Land - use Among The Gurage And Jille Farmers Of Dugda District, South Shewa

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LIST OF AMHARIC WORDS

Awraja	-	*Administrative District*
Kolla	-	*Agro ecological zone in altitude range approximately 1000 - 1800 m.a.s.l.*
Wereda	-	*Administrative Sub- district*
Woinadega	-	*Agro - ecological zone in altitude range 1800 - 2400 m.a.s.l.*

LIST OF ABREVIATIONS

C.S.A.	-	*Central Statstical Authority*
C.S.O.	-	*Central Statistical Office*
L.U.P.R.D.	-	*Landuse Planning & Regulatory Department*
M.O.A.	-	*Ministry of Agriculture*
P.A.S.	-	*Peasant Associations*

ABSTRACT

Dugda district is found in South Shewa Administrative Region, in the northern part of Adamitulu Awraja. The district is lying within the floor of the South Central Rift Valley system and is a typical example of the lowland zone of Ethiopia. The ethnic structure of the rural population of the Dugda is dominated by two ethnic groups: the Gurage and Jille Oromo. According to local legend, each group has its own centre of origion, culture and way of life which are partly reflected in their present settlement. Today the Gurage of Dugda live mainly on the undulating plains and uplands of the woinadega agro-ecological zone of the nothwestern and western parts of the district. On the other hand, the Jille are inhabiting the extensive moist Kolla agro-ecological zone that constitutes the North - South stretches of the eastern side of Dugda district. Therefore, the main objectives of this study have been to assess the land use pattern of the Gurage and Jille farmers of Dugda and their attitude towards differnet land uses (e.g. cultivation and animal husbandry).

The necessary data for these objectives were collected mainly through field survey of 90 Gurage and 110 Jille farmers. These have involved a two level of sampling techniques. For a detail study of land use history and field visits a total of 41 farmers (19 from the Gurage and 22 from the Jille), or 3% of the members of the selected PAS of each social group were visited by the writer. Beside this, a total of 161 farmers (89 from the Jille and 72 from the Gurage), or 12% of the farmers of the selected PAS were surveyed by the enumerators. In order to analyse the data percentages,

coefficient of variation, Chi - square, Standard deviation, Simple correlation and regression, and analysis of variance techniques have been employed.

The research revealed that the Gurage farmers have a larger holdings than the Jille farmers, the average holding per farmer for each group being 2.86 ha and 2.26 ha, respectively. The finding also indicated greater disparities in farm size among the Jille than the Gurage farmers. The study revealed that fragmentation is greater among the Gurage than among the Jille farmers, the average number of fields per farmer being 4.51 and 3.08, respectively. The land-use survey of the Gurage and Jille farmers indicated the existence of distinct pattern of crop zonation around the homesteads of the farmers. In the writer's view it is the type and spatial distribution of soils, whatever their distance from the homestead, that determines the zonation of crops around the settlement of the Gurage and the Jille farmers of Dudga. This finding vindicated Ruthenberg's finding of land use zonation in tropical Africa. The assessement of the attitudes of the Gurage and Jille farmers revealed that both farmers of the groups seem to support the policy that emphasizes more animal husbandry than crop cultivation, because of the risk involved in crop damage due to climate. The study recommended that the future land-use policy of the MOA in Dugda should take into account the experiences and desires of the farmers as well as the prevailing environmental constraints in the district.

CHAPTER - ONE

1. INTRODUCTION

1.1. LITERATURE REVIEW

In reviewing the literature on land use in tropical regions several approaches became apparent to the Writer. These approaches may be grouped into four major categories which will be summarized below.

1.1.1. Resource Inventory and Agronomic Approaches

Since the early 1970's a major body of literature has been developed by FAO experts concerning the soils and climatic resources of the developing nations as part of a general assessment of their agricultural potential. The inventory of these resources has revealed that areas of suitable soils account for only 19% of the total area of Africa, excluding the R.S.A. (Dudal, Higgins and Kassam, 1985:19) and only 34.1% of the total area in Ethiopia (NAE, 1988:8). In Africa the climatically suitable area for rainfed agriculture is estimated at 53% of the total area (Dudal, Higgins and Kassam, 1985:19). More recent estimate by the FAO suggest that almost 65% of the agroecological zones of Ethiopia are characterized by growing periods long enough to sustain at least 1 rainfed crop (FAO, 1988: Chapter 6).

Beside these resource potentialities, the tropical regions are noted to have varied environmental problems. The major ones being edaphic, climatic and biotic. In most of tropical Africa, heavy leaching, low humus content, poor structure and moisture retention have been identified as major edaphic problems (Allan, 1965: Dudal Higgins and Kassam, 1985, Mac Arthur, 1983).

Among the climatic problems the seasonal pattern of rainfall and its great variability, the high rate of evapo-transpiration, intensive storms, high winds and humidity are commonly cited as a major climatic constraints in the tropics (e.g.. Allan, 1965; Mac Arthur, 1983; Richards, 1983; FAO 1986). In Ethiopia climatic variability is also among the leading problems resulting in frequent drought and famine in many parts of the low lands and also in densely populated highland regions of North and Central Ethiopia (e.g.. NAE, 1988; Daniel, 1978, FAO, 1984; EHRS, 1986).

The other major groups of problems identified in the literature are the biotic problems. Diseases such as trypanosomiasis, malaria and yellow fever are biotic problems for the human population of the tropics (Allan, 1965; Richard, 1958; Webster and Wilson, 1980; Zein and Kloos, 1988). Studies in Ethiopia indicate that malaria, schistosomiasis, and yellow fever, trypanosomiasis, onchocerciasis, leishmaniasis, and Kala-azar are endemic diseases in the lowlands (Zein and Kloos, 1989; NAE, 1988). In the case of animal pests, tse tse flies and ticks emerge as widespread threats to the animal population in many parts of Africa (Allan, 1965; Webster and Wilson, 1980).

Based on such assessments of the spacial pattern of soils and climatic resources, it has been estimated that the total area suitable for rainfed agriculture in Africa covers only 38% of the land area (FAO, 1986), while estimate for Ethiopia put the figure at 49% (Alemayehu, 1989).

1.1.2. Demographic Approaches

As early as 1969 the FAO estimated that the population of the developing countries was growing at a rate of 2.5 to 3% per annum, which indicated that it would be more than double by the end of the century (cf Webster and Wilson, 1980:103). It was believed by many that such an increase would have a major impact on land use, although not all were in agreement regarding the nature of the impact. Some writers, notably Boserup (1965) emphasized the positive effects of population growth on land-use, technology and land tenure. However, many other authors have stressed the adverse effects of population growth, noting the decline in farm size, farm fragmentation, landlessness under employment and migration (e.g.. Allan, 1965; Gleave and White, 1969: Ruthenberg, 1968; Morgan, 1969; Nwafor, 1979).

Binswagner and Pingali (1985) note that rapid population growth has led to an exhaustion of the land frontier in many countries around the World, causing declines in arable land per capita and an associated decline in labour productivity (Binswagner and Pingali, 1985:62). In Africa, other authors have also observed declines in farm size, as a result of population pressure, notably, Allan (1965) in Kenya, Tanzania and Uganda, and Nwafor (1979) in Rwanda. Allan (1965) and Igbozurike (1970) have indicated population growth as one of the major cause for farm fragmentation in Tropical Africa.

In addition to the above mentioned themes, a considerable literature has emerged dealing with population movements from densely populated areas towards sparsely settled (often forested) lowlands or river valleys, e.g.. Gleave and White (1969), Morgan (1969), and Binswagner and Pingali (1985) on

West Africa; and Wood (1982) and Kloos and Aynalem (1989) on Ethiopia. Some writers also point to the importance of migration and agricultural settlement in sparsely settled pastoral areas and the resultant changes in land use (e.g.. Alula and Fekadu, 1988).

Several writers have also argued that in the densely populated areas of the country, the lack of land resources has resulted in excessive population pressure, shorter fallow periods, deforestation and overgrazing. It appears that these districts have been vulnerable to famine and have been characterized by migration to adjacent and distant localities for several generations (EHRS, 1986; Desalegn, 1987, Mesfin, 1984; Jackson, 1970; Kloos, Aynalem and Esayas, 1988; Mc Cann, 1990). Kloos, Aynalem and Esayas, for example, argue that within the last 100 years there had been a new trend in population distribution, i.e., a gradual shift from the densely populated highlands to the peripheral lowlands. Some of these down slope movement was noted to have taken place in the Rift valley areas, associated with the introduction of commercial agriculture and urbanism (Kloos, Aynalem, Esayas, 1989:10). This view is confirmed in the British Overseas Development study of the Lake Zway area (U.K., 1976).

1.1.3. **Cultural Anthopological/Approaches**

Two major contrasting themes are apparent in the cultural and anthropological literature dealing with land-use. One focuses on the negative effects of culture (e.g.. religion, custom and tenure), on the way people use their land, while the other focuses on the positive contributions which traditional methods of understanding and managing resources play in many peasant communities. In the former approach it is

argued that religion (e.g.. Hinduism in India) and the customs of certain tribes (e.g.. in Africa) encourage the keeping of excessive numbers of animals, resulting in the gross deterioration of pastures, erosion and the poor quality and low productivity of the stock. In addition, some researchers have noted that the value systems of some pastoralist clans or tribes have had a negative effect on the use of land for cultivation (Webster and Wilson, 1980; Allan, 1965; U.K., 1976; Bahru, 1984; Bizuwork, 1985). In such communities, it is argued that agricultural practices tend to change gradually and that most of the causes of change were external and not internal. This situation has been also observed in Ethiopia, particularly among the Jille tribes of the Central Rift Valley region. Other writers argue that Communal forms of tenure have had adverse effect on the development of both nomadic and cultivating communities. In the former case, it is believed to be a cause of frequent inter-clan conflicts over the use of grazing territories. In the latter case, it is argued that traditional tenure systems, in which every one is regarded as having equal use-rights to land, have inhibited individual initiatives (Webster & Wilson, 1980).

In recent years an opposing view of traditional farmers in developing nations has pointed to the high degree of ecological perception on the part of the individual cultivator. This view points to the ability of peasants to select those production systems and techniques of management that make the most efficient use of the available environmental resources. In the literature it is argued that the farmer's use of his resources usually depends on his perception of his resources and their value for alternative

production purposes. These perceptions, in turn, depend on the farmer's back ground information, his yardstick being based mainly on his past experience (e.g.. Morgan & Munton, 1971; Webster and Wilson, 1980; Abusin, 1986; Bonvin, 1986; Lado, 1989). Lado's (1989) study of the Maridi district of Southern Sudan is a good example of this approach. He discovered that the farmers in his study area had detailed knowledge of the rainfall pattern, crop pests, crop attacks by wild animals, insects and Weed ecology. They were also able to categorize and assess of the level of severity of the damage due to each problem. Detailed research along these lines is absent in Ethiopia but some recent studies by the Institute of Agricultural Research (IAR) have revealed that the farmers in the Kolla Zone of the Nazareth mixed farming zone have developed better strategies to overcome their problems, than the farmers in the Kolla and Woinadega mixed farming areas of Sidamo and Keffa (I.A.R., R.R. 4/87; W.P. 7/89). Desalegn's work on the indigenous systems of disaster forecasting and preparedness of the Ambasel and Kallu Awrajas of Wollo (Desalegn, 1987:133) and Knutson's work among the Mecha Galla also point to the importance of traditional peasant's environmental knowledge in the Ethiopian context (Knutson, 1967:44). Some studies in Ethiopia have also shown the existence of possibilities for keeping the balance between livestock population and the natural resources (Alula and Fekadu, 1988:49-51).

1.1.4. Geographical Approaches

The classical geographical approach to the study of land use patterns is based largely on the work of Von Thunen (e.g.. Hall, ed., 1966; Chisholm, 1984; Found, 1971; Blaikie, 1971;

Lloyd and Dicken, 1981). According to Von Thunen the land use patterns around farm settlements are determined mainly by variations in the market prices and transport costs for different crops. As a result, crops that required large inputs of manure and labour, (high market value) were found near the settlement and those that required low inputs of manure and labour (low market value) were grown in distant fields (e.g.. Chisholm, 1984:23).

Since the early 1960's several attempts have been made to examine the validity of Von Thunen's model of land use in the Africa context (e.g.. Morgan, 1969, Gleave and White, 1969, Hirst, 1970; Prothero, 1957; Jackson, 1972). In his study of the zoning of land use in Africa, Morgan (1969) tried to make a distinction between Von Thunen's model of the 'isolated state' and the relationships between the village and rural settlement in Tropical Africa. He indicated that the former provides a market centred model, while the latter is a centre for most farm inputs, as well as a centre to which all the farm produce is brought for consumption or onward shipment. He argued that input factors appear to be more significant in the creation of land use patterns than the factors of consumption (Morgan, 1969:302).

Gleave and White's (1969) analysis of the literature on land use in Africa and the study by Prothero (1957) point to the existence in parts of West Africa of concentrically zoned arrangements of land uses, which were some what different from the ones proposed by Von Thunen. For example, the first, immediately outside the village, was the zone of permanent cropland, the second was the ring of land either under

cultivation or in fallow; the third and the final ring was a zone of un-farmed bush or forest. Some findings in East Africa have also tended to support the views of Von Thunen, notably the work of Hirst (1970) in Tanzania. They found that the intensity of cultivation decreased with increasing distance from the farm-stead. Prothero (1957) used air photographs while Hirst (1979), used the questionnaire and interview method in his analysis.

Some attempts have also been made to evaluate the application of Von Thunen's model in the Ethiopian context (e.g.. Horvath, 1969; Jackson, 1970; Tadesse, 1989). Horvath used air photos to interpret the agricultural pattern around Addis Ababa and his study revealed that all of the Von Thunen's assumptions were not met, but the land use sequences of his study area were found to be similar to those in the isolated state (Horvath, 1969:323). In a more detailed micro study of the Doko area of the Gamo Highlands, Jackson (1970) identified two classes of farmers (the rich and the poor), each characterized by distinct economic outlooks and land-management approaches. His study revealed that the land use pattern of the richer /minority group/ was a curious version of the classic Von Thunen, while that of the poorer majority, due to the smallness of their holdings and intensive use of all the land for cultivation, was not marked by the expected distance decay in land use intensity (Jackson, 1970:45).

Tadesse's study (1989) indicated that distance from the urban market in Dejen had the predicted effect on agricultural production of Dejen Wereda., confirming the validity of Von Thunen's approach in the context of his study area. He used regression analysis to measure the impact of urban population

and market on land use intensity and his study revealed that land use intensity decreased with increasing distance from the market centre (Tadesse, 1989:223: 171-177).

On the other hand, a detailed land use study was undertaken by Yohannes (1988) in the Andit Tid area of Northern Showa. His study involved the making of a detailed land use map for three cropping seasons; measurements of the distances from the home to the field; and of the various physical characteristics of each sampled plots; together with visual inspections of each field and interviews with the owners of each plot. He employed regression analysis to examine the relationship between crop yield and other factors of production. However, his results revealed the existence of a positive correlation between crop yield and distance from home to field, which is contrary to Von Thunen's model. This was felt to be due to two conditions: First the manured homestead fields were not included in the regression; secondly, the distance fields were found to be more fertile than the nearby fields (Yohannes, 1988:84-85). All of these studies, however, were undertaken in the highland regions of Ethiopia. Others, focusing on the lowland areas of the country appear to be absent. There the presence or absence of land use patterns, zoned according to Thunian principles, remains a matter of speculation.

Generally Von Thunen's approach has been of great significance in assessing the spatial organization of agriculture. By focusing on the ways in which the prices of agricultural products are translated into patterns of land use, the followers of Von Thunen have had considered success in modelling land use patterns in market economies (e.g..

Wheeler, J. and Muller, P., 1981; Lloyd and Dicken, 1978). However, some of his assumptions, such as the existence of flat terrain, uniform income and profit maximization, may be more applicable in market oriented farm systems. In subsistence farming other principles, e.g.. adoption of crop patterns to different soils and the practice of mixed cropping in same field in order to maintain soil fertility, can also influence cropping pattern (e.g. Ruthenberg, 1968:331). Moreover, Von Thunen didn't make any distinction between different classes of farmers, which may be reflected in their economic outlook, and land use managements and approaches e.g. the poor farmers of Doko area of the Gamo highlands (Jackson, 1970:45). Nor did he take into account the effect of population pressure on land use zonation (4. Gleave and White, 1969:282-284). Nevertheless, his model can still provide a logical frame work for assessing land use and agricultural production in Dugda district. It will enable the writer to examine the impact of the distance factor on farming intensity and crop zonation. It will also help the writer to identify the extent to which economic principles govern the land use practice of the Jille and Gurage farmers. However, despite its strengths, Von Thunen's approach fails to tell us much about the culture and technology of the farmers; their environmental knowledge (e.g. about soils, climate and biotic resources); their farming experience; or their customs and attitudes towards cultivation, animal rearing and marketing.

1.1.5. Summary

Of the possible approaches to land use study in Dugda Wereda, the resource inventory approach has already been completed by the Land Use Planning and Regulatory Department

of the MOA (1989). This study revealed that suitable soils account for 45% of the total area of Dugda. The study also suggests that almost 70% of Dugda is characterized by growing periods long enough to sustain at least 1 rainfed crop (LUPRD, 1989). However, in addition to these potentialities, Dugda is noted for several edaphic, climatic and biotic problems. The dominant edaphic problems appear to be shallow soil depth, due to heavy soil erosion (in the West) and poor soil structure caused by high sodium concentration in the eastern lowland (MOA, 1984; MOA. 1989b). The most significant climatic problems appear to be the insufficient amount and high variability of rainfall, high evapo-transpiration in the moist Kolla plains, and the heavy rain storms in the high altitude areas of the undulating Woinadega agro-zone (MOA, 1989b; LUPRD, 1989).

The other major problems identified in the literature are biotic problems. In the Central Rift Valley including Dugda, malaria and schistosomiasis (near Lake Zway) appear to be the major biotic problems of man (MOA, 1989b; Zein and Kloos, 1988). In the case of animals, blackleg, antrax, render pest, sheep-pox and trypanosomiasis appear to be the major diseases (MOA, 1984; MOA, 1989b; NAE, 1988).

Studies employing the demographic approach are lacking in Dugda, although some touch on the district's population-resource balance. According to a British Consultancy Report, during the early 1950's and 1960's there was a perceptible movement by Gurage farmers from the Butajira highlands and upper meki valley to the farm lands surrounding Lake Zway and the meki plain. In addition, in the period since the 1970's new agricultural system seems to have emerged in Dugda and

Zway Zuria Weredas. This involved landless and unemployed settlers who had been selected by the ministry of Interior from as far afield as Arbaminch and Shashamane. The immigration of the Gurage farmers and these settlers led to the establishment of new settlements and major changes in the land use patterns, whereby the former extensive pasture land was converted into crop land. As a result, competition for land between cropping and grazing has became a significant problem in this part of the central Rift valley. Moreover, many of the nomadic Jille, who were the dominant element in this district's population, have became sedentary farmers and problems such as overstocking have become significant local problems (U.K., 1975; MOA, 1989b).

In the case of cultural /anthropological/ approaches detailed studies of Dugda are also lacking. The same can be said of Geographical studies of Dugda. There is thus considerable scope for employing the geographical, demographic and cultural approaches to study the land use practices of the farmers of Dugda. However, it is beyond the writer's capacity to adopt each. Emphasis will be placed on the geographical and cultural approaches. The cultural approaches will be used to assess farmers identification and /or understanding of their agrarian and environmental problems and the various land use strategies they have adopted and /or developed to overcome their problems, while the geographical approach will be used to assess the extent to which economic principles govern the land use practices of the farmers of Dugda district.

1.2. Statement of The problem

The Gurage and the Jille Oromo live in different agro-ecological zones of Dugda district and each group is known for

its distinct culture, attitudes, and way of life. For example the Gurage have long inhabited the undulating woinadega agrozone, where they are sedentary farmers subsisting by the cultivation of crops and the rearing of animals. They do not have a super naturalistic approach to their environment and land is not ceremonially blessed to ensure productivity. Rather they believe that land is a personal concern and that success or failure in farming depends mainly upon the rational use of land (Shack, 1966: 53-58). Through their age-old farming experiences, they have acquired a developed agricultural calendar and well defined views and values concerning the appropraite methods of land use.

On the other hand, the Jille who live mainly in the moist Kolla agrozone, have until recently been mobile pastoralists. Their involvement with sedentary farming began very recently. However, two different views of their economic life have appeared in the literature. One group (mainly anthropologists and historians) argues that the Jille were mainly nomadic people, with little knowledge of crop farming (Haberland, 1970:4). Such studies argue that the Jille revere and bless the land and consider it as an honourable mother that should not pierced by the hoe or the plough (e.g. Bahru, 1984:11; Bizuwork, 1985:6). Assefa (1967), on the other hand, argued that though cattle raising was the basis of the Jille economy, a form of shifting cultivation was also a significant part of their farming system. Wealth and status were reckoned in stock, above all cattle, which were the primary sources of food, draft power and more recently of Cach. According to Assefa, copping among the Jille appears to have been limited to the cultivation of maize and chick pea, with haricot beans

and pumpkins as supplementary crops (Assefa, 1967:25-26).

The fundamental cultural differences which exist between these groups of farmers appear to have had a considerable influence on their respective land use patterns, their agricultural productivity and their ability to cope with the environmental problems which characterize Dugda district. Available data suggest fluctuations from one production year to another, due to the physical as well as socioeconomic constraints which prevail in the district. These fluctuations, however, appear to be greatest in the moist Kolla agro-zone, i.e., the home of the Jille farmers. In this zone, the insufficient amount and high variability of rainfall, high evapo-transpiration and poor soil structure (due to high sodium concentration) are constraints on the intensification of crop production. In addition, shortage of water, inadequacy of grazing areas and incidence of diseases are reckoned as major constraints in livestock production.

During the five years, 1981-1985, the incidence of rainfall was reported to be adequate and timely in only one year; inadequate and untimely (starting late and ending early) for three years, and a total failure for one year (MOA, 1989a;55). It appears that the Jille farmers have failed to adjust their time of farm-work and cropping patterns in accordance with the changing climatic conditions,. They appear to lack knowledge about the selection of appropriate crop mixes and seed varieties to plant in these circumstances. As a result the risk of crop failure and subsequent food shortages have become a significant problem in their locality. In addition the high level of rainfall variability appears to have adversely affected the district's livestock population.

According to an MOA report, during the early parts of the 1988-89 crop year, nearly one-fifth of the livestock died, due to the late arrival of rains (MOA, 189a:56). How the Jille farmers have been trying to cope with their problems, using their traditional knowledge is not, however, well known and hence requires further investigation.

On the other hand, though the magnitude of drought in their district was lower, the Gurage farmers have also faced similar problems. However, they have tended to cope by growing different crop mixes and seed varieties. These have enabled them to minimize the risk of crop failures on the one hand, and to generate income from the sale of Cach crops on the other. They intensively use all their farm lands for the production of both cash and food crops, using techniques such as crop rotation, crop mix and manuring. According to the MOA (1989a), scarcity of land is a major problem for the Gurage farmers. However, calculations by the writer do not confirm this idea, since population densities in some predominantly Jille PAS exceed those in some of the predominantly Gurage PAS. Less debatable are the problems caused by shallow soils, due to heavy soil erosion and heavy rain storms. In addition, inadequacy of grazing areas, and animal diseases are reported as major constraints on livestock production in the Gurage, parts of Dugda (MOA, 1989a:177). In the writer's view the basic differences between the groups suggest that there are possibilities for the Jille farmers to learn a lot from the experiences of the neighbouring Gurage farmers. At the same time a re-examination of the Jille land use practice and environmental knowledge may yield valuable insights into the problems facing all the farmers of Dugda.

1.3. Objectives of The Study

1. To assess the current land use practices and cropping patterns of the two groups (the Gurage and the Jille) in the study area.

2. To assess the role of selected economic, technological and demographic factors on land use.

3. To investigate the perception of problems and management stratagies of the Gurage and Jille farmers.

4. To determine the attitudes of the Gurage and the Jille farmers towards a) the cultivation of land; b) livestock rearing; c) adoption of new farm technology; d) and markets.

5. To assess the traditional water use practices of the Jille and the Gurage farmers.

1.4. Methodology

1.4.1. Source of Data

For the fulfillment of the above stated objectives, data from the primary and secondary sources have been employed.

1.4.1.1. General Farmer Interviews

Primary data were generated from a general questionnaires which have provided the researcher with data concerning selected demographic (e.g family size), social and economic conditions, that are felt to have a direct influence on land use. This questionnaire was administered by 5 enumerators who were employed during the survey period. The enumerators were employed on the basis of their level of education (mainly 12th grade completed), knowledge of the locality and

familiarity with the language, habits and customs of the Jille and the Gurage population. Before starting the interviews, three days intensive training was given to the enumerators by the researcher. They were shown how to fill the questionnaire, and also how to approach the respondents and gather the relevant information. Moreover, their performance was closely supervised by the researcher. Discussions were held with them at lunch and night time to discuss the problems that arose during the survey. The enumerators interviewed a total of 159 farmers (refer to section on sample below).

1.4.1.2. ***Field Visits and Land-use History Survey***

For this part of the research a small sub- sample of 41 farmers (22 Jille and 19 Gurage) were selected and studied in detail by the writer. This has involved field visit to all fields of the selected farmers to determine the cropping pattern during the past five years. During the survey a total of 155 fields (67 Jille and 88 Gurage) were visited. This has allowed the writer to construct sketch maps of land use and diagrams of crop zonation around the farmers houses. In addition discussions made with the farmers about the land use history of each field visited have helped the writer to ascertain:

a) The existing pattern of crop zonation around settlements
b) Recent changes in crop patterns around settlements
c) The environmental qualities and constraints associated with each field.
d) The land use intensity (including estimated labour input, fallowing, manuring practices) in different fields
e) The sequence of crop rotation in each field

f) The changing size and location of communal and individual pasture areas.

1.4.1.3. Interviews With Local Citizens Noted For Their Knowledge Of The Traditional Culture

In addition, discussions and interviews with 4 knowledgeable citizens were held to obtain relevant information about their past landuse practices, environmental knowledge and management strategies, together with their attitude towards modern farming technologies. These interviews were undertaken by the researcher himself.

1.4.1.4. Secondary data

Population, livestock, land use and agricultural production data from different sources, including official documents and records of the Wereda MOA, official governmental statistical sources, reports, maps, and books have been used to document the physical as well as the socio-economic conditions of the study area.

1.4.2 Sample Frame

The sampling frame of this study was mainly designed to make an assessment of the current land use and agricultural production patterns of the Jille and Gurage social groups of Dugda district. Each social group was regarded as an independent population and the Peasant Associations of each group as the sample unit of the study. The membership list of each selected Peasant Associations became the sample frame.

1.4.3. Sample Size

According to the data obtained from the local Agricultural Department Office Dugda has 80 Peasant Associations, with a total membership of 11,512. Out of this total, the Gurage area farmers were mainly found in 28 Peasant

Associations (membership of 3,829). The Jille, on the other hand, were mainly found in 42 Peasant Associations (membership of 6,372).

For the purpose of the study a total of 10 Peasant Associations were selected, i.e., 6 in the Jille area and 4 in the Gurage area. In order to identify representative PAS, the crude population density of each Peasant Associations for each social group was calculated and arranged in ascending order. In order to select 6 sample PAS from the Jille area the population density data for study area were divided into 6 density classes and one PA was selected from each class using a random number table. As to the selection of the 4 sample PAS from the Gurage area, a similar procedure was used and the results are presented in Table 1.

After identifying the 10 sample PAS, a total of 159 farmers (i.e. 87 from the Jille and 72 from the Gurages), or 12% of the farmers of the selected PAS were surveyed by the enumerators. This number was fixed because of financial and time constraints. The number of interviewed farmers in each sampled PAS ranges between 7 and 28 in the Rasa Sumeya and Dalecha PAS in the Jille area, and between 12 and 26 in the Gedilala and Joro Raka PAS in the Gurage area. The interviewed farmers were selected from the membership lists of the selected PAS by using a random number table.

However, for the detailed study of land use history and field visits, 3% of the membership of the selected PAS of each social group were visited. This percentage was fixed at 3% due to the fact that the researcher has to visit each field owned by the 41 farmers. As a result a total of 155 farm fields, i.e., 67 in the Jille and 88 in the Gurage areas were visited

during the survey. The discussions with the selected farmers were thus a time consuming activity. The number of farmers interviewed during these detailed visits ranged between 2 and 7 in Rasa Sumeya and Gusa 1, and Dalecha (in the Jille area), and between 3 and 7 in the Gedilala and Joro Raka PAS (in the Gurage area). These farmers were selected from the PA membership lists, using a random number table.

Table 1. Coverage of The Survey

Social group	Name of the PAS	Crude density p/km2	Total farmers in the PAS	No. of sample farmers for general question (12%)	No.of sample farmers for detail visits (3%)
Jille	1. Rasa Sumeya	27	57	7	2
	2. Korke Raka	79	170	20	5
	3. Gusa 1	88	75	9	2
	4. Badegosa	107	115	14	3
	5. Boymo	118	88	11	3
	6. Dalecha	235	230	28	7
	Total			87	22
Gurage	1. Gedilala	49	104	12	3
	2. Ebichana Kusay	58	130	16	4
	3. Joro Raka	66	220	26	7
	4. Wula Wulana wudesha	87	150	18	5
	Total			72	19
	Grand Total			159	41

1.4.4. **Hypotheses and Methods of Analysis**

In order to assess the current land use practices and cropping patterns of the two groups, the following hypotheses were tested using descriptive methods, tables and diagrams, and non-parametric tests (e.g. Chi-square).

1a. It is hypothesized that crop zonation in relation to distance from the home will be more well defined among the Gurage farmers than among the Jille. To show this

crop fields located at varying distances from the home was established for each social group and the results displayed using distance-decay diagrams.

1b. The number of crops grown by the Gurage farmers will be significantly higher than that of the Jille farmers. This was tested using Chi-square.

1c. The number of crop types grown by the Gurage farmers will be significantly higher than that of the Jille farmers. This hypothesis was tested using the Chi-square test.

1d. More Gurage farmers will practice inter cropping (mixed Cropping) in their fields than the Jille farmers. This hypothesis was tested using Chi-square.

1e. The final hypothesis advanced in relation to the first objective is that more Gurage farmers practice crop rotation than the Jille farmers. The results for the two groups of farmers were compared using the Chi-square test.

In order to assess the role of selected economic, technological and demographic factors on land use, the following hypotheses were tested using correlation and regression analysis.

2a. It is hypothesized that the area of cultivated land per farmer (y) is positively correlated with family size (x)

2b. It is hypothesized that the number of fields per farmer (y) is positively correlated with family size (x).

2c. It is also hypothesized that family size is positively correlated with the number of distant fields located more than 3kms from the farm house. It is expected that these relationship (2a, 2b, 2c) will be stronger in the Gurage areas than in the Jille areas.

2d. It is also hypothesized that the area of cultivated land per farmer (x) will be positively correlated with the number of farm oxen (y).

2e. It is also hypothesized that the number of fields per farmer (x) will be positively correlated with the number of farm oxen (y). The writer expects that these relationships (2d and 2e) will be stronger in the Jille areas than in the Gurage areas.

2f. It is hypothesized that input use per hectare (i.e., use of manure, selected seeds and fertilizer) is negatively correlated with distance between fields and the home.

2g. It is also hypothesized that input use (i.e., use of manure, selected seeds and fertilizer) is negatively correlated with the number of parcels per farmer.

2h. It is also hypothesized that input use (i.e., use of manure, selected seeds and fertilizer) is negatively correlated with the size of cultivated land per farmer. It is expected that these correlations (2f, 2g, 2h), will be stronger in the Gurage than in the Jille areas.

In order to determine the attitudes of the Gurage and Jille farmers towards cultivation, livestock rearing, adoption of new farm technology and the market, it is hypothesized that

3a. Relatively more Gurage farmers have a positive attitude towards:

i) the cultivation of land,

ii) the use of fertilizer, selected seeds, pesticides and insecticides, manuring and weed killer;

iii) the production of crops for market.

3b. More of the Jille farmers have a positive attitude towards rearing of animals. To test these hypotheses 3a and 3b a list of attitude questions were administered to the farmers of each social group and the score of their answers were compared using the Analysis of Variance.

3c. The Jille farmers have more milk cows, more female calves and heifers than the Gurage.

3d. The Gurage farmers have more farm oxen (male cattle) than the Jille farmers.

3e. The proportion of sheep and goats is higher among the Jille farmers than the Gurage farmers. To test these hypotheses (3c, 3d and 3e) the Chi-square test was employed.

For objectives 3 and 5, no hypotheses were formulated. The researcher has attempted to present the data obtained from the farmers, elders and religious leaders through discussions and interviews.

CHAPTER - TWO

2.0. BACKGROUND TO STUDY AREA

2.1. The Physical Setting.

The relevant information used to describe the physical setting of the study area was obtained from the physiographic and soils, and land use and land cover maps of the Wereda. The maps were constructed by Land Use Planning and Regulatory Department of the MOA (1989) for the purpose of a land use planning study in part of South Shewa Administrative Area at the scale of 1:250,000. The areas and per centages indicated in the analysis were estimated by the researcher from these maps, using an electronic planimeter.

2.1.1. Location and Size

Dugda district is located in South Shewa Administrative Area, in the Northern part of Adamitulu Awraja. It extends between 38° 35'E in the West to 39° 00'E in the East, and between 8° 00N in the South to 8° 25'N in the North. It is bounded in the East by Chilalo (Arsi), in the West by Butajira, in the South by Dalocha - Lanfro, Alaba Siraro, Haykoch, and Munesa (Arsi); in the North by Sodo and Lume Bora Awrajas of South Shoa Administrative Area. Lying within the floor of South Central Rift valley Region, the district covers a total area of 820 square kilometer.

2.1.2. Physiographic Regions

The LUPRD'S physiographic and soils map shows that the Dugda may be divided into five major physiographic regions. (See Fig 2) They include:

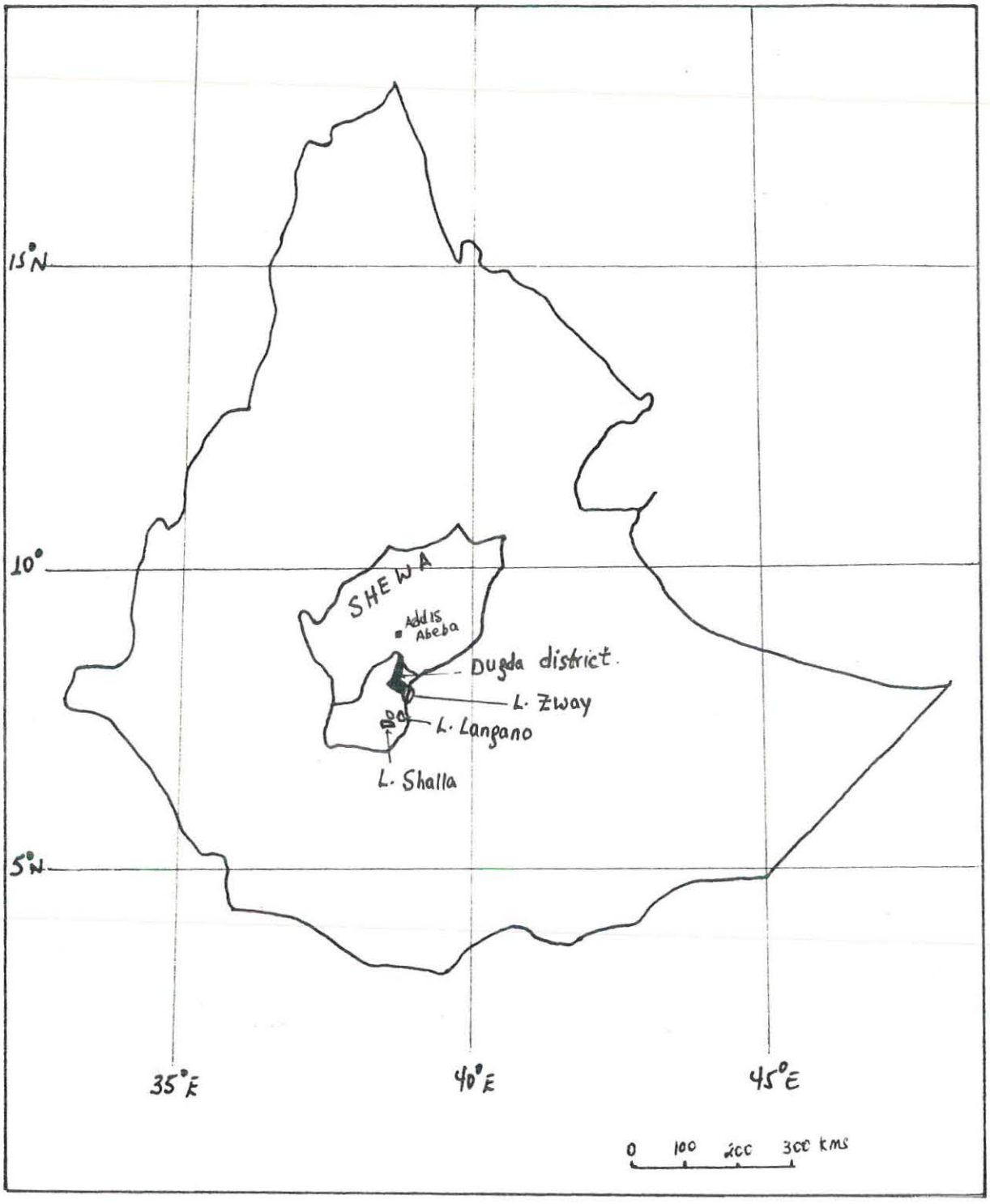


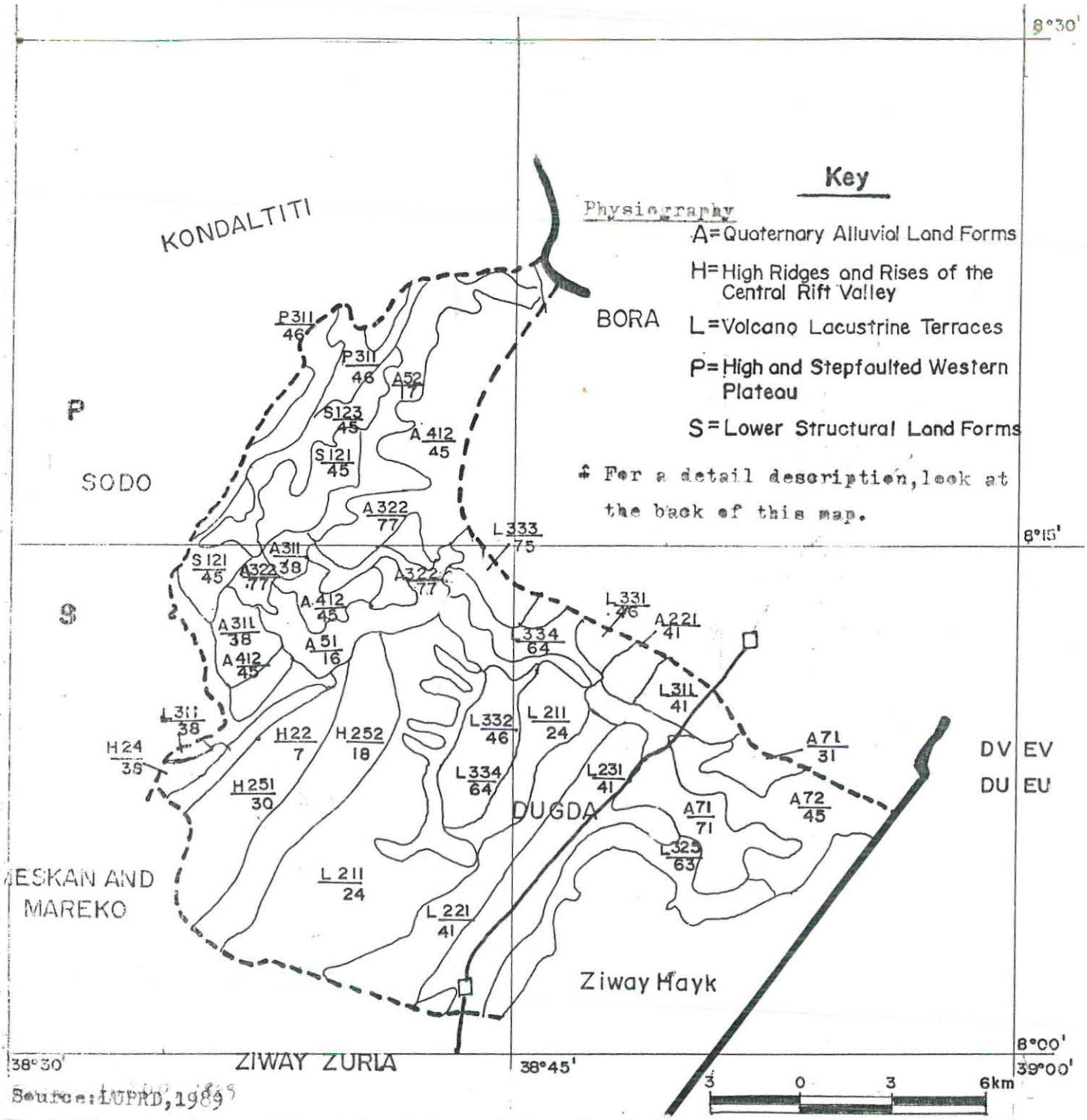
Fig. 1. Relative Location of the Study Area.

1. The Quaternary Alluvial Land forms constituted by the terraced flood plains of the Dijo - Meki river systems, the old alluvial flood plains of the upper Awash, the steeply incised and eroded river valleys and the fluvio-deltaic plains of the Lake Zway area. This physiographic region is found in the North-Central, North Eastern and Eastern parts of the Wereda. It is estimated to cover 278 sqaure kilometer, or 33% of the total area of Dugda.

2. The Hill Ridges and Rises of the Central Rift valley on Tertiary Ignimbrites, Felsitic Pyroclastics and Lava flows, between 1700-2200m.a.s.1. It includes the slightly titled southeast dipping Cuesta Ridges with steep front slopes, gentle back slope and nearly level inter-ridge valley bottoms. This region is confined to the southwestern part of Dugda and covers an estimated area of 105 square kilometer, or 13% of the total area.

3. The Volcano - Lacustrine Terraces on Quaternary Lacustrine Siltstone, Sandstone, Inter-bedded pumice and Tuffs. It includes the terraces of the Lake Zway region, between 1700-1800 m.a.s.1, and the sub-recent Lake bottom plains, between 1600-1700 m.a.s.1, of the southern and southeastern parts of Dugda. This physiographic region covers the largest area, 343.125 square kilometer, or 42% of the Wereda.

4. The High Step - faulted Western plateau on Tertiary Ignimbrites, Tuffs, pumice and Inter-bedded Lava. It includes the gently undulating to hilly lower plateau level, between 2000-2500 m.a.s.1, of the northern and northwestern parts of the district. It covers an



Source: LUPRD, 1989

Fig.1 The physiographic and soil map of Dugda district Scale 1:300,000

Soils (denominator)

41- Andosols
20- Arenosols
17- Badland
34,75- Cambisols(Vertic,Fluvic)
77,63,64- Fluvisols(Vertic,Calcaric)
64- Histosols
7,16,18- Lithosols(rock land)
30,77-Phaeozems(Luvic,Stagnic)
38-Planosols
38,45,46-Vertisols(Mollic,Pellic,Eutric)

Note: The numerator indicates the physiographic division, while the deneminator shows the deminant soils of Dugda.

estimated area of 41.9 square kilometer, or 5% of the total area.

5. The Lower structural Landform, which is comprised of the gently undulating to rolling piedmont of the western margin of the district between 2000-2200 m.a.s.1. It covers an estimated area of 52.5 square kilometer, or 6% of the total area.

2.1.3. Altitudinal and Agro - ecological Zones

The altitude of Dugda district ranges between 1600m around Lake Zway and 2500m in its Western and Northwestern parts. Generally altitude increases as one moves from the Lake region towards the West. On the basis of this altitudinal variation, the LUPRD (1989) has identified two major agro - ecological zones in the district, the moist Kolla and undulating Woinadega.

The moist Kolla zone, covering 60% of the total area, consists of two moist plains: the Zway plain (58%) and Alemtena plain (2%). This zone covers the largest portion of the Southern, Eastern and Northern parts of Dugda district. The slopes range between 0-2%.

The Woinadega zone, on the other hand, covers 40% of the district and consists of the undulating Bui up lands, the Koshe plain (1700-2500m) and the Ombolle plain (1700-1900m.a.s.1). This agro-zone is mainly confined to the Western, Southern and Northwestern parts of Dugda. The slope for the Woinadega zones varies between 0-2% in the Koshe and Ombolle plains to 2-8% in the undulating Bui up lands.

2.1.4. Climate

Altitude is the major controlling element in the climate of Dugda. Its modifying effect is clearly observed in the

spatial distribution of rainfall temperature, potential evapo-transpiration, and the length of growing period.

Rainfall is generally lowest in the vicinity of Lake Zway, about 600mm, and the climate becomes more humid with increasing altitude on the Western Rift Valley flank, including the catchment of Meki river, with a total annual rainfall of over 1,000mm (U.K., 1976:11). The mean annual rainfall in the district varies from 600-900mm in the moist Kolla Zway plain, to 800-1200mm in the Woinadega undulating Bui uplands. Rainfall variability appears to be is much greater in the extensive moist Kolla plains than the moist Woinadega zones.

The mean annual temperature is highest in the moist Kolla plains (i.e., 19.6-20.8° c), and lowest in the Woinadega Bui uplands (14.3-19.6° c), clearly indicating the inverse relationship that exists between altitude and temperature. Likewise, the mean annual potential evapo-transpiration i.e., the amount of water that is theoretically lost to the atmosphere through evaporation and transpiration, is highest in the Kolla plains (1600-1800) and lowest in the Woinadega undulating Bui uplands (1300-1700m.a.s.1). As a result, the length of growing period, which is a function of moisture and temperature conditions, varies from 120-195 days in the moist Kolla plains to 150-210 days in the upland Woinadega agro-ecological zones of the district.

2.1.5. ***Soils***

The researcher's analysis of the physiographic and soils map of the LUPRD (1989) shows that Dugda has 11 types of well identified soils, accounting for an estimated 91.3% of the total area (see FIg.2). Thc dominant soils in terms of their

areal coverage are vertisols (28%), Andosols (16%), Fluvisols (15%), Lithosols (14%), and Cambisols (9.2%), covering 82% of the total area, or 673 square kilometer. Others like Phaeozems (5.7%), Planosols (2.2%), Histosols (1.1%) and Arenosols (0.8%) cover only 9.8% of the Wereda. Badlands and undifferentiated alluvial soils cover 71.34 square kilometer, or 8.7% of the total area.

Vertisols (cracking and heavy clay soils) are the major soil type and are mainly found in the moderately dissected, gently concave inter-fluves of the north central parts of the district. They also occur in the basins and seasonally inundated areas near Lake Zway. These soils present significant management problems for the farmers of the study area.

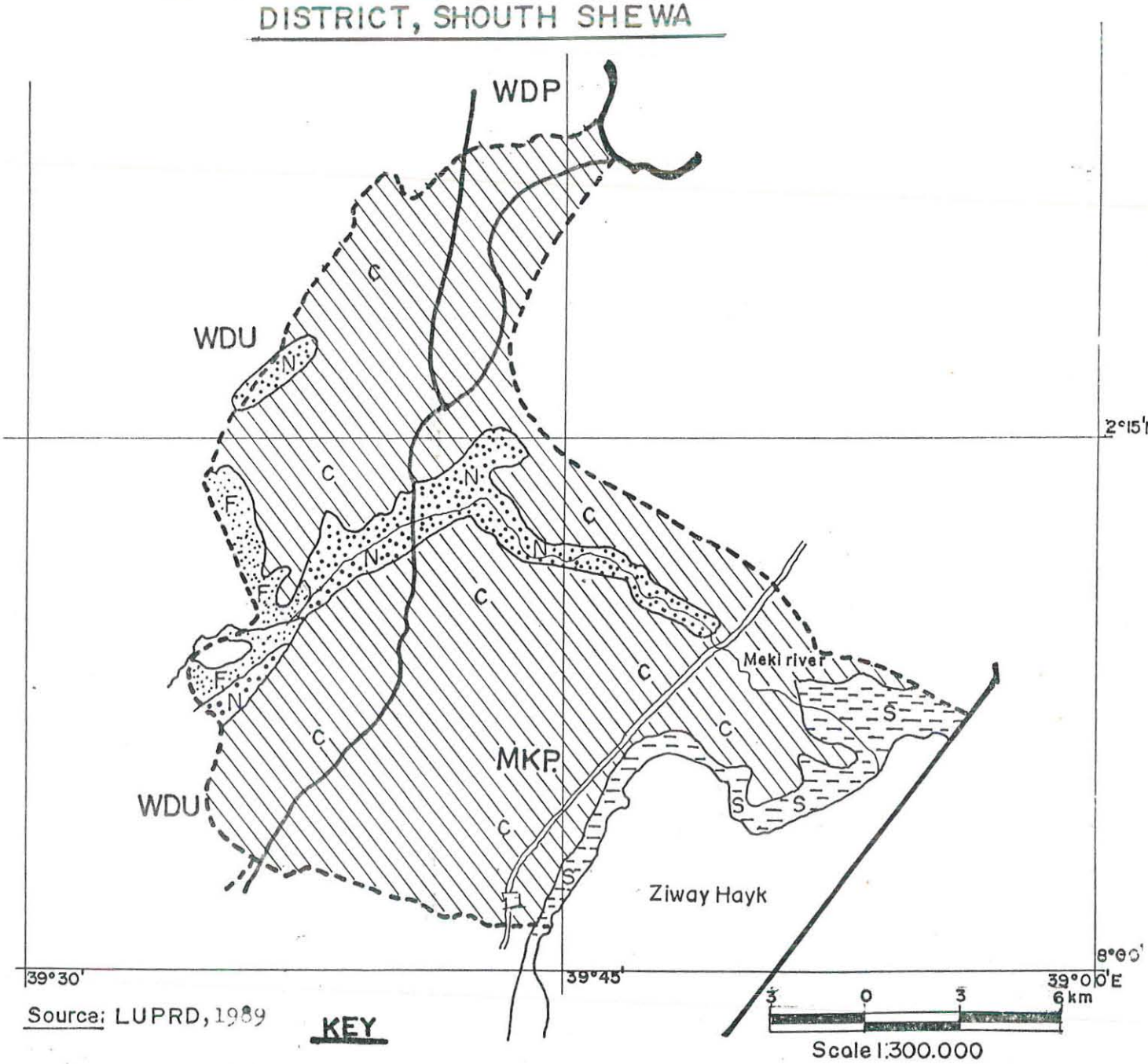
The Andosols, Fluvisols and Cambisols are found in the flat to gently undulating and nearly level areas of the Lake Zway region, and in the depressions and the lower Meki terraces. These soils have no instrinsic fertility limitations and have good agricultural potential.

Lithosols, on the other hand, are confined to the strongly eroded, steeply incised minor river gorges and on the steep upper slope sides and escarpments. They mainly occur in the north central and western parts of Dugda. These soils are very shallow, usually less than 10 cm, and their use for agriculture is limited.

*2.1.6. **Land Cover***

Analysis of the land use and land cover map of the district shows that 17% of the total area is under open natural vegetation and forest cover. The wooded shrub

Fig. 2 LAND USE AND LAND COVER MAP OF DUGDA DISTRICT, SHOUTH SHEWA



Source: LUPRD, 1989

KEY

F	Forest
N	Natural vegetation
S	Seasonally inundated grass land
C	Cultivated
	Agro ecology
	Meki river
	Wereda boundary
	Awraja boundary
	Road
WDU	Woinadega undulating
WDP	Woinadega plain
MKP	Moist Kolla plain

grassland vegetation is confined to the higher areas (over 2000 m.a.s.1) in the Southwestern and Western parts of the district. Below 2000m.a.s.1 open forest predominates, with riverine forest in the Maki valley. Following the course of Maki river in the east ward direction, the riverine forest is degraded into wooded bush land vegetation, extending up to the immediate northwestern side of Meki town (see Fig.3). It covers an estimated 7.4% of the area of Dugda district and is the only vegetation type found both in the Woinadega Koshe and moist Kolla Zway plains. Seasonally inundated grassland vegetation is limited to the shores of Lake Zway. From the distribution point of view, we can conclude that these natural vegetation types are restricted to the river valley and sloping areas that are not suitable for cultivation (LUPRD, 1989).

2.2. The population and Social Structure of Dugda

Before 1984, there were no census data at Wereda level in Ethiopia, but the census of 1984 shows that the total population of Dugda district, was 71,465, of which 84% was rural. The sex composition of the total population for the period shows that females out-numbered males, accounting for 51% and 49%, respectively. However, the reverse is true as far as the composition of the rural population is concerned, where males accounted for 51% and females for 49% (CSO, 1985).

The age structure data for the rural population shows that the working age population, i.e., between 15-60 years, accounted for 48% and the non-working age population (below an age of 15 and over 60) for the remaining 52% of the total population. The sex composition for the former age group shows that females accounted for 56% while the males for 44% of the

total working age population of the rural area. A recent report indicated that 14% of the total rural population could read and write of whom 73% were males and the remaining 27% females (MOA, 1984).

Unfortunately, because of the absence of data and other published materials, the pattern of changes that may have taken place in these and other demographic characteristics of the rural population can not be treated for the post 1984 period. However, data obtained from the Agricultural Department of Dugda (Meki), though it lacks the details of CSO data, puts the total rural population of the district, in 1989/90, at 56,549. This figure suggests a reduction of 3482 people compared to the total rural population of 1984. However, the MOA data for the 1989/90 refers only to the population living in all of the 80PAS of the district. This MOA estimate for 1989/90, indicates an Agricultural population density of 139 persons/km2 (MOA, 1989/90).

The ethnic structure of the rural population of the Dugda is dominated by two ethnic groups: the Gurage and the Jille Oromo. The ethnographic history of this part of the Rift Valley suggests that the ancestors of the Gurage probably inhabited their present area between 300B.C-100 A.D. (Tadesse, 1977:126) By contrast the Jille appear to have settled in Dugda since the late 16th and early 17th centuries, following their great migration from the South (Lewis, 1966:31; Trimingham, 1965:95).

2.3. Settlement Patterns

The Gurage and the Jille are the two major ethnic groups in Dugda. According to local legend each group has its centre of origin, culture and way of life, which are partly reflected in their present settlement pattern.

One study on the Gurage people states that the Gurage have been a settled people and at no time have they been nomadic or trans-humant. Their Settlement is fixed in accordance with corporate land rights held by localized descent groups (Ipcar, 1970:42). Unlike the other Gurage tribal groups living in the other part of the Gurage territory, these are mixed farmers relying heavily on the cultivation of field crops rather than ensete cultivation. This is because of climatic problem mainly uneven distribution of rainfall (800-1200 mm), often below the requirement for enset growth (1100-1500mm) for most parts of the years as well as lower attitude condition (1700-1900 meter) which is below the recommended range for the growth of the palnt (2500-3500m) (see section 2.1.3 and 2.1.4 FAO, 1984). To day, the Gurage of Dugda live mainly on the undulating plains and uplands of the Woinadega agro-ecological zone of the Northwestern and Western part of the district. According to the Agricultural department of Dugda they are mainly found in 28PAS (with a total of 3,829PA members and 16,578 people).

On the other hand, the studies on the Jille Oromos, (offshoot tribe of the Oromo), shows that these people have been semi-nomadic pastoralists subsisting, largely on government owned land, until the mid of 1960's (U.K. 1976 :36). At the same time Jille settlements consisted of scattered temporary huts, with each family having a large cattle enclosure around the hut. (The number of cattle per family was quite large, so a considerable space was required). The temporary nature of the Jille settlements may also have been influenced by their reliance on a type of shifting cultivation (Assefa, 1967:25-26). But this form of life has since been disrupted, as the land was distributed to

people from the outside the area as well as to the Jille themselves, as the area under cultivation increased. To day they have become mixed farmers, inhabiting the extensive moist Kolla agro-ecological zone that constitutes the North-South stretch of the eastern side of the Dugda district. According to information obtained from the district the Jille are mainly found in 42 PAS (i.e., 53% of the total PAS) having a total of 6,372 PA members and 34,062 people.

2.4. Land use and Agricultural Production In Dugda Wereda.

2.4.1. Farming Systems

Until the 1960's and early 1970's two major types of farming systems could be identified in Dugda. One was the animal dominated farming system of the moist Kolla plains and the other was the mixed farming system of the undulating Woinadega plains of the district. The former was totally a nomadic farming system with no regular cultivation of crops. This farming system lasted into 1960's, when the government took over the land and distributed it to the local feudal lords, as well as to people from outside the locality. Nevertheless, a complete change in this farming system (i.e., from nomadic farming system to a sedentary farming system) took place following the land reform of 1975, particularly with the establishment of PAS in 1975 and villagization (1985).

As a result, the farming systems of Dugda are nowadays characterized by the sedentary production of crops, as well as the rearing of animals (mixed farming). Here we do not see a clear specialization of crops or animals. According to a recent study conducted by the Land-use Planning and Regulatory Department of the MOA, three types of farming systems can be

identified in the two major agro-ecological zones of the district:

1. Maize - Tef - Haricot been - Cattle - Goat - Donkey farming systems of the moist Kolla Plains (altitude range between 1700-1900 m.a.s.1).

This farming system is described as " traditional small peasant agro-pastoralism of the moist Kolla plain with rainfed cereal of Maize, tef and pulse (haricot bean) for cash; and extensive grazed cattle, donkeys and goats "(MOA, 1989a:52). This farming system is practiced in the eastern part of the district, encompassing an estimated area of 502.5 square kilometer, which is equivalent to 61.3% of the total land area. Most of the farmers in this system are Jille Oromos.

This farming system is entirely rainfed and irrigation is absent. The ox plough is an important method of cultivation and animal dung is used both for fuel and manuring the field. According to the MOA, one half of the animal dung is used as the dominant fuel and the rest for manuring. Animal droppings from the pen are collected and used for manuring maize grown on the homestead or on the fields nearest to the tukul. Fields far from the tukul are not manured because of transport difficulties. In this farming system traditional management practices still dominate, even though small amounts of fertilizers are applied to grain crops. It appears that no single crop dominates the cropping pattern; maize accounts for one third and tef one fifth of the cropped area. Other cereals of significance are wheat (13%) and sorghum (10%). Haricot beans, grown for cash is the only pulse, occupying one seventh of the cropped area (MOA,

1989a:57).

Livestock occupy a significant place in the economic and social value system of the peasantry under this farming system. Cattle are kept primarily for wealth and savings, hedges against contingencies, food, bride price and social ceremonies (MOA, 1989a:66).

2. *Tef - Wheat - Pulse - Cattle - goat - donkey farming system of the undulating Woinadega zone (altitude range between 1900-2400 m.a.s.l).*

This farming system is described as "traditional small peasant agro-pastroralism of the undulating Woinadega, with rainfed tef, wheat and a mix of pulses (mainly chickpeas) and extensively grazed cattle, donkeys and goats "(MOA, 1989a:184). This farming system encompasses an estimated area of 188.8km2 (23% of the total land area) spreading over the north western quarter of Dugda district. Here irrigation is also completely absent. Both human as well as ox power are used for cultivation. Animal dung is not used as fuel but for manuring maize grown on the Odo (homestead) or on field nearest to the tukul (as in the former farming system). Fields far from tukuls are not manured due to transport difficulties (MOA, 1989a:195).

According to the MOA a number of crops are grown, with no single crop dominating the cropping pattern. Tef and wheat are the major crops, each roughly accounting for one third of the land cropped. Maize is the third ranking crop accounting for one sixth of the cropped area. Sorghum and barley are also grown but in small amounts (MOA, 1989a: 188). The MOA researchers noted that peasants in this zone have taken to the application of

fertilizers for the two major crops grown, i.e., tef and wheat, though at the modest level of one third to one half of the recommended dozes (MOA, 1989a:27).

Livestock are highly valued in the system. Cattle are kept for draught power and as a source of food, wealth and savings, insurance against adversities, and buying inputs (like fertilizers) in that order of importance.

3. Maize - Wheat - Sorghum - Tef - Chili - Cattle - Goat and Donkey farming system of the Woinadega plains (1900-2400 m.a.s.l).

This is described as "traditional small peasant agro-pastroalism of the Woinadega plains, with predominantly rainfed cereals of maize, wheat, sorghum and tef and a cash crop, chili and extensively grazed Cattle, goats and donkeys" (MOA, 1989a:105). This farming system is practiced in the western part of Dugda, covering an estimated area of 128.8km2 (15.7% of the total land area). Here both human as well as ox power are used for cultivation. Animal dung is used for manuring the chili fields and maize grown on the homestead or on the fields nearest to the tukul. Like the above two farming systems, grain fields far from the tukul are not manured due to transport problems. Here again the peasants are aware that dung improves fertility, thereby the yield (MOA, 1989a:116).

The MOA report also suggests that a large number of crops are grown in this zone. Maize occupied the largest proportion with two-fifth, wheat, sorghum, tef and chili one tenth each. Other crops are barley, lentils and

haricot beans. Pulses occupy one-tenth of the crop area with haricot bean being a major component and sold in the market. The availability of pulses for consumption is negligible (MOA, 1989a:108).

Finally, it should be stressed that livestock rearing is being more than an income source significant in providing the required draught power for this farming system. Livestock income accounts for less than one seventh of the farm income under normal condition.

2.4.2. Farm Size

The proportion of the total cultivated land per farmer in Dugda is estimated at 4 hectare, but the size of holding varies from one agro-ecological zone to another (MOA, 1984). In the moist Kolla agro-zone of eastern Dugda land was distributed between the families on the basis of the family size. In one of the PAS of this zone a couple was given 1.75 ha to 2.0 ha, depending on the number of children. In 1986 and 1987 some new members were given lands, largely the land vacated on migration and death or lands remaining uncultivated, although possessed by individuals. The area distributed to the new members, however, reduced to 1.0 - 1.5 ha per family due to land shortage, which implies further fragmentation (MOA, 1989a:53).

In the Northwestern Woinadega undulating agro-zone, the land suitable for cropping, was distributed and allotted to individual families on the basis of certain norms evolved by the peasants. Thus in some PAS of this zone each couple was allotted 1ha of crop land plus an additional 1ha for their offspring, irrespective of the number. However, in subsequent allocations, every family was given only one hectare of crop

land and only lands left vacant on account of migration have been allocated (MOA, 1989a:185). By contrast, in the undulating Woinadega zone of Dugda, all lands in the PAS were distributed on the basis of family size. Thus large families were given 4ha, medium families 2ha and single persons and couples without children 1ha. Subsequently, only lands left vacant on account of death or migration have been allotted to new members. In this zone no land allocation has taken place during the last ten years (MOA, 1989a:105).

2.4.3. General Land - Use Patterns

Data regarding land use and agricultural production are not available for the period prior to 1984, although a 1975 study of the irrigation prospects of Lake Zway provides useful information on land use in two parts of the Dugda; the Mid-Meki Valley (8020ha) and the Meki delta (5500ha). The study of the Meki delta, South east of Meki town, shows that much of the delta area had been under cultivation since about 1965 and it was intensively cultivated until 1975. The most important crop, in 1973 was maize, occupying about 82% of the cultivated area. Other crops included haricot bean (12%) and tef (4%). The farmers of this locality, mainly the Jille, were limited in their market orientation and livestock played an important role in their farming systems (UK. 1976;126-128).

On the other hand, the land use pattern of the Mid-Meki Valley, a Gurage area, showed that 83% of the total area was cultivated in 1974, with maize accounting for up to 90% of the cultivated area. The other fields were occupied by peppers, sorghum, haricot bean and barley. In this area Cattle ownership was less important compared to the other localities within the project area (U.K., 1976:38-40:140).

In addition to these estimates information on the land use patterns of the district appeared in the General Agricultural survey of 1984. According to this data, 86% of the total arable land of the Dugda was cultivated in 1982/83, the remaining 14% being fallowed. The most important crop, in the 1982/83 main season was maize, occupying 44% of the cultivated area, followed by tef (28%), haricot bean (13%), sorghum (6%) and barley (5%). In the 1983/84 main season, maize was again the dominant crop covering 43% of the cultivated area, followed by tef (30%), haricot bean (8%), sorghum (7%) and barley (3%).

The estimates for the 1988/89 and 1989/90 main season, obtained from the Agricultural Department of the district suggest that the area under maize and haricot bean has been declining, while that of tef and sorghum has been increasing. The cultivated area under maize in 1988/89 was 41% and 35% in 1989/90 main seasons, and that of haricot bean was 14% and 7%, respectively. On the other hand the area under tef in 1988/89 was 27% and increased to 31% in 1989/90 main season. Likewise the area under sorghum was 13% in 1988/89 and 16% in 1989/90 main seasons. Thus in 1989/90, maize was the first ranking crop (35%) followed by tef (31%), sorghum (16%) and haricot bean (7%).

2.4.4. Agricultural Production

2.4.4.1. Crop Production

Dugda is one of the major crop producing districts in the Rift Valley, the dominant crops being cereals and pulses. However, MOA data for 1982/83 and those obtained from the district head quarter for the 1987-90 period suggest significant fluctuations in crop yield. Between 1982/83 -

1989/90 periods, the production of maize and sorghum appear to have been increasing, while that of tef and haricot bean were fluctuating. The yield for maize, for instance, was 6q/ha in 1987/88 and 20q/ha in 1989/90. Tef yielded 2q/ha in 1987/88 and 8q/ha in 1989/90. Likewise, the yield for sorghum was 6q/ha in 1987/88 and 20q/ha in 1989/90, and haricot bean yielded 9q/ha in 1987/88 and 20q/ha in 1989/90.

According to the local authorities the periodic decline in yields has led to serious food shortages in some parts of Dugda. In their view the underlying causes of the yield fluctuations and crop failure are both physical and socio-economic. This conclusion is partly confirmed by the MOA survey for 1982/83. According to this report the main causes of crop damage in Dugda Wereda were related to climatic factors, i.e., excess or shortage of rain and insects. For instance, 36% of the damage to tef was due to excess rainfall and 18% was due to frost hazards, while 65% of the damage in maize was caused by shortage of rainfall and 5.4% due to excess rainfall. Fifty three percent of the damage to horse bean was reported to be due to insects.

Besides these problems, other socio-economic factors may be responsible for the low and fluctuating production. One of these factors may be the small proportions (7%) of farmers that use fertilizers, herbicides (4.7%), pesticides (1.7%) or improved seeds (0%). Another factor contributing to low/fluctuating productivity may be the differences in the working assets (ox and farm tools) of the farmers. For example, although the average number of work oxen (1.7%) in the Wereda in 1982/83 was high compared to other Weredas in the Awraja, 65% of the farmers did not own a complete oxen

team. Moreover, the prorotion of farmers without simple hand tools was also high.

2.4.4.2. **Livestock**

According to the MOA, Dugda had the largest livestock population in the Awraja in 1982/83, i.e., 132,990., or 12 livestock per farmer. Cattle accounted for 67% of the total livestock, cows being dominant (34%) followed by calves (32%), ox (15%) and heifers (13%). Sheep and goats also accounted for 27% of the total herds. Draft animals constituted only 6% of the total livestock population. The data also indicates that the herd size was high in relation to the pasture area (6.254 TLU/ha), the density for Cattle, draft animals and sheep and goats being 5.74, 0.29 and 0.228 TLU/ha, respectively.

More recent data from the Agricultural Office of Dugda estimates the total livestock population, in 1989/90, at 165,513 suggesting an annual growth rate of 4.5% since 1982/83. As a result the average livestock holding of a farmer has risen from 12 (1982/83) to 14 (1989/90). Livestock density had also risen to 9.38 TLU/ha, the density for Cattle, draft animals, sheep and goats being 8.83, 0.31 and 0.24 TLU/ha, respectively. These increases in the overall livestock population density are not only due to the increase in the number of the animals, but also reflects a small decrease in the size of the pasture area which was estimated at 11,846 ha in 1982/83, compared to 11,825 ha in 1989/90.

Some attempts have been made to indicate the location of the major grazing areas of the district. A Livestock and Meat Board Survey for 1973 outlines in general terms the grazing conditions and patterns of stock migration within the Wereda some 20 years ago. According to this report, in addition to

the pasture, abundant crop residues were used to feed the livestock all the year round. As a result seasonal stock migration outside the Wereda was not common. But some movements of stock within the Wereda were not so rare. Within the Wereda livestock tended to move from the cultivated to grazing areas, or from waterlogged to dry grazing areas during the months of July-October (EL & MB, 1973:20). In the writer's view animal movement in the Kolla plains are probably from the seasonally inundated grassland near Lake Zway to its immediate northern and western localities, where there is adequate natural grazing. On the other hand, the movement in the Woinadega area are probably from the intensively cultivated land up slope to the high lands or down slope into the Meki Valley, where open forest, grassland and wooded vegetation are common.

CHAPTER THREE

3. THE HISTORY AND CURRENT LAND-USE PATTERN OF THE GURAGE AND JILLE FARMERS

3.1. The modern Agricultural History of the Gurage and Jille Farmers

This section of the paper focuses on how farming, particularly the crop cultivation has evolved and transformed the economic life of the Jille community from an entirely nomadic into a mixed farming economy. The information was obtained through interviews with four elder citizens viz. Grazmach Sebsebe Rago and Ato Chaka Bedasso from the Gurage Community, and Ato Dori Dallecha and Ato Tikse Tuchi from the Jille community.

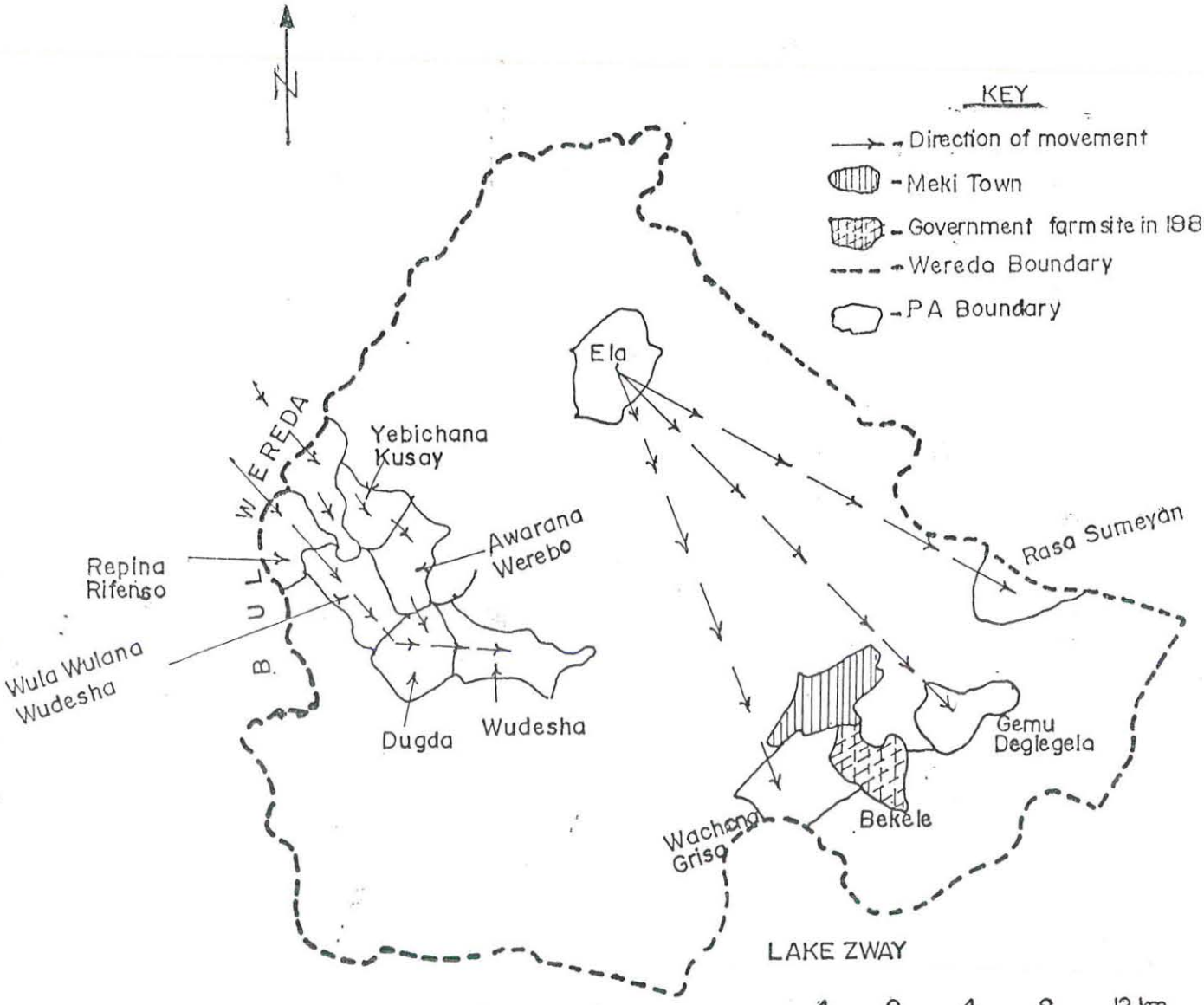
Until a few decades ago the Jille had been nomadic, subsisting largely by rearing animals. When their ancestors arrived in Dugda they occupied the vast stepped terrace plain stretching westward from Lake Zway to the foot of the Sodo Highlands (Fig 3). Within this territory they had moved from place to place with their herds, following the availability of pasture and water. They had never been settled farmers and do not seem to have cultivated any crops. They used to satisfy their crop needs by bartering with neighbouring Gurage farmers, i.e., they exchanged livestock products and sheep and goats for crops. In this way, the two social groups lived in a close proximity through mutual cooperation. Over the years, however, the Jille began to adopt cultivation following the experiences of the Gurage farmers. This process of cultural adoption may be summarized into the following three points.

The cultivation of crops appears to have advanced into the nomadic Jille community from the West. This process began, following fierce fighting between the Gurage and Jille

tribes. According to Ato Dori Dalecha, the Jille men used to Kill and mutilate many Gurage males as means of increasing their social status. This eventually led to the outbreak of frequent fights in which the Jille were increasingly defeated and were forced to evacuate their former homes. As a result most of the settlements were confined to the moist Kolla plains, including the area around Lake Zway.

By contrast the Gurage people of Dugda came from the highlands of the Sodo and Bui districts (see Fig. 3). Before they settled in the Western parts of the district, i.e., in the moist Woinadega zone, they had been settled farmers, growing various field crops and rearing animals. They had never been mobile nomads or transhumants in their history. Those Gurages who displaced the Jille first settled in two localities, known as Repina Refenso and Wudeshana Wulawula, and later in Awarana Berbera (see Fig. 3) after which Gurage settlement expanded east wards to Dugda and finally to Wudesha. Following these occupations many other landless Gurage people from the high lands began to descend and settle in the occupied Jille territory. In these localities the new settlers began clearing extensive bush areas for cultivation. Later on, the conflicts between the Gurage and Jille tribes subsided and they started to live in harmony, the former occupying most of the moist Woinadega zone and the later inhabiting the moist Kolla Plain.

Over the years the Jille who lived closest to the Gurage farmers began to copy the arts of ploughing with oxen and crop cultivation from their neighbours. At first they grew maize around homesteads. Later, these practices spread to Jille farmers living in adjacent areas.



Source: Central Statistical office, 1981/82
Dugda district

Fig.3 Movement of the Gurage and Ela people into the Jille land

However, the spread of crop farming among the Jille was not only due to Gurage influences from the West. Crop farming was also introduced by the government in 1889 E.C (1897/88), at a place called Bekelle, to the Northwest of the Lake and to the southwest of Meki town (Fig.3). The area under cultivation was more than 40ha and on this land only red peppers were grown for palace use. However, the government evacuated the land after cultivating for five consecutive years (1897/88 - 1901/1902). Thereafter the Jille people of the Bekelle continued to use the already cultivated area. They shared land among themselves and continued cultivating crops, mainly maize. Gradually the other members of the Jille community living in the environs of Bekelle began to adopt crop cultivation as a complementary activity to their animal rearing.

A third group of Jille people, living at a place called Ela, North-central part of Dugda, are believed to have been the other group involved in the diffusion of cultivation around the Lake region (see Fig.3). These people are also thought to have learnt cultivation earlier than the other remaining sections of the Jille community. According to Ato Tikse Tuchi, there have been a perceptible movement of the Jille people from Ela towards the northern shores of Lake Zway, since the late 1920's. The main reason for their migration was the reputed decline in soil fertility in the Ela district. The Jille migrants rented land from the people of the Lake region on a contract basis and started cultivation firstly at a place called Gemu Deglegela and later at Wachona Grisa and Rasa Sumeya.

Between 1949/50 - 1957/58 the other clans of the Jille known as the Siba who had previously lived in the Koka area were brought by government to settle on the area north of Lake Zway. Following their arrival, these people also started cultivation by clearing the bush. In these ways many of the previously nomadic Jille were attracted to and became involved in cultivation thereby transforming their former extensive pasture lands into cultivated lands.

3.2. The Current Land Holding and Farming Practices of the Gurage and Jille Farmers

3.2.1. Farm size

The unit of land measurement used in both the Gurage and Jille areas is known as the Kert or timad. In order to standardize this unit into the metric system, the approximate value provided by the MOA is 4 Kert to 1ha. The writer has used this conversion factor to estimate the size of holdings of the 90 sample Gurage and 110 Jille farmers interviewed during the questionnaire survey. On the basis of the interview results the farmers' holdings were grouped into the following three size categories:

1. Small holdings (< 2ha)
2. Medium holdings (2-5ha)
3. Large holdings (> 5 ha)

The size characteristics of the holdings of each social group are displayed on Tables 2 and 3.

As indicated on Table 2, about 12% of the sampled Gurage households have small holdings accounting for 7% of the total farm area. This farm size category supports about 8% of the total families of the sampled population. The majority of the

Gurage households (88%) have medium size holdings. This size category accounts for 93% of the total farm area and supports

Table 2. Farm Size and Population by Farm Size Category of the Gurage Community.

Farm size Category	Number of H. Holds	% of the total H.H	Farm Size Min	Max	AV	SD	Total area (ha)	% of total area
small	11	12	1.25	1.75	1.59	0.17	17.5	7
medium	79	88	2	5	3.03	0.86	239.25	93
large	-	-	-	-	-	-	-	-
total	90	100	1.25	5	0.52	0.52	256.75	100

Source: Field Survey, 1991

the remaining 92% of the total families. No Gurage farmer was found owning a total farm size greater than 5ha. Generally the landholding per farmer in the Gurage area varies from 1.25 ha to 5ha, with an average holding of 2.85 ha per farmer.

On the other hand, as shown on Table 3, 41% of the sample Jille households have small holdings (less than 2 ha) accounting for 25% of the total farm area. This farm size category supports 34% of the total families of the households. In addition 57% of the Jille households have medium size holdings (2-5 ha). This size category covers 70% of the total

Table 3. Farm Size and Population by Farm Size Category of the Jille Community.

farm size category	No. of H. Holds	% of the H. Holds	total farm size Min	Max	AV	SD	Total area (ha)	% of the total area
Small	45	41	0.5	1.75	1.39	0.35	62.5	25
medium	63	57	2	5	2.75	0.86	173.5	70
Large	2	2	5.25	7	6.125	1.23	12.25	5
Total	110	100	0.5	7	3.42	0.81	248.25	100

Source: Field Survey, 1991.

farm area and supports 62% of the Jille families. Finally only 2% of the Jille households were found having large holdings (>5ha). This size category covers 5% of the total farm area and supports the remaining 4% of the Jille families. Generally the size of holdings in the Jille area varies from 0.5 ha to 7 ha, with an average holding of 2.6 ha per household.

The survey suggests that there is considerable variation in farm size between the Gurage and Jille farmers. The calculated co-efficients of variations indicate greater disparities in farm size in the Jille area (c.v. 49%) than in the Gurage area (c.v. 33%). In addition the calculated coefficient of correlation between farm size and family size indicate a stronger relation in the Jille area (r= 0.45389) than in the Gurage area (r= 0.37593). This may presumably suggests that the land distribution process in Dugda has always been fair.

3.2.2. Fragmentation

Farm fragmentation indicates a situation where a farmer's holding is broken up into a number of small separate plots, usually located at different distances from each other. When the 90 Gurage and 110 Jille households were asked to tell the number of farm fragments they have currently, they supplied the data shown on Figure 4. This figure shows that 67% of the Gurage farmers hold less than 4 plots, while 27% of them between 5-8 farm plots. Although they were few in number, some farmers owned upto 20 plots. Nonetheless, the average farm plots per farmer for the Gurage farmers was 4.5.

By contrast 86% of the Jille farmers have less than 4 plots, while 12% owned between 5-8 plots. No Jille farmer was

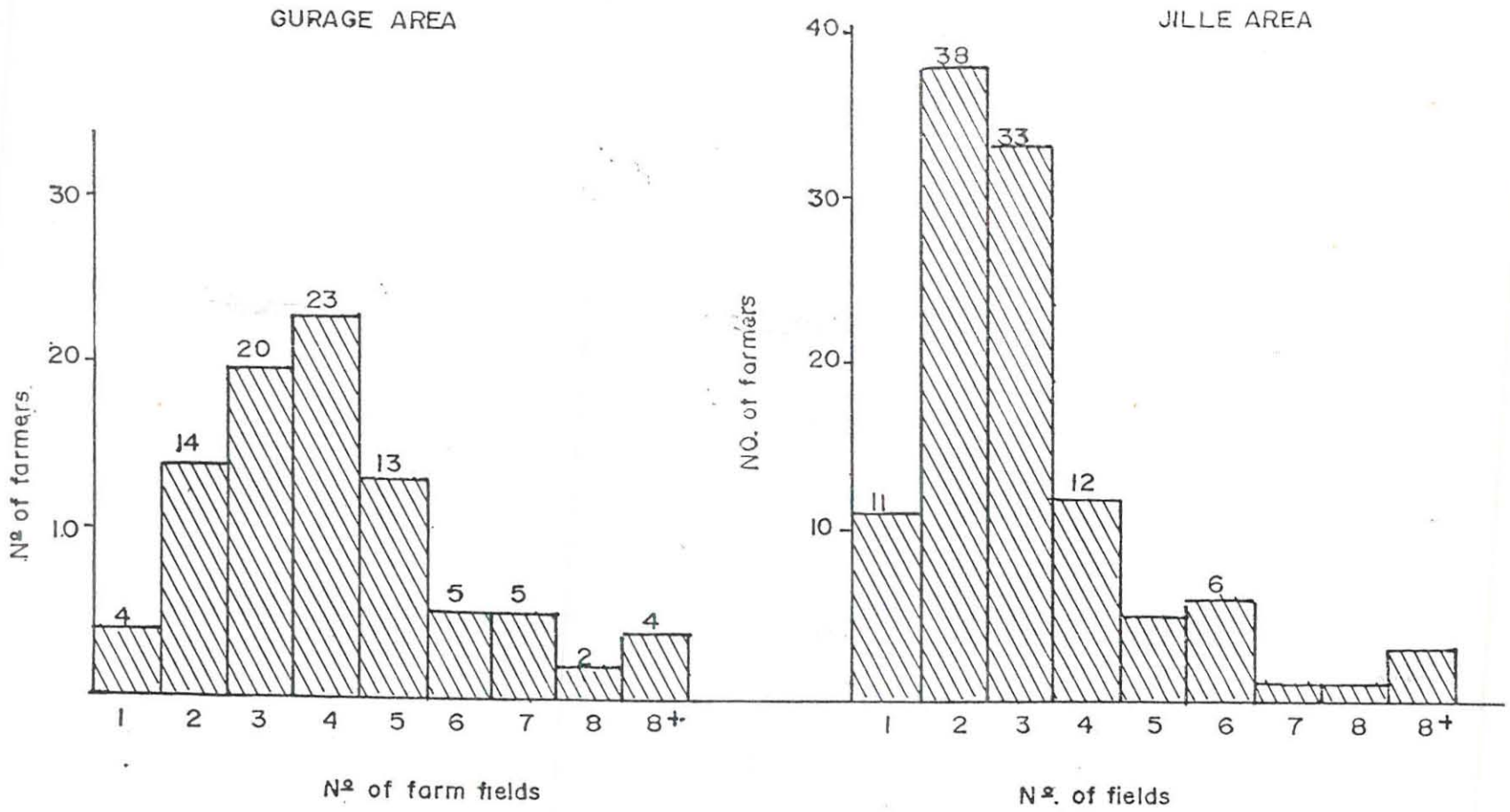


Fig.4 Number of farm fields owned by the Gurage and Jille farmers (1991)

found owning more than 12 fields. The average number of fields per farmer for the Jille area was 3.08. When one compares the number of plots owned by the households in each social group, there are considerable variations. The calculated co-efficient of variation revealed greater disparities in farm fragmentation in the Gurage area (c.v. 69%) than in the Jille area (c.v.57%).

Data showing the number of fields owned by farmers in each category of farm size for each social group is shown on Tables 4 and 5. Table 4 shows that 13% of the plots of the Gurage farmers were found in small holding category (<2ha), while the remaining 87% belonged to the medium-size category (2-5ha). The degree of farm fragmentation in the Gurage area appears to be greater among the small farmers than among the medium farmers. The maximum and the average number of plots

Table 4. Fragmentation and Family Size by Farm Size Category for the Gurage Area

farm size category	family number	%	Number of Fields Min	Max	AV	Total fields	%
small (<2ha)	53	8	3	7	4.6	51	13
medium (2-5ha)	586	92	1	2	4.5	355	87
large (>5ha)	-	-	-	-	-	-	-
Total	639	100	1	7	4.55	406	100

Source: Field Survey, 1991.

being 7 and 4.6 for the small holders and 2 and 4.5 for the medium-size farmers, respectively.

By contrast, Table 5 shows that 31% of the plots of the Jille farmers were found on the small-size holdings, 67% on medium size farms and the remaining 2% on large size farms. In the Jille area more fragmentation was found among the medium sized holdings than among the small-sized farms, the average and maximum number of plots per farmer being 3.2 and 10 for the medium size farmers and 2.3 and 6 for the small farmers.

Table 5. Fragmentation and Family Size by Farm Size Category for the Jille Area

Farm size category	Family number	%	Number of fields Min	Max	AV	Total fields	%
small (<2ha)	262	34	1	6	2.3	105	31
medium (2-5ha)	474	62	1	10	3.2	225	67
large (>5ha)	28	4	4	4	4	8	2
Total	769	100	1	10	3.3	339	100

Source: Field Survey, 1991.

It is generally thought that land fragmentation is caused by a combination of physical, economic and socio-cultural factors. However, informal discussion with the farmers revealed that the major cause of fragmentation in both the Gurage and Jille areas was variations in soils fertility. The farmers of each social group have identified three types of soils that are suitable for different types of crops. The most commonly identified soils in Dugda district are: Koticha (vertisols) - highly suitable for tef and wheat; Gombore (Andosols) - suitable for every crop; and Ashewa (sandy) suitable only for maize.

Based on this suitability classification every farmer was given a plot of each of these three soil types since 1986, without considering their distance from his home. This inturn has had an impact on the farmers' labour time budget and land-use. In order to examine the relative location and land use patterns of the two groups, 19 Gurage and 22 Jille farmers were selected by the writer and the distance of every field from each homestead was measured in minutes. As a result the writer visited the plots of 88 Gurage and 67 Jille farmers and the data obtained are shown in Figure 5. The data revealed that 32% of the plots of the Gurage farmers were located at

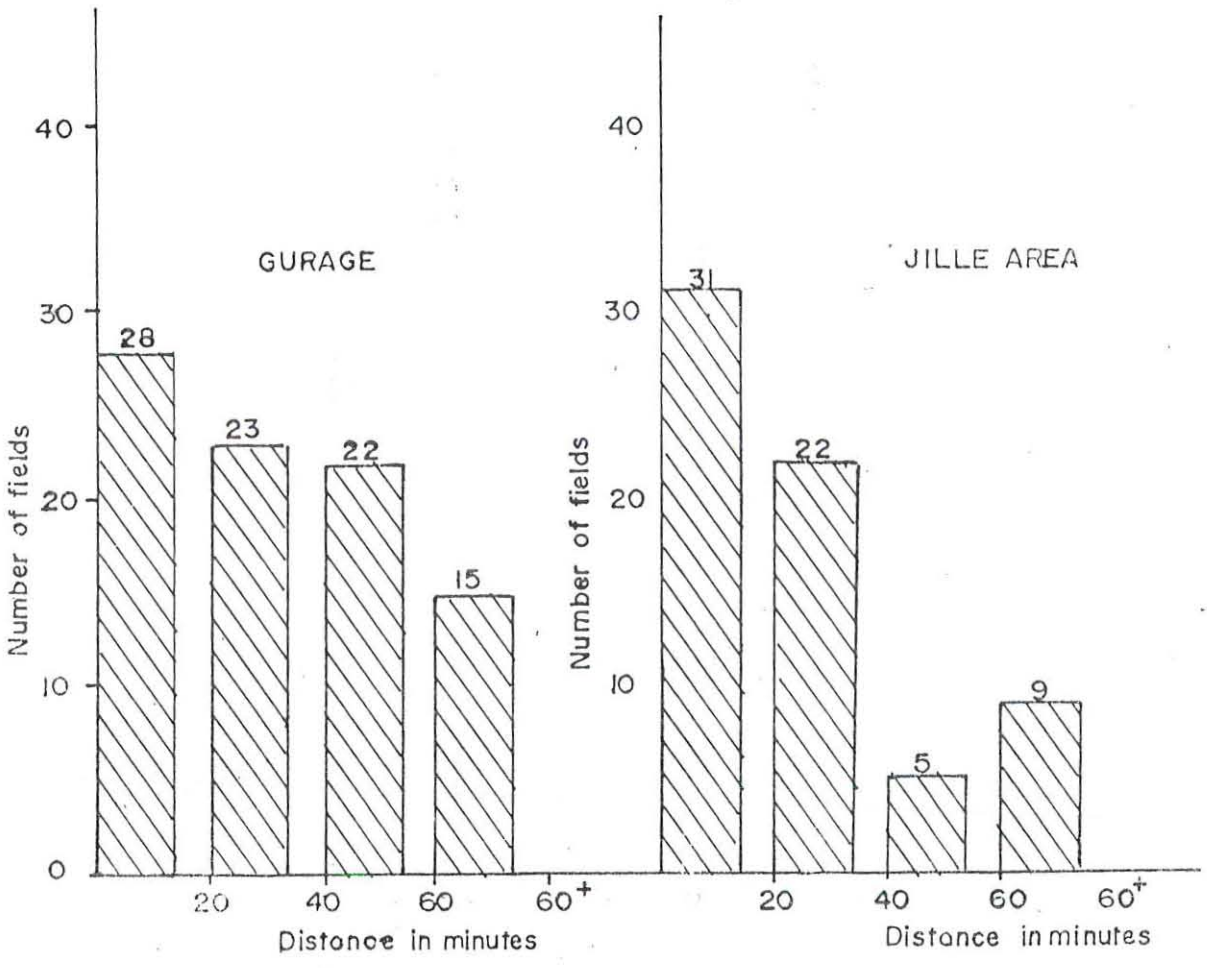


Fig.5 Number of fields by distance both in the Gurage and Jille area (1991)

distances between 01-20 minutes from the farmhouse, 26% of them between 21-40 minutes; and 25% of the plots at a distance of 41-60 minutes from the farm house. Only 17% of the plots were found to be at distances of more than 1 hr. In the case of Jille, however, 46% of the plots were found at distances of 01-20 minutes, 33% of them at 21-40 minutes; 8% at 41-60 minutes from homestead, while 13% of the plots were located at distances more than 1 hour from the homestead. Generally peas and haricot bean fields were found closer to homestead in the Gurage area, while peas and maize fields were closer to homesteads in the Jille area. The simple correlation between family size and number of fields was found to be negative and very weak in the Gurage area (r= - 0.0338), while it was positive and relatively weak in the Jille area (r= 0.2570). The correlation between farm size and number of fields was found to be very weak in the Gurage area (r= 0.16442) and moderate in the Jille area (r= 0.39074). (The value of t (1.658) was significant at 95% level of significance).

3.2.3. **Family Labour Supply**

Family labour is widely assumed to be the basis of subsistence-oriented farming in districts like Dugda. The amount of family labour is directly related to the number of working age population of a household. Although there are no clear-cut boundaries in the division of labour between family members, the members of a family help each other in different farming and household activities. In both the Gurage and Jille areas activities like ploughing, seeding, harvesting, threshing winnowing are mainly done by men, while house work, food preparation, milking, making - cow dung cakes fetching water, collecting firewood, grinding flour and looking after children are mainly done by women. Beside these, women also

participate in weeding and harvesting (mainly maize and pulses). During the Kremt (Summer) season when men migrate with the livestock, all the farming and home management tasks are the responsibility of the women.

Boys and girls also help their fathers and mothers in their respective male and female duties. The boys are mainly involved in looking after cattle, although they are some times involved in ploughing, weeding and protecting the crops from wild beasts such as wild pigs, monkeys and apes. The girls usually help their mothers in household tasks, including the fetching of water, collecting fire wood, making cattle dung cakes and grinding flour. There are also instances in which the young males are involved in such activities as fetching water from distant places.

According to the survey data (Table 6) the number of the persons in the working age group in the Gurage area accounted for 45% of the total family membership, of which 52% were females and the remaining 48% were males. The number of persons in the working age group (15-60 years) per Gurage household varied from 1 to 8 persons with an average of 2.9 workers per household. The size of the working age group also varied between the different farm size categories. The average

Table 6. Working Age Population and Family Size by Farm Size in the Gurage Area.

Farm size category	No. of family members	No. in working age group (15-60) Min	Max	Av	total W. age group (15-60)	W.A.group as % of family membership
small (<2ha)	53	1	5	2.55	28	53
medium (2-5 ha)	586	1	8	3.28	259	44
large (>5ha)	-	-	-	-	-	-
Total	639	1	8	2.92	287	45

Source: Field survey, 1991.

number of working age family members among the small holders (<2ha) was 2.55, where as among the medium size farm households (2-5ha), it averaged 3.28.

The data for the Jille farmers also revealed that the total number of persons in the working age group accounted for 49% of the total family membership, of which 54% were females and the remaining 46% were males (Table 7). The number of persons in the working age group (15-60) in each Jille household varied from 1 to 10, with an average of 4.66 workers. The average working age population also varied between different farm size categories in the Jille communities. The number of working age persons among the small

Table 7. Working Age Population and Family Size by Farm-Size Category in the Jille Area.

Farm size category	No. of family members	No. in working age group (15-60)			Total W.A group (15-60)	W.A. group as % of family membership
		Min	Max	AV		
small (<2ha)	262	1	7	2.82	127	48
medium (2-5ha)	474	2	10	3.67	230	49
large (>5ha)	28	6	9	7.5	15	54
Total	764	1	10	4.66	372	49

Source: Field Survey, 1991.

holders averaged 3.67 and 7.5, respectively. In both the Gurage and Jille areas, families with larger holdings had had access to more working age persons and vice-versa. The calculated correlation coefficients for each social group suggests the existence of a moderate positive relation between family size and area of cultivated land, the relation being stronger in the Jille area (r= +0.4538) than in the Gurage area (r= +0.3759). The coefficient of determination also revealed that 21% of the variation in area of cultivated land in the Jille community was explained by family size (r2= .2059), while 14% of the variation in area of cultivated land

in the Gurage community was explained by family size (r2= 0.1413).

3.2.4. Holidays and Labour Time

The total number of working days is greatly influenced by several conditions, notably holidays. All the sampled Gurage and Jille households indicated that they are Christians and observed certain Saint days and the number of days spent on farming are thus significantly reduced (Table 8). When the farmers were asked about the total number of days disengaged from farming due to Saint days, 88% of the Gurage households responded that they spent more than 10 days every month, while 7% of the households observed between 7-10 saints days every month. By contrast, 45% of the Jille farmers responded that they stopped farming for 7-10 days every month and 28% of them observed over 10 saints days every month (Table 8). Eighteen percent of the Jille stopped farming for 4-6 days. The survey data suggest that the Gurage farmers celebrate more saints

Table 8. Number of Days Disengaged From Farming Due to Saint /Holidays/ Per Month

Number of days	Gurage		Jille	
	No.	%	No.	%
1-3	5	5.56	9	0.91
4-6	0	0	20	18.18
7-10	6	6.67	49	44.55
10	79	87.78	31	28.18
Total	90	100	110	100

Source: Field Survey, 1991.

days than the Jille. It is perhaps significant that although the Jille claimed they were Christians, the writer didn't come across a single Church while traversing their settlement areas. By contrast several saints Churches are found in PAS of the Gurage areas.

Beside holidays other days are also lost due to social events like weddings, funerals, public holidays and births. For example, in the Jille community the ceremonies associated with Gada system, which are celebrated every 8 years, also have an impact on the number of working days. Based on such conditions the average labour time available for farming was estimated by the writer. The result suggest that the total number of working days for the Gurage farmers is less than 122, or an average of less than 10 days per month. For the Jille, however, the total number of working days is 179, or an average of 15 days per month. This doesn't mean that the farmers fully utilize all these working days on their farms. The total number of working days are also influenced by other obligatory activities, such as PA meetings, campaign workings and work for " Zemach" families (e.g for those household heads who were recruited by the PA Leaders for Military Services). When the farmers of both the Gurage and Jille communities were asked about the number of days per month spent on meetings and campaign works, they supplied the data on Table 9. As shown on the table, 56% of the Gurage farmers spent 4-6 days on such obligatory Works, while another 25% spent between 1-3 days per

Table 9. Number of Days Spent on Meeting and Campaign Works Per Month

Number of days	Gurage		Jille	
	No.	%	No.	%
1-3	23	25	31	28
4-6	50	56	35	32
7-10	7	8	36	32
>10	10	11	8	7
Total	90	100	110	100

Source: Field Survey, 1991.

month. The Jille, on the other hand, responded that 33% of the farmers spent 7-10 days, with 32% spending 4-6 days and 28% 1-

3 days on such activities. These figures suggest that the Gurage farmers spent fewer days on meetings and Campaign works compared to the Jille. This tends to suggest that the Gurage farmers spend more days on their farms than the Jille farmers.

3.2.5. Cropping Calendar

In both the moist Woinadega and Kolla agro-ecological zones of Dugda, crop production takes place during one cropping season only, the meher season. The reason given by the farmers as well as by the people of the MOA was the complete absence of belg rain in the locality. In the Gurage area the most important crops include tef, maize, wheat, sorghum, haricot bean, chick pea, lentils and beans. The farmers of the Gurage area were asked to tell the crop calendar of each crop type under normal climatic condition and the results are displayed on Figure 6. According to the calendar, the ploughing period varies from one crop type to another. Ploughing for maize and sorghum starts early in January, following the arrival of rain in late December, and lasts into March. The length of ploughing is a little bit longer because sorghum is usually sown earlier than maize. Ploughing for tef, wheat, haricot bean and beans starts in February, the longest ploughing period being for wheat, followed by tef, haricot bean and beans. The ploughing period for wheat and tef crops was relatively long because the fields need to be ploughed repeatedly, even though the soils (vertisols) are difficult to cultivate. Of all the crops, ploughing is latest for beans and lentils. Regarding seedings, sorghum is sown first in mid of March, followed by maize (in April) and haricot bean (in April). Beans are sown in June while other major crops like tef, wheat and lentil are sown in July. The last crop to be sown is usually chick pea, i.e.,

between the mid - August and the first week of September. Harvesting is early for haricot bean, usually between August and October, while sorghum and maize are usually harvested following haricot bean. For the remaining crops, such as tef, wheat and chick pea, harvesting is between October to December. The range in the harvesting season is due to the difference in the sowing time of the farmers, those who sow early harvest early and vice - versa.

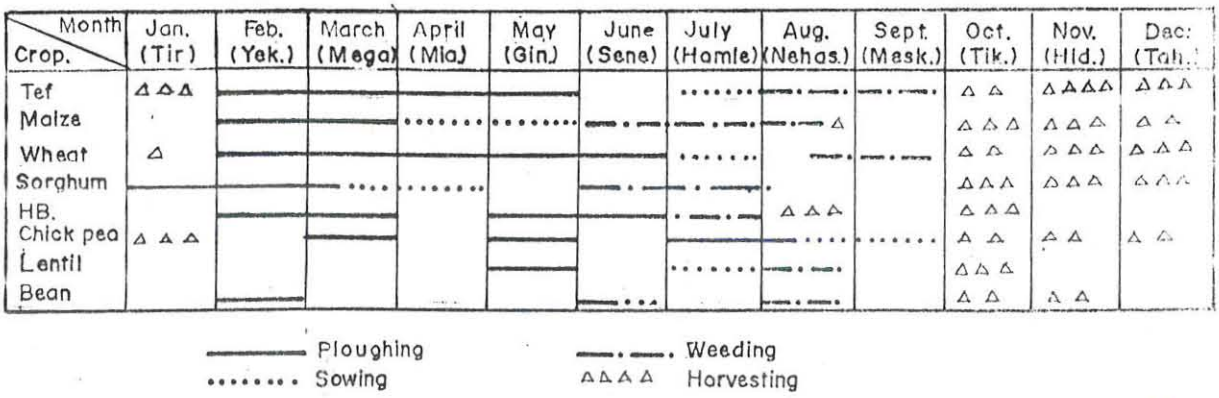


Fig.6 Cropping calendar of the Gurage farmers

As to the calendar of the Jille farmers (Fig. 7), the farmers have provided for their most important crops viz. Maize, tef, haricot bean, wheat, barley and peas. The Jille calendar shows that no farming activity takes place in January. Ploughing starts in February for crops such as maize, tef and wheat. Ploughing for haricot bean and barley starts in May and ends in June, while for peas it starts and ends in July. Except for maize and barley the Jille farmers do not start ploughing in the same month. For example, some of them start ploughing their tef and wheat fields in February, while others plough in April and May. Regarding seeding, maize and haricot bean are sown first in May, followed by wheat, tef,

barley and peas. The case of haricot bean is exceptional in that the period of ploughing coincides with the period of sowing. This is because some of the Jille farmers sow the seed immediately after ploughing the bean field. However, the seeding period extends upto July, since some farmers plough the field twice before sowing. Harvesting is early for maize, i.e., mid-August. Except for wheat, the harvesting of the other crops starts in October.

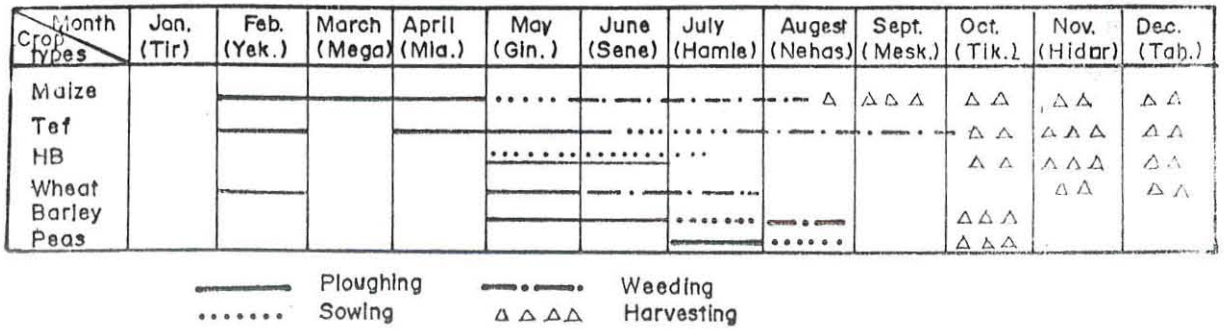


Fig.7 cropping calendar of the Jille farmers

Comparison of the cropping calendars of the Gurage and Jille farmers reveals some variation in the length of ploughing for the same crop. For example the length of ploughing for wheat in the Gurage area takes 5 months, while ploughing for the same crop in the Jille area is only 2 months. Similarly for maize and tef it takes 3 and 3.5 months in the Gurage area and 2.5 and 3.5 months in the Jille area,

Table 10. The Average Number of Times of Ploughing For Each Crop by The Gurage and Jille Farmers.

Crop type	Gurage No. of times	Jille No. of times
Tef	4.5	3.5
maize	3	2.5
wheat	5	2
Haricot bean	2	2

Source: Field Survey, 1991.

respectively. These differences could be due to the number of times that the farmers of each social group plough their fields before seeding. Table 10 summarizes farmers responses regarding the average number of times they plough their fields. Except for haricot bean it appears that the Gurage farmers plough their fields more than the Jille farmers. Before sowing wheat the Gurage farmers plough their fields five times while the Jille plough only two times. Similarly the Gurage plough 4.5 times for tef while the Jille plough 3.5 times. These differences presumably reflect the recent transition of the Jille to sedentary agriculture a few decades ago.

3.2.6. Farm Inputs

3.2.6.1 Oxen

The farm ox is one of the basic inputs in many traditional Ethiopian farming systems. When the Gurage and Jille farmers were asked to tell the numbers of their oxen they supplied the data displayed on Figure 8. This figure shows that the number of oxen owned by the households of each social group ranges between 0 and 8, but with unequal proportion in ownership. In the Gurage area 53% of the households owned a pair of oxen, 20% owned a single ox, while only 9% of the Gurage households had no ox. Some households owned more than three oxen. Generally, 91% of the Gurage households owned more than one oxen, the average being 2.2 per farmer.

By contrast, 36% of the Jille farmers had no oxen, while 30% had only a single ox and only 29% of them a team of oxen. Generally 64% of the Jille farmers owned more than one oxen,

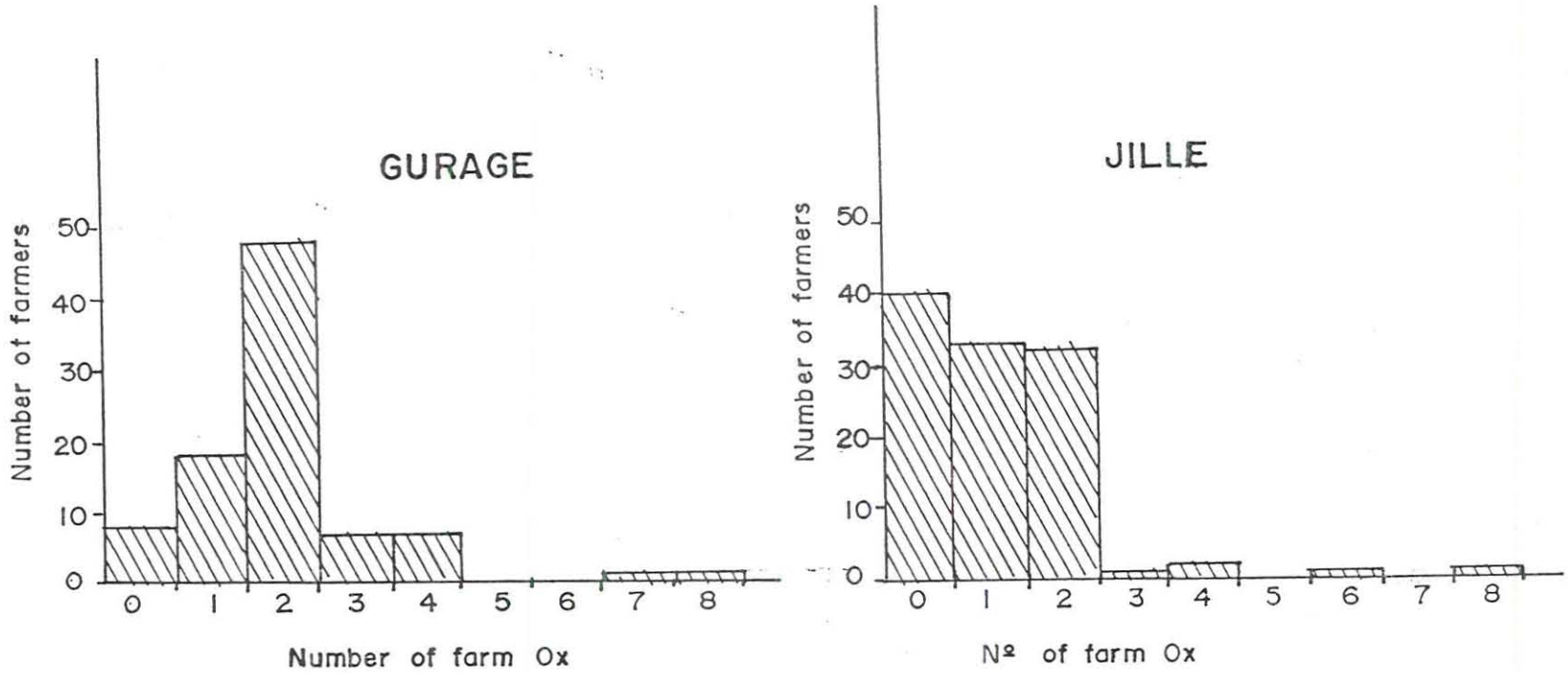


Fig. 8 Number of oxen owned by the Gurage and Jille farmers

the average being 1.25 per farmer. The data suggests that shortage of oxen is more acute in the Jille area than in the Gurage area. The underlying cause of this situation was reported to be the drought /famine/ period of 1984/85 when most of the Jille farmers were compelled to sell their livestock holdings to buy food for their families. Some of these farmers seem to have been without oxen during the last six to seven years.

*3.2.6.2. **Improved Seeds***

When the sampled farmers were asked whether they currently (1990/91) used modern farm inputs, such as improved seeds and fertilizers, 62% of the Gurage and 28% of the Jille responded yes to the question (Table 11).

Table 11. Proportions of The Gurage and Jille Farmers Using Modern Farm Inputs

Response	Gurage		Jille	
	No.	%	No.	%
Yes	56	62	31	28
No	34	38	79	72
Total	90	100	110	100

Source: Field Survey, 1991.

However, of these only 20% of the Gurage and 50% of the Jille farmers responded that they used improved seeds (Table 12). The most commonly grown improved seeds in the Gurage area was maize while haricot bean was a commonly grown seed in the Jille area. The main reasons for such a limited use of improved seeds by the Gurage and Jille farmers include: the inadequate supply of different varieties of improved seeds during the different growing seasons; the second reason is that most of the farmers of both social groups do not have a positive attitude towards growing haricot bean because of the low price offered at market. Nonetheless, the proportion of

improved seed user Jille farmers were greater than the Gurage farmers. This may presumably be due to the fact that the MOA provided the Jille farmers with haricot bean to be adopted as a strategy against crop failure due to drought.

Table 12. Type of Input Used by The Gurage and Jille Farmers Using Modern Inputs.

Type of inputs used	Gurage		Jille	
	No.	%	No.	%
Improve seed	11	20	16	50
Fertilizer	53	95	30	97
Total	56	62	31	28

Source: Field Survey, 1991.

* N.B the No. and % are computed based on the modern input users.

3.2.6.3 **Fertilizer Use.**

From the total number of modern farm input users among Gurage farmers (53), 95% said they used fertilizer. When they were asked about the type of crop they fertilized, 47% said they used fertilizer for tef and wheat; 36% for tef only; and 15% for wheat only (Table 13).

Table 13. The Proportions of The Gurage and Jille Farmers Using Fertilizer by Crop Type

Type of crop fertilized	Gurage		Jille	
	No.	%	No.	%
Tef	19	36	16	53
Wheat	8	15	2	7
Tef and wheat	25	47	10	33
Maize	1	2	2	7
Total	53	100	30	100

Source: Field Survey, 1991 (based on farmers using fertilizer)

All but one of the Jille farmers who used modern inputs used fertilizer. when they were asked about the types of crop they fertilized, 53% said they used fertilizer for tef only and 33% of them for both tef and wheat. When viewed from the stand point of crop type, the proportions of farmers using

fertilizer for tef were large in both the Gurage and Jille areas. This is because tef has got the highest market price in the market so that the farmers tend to increase the productivity of tef to earn more money from the sale of the crop.

3.2.7. Traditional Methods of Maintaining Soil Fertility

3.2.7.1. Fallowing

Although fallowing the land is one of the traditional method of restoring the fertility of the soil, none of the Gurage or Jille farmers admitted fallowing their land during the last five years. When they were asked why they did not fallow, they all responded that the soil of their respective localities have no inherent fertility problems. Thus fallowing is not employed as a method of maintaining soil fertility by either of the communities of Dugda.

3.2.7.2. Crop Rotation

Crop rotation is another major method used by the Jille and Gurage farmers to restore soil fertility. Based on the responses of a small sub-sample of 41 farmers, an attempt was therefore made to see if there was any variation in crop rotation experiences of the Gurage and Jille farmers. The farmers responses were analyzed using the chi-square test. The calculated value (x2 cal) 15.248 was found to exceed the critical value of (x2 tab) 5.99 at the 0.05 level, leading to the acceptance of the hypothesis that "the Gurage farmers are more experienced crop rotation than the Jille farmers". This is reflected in their responses (Table 14) which revealed that 79% of the Gurage farmers used crop rotation, significantly exceeding the Jille farmers, of whom only 18% used crop rotation.

Table 14. Chi-square Test For The Crop Rotation Experience Between The Gurage and Jille Farmers.

Response	Gurage		Jille			
	Act.	Exp.	Act.	Exp.	Column	
Yes	15	(8.80)	4	(11.20)	19	x2cal = 15.248
No	4	(10.20)	18	(11.80)	22	x2tab = 5.99
Total	19		22		41	

Source: Field Survey, 1991 (based on 19 Gurage and 22 Jille sampled farmers).

Generally crop rotation is more clearly defined among the Gurage farmers than among the Jille. In the Gurage area, (except on sandy soils), crops are rotated on every plot from one year to another. For example, cereal crops are usually rotated with pulses. Fields which are first sown with lentil or haricot bean are usually followed by either tef or wheat in the second year. In the third year the tef and wheat fields will be changed to either sorghum or maize and in the fourth year tef and wheat will be sown (e.g. Lentil-tef-sorghum-tef; HB - wheat - maize - wheat).

By contrast the writer found no significant cycle of crop rotation in the Jille area. During the last five years maize, tef and haricot bean fields have been repeatedly sown under the same crop (i.e., without changing the crop or the variety). When the 22 Jille in the sub-sample farmers were asked why they did not rotate their crops, they gave three main reasons: the first was lack of seed; the second was because of the strategy used to reduce the damage caused by wild animals, i.e., they repeatedly plant the fields closest to the habitats of the wild animals with a crop which is less liable to animal damage. The third reason for not rotating their crops is the nature of the soil. On sandy soils only maize gives satisfactory yields, hence sandy fields are

repeatedly sown with maize. However, there were indications that some of the Jille farmers (18%) have started crop rotation. They rotate pulses, mainly haricot bean, with tef (e.g. haricot bean - tef - haricot bean - tef).

3.2.7.3. **Crop Mixing**

Based on the responses of the small sub-sample of 41 farmers, an attempt was also made to assess if there was any variation in the crop mixing experiences of the Gurage and Jille farmers. The calculated chi-square (x2cal) 0.9095 was found less than the critical value at the 0.05 level (5.99), leading the writer to reject the hypothesis that "crop mixing is more widespread among the Gurage farmers than the Jille." This implies that there is no significant variation in the crop mixing experiences between the two groups of farmers. The proportions of the Gurage and Jille farmers that experienced

Table 15. Chi-square Test For Crop Mixing Experiences Between The Gurage and Jille Farmers.

Response	Gurage		Jille		Column total	
	Act.	EXP.	Act.	EXP.		
Yes	9	(6.95)	6	(8.05)	15	x2cal= 0.9095
No	10	(12.05)	16	(13.95)	26	x2tab= 5.99
Total	19		22		41	

Source: Field Survey, 1991 (based on 19 Gurage and 22 Jille farmers).

crop mixing have never used it as a strategy against drought occurrences, rather as a means of cultivating different types of crops for different purposes, i.e., for sale and for home consumption.

3.2.7.4. **Animal Manure**

The other traditional method of maintaining soil fertility involves the use of animal manure. The farmers of both the Gurage and Jille group were asked whether or not they

used animal manure as a fertilizer and their responses are displayed on Table 16. Only 17% of The Gurage and 5% of the

Table 16. Responses of The Gurage and Jille Farmers to The Use of Animal Manure.

Response	Gurage		Jille	
	No.	%	No.	%
Yes	15	17	5	5
No	75	83	105	95
Total	90	100	110	100

Source: Field Survey, 1991

Jille households used manure as a fertilizer. The great majority indicate that they have not used manure during the last five years.

The farmers were also asked to give the reasons why they did not use manure as a fertilizer. As indicated on Table 17, 79% of the Gurage farmers suggested that they didn't use manure because of the distant location of farm fields, while 16% responded that manure was not good for some crop types (e.g. tef). By contrast only 41% of the Jille households did not use manure due to the distant location of their fields, while 27% of them responded that they had no knowledge of manuring. The number of Jille farmers who responded that manure was unsuitable for certain crops account for 23% of the total sampled farmers. Nevertheless, during informal discussions with the farmers an attempt was made by the writer to cross- check whether they have the experience of transporting manure to different fields. As a result it was found that no farmer, in either the Gurage or Jille communities, transported manure from his cattle enclosure to even to the nearest fields.

Even among the manure users, manure is not transported by any means to fertilize the fields. Rather they fertilize their

fields by rotating the cattle enclosure from one field to another. This method is more common among the Gurage farmers

Table 17. Reasons Given by The Gurage and Jille Farmers For Not Using Manure.

Reasons	Gurage %	Jille %
No reason	0	4.5
Not easily available	5	4.5
Lack of transportation	79	41
No knowledge of manuring	0	27
Not suitable for some crops	16	23
Total	100	100

Source: Field, Survey, 1991.

who call this rotation of enclosure "Dereba." However, when the farmers of each social group were asked about the importance of manure, all of them seemed know it very well, though few actually used it as an input. This could suggest that the soils of the respective localities have relatively few fertility problems.

3.3. The Land-use Pattern Of The Gurage and Jille Farmers of Dugda.

3.3.1. Dominant Land Use Between 1986/87 - 1990/91.

During the survey, both the Gurage and Jille farmers were asked to estimate the area of their cultivated land during the last five years (1986/87 - 1990/91) and they supplied the data presented in Figure 9. The data for the Gurage farmers shows that their cultivated area in 1986/87 and 1987/88 was 38.75 ha and that this increased to 53.5 ha in 1990/91, showing an annual growth rate of 2.95%. The data for the Jille farmers, by contrast, shows that their cultivated area increased from 38.25ha in 1986/87 to 43.5ha in 1990/91 indicating an annual growth of 1.05%. These figures clearly suggest that the growth of the cultivated area has been faster among the Gurages than the Jilles (see Fig. 9).

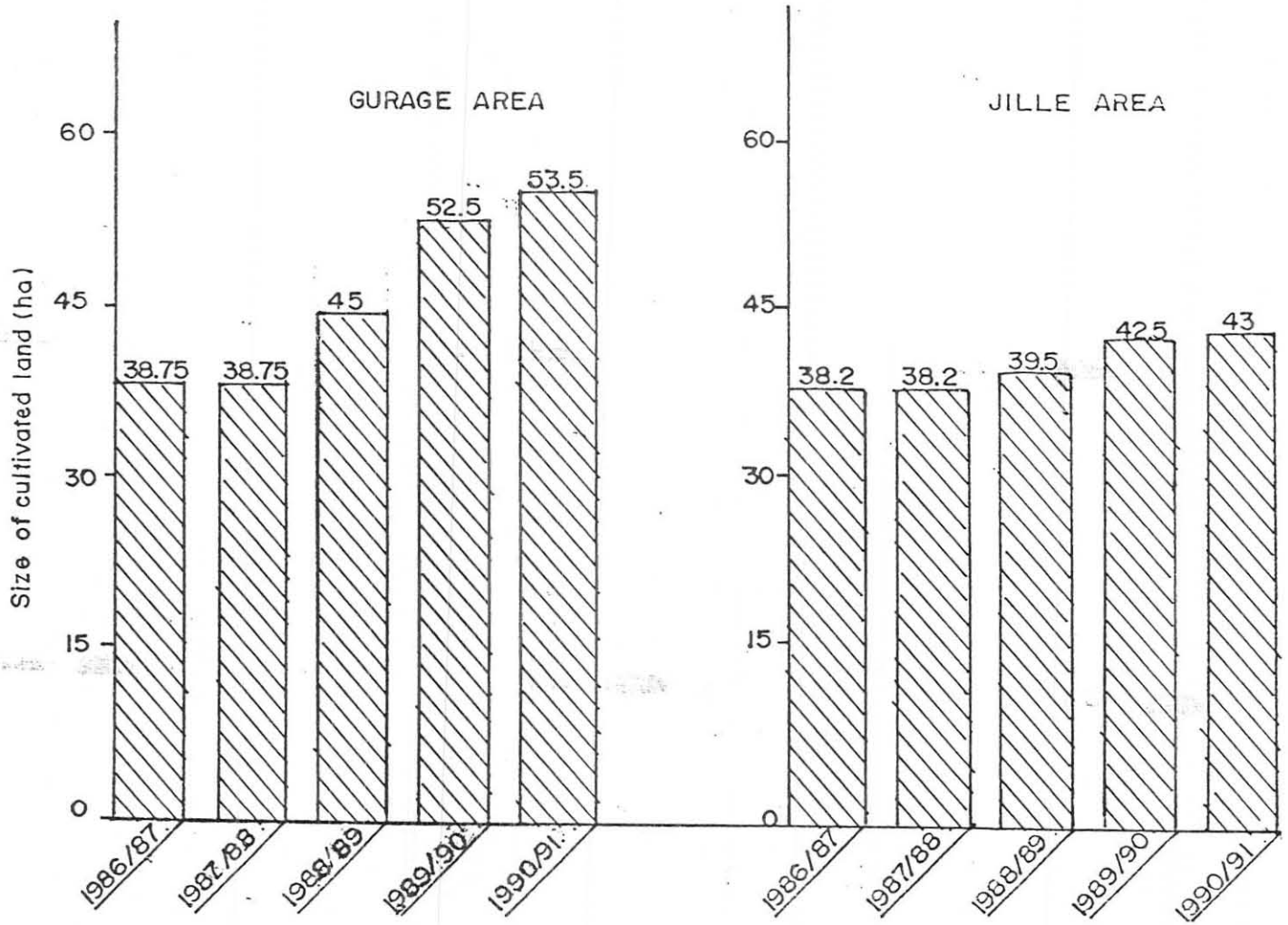


Fig.9 Size of cultivated area during the past five years, 1986/7- 1990/91

Several crops have been grown on these fields during the past five years (see Figure 10). In the Gurage area tef have been the major crop accounting on average for 39% of the total cultivated area, followed by maize (25%), wheat (13%) and sorghum 10%). The cultivated area under tef in 1986/87 was 48% and 34% in 1990/91 main season, and that of maize was 29% and 22%, respectively. Similarly the cultivated area under chick pea in 1986/87 was 7% and 5% in 1990/91, and that of bean 2% and 0.5%, respectively. On the other hand, the area under tef in 1986/87 was 6% and this increased to 24% in 1990/91 main season. Likewise, the area under sorghum was 6% in 1986/87 and 16% in 1990/91, and that of haricot bean was 2% and 5%, respectively. Thus, the general trend for the period shows that the area under tef, maize, chick pea and bean has been declining while that of wheat, sorghum and haricot bean has been increasing.

Fig. 10 also shows that maize was the dominant crop in the Jille area during the last five years, accounting for an average of 57% of the total area. Except for the year 1988/89 tef was the second ranking crop accounting for an average of 20%, followed by haricot bean and wheat accounting for 17% and 3%, respectively. The cultivated area under maize in 1986/87 was 64% and 58% in 1990/91 main season, and that of barely was 4% and 1%, respectively. On the other hand the area under tef in 1986/87 was 20% and 21% in 1990/91. Likewise, the area under haricot bean was 11% in 1986/87 and increased to 16% in 1990/91 main season, and that of wheat was 1% in 1986/87 and increased to 3% in 1990/91. Thus, the general trend for the period (1986/87 - 1990/91) shows that the area under maize and barley has been declining while that of tef, haricot bean and wheat has been increasing.

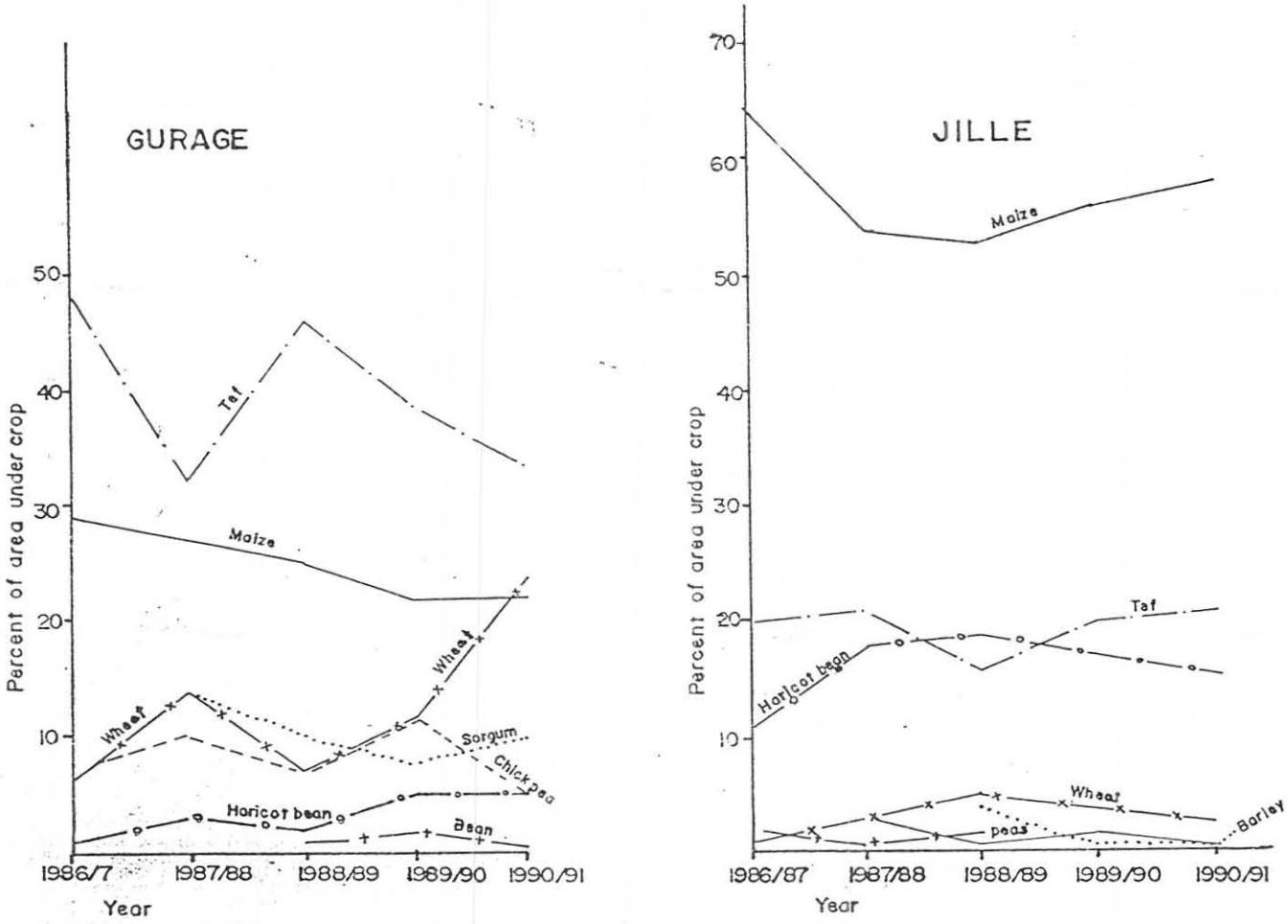


Fig. 10 Percentage of area under each crop / 1986/87 - 1990/91

Comparison of the land use data for the Gurage and Jille areas suggests the existence of single crop (maize) domination in the Jille area. In 1990/91, for example, 60% of the Jille crop area was accounted by maize alone, while the remaining 5 major crops covered only 40%. In the Gurage area, however, no single crop was clearly dominant. It seems that there is more diversity in the Gurage cropping pattern.

Interviews with the Jille farmers revealed several opinions as to why their land use pattern has been dominated by maize. One reason points to the fact that maize' is relatively a low labour requiring crop compared to others; a second reason is that it is less liable for wastage while harvesting; a third reason is that the local environment is relatively favuorable for maize cultivation; a fourth reason is that maize can be prepared into a variety of foods. Despite these claims this land use system has not been without its problem, because during the last two decades, climatic variability has frequently destroyed the crop and as a consequence many of the Jille people have been victims of famine.

By contrast the more varied land use pattern of the Gurage farmers seems to have made them less liable to damage by climatic variability. This shows that the risk of crop failure is more acute in mono-crop localities than in places with relatively diversified land uses.

3.3.2. The Crop Diversity Patterns Of The Gurage and Jille farmers of Dugda

The agro-ecology of Dugda permits the growth of different crops. Based on detailed interviews with a small sub-sample of

41 farmers an attempt was made using the Chi-square test to examine if there were any statistically significant variations in the number of crops and the number of crop category (pulse and cereals) grown by the Gurage and Jille farmers. In the case of the number of crops grown the calculated chi-square value (x2cal) (3.0178) was less than the critical value (3.84146) at 0.05 probability level, suggesting the absence of variation in the number of crops grown by the Gurage and Jille farmers. Hence, the survey provided no evidence to support the hypothesis that "the number of crop grown by the Gurgae farmers is significantly higher than that of the Jille farmers (see Table 18).

Table 18. Chi-square Test For The Number of Crops Grown by The Gurage and Jille Farmers.

Number of crops grown	Gurage Act.	Gurage Exp.	Jille Act.	Jille Exp.	Column total	
<2	3	(6.24)	10	(6.97)	13	x2 cal= 3.0178
>2	16	(12.76)	12	(15.03)	28	x2 tab= 3.8474
Total	19		22		41	0.05

Source: Field Survey 1991, (based on 19 Gurage and 22 Jille farmers.)

Table 19 shows the result for the number of crop categories (mainly pulses and cereals). The calculated value of Chi-square for the number of crop category suggests no significant difference between the groups. The calculated Chi-square was less than the critical value (x2cal 0.044 < x2tab 5.99) at the 0.05 probability level. Thus the survey provided no evidence to support the hypothesis that the "number of crop category grown by the Gurage farmers is significantly higher than that of the Jille farmers. " In a nut- shel the Gurage and Jille farmers do not seem to differ in the number of crops

Table 19. Chi-square Test For The Number of Crop Category by The Gurage and Jille Farmers.

Number of crop category	Gurage Act. fr	Ex.fr	Jille Act.fr	Ex.fr	Column total	
1. pulse	8	(7.88)	9	(9.12)	17	x2cal= 0.044
2. cereals	11	(11.12)	13	(12.88)	24	x2tab= 5.99
Total	19		22		41	0.05

Source: Field Survey, 1991 (based on 19 Gurage and 22 Jille Farmers)

grown or in the number of crop category.

3.3.3. Crop Patterns of the Gurage and Jille Farmers.

The writer interviews and observations in Dugda revealed that the cropping patterns of the Gurage and Jill farmers were more strongly influenced by the type and spatial distribution of soils than by other factors like labour and manuring. During the writer's visits to all of plots (155) of a sub sample of 19 Gurage and 22 Jille farmers, three types of soils were commonly identified by the farmers (see Table 20). The soils were Andosols, (locally named Gombore), Vertisols (Koticha) and sandy (Ashewa). In both the Gurage and Jille farm fields Andosols (Gombore) were dominant, accounting for

Table 20. Area Under Different Types of Soils In The Gurage and Jille Farms.

Soil types	Gurage Area (ha)	% of the total area	Jille Area (ha)	% of the total area
Andosols (Gombore)	30.75	58	19.25	45
Vertisols (Koticha)	16.75	31	14	32
Sandy (Ashewa)	6	11	9.75	23
Total	53.50	100	43	100

Source: Field Survey, 1991 (based on 88 Gurage and 67 Jille farm plots).

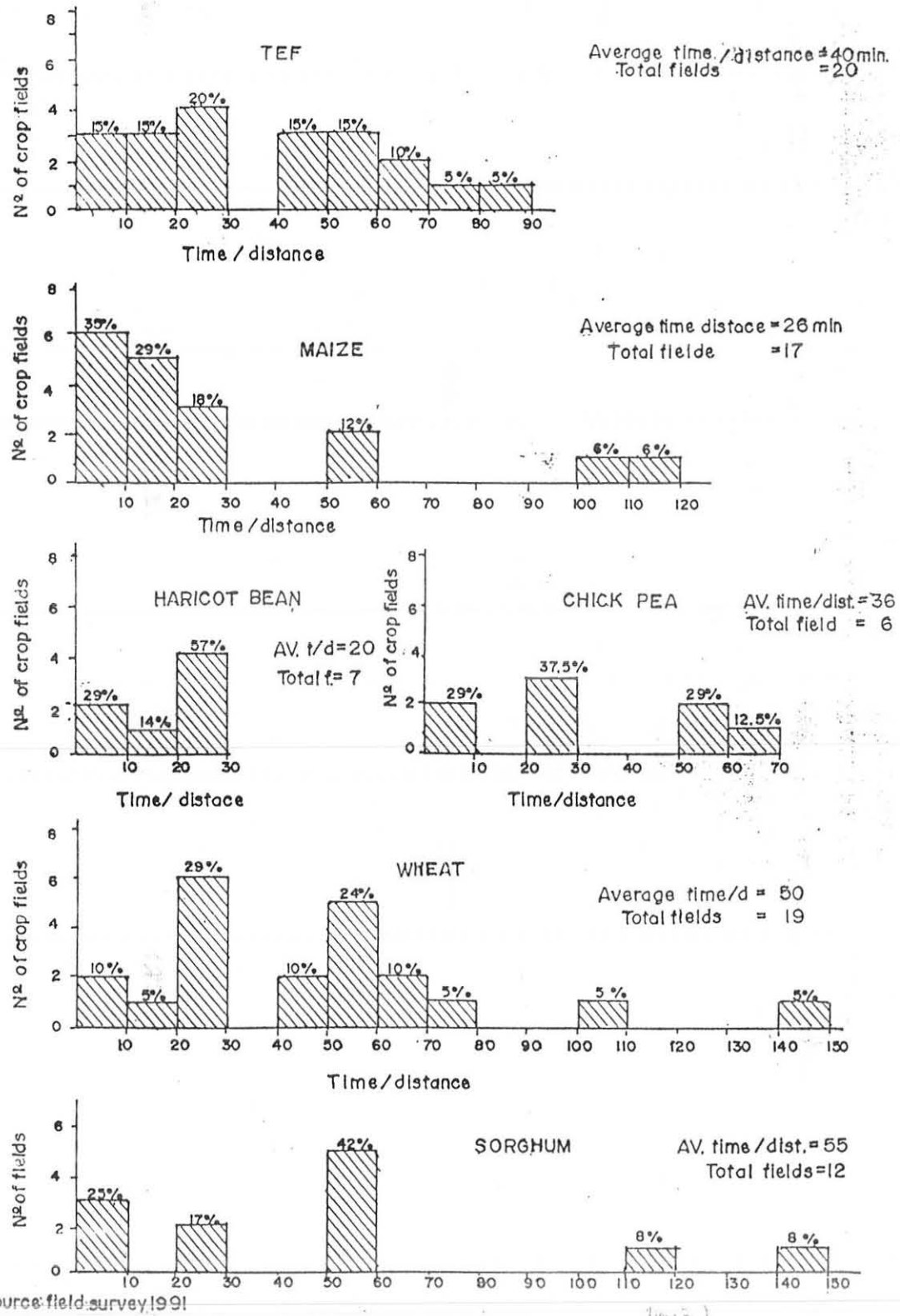
58% and 45% of the total area of their fields, respectively. The second most important soil type was the Vertisols, which accounted for 31% of the fields in the Gurage and 32% in the Jille area. Sandy soil is the third soil in terms of its area coverage in both the Gurage and Jille fields, but with a larger proportion among the Jille. Because of their difference in fertility and water holding capacity each soil type was preferred for the cultivation of different types of crop. In the Gurage area, for example, vertisols (Koticha) are usually sown under crops like tef, wheat and barley, even though vertisols are difficult to cultivate because of their water logging problem. Andosols (Gombore) however, are considered good for all types of crops, while sandy soils are considered suitable for maize only. By contrast, although the Jille farmers know the various fertility and water holding capacity of the soils, they do not follow a similar pattern with that of the Gurage farmers. When the farmers were asked why they didn't use different types of soils for different types of crops they answered that they lacked seeds, and that they sometimes do not grow crops on suitable soils if the field is exposed to damage by wild animals. In the writer's view it is the spatial distribution of these soils, whatever their distance from the homestead, that greatly determines the zonations of crops around the settlement of the Gurage and Jille farmers of Dugda.

3.3.3.1. Crop Patterns Among The Gurage Farmers

The current pattern of crop zonation of the Gurage farmers is displayed on Figure 11 and Table 21. As shown on Figure 11, the minimum distance for tef fields was 05 minutes, while the maximum was 90 minutes; the range of distance being

85 minutes. The average time/distance for tef fields was 40 minutes. The table revealed that 50% of the total fields were found within a distance zone of 30 minutes while 75% of them were within 60 minutes from the farm house. For maize fields the minimum distance was 05 minutes, while the maximum was 120 minutes; the range of distance being 115 minutes. The average time/distance zone for maize fields was 26.5 minutes. The table indicates that 50% of the total maize fields were found within 20 minutes/distance zone, while 75% of the fields were within 30 minutes from the farm house. The figure shows that the minimum distance for haricot bean fields was 05 minutes, while the maximum was 30 minutes; the range of distance being 25 minutes. The average time/distance for haricot bean fields was 20 minutes. In addition, both the 50% and 75% of the total haricot bean fields were found within a time/distance zone of 30 minutes from the farm house. On the other hand, the minimum distance for wheat fields was 05 minute, while the maximum was 150 minutes the range of distance being 145 minutes. The average time/distance for wheat fields was 52 minutes. Thus 50% of the total wheat fields were found within a time/distance zone of 50 minutes, while 75% of the fields were within a zone of 60 minutes from the farm house.

Furthermore, the figure indicates that the minimum distance for sorghum fields was 05 minutes, while the maximum was 150 minutes; the range of distance being 145 minutes. The average time/distance for sorghum fields was 55 minutes. In addition, both the 50% and 75% of the sorghum fields were found within 60 minutes/distance zone from the farm house.



Source: field survey 1991

Fig.11 Frequency of crop fields at different time/distance for the Gurage area, 1991

Table 21. Percent of Crop Fields In Time/Distance Zone (min) From The Gurage Farm House, 1990/91

Crop	50% of the field	75% of the field
Tef	30	60
Maize	20	30
Haricot Bean	30	30
Wheat	50	60
Sorghum	60	60
Chick Pea	30	60

Source: Field Survey 1991

For chick pea fields, the minimum time/distance was 05 minutes, while the maximum was 70 minutes; the range of distance being 65 minutes. The average time/distance for these fields was 75 minutes. The table also indicate that 50% of the Chick pea fields were found within a distance zone of 30 minutes, while the 75% were found within 60 minutes zone from the farm house.

Besides these, an attempt was made to assess the pattern of crop zonation of the Gurage farmers for the last five years (1986/7 - 1990/91) and the results are displayed on Figure 12 and Table 22. The figure shows that pulses, (mainly peas and haricot bean), were grown closer to the farm house, clearly showing a distance decay situation. Next to these crops, maize and chick pea were grown closer to the farm house and show, to some extent, a distance decay condition. The remaining crops like tef wheat and sorghum were grown at distant fields and they did not indicate a clear distance decay. The figure also shows that most of the chick pea, tef, wheat and sorghum fields were concentrated at distance zone of 60 minutes from the farm house.

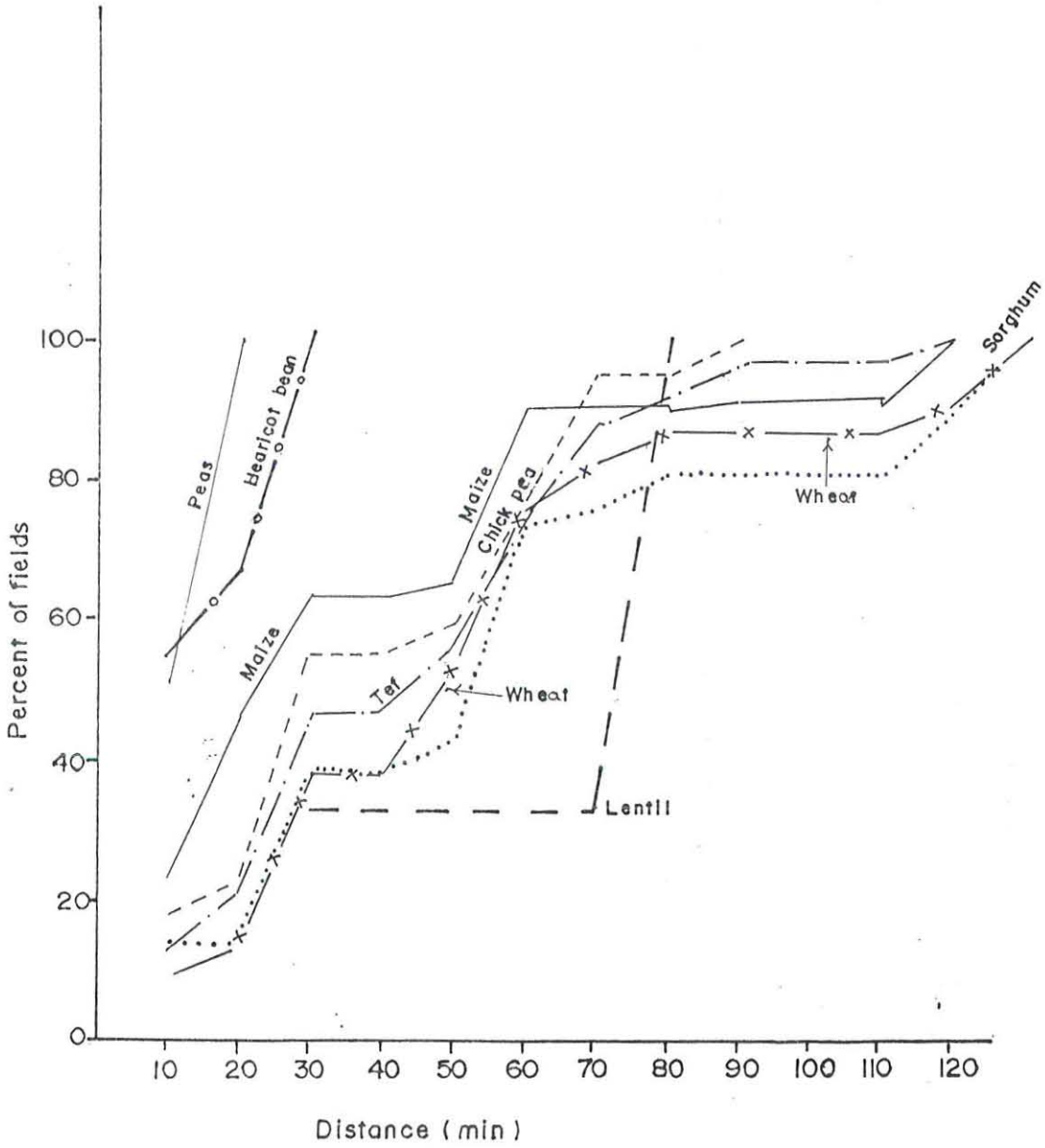


Fig. 12 pattern of crop zonation of the Gurage area (1986/7-1990/1

Table 22 shows the percent of crop fields in time/distance zone from farm house. As indicated on the table, 50% of the total pea fields were found within a distance zone of 10 minutes, while 75% of them were within 15 minutes from the house. Besides this, 75% of the haricot bean fields were found within 22 minutes/distance zone. On the other hand, 50% of the maize fields were found within 23 minutes, while 75% of the fields were within 52 minutes/distance zone. The table also indicates that 50% of the chick pea fields were found

Table 22. Percent of Crop Fields In Time/Distance Zone From Farm House (1986/87 - 1990/91)

Crop	50% fields from farm house	75% of fields from farm house
Peas	10	15
Haricot bean	-	22
Maize	23	52
Tef	45	60
Wheat + Chickpea	49, 28	59, 59
Sorghum	52	66
Lentil	72	76

Source: Field Survey 1991 (based on 19 Gurage farmers)

within 28 minutes/distance while the 75% were within 59 minute zone from the farm house. In addition the table indicates that 50% of the wheat fields were found within 49 minutes/distance zone while the 75% were within 59 minutes. Furthermore, 50% of the sorghum fields were found within a distance zone of 52 minutes, while 75% of the fields were within 66 minutes from the farm house. The table also shows that 50% of the Lentil fields were found within 72 minute/distance zone while 75% of the fields were within 76 minute from the farm house. Finally by taking 75% of the crop field in time/distance from farm house, the pattern of crop zonation of the Gurage farmers for 1986/87 - 1990/91 is displayed on Figure 13.

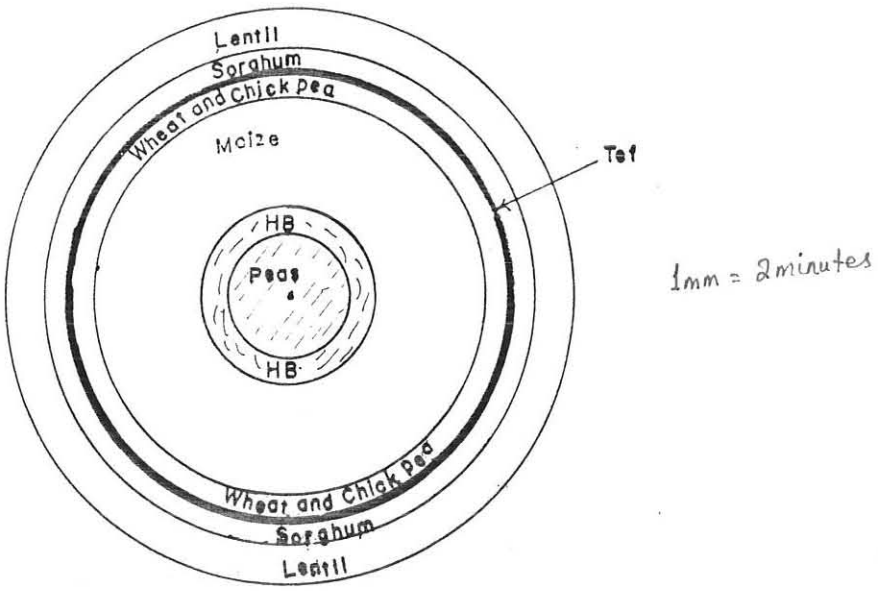


Fig. 13 crop patterns of the Gurage farmers 1986/87 - 1990/91.

3.3.3.2. Crop Patterns Among The Jille Farmers

Figure 14 presents the 1990/91 pattern of crop zonation of the Jille farmers. As shown in the figure the minimum distance for tef fields was 20 minutes, while the maximum was 120 minute, the range of distance being 100 minutes. The average time/distance for maize fields was 120 minute. Table 23 shows that 50% of the tef fields were found within 30 minutes/distance zone, while 75% of the fields were within 60 minutes from the farm house. On the other hand, the minimum distance for maize was 05 minutes, while the maximum distance was 40 minutes; the range of distance being 35 minutes. The average time/distance for maize fields was 19 minutes. The table also shows that 50% of the total maize fields were found within 20 minutes/distance zone, while 75% of the fields were within a zone of 30 minutes from the farm house. According to the figure, the minimum distance for haricot bean fields was

20 minutes, while the maximum distance was 120 minutes; the range of distance being 10 minutes. The average time/distance for haricot bean fields was 53 minutes. The table reveals that 50% of the haricot bean fields were found within 40 minutes/

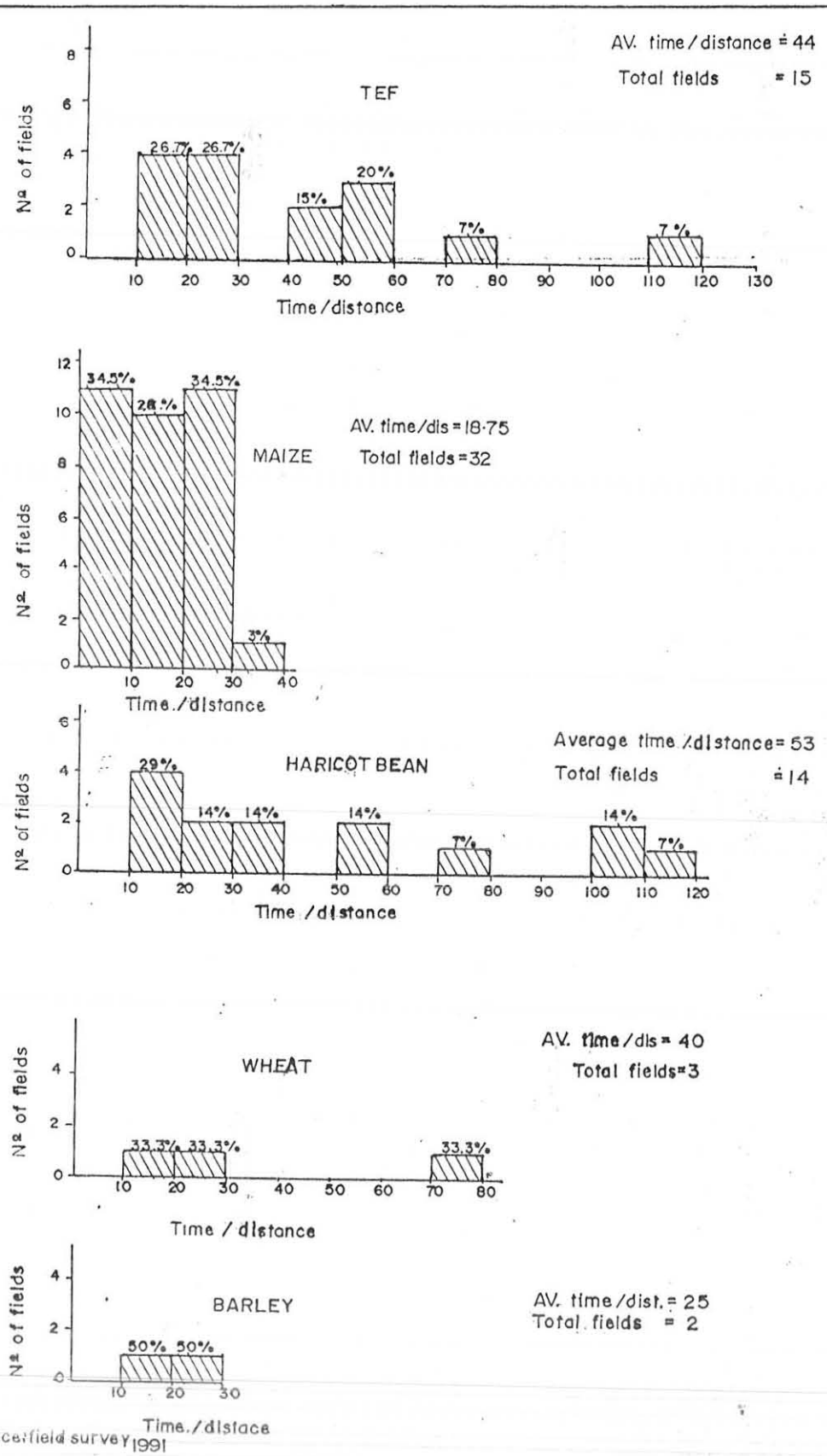
Table 23. Percent of Fields In Time/Distance Zone from the Jille Farm - House, 1990/91.

Crops	50% of the fields from farm house	75% of the fields from farm house
Tef	30	60
Maize	20	30
Haricot bean	40	80
Wheat	30	72
Barley	20	30

Source: Field Survey, 1991 (based on 22 Jille farmers)

distance zone, while 75% of the fields were within a zone of 80 minutes from the farm house. For wheat fields, the minimum distance was 15 minutes, while the maximum distance was 75 minutes. The range of distance was 60 minutes, while the average distance being 40 minutes. The table indicates that 50% of the wheat fields were found within a distance zone of 30 minutes, while 75% of the fields were within a zone of 72 minutes from the farm house. Finally the minimum distance for barley fields was 20 minutes while the maximum distance was 30 minutes. The range of distance was 10 minutes, while the average distance for barley fields was 25 minutes. The table also shows that 50% of the barley fields were found within a zone of 20 minutes while 75% of the fields were within a distance zone of 30 minutes.

Furthermore, an attempt was made to assess the pattern of crop zonation of the Jille farmers for the period 1986/87 - 1990/91, and the results are displayed on Figure 15 and Table 24. The figure revealed that peas, barley and maize were grown closer to the farm house and clearly indicating a distance



Source: field survey 1991

Fig.14 frequency of crop fields at different time/dist. for the Jille area, 199

decay condition than the remaining crops such as wheat, tef and haricot bean, which were grown at distant fields.

Beside this, Table 24 shows the percent of fields in time/distance zone from farm house. As shown on the table, 50% of the total pea fields were found within a zone of 11 minutes, while 75% of the fields were within 16 minutes from the farm house. Likewise, 50% of the total maize fields were found within a distance zone of 17 minutes, while the 75% were within 24 minutes zone. The table also indicates that 50% of the barley fields were found within 26 minutes/distance zone, while 75% of them were within 30 minutes. On the other hand, half of the total tef fields were found within 22 minutes/ distance zone, while 75% of the fields were within 50 minutes from the farm house. 50% of the haricot bean field were found

Table 24. Percent of Crop Field In Time/Distance From The Jille Farm House, 1986/87 - 1990/91.

Crop	50% of crop fields	75% of crop fields
Peas	11	16
Maize	17	24
Barely	26	30
Tef	22	50
Haricot bean	24	52
Wheat	24	71

Source: Field Survey, 1991 (based on 22 Jille farmers).

within a zone of 24 minutes, while 75% were within 52 minute from the farm house. Finally 50% of the wheat fields were found within 24 minutes distance zone while 75% were within 71 minute zone from the farm house. Thus based on the 75% of the crop field in time/distance zone, the pattern of crop zonation of the Jille farmers is displayed on Figure 16 below.

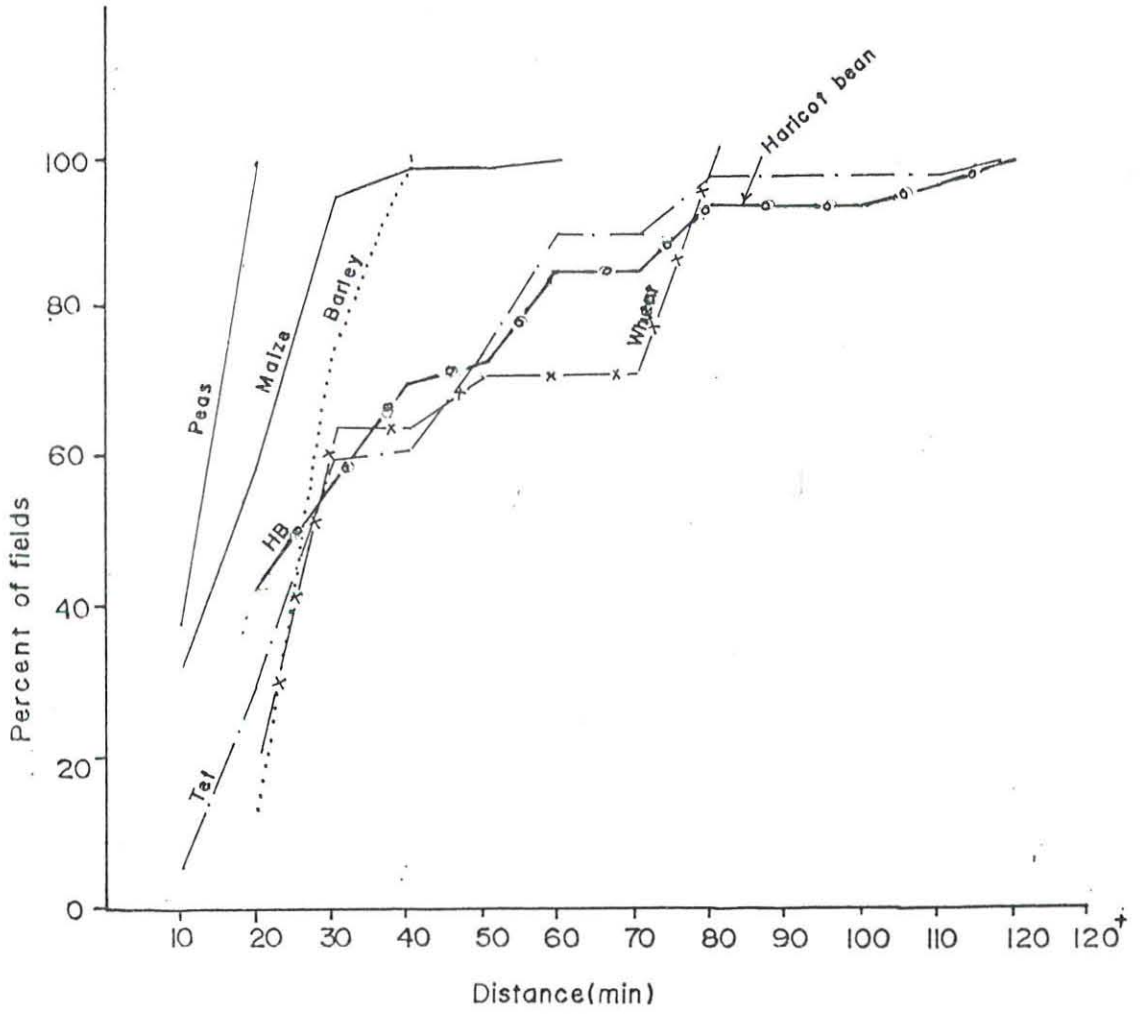


Fig.15 pattern of crop zonation of the Jille area(1986/7-1990/1)

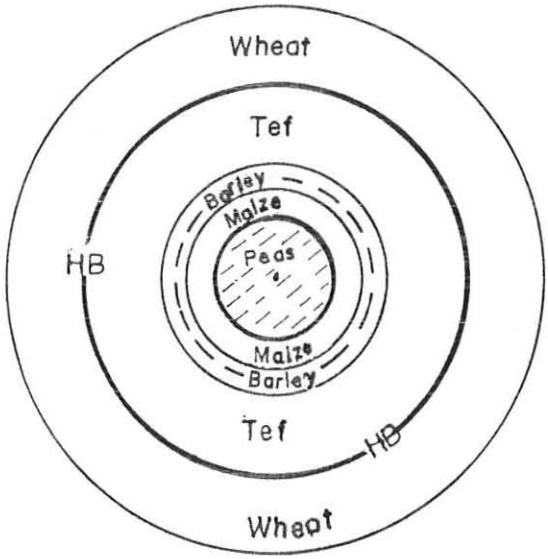


Figure 16 Crop Pattern of the Jille farmers 1986/87 - 1990/91.

Comparison of the crop zonation of the Gurage and Jille farmers revealed the existence of a distinct pattern of crop zonations. The figure revealed that peas were commonly grown closest to the farm house in both localities. Haricot bean was grown next to peas in the Gurage area, while maize was grown following peas in the Jille area. Maize was grown in the third zone in the Gurage area, while barley was in the third zone in the Jille area. Tef was commonly grown in the fourth zone in both localities. Finally sorghum and lentils were grown at the fifth and sixth zones in the Gurage area, while haricot bean and wheat in the fifth and sixth zone in the Jille area, respectivelly.

3.3.4. Factors Affecting the Land-use pattern of the Gurage and Jille Farmers.

Land use can be influenced by several environmental, economic, demographic and technological factors. The effect of these factors up on Land use, crop production and yield have been also studied by different people such as Westphal (1975)

and Yohannes (1988). However in order to assess the land use patterns of the Gurage and Jille farmers of Dugda district the writer selected one demographic, two technological and five economic factors. The selected demographic factor was family size, while the technological factor was represented by the use of manure and fertilizer. The remaining socio-economic variables were area of cultivated land, number of fields, number of farm oxen, number of distant fields located over 3 kms from the farm house, and the use of fallowing. Of these variables fallowing was omitted from the analysis, because none of the sample Gurage or Jille farmers practiced fallowing.

Using these variables the following working hypotheses were tested. Firstly it was hypothesized that family size is positively correlated with the area of cultivated land, the number of fields, and with the number of distant fields. This was because households with many family members were expected to have larger holdings, often with many fragmented fields, some of which would be far from the farmers home. This relationship was expected to be stronger among the Gurage farmers than among the Jille.

Secondly it was hypothesized that the number of oxen would be positively correlated with the area of cultivated land and with the number of fragmented fields. This relation was expected to be stronger among the Jille than the Gurage farmers, because since the Jille had recently been nomads and the number of their oxen were expected to be higher in relation to the area of their farms and the number of their fields.

Finally it was hypothesized that input use (e.g. manure and fertilizer) would negatively correlated with farm size,

number of fields, and the number of distant fields. These relationships were expected to be negative because the amount of input applied tends to decrease as the size of holding becomes larger and as the number of fragmented fields and their distance from home increases. This relationship was expected to be stronger among the Gurage farmers than the Jille, since the Gurage farmers were believed to have a better knowledge of applying farm inputs. Data on all of these demographic, economic and technological variables were obtained from the sampled households by questionnaire methods, except for the data on fertilizer where dummy variables were used. This was because the farmers couldn't recall the exact amount of inputs applied. Those farmers who responded "yes" to the question "Do you apply modern inputs" were valued 1, otherwise 0.

In order to test these hypotheses the writer employed simple correlation and regression analysis methods. To test the statistical significance of the result T and F tests were also used and the results presented in Tables 25 and 26. The calculated value for the relation between cultivated area and family size indicates the predicted positive relation for both the Gurage and Jille areas. The correlation value for the Gurage area was weak ($r = + 0.3759$) and the coefficient of determination indicates that family size explains only about 14% of the variation in cultivated area. By contrast, the value for the Jille area shows moderate relation ($r = + 0.4538$) and the coefficient suggests that family size explains 21% of the variation in cultivated area. These values, therefore, indicate the difference in the strength of association between the variables in both communities. For the Gurage area the coefficient was statistically significant at 95% level, while

for the Jille it was at 99% significant level. Hence, the simple correlation between family size and cultivated area was more confirmed for the Jille area than for the Gurage.

In the case of the second hypothesis (that the number of fields is positively correlated with family size) reveals a negative relation for the Gurage area, and the predicted positive relation for the Jille area. The correlation value for the Gurage area was very weak (- 0.0338) and the coefficient explains no variation at all. On the other hand, the value for the Jille area was weak (+ 0.2570) and the coefficient indicates that family size explains only 6% of the total variation in the number of fields. Each of these coefficients was statistically significant at 95% level for both localities. Therefore, the hypothesis that the relation between the number of fields and family size was confirmed for the Jille area and was rejected for the Gurage area.

In the case of the third hypothesis, the correlation between the number of distant fields and family size reveals a negative relation for the Gurage area and the predicted positive relation for the Jille area. The correlation value for the Gurage area was very weak (r= -0.0751) and the coefficient explains no variation at all. By contrast, the value for the JIlle area was also weak (r= +0.1597) and the coefficient indicates that family size explains only 2% of the total variation in distance fields. Each coefficient was statistically significant at 95% level. Therefore, the hypothesis that the relation between the number of distant fields and family size was confirmed for the Jille area and rejected for the Gurage.

The correlation between cultivated area and the number of farm oxen revealed the predicted positive relation for both

the Gurage and Jille areas. The calculated (r) value for the Gurage area was moderate (r= + 0.4420) and the coefficient (r2) indicates that farm oxen explains 20% of the total variation in cultivated area. On the other hand, the value for the Jille area was very weak (r= +0.2699) and the coefficient (r2) suggests that farm oxen explain only 7% of the total variation in cultivated area. This again shows the difference in the strength of association between the variables of the Gurage and the Jille area. The coefficients for the Gurage area were statistically significant at 99% level, while for the Jille at 95% level. Therefore, the relation between cultivated area and farm oxen was more confirmed for the Gurage area than for the Jille area.

The computed correlation between the number of fields and the number of farm oxen revealed the predicted positive relation for both the Gurage and Jille areas. The value for the Gurage area was moderate (r= +0.4191) and the coefficient of determination (r2) indicates that farm oxen explains 18% of the variation in the number of fields. By contrast, the correlation value for the Jille area was weak (r= +0.2474) and the coefficient (r2) suggests that farm oxen explain only 6% of the variation in the number of fields. The coefficients for the Gurage area were statistically significant at 99% level, while for the Jille at 95% level of significance, indicating difference in the strength of association. Hence, the hypothesis that the relation between the number of fields and farm oxen was confirmed more for the Gurage areas than for the Jille.

The correlation between fertilizer use and the selected economic factors (size of holding, number of fields and No. of

25. Correlation and Regression Results for the Gurage area.

Dependent variable (y)	Independent variable	Co-eff of B	S. Error of B	Correlation value r	Co.eff of determi, (r2)	T value
Cultivated area	Family size	3.8581	0.8957	**0.3759	0.1413	4.3074
No. of fields	Family size	6.9620	0.5272	**-0.0338	0.0011	13.2056
No. of distant fields	Farm size	0.8909	0.3348	**-0.0751	0.0056	2.6610
No. of oxen	Cultivated area	0.3521	0.4076	* 0.4420	0.1955	0.8667
No. of oxen	No. of fields	1.2551	0.0375	* 0.4191	0.1756	1.3791
Fertilizer use	Cultivated area	8.6136	1.1504	**-0.2649	0.0702	7.4875
Fertilizer use	No. of fields	3.1847	0.9968	**-0.1520	0.0226	3.2273
Fertilizer use	No. of distant fields	0.8001	0.3703	**-0.0945	0.0089	2.1607
Manure use	Cultivated area	10.8400	1.9916	**-0.0307	0.0009	5.4473
Manure use	No. of fields	0.7961	1.6172	**-0.2429	0.0590	0.4923
Manure use	No. of distant fields	0.4267	0.6166	**-0.1200	0.0144	0.6920

Table 26. Simple Correlation and Regression Results for the Jille area

Dependent variable	Independent variable	Co.eff. of B	S.Error of B	Correlation value (r)	Coeff. of Deter. (r2)	T. value
Cultivated area	Family size	4.1286	0.5918	*0.4538	0.2059	6.9763
No. of fields	Family size	5.5903	0.5649	**0.2570	0.0660	9.8961
No. of distant fields	Farm size	0.3985	-0.2130	**0.1579	0.0255	1.8709
No. of oxen	Cultivated area	0.4563	0.2594	**0.2699	0.0728	1.7519
No. of oxen	No of fields	0.6070	0.2298	**0.2474	0.0612	2.6414
Fertilizer use	Cultivated area	4.1376	1.3876	**-0.3335	0.1112	2.9818
Fertilizer use	No. of fields	1.5042	0.5700	**-0.2676	0.0716	2.6389
Fertilizer use	No. of distant fields	0.6941	0.2997	**-0.0110	0.0001	2.3160
Manure use	Cultivated area	1.6018	3.9101	**0.1803	0.0325	0.4097
Manure use	No. of fields	0.0476	1.5705	**0.1833	0.0336	0.0303
Manure use	No. of distant fields	-0.3524	0.8027	**0.1288	0.0166	-0.4390

Ttab(+) = 1.658 * significant at 99% level
Ttab(-) = -1.658 ** significant at 95% level

distant fields) indicates the predicted negative linear relationship in both communities. The relation between the cultivated area and fertilizer use was weak (r= -0.2649) for the Gurage area and the coefficient of determination (r2) suggests that the cultivated area explains only 7% of the variation in fertilizer use. By contrast, the value for the Jille area was moderate (r= -0.3335) and the coefficient of determination (r2) reveals that the cultivated area explains only 11% of the total variation in fertilizer use. Each of these coefficient was statistically significant at 95% level, and shows differences in the strength of association between the variables of both communities. Therefore, the simple correlation between the cultivated area and fertilizer use was more confirmed for the Jille area than for the Gurage area.

In addition, the correlation between fertilizer use and number of fields for the Gurage area was very weak (r= -0.1502) and the coefficient of determination indicates that the number of fields explains only 2% of the variation in fertilizer use. On the other hand, the value for the Jille area was also weak (r= -0.2676) and the coefficient reveals that the number of fields explain only 7% of the variation in fertilizer use. (The values were statistically significant at 95% level). The comparison of the coefficients for the groups suggests, although the values were weak, the existence of unequal strength of association. Thus, the hypothesis that the relation between the number of fields and fertilizer use was more confirmed for the Jille area than for the Gurage.

In the case of the relation of distant fields and fertilizer use, the correlation value for the Gurage area was very weak (r= -0.0945) and the coefficient (r2) explains no variation (0%) at all. By contrast, the value for the Jille

area was also very weak (r=-0.0110) and the coefficient of determination (r2) also indicates no variation (0%). Each of these coefficients was significant at 95% level, for both communities. Thus the hypothesis that the relation between the number of distant fields and fertilizer use, although the values were very weak, was more confirmed for the Gurage area than for the Jille.

Finally the correlation between manure use and the selected economic factors (cultivated area, number of fields and number of distant fields) indicates the absence of the predicted negative relation for the Jille area as a whole. While on the other hand, except for the relation between manure use and the number of distant fields, the predicted negative relation was maintained for the remaining two variables in the Gurage area. The correlation values between manure use and these economic factors were very weak in both the communities and the T - test indicates the absence of a significant relation between the variables in the Jille area. By contrast, the T - test confirmed the existence of a significant relation between manure use and cultivated area only in the Gurage area (r=-0.0307) at 95% level of significance, thus validating the hypothesis. Therefore, the hypothesis for the relation between manure use and those economic factors were rejected for the Jille area.

3.3.5. The Livestock Resource of the Gurage and Jille farmers.

3.3.5.1. Animal Number and Herd Composition.

Livestock are important in the economic life of both the Gurage and Jille farmers. They provide them with food, transport, draft power and they also serve as wealth and saving and insurance against adversities. According to the

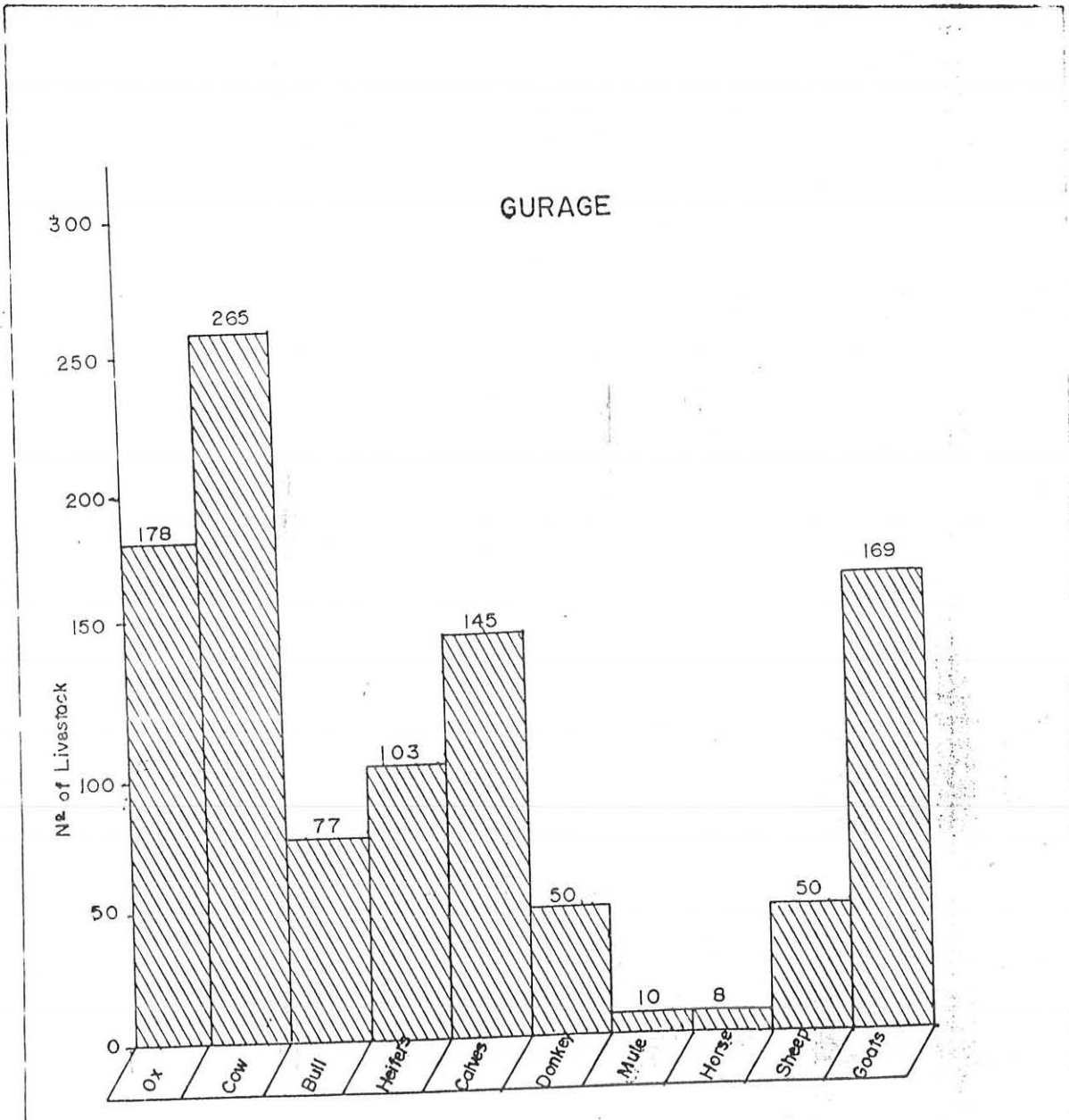


Fig.17 Livestock population by species, Gurage (1991)

writer's survey (1990/91), the total herd size owned by 90 sampled Gurage farmers was 1052. Of this total the dominant type of animals were cows (25%); oxen (17%); followed by goats and calves (16% and 13%). The number of draft animals were very small compared to the other types. The average Gurage farmer owned a herd of 11.95 animals. Overall, 98% of the sampled Gurage farmers owned more than one animal while the remaining 2% owned no animals. Eighty percent of the Gurage farmers owned 50% of the total herd, and 93% of the farmers owned 75% of the total herd. (see Fig. 17).

The herd owned by 110 Jille farmers numbered 1061. Of this total, Cows were the dominant type, accounting for 27%, followed by calves, goats and oxen, accounting for 18%, 15% and 12%, respectively. The average Jille farmer thus owned 11.17. The survey revealed that 15% of the sampled Jille farmers had no livestock while the remaining 85% owned at least one animal. Thus 80% of the Jille farmers owned nearly 50% of the total herd, with 92% of the farmers owning 75% of the total herd (see Fig. 18). Fig. 17 and 18 show some differences in the herd composition of the two groups of farmers. The writer therefore attempted to determine if the difference in their livestock holdings was statistically significant using the Chi - square test. It was expected that the Jille farmers own more animals than the Gurage. The calculated Chi - square (X2cal 6.9660) exceeds the critical value (X2tab 5.991), showing the existence of significant difference in the number of livestock owned by the Gurage and Jille farmers. Since the number of livestock owned by the

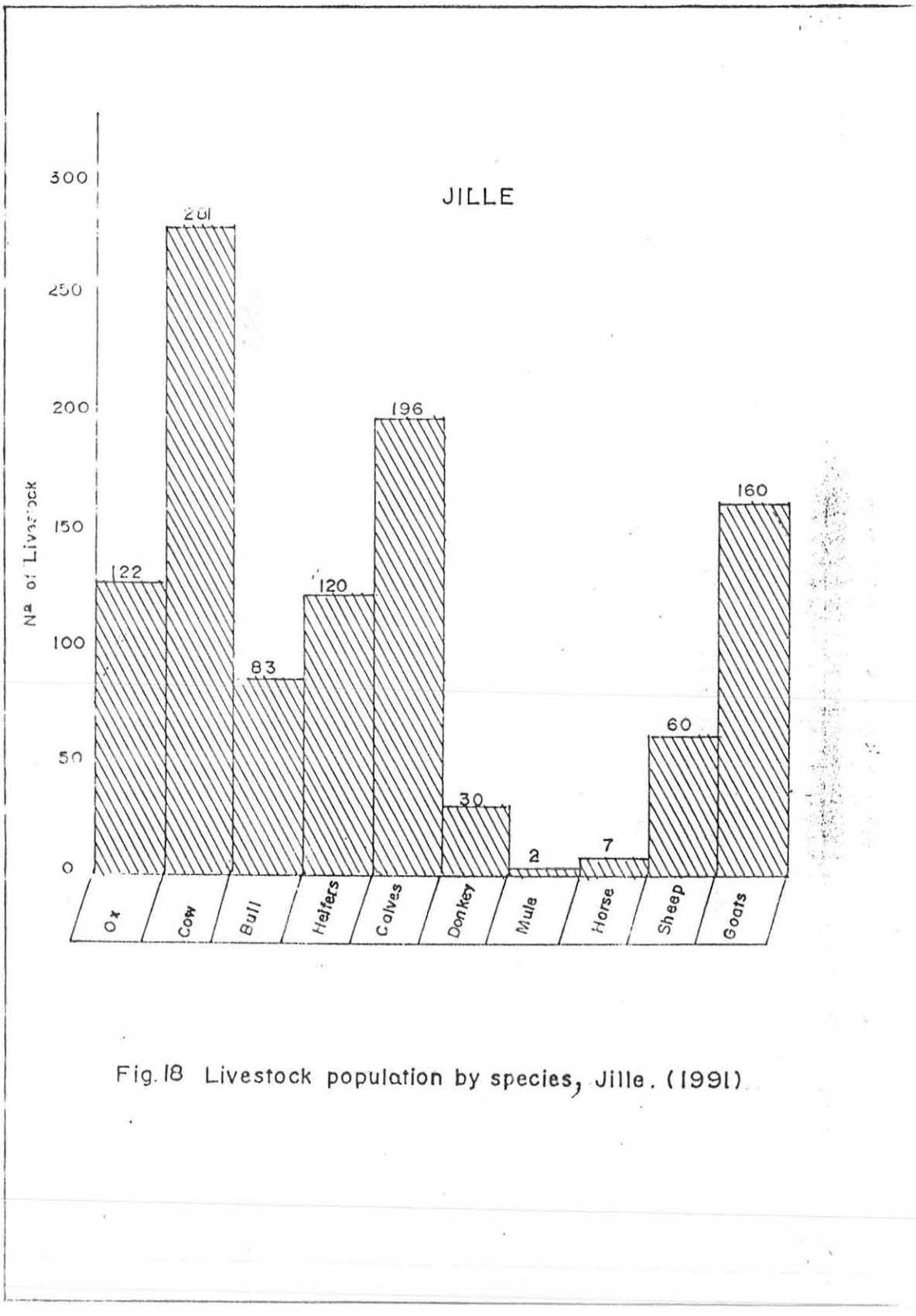


Fig. 18 Livestock population by species, Jille. (1991)

Jille exceeded that of the Gurage, the writer's expectation was accepted.

In addition, the calculated Chi - square for male cattle (Bull and ox) was found exceeding the criteria value at alpha 0.05 level (X2cal 2.5616 > x2tab 1.645). This indicates the existence of significant variation in the number of male cattle owned by the social groups. Since the proportion of the male cattle owned by the Gurage farmers significantly exceeds that of the Jille, the hypothesis that "the Gurage farmers have more male cattle than the Jille" was accepted.

Table 27. Chi - square Test Between Herd Composition and Holdings by The Gurage and Jille Farmers.

Herd Composition	Gurage Act.	Exp.	Jille Act.	Exp.	Column Total	
Bull and ox	255	(221.7)	205	(228.3)	460	x2cal=2.5616
Cows & halfers	366	(388.3)	401	(380.7)	767	x2cal=1.976
Sheep & goats	217	(220)	220	(216.9)	437	x2cal=0.396
Total	838		826		1664	x2tab=1.645

Source: Field Survey, 1991

The Chi-square test was also used to see if the number of female cattle (cows and heifers) owned by the groups was significantly different. Since the calculated value 1.976 exceeded the critical value of 1.645 at alpha 0.05 level, the hypothesis that "the Jille farmers have more milk cows and heifers than the Gurage farmers" was accepted. It seems that the Jille own significantly more female cattle than the Gurage (see Table 27).

By contrast, the Chi- square value for sheep and goats does not indicate the existence of statistically significant variation in holdings of the two groups. The calculated Chi - square value 0.329 was lesser than the tabulated value (1.645) at alpha 0.05 level. As a result the hypothesis that "the number of sheep and goats would be higher among the Jille farmers than among the Gurage" was rejected.

3.3.5.2. Animal Feed and pasture Resources.

The farmers were also asked to identify the major type of feed resources for their livestock and they supplied the data shown on Table 28. The survey revealed that 56% of the Gurage livestock owners responded that they fed their livestock with pasture, while the remaining 44% depended on harvest residues. Similarly 53% of the Jille livestock owners responded that they fed their livestock with pasture while the remaining 47% depended on harvest residues.

Table 28. Major Feed of Livestock In The Gurage and Jille Areas of Dugda.

Feed resource	Gurage		Jille	
	No.	%	No.	%
Pasture	49	56	50	53
Stalk	39	44	44	47
Total	88	100	94	100

Source: Field Survey, 1991 (based on livestock owner households).

The writer also held informal discussion with the farmers to try to identify the seasons during which the farmers relied on these feed resources. The replies of the Gurage and Jille farmers suggest that they depended on crop residues for only a short period, between the months of October and December, i.e. between the post harvest and beginning of the ploughing period. For the remaining part of the year they relied heavily on the available pasture, either within their own locality or found elsewhere. This actually involved migration following different seasons of the year out side their respective residential places.

Table 29 revealed that migration to find pasture is more important among the Jille than the Gurage. According to the data, 27% of the Gurage livestock owners migrated to different

localities while the remaining 73% were fixed. By contrast, 63% of the Jille livestock owners migrated to several localities while the remaining 37% did not migrate. The main reason why the Gurage and Jille livestock owners migrated was due to lack of pasture (feed resource) either during the bega (dry) or kremt (summer) seasons of the year. In addition when both the Gurage and Jille farmers were asked to identify the main seasons of migration and the respective places of destination,

Table 29. Proportions of The Migrating Gurage and Jille Livestock Owners

Proportions of migrants	Gurage		Jille	
	No.	%	No.	%
Migrating owners	24	27	59	63
non- migrating	64	73	35	37
Total owners	88	100	94	100

Source: Field Survey, 1991 (based on livestock owner households).

they supplied the data displayed on Tables 30-32. As shown on Table 30, the major migration season in both the Gurage and Jille area was the kremt (summer) season. The data indicates that no Gurage livestock owner was found migrating during the bega (dry) season, while the Jille used to migrate during the two seasons. Hence, 24% of the Gurage livestock owners migrate

Table 30. Proportions of The Gurage and Jille Livestock Owners Migrating During Different Seasons.

Seasons of migration	Gurage		Jille	
	NO.	%	No.	%
Bega	-	-	12	13
kremt	24	27	47	50
Total	24	27	59	63

Source: Field Survey, 1991 (based on 88 Gurage and 94 Jille animal owners)

during the kremt (summer) season only. By contrast, 50% of the Jille animal owners migrated during the kremt (summer) season while the remaining 13% during the bega (dry) season. The data on Table 31 suggests that the Gurage migrants kept their animals for 5 months at the kremt pasture areas, while the Jille herders kept their animals for 4 months both at the bega (dry) and kremt (summer) season pastures (see Table 32).

Furthermore, Table 31 and 32 show the origin and destination places of the sampled migrant Gurage and Jille farmers during the different seasons of the year, and the relative location of these places is displayed on Figure 19. As shown on Table 31, 67% of the sampled Gurage livestock owners migrated mainly to Udma, an extensive bush land and

Table 31. The Origin, Destination and Average Distance Travelled by The Gurage Migrants During The Kremt Season.

Origin (PAS)	Migrants No.	%	Destination	Average time distance	Average duration month
Yebichana Kusay	2	8	Udma	1.50hr	4.50month
Joro Reka	1	4	Udma	3 hrs	4
Wudesha	3	12	Lake region	2.3	5.7
	4	17	Udma	1.5	5
Gedilala	4	17	Ombolle	2	5.25
	9	38	Udma	2	4.3
	1	4	Lake region	6	3
Total	24	100		2	5

Source: Field Survey, 1991 (based on the kremt migrating animals owners).

belt found along the bank of Meki river, while 17% and 12% of them migrated to Ombolle and the Lake region, respectively. The maximum time/distance travelled by the herders was 6hrs (i.e., from Gedilala PA to the Lake Zway region) while the minimum was 1.50 hrs (from Yebichana Kusay and Wudesha PAS to Udma). The average time/distance that the Gurage herders travelled was estimated at 2 hrs. At Udma the Gurage farmers

stayed for an average of 4.50 months, while those who settled at Ombolle and near the Lake Zway region for 5 and 4.5 months, respectively.

On the other hand, Table 32 revealed that the Jille farmers migrated both during the bega (dry) and kremt (summer) seasons. During the bega (dry) season the Jille livestock owners migrated to near the Lake Zway region. The Maximum time/distnace travelled by the herders was 6hrs (i.e., from Gusal to the Lake region), while the minimum time/distance was 2hrs (i.e., from Badegosa to the Lake region). The average time/distance that the herders travelled was 4hrs. At the Lake region, the Jille farmers stayed for an average of 4 months. During the kremt (summer) season, the majority of the Jille

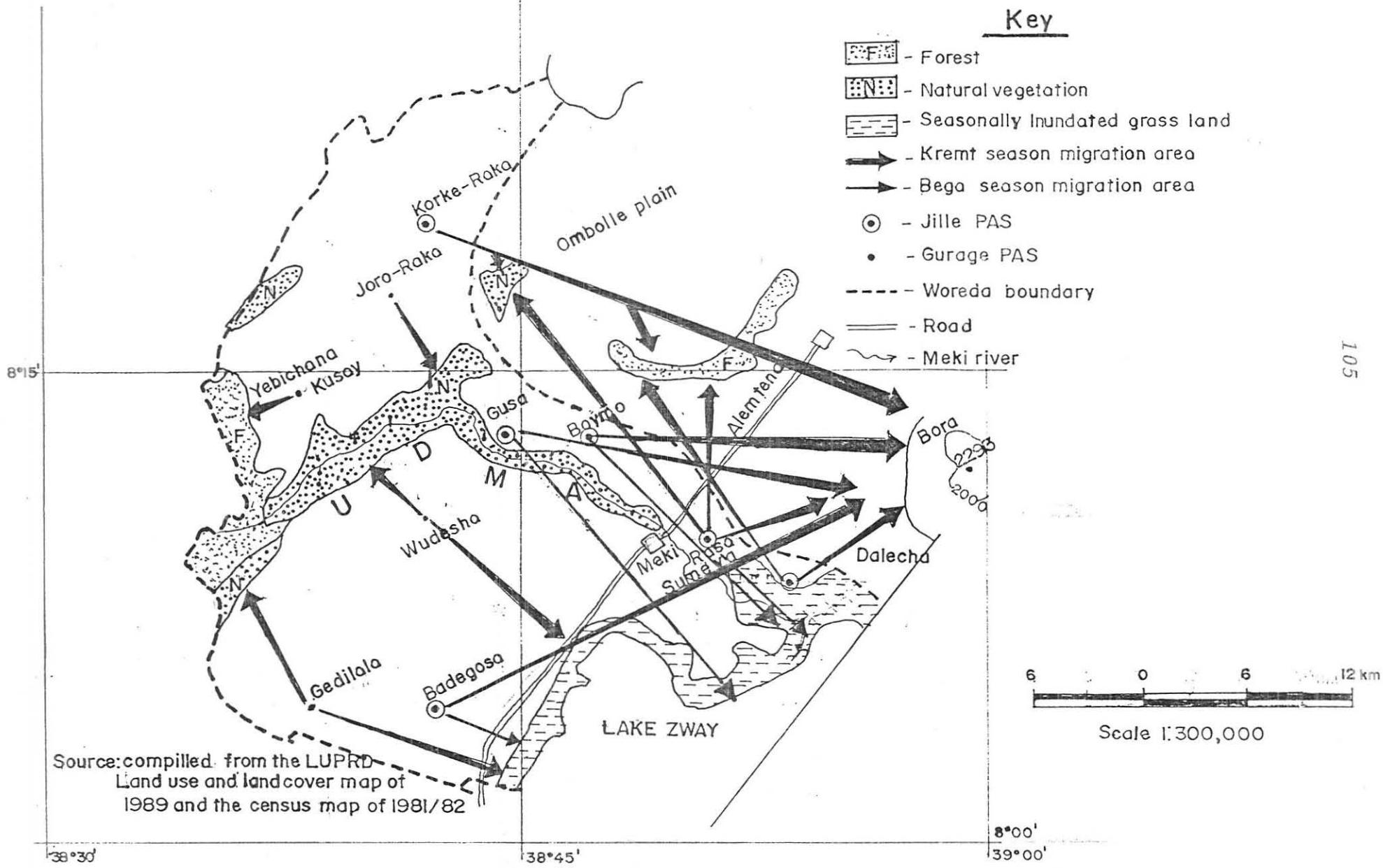
Table 32. The Origin, Destination and Average Time/Distance Travelled by The Jille Migrants During Two Seasons.

Seasons	Origin (PAS)	Migrants No.	%	Destination	Average time distance	Average duration month
	Badegosa	5	42	Lake	2	2
Bega	Gusa 1	1	8	Zway	6	3
	Boymo	5	42	region	4.6	4.4
	Rasa Suyman	1	8		4	7
Total		12	100		4	4
	Badegosa	6	10	Bora	6	4.2
Kremt	Gusa	2	3	Bora	3	4
	Boymo	3	5	Bora	3.7	5.3
	Rasa Sumeya	5	9	Bora	2.6	3.2
		2	3	Alem tena	2	6
		1	2	Ombolle	4	2
	Korke Reka	5	9	Bora	6	4
		9	15	Alem tena	3.2	5
		7	12	Ombolle	3	4.4
	Dalecha	16	27	Bora	3.2	3.2
		3	5	Ombolle	5	3
Total		59	100		4	4

Source: Field Survey, 1991 (based on 71 migrating animal owners).

herders (64%) migrated to Bora highland, while 18% of the animal owners migrated to Alem tena and Ombolle plains,

Fig. 19 The origin and destination of the Gurage and Jille migrants during the Bega & Kremt seasons



respectively. The maximum time/distance travelled by the Jille herders was 6 hrs, (i.e., from Korke Reka and Badegosa to Bora highland), while the minimum was 2 hrs (i.e., from Rasa Sumeyan to Alem tena area). The average time/distance travelled by the Jille herders to Bora was 3.6 hrs, while those who migrated to Alem tena and Ombolle plains travelled for an average of 2.6 and 4 hrs, respectively. At Bora the herders stayed for an average of 4 months while others stayed for 5.5 and 3 months at Alem tena and Ombolle plains, respectively. Generally, the overall average time/distance travelled by the Jille farmers during the Kremt season was 4 hrs. This suggests the absence of significant variation in time/distance travelled by the Jille farmers during the bega and kremt seasons. Furthermore, the Comparison of the average time/distance travelled by the Gurage and Jille herders during the kremt season revealed that the Jille's travelled for distant place than the Gurages.

CHAPTER FOUR

4. FARMERS' PERCEPTION OF PROBLEMS, MANAGEMENTS AND ATTITUDES TOWARDS DIFFERENT LAND USE

Success in farming is greatly influenced by the farmers' understanding of their environmental resources. Lado, for example, stressed that many of the agrarian problems experienced by Sudanese farmers arise from environmental uncertainties, the timing and severity of which can not be fully predicted (Lado, 1988:45). This also seems to be true in Dugda, where a variety of environmental problems are perceived by most farmers. In order to identify and understand the most prominent agricultural and environmental problems in the Jille and Gurage areas the writer interviewed some 200 farmers using structural questionnaire. The farmers of each social group were asked to indicate the present condition of their major natural resources and to identify and rank the magnitude of the problems they experienced in relation to these resources. In addition informal discussions were also held with farmers, knowledgeable men and elder people which have yielded valuable information on the drought prediction and management strategies of the farmers of Dugda.

4.1. Perception of The Present State of Natural Resources

4.1.1. Forest/Bush Resources

When the farmers of the Gurage and Jille Communities were asked about the present state of the major natural resources (forest, soil and pasture) they supplied the data shown on Tables 33-35. As shown on Table 33, 56% of the Gurage farmers indicated that the forest in their locality was depleting, while 42% of them felt that the forest resource had already been depleted. By contrast, 50% of the Jille farmers indicated that the forest resource had already been depleted while only

38% of them said that it was depleting. Informal discussions with local elders in both communities were also undertaken inorder to identify the underlying causes of deforestation and its recent historical evolution. These discussions indicated that charcoal making was the major cause for the degeneration of the forest resource of Dugda district as a whole. This process seems to have taken place between the 1950's and mid 1970's by which time most of the wood resource had been removed, without regeneration. In addition, to charcoal

Table 33. The Present State of Forest Resource as Perceived by The Gurage and Jille Farmers

Present state	Gurage		Jille	
	No.	%	No.	%
Stable	2	2	13	12
Depleting	50	56	42	38
Depleted	38	42	55	50
Total	90	100	110	100

Source: Field Survey, 1991.

burning, the expansion of cultivation was reported as the other major cause for the degeneration of bush vegetation in the respective localities. More recently, especially in the Jille area, the cutting down of trees seems to have been increasing, following the 1985/86 drought period. Many of the Jille lost their livestock during this period and they appear to have started to rely on the sale of wood as a source of income especially in the summer season.

4.1.2. Pasture Resource

Regarding the pasture of their locality 81% of the Gurage responded that it was depleting and 12% of them indicated that it had already depleted. By contrast, 61% of the Jille farmers indicated that the pasture in their locality was depleted and 33% of them responded that it had already depleted. This reduced availability of pasture is presumably due to increases

Table. 34. The Present State of Pasture Resources as Perceived by The Gurage and Jille Farmers

Present state	Gurage		Jille	
	No.	%	No.	%
Stable	6	7	7	6
Depleting	73	81	67	61
Depleted	11	12	36	33
Total	90	100	110	100

Source: Field Survey, 1991.

in the size of cultivated area from one year to another, the rate being higher in the Gurage area than in the Jille area (Fig.9)

4.1.3. Soil Resources

Seventy percent of the sampled Gurage farmers responded that the soils of their locality were moderately eroded while 28% indicated that they were not eroded. On the other hand, 62% of the Jille responded that the soil in their locality was

Table. 35. The Present State of Soil Resource as Perceived by The Gurage and Jille Farmers

Present state	Gurage		Jille	
	No.	%	No.	%
Not eroded	25	28	68	62
Moderately eroded	63	70	40	36
Highly eroded	2	2	2	2
Total	90	100	110	100

Source: Field Survey, 1991.

not eroded, while 36% responded that it was already moderately eroded. This suggests that soil erosion is not a prominent problem in both the Gurage and Jille communities of Dugda.

4.2. Farmers' Perception of Major Agrarian and Environmental Problems

When the Gurage and Jille farmers were asked if they faced environmental problems, 98% of the Gurage and 91% of the Jille responded yes and they emphasized the problems listed in Table 36. Of the perceived problems in the Gurage

area the two most significant were crop attacks by wild animals (98%), rainfall variability (94%), lack of land and water (88%), and crop diseases (86%). Weeds (4%), declined in

Table 36. Major Agricultural and Environmental Problems Perceived by The Gurage and Jille Farmers

Major problems	Gurage N = 90		Jille N = 110	
	NO.	%	No.	%
Decline in soil fertility	4	4	4	4
Rainfall variability	85	94	100	91
Crop attacks by animals	88	98	92	84
Human disease	53	59	64	58
Livestock disease	15	17	26	24
Crop disease	77	86	71	65
Weed	4	4	7	6
Shortage of land & water	79	88	96	87

Source: Field Survey, 1991.

soil fertility (4%) and livestock diseases were the least commonly cited problems in their localities.

By contrast, rainfall variability (91%), shortage of land and water (87%) and crop damage by wild animals were the most widely perceived problems in the Jille area, while decline in soil fertility (4%) and weeds (6%) were the least commonly cited problems. Once these major problems had been identified, the writer held detailed discussions with the farmers of each social group to try to determine the nature and magnitude of each problem and the results are reported below.

4.2.1. **Crop damage By Animals**

Except for hippopotamus (Ropi) which is a pest only in the Jille area, wild pigs (Golja), porcupines (Tede), monkeys (Zinjero) and Gazelles (Dikula) were the most frequently perceived and reported animal pests in both communities. In the Gurage areas monkeys (Zinjero) were cited as a number one animal pest (91%), followed by Porcupines (84%) and wild pigs (75%).

Table 37. Major Crop Damaging Wild Animals Identified by The Gurage and Jille Farmers.

Type of wild animals	Gurage N = 90		Jille N = 110	
	No.	%	No.	%
Wild pig (Golja)	66	75	77	84
Porcupine (Tede)	74	84	74	80
Monkey (Zingero)	80	91	46	50
Gazelle (Dikula)	12	14	17	19
Hippopotamus (Ropi)	-	-	17	19

Source: Field Survey, 1991.

In the Jille area, however, wild pigs (Golja) were cited as most common animal pest (84%), followed by porcupines (80%) and monkeys (50%). Although its occurrence was limited to the Lake area, the crop damage by hippopotamus was very serious in Dalecha PA in the Jille area.

The effect of these pests on crops was reported to be greater in the distant fields and less in fields closer to the settlements. The farmers also reported that the damage caused by wild pigs (Golja), porcupines (Tede) and hippopotamus (Ropi) was higher during the night than during the day. In order to reduce the damage caused by wild animals, the farmers repeatedly plant the fields closest to the habitats of the wild animals with a crop which is less liable to animal damage.

4.2.2. Climatic Problems

The farmers of each social group were asked to identify

Table 38. Climatic Problems Perceived by The Gurage and Jille Farmers

Climatic problems	Gurage N = 85		Jille N = 100	
	No.	%	No.	%
Drought	72	85	98	98
Flood	-	-	-	-
Wind	29	34	44	44
Frost	-	-	-	-

Source: Field Survey, 1991

and rank the major climatic problems in their respective localities and they supplied the data shown on Table 38.

In both communities, drought and wind were identified as a major climatic problems, while flood and frost hazards were non existant. In the Gurage area drought was cited as the number one hazard (85%) with wind as a secondary problem (34%). In the Jille area drought was perceived as the major climatic problem (98%), followed by wind (44%). Although drought was perceived as the most significant hazard, the two social groups differ in their experiences, its effect being especially severe on Kolla plains, which is predominantly occupied by the Jille.

The wind problem was ranked as the second climatic hazard by both groups of farmers. The farmers reported that speedy wind removes moisture from the surface and as a result the planted crops first become pale and later dried, following the increasing removal of moisture.

4.2.3. Shortage of Land and Water

Shortage of Land and water was indicated as the third most significant problem in the Gurage area. Fifty percent of the Gurage farmers indicated that they lacked sufficient pasture for their livestock, and 27% of them stressed their lack of sufficient land for cultivation. Even more of the Jilles (81%) responded that they lacked sufficient pasture while only 6% indicated the inadequacy of their cultivated area.

Besides the problem of inadequate land resources; water availability is also a serious problem during the bega (dry) season in those localities that are situated far from the Meki River and Lake Zway. During the bega (dry) season 80% of the

drought. During the survey, 36% of the farmers in the Jille area had no ox, while 30% had only a single ox. Generally 66% of the Jille farmers did not have a complete team of oxen. By contrast, only 9% of the Gurage households had no ox, while 20% owned a single ox. Hence, 29% of the Gurage households had no a complete team of oxen. Majority of the Jille farmers that lack oxen get rid off their problems by changing labour for oxen, while the Gurage farmers get over their lack of oxen by means of renting.

4.2.5. Biotic Problems

These problems include the diseases which affect the human, animals and crops of the study area.

4.2.5.1. Human Disease

The data on Table 40 shows that each of the 58% Of the Gurage and Jille households mentioned the existence of diseases in their localities while the remaining 42% did not mention. The most frequently mentioned health problems in the Gurage households were malaria (62%) and coughs (38%). The Jille farmers indicated that coughs were their major health problems (55%), followed by malaria (38%) and meningitis (7%). During the survey period the writer came across a number of sick people who had to travel long distances for treatment in Meki town. Except one PA in the Gurage area, (Yebichana Kusay)

Table 40. Types of Diseases Affecting The Gurage and Jille Households

Type of disease	Gurage		Jille	
	No.	%	No.	%
Malaria	32	62	24	38
Cough (Kufa)	20	38	35	55
Meningitis	-	-	5	7
Total	52	58	64	58

Source: Field Survey, 1991 (based on % of farmers mentioned disease).

none of the 3 sample PAS had a clinic. It was, therefore common to see two to three sick people loaded on a single donkey going to Meki for treatment. Hence, beside carrying water, wood and other goods, donkeys also provide an "ambulance" service for sick people of Dugda.

4.2.5.2. Animal Diseases

In addition to such human health problems the farmers also reported the prevalence of several livestock diseases. The data on Table 41 revealed that 17% of the Gurage and 24% of the Jille households emphasized the existence of animal disease in their localities, while the remaining 83% the Gurage and 76% of the Jille did not emphasized. This indicates that animal disease was more widely perceived as a problem in the Jille area than in the Gurage area. In the Gurage area, for example, twp types of livestock diseases were identified. Of those Gurage farmers who mentioned the existence of animal diseases, 80% of them perceived Rinderpest (Desta) as the number one livestock disease, while the remaining 20% cited blackleg (Aba Gorba) as a secondary problem. In the Jille area the number of serious livestock diseases mentioned by farmers was twice the number mentioned in the Gurage area. The predominant disease among the Jille was Anthrax (Aba Senga) (46%), followed by blackleg (Aba Gorba) (31%). In addition to these two types 19% of the Jille farmers mentioned an unknown disease. These animal diseases basically attacked cattle e.g. ox, cow, bull and heifers. Although its effect on livestock is very minimal, the Jille farmers have indicated the existence of tse-tse fly around the Lake region, especially during the kremt (summer) season. Regarding the veterinary service, except the one provided by the MOA Centered at Meki, there is no a single service centre found within the reach of the rural

Table 41. Types of Diseases Affecting The Livestock Resources of The Gurage and Jille Farmers

Type of disease	Gurage N = 15		Jille N = 26	
	No.	%	No.	%
Anthrax (Aba Senga)	-	-	12	46
Blackleg (Abe Gorba)	3	20	8	31
Rinderpest (Desta)	12	80	11	4
Unknown/unnamed	-	-	5	19

Source: Field Survey, 1991.

population. However, the actual number of farmers that use veterinary service at Meki were not well known. Likewise the economic impact of these diseases and how the farmers try to control the problems were not discovered during the survey.

4.2.5.3. **Crop Diseases**

In addition to these animal diseases the Gurage and Jille farmers also identified the prevalence of different types of crop disease in their respective localities. The data on Table 42 shows that 86% of the sampled Gurage and 65% of the Jille households mentioned crop diseases, while the remaining 14% of the Gurage and 35% of the Jille did not mention. This indicate that crop disease is more of problems in the Gurage area than

Table 42. Types of Crop Attacking Disease in The Gurage and Jille Areas

Type of crop disease	Gurage No = 77		Jille No = 71	
	No.	%	No.	%
Geri	3	4	2	3
Kurtitu	2	3	14	20
Agurtuma	31	40	11	15
Wag	41	53	44	62

Source: Field Survey, 1991

in the Jille area. In the Gurage area, Wag was cited as the number one crop disease (53%), followed by Agurtuma (40%), Geri (4%) and Kurtitu (3%). In the Jille area Wag was also indicated as the most significant problem (62%) followed by

Kurtitu (20%), Agurtuma (15%) and Geri (3%). According to the interviewed farmers Wag attack all crops indiscriminately, while Agurtuma and Kurtitu are diseases of pulses and maize, respectively. Nonetheless, the economic impact of these diseases and the method used by the farmers to avoid the problem were not discovered during the survey.

4.3. The Traditional Drought Prediction Methods of The Gurage and Jille farmers

The perception of drought as a hazard is the result of individual and the group perceptions of all the components of the physical, economic and cultural environment. The perception of drought also depends up on its severity, expressed interms of losses, frequency and past experiences. Drought prediction thus depends on the personal characteristics of an individual, his age, level of education, religious beliefs and occupation, which inturn are modified by group norms, institutions and historical experiences (Desalegn, 1989:33; Knutson, 1967:44).

During the survey an attempt was made to assess the perception of drought by the Gurage and Jille farmers of Dugda. Each sample farmer was asked about his drought experiences, the severity of the problem and the traditional methods of prediction he used to foresee the occurrence of the event. In addition, extensive conversations were held with two locally renowned forecasting experts (i.e., Sooth- Sayers).

The farmer interviews revealed that, although the problem of drought had affected all the population of the district, it was most severe in the Kolla plain which is predominantly occupied by the Jille. For the Gurage farmers drought seems to mean nothing other than the untimely occurrence of rain (later or early arrival). According to the Gurage farmers interviewed

by the researcher the late arrival of rain never prevented them from growing the late sown crops such as Chick pea (see Fig. 6 above). Moreover when they were asked about the occurrence and severity of late rains in the past, they could not readily recall severe periods. They were most familiar with the problem of 1984/85, when most of their crops were damaged by the erratic nature of the rainfall. Significantly none of the Gurage farmers indicated that they used traditional drought prediction methods. Instead they indicated that the use of such methods was the exclusive practice of the Jille farmers of the district.

In contrast to the Gurages the elders of the Jille community were more familiar with the climatic events of previous decades. They could trace the occurrence of drought back to the mid 1880's. According to one such elder Ato Dori Dalecha, Jille soothsayer, the most remarkable drought in their locality was in 1916-1918. It is known locally as the "Bere-Honge" (meaning period of empty hands). He noted that because of a complete absence of rain for two years many people and animals died. In subsequent decades, drought were recalled for 1962/63, 1984/85 and 1989/90. Of these, the drought of 1984/85 was remembered as the most striking, its effect being more severe on the Jilles crops than on their animals. During 1984/85 rainfall came very late (in September), allowing the growth of grass and other vegetation for livestock, but it resulted in the complete absence of crop production. As a result many Jille households were forced to sell their animal assets to buy grains. As a result the price of livestock fell drastically while there was a corresponding rise in the price of crops. For example, the price of an ox was 60 Eth. birr, while a bundle of ensete was sold for the

same price. In the following year, when the crop situation improved the animal gross price ratio returned to normal and as a result many households who had previously sold their animals could not earn enough from their crop sales to rebuild their herds.

Unlike the Gurage farmers, the Jille farmers use several traditional methods of drought prediction. The methods can be grouped into two: those used/known by every member of the community and those known only by a few knowledgeable elders. The methods used by most Jille farmers are crude environmental indicators that enable them to evaluate the forthcoming weather conditions. The other methods known only by local specialists are more complex and involve historical and astrological elements. Each of these methods are summarized below.

4.3.1. Weather Prediction Methods Used by Most Jille Farmers

4.3.1.1. Bird Songs

Most Jille farmers appear to be aware of the songs of certain birds that indicate the impending, arrival of rain. According to the Jille some birds such as the "Humo," Fu-du-de" and "Tilisa" sing only when rainy days are approaching. The Jille farmers believe that these birds are good indicators either of the occurrence or the complete absence of rain during the expected season. They told the writer that the rains have never failed when these birds were singing. By contrast if these birds fail to sing during the rainy season, the farmers predict the late arrival or complete absence of rain. This environmental indicator is still widely used by most Jille farmers.

4.3.1.2. Temperature Conditions

This was also cited as an important indicator of the arrival of rain. Jille farmers feel that when the temperature becomes usually hot, sweeting and suffocating it indicates the commencement of rain sooner or later.

4.3.1.3. Wind Direction

For the Jille, the direction of the wind can also indicate the arrival or the absence of rain during the rainy season. Usually the first rain is expected during January and early February. During these months, if the wind blows from south to north they expect it will bring rain. This wind is locally called Bomboletti. However, some of the farmers noted that not all winds blowing from south to north bring rain. During the above indicated months, if the wind reverse its direction and blow North to South, the farmers believe that the rain will not come on time and that the drought conditions can be expected.

4.3.1.4. Cattle Behavior and Appearance

The Jille also predict the future weather conditions by noting the condition of their livestock during different seasons of the year. For example during Kremt (summer), if the cattle drink too much water and have less appetite for pasture, and if they tend to urinate and defecate while sleeping the Jille believe that the coming season will be dry (they locally name it "Bona") and inhospitable. On the other hand, if the cattle refuse to drink and graze the dry pasture and look for wet leaves and if they tend to move towards the pasture areas instead of the Lake region, the Jille believe that the Kremt (summer) rains are about to come.

4.3.2. Weather Prediction Used by Community Experts

Unlike the above methods which are used by most Jille farmers some weather prediction methods are known only by a few individuals of the Jille community (e.g. Ato Dori Dalecha and Ato Tikse Tuchi). These experts were known by almost all the surveyed Jille farmers and were interviewed in depth by the writer. After spending a couple of hours with each of them the following valuable information was obtained.

Initially both of the Jille weather prediction experts were reluctant to explain the methods they used to predict the future, however, after telling the nature of the study they willingly described their methods. Each of the soothsayers specializes in different methods, although there seems to be some parallels in their approach. Ato Dori specializes in the use of a special calendar which pertains only to the Jille community, while Ato Tikse relies on the juxtaposition of the stars and the moon. Both of them told the writer that their methods are the most valuable techniques for forcasting the occurrences of various environmental, social and economic hazards in their communities. They also claimed that many oromo people used to come for as far afield as Arsi and Arsi Negele and Zway districts. They both noted that they inherited their specialist knowledge from their fathers and that no other member of the Jille community is familiar with the use of these methods, since they are restricted to their own family members.

4.3.2.1. The Jille Calendar

Ato Dori uses a well documented calendar to predict the future situation and to fix special ceremonial days, such as weddings and Gada celebrations for the Jille community. According to this calendar, every month has 27 days and each

day has a different name and characteristics. Out of these 27 days, 7 are considered as odd days, meaning any event taking place in one of these days is bad or unlucky. Of the remaining 20 days in the month two are identified as the best days for marriage while six as the best days for the celebration of various other social and cultural events. As a result the socio-economic and cultural life of many Jille families is influenced by their consultation of Ato Dori.

The counting of the days of each month is determined by looking at the position of the moon and the brightly glittering star. According to Ato Dori, every 27 days this star and the moon pass the night and they separate on the next day. In the Jille calendar this separation day becomes the first day of the month (called Hinika - an oromic word meaning divorce or separation).

This calendar is also used to predict the future weather conditions. According to Ato Dori if the first day of the Kremt (summer) rain takes place in one of the 7 odd days, then he has no doubt that the farmers should expect drought or erratic rainfall conditions. By contrast if the first day of the Kremt (summer) season happen to take place on one of the six best days then the coming season is expected to be good for the Jilles' crops and animals.

4.3.2.2. **Gada Ceremonies**

The Jille, like other oromo peoples, conduct Gada ceremonies every 8 years. Among the Jille there are five Gadas: Robelle, Birmeji, Melba, Mudana and Halchisa. Each Gada has its own distinct characteristics, which seems to based on the conditions which have been observed during the period of its celebration in the past. For example, the Robelle Gada celebrations are associated with periods of drought, famine

and poverty, where as Birmeji, Mudana, and Halchisa are known as the Gadas of plenty, while Melba is a Gada of war. Therefore when the time comes to celebrate the Robelle Gada (every 40 years) the experts predict that drought, famine and poverty will prevail. For example, according to Ato Dori, the drought and famine periods of 1922/24 - 1925/26 and 1962 took place during the Robelle Gada. This Gada is also expected to be celebrated again during the 1992/93 - 2000/2001. The use of Gada calendar as an indicator of hazards is, therefore, cyclic in nature

4.3.2.3. The Position of The Stars and The Moon.

Ato Tikse Tuchi's soothsaying relies heavily on reading the position of the stars and the moon. According to him every 27 days a bright star and the moon pass the night together. On the 28th day (separation day) if the star passes on the right side of the Moon, then the coming season is expected to be good for the Jille crops and animals. On the other hand, if the star passes on the left side of the moon, then the season is expected to be problematic for cultivation.

4.4. The problem Management Strategies of The Gurage and Jille Farmers

4.4.1. Drought Management Strategies

Drought was perceived as number one climatic hazard both by the Gurage and Jille farmers of Dugda district. Although the magnitude of the problem varies, its effect on crop production in recent years has been significant. The Gurage and the Jille farmers, however, have adopted different strategies to cope with the problem and its consequences. The Gurage farmers, for example, have relied on the reploughing of fields as a strategy against the late arrival of the rains. This technique is used when the farmers suspect that moisture

stress may affect their early sown crops, and when the rain is sufficient for their late sown crops. This strategy is still employed by 99% of the Gurage farmers.

The Jille, on the other hand, traditionally used different strategies to minimize the effect of drought (i.e., prior to their sedenterization). When they became aware of the arrival of a drought, they tend to change the balance within their crop- livestock economy by giving more emphasis to their animals (this usually involved migration with their livestock), thus giving much less attention to cultivation. However, in the post sedenterization period (since 1950's) only households with large herds have relied on this strategy. The majority of the Jille who have relatively small herds, have abandoned this strategy. Instead they also have started to replough their fields, following the practice of their neighbors, the Gurage farmers.

The research suggests that the Jille farmers are not familiar with soil moisture conservation technique such as mulching and ridging. Moreover their water management was found to be poor, compared to the Gurage farmers. In the Jille districts ditches are not prepared to accumulate **Kremt** (summer) rain for use by animals or humans. By contrast water storage ditches were observed in almost all the sampled (and adjacent) PAS of the Gurage area of Dugda.

Each group has also adopted ritualistic ceremonies to try to minimize the effect of drought hazards. The Gurage farmers, for example go to a church and pray and fasting for a couple of days. In doing so, they believe that the rains will commence at the required time. By contrast the Jille have adopted a quite different method. When the rainfall appears to be inadequate the older women of the community gather near the

bank of Meki River bringing with them empty milking utensils. The older men contribute money and buy cattle to be slaughtered during the ceremony. On the ceremonial day the cattle is slaughtered by the "Boku" - Gada leader, or by a person appointed by the community, near the bank of the River. In doing so the Jille believe that the rains will commence soon.

4.4.2. Disease Management Strategies

When both farmers were asked about control measures against pests and crop diseases almost all the farmers (100%) expressed the feeling that little could, infact, be done to counteract the prevailing hazards, since no pesticides or insecticides are found within their immediate reach. Likewise, no traditional control measure against these problems were detected by the writer during his interviews with the farmers.

4.4.3. Management of Animal Pests

The other major problem faced by the farmers of Dugda is the damage done by wild animals. In order to limit such damage to their crops, the farmers build small tukuls (locally known as Dereba or Mama) near to their distant fields. The males spend the night in these huts and light fires to deter visits by wild animals during the night time. In addition to this method, for example, the farmers also plant crops in distant fields that are not easily destroyed by these animal pests (see also section 4.2.1. above).

4.5. The Attitude of The Gurage and Jille Farmers Towards Different Land-uses

Generally 18 affirmative statements were developed to ascertain the current attitudes of the Gurage and Jille farmers towards cultivation and animal husbandry. Each of these statements was followed by two alternative choices,

Agree or Disagree, and every sampled farmer was asked to respond to questions. Those who responded "Agree" to the statement were valued 1, other wise zero. In order to examine the attitudinal variation between the groups the writer then employed analysis of variance (ANOVA) and the statistical significance of the results were tested using the F-test (see Table 43).

The ANOVA results suggest that the Gurage and the Jille farmers have no statistically significant attitudinal difference on 13 statements. The farmers of both groups have got strong attitude similarities on statements six, eight, nine, eleven, fourteen, fifteen, sixteen and eighteen closest to hundred percent agreement. In this case, 94% of the Gurage and 95% of the Jille farmers strongly agreed with the sixth and fifteenth statements which indicate the complementarity of cultivation and animal husbandry. This suggests that both groups view themselves as mixed farmers subsisting by crop cultivation as well as animal rearing.

In the case of statement eight (the economic gain from cultivation is higher than animal rearing) 74% of the Gurage and 81% of the Jille farmers strongly agreed, while the remaining 26% and 19% disagreed, respectively. This suggests the fact that livestock are not serving as a major source of income for the farmers and hence most of their income is based on the sale of crops. This is also supported by their responses to attitude statement nine, where 98% of the Gurage and 95% of the Jille have got a strong desire to grow more crops for sale.

Both farmers of the groups would seem to have a strong positive attitude towards the importance of manure. In this respect 98% of the Gurage and 93% of the Jille strongly agreed with statement eleven (manure increases soil fertility), while the remaining 2% and 7% of the farmers disagreed, respectively.

On statement fourteen (animal rearing is my favourite means of living) 55% of the Gurage and 57% of the Jille strongly agreed, while the remaining 45% and 43% of the farmers of each group disagreed, respectively. If pasture and water are plenty then both farmers would seem to prefer animal husbandry, this was again a choice consistent with the view of both groups that the risk involved in crop cultivation is higher than the risk involved in animal rearing in Dugda (see statement sixteen). These results, however, contradict with the recommendation made by the MOA planners. In their Land Evaluation Study of the Hykoch and Butajira **Awraja** in 1989, the planners have recommended stabilization of crop production through the introduction of short maturing varieties of maize, katumani, as a strategy in this part of the rift valley region. This recommendation arises from the aim to achieve self - sufficiency in staple food crops and the production of surpluses to meet Agricultural Marketing corporation target and to generate cash income throughout the **Awraja** (MOA, 1989 :129), and this recommendation failed to reflect the desire of the farmers. Therefore, these attitude scores suggest that both the Gurage and Jille farmers would seem to support a policy that emphasize more on animal husbandry than on cultivation, provided that the risk in crop cultivation remain unchanged.

On the other hand, both the Gurage and Jille farmers have got strong attitude similarities on five statements (e.g. third, fifth, seventh, twelveth and thirteenth) closest to hundred percent disagreement (see Table 43). On the third statement (if one knows his environs and could manage it the risk involved in cultivation is minimum), 81% of the Gurage and 78% of the Jille farmers strongly disagreed, while the remaining 19% and 22% of farmers of each groups agreed, respectively. This indicates that the risk involved in cultivation, due to environmental hazard, is always high in both the Gurage and Jille localities of Dugda district.

According to the ancient Jille traditions it was wrong to pierce the land with a hoe or a plough (statement five). But their current attitude towards this statement was reverted and almost all of them (96%) strongly disagreed like their neighbouring Gurage farmers. This suggests that their former nomadic life has been transformed (evolved) into sedentarized farming. This is also supported by their responses to attitude statements six and fifteen.

The farmers of both groups have got attitude similarity on statement seven (cultivators are less able to cope with life than herders) closest to hundred percent disagreement. Seventy eight percent of the Gurage and seventy seven percent of the Jille farmers strongly disagreed, having a view that cultivators are not less able to cope with life than animal herders. This is also supported by their responses to attitude statements eight and nine.

The farmers also strongly disagreed with attitude statements twelve and thirteen. In the case of statement

twelve (the continual use of input impair soil fertility), 84% of the Gurage and Jille farmers strongly disagreed, while the remaining 16% agreed, respectively. Likewise, 82% of the Gurage and 86% of the Jille strongly disagreed with statement thirteen (insecticide, pesticide and weed killer harm crops). These attitude results suggest that both farmers of the groups have got a strong positive attitude towards the importance of modern farm technologies.

Beside these, there are significant intra-group attitude differences on four statements. Among the Gurage farmers the differences was significant on statements two, seven, eight and fourteen, while among the Jille the difference was significant on the second, seventh, fourteenth and seventeenth statements. In the case of the second statement (cultivation involves higher risk than livestock rearing) 52% of the Gurage farmers disagreed with a view that the risk is minimum, while the remaining 48% viewed that the risk involved in cultivation is by far greater than the risk involved in animal husbandry. On the same statement, however, 63% of the Jille farmers strongly agreed, while the remaining 37% disagreed. This intra - group variation has resulted in a statistically significant attitude difference between the groups.

On the seventh statement (cultivators are less able to cope with life than herders) 78% of the Gurage and Jille farmers strongly disagreed, while only 22% of the farmers of each group agreed. In the case of the eighth statement (the economic gain from cultivation is higher than animal rearing) 74% of the Gurage farmers supported the statement while the remaining 26% viewed that economic gain from animal rearing is higher than from crop cultivation.

The most significant intra - group attitude difference was observed on statement fourteen (animal rearing is my favourite means of living). In this case 55% of the Gurage farmers have responded that they prefer animal husbandry to cultivation, while the remaining 45% prefer cultivation as their favourite means of living. Likewise, 57% of the Jille farmers have agreed with the statement, while the remaining 43% disagreed. This strong desire of the farmers for animal husbandry may be due to the higher risk involved in crop cultivation in their respective localities.

In the case of statement seventeen (over a period of time the risk involved in livestock rearing becomes great) 86% of the Gurage farmers have strongly agreed with the statement while the remaining 14% disagreed. Similarly 77% of the Jille have strongly agreed, while the remaining 23% disagreed. This intra - group responses have resulted in a statistically significant attitude variation between the groups.

In these attitude scores very surprising results were found between and among the groups of farmers. Initially the writer expected a statistically significant attitude difference between the Gurage and Jille farmers on statements three, five, seven, eight, fourteen, sixteen and eighteen. In the first case, because of their age-old farming experience the Gurage farmers were expected to have a developed environmental management strategies to minimize the risk in cultivation as compared to the recently sedenterized Jilles. However, they were not found to have significant strategies like their neighbouring Jille farmers.

In the case of the fifth statement (it is wrong to pierce the land with a hoe or plough), because of their nomadic life, majority of the Jille were expected to agree with the statement. However, 96% of the Jille strongly disagreed and they were found to have similar view with the Gurage farmers. As a result, no statistically significant result was obtained.

The writer also expected a statistically significant attitude differences between the Gurage and Jille farmers on statements seven and eight. In these respect majority of the Jille were expected to support that the economic gain from animal husbandry is by far better than cultivation. However, their responses to these statements have become similar with that of the Gurage farmers, indicating the importance of crop cultivation in the economic life of the farmers.

Other surprising results were found for statements fourteen, sixteen and eighteen. On these themes majority of the Gurage farmers, because of their age-old farming experience, were not expected to prefer animal husbandry as a means of living to cultivation. However, they would seem to have a similar view with that of their neighbouring Jille farmers.

On the other hand, the ANOVA, result suggest significant attitude variation on only five statements. The statements showing significant variation were the first, second, fourth, tenth and seventeenth (see Table 43). For the first statement (cultivation is the main stay of my existence) the calculated F-value (4.2324) exceeded the critical value of 3.89 at 0.05 level of significance, indicating the existence of a

statistically significant attitude difference between the two groups of farmers.

A similar result was also found for the fourth statement (cultivation is the main activity of the locality). These results reflect the fact that 100% of the Gurage farmers agreed with the statements one and four, indicating the higher emphasis on cultivation than animal husbandry among the Gurage farmers. Significantly 96% of the Jille households agreed to the statements while the remaining 4% disagreed. Because of their late sedentarization, the writer didn't expect such a support among the Jille farmers. Although majority of the Jille farmers strongly supported the statement, the 4% disagreement among the Jille suggests that the evolution of their farming system, i.e. from nomadism to sedentarism, is not yet fully completed.

Statistically significant attitude variation was found in the case of the second statement (cultivation involves higher risk than livestock rearing) since the calculated F-value (7.8554) exceeded the critical value of 6.74 at 0.01 level of significance. Sixty three percent of the Jille agreed, compared to only fourty eight percent of the Gurage. This suggests that cultivation is more risky in the Jille occupied **Kolla** zone than in the Gurage occupied **Woinadega** zone.

For the tenth statement (farm inputs increase yield) the calculated F-value (2.7679) exceeded the tabulated value of 2.73 at 0.10. level, indicating the existence of a statistically significant attitude difference between the groups. This result reflects the fact that 99% of the Gurage farmers agreed with the statement compared to 95% of the

Jilles, indicating the higher reliance on the use of farm inputs among the Gurage farmers than the Jilles.

Finally, statistically significant attitude variation between the groups was found for statement seventeen (over a period of time the risk involved in livestock rearing becomes great), since the calculated F-value 2.9114 exceeded the critical value of 2.73 at 0.10 level of significance. This reveals the fact that 86% of the Gurage farmers strongly agreed compared to 77% of the Jille, indicating that livestock rearing over a period of time becomes a greater problem more in the Gurage area than in the Jille area.

Moreover, these attitude results reveal the current land use practices as well as the future desire of the Gurage and Jille farmers of Dugda district. The Gurage farmers, since long ago, have been sedentary mixed farmers and have a strong positive attitude towards crop cultivation, use of modern farm inputs, marketing and animal rearing. They have a diversified land use pattern, a developed cropping calendar and good perception of their agrarian problems.

Although they have been sedentarized very recently majority of the Jille have a very strong positive attitude towards cultivation, modern farm inputs, manuring and animal husbandry. At present they have a distinct pattern of land use (often dominated by a single crop) around their settlement, a relatively developed cropping calendar, good perception of environmental problems and a traditional method of predicting the occurrence of drought.

Now a days the farming systems of both the Gurage and Jille farmers of Dugda is found on a subsistence level,

characterized by crop cultivation as well as animal rearing. However, the development of their farming system have been severely affected by the variability of climate and the problem have become more serious on crop cultivation than on animal husbandry, particularly in the Jille occupied **Kolla** zone than in the Gurage occupied **Woinadega** zone. Because of the higher risk involved in cultivation the farmers of both groups would seem to prefer animal husbandry to cultivation. This attitude result suggests to the MOA planners to reconsider their former land use recommendation, i.e. stabilization of crop production, in this part of the Rift Valley region. In the writer's view, therefore, the MOA planners should have to take into account the prevailing environmental constraints, farmers' traditional knowledge of their environment and their desire in order to formulate an appropriate land use policy in Dugda district in the future.

Table 43. ANOVA Results For The Attitude of The Gurage and Jille Farmers Towards Different Land-use

Attitude statements and percent of respondents				sum of square	mean square	F value
1. Cultivation is the main stay of my existence						
Gurage	Jille		Between	0.1020	0.1020	4.2324
Agree	100	96	within	4.7730	0.0241	**
Disagree	-	4	Total	4.8750		crv=3.89
2. Cultivation involves higher risk than livestock rearing.						
	Gurage	Jille	Between	1.9010	1.9010	7.8554
Agree	48	63	within	47.9190	0.2420	*
Disagree	52	37	Total	49.8200		crv=6.76
3. If one knows his environs and could manage it the risk involved in cultivation is minimum						
	Gurage	Jille	Between	0.0420	0.0420	0.2555
Agree	19	22	within	32.5530	0.1644	
Disagree	81	78	Total	32.5950		
4. Cultivation is the main activity of the locality						
	Gurage	Jille	Between	0.1020	0.1020	4.2324
Agree	100	96	Within	4.7730	0.0241	**
Disagree	-	4	Total	4.8750		crv=3.89
5. It is wrong to pierce the land with a hoe						
	Gurage	Jille	Between	0.2340	0.2340	1.9435
Agree	2	4	Within	23.8460	0.1204	
Disagree	98	96	Total	24.0800		
6. For a cultivator animal rearing should be complementary						
	Gurage	Jille	Between	0.0000	0.0000	0.0000
Agree	94	95	Within	10.3950	0.0525	
Disagree	6	5	Total	10.3950		

7. Cultivators are less able to cope with life than herders

	Gurage	Jille				
			Between	0.0010	0.0010	0.0057
Agree	22	23	Within	34.8740	0.1761	
Disagree	78	77	Total	34.8750		

8. The economic gain from cultivation is higher than animal rearing

	Gurage	Jille				
			Between	0.2070	0.2070	1.2014
Agree	74	81	Within	34.1130	0.1723	
Disagree	26	19	Total	34.3200		

9. Every farmer should be encouraged to grow more crops for sale

	Gurage	Jille				
			Between	0.0100	0.0100	0.3413
Agree	98	95	Within	5.8100	0.0293	
Disagree	2	5	Total	5.8200		

10. Farm inputs increase yield

	Gurage	Jille				
			Between	0.0930	0.0930	2.7679
Agree	99	95	Within	6.6620	0.0336	***
Disagree	1	5	Total	6.7550		crv=2.73

11. Manure increases soil fertility

	Gurage	Jille				
			Between	0.1260	0.1260	2.6638
Agree	98	93	Within	9.3740	0.0473	
Disagree	2	7	Total	9.5000		

12. The continual use of inputs impair soil fertility

	Gurage	Jille				
			Between	0.0030	0.0030	0.0221
Agree	16	16	Within	26.8770	0.1357	
Disagree	84	84	Total	26.8800		

13. Insecticide, pesticide and weed killer harm crops

	Gurage	Jille				
			Between	0.0850	0.0850	0.6444
Agree	18	14	Within	26.1100	0.1319	
Disagree	82	86	Total	26.1950		

14. Animal rearing is my favourite means of living

	Gurage	Jille				
Agree	55	57	Between	0.0340	0.0340	0.1374
Disagree	45	43	Within	48.9860	0.2474	
			Total	49.0200		

15. Animal rearing should be complemented by crop cultivation

	Gurage	Jille				
Agree	97	95	Between	0.0000	0.0000	0.0000
Disagree	3	5	Within	8.5950	0.0434	
			Total	8.5950		

16. Animal rearing is alright if pasture and water are plenty

	Gurage	Jille				
Agree	84	91	Between	0.2070	0.2070	1.9602
Disagree	16	9	Within	20.9130	0.1056	
			Total	21.1200		

17. Over a period of time the risk involved in livestock rearing becomes great

	Gurage	Jille				
Agree	86	77	Between	0.4370	0.4370	2.9114
Disagree	14	23	Within	29.7180	0.1501	***
			Total	30.1550		crv=2.73

18. Animal rearing should be encouraged in the future

	Gurage	Jille				
Agree	93	94	Between	0.0020	0.0020	0.0304
Disagree	7	6	Within	13.0180	0.0657	
			Total	13.0200		

Degree of freedom between = 1
within = 198
total = 199

* At 99% level of significance
** At 95% level of Significance
*** At 90% level of significance

CHAPTER - FIVE

5. SUMMARY AND CONCLUSIONS

5.1. Major Findings

The writer's assessment of the land use patterns of the Gurage and Jille farmers leads to several conclusions. The research indicated that the Gurage farmers have a larger holdings than the Jille farmers, the average holding per farmer for each group being 2.86 ha and 2.26 ha, respectively. The data show that 88% of the Gurage households have holdings between 2-5ha and the remaining 12% less than 2ha. No farmer has more than 5ha of land. By contrast, 57% of the Jille have holdings between 2-5ha, 41% of them less than 2ha, while the remaining 2% of the household own over 5ha. The findings indicate greater disparities in farm size among the Jille than among the Gurage farmers. However, the average holdings of the farmers of Dugda are much larger than the average farm and holdings found by the MOA's survey for most farmers of Ethiopia. This may be due to the fact that the data for Dugda were obtained through interview method and lack accurate field measurment.

The data also indicated that fragmentation is greater among the Gurage than among the Jille farmers, the average number of fields per farmer being 4.51 and 3.08, respectively. The findings indicated that farm fragmentation is greater among the Gurage farmers. Generally it is not normal for fragmentation to be greater in areas where farms are relatively big. However, local environmental variations (e.g. soil and topography) and crop patterns have encouraged fragmentation among the Gurage farmers. On the other hand, the absence of these variation might restricted fragmentation among the Jille farmers.

The research indicated that access to farm oxen is a very

farmers using these methods were very small compared to the total population. This was because of the absence of a significant soil fertility problem in the district. The use of manure in Dugda was not by transporting it to the field but by simply rotating the cattle enclosure on the fields where manuring is required. This finding doesn't validate the 1989 MOA report on the use of manure in Dugda district (see section 2.4.1 above). However, one exceptional case was found in one of the sampled Jille PAS, where a farmer transported a bulk of manure into the sandy and Gombore fields near his farm house for cultivating different types of fruits and vegetables.

The study also revealed that the land use of the Jille farmers is characterized by the dominance of a simple crop, maize. For the period, 1986/87 - 1990/91, maize accounted for an average of 57% of the total cultivated area, followed by tef (20%) and haricot bean (17%). By contrast, tef has been a dominant land use in the Gurage area (39%), followed by maize (25%) and wheat (13%). These figures suggest that the land use pattern of the Gurage farmers is relatively diversified than those of the Jilles, implying the minimum risk involved in crop failure. The data also indicated that no statistically significant variation was found in the number as well as crop type grown by the Gurage and Jille farmers. However, each group has got a distinct pattern of distance zonation which have been due to local environmental variation (mainly soils) as well as crop damaging beasts. In the Gurage area, peas and haricot bean were grown closer to the farm house, the former being within a distance zone of 15 minutes, while the later was within 22 minute. Maize was grown in the third zone (within 50 minutes), followed by wheat and chick pea in the

fourth zone (within 58 minutes). Tef was grown within a distance zone of 60 minutes, while sorghum and lentil within 66 and 76 minute, respectively. By contrast, peas and maize were grown closer to the farm house in the Jille area, the former being within a zone of 16 minutes, while the later was within 24 minutes. Barley was grown in the third zone (within 30 minute) followed by tef and haricot bean in the fourth and fifth zones, each being within a zone of 50 and 52 minute, respectively. Wheat was grown on distant fields within a distance zone of 71 minute from the farm house. In theoretical terms, therefore, this research have vindicated Ruthenberg's findings of land use in Eastern Africa, where local soil variation and topography have considerably influenced the cropping patterns of the farmers.

The farmers of each social group have identified various agrarian problems in their respective localities. The Gurage farmers identified crop damaging wild beasts as number one problem, followed by variability of rainfall and shortage of land and water. By contrast, the Jille cited climatic variability as a leading and critical problem followed by shortage of land and water, and crop damaging wild beasts. Beside these, crop, human and animal diseases were identified by both communities as significant problems.

In addition to their identification of problems, the Jille were found to use a developed and documented calendar as well as crude environmental indicator methods to predict the forthcoming short-term and long-term weather condition. Based on these traditional methods, when they became aware of the arrival of a drought, they tended to change the balance within their crop-livestock economy, by giving more emphasis to their

animals, thus giving much less attention to cultivation. This adjustment strategy is still employed by those Jille farmers who have larger flocks of herds. The writer failed to identify any other adjustment strategies either among the Gurage or the Jille farmers.

The research also suggests that the Jille farmers are not familiar with soil moisture conservation techniques such as mulching and ridging. Their water management was found to be poor, compared to the Gurage farmers. In the Jille district ditches are not prepared to accumulate summer rain for use by animal or humans. By contrast water storage ditches were observed in almost all the sampled PAS of the Gurage area of Dugda.

Moreover, the ANOVA results suggest that the Gurage and Jille farmers have a statistically significant attitude differences on only five statement. The farmers of both group appear to have a strong positive attitude towards crop cultivation and animal husbandry. The positive attitude of the Jille towards cultivation reveals that cultivation has become part of their economic life, indicating the evolution of the Jille's farming system from nomadism to sedentary mixed farming. However, because of the higher risk involved in cultivation, (mainly due to climatic variability,) both the Gurage and Jille farmers of Dugda would seem to prefer animal rearing to cultivation and tend to support a policy that emphasize on animal husbandry than on crop cultivation.

5.2. Conclusions

From the overall assessment of the land use pattern of the Gurage and Jille farmers the following conclusive points may be drawn.

Now a days both the Gurage and Jille farmers live by cultivating crops and rearing of animals. The research indicated that the Gurage appear to have a better farming experience, a developed agricultural calendar, a diversified land use pattern and a better economic status compared to the recently sedentarized Jilles. By contrast, the land use pattern of the Jille farmers was dominated by a single crop (maize), indicating the higher risk in crop failure because of either early or late arrival of rain. In the writer's view, therefore, the land-use planners should encourage the Jille farmers to diversify their cropping patterns inorder to minimize the risk in crop failure. In addition the Jille should be encouraged to grow high value crops, like tef, pepper and wheat, to increase their income level.

The research also indicated that in the Jille district drought has caused a severe damage on crop and animal resources sine 1984/85. At present farmers with few cattle and no ox are directly involved in selling fuel wood at Meki and along the Addis Ababa road to the users. This may leads to the complete deforestation of the Jille area of Dugda which may also extend into the Gurage area, thereby increasing the extent and frequency of drought. Therefore the writer recommended that the concerned government body (e.g. MOA) in collaboration with other non-governmental organizations should find ways and means (e.g. long term credit,) by which the ox-

less farmers could become owner of ox. Following this measure, strict control over deforestation should be undertaken through-out the district.

The prevention of the damage to crops by wild animals is more problematic in the Gurage area than in the Jille area. Although they are labour demanding, the traditional management strategies such as building blockades, chasing and trapping should be encouraged and improved. Therefore, assistance from the wildlife and conservation department and advice on preventing the problem may be useful.

For the prevailing health problems (human as well as animals) the establishment of health centres within the reach of the farmers may solve the problem. This actually requires money, educated personnels which may take a couple of years to be realized.

In Jille PAS where lack of water has been a critical problem the construction of wind pumps should be encouraged. In addition, the construction of ditches for the accumulation of summer rains should be encouraged among the Jille PAS, where there are no one, as a short term strategy to minimize water shortage for human or animal use. Other moisture conservation methods such as mulching and ridging should be encouraged to be used by the farmers of both groups to minimize moisture loss from their crop fields.

The study findings revealed that climatic variability (too little, inadequate or late rainfall) has caused serious problems for the Gurage and Jille farmers of Dugda district. The problem has become very critical on crop cultivation than on animal husbandry and this have resulted in changing the

balance within the crop-livestock economy of the farmers. Currently the Gurage and Jille farmers would seem to prefer animal husbandry to cultivation, because the risk involved in cultivation is higher than the risk involved in animal rearing. This implies that the long term trends in the Gurage and Jille farming system will greatly depend up on the climate of the district. Therefore, based on the farmers' drought experience and attitude results, the writer tends to suggest two alternative land use developments in the farming system of the farmers of Dugda.

1. If the climate of Dugda allows the growth of crops, then cultivation will become the main-stay for the Gurage and Jille farmers. If this will happen to take place, then the expansion of cultivated area to marginal areas (due to population pressure) will be inevitable, aggravating the scarcity of pasture and thereby reducing the number of livestock.

2. If the variability of climate continue to increase the risk in cultivation, then animal rearing will become the dominant land use of the farmers. In this regard, most of the cultivated area will remain fallowed thus increasing the extent of pasture for their animals.

Moreover, this study suggests to the land use planners to take into account the prevailing environmental risk, farmers' back-ground knowledge of the environment, culture and attitude inorder to formulate an appropriate land use policy in Dugda district.

5.3. Future Research In Dugda District

This study has covered only certain parameters and aspects of the land use pattern of the Gurage and Jille farmers of Dugda district. This indicates that other related studies which incorporate the physical as well as socio-economic aspects of land use can be carried out in the future. In this respect, it is recommended that a detailed investigation of the climate of the district should be undertaken to determine the future trend in the farming system of the farmers. In addition a detailed study of the various characteristic of the soils (e.g. depth, texture, structure and drainage) and its influence on crop yield should be carried out. Along with this the possible influence of the various socio-economic (e.g. fragmentation, number of farm oxen, distance from home, labour supply etc) and technological factors (e.g manuring, fertilizer, weed killer, insecticide and pesticide) on crop production/yield of the farmers should be investigated. Finally, it is recommended that a detailed study of land use dynamism, i.e. ecological degradation viz charcoal making and cultivation in the Jille occupied Kolla zone; and the attitude of the Jille towards irrigation and fishing should be carried out.

From his field experience, the writer would like to comment on the methodology involved in the study. In studying the land use pattern of the Gurage and Jille farmers of Dugda district both questionnaire and field observation methods were employed. It was found that questionnaire method alone doesn't provide adequate information as far as a detailed land use study is concerned. Infact it has other advantages in

providing comprehensive information on the demographic characteristics of a household, livestock resources and other socio-economic variables. However, the writer found field observation, particularly visit to each farm plot, as the best method to extract a very detailed and valuable land use information. Visits to each farm field, although it is a very difficult task, is very important to ascertain the approximate distance of the field from home, to know the size of the field and its land use history, to measure the physical characteristics of the field and its related problems. In addition, discussions with elder people is very important to know the previous land use history of the district, to identify the major environmental constraints and management strategies that the community have. Along with this, it is equally important to know the tribal language to comprehend the problem faced by the farmers. Therefore, it is strongly recommended that future land use studies should give more emphasis on field observation methods than on questionnaire method alone.

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19. Fill out the major land uses for this farm plot during the last five years and indicate the types of crops grown.

	1990/91	1988/89	1987/88	1986/87
Major Land use				
Types of crops grown				

code for major land use types.

1. Cropped 2. Fallowed 3. Pasture 4. Forest

5. Waste

20. Do you fallow your farm plots?

20.1. Yes ___ 20.2 No _____

21. If yes, what seem to be the major reason for fallowing the farms? (List reasons)._____

22. Are these fields fallowed more/less frequently than other? 22.1. Yes _____ 22.2. No _____

23. If yes, where are these fields found? _____

24. Why are some fields fallowed more/less than others? (List reasons). _____

25. How many growing seasons do you have in your locality in a year? _____

26. During the belg season, when do you normally

	month		month		month
a) Plough	_____	c) Weed	_____	e) Tresh	_____
b) Seed	_____	d) Harvest	_____	f) Market	_____

27. During the meher season when do you normally

	month		month		month
a) Plough	_____	c) Weed	_____	e) Tresh	_____
b) Seed	_____	d) Harvest	_____	f) Market	_____

28. During the belg season, what crops do you grow on this field? _____

29. During the belg season, how often do you plough for each crop? _____

30. During the belg season, how often do you weed for each crop? _____

31. What crops do you grow on this farm during the meher season? _____

32. During the meher season, how often do you plough for each crop? _____

33. During the meher season, how often do you weed for each crop? _____

34. Do you practice inter cropping on this farm plot?

    1. Yes _____ 2. No _____

35. If yes, what crops are grown intermixed in the same field.

    1. _____ _____ _____ ___

    2. _____ _____ _____ _____

    3. _____ _____ _____ _____

36. Has this field ever been fertilized in the past 1 to 5 years? 1. _____ 2. _____

37. If yes, what types of fertilizer did you apply? _____
_____

38. From where do you get chemical fertilizers? _____
_____

39. On what basis do you get fertilizers from these/this source? _____

40. How many bags of fertilizer did you buy last year? ____

41. For what crops did you apply fertilizer? _____

42. How much fertilizer did you apply on this plot? _____

43. If you haven't been using (or very rarely) fertilizer, the reason is _____
_____

44. Have you been using animal manure on this plot?

    1. Yes _____ 2. No _____

45. If yes, who is responsible for manuring the fields? __
46. If you haven't been using manure, list your reasons ___
_____

47. Do you have other sources to be used for fertilizing the soil? 1. Yes _____ 2. No _____

48. If yes, mention some of them 1. _____ 2. _____

3. _____ 4. _____ 5. _____

49. Have you been using selected (improved) seeds in the last 1 to 5 years on this farm? 1. Yes _____ 2. No __

50. If yes, what type of seeds did you grow? _____

_____

51. From where do you get improved seeds? _____

_____

52. On what basis do you get improved seeds from these/this sources? _____ _____ _____

53. If you haven't used improved seeds, the main reason is (List the reasons). _____

_____

54. Have you ever faced shortage of labour on this farm?

1. Yes _____ 2. No _____

55. If yes, during which activity do you face the problem?

_____

56. What are the main reasons for labour shortage? (List reasons). _____

_____

57. Have there been any environmental problems in/near this farm plot? 1. Yes _____ 2. No _____

58. If yes, what environmental problems have been significant in/near this farm plot. (List them in rank order).

1. _____ 4. _____

2. _____ 5. _____

3. _____ 6. _____

59. Have drought conditions affected your crops on this field ? 1. Yes _____ 2. No _____

60. If yes, what methods did you employ to minimize drought risks on your crops?

1. _____ 2. _____ 3. _____

4. _____ 5._____ 6. _____

76. If no, how do you (they) adjust to scarcity of pasture?

_____

_____

77. Do pasture problems are restricted to you or to most other farmers? _____

78. Is there competition with neighbors for pasture?

1. Yes _____ 2. No _____

79. If yes, where and when is the competition most severe?

_____

_____

80. How is competition/dispute regulated _____

_____

81. In your locality how many pasture seasons do you have

_____

82. Name each pasture season and describe its characteristics

Name of pasture season	Month Beg - End.	Intensity of grazing	Daily distance
1.			
2.			

83. Is there any seasonal pattern of livestock movement in your locality 1. Yes _____ 2. No _____

84. If yes, during which season do you start moving with your stock _____

85. If it is during bega season where you settle?

Name of the locality	Distance	Duration
1.		
2.		

86. If the movement is during the Kremt season where do you settle?

Name of the locality	Distance	Duration
1.		
2.		

87. Who moves with the livestock? (the males, the whole family) _____

88. What is the division of labour concerning livestock? (List tasks). Male _____
Female _____

89. What type of feed do you use for your livestock? (put in a rank order)

___ 1. Hay ____ 4. stalks left in the field after harvest

___ 2. Grazing land ____ 5. Grain concentrate

___ 3. Fallowed ____ 6. Other (specify)

90. Do you know of any ways in which you could improve the quality of your livestock ? Yes _____ No _____

91. If yes, list some of the most important methods you apply? 1. _____ 4. _____

2. _____ 5. _____

3. _____ 6. _____

92. Do you have any form of livestock slaughering ceremonies? Yes_____ No _____
1.
2.
3.

93. If yes, indicate the types of livestock slaughetered, the ceremonies, seasons and number of animals.

Types of livestocks slaughter	types of ceremonies	Seasons of slaughtering	No. of animals

94. What is the major source of your income? _____

_____ 1. Crop sale ____ 3. Labour sale

_____ 2. Animal sale ____ 4. Handicraft sale

95. If you depend on income from animal sale, which type of animals provide most income? (rank them)

_____ 1. Cattle _____ 3. hens

_____ 2. Sheep and goats _____ 4. Draft animals

96. Where do you prefer to sell animals (market names).___
_____

97. In which month do you sale animals? _____

98. Why do you sale animals? _____

99. To whom do you sale animals? _____

100. Do you get a favourable price for your animals?

1. Yes _____ 2. No _____

101. If you depend on income from the sale of handicraft products, when did you start to rely on it? _____

102. Why do you rely on this type of activity? _____
_____

C. Source of Water and Fuel.

103. Water for human and animal use: indicate by a tick and its distance from home; if more than one source are used rank the source by writing 1 for the most important, 2 for the second most important and so on.

Source of Water	Dry - Season			Wet - Season		
	Tick if used	Distance from home	rank	Tick if used	distance from home	rank
Spring						
stream/river						
Well						
Lake						
Pond/ditch						
Piped system						
other						

104. Who fetches water from its source? _____

_____ 1. Female only _____ 3. Children only

_____ 2. males only _____ 4. Females and children

105. How many time a day/a week the household fetches water from its source? _____

____ 1. Twice a day ____ 3. Three times ___ 5. other

____ 2. Once a day ____ 4. once a week

106. Mode of transport used while fetching _____

107. The most commonly used type of fuel _____

___ 1. Wood ____ 3. Crop residue ____5. Charcoal

___ 2. Shrub leaves ____ 4. Dung ____ 6. Other

108. List the major sources of fuel wood and indicate the distance of each source from your home.

Source of fuel Wood	Distance from home (time)
1. _____	_____
2. _____	_____

109. Who collects fire wood? _____

120. Is there any climatic problems in your area?

1. Yes ____ 2. No _____

121. If yes, what is the major climatic problem in your area? _____

_____ 1. drought _____ 3. Wind ____ 5. I don't know

_____ 2. flood _____ 4. frost

122. Are there wild animals that cause problems for you in the area? 1. Yes _____ 2. No _____

123. If yes, list the type of animals and state the nature of the problems?

Type of wild animals	The problem it cause
1. _____	_____
2. _____	_____
3. _____	_____

124. Is there any type of disease that attack your crops?

1. Yes _____ 2. No _____

125. If yes, list the type of disease and crops affected by the disease.

Type of disease	Crop affected
1. _____	_____
2. _____	_____
3. _____	_____

126. Is there any type of disease that recurrently attacks the family in 1990/91? 1. Yes _____ 2. No _____

127. If yes, identify the type of disease.

1. _____ 3. Cough 5. Malaria 7. other ____

2. _____ 4. T.B 6. Typhus

128. Is there any type of disease that attack your livestock? 1. Yes _____ 2. No _____

129. If yes, identify the type of disease and the type and number of animals died by the disease in 1990/91.

	Type of disease	Type of animal attacked	number of animals died
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____

130. What are the most important problems in your area that affect livestock production?

_____ 1. lack of grazing ____ 4. Wild animals

_____ 2. Lack of water ____ 5. Theft

_____ 3. Disease ____ 6. other (specify) _____

IV Drought Assessment Strategy

131. Have you ever experienced major drought problems in your present locality? 1. Yes _____ 2. No _____

132. If yes, indicate the years of the drought and its effect upon the lives of human and animal resources.

	Years of occurrence	level of Severity	no. of persons died in family	No. of animals died
1.				
2.				
3.				

133. In your opinion, what are the possible causes of drought on your locality? _____
_____

134. What traditional indicators do you use to evaluate change in the weather on a day to day basis? _____

___1. Wind movement ___ 3. temperature level 5. other_

___2. cloud behavior _____4. humidity level

135. From your experience, what are the accepted traditional prediction systems of drought in your locality? (List them)

1. _____ 4. _____

2. _____ 5. _____

3. _____ 6. _____

136. According to you, did these drought prediction methods accurately predict the actual weather patterns?

1. Yes _____ 2. No _____

137. Is there any quick adjustment technique in minimizing the effect of drought on your crops? 1. Yes ___ 2. No

138. If yes, what adjustment did you use to minimize drought damage to your crops?

1. _____

2. _____

3. _____

4. _____

139. Of these methods, which one is usually most successful?

_____

140. Do you practice all these adjustment methods on all farm fields? 1. Yes _____ 2. No _____

141. If no, why not? _____

_____

142. When drought strikes for two or more successive years, how do you adjust your farming activity?

1. _____

2. _____

3. _____

4. _____

143. Have you ever been forced to sell any of your assets in time of drought? 1. Yes _____ 2. No _____

144. What did you sell? _____

145. Where did you sell the assets? _____

146. To whom did you sell? _____

147. Did you receive a favorable price for the items ?

1. yes _____ 2. No _____

D E C L A R A T I O N

I, the undersigned, declare that this thesis is my original work, has not been oresented for a degree in any other University and that all sources of material used for the thesis have been duly acknowledged.

Name: Getachew Assefa

Signature _____

14/09/91