A REVIEW OF GENDER DISAGGREGATED DATA ON MAIZE AND WHEAT CROPPING SYSTEMS IN ETHIOPIA, KENYA, TANZANIA AND UGANDA

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ABBREVIATIONS AND ACRONYMS

CIMMYT	International Maize and Wheat Improvement Center
NARO	National Agricutural Research Organisation (of Uganda)
FAO	Food and Agriculture Organisation (of the United Nations)
ECAMAW	East and Central Africa Maize and Wheat Research Network
CSA	Central Statistics Authority (of Ethiopia)
KARI	Kenya Agricutural Research Institute
NAFCO	National Food Corporation (of Tanzania)

EXECUTIVE SUMMARY

This study set out to consolidate existing data and literature on the gender roles and responsibilities performed by men and women in maize and wheat dominated cropping systems in Ethiopia, Kenya, Uganda, and Tanzania. In each country, the cropping systems of maize and wheat were characterized to facilitate an understanding of the various tasks undertaken on the farm. Qualitative and limited quantitative data on the division of labour, access and control of farm resources, and the decision making process in each farming system was documented.

This study clearly shows that women's contribution to agricultural production in Eastern Africa is significant. It also shows that the roles of women and men in maize and wheat production are complimentary. In all the East African Countries studied, with the exception of Ethiopia, women participate most in the various farm activities, especially the non-mechanized activities. Women participate in time-consuming and labour intensive work in maize and wheat based farming systems across the region. Their exact contribution in terms of time, effort and income have yet to be quantified. Operations that are not yet mechanized such as planting of maize, weeding, harvesting and post-harvest operations occupy a significant proportion of women's time. However, women in all the four countries (Ethiopia, Kenya, Tanzania and Uganda) do not participate in decision making (i.e. control of own income, household income and other farm resources). There are a feww exceptions in North Wollo in Ethiopia and Illolo village in Tanzania where women participate in decision making. In addtion, women in female headed households (*de jure*) make virtually all decisions on the farm.

While men engage in capital intensive activities on relatively large farms, women are more concentrated on subsistence food production. Their participation in maize and wheat farming systems can be made more efficient if the constraints facing them are alleviated. These include women's limited access to and control over productive resources such as land, credit, agricultural inputs, technology (tools and machinery), as well as support services such as extension, information, training and marketing. This gender pattern in terms of division of labour, access to and control of production resources(such as credit, technology, education) and access to and control of benefits has major implications for adoption and effective management of maize and wheat production technologies. It is evident that:

- Women's time is spread thinly between farm activities and household responsibilities. Men do not participate in household chores due to cultural expectations. The women are therefore unlikely to adhere to the required agricultural practices. This limits both the productivity and adoption of maize and wheat production technologies.
- Women benefit to a lesser extent than men from the proceeds of the farm activities. It is clear from this study that men benefit more than women by virtue of men being decision makers. This is likely to reduce women's interest and input into maize and wheat production.
- Women have inadequate access to credit .This is due to the lending principles of financial institutions. This limits the ability of women to purchase fertilizers, seeds and pesticides that are needed for optimal maize and wheat production. In addition, they will be unable to access hired labour to be able to plant, weed or harvest at the recommended time.
- Women lack the relevant knowledge and skills in maize and wheat production. This is a result of poor education and limited extension services This could delay the adoption and efficient utilization of the technologies. It also limits their ability to manage the farms in case of absence of their spouses.

- Women lack efficient food preparation and processing technologies. This results in spending too much time on non-farm activities. This reduces the time available for farm work, hence their input is compromised.
- There is inadequate data disaggregated by gender in both maize and wheat cropping systems. This may result in gender-blind research programmes, with ineffective communication between the farmer and the researchers.

Country specific recommendations were made for research, extension and policy The implementation of these recommendations will be a step towards integrating gender sensitive approaches in maize and wheat farming systems.

Ethiopia

The recommendations made are as follows:

- Develop and promote technologies that alleviate household work to release women's work for productive activities. Water harvesting and afforestation should be encourage to increase water availability.
- Better understanding of the circumstances and needs of female headed households to improve the adoption and efficiency of agricultural production technologies
- Specific targeting of clients with relevant extension education and messages. There is a need to design a method on how to reach the female heads of households and the wives in the extension services. This could be through the design and implementation of an agricultural education service for men and women locally.
- Raise gender awareness in the community to help achieve equity in the farming systems. There is need for both men and women to be involved in decision making within the household, and for the females to have access to agricultural technology.
- Improve research-extension linkage, and find out the appropriate and culturally acceptable approaches of extension service to reach women.
- Strengthen service cooperatives, improve credit extension and raise awareness in the community to the importance of women having access to credit. Means and ways should be designed to link formal and non-formal credit associations with the farmers.
- Design an accepted mode of providing farm inputs to men and women through female membership of service co-operatives. In addition, there is a need to strengthen the service co-operatives.
- There is an urgent need to promote female education, both formal and non-formal.

Kenya

It is recommended that:

- A comprehensive survey be done to record all gender disaggregated information in maize and wheat production systems. This may include the roles of men and women in each production activity, the time spent on it; classification of households based on economic status and how this affects labour division in the household.
- Research programmes be initiated to address agricultural issues of concern to women. This may include topics like workload and labour bottlenecks, storage and pest control, processing characteristics and methods of improving the access of women to land, credit and information.
- Research be carried out to develop technologies that alleviate household work to release women's time for productive resources.
- There should be better targeting of extension education to reach both the women and men clients.

- Initiate gender awareness programmes at extension and family level to increase the understanding of the need for equity in society. The community needs to understand why women should benefit from the agricultural activities.
- Formal and informal agricultural education be promoted for women farmers to improve their knowledge and skills of agricultural production

Tanzania

The recommendations made are as follows:

- Development of appropriate technologies to ease women's workload in the home and on the farm;
- Adoption of participatory research methodologies, e.g. participatory technology development, participatory plant breeding and farmer involvement in technology assessment;
- Establishment of databases that reflect the time spent on various activities on the farm in national or regional statistics;
- Devise mechanisms for improving women's access to credit and farm inputs;
- Gender sensitize extension officers to target both men and women;
- Collect gender disaggregated data for at least one district in each of the 25 regions in the country, and in one of the districts in Tanzania where both maize and wheat are grown (e.g. Karatu in Arusha region). This would provide information about maize and wheat farming systems at the same time.

Uganda

It is recommended that the following be done:

- Develop a comprehensive database on the division of labour in farming households, decision making on the use of various resources on the farm, and the sharing of farm benefits in the household;
- Develop labour saving technology that is appropriate, cheap and accessible, in both maize and wheat production;
- Devise methods of easier credit access for both men and women in the main banking industry or cooperatives that do not demand collateral in the form of land. This will assist the farmers, especially women, to purchase farm inputs and also hire labour;
- Gender sensitize the extension personnel on the special needs and roles of women and men farmers ;
- Promote the training of more female extension agents so that communication channels with women farmers can be opened.

Overall, there are gender specific constraints that cut across all the countries and the two (maize and wheat) farming systems. Strategies to address some of these constraints are proposed:

Gender disaggregated databases

Studies which conduct activity analysis by gender and ask questions such as who does what, where and when, paid or unpaid, on-farm or off-farm work are very rare in Eastern Africa (Ethiopia, Kenya, Tanzania and Uganda). The overwhelming majority of relevant research contains brief accounts of what " farmers" do or what women do without specifying the tasks involved or providing activity analyses or time -allocation studies which could have provided more useful, accurate and detailed information.

From the available literature, it is evident that in the four countries (Ethiopia, Kenya, Tanzania and Uganda), only Ethiopia has a relatively adequate gender disaggregated database for both maize and wheat farming systems, although time-allocation studies are missing. Uganda and Kenya have the least quantitative data in these farming systems: in fact for wheat production systems, there is very little that is documented on the role of men and women. Tanzania has some qualitative data gathered from four to five districts in the whole country. The data sought should capture the majority of maize and wheat production systems in each country and have time trends in the roles of men, women and children in maize and wheat production.

There is, therefore, a need for comprehensive quantitative databases to be developed in Uganda (maize and wheat), Kenya (especially wheat) and Tanzania (more coverage). This may include data from all agro-ecological zones, other farm activities and off-farm activities as this does impact on the time spent on maize and wheat production as well as resources devoted to these activities. It may also be important to delineate households into male headed and female headed households to help understand the differential constraints that they face in agricultural production. The role of children in these farming systems is crucial: hence the need to have their participation documented.

In Ethiopia, there is a need to develop databases that reflect the interaction between crops, livestock and other enterprises. It is also important to have some data showing the interaction between gender and education as well as wealth levels within the community.

Labour constraints

There is a need to develop technologies that ease labour in the maize production activities especially weeding and processing. This may be through research on lighter weeders, maize varieties that are tolerant to late weeding, and suitable varieties that can be planted at slightly different times without loss of productivity. Labour can be made easier for crop processing if varieties that thresh easily are developed in consultation with the farmers to maintain consumer preferences. Equipment that can easily be used by both men and women in threshing maize and even wheat could alleviate the labour burden.

Knowledge, skills and technology constraints

A gender sensitized extension service needs to aggressively disseminate agricultural information to both female and male farmers. This may specifically target seed selection, planting technologies, pest control (biological) and processing. These are the areas women are most involved in yet are not equipped with the necessary knowledge and skills. In addition, local seminars and demonstrations need to be promoted as a means of information dissemination without taking the women away from home.

Access to production resources and credit

Research needs to be carried out on the existing credit facilities in each country to explore the possibilities for micro-financing of women farmers. This may also involve financing institutions which can assist in developing lending mechanisms to accommodate women who may not have tangible collateral. In most cases, farmers' organizations are more likely to provide access to credit for women farmers than the formal banking institutions. Also, the farmers organizations are better placed to advance cash to women farmers for the purchase of farm inputs.

Apart from addressing this issue at policy level, it is critical that the officials of lending institutions (formal and informal) are gender sensitized to appreciate the importance of women participating in cash economy and the resultant impact on agricultural productivity. Women can be part of these lending institutions by being members of cooperatives, credit unions, labour unions, marketing organizations and community organizations.

The issue of land tenure in the various countries needs to be studied to make recommendations on how best that can be matched with cultural norms to increase the access and control of women over land. This may greatly improve the management of crops and increase productivity especially on small holder farms.

It is also necessary to address the issue of markets for the small scale farmers especially women. Good markets accelerate the flow of income and hence efficient implementation of the recommended production practices.

1.0 INTRODUCTION

This study is an effort to consolidate existing data and literature on the gender roles and responsibilities performed by men and women in maize and wheat dominated cropping systems in Ethiopia, Kenya, Uganda, and Tanzania. Specifically, the objectives of the study were to:-

- Characterize the cropping systems,
- Determine the division of labour in the farming systems,
- Determine the access to and control of production resources (land, seed, fertilizer, agro-chemicals, credit, and farm implements),
- Determine the decision making process.

1.1 Rationale

Gender is a socio-economic variable which has potential to either accelerate or undermine development. In focusing on gender-based roles, responsibilities, capabilities and entitlements, gender analysis is applied to a study of the division of labour, access to and control over production resources (such as skills, technologies and inputs) and access to and control over benefits.

A clearer and more coherent understanding of what women do in the farming systems of the study countries (Ethiopia, Kenya, Tanzania and Uganda) can contribute to improving efforts in understanding what the contraints and opportunities are to increasing productivity of maize and wheat. Such insight should help in the design and implementation of valuable research and the development of appropriate technology to increase food production and improve the general standard of living in these countries. Ignoring the role of women in the development of new agricultural technologies may actually have a negative impact on rural women and on the development process as a whole. The differential impact of technology adoption on farm household members is an important theme in gender analysis, and the rationale behind it rests in the opinion that households are not integrated units. A household consits of women and men. These two have different needs in the maize and wheat farming systems. For example, technology changes that benefit the men in a household may not always benefit the women, and may even be detrimental to them. In fact, if a change adversely affects men, then it has a worse effect on the women. That is, the popular assumption of the household as a unit of common interests and constraints is questioned. This study endeavours to determine if indeed in any given socioeconomic class of households there are differential effect by gender within each class.

In sub-Saharan Africa, women are the primary source of labour especially on small scale farms. It is therefore sound economics to address constraints faced by both men and women in order to accelerate productivity of maize and wheat production. However, it is very common in the planning and implementation of agricultural development projects that the household is usually taken as the unit of analysis with male heads assumed to be the principal decision makers and source of information (Feldstein and Poats, 1990). This means that the roles of women, and children are ignored. This is detrimental to crop productivity as the women and other members of the household bring specific skills, resources, and priorities to crop production. By ignoring other members of the household, we are excluding a group in the system who actively participate in agricultural production, hence wasting a vast potential for increased productivity.

Another element that is ignored in planning of agricultural activities is the female headed households. International data sources classify households as spatial units defined by shared residence and designate women as household heads solely in the long term absence of a male partner (Sylvia, 1997). However, the definitions and meaning of household headship vary culturally and historically. For example, in the Phillipines, census does not record households as female headed unless their husbands have been absent continuosily for over a year. In this way many de facto female household heads are not enumerated, or identified as such (Sylvia, 1997).

Defining households as female headed when they are headed by an unpartnered women but male-headed when they have an intact couple is clearly assymmetrical. Morever, this definition of female household headship tends not only to understate the numbers of households in which women take major responsibility (financial decision-making or otherwise) for household affairs, but can also act to reinforce motions of male authority in society at large. Indeed, instrumental criteria for household headship (such as bread winning or decision-making) and the more common practice of self- or proxy-reporting, both tend to bias the designation of household headship towards men (Sylvia, 1997).

In this study, a female headed household is defined as a household in which a male decision maker is absent. A *de jure* female headed household is one in which the woman owns the land and makes all decisions (e.g., widows, divorced women and single mothers). A *de facto* female headed household is where a woman is responsible for all aspects of managing the farm and household due to temporary absence of the man. However, she does not independently make decisions on the farm.

1.2 Background to study

Africa's food problems, which have persisted despite technological advances, present a deep and urgent challenge to agricultural research. Whereas significant yield increases have been registered in the major world cereal staples (e.g. maize and wheat), it has become increasingly apparent that the application of these technological advances in Africa on a sustainable basis is limited. The applicability may be limited by the selective targetting of only a portion of the farmers, disregarding the majority of women farmers in the on-farm research activities. Secondly, the prevailing farming systems in large parts of East Africa are dominated by smallholdings based on multiple cropping systems which rely on family labour. However, the contribution and significance of this labour input by men, women and children is not adequately recognised in project planning, even at farm level. Owing to resource poverty and inadequate access to the knowledge required to utilise integrated crop and pest management techniques, these smallholdings have not usually benefited from modern agricultural research as presently constituted.

The International Maize and Wheat Improvement Center (CIMMYT), Eastern African Region, felt that it was necessary to establish the division of labour, access toand control over farm resources, and the decision making process in the maize and wheat cropping systems in Eastern Africa. As a first step in this direction, a three day workshop was held in Arusha (12-15 January, 1998) to establish the status of knowledge of gender roles in maize and wheat production in Eastern Africa. From the presentations, it was evident that there was relatively good qualitative data on the role of gender for all countries. However, there was little quantitative data available except for Ethiopia. Important gaps were identified in the database. These were:

1. Lack of quantitative baseline data in all countries except for Ethiopia and Uganda (partially).
2. Lack of data classified on the basis of household economic status, agro-ecolocial zones and/or cultural differences.
3. The data and characterization did not capture the majority of the maize and wheat production systems in each country.
4. There was no clear distinction between *de jure* and *de facto* female headed households in the reports. In addition, the role of females in male headed households is not clearly stated.
5. There is no indication of consumer preferences in the maize and wheat production systems.
6. Information on post harvest and marketing issues was lacking.
7. There was no clear distinction made between commercial and subsistence maize and wheat production in the region.
8. There was no indication of time trends in the roles of men and women on crop production in the data presented.

It was felt that the information available was insufficient to identify major issues affecting women and to establish a target of involvement of women in on-farm activities for countries in the region. The first step in obtaining such important information should be a review of existing information available in most countries from Farming Systems Reports, surveys and other secondary data sources. After a thorough review of the data obtained from the above activity, surveys to collect primary data that can be extrapolated widely throughout the region may have to be carried out.

1.3 Study site selection

Data was collected from the four East African countries (Ethiopia, Kenya, Tanzania and Uganda). The source of secondary data was agricultural institutions (research and government institutions). Detailed identification of these data sources was obtained from contact persons (Dr. Mary Mgonja, Tanzania; Ms. Mary Mugisa-Mutetikka, Uganda and Ms. Addis Tiruneh, Ethiopia) participating in the ECAMAW Working Group on gender sensitization in Arusha. In all countries, an effort was made to capture both maize and wheat farming systems.

1.4 Methodology

Secondary data was collected from several agricultural research institutions and documentation centers in each of the countries (Ethiopia, Uganda, Tanzania and Kenya). Within each national production system, there was a classification of production based on farm size, large and small scale. Thus the roles of men and women in the various farm activities, their access to farm resources, and the control of income generated from the farm were extracted. The access of both men and women to extension services and credit facilities were documented. The constraints faced by both men and women on the farm was established from the literature. The data collected was compiled on a country basis, interpreted and suggestions made.

Through analysis and interpretation, gender needs were identified at the farm level which may assist researchers in incorporating women farmers in on-farm research activities in East Africa.

2.0 ETHIOPIA

2.1 Introduction

The total population of Ethiopia in 1994 according to the Central Statistical Office (1995) is around 54.939 million. The male population is about 27.578 million while that of females is 27.361 million This clearly shows that women constitue 50% of the population.

Ethiopia's economy is agriculture dominated. Agriculture in Ethiopia is characterized by subsistence small holder mixed farming systems. Cereals, mainly wheat, teff, maize, barley and sorghum contribute about 65% of calories consumed in the country. In the production of these cereals and other agricultural commodities, all members of the household participate. Cereals account for 90 percent of the total production (Addis *et al.* 1998)

According to the available data, both maize and wheat production is done by three groups, i.e., individual farmers, Co-operatives and State farms (Table 2.1). The small holder farming system is the dominant one as it accounts for over 95 percent of the agricultural production and 94 percent of the cultivated area.

The relative importance of the cereals in terms of area in 1996-1997 season (CSA, 1996, 1997) is: tef (2167800 ha.), sorghum (1,399,900 ha.), maize (1,316,900 ha.), wheat (772,200 ha.) and barley (697,700 ha.). Over 95% of the cereals are produced by small scale farmers and the remainder by producer cooperatives (1.9%) and state farms (3 %) (Cohen and Isaksson, 1988).

2.2 Maize Production Systems

2.2.1 General Introduction

Maize was introduced in Ethiopia in the 16th or 17th century (Haffnagel, 1961). It grows from sea level to over 2400 meters above sea level (m.a.s.l.). The major producing areas lie between 1000 and 2000 m.a.s.l.. Maize is grown in the country on over a million hectares, accounting for 19% of the area of all cereals. At present, more than 85% of maize is produced by small scale farmers and the rest by state farms (Addis *et al*, 1998) Production is totally under rainfed condition. The bulk of production (94%) is obtained in the long rainy season (*kiremt).*

Regarding regional distribution, about 40% of maize is in Shewa, Sidamo, North and South Omo, Arsi and Bale Zones. Shewa zones have the highest hectarage (21%). Wollega, Ilu-Babor and Jima zones cover 29% of maize area. Harerghe zone covers 7% of maize area, while Gojam and Gonder zones cover about 18% maize area in the country (Mulatu *et al.*, 1993).

In 1996/97, maize was ranked third after tef and sorghum in terms of area planted (CSA, 1996,1997). The bulk of maize production is under small scale farms. For example, during the main season, in 1987, small holder farms accounted for 73.3 % (Table 2.1) of the total hectarage while state farms accounted for 5.4 % and producer cooperatives 5.3 % (CSA, 1987) .However, small holder yields are significantly lower (1.92 t/ha.) than for state farms (3.03t/ha.) (Table 2.1).

Table 2.1 Maize area, production and yield by type of farm (1987).

Sector	Area '000' ha	%	Production '000't	%	Yield (t/ha)
Main season (1987)					
Smallholder farmers	781	71.3	1502	76.5	1.92
State farms	59	5.4	179	9.1	3.03
Producer cooperatives	58	5.3	97	4.9	1.66
Minor season (1988)					
Small holder farmers	192	17.6	179	9.1	0.93
State farms	0	-	0	-	-
Producer co-operatives	4	0.4	7	0.4	1.83
Total	1094	100	1964	100	-

Maize is grown mainly in pure stands. Maize grown at homesteads is usually intercropped with haricot bean, rapeseed and squash. In Eastern,. Southern and southwestern areas of the country, maize is grown mixed with coffee, '*chat*' or with annual crops like sorghum. Farmer's main reason for not commonly intercropping maize is that the presence of other crops interferes with weeding and other operations on maize. Rotation of crops is a common practice in the country. For example, in the Bako area, 74% of the sample farmers grow tef on newly cleared land for the first harvest, then maize (47%) or *noug* (33%) for the second harvest (Negassa, *et al.*, 1994).

Maize is mainly grown for food. It is preferred for making *Injera* (pancake). Maize stalks left after harvest are used as fuel, compost and livestock feed. In general, for a typical household in rural Ethiopia, the average farm size is between 0.7-3.5 ha./family depending on land availability and quality, family size, and overall population of the area. The average family size is 5-7.

Farmers' resource endowments, versus family labour, farm size, and oxen ownership are reported to influence maize production. Family labour shortage, oxen and cash availability, low soil fertility, inefficient credit service, excess or shortage of rain and poor extension services are also reported as major constraints to maize production (Negasse *et al.*, 1994).

2.2.2 Maize production practices

Maize production activities extend almost throughout the year. Almost all members of a household including women and children participate in the maize production operations. Most of the data collected for maize are relevant for male headed households although some information is available for female headed households.

Field selection and land preparation.
Farmers select a suitable land for maize. In areas like Bako farmers grow maize on reddish-brown nitosols. In this area, fertile land is primarily allocated to maize. Land preparation extends from early February up to late April and is done with a local ox-drawn plough (*maresha*) pulled by a pair of oxen. This implement ploughs to a depth of 5-10 cm, which is less than the recommended 15 cm depth. Farmers plough maize fields 3-7 times excluding the ploughing operation at planting. In Harerghe "*Dengora*"- a local tool for digging soil, supplements the ox-plough.

Women and children (male and female) remove grasses from the fields (*Gulgualo*) while the men plough using the oxen.

Planting
Maize planting accompanied by harrowing starts in late May. Planting time is dependent on there being sufficient rainfall for soils to retain enough moisture. Maize is planted in rows or by broadcasting. Planting is mainly done by men and male children (Annex 1).This is evident in West Hareghe, Nazret area, Ada, Lume and Gimbichu woredas (Addis *et al.*, 1997). However, in some parts of the country (North Wollo and North Omo) women also participate in planting maize.

Weeding.
As weeds are an important problem of maize production, farmers practice different methods to control weeds. Maize weeding usually starts from early May and extends to dough stage. Hoeing is the first maize weeding operation and is performed using a local implement called "*gesso*" - made of wood with metal tip. Women, men and children participate in this activity. This includes women in both female and male headed household (Annex 1 & 2). For example, in Central Rift Valley and North Wollo, both men and women weed, while in West Hareghe it is only men who weed in male headed households; women from female headed households are the only ones who weed.

Many farmers (for example, 91% of sample farmers in Bako area) hoe maize once. (Negassa *et al.*, 1994). Oxen-cultivation is done usually 3-4 weeks after first weeding (hoeing). It is done parallel to maize rows. Hand-pulling is done after oxen ploughing which is followed by the last weed control practice, slashing. Slashing prevents weeds from seeding and facilitates harvesting. Timeliness of weeding depends mainly on family and farm sizes. Competition for labour for other crop activities and off-farm activities influence the efficiency and timeliness of weed control. Thinning is also done by many maize growers in which weeds are also controlled. The thinned crops are used either for compost in the field or feed for animals.

Soil fertility management and pest control.
Farmers apply manure and commercial fertilizer and practice rotation to improve soil fertility. Use of commercial fertilizer depends on the availability of fertilizer and the cash income status of farmers. Manure is used on maize fields around homesteads. The major pests of maize are wild animals, storage weevils and stalk-borer.

In most cases, men and male children apply the fertilizer. In case of female headed households, the woman may apply it.

Harvesting and storage practices

Maize harvesting is done at different stages for consumption or sale. The green cobs are harvested at soft dough usually from late August to September for late maturing varieties. The full harvest usually commences when cobs are just beginning to drop, mainly between November and December. Farmers follow two procedures for harvesting of maize.

- Cut, pile, dehusk, transport to barn, store until dry, shell and store.
- Dehusk, transport to barn, store until dry, shell and store.

Shelling maize is done usually with sticks or mortar and pestle. Farmers use traditional storage systems. They store unshelled maize outside the house in a store made of interwoven sticks with grass roof. Shelled maize is stored in the house either in a local store made of a mixture of soil and straw or in "*gotera*" made of bamboo reinforced with a mixture of muddy tef straw and cow-dung. In Harerghe, shelled maize is stored underground.

Cutting of maize is mostly done by men (e.g. Annex 1) while transporting is done by men, women and children (Annex 1 & 2,). Threshing and storage is done by all household members except the female child.

Most farmers preserve seeds for the next season by hanging unshelled cobs in a place that could be fumigated with smoke from a fire to protect them from storage pests. (Negassa *et al*, 1994).

In summary, all members of the household (men, women and children) participate in the farm activities. For example, in Sidama, Areka, Bako and Adet areas, men are responsible for all agricultural operations from land preparation up to threshing. Their role is more significant in ploughing, planting and marketing large quantities of produce. Women in turn do actively participate in removing grasses from fields prior to planting, weeding, harvesting, transporting the harvested crop, and marketing of farm produce in small quantities. Children also take part in preparing land before planting (the case of boys in Debre Tabor), weeding, planting (a case around Adet) and harvesting. Activities where women participate most are weeding, harvesting and marketing. However, their involvement in the preparation of land by removing grass is very important across all the areas. In addition women make a significant contribution in transporting the harvested produce and preparation of threshing ground. Although women are said to market in small quantities, their contribution is vital in terms of the sustenance of the household by taking care of the day-to-day basic necessities

From the available data, all members of the household participate in maize production activities. There are slight variations between regions. However, the time spent on the various activities, and availability of various technologies to do that work is not indicated. This makes it difficult to assess the quantitative contribution of the different members of the household. Whereas both men and women participate in the productive activities on the farm, women are principally involved in household chores (Annex 1 & 2) This dual responsibility for women could negatively impact on technology adoption and efficiency of agricultural production .

2.3 *Wheat Production Systems*

2.3.1 General Introduction

Ethiopia is the largest wheat producer in sub-Sahara Africa with about 0.75 million hectares of land. In 1996/97 season, wheat was the fourth most important crop both in area and production after tef, maize, and sorghum (Addis *et al.*, 1998). In some areas (Inewa & Sendafa) wheat is rated first in importance, while in Alefu and Kulumsa it occupies the second position (Table 2.2).

Wheat grows in the Ethiopian highlands ranging from 1500 to 2800 m a. s. l. The most suitable areas for wheat production fall, however, between 1900-2700 m.a.s.l. Of the current total wheat production area, more than 75% is located in Arsi, Bale and Shewa Zones. Other important zones include Ilu-Babor, West Harerghe, Sidamo, North Gonder and Gojam (Gebre-Mariam, 1991). Altitude plays an important role in the distribution of wheat production through its influence on rainfall, temperature and diseases. Areas in the altitudes of 1900-23000 m.a.s.l. are the most favourable zones for early and intermediate maturing varieties of wheat. Soil type used for wheat production vary from well drained fertile soils to waterlogging heavy vertisols. At present, wheat is produced solely under rainfed conditions. It is grown on smallholder farms, state farms and producer cooperative farms (Table 2.3). The state farm yields are almost double the small holder farms.

In most areas, wheat is grown only once per year during the main season (*Meher*). However, in some areas such as parts of Bale wheat is sown twice, using both rainy periods (*Belg* and *Meher* season), but in different fields. There exists also a potential for double cropping using irrigation in the Awash river basin (Beyene *et al.*, 1991).

Table 2.2 Importance of wheat in selected wheat growing areas of Ethiopia.

Area	Major crops in order of importance*	Farms growing wheat (%)	Total area cultivated per farm (ha)	Wheat area per farm (ha)	Wheat as a % of farm area
Holetta	T, W, B, F	85	2.61	0.71	27
Inewan	W, T, F, L	100	2.16	0.71	33
Sendafa-Aleltu	W, T, C, L	100	3.44	0.81	24
Kulumsa	B, W, P, F	93	2.20	0.86	39
Sinana	B, W, P	85	4.00	1.00	25

Source: Alemayehu and Franzel 1987, Hailu and Chelot 1989, Chilot *et al.*, 1989, Hailu and Mohammed 1986.
*B = barley, C = chickpea, F = faba bean, L = lentil, P = field pea, T = tef, W = wheat.

Table 2.3 Wheat area, production and yield by farm type, main season 1986*.

Sector	**Area**		**Production**		**Yield**
	'000' ha	**%**	**'000' t**	**%**	**(t/ha)**
Smallholder	526.49	82.4	585.2	76.3	1.11
Producer cooperatives	49.3	7.7	53.1	6.9	1.08
State farms	63.1	9.9	129.1	16.8	2.04
Total	**638.9**	**100.0**	**767.5**	**100.0**	

Source: CSA, 1987
*main season wheat production accounts for 99% of total wheat production.

2.3.2 Wheat production practices

The data for wheat, with the exception of one, is also mainly about male headed households with some information about the female headed households. However, the study conducted in Ada, Lume and Gimbichu Woredas of Ethiopia is specially relevant for female headed households. This also indicates that like the activity analysis for maize production, women participate in all agricultural operations excluding ploughing and planting.

Men are usually responsible for preparing land, planting, weeding, harvesting, threshing, storing, herding and marketing (if in large quantity). Women actively participate in cleaning seeds, weeding, harvesting, winnowing, transporting harvested crops and routine marketing of produce (Annex 3). Men make major decisions but women give opinion (Franzel and Helen [Eds.],1992). In case of female headed households (*de jure*) as shown in the case of wheat growing areas in Ada, Lume and Gimbichu areas, women have the highest power in making the final decision with a contribution from the son.

On varietal preferences, gender was not taken into account. Both men and women are grouped as 'farmers'. The primary concern of most farmers is grain yield, though, some prefer taller varieties for roof thatching and those that suppress weeds (Tanner *et al.*, 1995).

Land preparation

Land preparation for wheat fields starts at the onset of rains during January. Wheat fields are generally ploughed 2-4 times before sowing. In most areas a pair of oxen are used for preparing wheat fields.

Planting

Wheat is generally planted during mid-July to end of August, depending on soil type the level of rainfall and varieties used. Wheat is generally planted on flat seed bed. Wheat seed and fertilizer are broadcast and covered by '*maresha*'.

Weed control

Weeds are important problem of wheat production. Hand weeding is the common farmer's weed control practice. It is practiced between end of August and early November. Some farmers apply post-emergence herbicide to control weeds.

Soil fertility management

Urea and Diammonium Phosphate (DAP) are the major chemical fertilizer sources. They are mixed and broadcast at planting. In some areas like Ada, Lume and Gimbichu, farmers split application of urea at planting and about eight weeks after planting (Negatu *et al.*, 1993). Manure is used mainly for preparation of dung-cake fuel. A few farmers apply limited manure to crops grown in the homestead areas.

Harvesting, threshing, and storage

Under normal conditions wheat is harvested from October to November manually using sickles. The harvested crop is then piled until harvesting is completed. It is threshed, using animals which trample on a threshing ground that is plastered smooth with cow dung. Threshing is done mostly from December to January. Wheat is stored in a locally constructed grain store ("*gotera*") which is usually placed near the homesteads.

2.4 Gender specific constraints and Implications

From the constraint analysis done in maize growing areas of Eastern Hareghe (Table2.4a), Nazret area (Table 2.4b) and North Wollo (Annex 5), it is indicated that women in general would be affected by the various problems the society encounters as it plays its role in increasing agricultural productivity. Nevertheless, the issues that specifically affect women in maize production include: less access to credit, low extension services and shortage of labour availability.Similarly, a constraint analysis in Western Hareghe (Table 2.4c) where wheat is one of the major crops grown does show that women have limited access to extension service, farm inputs, credit and income.

The wives in male headed households have in general less control over farm produce, cash crops and extension education as shown in Eastern Hareghe and Ada, Lume and Gimbichu Woredas (Table 2.5a, b). Both men and women in polygamous marriages in Lisano village confirm that there is differential benefits for men and women (Annex 6). The only exception is the case for middle income women in North Wollo (Table 2.6) where women have equal control or more over money and farm produce respectively. The main limitation for the women is lack of the necessary knowledge and skills to adopt and manage technologies that are involved in maize and wheat production. This is because of their low educational levels and the fact that they are not a target of extension education. As a result, the ability to access any relevant agricultural information is low.

The women receive very limited education and extension service (Addis, 1997); even female heads of households (e.g. in Eastern Hareghe) do not get much attention as compared to their male counterparts (Table 2.5a). Women's lack of access to extension service combined with their lack of decision making on the farm, results in women being unable to manage the farm once the husband is away. They lack some of the basic skills which men have gained from contact with extension officers.

Both men and women have limited access to agricultural technologies. As a result, much time and labour is spent for a small return. This reduces their yields and quality of final product. This is particularly difficult for women who are also expected to do other household duties.

Women have less access to credit facilities, and farm inputs. Though this data is from a few regions (Eastern & Western Hareghe, Nazret area and North Wollo), it is representative of the general situation in Ethiopia. Lack of credit to women, for example in North Wollo, is due to weak and biased service cooperatives. These co-operatives can only give credit to a woman who is a household head The lack of credit for women limits the opportunity for them to obtain labour saving devices or inputs. This means they do not have a chance of using improved farming practices.

In Western Hareghe, the major constraint related to maize and wheat production is lack of farmland and erosion. In this case, both men and women are equally affected. Erosion leads to a reduction in crop yield and farmland. This affects the whole household. However, lack of farmland reduces the chance of women to rotate crops, hence limits the variety of food they can produce. This also leads to a reduced interest in farming, hence impacting negatively on agricultural productivity. In addition, lack of water in this region, impacts negatively on women's participation in agricultural production as they spend a long time fetching water. This cuts across both female and male headed households. The female child is also involved in fetching water, so her participation in maize production is limited.

Table 2.4a Development constraint analysis in Eastern Hareghe-Alemaya

Development constraint	Gender considerations	Implications for interventions
Shortage of fuelwood	It takes women time to travel further and longer.	Backyard tree plantations
Population pressure	Women depend on having children for their survival	Family planning has to go along with ownership of land
Very poor educational facilities	Very low (almost nil) school attendance for girls	Parents need to be encouraged to send their daughters to school
Very low or no extension service	Female heads of households do not get much attention. Only husbands are considered for extension service	Design a method on how to reach the female heads of households and wives
Non-availability of credit facilities	Less access than men	A means and ways should be designed to link formal and non-formal credit associations with the farmers

Table 2.4b: Constraint analysis and possible interventions in the Nazret area.

Constraint Analysis	Gender consideration	Effect	Implication for intervention
Land shortage	Affects households as a whole	• Alternative crops cannot be grown • Produce only limited amounts.	• Intensify crop production • Carry out family planning
Oxen shortage	Same as above	• Low yield	• Provision of credit to purchase oxen • Demonstration , different ploughing techniques • Provision of tractor for rent.
Erratic rains	Same as above	• Crop failure • Low productivity	• Use of water harvesting techniques • Develop drought tolerant varieties • Diversification to reduce risk
High fertiliser cost.	Same as above	• Discourages input utilisation • Low yield	• Use of organic fertilizer
Labour shortage	Affects households	• Low production and productivity	• Introduce improved production techniques

Table 2.4c Constraint analysis in Western Hareghe-Karadimtu

Development constraint	Gender considerations	Implications for interventions
Shortage of grazing land	• Time taken to go further to collect feed (M,F,F*,MC,FC)	• Introduce improved means of forage production and intensive farming • Improve grazing land
Drought / erratic rainfall	• Low agricultural productivity (H) • Need to replough (M,F)	• Introduce short cycle varieties • Encourage use of fertilizer and tie ridgers • Advise on terracing and manuring
Shortage of farmland	• Lower yield potential, productivity decreases leading to migration (H) • Less interest in farming (F) • Less chance to rotate crops (M,F*)	• Encourage intensive farming and production of cash crops • Introduce alternative income generating activities
Erosion	• Reduction in crop yield and farmland (H,M)	• Introduce terracing, afforestation, contour ploughing, relay cropping, gully control and alley cropping
Water shortage	• Less sanitation, less drinking water (H) • More time used fetching water (F,F*,FC,MC)	• Encourage water harvesting and afforestation
Culture	• Fixed gender roles i.e. men never cook, women do not plough • Men have more control and decision making power than women	• Extension services to try and raise awareness in the village concerning culture in cass where it has a negative effect on productivity
Population pressure	• Less farmland and fuel (H) • Increased reproductive role (F,F*) • Less education (MC,FC)	• Provision of family planning advice • Advise farmers on the link between high population growth and low productivity per capita

Limited access to, and use of inputs and extension services	• Reduced agricultural productivity and high labour input (M,F,F*) • Less participation in agricultural production (F,FC). Women have leven less access than men to inputs and extension services	• Improve the farmer: DA ratio possibly by employing more female development agents • Look into ways in which inputs can be made more available locally • Raise awareness in the community on the importance of extension being accessible to female headed households and wives. • Find out the most appropriate ways in which extension can reach women
Low income and limited access to credit	• Less inputs (M,F*) • Limited poultry production (F,F*) • NB Access to credit is even more limited for F and F*	• Strengthen service cooperatives • Improve credit extension and raise awareness in the community to the importance of women having access to credit

M = men , W =women, FC =female children, MC = male children and H = household.

Table 2.5a Resource profile for Eastern Hareghe (Alemaya)

Resource	% access		% Control	
	Men	Women	Men	Women
Land	80	20 [100]	100	0 [100]
Labor				
Irrigation	60	40 [100]	100	0 [100]
Farm inputs	75	25 [50]	100	0 [100]
Farm produce	90	10 [100]	100	0 [100]
Cash crop	100	0 [100]	100	0 [100]
Livestock				
Oxen	50	50	30	-
Cows	50	50/100 [100]	50/100	50/100 [100]
Poultry	30	70	30	70 [100]
Extension	75	30	90	60
Revenue	90	10	-	10 [100]

Figures in bracket [ ] represent the households headed by women, i.e, *de jure* ones. 50/100 is to show that sometimes the cows (usually given by her family) could be under her ownership.

In the case of Nazret area, where maize is grown, the decision of what to produce, how much to produce, and when to produce is made by men or husbands. However, the husband will inform the wife about his plan. The bulk of the produce from each crop is marketed by men. The money generated through the bulk sale is managed by the husband for paying taxes, and buying farm inputs. The wife can keep the money but cannot spend it without permission from the husband (Yeshi, 1997). This setup could be a disincentive for women's participation in agricultural production.

The resource profile of Eastern Hareghe shows that men control land , irrigation and farm inputs in male headed households. However, the farm produce can be controlled by the wife as much as 30 %. On the contrary, female headed households, women control all their resources on the farm.

Decision-making differentials

Decision-making differentials exist between *de-jure* female and male headed households. In all *de-jure* female headed households, women make virtually all the decisions with a minor contribution from the sons (Table 2.5b). The men in male headed households make most of the decisions. However, there are slight regional variations in this pattern.

Available information on wheat production indicates that:

- Male and female headed households have very different rights and responsibilities with respect to resource ownership and decision making in wheat production.
- There is no significant difference between male and female household with respect to access to farmland.
- Male headed households have more access to education than female headed households.

- Female headed households have less access to assets (animals owned and draft power) and technologies.

Table 2.5b Decision making in male and female headed households in Ada, Lume and Gimbichu Woredas, 1996/1997.

Decision making	Gender					
	Female (N = 81)			Male (N = 99)		
	Head	Son	Both	Husband	Wife	Both
Decision to plant wheat (%)	89.1	1.6	9.4	56.3	-	43.8
Decision to use fertilizer (%)	87.8	2.7	2.7	59.3	1.1	36.3
Decision to use manure (%)	100	-	-	60.0	20.0	20.0
Decision to sell crops (%)	93.5	-	6.5	53.9	-	56.1
Decision to keep proceeds from sale (%)	96.1	1.3	2.6	55.1	8.2	36.7
Decision to look after produce (%)	84.6	1.3	12.8	49	4.1	45.9
Decision on how much to consume of the produce (%)	94.9	-	5.1	27.6	-	72.4

Table 2.6 Resource profile for middle income women in North Wollo.

Resource	% access, men	% access, women	% control, men	% control women
Irrigation	75	25	75	25
Spring water	25	75	25	75
River	50	50	50	50
Land	70	30	70	30
Livestock				
cow	30	70	70	30
Oxen	70	30	100	0
Sheep + goats	50	50	60	40
Poultry	0	100	0	100
grazing	100	0	100	0
Horticulture	55	45	55	45
Extension	80	20	100	0
Crop produce	60	40	40	60
Trees	50	50	60	40
Credit	100	0	100	0
Labour	35	65	50	50
Team work	65	35	100	0
Farm inputs	100	0	100	0
Money	55	45	50	50

Gender Implications

In general, men do play the highest role in terms of decision making regarding the choice of a crop to be planted, how much should be planted and the use of resources accrued from the sale of farm produce. In case of female headed households (*de jure*) then the woman makes all the decisions on the farm. This gender pattern in terms of division of labour, access to and control of production resources (such as credit, technology, education) and access to and control of benefits has major implications for adoption and effective management of maize production technologies. For example:

- Women's time is spread thinly between farm activities and household responsibilities. In Western Hareghe (Annex 1) women and men participate in transporting, piling, preparation of threshing ground and shelling of maize. In addition to these duties, women fetch firewood, clean grains, dehusk, grind the produce, take care of children, make dough, bake and cook (Annex 1) Men do not participate in these activities due to cultural expectations. Wheat is also grown in this region and the reproductive roles for the woman would be the same as in the maize cropping system. A similar situation is observed in North Omo (Annex 2). Men and women participate in planting, weeding, harvesting, transporting, shelling and storing of maize. However, the reproductive roles of collecting firewood, cleaning the house, grinding, cooking and baking are done by women and female children. The women are therefore unlikely to adhere to the required agricultural practices. This limits both the productivity and adoption of maize and wheat production technologies.
- Women benefit to a lesser extent than men from the proceeds of the farm activities. From the resource profile of Eastern Hareghe (Table 2.5a), the access and control profile in Ada, Lume and Gimbichu Woredas (Table 2.5b), the resource profile of middle income women in North Wollo (Table 2.6) and the percentage benefit of husbands and wives in polygamous marriages (Annex 6), it is clear that men benefit more than women by virtue of men being decision makers.This is likely to reduce the interest and input into maize and wheat production.
- Women have inadequate access to credit as shown in the constraint analysis of Eastern Hareghe (Table 2.4a), resource profile of middle income women of North Wollo (Table 2.6) and North Wollo (Annex 5) These are basically maize growing areas. This limits the ability of women to purchase fertilizers, seeds and pesticides that are needed for optimal maize production. In addition, they will be unable to access hired labour to be able to plant, weed or harvest at the recommended time. Similarly, a constraint analysis in a wheat growing area of Western Hareghe, Karadimtu (Table 2.4c) women have limited acces to credit, farm inputs and extension service.The implications for these limitations are as stated for the maize growing areas.
- Women lack the relevant knowledge and the relevant skills in maize and wheat production.This is a result of poor education and limited extension services (Table 2.4a & Table 2.4c) This could delay the adoption and efficient utilization of the technologies. It also limits their ability to manage the farms in case of absence of their spouses.
- Women lack efficient food preparation and processing technologies. This results in spending too much time on non-farm activities. This reduces the time available for farm work, hence their input is compromised.
- Women who are responsible for food selection and preparation at the household level prefer maize varieties that make good quality "Injera" (unleavened bread). (Asfaw Negawa *et al*, 1992). This has implications for adoption of new varieties of maize seed. In the case of wheat, varietal preferences were not delineated on a gender basis. Both men and women are grouped as 'farmers' whose primary concern is yield. However, a critical analysis may have shown that the men have different preference from women. Whereas

men may prefer taller varieties for roofing, women may prefer a variety that is easy to thresh and one that makes good bread.

- Quantitative maize and wheat data dissagregated by gender is inadequate. Only one report from Western Hareghe does give some disaggregated data on wheat cropping system in Ethiopia. This often will lead to "gender blind" research and extension programmes. This is likely to result in a mismatch between the needs of the clients and the developed technologies and extension messages.

2.5 Suggestions and Recommendations

From the the available information, it is recommended that the following be done as a step towards integrating gender sensitive approaches in maize and wheat farming systems:

- Develop and promote technologies that alleviate household work to release women's work for productive activities. Water harvesting and afforestation should be encourage to increase water availability.
- Better understanding of the circumstances and needs of female headed households to improve the adoption and efficiency of agricultural production technologies
- Specific targeting of clients with relevant extension education and messages. There is a need to design a method on how to reach the female heads of households and the wives in the extension services. This could be through the design and implementation of an agricultural education service for men and women locally.
- Raise gender awareness in the community to help achieve equity in the farming systems. There is need for both men and women to be involved in decision making within the household, and for the females to have access to agricultural technology.
- Improve research-extension linkage, and find out the appropriate and culturally acceptable approaches of extension service to reach women.
- Strengthen service cooperatives, improve credit extension and raise awareness in the community to the importance of women having access to credit. Means and ways should be designed to link formal and non-formal credit associations with the farmers.
- Design an accepted mode of providing farm inputs to men and women through female membership of service co-operatives. In addition, there is a need to strengthen the service co-operatives.
- There is an urgent need to promote female education, both formal and non-formal.

3.0 KENYA

3.1 Introduction

In most countries of sub-Saharan Africa, women are the primary source of labour especially on small scale farms. The majority of Kenyan women live in the rural areas and actively contribute to agricultural production. About 88% of the women in rural Kenya are economically active (CBS, 1983). Women traditionally contribute most of the labour required for the cultivation of food crops on family holdings and increasingly in the production of cash crops (CBS, 1983). While men tend to undertake the heavier jobs of land clearing, fencing. and land preparation, women participate equally in planting and do most of the weeding, harvesting, transporting, processing, and marketing (Hassan and Salasya, 1994).

The current situation is that the planning and implementation of agricultural development projects take for granted that the household is usually a unit of analysis with male heads assumed to be the principal decision makers and source of information (Sutherland, 1994). Thus, the roles of members other than the male head of the household are frequently ignored. In some instances, even polygamous units are considered as single households. In the extreme, female headed households are ignored all together. This could be detrimental to many projects, since women and other members of the family bring specific skills, resources, and priorities to farm production. By ignoring those members and their roles, we are excluding important elements of the system in which agricultural production decisions are made and consequently wasting a great potential for increased productivity. Better information about women's situations and their multiple roles would help agricultural policies, programmes, and projects achieve greater agricultural productivity and national food self reliance beside supporting socio-economic goals (FAO 1986).

The demand on women's labour, time and energy in rural areas is not matched by technology. They still use crude implements for land operations and food processing is time consuming . While men in rural areas face similar technological bottlenecks, it is true that the division of labour between the two (women and men) make it more critical for women who are assigned the most tedious jobs in the field and in the household. The women bear more responsibilities for providing for the family in comparison to men.

3.2 Maize production systems

3.2.1 General Introduction

Maize (*Zea mays*) is the most important staple food crop in Kenya. It is probably the most important agricultural commodity particularly as a source of income and subsistence for the rural population. Therefore, the country's food security and the welfare of its farming population are largely dependent on changes in the production capacity of maize farmers. The maize fields are centres of economic activities in most rural areas where women contribute a significant share of the required labour. It is estimated that 1.6 million hectares of land are under the crop annually mainly on small holdings (Rees *et al*, 1997 eds., Hassan and Salasya, 1994). The major large scale maize growing areas are Trans-Nzioa and Uasin Gishu districts (Nkonge *et al*, 1997).

Maize (*Zea mays L.*) was introduced in Kenya in the 16th century but it was not until the early 1930's that conventional inbreeding and hybridisation was started at Njoro Plant Breeding Station. A formal breeding programme for yield was started in Kenya at Kitale in 1955. A large germplasm collection was introduced from Central and Southern America in 1959. The

annual average production is about 3.3 million metric tonnes (Rees *et al*, 1997 eds.). The average production per unit area is 1.5 tonnes per hectare which is very low. Maize production increases have not kept pace with growing demand. Consumption has increased at a rate of 2.1 percent per year while production has only increased at a rate of 1.6 percent a year between 1972 and 1992. Kenya can currently meet internal maize consumption needs in an average year, but must rely on imports in poor rainfall years.

About 85 percent of Kenya's maize is planted by small scale farmers. Small scale farms are those with an acreage of less than 20 ha. while large scale farms have more than 20 ha. Most of these farmers plant maize in combination with other crop plants such as beans, cowpeas, groundnuts, garden peas and sorghum. Maize/bean intercrop system is probably the most common practise. Maize is also grown as a sole crop mostly by the farmers who own medium and large farms (Kamau *et al*, 1998).

Approximately 70 percent of the area under maize is planted with hybrids or composites and the remaining 30 percent with either local or advanced generation hybrids (Nkonge *et al*, 1997). The average yield on farmers' fields is very low (1.5 tonnes per hectare) compared to research centre yields of 7.8 tonnes per hectare (Nkonge *et al*, 1997). There is a very limited area of uncultivated land suitable for maize production. This means that productivity gains are likely to come from increased output per unit area.

In many instances, decisions related to the procurement and application of modern inputs on the maize fields are made by men. Accordingly, the gender factor is considered crucial to the success of maize production technology development and transfer in Kenya. Maize technologies need to respond to the special needs of both men and women farmers to attain considerable potential for increased productivity.

The Kenya Agricultural Research Institute (KARI) maize programme has identified six maize agro-climatic zones (Table 3.1) with relatively homogenous biological responses to potential technological innovations. The zonation scheme has been adopted as the current basis for programme targeting and resource allocation (Nkonge *et al*, 1997) The key environmental determinants (elevation, rainfall, and temperature) and the criteria applied are given by zone. All zones are mutually exclusive in terms of criteria, except for the moist transitional and high tropics which overlap between 1800 m and 2000 m within this range. Only areas with minimum average temperatures between 7° and 11° from March through August are allocated to the high tropics zone.

Table 3.1 Maize programme target zones

	Elevation (m)	Rainfall (mm)	Temperature (^{0}C)
Low tropics	0-800	500-1000 (Mar-Aug)	<30°Av. Max and >20^{0}Av. Min. for Mar.-Aug.
Dry Mid altitude	400-1400	250-500 (Mar-Aug)	<30° Av. Max. for Mar.-Aug.
Moist Mid altitude	1000-1400	> 500 (Mar -Aug.)	N/A
Dry Transitional	1400 -1800	300-500(Mar-Aug.)	N/A
Moist Transitional	1400-2000	>500 (Mar-Aug.)	>11° Av. Min for Mar.-Aug.
High Tropics	1800 -2500	>500 (Mar-Aug.)	>7° Av. Min for Mar.-Aug.

Notes: N/A = not applicable
Source: Rees, Nkonge and Wandera (1997 eds.)

3.2.2 Maize production practises

Most small scale farmers practise mixed farming. Maize is intercropped with beans in most cases. Over 70% of the smallholder farmers intercrop maize and beans in the region(Kiiya *et al,* 1997). Recommended maize varieties are intercropped with a wide variety of bean varieties. Maize seeds are planted in rows and bean seeds put in the same holes with maize seeds (Lusweti *et al,* 1997). There are no rotations for maize and beans, unless land permits. Maize may also be intercropped with finger millet, cassava, sugarcane, sorghum, cowpea and groundnuts (CMRT, 1996). Some farmers intercrop maize and beans at the start of the growing season and they plant sweet potatoes immediately after they harvest beans (Lusweti *et al,* 1997; CMRT, 1996). When planting sweet potatoes, the farmers remove the maize tops as a source of forage for their dairy animals. It is not clear whether this practise of relaying potatoes with maize is done by women or men as it is stated that the selected farmers in Nyakinyua village were not separated into males and females; therefore this information was from "representatives of the community (men and women)" (Lusweti *et al,* 1997).

Field selection

In most cases, it is the men who decide on where each crop is planted, especially when it is a cash crop being planted. Women make the decision only in female headed (*de jure*) households.

Land preparation

Land preparation involves the use of a tractor, hand hoeing and oxen. The common method used varies from place to place depending on their availability, farm size, and socio-economic status. Irrespective of the sex of the farmer, land preparation is largely a man's job or jointly done by men, women and children (Table 3.2). Tractor and oxen ploughing and harrowing is done by men. Hand hoeing is done by men, women and older children except for difficult tasks such as hand hoeing virgin land full of couch grass where male adults are required (Kamau *et al,* 1998).

Table 3.2 Division of work on maize farm by sex and age groups.*

	Land preparation		Planting		Weeding		Harvesting		Processing		Selling	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Men	40	32	14	9	7	5	5	4	5	4	39	18
Women	10	26	16	33	16	32	13	32	59	59	35	56
Men,Women & Children	40	32	57	44	62	49	66	52	23	23	12	14
Men & Women	9	7	11	8	12	8	12	7	5	3	12	8

*The contribution of other labour groups such as children alone, men and children was less than 5% and hence not reported here.
Source: Hassan and Salasya, 1994.

Planting
Planting is to a large extent done jointly by men and women and children irrespective of who heads the family. Opening furrows using oxen, is done solely by men who occasionally are helped by older male children. Dropping of seeds and fertiliser application, where used, and covering of seeds is mostly done by women and children. Planting of beans between maize rows is mostly done by women particularly in the Kikuyu community. However, both men, women, and children can plant beans. In a survey carried out in the maize growing areas under the Kitale mandate region (Trans-Nzioa, Uasin Gishu, West Pokot, Keiyo Marakwet, Baringo, Laikipia and Nyandarua Districts), it was found that the sex of the household head had a significant effect on the system of cropping adopted by the family (Mose *et al*, 1997). More intercropping was done by families headed by females.

In zones where commercial farming is practised (Moist Transitional and Moist High Tropics), mechanical planters are used for the planting of maize.

Weeding
The weeds are controlled by hand-hoeing or slashing using family, communal or hired labour. Weeding is not gender specific: men, women and children weed when required (Table 3.2). However, womens' participation in weeding was found to be higher in female headed households than in male headed households (Hassan and Salasya, 1994). Use of herbicides is hardly practised by small-scale farmers When used, possibly by rich farmers, it is applied by men.

In high potential areas, where stalk borers are a problem, insecticides such as Dipterex granules, pyrethrum marc are applied by hand by both men and women. However, where a sprayer is used to control other pests, the spraying is done by men (Kamau *et al.*, 1998).

Soil fertility management
Soils in major maize growing areas (North of the Rift Valley Province) have diverse soil types. The region must have been subjected to different soil forming processes. Due to the various soil types, application of fertiliser varies from region to region. For example, application of 75 kg of Nitrogen is economical in maize and maize/beans intercrop in Trans-Nzioa district while fertiliser application in West Pokot to maize, beans or potato has proven uneconomical (Onyango, 1997).

Inorganic fertilisers alone or together with farmyard manure may not be the answer to the soil fertility problem due to high cost of fertilisers and the unavailability of farm manure. It is proposed that alternative ways of improving soil fertility be employed such as legume green manure, forage legumes, forage tree legumes, legume inoculants and compost manure. To conserve soil and sustain its fertility, various soil conservation measures are encouraged. These include construction of terraces, tree planting in catchment areas, planting trees or grass along contour lines, and rehabilitation of gullies within farms or catchments. There is data indicating who in the household does apply the fertiliser or manure when used. It is important to identify the daily division of labour especially in constructing terraces and rehabilitation of gullies.

Harvesting and storage
The maize is harvested by men, women and children. Men cut and stook maize while women and children dehusk the maize. Similarly, beans can be harvested by all but much more frequently by women and female children.

The storage of maize and beans, is done by both men and women, the former being involved more when both grains are for commercial purposes. Storage for home use is mainly the responsibility of the woman. Use of insecticides against weevils is common where grains are stored for a long period. Application of insecticide in this case is not gender specific (Kamau *et al,* 1998). Processing is mainly a woman's job whether in male or female headed households (Table 3.2). Therefore, women become the most important factor in designing post-harvest technologies as they are the potential adopters.

Marketing
Selling commercial maize, is mostly a man's work, except in female headed households (*de jure*) and women managed farms (*de facto*) where the latter generally need the approval of the husband. Women are involved in selling small amounts of maize and beans in local markets to generate cash for home use. More men sell the produce of female farmers than women in male headed households.

Small holder constraints
Women farmers' ranking of the most serious problems facing maize production did not differ significantly from male farmers ranking (Hassan and Salasya, 1994). Apart from weeds and diseases such as head smut and streak, the general constraints facing especially the small scale farmer are:

- Lack of credit facilities, even where they are available farmers lack security to enable them to get the loans.
- Unreliable marketing channels and inadequate incentives for production discourage farmers from venturing into commercial maize production.
- Most of the inputs, especially fertilisers, are too expensive for the ordinary farmer to use.

3.3 Wheat Production Systems

3.3.1 Introduction

The Kenya Agricultural Research Institute (KARI) has ranked wheat second after maize in its cereal crop research priorities (Hassan *et al.*, 1993). Wheat is increasingly becoming an important source of food in Kenya, especially for urban dwellers (GOK, 1986). The total area under wheat is about 141,230 ha. with a production total of 381,332 metric tonnes, with an average yield of 2.7 t/ha. (Kinyua *et al,* 1989). More than 50 % of Kenya's wheat is produced in Narok, Nakuru, Baringo and Uasin Gishu districts in the Rift Valley province (KARI, 1989).

Currently local production meets only 50 % of total wheat consumption (Hassan *et a.,l* 1993). The wheat supply has undergone major structural changes, but the demand for wheat flour and wheat products continues to outgrow supply due to a fast growing population (at 4% per annum), increasing income, and an increasing concentration of population into urban areas. The urban population is growing at 7% per annum and this is where most of the wheat flour and wheat products are consumed (GOK, 1986). This has led to changing consumption

patterns in favour of wheat products relative to maize consumption and other traditional staples (GOK, 1986).

Until 1974, Kenya was a net exporter of wheat to neighbouring countries and to Saudi Arabia, but since then the country has had to import wheat each year to meet a high and rising local demand. Wheat supply dropped from 132 % in 1961-1965 to 60 % in 1983-87 (Byerlee and Morris, 1990). The ever increasing gap between supply and demand continues to be bridged by imports. The level of wheat imports rose from 33,000 t in 1977 to approximately 218,000 t in 1987, an increase of over 500 % in a decade. Revised government projections indicate that the country will continue to rely on imports into the year 2000 to bridge the gap between wheat production and consumption (World Bank, 1989).

To bridge this gap, the government has proposed price and market incentives, expansion of wheat area to marginal lands, an emphasis on crops that could substitute for wheat, and intensified wheat research (Hassan *et al*, 1993). There is a need to increase wheat production through easing constraints faced by both small scale and large scale farmers. Gender considerations may be one of those factors which need to be diagnosed and solutions sought to increase wheat production especially on small scale farms. Kinyua *et al* (1989) and KARI (1992) identified soil fertility as one of the major constraints in wheat production besides diseases (especially rusts), poor farm management, poor yields and lack of credit. These factors would impact more negatively on the small scale farmer than the large scale farmer. Hence, taking gender into consideration in wheat research may alleviate the present situation as information, new technology and proper farm practises may reach a wider audience than what the current situation offers.

Wheat farming began in Kenya in the early 1900s when European settlers, mainly in the highlands of the Rift Valley, began producing wheat on large farms, using highly mechanised production methods. As a result of the government's land settlement policies in 1960's and 1970's, wheat production is no longer confined to large farms. In the medium and high potential zones, there exists both small and large scale wheat producers. In 1960, only 7 % of the total wheat area was under smallholder production, but this has increased to 20 % by the 1970's. The proportion of wheat area under small holder cultivation was expected to level off at around 25 % as land subdivision declined (World Bank, 1989). Unfortunately, little up to date information is available on the distribution of wheat farms by size and region, the contribution to total wheat production, and numbers of smallholder and large scale wheat farmers (Hassan *et al*, 1993). Using Nakuru as a representative wheat growing area, it was estimated that smallholder farms (<20 ha.) occupied no more than 15 % of the total wheat area but represented over 70 % of the total number of wheat farmers (Hassan *et al*, 1993).

3.3.2 Wheat production practises and labour implication by gender

The sub-division of land led to changes in the structure of wheat production. Maize production and dairy have replaced wheat on most small scale farms. At the same time, wheat in the marginal areas in the marginal zones of Narok, Trans-Mara and Samburu has expanded (Hassan *et al*, 1993). In these marginal areas, wheat competes for land with wildlife and communal grazing.

Land preparation

Land allocation to the various crops is determined by the head of the household whether male or female headed. Land preparation is normally done by tractor, regardless of farm size. Where the farmer does not own machinery, he/she hires from the neighbours. Large scale farmers have better access to machinery than small scale farmers, and this has the implication that small scale farmers tend to prepare their farms late. Plowing is only recommended for "virgin land". Farmers plow 1.7 times on average.Harrowing occurs two to three times or zero tillage is used with the herbicide glyphosate applied at 2.5 l/ha to control perennial weeds on stubble land. None of the farmers surveyed used glyphosate and all practised mechanical tillage. Wheat farmers in low potential areas plow more frequently, using chisel plows, and harrow less than farmers in high potential areas. Large scale farmers perform more tillage operations than small scale farmers on average in both high and low potential areas. There is no gender classification in this survey. However, since the land preparation is mainly by tractors, it is the hired men drivers who do the planting.

Planting

The seed rate ranges from 100-150 kg/ha. depending on the variety (Kamau *et al*, 1998). The choice of variety is normally determined by the household head of the farming family. In most cases, planting is done by machinery using drills. In cases of very small farms, the planting can be done by women who open the furrows using hand hoes.

Weeding and crop protection

The proportion of farmers who use manual or zero weeding versus chemical weed control is higher the smaller the size of the farm. The women would normally do the manual weeding. The proportion of farmers who use chemicals to control crop pests and diseases increases with farm size . This indicates that limited access to modern means of wheat production is an important factor hindering productivity growth among small scale farmers. The use of pesticides is higher in marginal areas, because aphid infestation is higher. A large proportion of farmers use fungicide to control rust in the high- potential areas where the incidence of this disease is greater.

Harvesting and marketing of wheat

All farmers use combine harvesters and 99 % of the crop is sold, indicating that wheat is not an important subsistence food in rural Kenya. The proportion of farmers delivering wheat to the National Cereals and Produce Board increases with farm size.

Constraints to small scale farmers

- Lack of mechanised technology appropriate for small scale wheat producers.
- The high cost of machinery services.
- Weed infestation is ranked second in high potential areas.
- Fertiliser cost especially in low potential areas.
- Obtaining credit for small scale farmers is very serious.

There is no systematic characterisation of farmers in the wheat farming systems based on gender (Kinyua, person. comm.). However, there is a willingness on the part of the researchers to incorporate gender considerations in the ongoing research projects and future projects at National Plant Breeding Station at Njoro.

3.4 Gender Specific Constraints and Implications

Gender Constraints

Access to education and training

In a survey carried out in various districts in Kenya, it was found that there are more female farmers with no education than men (Table 3.3) across tribes as well as religious groups (Hassan and Salasya, 1994). The bias against women was higher among the Luo's , the Kisii's, the Giriama and the Digo's compared to others. The Luyia women had better chances of attending farmers training colleges, while the Luo's and the Kisii's had the least chance (Hassan and Salasya, 1994).

Access to farm resources

Male farmers were found to control larger farms, are more educated and with better chances to attend farmers training college than women farmers (Table 3.3). Also the percent of farmers owning farm machinery and tillage equipment was higher among males than females (Table 3.4).

Access to information and new technologies

Access to new technologies, training and access to information tend to favour, first the large scale farmers and male heads of households. The two categories are more likely to get access to credit facilities than the small scale farmers, in particular, the women farmers.

Varietal preferences

Women's varietal preferences in terms of the various traits desired in maize were similar to those of men. This is especially so in the relatively more favourable environments, medium to high potential. However, women tend to have stronger preferences than men for the local varieties in more marginal environments (Hassan and Salasya, 1994).

Table 3.3 Sex distribution of maize farmers and selected socio-economic characteristics by ethnic and religious groups.

	Average farm size (ha)		% with no education		% attended FTC		No. of family members attending School		% of female farmers
A.Ethnic group	Male	Female	Male	Female	Male	Female	Male	Female	
1. Kikuyu	18	2	30	42	2	1	2	3	44
2. Luo	3	2	21	54	4	0	2	3	48
3. Luyia	122	9	26	30	0	3	3	3	45
4. Kamba	5	4	42	43	1	1	3	3	44
5. Kisii	2	2	38	61	3	0	3	4	42
6. Kalenjin	30	37	35	48	6	5	3	3	30
7. Pokot	5	6	46	58	3	0	4	1	30
8. Teso	3	2	0	0	0	0	3	1	26
9. Duruma	4	2	92	100	0	0	3	4	40
10.Giriama	3	3	61	100	0	0	1	2	18
11. Digo	1	1	17	73	0	0	3	2	65
12. Rabai	1	1	88	75	0	0	3	2	20
B. Religious group									
Christian	38	17	34	45	3	2	3	3	41
Muslims	1	1	68	73	0	0	3	2	41
Traditional	5	4	38	50	0	0	3	1	20

Table 3.4 Effect of gender on access to farm resources and agricultural services among maize farmers.

	Average farm size (ha)	No. of family attending school	% farmers with no education	% farmers received FTC training	% farmers owning a tractor	% farmers owning a plow	% farmers owning a draught animal	% never received extension advise	% used credit
Male farmers	35.8	3	35	6.4	4.6	14.0	18.8	36	7.3
Female farmers	7.0	3	47	3.7	2.1	9.7	13.7	45	3.0
Error Statistics									
Chisquares	-	-	19.9***	4.9**	6.3**	7.3**	7.4**	13.4***	11.4***
Likelihood ratio	-	-	20.0***	5.1**	6.7**	7.5**	7.6**	13.4***	12.3***
F-ratio	4.3**	1.8	-	-	-	-	-	-	-
Total Sample	24.1	3	40	5.3	3.6	12.2	16.7	39	5.5

*, ** and *** denote significance at 10, 5 and 1% levels respectively.

Access to extension services and credit

The extension services tend to concentrate on household heads who are not necessarily involved with the implementation of the various activities, especially so on small scale farms.

Before the introduction of the Training and Visit (T &V) system in 1982, fewer women farmers were reached by extension staff. After 1982, the percentage of male and female farmers receiving extension service was almost equal (Hassan and Salasya, 1994). There is still some bias towards male farmers (Hassan et al, 1997) (Table 3.4).

More male farmers had access to credit than women. The gender effect was found to be statisticall significant for extension and credit access. However, this bias in targeting male farmers seems to have a minimum impact, as it was found that the rate of adoption of improved maize seed and fertiliser technologies are the same for both male and female farmers (Hassan and Salasya, 1994). This could be due to the availability of other sources of information such as fellow farmers and seed dealers. In a later study (Hassan *et al.*, 1997), socio-economic attributes of the head of a farming family, was found to correlate with adoption patterns. The likelihood of adoption was higher among male farmers than female farmers.

The observed disparities in access to education, extension and credit culminates in differential maize yields for male and female farmers. Male farmers were found to achieve higher yields than female farmers (Hassan and Salasya, 1994) even if their production practises were almost similar. Higher education levels, better access to training, credit, and extension services, ownership of large farm lands and modern machinery put men in a better position to perform timely production operations.

There are various, well intended maize research projects, but they fall short of incorporating gender considerations. For example, in the characterisation of farming systems in NARC Kitale (Wanyama *et al,* 1997), it is specified that there is a need to define target groups of farmers for efficient technology development transfer. It is acknowledged that this will contribute significantly to increased technology adoption and hence improve the welfare of the majority of the resource poor, small scale farming community. However, the key informants chosen were village headmen or their representatives. It was assumed that the male informants were "fairly knowledgeable on agricultural practises, trend and constraints". This decision left out the women farmers who participate in a majority of the agricultural activities on the farm. Another example is the recent Participatory Rural Appraisals of the maize farming systems of the North of the Rift Valley Province of Kenya (Rees *et al.*, 1998 eds.). The daily calendar activities for men and women are indicated and the roles by gender of the household in every village (there were 12 villages in the study) presented. However, maize production constraints are not disaggregated along gender lines except in two farms, Sebit and Moiben.

Gender Implications

- There is inadequate maize data disaggregated by gender, and virtually none for the wheat production system. This may result in "gender blind" research programmes, with ineffective communication between the farmer and the researchers.
- Women lack the basic education, knowledge and relevant skills in both maize and wheat production. This is likely to cause a delay in the adoption and efficient utilization of technologies developed. It also limits their potential in management of the farm should the man be absent.

- Women have inadequate access to farm inputs, machinery and credit. This limits their ability to purchase fertilizers, seed and pesticides that are necessary for optimal maize and wheat production. Hired labour will be restricted due to unavailble credit; hence a delay in the various farm activities will occur
- Women do not directly benefit from the produce on the farm as most sales are done by the men. This may act as a disincentive in crop production.
- Women spend their time on the farm and on household chores. These dual responsibilities limit the time she can spend on the farm; hence she is unlikely to perform the production practises on time. This limits both productivity and ability to adopt new varieties.

3.5 Suggestions and Recommendations

In view of the available information obtained, it is recommended that:

- A comprehensive survey be done to record all gender disaggregated information in maize and wheat production systems. This may include the roles of men and women in each production activity, the time spent on it; classification of households based on economic status and how this affects labour division in the household.
- Research programmes be initiated to address agricultural issues of concern to women. This may include topics like workload and labour bottlenecks, storage and pest control, processing characteristics and methods of improving the access of women to land, credit and information.
- Research be carried out to develop technologies that alleviate household work to release women's time for productive resources.
- There should be better targeting of extension education to reach both the women and men clients.
- Initiate gender awareness programmes at extension and family level to increase the understanding of the need for equity in society. The community needs to understand why women should benefit from the agricultural activities.
- Formal and informal agricultural education be promoted for women farmers to improve their knowledge and skills of agricultural production

4.0 TANZANIA

4.1 Introduction

Agriculture is the mainstay of the economy of Tanzania. The sector contributes 62.5% of the country's GDP, 90% of the labour force and is responsible for 75-85% of the country's foreign exchange earnings. The major agricultural exports are coffee, cotton, tobacco, cashew nuts, sisal and tea. Coffee and cotton contribute 20.3 % and 18.7 % of the GDP, respectively.

Women in Tanzania constitute more than half the total population (1988 census). They also constitute more than half of the economically active group. They dominate the small-scale farms which comprise 93.4% of the agricultural land (the remaining 6.6% comprises of large farms which are run by the state). In general, women are responsible for 64% of land tilling, 70% of sowing, 71% weeding , 73% harvesting and 56% marketing. Despite this contribution, women form a bigger proportion of the illiterates (about 43% of women above 15 years). They are subject to poor nutrition, are absent in decision-making, contribute a bigger portion of the rural poor, and do not control or get an equal share of the income they generate, especially in rural areas (Rugimbana, 1998). Land and cash needed for increased productivity are controlled by men principally because of the patriarchal system that prevails.

Gender issues in agricultural research are now of paramount importance in Tanzania, stemming from the realization of the importance of addressing social relations in agriculture and how they are related to the emerging concepts and practices of 'client oriented research'. Social relations at the household level have been shown to have an important bearing on technology use and adoption.

In Tanzania, there are both male and female headed households. The relevant data was obtained from Participatory Rural Appraisals and Gender Analysis done in Mvumi Division in Dodoma, Illeje District in Mbeya, region and Zanzibar North. For example, in Mvumi Division in Dodoma, an average of 33% of households are headed by women, either in a *de facto* or *de jure* marital status, 70 % of the single women are widows and nearly all of the women headed households are in the low income category. In Illeje District of Mbeya region, female headed households are mainly headed by widows who are usually poor, harvesting less than four bags of maize annually. For Zanzibar North, 25% of households are headed by women.

4.2 Maize Production Systems

4.2.1 General Introduction

The maize production regions in Tanzania are Arusha, Kilimanjaro, Iringa, Mbeya, Rukwa, and Ruruma. Most of the maize is produced on small farm holdings and only a small proportion is produced on large-scale commercial farms (Moshi and Marandu 1985). Most farmers in Tanzania prefer white maize and there is also preference for flint types which seem to store better and are more suitable for the preparation of acceptable and adaptable maize dishes. Flint maize types are also less susceptible to breakage during processing than dent maize.

Maize is mainly grown in pure stands. In dry areas and in cases where farms are away from the homestead, maize is intercropped with beans (*Phaseoleus vulgaris*) and pigeon peas (*cajanus cajan*). This intercropping is meant to reduce the risk of failure (Mugendi *et al*, 1996). Other crops usually intercropped with maize are cowpeas, lab-lab bean and green gram. Maize can be rotated with beans especially where there are possibilities of bimodal rains with maize and beans grown in the shore and long seasons, respectively. In the valley bottoms, beans can follow maize depending on residual moisture. Planting maize in association with pigeon peas has an overwhelming advantage over planting sole maize and more than 20% of the farms in Northern zone plant maize in association with legumes.

The main maize producing areas are Arusha, Kilimanjaro, Iringa, Mbeya, Rukwa, and Ruvuma. About 50% of the maize produced is used as human food at the points of production with a small proportion used as green or boiled maize. The stalks, green or dried, are used as animal feed. Maize is

produced by over 50% of the country's farmers on approximately 1.7 million hectares. The national production has during the last 10 years ranged from 21,59,000 metric tons in 1993/1994 to 3,125,000 tons in 1998/89 (Tanzania Food Security Bulletin, 1996). Most of the maize is produced on small-scale farms and only a small proportion is produced on large-scale farms (Moshi and Marandu, 1985).

4.2.2 Maize production practices

Maize is mainly grown in pure stands. In situations where it is grown on a large acreage (more than 2 ha), intercropping as well as relay cropping is practised. For pure stands of maize, ox weeding is the most efficient method of weed control. However, for maize intercropped with legumes further research needs to be done to assess yield losses that result from planting maize and companion crops in the same row to allow passage of the ox weeder compared to the labour saved by using the ox-weeder. This can only be done if noxious weeds are not found in the field, otherwise systemic herbicides would be recommended in monocrops (Nkonya *et al.*, 1996). Other maize production practices vary by agroecological zones.

Gender differentials in maize production - Time use and division of labour

The most striking observation is the amount of labour women contribute in all stages of agricultural production of main food cash crops. At Handali village, 78% of the women are involved in all stages of agricultural production compared to an average 29% of the men. Harvesting is the single task where all women participate without exception. Other activities where women contribute almost all labour are seeding, harvesting, storage, farm clearing, seed preparation, weeding, transporting and milling

Similarly, in Illeje District in Mbeya region, in the cultivation of maize, men contribute an average of 45% of the required time and women about 55%. In cultivation of beans, women contribute an average of 80% of the required labour input and men the remaining 20%. However, this contribution varies in relation to wealth categories. Women are definitely the undisputed main participants in agricultural production in Mvumi considering that 60% and 40% of the respondents were women and men, respectively (Soer, 1988). The above information contain unbiased observation with regard to men and women's participation in agricultural production.

Field selection and land preparation

In the majority of cases, decisions on what to plant and the location is made by men. This is well reflected in the gender patterns in both Jitengi village (Korogwe District) and Mogabiri extension project.

Planting

Planting is a back-breaking activity and is often undertaken by men, women and children (Annex 4).

Weeding

This is predominantly a women's activity (Annex 4). For example, in the Mogabiri Extension Project, 69.4 % of the women against 12.3 % of men undertake the work.

Harvesting and storage

Percentage female participation in harvesting is much higher (73 %) as compared to that of men (Rugimbana, 1998). They dominate in maize storage and transportation.

Marketing

Fewer women sell the produce (56 %) as compared to the men (Rugimbana, 1998).

4.3 Wheat Production Systems

4.3.1 General Introduction

Wheat is the fourth most important crop after maize, sorghum and millets and rice. It is produced in the highlands of southern and northern Tanzania. Altitude plays an important role in wheat distribution as it influences rainfall, temperature and disease incidences. Domestic production of wheat is estimated at 80,000 tons which is 70% of the national demand. Wheat is produced by both the large and small scale farmers of Northern Tanzania to a greater extent and less in the Southern Highlands. The large-scale farms, which are owned by the National Food Corporation (NAFCO), produce about 50% of the national production. The country imports between 23,000-55,000 tons per year to supplement the national deficit.

Wheat product consumption has been rising fast in both urban and rural areas in Tanzania. It is estimated that wheat consumption in Tanzania ranges between 90,000 to 140,00 tons per year (Loewen Rutger, 1990). However, domestic production is estimated to be 80,000 t which is 70% of the demand.

Wheat marketing has experienced a spectacular change. There has been a transition between wheat market liberalization and private businesses assuming bigger roles in food marketing. Local wheat marketing has been difficult in years like 1994 onwards due to wheat stockpiling caused mainly by private traders who flooded the market with "cheap" imported wheat. This is continuously worrying NAFCO wheat farmers as well as other wheat producers (Masaga *et al.*, 1997).

4.3.2 Wheat production practices and labour implications by gender

In most areas, wheat is grown as a monocrop and grown once a year during the long rains. However, areas of West Kilimanjaro sometimes grow wheat during the short rains as well. In small scale farms, part of the wheat fields can be in sequential cropping with *Phaseolus* beans. This is particularly common in Karatu districts of Arusha region as well as in Mbeya and Iringa regions in Southern highlands.

The major farming activities involve land preparation, planting, fertilizer application, weed control, crop protection, harvesting, transportation, processing, storage and marketing. Women participate most in hand hoeing, seed selection, hand weeding, dusting, and transportation (Annex 4).

4.4 Gender Specific Constraints and Implications

Most women farmers in Tanzania have very limited access to education, extension services, credit and farm inputs. An example from Mvumi Division in Dodoma illustrates this situation (Table 4.1, 4.2 and 4.3). The following constraints are applicable in both maize and wheat farming systems:

- inadequate gender disaggregated data and minimal use of what exists in planning;
- extension services are biased towards male and often rich farmers who are usually men;
- lack of appropriate technologies for female farmers;
- improved or simplified technologies are usually captured by male farmers;
- what is originally women crop may turn into men's crop with the changing value of that particular crop;
- low involvement of women farmers in the cash economy due to lack of ownership, access and control of resources and outputs;
- women have limited access to credit

Access to education

Fifty one percent of women in Mvumi have not had regular schooling. However, on average 40% are literate. The only other form of education accessed by 23% of women is religious training. Agricultural training is accessed by only 8% of the women (Table 4.1)

Access to means of production

Information on access to means of production is extremely important in order to determine whether women receive a fair share of the various inputs necessary for agricultural production.

Access to seeds in Mvumi Division

Most of the interviewed villagers (79%) in Mvumi use seed from their own harvests (Table 4.2). Women and especially those from low resource households are more dependent on such seeds. Similarly, their use of other farming inputs such as fertilizers and pesticide is low (Table 4.2).

Table 4.1 Level of education of the interviewed villagers in Mvumi Division.

Level of education	Women		Low resource Women		All men and Women	
	N = 53		N = 41		N =69	
Regular schooling	26	49%	18	44%	39	56%
Primary education	27	51%	19	46%	39	57%
Secondary education	00	0%	00	0%	00	0%
No regular schooling	27	51%	23	56%	30	44%
Literate	33	62%	25	61%	46	68%
Illiterate	21	40%	17	41%	23	34%
Religious education	12	23%	10	24%	17	25%
Post secondary	00	0%	00	0%	0	0%
Teacher training	00	0%	00	0%	00	0%
Agricultural education	00	0%	00	0%	01	1%
Technical education	01	2%	01	2%	02	3%
None/other	40	75%	30	73%	48	71%

Access to organic and inorganic fertilizer

Use of manure is low in Mvumi Division due to the destocking exercise. With respect to fertilizer use, more than 80% of the villagers did not use manure (Table 4.2). None of the women interviewed at Mvumi use artificial fertilizers, and 47% of the interviewed women stated they used neither organic nor artificial fertilizer (Table 4.2).

Access to tools and machinery

An axe, the second most common tool is used in 60% of the women's households followed by the *machete*. The most common farming tool was the hand hoe

Access to credits and revolving funds

Formal credit is not accessible to 92% of the women, while informal credit sources are not available to about 83% of the women in Mvumi division. Previously, in the baseline survey on Mwifikira Division in Dodoma rural, 98.5% of the villagers responded that they had not received any loans; 93% of all interviewed men and women had not received any formal credit (Table 4.3).

Decision making in Ilolo village of Kisimani hamlet

Concerning decision making, women in Ilolo village contribute to decisions on what type of crops to grow, where to plant, what techniques to use and how to distribute income accruing from sale of crops. Women are similarly strongly engaged in deciding whether money should be borrowed, whether livestock should be sold, how income coming from sale of livestock should be distributed and if surplus crops should be retailed. Overall, 71% of women in the village are involved in decisions made within their households on a wider range of issues (Table 4.4).

Table 4.2 Access to seeds and fertilizers in Mvumi Division in Dodoma.

Source of seeds/fertilizer	All Women (N = 53)		Low resource women (N = 41)		All men and women (N = 69)	
Seeds from own harvest	44	83%	35	85%	54	79%
Seeds from friends	14	26%	10	24%	18	26%
Seeds from NGO's	00	0%	00	0%	00	0%
Seeds from dealers	14	26%	09	22%	21	31%
Seeds from Coops	00	0%	00	0%	00	0%
None/other	05	9%	03	7%	06	9%
Artificial fertilizer	00	0%	00	0%	02	3%
Organic manure	03	6%	01	2%	04	6%
Ashes	04	8%	03	7%	06	9%
Unaffordable	12	23%	10	24%	13	19%
Unavailable	17	32%	14	34%	19	28%
None/other	25	47%	20	40%	34	50%

Table 4.3 Access to formal credits by the interviewed villagers in Mvumi Division in Dodoma.

Type of credit source	Women (N =53)		Low resource women (N = 41)		All men and women (N = 69)	
Bank	00	0%	00	0%	00	0%
Credit societies	03	6%	02	5%	03	4%
Cooperatives	00	0%	00	0%	00	0%
NGOs	02	4%	00	0%	03	4%
Goods	00	0%	00	0%	00	0%
None/other	49	92%	38	93%	63	93%

Table 4.4 Decision making in agricultural production and other household activities at Illolo village - Kismani Hamlet.

Decision on :	Father		Mother		Children	
Types of crops to grow	07	39%	11	61%	01	6%
Where to plant	07	39%	10	56%	02	11%
Technique to use	06	33%	06	33%	00	0%
Sale of surplus crop	06	33%	06	33%	01	6%
Sale of surplus livestock	04	22%	03	17%	00	0%
Distribution of crop income	05	28%	10	56%	00	0%
Distribution of livestock income	02	11%	03	17%	00	0%
Borrowing of money	04	22%	04	22%	00	0%
Average	05	28%	07	39%	05	3%

(N=18)

Gender Implications

- Low access to production knowledge and skills can negatively affect productivity;
- Limited control over resources and outputs often acts as a disincentive to women, resulting in less input and reduced productivity;
- Women's poverty may lead to inadequate use of agricultural technologies such as improved seeds, fertilizers and other agro-chemicals;
- Women's constraints on time may mean less land being ploughed,and less intensive management resulting in low productivity.

4.5 Suggestions and Recommendations

- Development of appropriate technologies to ease women's workload in the home and on the farm;
- Adoption of participatory research methodologies, e.g. participatory technology development, participatory plant breeding and farmer involvement in technology assessment;
- Establish databases that reflect the time spent on various activities on the farm in national or regional statistics;
- Devise mechanisms for improving women's access to credit and farm inputs;
- Gender sensitize extension officers to target both men and women;
- Collect gender disaggregated data for at least one district in each of the 25 regions in the country, and in one of the districts in Tanzania where both maize and wheat are grown (e.g. Karatu in Arusha region). This would provide information about maize and wheat farming systems at the same time.

5 0 UGANDA

5.1 Introduction

In Uganda, agriculture is the most important sector of the economy, accounting for 76% of export earnings. It provides forthe employment of about 80% of the population, and it is the base of most of the manufacturing and service industries in the country (Ministry of Women in Development, Culture and Youth, 1994).

Ugandan women constitute 70-80% of the total agricultural labour force, and account for over 80% of the food production. They are responsible for 60% of planting, 70% of weeding, and 90% of preparation and processing. Food crop production has sometimes outpaced population growth but in 1988 and 1989 food production grew by 11.8% and 12.2%, respectively, compared to the population growth of 2.5 percent annum (Ministry of Women in Development, Culture and Youth, 1994).

Despite the above, women's roles have for a long time been inadequately reflected in the formulation and implementation of the agricultural polices and strategies, leave alone the reflection of their contribution in production statistics. Governments's policy is to support, and guide all crop, livestock and fisheries production by ensuring that all farmers and producers are assisted in raising the quality and quantity of their produce so as to sustain not only Uganda's self sufficiency in food, but also the country's economic and social development.

Since 1988, the policy direction has been changing towards the advancement of women within the agricultural sub sector. Such changes include: the implementation of gender oriented policies aimed at mainstreaming gender and women's issues in all sub sectors, in the agricultural development process and to achieve an overall economic, political and socio-cultural emancipation of women in the sub sector.

Before the 1960s the rural women were mainly using their indigenous methods in food production and processing. In 1964, the Ministry of Agriculture started the Home Economics and Young Farmers programmes as part of the extension system to target women and youth farmers for improved and increased food production, processing, utilization and improved home management. These programmes were to equip them with improved production technologies, knowledge and leadership skills. The programme progressed and expanded their activities up to 1977, when the political instability at the time led to the breakdown of the economic activities in the country.

In the early 1980s, most programmes were gender blind and male dominated resulting in the marginalisation of women's roles and their extension needs. Even the above mentioned women's programmes were not successful because they were under funded and generally marginalised. As a result, women were working in isolation, which led to low production, poor food handling and utilization, causing food insecurity at the family level and at times at the national level.

The early 1980s, were characterized by low numbers of women in both the decision echelons and the extension service. However, by 1988, 34% of the district's decision makers in the sector were women compared to 0% prior to 1985 (Ministry of Women in Development, Culture and Youth, 1994). By 1993, approximately 20% of the decision makers in the crop sector were women. In the crop extension sector the women graduate personnel constitute

21% of the total while women constitute about 12.8% of all extension personnel in the crop sector. By 1992 the percentage of women in the two main agricultural research stations was 34.4%. (Ministry of Women in Development, Culture and Youth, 1994).

At the farm level, culturally the women do not usually make decisions without the consent of either their husbands or their male peers. This is mainly because women do not own land. At the moment, Government is trying to increase the decision making ability of women farmers through training, gender sensitization, income generating activities and exchange tours. The Government has increased participation of women through mainstreaming gender in projects and programmes and provision of credit and other production incentives.

In all studies identified, there was no clear demarcation between male headed and female headed households except in one instance. However, due to the war situation in Uganda, there were many families which were left without males. It is probably a gap in the methodology used in data collection rather than an absence of female headed households in Uganda.

5.2 *Maize Production Systems*

5.2.1 General Introduction

Maize is produced throughout Uganda, but the major maize producing areas are: Iganga, Mbale, Masindi and Kapchorwa. Until 1930, the government promoted maize production, but this policy was later reversed owing to the maize crop's heavy uptake of soil nutrients, vulnerability to sheet erosion under poor management, and competition with cotton, the major export crop at the time (Ntege-Nanyeenya *et al,* 1997). In 1949, the Cotton Research Corporation opened a regional research station at Namulonge, but until the early 1970s most research focused on Uganda's principal cash crops, coffee and cotton (Ntege-Nanyeenya *et al,* 1997). Maize became an important subsistence and nontraditional cash crop in the 1970s and 1980s as marketing systems for cotton collapsed. Although USAID sponsored a programme to strengthen research in food crop production in 1983, the programme lasted only until the late 1980s, before much actual research could be undertaken.

Currently maize is a major staple, giving variety to household diets in the form of roasted or steamed green cobs, maize flour, and porridge. Maize stover and bran also constitute major ingredients in livestock feeds. Maize is thus a strategic crop in Uganda's food security, largely as a result of increasing urbanization, and has the potential to become a non-traditional agricultural export. The predominant food crop is bananas (*matooke)*, followed by maize, though Irish potatoes are growing in importance in certain areas. Uganda's aggregate maize supply is about 900,000 metric tonnes (t) from an area of about 563,000 hectares (ha). Maize exports for the financial year 1993/94 were 88,263 t, equivalent to 27,551 million Ugandan shillings (USh.). Per capita consumption of maize is 23 kilograms (kg) per capita per year (Ntege-Nanyeenya *et al,* 1997). The total demand for maize is estimated at 391,300 t. This includes maize for animal feed, industrial use, and human consumption,

Over 40 % of the maize produced in Uganda is sold while 60 % is for household consumption (Acasio and Borsdorf, 1994).

5.2.2 Maize production practices

Maize is grown as a monocrop and also intercropped with beans, groundnuts and soy beans (Mugisa-Mutetikka *et al.*, 1998). It is usually grown twice in a year. Major farm activities for maize include land preparation, planting, weeding, harvesting, dehusking, threshing, winnowing, storage, processing and marketing. In general, men make the decisions regarding the growing of cash crops, while women make decisions regarding food crops. There is usually mutual agreement on where to plant each crop, though the man has an edge in this particular issue.

Land preparation

The farmers use oxen plough and hand-hoeing to prepare the land. Hand-hoeing is dominant on small scale farms while oxen-plough and tractors are mostly used on farms that are 2 ha and above.

Weeding

Most farmers control their weeds manually using hand hoes. Weeding is done twice or thrice depending on the type of maize grown. Use of herbicides is rare in the control of weeds. For example, in Iganga, none of the farmers in the sample used herbicides to control weeds. The farmers are either not aware of their existence or the chemicals are too expensive (Ntege-Nanyeenya *et al*, 1994). Weeding is mainly done by women but men occasionally participate.

Soil fertility management

There is limited utilization of inorganic fertilizer in maize production. For example, in Iganga district, 97 % of the farmers interviewed used no inorganic fertilizer while only 2 % used inorganic fertilizer on crops other than maize. The reason given is lack of knowledge of the existence of inorganic fertilizer and the high price that they had to pay for the fertilizer (Ntege-Nanyeenya *et al*, 1994). As a result of this trend of not using inorganic fertilizer, national fertilizer consumption has fallen from an estimated average of 1.4 kg/ha in the 1960s to 0.2 kg/ha in 1993 (Ntege-Nanyeenya, 1994). This makes fertilizer use in Uganda among the lowest in the world.

Storage and marketing

Most farmers (~70 %) shell maize and store it in bags while the remainder store maize on the cob. The maize is kept inside the house to avoid rampant theft of the commodity. Some farmers sell their maize at the farm gate while others sell their maize in trading centers. The time it takes for a farmer to sell off maize depends on the economic standing of the family. Poor households are bound to sell their maize earlier than relatively well off households.

Sale of farm produce is mainly done by men who also are major decision makers on how the proceeds should be utilized.

5.3 *Wheat Production Systems*

5.3.1 General Introduction

Farming systems in Uganda are dominated by the distinction between food/subsistence and cash crops. In some instances, for example maize, the distinction is breaking down but the need to provide the bulk of family food requirements from the holdings remains paramount. Although wheat is eaten in small quantities in parts of Uganda, especially Kabale, it is essentially regarded as a cash crop. Over 95 % of the wheat produced in Uganda is sold (Acasio and Borsdorf, 1994). Although cash crops take second place to basic food production they are an integral part of the farming system in order to meet cash expenses such as housing, clothing, health and education.

Bananas compete with wheat in terms of labour requirement, but may not compete directly for land at higher altitudes. The main competition for land at higher altitudes comes from maize, sorghum, beans, Irish potatoes, peas, and sunflower. These crops have the advantage that they are short term and can fit into a rotation with wheat. At lower altitudes, even 1,600 m, wheat will have to compete with a wide range of food crops, including bananas and other cash crops such as coffee.

With the exception of the eastern half of Kapchorwa district, the potential wheat areas under consideration exhibit a bimodal rainfall regime which, in principle, provides farmers with the choice of two seasons or even wheat in both seasons, not necessarily on the same land. The choice made is partially determined by the relative performance of wheat in the two seasons but also by the need to fit wheat into a cropping pattern which does not unduly disrupt the growing of food crops and existing profitable cash crops.

In Kapchorwa, most potential wheat land is already being used to grow maize, legumes, oilseeds (sunflower) and potatoes. Maize or maize inter-cropped with beans is the dominant crop (Government of Uganda, 1995). Wheat is regarded as the cash crop. Where the rainfall pattern is monomodal wheat and maize will be in direct competition. The bimodal rainfall regime offers the prospect of wheat in the second season without markedly affecting the maize crop.

In Kabarole, bananas dominate the cropping system and are supplemented by annual crops, mostly cereals and legumes, which are grown in both seasons. If grown in the second season, wheat would compete with millet. However, the comparatively low population density and large tracts of under-utilized land indicate that the (relatively small) area where wheat could be grown has the potential to increase so long as appropriate technologies are developed, especially for weeding maize.

In Bushenyi and Mbarara, wheat is grown by small groups of farmers stimulated by UGMC initiatives. These farmer groups grow wheat at around 1,800 m on previously under utilized land. Some groups are following a wheat/legume cycle but others are growing wheat continuously.

Most of these farmers have land under bananas at lower altitudes and supplement them with cereals/legumes at higher levels. The predominant cereal is millet grown in the second season. It is possible that farming at two altitudes could be combined, especially if wheat is established in the first season. However, the longer term solution may be settlement of the

higher lands based on a wheat/legume/forage rotation. In part, this possibility is dependent upon resolution of land tenure issues.

Finally, wheat growing in Kabale and Kisoro is undertaken on well established intensively cultivated small farms. Wheat competes with sorghum which is used to make local beer. Any expansion of wheat production is likely to reduce the area of sorghum.

In summary, current cropping patterns are not seen as a significant constraint to wheat expansion, at least in the medium term. The dominant feature of all the areas surveyed is the lack of a reliable cash crop. Coffee prices are depressed, any expansion of tea will be modest, and the cotton industry needs rehabilitation. Even if these crops did recover quickly they are not considered major competitors in the most promising wheat areas. Currently, in these areas, farmers are dependent largely on maize, beans and bananas for cash income. All of these crops tend towards surplus production, with prices fluctuating widely, which affects farmers confidence. Wheat represents a potentially low risk solution to the cash crop problem. If it is competitive, wheat has a guaranteed market at an agreed price with the millers; farmers would know if they could meet those terms. However, the agronomic work undertaken seems likely to provide wheat with a significant technical advantage over competing cereals such as sorghum and millet, though possibly not hybrid maize. In Kabarole, Bushenyi and Mbarara crop competition is not the key issue. Seasonal flexibility provides considerable scope for integrating wheat. The key issue is inadequate farm power resources. Labour availability alone is totally inadequate. Expansion of wheat must go hand in hand with the adoption of animal traction or full mechanization.

5.3.2 Wheat production practices

The available information on wheat does not give any information on who does the various activities on the farm. There is one report (Mugisa-Mutettikka *et al*, 1998) that gives some qualitative information on the division of labour within the household. The role played by each member in wheat production is purely qualitative.

Land preparation and planting

Preparation of farmers' fields in Eastern Uganda is by tractor and disc plough or oxen teams. Land preparation is performed mostly by private tractor hire operators and partially by the Cooperative Union. It usually consists of two ploughings. Oxen are used in some areas, with the oxen team usually being owned by a group of farmers, each one with a single oxen. The cost of a tractor ploughing is almost double that of oxen ploughing. Hand preparation is only practiced on very small farms or steeply sloping land. After cultivation, seed is broadcast, and incorporated using a disc harrow, ox-plough or even by a tree branch dragged by oxen.

Land preparation is mainly done by men. Women participate most in the broadcasting of seed.

Fertilizer Usage
At some sites, there have been no significant responses to phosphorus or potassium applications despite the fact the soils are low in both nutrients. However, there was a response to nitrogen fertilization. Fertilizer use by farmers is erratic. Those near the Kenyan border sometimes use fertilizer on wheat, and some use 50 kg NPK basally, but in general, fertilizer is not a routine input. In cases where fertilizer is applied, men participate most and also male children.

Weed control and crop protection
Farmers generally do not weed, but do remove tall weeds late in the crop cycle to facilitate harvesting. A small proportion use herbicides (Buctril MC or 2,4-D). They are enthusiastic about the possibilities of herbicide use but lack knowledge of the correct herbicides and their proper use, particularly timing. Women, men and children participate in this activity.

Harvesting/Marketing
Harvesting is largely done with the Cooperative Union combine harvester in Eastern Uganda but farmers may have to wait up to four weeks after the crop has matured for its arrival, during which time bird damage and natural shattering constitute a significant yield loss. Birds are a problem during the grain filling stage, particularly for the early and late sowings. However, better synchronization of crop sowings would further exacerbate the combine harvester shortage problem. Farmers who do not or cannot use the combine harvester, commonly employ a harvesting gang to cut the crop and use family labour to thresh. The hiring of labour is not a constraint, but it is clear that the lack of harvesting technology is a major problem. Young men are involved in harvesting as they easily organize themselves into harvesting gangs. Tractor operation is a man's job, and so is harvesting using a combine harvester.

Some parts of Uganda have experience with oxen cultivation and it would appear most appropriate to foster this type of intermediate technology, with the introduction of improved ploughs, harrows and a seeder. However, any significant increase in the use of oxen will require improved security or specific measures to collectively protect oxen theft..

5.4 Gender Constraints And Implications

Gender specific constraints
There continues to be a number of constraints hindering women's effective participation in the agricultural sector as most of them continue to produce at subsistence level. Such constraints include the following:

- limited access to agricultural land,
- inadequate extension services,
- limited access to credit and other production inputs,
- limited decision making in the whole production process,
- inadequate gender disaggregated data to highlight the importance of women's role in agricultural production.

Access to land
Although 97% of the women have access to land, only 8% have leaseholds and 7% actually own land. Available statistics indicate that of all the land holders from 26 districts, 84% were males while 16% were females (Ministry of Women in Development, Culture and Youth, 1994). The corresponding holding areas are 3.2 million or 88% for male holders and 449,000 hectares or 12% for female holders. 87% of the males have land of more than 2 ha. However, only 3% of females have land greater than that size.

Access to information and extension service
There are various sources of agricultural information. These include the extension agents, cooperatives, contact farmers, neighbours and NGOs. Due to cultural norms, women are not expected to talk to strangers especially men. As a result, their access to agricultural information is limited. The number of women attending farmer training courses and field days is low.

Access to credit
Sources of credit in Uganda include "*Etandikwa*", local money lenders, and neighbours. Overall, most women as well as men have very limited access to credit. The reason given for this failure to access credit is that the credit is not available (Ntege-Nanyeenya *et al*, 1994). Similarly, the lack of credit implies that most women cannot afford hired labour for the various farm activities and farm inputs.

Gender Implications
- Lending principles of financial institutions continue to include possession of collateral. This means that female farmers who do not own land cannot access credit. As a result most farmers are unable to purchase the necessary agricultural inputs that are essential for efficient production of maize and wheat.
- The extension service has a higher proportion of males as compared to females. In Uganda, it is not proper for a man to talk to another man's wife in the absence of the husband. This limits the information flow to female farmers that is necessary for proper management of these cereals.
- The methods used for weeding of maize, removing of weeds in wheat fields, and harvesting of maize and wheat is time consuming. This reduces the time that a farmer could use to gather useful information on management of the crop and its marketing.

5.5 Suggestions and Recommendations

The Uganda Government policy aims at strengthening the position of women in society through accessing and control of productive resources such as land, credit and other production inputs. After 1988, this policy has been improved further by emphasizing that all programmes in the agricultural sector will be gender responsive with specific target numbers where possible.

To complement this effort by Government, there is a need to:
- Develop a comprehensive database on the division of labour in farming households, decision making on the use of various resources on the farm, and the sharing of farm benefits in the household;
- Develop labour saving technology that is appropriate, cheap and accessible, in both maize and wheat production;

- Devise methods of easier credit access for both men and women in the main banking industry or cooperatives that do not demand collateral in the form of land. This will assist the farmers, especially women, to purchase farm inputs and also hire labour;
- Gender sensitize the extension personnel on the special needs and roles of women and men farmers ;
- Promote the training of more female extension agents so that communication channels with women farmers can be opened.

6.0 STRATEGIES AND RECOMMENDATIONS

Overall, there are gender specific constraints that cut across all the countries and the two (maize and wheat) farming systems. These include:

- Labour bottlenecks in both male headed and female headed (*de facto* and *de jure*) farming households.
- Poor access to knowledge, skills and technology by female farmers.
- Lack of access to credit and production resources (land, seeds, fertilizer and agro-chemicals).
- Inadequate gender disaggregated data in both maize and wheat farming systems.

Gender disaggregated databases

Studies which conduct activity analysis by gender and ask questions such as who does what, where and when, paid or unpaid, on-farm or off-farm work are very rare in Eastern Africa (Ethiopia, Kenya, Tanzania and Uganda). The overwhelming majority of relevant research contains brief accounts of what " farmers" do or what women do without specifying the tasks involved or providing activity analyses or time -allocation studies which could have provided more useful, accurate \nd detailed information.

From the available literature, it is evident that in the four countries (Ethiopia, Kenya, Tanzania and Uganda), only Ethiopia has a relatively adequate gender disaggregated database for both maize and wheat farming systems, although time-allocation studies are missing. Uganda and Kenya have the least quantitative data in these farming systems: in fact for wheat production systems, there is very little that is documented on the role of men and women. Tanzania has some qualitative data gathered from four to five districts in the whole country. The data sought should capture the majority of maize and wheat production systems in each country and have time trends in the roles of men, women and children in maize and wheat production.

There is, therefore, a need for comprehensive quantitative databases to be developed in Uganda (maize and wheat), Kenya (especially wheat) and Tanzania (more coverage). This may include data from all agro-ecological zones, other farm activities and off-farm activities as this does impact on the time spent on maize and wheat production as well as resources devoted to these activities. It may also be important to delineate households into male headed and female headed households to help understand the differential constraints that they face in agricultural production. The role of children in these farming systems is crucial: hence the need to have their participation documented.

In Ethiopia, there is a need to develop databases that reflect the interaction between crops, livestock and other enterprises. It is also important to have some data showing the interaction between gender and education as well as wealth levels within the community.

Labour constraints
There is a need to develop technologies that ease labour in the maize production activities especially weeding and processing. This may be through research on lighter weeders, maize varieties that are tolerant to late weeding, and suitable varieties that can be planted at slightly different times without loss of productivity. Labour can be made easier for crop processing if varieties that thresh easily are developed in consultation with the farmers to maintain consumer preferences. Equipment that can easily be used by both men and women in threshing maize and even wheat could alleviate the labour burden.

Knowledge, skills and technology constraints
A gender sensitized extension service needs to aggressively disseminate agricultural information to both female and male farmers. This may specifically target seed selection, planting technologies, pest control (biological) and processing. These are the areas women are most involved in yet are not equipped with the necessary knowledge and skills. In addition, local seminars and demonstrations need to be promoted as a means of information dissemination without taking the women away from home.

Access to production resources and credit
Research needs to be carried out on the existing credit facilities in each country to explore the possibilities for micro-financing of women farmers. This may also involve financing institutions which can assist in developing lending mechanisms to accommodate women who may not have tangible collateral. In most cases, farmers' organizations are more likely to provide access to credit for women farmers than the formal banking institutions. Also, the farmers organizations are better placed to advance cash to women farmers for the purchase of farm inputs.

Apart from addressing this issue at policy level, it is critical that the officials of lending institutions (formal and informal) are gender sensitized to appreciate the importance of women participating in cash economy and the resultant impact on agricultural productivity. Women can be part of these lending institutions by being members of cooperatives, credit unions, labour unions, marketing organisations and community organizations.

The issue of land tenure in the various countries needs to be studied to make recommendations on how best that can be matched with cultural norms to increase the access and control of women over land. This may greatly improve the management of crops and increase productivity especially on small holder farms.

It is also necessary to address the issue of markets for the small scale farmers especially women. Good markets accelerate the flow of income and hence efficient implementation of the recommended production practices.

Conclusion

In spite of a shortage of quantitative and in some instances qualitative data, this study clearly shows that women's contribution to agricultural production in Eastern Africa is significant. It also shows that the roles of women and men in maize and wheat production are complimentary. Women participate in time-consuming and labour intensive work in maize and wheat based farming systems across the region. Their exact contribution in terms of time, effort and income have yet to be quantified.

Operations that are not yet mechanised such as planting of maize, weeding, harvesting and post-harvest operations occupy a significant proportion of women's time. The only exception where both men and women participate almost equally is in Ethiopia. Women in all four countries are excluded in decision making (i.e control of own income, division of control of household income) on the farm .However, there a few exceptions (Illolo village of Kisimani hamlet in Tanzania and North Wollo in Ethiopia) where women participate in decision making at all levels.

While men engage in capital intensive activities on relatively large farms, women are more concentrated on subsistence food production. Their participation in maize and wheat farming systems can be made more efficient if the constraints facing them are alleviated. These include women's limited access to and control over productive resources such as land, credit, agricultural inputs, technology (tools and machinery), as well as support services such as extension, information, training and marketing.

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ANNEXES

Annex 1 West Hareghe case study - Gender Analytical framework: Activity prommfile.

Activities	Gender*	Time**	Location***
Productive			
Field crops			
Clearing	M, MC,	S	F
Ploughing	M, MC	S	F
Planting	M, MC	S	F
Hoeing	M, MC	S	F
Weeding	M, MC,F*	S	F
Thinning	M,MC	S	F
Scaring birds	MC, FC	S	F
Bundling	M, MC,	S	F
Cutting/Harvesting	M,MC,	S	F
Transporting/Piling	M, F, MC, FC, F*	S	F
Preparation of threshing ground	F,F*,MC,FC(M)	S	H
Store preparation	M,F,F*	S	H
Transport to store	M,F,F*,MC,FC	S	H
Reproductive			
Fetching water	F,FC,MC,(M)	C	F
Fetching fuelwood	F,FC,(MC)	C	F
Shelling maize	M,F,MC,FC	C	H
Cleaning grains	F,(FC)	C	H
Do husking	F,(FC)	C	H
House repair and fencing	M,(F,MC,FC)	O/S	H
Grinding	F,FC	C	H
Mortaring	F,FC	C	H
Taking children to clinic	M,F	C	H
Child care	F,FC	C	H
Cooking	F,FC	C	H
Nursing	F	C	H
Making dough	F,FC	C	H
Baking	F,FC	C	H
Idir	M,F*,F	O	LC
Ekub	MC,FC	C	LC
Mabher	M,F,F*	monthly	LC
Senbete	M,F,F*	weekly	LC
Peasant association	M,F*	C	BC
Guzza	M,F,F*,MC,FC	O	F
Stream cleaning	F, F*, (FC)	O	F
Wedding / funerals	M, F, F*, MC, FC	O	LC, BC
Service co-perative	M, F*.	C	BC

M = male, F = female, MC = Male child, FC = female child, F = Female headed household; ** C = Continuous, S = Seasonal, O = Ocassional;
*** H = Home, F = Field, LC = Local community, BC =Beyond community.

Annex 2 Activity Profile for North Omo

Activities	Gender
PRODUCTIVE	
Agricultural activities - Field crops	
Clearing	MM, PM, MY, F (M), F (P), F*
Ploughing	MM, PM, MY
Planting	MM, PM, MY, MC, F (M), F (P).
Fertilizer application	MM, PM, MY
Weeding/Cultivation	MM, PM, Y, F (M), F (P)
Ridging	MM, PM, MY
Harvesting	ALL
Transporting	ALL
Threshing	MM, PM, MY
Shelling of maize	ALL
Storing	ALL (except children)
REPRODUCTIVE	
House repair	M, MY
Fetching water	F, F Y (MY)
Collecting fuelwood	F, F Y,C
Cleaning house	F, F Y
Grinding	F, F Y
Baking	F, F Y
Dough making	F, F Y
Cooking	F,FY
Child care	F, FY (M)

M = males, MM = Monogamous males, PM = Polygamous males, MY = Male youth, MC = Male children, F = Females, F (M) = Females in monogamous marriages, F (P) = Females in polygamous marriages, FY = Female youth, FC = Female children, C = All children.

Annex 3 Gender division of labour by tasks of agricultural production in Ada, Lume and Gimbichu Woredas, 1997.

Tasks of agricultural production	District					
	Ada		Lume		Gimbichu	
	male	female	male	female	male	female
1. Land preparation						
Average no. of days						
Head	34	-	21.5	-	30	-
Son	29.3	29.8	26.6	28.2	20.3	19.6
Relatives	-	28.7	40	32	14.3	19
Non-relatives	27.8	31.4	16.4	28.2	29	20.8
2. Planting						
Average no. of days						
Head	17	-	11.4	-	15.5	-
Son	14.1	13.1	9.2	13.6	14.7	13
Relatives	-	15.7	-	8	18.7	15.2
Non- Relatives	16.5	15	9.2	12	14	14.1
3.Weeding						
Average no. of days						
Head	14.3	13.7	21.3	18.6	14.5	15.9
Wife	13.7	-	18	-	16.9	-
Son	22.6	20.9	26.3	26	19.3	20.2
Daughter	18.3	20.7	20.2	19	16	21.3
Relatives	3.3	12.7	9	8	18.3	21.3
Non-relatives	21	18.7	19.7	18.6	19.9	20.2
4.Harvesting						
Average no. of days						
Head	12.2	3.2	11.2	6.4	18.9	7.2
Wife	4.1	-	6.1	-	5.3	-
Son	16.5	16	12.1	11	21.5	23.4
Daughter	6.3	6	5.2	8.2	9.9	10.7
Relatives	20.3	16.5	9.1	9.8	17.1	20.7
Non-relatives	10.2	15.4	12	8.3	25	27
5.Transporting						
Average no. of days						
Head	9.6	-	9.4	5.7	10.6	6.9
Wife	8.5	-	8.9	-	8.3	-
Son	16.9	11	12.1	9.2	13.8	12.5
Daughter	10.1	-	7.7	9.3	7.3	7.8
Relatives	17.1	9.2	21.7	19.2	10.4	20.1
Non-relatives	9.7	11.8	11.3	5.2	15.3	17.6
6.Threshing/ storage						
Average no. of days	-					
Head	13	4.7	16.4	9.5	11.9	7.2
Wife	7.1	-	10.8	-	8.3	-
Son	17.8	14.1	19.5	19.1	14.5	12.6

Daughter	12.9	3.3	8.5	16.4	9.3	7.9
Relatives	22.5	10.4	9.6	14.0	6.4	11.1
Non-relatives	18.3	13.3	19.1	12.0	18.3	9.9

Annex 4. Division of labour at household level in Tanzania.

Activities	Maize	Wheat
LAND PREPARATION		
-bush clearing	M	M
-ploughing/seedbed preparation		
-hand hoe	M F C	M F C
-oxen	M	M
-tractor	M	M
PLANTING		
-seed selection	F	F
-furrow opening	M	-
-seed dropping	F C	-
-seed broadcasting	M F C	M F C
-seed incorparation	M* F	M* F
FERTILIZER APPLICATION		
-organic	F C	F C
-inorganic	M F C	M F C
WEED CONTROL		
-herbicides	M	M
-hand weeding/hand hoes	M F*	M F*
-ox-weeders	M	-
CROP PROTECTION		
-insecticides		
-dusting	M F* C	M F* C
-spraying	M	M
-fungicides		
-dusting	M F* C	M F* C
-spraying	M	M
-wild animal scaring	M	M
HARVEST ING		
-machinery	M	M
-manual		
-cutting	M F C	M F C
staking	M F C	-
piling	-	M F C
stripping -	F C	-
threshing	-	M F C
shelling	M* F	-
TRANSPORTATION		
-porterage	M F* C	M F* C
-on animal backs	M F C	M F C
-ox-drawn carts	M F C	M F C
-haulage	M	M
PROCESSING		
-shelling	M* F C	-
-winnowing	F	F
-bagging	M* F	M* F
-pounding/ milling	F	F

STORAGE		
-dusting	M F	M F
-spraying	M F	M F
-stacking	M* F	M* F
MARKETING		
-small quantities	F	F
-large quantities	M	M

Key: M = Male; F = Female; C = Child; * most involved.

Annex 5 Constraint analysis in North Wollo

Development constraint analysis	Gender constraints	Implications for successful interventions
Lack of income and credit partly due to weak service cooperatives	• Women have less access to credit than men and can only get credit from SC if they are households heads • Lack of income/credit means that women cannot raise poultry, sheep or goats • Both males and females lack agricultural inputs and ploughing oxen	• Raise community awareness with regard to women receiving credit from service cooperatives • Encourage women to join service cooperatives • Look into possisbility of using the IDIR as alink between credit institutioons and farmers • Amhara regional office could draw up a funding proposal for strengthening of service cooperatives or provision of credit through traditional saving schemes
Erratic rainfall	• Work burden of males and females is increased, especially that of men who have to plough several times as a consequence	• Improve the utilization of existing water resources (irrigation system) • Introduction of short cycle variety crops
Shortage of grazing land	• Male and female children have to travel long distances to feed animals therefore they have limited time for either other agricultural activities or for education	• Initiate and encourage forage development around the homestead
Shortage of farmland	• This affects both male and female. This leads to low yields and only limited possibilities for crop diversification • Females have limited decision-making over farmland, this could mean that they may have less interest in farming activities and contribute less	• Identify appropriate intensive farming approaches and encourage their use • Encourage production of horticultural crops • Raise awareness within the community for the need for females, along with males to have decision-making power concerning the land • Encourage family

		planning
Deforestation	• Lack of fuelwood causing more time spend in getting fuelwood from long distances as well as additional income to buy fuelwood • Shortage of wood for construction and for making farm implements • Lack of tree leaves and bushes to feed small animals • Erosion	• Encourage construction and use of fuel-efficient stoves • Demonstrate biogas energy • Strengthen terracing and check damming activities
Population pressure	• women are weakened by constant bearing and caring for children • Population pressure leads to the depletion of resources, which in turn leads to environmental degradation, malnutrition and poverty	• Encourage family planning (home agents)
Human diseases	• Reduces agricultural activities and minimizes productive human labour	• Teach about health, sanitation and child care (home agent)
Lack of education	• Females are less educated than males formally and informally. This has a negative impact on household management and childcare • Most of the population especially females are illiterate	• Explain the repercussions of lack of education for women • Convince the community to send female children to school as well as male children • Design and implement an agricultural education service for females and males locally • Develop extension materials for illiterate females and males
Depletion of the soil	• Affecting the whole family. Crop yield and quality is reduced and there are more pests and diseases	• Strengthen the soil-crop management (extension)

Annex 6 Benefit % of husbands and wives in polygamous marriages as viewed by polygamous males and wives of polygamous men in Lisano village.

Benefits	% Benefit as viewed by polygamous males		% Benefit as viewed by wives of polygamous males	
	Male	Female	Male	Female
Decision making	80	20	100	0
Social respect	50	50	70	30
Education	80	20	60	40
Fuelwood	40	60	40	60
Money	60	40	80	20
Marriage	60	40	70	30
Drink	80	20	70	30
Cloth	70	30	70	30
Food	60	40	60	40
Mobility	90	10	80	20
Employment	70	30		