

AGRICULTURAL DEVELOPMENT AND RESEARCH PRIORITIES

FOR A SEMI ARID AREA OF MACHAKOS DISTRICT,

KENYA

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Introduction

The study area comprising of Mwala and Mbiuni locations (Kagundo Division) of Machakos District lies within the semi-arid tropics. Fifteen per cent of total land area in the district is arable predominated by a subsistence type of farming.

The objective of the study was to describe and to analyse the principal farming systems; to identify their physical, biological, social and economic constraints to increasing production; to identify areas of research interest and intervention; to examine the effectiveness of extension, and to analyse the decline of cotton in Mwala and Mbiuni between 1979/80 and 1981/82.

Methodology

A reconnaissance survey (3 days) with a checklist of questions was undertaken to familiarize the group with the study area, to establish "recommendation domains" (Byerlee et al, 1980) and to satisfy protocol requirements.

Subsequently, an in-depth survey (3 days) of 18 purposively selected farmers was carried out using guidelines to facilitate an understanding of the farming systems, to identify major constraints and areas of interest and to formulate hypotheses as an input to the formal survey.

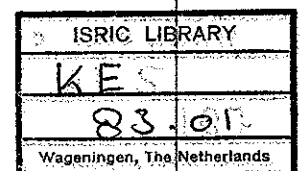
The formal survey (6 days) of 108 farmers with a questionnaire was designed to test the hypotheses and to quantify descriptive data.

An additional survey of 40 farmers was conducted in Kalame location of Kilome Division to compare the effectiveness of the current extension service with that in Mwala and Mbiuni. Farmers were selected for this and the formal survey on a random basis.

Environment and the farming system

The Western border of Mwala and Mbiuni is formed by the Kanzalu range and the East by the only permanent river, the Athi. Annual rainfall for the area is bimodal, averaging about 750 mm, though varying greatly in quantity and distribution; thus farming is not without risk.

Soils in the study area are mainly Ultisols (85%) although Inceptisols (10%) and Entisols (4%) may be found.



Soil erosion is a problem although terraces can be found on most farms. The soils are inherently poor in fertility with low organic matter content. Since settlement began in the seventeenth century, the Kamba, the predominant tribe in the area, have changed from agro pastoralism to a system of permanent cultivation with keeping of livestock.

On the farm, the roles of men and women have now become less demarcated and off-farm employment has become increasingly important. Over time, cropping patterns have changed from a sorghum millet mix to a maize-beans-pigeon pea combination. Livestock is important for many reasons e.g. as a store of wealth and for meeting other requirements in the farming system such as milk, meat and draught power. Each location is administered by a Chief and the sublocation by Assistant Chiefs while other social organizations e.g. self help groups, women's groups, do exist and perform other important agricultural functions.

Each location has a market operating twice a week and communications with Machakos and Nairobi are good.

A number of Government institutions affect farmers' production and marketing activities: the Ministry of Agriculture is responsible for extension in the area, the Ministry of Livestock Development is responsible for cattle dips and livestock extension among other functions, the National Dryland Farming Research Station at Kahimani (the major agricultural research station in the district), the National Cereals and Produce Board, which controls prices for farm produce and the Machakos Integrated Development Programme.

The farming system in Mwala and Mbiuni was found to be relatively homogenous with most farmers owning one parcel of land. The average farm size was 4.1 ha of which 42 per cent was under cultivation. Farm sizes increased from west to east. Cash requirements were met by sales of livestock and/or cash crops. Recently, fruit production has become increasingly important as a source of cash earnings for many farmers. Major food crops were maize, beans, pigeon peas and cowpeas grown either in pure stands or in various combinations.

Only seven per cent of the farmers used chemical fertilizer, while 79 per cent used farm yard manure. Use of pesticides was limited to 26 per cent of the farmers. Land preparation was performed using oxen and mould board plough. Eighty one per cent of the farmers owned some form of livestock, most commonly cattle, goats, sheep. Most households possessed at least a few chickens.

Farmers in the study area were found to be passive regarding buying and selling of crops and/or livestock, responding to cash needs rather than market opportunities and most households (90%) earned or received income from off-farm sources.

Constraints

The semi-arid climate of the study area renders it unsuitable for much of the current high-input agricultural technology. According to Braun (1977), the bimodal rainfall pattern and the brevity of the seasons act as a major constraint in the farming system, and the probability of obtaining one good crop per year is only 58 per cent. The short duration of the rainy season necessitates the growing of crops which can complete their life cycle within 80-90 days or those that can withstand the dry spell inbetween. Inherently low soil fertility poses a major problem for realizing the full yield potential of crops. The situation is further accentuated because of a shortage of farm yard manure. The condition of the soil after the dry spell and the available draught power (0.1 kW/ha) makes land preparation before the onset of rains (made necessary by the brevity of the rainy season) very difficult; ultimately, low yields are the result.

Stocking rates in the study area were much higher than recommended. With decreasing farm sizes one would expect farmers to reduce livestock numbers in line with the carrying capacity of the land, but this was not the case. Poor management of grazing areas has resulted in a degradation of soils over time.

The apparent lack of a commercial approach to buying and selling of crops and/or livestock appeared to be a constraint in the system, occurring because other factors determine when households can trade and because the need to ensure future food security is paramount. Income from off-farm sources was important not in the way it relieved agricultural constraints (e.g. purchase of inputs) but for other less risky investments (e.g. education, permanent roofing) in the system.

Extension workers in the study area were constrained by poor transport facilities and the sheer numbers of farmers to be visited (1 extension worker: 700 - 1200 households).

Research proposals

Research efforts should concentrate on developing a low to medium input agricultural production system offering reasonable output.

Land preparation, planting and weeding, management of soil fertility and management of livestock and grazing areas are the main areas where research efforts need to be strengthened in order to relieve constraints in the system.

The short rainy season makes timely land preparation essential and further research to explain farmer practice is necessary. Precise draught power requirements need to be estimated and depending on the results, research should aim at increasing available draught power and improving implement design not only to reduce draught power requirements but also to maximise soil moisture retention and minimise soil losses during tillage. The former is a long term proposal involving breeding of oxen for higher work output levels or use of supplementary draught power (e.g. tractor) once every two or three years. The latter could be achieved by use of tined implements. In view of the low rainfall in the area, the possibility of using minimum tillage and mulching techniques should be investigated. This could also help in preventing run-off from terraces. Ox-cart design needs to be improved to minimize problem of transporting manure to the field. To overcome problems associated with weeding, design and development of better and cheaper inter-row cultivators reducing plant damage should be undertaken.

Research efforts should also be directed at efficient management of grazing areas, either by practices such as rotational grazing or planting improved grasses and fodder crops.

Soil fertility can be improved via planting of N-fixing trees, which could also be a source of feed for livestock. Assessment and improvement of crop residue quality needs to be undertaken.

Agricultural development includes training farmers in new skills. In order to encourage farmers to adopt a more commercial attitude in farming, training in book-keeping and marketing techniques should be introduced. Handicrafts, being an important source of income need to be encouraged, particularly in terms of quality; existing schemes could also be expanded. One way of tackling the livestock density problem would be to encourage farmers to consider alternative wealth stores e.g. a bank or post office savings accounts.

Factors affecting the work efficiency of front line extension staff need to be researched. At the same time training programmes such as methods of extension teaching etc. could improve the effectiveness of extension staff. Better transport facilities and less households per extension worker may also be important. Production of fruits should be encouraged as a source of income for farmers, provided adequate transport and market facilities exist.

If cotton production is to be encouraged in the study area, the existing disincentive to grow cotton should be removed by separating payments for growing cotton from MDCU's method of collecting outstanding loans under SPSCP and AIDP. Extension agents should ensure that cotton growers have better understanding of spraying techniques and price information.