

AGROBIODIVERSITY CONSERVATION PRACTICES AND GENDER
CONSIDERATION IN SINANA DISTRICT, SOUTHEASTERN ETHIOPIA



MSc Thesis

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DECLARATIONS

I Workalegn Asseffa Balcha, do hereby declare that, this Thesis is my original work and that it has not been submitted partially; or in full, by any other person for an award of a degree in any other university/institution.

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
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APPROVAL

The undersigned certify that they have read and hereby recommend to the Madda Walabu University to accept the Thesis submitted by **Workalegn Asseffa Balcha** and entitled“ Agrobiodiversity Conservation and Gender Consideration in Sinana District, Southeastern Ethiopia”, in partial fulfillment of the requirements for the award of Master of Science Degree in Ecosystem and Biodiversity Conservation.

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Abstract

Agricultural biodiversity have significant role in food security, environmental protection, income generation and cultural values and many conservation activities are performed by women but no recognition is given to them as important contributors. Many conservation activities are performed by women but due to unbalanced decision making roles in resource allocation, monocropping has increased from time to time resulting into decrease in nutritious crops, income diversification and increase in environmental problems (like soil and air pollution due to the use of high insect and pest side). The study was carried out in Sinana district, south east of Ethiopia between November 2015 to June, 2016 to investigate agrobiodiversity practices and the role of gender in its conservation. A sample of 364 respondents was selected using simple random sampling technique from four kebeles (villages). Using a semi structured questionnaire, data were collected from 182 female respondents, of which, 91 were married women and 91 female household heads; and 182 were male household heads. In addition twelve focus group discussions (FGDs) were conducted with farmers' (three groups per kebele) Data were analyzed using SPSS version 20 software to generate descriptive statistics. Chi-square was used to analyze the participation level in agricultural activities by women and men. Pearson correlation was used to test the relationship between gender, age, land size, land ownership and diversity. In addition Simpson's index $(D) = (1 - \sum P_i^2)$ also used to identify the diversity of plants and animals that are used by women and men. The results show that rural women, cultivate and domesticate more diversified crops/plants and livestock respectively than men on their land holding. Women participated in all farming activities including decision making, land preparation, seed selection, crop management (weeding, storing, pest control), harvesting and selling commodities and animal domestication. But their participation level has significant Variation on each activity performed in agricultural ($P=0.01$), and also crop diversity by using Simpson's index (agricultural diversity on men's land = 0.864) and that for women's land =0.84), which plays a great role in conserving agricultural diversity. So there is need to create opportunities for rural women to improve their level of participation and decision making in farming activities for conserving agricultural diversities through well organized and integrated awareness creation, experience sharing, promoting women's work, identifying constraints and exposing women to different simple technologies.

Keywords; Biodiversity , Gender, Participation

1. Introduction

1.1. Background

Agrobiodiversity is the result of natural selection processes and the careful selection and inventive developments of farmers, herders and fishers over millennia. Agrobiodiversity is a vital sub-set of biodiversity. All people's food and livelihood security depend on the sustained management of various biological resources that are important for food and agriculture. Agricultural biodiversity also known as agrobiodiversity or the genetic resources for food and agriculture includes: harvested (domesticated) crop varieties, livestock breeds, fish species and non domesticated (wild) resources within field, forest, rangeland including tree products, wild animals hunted for food and in aquatic ecosystems (e.g. wild fish); non-harvested species in production ecosystems that support food provision, including soil micro-biota, pollinators and other insects such as bees, butterflies, greenflies; and non-harvested species in the wider environment that support food production ecosystems (agricultural, pastoral, forest and aquatic ecosystems (FAO, 2004).

Agrobiodiversity is essential to life on earth. It provides resources such as food, medicine, fibers, fuel, and building materials as well as intangible services on which human kind relies. For people in developing countries, particularly in the least developed contexts, biodiversity is vital for survival. Biodiversity also forms an important part of people's belief systems and their cultural and spiritual values that need conservation (Khadka and Verma, 2012). Agro biodiversity conservation can be considered as the protection, maintenance and/or restoration of living natural resources to ensure their survival over the long term. But it is variously defined depending on different values, objectives and world views (Elliott *et al.*, 2011).

Biodiversity conservation and gender are interlinked issues. Because gender is not determined biologically; it is a central organizing principle of societies and often governs the processes of production, reproduction, consumption, distribution and focuses on the relationships between men and women. Biodiversity conservation and management is community-based, and requires the support of the entire community young and old, rich and poor, men and women, boys and girls (FAO, 2005). Because women play a restricted or invisible role in the public affairs of many communities, special steps need to be taken so that women are consulted on agrobiodiversity management. Tradition may dictate that the household head speaks for the households. However, many men are not sufficiently aware of women's concerns to raise them adequately in public

meetings. Hence, other ways must be found to tap women's knowledge, needs and requirements, and to determine their commitment and contributions to agro biodiversity management. Second, men and women use agrobiodiversity in different ways and have diverse allocation and conservation measures. For example, women are often experts in the use of 'neglected' species (rather than primary cash crops). According to FAO documentation, this "has important implications for the conservation of genetic resources because the decision to conserve a plant variety and to favor the development specific characteristics of certain plants and animals depends on their perceived usefulness to the farm households and to the community as a whole. Agrobiodiversity management requires information, participation in decision-making; management and commitment from both sex (FAO, 1997; FAO, 1998; Von Lossau and Qingsong, 2011). Women make up almost 50 percent of the agricultural labor force in sub-Saharan Africa, an increase from about 45 percent in 1980. The averages in Africa range from just over 40 percent in Southern Africa to just over 50 percent in Eastern Africa. These sub-regional averages have remained fairly stable since 1980, with the exception of northern Africa, where the female share appears to have risen from 30 percent to almost 45 percent. The sub-regional data for Africa conceal wide differences between countries both in the share of female labor in agriculture and the trend (FAO, 2011).

In poor families with two adults, more than half the available income comes from the labor of women and children. But the income that generated from major staple crops and large animal is controlled by men. Women spend most of their earnings on meeting the basic needs of their families (Howard, 2003). Women produce 80 percent of the food in Africa, 60 percent in Asia and 40 percent in Latin America which contributes to conservation of biodiversity through cultivating different crops (Howard, 2003). Ethiopian women are largely responsible for nearly all reproductive tasks such as fetching fuel wood and water, cooking, washing, cleaning and child care. In most cases, men are the heads of households and are therefore the principal decision-makers in the household although some consultation with women may take place. Ethiopian women have longer working hours than men; they carry much of the burden of reproductive work in addition to their productive activities (JICA, 1999). In rural areas of Ethiopia, women play a major role in agricultural production. They are equally efficient in seed bed preparation, tilling, sowing, fertilizer application, fodder cutting, weeding, intercultural operations, transplanting, husking, threshing, drying, storing cereals and fodder, selling agricultural commodities and harvesting of all the crops, fruits and vegetables. Rural women have significant contribution in the

labour force for agricultural activities. Yet, the role of women in these activities, so important economically, has remained obscure for long because women seldom played any major roles in political activities or decision making processes. They also face various difficulties on agricultural productivity and they operate agricultural activities under greater constraints than men (Lemlem *et al.*, 2010)

Rural women are the most knowledgeable about the patterns and uses of local biodiversity. Yet, these same women are often denied access to resources. Gender division of labour in rural Ethiopia varies in terms of farming systems, cultural settings, location and the different wealth categories (Mollel and Mtenga, 2000; Abera *et al.*, 2006).

Due to the alarming rate and extent of loss of agrobiodiversity during recent decades, attention has been raised at both national and international levels on the need for preserving genetic diversity, which represents a key component of sustainable agricultural development and food security in the world (FAO, 2004).

Because of illiteracy, cultural, believes and women's economic dependency within the household, their contribution is not considered. Such gender inequalities cause loss of biodiversity, which leads to mono cropping, loss of nutritious and high value crops, highly resistance varieties and absence of diversified income. The contribution of women to the maintenance and enhancement of crop diversity is very important. Therefore, analysis of their role is an important factor in understanding agrobiodiversity management. This study aimed at assessing the local farmer's agrobiodiversity conservation practices and role of gender in its conservation in Sinana Woreda (district). That means that each activity performed by farmers (women and men) in order to feed themselves and increase productivity plays a great role in conserving agricultural diversity.

2. Statement of the problem

Every life depends on and has a great interdependence with agricultural diversity. Gender and agrobiodiversity conservation have a great relationship in terms of the practice and activity undertaken in different agricultural activities that aid agricultural diversity conservation, but there is not considered (World Bank, 1995; Nahusenay and Tesfaye, 2015). There is systematic inequality between men and women in access to and control of resources within communities due to social, economic and cultural factors, which affect their resource management strategies. Understanding how men and women engage with the biodiversity and the multiple ways they manage and use it is essential for understanding and conserving that diversity effectively, and for promoting equitable benefits from its use. However there is limited understanding of the practices that men and women employ to conserve agrobiodiversity, the extent to which they participate in agricultural activities that affect agrobiodiversity conservation, and the constraints and opportunities they face in achieving agrobiodiversity conservation. This study aims to assess the local farmer's agrobiodiversity conservation activity and role of gender in its conservation in sinana Woreda. In this study, type of agrobiodiversity, activity that is done for conservation of agrobiodiversity, the participation level of women in conserving agrobiodiversity and constraints that affect women participation were identified. The research findings will be used by government, NGO's and other stake holders and local community through capacity building, technology adoption and increase participation of both sexes in research that performed in the Woreda.

1.3. Objective of the study

1.3.1 General Objective

- The general objective of this study was to investigate agrobiodiversity conservation practices and role of gender in its conservation in Sinana district.

1.3.2 Specific Objectives

- ✓ To identify the types of agrobiodiversity conservation activity.
- ✓ To determine the participation level of men and women on different types of farming activities.
- ✓ To identify interests of men and women in agrobiodiversity and its conservation.
- ✓ To assess the types of agrobiodiversity (crops and animal species) in the study area.

1.3.3. Research question

- What type of agrobiodiversity conservation activity is under taken by men and women?
- Is it the participation difference between women's and men on different agricultural activities?
- What kind of crops and animals women and men select to cultivate and domesticate respectively?
- What types of crops and animals species are located on the farm land of sample households in the study area?

1.3.4. Hypothesis

- They are no significant variation between women and men on the participation of different activity of agriculture.
- They are no significant variation between kebeles in the participation of women on the field and homestead farm.

1.3.5. Definition of variables

- Land preparation: it is the activity that is done starting from land clearing, tilling,, hoeing bed preparation to sowing.
- Seed selection: selecting different seeds that are used for planting or sowing depending on species, variety, seed quality and other different criteria.
- Seed sowing: planting seed for cultivating crops
- Seed management: managing different crops at field level as well as at home after harvesting.
- Crop transportation: the collection of crop from the field after the harvest and move to market.
- Diversity: different type of crop and animal species
- Agricultural practice: major agricultural activities (Crop production, Horticultural production and livestock domestication)
- Agricultural activity: Activity done in order to cultivate crops, and livestock domestication like land preparation, seed selection, weeding, harvesting, storing, livestock watering and etc.

1.4. Scope of the study

The study was conducted in Sinana Woreda, Bale Zone Southeastern Ethiopia. Out of 20 kebeles located in this Woreda four Kebeles (Shawade, Illu-sanbitu, Selka and Waltaibarisa) were selected. The study focused on agrobiodiversity management practices of crops and livestock, the role of women and men in conserving agricultural diversity and the activities performed by both sexes. To collect quantitative data, 364 men and women respondents were selected using simple random sampling technique and separate focus group discussions were conducted with 8-12 men and women participants.

1.5. Significance of the study

Agrobiodiversity plays a great role in diversifying food, income and changing the livelihood of the community. So, this study provides valuable information on type of agricultural practice and activity performed, and the role of women and men in conserving agricultural diversity. The interest of men and women in cultivating and domesticating different crop and animal was identified. Moreover, the constraints that affect women participation in the conservation of agricultural diversity were identified. In addition, the study gives valuable information that will help the Governmental and Non-Governmental Organizations to undertake different measures to address the challenges to balancing the participation of women and men and use it select and disseminate agriculture diversity practices and activities that are accepted by local community.

2. Literature Review

2.1. Definition and Concepts of Agrobiodiversity and Gender

Biodiversity refers to all species of plants, animals and micro-organisms existing and interacting within an ecosystem (Vandermeer and Perfecto, 1995; FAO, 2004). Natural biodiversity has provided the foundation for all agricultural plants and animals. The entire range of the domestic crops used in world agriculture is derived from wild species that have been modified through domestication, selective breeding and hybridization. Most remaining world centers of diversity contain populations of variable and adaptable landraces as well as wild and weedy relatives of crops, all of which provide valuable genetic resources for crop improvement (Harlan, 1975). In addition to producing valuable plants and animals, biodiversity performs many ecological services. In natural ecosystems, the vegetative cover of a forest or grassland prevents soil erosion, replenishes ground water and controls flooding by enhancing infiltration and reducing water runoff (Perry, 1994).

Biodiversity is essential to life on Earth; it provides resources such as food, medicine, fibers, fuel, and building materials, as well as intangible services, on which human kind relies. For people in developing countries, particularly in least developed contexts, biodiversity is vital for survival. Biodiversity also forms an important part of people's belief systems and their cultural and spiritual values (Khadka and Verma, 2012).

Agrobiodiversity is all time approached as an ecological service rather than as a resource, owing to its broader and ecological association, and to its delineation within the three levels of biodiversity (i.e. system, species and genetic diversity). O'keeffe *et al.*, (2013) describes agrobiodiversity as 'a dynamic and constantly changing relationship between people, plants, animals, other organisms and the environment, always coping with new problems.

Gender is defined by FAO as 'the relations between men and women, both perceptual and material. Gender is not determined biologically, as a result of sexual characteristics of either women or men, but is constructed socially. It is a central organizing principle of societies, and often governs the processes of production and reproduction, consumption and distribution (FAO, 1997).

Despite this definition, gender is often misunderstood as being the promotion of women only. However, as we see from the FAO definition, gender issues focus on the relationship between men and women, their roles, access to and control over resources, division of labor, interests and needs.

Gender relations affect household security, family well-being, planning, production and many other aspects of life (Bravo-Baumann, 2000). All these things affect the mutual relationships of household members, family wellbeing, planning, production and many other aspects of everyday life (Von Lossou and Qingsong, 2006).

Women's crops and activities are often overlooked or not considered as good targets for investment. For investment, for example, in home gardens, with less technical assistance. Women often use and adapt wild plants thus contributing to the preservation of biodiversity (Woroniuk and Schalkwy, 1998).

2.2. Role of Women in Agrobiodiversity Conservation

Women are both producers and providers of food in developing countries, most particularly in African countries, apart from participating in a wide range of productive activities (Nahusenay and Tesfaye, 2015). Women make essential contributions to the agricultural and rural economies in all developing countries. Their roles and responsibilities vary considerably between and within regions and are changing rapidly in many parts of the world, where economies and social forces are transforming the agricultural sector. Rural women often manage complex households and pursue multiple livelihood strategies. Their activities typically include producing agricultural crops, tending animals, processing and preparing food, working for wages in agricultural or other rural enterprises, collecting fuel and water, engaging in trade and marketing, caring for family members and maintaining their homes (Doss, 2011).

Women and men often have different knowledge of plants their uses, growing conditions, characteristics, and different species (Woroniuk and Schalkwyk, 1998). Women are also disadvantaged, with limited access to and control of productive resource such as land, inputs, labour, information, credit, and technologies among others (FAO, 2011a). Ethiopian women are economically, socially, culturally and politically disadvantaged in the enjoyment of equal rights, in accessing opportunities, decision-making processes, and basic resources/services (JICA, 1999). For example, women are often experts in the use of 'neglected' species (rather than primary cash crops (FAO, 2004). According to FAO (1998), agrobiodiversity has important implications for the conservation of genetic resources because the decision to conserve a plant variety and to favor the development specific characteristics of certain plants depends on their perceived usefulness to the farm households and to the community as a whole. The experiences and practices of women

as gathers, cultivators, natural resource managers and providers of sustenance and health for their families constitutes a substantial indigenous knowledge system that can contribute to the conservation and use of agricultural biodiversity (Woroniuk and Schalkwyk, 1998).

Wild plants provide food, fodder, mulch, medicine, fuel and a multitude of materials for crafts and construction. They provide essential foodstuffs in times of food scarcity or famine. Men and women have different needs and responsibilities for gathered plants, and different knowledge and preferences. For example, research in Uttar Pradesh, India (Flickenger, 1997) stated that women have greater knowledge of the usefulness of wild plants than men and perceive their usefulness differently. Women's employed in agriculture (accounting for two thirds of all employed women in developing countries) work heavily as unpaid family labor in crop and livestock production including post-harvest activities such as tomato paste, milk and other animal products' processing such as wool. They are responsible for storing and processing many agrobiodiversity products (Flickenger, 1997). In Ethiopia, women play different role in agricultural production. They participate in seed bed preparation, tilling, sowing, fertilizer application, fodder cutting, weeding, selling agricultural commodities and harvesting of all the crops, fruits and vegetables. Rural women have significant contribution in the labour force for agricultural activities. Yet, the role of women in these activities so important economically and socially is not considered due to different factors like cultural problem, believes and other socio-economic problem (Lemlem *et al.*, 2010). Taking gender into account usually, but not always, involve focus on women since women most often occupy sub-ordinate position in society or are the most marginalized in their communities. Women have traditionally held lower status than men in most countries around the world. Experience has shown that sustainable changes are most fully realized through activities focused on engaging both men and women to transform harmful attitudes and behaviors (ILRI, 2013).

2.2.1. Women's role in crop production

Across the globe, and particularly in tropical regions rich in biodiversity, in villages, on farms, in homesteads, forests, common pastures, fields and borders, it is women who manage most of these plant resources that are used by humans. This means that they have the greatest local plant knowledge and are mainly responsible for the *in situ* conservation and management of useful

plants, whether domesticated or wild. The simple explanation for this is that, throughout history, women's daily work has required more of this knowledge (Howard, 2003).

Because of these gender and resource biases, biodiversity conservation policies, programs and guidelines frequently omit reference to women, to gender relations, and to the domestic sphere. Even, Plant biodiversity research is also not gender sensitive, which can lead to incomplete or erroneous scientific results with respect to the diversity, characteristics and uses of plants, the nature of people-plant relationships in culturally-specific contexts, and to the causes of, and potential responses to, genetic erosion (Howard, 2003). Both women and men working with plants and animals need credit, technical support, and extension services. Women's crops and activities are often overlooked or not considered good targets for investment (Woroniuk and Schalkwyk, 1998).

Women play a role in the seed-selection process, separating what is to be sown and what is to be used as food, and are in charge of selling the grain from the cobs selected for seed for the following crop cycle. This manual harvest technique serves as a form of artificial selection which allows them to maintain the characteristics of local varieties as well as giving them the opportunity to recognize and propagate attractive mutations or new hybrids (FAO, 1997). In many places gardens are tended by women, who cultivate a wide range of plants for various purposes. Home gardens are looked after with much more care than the fields that are further away. They are often fertilized with compost or manure, and watered where possible. Culinary and medicinal herbs, leafy and other vegetables, legumes, fruit and nuts the variety available in the garden provides something for every occasion, nutritious food and medicine for the family's own use, for social and religious purposes (FAO, 1997). This fact is also a common phenomenon in Ethiopia. Even though gender division, in rural Ethiopia, varies in terms of farming systems, cultural settings, location and the different wealth categories, female farmers perform up to 75 percent of farm labor, representing 70 percent of household food production in Ethiopia (Ishidas *et al.*, 2015).

2.2.2. Women's role in animal husbandry

Animal domestication began some 10, 000 years ago when people began selecting animals for food, fiber, work power and other agricultural uses. Livestock provide valuable products such as hides, skin, wool and manure, which are important both for subsistence and as sources of income for rural communities. Livestock convert forage and crop waste, inedible to humans, into

nutritionally important food products. Approximately 40 percent of the total land available in developing countries can be used only for some form of forage production. An estimated 12 percent of the world's population lives in areas where people depend almost entirely on products obtained from ruminant livestock- cattle, sheep and goats (Mohammed, 2014).

Livestock husbandry is one of the important segments of Ethiopian agriculture. It has been practiced as auxiliary activity in the process of production of different food and non-food grains crops since antiquity. Various kinds of livestock such as cattle, goats, sheep, horses, donkeys are being reared as domestic and subsistence animals with traditional techniques and practices. Except in the case of milk and meat production, commercial form of livestock husbandry rarely existed in Ethiopia. Production has remained at the small scale targeted at meeting local demands. Cattle in subsistence and semi subsistence types of economies have been reared and used mainly to work in agriculture as draught animals. Cow dung is also very valuable that is used as manure and domestic fuels in many rural as well as sub-urban areas. Despite very primitive and traditional form of livestock husbandry, Ethiopia has the largest number of cattle, sheep, goats and poultry in Africa (Tassew and Seifu, 2009).

Animals account for 19 percent of the world's food basket directly, but they also provide draught power and fertilizer for crop production, bringing their overall contribution up to 25 percent (FAO, 2010). In addition, livestock serve as a very important form of cash reserves in many of the mixed farming systems. Taking this into account, animals contribute an estimated 30 percent of total human requirements for food and agriculture (FAO, 2010).

Women's typical role within a livestock production system is different from region to region, and the distribution of ownership of livestock between men and women is strongly related to social, cultural and economic factors. Generally, it depends on the type of animals they raise. In many societies, for example, cattle and other larger animals are owned by men, while smaller animals such as goats, sheep, pigs and backyard poultry kept near the house are more a woman's domain (IFAD, 2003). Women play an important role in animal husbandry activities as managers, decision makers and skilled workers. They help in farm operations, take animals for grazing, look after the sale of milk, and in addition, perform the functions related to house management. Rural woman contributes a share of more than 75 per cent in animal husbandry operations like feeding, milking and sale of milk (Upadhyayand, 2011). Livestock farming plays a significant role in accelerating the rural economic growth in the developing countries like India. Many of the important tasks in

animal husbandry activities are performed by women besides fulfilling their responsibilities as home makers (Randhawa and Chandra, 1993). Thus, involvement of farm women in farming activities is a common feature in Indian rural setting. Women perform a variety of roles, of which many are of greater economic significance (Bhopale and Palki, 1998). In rural Ethiopia, women equally play key role in both livestock management and household activity besides farming activities, They are the household manager but their work is considered as nonproductive, unorganized and undocumented (Bishop-Sambrook, 2004; Lemlem *et al.*, 2010). Hence, development assistance has failed to reach women in the rural areas both in absolute and relative terms compared to men for two reasons: agricultural development programs were traditionally focused on men as producers; and lack of knowledge or false assumption about the role of women in agriculture (Wude, 2006).

2.2.3. Women's role in natural resource conservation

All of the natural environment such as the atmosphere, water, soil, forest, wildlife, land, minerals and environmental assets, It is the backbone of every economy directly or indirectly. In particular, for developing countries like Ethiopia, where about 85% of the population are living in rural areas and dependent on agriculture, natural resources are the base for economic development, food security and other basic necessities (Alemneh, 2003).

The role of women in forest resources management is very important. Collection of forest products to meet subsistence requirements and also to augment family's income is generally the responsibility of women. Awareness about trees, shrubs and grasses is higher amongst women than in men because women devote more time than men to collect forest products to meet family needs. About one-third of poor women are directly involved in forestry or forestry related works in the unorganized sector (Nanavaty, 1996). Forest management needs to recognize that forests are important to the poor, especially poor women. More than 1.6 billion people depend on forests for their livelihoods. Of those, about 60 million indigenous people are almost wholly dependent on forests. Although women have limited ownership of land they often use forest resources for subsistence, as safety nets and even to generate modest incomes (FAO, 2012).

2.3. Major Challenges in Agrobiodiversity Conservation

2.3.1. Decision making over use of resource.

Theoretically, in Sub-Saharan Africa, Southern and South-East Asia, women generally have the right to dispose of the product and income from their own economic activities. However, in practice they are often constrained to using them to meet their responsibilities for certain expenditures that are determined by their husbands or by prevailing male enforced norms (Dey, 1992). Rural development and research programs present a diversity of perspectives on this issue. While their reports indicate that women have very little influence or decision making power in the public sphere some of the studies indicate that women have a great deal of influence in household decisions (Derje, 2013). These reports suggest that men and women discuss quantity and timing of inputs, grain marketing and household purchases. In this scenario men try to convince their wives and presumably if they can't, they won't carry out any action that she doesn't agree with. However, other studies suggest that women do not have this type of influence in the home (UNECA, 1998).

Women are left out of the planning and implementation of local initiatives, valuable input is lost. A related challenge faced by community-based biodiversity initiatives (increasingly based on participatory planning methodologies) is to move gender-specific insights from the local level up to the policy level (Woroniuk and Schalkwyk, 1998). In Ethiopia most rural women have no independent budget, but depend on their husbands, income even though they participate in different income generating activities. After the husband gives them the monthly budget of the family, they exchange this little amount of money to fulfill others family needs that could not be covered with what they are given by their husbands (Messay, 2012). Land and property right for women have received urgent attention by policy makers and land reform practitioners in Africa during the last three decades. The increased focus on a Global Realization of Women empowerment in Africa generally gets little attention. These situations are also true to Ethiopia (UNDP, 2006). Women's active involvement in decision making is considered essential for rapid economic development of the country (Mihiret and Tadesse, 2014). Almost all resources are controlled by their husbands, fathers, brothers in low etc. female headed households are even they are more decision power. But not female that have husband, because of some structural problem to gender (Birhanu, 2006).

2.3.2. Cultural norms

These gender inequities arise from disparities in access to factors of production and education, from gender inequalities in time budgets, gendered labor markets, and power imbalances or cultural norms that affect participation of individuals in decision making (Coles and Mitchell, 2011). In developing countries like Ethiopia, there are traditional perceptions and ill-attitudes among the society toward the women's right on properties. These perceptions were deep rooted in the society and greatly affect the women's role in the economy. A deep rooted negative perception of the society towards the empowerment of women, directly or indirectly, has been reflected in the government sector in employment and remuneration schemes. Considering Agriculture, which is the backbone of economy in the developing countries like Ethiopia, the contribution of women in the agricultural practices from plowing of farm land up to transporting of products to homestead is extremely important. Rural women in Ethiopia often face social, cultural and at times legal constraints that limit their capacity to effectively participate in farming, natural resources management and decision making. Moreover, the traditional role of women puts gender specific constraints on access to resources such as fuel wood, water resources, post-harvest activities, and livestock management (Dejene, 2003). However, all those roles they play had not been recognized, because traditionally the society provides them low status (World Bank, 1995).

2.3.3. Lack of information on agriculture for women

Good and timely information on new technologies and techniques is essential for farmers when deciding whether or not to adopt an innovation. Although private extension services are playing an increasing role in some countries, such as Brazil, China and India, public extension services remain the key source of information on new technologies for farmers in most developing countries (FAO, 2010e). According to FAO (1988 and 1989), survey of extension organizations covering 97 countries with sex disaggregated data (the most comprehensive study available) only 5 percent of all extension resources were directed at women. Moreover, only 15 percent of the extension personnel were female (Olawoye, 1993).

Gendered education systems affect the way men and women gain from their participation in value chains: agricultural development programs were traditionally focused on men as producer; and lack of knowledge in several ways. Firstly, women's income is often limited by their occupancy of lower skilled roles. Secondly, the less educated are less able to access training and thereby

upgrade their skills and knowledge. Thirdly, they are less able to access and process market and financial information. Thus, women, tend to earn less benefit than men even in similar roles. These make the women's to cultivate crops and domesticate animals with less knowledge or with only traditional way, this create less participation of women on agrobiodiversity conservation (World Bank, 2001, 2007; Wude, 2006). Women In Ethiopia play a major role in agriculture, particularly in pastoral areas. Households headed by women – 25 per cent of all households – are often among the poorest. They have few assets, little or no land, limited access to credit, low levels of literacy and weak decision-making power Illiteracy is high at 74%, 54% for male and 75% for female. Success rate in education for women is lower than men, the gap getting wider as one goes higher the educational ladder, as a result there limited number of women professionals.(Hargiwoin and Emebet, 2002)

2.3.4. Women work load

Women are increasingly active in virtually every economic sector. In addition to producing much of the world's food, women hold primary responsibility for gathering the water and fuel used daily by their families (Mohammed, 2014). Women in some African countries spend up to 60% of their time on agricultural activities. Women farmers contribute up to 50% of labour on farms in sub-Saharan Africa. More than 60% of employed women in sub-Saharan Africa work in agriculture (FAO, 1994). Even if the participation of women is high may be duo to passing their time on different activity, during major participation needed in agriculture activity women are not participated duo to that they are not cultivate what they want which minimize diversification of farm (FAO, 1994). It is estimated that the average Ethiopian woman has a working day of 12-14 hours, much of it spent in hard physical labour. Women's role as producers in its present form, is generally detrimental to their well-being and that of their children. In the peak agricultural season, women spent up to 10 hours per day in the field. The heaviest workload on a woman during the pre-harvest and harvest generally coincides with the period of lowest household food availability increasing the strain on her, the situation being aggravated if she is pregnant or lactating.

Women's participation in food production is vital, with an estimated 60 and 80 per cent of the total labour expended on farming activities in Africa contributed by them. But, as modernization reorganizes agricultural production and marketing, women are increasingly marginalized (Hargiwoin and Emebet, 2002).

2.3.5. Agriculture modernization

The commercialization of agriculture is one of the most important trends affecting agricultural development. With commercialization, the marketplace has a more important role to play than in the past. The simplest example of this process is the shift by farmers from subsistence agricultural production mainly for food production to the cultivation of cash crops. More often than not, commercialization also entails modernization of agriculture, which relies heavily on the intensification of production processes, as well as the introduction of new technology and mechanization. While modernization and mechanization can improve farm productivity and income, they can also reduce the need for manual labour and therefore reduce options in rural communities. The impact on women and men is frequently different, depending on whose tasks are mechanized, how workloads are affected, and who loses opportunities for paid work (FAO, 1999). So these may affect agrobiodiversity conservation through modern agriculture they focus on increasing productivity that means most of the time only crops or animals that have high productivity are promoted and used by farmers that plants that have high value but low productivity start to decline or not used by farmer which cause loss off agricultural diversity.

In general men and women play important, often distinctive roles, in the management and conservation of agrobiodiversity. Men and women are responsible for the management of different aspects of agrobiodiversity having different purposes and demands (FAO, 2004). This in turn has an impact upon men's and women's knowledge of the management and utilization of specific elements of agrobiodiversity (FAO, 2004).

3. Materials and Methods

3.1. Description of the study area

3.1.1. Location

The study was conducted in Sinana District, Bale Administrative Zone, and Southeastern part of Ethiopia. It is located 430 km far from the capital city of the country, Addis Ababa. Sinana Woreda is situated between 6.91^o to 7.28^o latitude and 39.9^o to 40.37^oE longitude (SWAO, 2015).

3.1.2. Population

According to the Sinana Woreda Agricultural office statistical data (2015), the total population of the district, is 119,208, of which 62,280 are male and 56,928 are female. The number of households is 18161 of which 16,106 are male headed and 2,055 are female headed households.

3.1.3. Climate

The study area falls within two agro-ecological zones, that is, 95% of the total area lies in ‘Weyna Dega’ while the remaining 5% falls in Dega. The mean annual temperature of the Woreda ranges between 12°C - 25°C. Annual rainfall ranges between 900-1,200mm). The altitudes of area ranges between 1800-2700 above sea level (Sinana Wored Agricultural Office, 2015).

3.1.4. Farming systems

The Woreda considered as ‘Weyna Dega’ has two major seasons, namely Belg and Meher. Irrigation is practiced in some areas. The total area used for cultivation within the two seasons is about 99,994 hectares. Agriculture is the predominant economic activity and over 95% of the population is engaged in this sector. The farming system is mixed crop and livestock production, characterized by subsistence methods. The overall farming system is strongly oriented towards grain production to sustain farmers’ livelihoods and practiced using oxen for land plowing and grain threshing. Crop residues and intensive grazing are the major livestock feed resources in the area. The types of crops cultivated in the district are Wheat, Barley, Oat, Faba bean, Field pea, Maize, and Linseed. The major vegetables produced include Potato, Onion, and Cabbage (Sinana Wored Agricultural Office, 2015). 40 % of the average crop harvested is produced during the Belg season and the remaining 60% is from the Maher season (Sinana Wored Agricultural Office, 2015). Cereal crop production is the dominant means of livelihood and livestock production is another source of income and food.

3.1.5 Land use systems and their coverage

The total land area of the district is estimated to be 168847 hectares, (59% hectares under crop production, 15.19% hectare under grazing and 8.5% is covered by shrubs/bushes and natural

forests and the remaining 17.31% are used by settlement. The land uses are individual land, communal grazing land and governmental land holdings which can be identified through land use patterns (Sinana Wored Agricultural Office, 2015).

3.1.6. Vegetation type

There are different types of vegetation within the district. From these vegetation, *Junipers procera*, *Haygenia abyssinica*, *Acacia tortolis*, are some of the major forest trees found around the forest areas while *Eucalyptus*, *cupperessus lustanica*, *Acacie decurrence* and *Grevillea robusta* are the major tree species found around the homestead and farm area. *Eucalyptus globules* mostly used as a source of income, construction material for houses and energy. Most of the natural forests within the district are owned by government. From fruit (Apple), from fodder tree, tree (lusern), and from grass that used for fodder elephant grass are located (Sinana Wored Agricultural Office, 2015).

3.1.7. Water source

According to Sinana Woreda Irrigation Authority (Sinana Irrigation Authority, 2015), there were two major types of water sources within the Sinana Woreda. The first major source of water is river. There are three rivers in the Woreda that include ‘Shaya River, Tagona River and Webe River’. The other source of water is Shallow wells constructed by the Agricultural Growth Program. At the time of the study, there were three rivers and 12 shallow wells used by people as source of water for drinking and irrigation purpose.

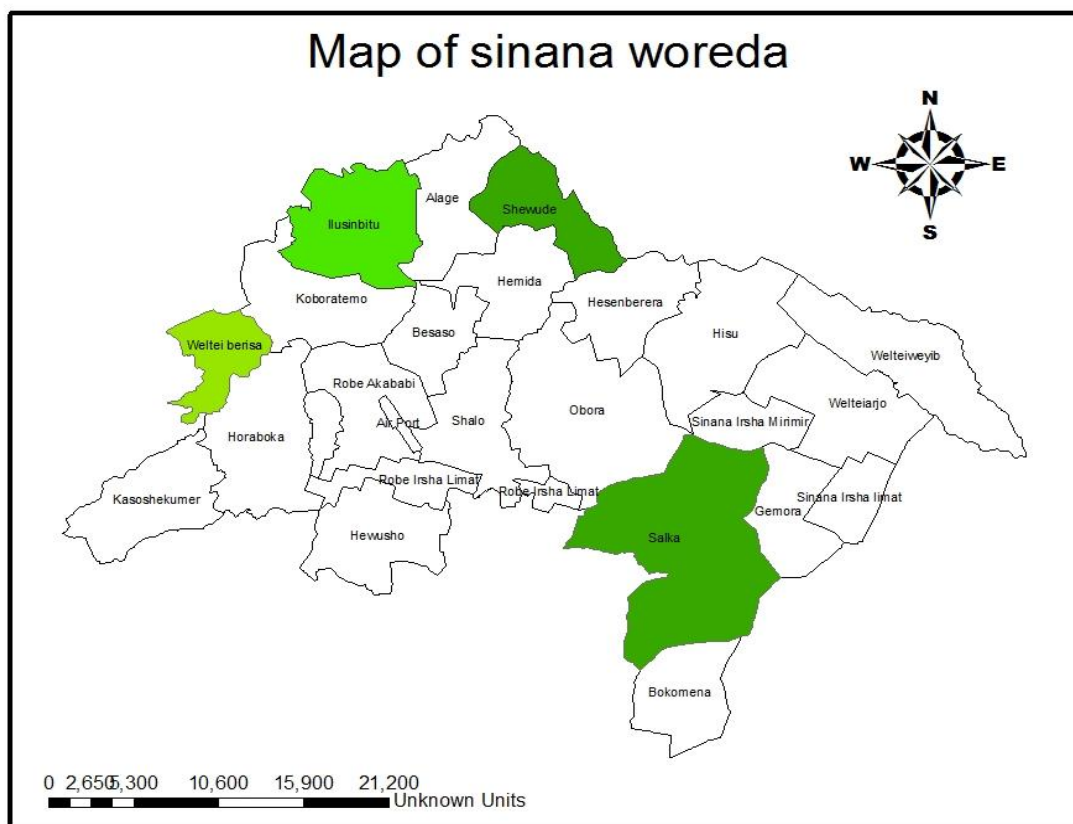


Figure 1 Map of study area (Source: CSA, 2014)

3.2. Research design

The type of research was descriptive describing women and men participation level in different agricultural activities, their interest in cultivating and domesticating different crop and animal species which play a great role in conserving agrobiodiversity.

3.2.1. Site selection and sampling design

A multi-stage sampling technique was employed in this study. From 20 Kebeles in sinana Woreda, four Kebele (Waltaibarisa, Shawade, Illu-Sanbitu and Selka) were selected for the study. First Selka and Illu-Sanbitu were included in this study purposefully since they are pilot sites for African RISING project. African RISING project have been working in Sinana Woreda on research and technology adoption on different types of agricultural cereal crops, vegetable, fruit, fodder tree establishment and animals to increase their productivity and improve nutrition with the local communities in the study area. Second, the other two Kebele (Shawade and Waltaibarisa) were

selected randomly using lottery method from the remaining kebele. After that, the sample size was determined using a complete land holders list obtained from the farmers' training center. The sample size for collecting quantitative data for this research was determined by using the (Cochran, 1977) sampling formula;

$$n = \frac{N}{1 + N(e)^2}$$

n = the sample size the research uses;

N= Total number of households.

e = Maximum variability or margin of error 5 % (0.05);

1= the probability of the event occurring.

First a total of 364 households (91 women (Widowed and single) and 273 men headed household) were selected using simple random sampling technique lottery system. Secondly, for selecting female and male that have husband and wife from the 273 selected men headed households, by using a systematic random sampling technique during the interview, if the first respondent is men then the second was a women (with spouse) in the second household. So by following this step ninety one (91) female respondent and 182 male household respondents were selected. These used to identify the participation level of women and men on different agriculture activity.

Table 1 the selected Sample household

No.	Name of kebele	No of households	Sample size	No. of women	No. of Men	Participant
1	Illu-Sanbitu	1311	114	57	57	PA and NPA
2	Selka	1574	139	69	70	PA and NPA
3	Waltaibarisa	636	55	27	28	NPA
4	Shawade	670	56	28	28	NPA
	Total	4191	364	182	182	

Note; PA = Project Area, NPA = Non- Project Area

Generally, 182 women (91 women household head/widowed and 91 married women/spouse) and 182 household men were selected from all Kebeles through simple random sampling technique using the lists of men and women headed households obtained from the farmer training center and systematic random sampling to foster equal chance of selection. In addition, 10 sample household head (5 female household head and 5 male household head) were selected from each Kebele systematically by dividing the total household size by 10 and (every 10+1) sample household was

selected for identification of the crop species diversity in their farmlands and home gardens, yielding a total of 40 sample households.

3.3. Method of data collection

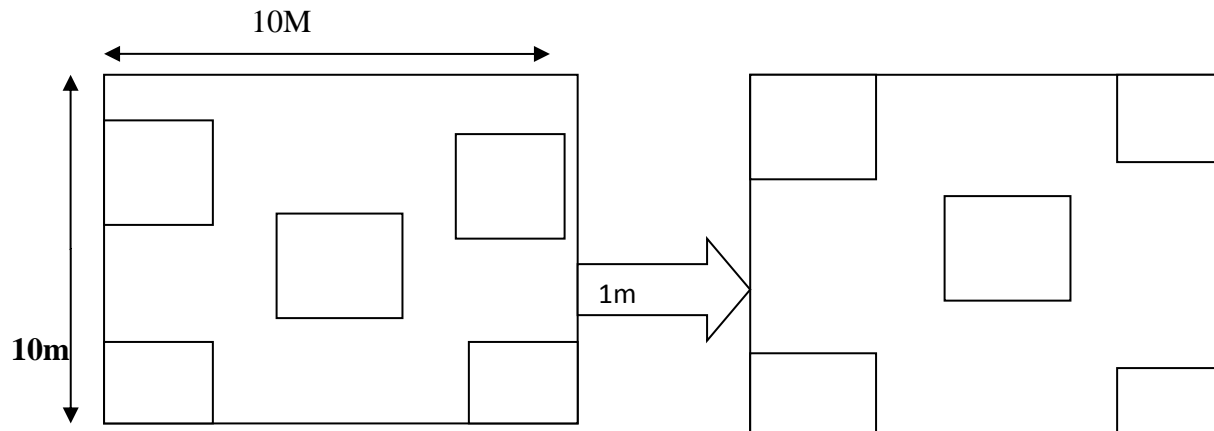
Data for this study were collected between October 2015 and June 2016 using a socio economic survey, field survey and Focus Group Discussions (FGDs) to identify the types of agricultural biodiversity used by women and men, their conservation practices, constraints and opportunities.

A preliminary survey in the study area was made during November, 2015 to gather relevant data about the area. This information was collected from the farmer training center. This helped us to identify the size of population that was used to determine the sample size. General information was also gathered particularly on the identification of conservation activities that are done by women and men 40 respondents from both sex (10 from each of the four kebele), which were not included in the main sample group were randomly selected and interviewed to pretest the tool. The main purpose of the pilot survey was to evaluate the questionnaire and to check whether it is applicable and suitable in the study area.

The study was carried out using a semi-structured interview schedule to establish the type of agrobiodiversity conserved the participation level of men and women respondents, constraints that affect women participation and respondents' demographic characteristics (age, sex, religion, marital status, family size and educational status). The questionnaire was administered to farmers within their area of farming and/or residence using the local language (Afan Oromo). For this survey, four development agents and four Woreda agricultural experts along with the researcher administered the questionnaire.

A field survey was also undertaken to identify the types of plants and animals domesticated on the household land holdings. For these survey 10 (5 male headed and 5 women headed) that have home garden, animals and field farm were selected systematically by dividing the total household by 10. Hence, every 10+1 sample household was selected for identification of the crop species diversity on farmlands and home gardens which cover a total of 40(20 male and 20 female) sample households. The plots examined were selected using a stratified sampling technique. First, the farming area was divided into two strata (homestead and farm far away from home), from which sub-plots were randomly selected to identify the type of crops. The type of plants were counted by laying a

quadrant size of 10 x 10m Within the 10x10m sample quadrant, a sub-plot of 5m*2m for home garden crops and 1m*1m for field crops and the plot far from each other by 1m interval (Whittaker Plot, 1977, Ramanujan and Kadanban, 2001 and Zange and Barrion, 2006). Within the 10x10m sample quadrant, a sub-plot of 5m*2m for home garden crops and 1m*1m for field crops and the plot far from each other by 1m interval.



Each crop located in this plot was recorded by the local name. The purpose of this method was to evaluate and differentiate practically the agricultural diversities managed by men and women on their land holdings. At the same time, the type of animals that was domesticated also counted directly on their land holding. This data was collected from the month of February to June 2016.

Focus group discussions were conducted with three groups (male only, female only and mixed). In total, 12 FGDs were conducted (three in each Kebele). Mixed focus group discussions (FGD) of 8-12 participants included the kebele leader, women and men elders, kebele women representative, and youth representative were conducted. Knowledgeable male and women farmers that had an ability to explain the question and lived for a long period of time in the area were selected purposefully. During the discussion three researchers (facilitator, note taker, and discussion maker) were participated. During discussion, discussion maker facilitate the participants especially women to explain their work. The FGDs was held in the Kebele which facilitated using an open-ended checklist (Appendix 1). Participants were allowed to state their views or suggestions on agricultural practice that used in their area, the involvement of women in the activity, the value of diversification and the factor that hinder agrobiodiversity.

3.4. Data Analysis

Descriptive (percentage) and inferential (Chi-square test and Pearson correlation) statistics were used to analyze quantitative data using SPSS Version 20 at 95% level of significance. The qualitative data gathered through FGD were transcribed, organized into themes, narrated and triangulated with quantitative data collected through individual survey. In addition, diversity index (Simpson similarity index) was used to analyze the diversity of agricultural crops cultivated on land holdings. This information was collected through field observations.

Simpson's index (D) = $(1 - \sum P_i^2)$.

Where

- ✓ p_i is the relative abundance of each species (n/N)

3.5. Quality and ethical consideration

The researcher received official permit from Sinana Woreda Administration Bureau to conduct this study in the stated Kebele. Sinana Woreda agriculture and rural development office was willing to assist the researcher. Focus group discussions with local communities were conducted to familiarize them with the overall objective of the study and their permission was obtained ahead of data collection time. Interviews were administered on free will of interviewees and assured confidentiality and anonymity of the information obtained from them, and that this information was to be used only for the intended research objectives.

4. Results and Discussion

4.1. Demographic and Socio-economic information

Depending on total respondent age range distribution showed that 17 % of the respondents are <30 years, 77.2% are in 30-60 age groups, 5.8 % are greater than 60 age groups (Annex 1). The majority of the respondents were within the range of 30-60 years. This implies that majority (72%) of the respondents were at their highest productive and reproductive age group.

With regards to marital status, 74% of respondents were married, 21.2 % were widowed and 4.7% of the respondents are single. The sex of the respondents was 50% Male and 50% Females.. The majority of the respondents were Muslim 64.8% followed by 28.2 % Orthodox Christian and 7% Protestant Christians. About 47.3% of the respondents were illiterate, followed by primary grade (25%) and secondary education (9.8%), followed by (.8%) college and university Annex 1. According to the collected data most of the farmers (85.2%) obtain their income from both crop production and Animal husbandry, 12.9% crop production and 1.4% animal husbandry. All the men and women farmers interview have land that was acquired from government 37.6 %, from government and family 29.7%, inherited and government 8.5%, rented 1.1% and 3.6 % from other. All of their land is certified and 73.9% of them have land that is recorded under the name of both husband and wife and 26.1% is in the name of the wife. 73.9% of the respondents mentioned that their land is owned both by the husband and wife and 26.1% female household head. When it comes to the length of time the respondents lived in that locality, all of them claimed to have lived for more than 20 years.

Table 2 Demographic character of respondent with gender

		Female Respondent (%)	Male Respondent (%)	X ²	P
Age	<30	24	10	30.22	0.000
	30-60	76	78		
	>60	0	12		
Total		100	100		
Marital status	Widow	42	0	1.2	0.000
	Single	9	0		
	married	48	100		
Total		100	100		
Religion	Orthodox	32	34	3.66	0.165

	Muslim	64	65		
	Protestant	3	1		
	Total	100	100		
Education	illiterate	56	38	16.5	0.001
	1-7	38	46		
	7-12	5	14		
	college and University	0	2		
	Total	100	100		
	Animal Husbandry	2	0.5		
	Crop production	10	15.9	6.49	0.000
	Vegetable Production	1	0.0		
	Mixed	87	83.5		
		100	100.0		

4.2. Access to and means of ownership of land in the study area

All the farmers that participated in the survey have land that was acquired from government 37.6 %, from government and family 29.7%, inherited and government 8.5%, Brought/Leased 1.1% and 3.6 % from other. All of their land is certified and 73.9% is registered in the name of both husband and wife and 26.1% is by wife only. Their land was owned by both male and female (73.9%) and 26.1% by women only. (Annex 1). Focus group discussion also they said that without female headed household “our land managed both by wife and husband and on the certificate both wife and husband name were recorded” (male group and mixed group). According to them” most women in rural areas do not get land from government bodies when we see in relation to men but most of the women get land from their parents through marriage, transfer and inheritance” (female focus group). Similarly, some research state that less than 2 % of the world’s land is owned by women or women own approximately 15 percent of agricultural landholdings in Africa. Yet, across countries, the pattern that women own less land than men, regardless of how ownership is conceptualized, is remarkably consistent. Further, in many cases, the gender gaps are quite large (Mara *et al.*, 2013). Mara *et al* (2013) also indicated rural women do not have equitable access to land and agricultural resources. This might be due to social, cultural and religious problem present in the community. This probably affects the participation of women in conservation of agrobiodiversity in the study area. Because not participate on every agricultural activity.

4.3. Type of agricultural practices and activity that performed by men and women

The major crop production and management activity identified in the four surveyed communities include farming (decision making, land preparation, planting, crop management, compost and fertilizers application, harvesting, storage, food processing and preparation harvesting of crops, collection of edible and medicinal plants, processing of food crops and wild plants in edible form and) and marketing, seed selection, preservation, irrigating the land, crop exchange (selling and purchasing), animal production and management, collecting products of animals and changing to another value (value addition) for creating good income and seed multiplication and storing for the next season (Table 3).

Table 3 Type of agricultural practice and activities mentioned by women and men

Agricultural Practice	Type of activity	Gender participation in frequency and (%)				Gender participation in frequency and (%)			
		Between women and men house hold head		women and men between the household					
		Women%	Men%	Women	Men	Women	Men	Women	Men
		<u>frequenc</u> y	<u>frequenc</u> y	<u>frequenc</u> y	<u>frequenc</u> y	<u>frequenc</u> y	<u>frequenc</u> y	<u>frequenc</u> y	<u>frequenc</u> y
		%	%	%	%	%	%	%	%
Crop production(cereal, vegetable, pulse)	Decision making	91	100	182	100	89	98	182	100
	Land preparation	89	100	182	100	75	82	182	100
	Seed selection	91	100	182	100	82	90	152	84
	Irrigating the land	44	48	36	20	10	11	44	24
	Fertilizer and compost application	91	100	182	100	84	92	157	86
	Crop rotation and Row planting	91	100	182	100	80	88	182	100
	seed sowing	91	100	182	100	84	92	157	86
	Crop management	91	100	182	100	89	98	138	76
	Crop harvesting	91	100	182	100	85	93	128	70

	crop transportation	91	100	182	100	81	89	127	70
	other /seed multiplication, seed storage for the next season and etc	91	100	182	100	91	100	182	100
	Crop exchange	91	100	182	100	100	100	100	100
Animal husbandry and poultry	Decision making on Animal selling, buying ,income control	91	100	182	100				
						86	90	182	100
	Animal management	91	100	182	100	100	100	100	100
	Collecting products from animal	91	100	182	100	91	100	90	49
	Decision making ,buying ,selling and income control of poultry	91	100	59	60	91	100	59	60

Source: Field survey data, 2016.

As indicated in (Table 3) women and men act differently on different agricultural activities and also their participation is different on the same activity and also differ between the house hold. Activities that are performed between the households (female and male headed) on the crop production and animal husbandry without some activity like land preparation almost they have same participation level. But according to the above data two things are observed. The first one is, the participation of women and men was different on the production activity of the same crop species and also different throughout the agricultural activity.

Focus group discussion (Mixed group and men group) explained: “Without limited number of activity like land preparation women take the major part of every activity of agriculture. The discussion also agreed that women are key in all of our agricultural activities starting from home stead level to field work and field preparation to harvesting storing and selling. Especially women play a great role on management of crops at field and at home, storing crops for the next season. For example women store seed for the next season in plastic bags and for plants that are easily

damaged, women plant the seeds in the homestead and managing” (January/ 18-21/2016) in all groups of four kebele of the area.

Similarly, according Lemlem *et al.*, (2010), women are invisible workers, in rural areas of Ethiopia although they play a major role in agricultural production. They are equally efficient in seed bed preparation, tilling, sowing, fertilizer application, fodder cutting, weeding, intercultural operations, transplanting, threshing, drying, storing cereals and fodder, selling agricultural commodities and harvesting of all the crops, fruits and vegetables. Rural women have significant contribution in the labor force for agricultural activities. So women have a great role in every agricultural activity that is performed in their area, which contributes to conservation of the agrobiodiversity. The difference in participation also might be due to the low attention of community, problem of confidence, work load and other factors discussed in the next section.

4.4. Participation in agricultural activities

Men and women participate in various activities at different levels to produce agricultural products.

4.4.1 Level of participation in decision making

As stated above women’s participation on every activity of agriculture excluding land preparation is equal to men. But women who have husband their participation level is different in the same type of activity with men household (table 4).

Table 4 Participation level of women and men in decision making participation level

Decision making on different agricultural activity	Gender Participation				
	<i>Women</i>		<i>Men</i>		$\alpha=0.05(95\%)$
	Number	%	Number	%	
Decision on cereal crop production.	65	70	182	100	.000
Decision on pulse crop production.	84	90	182	100	.000
Decision on vegetable crop production	91	100	122	70	.000

Decision on livestock husbandry in addition to selling and buying	86	90	182	100	.001
Decision on hen buying and selling and Income control	91	100	59	60	.000

Source: Field survey, 2016

Decision making is the major activity that is performed in any farming activity. Decision taken on agriculture on cereal crop, pulse, vegetable crop production and livestock and poultry production type crop cultivated, where to cultivated, how to purchase and sell the commodity, type of animal they use and in general in all activities of agriculture decision is made by both sex (Table 4). But even, if both sex participated on decision making in the family their participation level is different. 8% women and 94% men on cereal crop, 20% women and 48% of men on pulse crop production, 78 % of women and 12% of men on vegetable production, 16% of women and 100 % of men on livestock husbandry, selling, buying, and income control, 100% of women and 23% of men poultry management and income control were participated very often (Annex 2). There were significant variation between women and men in decision making participation at ($P < 0.05$) (Table 4). It concludes that women without vegetable production and poultry production that performed at the homestead level most of the women were not participated as men on decision making. According to the farmer group discussion, the mixed group said

“Women do not participate fully in decision, like other agricultural activities. The male do not give them the opportunity do so, they think women don’t know anything” *January 18-21/ 2016* in all surveyed kebele. Married women group said

“We are women; we don’t know all the things done at field level, also get different trainings from the Development agent. The man knows what is done and also he is the leader of my family so we can’t convince them on decisions and sometimes even when we rise our ideas they don’t take from us” *February/ 1-6/ 2016*. The situation is almost the same for all studied Kebele. Similarly, different studies also show that various factors affect rural women’s participation in decision making on farm activities (Aazami *et al;* 2011). Men and women have different rights to different crops and livestock. Rights can be divided into user rights, including resource access, rights to withdraw products, rights to exploit commercially, and decision-making rights, such as management, exclusion (Aazami *et al;* 2011; Meinzen Dick *et al.*, 2007). So the decision making

power of woman on different agricultural activities might be as result of low attention of community, expectation of women that only my husband is the decision maker of my family and low participation of women on different community training and cultural norms. That affects the conservation of agrobiodiversity. For example one person said that may “wife live with my shadow. That means if I am not present all of the work that is performed stops” *February 1/2016* on selke kebele. that show the expectation of some parts of community have for women.

4.4.2. Level of participation on cereals crop

The dominant crops primarily grown in the area are cereal crops such as Barley, Wheat, Oat, Maize and Teff. The major staple food crops are wheat, barley and oat. Wheat, in addition to food, is used to earn income. Women and men participate on different activities of cereal crop production with different level of participation. The same to decision making the participation level on cereal crop production is different throughout the activity performed For example women and men that participated very often on land preparation 52% women,100% men, On seed selection 40% women and 100% of men, On seed sowing and fertilizer application 22 % of women and 100% of men, On crop management (weeding, Pest control at field and home) 64% of women and 24 % of men, On cereal crop harvest 16% of women and 100% of men, On crop transportation 38% women and 92% of men and on crop selling and income control 7% women and 65% men were participated and the other are participated some times and often (Annex 3). So their participation variation were significant at ($P<0.05$) on all activity of cereal crops production (Table 5). According to farmers’ group discussion (man and women group of all Kebele) also, male farmers focus on field crop wheat and barley because these crops are used by them as a source of income and simple to cultivate in relation to others and also the community believes that cereal crop production is related to men. Men prepare land, select type of seed that they want to cultivate and sow the seed. Some women who have not husband or widow rent out their farm land to other men through sharing the benefit, but because of men dominance, their field farms are covered by cereal crops like wheat cultivation which contributes to the cultivation of only cereal crop on fertile land. So some of the major activities are performed by men. But, even if the dominance of men is greater than that of women due to different factors mentioned on the next page women have high contribution in cereal crop production starting from land preparation to harvesting and storing. Similarly, according to Damisa *et al.*, (2007) and Sharon, (2008), women and men play critical roles in agriculture throughout the world, producing, processing and providing the food we

eat. Women make up half the rural population and they constitute more than half of the agricultural labor force ranging from tasks such as land clearing, land-tilling, planting, weeding, fertilizer, manure application to harvesting, food processing, threshing, transportation and marketing and it is the same in all Kebele. So the major tasks performed in cereal crop production are majorly done by men. That means the entire field farm is covered by cereal crop like Wheat and Barley. Men and women farmer may use different varieties of wheat or barley for increasing their productivity that create mono species crop cultivation.

Table 5 Participation level of women and men in cereal crop production

Agricultural activity /cereal	Gender Participation				$\alpha=0.05$
	<i>women</i>		<i>Men</i>		
	Frequency	%	Frequency	%	
Land preparation(land clearing, plowing and etc)	61	67	182	100	.000
Seed selection	74	81	182	100	.000
Seed sowing and fertilizer application	80	87	182	100	.000
Crop management(weeding ,pest control)	87	95	182	100	.002
Crop Harvesting	81	89	182	100	.000
Seed transportation	74	81	182	100	.000
Crop selling	89	97	182	100	.000

Source: Field survey, 2016

4.4.3 Level of participation on pulse crop

Pulse crops like fab bean, field been, lintel are cultivated in this area. In addition to this chickpea also cultivated by some farmers that participated in African RISING project. Fab bean, field pea, linseed, lentil, were the major source of food and income from pulse and oil crop next to wheat

and barley. Similar to the data presented, it shows that there is active participation of both men and women on the production of pulse crop as the same to cereal crop production (Annex 4). But 19% women, 100% men on seed selection, 24% women and 65% of men on seed sowing and fertilizer application 8 % of women and 39% of men on crop management (weeding, Pest control) 78% of women and 45% of men on pulse crop harvest 23% of women and 86% of men, On crop transportation 15% women and 95% of men and on crop selling and income control 54% women and 70% men. It was a difference in participation level from activity to activity similar to cereal crop production. On pulse crops management, Selling and income control women participation were active, and on other production activity their participation level were less that were significantly differ at ($P < 0.05$) (Table 6) between men and women participant.

According to the respondents and discussions with farmers, women and men have a great role in the production of pulse crops, but women participate more on pulse crop than cereal crop. Women group on Selka (9), Shawade (10), Illu- sanbitu (12) Waltaibarisa (9) which have a total member of 68 farmer that participated on focus group discussion said that “pulse crops are the major source of food for our family. Our child is not satisfied without fab bean or field pee in the food and also pulse crop have many purpose for us” *February/ 1-6/ 2016*. On pulse crop production women’s that are widowed and female managed household participated more than women in male headed households because these women are able to decide on their land as they want. In Addition men are not want to cultivate this pulse crop because pulse crop production most of their activity are manual that is not easy cultivated like cereal crop. Similarly some study show that women’s participation in pulse crop production activities is still higher when compared to cereal crop production (Zenebe *et al*, 2014). These show women have high interest and play a great role in the production of pulse crop than men. So this contributes more for the conservation of agrobiodiversity of the area through the production of different type of pulse crop

Table 6 Participation level of women and men on pulse and oil crop production

Agricultural activity/Pulse crop/	Gender Participation	$\alpha=0.05$
	<i>Women</i>	
		<i>Men</i>

	Number	%	Frequency	%	
Land preparation(land clearing, plowing and etc)	76	83	182	100	.000
Seed selection	82	90	182	100	.000
Seed sowing and fertilizer application	80	88	163	90	.000
Crop management(weeding pest control)	91	100	182	100	.002
Crop Harvesting	83	90	182	100	.000
Seed transportation	79	87	182	100	.000
Crop selling	89	98	173	95	.278

Source: Field survey 2015-2016

4.4.4 Level of participation on vegetable, fruit, spice and aromatic plant production

In the study area vegetables like potato, Carrot, Tomato, Onion, Rue, Pumpkin, Beetroot, Swiss chard, Pepper, *Kale*, *Khat*, *Rhammnus*, and other plants are cultivated. These plants are home stead crops, but currently, vegetables like potato, cabbage, pepper start to grow on the field farm by using irrigation and rain water especially after African RISING project started in Illu-sanbitu and Selka. The community produces these vegetables for home consumption as well as income generation. Women's and men participation level show significant variation at ($P < 0.05$) at all level of vegetable production activity (Table 7), rather than land preparation. On land preparation women and men participate was the same, because most of the vegetable production were practiced around their home and not affected by other factor. Farmers group discussion also show that in vegetable production especially at homestead level women play a great role and the community including women themselves perceive vegetable work/homestead work, as a women's responsibility as they have no ability to work outside the home garden especially women with husbands at home. One married farmer said that "i am working in homestead very often and I cultivate different crops and I use for my family and also I sell for getting income, I am not take any money to my husband and also I am not ask him to take me money" February/ 1/2016 in Shawade, In the homestead women cultivate different vegetables, and spices for food, income, medicine, and ornamental purposes. In addition to this women have started to cultivate fruit trees like apples after African RISING started the apple intervention in two kebeles (selka and Illu-

sanbitu). Women decide on homestead activities, and they plant what they want in their homestead. Nobody controls their purchase, sell and income of produce from home gardens to fulfill their household food security needs and what to plant in the next season. Plants in homesteads have far more species diversity than crops cultivated in fields, and hence should be recognized as the single most important repository of cultivar diversity. So the homestead is an area of diversity which is managed by women. For example at Illu-sanbitu the home garden of “Shawaye” ten types agricultural plants that have different purpose are located over 200m² by using agro forestry system.

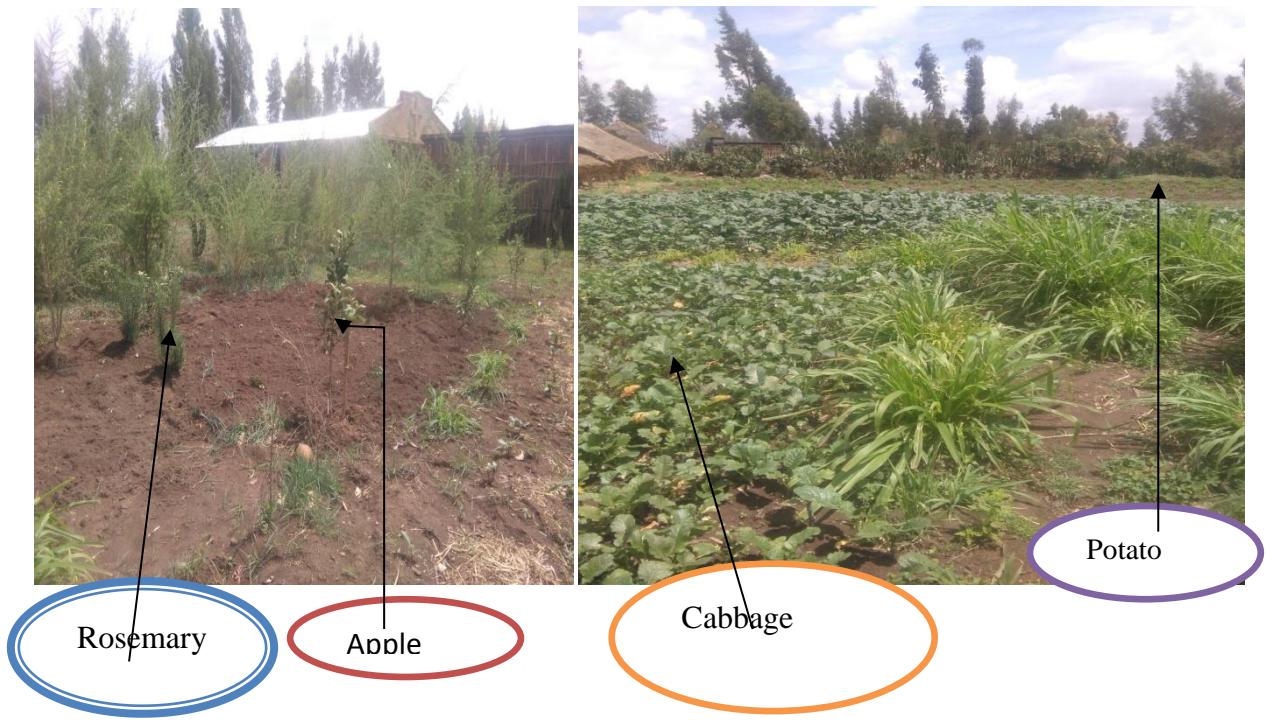


Figure 2 Types of plants in home gardens

As different studies show, tropical gardens are the most renowned form of home-gardens and are the most complex agroforestry systems known. It is some of the world’s richest area that plant species were found and complex, diversified and highly traditional rooted part of plant biodiversity conservation and utilization (Zemedu, 2004; Kumer and Nair, 2006). For that reason women contribute highly than men in conserving diversity of vegetables, spices, stimulants and other plant.

Table 7 Participation levels of women and men on vegetable and fruit crop production

Agricultural activity/vegetable/	Gender Participation				$\alpha=0.05$
	<i>Women</i>		<i>Men</i>		
	Number	%		%	
Land preparation(land clearing, plowing and etc)	90	99	172	95	0.042
Seed selection	91	100	92	51	0.000
Seed sowing and fertilizer application	91	100	108	59	0.000
Crop management(weeding ,pest control)	91	100	50	27	0.000
Crop Harvesting	91	100	21	12	0.000
Seed transportation	91	100	19	10	0.000
Crop selling and control income	91	100	34	19	0.000

Source: Field survey 2016

4.3.5 Level of participation on animal husbandry

In this area the farmers use animals with crop production for food, income, transportation and plough their land. Animal husbandry like crop production they have their own activity like livestock feeding, watering, utilizing animal product, selling animals, controlling income generated from animal sale, poultry management, utilizing hen product and hen selling and buying that women and men act on differently. Without livestock feeding on all activity of livestock and poultry production there is a significant variation between men and women at ($P<0.05$) (Table 8). The influence of women is strong in the use of eggs, milk and poultry meat for home consumption and they often have control over marketing and the income from these products. According to farmer group discussion that under taken on all kebele “Women keep and decide on animals like cow, sheep, goat and hen and used them as major food source and, income next to field farm for their household. Perhaps for this reason poultry and small scale dairy projects have been popular work for women” *February/ 1-4/2016*. So that women participate more than men in the management of livestock which contribute for the conservation of livestock diversity. Similar

different study also show that ownership of livestock is particularly important to women in societies where access to land is restricted to men. They share responsibility with men and children for the care of animals, and particular species and types of activity are more associated with women than men. For example, women often have a prominent role in managing poultry and dairy animals and in caring for other animals that are kept in the house and fed within the homestead (Bravo-Baumann, 2000; Guèye, 2000). This is also true for this district, according to the farmers' group discussion and respondents most of the management part for large animal and all activity for small animals like equine and poultry is taken for women and children and other cattle like oxen are mostly related to men. So that both women and men play a significant role in conserving livestock diversity of the area, but women participation on every activity of livestock management is most of the time related to women especially small animals that contribute to the conservation of diversity of animal.

Table 8 Participation level of women and men on animal production in sampled kebele

<i>Kind of activity in Animal production</i>	Gender Participation				$\alpha=0.05$
	<i>women</i>		<i>Men</i>		
	Number	%	Number	%	
Livestock Feeding	91	100	182	100	0.157
Livestock watering	81	91	182	100	0.000
Utilizing Animal product	91	100	90	49	0.000
Selling large animal	81	89	182	100	0.000
Income and income control.	83	91	182	100	0.000
Poultry production					0.000
Poultry Management	91	100	59	32	0.000
Utilizing hen product	91	100	87	48	0.000
Hen selling, Buying and income control	91	100	63	35	0.000

Source: field survey 2016

4.4 The participation of women and men by Kebele.

The participation of women on different agricultural activity between kebeles is different. That means as stated above women and men perform different activity in agriculture in order to conserve agrobiodiversity and increase their productivity. But their participation have significant variation at ($P < 0.05$). As shown that the participation level of women at both (homestead and field) is different from kebele to kebele (figure: 4), that means women participation is higher in selka and Illu-sanbitu than waltaibarisa and shawade. That might be due to Selka and Illu-sanbitu is the Pilot area of the African RISING. African RISING project incorporate women on different activities of agriculture that increase their knowledge, income, nutrition, productivity. Women in African RISING participate directly on training, cereal crop production, vegetable production, fruit production, fodder development and monitoring and evaluation that undertaken by Kebele and Woreda IP committee. So that women farmer participated starting from research performed to seed multiplication. On the women focus group discussion they said that “African RISING performs different activities on my land and we are the major actor for the activities done by African RISING project according to our Kebele. Please come and see my homestead we are cultivating different vegetable, fruit, fodder now we are start to earn many from my homestead, my homestead start to use as a source of nutritious food, this is the result of African RISING”.



Figure 3 Photography showing of home garden of women that participated on African RISING project

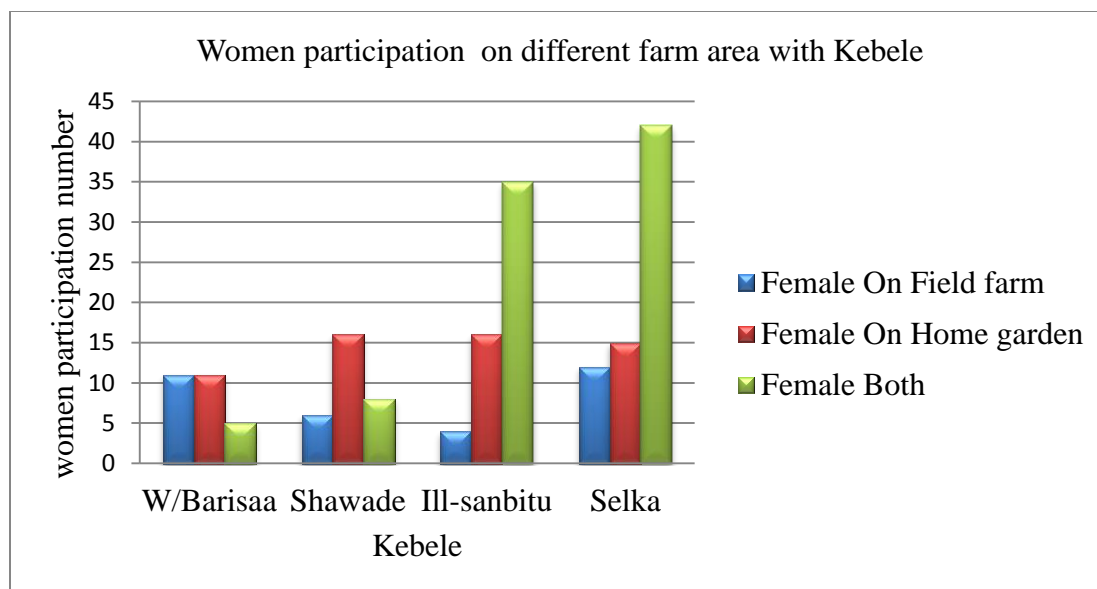


Figure: 4: The difference in participation of women between Kebele.

4.5 The interest of women and men on different crop and livestock species

Women and men show different interest on the production of different crop type and livestock species (Table 9). The interest women and men to cereal crops 100% women and 100% men, to pulse crops 100% and 92 % men, oil crops 97% women and 100 % men, to vegetable crops 94% women and 34%men,to Fruit 92% women and 59% men, to spice 68% women and 12 % men, to stimulant/tobacco and cat/ 22% women and 12% men, to Aromatic 26% women and 0% men and to fodder plant 97% women and 90 % men were interested.

Table 9 Interest of women and men crop and animal production and domestication

Type of crop they want to cultivate	% of female	% of male
Cereal crops	100	100
Pulse crops	100	92
Oil crops	97	100
Vegetable	94	34
Fruit	92	59
Spice	68	12
Stimulants	22	12
Aromatic	26	0

Source: Field survey 201

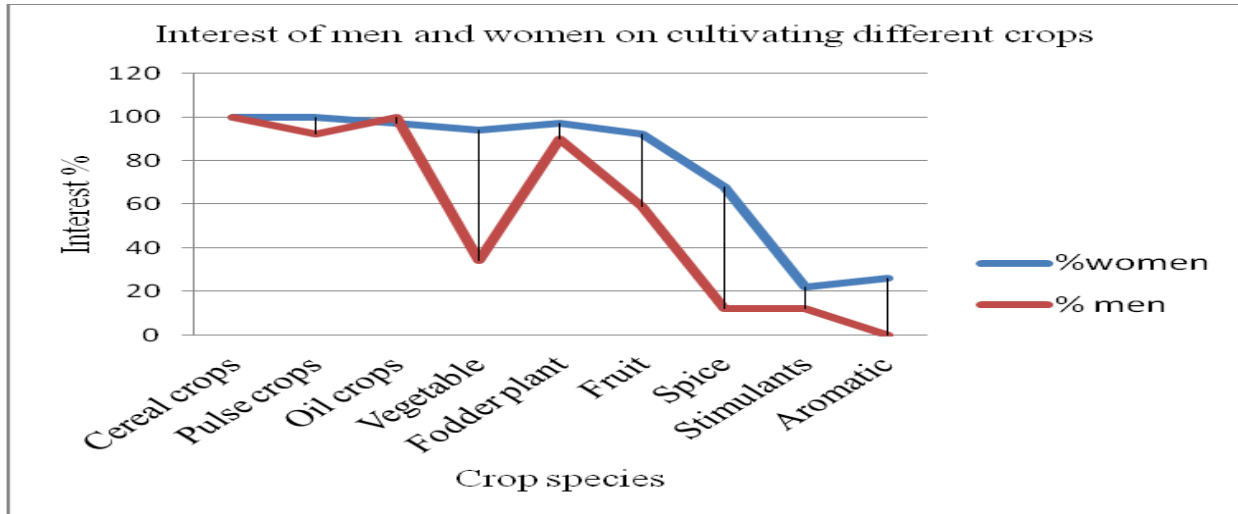


Figure 5 Interest of women and men on different crop species (Source: Field survey 2016)

The interest on livestock: On large animal production 50% women and 50% men, to sheep and goat production 50% women and 34% men, to poultry production 49.5% women and 17.6 % men were interested.

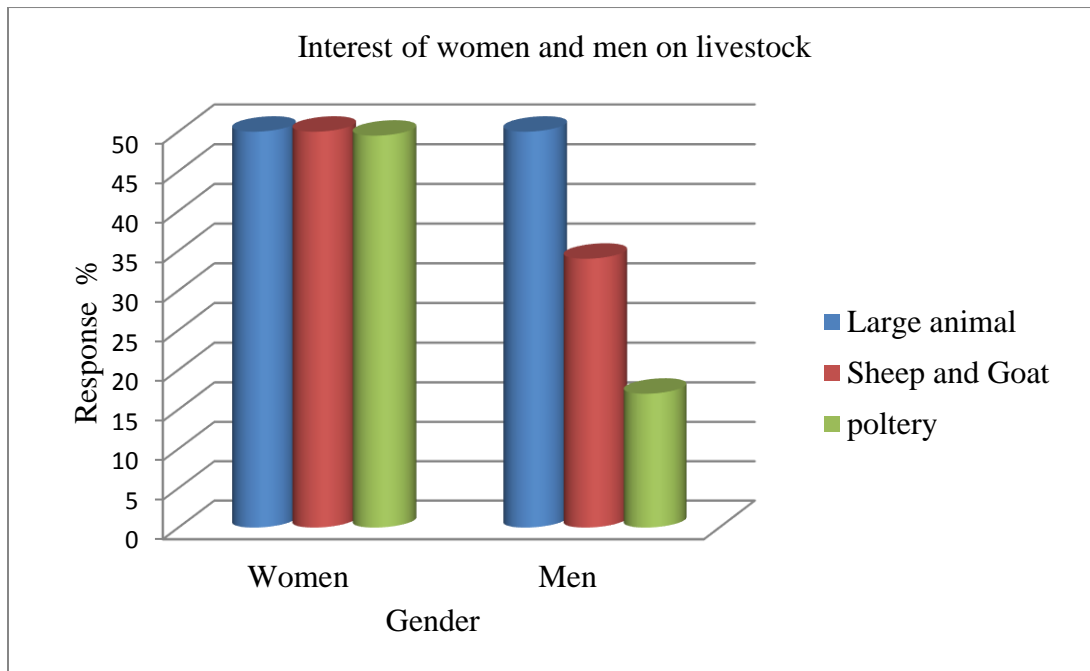


Figure 6 Interest of men and women on animal species (source: Field survey, 2016)

According to the survey and farmers group discussion, in general, women and men have different interests in different agricultural crops and animals. So these might be due to the fact that men focus on the market while women focus on fulfilling family food demand. Women’s producing different crops, vegetables, spice, fodder, fruit for food, nutrition, income and also some time by multiplying seed. Generally Women’s interest in cereal is equal to that of men. And women’s interest in pulse and oil crops is relatively higher compared to other crops and its above men’s interest that contributes for conserving agricultural diversity. As pointed out earlier, cash and export crops are frequently regarded as “men’s crops and subsistence crops as women’s crops. The standard explanation for this division of crops by gender is that women are responsible for feeding the family and thus prefer to grow subsistence crops for the household, whereas men are responsible for providing cash income and thus raise cash and export crops.

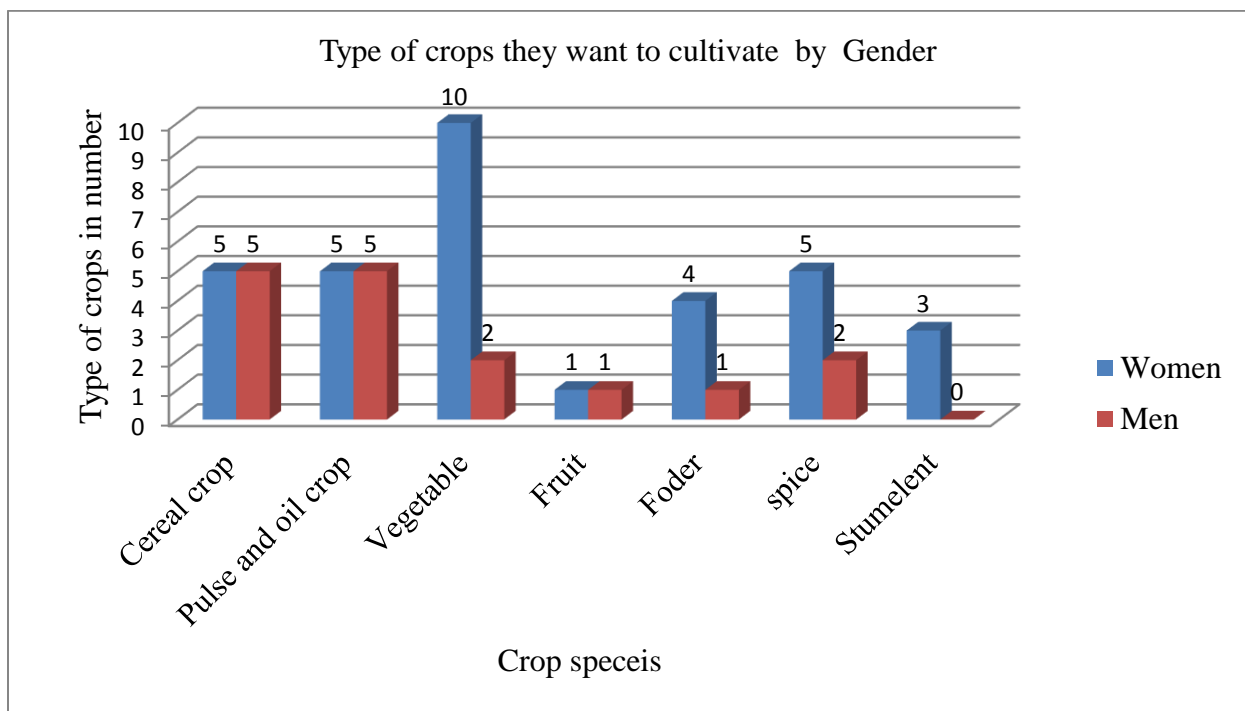


Figure 7 Number of crops they want to cultivate by gender (Field survey, 2016)

Men focuses cereals crop like wheat and barley, pulse crop like faba bean to cultivate on the field (Figure 7). But women focuses/have interest on all crops to cultivate specially like barley, faba bean, Wheat, field pea, lintel and different vegetable. In general, it is difficult to tell whether women grow lower-value subsistence crops because they have different preferences and concerns but women grow and want to cultivate more diversified crops than male but they cannot access

the land, inputs, credit, information, and markets that would permit them to do otherwise (Doss, 1999).

4.6 The diversity of agricultural crops/plants cultivated and animal domesticated by household

According to the respondents in this district different plants are cultivated for food, income, fodder, medicine, preparing some local drink like “*Tella*” and sometimes reclaiming their soil and other proposes. Types of crops cultivated on in the area are wheat, barley, oat, maize, faba bean, field pea, chickpea, linseed, niger seed, potato and onion. farmers that have irrigated land on the field farm grow potato, onion, cabbage, ,garlic, kale, beetroot, tomato, pepper, pumpkin, pepper, rue, rosemary, lemon grass and fringed rue, apple/Ana, elephant grass, tree lusern, enset, stimulants like Khat, rhamnus and tobacco that cultivated at the homestead. According to data collected from the field farm and homestead level, the type of crop species that cultivated by both sex are Cereal crop 4 Species, Pulse and oil four species Vegetables eight species, spice four species, fruit one species fodder four species and stimulants three species total of twenty eight species which is 71% are homestead crops species on women farm area and species that cultivated by men is cereal crop 4 species, pulse crop 4 species vegetable two species and fodder one species. And the Simpson index for (men = 0.864) and that for women =0.84) which show the diversity of plants cultivated by women is more diversified than men’s. From recorded data, from fruit apple, from pulse chickpea and linseed, from fodder alpha alpha, recorded on African RISING project site (Illu-Sanbitu and Selka).So that African RISING project play a role in conserving agrobiodiversity of the area. In relation to field farm crop diversity an average of wheat variety five, barely two, field pea two, faba bean two, lentil one, chick pea one, maize one (melkasa variety) and potato two of crop variety recorded on field farm of man and On women field farm, average of variety wheat three , barley two, field pea two, faba bean two, lentil one, chick pea one, maize one (melkasa variety) and Potato two are recorded. From this variety wheat two varieties, barely one variety, field pea one variety faba bean one variety, chickpea one variety and potato one variety recorded from African RISING project site. Variety number is high on the field than homestead but species number is high in the homestead than field farm when we compare field farm and homestead. In addition at homestead level on less land (200 Meter to 400 Meter) there is high diversity of species, but at field level within two hectare we get a maximum of two species of crops on men farm but they are increased to three species on the women field farm. According to the field data and farmers’ group discussion, farms of women in male headed households and

female managed farm were not only diversified at homestead but also at field level because women cultivate crops not only for the income but to also fulfill their family food security than men. This contributes to the conservation of agricultural diversity at in situ level. Similarly, some research also men and women are responsible for different crops, or varieties, or responsible for different tasks related to one crop. Women tend to be more actively involved than men in the household economy. This typically involves the use of a much wider diversity of species for food and medicine than are traded in regional or international markets. Women generally have the primary responsibility of providing their families with food, water, fuel, medicines, fibers, fodder and other products. Often they need to rely on a healthy and diverse ecosystem for a cash income. Women tend to manage complex production systems with multiple functions, purposes, and species. These systems are not designed to maximize the productivity of any single crop but to ensure overall stability and resilience among the crops that are produced. This agricultural reality is often overlooked when yields of a single crop are taken as a criterion for evaluating the performance of crop production. Cultivation not only of different crops but also of different varieties of the same crop may also vary by gender. High-yielding maize varieties were introduced in many areas to generate a marketable surplus, but many of these varieties had different processing, cooking, and storage characteristics than the local varieties. The high-yielding varieties were often promoted as cash crops. Consequently in many places local varieties are considered women's crops (FAO, 1998 and 2005; Badstue, 2007).

In relation to animal domestication, both women and men domesticated animals like cow, oxen, sheep, and hen. From the counted animals' women have an average of cow two, one oxen, two sheep, 3-4 hen and men have an average of, three oxen and two sheep. There is difference in interest on animal domestication between women and men. So that this might be due to reason women most of the time devoted in order to full fill their family food need through diversified crop and animal cultivation activity but men most of the time they want to increase their income through cultivating only single crops and domesticate animal that have high price on the market.

There is different relationship between some demographic characters and diversity. For example there is a negative relationship between sex, age and diversity because according to collected data, first more diversified crop cultivated only by women (female headed and female that have husband) also there is a negative relationship between age and diversity according data collected there is high diversity but as age increases, diversity decreases. There is positive relationship

between land size and diversity that means as land size increase diversity also increase at ($P < 0.05$). The relation between age and diversity is negative it might be due as the age increase the ability to cultivate different crop start to decrease because some crop and animal want high capacity/manual work/ and difficult to perform.



Figure 8 Photo taken during field survey (by Tesfaye Urgessa, 2016)

4.7. Constraints that affect women's participation in different agricultural activities.

There are different problems that affect women participation in different agriculture activity. Like low attention of community (expectation of community women have not ability to perform agricultural activity or women work only in home), cultural problem, religious problem, lack of awareness of different agricultural practices, lack of experience, illiteracy, false assumption about the role of rural women in agriculture, shortage of technical knowledge/skills, and shortage of

extension service And many rural women especially who have husband were affected by these constraint

According to the farmers discussion on male farmer group discussion “ Women have no ability of working every agricultural activity we performed because some activities are difficult for them and also our religion does not allow” from men farmer discussion on Shawade and on Selka” women are the determinant in every activity of agriculture they convince me in order to cultivate different crop but this is not for all family (spouse) some husbands not allow for his wife to work with him they see as a bad culture to work with him” and in all Kebeles on women and mixed farmer discussion “women expected as only home worker. Without homestead and hen products not allowed to sell much crop (more than 100kg) for us, we don’t control income.” So that according to the discussion the community expect the women as no ability and women the only work on home work even their contribution that have in agriculture is seen only as a participant or they registered for men, they expected only men as the producer but the reality is not that women is play a great role in agriculture which contribute for conservation biodiversity. similarly different study show that women role is affected by different factors like low community attention, lack of accesses of land, lack of training, Religion and culture that control women’s participation on different agricultural activity (FAO, 2003; Ogunbamery, 2009). So the above factors affect women’s contribution to agrobiodiversity conservation that causes loss of agricultural diversity through limiting women participation.

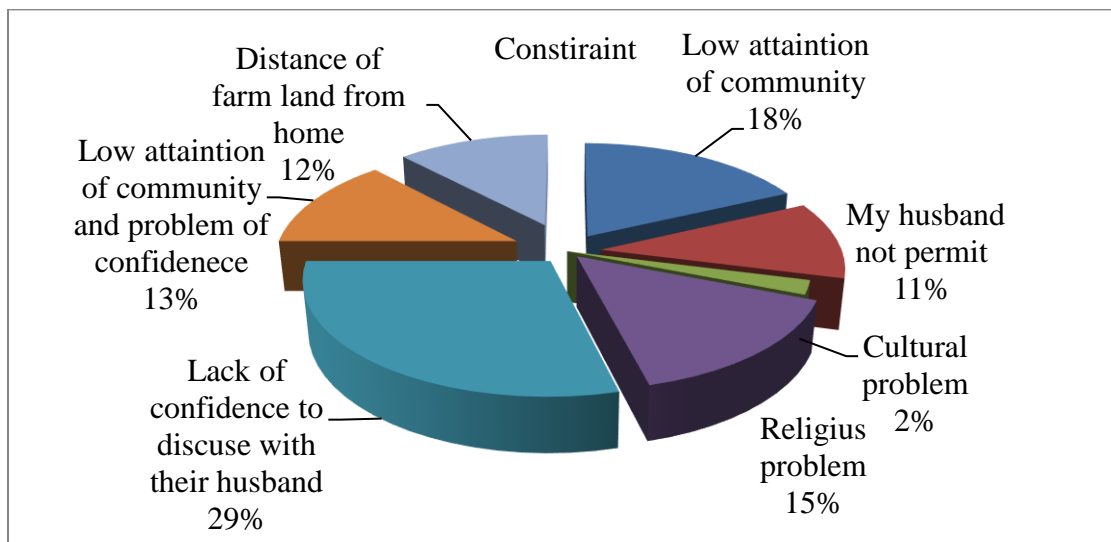


Figure 9. Constraint that affects women participation (Source: Field survey, 2016)

5 .Conclusions and Recommendation

The findings show that women are a major working force in households' agriculture activities and play a great role in conserving agricultural diversity. Women are also found to do the same as men, participating in agriculture starting from decision-making, seed selection, and land preparation to the storage of seed for the next season as well starting from livestock purchase, management to utilizing animal products and selling which play a great role in conserving agricultural diversity. But the level of participation differs from activity to activity and the type of crop cultivated, which means that the extent of participation varies to a high level between the two sexes like that of decision making, seed selection, exchanging the product through selling and buying as well as controlling income where men's participation is higher than women's participation particular in cereal production. Women play a great in conserving agrobiodiversity and interest in cultivating different agricultural crops and domesticating animals(cow, hen, sheep and goat) than men, but there participation level not equal with men on the major activity of agriculture(Land preparation, Seed selection, sowing, fertilizer application, crop harvesting and income control of especially on cereal, pulse and Oil crop production activities. So this affects the diversification agricultural products through minimizing women participation that cultivate different crop. According to the respondent there are different constraints that affect women participation like low perception that community have for the women, problem of confidence that women have in discussing with their husband, religious problem, lack of permission from their husband and distance of their farm land from their home. But even if the above constraints affect the women, women participate in different agricultural activities and the diversity of crops cultivated by women is greater than that of men. Based on the findings of this study the following recommendations were forwarded;

- Promote collective action among women and strength them:-. Strength different organization that women participated (like women cooperative and women association that women organized for increasing their income and helping each other) through strong collaboration

with stakeholders (Madda Walabu University, Woreda Agricultural office, Sinana Research institute). Because if these organization is strengthen women start to develop their confidence and get the opportunity for training which contribute to increase their participation in agricultural activity.

- Implementing experience sharing between women and men:-Women and men have diverse knowledge and experience that differs from women to women, men and men, from male headed households to female headed households, from village to village and from Woreda to Woreda which has the potential to change the capacity of women to participate in agricultural biodiversity conservation and the role they have in increasing food security and for changing attitude of community and their husband and these experience organized by stackholders and shared by using their organization.
- Capacity development:-Agricultural diversity needs decision making, active participation of both sexes and knowledge management. So developing the capacity of both men and women through training, participating both sex on different agricultural activities promoted by different NGO's and stakeholders and creating interventions that are applied around home gardens and practiced by both sex and different age group is crucial.
- Design interventions that simply target women:-Gender-responsive interventions that successfully impact overall productivity, income and natural resource management should target development assistance specifically at women in sectors and areas where women are disadvantaged by gender norms.
- Protect women's rights and control over economic gains:-Special policies and provisions are often required to ensure that women retain control over important income generating assets, when commercialization makes them more profitable and men may seek to take over control of the assets. Regulations that defend women's control over loans against the demands of other family members can make rural women a more effective in conserving agricultural diversity.
- Working with elders and religious person: .Elders and religious persons that live in the village have the capacity to change negative attitudes of the community. Because elders and religious persons have more acceptance and teach the community at church and Mosques, weeding area and at idir which have the ability change community attitude.
- Small infrastructure development:- Infrastructure play greater role in increasing the participation of women. So developing/ establishing small roads around their farm land area

is another solution. Because the female farmer easily go and manage and cultivate different crop on their land.

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7. Appendix

Appendix 1. List of questions for Household survey

This study was done by Workalegn Asseffa, MSc student at Madda Walabu University, and the information collected from you are important for my study, hence, I kindly request to provide me with relevant information for each

1. Name of respondent-----
 - a. Sex-----
 - B. Family size-----
 - C. Age-----
 - D. Occupation-----
2. Residence
 - a. Kebele-----,
 - b. Woreda-----
 - c. For how long have you been a resident of this area-----?
3. Marital Statuses.
 - A) Single
 - B) widowed
 - C) Married
4. Types of household A/male headed B female headed C female managed
5. Education Status A) Illiterate C/. High school/7-12
B/ Elementary /1-6/ D/. College and university
6. Religion A) Orthodox B) Muslim C) Catholic D other
7. What is your major source of income?
 - A Animal husbandry
 - B/crop production
 - c/Vegetable production
 - D other
8. For how long have you been farming (in years)-----
9. Do you have cultivated land? Yes/no If yes who Own it? A/ myself B/ spouse C/ Both husband and wife
10. How the land acquired? A/ Given by government B/given by parents C/inherited D/bought, E/rent F/other specify
11. Is land certified? A/yes B/No ,if yes who name is on the certificate A/husband B/wife C/both
12. On which type of farm Activity Women participation is active?

- A On field crops/field farm C Animal Husbandry B Home garden
- D All

13. What type of crops do you cultivate on your farm land?

- A) Cereals B) vegetables C) fruit
- D) Pulse crops E) Oil crops F other/specify/

14. Is there land that is managed by women /wife/alone mostly applies to women in male headed hold?

- A/ Yes B/ No.

15. Where the land located? A/ Homestead B Main farm C / Both

16 What kind of plant crop (Variety and species) or Animals on this land?

16. Is there any plot or land managed by the husband along? A/ Yes B/ No.

17. What kind of plant crop (Variety and species) or Animals on this land?

18. Do you know the distance of your field from your home? A/ Yes B/ No

19 If yes what is an average distance A/ 1-3KM B/ 4-6KM C/ 7-10KM D/>10

20. Select type of agricultural practices that done according to your district?

No.	Agricultural practice	Select
1	Serial crop production	
	To decide type of crops cultivated and where to cultivated	
	Land preparation	
	Seed selection	
	Crop rotation	
	Watering	
	Fertilizer application	
	Seed sowing	
	Crop management	
	Seed collection/harvesting	
	Seed transportation	
	Product selling	
	Animal management	
	Harvesting and selling their product	
	Write if there is another	

21. From activity mentioned in the table at how often the women's participation is low and men's participation is high and vice versa in different type of agricultural practice? Participation 1=Never 2= Sometimes 3=Often 4= Very Often Or Always

No.	Activity	Women Participation	Men Participation
1	Serial crop production		
	To decide type of crops cultivated and where to cultivated		
	Land preparation		
	Seed selection		
	Seed sowing		
	Fertilizer application		
	Weeding		

	Pest control		
	Seed collection/harvesting		
	Storage		
	Seed transportation		
	Income control		
	Product selling and income control		
2	Pulse crop and Oil Seed		
	To decide type of crops cultivated and where to cultivated		
	Land preparation		
	Seed selection		
	Seed sowing		
	Fertilizer application		
	Weeding		
	Pest control		
	Seed collection/harvesting		
	Storage		
	Seed transportation		
	Income control		
	Product selling		
3	Fruit and Vegetable		
	To decide type of vegetable cultivated and where to cultivated		
	Land preparation		
	Seed selection		
	Seed sowing		
	Irrigating Land		
	Fertilizer application		
	Weeding		
	Pest control		
	Seed collection/harvesting		

	Storage		
	Seed transportation		
	Income control		
	Product selling and income control		

22 . Who decide majorly on any farming Activity?

A) Husband B) Wife C) Both D) Family E/ Specify

23. Mention the crop type that you want to cultivate continuously depends on your interest.

No.	Crop species	Women/men	Variety selected	Their purpose
1	Wheat			
2	Barley			
3	Oat			
4	Field pea			
5	Feb. been			
6	Lentil			
7	Maize			
8	Linseed			
9	Potato			
10	Onion			
11	Cabbage/tekur gomen			
12	Carrot			
13	Apple			
14	Different spice			
	Total type of crop cultivated on their land			
	Total hectare do you have			

B Animal Resources

24 Do you have livestock? Yes/No, if yes

25. Mention the type of animals do you have in these house hold

No.	Type of Animals	Women	men	Animal variety
1	Oxen			
2	Cow			
3	Goat			
4	Sheep			
5	Hen			
7	fish			
8	Bee keeping			
	Total type of Animals they have.			

26 How was the livestock acquired? 1/bough 2/given 3/inherited 4/others/specify

27. From activity mentioned in the table at how often the women's participation is low and men's participation is high and vice versa in different type of agricultural practice? Participation 1=Never 2= Sometimes 3=Often 4= Very Often or Always

No.	Activity	Women Participation	Men Participation
	Animals		
1	Decision on the kind of animals to buy and sell		
2	Livestock feeding		
	Livestock Watering		
3	Utilizing animal product		
4	Selling		
	Controlling income		
5	Poultry production		
	Decision on to buy and sell hens		
	Management of hens		
	Utilizing hen product		
	Selling hen		

28. What is the constraint to protect you for /females/ to participate on the whole activity of farming equal to men?

No.	Activity	Low Attention of Community	My Husband not allowed to discuss with them	Cultural problems	Religious problem	Problem of confidence'	I participate equally with my husband	Distance of my farm land.
1	Decision making what to plant and where to plant							
2	Seed Selection							
3	Seed planting							
4	protection/management							
5	Thrashing							
6	Selling crops							
7	Livestock management							
	Livestock selling							
	Livestock product harvesting							

29 What is your source of information in order to cultivate different crops? A/development agent B/ NGO
 C/Radio D/ Television E/Near Farmer F /research center G other specify

8.2. Checklist for farmers' focus group discussions

✓ Type of groups-----

✓ Number of participant -----

1. Do you know importance of agricultural diversity?
2. Mention type agricultural practice that performed according to this area?
3. Mention the types of agro-biodiversity /Crops, livestock/ in species and variety that used by Men head

Female Head

Children

4. what type of crops and livestock you want to have more depending on the different value of agriculture.
 - A. -----
 - B. -----
 - C. -----
 - D. -----
5. How do you conserve this agricultural diversity? And who is responsible?
6. At this time do you expect that agricultural diversification increase or decrease? Why?
7. What men ,women and children do to conserve or deplete biodiversity (crop, livestock) species and varieties)
8. What is the constraints that hinder agro biodiversity conservation?
9. What is the relationship between agro biodiversity conservation and women?
10. At what type of agricultural activity that women participate more.(land preparation, crop and animal management, Selling product)
11. How do you utilize agricultural diversity?
12. At which level of agricultural the women participate more?
(Field Farm level, Homestead level, Animal husbandry) D. All
13. Can women decide equal to men in all activity of agriculture? A/yes/ No
14. If No, list and Rank the constraint that control women to decide like a men?
15. What is your source of information?
16. How do you plan agricultural activity that you perform?

Annex 1

Variable	Frequency	%
➤ Age(years)		
✓ <30	62	17
✓ 30-60	281	77
✓ 60>	23	5.8
✓ Total	364	100
Sex		
✓ Women	182	50
✓ Men	182	50
➤ Marital status		
✓ Single	17	4.7
✓ Married	270	74.2
✓ widow	77	21.2
✓ Total	364	100
➤ Household		
✓ Male headed	249	68.6
✓ Female headed	91	25.1
✓ Female Managed	46	12.6
Total	364	100
➤ Education		
✓ Illiterate	172	47.3
✓ 1-7	154	42.3
✓ 7-12	35	9.8
✓ College and university	3	.8
✓ Total	364	100
➤ Religion		
✓ Orthodox	121	33
✓ Muslim	236	64
✓ Catholic		0
✓ Protestant	7	1.9
✓ Total	364	100
➤ Source of income		
✓ Animal Husbandry	5	1.4
✓ Crop production	47	12.9
✓ Vegetable production	2	0.5
✓ Mixed(crop and Animal husbandry)	310	85.2
Total	364	100

Land owner ship

Frequency

percent

➤ Land Availability		
✓ yes	364	100
✓ No	0	0
✓ Total	364	100
➤ Land Ownership		
✓ My self	95	26
✓ Spouse		
✓ Male and female	269	73
✓ Total	364	100.0
➤ The way to get land		20.0
✓ Government	137	37.6
✓ Family and government	108	29.7
✓ Inherited	31	8.5
✓ Brought	4	1.1
✓ Inherited and government	71	19
✓ Other	13	3.6
✓ Total	364	100
➤ Land certification		
✓ yes	364	100.0
✓ No	0	0.0
✓ Total	364	100.0
➤ Name on certificate		
✓ Husband only		0.0
✓ Wife only	95	26
✓ Both	269	73.9
✓ Total	364	100.0

Annex 2

Decision making on different agricultural activity	Gender	Participation in %			
		<i>Never</i>	<i>Some time</i>	<i>Often</i>	<i>Very often</i>
Decision on cereal crop production.	women	30	42	19	8
	Men	0	3	3	94
Decision on pulse crop production.	women	8	24	48	20
	Men	0	12	40	48
Decision on vegetable crop production	women	0	0	22	78
	Men	34	20	34	12
Decision on livestock husbandry/buying, selling and income control.	women	6	29	49	16
	Men	0	0	0	100
Decision on hen buying and selling	women	0	0	0	100
	Men	68	3	7	23

Annex 3

Kind of activity cereal crop production	Gender	Participation level (%)			
		Never	Some time	Often	Very often
Land preparation	women	52	14	1	52
	Men	0	0	0	100
Seed selection	women	40	30	12	40
	Men	0	0	0	100
Seed sowing and fertilizer application	women	22	57	9	22
	Men	0	0	0	100
Crop management (weeding , pest control)	women	2	32	62	2
	Men	7	26	67	7
Crop Harvesting	women	16	47	24	16
	Men	0	0	0	100
Seed transportation	women	38	30	13	38
	Men	0	0	8	92
Crop selling	women	2	31	59	7

Annex 4

Kind of activity Pulse crop production	Gender	Participation level (%)			
		Never	Some time	Often	Very often
Land preparation	women	16	24	41	19
	Men	0	0	0	100
Seed selection	women	10	23	43	24
	Men	0	12	23	65
Seed sowing and fertilizer application	women	13	29	51	8
	Men	7	14	40	39
Crop management(weeding ,pest control)	women	0	3	19	78
	Men	9	23	24	45
Crop Harvesting	women	9	7	19	23
	Men	0	5	9	86
Seed transportation	women	13	16	40	15
	Men	0	1	4	95
Crop selling	women	2	12	32	54
	Men	6	12	13	70

Annex 5

Kind of activity vegetable crop production	Gender	Participation level (%)			
		Never	Some time	Often	Very often
Land preparation	women	1	1	51	38
	Men	10	74	60	38
Seed selection	women	0	0	8	83
	Men	89	49	27	17
Seed sowing and fertilizer application	women	0	0	0	91
	Men	74	94	2	12
Crop management(weeding ,pest control)	women	0	0	0	91
	Men	131	24	11	16
Crop Harvesting	women	0	0	0	91
	Men	161	8	0	13
Seed transportation	women	0	0	0	91
	Men	163	4	3	12
Crop selling	women	0	0	0	91

Annex 6

Kind of activity in Animal production	Gender	Participation in %			
		Never	Some time	Often	V.often
Livestock Feeding	women	0	4	7	80
	Men	1	9	27	145
Livestock watering	women	0	0	27	64
	Men	0	7	24	151
Utilizing Animal product	women	0	0	0	91
	Men	92	24	38	28
Selling animals	women	10	39	40	2
	Men	0	4	4	174
Controlling Animal income	women	7	33	36	14
	Men	0	0	50	132
Poultry production	women	0	0	0	91
	Men	123	0	0	59
Poultry management	women	0	0	0	91
	Men	123	53	6	0
Utilizing hen product	women	0	0	0	91
	Men	95	0	0	87
Hen selling and purchase	women	17	0	0	74
	Men	119	58	1	4

Annex 7

Types of plants identified during field observation

N	Crop	Scientific name	Common English Name
0.	species cultivated		
1	Cereal crop		Wheat
		<i>Hardeum vulgare</i> L.	Barley
		<i>Triticum polonicum</i> L.	Oat
		<i>Eragrostis tef</i> (Zucc.) Tratter	Tef
		<i>Zea mays</i> L.	Maize
2	Pulse crop	<i>Pisum sativuma</i> L.	Field pea
		<i>Vicia faba</i> L.	Faba bean

	<i>Lens culinaris</i>	Lintel	
	<i>Cicer artinum</i> L.	Chickpea	
3	Oil crop	<i>Linum unisatissimum</i> L.	Linseed
	<i>Helianthus annus</i> L.	Sunflower	
	<i>Nigella sativa</i> L.	Ethiopian mustard	
4	Vegetable	<i>Allium sativum</i> L.	Garlic
	<i>Brassica integrifolia</i> (west) O.E.schulz	Kale	
	<i>Daucus Carita</i> L.	Carrot	
	<i>Solanum tuberosum</i> L.	Potato	
	<i>Lycopersicon esculanta</i> L.	Tomato	
	<i>Allium porrum</i>	Leek	
	<i>Allium cepa</i> L.	onion	
	<i>Brassica oleracea var.capitata</i>	cabbage	
	<i>Beta vulgaris</i> L.	Beet root	
5	Fruit	<i>Musa paradisiacal</i> L.	Banana
	<i>Malus sylverstris</i> Miller	Apple	
6	Stimulant	<i>Coffea Arabica</i> L.	
	Chata edulis(Vahl,)Forssk.ex Endil.	Khat	
	<i>Nicotiana tobacum</i> L.	Tobacco	
	<i>Rhamnus prinoides</i> L.Herit	Rhammnus	
7	spice	<i>Zingiber officinale</i> L.	
	<i>Capsicum frutescens</i> L.	Chill	
	<i>Tringonella foenum-graecum</i> L.	Fenugreek/Abish/	
	<i>Ocimum basilicum</i> L.	Rosemary	
		Basil/Bosbila	
Total	<i>Rosmerinus officinalis</i> L.	Rose mary	
	<i>Cymbopogon citratus</i>	Lemon grass	
	<i>Ruta chalpensis</i> L.	Rue	



FGD at Illu-



FGD at Waltaibarica



FGD at Selka



FGD at Shawade



Figure 4 Different photo during data collection



Bulchiinsa Ganda Wajjira
 Bulchiinsa Ganda Sinaanaa
 P.O. Box 100
 Addis Ababa, Ethiopia

Lakk 0-9/630/2008
 Guyyaa 7/4/2008

Waajjira Bulchiinsaa Gandaa Sa/ra ttif

Dhimmi:-Degarsaa Barbachisaa Akka gottanif isiin ibsuu ilaala.

Akkuma mata duree irratti ibsamuuf yaalamettii hojjeta wajjira Ittisaa Balaa kan ta'an Obboo Warqalany Assaffaa kan jedhaman qorannoo mataa duree Hirmanaa dubartoonii kunnunsa omishaa qonna irratti qabaan jedhuu irratti hojjechuu wanta barbadaniif Univarsiitiin Madda Walabuu xalayaa gafaa guyyaa 23/02/08 barressen degarsi barbachisan akka godhamuuf nu gaffata nii jiruu.haaluma kanaan issinis kannuma hubatani deegarsa barbachisan akka gotaniif isiinif ibsaana.

Nagaa waajjiin



[Handwritten signature]

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Bulchiinsa Godina Ebsaleetti Waajjira
Aana Sinaana

Waajjira Bulchiinsa Gandaa Ibsanbiittif

Lakk 29/6/2008
Guyyaa 7/4/2008

Dhimmi:-Degarsaa Barbachisaa Akka gottanif isiin ibsuu ilaala.

Akkuma mata duree irratti ibsamuuf yaalamettii hojjeta wajjira Ittisaa Balaa kan ta'an Obboo Warqalany Assaffaa kan jedhaman qorannoo mataa duree Hirmanaa dubartoonii kunnunsa omishaa qonna irratti qabaan jedhuu irratti hojjechuu wanta barbadaniif Univarsiitiin Madda Walabuu xalayaa gafaa guyyaa 23/02/08 barressen degarsi barbachisan akka godhamuuf nu gaffata nii jiruu.haaluma kanaan issinis kannuma hubatani deegarsa barbachisan akka gotaniif isiinif ibsaana.

Nagaa waajjiin




Heldesawwar Kabbadaa Barbaache
U-03-00. H.S. (M.T.G.)

I/C/Waajjiraa Bulchaafi Dhimma
Ummataa A/Sinaanaa
የሲ.ና. ወ.ረ.ና. ኢስተባሪ. ጽ/ቤተ
እና የሀዘብ ጉዳይ. ያላፈ



Bulchiinsa Gadaa Baraaletti Waajjira
 Bulchiinsa Aanaa Sinaanaa
 P.O. Box 117432
 Addis Ababa 1000

Lakk 1-9/630/2008
 Guyyaa 7/4/2008

Waajjira Bulchiinsaa Ganda kl/berisa ttif

Dhimmi:-Degarsaa Barbachisaa Akka gottanif isiin ibsuu ilaala.

Akkuma mata duree irratti ibsamuuf yaalamettii hojjeta wajjira Ittisaa Balaa kan ta'an Obboo Warqalany Assaffaa kan jedhaman qorannoo mataa duree Hirmanaa dubartoonii kunnunsa omishaa qonna irratti qabaan jedhuu irratti hojjechuu wanta barbadaniif Univarsiitiin Madda Walabuu xalayaa gafaa guyyaa 23/02/08 barressen degarsi barbachisan akka godhamuuf nu gaffata nii jiruu.haaluma kanaan issinis kannuma hubatani deegarsa barbachisan akka gotaniif isiinif ibsaana.



Nagaa waajjiin

[Handwritten signature]

Heiseesamu Kabbadea Baraaletti
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ቀን Date 23/02/08 E.C

ሰበሰብራዊ ሜትሮሎጂ ስከተዳደር ጽ/ቤት

ሰሲናና ወረዳ ስከተዳደር ጽ/ቤት

ርቢ

ሰገባ ወረዳ ስከተዳደር ጽ/ቤት

ገባ

ጉዳዩ:- ትብብር ስስመጠየቅ፤

በመደወላቡ ዩኒቨርሲቲ የሰነዎህዳርና ብዝሀ ህይወት አንክብካቤ 2ኛ ዲግሪ ተማሪዎች የመመሪያ ጽሁፋቸውን ስመስራት አየተንቀሳቀሱ ይገኛሉ። በመሆንም ስማቸው ከዚህ በታች የተዘረዘረው ተማሪዎች 1.ፕላሁን ገመቹ 2.ስምረት አበበ 3.ወርቃልኝ አሰፋ 4.ዘሪሁን ደምሴ የት/ት ክፍሉ ተማሪዎች ሲሆኑ የመመሪያ ጽሁፋቸውን ሰማዘጋጃት የሚያስፈልጋቸውን መረጃዎች ስመሰብሰብ ወደአናንተ ስሚመጡ አስፈላጊውን ትብብር አንድታደርጉላቸው በማክበር አየጠየቅን ሰሚደረግቸው ትብብር አስቀድምን አናመሰግናለን።

ገልግሎት

- ✓ ስተማሪ ፕላሁን ገመቹ
- ✓ ስተማሪ ስምረት አበበ
- ✓ ስተማሪ ወርቃልኝ አሰፋ
- ✓ ስተማሪ ዘሪሁን ደምሴ

መወደ



ከሠላምታ ጋር

አብዱናሰር ዩኒስ
Abdunasir Yunus

የብዝሀ-ህይወትና ተፈጥሮ ህብት ት/ት-ቤት
ዳይሬክቶሬት ዳይሬክተር
For School of Biodiversity and
Natural Resources Directorate Director