

Review of Gender Differential in Agriculture in Ethiopia: The Case of Pulse Production and Marketing

Rehima Mussema (PhD),
Ethiopian Institute of Agricultural Research P.O. Box 2003

Abstract

This study assesses and reviews briefly status of pulse production, the roles that men and women played in agriculture, gender differential on access and control over resources, access to services, market access, and skill and knowledge, in Ethiopia general pulse in particular. Pulse production, and marginal productivity of land for pulses fluctuates due to land allocation and unobserved factors; recently pulse production declined (one might be gender issues). Women are characterized by playing a significant role in pulse production but it is invisible; they have lower production than men, illiterate, have limited skill and knowledge (working indigenous knowledge), limited access and control over productive resources, face cultural barriers, etc. Despite their contribution for pulse production women have limited access to technology, extension service, information on technology and market. Their preference and priority for pulse varieties also neglected. These findings and review suggests that considering the needs, preferences, priorities and constraints of men and women separately is important and empowerment through pulse technologies is a key for sustainable pulse productivity and food security gains. It is also important to link women with potential market to maximize their benefit from the market portfolio.

Keywords: Production function, marginal product, gender role, skill and knowledge, extension

1. Introduction

Ethiopia has different agro-ecology that conducive for different crops and it has been known as the homeland and domestication of several pulses production. Pulses share about 12.4% of the total crop cultivated area (NBE, 2015) and 11% of the total crop output harvested (PARI, 2015). Production is concentrated in Amhara and Oromiya regions (Frehiwot, 2009 and IFPRI, 2010). Faba bean (36%), haricot bean (17%), chickpeas (16 %) comprise the largest share of pulse production (IFPRI, 2010). Pulse share about 7.3% from export commodities and stands third position from agricultural commodities next to coffee and oil crops (NBE, 2015).

Pulses are the second most important element in the national diet in Ethiopia (Frehiwot, 2009), providing dietary supplement to cereal consumption; sometimes it serve as a main dish. They are used primarily for making Ethiopian traditional sauce “*wot*” (sauce made of finely powder /Shiro/ or *kik*) also it can be prepared in different forms of food (*kolo/roasted, nifro/boiled, hilbet, for sandwich/sambusa, etc*). Women use these crops as a complimentary food (snack/*buna kurisi*) together with coffee ceremony at home. Pulses play a greater role in household food security because they provide an affordable protein source, particularly poorer households that have low income to purchase animal protein source. Pulses are commonly used during religious practices of fasting that serve as alternative sources of protein for those do not consume livestock product (Gabrielle, 2016). Recently real price of chickpea, faba beans, field peas, and lentils have been increased by 52%, 41%, 39%, and 91% respectively that may benefit for surplus producers, but adversely affect dietary diversity of poorer households; Ethiopian women are poorer than men related to access to land, oxen, financial background, etc. (Tewodros, 2013; Henry *et al.*, 2016) may reduce their pulse production and intake (Bellmon, 2015; AKLDP, 2016).

Men and women play important role in agricultural activities in developing countries; also both have been playing a significant role in Ethiopian agriculture. Since Ethiopia is the country of multi-ethnic and cultural groups, all ethnic and cultural groups have different gender roles in pulse production and marketing. Gender inequalities and lack of attention to gender role in agricultural development contribute to lower productivity, higher levels of poverty, as well as under-nutrition (World Bank, FAO and IFAD, 2009; FAO, 2011). Therefore, understanding gender role, access to and control over resource, access to services of women in agriculture in general and pulse production particular is important to identify the gender gap in pulse production that may affect pulse production and productivity.

1.1. Objectives

1. To identify marginal productivity and average productivity of land for pulse production
2. To review gender role in pulse production, marketing and access to resource and services in the country

1.2. Methodology

The study used secondary data from Central Statistics Authority (CSA) and National Bank of Ethiopia (NBE) to assess the trend of area allocated for pulse production and production trend or production function of pulse in Ethiopia for the last 14 years. The study also reviewed different literatures that related to gender in agriculture,

particularly focused on women participation in pulse production and marketing.

2. Results and review findings

A result and review for agriculture in general and in pulse growing areas of Ethiopia particular indicated in six sections: pulse production, gender role in pulse production, access to services, women’s market participation, access and control over resources, and gender differential skill and knowledge on pulse production and management.

2.1. Pulse production function $Y(k)$, marginal product (MPk) and average product (APk)

This section provides an overview of the findings that have been conducted in production function, marginal product and average product of pulse.

Area (‘000 hectare): The analysis (Table 1 and Fig. 1) indicated that the land allocated for pulse production by small holder farmers in Meher season is a highly volatile and increased by 541,000 hectare within 14 years. It was highly declined between 2009/2010-2010/2011 and continued to decrease from 2012/13 to 2014/15 that might be the diversification of farmers from pulse production to other enterprises (cereal, livestock, etc) due to different reasons.

Table 1. Area (‘000 of hectares) and production (‘000 of Quintal)

Year	Area (ha)	Produ $Y(k)$	MPk (Qu)	APk (Qu)
2001/02	1017	10212		10
2002/03	1055	10013	-5	10
2003/04	1100	10373	8	9
2004/05	1349	13496	13	10
2005/06	1292	12713	14	10
2006/07	1379	15786	35	11
2007/08	1518	17827	15	12
2008/09	1585	19646	27	12
2009/10	1489	18981	7	13
2010/11	1358	19532	-4	14
2011/12	1617	23162	14	14
2012/13	1864	27510	18	15
2013/14	1743	28589	-9	16
2014/15	1558	26718	10	17

Source; CSA, data archive and NBE, 2015,

Area in hectare, MPk (marginal productivity of land), APk; (Average product of land)

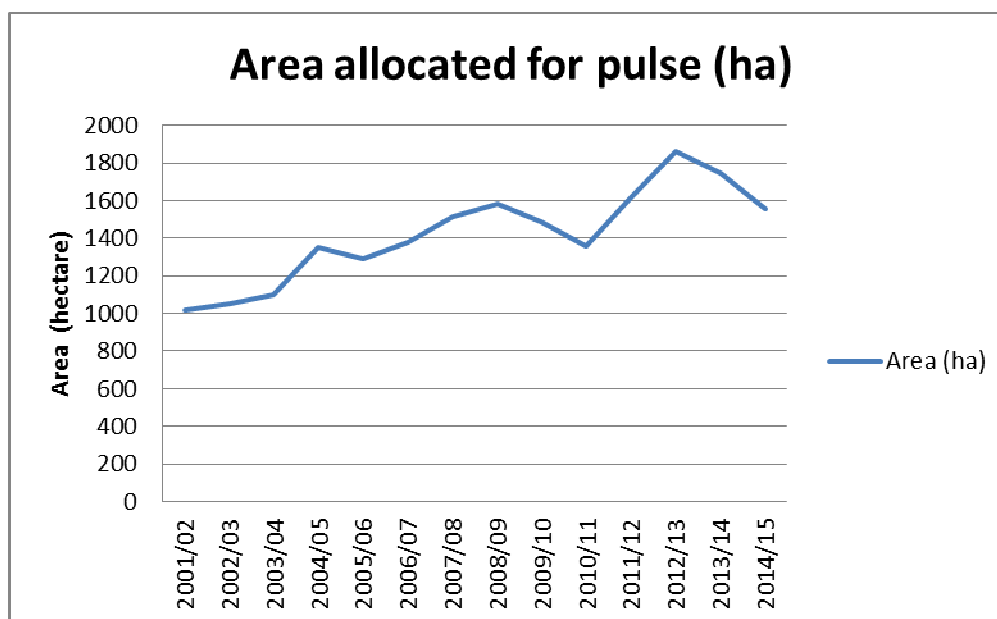


Fig.1. Area (hectare) allocated for pulse production

Pulse production– $Y(k)$: Production function was developed using tabular and graphical illustrations (Table 1 and Fig. 2). Production function describes the technical relationship that transforms inputs (land) into outputs (pulse) from 2001/02 up to 2014/15, and production functions gives the maximum amount of pulse that can be

produced with a given amount of land.

The analysis indicates that pulse production shows increasing trend, more than double, through 2001/02- 2014/15; but it is highly volatile. The production increased and reached its maximum (19.6 million quintal) in 2008/09, then after it declined for a year due to land reduction and unobservable/unrecognized factors (climate, miss management of the crop, technology used, lack of gender consideration, etc). Even if the land allocation reduced the production started to increase and continue to increase up to 2013/14 that might be due to weather condition, technologies and other unobservable factors. Due to reduction in land and unobservable factors the production declined from 28.6 million to 26.7 million quintals in 2014/15.

There are different literatures that support the gender gap affect productivity of agriculture general and pulses in particular. FAO (2011) studies indicated that the agricultural sector in many developing countries is underperforming, in part because women, who represent a crucial resource in agriculture through their roles as farmers, laborers and entrepreneurs, face more severe constraints than men in access to productive resources. Lack of considering gender issues during pulse production might be one of the cases that the recent decline pulse production in Ethiopia.

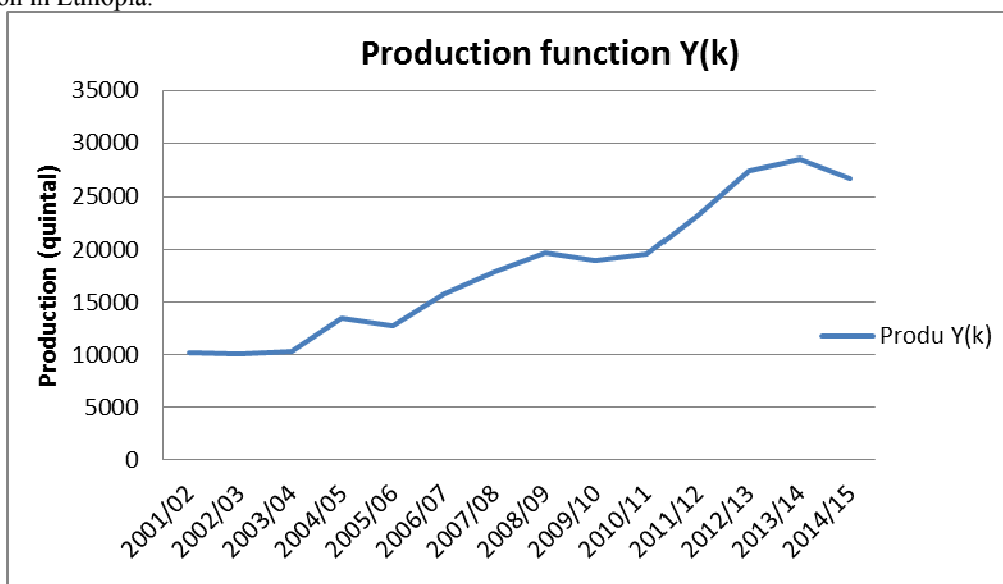


Fig. 2. Pulse production function Y(k)

Marginal Product of land (quintal): A marginal product is the extra output that results from an increase one unit of the inputs holding all other inputs constant. The marginal productivity of land (MPk) indicated that change in land by one hectare lead to a change in one quintal of pulse, other inputs (fertilizer, labour, etc) remains constant. As indicated in (Table 1 and Fig. 3), due to change of land allocated for pulse production the MPk is highly fluctuated; the MPk declined by 5 quintal in 2002/03. The MPk was increased significantly and reached its pick in 2006/07, then after it was highly fluctuated. The lowest MPk was seen in 2013/14, that land allocated for pulse is reduced by one hectare leads to the highest pulse production deficit (9 quintal) than previous year.

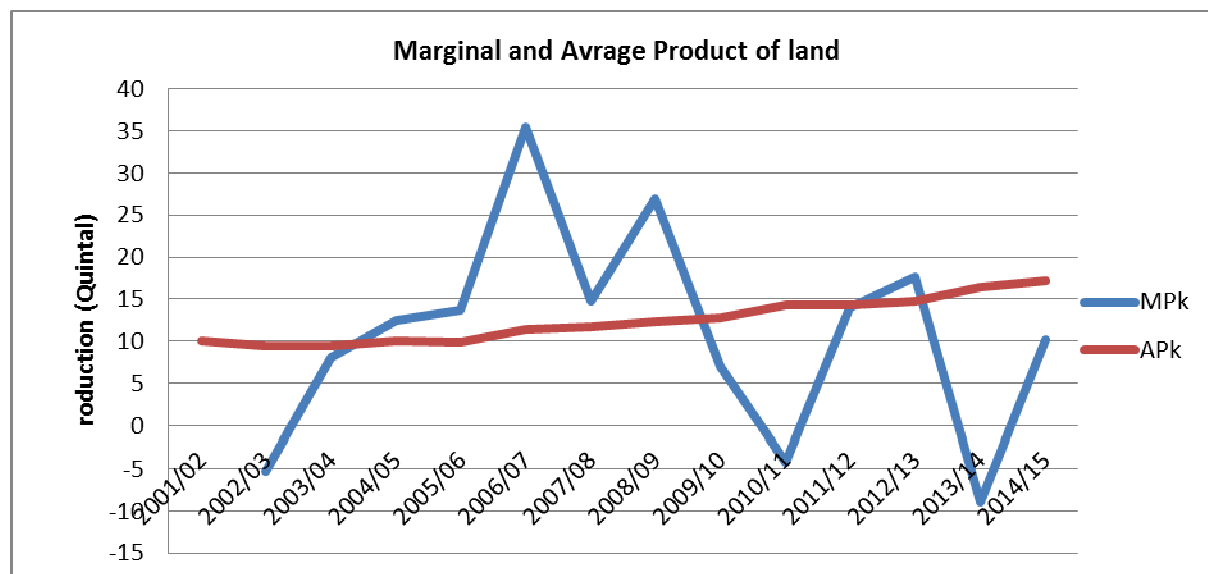


Fig. 3. Marginal product of land (MPk) and Average product of land (APk)

Average Product of land (APk): An average product is the outcome of the total product divided by the total units of the input employed. An average product indicates productivity of an input. Agricultural productivity is a function of the characteristics of the farmer, labor and non-labor inputs, and land characteristics (Aguilar *et al.*, 2014). Therefore, the productivity of pulse is total production (quintal) of the crop over land allocated (hectare) for pulse production in that year. The average product of land indicated relatively stable trend, that ranges between 9 to 17 quintals and it increased almost double within 14 years time (Table 1 and Fig. 3).

2.2. Gender role in pulse production

Women are primary responsible for household duties and as primary caregivers in a household that may limit them to budget their time for their farm activities; World bank (2014) study indicated that Ethiopian women farmers spend around nine hours fewer per week on their own agricultural work than males, because women's time burdens on household chores could thus have important implications for their farm productivity and widen the gender gap by 13%. Menigistu, *et al.* (2009) underline the work load of women in southern part of Ethiopia that in-door and out-door activities such as fetching water from distant places, collection of fire wood, taking cattle to the field, taking care of animals and the like are usually women's task that may limit their participation of farming activities.

Gender part of pulse production relates primarily to access and control over resources, labour availability and women's engagement in pulse production and marketing. In terms of labour availability, women in female headed households (FHHs) have fewer members (1.7) than male headed households (MHHs) in Ethiopia, that leads to reduce agricultural productivity, resulting 23% of the overall gap (World Bank, 2014), this suggested that needing labour saving technologies. Recent study also identified that FHHs own less land, livestock and other important strategic resources than MHHs that affect pulse productivity and related interventions (Henry *et al.*, 2016).

Women can involve in different activities of production which throughout the value chain in agriculture. Men and women farmers participate on different stages of pulse production, from land preparation to food preparation. The study (Henry *et al.*, 2016) in Damot Gale, Halaba, Jido Combolcha and Hawassa Zuria, district of Southern Nation, Nationalities Peoples (SNNP) region of Ethiopia identified that women direct participation on land preparation, sowing and harvesting, activities is limited/invisible; the study identified that more than 80% of the respondents justified that men mostly engaged on these activities for pulse production. Their study also revealed that 32% of respondents confirm that women mostly engaged in pulse transporting from farm to home. However 80% and 89% of respondents confirmed that women are fully responsible on processing and cooking of pulse, respectively.

Solomon *et al.* (2010) study in Minjar-Shenkora, Gimbichu and Lume-Ejere districts in Ethiopia, land preparation, planting, fertilizer application and irrigation are usually done by men while women are playing a great role in weeding, harvesting, transporting and threshing in chickpea production. However the cultural taboo might hinder to participate directly on men's activities including broadcasting (sowing) and plowing using oxen. Nevertheless they are engage in these activities with the available technologies: row planting, fertilizer application, avail seed and water for chemicals, soil cover on seed and land cleaning together with their families. They also prepare food and local drink for threshing time. In Amhara region women are heavily involved in

production during both planting and harvest, with additional activities in value-addition. However all these activities are invisible and masked by men's activities.

The national household survey report (Lulseged *et al.*, 2015) indicated that pulses are the most widely grown by both FHHs and MHHs; however women participation on pulse production is relatively low. The survey also indicated that, nationally the women participation in each type of pulse production on average lower than the percentage of male holders; that may be due to limited access to resource and service for women farmers. The same study revealed that the largest gender gap was seen in Amhara, relatively Tigray was better than other regions.

2.3. Access to agricultural services (extension, technology and information)

Despite the significance of women contribution to agriculture, yet they lack access to improved technologies and information due to they have low productive resource, their poor educational and financial background. World Bank (2014) research highlighting the gender gap in agriculture has focused exclusively on women's access to key inputs, such as fertilizer, agricultural information and farm labour, concluding that if women had better access, they would be equally productive. Women from SNNP have limited access to land and oxen, and financial background related to men (Tewodros, 2013; Henry *et al.*, 2016); that might affected women farmers' access to pulse technology and extension services.

Contact with extension agents will be the primary source of information about new technology and might have positively associated to adoption of technologies. However agricultural extension services are insignificant and the services are male dominated and due to cultural and other socio-economic reasons extension agents do not reach to women farmers. Tewodaj *et al.* (2009) shown that male extension agents do not often visit women farmers. Since women own lesser means of production, skill and knowledge they are not in a position to do effective agricultural work hence, they get little attention agricultural extension advice in such situation women are considered as weak farmers.

Gender disparity in access to inputs through extension service is noted in pulse production areas. Henry *et al.* (2016) verified that more than half of the FHHs used partial agricultural extension package or never used any for pulse production, thereby affecting, productivity preferences, and the types of agricultural activities households engaged in. Tewodaj *et al.* (2009) also found that new forms of technologies are integrated into extension packages in pulse producing areas that was farm based extension programs focus on the use of fertilizer, selected seed, land management, pest control, etc. however FHHs were not well addressed.

In intra-household decision, men have an access to extension and information because men are usually head of the households position tend to control and decisions on resources that affect women's access to resources and extension services (training, technologies, etc.). Mostly husbands participate trainings however they do not share extension information with their wives therefore women from MHHs more marginalized from technology and information than FHHs. World Bank (2014) report indicated that gender gap is not narrow even if women receiving agricultural extension services, however these services generate better relative returns for men farmers; this suggests that women may receive less effective extension advice or guidance that is not focused to their specific needs.

Demand of men and women farmers for technologies may differ depending on the role they play. The available technologies may not user friendly and priority of women farmers. The study (Lemlem *et al.*, 2011) in Aalaba, Dale and Ada Liben districts in Ethiopia indicated that men preferred to produce improved varieties (Shasho and Arerti for chick-pea) for market while women prefer the local variety (Dima) for household consumption. Similarly, (Henry *et al.*, 2016) identified that women's preference for some varieties of pulses is for household consumption and men opting other varieties that have high market demands and prices.

Despite of their participation on pulse production women do not access to technologies. Abebe *et al.* (2010) reported that 440 farmers purchased different variety seeds on haricot bean market promotion days which was organized by Improving Productivity and Market Successes (IPMS) project and Office of Agriculture and Rural Development; however only 21(5%) of them were women. The same study indicated that haricot bean varieties, Nasir and Dimtu (basic seeds), distributed in Alaba District from Melkassa Agricultural Research Centre; seed multiplication was initiated by 60 farm households, however only 4 (7%) of them are women who participated in seed production; that might not be the priority variety of women or women might be systematically marginalized from access to the technology or women preferences might not be identified and prioritized.

Credit is important to small holder farmers for many economic reasons, particularly to purchase agricultural inputs. Access to credit is important to empower women for agricultural improvement, however women are rarely considered creditworthy because they have no collateral and have limited decision power on productive resources (land, oxen, etc). Therefore credit access is a major constraint: in Africa women receive less than 10% of the credit issued to smallholder farmers (World Bank, 2014) and men have easier access to credit than women in Ethiopia (Solomon *et al.*, 2010).

2.4. Women's pulse market participation

Both men and women participate on pulse production and market. However different studies (Abebe *et al.*, 2010; Lulseged *et al.*, 2015) indicated that women participation on pulse production is lower than men that might result low participation of women on pulse market. The studies (Solomon *et al.*, 2010; Bationo *et al.*, 2011) found that men and women did not have equal access to markets. Henry *et al.* (2016) revealed about 80% the respondents confirmed that men controlled pulses marketing in SNNP. Similar study (Tewodros, 2014) found that FHHs have a reduction in the chickpea market orientation compared to their male counterpart. Mostly women engage in nearest or village market; distant market sale taken over by men. Distant markets are sophisticated with transport, and need financial resource, social network and market information that women lack. Similar finding (Solomon *et al.*, 2010) indicated that women did not well known about modern markets and sense powerless to influence these markets. They have limited market outlet and market options that force them to supply to retailers, assemblers or consumers at lower price in open spaces.

In pulse market men traders are dominant in number. Bekele and Shifereaw (2007) observed that 66% of chickpea traders were men. Men traders charged lower prices than women to kick out them from the chickpea market and men have better bargaining power or negotiation ability to set low and highly competitive prices. Traditionally rural women supply small quantity of pulses (lentil, faba bean, chickpea, etc.) and less familiar with wholesale markets. Ferris and Kaganzi (2008) identified that the main bean traders in small lots (cups) were women in Dale and Alaba districts. Women in rural towns mostly engaged in unprocessed pulse with small quantity but in urban centers mostly women employed in processing and sale of processed pulse product; like *shiro*, *kik*, etc. in Baltina shops.

2.5. Access and control over resources and income from pulse

World Bank (2009) reported that women access to resources enables them to move from subsistence agriculture to higher value chains; however FHHs have less labour, land, oxen to perform their agricultural production in Ethiopia. Fetien *et al.* (2009) raveled that women farmers have fewer oxen than men farmers in Tigray. World Bank (2014) also identified that very few labour is available for women farmers. Similarly (Henrey *et al.*, 2016) observed women in pulse producing areas forced to share out their land due to lack of oxen, men in that community bring their labour and oxen for harvesting the lion share of the produce leaving the FHHs with food insecurity.

Usually both men and women participate in marketing activities and control the income with the dominance of men, because it is a cash crop that men sometimes take over women's enterprises once they become profitable (Bationo *et al.*, 2011). Men have better decision making power compared to women related to marketing issues; taking pulse to the market, keeping and spending money from pulse sale. Solomon *et al.* (2010) identified that even if women in MHHs performed various tasks in pulse production they did not control the income from the sale and have limited access to the means of production. Bationo *et al.* (2011) identified that men dominate the marketing of common bean in the central rift valley of Ethiopia and take the benefit from the sale.

2.6. Gender differential in skill and knowledge on pulse production

Acquiring skill and knowledge on crop management and postharvest handling practices is important to improve farmers' productivity. It is also important to create technology demand and commercialization behavior. Skill and knowledge can be obtained through formal education or training that women lack. Access to skill and knowledge differ by gender in rural Ethiopia; mostly rural women are illiterate that may affect production process. Solomon *et al.* (2010) verified that women are less literate than men in legume production areas that may lead to low adoption and implementation of technologies.

Access to training is also critical; men have easier access to technology and training than women, mainly due to their strong position of head of the households and greater access to information through different social network. Women have limited access to skill and knowledge to: manage crop (control weeds and disease, and apply herbicide, fertilizer, pesticide) and soil, select varieties and seed; but they are working with their indigenous knowledge, because usually men participate in whatever training. Access to technology skill and knowledge of women in MHHs are relatively worsen than those in FHHs because extension agents not contact wives; assuming that husband will share what they gained to their spouse.

Tewodaj *et al.*, (2009) confirmed that there is a greater and significant gender gap when it comes to accessing technical advice through community meetings organized by extension officers. Other study also identified that significant gender disparities in level of educations, access to media (especially radio), and access and use of agricultural packages all are negatively affect women's production and consumption of pulse (Henry *et al.*, (2016). Mostly women use different informal social network to access information and know-how on technologies.

Any new activities, such as attending trainings or meetings, will add to their time burden. Absentees

from attending a meetings and trainings are very common due to women's triple role (reproductive, productive and community) which widens skill gap between men and women. As a result, women worked by using indigenous knowledge on production and crop management, that may lead to low production and productivity. World Bank (2014) report indicated that women in Ethiopia show smaller improvements in yields than men even when they apply the same amount of fertilizer and use oxen on their farms due to differences in knowledge of appropriate farming techniques or proper timing of use. Other study also identified that while an increase in fertilizer expense by one birr reduces the chickpea market orientation of women farmers (Tewodros, 2014); that might be improper use of fertilizer that might reduced chickpea production and have low marketable surplus.

3. Conclusion and recommendation

Ethiopia has different agro-ecology and produce different pulse crops. It shares 12.4% and 11% of the total crop cultivated area and the total crop output harvested, respectively. Amhara and Oromia regions take the largest share of pulse production in the country. In terms of production faba bean stands first followed by haricot bean and chickpea. Pulses are also contributing the foreign earning. Pulses are important element in the national diet next to cereal in Ethiopia. It serves as source of protein for poorer households, particularly for women who have low income to purchase animal source protein. However recently pulse production declined and price of pulses increasing that results poor, particularly women may in question to consume the crops; hence it is important to encourage farmers to produce more pulses using the available technologies.

Area allocated for pulses production increased from 2001-2013, however recently more declined than before that indicates farmers may diverse from pulse production to other agricultural activities. Production of pulses increased and reached more than double since 2002/2003, however the increment of production and marginal production was highly volatile; lack of consideration of gender issue may be the one the recent year production reduction. This suggests that identify problems, and the needs and priorities of men and women, separately is crucial.

Women engaged in different agricultural activities, however their contribution is over sighted; different evidence indicates that women have limited access and control over recourses, technology, training that might be widen the gender gap. Gender disparities on pulse production and marketing have seen in different literatures, particularly limited access to and control over productive resources that associated with access to extension service, technology, training, market information, etc. These may hinder technology adoption, cause to miss management of crops, low production and productiivity that leads to limited market participation; mostly pulse market dominated by men. Therefore gender responsive technologies, equal distribution of technology, , technical support, and strong and effective extension advice/guidance are important to maximize the pulse production potential and linking women to markets also critical.

Men and women preference and priorities are different because of the role they play, however the evidences indicate that women systematically disadvantaged in accessing improved pulse technologies and their preference is not clearly identified. Considering the needs, preferences and constraints of men and women separately is important and empowerment through pulse technologies is a key for sustainable pulse production, productivity and food security gains.

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