"DECISION MAKING AMONG SMALL SCALE WOMEN HORTICULTURAL FARMERS IN LIMURU LOCATION OF KIAMBU DISTRICT, KENYA"

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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This thesis has been submitted for examination with our approval as the University supervisors.

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This work is dedicated to
my parents
Mr. & Mrs. Nicholas Nge'the,
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ABSTRACT

This study is an examination of the factors that small scale women farmers consider when engaging in horticultural farming. The study focused on a small area of Limuru Location, Kiambu District, Central Province.

The objectives of the study were to identify the varieties of horticultural crops cultivated in the area and the individuals responsible for choosing these crops. It also investigated and documented the rationale for the choices made regarding type of crops grown and methods for solving problems encountered. The study finally presents an anlysis of factors that come into play in the horticultural industry with special reference to decision-making.

The research was carried out between January and March 1990. The data collection methods used were those of library and archival records, survey, scheduled interviews, discussions with key informants and participant observation. Qualitative method of data analysis was employed coupled with simple percentages calculated from the responses of informants.

The study established that in the horticultural industry of the area under study, women are key decision makers on farm and farm related activities. Decisions made focus on household food requirements and generation of hard cash used to purchase other household needs, and agricultural materials. In the whole exercise of decision making, several factors were considered. These were land size, structure, availability and access to essential inputs, technical applicators or possibility of improvisation, marketability, time of maturing of crops, possibility of intercropping and many more.

Agricultural decisions made were found to be practical, realistic and progressive in promoting horticultural development and assurance of self-sustenance.

CHAPTER ONE

INTRODUCTION

1.1 PREAMBLE

This study concerns itself with the process of decision making, that is, the taking of a stand with regard to an issue posed to an individual's mind. Lancaster (1966,1971) Put forward the theory of Real Life Choice, which explains how people in everyday life make choices among a large number of variables. According to this theory, decision-making takes place in two stages, preattentive and attentive. Preattentive (conscious) stage is a quick process of elimination, by aspects of the alternatives having some characteristics that the decision-maker does not like. The decision-maker is then left with alternatives with characteristics that he or she likes. With these alternatives an individual will then proceed to the second (Conscious) stage of "hardcore" decision making process.

In the attentive stage the decision maker consciously orders each option on the basis of one or more important aspects. The top options in ranking are those which have passed almost or all constraints of the decision situation (Gladwin, 1980-pp85). Here a constraint is defined as a requirement in an alternative which the decision maker is unable to resolve. If, for example, one of the crops among the available alternatives requires to be sprayed with a chemical that has to be bought from a local retailer, and the farmer has no money with which to buy it, this constraint forces him or her to automatically eliminate that crop. At the very end of the decision making process the decision maker may have to carry out trade offs, weigh pros and cons before finally reaching a decision on which crop or crops to plant.

A casual observer of the day-to-day routine of small-scale women horticultural farmers, is likely to conclude that such women are traditional and homogeneous in the way they tackle farming decisions. While the element of tradition in agriculture, and for that matter horticulture, cannot

be ruled out, still women make varying and very crucially important decisions in farming. An indepth research on factors women consider when making decisions in agriculture reveals varying priorities due to differences in socio-economic status and their educational levels, among other factors. Decision making has been described as the most important step that any farmer takes towards the right or wrong direction in farming activities (Janick, 1972 pp9).

When talking about horticulture, it is not easy to avoid the term agriculture since one is the child of the other. It is necessary that the two terms be closely defined in order to avoid a misunderstanding whereby one term is taken to mean the other. Janick (1972) defined agriculture as purposeful work through which elements of nature are harnessed to produce plants and animal that meet human needs. It is a production process which depends on selected plants and animals within a local environment, exploited through cultural knowledge and skills learned from past generations by a socialization process (Steward, 1955 pp129). Leaving aside the animal husbandry sector of agriculture, horticulture falls within the plant domain. It is a term that first appeared in the literature in the 17th century, derived from two Latin words "hortus" meaning garden and "coleare" meaning cultivate. Horticulture as a cultivated crop envelops three farming activities, namely: pomology, the science and art of producing fruits; oreliculture, the art of growing vegetables; and floriculture, the art of growing flowers for ornamental purposes (Janick, 1972 pp31).

1.2 PROBLEM STATEMENT

Decision making in all aspects of life is a topic that has attracted considerable scholarly investigations. In the agricultural sector, decision-making studies have focused more on male than female farmers because of the assumption that men are always heads of households and owners of the land on which production is carried out. Women are assumed to be merely house and farmers' wives whose activities are in the kitchen. In cases where they go out of it, they only assist either their spouse farmers or male

relatives if unmarried (Sachs, 1983). However, Bernes (1978-pp58) notes that more and more women are becoming heads of their own households. It should follow, therefore, that such female heads do make or should make decisions for their own households.

This work is a study of the process of decision making among women who engage in agriculture and horticulture in particular. It examines the role played by women as decision makers in this sector. There are those women who are heads in their own households because their spouses are away from home and cannot execute day to day or season to season decisions on farming activities. The study addresses itself to the kinds of decisions that horticultural women farmers make in this sector, when they make them and why. For example, how much of the land available to them is put under crops? What kind of crops do they grow? Why do they prefer certain crops and not others? In cases where women have their spouses residing away from home for most of the time, what influences do these spouses have on decisions their wives make regarding farm and farm related activities? Who decides on how to spend proceeds that are accrued from these horticultural activities and what do they spend proceeds on? What behaviour patterns emerge from the issues raised in the study?

1.3 ASSUMPTIONS

Horticulture is an increasingly important enterprise for both the local and export markets. The Kenya Government's Ministry of Agriculture and Livestock Development has instituted a section of Extension Services. Officers employed in this section help farmers resolve their problems, so as to increase the quality and quantity of agricultural products. In addition to this, the Horticultural Development Authority (HCDA) extension officers interact with farmers to specifically harness horticulture. In spite of the work carried out by the above organizations, horticultural farming is still reeled with many problems as highlighted by Democratic Party of Kenya (DPK) (1992) and the local dailies.

Our assumptions are that farmers, women included, are guided by certain factors which they consider as very important. They (farmers) do not ignore advice and guidance preached to them by extension agents just for the sake of doing so. Faced with certain problems, they have devised their own ways of circumventing those problems, and their ways of solving problems work effectively; it is difficult to convince them otherwise. The many farmers who are interested and are actually engaged in horticulture do so because the activity meets their needs. It, however, may not necessarily be economical in the strict economists' sense of yielding tangible material benefits (Steward, 1955)

1.4 THE OBJECTIVES OF THE STUDY

The overall objective of this study is to have a clear understanding of the role played by women at the grassroots in the horticulture industry using Kiambu District as a case study. The specific objectives are as follows:-

1. To identify and study the main varieties of horticultural crops commonly grown by farmers in the area of study.
2. To identify individuals responsible for deciding on the type of crops grown by farmers.
3. To investigate and document the problems and reasons for choosing to grow the identified crops.

1.5 JUSTIFICATION OF THE STUDY

Evidently, women constitute the focal point of agriculture of which horticulture is only a part. A study of the decision-making process in the horticultural sector is, therefore, more than justified for the following reasons:

1. Individual decisions made determine the overall household welfare depending on whether such are economically or otherwise beneficial. They also determine the mechanism of

land use including adoption of new technologies and management method.

2. The same decision determine a nations' exports, domestic supplies and improved or stagnant standards of living in rural areas.

3. An understanding of the considerations and constraints that influence farmers when making agricultural decisions would aid policy makers and agronomists to guide farmers more effectively in horticultural farming.

CHAPTER TWO
LITERATURE REVIEW

2.1 INTRODUCTION

Decision-making is a process of taking a stand with regard to a number of alternatives available to an individual. The choice situation has been described as a very complex system guided by the individual's preferences which, in turn, are based on several and varied factors (Joy, 1967 pp32-37; Barlett, 1980 pp90). Economists view decision making in the light of economic models which stress rationality and maximization. Here rationality implies that when an actor is faced with a set of alternative actions, he or she will evaluate and rank them according to his or her own particular preferences. He or she will then choose the course of action which he or she ranks highest. He or she will not forego a high preference action, in terms of what is to be gained and/or lost (Joy, 1967 pp37).

Many scholars (Edwards, 1961; Ortiz, 1967; Joy, 1967; and Barlett, 1980), have argued that in farming communities, the element of rationality does not apply in strict terms. The explanation given for the absence of total rationality is that farmers are seen to make decisions under factors of uncertainties. Factors of uncertainties could be climate, technical skills, occurrences of diseases, problems of pests, price fluctuations, and many others (Ortiz, 1967 pp193). It can, however, be argued that out of those uncertainties and with accumulated experience of the local environment under which farming communities work, some decisions have to be made. Indeed, farmers do make such decisions and, as such, there must be some criteria upon which they base their decisions. It is the responsibility of studies such as this one to discover those criteria.

2.2 DECISION-MAKING IN AGRICULTURE AND HORTICULTURE

The historical development of horticulture can be traced from the domestication of plants when people learnt that they could grow what they gathered from their natural surroundings. Some of the first horticultural crops to be cultivated were fruits such as dates, olives, figs and grapes. In the vegetable category, garlic, cucumber, lettuce and onions were the first to be domesticated. Garlic was also used for the making of drugs. In the field of ornamental flowers and landscaping, a lot of literature exists, elaborating on the palaces of Rome and Versailles and the magnificent gardens of Le Notre in France (Janick, 1972:9).

In the process of human evolution, the cultural skills of adaptation have enabled people to devise ways and means of overcoming environmental constraints to suit their needs. Technological skills of exploiting the environment have advanced at different paces in different parts of the world. Developed countries, no doubt, have a lead in this. In California, United States of America, for example, fruits and vegetable ranches are cultivated with a network of irrigation systems, to make desert areas highly productive. In Holland, cold winter temperatures are circumvented by green houses where temperature and moisture contents are scientifically controlled to ensure an all year round production of fruits and vegetables (Gibbs 1978 pp120). Infertile soils are enriched with artificial fertilizers, diseases are curbed by the use of chemical sprays, scarcity of labour is overcome by mechanization and distant markets are reached by an efficient and fast network of transportation. Research is continuously going on to see how best the horticultural industry can be further improved.

In contrast to developed countries, developing nations are still in their infancy in agriculture generally and in the field of horticulture in particular. Developing countries are still to a very large extent at the mercy of the environment. Nevertheless, tropical horticultural produce has a lot of potential if properly guided. This potentiality arises from the great demand imposed on tropical fruits, vegetables and cut flowers by Western countries

with differential climatic conditions from those of tropical countries. Because of this difference in climate, tropical horticultural produce is ripe during the winter time in temperate countries and tropical produce, especially fruits, are sweeter because of the abundant sunshine. Tropical countries also have the potential to produce these products throughout the year with improved technology in irrigation because temperatures always range from warm to hot. Dorling (1983) stresses the need to link and tap this market by tropical horticulturalists.

Much of the literature on agriculture, and horticulture for that matter, has given a very sketchy picture of the role of women (Sachs, 1983). Male farmers observed that whatever literature that exists on horticulture the focus is more on men while women are assumed to operate only under the guidance of male farmers. Women the world over, have significantly and economically contributed to agriculture through making key decisions. Nevertheless, their role and participation has all along been overlooked and undervalued. There is a universal tendency of viewing women as farmers' wives, helpers and supporters (Sachs, 1983; Spring, 1985). Both women and men are socially internalized to view women's role as primarily revolving around the home. In fact, a popularly held notion is that whatever a woman does, including her domestic work, which is really never considered as work (Sachs, 1983), is directly or indirectly under the control of men. This notion may have had its credibility a few centuries back. However, it hardly applies today, considering that a substantial proportion of households are headed by women who guide and direct horticultural activities besides other responsibilities (Spring, 1985: 21).

The decision making process of women in horticultural activities cannot be understood without relating it to other factors, mainly (the roles enhanced in) the cultural division of labour. The popularly held notion that a woman's place is in the realm of the home has a lot to do with agricultural production. In the United States of America, for example, through division of labour, women in the realm of home were expected to keep gardens that produced most of the family's requirements in terms of

food. They were continuously involved in decisions pertaining to tending vegetables, fruit trees, flower gardens, mowing grass lawns and landscaping, all as part of domestic work. They also looked after small categories of livestock such as chicken (broiler and layers), milk cows, geese, ducks and goats (Sachs, 1983). Sachs further observes that these women were not classified as farmers either by their husbands or by themselves. Very often, some women were called upon to help in harvesting their husbands' cash crops due to the labour intensive character of agricultural work. Division of labour was never really and strictly adhered to, though husbands were not called upon to help in domestic work which was women's responsibility.

The American experience cited by Sachs is not unique because the same does hold true in many parts of the world. In the area of this study, Limuru, tending and milking of cows is traditionally a man's job although very few men and teenage boys continue doing so. This responsibility has been by and large thrust upon women and girls. When school is in session, it becomes a women's responsibility to see that cows are not only milked but are also fed with napier grass, sweet potato vines, cut grass and are also taken where they have to graze for the rest of the day. The assumption by men is that the above mentioned responsibilities can unquestionably be imposed on women at men's will (sachs, 1983). Women have, therefore, more than their due share of work in the division of labour (Steward, 1955).

Another key determinant in decision making is land ownership, land being a major resource in agriculture. In the area of study land is passed on patrilinially. Therefore, men have greater authority in decisions pertaining to land use than women (Okoth-Ogendo, 1978). Okoth-Ogendo observes that in many traditional African societies land is owned by men through clans but women have greater usufructory rights, especially married women, with regard to their husbands' land. However, when ownership changed to individuals on documentary status, i.e., title deed, women enjoyed less usufructory rights than they used to enjoy when land was owned by the clan.

In spite of the problems associated with land access, usufruct and a horde of other responsibilities, several women have ventured into horticultural farming. What makes horticulture appeal to many small-scale women farmers are the economic gains realized. In the United States of America, households engaging in maintenance of yards do so on a part time basis to earn extra income. In the final analysis such farmers made the part time occupation a full time family business.

Another important factor in decision making is the response women farmers show towards new innovations. These new ideas help in improving agricultural production in quality and quantity (Lucas, 1986). Early studies evaluating farmers' response to innovations were conducted among the Indian, Vietnamese, Mexican and Italian farmers by Carstairs (1958), Reichel-Dolmatoff and Reichel-Dolmatoff (1961), Lewis (1960) and Lobreato (1962), respectively. These studies were highly subjective and extremely negative. To add on to this, Roger (1970) drew up a subculture of peasants highlighting ten, all negative values, attitudes and motivations of peasants and agriculture. Such an evaluation of small-scale farmers negatively referred to as peasants is unjustified, considering the role played by these farmers in the economies of their countries. Ortiz (1967) has concluded that no social scientists would use such data for argument. Besides, it is non-scientific to argue that a culture or subculture can thrive on negative attributes alone.

Recent studies on small-holder farmers (Cancian, 1979; Lucas, 1986; Spring, 1985) have shown that such farmers make decisions to accept or reject innovations. Cancian, in his study of rank and innovations, observes that poor farmers and very rich farmers are at times more willing to innovate under uncertainty because they have less to lose. Those that are moderately rich innovate later, when uncertainty is reduced because they have more to lose, especially in their socio-economic rank if innovations fail. Lucas' (1986) study on "Differential Innovation Adoption Patterns of Female and Male Small Holder Farmers" in Taita Hills, concludes that given the same opportunities, women are just as highly innovative as men. The

little difference observed, Lucas explained, was due to women's roles as providers of family food. The priority of ensuring that there was enough food for the family caused women to want to engage more in food related products than otherwise.

Decisions to adopt innovations follow five stages, according to Lionberger (1960). The five stages are awareness, interest, evaluation, trial and adaptation. Cancian (1979) identified two stages based on certainty and uncertainty together with rank. A Key determinant of adoption is access to information and sources of information are many and varied, the most important and effective sources being those of the people themselves. Thus, extension agents, progressive farmers, social groups, and neighbours are all instrumental sources of information. Radios, magazines, televisions, pamphlets, posters, books, and public broadcasts supplement and enforce personal communication. However, the final decision to adopt the innovation ultimately lies with the decision-makers and it may be guided by values, attitudes and motivations held by each individual. Values are abstract and unconscious assumptions of central importance as to what is right or of moral worth. Attitudes are a mental stance that provides clues regarding the action an individual is inclined to take at some future time. Motivation is a state of desire and an impeller of action (Loomis and Beagle, 1950; Lionberger, 1960).

Individual farmers' rate of adoption of innovations may be influenced by the level of formal education, the tendency being that those with higher formal education are more innovative than those with none. Also, farmers with higher aspirational levels view farming as a business and not merely a way of life, are more exposed to the outside world, have greater access to information, are all more innovative than their counterparts with the opposite qualities. The former are ready to experiment on an innovation once a reputable company or the government has confirmed the research.

Decisions also revolve around the choice of crops to plant. Janick (1972) asserts that when a farmer selects a cultiva to plant, he or she is in many ways making a marketing decision as well. Gladwin (1980), in her

theory of "Real-life Choice", explains how farmers in everyday life make choices among a large number of options. She identifies a two stage model in decision-making. The first stage is called preattentive (unconscious) choice. This is arrived at by elimination of all those crops which have a constraint that a farmer cannot resolve. For example, the farmer may have considered profitability, risk involved, knowledge about the crops, time it takes to mature, provision of irrigation water, necessity for sprays and fertilizers, provision of family food and livestock feeds. The second stage is attentive (conscious) choice which refers to the "hardcore decision process". Crops which were selected in the preattentive stage are seriously considered in stage two. The farmer orders the alternatives considering all aspects. Those crops which pass the constraints in both stages are chosen for planting.

Traditional values are also taken into account when it comes to making decisions. Gladwin (1980) cited an example of the Altoplano farmers in Guatemala who traditionally grow vegetables down the valley and maize on the slopes or level highland areas. Such a farmer confronted with a choice of what crops should be planted where is socially internalized to know that vegetables are grown down the valley while maize is grown on the sloppy ground. By the same token familial needs may take priority in a choice between cash and subsistence crops. Women farmers want to be assured that they have food for their families until the next season's harvest.

Amazingly, enough economic theories of monetary maximization do not always apply when it comes to decision-making in farming. A farmer may make twice as much money in growing vegetables than in growing maize. The logic that the money she makes from vegetables can be used to buy the maize she did not grow is not convincing enough, the question being: whether there will be enough maize on sale for her to buy for her family needs. If she is not assured, then she will choose to grow maize since family needs take priority. There are many more examples of traditional crop production in agriculture. Janick (1972) observes that

"green houses farming" is associated with the Dutch descendants in the United States of America, this having been the tradition back home. Dorling (1983) notes that Limuru farmers have a tendency of growing tomatoes for cash, while Wembah-Rashid (1986) observes that Kirogwe women insisted on subsistence fishing economy and not a socio-economic fishing enterprise. Traditional systems that satisfy the needs of the farmers may be adhered to until farmers are convinced otherwise.

2.3 HORTICULTURAL FARMING IN KENYA

In Kenya, commercial horticultural production was started by European settlers who produced these products for hospitals, schools, hotels, and prisons. A small portion of horticultural business was also transacted among the three East African countries, namely, Kenya, Uganda and Tanganyika (now renamed Tanzania) (Byaruhanga, 1977). The main buyers then were the city wholesalers, retailer markets, and the Horticultural Co-operative Union (HCU), the earliest marketing body to be instituted. This co-operative body, comprising 122 members, was established in 1951 with European settlers as the majority subscribers who had 115 societies. Africans and Indians had a representation of six and one co-operative societies, respectively. The HCU operated very well, making a steady profit until 1969 when it started losing money due to mismanagement.

Since independence, the Kenya Government has taken a positive action towards promoting the horticultural industry by establishing the HCDA in 1967. The decision to promote horticulture was motivated by the need to diversify Kenya exports. Some of the exports, for example, sisal and pyrethrum, were experiencing severe competition from synthetic products in the world market. Similarly, the over supply of crops like coffee, and recently tea, in the world market and the resultant fluctuation of prices meant that Kenya would no longer count on coffee and tea to earn her a stable income (Wilson, 1973;Dorling, 1983).

The promotion of horticultural farming aims at increasing foreign exchange earnings through exports, promotion of better living standards for

farmers, creation of employment and provision of a balanced diet for the people. Kenya's development has continuously emphasized the need to intensify horticulture as can be seen in the following national Development Plans: 1975-1979; 1979-1983; and 1983-1988. The government has established several horticultural and research stations so that each province has at least one research station. The government has also been instrumental in establishing irrigation schemes to grow horticultural crops besides other agricultural products.

The country has received overseas specialists on both scientific and technical administration fronts and their advice on horticultural development will continue to be useful as the government replaces expatriates with locally trained personnel (Dorling, 1983). The bulk of horticultural production in Kenya is by small scale producers and there has been a steady increase both in quality and quantity, especially of fruits like pineapples and vegetables like French beans. So far, the horticultural industry has been ranked fourth in monetary returns of Kenyan exports and its position is bound to be higher as tea and coffee, the former major Kenya exports, continue to decline due to world overproduction. Horticultural products have a lot of potential for development. Currently, the industry is facing a number of problems some of which were highlighted in the Sunday Nation of 8th October 1989. The problems include lack of cargo space in aircrafts, high prices of imported fertilizers, high cost of packaging materials and competition from other tropical countries like Zimbabwe. As such a lot still remains to be done to streamline horticultural production. Farmers' methods of decision making will need to be re-examined in order to improve the present status of horticulture.

2.4 THEORETICAL FRAMEWORK

The Theory of Real-Life Choice

This study was guided by the theory of "real-life choice", a two stage model of the choice process that can be represented by a decision tree, a decision table or a set of rules. This theory incorporates some of the simplest procedures people use in making everyday real-life decisions (Gladwin, 1980). The theory is based on Lancaster (1966, 1967).

According to Lancaster (1966), when a decision-maker is presented with several alternatives to choose from, he or she quickly and preattentively undergoes stage one of making choice. At this stage the decision-maker applies the process of "Elimination by Aspect", here aspect meaning an attribute, dimension factor or feature of alternatives, that he or she does not like. Alternatives with such aspects are automatically disqualified. Lancaster (1966) demonstrated this with the hypothetical case of a person wishing to buy a second hand car from several cars advertised in a newspaper. In "elimination by aspect" the car buyer chooses certain aspects in alternative cars that he or she would not want and uses these aspects to disqualify some of the cars. Such aspects may, for example, include: the price, i.e., not more than Kshs.25,000; age, not older than three years; make, should be a saloon not a van or a pick-up; should have four doors and must accommodate five people with ease, etc. All cars that do not meet the above listed requirements are then automatically eliminated. Those that pass these demands proceed to stage two, that is, "hardcore" decision-making process. If all the alternative cars posted for sale pass her demands, then the decision-maker must choose other aspects to eliminate some of the cars.

A farmer in trying to choose crops to plant, might follow the same procedure. Choice of crops may be determined by aspects of profitability, risk involved, knowledge about a crop, time it takes to mature, amount of land it requires, labour, available capital and inputs. Those crops that pass what a farmer is looking for pass to the second stage. If only one crop

passes, and the farmer needs to plant only one crop, then there is no need to proceed to the second stage for a choice will already have been made.

At stage two, a conscious (attentive) hardcore decision process takes place. This is a systematic process in which the decision maker evaluates each alternative and orders it accordingly. The process follows six stages as presented below:-

(a) Aspects of choice are listed.

(b) Aspects that are of little or no subjective worth, one of equal or equivalent value and importance, and the order of one alternative is the opposite of the order of the other, are eliminated. Also, those aspects that are dependent on one another and have no separate effect on their own should be combined as one.

(c) From the aspects not eliminated the decision maker chooses the aspect with the greatest utility by means of a choice function. By this time he or she will have narrowed the choice to very few alternatives and may actually be faced with a choice between only two crops.

If the two crops are mutually exclusive a choice of one is easily made; otherwise the decision maker may have to plant both crops, or randomly choose one if both result in a constraint.

(d) If by stage three (c) no decision has been made the alternatives proceed to stage four. Constraints are applied as a measure of reaching a choice. A constraint is the powerlessness of the decision maker against needs. For instance, a crop that of necessity requires irrigation water when such is not available, or requirement of capital to start a new innovation, tradition, or environmental factors, all aid a decision maker to eliminate some alternatives and come to a choice.

(e) If still no decision is reached the farmer applies a version of maximization aspects subject to constraints. This way the decision-maker may come to a choice or proceed to the next step.

(f) (i) At this stage, the decision-maker may be forced to go back to one of the older stages like "c" to select another ordering aspect, taking the next highest sub-set worth utility or use another production rule to choose other aspects. He or she then passes steps "d" and "e", relaxing some of the unimportant constraints so that some crops can pass to the final decision. If, at the end of this, two alternatives remain, both may be taken or a random selection made to choose one.

(ii) Decision maker may apply trade offs on some aspects to arrive at some choice of the highly ranked alternatives.

(iii) Failure to make decision may cause the decision maker to shelf the process until some other time when the issue is revisited. An alternative is likely to pass the constraints to be chosen, or the decision maker may go back to stage "a" and start all over again.

2.5 HYPOTHESES

Given the background on the Kenyan context of agriculture, horticulture and the roles of women as farmers and heads of households, the following hypotheses were formulated and tested:

1. Decision to grow certain horticultural crops is not directly related to availability of certain inputs and/or the possibility to improvise constraints.
2. Women do not engage in horticultural production in order to increase their monetary or financial gains.
3. Engagement in horticultural production is not directly related to provision of family food and other needs.

CHAPTER THREE

AREA OF STUDY AND METHODS OF DATA COLLECTION.

3.1.0 Introduction

The first part of this chapter will give a description of the area of study's physical structure, that is, relief, climate, vegetation, drainage and soils. It will also look at the social behaviour of the people, paying particular attention to issues pertaining to land acquisition, ownership and utility.

The second part of the chapter will look into the various methods employed in the data collection and analysis. This will include key issues such as the rationale employed in the choice of the area of study, the sampling procedure, drawing up of the questionnaires or interview schedules, and the pretest research used to determine the number of informants to be interviewed.

3.1.1 Location

This research, on women horticultural farmers and decision making, was carried out in Gitithia and Limuru Township sublocations. Gitithia sublocation is located in Lari Division, at the boundary of Lari and Limuru Divisions. Until 1979 Gitithia was part of Limuru Division and location but during the National Census of 1979 it was curved out of Limuru and incorporated in Lari Division. Limuru Township is in Limuru Location. Both are administrative units in Kiambu District.

Kiambu District (Kabete) is the southernmost district among the three districts classified as the occupational zone of the Agikuyu ethnic community (Muriuki, 1972; Kenyatta, 1938). The other two districts are Murang'a (Metumi) at the centre and Nyeri (Gaki) to the north.

Kiambu District is situated at 0 25' north and 1 10' south of the equator. On the eastern side of the Greenwich meridian it lies between longitudes 38 30' and 37 15' east. It shares a boundary with Kajiado district to the southwest and Nairobi to the south. To the west it is

bordered by Nakuru district and to the north by Nyandarua district. On the northeastern side, it borders Murang'a district while on the eastern side it borders Machakos district (fig. 3.2)

3.1.2 Physical Structure

Kiambu district is a plateau which lies within the central highland zone of Kenya, at the edge of the Rift Valley escarpment. Its altitude ranges between 1430 metres on the low lying areas of Ruiru to 2400 metres on the uplands of Limuru and Lari, including Githunguri and Kiambaa. The plateau is traversed by ridges and valleys, some of which are crossed by tributaries of the Athi River which form part of its basin (Waruhiu, 1972).

3.1.3 Climate

Due to its high altitude the district experiences a high rainfall of 1500 mm per year in highland areas such as Limuru, Lari, Kikuyu, Githunguri and Kiambaa. On the other hand, the lowland areas of Ngoliba and Munyu experience lower amounts, 750-1000 mm per year. Rainfall occurs in two seasons each after the equinoxes. The long rainy season starts at around late March or early April and lasts up to June or early July. The Agikuyu call this season kimera kia njahi. This is the season in which black peas, which take two seasons to mature, are planted. The second, the short rainy season, comes in October and November. The Agikuyu call it kimera kia mwere, the season when millet, which takes one season, is planted. Any unexpected rain spell, falling between these two seasons, was called maguna ngombe, that is, "rain which supports pasture for livestock" (Muriuki, 1972). Rainy and dry seasons help the Agikuyu to plan their calendar year.

Temperatures are generally described as ranging from cool to warm (15-20 c). The altitude has a temperature moderating effect, so that the higher areas are cooler and the low lying areas are warmer.

3.1.4 Vegetation and Soils

Much of the natural vegetation has been cleared for settlements and agricultural use. A few areas, such as Kenale, have been reserved as forest land. Even in such forest reserves, the indigenous trees have been replaced by cultivated soft wood trees for various economic uses. Soils are basically of two categories. The first, which is most widespread, is the red loamy type composed of weathered and volcanic rock. It covers 75% of Kiambu district. It is deep, naturally fertile and well drained. The remaining 25% is composed of sticky clays found on the low-lying plains. These clays have a low fertility level with a poor drainage. In summary, 55% of the land is agriculturally of high potential while 45% is of low potential. The area of study lies within the high potential zone.

3.1.5 Drainage

Gitithia and Limuru Township sublocations have no permanent streams flowing in the area. At the entrance of Limuru Township is a seasonal swamp, Manguu, which is highly polluted with waste from the Limuru Bata Shoe Factory. Water for domestic supply in the township is supplied by the Ministry of Water Development. In Gitithia, valleys are dry except for the occasional seasonal streams after heavy rains.

3.1.6 Population and People

The area of study is inhabited by the Gikuyu community. Their myth of origin describes the famous Mukurwe wa Gathanga in Murang'a district as the ancestral home. Here God crated a man called Gikuyu and his wife Mumbi. The two were blessed with nine daughters but no sons. Later, God created nine young men who become the husbands to the nine daughters of Gikuyu and Mumbi (Kenyatta, 1938; Leakey, 1977).

A second myth of origin highlighted by Kenyatta (1938) and Muriuki (1972) talks of a man called Mubeere who had four sons. On his death bed, Mubeere called his sons and had four articles to bequeath them before dying. The four articles were a herding staff, a quiver of arrows and a bow,

a stabbing spear and a digging stick. The son who took a herding staff started the Maasai community, the one who took a bow and arrow founded the Akamba, the one who took a stabbing spear become the ancestor of the Dorobo, while the one who took a digging stick become the ancestor of the Agikuyu. This myth is also quoted by Routledge and Routledge (1972, 283-4).

Irrespective of the manner in which the Agikuyu were formed, by the time of the arrival of the European colonists during the late 19th and early 20th centuries, they were well established as a sedentary community. The area of study, Limuru location, has a population of 27,636 people within an area of 56 square kilometres. This gives the location a population density of 472 persons per square kilometre. The locations is divided into four sublocations each with a listed number of households. A household is composed of people who reside in the same house and share food from a common pot (Muriuki, 1972). The listed number of households for the sublocation are Kamirithu (2057), Bibirioni (2044), Gitithia (850), and Limuru Township (653). This gives a total of 5604 households within the location.

3.1.7 The Traditional Agikuyu Land Tenure System

In this research, land use and ownership feature prominently because the focus is basically on agriculture. This calls for a clear understanding of the Gikuyu land tenure systems, to be able to relate problems of decision making in farming activities and women's land ownership.

The process of acquiring and owning land among the Agikuyu is clearly defined. Any virgin land which nobody had any claim to was open to ownership on the basis of first come first served (Muriuki, 1972:74). When a man cleared virgin land it legally become his own property to be passed on to his sons as inheritance. A man divided his land among his many wives who held these portions in custody for their sons. People related patrilineally normally owned land within the same zone or area, and such a clan was known as mbari. Their land was jointly owned by the clan

members. The chief guardian of the clan (or mbari) land, was called muramati (Muriuki, 1972).

An individual could also acquire and legally own land among the Agikuyu through direct buying from a known owner or claimant. Waruhiu (1972) explains very clearly how the Gikuyu from Kiambu purchased land from the Dorobo who had hunting rights over such land. Purchase of land was sanctioned when the buyer parted with a stipulated number of livestock (sheep, goats or cattle) to the seller. Thereafter, buyers and sellers become like blood relatives (Muriuki, 1972). The bond between the Dorobo land sellers and the Gikuyu land buyers is what led to the eventual assimilation of the former by the latter(Waruhiu, 1972).

It was common practice among the Agikuyu to own land on different ridges. This led to land fragmentation as the heirs were allocated small portions of land from different ridges. This fragmentation had a purpose. Each ridge was believed to have differing fertility, rainfall and sunshine, hence the performance of crops would be different on the various ridges, thereby minimizing the risks of total crop failure. Failure of a crop on one ridge would be compensated by a bumper harvest from another (Kenyatta, 1938).

When land become unproductive and drastically reduced crop yields due to continuous cultivation, it was allowed time to revert to bush in order to naturally regain its fertility. Such land was used for communal grazing which aided in the speedy recovery to fertility. Land which nobody had cleared was also used for communal grazing. This was the position of land ownership at the time of European arrival and subsequent settlement in Kenya.

3.1.8 Gikuyu Land Tenure System Under Colonial Rule and Thereafter

The coming of Europeans and their subsequent settlement in Kenya was foretold by Mugo wa Kibiru, a famous medicineman and prophet. According to his prophecy, a long snake (the railway line) would start from

one expanse of water in the east (the Indian Ocean) to another expanse of water to the west (Lake Victoria). The snake would herald the coming of white butterflies (the Europeans) and any resistance put to this intrusion by the Agikuyu would be ruthlessly crushed by firing sticks (guns) (Kenyatta, 1938; Muriuki, 1972).

In 1895, after Kenya was made a protectorate, the British administration declared that any vacant land would be acquired by various means. Land was classified as vacant if no one was cultivating it at the time of annexation and if no native had a claim to it (Sorrenson, 1967). Under this classification, any land that was left to revert to bush, or was communally grazed upon was declared vacant. By coincidence, a lot of land in Gikuyu country appeared vacant since the community had been hit by a number of calamities. The mid 19th century locust invasion and the resultant famine, coupled with the small-pox epidemic, killed a lot of people. Also an outbreak of rinderpest wiped out a lot of livestock. Thus, a lot of land did appear vacant although it was actually owned by someone. The land ordinances of 1903 and 1915 were conveniently applied to annex the "vacant"land which then became Crown Land (Sorrenson, 1967).

The annexed land was given to European settlers, first in portions of 400 hectares, then 20,000 hectares and, finally, in large portions of 40,000 hectares. The large portions were allocated to those farmers whose interest was in livestock farming. Other land was used for railways, administration forts, towns and other public utilities. The Agikuyu were only apportioned land in what was classified as "native reserves".

There are three outcomes of land alienation and the resultant land consolidation on land use by the Agikuyu. The first is that by taking the land which had been open to Gikuyu expansion, any population growth would have to be contained within the delineated "reserves". This would increase pressure on the land and at the same time leave many of the Gikuyu landless. Secondly, the Gikuyu land tenure system allowed the landless squatters, ahoi, privileges of cultivating the land of those who had big chunks, while making arrangements to acquire their own land. This system

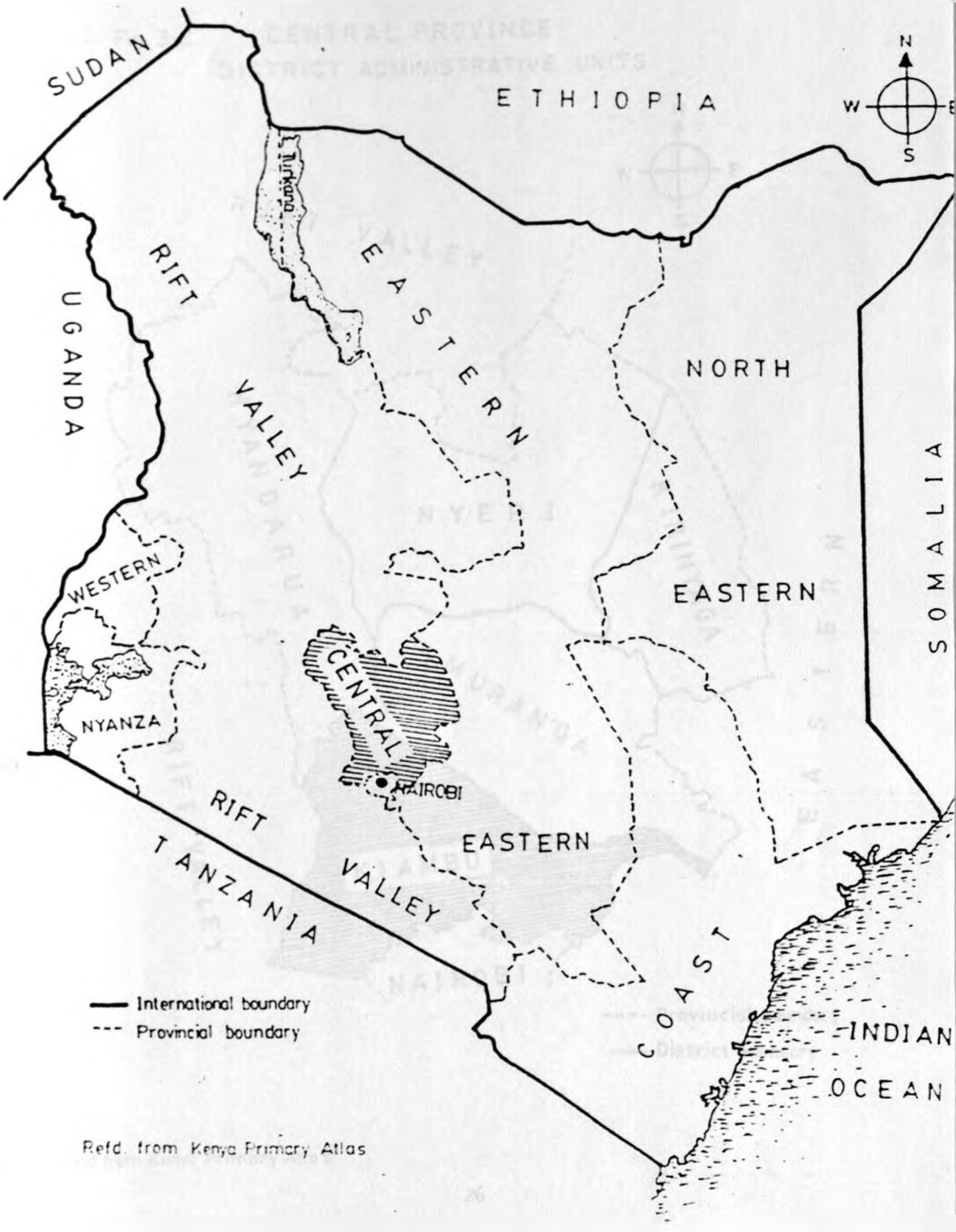
was no longer condoned as the land became even scarcer. Many ahoi were left with no option but to seek employment and squatter status on European farms (Were, 1968).

Lastly, the land issue became the major bone of contention spearheading nationalist movements which started after World War I. This struggle persistently continued, gathering momentum after World War II, until it climaxed the 1952 Mau Mau revolt. The revolt was ruthlessly crushed by the British administration and the Agikuyu were concentrated in the colonial villages to stamp out the Mau warriors who had taken to the forest.

The British Government felt obliged to re-examine the land issue, particularly in the Gikuyu country where some of the best land had been annexed. There was a feeling that if the fragmented land in the Gikuyu "native reserves" was consolidated, the pieces would appear bigger and enable the people to engage in a more organized and economically viable land utilization, particularly cash crop farming. The Swynnerton Plan of 1953 (Sorrenson, 1967), which was entrusted with the land consolidation programme, had a hidden agenda of dispossessing the Mau activists and rewarding the Loyalists. All in all, land consolidation was hastened in the Gikuyu area to end by 1958 (Fleuret, 1986).

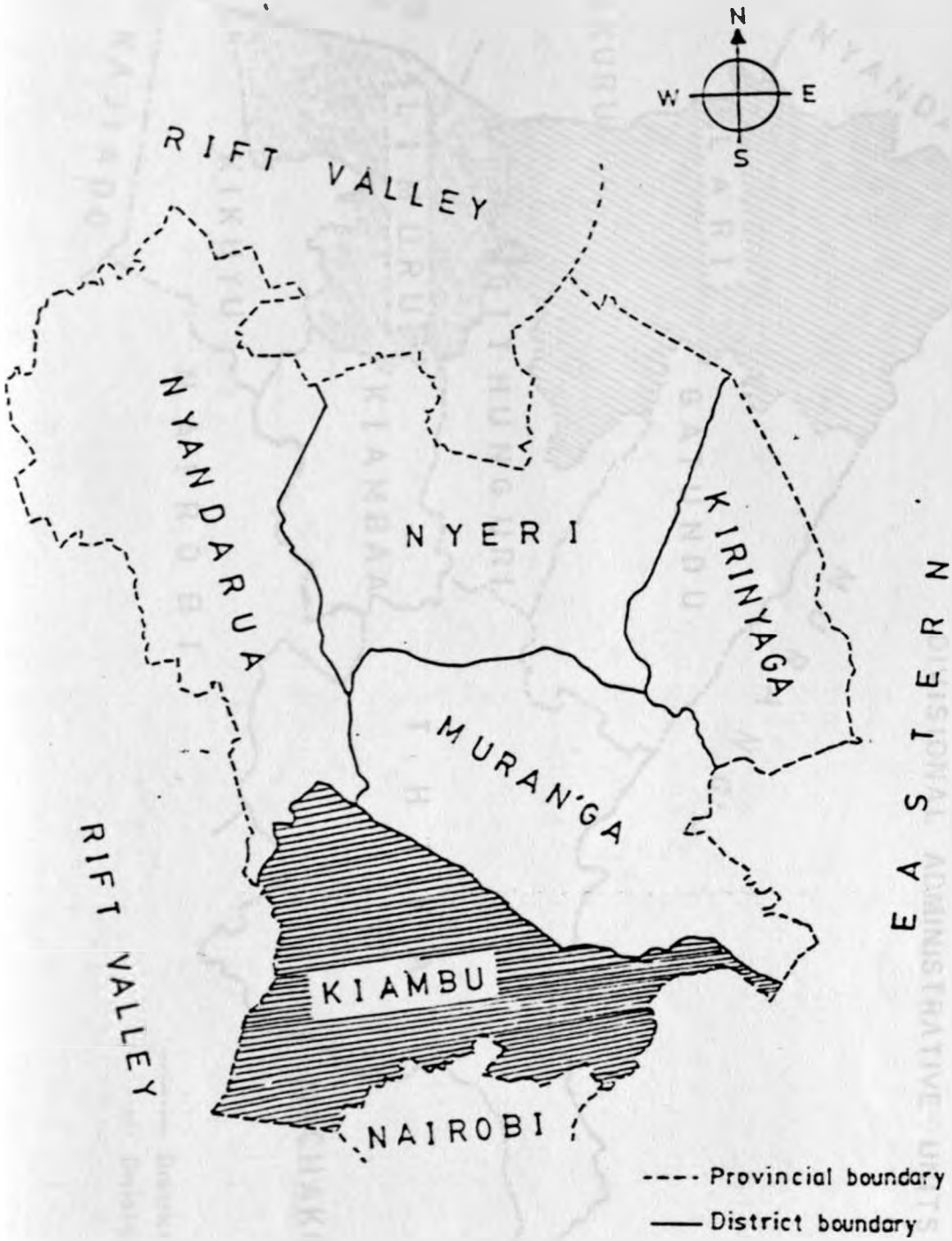
Whereas land consolidation did bring the fragmented pieces of land together, the question of landlessness still remained unresolved. Many people were forced to remain in the colonial villages, such as Kamirithu and Bibirioni in Limuru Division along the Trans-Africa Highway. At the same time the Gikuyu customary succession of land among the sons of a household has meant that land sub-division still continues to realise the same uneconomic units. It is on these strips of land that small-holders are expected to respond to the various forces impinging on them and hence make decisions pertaining to the types of crops to grow, to cater for what demands. Given that women are the majority of those who directly work on the land (Tindrick, 1983), these decision squarely falls on their shoulders.

Fig 3.1 KENYA
PROVINCIAL ADMINISTRATIVE UNITS

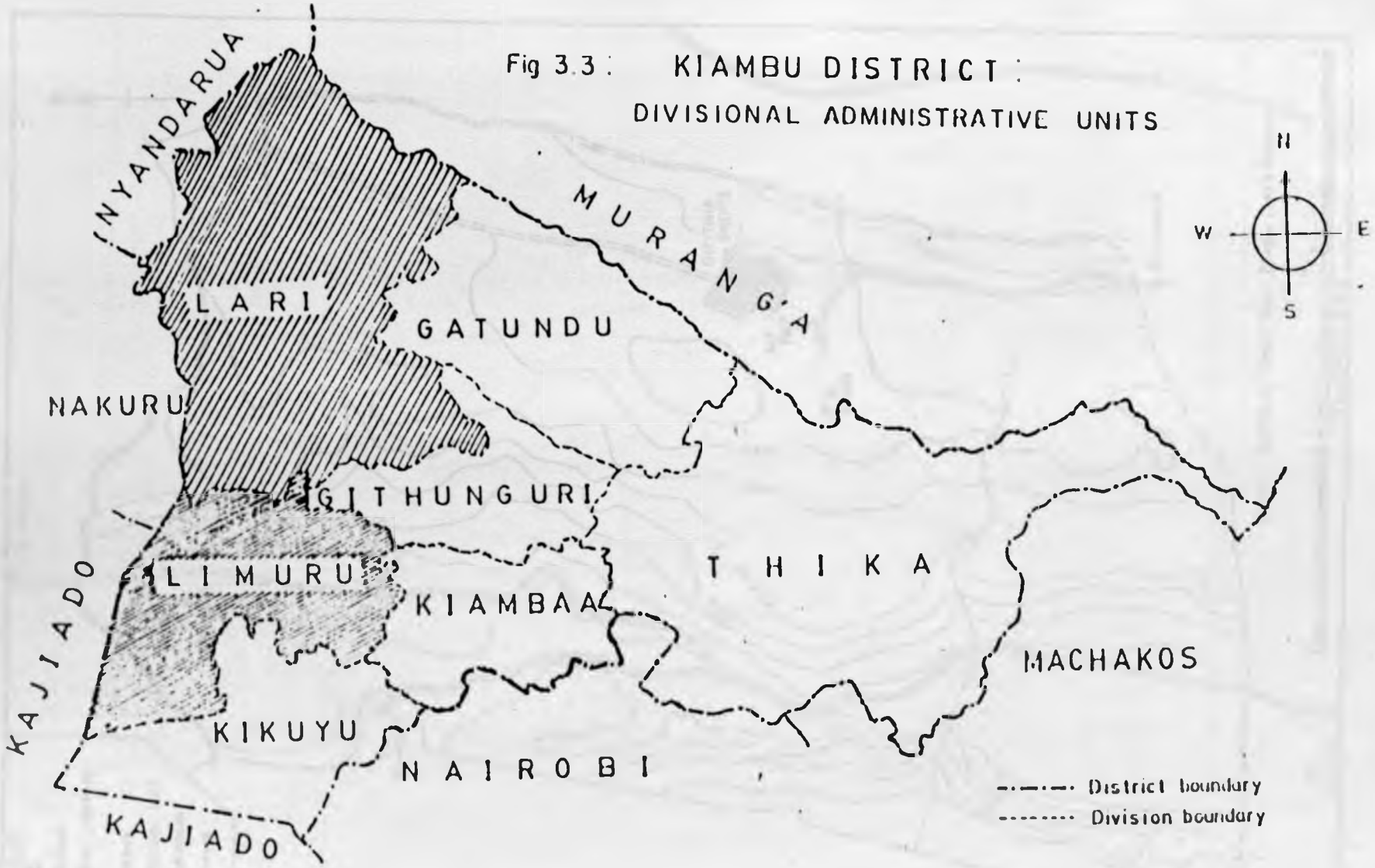


Refd. from Kenya Primary Atlas

Fig 3.2 CENTRAL PROVINCE
DISTRICT ADMINISTRATIVE UNITS



Redd from Kenya Primary Atlas



Reld. from District Development Plan

Fig 3.4 : GITITHIA SUB-LOCATION

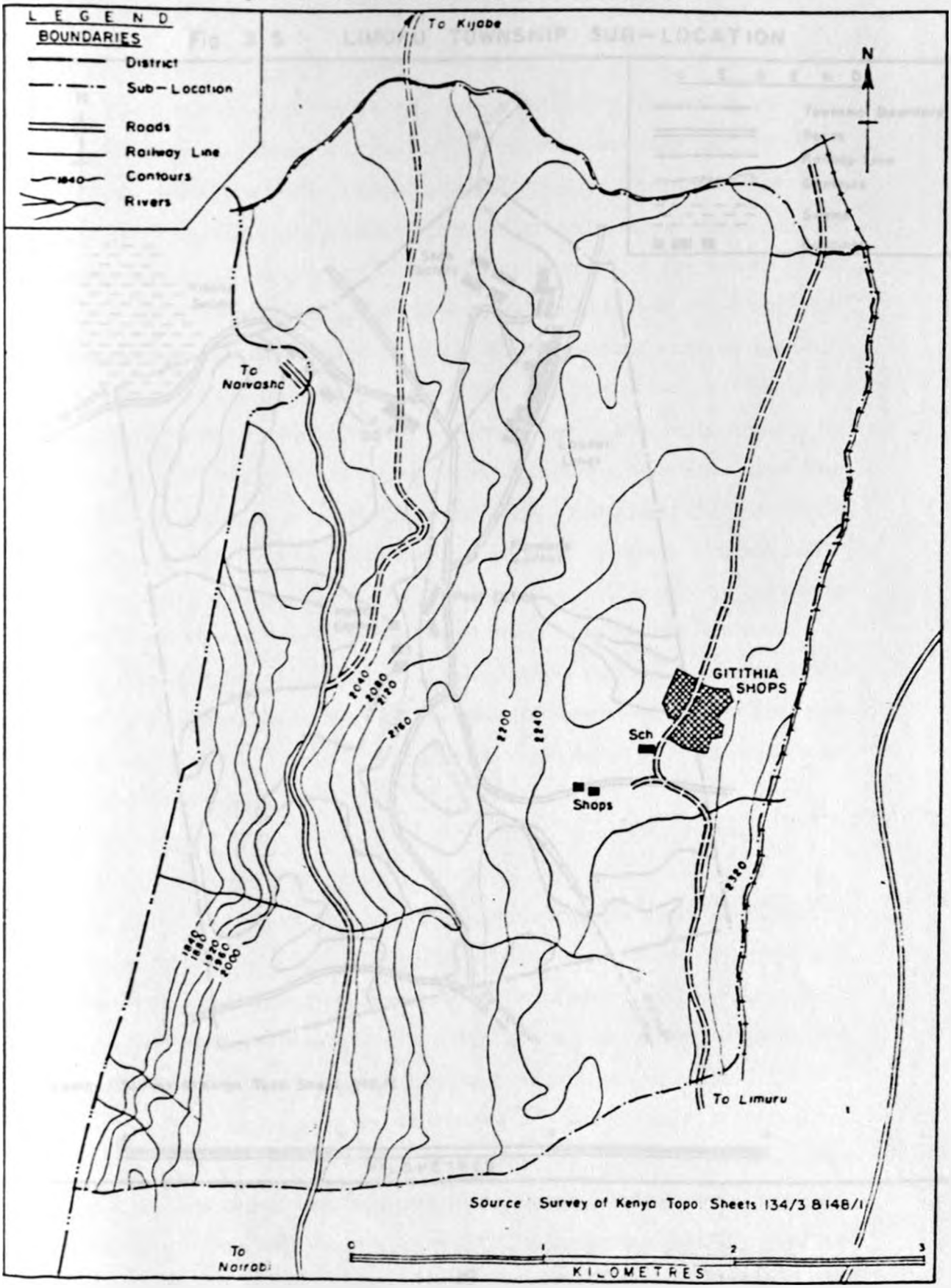
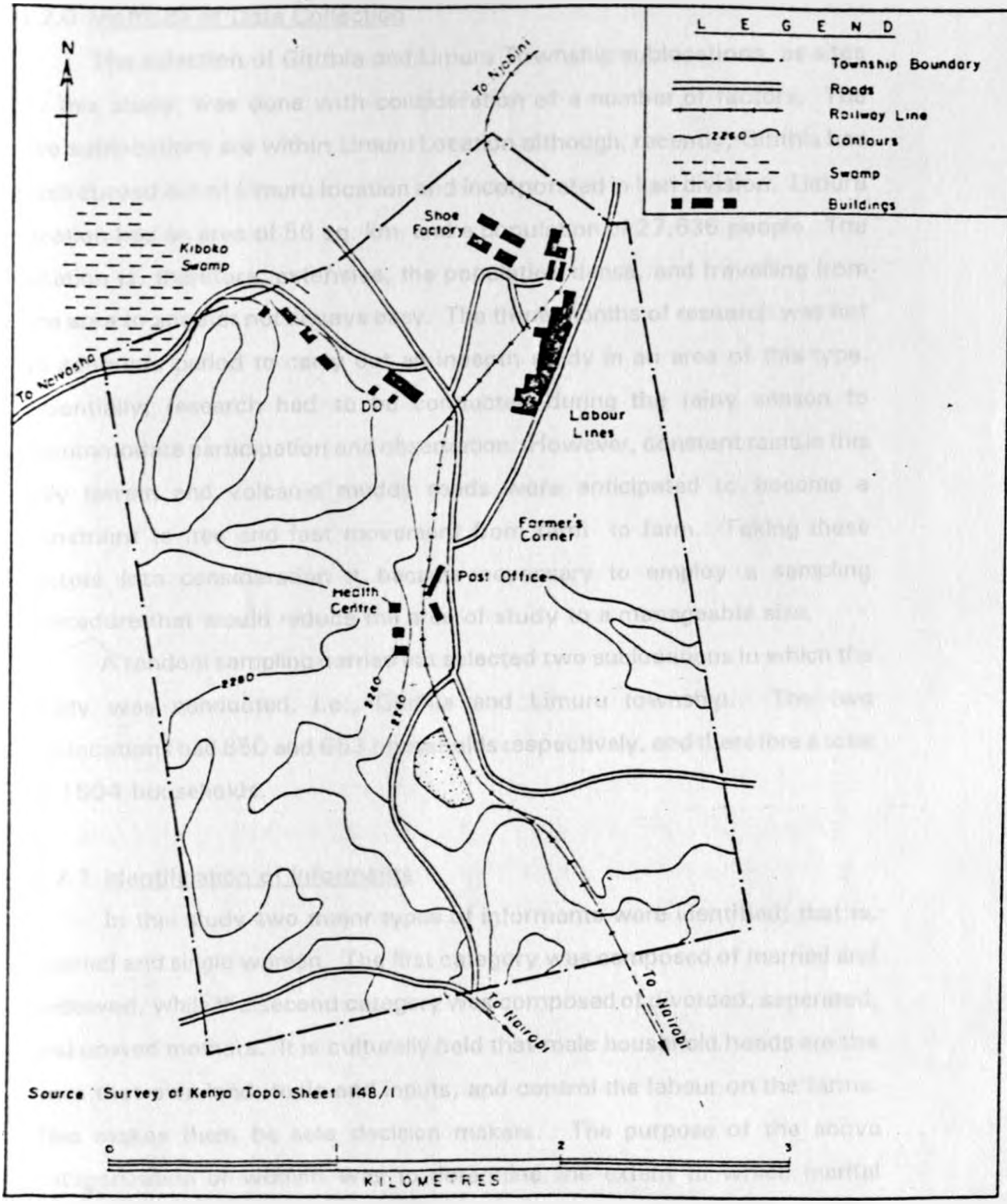


Fig. 3.5 : LIMURU TOWNSHIP SUB—LOCATION



3.2.0 Methods of Data Collection

The selection of Gitithia and Limuru Township sublocations, as sites for this study, was done with consideration of a number of factors. The two sublocations are within Limuru Location although, recently, Gitithia has been curved out of Limuru location and incorporated in Lari division. Limuru location has an area of 56 sq. km. and a population of 27,636 people. The location is, therefore, extensive, the population dense, and travelling from one area to another not always easy. The three months of research was not an adequate period to carry out an indepth study in an area of this type. Essentially, research had to be conducted during the rainy season to accommodate participation and observation. However, constant rains in this hilly terrain and volcanic muddy roads were anticipated to become a constraint to free and fast movement from farm to farm. Taking these factors into consideration it became necessary to employ a sampling procedure that would reduce the area of study to a manageable size.

A random sampling carried out selected two sublocations in which the study was conducted, i.e., Gitithia and Limuru township. The two sublocations had 850 and 653 households respectively, and therefore a total of 1504 households.

3.2.1 Identification of Informants

In this study two major types of informants were identified; that is, married and single women. The first category was composed of married and widowed, while the second category was composed of divorced, separated, and unwed mothers. It is culturally held that male household heads are the ones that own land, tools and inputs, and control the labour on the farms. This makes them be sole decision makers. The purpose of the above categorization of women was to determine the extent to which marital status and household headship allowed women to make, or not to make, decisions on farm activities independent of their spouses or male relatives.

Traditionally, married and widowed women enjoyed full usufructory rights of parcels of land allocated to them by their husbands. Such women

were expected to make full use of the land to meet their household needs in food, while at the same time they held these parcels of land in custody for their unmarried sons (Muriuki, 1972). Single motherhood resulting from divorce or separation and unwed motherhood, were all phenomena that were discouraged among the Agikuyu. This made such status rare in the past and women under this category were allocated land for cultivation by their male relatives (Kenyatta, 1938). Presently, however, this category of mothers is on the increase for a variety of reasons which are not the subject of this work. There are also married women whose husbands are not in residence, thus making such wives automatic heads of their households. Decision-making must of necessity be associated with heading the household.

Before deciding on the number of informants to be interviewed, the researcher conducted a three day pretest research. During this period, the questionnaire was administered to the would be informants, of which six were interviewed. On average this was two persons per day. At this rate and considering the physical demands of research, it was decided to interview between seventy and eighty informants. These numbers, among other considerations, were based on Lucas' (1986) approach of "... better a small sample than no sample at all ..." The sample interviewed therefore was seventy five, which constituted 5% of the listed number of households in both Gitithia and Limuru township sublocations. Gitithia with 850 listed number of households was represented by 43, while Limuru township with 653 households was represented by 32 informants.

From the 75 women who were primarily interviewed, key informants were identified. The key informants were used to elicit indepth data about the issues that were being studied because they had shown competence in these issues.

The second type of informants were drawn from government workers, e.g., agricultural extension, co-operatives and administration officials, local leaders, e.g., church leaders and local dealers in horticultural inputs and products.

3.2.2.0 Data Collection Procedures

This study employed the following methods and procedures to obtain data.

3.2.2.1 Library Sources

During the formative stage, library and archival research was a major source of background data on the topic and area of study. Most information on agricultural activities in the third world, and Kenya for that matter, was highly subjective and biased, emphasizing the negative aspects of decision making in the agricultural sector. Nevertheless, these data were useful in that they provoked us to ask relevant questions to see whether new answers would guide us to a more positive approach into the question under study.

3.2.2.2 The Survey Method

This method was primarily effected in the field although the preparation of the questionnaire was carried out before going out to Limuru. The questionnaire was composed of open ended and close-ended questions. The purpose of the close ended questions was to limit the informants to specific choices and responses which would allow easy determination of percentages during analysis. Open ended questions aimed at allowing verbatim on the part of the informants, from which the author would analyse and incorporate the useful materials. Administration of the questionnaire was conducted by the author.

3.2.2.3 Interviews and Discussions

After the administration of the questionnaire, the author perused through the answers that informants provided to obtain a general picture of the information generated. This exercise provided an insight into who, of the informants, were suitable candidates for giving detailed information on specific issues that were being pursued. The identified individuals were then interviewed individually or in groups, depending on the topic and

circumstances. The majority of those interviewed or with whom discussions were held were what are described as key informants in our identified informants category. However, interviews and discussions were also extended to other knowledgeable persons in the area, e.g., government officials and other local dignitaries. These are not considered to be key informants nor are they included in the main pool of 75 informants. The data they provided has been taken into consideration in the final analysis as extra information from outside the sampled population.

3.2.2.4 Participant Observation

One way of establishing rapport and getting to be accepted by the would-be informants is for the researcher to identify with them. In this research this was not a problem because the researcher spoke the same language as the informants, which facilitated easy communication.

On arrival at the homestead, the researcher exchanged greetings followed by a humble request that she should be given something to eat. Among the Agikuyu, this request is an accepted behaviour which does not necessarily have to be adhered to. The response given by the woman of the household is one of consensus on the basis that mucii ukuaga ngaguro, meaning that a homestead can be despised for not welcoming a visitor hospitably. The hidden implication in this saying would also be that the visitor could be having an agenda that will take some time to discuss. Other activities performed as part of participants observation involved rendering a hand in whatever the people were engaged in, particularly the women of the household. Rendering a hand in such activities is traditionally termed Kunyita itemi kana muro and this is more related to farming activities. On the farm plots, the researcher got involved in activities such as weeding, harvesting of kale, and picking of pyrethrum or fruits. Inside the house common activities included fuelling the fire, holding a baby, and peeling potatoes. In the meantime the research had access to various areas of the household, which enabled her to observe material markers of the economic

status. This enabled us to make a rough estimate of the economic well being of individual households.

3.2.2.5 Problems Encountered

On the whole, very few problems were encountered. The informants were quite helpful and agreeable. However, the informants had several questions on which they sought clarification. One of the commonest questions asked was, how was the research going to benefit them? The informants cited past experiences of researches such as the one I was carrying out, as having yielded no benefits on the myriads of problems that the farmers faced. To this question the answer given was that the government will, when funds are available tackle some of the problems that faced farmers in the area. As this happened to be at the time when the Trans-Africa highway was undergoing construction to become a dual carriage way, I very often gave this as an example of an occasion when the government was doing something beneficial to farmers.

The other problem experienced is that of married women wanting to portray the ideal situation of a man head of household, who is consulted in all matters before decisions are made. Other women portrayed the ideal picture of a husband and wife who made decisions together on all issues. This problem was easily cross-checked when the spouse's occupation and place of residence were ascertained.

3.2.3 Data Collection and Analysis

The data have been analysed by using percentages. From the responses given by informants, frequencies have been recorded and from these, percentages have been worked out. Higher percentages support presented statements while low percentages negate the statements in question.

In this work, the units of study are individual women horticultural farmers. The main focus was to establish similarities and dismilarities of these individuals in so far as their decisions regarding horticultural activities

are concerned. The study also sought to understand whether the individuals studied have made any meaningful changes over time with regard to bettering their own welfare as a result of the decisions that they made in the course of conducting their horticultural activities. In a nutshell, therefore, the analysis used two modes of analysis, cross-sectional comparison or synchronic and historical or diachronic approach. This study has, thus, not used quantitative methods to analyse its data. However, both synchronic and diachronic methods of data analysis are susceptible to quantitative analysis and theory building particularly where one deals with complex data. The data dealt with in the study are not complex (cf Paden, 1970):607-622).

CHAPTER FOUR
DATA ANALYSIS

4.1.0 Introduction

In this chapter the author presents analytically the data collected. The results of the hypotheses tested by the study were also presented. For ease of reference, the data have been presented in two parts. The first part mostly deals with quantitative data which helps to establish the persons responsible for decisions made in horticulture. This part also analyses the types of crops chosen and the use to which they are put.

The second part, for the most part, deals with qualitative data. It analyses the systematic process followed by decision makers when engaging in horticulture. The Real Life Choice Theory is shown to adequately explain the process that decision makers go through both at the preattentive and attentive stages of decision making. Decision trees have also been used in this section to illustrate what it takes to make decisions.

4.1.1 Quantitative Data Analysis

The administration of the questionnaire started with the introduction of the researcher to the informants. The researcher then established the social status of the informants, e.g., age and marital status. It was difficult for some of the informants to know their exact age because dates of birth were not recorded. In order to make a fair and realistic guess of their ages, famous occurrences in the course of their lives and those of the community such as war, disease epidemics, famine, intrusion by European settlers, and circumcision age sets, were all used as markers or indicators of times of birth. This particularly applied to those informants who were over fifty years of age. For younger informants time of joining and completing or dropping out of formal education were used to determine the age.

The use of age in data collection was to enlighten the researcher on what kind of age groups were involved in decision-making. In both sublocations, the age bracket of the informants ranged between 21 and over

70 years. The table below shows informants interviewed by age from the two sublocations separately and then combined.

Table 4.1.2.: Women Informants by Age

Age in years	Limuru Township		Gitithia		Both Sublocations	
	Freq.	%	Freq.	%	Freq.	%
21-40	10	31.3	19	44.2	29	38.7
41-60	19	59.4	17	39.5	36	48.0
61 and above	3	9.4	7	16.3	10	13.3
Total	32	100	43	100	75	100

Table 4.1.2 shows that informants between 21 and 40 years of age added up to 29 (38.7%) of the total number of informants. Nineteen are from Gitithia while ten are from Limuru Township. The number in this category, of what would be classified as young women informants, is relatively low. A possible explanation for this may be that young women of this age tend to join their husbands who are in formal employment in urban areas. Another possibility is that the said age category is highly mobile due to education, formal employment, trade etc. and if they have any children dependants, such are left under the care of their grandparents. The last possibility is not without basis judging by the large number of grand children the older parents claimed to support.

Informants between 41 and 60 years were classified as middle aged. This category of informants, 36 (48%), formed the majority of the combined total number of informants. The group had self assertive qualities that easily marked them out to be picked for interviews. At the same time the aged category, 61 years and above, feeling rather incompetent, opted to have their sons' wives interviewed in their stead. They claimed that their daughters were more conversant with agricultural issues.

The aged group, 61-70 years of age, comprised 10 informants or 13.3%. This was the smallest group of informants. The small size may be accounted for by natural elimination. It was also highlighted that at an earlier age, some parents who would have been of this age group had migrated to Rift Valley areas where they had purchased land through shares from land selling companies. This explanation featured quite often when the researcher sought to know the legal owners of the plot or land in the area of study. Parents had left the land to their married and unmarried sons, some of who were employed in urban areas.

The first question to be posed to the informants, after their social status and ages were established, sought to know the types of crops each farmer grew in her plot. Each farmer would give reasons for choosing to grow the particular crops that she mentioned. Choice of crops determined the economy of the individual households, community and the nation at large. From the list given by each informant, a total of 22 crops were found to be cultivated in the area (see Table 4.1.3 below).

Table 4.1.3: List of Crops Grown by Informants

Horticulture		Others
Peas	Kale	Maize
Plums	Spinach	Sweet Potatoes
Tomatoes	Cabbage	Pyrethrum
Tomatoe Fruit	Potatoes	Tea
Avocado Pears	Peaches	Napier Grass
Cut Flowers	Pears	Beans
Carrots	Passion Fruit	Pumpkin
Onions		

The farmers' choice of what crops to grow calls for a careful evaluation of the important factors that have a direct or an indirect bearing on agriculture. Farmers must decide on the number of crops they want to grow relative to the available land. As we have already pointed out, scarcity of agricultural land is a major problem in both areas of study.

To understand choice in the realm of decision-making, it is essential to find out the extent to which women independently, without influence from their spouses or other male relatives, make decisions. To start with, a survey on marital status was carried out to establish the number and percentage of women informants who headed their own households by virtue of not having a male head of household. Any informant who was widowed, divorced, separated or unmarried, but with children of their own and perhaps other additional members of the extended family to support, qualified to have the status of "head of household". However, there is a class of unwed mothers that we excluded from the category of head of household. For instance, some young school drop outs or leavers with one or more children, but who continue to live under the same roof with their parents or single mothers, were not in a position of authority to make decisions on issues affecting the household. Either the mother or father had that authority on agricultural issues. Such women were assumed to be still under the influence and guidance of their parents and, therefore, were not interviewed.

Single women heads of households by various dispositions, had access and usufruct rights to land. The widowed inherited land from their deceased husbands whereas the divorced and the separated women could have access and usufruct rights to their husbands' lands though not living as married couples. If, on the other hand, the widowed and divorced women went back to their parents, their male relatives such as their fathers, uncles and brothers may allocate them land to use for their dependants' welfare. Likewise, unwed women may have parcels of plots from male relatives on their father's side (Kenyatta, 1938). These days it is common

for single women to buy their own land or even to have land allocated to them by their parents as inheritance.

Table 4.1.4: shows the status of informants according to the two prescribed categories.

Table 4.1.4: Marital Status of Informants in the Two Sublocations

Marital Status	Limuru		Gitihia		Combined	
	Freq.	%	Freq.	%	Freq.	%
Single	9	28.1	15	34	24	32
Married	23	71.9	28	65.1	51	68
Total	32	100	43	100	75	100

Freq = Frequency

According to Table 4.1.4 above, 51 informants, (68%) out of 75, are married. Limuru had 23 out of 32 or 71.9%, and Gitithia has 28 out of 43 or 65.1%. Further investigations was carried out on the 51 married informants to evaluate the extent to which they were influenced by their spouses in decision making. Information was sought regarding the occupation of male spouses. Knowledge of spouses' occupations would reveal the number of spouses who opted for farming either on a part-time or full time basis. Other occupations which featured were business and formal employment. All in all, the occupations listed added to five because spouses could combine more than one occupation. A column, of "no occupation" was added to cater for those spouses who did not engage in any occupation for one reason or the other. Table 4.1.5: shows married informants' spouses occupation.

Table 4.1.5: Occupations of Married Informants' Spouses

Occupation	Limuru		Gitithia		Combined	
	Freq	%	Freq	%	Freq	%
Farmer	10	41.7	10	37.0	20	39.2
Business	4	16.7	3	11.1	7	13.7
Employed	6	25.0	11	40.8	17	33.3
Farmer/Employed	3	12.5	1	3.7	4	7.8
Farmer/Business	0	0	1	3.7	1	2.0
No Occupation	1	4.1	1	3.7	2	4.0
Total	24	100.0	27	100.0	51	100.0

Freq = Frequency

The total number of married informants was 51 of whom 27 came from Gitithia and the rest (24) came from Limuru Township. From the Table above only 20 informants' spouses, i.e., 39.2%, were classified as farmers. The rest, 31 (60.8%), had other occupations besides agriculture; or they were engaged purely in non-agricultural economic activities. Our assumption is that the 20 informants' spouses who were classified as farmers had the chance to actively and effectively influence their wives in decision making in agriculture. The part-time farmers who combined agriculture with paid employment or business were 5 (9.8%). By virtue of their occupations the men in this category are, most of the time, away from the farms which are the scenes of action in matters relating to agriculture. It is highly unlikely that such spouses can offer meaningful and immediate decisions on horticulture and / or agricultural matters in general. Further investigation regarding their places of residence revealed that 3 individuals (60%) out of 5 resided at their respective places of work or business. Even those who resided in the homes, the normal time of leaving their homes is very early in

the mornings and return is late in the evenings. Saturday could be just about the only day they can effectively participate in agricultural issues, considering that Sundays are days of rest. Other times of possible participation are during annual leave and public holidays. Such participation in all fairness cannot be considered to be really effective or highly determinative of the direction of agriculture in any given household.

Most of the women farmers lived and worked on their plots, the actual site for decision making, everyday of the week. Some of the issues such as those pertaining to livestock and horticulture are very urgent and require an on the spot decision and implementation. If, for instance, a cow fell sick or fell into a pit, or tomatoes and potatoes began showing signs of a precipitating blight attack, or a vegetable vendor places to a woman farmer an order of 10 bags of kale, a decision has to be made immediately. No woman would wait for her husband to come home in the evening or over the weekend, or during the annual leave to make such a decision. Women make decisions independently not only in agriculture and horticulture but also on many other issues.

Spouses classified purely as businessmen or solely in formal employment were 24 (47%). These did not portray any interest in agriculture. It was left to their wives to manage and make all decisions pertaining to it.

In conclusion, therefore, of the 51 married informants' spouses, only 20 had the possibility of effectively participating in agriculture. It can be cautiously suggested that an indepth investigation of their day-to-day activities would reveal that either their participation was fifty-fifty or less. The remaining 31 married informants can justifiably be grouped with the 24 single informants, to raise the number to 55 (73.3%) of the independent decision makers in agriculture and horticulture.

In this study choice of crops to be planted by farmers is one of the key decisions that needs to be made. Following the above argument, on who makes agricultural decisions within a household, informants were asked to indicate whether or not their spouses participated in choosing the crops

to be planted. Table 4.1.6 shows the participation that was highlighted within the area of study.

Table 4.1.6: Informants' Spouses Participation in Choice of Crops

Occupation	Limuru		Gitithia		Combined	
	Freq	%	Freq	%	Freq	%
Yes	6	26.1	12	42.9	18	35.3
No	17	73.9	16	57.1	33	64.7
Total	23	100.0	28	100.0	51	100.0

Freq = Frequency

From Table 4.1.6 Only 18 (35.3%) Spouses were said to have participated while 33 (64.7%) Spouses did not. Already we have 24 single independent decision-makers. When this number is added to the above 33 informants, the total comes to 57, which is 76% of the informants interviewed. Only 18 (24%) informants were said to have been assisted by their spouses to decide on crops to be planted. Since the question of who makes decisions in agriculture was of crucial importance to this research, it became necessary to seek the opinion of the extension officers. These are the personnel who interact most often and directly with the farmers. The opportunity to have a free discussion with the said officers materialised when the researcher was invited to the extension officers' meeting held on 15th March 1990 at Limuru Social Hall. At this meeting two issues, among others, were raised by the author. They first sought to know who, according to the extension officers' assessment, made decisions on agricultural issues and second, who did the extension officers interact with most, between men and women farmers, during their field visits.

The unanimous response to the first issue was that women made decisions on agricultural issues unless such issues touched on cash crops

such as coffee, tea and pyrethrum, or on livestock, particularly the dairy cattle. On the second issue the consensus was that extension officers interacted more with female than male farmers. This seemed to contradict the popularly held notion that extension officers interacted more with male and not female farmers (Barnes, 1978; Uma, 1975).

Using the above data, (Table 4.1.6), together with the illuminating information yielded by the extension officers, it is reasonable to argue that in the research area, women generally made decisions on agricultural activities independent of their spouses or male relatives. Even in cases where married women do concede to their husbands' participation in decision making, it is possible that such concession is primarily intended to protect the image of the husband. This finding supported the objective which sought to identify individuals responsible for choosing the crops cultivated in the area of study. Women are the key decision makers in horticultural farming besides other farming activities.

Having reached the conclusion on who makes decisions in agriculture and horticulture, the researcher had the task of proving the two null hypotheses that this research set out to test. These were:-

(1) Engagement in horticultural production is not directly related to provision of family food and other needs.

(2) Women do not engage in horticultural production in order to increase their monetary or financial gains.

It has been shown in Table 4.1.3 that the 75 informants cultivated a total of 22 different crops. This list did not classify which of the crops were horticultural, such a classification being of no importance to the farmer. Farmers choose and grow crops not because they fall under any one classification, but because they serve their needs and such crops are within their means to grow them. Therefore, the task of classification was the researcher's.

One of the objectives of this study was to identify the variety of horticultural crops chosen and grown in order to investigate the rationale

behind the choice. Going by this objective, 16 (72.6%) of the 22 listed crops fall under horticulture (Table 4.1.7). Of these crops the horticultural ones are further classified separately as vegetables, fruits and flowers. The last crop, cut flowers, is purely for its aesthetic value for those who value the beauty of natural flowers.

Table 4.1.7: Types of Horticultural Crops Grown in the Area of Study

Vegetables	Fruits	Flowers
Kale	Plums	Astronomen
Peas	Pears	
Spinach	Tomato fruits	
Cabbages	Avocado pears	
Tomatoes	Passion fruits	
Potatoes	Peaches	
Carrots		
Onions		
Pumpkins		

Judging from the fact that the horticultural sector constitutes 16 out of 22 crops, it is obvious that this sector dominates arable cropping in the area of study. Apart from pumpkins, the remaining 15 crops are foreign in the area, an indication of the high rate of innovativeness on the part of the farmers. Pumpkin as a crop has dual purposes both of which fall under the vegetable class. The pumpkin fruit and leaves are used in the Gikuyu traditional mashed dish, irio. Another vegetable called thabai or hatha used in the same dish is not cultivated. It grows naturally in the bush or along the road-sides as was the case in traditional times. The fact that it is not cultivated may have contributed to its lesser usage. In fact, it is only the elder members of the community (over 50 years) that to some extent remembered its use in the past.

The other traditional vegetable featuring in horticultural category is peas. Traditional peas have, however, undergone an extensive cross-breeding process with foreign varieties to the extent of almost doing away with pure traditional peas. The area of study has had a long history of horticultural cropping (Byaruhanga, 1977) with a high possibility of this having been brought about by the African labourers on the neighbouring European settler farms.

Other than horticultural crops, other crops grown in the area are cash crops such as tea and pyrethrum marketed through the Kenya Tea Development Authority (KTDA) and the Pyrethrum Board of Kenya (PBK), respectively. Subsistence crops like sweet potatoes, maize and beans as well as napier grass, which is grown as a livestock fodder or as a protection against soil erosion on the steep slopes, are also cultivated. The later is indicative of the farmers' awareness of proper land use techniques in order to conserve soil. Table 4.1.8 details the horticultural crops grown, the number of informants growing each crop and the use to which it is put.

Table 4.1.8: Number of Informants Growing, Horticultural Crops and Their Uses.

Type of crop	No growing		For household consumption		For sale		For both household consumption and sale	
	Freq	%	Freq	%	Freq	%	Freq	%
Kale	75	100					75	100
Potatoes	68	90.7	11	16.2			57	83.8
Spinach	33	44.0	15	45.5	18	54.5		
Peas	64	85.4	17	26.6			47	73.4
Cabbages	59	78.7	3	5.1			56	94.9
Carrots	51	68.0	5	9.4			46	90.2
Passion fruit	17	22.7					17	100
Plums	41	54.6					40	47.6
Pears	44	55.7	1	2.4			44	100
Tomatoes	19	25.3					18	94.7
Tomato fruit	2	2.7	1	5.3			2	100
Peaches	3	3.9					3	100
Cut flowers	1	1.3			1	100		
Onions	11	14.7	4	36.4	1	9.1	6	54.5
Avocado pears	1	1.3			1	100		
Pumpkins	2	3.7	2	100				

Freq = Frequency

According to Table 4.1 8, it is observed that Kale, potatoes ,peas, cabbages, and carrots, in that order, are the most popular choices cultivated by more than 50% of the informants . Following these crops are the pears, plums and spinach cultivated by between 44 and 55.7% of the informants. The least popular crops are the tomatoes, passion fruit, onions, peaches, pumpkin, tomato fruit, avocado pears, and cut flowers. In addition to the foregoing, food crops alone indicate that out of the 16 crops listed, 9 (56.3%) are grown for household consumption. four crops (25%), including cut flowers, are grown for sale. The fact that 9 crops, as compared to 4, are grown for family consumption is a clear indication that familial requirements take priority over cash generation. Apart from cut flowers, which are not edible, all other edible crops are reflected in columns

designated pure food or pure sale. this means that these crops too end up being consumed in the home. As a matter of fact, almost all edible horticultural crops are also grown for home consumption.

In choice situation, priority of familial needs over cash generation is a phenomenon that has been observed by Gladwin and Murtaugh (1980). The two observed that Altoplano women farmers in Columbia plant maize their staple food in areas where they would make twice as much money by growing vegetables. The rationale applied here is one of assurance. Every woman wants to be assured that she will have enough maize to last her family until the next season's harvest. In Columbia, maize is sold in the open market, but farmers sell only the surpluses. Since the woman is not sure whether there will be sufficient food surpluses in the market for her to buy, the only way she can be assured is by growing it for her own requirements. ".. it would be very sad state of affairs if a woman had money but no maize to buy. ..."(Gladwin and Murtaugh 1980)

The column of food and sale usage has 12 (75%) of the listed crops. This column was included because it became evident that surpluses, other conditions permitting, always end up in sale. If for any reason sale is not forthcoming, surpluses, where possible, were fed to livestock, dried as is the case with peas for ease of storage. Sale only takes preference over food in cases of emergencies such as sickness, expulsion of a child from school due to an outstanding debt of fees or an inevitable journey made to contact relatives on some calamity that has befallen a family. Therefore, family needs dictate the choice of agricultural activities.

From the list of horticultural crops three of the edible crops, namely, spinach, onions, and avocado-pears, it was established that a number of horticulturists grew them specifically for sale. It seemed strange that anyone should grow an edible crop and not eat it at all. However, all the farmers who grew these crops without they themselves having to eat them, claimed that they disliked the taste of such crops. Spinach has the largest number of informants 18 (54.5%) out of 33 who grew it but did not eat it. Informants stated that they substituted kale for spinach because the former is tougher and more appealing in taste. Spinach was described as being too soft, slimy, watery and too easily digested. No matter how much one ate of spinach, one was never really full. Spinach was relegated to second position over kale and was categorized as food suitable for babies, the sick and the aged. Informants also highlighted the fact that when spinach was

used, it was almost always in combination with kale in the ratio of one bunch of spinach to three bunches of kale. In this proportion spinach was said to give kale a finer smoother texture and a better taste. As a cash generating crop, farmers felt that spinach does well and gives high yields. Its nutritional value was acknowledged as being high especially for babies, growing children and the aged.

The direct provision of family food is not the only familial need observed among the informants. A lot of foodstuffs such as cooking fat, tea, coffee, bread, sugar, rice, flour and many more have to be bought from grocery shops. Other items such as toilet soap, detergents, radio and torch batteries, kerosene for lighting and at times for cooking as well, kitchen ware, clothing, and various types of payments, all required hard cash. Within a household, therefore, are a number of ways of generating the required cash. One of the sources and that which is most reliable is the regular remittance of money made to households by those in business or salaried employment. Such remittances have been cited by Fleuret (1982) and Lucas (1986).

However, a relatively large number of informants did not enjoy such regular remittances because they did not have any of their household members in business or formal employment. For these farmers, the major, and sometimes the only source of cash, was that which accrued from the sale of agricultural produce. Most of them depended basically on agriculture as a main source of livelihood. Occasionally, some of the household members may get casual employment during the peak period of farming or may be employed as domestic servants in urban areas where salaries are very low but nevertheless do help to cater for some of the financial commitments described above. This study confirmed this practice since 70 informants (93.7%) out of 75 were in the farmer-house wife category. The remaining 5 (6.3%) were formerly employed as teachers besides their housewife-farmer roles.

As agriculture is a wide and varied sector there are other avenues from which cash could be generated, for instance, through the sale of livestock and livestock products such as eggs, milk and manure. Cash is also obtained from sale of cash crops such as coffee, tea and pyrethrum where these are grown. Money from sale of cash crops and milk may be under the control of the male head of a household which too often may not find its way in the general day-to-day use of the items listed above. This

commonly goes into the male's personal use and sometimes into investment of business or livestock. This makes arable cropping dominated by horticultural crops the major and most reliable source of money for household use for most women in the area of study.

Once the money has come into the household kitty from horticulture or other sales and salary remittances, it is not easy to differentiate what money has the greatest impact on the economic status of such households. However, many informants acknowledged the fact that sales of vegetables generate more money and are a more reliable source. Vegetables take only a short time to mature and then they are sold off immediately. Kale in particular, was very popular for generating cash to pay school fees, and buy other foods and inputs. In fact, some women stated that kale was their major cash generating crop. The popularity of kale is not without reason. The vegetable grows throughout the year, can be intercropped with other crops, has low perishability rate and is easily marketed. Although this study has not been able to quantify income (in monetary terms) obtained from horticulture, judging by the dominance the sector commands, it can be sagely assumed that horticulture plays a bigger role than that played by other forms of agriculture. Table 4.1.9: illustrates the household needs catered for by money accrued from horticultural sales.

Table 4.1.9: Use of Proceeds from Horticultural Income

Needs	Out of 75	%
1. School Fees	45	60
2. Clothing	69	92
3. Other Food Stuffs	65	86.7
4. Day to day needs	63	84.0
5. Household items	41	54.7
6. Furniture	15	20.0
7. Jerry cans	6	8.0
8. Purchase of livestock	4	5.3
9. Agricultural inputs	54	72.0
10. Women Groups	13	17.3

The above tabulation of "needs" requires a further clarification. Terms such as "other foodstuffs" refers to food materials purchased from grocery shops, e.g., sugar, cooking oil, wheat flour and tea leaves, among others. As for "the day-to = day needs" there are several purchased items that could fit in this category. They include kerosene, torch and radio batteries, detergents and toilet soap. In this study, household items were taken to mean any of the items used in the house such as cooking pots, stoves, hurricane lamps or similar lighting devises, mugs and glasses. Table 4.1.9 indicates that clothing needs were reported by 92% of the informants, foodstuffs by 86.7%, agricultural inputs 72% day to day needs 84% and household items 54.7%. These percentages are high, showing that most people relied on money accrued from horticulture for the purchase of most of the items they needed. Informants recalled incidences when immediately they sold a number of bags of kale, they cleared outstanding fees, purchased a dress, bought pair a of shoes and perhaps a jerry/plastic can for storing or fetching water. Alternatively, after selling potatoes at the market they passed via a grocery shop to buy the items they needed at home.

For most farmers the system of sale and purchases is not planned in a manner that money from sales goes to a pool from where it can be accounted for because it is expended immediately. Very often women know they were making improvements in their lives through growing horticultural crops as they rationally explained:

> Look at this tank; for a long time I have wanted to have a tank of my own to store water. I paid for this tank in instalments after several sales of kale, potatoes and pears until I finally brought it home. Were it not for the above listed produce, possibly I would never have afforded a tank.

The economic progress women made may appear to be trivial, slow and at times even unnoticeable to a casual observer or a visitor. It is only the women themselves who are aware, and feel a sense of achievement for what they have accomplished. Some informants stated that they have advanced from a grass-thatched house to one with corrugated iron sheet roof, which indeed is a great advancement.

Needs such as purchasing of animals, jerry cans, furniture and payment of subscription fees to women groups are reported by only a few informants. The thirteen individuals who used money from horticultural sales for women groups eventually made accumulations which went into big

investments such as buying a dairy cow, a set of furniture or a pump sprayer.

The hypothesis that women grow horticultural crops to increase their incomes and provide family needs has therefore been conclusively proved. Although farmers are not able to say precisely what percentage of development or family needs are met by the proceeds from agricultural production they nevertheless are fully aware of the benefits of horticultural engagements. It is true that some of the things the household owns have been acquired with money accrued from formal employment, business and other forms of agricultural production; but it is evident that when it comes to cultivated crops, horticulture dominates production as most of the crops fall under this classification. From the list of crops grown by informants (Table 4.1.3) only maize, beans and sweet potatoes fall strictly under subsistence and are not horticultural. These are grown in very small quantities for household demands whereas horticultural crops such as kale are grown in largest quantities.

The third hypothesis states that: the cost of inputs and value of output affects economic gains from horticultural cropping. Inputs are commodities such as fertilizers and chemicals applied to crops to harness production or yields and quality per given unit. Other inputs are applied on animal husbandry. Within horticulture some of the common inputs used are improved seeds, fungicides and pesticides, fertilizers and irrigation water where available.

In developed countries where horticulture is treated with a status befitting an industry or a corporation, a wider variety of inputs are applied, coupled with detailed research work to ensure that optimum environmental conditions are artificially created to maximise yields. The Netherlands, Belgium, United States of America, and Germany, to mention only a few, are some of the countries where the above stated technology is applied (White, 1978; Gibbs, 1973).

The area where this research was conducted does not deal with this kind or advanced specialization for understandable reasons. The type of farmers dealt with are smallholder with limited resources and technology. Nevertheless, this does not imply that the farmers are totally devoid of some of the modern techniques of farming. There is a limited application of chemical fertilizers or their substitutes in natural manures, use of improved seeds, fungicides and pesticides by farmers, using skills learned from

European settlers. Local farmers are limited mostly by scarcity of resources such as land, capital and infrastructure. The study established that information relating to inputs had been available to farmers through a number of sources, e.g., government and HCDA extension agents who directly interact with farmers. They also get information from agricultural literature which is obtained from local journals and radio broadcasts. Progressive farmers' farms serve as demonstration centres for other farmers to learn from. Those who have been to farmers' training centres have assisted their neighbours to acquire new techniques in farming. Women groups and local input retailers have also assisted in many ways to spread information useful to farmers in the area of study. Farmers' awareness was tested on four most common inputs, that is fertilizers, improved seeds, fungicides and pesticides, as will be shown in Table 4.1.10.

During the formulation of the questionnaire, water as an input in irrigation was included. This is because it is one of the most important inputs in horticultural farming. Although farmers were aware of the importance of water as an input, and would have gladly applied it to harness production during the dry spells, none of the farmers irrigated their crop. In Limuru township sublocation water installed in homesteads was metered and households paid according to how much they used each month. Although water was available most times and usage was not restricted by water authorities, the cost was a prohibitive factor.

In Gitithia sublocation, water was installed by a cooperative water project where each homestead, household and/or plot owner had to pay a fixed amount of money every month. Each homestead or household had pipes installed complete with a meter although payment was fixed at Kshs.15.00 per month. However, the authorities of this cooperative project forbade the use of this water for irrigation purposes. The flow of water was also quite irregular especially during the dry season when water was needed most. This caused a major problem to the residents and the women pointed out that they had to spend an enormous amount of time looking for water when the taps ran dry. Consequently, anybody caught irrigating even seed nurseries was threatened with disconnection.

As for the other listed inputs, a survey was carried out to determine awareness and usage as per table 4.1.10.

Table 4.1.10: Awareness and Usage of Inputs

Input	Awareness		Usage	
1. Fertilizers	Freq.	%	Freq.	%
Yes	75	100	74	98.7
No	0	0	1	1.3
Total	75	100	75	100
2. Improved Seeds				
Yes	74	98.7	74	98.7
No	1	1.3	1	1.3
Total	75	100	75	100
3. Pesticides				
Yes	73	97.3	65	86.7
No	2	2.7	10	13.3
Total	75	100	75	100
4. Fungicides				
Yes	73	97.3	63	84
No	2	2.7	12	16
Total	75	100	75	100

Given that inputs harness production for increased quantities and quality, fertilizers as an input adds nutrients to plants for a faster healthy growth provided that other essential conditions are fulfilled. There are two types of fertilizers used, artificial and natural. Artificial fertilizers are chemical formulations of different nutrients required by different plants and found to be lacking or in insufficient quantities in the soil. Such nutrients are sold to farmers by local input retailers. They are expensive but effective if properly applied in the required amount and manner.Natural fertilizers are derived from decayed vegetable matter,composite refuse and animal dropping.

The term commonly used to describe this kind of fertilizer is manure.It is easily available to all farmers who practice mixed farming. Farmers who only cultivate crops can buy manure at reasonable prices from mixed farmers who have it in excess.

The data indicates that every informant interviewed had actually heard of fertilizers, but only one claimed not to have used it in any of the two

forms. The reasons given for failure to use it in spite of knowing about it were that both natural and artificial fertilizers were too expensive and she did not keep livestock. Among the 74 (98.7%) who had used it, some had used both artificial and natural forms of fertilizers, while others had only used either of the two.

All farmers who were aware of improved seeds, had also used them. The total number of users was 74 (98.7%) and only one did not use them. She was an elderly woman who self-processed most of her seeds. Although she claimed not to have used improved seeds, she was known to have used kale seedlings from her daughter in-law. On maize she adamantly refused to buy improved seeds recommended for the area and instead selected seeds from her previous harvests. Improved seeds are high quality seeds specifically selected and produced for subsequent plantings. Although nearly all farmers claimed to have bought improved seeds, it was not the case that all seeds planted were bought from approved agents. On several occasions farmers selected what they considered to be the best seeds from current harvests and kept them for planting. It was logical thinking for farmers to select their own seeds because some of the improved seeds were very expensive. Among those listed to have a high cost was kale, potatoes, carrots, spinach, and tomatoes. They all happen to be horticultural. The cheapest improved seeds were maize and so most farmers could afford to buy them. The easiest seeds to process were kale, potatoes and tomatoes; while carrots and spinach had inevitably to be bought. The practice of processing seeds was more common and persistent in Gitithia whereas in Limuru, farmers were abandoning the practice because they noticed that the yields and quality from home made seeds deteriorated with time.

Fungicides and pesticides are drugs that curb disease and kill pests, respectively, which attack and destroy crops. A fungal disease known as blight commonly attacks potatoes, tomatoes and beans. The first two crops can be completely ruined by such an attack. Beans are more resistant to blight and a farmer is still likely to harvest lesser quantities, when the crop is attacked. Regular spraying, once a week in the early stages of growth, with dithane chemical prevents fungal attack and ensures a bumper harvest provided that other requirements have been met. Women who cannot afford to buy dithane or have no sprayers, often opt not to grow potatoes and tomatoes for fear of blight attack. Those who can afford to buy dithane

but have no sprayers, either borrow from those who have or improvise sprayers by using leaves to spread the chemical on tomatoes.

During the dry season most vegetables, namely, kale, cabbages, and spinach are attacked by worms. Spraying regularly, once a fortnight, with an insecticides controls the attack and the leaves are spared. During the rainy season, worm attack is minimal because too much of cold water and cold temperatures causes the worms to die.

Whereas farmers have their own substitutes in fertilizers and improved seeds, there are no known substitutes for fungicides and pesticides. Any farmers wishing to protect crops from disease and pest attacks must buy drugs from the local input retailers. The data on fungicides and pesticides shows that the awareness and usage differs significantly from that of fertilizer and improved seeds. Seventy three (97.3%) informants had heard about fungicides and pesticides while only 63 (86.7%) of them had used them.

The relatively bigger drop in the number that had actually used these drugs is caused not only by the cost of the drugs, but also by the greater cost incurred in application. Fungicide and pesticides must first be mixed with water according to stipulated measurements of water and drug, following which the contents are put into a sprayer machine for spraying to be carried out. For proper application of fungicides and pesticides a chemical sprayer is necessary. However, the cost of a sprayer is between Kshs.1,500 and Kshs.2,500, depending on size and quality. This rendered these items beyond the reach of most smallholder farmers. A survey carried out to determine the number of informants owning a sprayer as a marker of socio-economic status revealed that only 22 out of the 75 informants owned one of these, 14 are from Limuru, and 8 from Gitithia. Farmers who own sprayers are very reluctant to loan them out to neighbours. Neighbours are equally reluctant to borrow them from those who have for fear of mishandling them let alone the feeling of humiliation at having to borrow. This being the situation farmers have three options, namely, improvising the sprayers, or opting not to grow crops that demand spraying or borrowing a sprayer from a neighbour.

Table 4.1.8 shows that 68 of the informants grew potatoes, 75 kale, 19 cabbages and 19 tomatoes. Kale and cabbages can be grown without spraying but definitely not tomatoes and, to a lesser extent potatoes. It was

highly questionable how farmers manage to grow these crops without spraying.

The explanation given was plausible as well as interesting. A few people claimed to have borrowed sprayers from their neighbours and friends. For a neighbour or a friend to loan out her sprayer, there must have existed a very strong bond of friendship between the two. Such friendship was reciprocated with occasional gifts of sugar, tea and other items. People hardly borrowed items like sprayers from casual friends. Other tools such as forks, hoes, axes, and bush-knives could be interchanged and borrowed without much fuss, but not a sprayer.

This kind of situation forced those wishing to grow tomatoes and potatoes without having sprayers of their own and with no intimate friends from whom they could borrow, to be inventive. These farmers cut cypress leaves which they dipped into the chemical mixture and then splashed onto the crops to be sprayed. This improvisation was rather messy besides being wasteful on the drug. It nevertheless accomplished the task though not as well or even as effectively as those with sprayers. Due to lack of sprayers and excessive wastage, farmers who splashed with cypress leaves did not spray as often as was required, hence blightal attack continued to threaten the crops.

Conclusion

In this section, through the criteria of head of household and making of one of the most important decisions in agriculture (choosing the crops to be cultivated), the research established that women make agricultural as well as horticultural decisions. This finding was confirmed by the extension officers, the change agents, who interact most often with farmers.

Using the collected data the research found out that women choose to grow crops that meet their family food requirements where surpluses could always be sold. At the same time, generation of hard cash required to meet other pressing family needs, was reflected in choice of crops which the cultivators did not even use as food. In this category were the spinach, avocado pears, and peaches. In their endeavor to maximize production in small plots of land farmers were found to use good methods of farming such as use of fertilizers, sprays, intercropping and improved seeds.

4.2.1 Qualitative Data Analysis.

This part analyses the processes followed by women farmers when making decisions pertaining to agriculture and horticulture in particular. The frame of reference to be used in this task is the theory of real life choice which follows a two stage model of decision-making. Gladwin (1980) observed that the two stage model poses psychologically and realistically a decision-making process, which even those intimidated by mathematical language can understand.

In the first stage of decision-making, decision makers take actions or decisions preattentively or unconsciously. They base their choices on some preferred aspects while at the same time discarding some of the given alternatives with some aspects they do not like. The aspects they do not like could be some constraints they are unable to overcome. The considerations applied in the choice situation need not be economic (Firth, 1955), some of the considerations may be cultural or the priority of family food supplies. Sometimes it may involve the case of one's view on whether their expectations will be met or not depending on what normally happens in the area. Farmers, like all decision makers, may at times make decisions by intuition for which they may have no suitable explanations. For instance, a study carried out on decision making among the farmers in Guatemala highland zone showed that during planting season it is very common for farmers to ask one another:-

> "... what are you considering between carrots, lettuce, and cabbages....? (Gladwin and Murtaugh 1980 pp 64)

The three crops are not necessarily the only alternatives open to the farmer and neither are they the only crops which can be grown in the area. The norm in the area, however, is to choose these three crops after farmers have used some criteria to eliminate the rest. Similarly, if a farmer was faced with a problem of choice with regard to what to grow in the valley bottom or on the slopes, for both vegetables and corn crops, such a farmer would be constrained to grow vegetables on the valley bottom and corn on the slopes. The reason is not that these crops would not do just as well if interchanged, but because culturally vegetables are grown in valley bottoms and corn on slopes (Gladwin and Mourtaugh, 1980).

4.2.2 Application of the Preattentive Decision-Making in the Area of Study

In order to understand how farmers undergo stage one of decision making, a listed number of crops were posed to the farmers to make a choice of what they would plant. The total number of crops posed for choice were (20) of which 12 were randomly selected from Table 4.1.3, crops listed as having been generally grown in the area of study. These crops were well known to the farmers who had practical experience of what it involved in growing and disposing of the products. Hereafter these crops will be refereed to as "familiar crops". (Table 4.2.3 a and b)

The remaining eight crops were selected from Janick (1972). Although the selected crops were not grown in the area, they were familiar in the sense that farmers had seen them in markets or green grocers. It could be said that the crops were alien to the area but not unknown to the farmers. Hereafter these crops will be referred to as "foreign crops" (Table 4.2.3 a and b).

The purpose of mixing familiar and foreign crops was to investigate the contribution of fore knowledge of a crop when choosing or rejecting it in the preattentive stage of decision-making. The informants were asked to respond with a simple "yes" or "no" on whether they would choose to cultivate each of the listed crops (Table 4.2.3(a)).

Table 4.2.3(a): A List of Twenty Familiar and Foreign Crops Presented to Farmers to Make a Choice.

Maize	Peaches
Cabbages	Carrots
Celery	Counteloupe
Spinach	Potatoes
Obergeen	Kale
Zuccin	Sweet Pepper
Peas	Radishes
Pears	Plums
Red Water Melon	Grapes
Beans	Tomatoes

Table 4.2.3(b): Familiar and Foreign Crops

Familiar Crops	Foreign Crops
Maize	Celery
Cabbages	Obergeen
Spinach	Zuccin
Peas	Red water melon
Beans	Counteloupe
Peaches	Sweet Pepper
Carrots	Radishes
Potatoes	Grapes
Kale	
Plums	
Tomatoes	

Samples of the foreign crops were first shown to the farmers and thereafter each crop was read out for the informant to make the appropriate response. Listed below are the responses which were recorded.

Table 4.2.4: Responses of "Yes" or "No" from Informants on whether or Not They Would Cultivate the Listed Crops

Crop	Yes Reply		No Reply	
	Sample (75)	Percentage	Sample (75)	Percentage
Maize	75	100	0	0
Cabbages	75	100	0	0
Spinach	75	100	0	0
Peas	75	100	0	0
Pears	75	100	0	0
Beans	75	100	0	0
Peaches	0	0	75	100
Carrots	75	100	0	0
Potatoes	75	100	0	0
Kale	75	100	0	0
Plums	75	100	0	0
Tomatoes	75	100	0	0
Celery	0	0	75	100
Obergeen	0	0	75	100
Zuccin	2	2.7	73	97.3
Red Water Melon	0	0	75	100
Counteloupe	0	0	75	100
Sweet Peppers	0	0	75	100
Radishes	0	0	75	100
Grapes				

NB. For analysis purposes the crops have been arranged so as to have the first 12 being the familiar and the last 8 the foreign crops.

The analysis of responses showed that all the 75 informants answered with the affirmative "yes" on all the familiar crops except the peaches. Peaches were rejected by all the informants. On the other hand, foreign crops were responded to in the negative "no" except for 2 informants (2.7%) who chose to cultivate zuccin. Each farmer was asked to explain why she would or would not cultivate a particular crop.

Due to similarity of responses and the large number of informants involved, individual explanations will not be listed. A general summary of the explanations given established that familiar crops were chosen because farmers had fore knowledge about what it took to grow such crops. Such knowledge could have been acquired from parents, neighbours, friends, local input-retailers, extension personnel, and through public meetings such as those convened by chiefs. Some of the knowledge the farmers had with regard to familiar crops revolved around mode of growing, application of inputs, preparation as in food or sale, processing as in drying before storage or selling and in general, various channels of disposal. This knowledge preattentively passed familiar crops as suitable for planting while foreign crops were rejected as unsuitable.

At the preattentive stage, both zuccin and peaches posed some abnormality in the choice trend. Peaches listed as a familiar crop and actually grown by 3 informants (3.9%) (see Table 4.2.4) were rejected by every informant including those who had actually engaged in growing them. Further investigation revealed that peaches tend to rot and develop worms on ripening. It is not clear what causes this problem but apparently it was a major deterrent factor on the number of farmers that grew or wished to grow it.

On the other hand, zuccin listed as a strange crop was chosen by 2 informants (2.7%). Since succin was not a local crop traditionally grown in the area, this aroused some curiosity as to why the two informants were willing to grow it. The explanation given pointed out that the two informants came from backgrounds where zuccin was cultivated for sale to the Indian community in the city of Nairobi. Neither of the two informants claimed to have used zuccin as a vegetable food nor did they know how it is prepared. As proof of fore knowledge in the cultivation of the crop, both unanimously agreed that the crop required fertile moist soils as are found in valleys or where heavy irrigation could be applied.

Rejection of foreign crops seemed to be largely based on uncertainty of the requirements in cultivation of such crops. Informants expressed fear that physical and climatic conditions of the area might not be conducive to the cultivation of such crops or that the taste might not generally appeal to the people. A lot of literature does highlight incidences of farmers' over unwillingness to take risk unless there was a high possibility of success (Cansian, 1979; Lionberger, 1960). The informants also wondered whether

some of the inputs required by foreign crops might not be out of reach for them. So little or nothing was known about foreign crops that farmers felt it was safer not to take the risk.

4.2.5 Stage Two - Hardcore Decision-Making Process

We have witnessed how in stage one of decision-making, fore knowledge and practical experience in cultivation of certain crops was used as a criterion of choice. Informants faced with a choice between foreign and familiar crops, preferred to choose the familiar crops over the foreign crops. As we proceed to stage two of hardcore decision-making almost all the informants stand at par in the fore knowledge of the crops presented for choice. It will be expected that other considerations will have to be carefully thought over by the farmers before a choice can be made over or reject some of the successful alternatives. Unlike the uniformity observed in the first stage criterion of choice, stage two is bound to have very individualistic considerations dependent on an individual's capability.

Because of the individualism involved in stage two, it will not be possible to take into consideration each and every informant's responses given that there are 75 informants. However, there will be a general summary of all the considerations highlighted by informants on why they would choose one crop and not the other. In this stage, it was deemed important to have a step by choice analysis of some of the factors decision-makers consider, to understand the complex process of decision-making. This necessitated a sampling procedure to select some of the 75 informants interviewed in the study.

4.2.6. Sampling

A random sampling was carried out to select 5% of the 75 interviewed informants. Once more the decision to use 5% for the analysis on the indepth decision-making process was based on what it involved in terms of time and space. Analysis would then be followed by a decision tree to demonstrate how farmers arrive at a choice. The 5% calculations of the sample informants from Gitithia and Limuru Township sublocations yielded 2.15 and 1.6 persons respectively. When this was rounded off to the nearest whole person each sublocation ended up having 2 sample informants. From Gitithia, informants number 14 and 37 were selected while from Limuru Township informants number 5 and 24 were selected.

All those crops which had passed the preattentive stage of choice were presented again in stage two of hardcore decision-making. Every informants asked to choose five crops in order of preference. The most preferred would be number one while the least preferred would be number five.

Table 4.2.7(a) shows individual crop choices of the sample group of four informants.

Table 4.2.7(a): List of Crops Presented to Informants for Choice

Maize	Beans
Cabbages	Carrots
Spinach	Potatoes
Peas	Kale
Pears	Plums
Zuccin	Tomatoes

Table 4.2.7(b): Sample of Informants' Choice of Five Crops in Order of Preference

Informants No and sublocation	Choice and Rating				
	1	2	3	4	5
Gitithia 14	Kale ✓	Potatoes ✓	Maize ✓	Pears ✓	Peas
Gitithia 37	Potatoes ✓	Kale ✓	Peas ✓	Maize	Beans ✓
Limuru Township 5	Kale	Potatoes	Carrots ✓	Cabbage ✓	Peas
Limuru Township 24	Kale	Tomatoes ✓	Potatoes	Pears	Peas

Examination of Table 4.2.7(b) shows that out of the listed twelve crops in Table 4.2.7(a) only nine were selected by sample informants. These are maize, cabbages, pears, peas, beans, carrots, potatoes, kale and tomatoes. Three crops, namely, spinach, zuccin and plums were rejected. The table also shows priority of choices listed from one to five in order of most preferred.

Using this data it is possible to arrange the selected five crops both in order of popularity, i.e., one upto nine, and the five in order of preference from one to five.

Popularity of a crop is judged by the number of informants who chose it. The greater the number the higher is the popularity. On the other hand, priority of a crop is based on the position it holds out of five crops. Those rated as number one are of greater preference than those rated number two, three, four or five. The frequency of rating per each informant on each of the selected crops also establishes the overall popularity of a crop in the area. Table 4.2.8 below shows analysis of choice both by popularity as judged by the number of informants who have selected a particular crop and the position the chosen crops are placed.

- First column listed nine crops selected by sample informants in order of priority, i.e., kale--- beans.
- Column two shows number of informants who chose the crop out of the 4 sample informants.
- Column three on position of preference shows the number of informants who placed the crop as number one, two, three, four or five.

Table 4.2.8: Analysis of Choice by Popularity and Preference

Crops	No who chose it out of 4	Information Rating 1 - 5				
		1	2	3	4	5
Kale	4	3	1			
Potatoes	4	1	2	1		
Peas	4			1		3
Maize	2			1	1	
Pears	2				2	
Tomatoes	1		1			
Carrots	1			1		
Cabbages	1				1	
Beans	1					1

The above table shows that kale, potatoes and peas are the most popular crops having been chosen by all the informants. In terms of preference rating kale was rated as priority number one by 3 (75%) of the sample informants. Only one informant placed kale in the second position. Potatoes are rated as priority number one by one informant, position number two by two informants and position three by one informant. Peas are rated position three by one (25%) informant and position five by 3 (75%) informants. Although all the three most popular crops are horticultural, kale is the most popular crop followed by potatoes and peas in that order. All the other crops have been likewise recorded in their rightful positions. What is interesting to note is that all along there has been a tendency of horticultural crops to dominate the pattern of land use and the farmers' priorities.

4.2.9 Individual Analysis of Decision-making as per Sample Informants

Case Study One

Informant No. 14 From Gitithia Sublocation

She is 32 years old, married with four children, two boys and two girls. She terminated her formal education at Std. 5 then she worked for some time as a house girl before she got married. From a list of twelve crops shown in Table 4.2.3 (b), she selected kale, potatoes, maize, pears and peas, in that order of preference, as the most preferred crops. For each of the crops she selected, she was asked to explain why she chose it and placed in the number it held in priority position. She had the following to say:

Kale

I prefer kale to all other crops because it matures quickly and can be harvested regularly, say once a fortnight, thus providing a reliable and regular income. There is a high demand for kale and it sells fast, besides most buyers come to buy it on site. There is no transportation cost. However, prices offered by buyers on site are lower than those which one would get at Limuru or Nairobi markets. One, however, has to consider the amount of time spent, not to mention any unforeseeable problems, which may result in the product not being sold at all. As food, kale has an appealing taste and is highly nutritious. Kale is not a labour intensive vegetable and has the advantage of being intercropped with potatoes, and other crops.

Inter-cropping is highly advantageous where land is in short supply as is the case around our area. During the dry season, kale is attacked by worms but this can easily be combated by spraying with pesticides once every fortnight. During the rainy season transportation for buyers can be a problems when roads become impassable.

Potatoes

Like kale, potatoes mature very quickly to the extent that it is possible to have more than one harvest per year, There is a great demand for potatoes which makes it easy to dispose of. Potatoes have an appealing taste and can be cooked in several different ways. With careful planning potatoes can be intercropped with other crops.

Maize

Maize is the basic food for our people. In our kind of environment, unfortunately, maize takes most part of the year, engaging land for longer than necessary. Nevertheless, I always use a small portion of my plot to cultivate maize because I feel it is a shame to be buying maize when I could have planted my own. Every farmer does the same to be able to enjoy particularly green maize mbembe njua.

Maize cannot be effectively intercropped with other crops except in the early stages for quick maturing crops such as beans. Much as I may feel that maize strains a scarce resource, land, it is difficult to let a season pass without cultivating a small potion of maize for family.

Pears

I have a few pear trees and I plan to plant some more. Pear fruits are seasonal but when ready, there is always a great demand for them. When in season, pears are a reliable source of money. My children also enjoy eating pears. They ripen slowly, are not highly perishable like plums and are easily transported without getting blisters. If widely spaced, it is possible to grow a variety of crops, e.g. kale, potatoes and others in between. Cash accrued from sales is used for buying groceries, paying fees, buying books or even buying household items like cups, spoons and plates.

Peas

I have rated peas as the last of my priorities because growing peas is a tricky business. The best time for engaging in this crop is during the long rainy season when most farmers grow them. The more farmers grow the peas at the same time, the better for each of them because pest attack is spread out. Green peas are a favourite food for birds and rodents, hence when many farmers engage in this farming activity, the loss is evenly shared out and each farmer is able to make a profit in sales. When only a few farmers engage in peas growing, there is a high likelihood of not harvesting anything unless the birds are watched.

All the same, peas are one of the most valued farming activities particularly in marketing. Peas are sold green, so that a farmer is relieved of drying and threshing them as in beans. As food, they have an appealing taste and can be cooked in a variety of ways.

This informant rejected cabbages, spinach, succin, beans, carrots, plums and tomatoes. For each of the rejected crops she had the following to say:

Cabbages and Plums

I lumped the above two crops together because of their mode of ripening. The rate of ripening and going to waste is so fast that if a farmer is not in a position to organize a market fast enough, she would lose the whole crop. On the other hand, if a farmer is lucky enough to get a ready market for the whole crop, she can make money in lumpsome which can be used to buy a major item such as a sprayer, a water tank or even clear an outstanding school fees debt.

Zuccin and Spinach

I have never engaged myself in the cultivation of these two crops. My family and I do not find the taste of spinach appealing. As for zuccin, this is the first time I have heard of it and I do not remember seeing it even in the market at Limuru Town. The crop is, in all aspects, foreign.

Beans

Every year I grow some beans for my family's consumption. The main reason why I cultivate a small portion of my plot with beans is because they are very expensive in the market. When I compared beans with peas I decided that I am better off growing peas. Beans have to be dried, threshed, and stored after mixing with a weevil control powder. Peas, on the other hand, are consumed and sold before they dry. There is no storage, threshing, drying and other expenses.

Tomatoes

If I had the necessary facilities for growing tomatoes I would not hesitate to do so. There is a tremendous demand for tomatoes and the prices offered enable farmers to make a profit. Unfortunately, they are extremely labour intensive and require a lot of attention in terms of spraying, pruning, tying the vines to support, mulching and weeding. Spraying is one of the most taxing activities, particularly if one does not have a sprayer. The chemical used to spray against blight is very expensive and improvised spraying with leaves is very wasteful. Between potatoes and tomatoes, in terms of spraying, one is better off growing potatoes. On the former, two or three consecutive sprayings sees the crop through, while in the latter one has to spray many more times for a longer period.

Carrots

I was in a dilemma as to whether I should cultivate carrots or peas. Had I to choose a sixth crop, I would definitely have gone for carrots. Yields from carrots are generally quite high. They are also bulky and therefore profitable especially when they are sold by weight. Nevertheless, peas are likely to fetch more money in the market. Peas are also easier to transport and have a low rate of spoilage. Carrots are likely to break or split if roughly handled during transportation.

Case Study Two

Informant No 37 from Gitithia Sublocation

Informant No 37 is 38 years old and married with four children, all daughters. She had three years of formal education which enables her to read in mother tongue. Much of her reading concentrates on the Bible and other religious literature.

Her choice of crops starts with potatoes, followed by kale, peas, maize and beans, in that order of preference. In some respects her explanation differs from that of informant No. 14 but in others, the two are in total agreement.

Potatoes

Priority number one for me is potatoes. My feelings are that in spite of the labour intensive nature of potato growing and the expense involved both in time, money and chemical sprays, the effort is highly renumerated. A small portion of potatoes if well looked after is sure to produce a bumper harvest from which a farmer can pay off the costs of inputs and still make a reasonable profit. The demand for potatoes is fairly high in the market and they can be safely stored for a reasonable period as one looks for buyers. Potatoes appeal to a lot of people and are used in several different dishes. It is also possible to intercrop potatoes with other crops.

Kale

Like many other women farmers, I consider kale to be a cash crop. Kale matures quickly, is harvested regularly and many buy it on site, thereby relieving the farmers of the burden of transport. In addition, kale is not as highly perishable as spinach, and it gives reasonably high yields over a long period of time. As a food it is filling, appealing in taste and highly nutritious.

Maize and Beans

Any farmer worthy her name grows maize and beans. The two form the basic and bulk of our traditional food. While the two feature prominently in our local markets there is a greater assurance of family's food supply when a farmer has grown her own. I always reserve a portion of my plot, no matter how small, for the two crops.

One great disadvantage of growing maize is that it takes too long a time to mature and be harvested. For some ununderstandable reasons, maize yields are fairly low irrespective of the amount of manure or chemical fertilizers applied. I have a feeling that our local agricultural officers have not really carried out a thorough research to determine the most suitable maize variety for this area. When compared with peas, beans take much longer because they have to dry and be threshed before they are stored. Both dry maize and beans have to be mixed with a chemical powder to prevent them from being attacked by weevils.

Peas

One of the greatest advantages of growing peas is the fact that they are sold while they are still green. Thus, land cultivated with peas is soon free for other uses. However, growing peas becomes difficult due to the many pests such as birds, rodents and worms. The margin of profit is higher when many farmers have cultivated the crop, because the losses are minimised. When only a few farmers cultivate it, the crop is ruined by pests while still in the shamba.

This informant rejected zuccin, spinach, tomatoes, pears and carrots. On the rejected crops, she had the following to say:

Zuccin and Spinach

I have no fore knowledge of zuccin in terms of what it takes to grow it or use it as food. Therefore, I did not choose it. As for spinach, I cultivate a small portion to mix with kale for my family's food. As a cash crop to generate cash I believe not many people like to buy spinach. They prefer kale.

Tomatoes

Although I use a lot of tomatoes for cooking and eating raw, I do not think I would want to undergo what it takes to grow them. Tomatoes are too-labour intensive and when ready, they have to be transported in wooden crates to reduce the rate of spoilage. However, in the market, tomatoes fetch a lot of money.

Pears

Since pears are produced from several tree-like branches that seem to take a lot of the scarce resource, land, I have planted only a few pear trees on the homestead. I do not think it is wise to plant very many of them in preference to other crops. The seasonal nature of the pear crop, according to me, is far too unreliable for generation of cash or even as part of food.

Carrots

On carrots, like tomatoes, I prefer to buy what I need rather than engage my plot on their cultivation. My family's needs for carrots are small and I feel that there is not much money to make from growing them either. I find it cheaper to buy what I need rather than go through the hustle of cultivating them.

Case Study Three

Informant No. 5 from Limuru Township Sublocation

She is 48 years old and married with seven children, four boys and three girls. Her formal education terminated at Standard Four when she did the Competitive Entrance Examination (CEE) and failed. Her choice of crops starts with kale followed by potatoes, carrots, cabbages and peas.

Kale

The reasons that led this informant to place kale as number one are similar to the previous two sample informants. However, a summary of the reasons are early maturity, regular income for a long period of time, not labour intensive, allows for intercropping, appealing taste and high level of nutrition. Pest problem is easily controlled by spraying once a fortnight with pesticides, particularly during the dry season.

Potatoes

Like kale, potatoes can be cultivated twice in a year during the long and short rainy seasons. The yields are high and there is a big demand for potatoes. Storage is possible for a number of weeks while the farmer gets a well paying buyer. Potatoes can be cooked in a variety of ways and they suit the aged and the young alike. The

problem of blight attack can be overcome by spraying once a fortnight for three consecutive periods.

Carrots

Carrot yields are high from a very small portion of the plot. There is hardly any weeding to be done because carrots smother weeds and provide a cover for the soil. There is a great demand for carrots even among the neighbouring farmers who may not have cultivated them. Carrots are heavy and bulky to transport. Rough handling can also lead to breakage, bruising and splitting. Transportation problems can be overcome by selling on site or handling with a lot of care.

Cabbages

If a farmer plans for the growing of cabbages to ensure that they mature at a time when there is a short supply, it is very easy to make a lot of money. Cabbages mature at more or less the same time. It is necessary to organize buyers in advance before they are ready. Failure to get buyers when cabbages are ready can result in big losses due to the high rate of perishability.

Peas

One of the greatest advantages of growing peas is that they are disposed of while still green. Yields may not be exceedingly high but the demand is insatiable. Since peas are sold green and by weight, we stand to benefit.

Rejected crops

Pears and plums were rejected because their tree like structures form a shade that tends to smother other crops. A few trees of plums and pears widely spaced and preferably planted along the outer limits of the plot can be manageable. However, the monopoly that these crops impose on land is one major factor of their rejection.

Beans

It happens that the yields of beans are low. Then I have to wait for them to dry before I can thresh, clean and store. Beans take too much of a farmers time.

Tomatoes

Tomatoes are labour-intensive. There are too many activities to be executed as in spraying, pruning and tying the vines to support. A farmer also needs a lot of money to buy fertilizers and chemical sprays. Tomatoes are highly perishable particularly when transporting. A farmer has to buy wooden crates for transport to ensure that they are not squashed.

Spinach and Zuccin

Zuccin is an alien crop as far as I am concerned. As for spinach I have never really taken a keen interest to grow them. The taste does not appeal to my family and may be this explains why I have never had an interest on it.

Maize

The greatest disadvantage of growing maize is that it takes too long to mature. Although I grow a small portion of maize every year for the family's food I am convinced that I could make more money if I devoted the same area for kale and/or potatoes. The money proceeds from the latter crops could be used to buy maize from our local market where it is always in plentiful supply. However, like every one else, I do grow my maize ration every year.

Case Study Four

Informant No. 24 from Limuru Township Sublocation

Informant No 24 is 36 years old and married with five children. Her formal schooling terminated in form one when she got pregnant and thereafter got married. She is a housewife and a farmer while her spouse holds a clerical job in the city of Nairobi. Her choice of crops starts with kale, followed by tomatoes, potatoes, pears and peas, in that order of preference.

Kale

A summary of the reasons she gave for placing kale as her number one priority are similar to those of other informants. The problems she experienced are a bitter taste of kale during the dry season which she overcomes by mixing kale with spinach in a ration of 2:1. The

problem of worm attack during the same season is overcome by spraying with insecticides once a fortnight.

Tomatoes

Reasons for choosing tomatoes in this informant's case are high demand and high prices. Most farmers are constrained by lack of sprayers but in her case she has one. She also budgets sparingly to ensure that she has sufficient money to buy chemical dithane to spray as regularly as is recommended by the extension officer in her area. Yields of tomatoes when well tended are very high and for a reasonably long time. She uses a lot of tomatoes in her cooking which the family enjoys. She agrees that tomatoes are quite demanding both in her time and money but the rewards by far outweigh the cost.

Potatoes

The reasons given by this informant on why she chose to grow potatoes are similar to those of other informants already discussed. However, the summary of the reasons are, several harvests in a year, bumper production, high prices, and appealing taste as food. In her case, having a sprayer was yet another reason why she engaged in growing potatoes.

Pears

If this informant had a big shamba she would devote a big chunk of it to growing pears. Although pears are seasonal, they fetch a lot of money when sold. Unlike plums pears ripen slowly to give one time to organize for buyers to come and buy on site or even arrange for transport to take them to the urban centres. Pears are not as highly perishable as plums, and her family enjoys eating them.

Peas

I have chosen peas because there is a big demand for them and the prices offered are high. Since peas are sold green, labour in drying, while cleaning and storing do not arise. A major problem experienced by peas growers is that of predators such as rodent, birds and worms. However, when many farmers engage in the activity at the

same time, losses arising from the above predators are shared out and therefore minimised.

Rejected Crops

This informant rejected maize, cabbages, spinach, zuccin, beans, carrots and plums. The feeling that maize takes too long to mature seems to be the predominant reason for its rejection by the informants. At the same time provision of family food seems to be the main reason why almost all farmers cultivate it no matter how small the portion. Culture strongly persuades women farmers to spare a portion of land for the cultivation of maize in spite of the knowledge that its cultivation is uneconomical.

Cabbages and Plums

These were rejected because of the mode of ripening which is very short. Once they are ripe, the high rate of perishability may lead to a total waste and high loss to the farmer if the sale is not organised quickly.

Zuccin and Spinach

Zuccin is a foreign crop for which this informant had no information. Spinach was used mainly for family consumption while kale seems to stand for spinach in various uses, particularly for cash generation.

Carrots

These were rejected because of the lesser market demand compared to that of peas and kale, for example. This informant, however, acknowledged that carrot yields are high.

Beans

Beans were rejected because there is more work input on their cultivation than that of peas and yet the latter fetches more money within a shorter period of time. Beans, like maize, are mainly cultivated for family food and one is better off buying than undergoing the pains of their cultivation.

4.2.10: Decision-making analysis

In the process of analysing how women farmers make decisions on agricultural issues, the researcher established that there is a tendency to group certain crops together on the basis of their serving similar food needs. This means that by growing one crop within a particular food group the farmer also served the needs of the other crop or crops.

Maize and potatoes were grouped together as basic foods where maize had stress on actual family food than on sale. Potatoes, on the other hand, stressed more on cash generation than actual family food. Farmers felt that at least one of the these two crops had to be cultivated. Beans and peas are principle constituents in Gikuyu indigenous meals although the former were cultivated for household's consumption while the latter were for cash. The above two groups of foods provide carbohydrates and proteins, respectively.

Among the vegetables, the choice was between kale and cabbages, on the one hand, or kale and spinach, on the other. Kale is by far more popular as a food and a cash generator than either cabbages or spinach. Among the three, the cultivation of spinach is more for household consumption than generation of cash. however, even as food, there is a small number of families that claimed not to have used it because of an unappealing taste and texture of spinach once cooked. Cabbages, if and when properly planned for, bend more towards cash generation than as family food.

Pears and plums, both fruits, are seasonal and are harvested once a year, pears around April and May and plums between December and February. Between those two crops pears are more popular than plums. Informants stated that it is easier to handle pears both in terms of sales as well as transportation. Plums, on the other hand; are said to be highly perishable during transportation mainly because they ripen very fast. They are also so delicate that special wooden crates have to be sued in transportation. This make the marketing of plums very costly to the farmer.

Using the above grouping of crops, all the 75 informants were asked to make their choices between each pair of crops. Finally, each informant was asked to choose only one crop. This sequential choice of crops enabled the researcher to draw two tree diagrams, one for the four sample informants, and another for the 75 informants. Table 4.2.11(a) shows a list of substitute crops posed for choice while Table 4.2.11(b) shows the

substitute crops choice analysis. Following these two tables, a third table, 4.2.11(C) were drawn to show a summary of choice of substitute crops by the four sample informants.

Table 4.2.11(a): List of Substitute Crops Posed for Choice

Potatoes	Versus	Maize
Beans	Versus	Peas
Cabbage	Versus	Kale
Spinach	Versus	Kale
Plums	Versus	Pears

Table 4.2.11(b): Substitute Choice of Crops Analysis

Substitute Crop	Freq Choice (75)	Percentage choice
1. Potatoes Vs	61	81.3
Maize	14	18.7
2. Beans Vs	39	52
Peas	36	48
3. Cabbages Vs	0	0
Kale	75	100
4. Spinach Vs	0	0
Kale	75	100
5. Plums Vs	16	21.3
Pears	59	78.7

Freq. = Frequency

Table 4.2.11(c): Choice of Substitute Crops by Four Sample informants.

Substitute Crops	Choice by sample Information			
	14	37	5	24
Potatoes/Maize	Potatoes	Potatoes	Potatoes	Potatoes
Peas/Beans	Peas	Beans	Peas	Peas
Cabbages/Kale	Kale	Kale	Kale	Kale
Spinach/Kale	Kale	Kale	Kale	Kale
Plums/Pears	Pears	Pears	Pears	Pears

The crop choice analysis shows that kale, selected by all the informants against spinach and cabbages, is the most popular crop. This is followed by potatoes chosen by 61 informants, which is 81.3% , against maize, chosen by 14 (18.7%) informants. Following potatoes is pears, chosen by 59 (78.7%), against plums, chosen by 16 (21.3%). Last is peas against beans, where peas were chosen by 39 (52%) informants and beans by 36 (48%) informants.

After the choice on substitute crops was accomplished, informants were finally asked to chose any one crop that they would want to cultivate. The choice of this crop did not limit them to any listed crops. This seemed to be the hardest decision to make for a number of reasons. No farmer in the area has ever been engaged in cultivation of only one crop and even a hypothetical situation was out of their imagination. Their response in most cases was "... why should I choose only one crop ..." Farmers insisted on a minimum of two until the question had to be worded differently.

> "Supposing the government passed a directive that each and every farmer will cultivate one and only one crop, and failure to adhere to this directive will lead to prosecution, which crop would you choose?"

The informants were assured that this sort of thing would never happen, but it was important that they make a choice of the said crop for the purpose of the research. Amazingly enough, out of twenty two crops cultivated in the area (Table 4.1.3) only four crops found their entry into the one crop choice. These were maize, potatoes, kale and tomatoes. Table 4.2.12 below shows these crops and the informants who chose them.

Table 4.2.12: One Crop Choice List

Crop	No who chose 75	Percentage
Maize	19	25.3
Potatoes	32	42.7
Kale	23	30.7
Tomatoes	1	1.3
Total	75	100.0

We have already noted how several factors account for the choice or rejection of each of the crops presented for choice. The process has also shown how family needs, particularly food, and generation of cash are major incentives for choice of crops farmers cultivate and thus determinant of land use pattern. Farmers weigh benefits and disadvantages of one crop against another on what they consider to be their priorities in farming. Among the many factors considered are those of perishability, maturity period, yields, marketability and inputs required. If some of the requirements are unavailable to the farmer the rules can be bent by improvisation as in use of cypress leaves to spray potatoes and tomatoes when a farmer does not own a sprayer. Where improvisation is not possible, the constraints disqualify the crop.

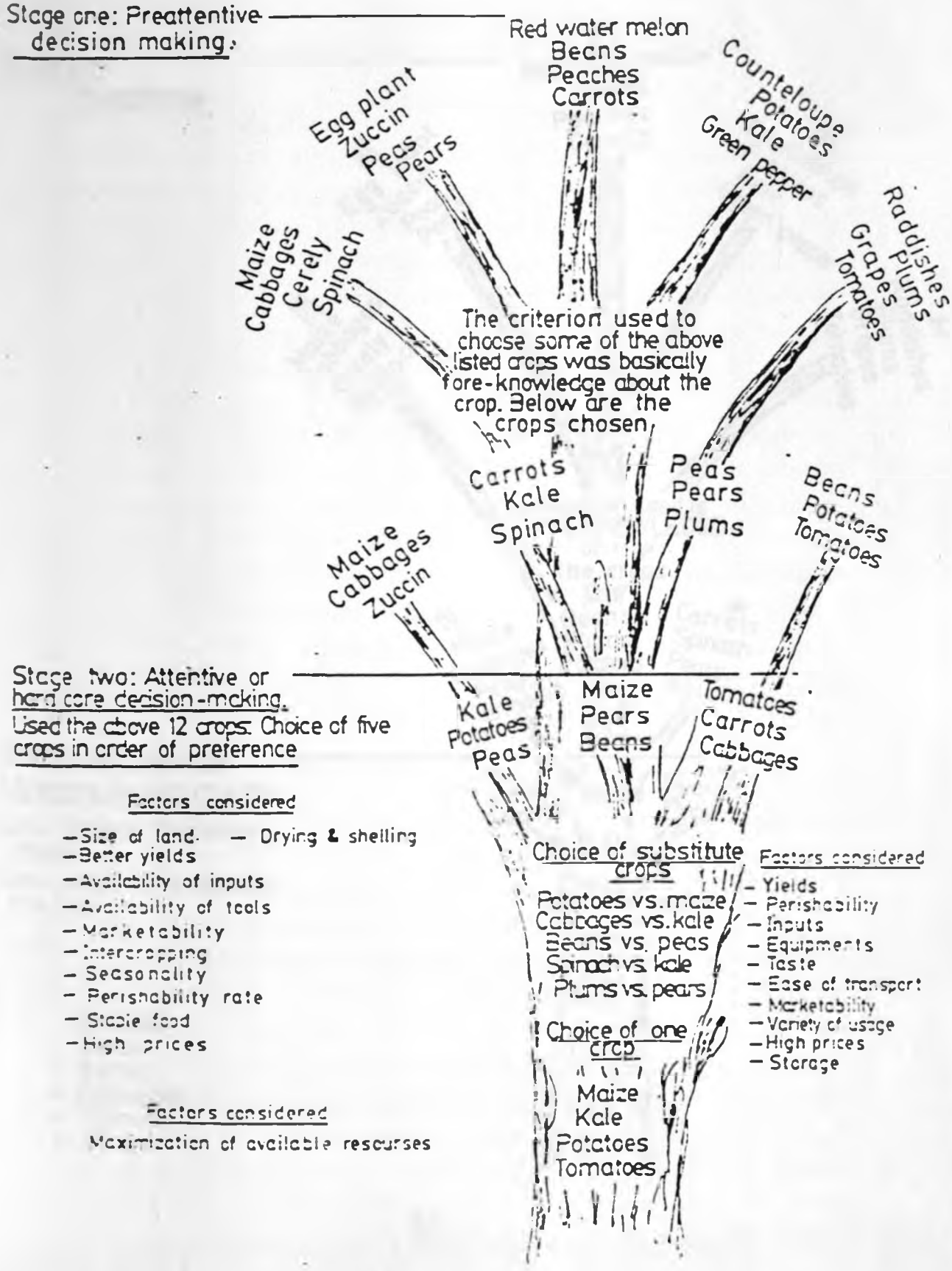
When farmers were confronted with a choice of only one crop, there was a big dilemma on the middle two crops. These were kale and potatoes. The analysis revealed that informants who choose maize and potatoes had family food as their primary objective while generation of cash was secondary. Whereas potatoes are used as household food, a big portion of this crop goes for sale because yields are high. There is a high demand and the prices are high enough to enable the farmer make a good profit. On the other hand, growing maize was purely for food and only surplus, if any, was sold. Choice of potatoes compared to maize, established that the former balanced very well both for food and cash generation considerations. It was also established that farmers were culturally ingrained to give priority to family food, particularly the staple food, irio. Growing of maize was mainly as a result of this enculturation. Maize does not have as high a demand as potatoes nor does it fetch prices as high as those of potatoes and, it takes a long time to mature. It is also difficult to intercrop maize with other crops.

Those who chose kale and tomatoes were more inclined to cash-generation than actual provision of family food. The argument they used showed some form of rationale in economic maximization of resources. According to these informants, families could actually subsist on maize and potatoes whereas a diet of kale and tomatoes was inconceivable. By implication informants who chose kale and tomatoes had in mid the generation of cash in amounts large enough to enable them to purchase other food requirements.

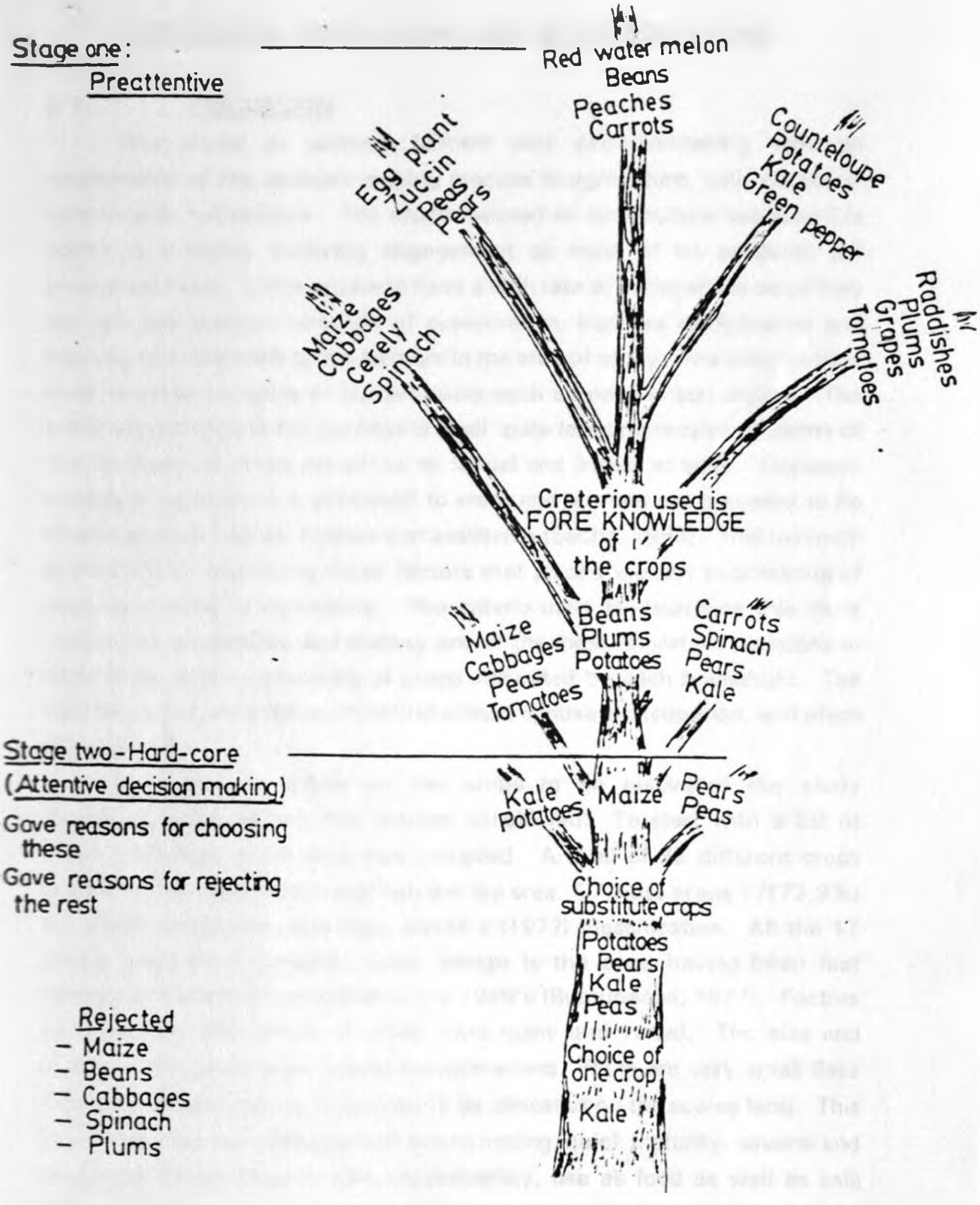
The choice also points out the importance of horticulture as a land use. Of the four final crops selected in the one crop choice three, namely, potatoes, kale and tomatoes are horticultural and only maize is a staple food crop. Kale and potatoes have all through portrayed the highest level of popularity and priority in choice. In the sample informants, for example, three of them chose Kale and one chose potatoes as priority number one.

Using the foregoing information it is possible to draw decision-making or tree diagram using any of the sample informants or generally using all the 75 informants. Diagrams 4.2.13 (a) and 4.2.13 (b).

4.2.13(a): DECISION – DIAGRAM FOR ONE OUT OF FOUR INFORMANTS



4.2.13 (b) DECISION-DIAGRAM FOR ALL THE SAMPLE INFORMANTS



CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 DISCUSSION

This study of women farmers and decision-making was an examination of the decision-making process in agriculture, with particular reference to horticulture. The study focused on horticulture because this sector is a highly involving engagement as most of its products are consumed fresh. These products have a high rate of perishability once they are ripe and modern methods of preservation, such as refrigeration and canning, are unknown to the farmers in the area of study. The only method used to preserve some of the products such as peas is sun drying. The tendering process in the gardens is itself quite labour intensive as some of the horticultural crops are prone to fungal and insect attacks. Decision-making in agriculture is attributed to men, and women are assumed to be simply spouses' wives, helpers and assistants (Sachs, 1983). This research started off by examining those factors that placed women in positions of decision-making in agriculture. The criteria used to determine this were heading of households and making one of the most important decisions in agriculture, that is, choosing of crops cultivated by each household. The variables used were those of marital status, spouse's occupation, and place of residence.

In making a choice on the crops to be cultivated the study investigated the factors that women considered. To start with a list of crops cultivated in the area was compiled. A total of 22 different crops were listed as having been cultivated in the area. Of those crops 17(77.3%) fell under horticulture following Janick's (1972) classification. All the 17 crops, apart from pumpkin, were foreign to the area, having been first introduced by European settlers in the 1940's (Byaruhanga, 1977). Factors considered in the choice of crops were many and varied. The size and outlay of the plots were crucial considerations. Plots are very small (less than 0.4 ha) and several crops had to be allocated on the scarce land. This being the case, considerations of intercropping, quick maturity, several and sequential harvests as in kale, marketability, use as food as well as sale were general factors highlighted. Those horticultural crops that had to be sprayed, e.g., potatoes and tomatoes, possession of a sprayer or the

possibility of borrowing from a neighbour, or the possibility of using home improvised mechanisms for a sprayer were also considered.

Regarding disposal of the crops, three channels were open to the farmers namely, food, sale, and food and sale. Produce opted for sale could either be sold on site, that is, at the farm plots, or be transported to the bigger markets at Limuru and the city of Nairobi. A majority of the farmers preferred to sell on site. This method was less involving, took less of the farmer's time and once an agreement was entered into, this was a reliable disposal channel. However, prices offered in this outlet were low and exploitative to the farmers. The method of transporting produce to the bigger markets at Limuru and the city of Nairobi were quite involving, particularly because farm roads were immotorable and vehicles and other means of transport scarce. The method was also time consuming and less reliable. Prices offered at these markets were definitely much higher and varied from day to day as dictated by the rules of supply and demand on the material day.

The study also examined the rate of awareness and actual implementation, including techniques of application of modern techniques in farming. The examination was based on four inputs used to harness quality and quantity of the produce. The four inputs were fertilizers, improved seeds, pesticides and fungicides. The study established a very high rate of awareness,implementation and knowledge of techniques of application. Farmers had advanced themselves to the extent of producing their own seeds in spinach, kale, sugar loaf, and potatoes.

The compiled list of cultivated crops was dominated by horticulture. The motivators of this engagement were found to be production of household food and generation of cash. The study investigated the role of the above motives in determining the decisions taken. The study established that for most products priority was that of family food requirements. Sale only took place after the family's food needs had been met. At times sale was only an exchange of a product for another food item. Certain crops, such as maize, were cultivated purely for the family's food. In growing maize, farmers were for the most part convinced that they were not utilising their resources to the best advantage. The enterprise was an unreasonable venture in terms of what it took to grow it against the benefits. One of the informants interviewed had the following to say with regard to the cultivation of maize.:-

... it occupies land for a longer period than most other crops, it is difficult to interplant with other crops, the yields are low and prices offered in the market fall far below the cost of production ...

In spite of this understanding, farmers still cultivated maize on scarce land because they lacked assurance that enough maize would be found in the market for them to buy for their requirements. Supplements of maize were made through yellow maize imported from the United States of America (1979, 80). However, this kind of maize was received with mixed feelings by Kenyans. There were rumours that it has been mixed with fertility reducing agents as a way of forcing consumers to family plan. This kind of propaganda compels farmers to cultivate some for their own consumption. This factor notwithstanding, in the choice of one crop by farmers, the study further observed the stress on family food over cash generation. There were more informants who chose maize and potatoes - staple food - compared to those who chose kale and tomatoes. The former were more cultural oriented because the two crops were considered to be important components of the traditional food of the Agikuyu. The latter group was more cash generation oriented because kale and tomatoes are basically produced for sale to provide a steady and continuous cash flow.

5.2 CONCLUSION

From the foregoing discussion a number of conclusions can be made about this study. It is the finding of this study that in the agricultural sector women are key decision-makers. The basis for this conclusion arises from the fact that of the 75 informants interviewed 55 (73.3%) of them were heads of their own households and 57 (76%) chose the crops the said household cultivated. Choosing of crops was done by these women independent of their spouses and male relatives.

The kind of crops these women chose showed that the agricultural sector was dominated by horticultural crops. Since these crops were found to be foreign to the area, the domination is an indication of high level of adoption of innovation on the part of the farmers. This is contrary to the popularly held notion by the early studies that smallholder farmers, negatively referred to as peasants, are culturally constrained to grow their indigenous crops because they lack the desire to try something new.

As for the marketability of produce, the two main channels of sale were on site and at the bigger urban markets. Both outlets were found to be inadequate to the farmers needs. Farmers have, however, to choose one of the options as there were no other alternatives.

On awareness and actual implementation of modern techniques in farming, the study recorded a high presence of both factors. Awareness recorded 73-75 (97.3-100%) while implementation recorded 63-74 (84-98.7%). This led to the conclusion that farmers in the study area are conversant with suitable methods of farming and therefore do not need to be sensitized on such issues. Their constraints were found to be either land or the required materials, or cash which could be used to buy such materials.

Cultivation of maize, which the farmer described as utilization of scarce resources to minimal advantages, was attributed to insecurity in supply of a major component of traditional food, and cultural behaviour that compels each farmer to produce her maize requirements. Every farmer was expected to cultivate a small portion of maize, and it was considered a great shame if a farmer tried to buy green maize elsewhere. Imported yellow maize from the United States of America did not ease this cultural attachment to growing one's maize, since people take it that yellow maize has negative side effects.

5.3 RECOMMENDATIONS

Most of the recommendations by this research derive from the role of women as decision-makers. The study's findings are that women do make decisions in agriculture independent of their spouses and male relatives. In these positions women are key determinants of the economies of households and those of the country at large. It is therefore recommended that development planners and change agents evaluate their strategies in development so as to focus on the actual actors in the field, in this case women. One way of doing this is enrolling more women to train as extension officers in order to interact with women farmers. In the area of study and perhaps in other areas as well, it is not easy for women farmers to interact freely with male extension officers. At least one female extension officer should accompany her male counterparts when providing extension services.

On factors of consideration, I would recommend that the government, if possible, harnesses the security of essential foodstuffs such as maize. Maize as a major component of staple food is at times in severe short supplies. There are areas where maize does very well, e.g., Trans-Nzoia where the farmers have considerably large hectareage of land. Extensive production of maize in these areas would, or should be, in a position to supply farmers with small plots best suited for horticultural cropping. This would ease the tradition of cultivating maize against all odds in the area of study. Alternatively, or even concurrently, the people of the area under study should be encouraged to recognize other types of food to reduce reliance on maize as their staple.

The research identified marketability as a major problem in the area of study. The two methods of sale highlighted by farmers were found to be inadequate and exploitative. The researcher recommends that the government or non-governmental organizations institute horticultural cooperatives. Such cooperatives would be in a position of instal canning and refrigeration facilities to process horticultural produce before selling, or to facilitate household canning and other food preservation measures. It is also recommended that the cooperatives stock their establishments with materials that farmers require such as fertilizers, drugs, seeds, and simple machinery, e.g. sprayers, wheel barrows, and tools such as knives, forks and hoes. Farmers should have access to the above listed items on credit secured by delivered produce. Payments for the same should be made by deductions from the cash accrued against products a farmer has sold to the cooperative.

Lastly, this research has suggested some decision-making models in agriculture. These models help to predict what farmers are likely to choose even when new ideas are introduced. They could thus be of use to development planners when making policy recommendations. The models also pin-point the main constraints or factors limiting farmers' choices. The question of whether, as land becomes more scarce, farmers will switch to cash generating over staple food production can be answered using decision-making models.

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