SOIL SCIENCE SOCIETY OF EAST AFRICA
12th ANNUAL GENERAL MEETING

30th NOV. - 5th DEC. 1992
NAKURU, KENYA

FIELD EXCURSION GUIDE

by
P.T.Gicheru and P.F.Okoth

Sponsored and Prepared by
Kenya Soil Survey.

MISCELLANEOUS REPORT No. M39, NOVEMBER, 1992

SOIL SCIENCE SOCIETY OF EAST AFRICA
12th ANNUAL GENERAL MEETING

30th NOV. - 5th DEC. 1992
NAKURU, KENYA

FIELD EXCURSION GUIDE

by
P.T.Gicheru and P.F.Okoth

Sponsored and Prepared by
Kenya Soil Survey.

MISCELLANEOUS REPORT No. M39, NOVEMBER, 1992

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Background

This excursion guide has been prepared for the participants of the 12th Annual General Meeting of the Soil Science Society of East Africa. The S.S.S.E.A. holds annual General Meeting during which various technical issues affecting the natural resouce soil, and its utilization are discussed. At this forum soil scientists, Agronomists, Soil resouce users and Policy makers come together and exchage views, research findings and discuss soil resouce management options within the East Africa region. The theme of the meeting is:

"Proper soil management - a key to food security in our nations". The theme is an appropriate one given the current draught situation within the region.
In addition to the discussions in plenary halls, it has become a tradition that participants venture into the field to examine and discuss the soil resouces on site. In line with this year's theme the excursion route area has been selected to reflect various Agricultural production systems under different land uses and climatic conditions. The route passes through diverse land forms, geology and soils. The excursion route selected also includes areas of scenic beauty and exciting wildlife for the participants.

The excursion route lies within the Rift valley, treversing Nakuru, Laikipia and Nyandarua districts as can be found in figure 1.

1.2 ENVIRONMENT

1.2.1 Accessibility

There is a tarmac road which runs from Nakuru, Subukia, Nyahururu, Olkalau, Gilgil and back to Nakuru. Generally the excursion route is well served by all weather roads.

1.2.2 Geology

The Excursion tour area is underlain by four geological formations viz (i) Recent
(ii) Pleistocene
(iii) Pliocene
(iv) Miocene

All these formations occurs in association throughout the excursion route.
The petrography of the area include superficial deposits, porphyritic trachyte, phonolitic trachytes, welded tuffs, vitric pumice tuffs, diatomites, phonolites and claystone tuff.

1.2.3 Physiography/Geomorphology

Six major land types are recognized in the area. These are: Mountains and major scarps, hills and minor scarps, uplands, plateaus and high level structural plains, volcanic foot ridges and plains. These land types are used for sub dividing major soil units in the area.
Mountains and major scarps have slopes which are greater than 30%. These are found West of Nakuru town where Menengai crater is located. The land type is associated with recent volcanoes e.g. Menengai crater. Hills and minor scarps have slopes which are greater than 16%. and are associated with Pliocene volcanics. Uplands are gently undulating to rolling. The slopes are between 2 to 16%. They are associated with Pliocene volcanics and they are found West of Olkalau and they run along the foot ridges.
Volcanic foot ridges are undulating to hilly. they are found west of Nakuru and runs all through upto Nyahururu. They are associated with Miocene volcanics.
Plateaus and high level structural plains are flat to gently undulating with slopes less than 8%. These are of recent volcanics and are found between Nyahururu all through upto Kinangop.
Plains are generally flat. They include Lacustrine plains. These are associated with recent alluvial deposits and an example is found around Lake Nakuru.

1.2.4 Climate

The excursion area falls between Agro-climatic zones I-IV. Therefore the climatic conditions ranges from humid in the highlands near Nyahururu to semi-arid in the rift valley. The highlands are cool while the semi-arid areas are warm.

1.2.4.1 Rainfall

The mean annual rainfall in the excursion area varies from 900mm to 1400 mm in the western side of the area. It varies from 1000 mm to 1200 in the northern part of the area and it varies from 900 mm to 1000mm in the Eastern part of the area. In the southern part Gilgil-Nakuru route it varies from 800-900mm (Jaetzold et al 1983). The rainfall distribution in the area is varied. It varies from bimodal in Nakuru area to one rainfall season in the Eastern, Western and Southern areas of the excursion area. Some areas have no definite rainfall season e.g. Gilgil region (EAMD, 1972).

1.2.5 Land use

A wide range of land use types and land use patterns are present in the excursion area due to the divergent ecological conditions.
In this area, mixed cropping is practiced commonly. This includes crops and livestock/crop combinations The crops grown along the excursion route include wheat, barley, maize, sisal, pyrethrum, potatoes citrus, coffee and tea. The animals kept include Dairy and Beef cattle, sheep, donkeys and goats.
The land use practices in the highland (humid) areas include Forestry, Dairy cattle, pyrethrum and Tea. In the lower areas and the lowlands in the right valley; wheat, barley, maize, coffee, potatoes and sisal are grown. Beef cattle are kept in the area.

1.2.6 Soils

The soils in the excursion area show variation in their properties which is mainly due to the lithology and the land unit on which they are developed.
The soils of the area occur on a variety of geomorphic units ranging from mountains to plains. These soils are developed on a variety of parent materials ranging from recent volcanics to miocene volcanic deposits.
The major soil types which occur in the area include: Phaeozems, Andosols Nitisols, Planosols, Cambisols, Regosols, Leptosols, Luvisols, Acrisols,Solonetz and Fluvisols.

STOP 1: Bahati Fertilizer Recommendation Project Site

Geomorphology

The site is located on a flat to gently undulating plain at an altitude of 1969m

Climate

The mean annual rainfall in the area is 981 mm. The site expriences only one continuous rainfall season.

Mean maximum and mean minimum temperatures are 25.4°C and 9.5°C respectively. The potential annual evaporation and evapotranspiration is 1742 mm and 1162 mm respectively (KMD 1984).

Geology

The site is underlain by Lower Pleistocene deposits. The local petrography is welded pumiceous tuff, with admixtures of ash ejected from the Menengai Crater. These tuffs are used as building materials.

Land use

The main crops grown are maize, wheat, barley, beans, cabbages and potatoes. Daily cattle are also kept in this area.

Soils

The soils are well drained, moderately deep, friable when moist, sticky and plastic when wet. They have good physical characteristics. The soils have a high organic matter content hence the very dark brown colours. They have a high water holding capacity. They have low bulk densities and are porous. The pH-soil varies from 6.1 to 5.7. The CEC varied from 43.34me/100gm soil in the topsoil to 47.32 me/100gm soil in the subsoil. The base saturation varied from 42.3 to 34.9%. They classify as Haplic Andosols (FAO/UNESCO classification 1990). For more details see profile in stop 1.

STOP 2: Little Farm - Bahati

The site is located on an undulating upland at an altitude of 2154 m. It is bordering a hilly topography to the East.

Climate

The average annual rainfall is 1249 mm. No specific meteorological station is located near that farm.

Geology

The geology of the site consists of Miocene volcanic deposits. The local petrography is phonolites.

Land use

The land use in the area is characterised by large coffee estates to the west and a large tea estate to the north. The high areas are covered by uncleared natural forests. Subsistence crops are also grown. These include maize and beans. Cabbages, potatoes and tomatoes are also

grown. Some dairy livestock are kept in the areas around the site.

Soils

The soils are well drained, very deep, friable when moist sticky and plastic when wet. They have good physical characteristics. They have high organic matter contents in the topsoil. They have high water holding capacities. They have high porosities. The pH-soil varies from 5.1 to 5.9. The CEC varies from 45.92me/100gm soil in the topsoil to 31.36me/100gm soil in the subsoil. The base saturation is also varied so that in the A horizon it is 34.5% and in the B horizon it ranges from 34.8% to 19.4%. These soils classify as Humic Alisols (FAO/UNESCO classification 1990). For more details see profile in stop 2.

STOP 3: OL JORO OROK Research Station

The site is located on a flat plateau at an altitude of 2400 m above sea level.

Climate

The average annual rainfall is 1026 mm after 25 yrs record. The distribution of this rainfall is such that it occurs in one rainfall season (March-August). The mean maximum annual temperature is 24.9°C and the mean minimum is 13.0°C.

The relative humidity is 79% and 53% for 0600 GMT and 1200 GMT respectively. The mean annual evaporation is 1608 mm and the potential evapotranspiration is estimated as 2/3 Eo where Eo is the pan evaporation (1072 mm).

Geology

The geology of area is phonolite of miocene age.

Land use

The site is located in a Rangeland. The Rangelands have been subdivided due to pressure of land into small parcels. The parcels are cultivated for subsistence crops. The crops cultivated include maize, wheat, barley, pyrethrum, beans, peas, cabbages and potatoes. Dairy and beef cattle and sheep are kept.

Soils

No profile pit was dug.

STOP 4: Ol Kalau

The site is located on a flat plateau at an elevation of 2359 m above sea level.

Climate

The average annual rainfall for 32 years is 766.1 mm. This site has one continuous rainfall season.

Geology

The area is underlain by recent volcanic deposits.

Land use

A considerable area around this site is used as grazing land. The land has been subdivided due to the population pressure in the area. This pressure has changed the land use of the area. Currently subsistence crops are grown. These include beans, maize, potatoes cabbages, peas and some wheat. Formaly the area used to be referred to as white highlands since this area was occupied by the white settlers.
Dairy cattle are kept to a small extent.

Soils

The soils of the area are moderately well drained with a pronounced and abrupt transition between a relatively light textured topsoil and a heavy, compacted B-horizon.
The soils have poor drainage which results in waterlogging. Artificial drainag is therefore the main management problem of these soils. Camberbeds were constructed in the past when these were large grazing lands. The pH-soils 5.4 varies from to 6.6. CEC varies from 20.72 me/100gm soil in the topsoil to 70.45 me/100gm soil in the subsoil. Base saturation varies from 68.3% to 39.9%. They classify as Dystric Planosols (FAO/UNESCO 1990) for details see profile in stop 4

STOP 5: Mbaruk area (Kiungururia Farm)

The site is located on a gently undulating plain at an elevation of 1908 m above sea level.

Climate

The average annual rainfall 781 mm. This site has one continuous rainfall season, No meteorological station is located at the site but the nearest station has been used to provide rainfall data.

Geology

The site is underlain by lower pleistocene volcanics. The local petrography is welded tuff which in most cases used as a building stone.

Land use

Most of the area used to be large ranches during the colonial time as was mentioned earlier in stop 4. The ranches have since been bought by the indegeous people from the white settlers. They are now subdivided. The land use include cultivation of maize, beans, cabbages, potatoes, citrus, wheat, barley and some dairy cattle.

Soils

The soils are well drained, shallow, friable when moist, sticky and plastic when wet. They have good physical characterstics. They have a high organic matter content hence dark colours. They have a high water holding capacity. They have low bulk densities and high porosities. The pH ranges 7.8 to 5.9 and CEC is from 17.36 me/100gm soil to 14.45 me/100gm soil and the base saturation ranges from 100+% to 59.6%. They classify as Dystric Cambisols according to FAO/UNESCO 1990. For more details see profile in stop 5.

STOP 6: Lake Nakuru National Park

The site is located on a nearly level to very gently undulating lacustrine plain. It is at an altitude of 1785 m
above sea level.

Climate

The average annual rainfall of this site is 856 mm taken over 60 yrs. The site has a continuous one rainfall season.

Geology

The site is underlain by recent Lacustrine deposits. The local petrography is fine sand.

Land use

The land use of this area is wildlife conservation.

Soils

The soils found at this site are moderately well drained, very deep clay loam to clay down the profile. They have high contents of salts. Salt crusts are observed at the soils surface. Most of the year, they experience waterlogging. The pH-soil ranges from 8.5 to 9.4; CEC from 51.45me/100gm soil to 41.33 me/100gm soil and base saturation from 100+% to 41.33%. They classify as Stagnic Solonetz (FAO/UNESCO 1990).
For more details see profile in stop 6.

Profile pit Descriptions and Data

LABORATORY DATA OF PROFILE DESCRIPTION No. 1

Observation no: Stop 1 **Mapping unit:** **Soil classification:** Haplic Andosols

Laboratory no. /92	6322	6323	6324			
Horizon	Ap	BW	CB			
Depth(cm)	0-33	33-61	61-90			
pH-H_2O(1: v/v)	5.7	5.8	6.1			
pH-KCl "						
EC(mmho/cm) "						
$CaCO_3$(%)						
$CaSO_4$(%)						
C (%)	1.92	1.01	0.83			
N (%)						
C/N						
CEC(me/100g), pH 8.2						
CEC " " pH 7.0	43.4	41.44	47.32			
Exch.Ca(me/100g)	10.9	12.4	14.6			
" Mg "	1.12	1.44	1.08			
" K "	2.34	2.14	3.04			
" Na "	0.80	1.05	1.30			
Sum of cations	15.16	17.03	20.02			
Base sat. %, pH 8.2						
" " %, pH 7.0	34.9	41.1	42.3			
ESP at pH 8.2	1.8	2.5	2.8			
Texture (limited pretreatment)						
Gravel % (>2.0mm)		-				
Sand % (2.0-0.05mm)	34	30	30			
Silt % (0.05-0.002mm)	20	28	28			
Clay % (0.002-0mm)	46	42	42			
Texture class	C	C	C			

Fertility aspects 0 - 30 cm **Laboratory no.** 6326 /92

General		Available nutrients			
pH-H_2O (1: v/v)	5.4	Na/me/100g)	0.66	Mn(me/100g)	1.22
Exch. acidity (me/100g)	0.4	K "	1.38	P (ppm)	
C %	2.04	Ca "	6.0	P-Olsen(ppm)	12
N %		Mg "	2.70		

Remarks:

STOP. 1
Site characteristics

Location	:	Bahati, Maili saba
Observation	:	11913
Agroclimatic zone	:	III
Parent material	:	Welded Pumiceons Tuff
Physiography	:	Plain
Macro relief	:	Flat or almost flat, 0-1%,>100m long, regular
Micro relief	:	Nil
Vegetation/landuse	:	Wheat, cabbages, maize, potatoes, Kales
Surface sealing	:	Nil
Drainage class	:	Well drained
Described by	:	Kibe/Gicheru

Profile Description

AP 0-30 cm Very dark brown (10YR 2/2) moist, dark yellowish brown (10YR 3/4) dry; silt clay; strong, very fine crumbs, weak, fine subangular blocky; slightly hard dry, friable when moist, sticky and slightly plastic when wet; many fine and medium pores; many very fine and fine roots; clear and smooth transition to:

(Lab.No.6322)

BW 33-61 cm Dark brown (7.5 YR 3/2) moist, dark yellowish brown (10YR 3/4) dry; weak to moderate fine and medium subangular blocky; slightly hard when dry, friable when moist, sticky and plastic when wet; few patchy organo-argillans; many very fine and fine pores; many very fine and fine roots; clear and smooth transition to:

(Lab.No.6323)

CB 61-90 cm Dark brown (7.5YR 3/2) moist, strong brown (7.5YR 4/6) dry; clay; moderate subangular blocky, slightly hard when dry, friable when moist, stick and plastic when wet; many very fine and fine pores; many very fine and fine roots; clear and smooth transition to:

(Lab No.6324)

C 90-100 cm Dark yellowish brown (10YR 3/4) moist, yellowish brown (10YR 5/6) dry

LABORATORY DATA OF PROFILE DESCRIPTION No. 2

Observation no: Stop 2 **Mapping unit:** **Soil classification:** Humic ALIS

Laboratory no. /92	6318	6319	6320	6321		
Horizon	Ap	Bt_1	Bt_2	Bt_3		
Depth(cm)	0-30	30-80	80-106	10-170		
pH-H_2O(1: v/v)	5.8	5.9	5.5	5.1		
pH-KCl "						
EC(mmho/cm) "						
$CaCO_3$(%)						
$CaSO_4$(%)						
C (%)	2.99	1.1	0.59	0.47		
N (%)						
C/N						
CEC(me/100g), pH 8.2						
CEC " " pH 7.0	45.92	34.44	37.8	31.36		
Exch.Ca(me/100g)	11.4	6.7	4.0	4.2		
" Mg "	1.52	0.96	0.80	0.64		
" K "	2.14	0.62	0.34	0.30		
" Na "	0.8	0.75	0.8	0.95		
Sum of cations	15.86	9.03	13.14	6.09		
Base sat. %, pH 8.2						
" " %, pH 7.0	34.5	26.2	34.8	19.4		
ESP at pH 8.2	1.7	2.3	2.1	1.8		

Texture (limited pretreatment)						
Gravel % (>2.0mm)	16	20-	14	12		
Sand % (2.0-0.05mm)						
Silt % (0.05-0.002mm)	30	6	28	48		
Clay % (0.002-0mm)	54	74	581	40		
Texture class	C	C	C	C		

Fertility aspects 0 - 30 cm **Laboratory no.** 6325 /92

General		Available nutrients			
pH-H_2O (1: v/v)	6.2	Na/me/100g)	0.44	Mn(me/100g)	1.16
Exch. acidity (me/100g)	-	K "	0.78	P (ppm)	
C %	2.68	Ca "	8.8	P-Olsen(ppm)	6
N %		Mg "	2.75		

Remarks:

STOP NO. 2

Site characteristics

Location	:	(Nakuru) Little Farm
Observation No.	:	119/1
Agroclimatic zone	:	III
Parent material	:	Phonolite
Physiography	:	Upland
Macro relief	:	Undulating, 7%,>100m long, irregular, straight
Micro relief	:	Nil
Vegetation/Land use	:	Grassland/cultivation
Erosion	:	Nil
Surface sealing	:	Nil
Drainage class	:	Well drained
Described by	:	Gicheru/Kibe/Okoth

Profile description

Ap	0-30 cm	Dark reddish brown (5YR 3/2) moist, dark reddish brown (5YR 3/4) dry; clay; weak medium subangular blocky; friable when moist, sticky and plastic when wet; many very fine, common fine and macro pore; common Krotovinas and worm channels; Frequent, very fine and fine roots, many medium roots; clear and wavy transition to:
		(Lab No.6318)
Bt1	30-80 cm	Dark reddish brown (2.5YR 3/4) moist and dry; clay; moderate medium angular blocky breaking down into moderate coarse subangular blocks; friable when moist, sticky and plastic when wet; patchy thick clay cutans; many very fine and fine roots; clear and wavy transition to:
		(Lab No.6319)
Bt2	80-106 cm	Dark reddish brown (2.5YR 3/4) moist, dark red (2.5YR 3/6) dry; clay; strong very fine, strong fine and medium subangular blocky; friable when moist, sticky and plastic when wet; patchy thin clay cutans; very many very fine, common fine and few macro pores; common fine and fine roots; clear and smooth transition to:

(Lab No.6320)

Bt3	106-170+	Dark red (2.5YR 3/6) moist and dry; clay; strong very fine and fine subangular blocky; very many very fine, common fine and few macro pores; common very fine and fine roots.

(Lab No.6321)

LABORATORY DATA OF PROFILE DESCRIPTION No. 3

Observation no: Stop 4 **Mapping unit:** **Soil classification:** Dystri Planoso

Laboratory no. /92	8040	8041	8042	8043	8044	
Horizon	AP	E_1	E_2	Bt	C	
Depth(cm)	0-20	20-32	32-46	46-109	109-144	
pH-H_2O(1: v/v)	5.6	5.6	5.4	6.4	6.6	
pH-KCl "						
EC(mmho/cm) "						
$CaCO_3$(%)						
$CaSO_4$(%)						
C (%)	1.41	0.96	1.14	0.59	0.16	
N (%)						
C/N						
CEC(me/100g), pH 8.2						
CEC " " pH 7.0	20.72	19.49	17.53	70.45	49.17	
Exch.Ca(me/100g)	6.0	6.2	6.0	30.0	28.0	
" Mg "	0.40	0.24	0.16	3.76	1.76	
" K "	0.56	0.34	0.28	2.34	1.94	
" Na "	1.30	1.10	0.90	6.0	1.9	
Sum of cations	8.26	7.88	7.34	42.1	33.6	
Base sat. %, pH 8.2						
" " %, pH 7.0	39.9	40.4	41.9	59.8	68.3	
ESP at pH 8.2	6.3	5.6	5.10	8.5	3.9	
Texture (limited pretreatment)						
Gravel % (>2.0mm)						
Sand % (2.0-0.05mm)	28	30	28	14	42	
Silt % (0.05-0.002mm)	40	38	40	8	14	
Clay % (0.002-0mm)	32	32	32	78	44	
Texture class	C/CL	CL	CL	C	C	

Fertility aspects 0 - 30 cm **Laboratory no.** 8039 /92

General		Available nutrients			
pH-H_2O (1: v/v)	5.2	Na/me/100g)	0.36	Mn(me/100g)	0.24
Exch. acidity (me/100g)	0.1	K "	0.26	P (ppm)	
C %	1.32	Ca "	2.40	P-Olsen(ppm)	6
N %		Mg "	1.0		

Remarks:

STOP NO. 4
Site characteristics

Location	:	Shiranga (Nyandarua)
Observation No.	:	119/4
Agroclimatic zone	:	IV
Parent material	:	Superficial deposits
Physiography	:	Plateau
Macro relief	:	Almost flat, 1.5%, 500-800 long, straight
Micro relief	:	Nil
Vegetation/land use	:	Grassland/Grazing
Erosion	:	Nil
Surface sealing	:	Nil
Drainage class	:	Moderately well drained
Described by	:	Gicheru/Okoth/Kimani

Profile description

Ap	0-20 cm	Dark brown (10YR 3/3) moist, common fine distinct mottle, strong brown (7.5YR 4/6); silt clay loam; weak fine and medium subangular blocky; slightly hard when dry, friable when moist, sticky and plastic when wet; many very fine and fine, few common pores; common very fine roots; clear and smooth transition to:
		(Lab No.8040)
E1	20-32 cm	Dark grayish brown (10YR 4/2) moist, light gray (10YR 7/2) dry; common fine distinct mottles, strong brown (7.5YR 4/6; silt clay loam; weak medium prismatic, breaking down into weak, medium to coarse angular blocky; soft to slightly hard when dry, friable when moist sticky and plastic when wet; many very fine and fine, few coarse pores, abudant weatherable, exposed sand grains; many fine to medium roots; clear and smooth transition to:
		(Lab No.8041)
E2	32-46 cm	Grayish brown (10YR 5/2) moist, light gray (10YR 7/2) dry; common fine distinct mottles, strong brown (7.5YR 4/6); silt clay loam to silt clay; weak medium prismatic breaking down into weak to moderate, medium to coarse subangular blocky; soft to slightly when, friable when moist, sticky and plastic when wet;

smooth transition to:

(Lab No.8053)

C1	45-76cm	Very dark grayish brown (2.5Y 3/2) moist; few fine, distinct, strong brown (7.5YR 4/6) mottles; clay; weak, medium, prisms, breaking down into weak, medium, subangular blocky; friable when moist, slightly sticky and slightly plastic when wet; few very fine, common fine and few medium pores; few very fine, common fine and few medium pores; few very fine and common fine roots; clear and smooth transition to:

(Lab No.8054)

C2	76-92 cm	Dark grayish brown (2.5Y 4/2) moist, fine loamy sandy; weak, medium prisms, breaking down into weak, medium and coarse, subangular blocky; friable when moist, none sticky and none plastic when wet; many very fine and fine pores; common very fine and fine roots; clear and smooth transition to:

(Lab No.8055)

C3	92-117 cm	Olive brown (2.54Y 4/4) moist; few fine, distinct, strong brown (7.5YR 4/6) mottles; clay; strong, moderate, platty; friable when moist, stick and plastic when wet; few very fine, common fine and few medium pores; common very fine and fine roots; clear and smooth transition to:

(Lab No.8056)

C4	117-135+	Dark grayish brown (2.5Y 4/2) moist, few fine, faint, strong brown mottles (7.5YR 4/6); clay; moderate, fine, platty; friable when moist, sticky and plastic when wet; common very fine and fine roots.

(Lab No.8057)

LABORATORY DATA OF PROFILE DESCRIPTION No. 4

Observation no: Stop 5 **Mapping unit:** **Soil classification:** Dystric Cambisol

Laboratory no. /92	8046	8047				
Horizon	Ap	Bw				
Depth (cm)	0-23	23-37				
pH-H_2O (1: v/v)	6.2	5.9				
pH-KCl "						
EC (mmho/cm) "						
$CaCO_3$ (%)						
$CaSO_4$ (%)						
C (%)	0.94	0.84				
N (%)						
C/N						
CEC (me/100g), pH 8.2						
CEC " " pH 7.0	17.36	14.45				
Exch. Ca (me/100g)	6.6	5.4				
" Mg "	0.56	0.64				
" K "	2.14	3.24				
" Na "	1.05	0.7				
Sum of cations	10.4	9.3				
Base sat. %, pH 8.2						
" " %, pH 7.0	59.6	100+				
ESP at pH 8.2						

Texture (limited pretreatment)						
Gravel % (>2.0mm)		-				
Sand % (2.0-0.05mm)	50	48				
Silt % (0.05-0.002mm)	24	24				
Clay % (0.002-0mm)	26	28				
Texture class	SCL	SCL				

Fertility aspects 0 - 30 cm **Laboratory no.** 8037 /92

General		Available nutrients			
pH-H_2O (1: v/v)	6.2	Na/me/100g)	0.7	Mn (me/100g)	0.66
Exch. acidity (me/100g)	0.1	K "	1.28	P (ppm)	
C %	0.94	Ca "	3.90	P-Olsen (ppm)	23
N %		Mg "	2.0		

Remarks:

STOP NO. 5
Site characteristics

Location	:	Nakuru (Mbaruk)
Observation No.	:	
Agroclimatic zone	:	IV
Parent material	:	Tuff
Physiography	:	Plain
Macro relief	:	Gently undulating, 3%, 300m long, straight
Micro relief	:	Nil
Vegetation/land use	:	Citrus cultivation
Erosion	:	Nil
Surface sealing	:	Nil
Drainage class	:	Well drained
Described by	:	Gicheru/Okoth/Kimani

Profile description

Ap	0-23 cm	Dark brown (7.5YR 3/4) moist, brown (10YR 5/3) dry; sandy clay; strong fine crubs, strong fine and medium subangular blocky; slightly hard when dry, friable when moist, sticky and slightly plastic when wet, very many micro pores, common fine pores, few macro pores; few crotovinas; many very fine, few fine, few coarse roots; clear and smooth transition to: (Lab No.8046)
Bw	23-37 cm	Dark brown (7.5YR 3/4) moist; sandy clay to clay; moderate fine to medium subangular blocky; slightly hard when dry, friable when moist, sticky and plastic when wet; very many micro, common fine, few macro pores; common very fine, few fine and medium, few coarse roots; clear and smooth transition to: (Lab No.8047)
C1	37-50 cm	Tuff

LABORATORY DATA OF PROFILE DESCRIPTION No. 5

Observation no: Stop 6 **Mapping unit:** **Soil classification:** Stagnic Solon

Laboratory no. /92	8051	8052	8053	8054	8055	8056
Horizon	AH	Bt_1	Bt_2	C_1	C_2	C_3
Depth (cm)	0-9	9-25	25-45	45-76	76-92	92-117
pH-H_2O (1: v/v)	8.5	8.9	9.2	9.2	9.3	9.4
pH-KCl "						
EC (mmho/cm) "						
$CaCO_3$ (%)						
$CaSO_4$ (%)						
C (%)	6.1	0.6	0.23	0.25	0.18	0.16
N (%)						
C/N						
CEC (me/100g), pH 8.2						
CEC " " pH 7.0	56.45	39.10	41.33	67.10	36.85	67.65
Exch. Ca (me/100g)	20.0	17.0	17.0	18.2	20.0	22.0
" Mg "	4.88	tr	tr	tr	tr	0.16
" K "	7.94	11.14	9.44	13.54	7.94	10.34
" Na "	7.0	17.0	18.5	33.0	14.5	29.5
Sum of cations	39.82	45.14	44.94	64.74	42.44	62.0
Base sat. %, pH 8.2						
" " %, pH 7.0	70.5	100+	100+	96.5	100+	91.7
ESP at pH 8.2	12.4	43.5	44.8	49.2	39.3	43.6
Texture (limited pretreatment)						
Gravel % (>2.0mm)						
Sand % (2.0-0.05mm)	56	24	18	14	24	18
Silt % (0.05-0.002mm)	28	56	66	54	58	26
Clay % (0.002-0mm)	16	20	16	32	18	56
Texture class	SCL	SCL	SiL	SiCL	Sil	C

Fertility aspects 0 - 30 cm **Laboratory no.** 8038 /92

General		Available nutrients			
pH-H_2O (1: v/v)	8.2	Na/me/100g)	5.90	Mn (me/100g)	0.08
Exch. acidity (me/100g)	-	K "	2.70	P (ppm)	
C % 0.95		Ca "	24.50	P-Olsen (ppm)	.66
N %		Mg "	0.6		

Remarks:

STOP No. 6
Site characteristics

Location	:	Lake Nakuru National Park (Nakuru)
Observation No.	:	
Agroclimatic zone	:	IV
Parent material	:	Fine sand (Recent Laustrine Deposits)
Physiography	:	Lacustrine plain
Macro relief	:	Very gently undulating , 0-2%
Micro relief	:	Nil
Vegetation/Landuse	:	Wooded grassland/wildlife
Erosion	:	Nil
Surface sealing	:	Nil
Drainage class	:	Moderately well drained
Described by	:	Okoth/Gicheru/Kimani

Profile description

Ah	0-9 cm	Very dark grayish brown (10YR 3/2) moist,grayish brown (10YR 5/2) dry; clay loam; moderate, fine to medium crumbs; friable when moist, slightly sticky and slightly plastic when wet; many very fine to coarse pores; common rodents and worm channels; abudant very fine and fine, common medium roots; clear and smooth transition to: (Lab No.8051)
A	9-25 cm	Very dark grayish brown (2.5Y 3/2) moist grayish brown (10YR 5/2) dry; few medium, distinct, strong brown (7.5YR 4/6) mottles; fine loamy sand; weak medium prisms, breaking down into weak, medium subangular blocky; friable when moist, none sticky and none plastic when wet; many very fine and fine, common macro pores; common rodents and warm channels; common very fine and fine roots; clear and smooth transition to: (Lab No.8052)
Bt	25-45 cm	Dark grayish brown (2.5Y 4/2) moist, few medium, distinct, strong brown (7.5YR 4/6); mottle; clay loam, weak, subangular blocky; friable when moist, slightly sticky and slightly plastic when wet; common very fine and fine pores, common very fine and fine roots; clear and

		common very fine pores; 25% Fe and Mn concretions, 1-8 mm; few fine roots; clear and smooth.
		(Lab No.8042)
Bt	46-109 cm	Dark brown (10YR 3/3) moist; clay; weak medium and coarse prisms; hard when dry, firm when moist, sticky and plastic when wet; few fine roots; abrupt and smooth transition to:
		(Lab No 8043)

REFERENCES

EAMD, 1972. Climatorological Statistics for East Africa, Nairobi.
Jaetzold, R. and Schmidt, H. 1983. Farm Management Handbook of Kenya Vol.II

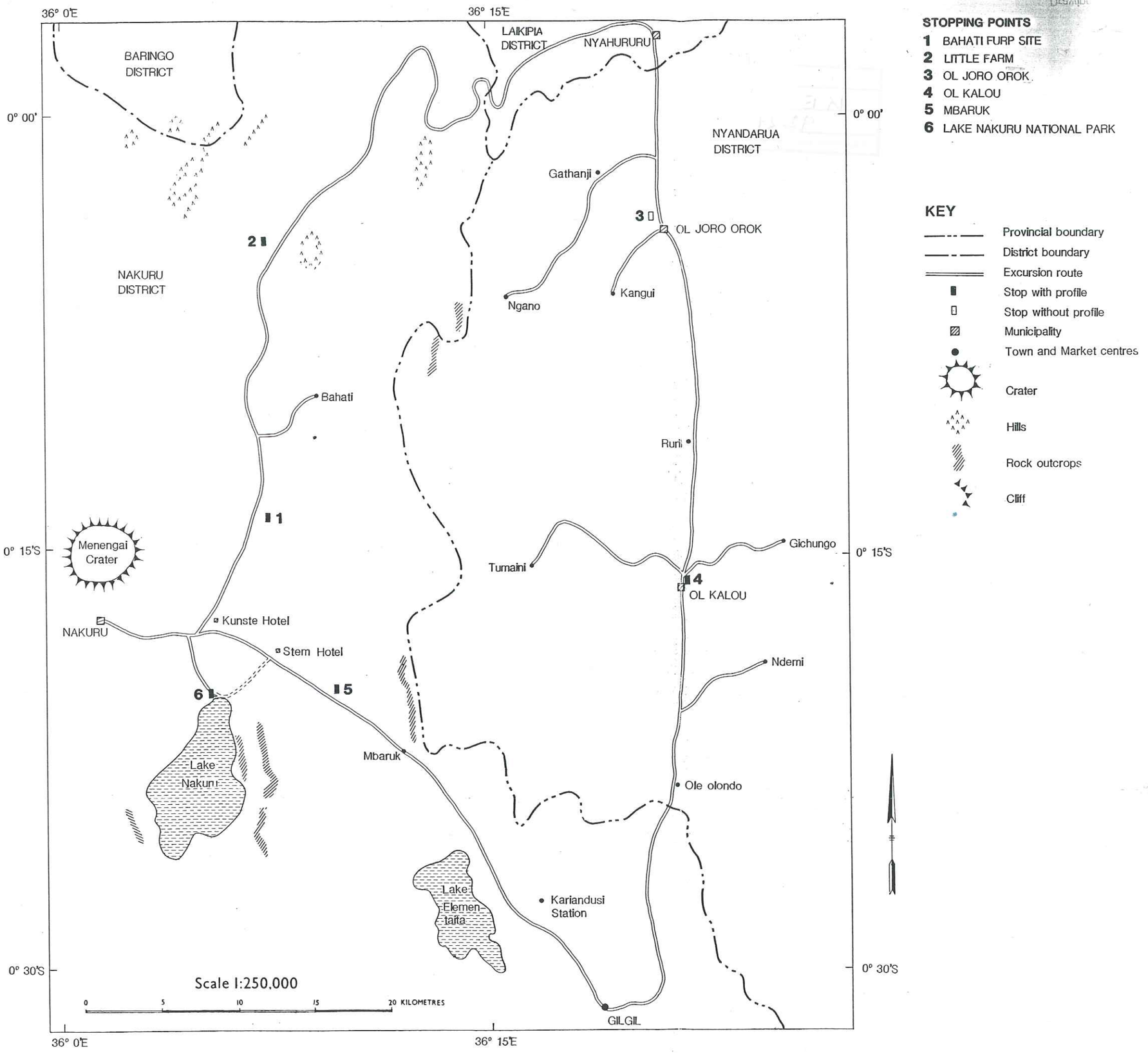

Fig. 1 Excursion route map