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Review

Review on gendered perspective of household's participation in agricultural activities in Ethiopia

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Gender is a crosscutting issue that attracts the attention of development professionals, policy makers and politicians. It is due to the fact that in any development, interventions involvement of women has become compulsory. To this end, considering the roles of men and women is very important, and gender roles vary across culture. In Ethiopia where agriculture is the backbone of the economy, the participation of women in the field is very high. Though men are taking the lion's share in agricultural production, the contribution of women has also been an undeniable fact. Rural Ethiopian women must work up to twice as many hours per day compared to men, since they are primarily responsible for their households, including gathering firewood and water, cooking, cleaning, and providing child care. The contribution of women to agricultural and food production is significant but it is impossible to verify empirically the share produced by women. This paper re-affirms that women make essential contributions to agriculture and rural enterprises across the developing world. But there is much diversity in women's roles and over-generalization undermines policy relevance and planning.

Key words: Gender, women, gender role, agricultural extension.

INTRODUCTION

Women of Ethiopia play key role by working with full passion in production of crops right from the soil preparation till post-harvest activities. Their activities naturally comprise crops production, livestock ranching, food processing and preparation, fetching water and collecting fuel-wood, working for wages in agricultural or other rural enterprises, caring for family members and maintaining their homes. Women particularly in the developing countries exercise hardship by undertaking triple roles, that is, productive role and reproductive role and community participation role in their everyday life

(IFAD, 2011). In agriculture, the majority of rural women are food producers working on joint family farms and tending their own land for household food production while only a small percentage is independent farmers. They are involved in both crop and livestock production at subsistence and commercial levels.

They produce food and cash crops and manage mixed agricultural operations often involving crops and livestock farming. All of them are considered part of the agricultural labor force. The sustainable production of food is the pillar of food security. Women in developing nations play

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vital roles in maintaining the three pillars of food security—food production, economic access to available food, and nutritional security. Such division of labour is perceived to be natural because it has not shown any change for generations. According to Boserup (1970), in many societies, “...the traditional division of labour... is usually considered natural in the sense of being obviously and originally imposed by the sex differences in itself.” Moreover, it has been believed for so long that any attempt to change or modify the defined gender division of labour is regarded as “inducing an upset into the accepted natural order” (Yaekob, 2011).

It has been observed that women, like men make major contributions in economic, social and political development. As far as women’s economic role is concerned, their agricultural contribution comes at the forefront (Boserup, 1970). Although women’s contribution is critical, there is a general tendency of obscurity and inadequate recognition of their roles. This is mainly due to the wrong assumption that ‘what would benefit one section of society (in most cases men) will be trickled-down to other section of society (in this case women)’. Due to this generalization, the role of women in productive activities is unusually recognized and remunerated for long (Sintayehu, 2011). This had led rural women to have a limited access to and control over resources (notably land, capital, agricultural inputs, and credit and extension services). As a result they are placed at the bottom stratum of society. What is more, in patriarchal societies, there is a traditional perception which greatly affects their place in society and economy (Charlton, 1984). The backbone of Ethiopia’s economy like many other developing countries is the agricultural sector, which absorbs significant labour force out of which women make almost half. Ethiopian rural women play a significant role in crop and livestock production in addition to their reproductive and community roles. However, their relative access to and control over resources is limited vis-à-vis men. This is believed to contribute its part to the sector’s low performance (Yaekob, 2011). In recognition to the aforementioned fact, gender issues, especially the case of gender and agricultural production, have drawn the attention of a good deal of academicians, development planners and practitioners. This review shows that both women and men take part in agricultural activities in spite of some differences among different regions. Therefore, this paper is set out to review factors affecting women participation in agricultural activities.

Objectives of the review

The general objective of the review is assessing the major roles of both men and women in agricultural activities in Ethiopia. The specific objectives of the review are:

- (1) To review the prominent roles of women and men in agricultural activities
- (2) To review the constraints rural women farmers face in utilizing agricultural extension services
- (3) To review factors affecting rural women participation in agricultural activities.

Method of data collection and interpretation

For this review paper, a variety of documents was analyzed, and the data were collected from records, articles, journals and original research papers. The collected data were organized and compiled for interpretation. The arguments of different researchers were taken, and made interpretation.

GENDER ROLES IN ETHIOPIA

Despite decades of agricultural investments from International Finance Institutions (IFIs), including the World Bank (WB), overall productivity in Ethiopia’s agriculture perennially dependent on food security programs, and several million more who are susceptible to food insufficiency in the event of adverse climatic shocks” (WB, 2008). Although, the WB has invested a total of US\$2.5 billion in agriculture and food security projects in Ethiopia since 1970, a 2010 WB project appraisal document (PAD) stated that “the capacity of Ethiopia’s agricultural institutions is still weak,” yields remain low, and many geographical areas have unexploited potential for productivity growth” (WB, 2010). The WB also noted how Ethiopia’s poor have suffered disproportionately from the global economic crisis, as “the price of goods consumed by the poor is estimated to have risen by 78% in urban areas and 85% in rural areas” between 2008 and 2010 (WB, 2010). Households are often forced to fulfill basic food needs by selling assets, reducing the number of meals eaten per day, or borrowing food or money (FAO, 2009).

Agriculture is the foundation of Ethiopia’s economy, employing 80% of the country’s people. The vast majorities of Ethiopians lives in rural areas and engage in rain-fed subsistence agriculture. Household food security therefore largely depends on external factors including “rainfall patterns, land degradation, climate change, population density, low levels of rural investment and the global market” (World Food Program, 2011). Despite the critical roles, women farmers still face multiple gender inequalities, including difficulty obtaining credit, land, extension services and other productive resources. Rural Ethiopian women must work up to twice as many hours per day compared to men, since they are primarily responsible for their households, including gathering firewood and water, cooking, cleaning, and providing child care (Frank, 2009).

Ethiopian women have played a traditional role of motherhood and home maker in both rural and urban areas. However, their work has never been limited to the household and the family. Ethiopian women are actively involved in all aspects of their social life. Women are both producers and procreators and they are active participant in the social and cultural activities of the community. However, the important roles they play have not always been recognized. Without, equal opportunities, they have lagged behind men in all fields of self advancement. Economic development is unthinkable without women participation; however, because their participation in the economy has not been valued Ethiopian women have not received even their share of the nation's wealth (Melese, 2011).

In rural areas, women are engaged in a wide variety of economic activities including the construction of houses, land cultivating, harvesting, and food storage and marketing (Regassa, 2009). However, women's work in the agricultural sector has often been erroneously documented as marginal and they have been considered more as consumer than producers. Women have secondary status within the family and in the society, which is why they get little credit for their productivity. Hence, women continue to be regarded as an appendage to the family and as consumer but not as producers. Important changes have taken place with the introduction of the socialist ideology, which advocate equal right for all, irrespective of sex, religious, racial or social origin. Ethiopian women seem to have gained somewhat better experience since the 1974 socio-economic and political transportation. They have expanded their horizon with educational advancement and increased economic activity (Tadele, 1994).

Hence 90% of the Ethiopian population inhabit in the countryside, our focus is on rural women because women in urban areas have less role in agricultural activities and have small comparison with rural women. Changes such as the rise in the literacy, an increase in school enrolment and growing competition in the employment market, have not directly affected the live of rural women. In regard to gender role in agriculture, Boserup (1970) classified it into two bases, the level of population density and the level of agricultural technology. On the basis of these variables, the gender role in agricultural production varies from place to place. According to Boserup (1970), female role in agricultural production is dominant in Africa because the continent is sparsely populated and the agricultural technology is based on simple hand tools that are hoes, sickle, axe and iron tipped digging stick. As to Boserup, women, in Africa, carry out nearly all farming activities except tree felling. This is illustrated in her own words as follow, Africa is the region of female farming par-excellence.

"In many African tribes, nearly all the tasks connected with food production continue to be left to women..... Tree

felling is always done by men, most often by young boys of 15 to 18 years...(1970: 16). In the places where plough cultivation prevails, men plough the land by using draught animals and women are expected to do the work by using their hands. To Boserup, the plough cultivation system exempts women from the work of agriculture and enables them to concentrate on the domestic duties."

Gender division of labor among farming communities of Ethiopia has also been common. Ethiopia is a country where more than 85% of its population depend on rain fed agriculture. Agriculture is the back bone of the national economy. Both men and women have been playing a significant role in the development of agricultural production. The role and the contribution of both male and female, in the agricultural activities, is not necessarily the same in all parts of the country. Since Ethiopia is the country of multi-ethnic and multi-cultural groups, all ethnic and cultural groups have different gender roles in agriculture.

The work of Tadele (1994), shows that among the community of Menz, in Northern Shoa of the Amhara region of Ethiopia, women do not plough agricultural land. Rather, they assist their husbands in supportive tasks except harvesting. They feed their husbands, fetch water to men and livestock during agricultural field work, help men during threshing and make grain seeds ready for sowing. Moreover, land preparation, weeding, harvesting, threshing and storing have been some of women's primary responsibilities. In Amhara region according to her, they are also in charge of herding, tending sick animals, watering, barn cleaning, milking and milk processing. Unlike the women of the Menz community, the people in Awra Amba, Southern Gonder of the Amhara region, have no specific gender role in agricultural production. The women of the Awra Amba community equally participate with men in agricultural production. The women plough the land with oxen while men perform domestic activities at home.

The division of labor, in this area, is based on age rather than sex. Hence, both women and men are equally considered as producers and have equal position and value in both agricultural production and decision making (Tadele, 1994). In the case of Sidama, which is found in Southern Nations, Nationalities and Peoples' Region, the participation of women in agricultural activities is common. According to Sintayehu (2011), manuring, harvesting, and storing are exclusively the task of women. However, women are culturally prohibited from agricultural practices such as ploughing, hoeing, sowing and weeding. They are not also allowed to use farm instruments like plows, hoes and sickles. In sidama men are engaged in production of both food and cash crops. Most agricultural works among the Oromos of Ethiopia are carried out by men. As Sintayehu (2011), mentions, cultivation, harvesting and threshing are all the activities of men while women are confined in cooking food,

Table 1. Average household participation in agricultural activities.

Agricultural activities	Average household participation (%)			
	Men	Boys	Women	Girls
Land preparation	66.6	33.4	-	-
Planting	23.4	15	51.6	10
Weeding	-	-	46.6	53.4
Manu ring	-	-	56.5	44.5
Pruning	53.4	26.6	20	-
Harvesting	81.6	18.4	-	-
Average	37.5	15.5	29.5	17.9

Source: Mesay (2012).

Table 2. Average households' participations in agricultural activities.

Agricultural activities	Level of participation in household respondents			
	Men	Boy	Women	Girl
Cereal crop production	71.1	12.4	15.3	1.2
Cash crop production	7.2	4.8	69.5	18.5
Livestock production	16.7	20	58.7	4.6
Apiculture production	92.5	-	7.5	-
Poultry production	-	-	100	-
Fruit and tree production	37.5	15.5	29.1	17.9
Average	37.5	8.75	46.68	7.0

milking and keeping the house.

According to Regassa (2009) agricultural activities are predominantly men's task among the Maqi Oromo, South East Shoa administrative zone of Oromia region. In this zone, women's involvement in agricultural production, like the Menz community of the Amhara region, is not much different despite variations from one household to the other. Ploughing is entirely men's activity. Women never try it. There is a belief in the community that goes, 'if women cultivate, there will be no rain fall'. They have a strong belief about it. The people in the community believe that father is analogous to God (Waqā) and mother is to earth (lafa). God gives rain to the earth so that earth bears different kinds of plants just as mother bears off springs after receiving the father's semen. So, if a mother is similar to earth, it is shame that, by analogy, a woman cannot till the earth. It is considered like a woman having sexual intercourse with another woman. Among the Maqi oromo, clearing the farming land, removing the bush, tilling, sowing, preparing the threshing floor and farm implements are all carried out by men. Other agricultural activities like weeding, digging and storing to some extent are shared with women. However, weeding is the most common task of women and girls in halaba woreda (Table 1).

As depicted in Table 4, poultry production is solely an activity of women and men have no role. Whereas, regarding apiculture production, 92.5% of producers are men household, only 7.5% of women participated (Table

2).

In many agricultural activities, women receive no remuneration for their labor, no monetary or material gains and no benefit in luxury time and improving their living condition. The point is not that women should place themselves above the need of their family, or that their need and wants are similar to those of urban women with higher income. Rural women spend their time in productive activities, which directly benefits their families and society in economic term. There should be some terms (measurable means) of remunerating their productive services and of providing incentives for them to produce efficiently and use their energies meaningfully (Yigremew, 2011).

Property ownership, income generation and purchasing power

In the past, women were not owners of the means of production except when they inherited out into employment areas. In the last one and half decades, urban women have got access of employment which do not require formal education. Women now fill jobs in the construction industry and in factories as well as in sales and marketing services. In contrast, 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. Mostly, this portion is for the women to purchase household goods necessary to sustain the family. A women may be allowed to use some cash for her own personal use if she considers it necessary, however, conditions are scarcely enough food to get the household through the season until the coming harvest.

Therefore, women rarely spend on themselves or their children without the approval of the pattern, and even then only for special occasions such as holy days (Pankhurst, 1990). What is surprising from this is that though women are doing a great job in both the triple role (Production, reproduction and community management) yet they do not have the right to make a decision and even their husbands do not consult them on the allocation of the produce. The United Nation statistically shows that women do 2/3rd of the available job in the world and earn 1/10th of the income. On other hand, they constitute 2/3rd of the illiterate people of the world and earn less than 1/100th of the world's wealth (Ruth, 1994).

Women's access to key economic resources

In Africa, the first shifting cultivation where hoe was the main tool for plowing land the contribution of women was much greater than men. In this system women were the dominant figures of the practice of farming whereas men's roles were only confined to clearing the land. Women prepare the soil, sowing, weeding, harvesting, threshing and transporting farm products (Boserups, 1970). In undertaking different economic activities more than men, rural women in developing countries have less property right, have no role in the economic input and they have remained economically insecure. Rural women have played significant role in livestock production in developing countries and they are active participants in the livestock management such as supply of fodder, milking, protecting animals (Boserups, 1970). Land and property right for women require urgent attention by policy makers and land reform practitioners in Africa during the last three decades (UNDP, 2006). The increased focus on a Global Realization of Women empowerment in Africa generally gets little attention. These situations are also true to Ethiopia.

In Ethiopia women's right on land emerged in 1974 during the Dergue Regime. At the time, women were actively involved in the political arena. They had their own mass organization, known as the Revolutionary Ethiopia Women's Association (REWA). Their rights on land holdings were also recognized in the rural land proclamation promulgation by the dergue regime (Mamo, 2006).

According to Mamo (2006), the rural land proclamation

of 1975 has given women accesses to organize themselves in peasant association as head of household if they have independent residence. The current government regarding to land right in general has similar position to that of Dergue regime. Women have the right to acquire, administer, control, use and transfer property. Women have equal right with men with respect to use, transfer, and control of property. However, the ground reality does not match with the blueprint of the policy in the traditionally and culturally blessed society about women's right.

In Ethiopia in general and in Southern Nations and Nationalities of Ethiopia in particular, the accessibility of women to key economic resources such as land and other economic and income generating activities remain far behind. Even though, the government tried to empower women by promoting the right of women on owning properties and the right to make decision on the economic and income generating activities equal to men, at local level, social courts and community elders had not been aware to bring the necessary change in attitude towards the reality. Similarly, the local level political leaders and other officials do not have enough information and have less knowledge to implement and interpret laws that have been promulgated by the government. But women were not utilizing these opportunities because of their illiteracy and each of exposure to information to resist men's dominance, social bias and traditional norms. The place of women in the society is complex that involves many interrelated problems which made women's livelihood difficult in relation to men. The problems of most rural women face can be described as UN attractive life style, low income, low employment opportunity, high illiteracy rate, and low health facilities (Melesse, 2011). The role-played by women both in the productive and reproductive sphere is very high. However, the position (place) given to women in the society is very little.

The contribution of women in the improvement of the socio-economy, the well being of human life is more significant than has been traditionally acknowledged (Boserups, 1970). This means that women productive and reproductive role were not getting sufficient consideration and less attention were given to their role in sustainable development of human well-being. The contribution of women in reducing poverty and hunger in Africa is more important than that of men. 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. Besides, the contribution of Ethiopian women in general by assisting of their husband in many economical activities is very high. However, all those roles they play had not been recognized, because traditionally the society provides them low status (World Bank, 2008).

Empirical studies on women in the agriculture sector

Women in Asia and Latin America also make a greater contribution to the food production (FAO, 2010). As noted by Frank (1999), it is also estimated that about 79% of rural women in Ethiopia work 13 to 17 h per day almost two fold of men. Different case studies conducted on gender analysis of small- scale farms in different parts of Africa indicate that crop and livestock production are major sources of livelihood. Off-farm activities, part-time jobs, pensions and remittances are some of the means to maintain the farm family. The use of technological packages is related to wealth (livestock), particularly cattle in rural households. Rural women in Ethiopia represent a tremendous productive resource in the agricultural sector. They are major contributors to the agricultural workforce, either as family members or in their own right as women heading households. There have been recent policy initiatives to strengthen the position of women in the agricultural sector. In 2005, the Plan for Accelerated and Sustained Development to End Poverty, 2005/2006 to 2009/2010 (PASDEP) was launched to safeguard rights such as access to land, credit, and other productive resources, and to protect women from other deprivations, such as longer working days, violence and discrimination.

Despite these recent initiatives, a mixture of economic constraints, cultural norms and practices continue to limit women's contribution to household food security and, to a lesser extent, inhibit the commercialization of the agricultural sector. Gender roles and relationships influence the division of work, the use of resources, and the sharing of the benefits of production between women and men. In particular, the introduction of new technologies and practices, underpinned by improved service provision, often disregards the gendered-consequences of market-oriented growth and many benefits bypass women (ILRI, 2010).

In most societies, men's roles in agricultural activities are understood to be directed and clear. However, women's role in agriculture is not clearly recognized. Hence, a clear picture of women's participation in agriculture is needed. Although there was increase in women involved in the world agriculture until recently it was difficult to gain a clear picture of where, and under what circumstance women participate in farm work (Boserup, 1970). Although the micro studies documenting

the importance of women's roles have arisen steadily, national statistics have to undercount women's agricultural labor, due to their definition of agricultural activities in their intervening producer. Women play important roles to help their family in particular and their community in general in sewing their food demand in the world. But the most surprising thing is that the community has not significantly understood the effort that they exerted in the last several years. Women are involved in agricultural and rural development representing more than half of the labor required to produce food consumed in developing countries (Mihiret and Tadesse, 2014). One problem here is reaching at common understanding as to how female farmers are perceived in society; observations indicate that a female farmer is commonly perceived as a co farmer as marginal players in agricultural development particularly by those individuals with significant influence is research, extension and development positions.

CONSTRAINTS RURAL WOMEN FARMERS' FACE IN UTILIZING AGRICULTURAL EXTENSION SERVICES

Despite rural women's significant involvement in agriculture production, agricultural extension services are not adequately reaching rural women. For the most part, extension programmes do not specifically identify women as an integral part of the target audience. Studies on agricultural extension have highlighted that women's marginalization from these services is closely related to their lack of access to land and consequently to financial resources like credit (Hareg Consult Plc, 2005). Rural women play major roles to produce food all over the world, but rarely enjoy extension services. However, rural women as producers of food productions and family supervisors, have little contact with extension services organizations. So their problems and needs would not be able to create and develop technology, suitable for their need (Swanson, 1991).

Several studies reviewed by Doss (1999), indicate different constraints faced by men and women smallholders in Africa. He emphasized the complexity and diversity among African households and summarized the possible causes of non adoption of maize technologies into three major categories. Doss found that, firstly, access to productive resources such as land, labour and inputs influence women farmers to adopt new technologies and secondly, the choice of technologies are specific to needs and roles. Thirdly, technology adoption is also affected by the dynamics of household decision making. Major constraints and factors that affect utilization of technological packages by rural households include: low level of education, bias in gender differentials, shortage of land size holding, and lack of working capital like cash on hand or livestock owned, lack of awareness on different technological packages, lack of farmers

Table 3. Constraints to utilize agricultural extension services (N=80).

S/N	Descriptions	Frequency	Percentage
1	Small land size	34	42.5
2	Shortage of cash	23	28.75
3	Cultural influences	88	10
4	Lack of female extension workers	5	6.25
5	High agricultural input costs	4	5
6	Not invited	3	3.75
7	Shortage and unavailability of inputs in time	2	2.5
8	Lack of adequate labour	1	1.25
N	Total	80	100

Source: Gashaw (2016).

participation in various area of human development aspects like planning, training, exhibition, exposure visit, practicing on-farm trial and demonstration, insufficient extension service, lack of credit, unavailability of inputs on time, etc (Edlu, 2006).

In the developing world, cultural and religious factors are often hindering factors for its movement: women's "inside" role, not speaking in front of men, traditions of men negotiating and handling financial matters, illiteracy, and family size supposed inferior abilities, and social pressures make it difficult for women to play an active and visible public role. The cultural, social and traditional barriers together with lack of other basic social amenities such as lack of education, health, extension and credit services aggravate the gender gaps (Wude, 2006). Cultural beliefs and low level of education are also found to be the major problems of women participation in farmer's organizations (Yodril et al., 2007).

FACTORS AFFECTING WOMEN'S PARTICIPATION IN AGRICULTURAL PRODUCTION

There are a number of factors that affect women's participation in agricultural production activities. Demographic factors (like age of women and number and characteristics of children in the family), economic factors (such as the size of the farm land and access to key factors of production), and the socio-cultural factors (such as attitudes toward women's work and culturally ascribed roles of women) have been used to explain the levels and trends of women's labour force participation. These factors are briefly discussed subsequently (Table 3)

Demographic factors

These factors include a multitude of interrelated issues that affect women's involvement in agricultural production activities. Since women's productive roles are undertaken side by side with household maintenance tasks and

reproductive roles, their farm participation is constrained by the time requirement for such tasks and roles. It is documented in many literatures that most of women's time is spent in strenuous and tiresome domestic chores and other reproductive roles like child bearing and rearing (Yaekob, 2011). The women's work in their houses is fundamental to the survival of their families although remains unremunerated. Some household jobs must be done every day, for example cooking, fetching water, collecting firewood or cleaning; some are done occasionally like washing, preparing local drinks or grinding just to mention a few. These family responsibilities take the women's time to participate in agricultural production activities.

In addition, childbearing and rearing can have different effects on labour force participation: it prevents women from working; it can affect the quality and quantity of women's work; and it can influence the type of work performed by women. Factors such as age and number of children can affect women's participation. It is generally believed that the more dependent, small aged children a family has the less probability of the women to participate in farm activities as she is responsible for childrearing. Other related factors such as availability of hired labour also affect women's involvement in agricultural production activities. According to Boserup (1970), the availability of hired labor is one factor for the release of women from agricultural activities in the plough culture areas.

Economic factors

The other determinant of women participation in farm production activities is related to their access to and control over key factors of production. It is revealed in many studies that most African women are active actors in agricultural production. And hence their relation to factors of production such as land, agricultural inputs, labour and services like agricultural extension and credit is a critical factor in their ability to produce food and

Table 4. Respondent's response on factors influencing the domination of men over the women on agricultural activities.

Influencing factors	Number of respondents	
	Frequency	Percent
Illiteracy	-	0
Ignorance	-	0
Social status	59	16.7
Religious status	15	4.23
Political status	-	0
Economic status	-	0
All of the above	280	79.092
Total	354	100

Source: Mesay (2012).

generate income for themselves and their families (Boserup, 1970). However, their access to these resources is limited. The recognition of the household through males (husbands) is one major factor usually cited for such limited access to resources.

Institutional factors also affect women's participation in agricultural production activities. By ignoring women's role in production, governments targets information, training and credit programs to men in rural areas (Sachs, 1996). This male bias is reflected in the assumption that farmers are men and therefore agricultural technologies and inputs are channeled through men (Ibid). "Bias against women farmers was apparent and commonplace in agricultural policies throughout Africa" Yigremew (2011) cited in Workwoha,(2012) reported that:

...agricultural knowledge...is noticed to be very much dependent on the cultural ideology that 'women cannot use the plough'. ...Such gender allocations of agricultural tasks and asymmetrical valuation of farm activities is the outcome of socialization in determining the way women and men should relate in production.

According to Yigremew (2001), women could not act as fully independent agents in relation to agricultural production". According to Wudenesh (2003), in traditional Ethiopian agriculture where a farmer is considered to be the male, women farmers in the small farm households are quite often left in the transfer of improved agricultural technologies.

Socio-cultural factors

Cultural factors are the most proximate determinants of women's place and status in a given society. In many societies, women have a subordinate status. It is documented in many studies that men feel that women's work is marginal/subsidiary to what men do and consider it as wifely duty rather than work. Similarly, women as well as men consider that men are responsible to perform

'heavy' and 'important' tasks and they therefore are in charge of every privilege in the household. On the other hand, women are believed to engage in 'less important' works as a result they enjoy less privilege. This is so believed in spite the lack of a parameter that measures a given work to level it as either 'heavy' and 'important.'

According to various studies that base themselves on direct matrix ranking and pilling methods, the time and labour demand of a given task is taken to differentiate the nature of the disadvantageous position in respect to access to resources is compounded by their lack of control over the use and management of such resources" (Yigremew, 2011). Such lack is one of the reasons for women's low levels of contribution to agricultural production work done by women and men. Accordingly, it is revealed that the longer the time and the more labour a certain task requires the more heavy the activity is (Workwoha, 2012). Moreover, some activities could be performed along side with other activities.

Powerful male supremacy norms dictate that a woman's status be defined only through the men who are responsible for her: father, husband, brother, son. Within such a context of patriarchal values, women's work and economic contributions tend to be viewed as supplementary and auxiliary to men's work and breadwinning function. An implicit assumption is made that the woman is basically a mother and housewife; any productive work she carries out is considered socially secondary, an extension of her primary function, and thus it has tended to remain unnoticed, more so in the case of rural women. In societies of rigid system of patriarchy, the norms, values, and social structures, creates mechanisms that hide rural women's contribution to Third World agriculture, especially among the poor, and maintain the image of female dependency on men (Safilios and Rothscild, 1985) (Table 4).

CONCLUSION

Gender is a crosscutting issue that attracts the attention

of development professionals, policy makers and politicians to mention some. This is due to the fact that in any development interventions involvement of women has become compulsory. To this end, considering the roles of men and women is very important, and gender roles vary across culture. In Ethiopia where agriculture is the backbone of the economy, the participation of women in the field is very high. It is, however, clear that the roles of men and women play in agriculture differs from region to region. Though men are taking the lion's share in agricultural production, the contribution of women has also been an undeniable fact.

Despite their critical roles, women farmers still face multiple gender inequalities, including difficulty obtaining credit, land, extension services and other productive resources. Rural Ethiopian women must work up to twice as many hours per day compared to men, since they are primarily responsible for their households, including gathering firewood and water, cooking, cleaning, and providing child care.

In Ethiopia rural women involve in almost all agricultural activities from land preparation to storing processes. The variations of labors between sexes exist only in the degree of works. Some activities are predominantly performed by women like storage preparation and storing processes; some by men and some labors equally share with the counterparts. They have always been made the invisible workforce and the unacknowledged backbone of the family economy. In order to achieve economic growth and attain food security, a modern technological approach, which systematically integrates women in development process, is a must. Balanced participation of men and women in development programs is indispensable to bring about effective agricultural production and sustainable food security.

RECOMMENDATIONS

- (1) Agricultural extension office should work on more effective extension services for female headed farmers in order to maximize their agricultural production and improved household nutrition from their limited land and livestock holdings.
- (2) Special attention should be given to increase the number of female headed farmers who should use agricultural inputs and also focus on increased use of improved seeds and fertilizer by female headed households.
- (3) Government should encourage and assist women farmers by giving them special attention in terms of access to needed farm inputs and incentives. New farming implements should be made affordable and available to women.
- (4) Informal and formal institutions should effectively disseminate agricultural extension information to women households.
- (5) Efforts should be made by administrative and

agricultural office to improve the literacy rate of particularly female headed farmers. Women adult literacy education programme is required to help women farmers acquire basic skills and abilities to seek and receive agricultural information through extension agents. This will make them to participate more in reading extension leaflets, bulletin, newsletter etc.

(6) Considering women designated roles in agricultural production effort, agricultural information to farmers should be gender specific and sensitive.

(7) Credit facilities should be provided by the government either through various women group or co-operate so as to enable they participate fully in agricultural activities.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Enhancing sorghum yield through demonstration of improved sorghum varieties in Tanqua-Abergelle Wereda, Central Zone of Tigray, Ethiopia

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With the aim of improving food security through enhanced production and productivity of sorghum a demonstration of two improved sorghum varieties (Chare and Melkam) was conducted in two selected Kebele (Shekha-Tekhli and Agbe) of Tanqua-Abergelle Wereda. A total of 100 farming households (88 male and 12 female) who are beneficiaries of the Productive Safety Net Program were purposively selected. Each farmer planted the improved varieties along with the local known as Merawi. A total of 2.5 quintals of seeds of both varieties was distributed to cover about 25 ha of land. The average grain yield obtained from the improved sorghum varieties (Chare, Melkam) and local sorghum variety (Merawi) was 47.6, 39.9 and 32.2 qt/ha, respectively. This indicated that the two improved varieties were about 47.8 and 23.9% more productive than the local variety in the same order. This will have significant contribution to the efforts towards ensuring food security and improving the livelihoods of poor farmers. In terms of monetary value, the beneficiary farmers would be able to generate an average gross income of 32,459.50, 27,681.00 and 22,305.50 Birr/ha from Chare, Melkam and local cultivar, respectively. Moreover, the improved varieties were found to be early maturing and can best adapt to moisture stressed areas. Therefore, it is recommended that the office of agriculture and rural development of the wereda to further scale up the varieties to other areas to benefit quite significant number of farmers.

Key words: Farmer' perception, sorghum, improved varieties, demonstration, Tigray, Ethiopia.

INTRODUCTION

Sorghum is a staple crop in drought prone areas;-as it is drought tolerant worth promoting in view of effects of climate change and brings out large percentage of the people from poverty. Sorghum grows in a wide range of agro-ecological zones most importantly in the moisture

stressed parts where other crops cannot survive and food insecurity is rampant (Asfaw, 2007). Globally, sorghum is the fifth most important staple food crop after wheat, rice, maize and barley (FAO, 2016). In Ethiopia, sorghum is grown in almost all regions occupying an estimated total

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land area of 1,854,710.93 ha of which 12.91% of land is in Tigray region (CSA, 2016). Sorghum in the study area is mainly grown under rain feed, where rainfall is erratic, low in amount and uneven in distribution. As a result, sorghum production has become highly unpredictable that leads into a chronic food shortage to the smallholder farmers.

The potential productivity of sorghum is reduced due to both abiotic and biotic stresses. Low soil fertility (nutrient deficiency) and drought were the main abiotic factors. Important biotic constraints include the parasitic weed; *Striga* (*Striga* species), foliar and panicle diseases and stem borers (Wortmann et al., 2006). Sorghum is utilized in different forms where the grain is used for human consumption and homemade beverages, leaves and stalks are commonly used as fodder for their animals. In the low land area of Tigray, farmers grow sorghum for human consumption in the form of food and homemade beverages.

In Tanqua Abergele Woreda, sorghum is one of the major food crops ranked first in its area coverage which accounts about 45.6% of the total cultivable land (TAWOARD, 2013). However, the erratic and uneven distribution of rainfall is becoming a threat to produce late maturing local sorghum varieties. These local varieties are frequently exposed to moisture stress at flowering and grain filling stages of the crop which resulted in either low yield or total crop failure.

Scholars agree that technology demonstration is a critical means of technology evaluation and transfer. Demonstration experiment can be effective technique in fostering awareness due largely to their direct experimental nature which is beneficial to discovery learning (Leeuwis, 2004). As the demonstration is conducted on farm which is open to technology user and nonuser it gives room to extend the merit of the technology within the social system through social networks. Social networking is an important means of promoting technology adoption. Despite the effort of science and technology which has heavily influenced agricultural production system for decades, there are no as such promising changes in the life of target communities (Amanor, 1994). Researches targeting on solving agricultural problem were designed and implemented on station through academician's motivation. However, these research output did not address farmers' needs as the effectiveness of the technologies were measured through production and productivity which is not complemented with users' preference and working condition. Perception is how the smallholder farmers perceive the improved sorghum varieties (Melkam and Chare) from his/her point of view. Perception plays a vital role in shaping human practice (Leeuwis, 2004).

Understanding the problem, Abergele Agricultural Research Center researchers have been conducting different research activities on-station and on-farmers'

field to identify varieties and agronomic practices which have better adaptation under the agro-ecological conditions of its study areas. From the varietal evaluation and adaptation trials conducted on sorghum, Chare and Melkam were found to be high yielder and early maturing. The study was designed to test whether improved varieties (Chare and Melkam) has no significant difference in grain yield improvement, while farmers apply the technology at farm condition (H₀). Hence, this study was initiated to enhance yield production and productivity through demonstration of improved sorghum varieties. The specific objective of the study seeks; to demonstrate the improved sorghum varieties (Chare and Melkam) in the economically marginalized smallholder farmers, to evaluate the performance of improved sorghum varieties (Chare and Melkam), and to collect farmers' perception about the improved sorghum varieties (Chare and Melkam) in the study area.

RESEARCH METHODOLOGY

The Wereda is located in central zone of Tigray 120 km away from Mekelle. It has area coverage of 122,500 ha with average holding of 1.0 ha per household (CSA, 2002). Agro-ecologically, the area is characterized as hot warm sub-moist low land (SMI-4b) with altitude below 1500 m.a.s.l. The annual rainfall and temperature is 350 to 700 mm and 24 to 41 °C, respectively (Legesse, 1999). Mixed crop-livestock farming system is dominantly practiced in the Wereda. Crops such as sorghum, maize and pulses (cowpea, ground nut, sesame) are commonly grown. The Wereda is also known for its huge livestock resources particularly small-ruminants (TAWOARD, 2013).

For the study, two kebelles (Shekha-Tekhli and Agbe) were purposively selected based on their accessibility and potential sorghum production. From both kebelles, a total of 100 productive safety net program (PSNP) beneficiary farmers (88 male and 12 female) were also purposively selected from both kebelles. Initially, farmers were trained about the varieties and improved agricultural practices namely about seed rate, fertilizer rate, planting dates and protection. Accordingly, they applied 10 kg/ha of seed rate along with 50 kg/ha Urea and 100 kg/ha DAP. Each farmer received 2.5 kg of seed to cover 0.25 ha of land improved sorghum variety along with local cultivar for comparison. In general, the beneficiary farmers hosted the intervention and apply all necessary management activities as per the recommendation. The woreda experts were involved in identifying the host farmers and conducted field supervision throughout the growing period. Similarly, training, technical backstopping, data collection and reporting were managed by researchers.

Both primary and secondary data were collected. The quantitative data (grain, cost and biomass yield) were collected using quadrant and qualitative data (farmers' perception) were collected from the beneficiaries using checklist. Additionally, data about the costs were collected by questioner and the profit data were collected from the grain and biomass yield estimated on January 2014 market price. Secondary data were also collected from different sources such as published (journals) and unpublished reports of the Wereda office of agriculture and Abergele agricultural research center (AbARC). The quantitative data were analyzed using simple descriptive statistics such as mean, standard deviation (SD) and benefit cost ratio analysis. Additionally, the study employed paired T- test to see if the mean yield of improved sorghum varieties (Chare and Melkam) were significantly different

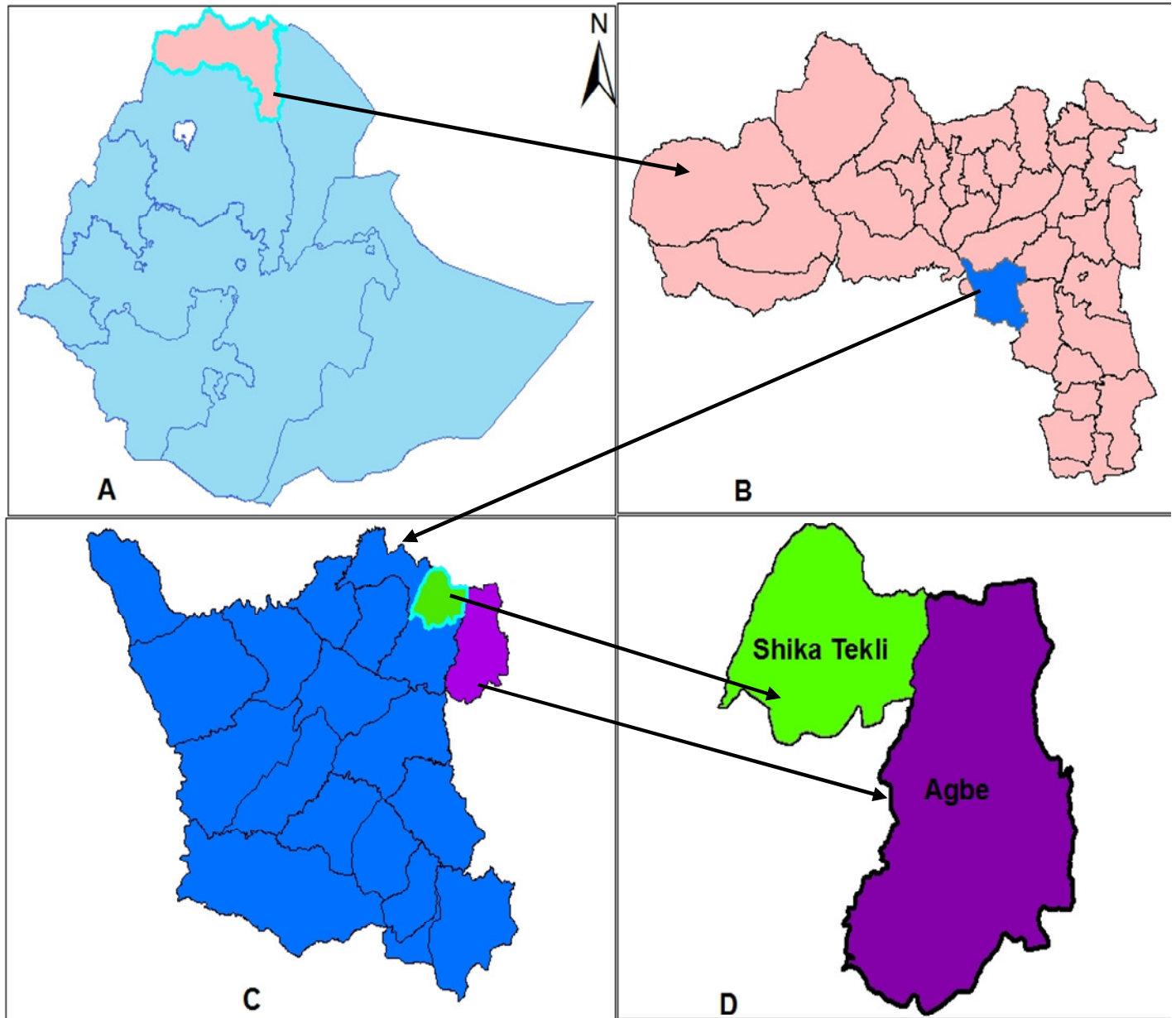


Figure 1. Map of the study area (A refers to Ethiopia, B refers to Tigray Region, C refers to Tanqua-Abergelle and D refers to study kebelles).

from the local cultivar. To analyze farmers' perception, the study used percentage and narrative analysis (Figure 1).

RESULTS AND DISCUSSION

Grain and straw yield of the varieties

Production comparison between the two improved varieties (Chare, Melkam) and one local cultivar known as 'Merawi' was made. The local cultivar 'Merawi' was selected because it is the cultivar most commonly grown in the study area. The result obtained from the improved

sorghum varieties as well as the local cultivar in the study areas are described in Table 1.

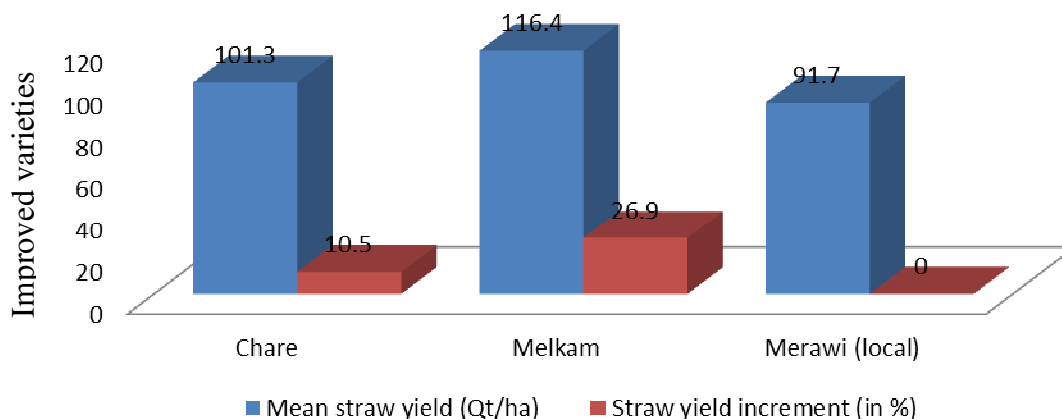
As it is described in Table 1, an average grain yield of 47.60 and 39.90 ql/ha were obtained from the improved sorghum varieties Chare and Melkam, respectively while the average grain yield obtained from the local cultivar 'Merawi' was 32.20 ql/ha. The result of the study indicated in (Table 1) shows both the improved sorghum varieties (Chare and Melakm) have statically significant (at > 5%) grain yield increment over the local sorghum cultivar with yield increment of 15.40ql/ha (47.8%) and 7.70 ql/ha (23.9%) over the local cultivar (Figure 2).

In the dry season shortage of animal feed is also one of

Table 1. Mean grain and straw yield of improved varieties vs. local cultivar in areas.

Variety	Minimum (kg/ha)	Maximum (kg/ha)	Mean (kg/ha)	Yield advantage from local t %	SD	T-value	Sig
Chare	4300.00	5200.00	4760.00	47.8	2.75	19.67	0.000***
Melkam	3010.00	4740.00	3990.00	23.9	4.71	6.89	0.000***
Merawi (local)	2800.00	3750.00	3220.00	-	2.46		

Source: Computed from field data taken in quadrant from 1 m² plot size (2014).

**Figure 2.** Mean of straw yield of improved varieties vs. local cultivar in qt ha⁻¹.**Table 2.** Benefit cost ratio of the improved sorghum varieties vs. local cultivar.

Variety	Total variable cost (Birr)	yield (Qt/ha)		Income (Birr/ha)		Gross income (Birr/ha)	Net income (Birr/ha)	Benefit Cost Ratio (GI/C)
		Grain	Straw	Grain	Straw			
Chare	13,777.00	47.6	101.3	30,940.00	1,519.50	32,459.50	18,682.50	2.36
Melkam	13,777.00	39.9	116.4	25,935.00	1,746.00	27,681.00	13,904.00	2.01
Merawi (Local)	13,777.00	32.2	91.7	20,930.00	1,375.50	22,305.50	8,528.50	1.62

Source: Computed from field data taken in quadrant and estimated price in the nearby market (2014).

the critical problems of farmers. In this regard, compared to the improved varieties the local cultivars are lower in their bio-mass yield. The result indicated that the straw yield obtained from Chare and Melkam was 10130.00 and 11640.00 kg/ha, respectively while the biomass yield the local is 9170.00 kg/ha. This implied that the improved varieties give additional straw yield, about 10.5% (Chare) and 26.9% (Melkam) higher compared to the local cultivar (*Merawi*).

Benefit cost ratio of the improved varieties Vs local cultivar

Given the prevailing market price, benefit cost ratio was

computed from grain and straw yield on hectare basis. In terms of monetary value, the beneficiary farmers were able to generate an average gross income of 32,459.50, 27,681.00 and 22,305.50 Birr/ha from Chare, Melkam and local cultivar, respectively (Table 2). There is no difference in management practices to all and hence the total variable costs are similar. The average net income farmers could generate per hectare was 18,682.50, 13,904.00 and 8,528.50 Birr/ha, in the same order. This implied that farmers could earn an additional net income of 10,154.00 and 5,375.50 Birr/ha from Chare and Melkam, respectively. The benefit cost ratio of Chare, Melkam and local cultivar was 2.36, 2.01 and 1.62, respectively. In other words, farmers can generate 2.36, 2.01 and 1.62 Birr benefit from Chare, Melkam and local



Figure 3. Performance of Chare and Melkam at heading stage in Tanqau Abergelle Wereda.

Table 3. Farmers' perception on attributes of improved sorghum variety versus local cultivar.

Parameter	Farmers response											
	Melkam Vs Local						Chare Vs Local					
	Lower (%)		No change		Higher		Lower (%)		No change		Higher	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
Early maturity	0	0	1	6.67	14	9.33	0	0	2	13.33	13	86.67
Drought resistance	0	0	0	0	15	100	0	0	0	0	15	100
Disease resistance	2	13.33	12	80	1	6.67	5	33.34	8	83.33	2	13.33
Pests resistance	3	20.00	12	80.00	0	0	1	6.67	14	93.33	0	0
Grain yield	0	0	2	13.33	13	86.67	0	0	0	0	15	100
Straw yield	0	0	3	20.00	12	80.00	0	0	2	13.33	13	86.67
Seed uniformity	0	0	0	0	15	100	0	0	0	0	15	100
Seed color	0	0	8	53.33	7	46.67	10	66.67	5	33.33	0	0
Taste of food (Enjera)	0	0	5	33.33	10	66.67	5	33.33	6	40.00	4	26.67
Marketability	0	0	6	40.00	9	60	0	0	5	33.33	10	66.67
Straw palatability	2	13.33	10	66.67	3	20.00	6	40.00	8	53.33	1	6.67
Over all acceptance	0	0	0	0	15	100	0	0	0	0	15	100

Source: Own computation from survey data (2014); Freq refers frequency.

cultivar for 1 Birr investment cost of production. The cost benefit ratio indicates growing all varieties of sorghum is financially profitable, however producing improved sorghum varieties has great contribution in capitalizing the return of producers'. This implies that with ever increasing human population while the size of the cultivated land remains constant, improving production and productivity of a given land using improved crop varieties could be the best solution as far as improving household food security status is concerned (Figure 3).

Farmers' perception on attributes of improved sorghum variety

The improved sorghum varieties merits and demerits were assessed from farmers' point of view. Table 3 demonstrates the perception of farmers based on the parameters listed in deciding a variety is acceptable in replacing the existing local cultivar. The participant farmers perceive the technology as a favor in its' drought resistant, early maturity, and grain and straw yield.

Additionally, the technology beneficiary criticizes the technology negatively in its' poor disease resistance and low palatability of the straw. The data collected from the sampled technology users response is similar with the data collected from non-technology user field day participant farmers and agricultural knowledge workers in the varieties early maturity and have good performance in field level. Both the target beneficiaries as well as participants of the field days perceived that the improved varieties (Chare and Melkam) were better in yield, early to maturity and drought tolerant. Additionally, the participant farmers perceive that improved sorghum variety especially Chare is lower in straw palatability and its color when compared with local cultivar.

CONCLUSIONS AND RECOMMENDATIONS

From the demonstration intervention, it can be concluded that there are wider possibilities to greatly support the government efforts toward enhancing food security and livelihoods of poor households. As in the case of the two improved sorghum varieties (Melkam and Chare), increasing productivity of a given crop commodity by about 23% and 48%, which have a quite significant implication on improving household food security. Therefore, the study points out the following recommendations:

- (1) There should be reliable seed supply both in quality and quantity of both varieties so as to ensure sustainable seed supply system and fulfill the farmers demand.
- (2) Considering the erratic and unrealizable climatic conditions, further research efforts to generate drought tolerant sorghum varieties are very essential.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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