865	-85
Maize & Beans	9,851	450	5	1,385	14	8,016	81
Maize & Others	832	0	0	0	0	832	100
Beans	1,200	0	0	60	5	1,140	95
Engl. Potatoes	10,010	0	0	3,220	32	6,790	68
Sweet Potatoes	720	0	0	720	100	0	0
Sweet Pot. IPC	350	0	0	0	0	350	100
Cabbage	11,200	0	0	10,240	91	960	9
Tomatoes	600	500	83	0	0	100	17
Second Rains							
Maize	3,780	0	0	1,260	33	2,520	67
Maize & Beans	3,810	0	0	1,870	49	1,940	51
Maize & Others	180	0	0	0	0	180	100
Beans	1,742	0	0	50	3	1,692	97
Engl. Potatoes	4,600	0	0	1,560	34	3,040	66
Cabbage	3,320	0	0	2,640	80	680	20
			Permanent Crops				
Nil							

'ERI DISTRICT

ABLE 14a: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 56[1)]

Z: LH 1 + UM 1 Survey Area 35 Sample Size: 30



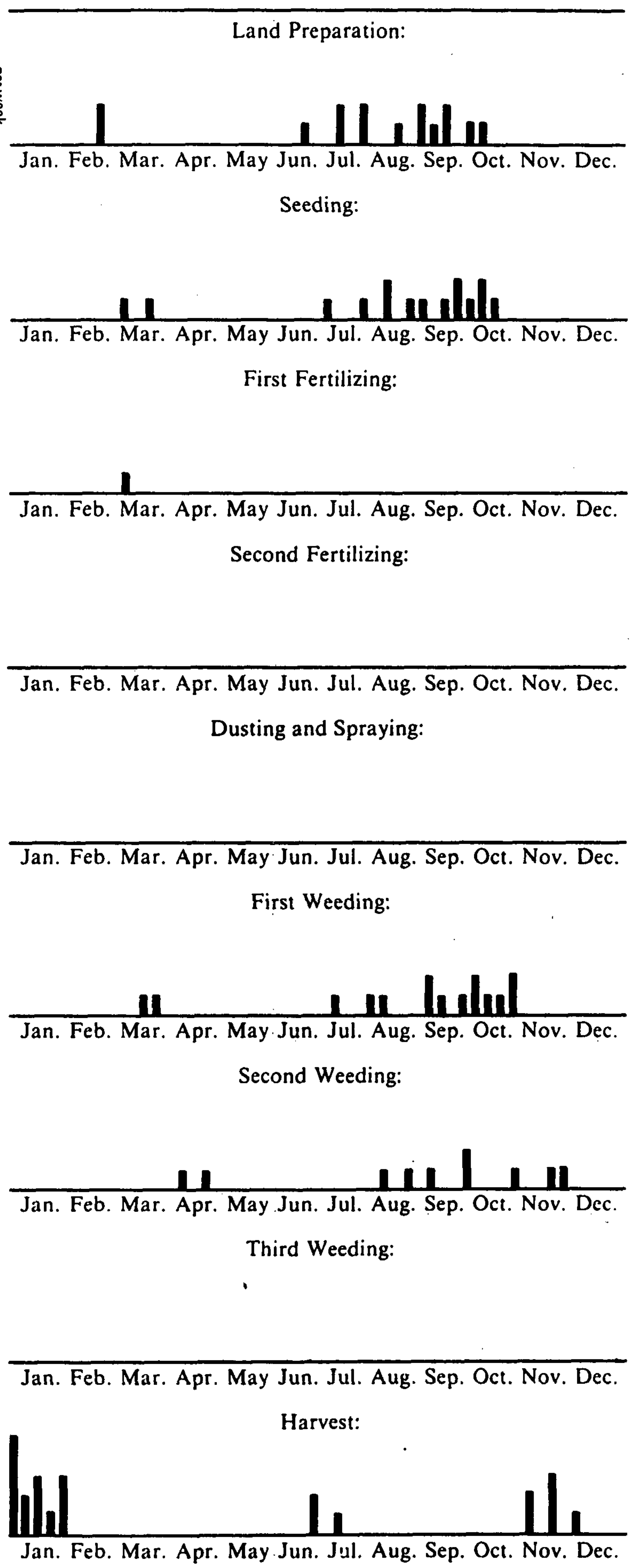
Maximum 30 per crop and season

NYERI DISTRICT

TABLE 14b: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 **Beans** Cases: 15

AEZ: LH 1 + UM 1 Survey Area 35 Sample Size: 30

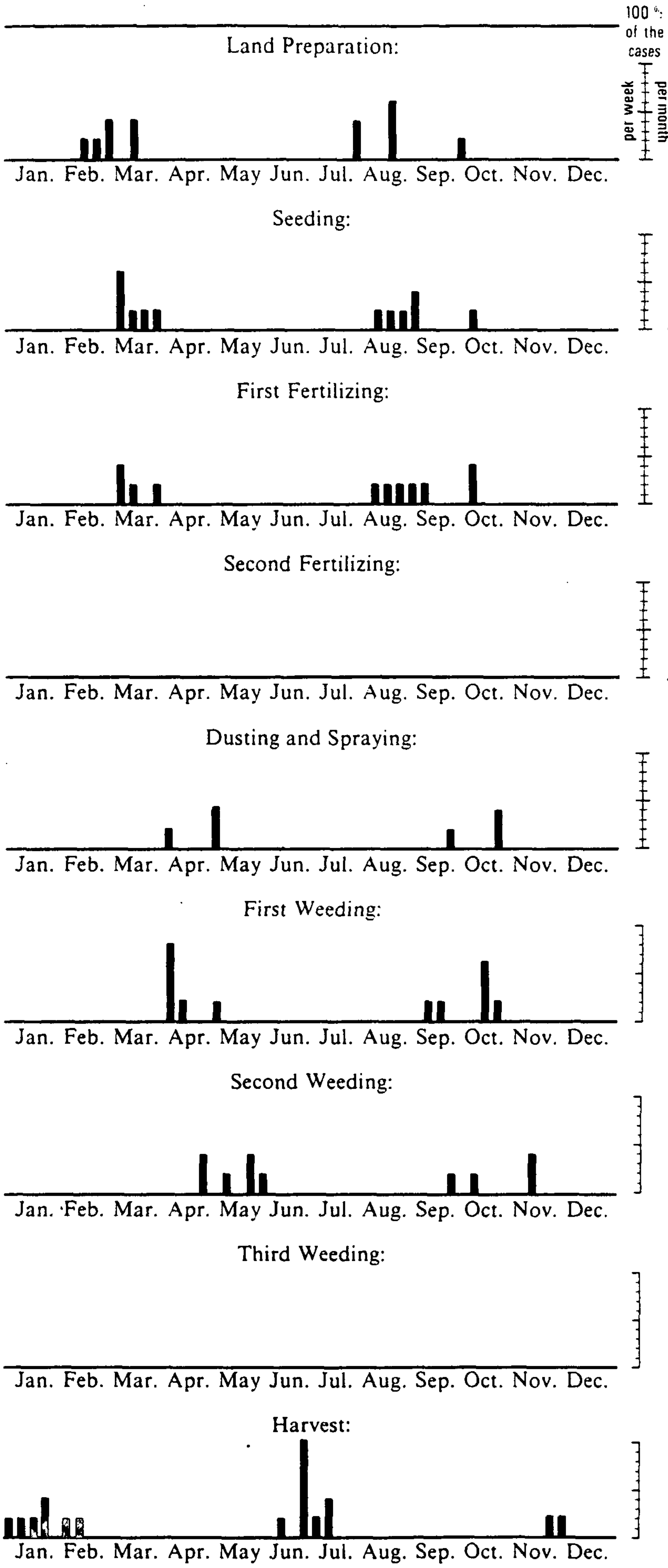


NYERI DISTRICT

TABLE 14c: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 12

AEZ: LH 1 + UM 1 Survey Area 35 Sample Size: 30

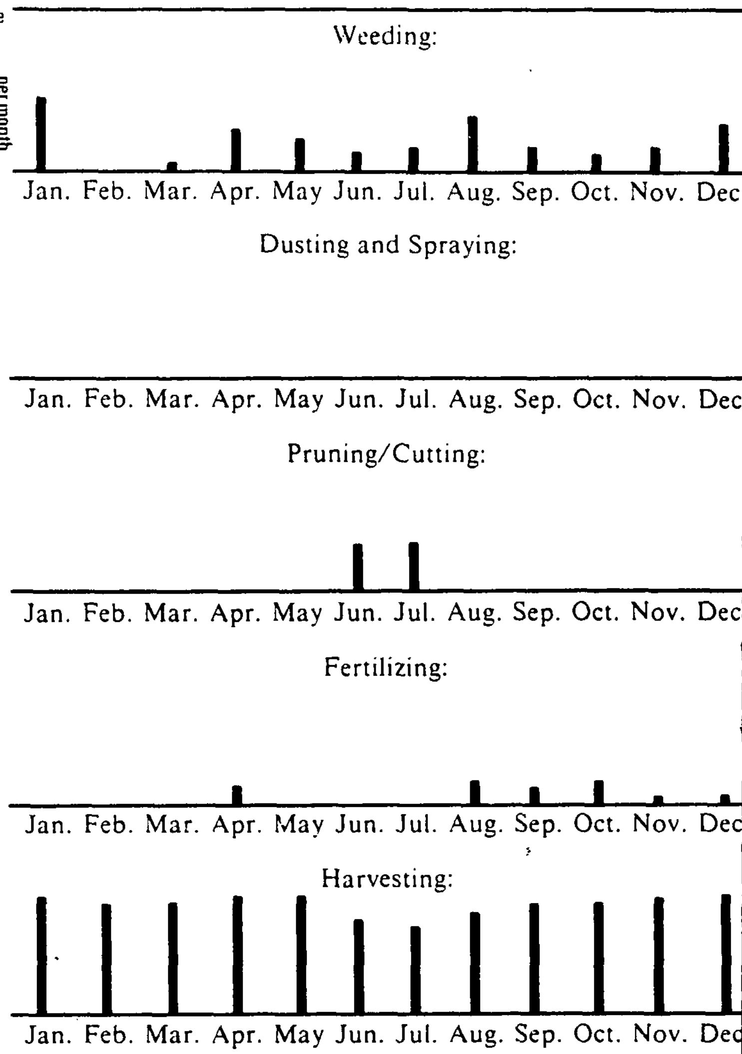


NYERI DISTRICT

TABLE 14d: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 **Tea** Cases: 17

AEZ: LH 1 + UM 1 Survey Area 35 Sample Size: 3(

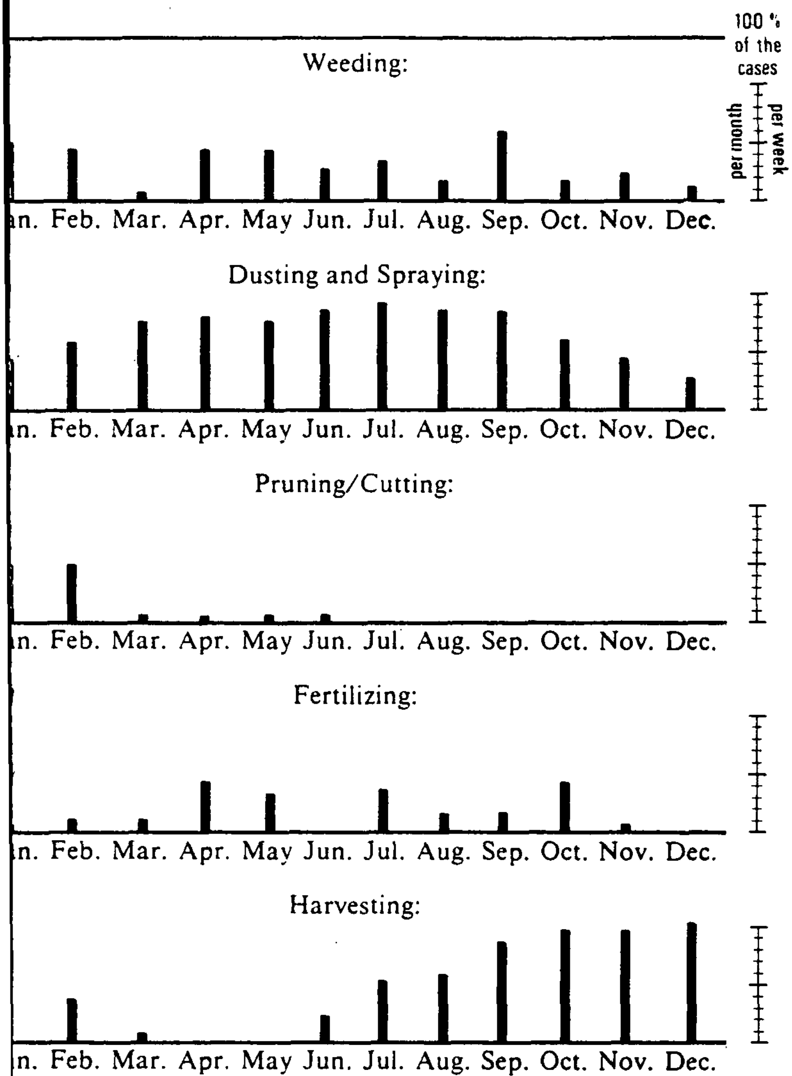


NYERI DISTRICT

TABLE 14e: DISTRIBUTION OF FARMING ACTIVITIES

Crop 51 Coffee Cases: 20

AEZ: LH 1 + UM 1 Survey Area 35 Sample Size: 30

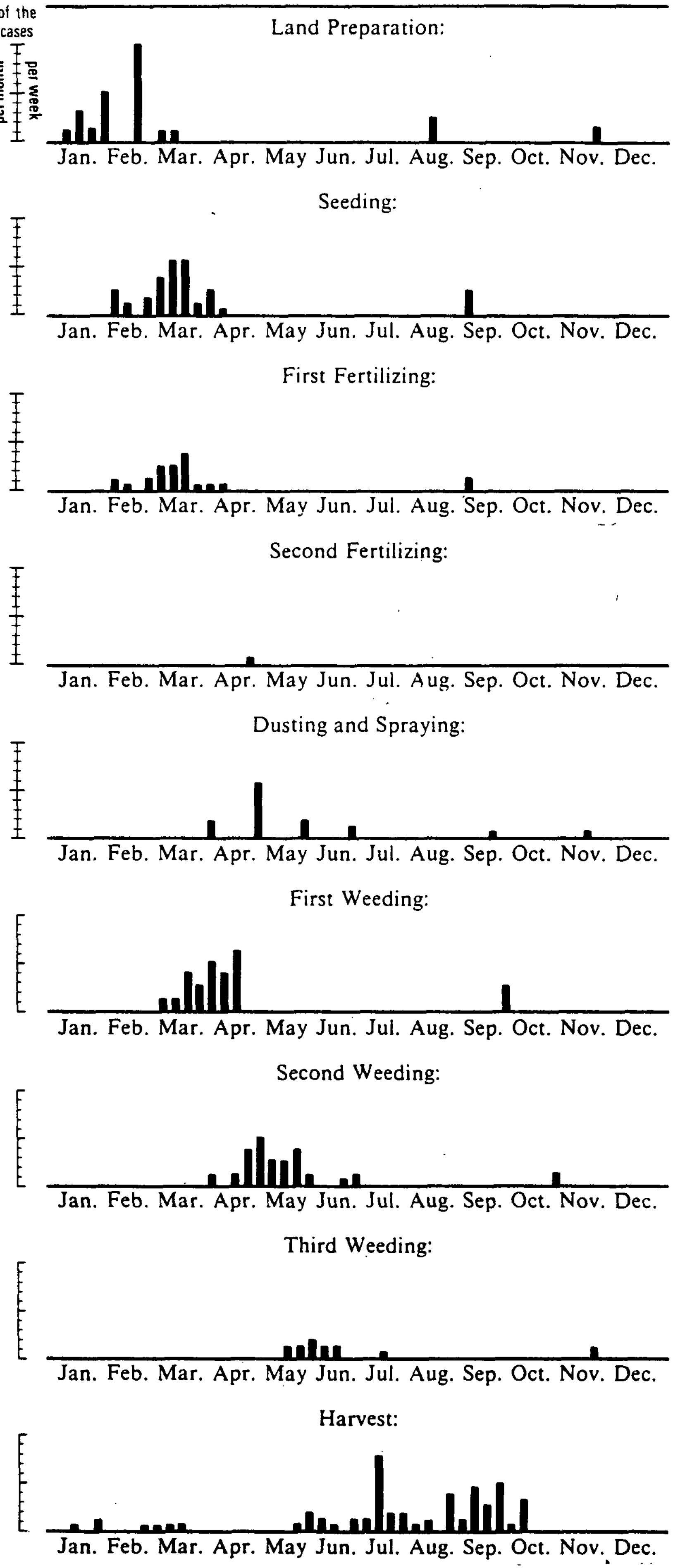


NYERI DISTRICT

TABLE 14f: DISTRIBUTION OF FARMING ACTIVITIES

Crop 2 **Maize & Beans** Cases: 44 [1)]

AEZ: UM 2–3 Survey Area 36 Sample Size: 30



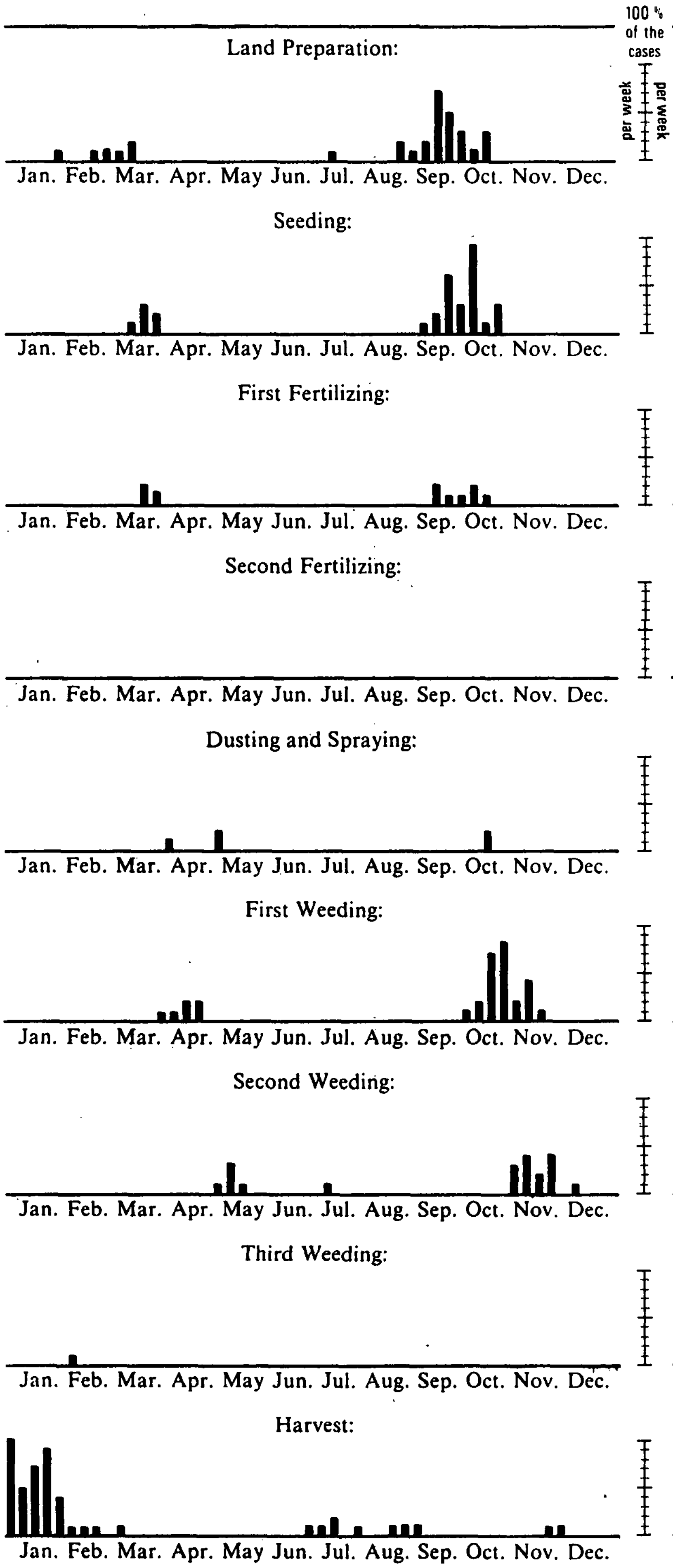
1) Maximum 30 per crop and season

NYERI DISTRICT

TABLE 14g: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 **Beans** Cases: 31[1)]

AEZ: UM 2–3 Survey Area 36 Sample Size: 30



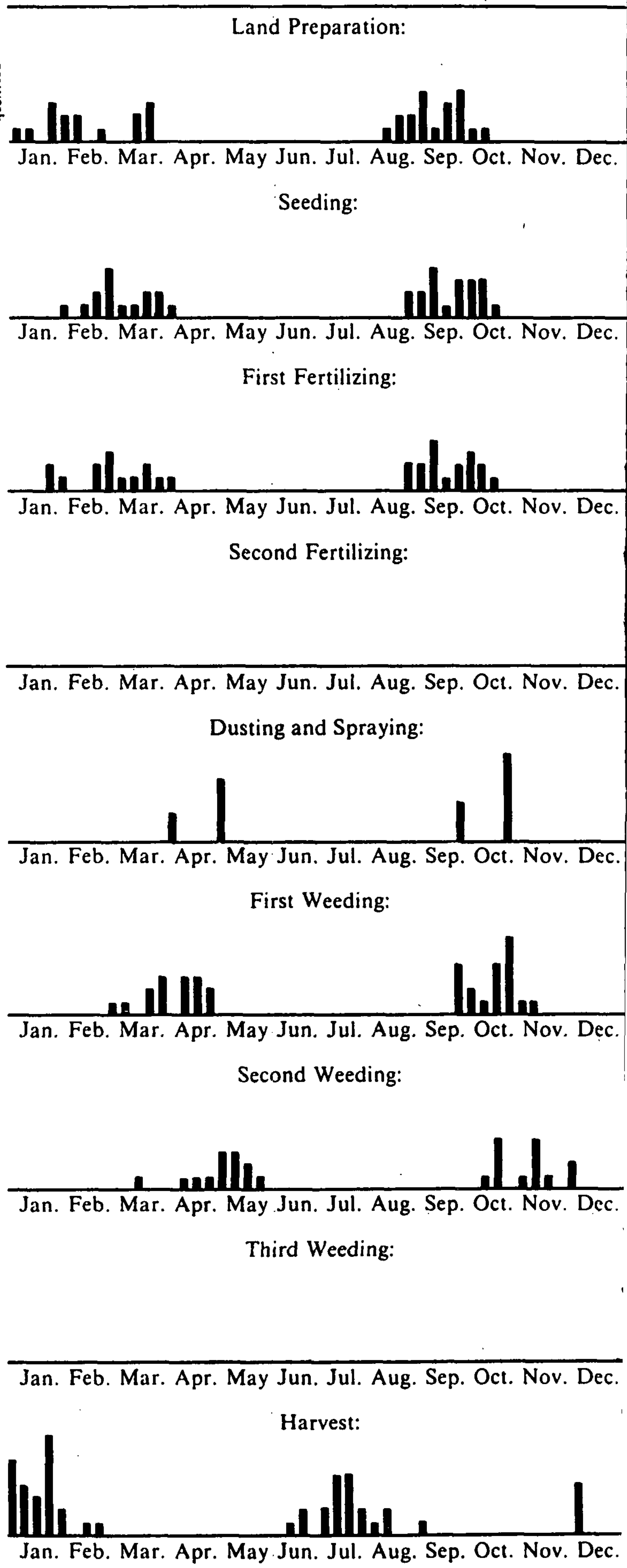
1) Maximum 30 per crop and season

NYERI DISTRICT

TABLE 14h: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 34[1)]

AEZ: UM 2–3 Survey Area 36 Sample Size: 30



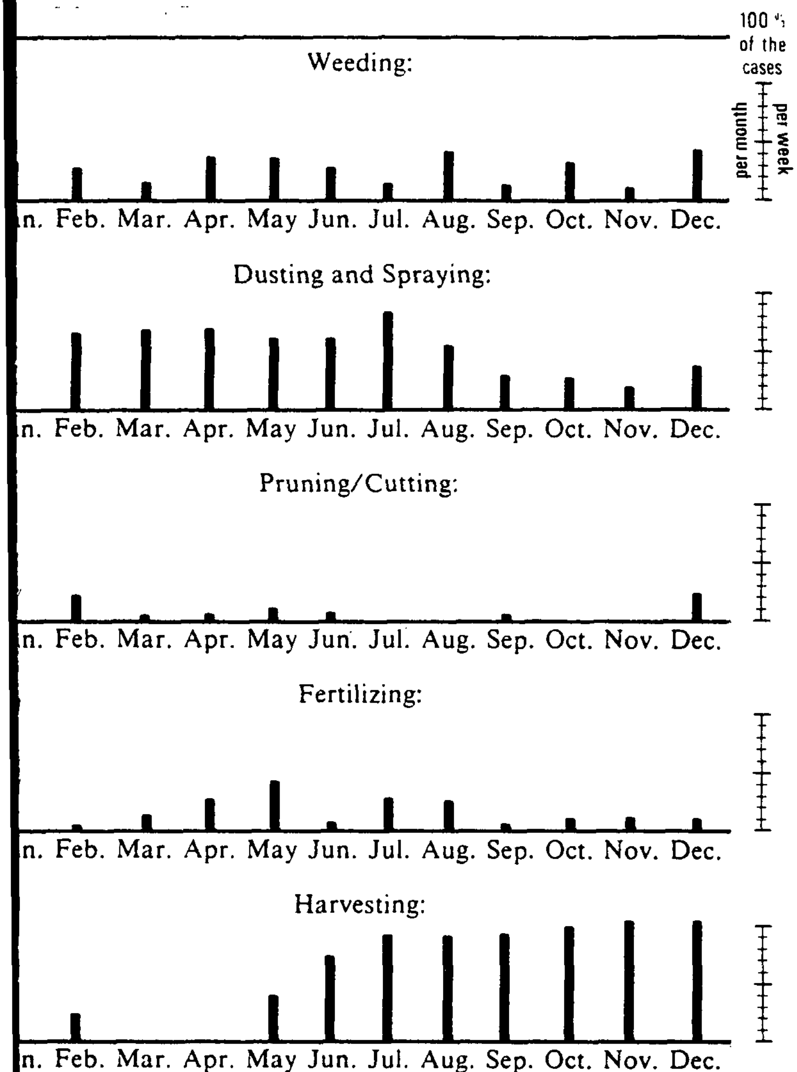
1) Maximum 30 per crop and season

ERI DISTRICT

ABLE 14i: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 **Coffee** Cases: 29

Z: UM 2–3 Survey Area 36 Sample Size: 30

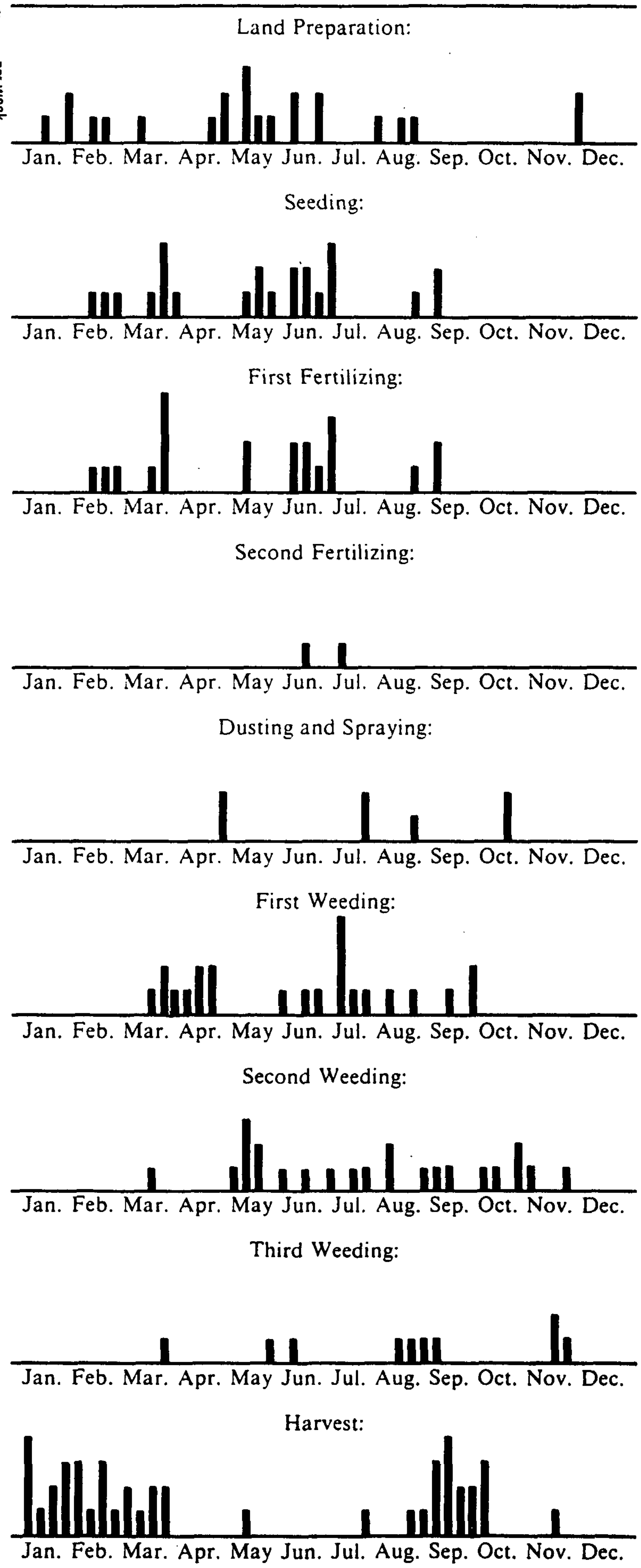


NYERI DISTRICT

TABLE 14j: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 1 **Maize** Cases: 23

AEZ: LH 1 + UM 1–2 Survey Area 37 Sample Size: 29

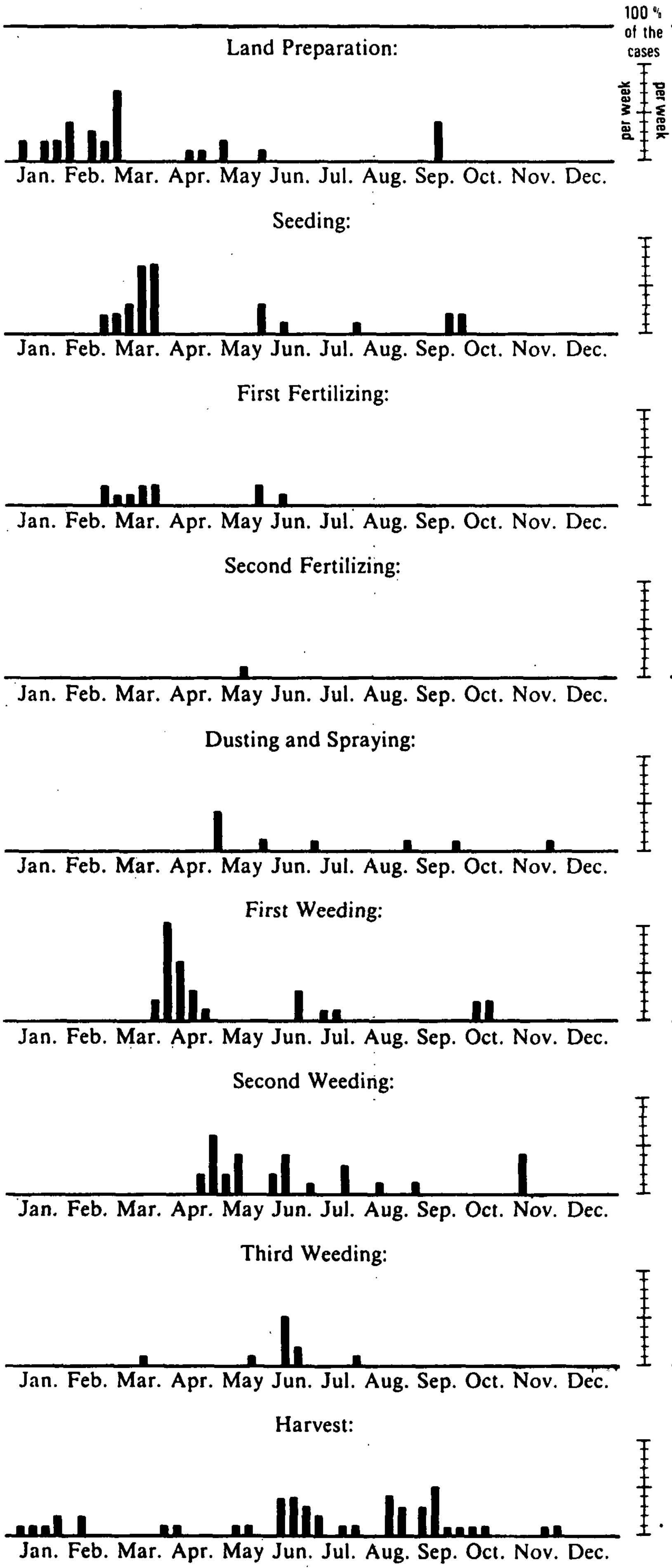


NYERI DISTRICT

TABLE 14k: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 31[1)]

AEZ: LH 1 + UM 1–2 Survey Area 37 Sample Size: 29



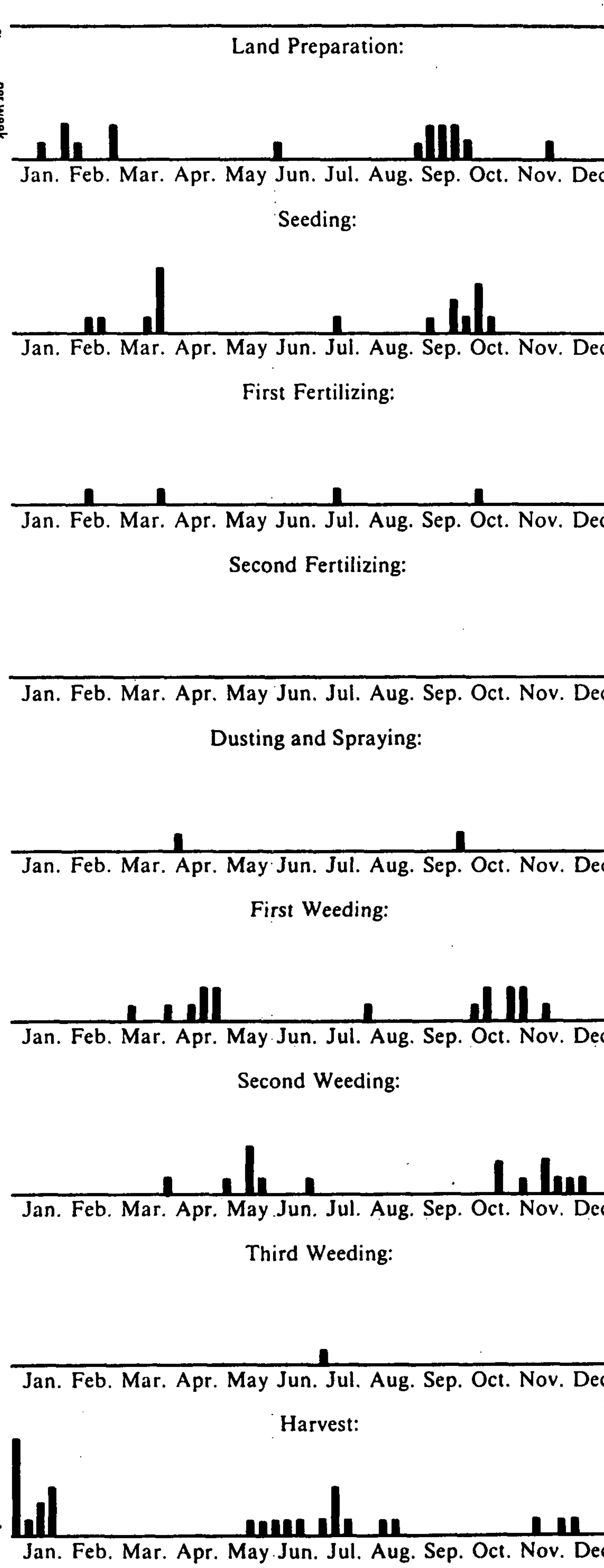
1) Maximum 30 per crop and season

NYERI DISTRICT

TABLE 14l: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 **Beans** Cases: 16

AEZ: LH 1 + UM 1–2 Survey Area 35 Sample Size: 2

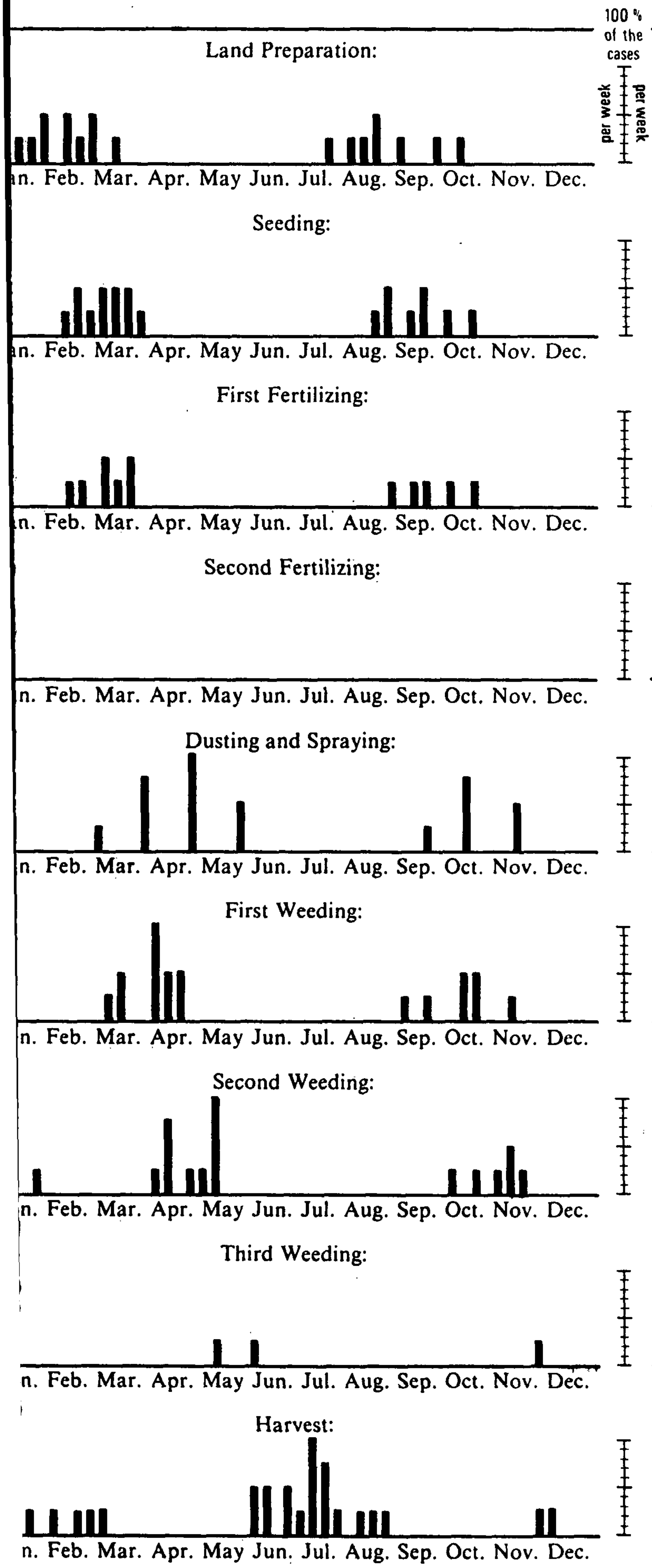


ERI DISTRICT

BLE 14m: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 19

Z: LH 1 + UM 1–2 Survey Area 37 Sample Size: 29

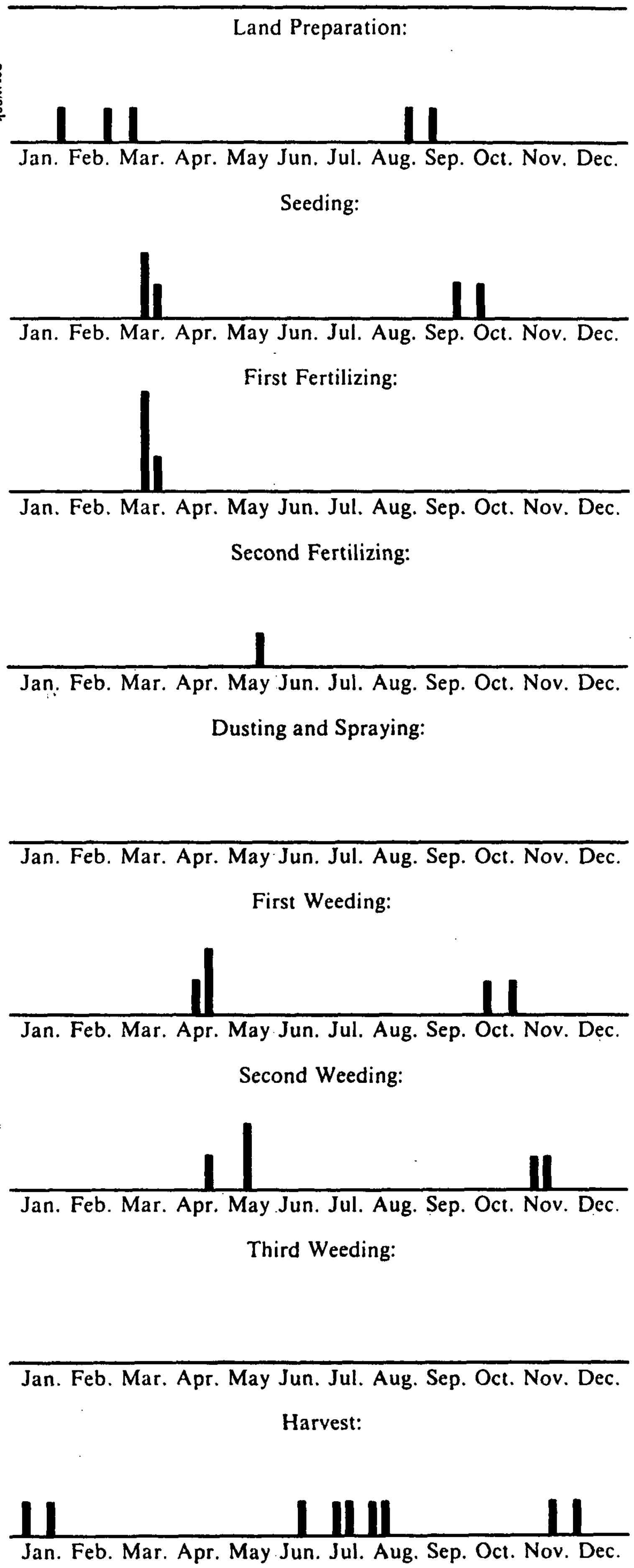


NYERI DISTRICT

TABLE 14n: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 40 **Cabbage** Cases: 5

AEZ: LH 1 + UM 1–2 Survey Area 37 Sample Size: 29

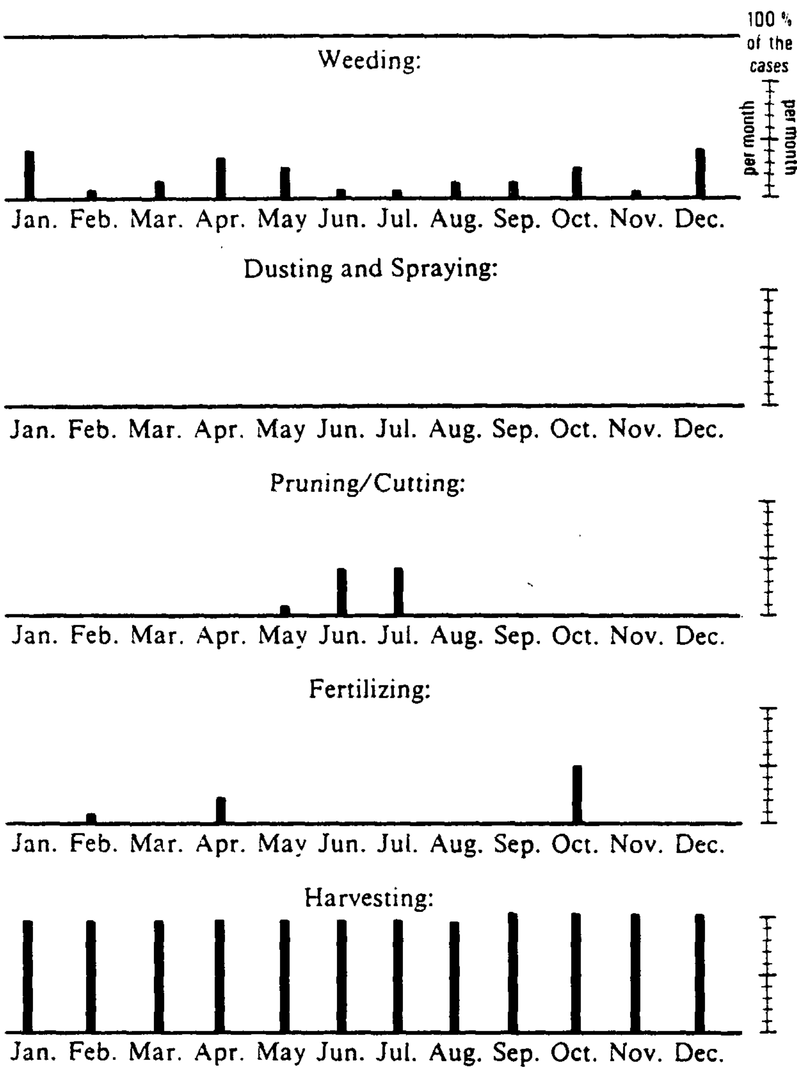


NYERI DISTRICT

TABLE 14o: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 **Tea** Cases: 17

AEZ: LH 1 + UM 1–2 Survey Area 37 Sample Size: 29



NYERI DISTRICT

TABLE 14p: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 **Coffee** Cases: 10

AEZ: LH 1 + UM 1–2 Survey Area 37 Sample Size: 30

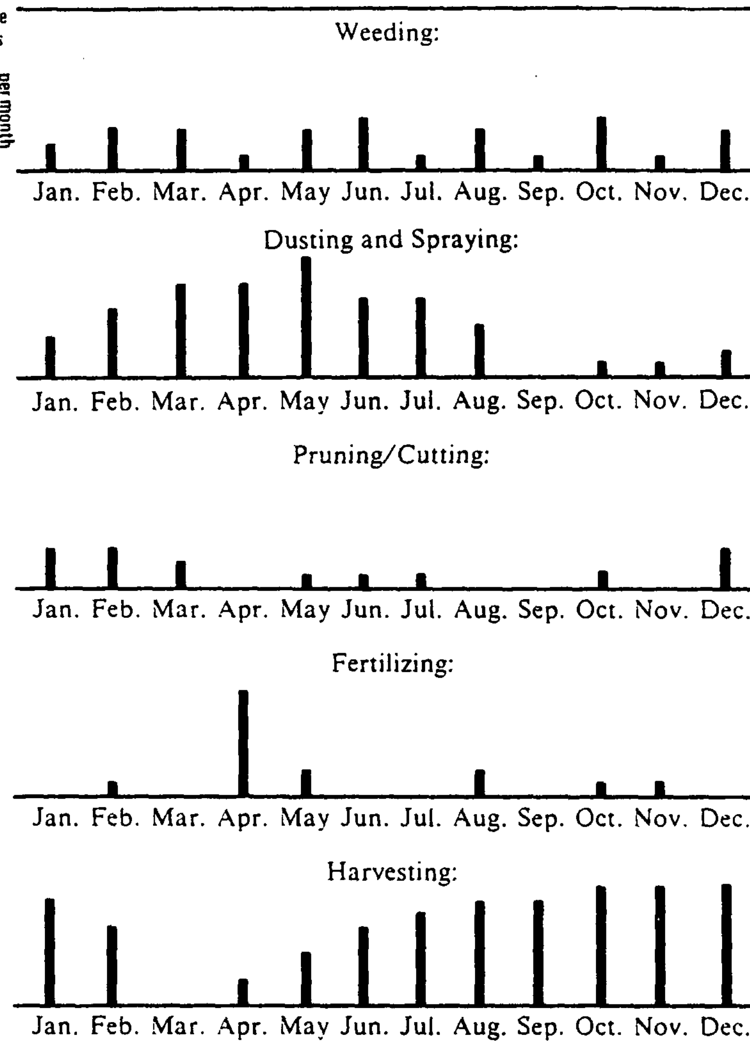


TABLE 15a: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT[1)]

		A.E.Z.: UH 1 SHEEP-DAIRY ZONE				LH 1 TEA-DAIRY ZONE							
		Vegt. Period 1st + 2nd: p or 1/vl-m in Days,1st: 22o or more		2nd: 13o-14o	total: 35o-36o	1/vl-m 22o or more		12o-14o	33o-36o				
		Soil: ANDOSOLS				ANDOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	3,000			6,000	3,000			6,000				
Fertilizer N	kg				166				166				
P_2O_5	kg				83				83				
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields 2)	kg	-			-	4,100			7,500				
Fertilizer N	kg								188				
P_2O_5	kg								94				
K_2O													
CROP: TEA													
Farmers in Production Level	%												
Yields	kg					2,200	5,500	7,000	8,000				
Fertilizer N	kg						110	160	193				
P_2O_5	kg						22	80	96				
K_2O	kg						22	80	96				
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg					500	450	800	1,200				
Fertilizer N	kg							8	19				
P_2O_5	kg							11	26				
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg					3,600	-	10,000	16,000				
Fertilizer N	kg							102	198				
P_2O_5	kg							134	260				
K_2O	kg												
CROP: OATS													
Farmers in Production Level	%												
Yields	kg	2,000	2,500	2,500									
Fertilizer N	kg		15	15									
P_2O_5	kg		15	15									
K_2O	kg												

1) for explanations see Vol. II A, p. 51   2) in kg TDN

NYERI DISTRICT

TABLE 15b: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

A.E.Z.:		UH 1 SHEEP-DAIRY ZONE				LH 1 TEA-DAIRY ZONE							
Vegt. Period 1st + 2nd: in Days, 1st:		p or 1/vl-m 22o or more		2nd: 13o-14o	total: 35o-36o	1/vl-m 22o or more		12o-14o	33o-36o				
Soil:		ANDOSOLS				ANDOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg					2,200	2,000	3,000	4,000				
Fertilizer N	kg							20	45				
P_2O_5	kg							13	29				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,200	5,000	20,000	40,000	4,000	4,000	18,000	40,000				
Fertilizer N	kg		6	111	251			98	252				
P_2O_5	kg		5	95	215			83	215				
K_2O													
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	7,000	7,500	18,000	30,000	6,500	7,500	20,000	30,000				
Fertilizer N	kg		4	88	184		8	108	188				
P_2O_5	kg		3	66	138		6	81	141				
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15c: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT[1)]

	A.E.Z.:	LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				LH 3 WHEAT/(MAIZE)-BARLEY ZONE				LH 4 CATTLE-SHEEP-BARLEY ZONE			
	Vegt. Period 1st + 2nd: in Days, 1st:	m/l + m/s 16o or more		2nd: 115-13o	total: —	f(m) i f(s) 15o or more		75-115	225-265	(m/s) i (vs/s) 13o or more		65-7o	195-2oo
	Soil:	ANDOSOLS				ANDOSOLS				ANDOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	2,400			4,800	1,800			3,600	1,500			3,000
Fertilizer N	kg				133				100				83
P_2O_5	kg				66				50				41
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields 2)	kg	4,000			8,500	2,700			6,000	2,500			3,500
Fertilizer N	kg				250				183				55
P_2O_5	kg				125				91				23
K_2O													
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg	660	400	1,000	1,200								
Fertilizer N	kg			10	15								
P_2O_5	kg			13	20								
K_2O	kg												
CROP: WHEAT													
Farmers in Production Level	%												
Yields	kg	2,000		2,000	3,000	1,700		1,800	2,600	1,600	800	1,500	2,000
Fertilizer N	kg				24			2	21				10
P_2O_5	kg							4	37				16
K_2O	kg												
CROP: BARLEY													
Farmers in Production Level	%												
Yields	kg	2,700		2,000	2,800	2,100		2,000	2,800	1,900	1,000	1,800	2,200
Fertilizer N	kg			-	12				14				7
P_2O_5	kg				14				17				9
K_2O	kg												
CROP: TRITICALE													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

1) for explanations see Vol. II A, p. 51 2) in kg TDN

NYERI DISTRICT

TABLE 15d: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 2 WHEAT/MAIZE-PYRETHRUM ZONE				LH 3 WHEAT/(MAIZE)-BARLEY ZONE				LH 4 CATTLE-SHEEP-BARLEY ZONE			
		Vegt. Period 1st + 2nd: m/l + m/s in Days,1st: 16o or more		2nd: 115-13o	total: —	f(m) i f(s) 15o or more		75-115	225-265	(m/s) i (vs/s) 13o or more		65-7o	195-2oo
		Soil: ANDOSOLS				ANDOSOLS				ANDOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,300		3,000	4,000	2,200	1,200	2,500	3,500	1,800	900	1,500	2,300
Fertilizer N	kg			18	43			8	33				13
P_2O_5	kg			11	27			5	21				8
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	1,000	400	700	1,000	900	500	700	900				
Fertilizer N	kg				-				-				
P_2O_5	kg				-				-				
K_2O					-				-				
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	4,500	10,000	25,000	35,000	6,000	3,000	12,000	25,000				
Fertilizer N	kg		45	164	244			48	152				
P_2O_5	kg		34	123	183			36	114				
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15e: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT[1)]

		A.E.Z.: UM 1 COFFEE-TEA ZONE				UM 2 MAIN COFFEE ZONE				UM 3 MARGINAL COFFEE ZONE			
		Vegt. Period 1st + 2nd: f lim in Days, 1st: 180 or more		2nd: 120-140 total: 300-320		m/l i m/s 160 or more		115-130 275-290		m/s+s 130 or more		85-100 —	
		Soil: NITOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	2,700			5,400	2,400			4,800	1,300			2,700
Fertilizer N	kg				150				133				77
P_2O_5	kg				75				66				38
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields 2)	kg	5,400			11,700	4,800			11,000	2,500			6,000
Fertilizer N	kg				350				344				194
P_2O_5	kg				175				172				97
K_2O													
CROP: TEA													
Farmers in Production Level	%												
Yields	kg	2,200	5,000	6,000	7,000								
Fertilizer N	kg		93	152	192								
P_2O_5	kg		19	30	38								
K_2O	kg		19	30	38								
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg		750	1,000	1,200		750	1,300	2,000		400	500	700
Fertilizer N	kg		75	100	120		75	130	200		40	50	70
P_2O_5	kg		90	100	100		90	100	100		90	90	90
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg	3,000		10,000	16,000	2,800		14,000	16,000				
Fertilizer N	kg			98	183			157	185				
P_2O_5	kg			147	273			235	280				
K_2O	kg												
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg	7,000	6,200	18,000	30,000	6,500	6,200	15,000	28,000	5,000	3,000	6,000	10,000
Fertilizer N	kg			165	345			108	275			15	75
P_2O_5	kg			66	138			44	110			6	30
K_2O	kg												

1) for explanations see Vol. II A, p. 51 2) in kg TDN

NYERI DISTRICT

TABLE 15f: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

A.E.Z.:		UM 1 COFFEE-TEA ZONE				UM 2 MAIN COFFEE ZONE				UM 3 MARGINAL COFFEE ZONE			
Vegt. Period 1st + 2nd: in Days,1st:		f lim 18o or more		2nd: 12o-14o	total: 3oo-32o	m/l i m/s 16o or more		115-13o	275-29o	m/s+s 13o or more		85-1oo	—
Soil:		NITOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,100	2,000	3,000	3,800	1,500	2,000	3,000	4,000	1,800	1,800	2,500	2,800
Fertilizer N	kg			23	43		13	38	63			18	25
P_2O_5	kg			22	41		12	36	60			17	24
K_2O	kg												
CROP: MAIZE AND BEANS													
Farmers in Production Level	%												
Yields	kg	2,100	2000/250	3000/350	3800/500	1,500	2000/300	3000/500	4000/600	1,800	1800/200	2500/300	2800/300
Fertilizer N	kg			47	67		27	62	92			32	39
P_2O_5	kg			37	56		21	51	78			23	30
K_2O													
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg					900	500	1,500	1,900	850	500	1,400	1,600
Fertilizer N	kg							30	50			26	36
P_2O_5	kg							24	40			22	30
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	800	700	800	1,500	750	600	1,000	1,600	900	400	600	1,200
Fertilizer N	kg				24			8	29				10
P_2O_5	kg				29			10	36				13
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15g: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

	A.E.Z.:	UM 1 COFFEE-TEA ZONE				UM 2 MAIN COFFEE ZONE				UM 3 MARGINAL COFFEE ZONE			
	Vegt. Period 1st + 2nd: in Days,1st:	f lim 18o or more		2nd: 12o-14o	total: 3oo-32o	m/l i m/s 16o or more		115-13o	275-29o	m/s+s 13o or more		85-1oo	—
	Soil:	NITOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	6,000	5,100	10,000	22,000	3,000	5,100	10,000	20,000				
Fertilizer N	kg			32	128		17	56	136				
P_2O_5	kg			36	144		19	63	153				
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	7,500	6,000	15,000	35,000	6,000	6,000	15,000	32,000				
Fertilizer N	kg			60	220			72	208				
P_2O_5	kg			45	165			63	182				
K_2O													
CROP: CABBAGE													
Farmers in Production Level	%					3,500	6,000	15,000	30,000	2,600	4,500	12,000	25,000
Yields	kg						16	76	212		13	66	157
Fertilizer N	kg						15	69	159		13	66	157
P_2O_5	kg												
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg					2,400		2,500	3,000				
Fertilizer N	kg							5	20				
P_2O_5	kg							5	18				
K_2O	kg												
CROP: CASSAVA													
Farmers in Production Level	%												
Yields	kg									5,500			9,000
Fertilizer N	kg												14
P_2O_5	kg												21
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

NYERI DISTRICT

TABLE 15h: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 4 SUNFLOWER-MAIZE ZONE											
		Vegt. Period 1st + 2nd: s/m+s in Days, 1st: 105 – 115		2nd: 85-100	total: —								
		Soil: NITOSOLS											
	Unit	Without Fertilizer	Production Level I	Production Level II	Production Level III	Without Fertilizer	Production Level I	Production Level II	Production Level III	Without Fertilizer	Production Level I	Production Level II	Production Level III
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	4,000	2,500	5,000	7,000								
Fertilizer N	kg			8	24								
P_2O_5	kg			7	21								
K_2O	kg												
CROP: CASSAVA													
Farmers in Production Level	%												
Yields	kg	3,500	3,000	5,000	6,000								
Fertilizer N	kg			6	10								
P_2O_5	kg			11	18								
K_2O													
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15i: PRODUCTION LEVELS PER CROP & AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

A.E.Z.: UM 4 SUNFLOWER-MAIZE ZONE

Vegt. Period 1st + 2nd: s/m+s in Days, 1st: 105 - 115 | 2nd: 85-1oo | total: —

Soil: NITOSOLS

	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE													
Farmers in Production Level	%												
Yields	kg	1,200			2,400								
Fertilizer N	kg				66								
P_2O_5	kg				33								
K_2O	kg												
CROP: BANA GRASS													
Farmers in Production Level	%												
Yields	kg	2,200			4,800								
Fertilizer N	kg				144								
P_2O_5	kg				72								
K_2O													
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	1,500	1,100	2,000	2,500								
Fertilizer N	kg			13	25								
P_2O_5	kg			12	24								
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg	2,000		2,000	2,700								
Fertilizer N	kg				22								
P_2O_5	kg				20								
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg	800	500	700	1,000								
Fertilizer N	kg				10								
P_2O_5	kg				8								
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	700	400	700	800								
Fertilizer N	kg				3								
P_2O_5	kg				4								
K_2O	kg												

KIRINYAGA DISTRICT

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NATURAL POTENTIAL

INTRODUCTION

The typical agro-ecological pattern of the south-eastern slopes of the Nyandarua Range is continued on the southern and eastern slopes of Mt. Kenya, due to the effects of the southeast trade wind which brings rainfall up to a maximum of > 2 200 mm annual average at about 2 500 m. Higher up, the rainfall decreases due to the lower moisture content of the trade wind inversion, but the higher altitudes are still so wet and steep that forest or conservation (National Parks) is the best land use. The lower, herbaceous parts of the Tropical Alpine Zones may be opened in future for seasonal grazing of livestock for farmers living below the forests, due to the demands of increasing land pressure.

The decrease of rainfall downwards from the 2 500 m maximum level does not create water stress in the 15 km broad zones down to 1 600 m, where 1 600 mm is the annual average. The low evaporation due to cloud cover and morning mists, and the storage capacity of more than 300 mm of the deeply weathered volcanic soils, mean that a high proportion of the rainfall is available to plants.

Below that altitude, the rainy seasons become considerably shorter, down to an expectation of less than 80 days in 6 years out of 10 for the first rains, and less than 65 for the second rains. Considering the fact that the two-thirds rainfall reliability drops to 250 mm in the first rains, and to 200 mm in the second rains, it becomes clear that maize crop failures will occur regularly, and that the Mwea Tebere Irrigation Scheme is very important in that area. The irrigation possibilities are not discussed in the Agro-Ecological Zones because the Zones are based on natural climatic conditions, not on artificial ones. We have the typical sequence from the Tea-Dairy Zone LH 1 through the three different coffee zones UM 1, 2, and 3, to the better and the Marginal Cotton Zone LM 3 and LM 4, as in Murang'a District.

KIRINYAGA DISTRICT

TABLE 1: **RAINFALL FIGURES FROM VARIOUS STATIONS**

having at least 10 years of records up to 1976

No. and altitude	Name of Station	Years of rec.	Kind of rec.	Ann. rainf. mm	Monthly rainfall in mm Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
9037031	Kerugoya Hospital,	39	Average	1 485	32	30	101	359	317	52	54	69	50	170	185	69
1 570 m	Sagana		60 % rel.[1]	1 332	17	12	52	269	251	38	48	49	37	92	154	42
9037103	Embu, Molinduko	20	Av.	1 012	26	32	98	237	182	11	19	21	13	110	212	53
1 378 m	Exp. Farm		60 %	902	9	8	79	185	115	7	10	14	8	80	179	31
9037110	Tebere Camp	20	Av.	977	27	23	75	248	155	21	28	21	18	117	194	49
1 200 m			60 %	791	9	2	44	220	68	11	10	8	10	49	148	29
9037112	Mwea Tebere Exp.	16	Av.	890	38	33	77	224	145	10	12	11	11	82	195	52
1 158 m	Station															
9037115	Kerugoya, Castle	18	Av.	2 265	66	67	104	392	456	141	164	148	118	256	232	121
2 040 m	For. Station		60 %	2 028	42	51	56	337	406	126	120	134	91	166	180	103
9037127	Kerugoya, Upper	15	Av.	2 549	111	95	140	326	492	180	189	194	139	303	238	142
2 438 m	Kamweti F. Station		60 %	2 221	57	51	84	233	430	137	138	160	91	208	184	109
9037137	Wamumu Approv.	11	Av.	955	25	29	141	281	179	18	8	1	2	72	152	48
1 219 m	School Muranga															
9037147	Embu,	10	Av.	953	18	43	122	232	180	32	11	14	5	87	175	34
1 219 m	Murubaru Village															

[1] These figures of rainfall reliability should be exceeded normally in 6 out of 10 years

KIRINYAGA DISTRICT

TABLE 2: **TEMPERATURE DATA**

No. and altitude	Name of Station	AEZ[1]	Kind of records	Temperature in °C Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Year	Years of rec.
9037112	Mwea	LM	Mean max.	28.4	30.3	30.2	28.3	27.1	26.5	25.0	25.8	28.2	29.2	27.3	26.9	27.8	
1 158 m	Tebere Ex-	4	Mean temp.	20.9	22.0	23.1	22.6	21.9	20.8	19.9	20.3	21.8	22.9	21.7	20.7	21.6	14
	perimental	hp	Mean min.	13.4	13.7	16.1	16.9	16.8	15.2	14.8	14.8	15.5	16.6	16.1	14.5	15.4	
	Station		Abs. min.	7.2	7.8	10.0	10.6	12.2	9.9	8.3	8.9	8.9	8.9	10.0	9.3	7.2	
9037115	Castle	LH	Mean max.	21.6	22.1	21.3	19.9	18.3	17.4	16.8	16.2	18.3	19.4	19.3	19.9	19.2	
2 040 m	Forest	0	Mean temp.	14.8	15.3	15.3	15.3	14.8	13.8	13.4	12.8	13.9	14.7	14.4	14.5	14.4	9
	Station	hp	Mean min.	8.1	8.5	9.4	10.7	11.4	10.2	10.1	9.5	9.5	10.1	9.6	9.2	9.7	
			Abs. min.	5.6	5.6	5.6	6.7	6.7	5.6	5.6	5.6	5.6	6.1	5.6	5.4	5.4	

[1] AEZ = Agro-ecological zone; hp = higher places within the zone

KIRINYAGA DISTRICT

TABLE 3: **CLIMATE IN THE AGRO-ECOLOGICAL ZONES**

Agro-Ecological Zone	Subzone	Altitude in m	Annual mean temperature in °C	Annual av. rainfall in mm	60 % reliability of rainfall[1] 1st rains in mm	2nd rains in mm	60 % reliability of growing period 1st rains[2] in days	2nd rains in days	Total[3] in days
TA 0 Rocks and Glaciers				National Park					
TA I + II Tropical-Alpine Moor- and Heathlands				National Park					
UH 0 Forest Zone				Forest Reserve					
LH 0 Forest Zone				Forest Reserve					
LH 1 Tea-Dairy Zone	l/vl ⌐ m	1 760–2 130	17.8–14.5	1 700–2 150	900–1 100	500–620	210 or more	140–150	250–260
UM 1 Coffee-Tea Zone	f l i m	1 520–1 820	19.3–17.5	1 400–1 700	750–950	430–520	200 or more	130–150	230–250
UM 2 Main Coffee Zone	m/l i m/s m + s/m	1 400–1 580	20.1–19.0	1 220–1 500 1 200–1 250	600–800 580–620	400–460 380–430	170 or more 160 or more	115–130 105–115	285–300 –
UM 3 Marginal Coffee Zone	m/s + s	1 310–1 400	20.6–20.1	1 100–1 250	450–580	350–400	120–140	85–105	–
UM 4 Sunflower-Maize Zone	s/m + s s + s	1 280–1 340	20.9–20.4	950–1 200 950–960	420–500 400–420	330–350 320–330	105–115 90–105	85–105 85–105	– –
LM 3 Cotton Zone	s/m + s s + s	1 220–1 280	21.2–20.9	950–1 200 900–1 100	420–500 380–460	320–350 280–330	105–115 85–105	85–100 80–95	– –
LM 4 Marginal Cotton Zone	s + s/vs s/vs + vs/s	1 090–1 220	22.0–21.2	850–950 800–850	330–400 300–350	250–300 200–250	85–105 75–85	75–85 55–75	– –
LM 5 Lower Midland Livestock-Millet Zone				Small transitional strip					

1) Amounts surpassed normally in 6 out of 10 years, falling during the agro-humid period which allows growing of most cultivated plants.
2) More if growing cycle of cultivated plants continues into the period of second rains.
3) Only added if rainfall continues at least for survival ($> 0.2\ E_o$) of most long term crops.

37°E 37°30' E

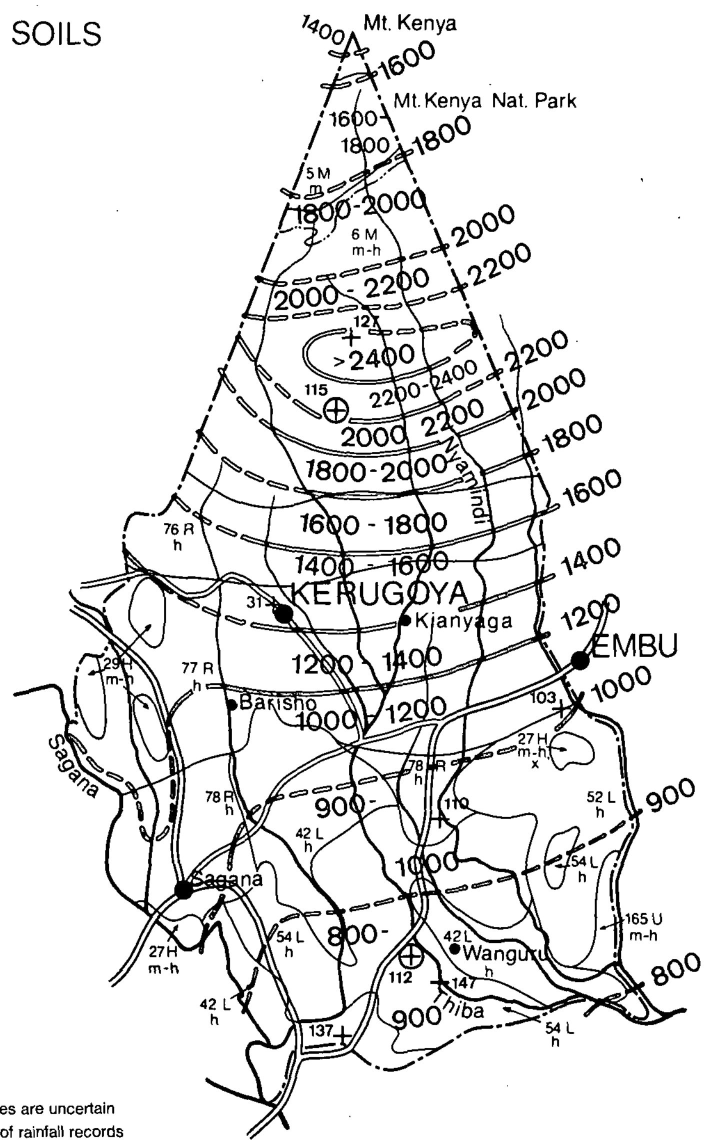
0° S

KIRINYAGA

AVERAGE ANNUAL RAINFALL

in mm

+ SOILS



9037

0°30' S

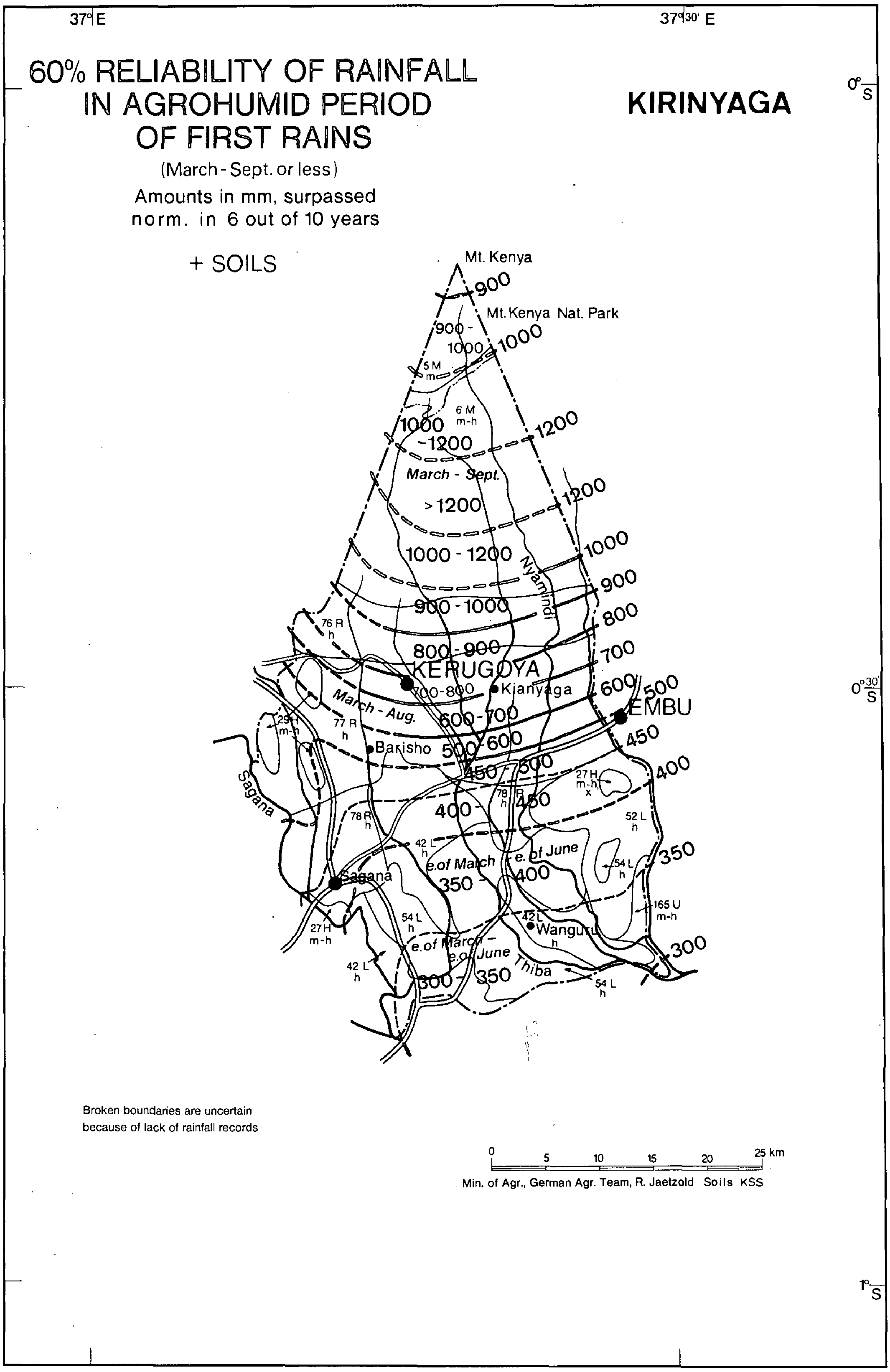
Broken boundaries are uncertain because of lack of rainfall records

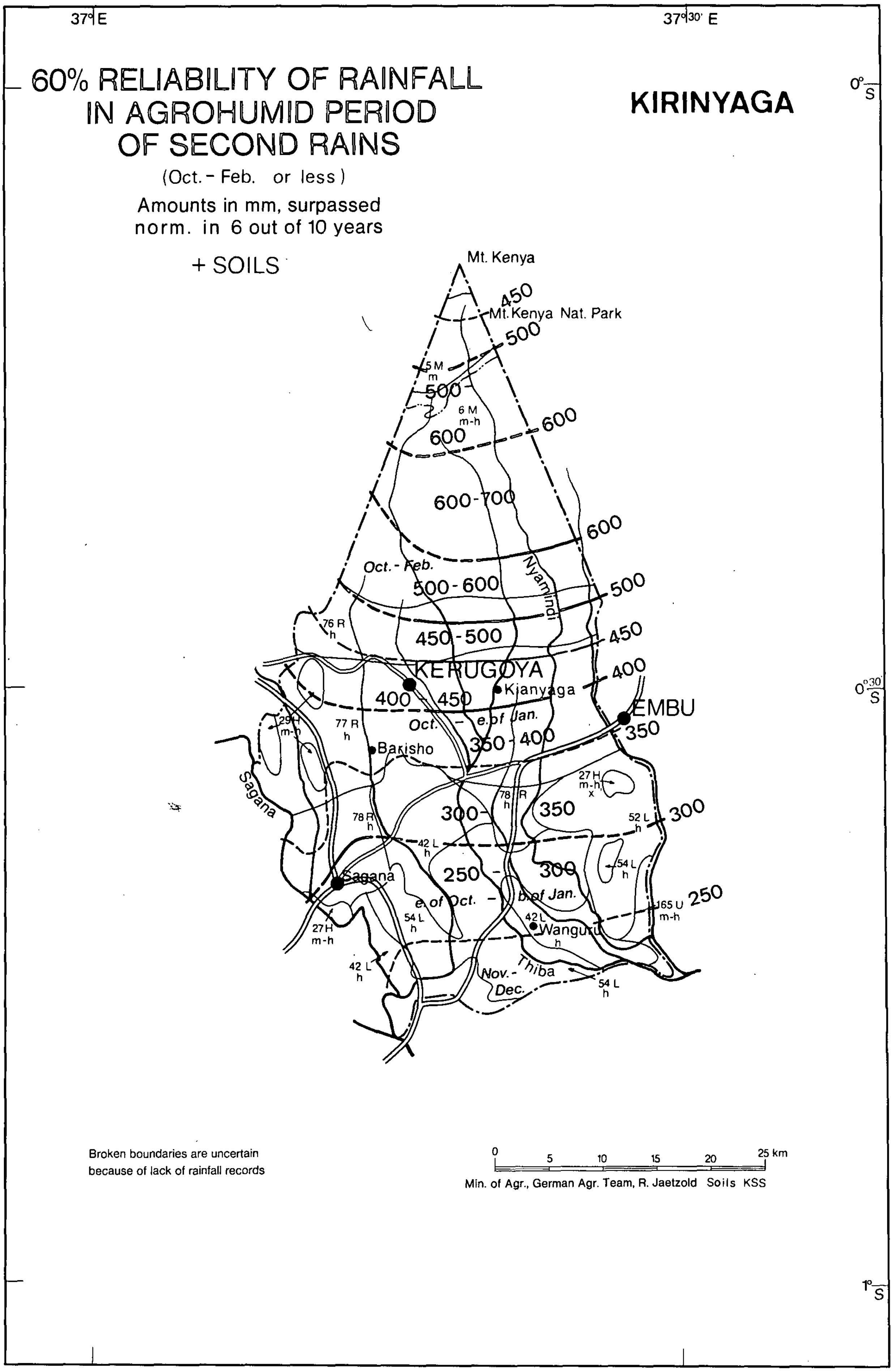
1° S

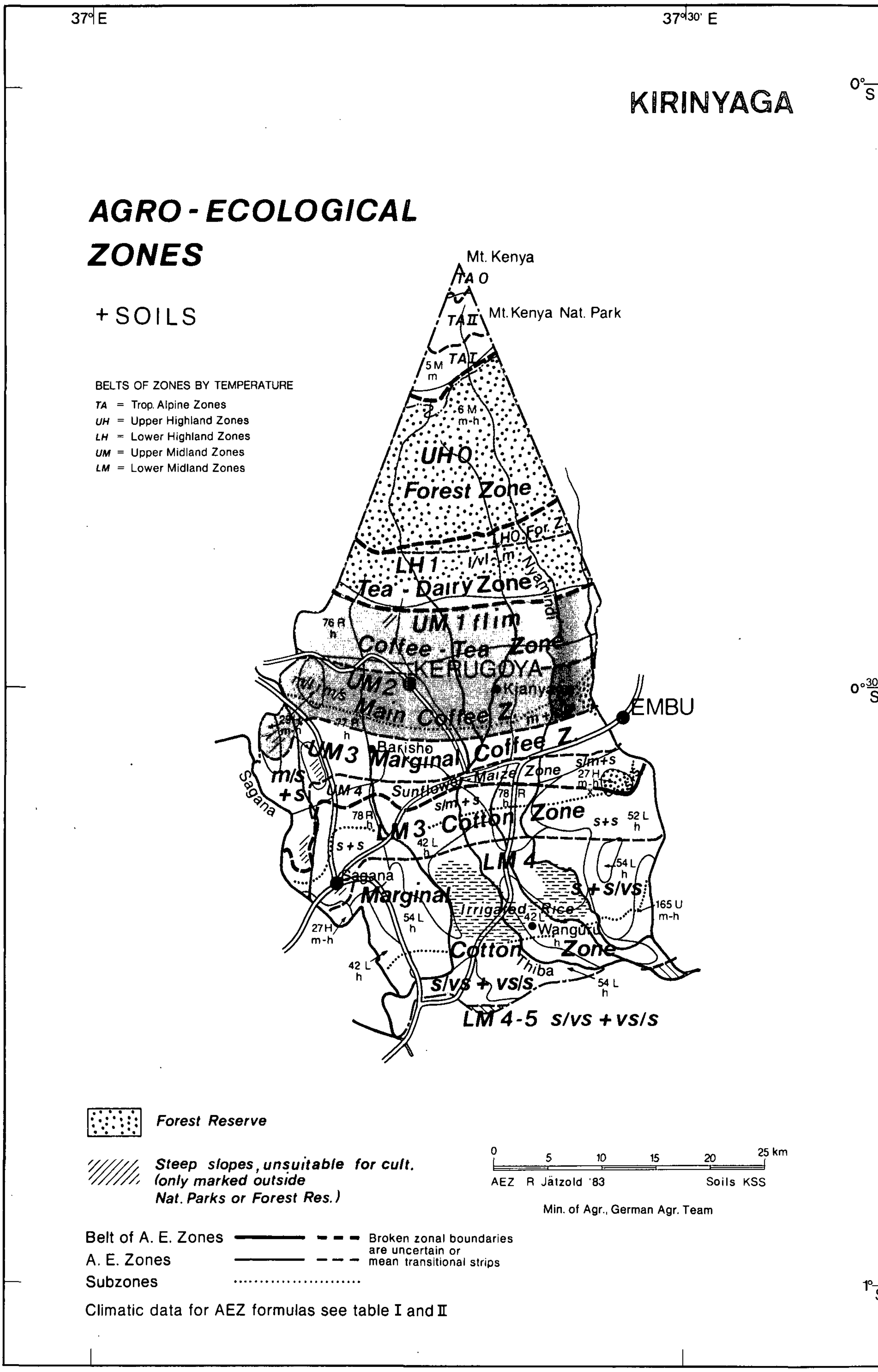
⊕	Temperature recording station, operating 1976
+	Rainfall recording station, operating 1976 and having at least 10 years of records
137	Station number in grid
9037	Grid number

0 5 10 15 20 25 km

Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


37° E
37° 30' E
0° S
0° 30' S
1° S
60% RELIABILITY OF RAINFALL IN AGROHUMID PERIOD OF FIRST RAINS
(March - Sept. or less)
Amounts in mm, surpassed norm. in 6 out of 10 years
+ SOILS
KIRINYAGA
Mt. Kenya
Mt. Kenya Nat. Park
900
900 - 1000
1000
5 M m
6 M m-h
1000 -1200
1200
March - Sept.
>1200
1000 - 1200
Nyamindi
900 - 1000
900
800
800 - 900
700
KERUGOYA
Kianyaga
700-800
600
500
EMBU
March - Aug.
600-700
450
76 R h
77 R h
29 H m-h
Barisho
500-600
450 - 500
400
27 H m-h x
Sagana
78 R h
400 - 450
52 L h
42 L h
e. of March
e. of June
350
350 - 400
54 L h
Sagana
165 U m-h
27 H m-h
42 L
Wanguru
300
e. of March - e. of June
Thiba
42 L h
300 - 350
54 L h
Broken boundaries are uncertain because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS


37° E
37° 30' E
60% RELIABILITY OF RAINFALL
IN AGROHUMID PERIOD
OF SECOND RAINS
(Oct. - Feb. or less)
Amounts in mm, surpassed
norm. in 6 out of 10 years
+ SOILS
KIRINYAGA
0° S
0° 30' S
1° S
Mt. Kenya
Mt. Kenya Nat. Park
450
500
5 M
m
500
6 M
m-h
600
600
600-700
600
Oct. - Feb.
500-600
500
Nyamindi
76 R
h
450-500
450
KERUGOYA
Kianyaga
400
400 - 450
EMBU
29 H
m-h
77 R
h
Oct. - e. of Jan.
Barisho
350 - 400
350
Sagana
27 H
m-h
x
78 R
h
78 R
h
300 -
350
52 L
h
300
42 L
h
Sagana
250 -
300
54 L
h
e. of Oct. - b. of Jan.
65 U
m-h
250
27 H
m-h
54 L
h
42 L
Wanguru
h
42 L
h
Nov. - Dec.
Thiba
54 L
h
Broken boundaries are uncertain
because of lack of rainfall records
0 5 10 15 20 25 km
Min. of Agr., German Agr. Team, R. Jaetzold Soils KSS



37° E
37°30' E
0° S
0°30 S
1° S
KIRINYAGA
AGRO - ECOLOGICAL ZONES
+ SOILS
BELTS OF ZONES BY TEMPERATURE
TA = Trop. Alpine Zones
UH = Upper Highland Zones
LH = Lower Highland Zones
UM = Upper Midland Zones
LM = Lower Midland Zones
Mt. Kenya
Mt. Kenya Nat. Park
UH 0 Forest Zone
LH 1 Tea - Dairy Zone
UM 1 Coffee - Tea Zone
KERUGOYA
UM 2 Main Coffee Z.
EMBU
UM 3 Marginal Coffee Z.
UM 4 Sunflower Maize Zone
LM 3 Cotton Zone
LM 4 Marginal Cotton Zone
Irrigated Rice
Wanguru
Sagana
LM 4-5 s/vs + vs/s
Forest Reserve
Steep slopes, unsuitable for cult. (only marked outside Nat. Parks or Forest Res.)
0 5 10 15 20 25 km
AEZ R Jätzold '83
Soils KSS
Min. of Agr., German Agr. Team
Belt of A. E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II

AGRO-ECOLOGICAL ZONES

TA = *TROP.-ALPINE ZONES*

TA 0 = *Rocks and Glaciers*

TA I + II = *Trop.-Alpine Moor- and Heathlands*

Here National Park
Limited grazing potential

UH = *UPPER HIGHLAND ZONES*

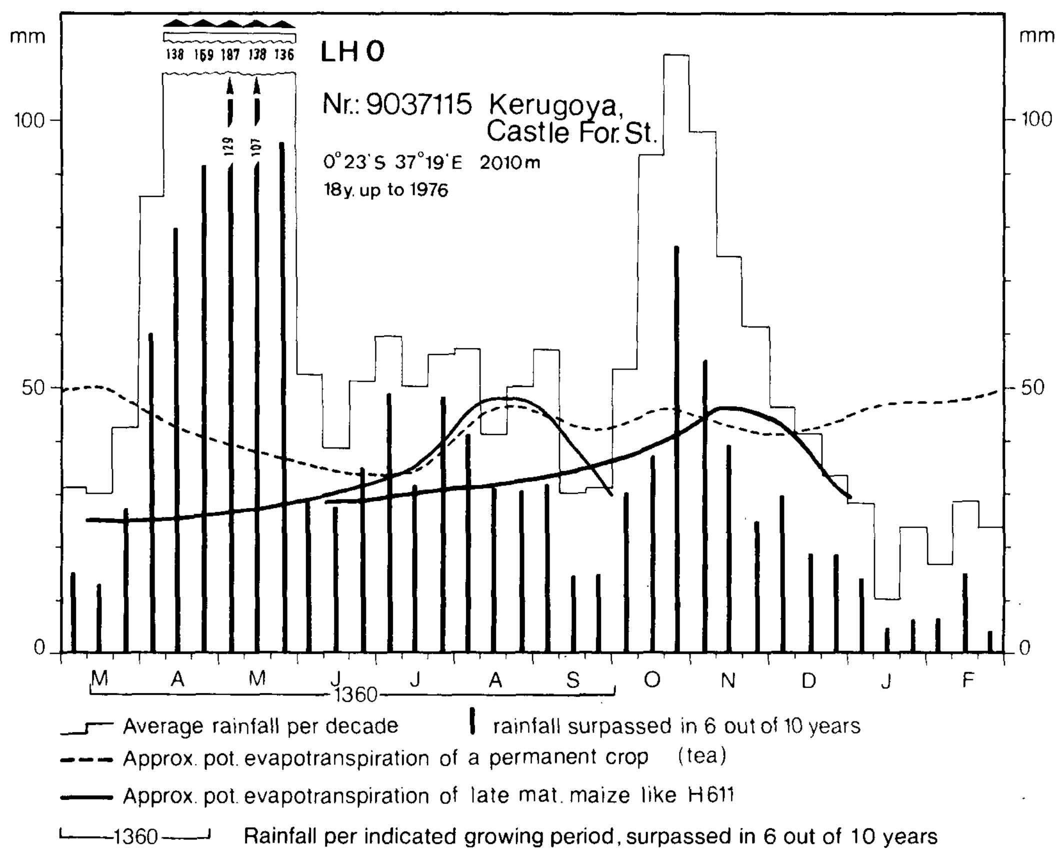
UH 0 = *Forest Zone*

Too wet, steep, and too important as a catchment area, therefore not cleared. Bamboo thickets. Forest Reserve

LH = *LOWER HIGHLAND ZONES*

LH 0 = *Forest Zone*

Almost the same as UH 0 but many valuable timbers and no bamboo. Forest Reserve



LH 1 = *Tea-Dairy Zone*

LH 1 = *Tea-Dairy Zone*
l/vl ⌐ m *with a long to very long cropping season followed by a medium one*[1)]

Very good yield potential (av. over 80 % of the optimum)
1st rains, start norm. mid March: Peas, cabbages, lettuce
2nd rains, start norm. mid Oct.: Peas

Good yield potential (av. 60–80 % of the optimum)
1st rains: Lima beans; carrots, leek, kales, endive
2nd rains: Potatoes; cabbages, carrots, kales
Whole year, best planting time mid March: Tea (high quality), loquats

1) On medium soils; on heavy soils permanent cropping possibilities. Given potential refers to predominating heavy red loams

Fair yield potential (av. 40–60 % of the optimum)
1st rains: Late mat. maize like H 611 (danger of soil erosion); beans (2 times, 2nd e. of Jy.–N.); potatoes (e. of F.–Jy.)
2nd rains: Maize H 612–14 (b. of June–b. of Jan.); beans; leek, lettuce
Whole year: Pyrethrum (too wet); plums

Pasture and forage
About 0.5 ha/LU on sec. pasture of Kikuyu grass, suitable for grade dairy cows; clover for higher productivity

UM = UPPER MIDLAND ZONES

UM 1 = Coffee-Tea Zone

UM 1 f l i m = Coffee-Tea Zone with a fully long cropping season, intermediate rains, and a medium one

Very good yield potential
1st rains, start norm. mid March: Lima beans; cabbages, kales
2nd rains, start norm. mid Oct.: Beans (Aug.–D./J.)
Whole year, best planting time mid March: Passion fruit, black wattle

Good yield potential
1st rains: Late mat. maize H 612–614, finger millet; potatoes[2]; late mat. sunflower like Kenya White; onions
2nd rains: Sweet potatoes; m. mat. sunflower like Hybrid S 301 A; cabbages (Aug.–D.), kales, onions, tomatoes
Whole year: Tea, Arabica coffee, bananas, yams, mountain pawpaws, loquats, avocadoes, passion fruit, arrowroots[3]

Fair yield potential
1st rains: Cold tol. sorghum, m. mat. foxtail millet (Jy.–O., seeds Meru District); sweet potatoes tomatoes
2nd rains: M. mat maize like H 511 & 512 (S.–Jan.), l. mat. H 612–614 (e. of June–b. of Jan.), cold tol. sorghum (Aug.–F.), finger millet; potatoes (Aug.–D.)
Whole year: Citrus, taro[3], pineapples (lower pl.)

Pasture and forage
0.5–0.6 ha/LU on sec. pasture of Kikuyu grass; down to about 0.15 ha/LU feeding Napier grass, banana stems and leaves, sweet potato vines, maize stalks. Zero grazing recommended because land is so scarce

UM 2 = Main Coffee Zone

UM 2 m/l i m/s = Main Coffee Zone with a medium to long cropping season, intermediate rains, and a medium to short one[4]

(see Diagram Kerugoya Hospital)

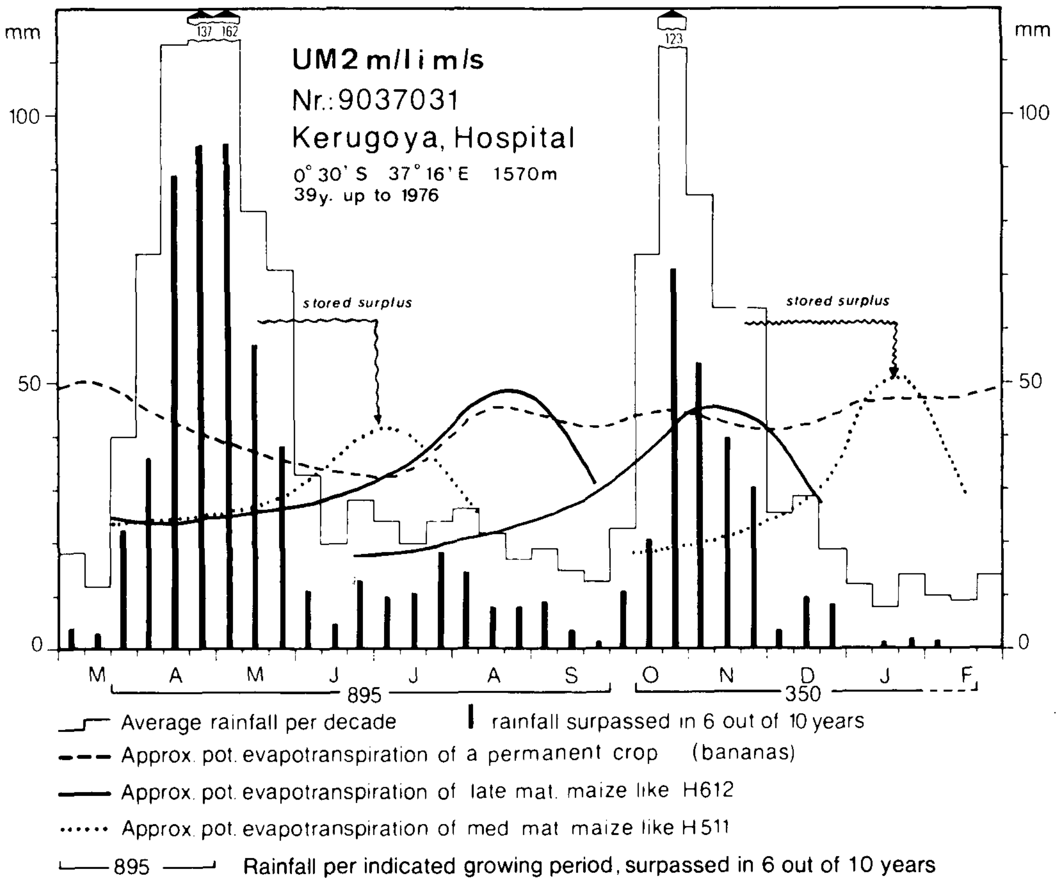
Very good yield potential
1st rains, start norm. mid March: M. mat. sunflower H S 301 A
2nd rains, start norm. mid Oct.: Beans (S./O.–Jan./F.)
Whole year, best pl. time mid march: Arabica coffee (~ 80 %); loquats, mountain pawpaws

Good yield potential
1st rains: M. mat. maize H 511 & 512, ratoon of sorghum (lower pl.) beans; potatoes[2], sweet pot.; cabbages, kales, tomatoes[3], onions
2nd rains: E. mat. maize like Katumani comp. B, e. mat. sorghum like 2 KX 17, e. mat. foxtail millet; sweet potatoes (Aug./S.–Jan.); e. mat. sunflower like Hybrid S 345 (< 1 500 m); kales, cabbages, onions, tomatoes
Whole year: Bananas, citrus, avocadoes, passion fruit, arrowroots[3]

Fair yield potential
2nd rains: Maize H 511 and m. mat. local maize (Aug./S.–J./F.), H 612 (Jy.–D.), finger millet; e. mat. potatoes
Whole year: Cassava; sugar cane (lower and wet places)

2) Spraying against fungus diseases important
3) Better in valleys
4) On medium soils; on heavy soils there is a long to medium and a medium to short cropping season. Given potential refers to predominating heavy red loams

Pasture and forage
0.6–0.9 ha/LU on sec. pasture of star grass (Cynodon dactylon) but land too valuable for grazing; down to about o.18 ha/LU feeding Napier or Bana grass with banana leaves and stems, maize stalks, sweet potato vines



UM 2 = *Main Coffee Zone*
m + s/m *with a medium cropping season and a short to medium one*

Potential almost the same as UM 2 m/l i m/s less about 10% of perennial or late maturing crops and of stocking rates because of more intensive drought; all vegetables better in valleys, coffee yields good

UM 3 = *Marginal Coffee Zone*

UM 3 = *Marginal Coffee Zone*
m/s + s *with a medium to short and a short cropping season*[5]

Good yield potential
1st rains, start norm. end of March: E. mat. maize like Katumani comp. B, m. mat. like H 511 or 512 (higher places), ratoon of e. mat. sorghum; e. mat. beans; e. mat. sunflower like HS 345 (< 1 500 m); onions, cabbages[3]
2nd rains, start norm. mid Oct.: E. mat foxtail millet, e. mat. sorghum like 2 KX 17; sunflower Issanka
Whole year: Pineapples (best planting time end of March), Macadamia nuts, per. castor

Fair yield potential
1st rains: Maize H 511 (lower places), m. mat. finger millet; m. mat. beans, sweet potatoes; kales, tomatoes[3]
2nd rains: Katumani maize; e. mat. beans; e. mat. cabbages[3], kales[3], tomatoes[3]
Whole year: Arabica coffee (lower places poor, there add. irrigation profitable), bananas (lower places marginal), citrus, pawpaws, cassava, pigeon peas (lower pl.)

Pasture and forage
0.7–1.1 ha/LU on sec. high grass savanna with zebra grass (Hyparrhenia rufa) predominant; down to about 0.23 ha/LU feeding Napier or Bana grass, glycine, maize stalks, sweet potato vines and other forage

5) On medium soils; on heavy soils first cropping season has a medium length, higher places even medium to long. Given potential refers to predominating heavy red loams

UM 4 = *Sunflower-Maize Zone*

UM 4 s/m + s = *Sunflower-Maize Zone with a short to medium and a short cropping season*[6]

Good yield potential
1st rains, start norm. end of March: E. mat. maize Katumani comp. B, e. mat sorghum like Serena, ratoon of e. mat. sorghum; mwezi moja beans; sunflower Issanka or H S 345
2nd rains, start norm. mid Oct.: Katumani maize, e. mat. foxtail millet, v. e. mat. sorghum; mwezi moja beans; sunflower Issanka
Whole year, best pl. time end of Oct.: Sisal, pineapples

Fair yield potential
1st rains: Maize H 511, finger millet; dolichos beans; sweet potatoes; Virg. tobacco; tomatoes[3], onions
2nd rains: E. mat. sorghum like 2 KX 17; e. mat. beans
Whole year: Cassava, castor

Poor yield potential (av. 20–40 % of the optimum)
2nd rains: E. mat. sweet potatoes[3]
Whole year: Bananas[3], citrus[3], mangoes, pawpaws[3]

Pasture and forage
0.8–1.2 ha/LU on high grass savanna with zebra grass (Hyparrhenia rufa) predominant; down to about 0.25 ha/LU feeding Bana grass, siratro (Macroptilium atropurpureum), horse tamarind (Leucaena leucocephala), maize stalks and silage (of green maize or fodder sorghum)

UM 4 s + s = *Sunflower-Maize Zone with two short cropping seasons*

Crop potential almost as UM 4 s/m + s, but maize H 511 not recommended any more except on very suitable heavy soils. Stocking rates 0.9–1.5 ha/LU

LM = *LOWER MIDLAND ZONES*

LM 3 = *Cotton Zone*

LM 3 s/m + s = *Cotton Zone with a short to medium and a short cropping season*[7]

Very good yield potential
2nd rains, start norm. mid Oct.: E. mat. proso millet like Serere I

Good yield potential
1st rains, start norm. end of March: E. mat. maize like Katumani comp. B, e. mat. sorghum like Serena, ratoon of sorghum, e. mat. bulrush millet (awned var.), e. mat foxtail millet (nearly 80 %); v. e. and e. mat. beans, cowpeas, chick peas (late planted on h. black soils), green grams; e. mat. sunflower like Issanka
2nd rains: Dryland comp. maize, e. mat. sorghum like 2 KX 17, e. mat. bulrush millet; green grams, cowpeas, pigeon peas (O.–S.); dwarf sunflower, cotton bimodal variety (e. of S./O.–Aug.)
Whole year, best planting time end of Oct.: Sisal, castor, Macadamia nuts, pineapples

Fair yield potential
1st rains: Maize H 511, finger millet, e. mat. foxtail millet; dolichos beans (50–60 %), groundnuts (in light soils), e. mat. soya beans; sweet potatoes; Virginia tobacco (higher places); tomatoes, onions
2nd rains: Katumani maize; dolichos beans, mwezi moja beans; cotton bimodal var. on medium soils, sunflower Issanka
Whole year: Cassava, mangoes, pawpaws[3]

Poor yield potential
2nd rains: Virg. tobacco; e. mat. sweet potatoes
Whole year: Citrus[3], bananas[3]

Pasture and forage
0.8–1.3 ha/LU on high grass savanna with zebra grass (Hyparrhenia rufa) predominant, down to about 0.25 ha/LU feeding Bana and Napier grass, siratro, horse tamarind (Leucaena leucocephala) a.o.

6) On medium soils; on heavy soils first cropping season has a medium to short length. Given potential refers to predominating heavy soils
7) On medium soils; on heavy soils first cropping season has a medium to short length. Given potential refers to predominating heavy soils

LM 3 = *Cotton Zone*
s + s *with two short cropping seasons*[8)]

(see Diagram Tebere Camp)

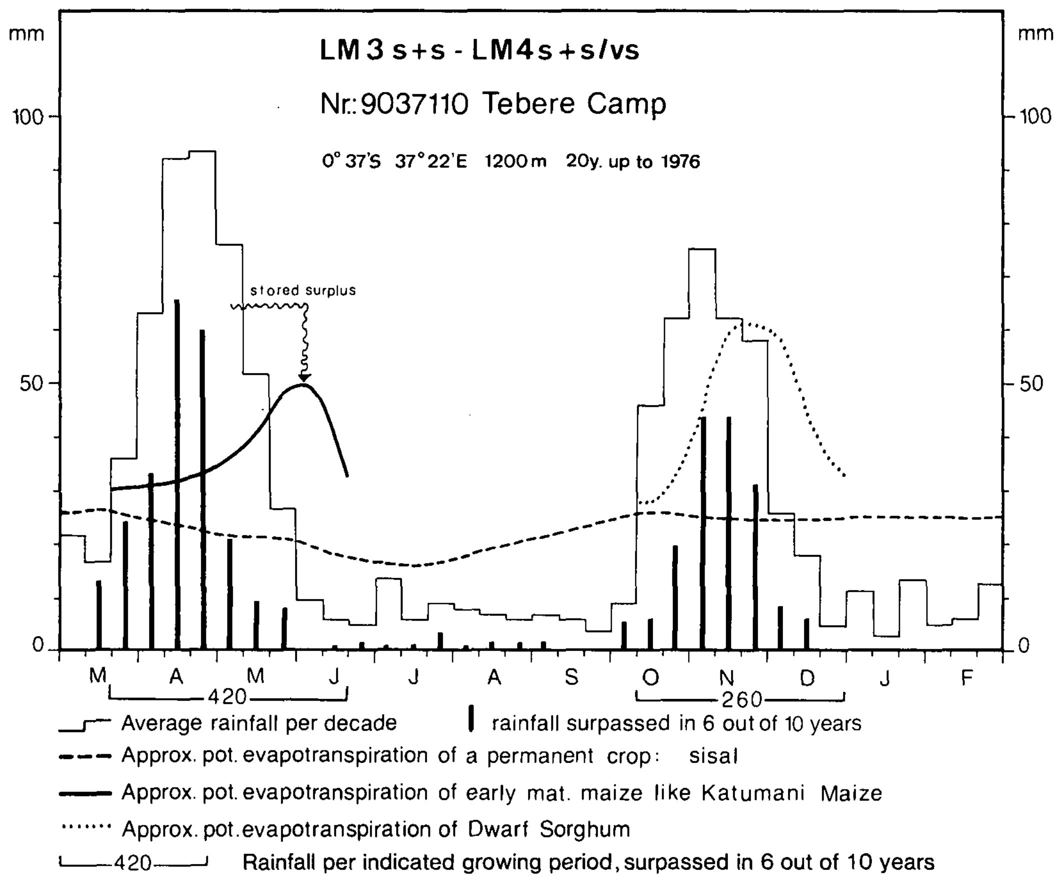
Very good yield potential
2nd rains, start norm. mid Oct.: E. mat. proso millet like Serere I

Good yield potential
1st rains, start norm. end of March: Katumani maize, ratoon of e. mat. sorghum like 2 KX 17, e. mat. bulrush millet (awned var.), e. mat. foxtail and proso millet; e. mat. beans, cowpeas, chick peas (on h. black soils), green grams; e. mat. sunflower like Issanka
2nd rains: E. mat. sorghum like 2 KX 17, e. mat. bulrush millet; green grams, cowpeas, pigeon peas (O.–S.); cotton bimodal var. on good, well drained heavy soils (b. of O.–Aug., ~ 60 %), dwarf sunflower
Whole year, best planting time end of Oct.: Sisal, castor

Fair yield potential
1st rains: M. mat. maize H 511; dolichos beans, groundnuts in light soils, e. mat. soya beans; sweet potatoes; Virginia tobacco; tomatoes, onions
2nd rains: Dryland comp. maize (50–60 %), Katumani maize; dolichos beans, mwezi moja beans; cotton bimodal var. on med. soils, sunflower Issanka
Whole year: Cassava, pineapples, mangoes, Macadamia nuts

Poor yield potential
2nd rains: Virg. tobacco (better with seedbed irrigation); e. mat. sweet potatoes
Whole year: Citrus

Pasture and forage
0.9–1.5 ha/LU on high grass savanna with zebra grass (Hyparrhenia rufa) predominant, down to 0.28 ha/LU feeding Bana grass a.o. forage



8) On medium soils; on heavy soils first cropping season has a short to medium length. Given potential refers to predominating heavy soils

LM 4 = Marginal Cotton Zone

LM 4 = Marginal Cotton Zone
s + s/vs with a short and a short to very short cropping season

Potential almost as LM 3 s + s but cotton marginal (except on very suitable soils) and stocking rates a little bit lower

LM 4 = Marginal Cotton Zone
s/vs + vs/s with a short to very short and a very short to short cropping season[9]

Good yield potential
1st rains, start norm. end of March: Dryland comp. maize (~ 60%), v. e. mat. sorghum like IS 8595, e. mat bulrush millet, e. mat. proso millet like Serere I, e. mat. foxtail millet like I Se 285; cowpeas; v. e. mat. dwarf sunflower
2nd rains, start norm. end of Oct.: E. mat. proso and foxtail millet; moth beans
Whole year: Buffalo gourds (on sandy soils), Marama beans (Tylosema esculentum) [10], castor; rice on irrigated heavy black soils

Fair yield potential
1st rains: Katumani maize; mwezi moja beans, chick peas (late planted on h. bl. soils), black and green grams (50–60 %), e. mat. soya beans, dolichos beans, v. e. mat. bambarra groundnuts (in light soils); sweet potatoes
2nd rains: V. e. mat. sorghum (50–60 %), e. mat. bulrush millet, Dryl. comp. maize on h. soils (40–50 %); dwarf sunflower, pigeon peas (O.–S.)
Whole year: Sisal (50–60 %), cassava

Poor yield potential (marginal)
2nd rains: Cotton bimodal var. (e. of S./O.–Aug.); Dryland comp. maize (nearly 40 % on m. soils, 30–40 % on light soils); sweet potatoes
Whole year: Macadamia nuts

Pasture and forage
1.2–3 ha/LU on mixed medium grass savanna with red oats grass (Themeda triandra) predominant; if degraded well improvable by saltbush (Atriplex nummularia) and horse tamarind (Leucaena leucocephala) as palatable shrubs; additional forage: fodder legumes like moth bean vines

LM 5 = Lower Midland Livestock-Millet Zone

LM 5 = Lower Midland Livestock-Millet Zone
s/vs + vs/s with a short to very short and a very short to short cropping season

Small transitional strip. Crop potential almost as LM 4 s/vs + vs/s but Dryland comp. maize 1st rains only fair; 2–3 ha/LU

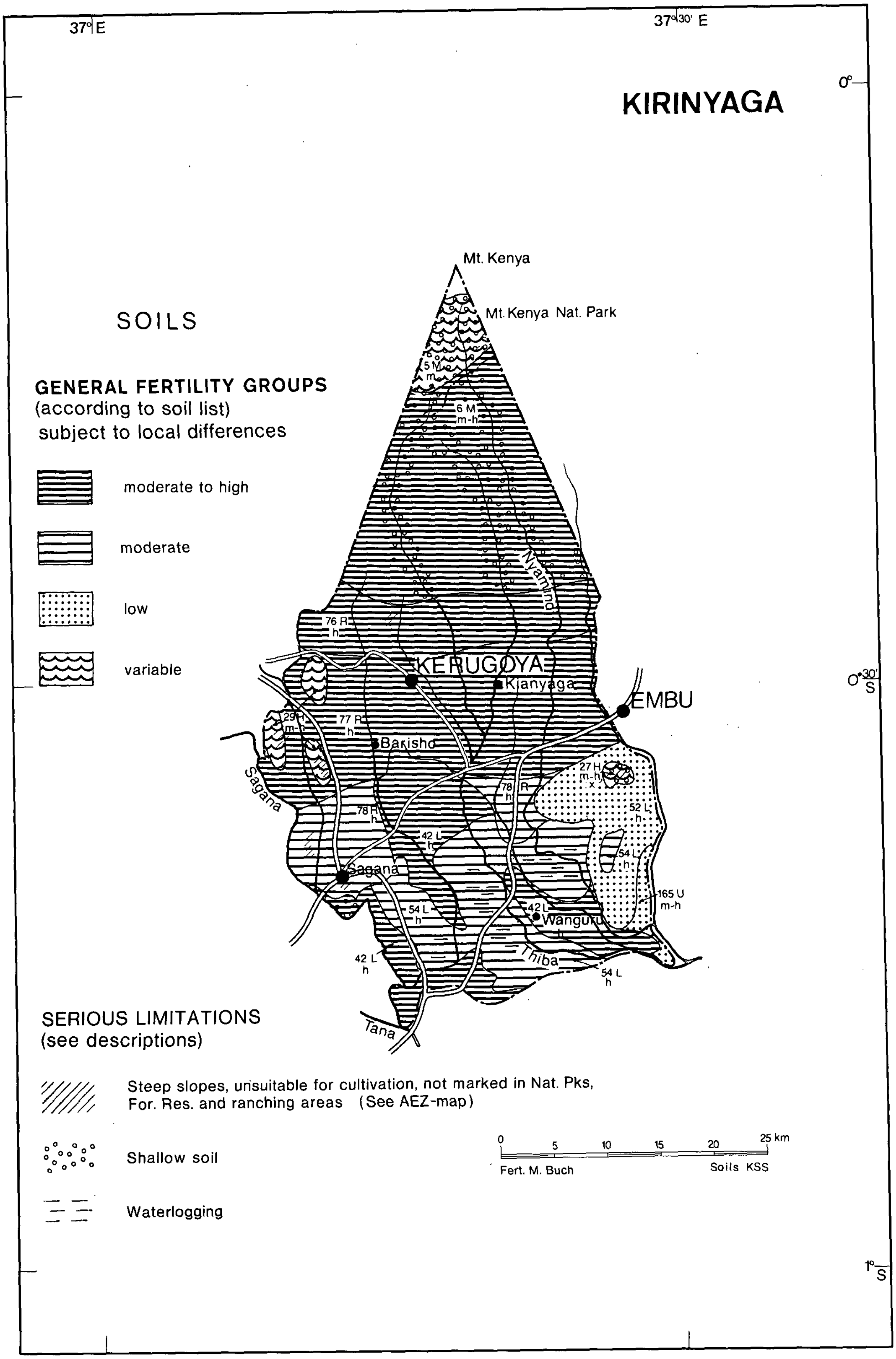
9) On medium soils; on heavy soils first cropping season has a short length, second a short to very short one. Potential refers to predominating heavy soils; black ones should be well drained for most crops
10) Still experimental

SOIL DISTRIBUTION, FERTILITY AND MAJOR CHARACTERISTICS

Mt. Kenya, situated in the northern part of the district, is the highest elevation in the area. Southwards, mountain foothills, plateaus and high-level structural plains are the predominant landforms. The area consists mainly of the volcanic bedrock of Mt. Kenya, with some small areas southwest of Kerugoya, south of Embu and in the utmost southeastern part of the district consisting of rocks of the varying Basement System. Mountain soils occur in broad zones from west to east, changing from a medium texture (m) in the highest parts, over a medium to heavy texture (m–h) in the middle, to a heavy texture (h) in the lower parts. Soils in the southern part of the district occur in varied patches and show mainly a heavy texture (h).

On the higher parts of Mt. Kenya, mountain soils (5 M, 6 M) of moderate fertility are found. On the volcanic foothills, soil units 76 R, 77 R and 78 R occur. They all have a moderately high to high natural fertility. Hill soils of low natural fertility, like unit 27 H and 29 H, are found on "Inselbergs". Here, the volcanic bedrock gives way to rocks of the Basement System consisting predominantly of gneisses.

The soil unit 52 L of low fertility and the soil units 42 L and 54 L of moderate fertility occupy the lower plateaus of Mt. Kenya. On the uplands, soils of low fertility (unit 165 U) occur.



37° E
37°30' E
0°
KIRINYAGA
0°30' S
1° S
SOILS
GENERAL FERTILITY GROUPS
(according to soil list)
subject to local differences
moderate to high
moderate
low
variable
SERIOUS LIMITATIONS
(see descriptions)
Steep slopes, unsuitable for cultivation, not marked in Nat. Pks, For. Res. and ranching areas (See AEZ-map)
Shallow soil
Waterlogging
Mt. Kenya
Mt. Kenya Nat. Park
5 M m
6 M m-h
Nyamindi
76 R h
KERUGOYA
Kianyaga
EMBU
29 H m-h
77 R h
Baricho
Sagana
27 H m-h x
78 R h
52 L h
42 L h
54 L h
165 U m-h
Wanguru
Thiba
Tana
0 5 10 15 20 25 km
Fert. M. Buch
Soils KSS

SOILS ON MOUNTAINS

Soils developed on olivine basalts and ashes of Mt. Kenya

5 M m[1]	= imperfectly drained, shallow to moderately deep, dark greyish brown, very friable, acid humic to peaty, loam to clay loam, with rock outcrops and ice in the highest parts (dystric HISTOSOLS, lithic phase; with LITHOSOLS, Rock Outcrops and ice).
6 M m–h	= well drained, very deep, dark reddish brown to dark brown, very friable and smeary, clay loam to clay, with thick, acid humic topsoil; in places shallow to moderately deep and rocky (humic ANDOSOLS, partly lithic phase)

SOILS ON HILLS

Soils developed on undifferentiated Basement System rocks, predominantly gneisses

27 H m–h, x	= complex of excessively drained to well drained, shallow, dark red to brown, friable, sandy clay loam to clay; in many places rocky, bouldery and stony and in places with acid humic topsoil (dystric REGOSOLS; with LITHOSOLS, humic CAMBISOLS lithic phase and Rock Outcrops)
29 H m–h	= somewhat excessively drained, predominantly moderately deep, red, very friable, sandy clay loam to sandy clay; in places rocky (ferralic CAMBISOLS; with rhodic or orthic FERRALSOLS and Rock Outcrops)

SOILS ON PLATEAUS AND HIGH LEVEL STRUCTURAL PLAINS

Soils developed on Tertiary basic igneous rocks (olivine basalts, nepheline phonolites; older, basic tuffs included)

42 L h	= well drained, very deep, dark reddish brown to dark brown, friable to firm, slightly cracking clay; in places with humic topsoil (verto-eutric NITOSOLS; with mollic NITOSOLS)
52 L h	= well drained, very deep, dark red, very friable clay (nito-rhodic FERRALSOLS)
54 L h	= imperfectly drained, very deep, dark grey to black, firm to very firm, bouldery and stony, cracking clay; in places with calcareous, slightly saline deeper subsoil (pellic VERTISOLS, stony phase and partly saline phase)

SOILS ON VOLCANIC FOOTRIDGES

Soils developed on Tertiary basic igneous rocks (basalts, nepheline phonolites; basic tuffs included)

76 R h	= well drained, extremely deep, dark reddish brown to dark brown, friable and slightly smeary clay, with acid humic topsoil (ando-humic NITSOLS; with humic ANDOSOLS)
77 R h	= well drained, extremely deep, dusky red to dark reddish brown, friable clay, with acid humic topsoil (humic NITOSOLS)
78 R h	= well drained, extremely deep, dusky red to dark reddish brown, friable clay; with inclusions of well drained, moderately deep, dark red to dark reddish brown, friable clay over rock, pisoferric or petroferric material (eutric NITOSOLS; with nito-chromic CAMBISOLS and chromic ACRISOLS, partly pisoferric or petroferric phase)

SOILS ON LOWER MIDDLE-LEVEL UPLANDS

Soils developed on undifferentiated Basement System rocks

165 U m–h	= well drained, moderately deep to deep, dark red to yellowish red, friable, sandy clay loam to clay (rhodic and orthic FERRALSOLS; with ferralo-chromic/orthic/ferric ACRISOLS)

[1] Soil texture-classes

h = heavy
l = light
m = medium
x = stony or bouldery
v = varying texture
m–h = medium to heavy
m, h = medium and heavy (e.g. abruptly underlaying a topsoil of different texture)

Soil description from Kenya Soil Survey:
Exploratory Soil Map and Agro-climatic Zone Map of Kenya, scale 1:1 000 000. Expl. Soil Survey Rep. E1, Nairobi 1982. See this map also for colours; symbols simplified here.

POPULATION AND LAND

According to statistics, Kirinyaga District is one of the most densely populated districts in Kenya (202 people per sq km, Table 4). Of a total rural area of 112,700 ha (Table 6), 95,500 ha (84.7 %) are used as agricultural land by a population of 291,431 people. As only a relatively small percentage of the population (2.8 %, 8,167 people) lives in the two small townships and two trading centres of this administrative area, it was already clear in 1979 (the year of the last population census) that land is at a premium here. Per average household of 5.39 people (Table 5), not more than 1.86 ha agricultural land were available, 0.34 ha per person (Table 6). This would still be enough to make a living where cash crops such as coffee or tea are cultivated, but in those areas, the farm sizes are even smaller, e.g. Gichugu division (1.04 ha per household, 0.20 ha per person) and Inoi location (0.99 ha per household, 0.18 ha per person). This is marginal, although agro-ecological conditions are quite good here.

The land situation is more promising in Mwea division, but only for the irrigation scheme in Tebere location where rice is grown (2.56 ha per household). In Muthiti location, however, conditions are more difficult because here LM 4 (Marginal Cotton Zone, 117 ha out of a total of 163 ha) is predominant and 3.59 ha per household are marginal for a small farm.

In future, it will only be possible to cope with the population growth if both intensification of, and innovations in agriculture (e.g. cultivation of new, more suitable varieties of crops) can be successfully introduced to the local farmers.

KIRINYAGA DISTRICT

TABLE 4: **POPULATION PER LOCATION AND DIVISION**
CENSUS 1979

Location/Division	Male	Female	Total	Number of households	Square kilometers	Density
Tebere	19 890	18 389	38 279	5 740	175	217
Murinduko	10 141	10 462	20 603	3 626	218	94
Mutithi	11 031	11 141	22 172	4 540	187	118
Mwea Division	41 062	39 992	81 054	13 906	581	139
Mutira	13 083	14 410	27 493	5 177	64	428
Kiine	15 351	16 469	31 820	6 913	114	277
Inoi	17 684	19 145	36 829	6 665	74	494
Mwerua	11 485	12 757	24 242	4 156	82	294
Ndia Division	57 603	62 781	120 384	22 911	335	358
Ngariama	15 673	16 048	31 721	5 962	87	363
Kabare	13 626	14 236	27 862	5 432	58	475
Baragwi	15 022	15 388	30 410	5 518	68	446
Gichugu Division	44 321	45 672	89 993	16 912	214	420
Kirinyaga District	142 986	148 445	291 431	53 729	1 437	202

KIRINYAGA DISTRICT

TABLE 5: **COMPOSITION OF HOUSEHOLDS PER LOCATION AND DIVISION**[a)]

LOCATION/DIVISION	No. of Households total	Farmers Family b)			Non-Relatives	Persons per Households total b)
		Adults >15 years	Children <15 years	Other Relatives		
Location:						
Tebere	5722	3.42	1.69	0.70	0.76	6.58
Murinduko	3624	3.17	1.62	0.56	0.27	5.61
Mutithi	4528	2.83	1.21	0.52	0.30	4.85
Division: Mwea	13874	3.19	1.49	0.61	0.49	5.76
Location:						
Mutira	5203	3.04	1.47	0,56	0.21	5.28
Kiine	6905	2.70	1.20	0.44	0.24	4.58
Inoi	6658	3.23	1.63	0.43	0.23	5.52
Mwerua	4138	3.16	1.59	0.79	0.32	5.85
Division: Ndia	22904	3.02	1.45	0.53	0.24	5.24
Location:						
Ngariama	5927	3.10	1.39	0.40	0.38	5.27
Kabare	5429	3.08	1.46	0.37	0.23	5.13
Baragwi	5548	3.24	1.57	0.40	0.25	5.45
Division: Gichugu	16904	3.15	1.46	0.39	0.29	5.28
DISTRICT: KIRINYAGA	53682	3.11	1.45	0.51	0.32	5.39

a) Source: Central Bureau of Statistics (CBS)

b) Average figures, includes one and two persons per household as well

KIRINYAGA DISTRICT

TABLE 6: **AEZ-LAND AREA AVAILABLE PER LOCATION, DIVISION AND PER HOUSEHOLD AND PERSON**[1)]

	in '00 ha = sqkm					in '00 ha = sqkm									in ha	
	Area	Non-agricultural land			Agri-	Area in agro-ecological zones									Agric. land	
Location/Division without townships	total Census 79	Unsuit. steep slopes	Forest Res., lakes, swamps	Others (roads, homesteads, rivers...)	cultural land	AEZ									per	
						LH 1	UM 1	UM 2	UM 3	UM 4	LM 3	LM 4	LM 4 – LM 5	LM 5	household	person
Tebere	175			28	147							146[2)]	1		2.56	0.38
Murinduko	218		F. 2	22	194				4	38	83	69			5.35	0.94
Mutithi	187			24	163					4	34	117	8		3.59	0.74
Mwea Division	580		2	74	504				4	42	117	332	9		3.83	0.69
Mutira	64			12	52	6	13	16	9	7	1				1.00	0.19
Kiine	114	3		21	90		6	17	30	6	25	6			1.30	0.28
Inoi	74	1		7	66	4	26	23	12	1					0.99	0.18
Mwerua	82			15	67		10	16	19	7	15				1.61	0.28
Ndia Division	334	4		55	275	10	55	72	70	21	41	6			1.23	0.23
Ngariama	87			17	70	5	29	21	15						1.17	0.22
Kabare	58			6	52	11	17	14	10						0.96	0.19
Baragwi	68			14	54	12	23	16	3						0.98	0.18
Gichugu Division	213			37	176	28	69	51	28						1.04	0.20
Total rural area	1 127	4	2	166	955	38	124	123	102	63	158	338	9		1.86	0.34

1) For official land statistics see supplementary publication to FM-Handbook, Vol. III A: Agriculture Land Statistics

2) Partly covered by the Mwea-Tebere Irrigation Scheme (rice)

AGRICULTURAL STATISTICS[1)]

The Kirinyaga district is the smallest in terms of land area in Kenya. The major cash crops are tea and coffee, but cotton is of importance for the farmers in AEZ LM 3, 4, while rice is grown under irrigation in AEZ LM 4. About 2,300 ha of **tea** is cultivated by small family farms, yielding between 4,000 and 6,000 kg of green leaves per ha, probably the highest tea yield in the smallholder sector. **Coffee** is produced on 5,600 ha producing roughly 800 kg of clean coffee per ha. The average tea farmer owns 0.35 ha of tea, while coffee producers have 0.25 ha under that crop. The ginnery at Mwea ginned about 2,000 t of **seed cotton** of which only a small portion is grown in the district.

1) *For more detailed and up to date information, see FMHB Vol. III/A*

KIRINYAGA DISTRICT

TABLE 7a: **TEA**
AREA – PRODUCTION – GROWERS – YIELDS – RETURNS[a)]

Small Farmers

Division	Item	Unit	Year				
			1975/76	1976/77	1977/78	1978/79	1979/80
Gichugu	Area	ha	996	1,179	1,212	1,237	1,282
	Production	t	3,337	5,170	5,590	1,200	5,440
	Value	'000 Shs	5,373	17,941	15,763	17,855	14,960
	Growers	No	3,134	3,194	3,254	3,334	3,405
	Yield per ha	kg	3,350	4,385	4,612	970	4,243
	Value per ha	Shs	5,395	15,217	13,006	14,434	11,669
	Area per Grower	ha	0.32	0.37	0.37	0.37	0.38
	Returns per Grower	Shs	1,714	5,617	4,844	5,355	4,394
Ndia	Area	ha	1,454	1,531	1,570	1,621	1,686
	Production	t	5,354	9,044	9,976	12,282	9,453
	Value	'000 Shs	8,619	31,147	25,540	30,091	29,806
	Growers	No	3,958	4,161	4,364	4,361	4,531
	Yield per ha	kg	3,682	5,907	6,354	7,577	5,607
	Value per ha	Shs	5,928	20,344	16,267	18,563	17,679
	Area per Grower	ha	0.39	0.37	0.36	0.37	0.37
	Returns per Grower	Shs	2,178	7,485	5,852	6,900	6,578

a) Source: K.T.D.A.

KIRINYAGA DISTRICT

TABLE 7b: **COFFEE**
AREA – PRODUCTION – YIELDS[a)]

Co-operatives

Item	Unit	Year					
		74/75	75/76	76/77	77/78	78/79	79/80
Area	ha	5616	5616	5616	5616	5100	5616
Production	t	3464	4151	4465	4843	3580	4490
Yield	kg/ha	617	739	795	862	702	799

Estates - Nil

TABLE 7c: **COTTON PRODUCTION**[b)]

Ginnery Zone	Year				
	75/76	76/77	77/78	78/79	79/80
Mwea					
Seed Cotton in t	858	2375	3535	3448	1847
Bales	1507	4167	6203	6050	3241

Sources: a) C.B.K.
b) C.L. & S.M.B., does not refer to district area only

SMALL FARM SURVEY (SFS)[1]

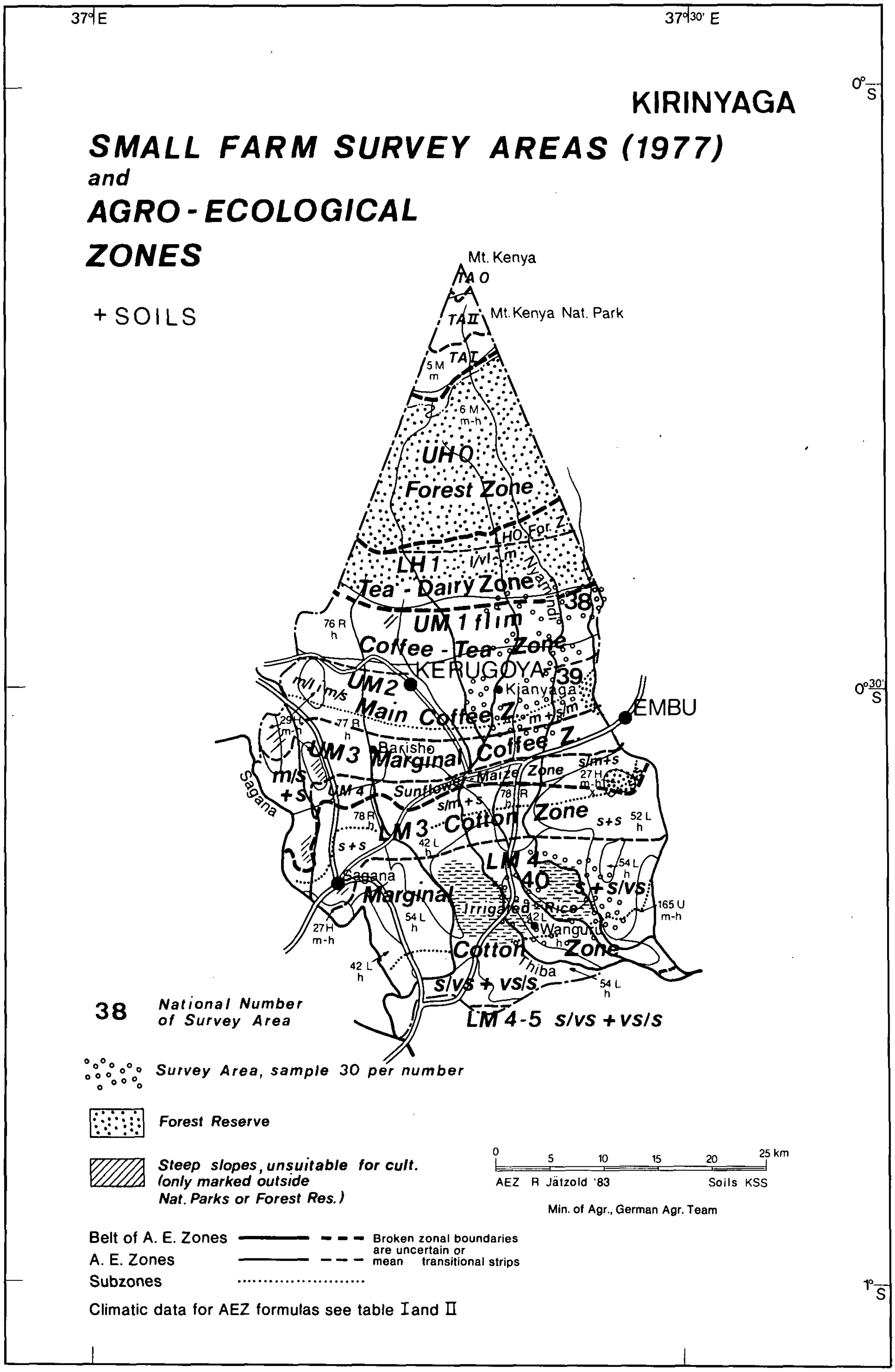
The natural conditions are very suitable for small-scale farming in the Lower Highlands and Upper Midlands which cover roughly two-thirds of the district's agricultural area. The conditions are similar to those of the three other agricultural districts of the Central Province, but the natural soil fertility is still higher. The potential of the Lower Midlands is much lower, in particular as the workability of the soils is often seriously hampered (black cotton soils).

The SFS was executed in the Gatugura (AEZ LH 1 + UM 1), the Kiangaga (AEZ UM 1–2–3), and the Thiba-Kirika (AEZ LM 4) regions. The farm organigsations of the UM farms are very similar. The farms were 2.4 and 2.8 ha in size,[2] roughly one-third of the farm land was used for annual crops, one-third for perennial crops, and one-third for pasture, and 5 % was planted with forage. Roughly 1.6 crops were planted p.a. and 4 LU were kept per ha. Fertilizer use is widely practised and so is plant protection. The farms in the LM 4 region are 6 ha in size[2] and use half of the land for annual crops, while the other part of the farms is used for pasture, forage and/or left fallow. Fertilizer use is not very economic under these adverse conditions and therefore very little is used (Table 8 & 9). Maize is the most important crop but the amount of beans planted during the second rains is high. The cotton area of LM 4 does not reflect the district average because the farmers included in the sample are all members of the cotton co-operative (Table 10). Between 12 % and 25 % of the grazing livestock units are sheep and goats, and between 12 % and 30 % of the cattle are male (Table 11). The maize yields recorded are surprisingly low in all three regions, but the bean yields are good when considering that farmers use neither fertilizer nor plant protective agents (Table 12). Most of the food crops produced are consumed on the farms (65–80 %) and it is a safe assumption that the district is a net food 'importer' (Table 13). Labour peaks do not pose a problem to the farmers of the Lower Highlands and Upper Midlands, but exist in the Lower Midlands. In LM 3 and LM 4, planting a few days late results in a reduction of the already short vegetation periods and thus in noticeable yield reductions, but field preparation of annual crops is still spread over 2–3 months (graph 14). The good to very good yield potential of AEZ LH 1 and UM 1–3 is indicated in table 15; the very limited potential of AEZ LM 3–4 can be seen from the same set of tables.

There are two regions of distinctive production potential, and consequently two types of farm organisation, in the district. Increased food output per area unit and increased biomass production through the use of N-fertilizer are the most important measures to be implemented in AEZ LH and UM. Manual work will continue to be the basis for good incomes in the future. In the LM 3–4 region, much bigger areas have to be cultivated in oder to harvest similar amounts, and timely field preparation and planting are preconditions for secure and economic yields. Here, improvements in harnesses, animal draught field preparation equipment and extension advice in production techniques of annual crops are most important.

1) For more detailed and up to date information, see FMHB Vol. III/B

2) For holding sizes, see also table 6


KIRINYAGA
SMALL FARM SURVEY AREAS (1977)
and
AGRO-ECOLOGICAL
ZONES
+ SOILS
37° E
37° 30' E
0° S
0° 30' S
1° S
Mt. Kenya
TA O
TA II
Mt. Kenya Nat. Park
TA I
UH 0
Forest Zone
LH 0 For. Z.
LH 1
Tea - Dairy Zone
UM 1
Coffee - Tea Zone
KERUGOYA
Kianyaga
UM 2
Main Coffee Z.
UM 3
Marginal Coffee Z.
UM 4
Sunflower - Maize Zone
LM 3 Cotton Zone
LM 4
Marginal
Irrigated Rice
Cotton Zone
LM 4-5 s/vs + vs/s
EMBU
Sagana
Wanguru
Thiba
Barisho
38
39
40
38 National Number of Survey Area
Survey Area, sample 30 per number
Forest Reserve
Steep slopes, unsuitable for cult. (only marked outside Nat. Parks or Forest Res.)
0 5 10 15 20 25 km
AEZ R. Jätzold '83
Soils KSS
Min. of Agr., German Agr. Team
Belt of A. E. Zones
A. E. Zones
Subzones
Broken zonal boundaries are uncertain or mean transitional strips
Climatic data for AEZ formulas see table I and II

KIRINYAGA DISTRICT

AEZ: LH 1 + UM 1

TABLE 8a: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 38

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group small	medium	large
Farm Size Total	ha	o.8	2.2	3.6
Land Use: Annual Crops[1] First Season				
Maize	ha	o.1	o.6	o.9
Maize & Beans	ha	o.2	o.1	o.1
	ha			
	ha			
	ha			
Total	ha	o.3	o.7	1.o
Second Season[1]				
Beans	ha	o.2	o.6	o.7
English Potatoes	ha	o.1	-	o.1
Maize & Beans	ha	-	o.1	o.1
Total	ha	o.3	o.7	o.9
Permanent Crops[1]				
Coffee	ha	o.2	o.2	o.7
Tea	ha	-	o.4	o.4
	ha			
	ha			
Portion of total	%	25 %	27 %	31 %
Grazing & Forage	ha	o.2	o.5	o.7
portion of total	%	25 %	23 %	19 %
Other Land Use	ha	o.1	o.4	o.8
Livestock on Farm:				
Cattle: local	LU	o.3	o.4	o.5
improved	LU	o.9	1.1	1.9
Sheep & Goats	LU	o.2	o.4	o.3
Total	LU	1.4	1.9	2.7

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group small	medium	large
Farming Intensity:				
Cropping Intensity	-	1.o	o.9	o.8
Portion of improved cattle kept	%	75 %	73 %	79 %
Portion of Farmers owning a Plough	%	-	-	-
Labour on Farm:				
Family Adults	persons	1.7	2.3	2.1
Perm. Hired Labour	"	-	o.1	o.4
Children > 14 years	"	o.2	1.3	2.7
Persons living on Farm[2] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.o7	o.34	2.41
Children < 14 years	"	3.77	-	3.77
Subsistence Units	SU	4.33	o.34	4.67
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1o61	2o52	
Beans	kg	333	635	
English Potatoes	kg	195	76	
Cabbage	kg	3o	4	
Cooking Bananas	kg	37	18	
	kg			
	kg			
	kg			

Other Crops cultivated: Cabbage, Tomatoes, Bananas, Passion Fruit, Tobacco, Sugarcane

1) Major crops only considered

2) Based on 1979 Census figures

TABLE 8b: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	1.2	2.9	9.1
Land Use: Annual Crops 1) First Season				
Maize	ha	o.1	o.2	3.o
Maize & Beans	ha	o.5	1.o	o.4
Cotton	ha	o.1	-	1.o
English Potatoes	ha	-	o.1	o.1
Others	ha	-	-	o.5
Total	ha	o.7	1.3	5.o
Second Season 1)				
Maize & Beans	ha	o.2	o.5	-
Beans	ha	o.2	o.4	o.5
Maize	ha	o.1	-	3.o
English Potatoes	ha	-	o.1	-
Total	ha	o.5	1.o	3.5
Permanent Crops 1)				
Coffee	ha	o.2	o.6	o.1
Tea	ha	-	o.2	-
Bananas	ha	-	-	-
	ha			
Portion of total	%	17 %	28 %	1 %
Grazing & Forage	ha	o.1	o.5	2.3
portion of total	%	8 %	17 %	25 %
Other Land Use	ha	o.2	o.4	1.7
Livestock on Farm:				
Cattle: local	LU	1.9	o.8	1.2
improved	LU	1.1	2.4	2.7
Sheep & Goats	LU	o.6	1.3	o.1
Total	LU	3.6	4.5	4.o

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	1.2	1.1	1.o
Portion of improved cattle kept	%	37 %	75 %	69 %
Portion of Farmers owning a Plough	%	4o %	2o %	5o %
Labour on Farm:				
Family Adults	persons	2.2	2.6	1.5
Perm. Hired Labour	"	o.5	o.1	o.5
Children > 14 years	"	6.1	3.6	2.o
Persons living on Farm 2) -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.o2	o.4	2.42
Children < 14 years	"	3.82	-	3.82
Subsistence Units	SU	4.31	o.4	4.71
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1o22	1977	
Beans	kg	265	5o6	
English Potatoes	kg	269	1o6	
Cooking Bananas	kg	2o	9.5	
	kg			
	kg			
	kg			
	kg			

Other Crops cultivated: Tobacco, Cabbage, Tomatoes, Arrowroots, Passion Fruit, Sugarcane

1) Major crops only considered

2) Based on 1979 Census figures

KIRINYAGA DISTRICT
AEZ: LM 4

TABLE 8c: FARM ORGANISATION ACCORDING TO FARM SIZE GROUP

Survey Area 40

Item	Unit	Farm Size & Land Use Livestock on Farm Farm Size Group		
		small	medium	large
Farm Size Total	ha	1.8	4.1	12.3
Land Use: Annual Crops[1]				
First Season			o.1	
Maize & Beans	ha	o.6	1.4	1.8
Maize	ha	o.1	o.2	1.7
Beans	ha	o.1	-	o.7
Cotton	ha	o.5	o.9	1.2
Others	ha	-	o.4	1.o
Total	ha	1.3	3.o	6.4
Second Season[1]				
Maize & Beans	ha	o.7	1.2	1.o
Maize	ha	o.1	o.3	1.4
Beans	ha	o.1	o.2	o.4
Others	ha	-	o.3	o.5
Total	ha	o.9	2.o	3.3
Permanent Crops[1]				
Coffee	ha	o.1	o.3	-
	ha			
	ha			
	ha			
Portion of total	%	6 %	7 %	
Grazing & Forage	ha	o.2	o.6	4.4
portion of total	%	11 %	15 %	4 %
Other Land Use	ha	o.2	o.2	1.5
Livestock on Farm:				
Cattle: local	LU	1.7	2.5	5.o
improved	LU	o.2	1.o	5.5
Sheep & Goats	LU	o.3	o.7	1.o
Total	LU	2.2	4.2	11.5

Item	Unit	Intensity, Labour/Persons on Farm Home Consumption Farm Size Group		
		small	medium	large
Farming Intensity:				
Cropping Intensity	-	1.3	1.3	o.8
Portion of improved cattle kept	%	11 %	29 %	52 %
Portion of Farmers owning a Plough	%	4o %	5o %	12o %
Labour on Farm:				
Family Adults	persons	1.9	2.1	3.o
Perm. Hired Labour	"	o.1	o.1	1.1
Children > 14 years	"	o.3	3.3	3.1
Persons living on Farm[2] -average household size-		Farmer's Family	Non-related Persons	Total
Adults > 14 years	persons	2.29	o.23	2.52
Children < 14 years	"	3.23	-	3.23
Subsistence Units	SU	4.22	o.23	4.45
Home Consumption of Major Food produced on Farm		kg/year household	cal. person day	
Maize	kg	1o26	1984	
Beans	kg	212	4o4	
English Potatoes	kg	25	1o	
Sweet Potatoes	kg	27	18	
Sorghum	kg	6	11	
	kg			
	kg			
	kg			

Other Crops cultivated: English Potatoes, Sweet Potatoes, Macadamia, Sorghum, Bananas, Sugarcane

1) Major crops only considered
2) Based on 1979 Census figures

KIRINYAGA DISTRICT

TABLE 9a: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: LH 1 + UM 1

Survey Area 38

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	2.4	5.7	0.8	2.1	0.2	1.5
Avg. 1	2.4	6.5	1.9	2.3	1.0	2.4
Up. Qu.	2.8	8.0	1.0	2.0	-	3.0
Lo. Qu.	1.6	3.0	-	2.0	-	-

Land Use

Range	Annual Crops ha	%	Perm. Crops ha	%	Pasture ha	%	Forage ha	%	Fallow ha	%	Other Use ha	%
Avg. 0	0.8	35	0.7	31	0.4	19	0.1	4	0.1	4	0.2	8
Avg. 1	0.8	26	0.7	24	0.5	17	0.3	9	0.5	17	0.2	6
Up. Qu.	1.2	48	1.0	41	0.7	25	0.1	5	-	-	0.2	9
Lo. Qu.	0.4	21	0.2	20	0.2	8	-	-	-	-	-	4
Total	23.4		21.0		12.7		2.5		2.5		5.2	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.7	0.9	4.0	64.8
Avg. 1			3.9	77.7
Up. Qu.	2.0	1.2	5.4	88.7
Lo. Qu.	1.9	0.4	2.1	-

Input Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	55.2	6.5	15.1	7.8	0.4	-	0.4	-	-	1.8	0.3	0.1	4.5
Avg. 1	55.2	8.4	15.1	8.6	2.3	-	2.2	0.1	0.3	2.1	0.5	0.8	4.8
Up. Qu.	100.0	10.0	21.7	11.5	-	-	-	-	-	2.8	0.6	-	7.5
Lo. Qu.	-	3.6	8.1	4.2	-	-	-	-	-	0.4	-	-	1.3

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

KIRINYAGA DISTRICT

TABLE 9b: ASSETS, LAND USE, FARMING INTENSITY, INPUTS

AEZ: UM 1–2–3

Survey Area 39

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	2.8	14.6	1.7	2.4	0.2	4.3
Avg. 1	2.8	15.1	2.2	2.4	1.4	5.9
Up. Qu.	3.3	15.0	3.0	3.0	-	4.0
Lo. Qu.	1.6	5.0	1.0	2.0	-	-

Land Use

Range	Annual Crops		Perm. Crops		Pasture		Forage		Fallow		Other Use	
	ha	%	ha	%	ha	%	ha	%	ha	%	ha	%
Avg. 0	1.4	52	0.5	21	0.4	14	0.1	4	0.1	3	0.2	6
Avg. 1	1.4	38	0.7	18	0.7	18	0.3	8	0.4	12	0.2	5
Up. Qu.	1.5	67	0.8	33	0.4	24	0.1	5	-	-	0.1	8
Lo. Qu.	0.8	38	0.2	9	-	-	-	-	-	-	-	2
Total	41.6		16.5		11.4		3.4		2.7		4.8	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.6	1.4	8.1	45.8
Avg. 1			3.9	65.0
Up. Qu.	2.0	2.0	10.0	83.3
Lo. Qu.	1.4	0.7	-	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P2O5		K2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	43.3	8.4	11.1	10.1	2.8	-	0.4	-	-	2.2	0.9	0.4	2.4
Avg. 1	46.6	15.4	17.7	19.4	18.3	-	5.1	0.1	0.3	2.6	1.2	3.3	3.4
Up. Qu.	100.0	16.3	19.7	18.5	-	-	-	-	-	4.4	0.9	-	4.2
Lo. Qu.	-	-	-	-	-	-	-	-	-	0.4	0.1	-	0.5

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

KIRINYAGA DISTRICT

TABLE 9c: **ASSETS, LAND USE, FARMING INTENSITY, INPUTS**

AEZ: LM 4

Survey Area 40

Range	Assets			People on Farm		
	Land ha	Livestock head	Equipment pieces	Family Adults	Perm.Hrd. Labourers	Children > 14 No.
Avg. 0	6.2	17.7	1.8	2.3	0.4	2.3
Avg. 1	6.2	19.0	2.2	2.5	1.9	3.7
Up. Qu.	9.6	25.0	3.0	3.0	-	4.0
Lo. Qu.	2.0	5.0	1.0	1.0	-	-

Land Use

Range	Annual Crops ha	Annual Crops %	Perm. Crops ha	Perm. Crops %	Pasture ha	Pasture %	Forage ha	Forage %	Fallow ha	Fallow %	Other Use ha	Other Use %
Avg. 0	3.6	60	0.1	2	1.7	28	0.1	1	0.3	5	0.2	4
Avg. 1	3.6	42	0.6	7	2.4	28	0.3	4	1.3	15	0.4	4
Up. Qu.	4.0	90	-	-	2.2	37	-	-	0.2	3	0.4	6
Lo. Qu.	1.6	43	-	-	-	-	-	-	-	-	-	-
Total	109.0		4.0		50.8		1.8		10.0		6.9	

Farming Intensity

Range	Cropping Intensity crops/yr.	Stocking Rate		Improved Cattle % of total
		Farm Land LU/ha	Pasture & Forage LU/ha	
Avg. 0	1.4	1.0	3.5	37.5
Avg. 1			2.9	50.2
Up. Qu.	1.8	1.4	4.0	47.6
Lo. Qu.	1.4	0.4	-	-

Inputs Applied

Range	Improved Seed Used % of area	Fertilizer Applied pure nutrient kg/ha						Manure Applied t/ha		Plant Protection			
		N		P_2O_5		K_2O				Insecticide kg/ha		Fungicide kg/ha	
	AC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC	AC	PC
Avg. 0	40.9	1.3	0.7	1.5	-	-	-	-	-	3.4	-	-	0.2
Avg. 1	51.2	4.0	17.9	3.6	-	-	-	0.1	0.1	4.1	0.2	0.8	4.4
Up. Qu.	27.3	-	-	2.1	-	-	-	-	-	6.3	-	-	-
Lo. Qu.	-	-	-	-	-	-	-	-	-	1.5	-	-	-

Notes: Avg. 0 = average of all sample farms
Avg. 1 = average of all farms excluding zero entries
Up. Qu./Lo. Qu. = Upper/Lower Quartile, refers to individual farm 50 % of all sample cases lie between these points
AC = Annual Crops
PC = Perennial Crops

KIRINYAGA DISTRICT

TABLE 10a: CROPPING PATTERN

AEZ: LH 1 + UM 1

Survey Area 38

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.6	0.8	1.00	0.00	17.4	77.7
Maize IPC	0.0	0.3	0.00	0.00	0.5	2.3
Beans	0.0	0.1	0.00	0.00	0.1	0.5
Engl. Potatoes	0.0	0.2	0.00	0.00	0.3	1.4
Cabbage	0.0	0.2	0.00	0.00	0.2	0.9
Tomatoes	0.0	0.1	0.00	0.00	0.2	1.1
Tobacco	0.0	0.1	0.00	0.00	0.1	0.4
Sugarcane	0.0	0.2	0.00	0.00	0.2	0.9
Passionfruit	0.0	0.2	0.00	0.00	0.2	0.9
Maize & Beans	0.1	0.4	0.12	0.00	3.1	13.9
Total					22.4	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.0	0.3	0.00	0.00	0.6	2.9
Beans	0.5	0.7	0.80	0.00	15.3	74.2
Beans IPC	0.0	0.1	0.00	0.00	0.1	0.6
Engl. Potatoes	0.0	0.2	0.00	0.00	1.0	5.0
Cabbage	0.0	0.1	0.00	0.00	0.3	1.4
Sugarcane	0.0	0.2	0.00	0.00	0.2	1.0
Passionfruit	0.0	0.2	0.00	0.00	0.2	1.0
Maize & Beans	0.1	0.6	0.00	0.00	2.9	14.0
Total					20.6	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.3	0.00	0.00	0.5	2.4
Coffee	0.4	0.4	0.60	0.20	11.6	53.0
Tea	0.3	0.5	0.68	0.00	9.8	44.6
Total					21.9	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

KIRINYAGA DISTRICT

TABLE 10b: **CROPPING PATTERN**

AEZ: UM 1–2–3

Survey Area 39

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.3	1.1	0.24	0.00	10.2	26.0
Beans	0.0	0.4	0.00	0.00	1.2	3.2
Engl. Potatoes	0.1	0.2	0.12	0.00	1.5	3.9
Cabbage	0.0	0.1	0.00	0.00	0.1	0.2
Tomatoes	0.0	0.1	0.00	0.00	0.1	0.2
Arrow Roots	0.0	0.2	0.00	0.00	0.2	0.5
Cotton	0.1	1.1	0.00	0.00	3.2	8.2
Tobacco	0.0	0.1	0.00	0.00	0.1	0.2
Sugarcane	0.0	0.0	0.00	0.00	0.0	0.1
Passionfruit	0.0	0.1	0.00	0.00	0.1	0.3
Maize & Beans	0.7	1.0	1.20	0.00	22.4	57.3
Total					39.1	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.2	2.2	0.00	0.00	6.6	21.3
Beans	0.3	0.7	0.72	0.00	10.2	32.9
Engl. Potatoes	0.0	0.2	0.08	0.00	1.4	4.5
Sugarcane	0.0	0.0	0.00	0.00	0.0	0.1
Passionfruit	0.0	0.1	0.00	0.00	0.1	0.4
Maize & Beans	0.4	1.1	1.00	0.00	12.6	40.8
Total					30.9	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.2	0.00	0.00	1.2	6.8
Coffee	0.4	0.5	0.60	0.20	13.0	76.9
Tea	0.1	0.9	0.00	0.00	2.8	16.3
Total					17.0	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

KIRINYAGA DISTRICT

TABLE 10c: **CROPPING PATTERN**

AEZ: LM4

Survey Area 40

First Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.6	1.6	0.80	0.00	17.2	17.6
Beans	0.2	0.8	0.40	0.00	6.2	6.3
Engl. Potatoes	0.0	0.1	0.00	0.00	0.2	0.2
Cotton	0.8	1.0	1.20	0.40	24.7	25.3
Sweet Potatoes	0.0	0.1	0.00	0.00	0.1	0.1
Sugarcane	0.0	0.1	0.00	0.00	0.1	0.1
Others	0.3	2.4	0.00	0.00	9.4	9.6
Maize & Beans	1.2	1.7	2.00	0.00	36.6	37.4
Maize & Others	0.1	1.6	0.00	0.00	3.2	3.3
Total					97.8	100.0

Second Rains
Annual & Semipermanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Maize	0.6	2.0	1.20	0.00	17.6	27.8
Sorghum	0.0	0.4	0.00	0.00	0.4	0.6
Beans	0.2	0.8	0.40	0.00	6.8	10.7
Engl. Potatoes	0.0	0.1	0.00	0.00	0.2	0.3
Sugarcane	0.0	0.1	0.00	0.00	0.1	0.2
Others	0.2	2.0	0.00	0.00	6.0	9.5
Maize & Beans	1.0	1.5	2.00	0.00	29.0	45.8
Maize & Others	0.1	1.6	0.00	0.00	3.2	5.1
Total					63.3	100.0

Permanent Crops

Crop	Average 0 ha	Average 1 ha	Upper Quartile ha	Lower Quartile ha	Total Sample Area ha	Total Sample Area %
Cookng Bananas	0.0	0.2	0.00	0.00	0.4	18.2
Coffee	0.1	0.4	0.00	0.00	1.7	76.4
Macademia Nuts	0.0	0.1	0.00	0.00	0.1	5.5
Total					2.2	100.0

Avg 0 = average of all sample farms
Avg 1 = average of all farms excluding zero entries
Up.Qu./Lo. Qu. = Upper/Lower Quartile, 50 % of all sample cases are in between these points
% columns = % of total farm land

TABLE 11a: HERD COMPOSITION (GRAZING LIVESTOCK)

– in Head & Livestock Units –

AEZ: LH 1 + UM 1

Aug. '77, Survey Area 38

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s. Total
Under 1 year, Average	0.13	–	–	0.27				0.10			0.10
Upper Qu.	–	–	–	–				–			–
1 - 2 years, Average	0.17	–	0.10	0.20				0.23			0.23
Upper Qu.	–	–	–	–				–			–
Over 2 years, Average	–	–	0.03		0.97			0.99			0.99
Upper Qu.	–	–	–		2			2.0			2.0
Subtotal(improved) Total	9	–	4	14	29			39.8			39.8
Average	0.30	–	0.13	0.47	0.97			1.33			1.33
Upper Qu.	–	–	–	1	2			2.5			–
Lower Qu.	–	–	–	–	–			–			–
LU Male Cattle =	14.6 % of total cattle,				Calves + Heifers =			48.3 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	–	–	–	0.17		0.60	0.50	0.14	–		0.14
Upper Qu.	–	–	–	–		1	1	0.2	–		0.2
1 - 2 years, Average	–	0.03	–	–				0.01			0.01
Upper Qu.	–	–	–	–				–			–
Over 2 years, Average	–	0.03	0.10		0.43	1.17	0.77	0.56	–	7.97	0.56
Upper Qu.	–	–	–		1	2	1	–	–	5	–
Subtotal (unimp.) Total	–	2	3	5	13	53	38	21.6	–	239	21.6
Average	–	0.07	0.10	0.17	0.43	1.77	1.27	0.72	–	7.97	0.72
Upper Qu.	–	–	–	–	1	3	2	1.1	–	10	1.1
Lower Qu.	–	–	–	–	–	–	–	–	–	5	–
LU Male Cattle =	24.4 % of total cattle,				Calves + Heifers =			38.5 % of dairy cows			
LU Goats + Sheep =	42.1 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	9	2	7	19	42	53	38	61.4	–	239	61.4
Average	0.30	0.07	0.23	0.63	1.40	1.77	1.27	2.05	–	7.97	2.05
Upper Qu.	–	–	–	1	2	3	2	3.6	–	10	1.1
Lower Qu.	–	–	–	–	–	–	–	0.6	–	5	–
LU Male Cattle =	16.9 % of total cattle,				Calves + Heifers =			45.2 % of dairy cows			
LU Goats + Sheep =	14.8 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

KIRINYAGA DISTRICT

TABLE 11b: HERD COMPOSITION (GRAZING LIVESTOCK)

– in Head & Livestock Units –

AEZ: UM 1–2–3

Aug. '77, Survey Area 39

Improved Livestock		Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year,	Average	0.17	0.07	-	0.17				0.10			0.10
	Upper Qu.	-	-	-	-				-			-
1 - 2 years,	Average	0.10	0.03	0.03	0.27				0.22			0.22
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	0.10	0.03	0.17		1.27			1.51			1.51
	Upper Qu.	-	-	-		2			2.0			2.0
Subtotal(improved)	Total	11	4	6	13	38			54.7			54.7
	Average	0.37	0.13	0.20	0.43	1.27			1.82			1.82
	Upper Qu.	1	-	-	1	2			2.5			-
	Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle	=	20.9 % of total cattle,				Calves + Heifers =			34.2 % of dairy cows			
Unimproved Livestock:												
Under 1 year,	Average	0.10	0.03	-	0.20		1.43	3.80	0.59	0.07		0.60
	Upper Qu.	-	-	-	-		2	1	0.3	-		0.3
1 - 2 years,	Average	0.03	-	0.03	0.33				0.18			0.13
	Upper Qu.	-	-	-	-				-			-
Over 2 years,	Average	0.13	-	0.63		0.63	3.20	1.60	1.39	-	11.77	1.39
	Upper Qu.	-	-	-		1	3	3	-	-	4	-
Subtotal (unimp.)	Total	8	1	20	16	19	139	162	64.8	2	353	65.1
	Average	0.27	0.03	0.67	0.53	0.63	4.63	5.40	2.16	0.07	11.77	2.17
	Upper Qu.	-	-	-	1	1	4	5	2.1	-	15	2.1
	Lower Qu.	-	-	-	-	-	-	-	0.3	-	4	0.3
LU Male Cattle	=	48.0 % of total cattle,				Calves + Heifers =			84.2 % of dairy cows			
LU Goats + Sheep	=	46.5 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock	Total	19	5	26	29	57	139	162	119.5	2	353	119.8
	Average	0.63	0.17	0.87	0.97	1.90	4.63	5.40	3.98	0.07	11.77	3.99
	Upper Qu.	1	-	1	1	2	4	5	4.6	-	15	2.1
	Lower Qu.	-	-	-	-	1	-	-	1.1	-	4	0.3
LU Male Cattle	=	31.4 % of total cattle,				Calves + Heifers =			50.9 % of dairy cows			
LU Goats + Sheep	=	25.2 % of total Grazing Livestock Units										

Livestock Unit (LU) key: Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU

Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU

Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

TABLE 11c: **HERD COMPOSITION (GRAZING LIVESTOCK)**

– in Head & Livestock Units –

AEZ: LM 4 — Aug. '77, Survey Area 40

Improved Livestock	Bulls	Steers	Oxen	Heifers	Cows	Sheep	Goats	Grazing LU Total	Pigs	Other L/Stock	L.U.s Total
Under 1 year, Average	0.03	-	-	0.53				0.14			0.14
Upper Qu.	-	-	-	-				-			-
1 - 2 years, Average	0.10	0.03	-	0.57				0.35			0.35
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	0.23	-	0.03		1.57			1.78			1.78
Upper Qu.	-	-	-		1			1.0			1.0
Subtotal(improved) Total	11	1	1	33	47			68.2			68.2
Average	0.37	0.03	0.03	1.10	1.57			2.27			2.27
Upper Qu.	-	-	-	1	1			2.3			-
Lower Qu.	-	-	-	-	-			-			-
LU Male Cattle =	12.7 % of total cattle,				Calves + Heifers =			70.2 % of dairy cows			
Unimproved Livestock:											
Under 1 year, Average	0.37	0.03	-	0.37		0.53	1.53	0.36	1.23		0.54
Upper Qu.	-	-	-	-		1	2	0.3	-		0.3
1 - 2 years, Average	0.20	-	-	0.30				0.23			0.23
Upper Qu.	-	-	-	-				-			-
Over 2 years, Average	0.37	-	1.83		1.97	1.33	3.67	3.21	0.87	18.63	3.34
Upper Qu.	-	-	3		2	3	7	-	-	9	-
Subtotal (unimp.) Total	28	1	55	20	59	56	156	113.8	63	559	123.3
Average	0.93	0.03	1.83	0.67	1.97	1.87	5.20	3.79	2.10	18.63	4.11
Upper Qu.	1	-	3	1	2	3	10	5.3	-	28	5.9
Lower Qu.	-	-	-	-	-	-	-	0.9	-	9	0.9
LU Male Cattle =	51.8 % of total cattle,				Calves + Heifers =			33.9 % of dairy cows			
LU Goats + Sheep =	18.6 % of total Grazing Livestock Units										
Improved + Unimproved Grazing L/Stock Total	39	2	56	53	106	56	156	182.0	63	559	191.4
Average	1.30	0.07	1.87	1.77	3.53	1.87	5.20	6.06	2.10	18.63	6.38
Upper Qu.	1	-	3	1	3	3	10	8.1	-	28	5.9
Lower Qu.	-	-	-	-	-	-	-	1.4	-	9	0.9
LU Male Cattle =	35.2 % of total cattle,				Calves + Heifers =			50.0 % of dairy cows			
LU Goats + Sheep =	11.7 % of total Grazing Livestock Units										

Livestock Unit (LU) key:
- Improved Stock = Under 1 year 0.25 LU, 1–2 yrs 0.5 LU, Over 2 years 0.8 LU, cows 1 LU
- Unimproved Stock = Under 1 year 0.20 LU, 1–2 yrs 0.45 LU, Over 2 years 0.65 LU, cows 0.65 LU
- Goats/Sheep/Pigs = Under 1 year 0.10 LU, Over 1 year 0.15 LU

KIRINYAGA DISTRICT

TABLE 12a: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: LH 1 + UM 1 | Survey Area 38

Crop		Inputs							Yield
		Improved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fungicide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	100	15	20	-	-	5	-	1,992
	UpQu	100	25	25	-	-	13	-	2,250
	LoQu	100	-	12	-	-	1	-	750
Engl. Potatoes	Avg.	-	11	29	-	-	17	-	8,083
Maize & Beans									
Maize	Avg.	89	15	20	-	0.06	7	-	1,567
Beans	Avg.	11	1	-	-	-	-	-	505
Maize	UpQu	100	25	25	-	-	8	-	1,800
Beans	UpQu	-	-	-	-	-	-	-	500
Maize	LoQu	100	-	-	-	-	1	-	857
Beans	LoQu	-	-	-	-	-	-	-	200
Second Rains									
Beans	Avg.	-	2	2	-	-	-	-	860
	UpQu	-	-	-	-	-	-	-	1,200
	LoQu	-	-	-	-	-	-	-	400
Engl. Potatoes	Avg.	17	27	21	-	0.13	-	19	7,321
	UpQu	-	25	20	-	-	-	10	6,000
	LoQu	-	-	-	-	-	-	-	3,000
Maize & Beans									
Maize	Avg.	75	13	24	-	-	20	20	1,166
Beans	Avg.	25	-	-	-	-	13	13	568
Maize	UpQu	100	25	25	-	-	25	25	1,350
Beans	UpQu	-	-	-	-	-	1	1	600
Maize	LoQu	-	-	-	-	-	1	1	714
Beans	LoQu	-	-	-	-	-	-	-	400
Perennial Crops									
Coffee	Avg.	-	76	1	-	0.32	2	33	6,065
	UpQu	-	81	-	-	-	4	29	8,039
	LoQu	-	36	-	-	-	-	2	2,188
Tea	Avg.	-	29	-	2	-	-	-	2,685
	UpQu	-	54	-	-	-	-	-	4,000
	LoQu	-	-	-	-	-	-	-	-

KIRINYAGA DISTRICT

TABLE 12b: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: UM 1–2–3

Survey Area 39

Crop		Inputs							Yield
		Imp-roved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fung-icide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	89	19	5	-	-	3	-	1,892
	UpQu	100	33	-	-	-	3	-	3,000
	LoQu	100	-	-	-	-	-	-	875
Engl. Potatoes	Avg.	-	41	29	-	-	1	9	7,088
	UpQu	-	50	50	-	-	-	10	8,100
	LoQu	-	-	-	-	-	-	-	3,600
Tomatoes	Avg.	-	81	-	-	-	25	-	2,500
Maize & Beans									
Maize	Avg.	100	14	11	-	0.01	5	-	1,577
Beans	Avg.	-	-	-	-	-	-	-	396
Maize	UpQu	100	23	20	-	-	10	-	1,800
Beans	UpQu	-	-	-	-	-	-	-	500
Maize	LoQu	100	-	-	-	-	1	-	1,125
Beans	LoQu	-	-	-	-	-	-	-	300
Second Rains									
Beans	Avg.	-	-	-	-	-	-	-	723
	UpQu	-	-	-	-	-	-	-	900
	LoQu	-	-	-	-	-	-	-	338
Engl. Potatoes	Avg.	-	22	26	-	-	1	9	8,234
	UpQu	-	23	50	-	-	-	10	6,250
	LoQu	-	-	-	-	-	-	-	4,500
Cotton	Avg.	33	-	-	-	-	33	33	1,471
Perennial Crops									
Coffee	Avg.	-	59	17	-	0.30	4	15	6,851
	UpQu	-	76	-	-	-	5	25	8,333
	LoQu	-	-	-	-	-	1	5	3,333

KIRINYAGA DISTRICT

TABLE 12c: **INPUTS & YIELDS OF MAJOR CROPS**

AEZ: LM 4

Survey Area 40

Crop		Inputs							Yield
		Imp-roved Seeds	Nutrients				Chemicals		
			N	P_2O_5	K_2O	Manure	Insec.	Fung-icide	
		%	kg/ha	kg/ha	kg/ha	t/ha	kg/ha	kg/ha	kg/ha
First Rains									
Maize	Avg.	82	3	4	-	-	2	-	2,598
	UpQu	100	-	-	-	-	4	-	2,700
	LoQu	-	-	-	-	-	-	-	375
Beans	Avg.	13	3	3	-	-	-	-	896
	UpQu	-	-	-	-	-	-	-	1,000
	LoQu	-	-	-	-	-	-	-	571
Sweet Potatoes	Avg.	-	54	-	-	-	-	-	13,333
Maize & Beans									
Maize	Avg.	60	6	5	-	-	2	-	1,503
Beans	Avg.	-	-	-	-	-	-	-	512
Maise	UpQu	100	-	9	-	-	3	-	2,250
Beans	UpQu	-	-	-	-	-	-	-	563
Maize	LoQu	-	-	-	-	-	-	-	900
Beans	LoQu	-	-	-	-	-	-	-	200
Second Rains									
Maize	Avg.	82	2	3	-	-	5	5	1,250
	UpQu	100	-	-	-	-	9	9	1,815
	LoQu	-	-	-	-	-	-	-	338
Beans	Avg.	11	-	-	-	-	5	5	569
	UpQu	-	-	-	-	-	-	-	675
	LoQu	-	-	-	-	-	-	-	169
Cotton	Avg.	39	-	-	-	-	31	33	1,397
	UpQu	100	-	-	-	-	35	35	1,500
	LoQu	-	-	-	-	-	4	4	879
Maize & Beans									
Maize	Avg.	73	-	1	-	-	1	1	739
Beans	Avg.	-	-	-	-	0.01	1	1	318
Maize	UpQu	100	-	-	-	-	-	-	925
Beans	UpQu	-	-	-	-	-	-	-	350
Maize	LoQu	-	-	-	-	-	-	-	338
Beans	LoQu	-	-	-	-	-	-	-	80
Perennial Crops									
Coffee	Avg.	-	60	-	-	-	1	12	2,619
	UpQu	-	81	-	-	-	2	16	3,571
	LoQu	-	-	-	-	-	-	-	-

KIRINYAGA DISTRICT

TABLE 13a: **DISPOSAL OF CROPS**

AEZ: LH 1 + UM 1

Survey Area 38

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	29,560	0	0	5,515	19	24,045	81
Maize & Beans	7,055	0	0	1,820	26	5,235	74
Maize IPC	270	0	0	0	0	270	100
Engl. Potatoes	3,020	0	0	1,800	60	1,220	40
Tobacco	200	0	0	200	100	0	0
Cabbage	4,000	0	0	3,500	88	500	13
Tomatoes	2,990	0	0	2,600	87	390	13
Second Rains							
Maize	495	0	0	0	0	495	100
Maize & Beans	3,802	0	0	270	7	3,532	93
Beans	10,960	0	0	2,890	26	8,070	74
Beans IPC	160	0	0	0	0	160	100
Engl. Potatoes	6,540	0	0	1,900	29	4,640	71
Cabbage	1,200	0	0	800	67	400	33
Permanent Crops							
Tea	450	450	100	0	0	0	0
Coffee	600	600	100	0	0	0	0
Cookng Bananas	1,400	0	0	300	21	1,100	79

KIRINYAGA DISTRICT

TABLE 13b: **DISPOSAL OF CROPS**

AEZ: UM 1–2–3

Survey Area 39

Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	12,395	0	0	4,190	34	8,205	66
Maize & Beans	58,125	5,490	9	13,411	23	39,224	67
Beans	840	0	0	165	20	675	80
Engl. Potatoes	11,460	0	0	4,070	36	7,390	64
Tobacco	30	30	100	0	0	0	0
Tomatoes	200	0	0	200	100	0	0
Second Rains							
Maize	4,520	0	0	960	21	3,560	79
Maize & Beans	20,110	360	2	3,930	20	15,820	79
Beans	7,212	0	0	2,885	40	4,327	60
Engl. Potatoes	14,560	0	0	5,650	39	8,910	61
Cotton	4,165	4,165	100	0	0	0	0
Permanent Crops							
Coffee	2,500	2,500	100	0	0	0	0
Cookng Bananas	2,400	0	0	1,200	50	1,200	50

KIRINYAGA DISTRICT

TABLE 13c: **DISPOSAL OF CROPS**

AEZ: LM 4

Survey Area 40

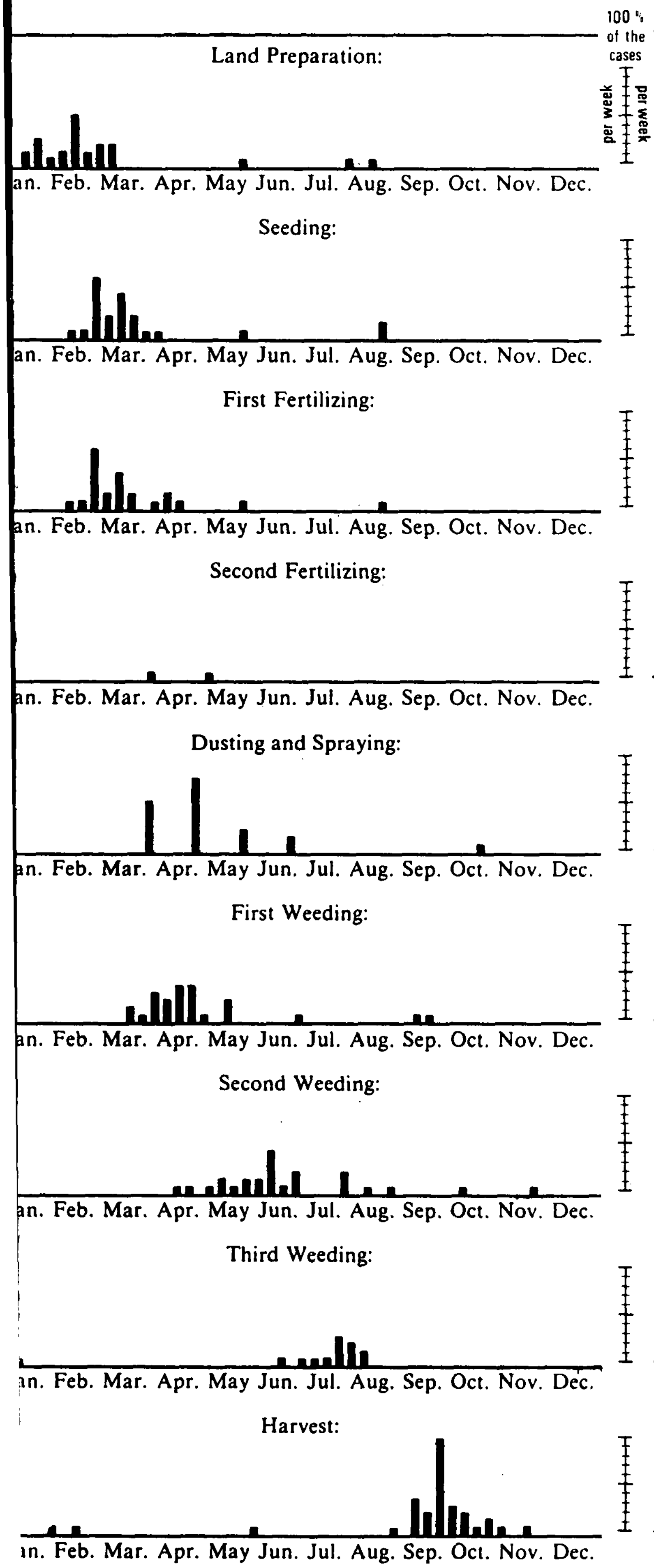
Crop	Production	Marketing Board		Local Market		Home Consumption	
	kg	kg	%	kg	%	kg	%
First Rains							
Maize	50,580	18,000	36	9,500	19	23,080	46
Maize & Beans	84,415	5,490	7	23,217	28	55,708	66
Maize & Others	5,600	1,700	30	810	14	3,090	55
Beans	4,600	720	16	990	22	2,890	63
Engl. Potatoes	1,770	0	0	1,300	73	470	27
Sweet Potatoes	1,600	0	0	800	50	800	50
Second Rains							
Maize	20,205	0	0	7,060	35	13,145	65
Maize & Beans	39,699	2,570	6	8,040	20	29,089	73
Maize & Others	1,320	420	32	0	0	900	68
Beans	3,353	600	18	400	12	2,353	70
Sorghum	180	0	0	0	0	180	100
Engl. Potatoes	1,090	0	0	800	73	290	27
Sweet Potatoes	510	510	100	0	0	0	0
Cotton	29,994	29,994	100	0	0	0	0
	Permanent Crops						
Nil							

KIRINYAGA DISTRICT

TABLE 14a: DISTRIBUTION OF FARMING ACTIVITIES

Crop 1 Maize Cases: 27

AEZ: LH 1 + UM 1 Survey Area 38 Sample Size: 30

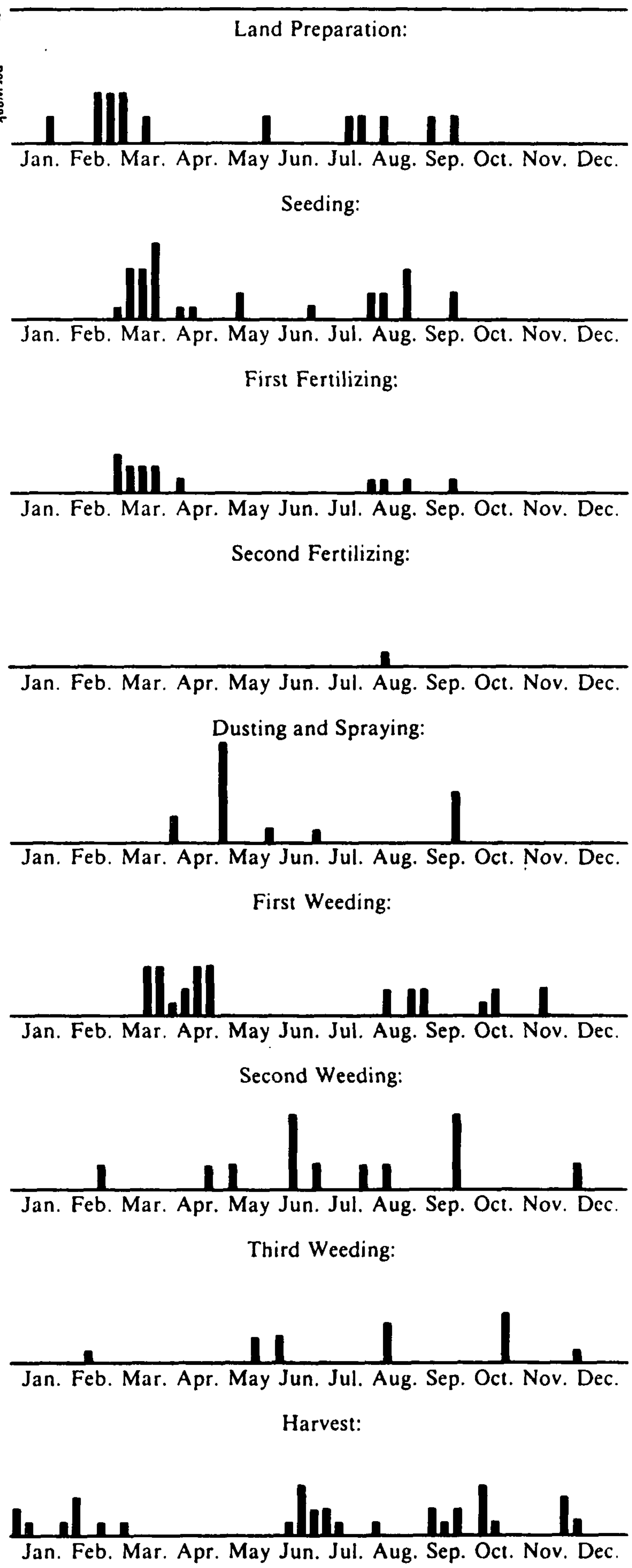


KIRINYAGA DISTRICT

TABLE 14b: DISTRIBUTION OF FARMING ACTIVITIES

Crop 2 Maize & Beans Cases: 30[1)]

AEZ: LH 1 + UM 1 Survey Area 38 Sample Size: 30



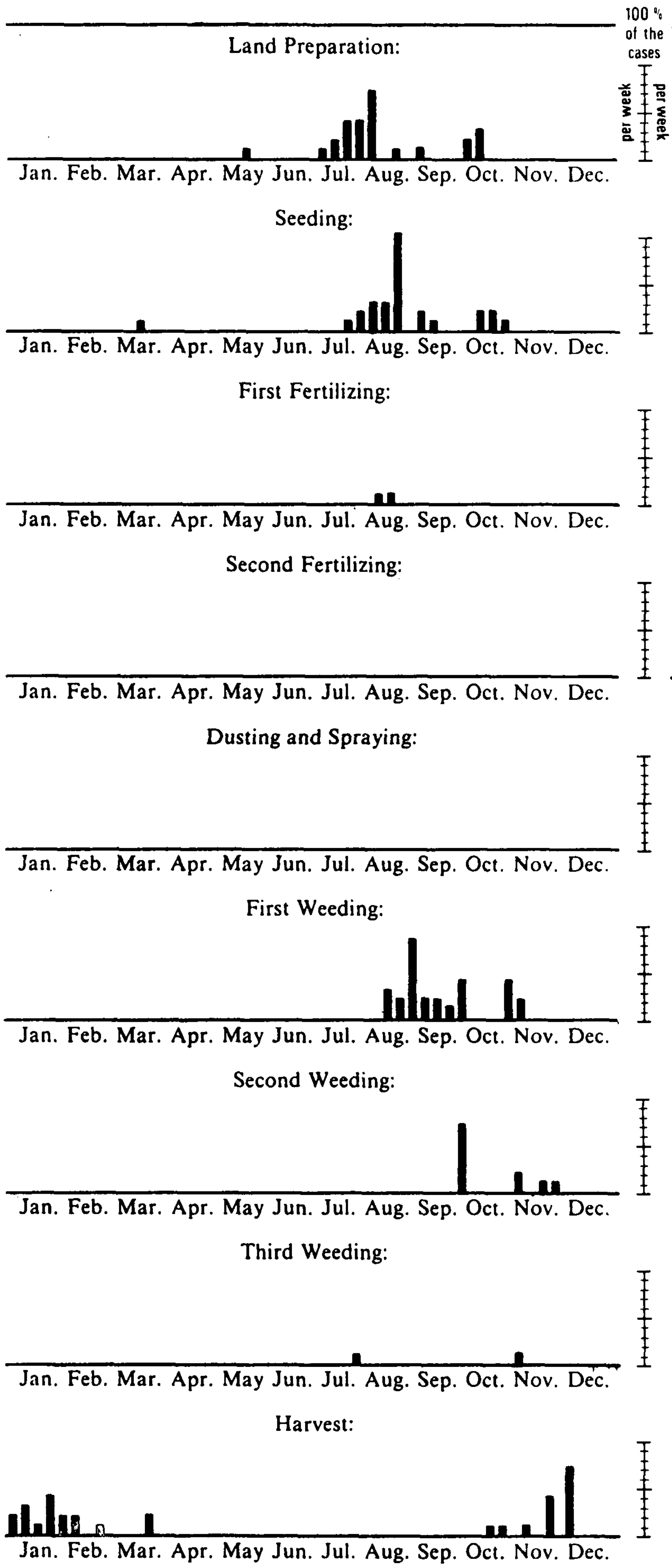
1) Maximum 30 per crop and season

KIRINYAGA DISTRICT

TABLE 14c: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 **Beans** Cases: 28

AEZ: LH 1 + UM 1 Survey Area 38 Sample Size: 30

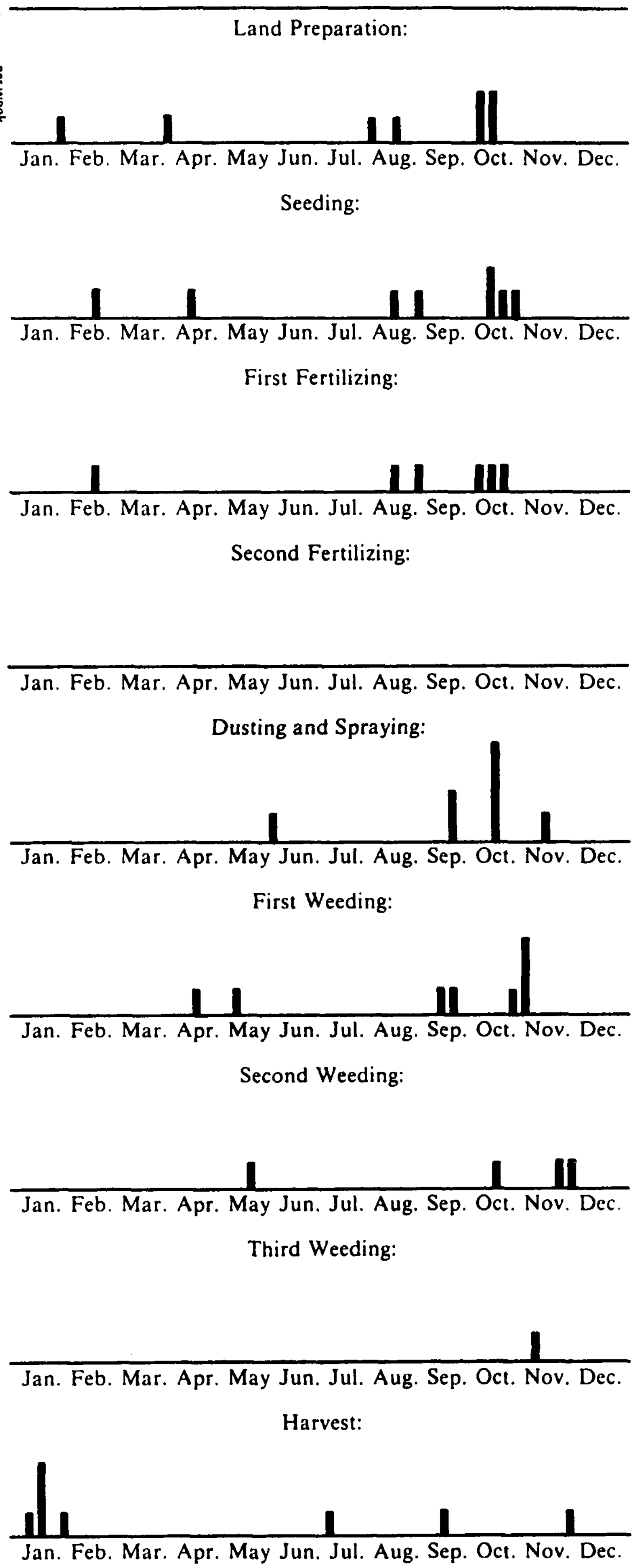


KIRINYAGA DISTRICT

TABLE 14d: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 8

AEZ: LH 1 + UM 1 Survey Area 38 Sample Size: 30

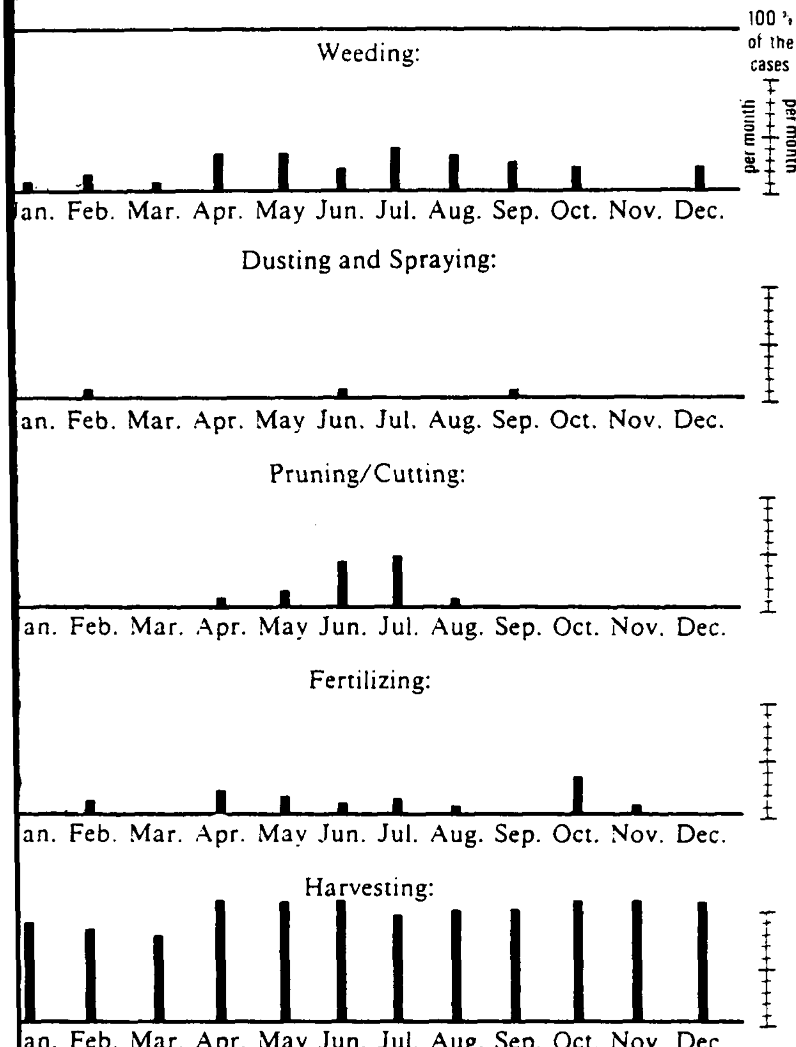


IRINYAGA DISTRICT

ABLE 14e: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 **Tea** Cases: 21

EZ: LH 1 + UM 1 Survey Area 38 Sample Size: 30

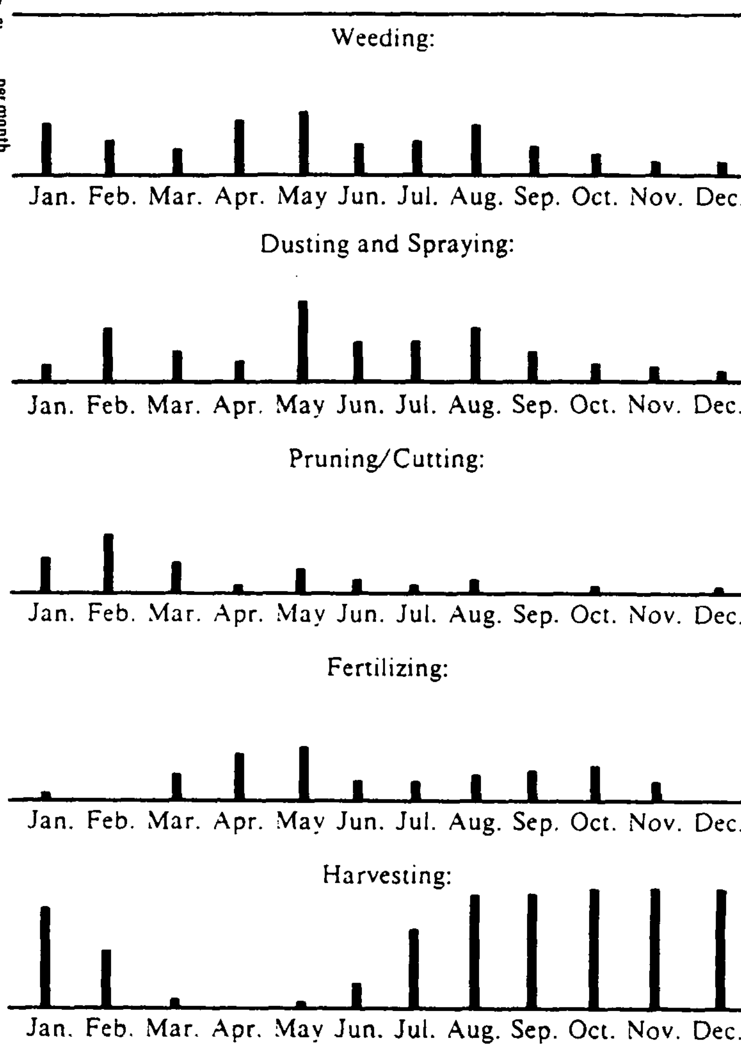


KIRINYAGA DISTRICT

TABLE 14f: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 **Coffee** Cases: 30

AEZ: LH 1 + UM 1 Survey Area 38 Sample Size: 30

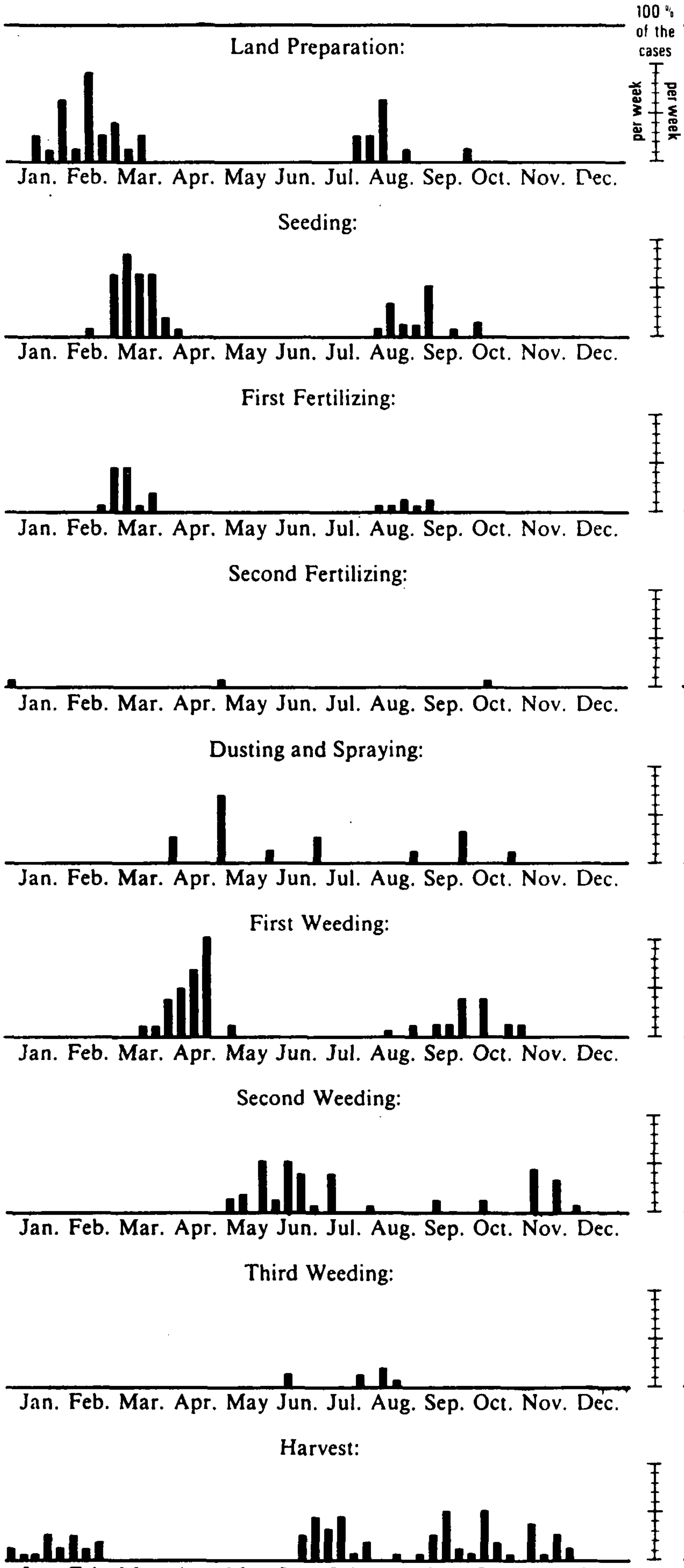


KIRINYAGA DISTRICT

TABLE 14g: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 2 **Maize & Beans** Cases: 60[1)]

AEZ: UM 1–2–3 Survey Area 39 Sample Size: 30



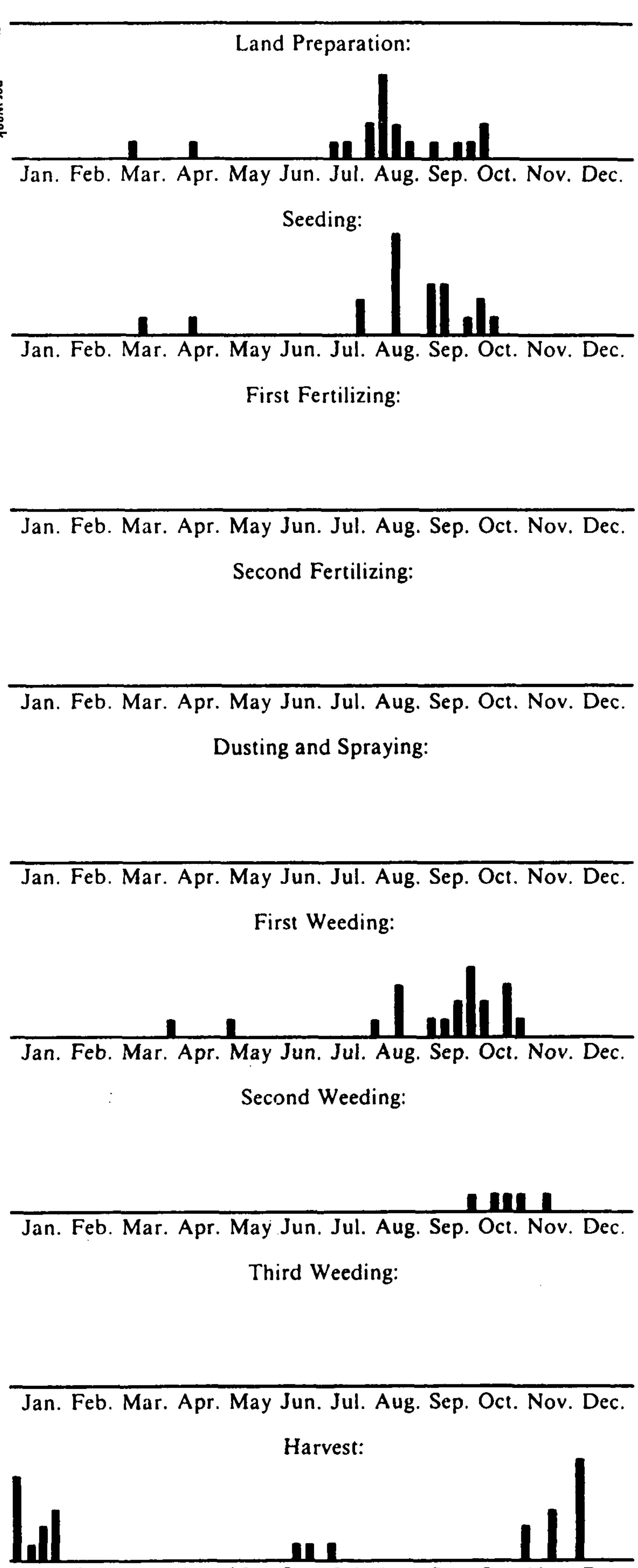
1) Maximum 30 per crop and season

KIRINYAGA DISTRICT

TABLE 14h: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 **Beans** Cases: 20

AEZ: UM 1–2–3 Survey Area 39 Sample Size: 30

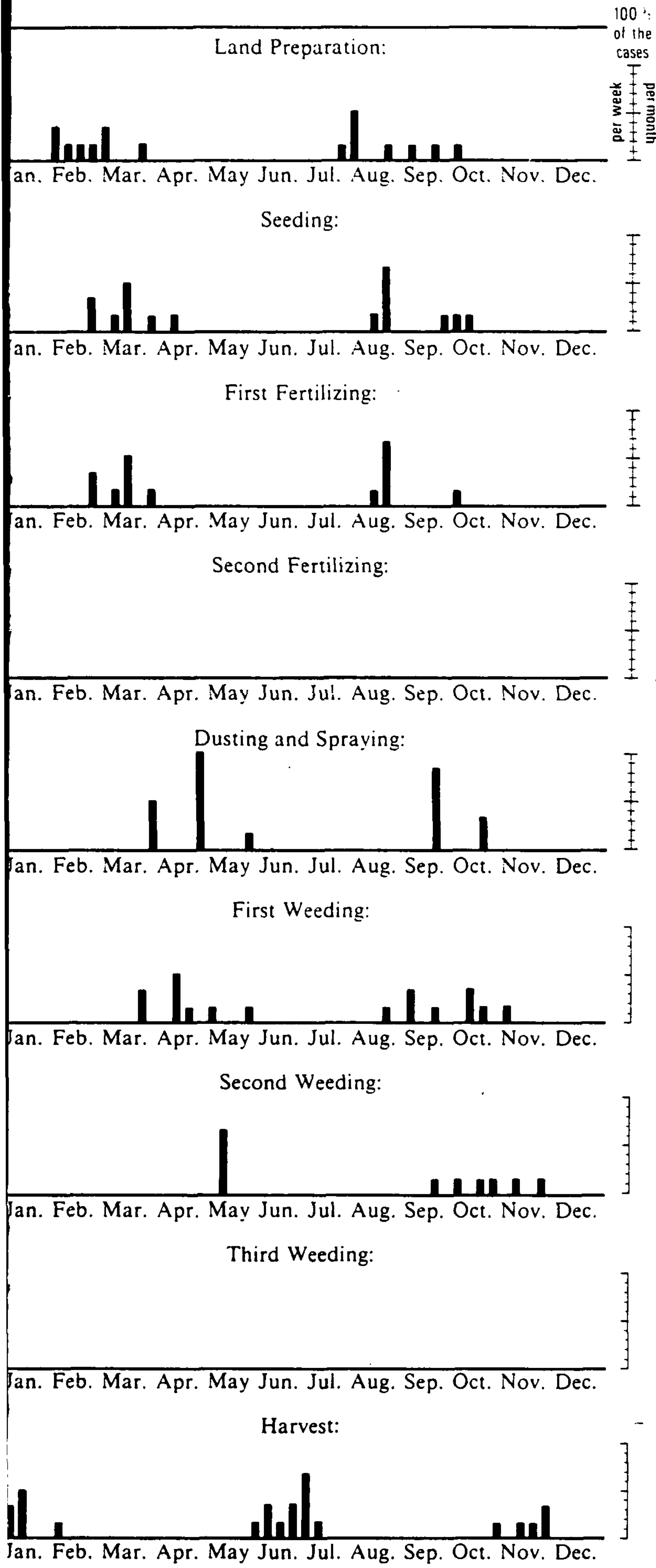


RINYAGA DISTRICT

TABLE 14i: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 28 **Engl. Potatoes** Cases: 16

EZ: UM 1–2–3 Survey Area 39 Sample Size: 30

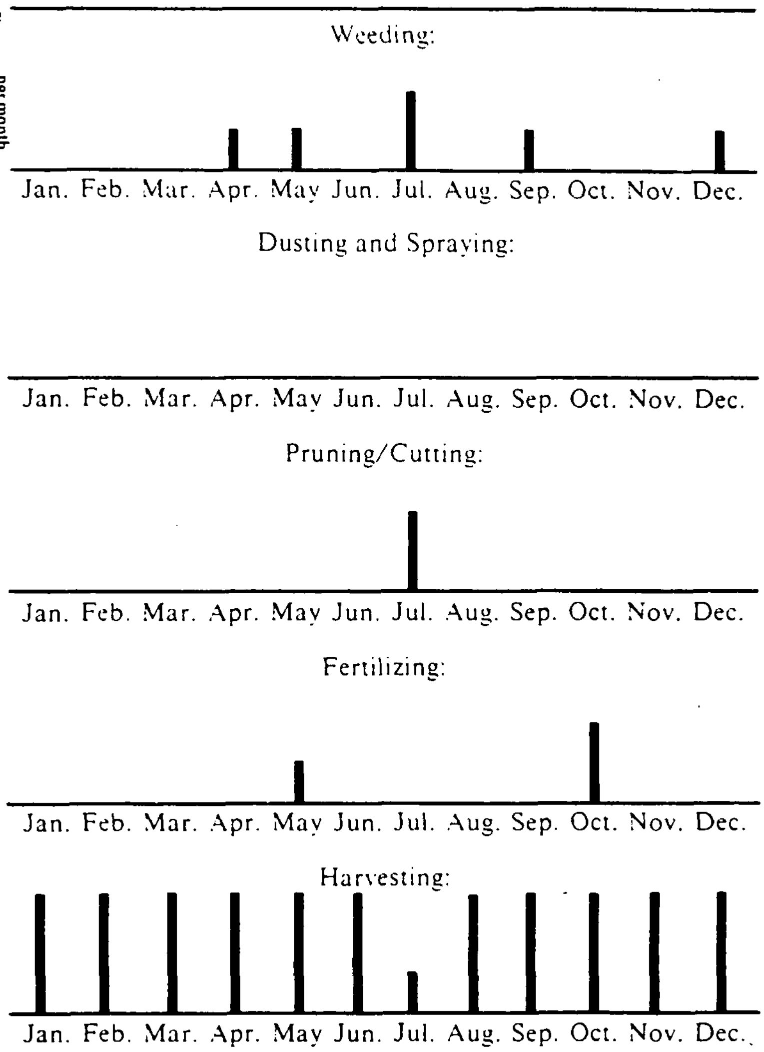


KIRINYAGA DISTRICT

TABLE 14j: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 50 **Tea** Cases: 3

AEZ: UM 1–2–3 Survey Area 39 Sample Size: 30

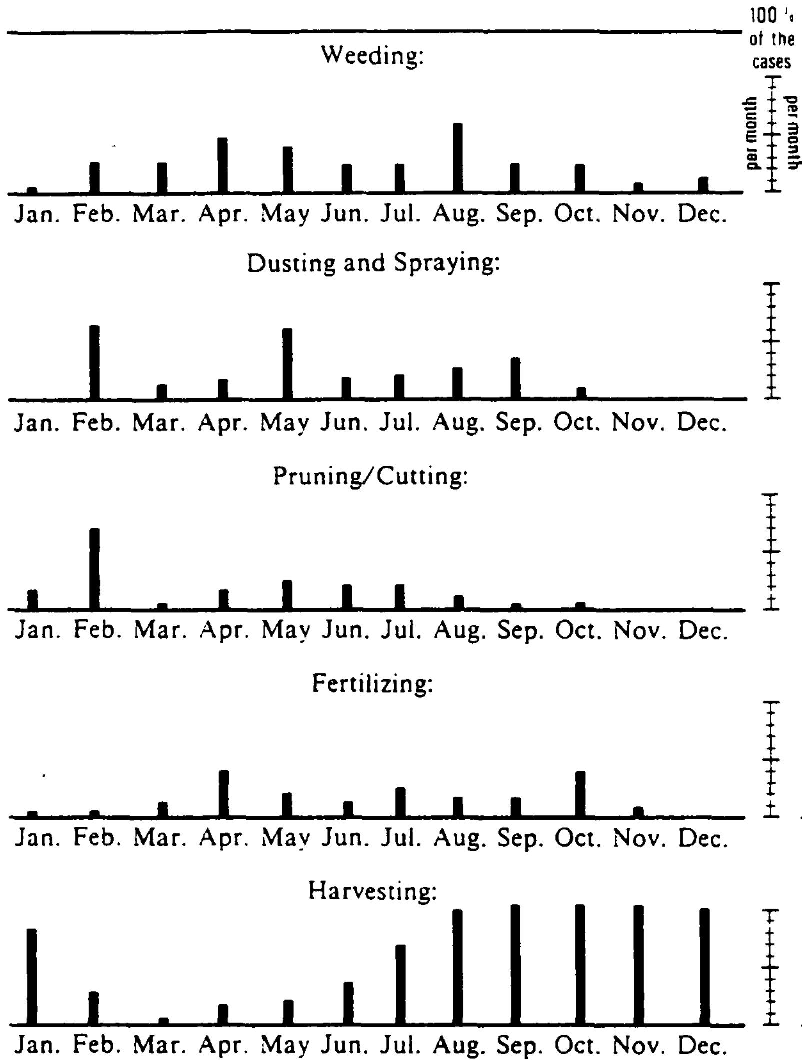


KIRINYAGA DISTRICT

TABLE 14k: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 51 **Coffee** Cases: 27

AEZ: UM 1–2–3 Survey Area 39 Sample Size: 30

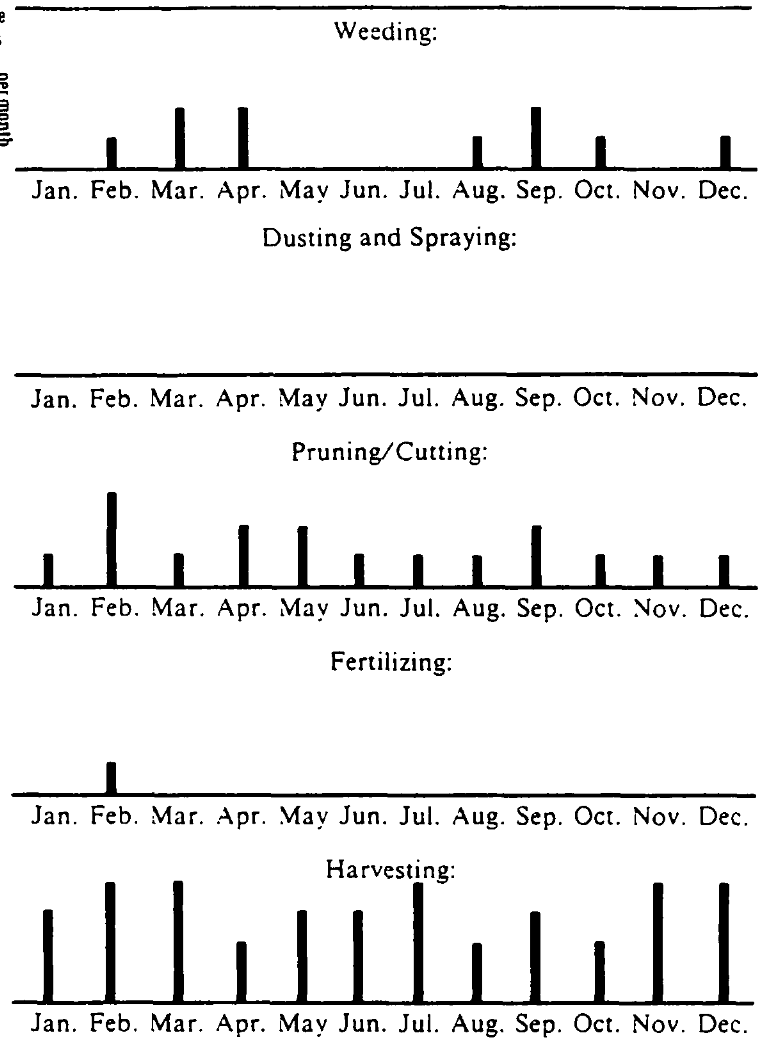


KIRINYAGA DISTRICT

TABLE 14l: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 56 **Cooking Bananas** Cases: 5

AEZ: UM 1–2–3 Survey Area 39 Sample Size: 30

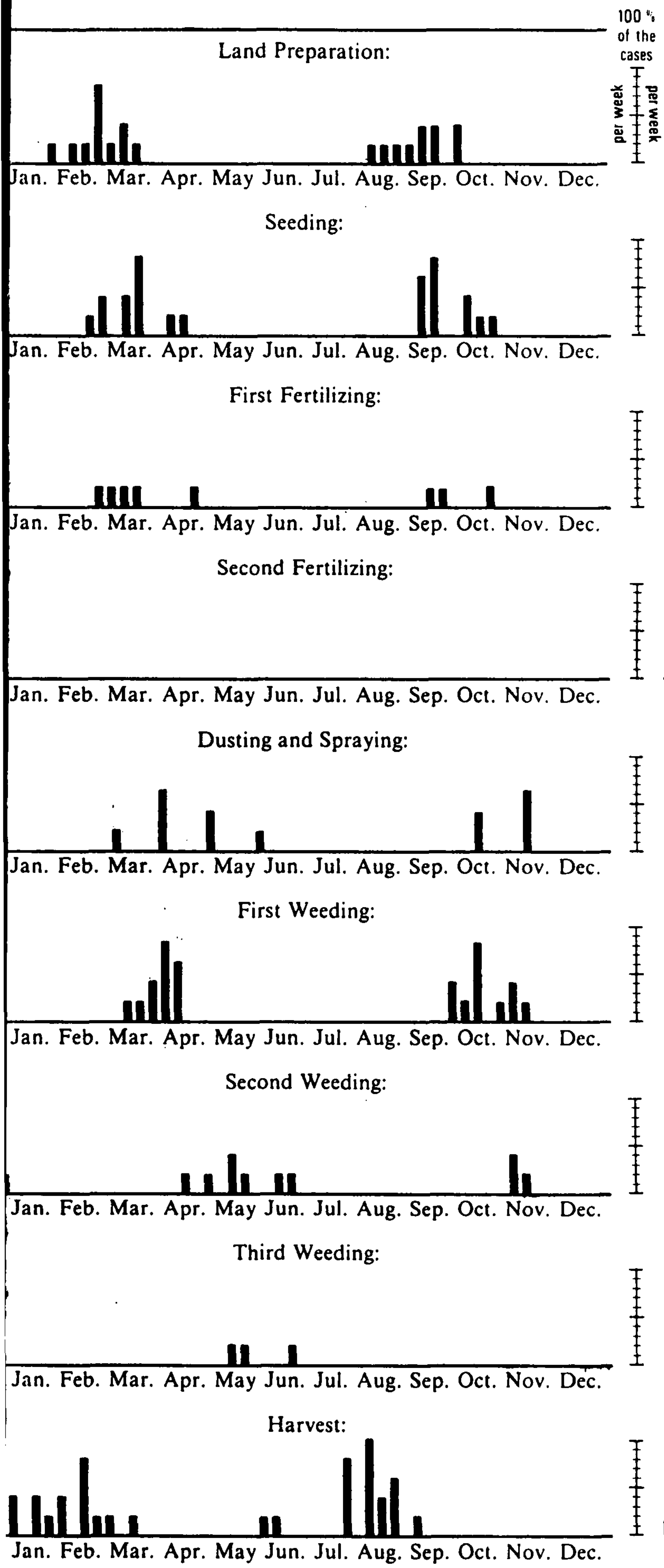


IRINYAGA DISTRICT

ABLE 14m: DISTRIBUTION OF FARMING ACTIVITIES

Crop 1 Maize Cases 22

EZ: LM 4 Survey Area 40 Sample Size: 30

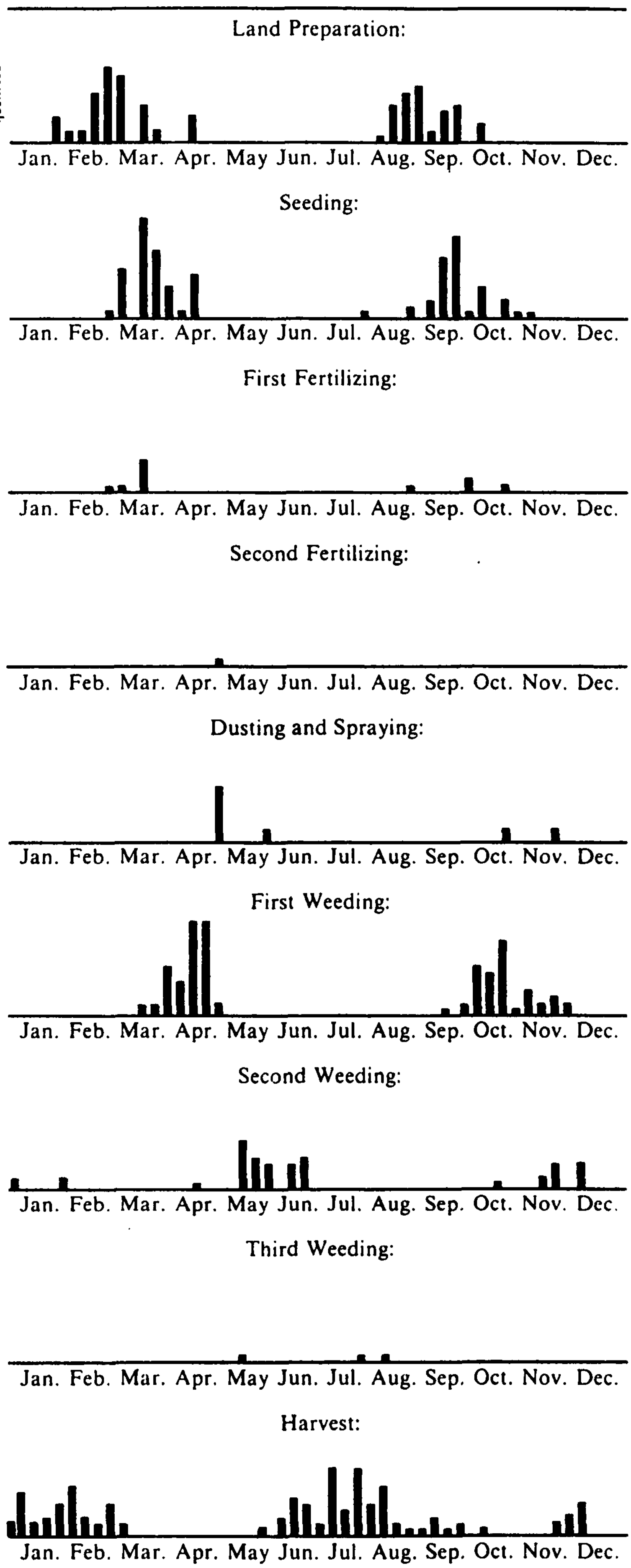


KIRINYAGA DISTRICT

TABLE 14n: DISTRIBUTION OF FARMING ACTIVITIES

Crop 2 Maize & Beans Cases: 60[1)]

AEZ: LM 4 Survey Area 40 Sample Size: 30



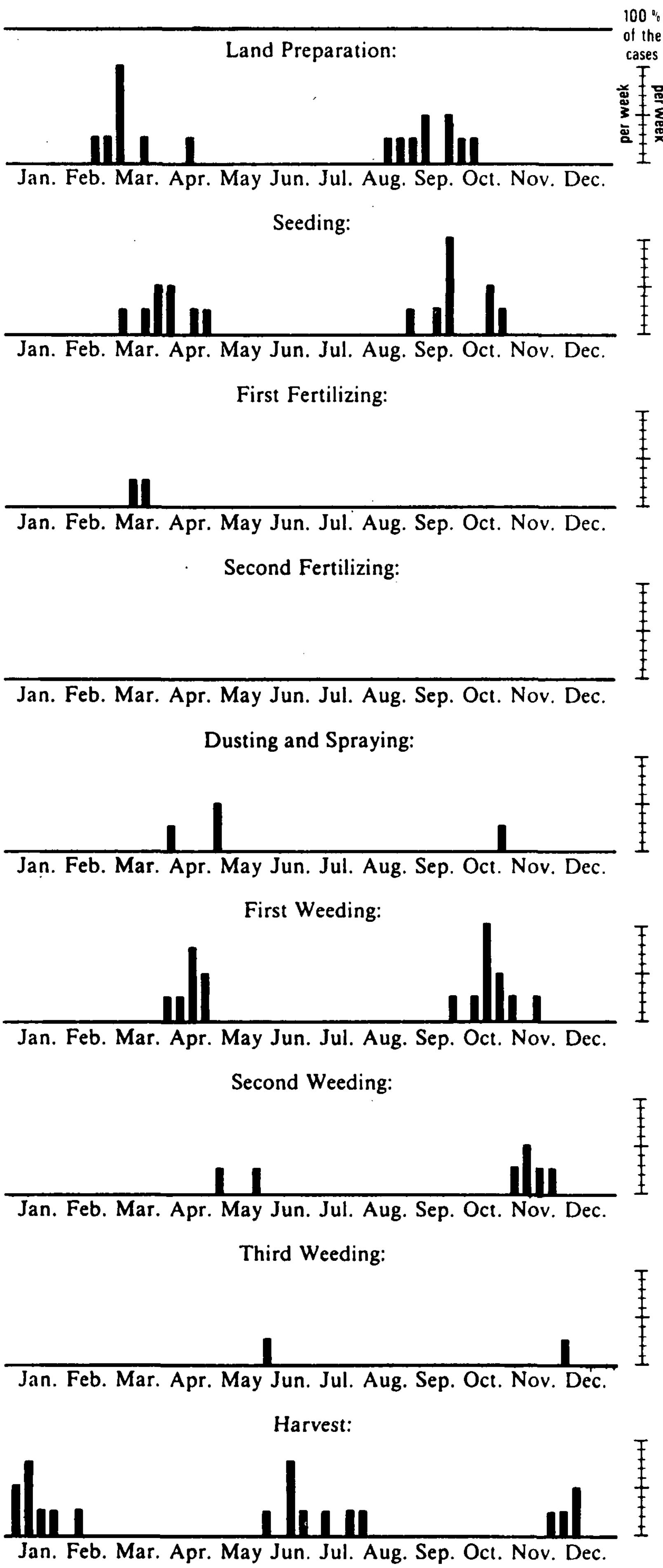
1) Maximum 30 per crop and season

KIRINYAGA DISTRICT

TABLE 14o: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 10 Beans Cases: 17

AEZ: LM 4 Survey Area 40 Sample Size: 30



KIRINYAGA DISTRICT

TABLE 14p: **DISTRIBUTION OF FARMING ACTIVITIES**

Crop 35 Cotton Cases: 23

AEZ: LM 4 Survey Area 40 Sample Size: 30

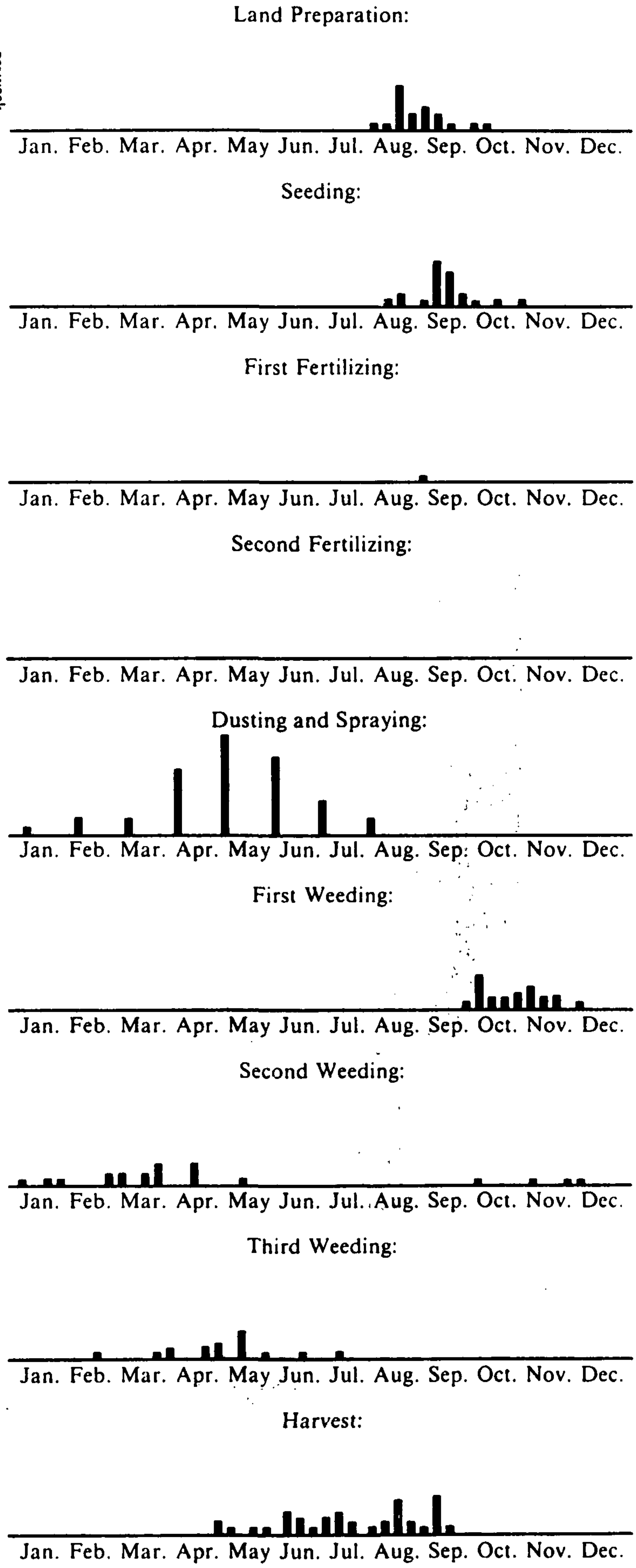


TABLE 15a: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 1 TEA-DAIRY ZONE				UM 1 COFFEE-TEA ZONE							
		Vegt. Period 1st + 2nd: 1/vl-m in Days,1st: 21o or more		2nd: 14o-15o	total: 25o-26o	f lim 2oo or more		13o-15o	23o-25o				
		Soil: ANDOSOLS				ANDOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	3,000			6,000	2,700			5,400				
Fertilizer N	kg				166				150				
P_2O_5	kg				83				75				
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields 2)	kg	4,100			8,500	5,400			11,700				
Fertilizer N	kg				244				350				
P_2O_5	kg				122				175				
K_2O													
CROP: TEA													
Farmers in Production Level	%												
Yields	kg	2,800	6,500	7,500	10,000	2,700	6,000	7,000	9,000				
Fertilizer N	kg		148	188	360		110	172	315				
P_2O_5	kg		29	37	72		22	24	63				
K_2O	kg		29	37	72		22	24	63				
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg						700	1,000	1,200				
Fertilizer N	kg						70	100	120				
P_2O_5	kg						90	100	100				
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg	3,200	-	18,000	25,000	3,000		16,000	1,800				
Fertilizer N	kg			207	305			183	211				
P_2O_5	kg			207	305			183	211				
K_2O	kg												
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg					8,500	12,000	20,000	40,000				
Fertilizer N	kg						53	173	473				
P_2O_5	kg						14	46	126				
K_2O	kg												

1) for explanations see Vol. II A, p. 51   2) in Kg TDN

TABLE 15b: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: LH 1 TEA-DAIRY ZONE				UM 1 COFFEE-TEA ZONE							
		Vegt. Period 1st + 2nd: 1/vl-m in Days,1st: 21o or more		2nd: 14o-15o	total: 25o-26o	f lim 2oo or more		13o-15o	23o-25o				
		Soil: ANDOSOLS				ANDOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	2,600	2,200	3,500	4,500	2,400	2,200	4,000	5,000				
Fertilizer N	kg			23	48			40	65				
P_2O_5	kg			14	30			26	42				
K_2O	kg												
CROP: MAIZE AND BEANS													
Farmers in Production Level	%												
Yields	kg					2,400		4000/500					
Fertilizer N	kg							63					
P_2O_5	kg							33					
K_2O													
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg					900	700	1,200	1,800				
Fertilizer N	kg							10	31				
P_2O_5	kg							8	25				
K_2O	kg												
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	7,000	8,000	22,000	40,000	6,500	7,300	12,000	28,000				
Fertilizer N	kg		8	12	264		6	44	172				
P_2O_5	kg		6	9	198		5	33	127				
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg					8,500	8,000	20,000	40,000				
Fertilizer N	kg							92	252				
P_2O_5	kg							44	126				
K_2O	kg												

TABLE 15c: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

	A.E.Z.:	LH 1 TEA-DAIRY ZONE				UM 1 COFFEE-TEA ZONE							
	Vegt. Period 1st + 2nd: in Days, 1st:	1/vl-m 21o or more		2nd: 14o-15o	total: 25o-26o	f lim 2oo or more		13o-15o	23o-25o				
	Soil:	ANDOSOLS				ANDOSOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	4,500	5,000	20,000	45,000								
Fertilizer N	kg		4	109	285								
P_2O_5	kg		2	62	162								
K_2O	kg												
CROP: PYRETHRUM													
Farmers in Production Level	%												
Yields	kg	600	450	800	1,000								
Fertilizer N	kg			5	10								
P_2O_5	kg			7	14								
K_2O													
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15d: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 2 MAIN COFFEE ZONE				UM 3 MARGINAL COFFEE ZONE				UM 4 SUNFLOWER-MAIZE ZONE			
		Vegt. Period 1st + 2nd: m/l i m/s in Days, 1st: 17o or more		2nd: 115-13o	total: 285-3oo	(m/s) + s 12o-14o		85-1o5	—	(s/m) + s 1o5-115		85-1o5	—
		Soil: ANDOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE/LEYS													
Farmers in Production Level	%												
Yields 2)	kg	2,400			4,800	1,300			2,700	1,200			2,700
Fertilizer N	kg				133				77				
P_2O_5	kg				66				38				
K_2O	kg												
CROP: NAPIER/BANA GRASS													
Farmers in Production Level	%												
Yields 2)	kg	4,500			10,000	2,700			5,800	2,400			4,500
Fertilizer N	kg				305				172				111
P_2O_5	kg				152				86				55
K_2O													
CROP: COFFEE													
Farmers in Production Level	%												
Yields	kg		800	1,300	1,600		400	600	800				
Fertilizer N	kg		80	130	160		40	60	80				
P_2O_5	kg		90	100	100		90	90	90				
K_2O	kg												
CROP: BANANAS													
Farmers in Production Level	%												
Yields	kg	7,000	10,000	18,000	35,000	6,000	4,000	8,000	12,000				
Fertilizer N	kg		45	145	420			30	90				
P_2O_5	kg		12	44	112			12	36				
K_2O	kg												
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	1,700	3,000	4,000	5,000	1,700	1,600	2,600	3,000	1,700	1,600	2,600	2,800
Fertilizer N	kg		33	57	83			23	33			23	28
P_2O_5	kg		20	37	53			22	31			22	26
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg					2,800	1,800	3,000	3,500	2,200	2,200	2,800	3,500
Fertilizer N	kg							10	22			18	40
P_2O_5	kg							10	18			16	35
K_2O	kg												

1) for explanations see Vol. II A, p. 51   2) in Kg TDN

TABLE 15e: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 2 MAIN COFFEE ZONE				UM 3 MARGINAL COFFEE ZONE				UM 4 SUNFLOWER-MAIZE ZONE			
		Vegt. Period 1st + 2nd: m/l i m/s in Days,1st: 17o or more		2nd: 115-13o	total: 285-3oo	(m/s) + s 12o-14o		85-1o5	—	(s/m) + s 1o5-115		85-1o5	—
		Soil: ANDOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE AND BEANS													
Farmers in Production Level	%												
Yields	kg	1,700	3000/400	4000/500		1,700		2600/400	3000/400				
Fertilizer N	kg		49	61				42	52				
P_2O_5	kg		29	52				30	31				
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg	1,200	800	1,700	2,000	1,000	600	1,500	1,800	900	600	1,000	1,200
Fertilizer N	kg			30	50			24	38			5	14
P_2O_5	kg			10	16			10	16			3	9
K_2O													
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	800	700	1,200	1,900	850	500	1,000	1,400	800	450	700	1,000
Fertilizer N	kg			14	37			5	19				7
P_2O_5	kg			11	31			6	23				8
K_2O	kg												
CROP: SWEET POTATOES													
Farmers in Production Level	%												
Yields	kg	7,000	8,000	18,000	35,000					4,500	3,000	6,000	10,000
Fertilizer N	kg		8	88	224							12	44
P_2O_5	kg		6	66	168							11	39
K_2O	kg												
CROP: CABBAGE													
Farmers in Production Level	%												
Yields	kg	3,500	5,000	15,000	30,000								
Fertilizer N	kg		10	92	186								
P_2O_5	kg		6	46	106								
K_2O	kg												
CROP: POTATOES													
Farmers in Production Level	%												
Yields	kg	3,500	7,300	12,000	28,000								
Fertilizer N	kg		30	68	196								
P_2O_5	kg		21	51	147								
K_2O	kg												

TABLE 15f: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

		A.E.Z.: UM 2 MAIN COFFEE ZONE				UM 3 MARGINAL COFFEE ZONE				UM 4 SUNFLOWER-MAIZE ZONE			
		Vegt. Period 1st + 2nd: m/l i m/s in Days,1st: 17o or more		2nd: 115-13o	total: 285-3oo	(m/s) + s 12o-14o		85-1o5	—	(s/m) + s 1o5-115		85-1o5	—
		Soil: ANDOSOLS				NITOSOLS				NITOSOLS			
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: CASSAVA													
Farmers in Production Level	%												
Yields	kg					5,000		6,000	12,000	3,800	4,000	6,000	8,000
Fertilizer N	kg							4	28		1	9	17
P_2O_5	kg							6	42		1	15	29
K_2O	kg												
CROP: PASSION FRUIT													
Farmers in Production Level	%												
Yields	kg	2,800		14,000	18,000								
Fertilizer N	kg			157	222								
P_2O_5	kg			157	222								
K_2O													
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												

TABLE 15g: PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES
OUTPUT & NUTRIENT INPUT

	A.E.Z.:	LM 3 LOWER MIDLAND COTTON ZONE				LM 4 MARGINAL COTTON ZONE							
	Vegt. Period 1st + 2nd: in Days,1st:	(s/m) + s 105-115		2nd: 85-100	total: —	s + s/vs 85-105		75-85	—				
	Soil:	NITOSOLS				VERTISOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: NATURAL PASTURE													
Farmers in Production Level	%												
Yields	kg	900			1,800	900			1,800				
Fertilizer N	kg				50				50				
P_2O_5	kg				25				25				
K_2O	kg												
CROP: BANA GRASS													
Farmers in Production Level	%												
Yields	kg	1,700			3,900	1,200			2,600				
Fertilizer N	kg				122				18				
P_2O_5	kg				61				9				
K_2O													
CROP: COTTON													
Farmers in Production Level	%												
Yields	kg	450	350	900	1,600	400	400	650	800				
Fertilizer N	kg				137				50				
P_2O_5	kg				108				36				
K_2O	kg												
CROP: MAIZE													
Farmers in Production Level	%												
Yields	kg	1,400	1,200	2,000	2,200	1,200	900	1,700	2,000				
Fertilizer N	kg			15	20			15	24				
P_2O_5	kg			14	19			8	13				
K_2O	kg												
CROP: SORGHUM													
Farmers in Production Level	%												
Yields	kg	1,600	1,800	2,800	3,500	1,000	1,600	2,500	2,500				
Fertilizer N	kg		6	36	57		23	45	45				
P_2O_5	kg		6	21	35		12	30	30				
K_2O	kg												
CROP: MILLET													
Farmers in Production Level	%												
Yields	kg	1,800		1,400	1,800	1.000	450	1,200	1,600				
Fertilizer N	kg							10	21				
P_2O_5	kg							8	17				
K_2O	kg												

TABLE 15h: **PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES OUTPUT & NUTRIENT INPUT**

		A.E.Z.: LM 3 LOWER MIDLAND COTTON ZONE				LM 4 MARGINAL COTTON ZONE							
		Vegt. Period 1st + 2nd: (s/m) + s **in Days, 1st:** 1o5-115		2nd: 85-1oo	total: —	s + s/vs 85-1o5		75-85	—				
		Soil: NITOSOLS				VERTISOLS							
	Unit	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III	Without Fertilizer	Production Level I	II	III
CROP: MAIZE AND BEANS													
Farmers in Production Level	%												
Yields	kg	1,400		2,000/400	2,200/400								
Fertilizer N	kg			29	39								
P_2O_5	kg			23	31								
K_2O	kg												
CROP: BEANS													
Farmers in Production Level	%												
Yields	kg	800	500	800	1,300	900	400	700	1,000				
Fertilizer N	kg				24				5				
P_2O_5	kg				15				3				
K_2O													
CROP: COW PEAS													
Farmers in Production Level	%												
Yields	kg					800	450	900	1,400				
Fertilizer N	kg							5	30				
P_2O_5	kg							3	19				
K_2O	kg												
CROP: GRAMS													
Farmers in Production Level	%												
Yields	kg	1,100	400	1,000	1,500	800	400	800	1,100				
Fertilizer N	kg				14				12				
P_2O_5	kg				12				10				
K_2O	kg												
CROP: SUNFLOWER													
Farmers in Production Level	%												
Yields	kg	700	400	700	1,200	700		600	800				
Fertilizer N	kg				17				4				
P_2O_5	kg				21				4				
K_2O	kg												
CROP: SOYA BEANS													
Farmers in Production Level	%												
Yields	kg					800		600	900				
Fertilizer N	kg								5				
P_2O_5	kg								4				
K_2O	kg												

TABLE 15i: **PRODUCTION LEVELS PER CROP AND AGRO-ECOLOGICAL ZONES**
OUPUT & NUTRIENT INPUT

		A.E.Z.: LM 3 LOWER MIDLAND COTTON ZONE				LM 4 MARGINAL COTTON ZONE							
		Vegt. Period 1st + 2nd: (s/m) + s in Days, 1st: 105-115		2nd: 85-100	total: —	s + s/vs 85-105		75-85	—				
		Soil: NITOSOLS				VERTISOLS							
	Unit	Without Fertilizer	Production Level I	Production Level II	Production Level III	Without Fertilizer	Production Level I	Production Level II	Production Level III	Without Fertilizer	Production Level I	Production Level II	Production Level III
CROP: CASSAVA													
Farmers in Production Level	%												
Yields	kg	3,600	4,000	8,000	12,000	4,000	3,000	6,000	7,000				
Fertilizer N	kg		2	18	35			8	13				
P_2O_5	kg		2	26	50			12	18				
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O													
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												
CROP:													
Farmers in Production Level	%												
Yields	kg												
Fertilizer N	kg												
P_2O_5	kg												
K_2O	kg												