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## **Women Farmers in Practices: Opportunities and Challenges in Accessing Potato Production Technologies in Welmera Ethiopia**

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### **Authors' contributions**

*This work was carried out in collaboration between the authors. Author BK designed the study, wrote the protocol and supervised the work. Authors BL designed questionnaire, monitored data collection and inputted the data into computer. Author BK managed analyses of the study, wrote the first draft of the manuscript, managed the literature searches and edited the manuscript. Both authors read and approved the final manuscript.*

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### **ABSTRACT**

Women farmer empowerment project was launched in the year 2006 to organize women farmers into Farmer Research Group (FRG) and improve their livelihood through accessing potato production technologies. Women farmers were targeted because they were disadvantaged with regards to this. Initially, 25 women farmers in *Robi Gebeya kebele* of *Welmera* district formed FRG. Consecutive trainings on potato production, gender roles and responsibilities, decision making, entrepreneur skills, among others were given to FRG. Each women farmer prepared and allocated 20 m×20 m plot of land for potato production. Initially *Jalane* potato variety with recommended packages was given to FRG, both *Gudene* and *Jalane* potato varieties were given in subsequent

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years. Five years data indicate that the number of women farmers who accessed potato technologies increased from 25 to 236. A total of 137 diffused light stores were constructed by women FRG which enabled them to store seed potato tubers. Women FRG reserved about 1,251 quintals of seed potato and made own plantation in consecutive years. In addition to own plantation, women FRG sold 2,521 quintals of both seed and food potatoes. During these years, price of food potato increased from 70 birr to 450 birr per quintal and that of seed potato increased from 180 birr to 600 birr per quintal. Women capacity building, bylaws formation and enforcement, knowledge and information sharing, spirit of competitiveness, accessibility, respect and patience, wisdom and interest, persuasiveness of other farmers were opportunities for women farmers. Difficulty to handle heavy duties, burden of workload, poor leadership and decision making ability, men influence over women intervention, prioritizing home activities and poor concept of entrepreneurship were among the challenges encountered. Further empowerment of women farmers through training on market outlet choices, home economics, entrepreneurship skills, facilitation, decision making and leadership capacity are potential areas for interventions.

*Keywords: Women farmers; potato production technologies; decision making; empowerment; entrepreneurship; leadership.*

## 1. INTRODUCTION

Women farmers produce over 50% of the food that is grown worldwide and more so in most developing countries [1]. Rural women produce half of the world's food and, in developing countries, between 60% and 80% of food crops [2]. Women farmers in Africa play important roles in agricultural production but they are more often considered as family assistants on farmland 'belonging' to their husbands who have a correspondingly enhanced status. In Africa, as much as 73% of women were involved in cash crops, arable and vegetable gardening, while post harvest activities had 16% and agroforestry 15% [3]. In sub Saharan Africa, women farmers produce 80% of food, both for household consumption and for sale [4]. They are usually responsible for food processing and make a major contribution to food storage, transportation and marketing although they seldom control the generated revenue [1].

Ethiopian economy is more on agrarian. Agriculture forms the basis for livelihood and creates job opportunity for more than 85% of the population. It accounts for 42% of the Gross Domestic Product (GDP) and 80% of the national export earnings [5]. It provides raw materials for local industries and hence saves foreign hard currency. This achievement in agriculture is as a result of roles and responsibilities each household member plays in day to day activities. Women farmers are integrated into the rural economy, which is basically labor intensive and exerts heavy physical toll on all, including children. Women farmers for instance play reproductive, productive and community

management roles though their contributions to later roles are not well valued [6]. Cognizant to this fact, in traditional Ethiopia, woman's worth is measured in terms of her role as a mother and a wife.

In Ethiopia, over 85% of women reside in rural areas, where peasant families are engaged primarily in subsistence agriculture. According to [7] the role women play in agricultural production in Ethiopia vary from one culture to another. For example, in Menz community women help husbands in all agricultural activities except land plowing and harvesting [8]. In Sidama, southern part of Ethiopia, manuring, harvesting, storing are exclusively the task of women [9]. But there have been few studies concerning rural women farmers in Ethiopia and many observers have commented on the physical hardship that women farmers experience throughout their lives. Such hardship involves carrying loads over long distances, grinding grain manually, working in the homestead, raising children, cooking, among others. Ethiopia women farmers traditionally have suffered from socio cultural and economic discrimination and have had fewer opportunities than men for personal growth, education, and employment [10].

Experiences while working in the national research system and observation from research outputs, trial sites, field days, field visits, etc indicate that women farmers are underrepresented. In other words, women farmers have little access to modern technology, which in turn contributes to limited growth in agricultural production as most farm activities such as weeding, planting, harvesting, etc are

borne by women farmers. Improving women farmers' livelihood through accessing modern agricultural technologies is believed to ameliorate their current situation. Cognizant to this fact, Women Farmers Empowerment project was launched to organize women farmers at *Welmera* wereda and create opportunities to access and utilize potato technologies and thereby improves women's as well as their families' livelihood. The objective of this paper therefore is to assess opportunities and challenges of women farmers in accessing improved potato technologies.

## 2. MATERIALS AND METHODS

The study was conducted at *Robi Gebeya Kebele* of *Welmera wereda* in *Finfine zuria liyu* zone of Oromia regional state in Ethiopia. *Robi Gebeya kebele* was selected through discussions with *wereda* bureau of agriculture. Baseline data of the *kebele* was generated from 50 households using PRA<sup>1</sup> data collection techniques which mainly focused on age group, marital status and number of family members, landownership, willingness to participate and commitment, among others. Selected women farmers were provided training on potato production technology management (mixing chemical with water, spraying methods, recommended seed and fertilize rate) and post harvest handling. Frequent contact and iterative discussions with women farmers were done to group them into potato women Farmer Research

Group (FRG). In order to respond effectively, the group has developed its abiding bylaws and elected leaders to whom each member was accountable and responsible.

Consecutive trainings were provided to FRG before and after distribution of planting materials. This is believed to raise awareness on decision making, develop technical skills and raise their entrepreneur skills. Each member then allocated and prepared fine seedbed and hence given freely seeds of potato varieties with recommended packages. The recommended packages include fine seedbed preparation, *Jalane* and *Gudene* varieties, 20 m×20 m plot size, a spacing of 75 cm between rows and 30 cm between plants, 119/90 kg/ha N/P<sub>2</sub>O<sub>5</sub> fertilizer and hilling 2 to 3 times during production season. Planting was done with direction and advice from bureau of agriculture and researchers. On spot/plot training, method demonstration and monitoring was given individually at farmer's own trial plot (Fig. 1). Associated with, on station training was given to update their skills and awareness level.

Group evaluation was conducted among FRG; in which members visited trial sites and status of each farmer's trial field. The most important events observed include sharing of experiences, experts, knowledge, views and surprises among members. During such evaluation, mismanaged



Fig. 1. On spot training and demonstration to women FRG

<sup>1</sup>PRA- Participatory Rural Appraisal

trials were advised to be treated correctly as recommended. Agronomic practices such as weeding, identification of bacterial wilt and potato late blight were shared and managed on individual plot. Once the symptom of potato late blight appeared fungicide *Ridomil* MZ 63.5 WP at 3kg/ha was sprayed. For those plots which showed symptoms of late blight again during production period, second turn spraying was done. The amount of water needed (450L per ha) to mix with and safety measures were demonstrated to FRG and development agents before and during fungicide sprays.

Cross visits were organized by *Wereda* experts (government officials at lower administrative unit such as cooperative offices, extension and credit services providers) to share information on women farmer performance and collect feedbacks. This was accompanied with leaflets, posters and pamphlets to aid dissemination and complement observation and oral delivery. Harvesting and transportation of potato tubers to store was carried individually by members. Post harvest handling techniques were also provided, such as construction of own diffused light store, identification and categorization of seed potato, management of store house, linking with market outlets and monitoring. As a result, most women farmers were able to identify and categorize potato tubers for consumption and seeds. They were provided training and technical support to construct own diffused light store.

### 3. RESULTS AND DISCUSSION

#### 3.1 Socio Economic Characteristics

According to PRA survey, women farmers comprised more than 51% of the total population in the peasant association. Married women comprised 60% of the total women population. Large numbers of households were headed by women due to divorce or death. About 37 members of FRG were women headed and others live with their husbands. Out of 57 women interviewed, 18 do not have own land for crop production but their own homestead. Interview with 39 women farmers who owned land indicated that 5 belonged to age group 25-35, 13 belonged to age group 36-50 years, 16 belonged to age group 51-60 and 5 belonged to age group 61-70 years. Though most of them did not attend primary school, majority of peasant association were able to speak Amharic, the national language of Ethiopia. Others predominantly

speak *Oromifa*, the native language of the peasant association.

#### 3.2 Women Farmers' Access to Potato Technologies

During the initial phase of the project life, only 25 women farmers had access to potato technologies with recommended packages. The number of women farmers who willingly joined to form groups in order to access potato technologies increased year after year. In the subsequent year, the number of members in FRG raised to 96. Currently the number of women farmers being in different FRGs reached to 236 under a total of 10 FRGs (Table 1). Profit as a result of potato seeds sale, the knowledge and skills gained through group learning, an opportunity of working with outsiders such researchers were the reasons for the increase in the number of women farmers.

#### 3.3 Construction of Diffused Light Store

Construction of diffused light by every member of FRG for better potato seed quality is one of the preconditions for farmers who intend to sell seed potatoes. Taking this case into consideration, the project constructed diffused light store at Holetta research center which can store 100 quintals of potato tubers (Fig. 2). The purpose of diffused light at the center was to store revolving seed potato tubers from farmers. This helped to store seed potato for women farmers until each one of them was able to construct own store at farm gate. Initially about 100 quintals of improved potato variety, fertilizer and chemicals were purchased and stored in the store before the usual planting time. Frequent follow up of the stored seeds inside diffused light was done by the research staff to monitor the quality of seeds. At times chemicals were sprayed to minimize pest attack and ensure purity of seeds. Moreover, as indicated in Table 1, in the first cropping season about 17 members of FRGs constructed diffused light store and currently a total of 137 FRG members constructed diffused light store at their farm gate.

#### 3.4 Potato Tuber Production

FRGs were able to harvest relatively encouraging potato tuber yield (Table 1). A maximum of 541 qt/ha of potato tuber yield was obtained during 2008/09 cropping season. On average a maximum of 313 qt/ha of potato tuber

yield was recorded during 2006/07 cropping season. At the first year of the trial, demonstration and evaluation conducted. The lowest yield of 186 qt/ha was obtained due to two women FRG members disobeyed the bylaws and did not apply recommended practices as per training. When compared with the highest yield of local potato cultivars (120 qt/ha) of the same year, this lowest yield were considered better than local yield by members. The lower tuber yield in some farmers' field was attributed to low soil fertility status, misuse of row and line adjustment, inappropriate/no fertilizer and

chemical application and poor management of the trial. As responded by farmers, potato tuber yield greater than 120 qt/ha provides better income even sold directly for consumers.

### 3.5 Income from Potato Sales

According to the response from farmers, all of them earned better income from the project intervention than yield from local cultivars. During the first year, a quintal of fresh potato tuber for consumption sold at local market fetched 70 birr



Fig. 2. Diffused light store constructed at Holetta research center

Table 1. Member of FRGs, DLS constructed and potato yield across years (2006/7-2010/11)

Year	Member of women FRG	DLS constructed	Yield (qt)	
2006/07	25	17	Minimum	186
			Maximum	488
			<b>Average</b>	<b>313</b>
2007/08	96	63	Minimum	41
			Maximum	454
			<b>Average</b>	<b>264</b>
2008/09	183	113	Minimum	47
			Maximum	541
			<b>Average</b>	<b>239</b>
2009/2010	223	132	Minimum	82
			Maximum	407
			<b>Average</b>	<b>243</b>
2010/2011	236	137	Minimum	46
			Maximum	409
			<b>Average</b>	<b>173.7</b>

Note: Each year the number of FRG members exceeds the number mentioned. Because some farmers who start consuming potato in August, sell food potato for immediate household need and did not record yield were excluded. Moreover, some farmers who left tubers in the field until they are ready for sale, and some farmers who do not want to see changes in color of the seed tuber while left simply at home were not included

whereas if kept as seed potato for 3-4 months, a quintal fetched 350 birr. However, as farmers noted a quintal of potato tuber stored for seed purpose loses about 30% of its weight and hence the benefit reduces at that rate. The net income a farmer earned by storing potato tuber for seed purpose than selling immediately for consumption was approximately 245 birr for the 2006/07 cropping year. Currently a quintal of fresh potato tuber for consumption sold at local market fetches 450 birr whereas if kept as seed potato for 3-4 months, a quintal fetches 600 birr. Currently, the net income a farmer can earn by storing potato tuber for seed purpose than selling immediately for consumption is approximately 320 birr. Women FRGs reserved 1,251 quintals of seed potato tubers for own plantation. Moreover, they sold 2,521 quintals of seed potato tubers to different market outlets, which made them as one of the seed potato tuber sources in the country.

### 3.6 Opportunities

- Capacity building-capacity of women FRGs at *Robi Gebeya* of *Welmera wereda* were built through training on potato production, management, post harvest handling, entrepreneurship, decision making, facilitation and leadership skills. They were provided information on sources of markets for inputs such as chemicals and linking to better market outlets for their produces. Simple cost-benefit analysis related to selling their produces at farm gate, local markets and seed potato tuber markets were advised and consulted. The benefit of storing potato as seed sources as compared to selling immediately for consumption was presented in economic terms.
- Formation of bylaws-women FRG members established bylaws in a participatory manner to which members were accountable. They elected chairperson, assistant chairperson, secretary and treasurer for FRG. The bylaws include fixed meeting date per month, to be punctual during the meeting date and avail at 8:30 in the morning, construction of diffused light store, store own seed for next cropping season, among others. Any member who arrives late (after 9:00 AM in the morning) must be punished by paying 1 birr to FRG and absentee must be punished by paying 2 birr per meeting. Moreover, a women farmer who disobeyed potato management practices may not be connected to better markets. Repeated disconnection and mismanagement leads to complete dismissal from membership and access to improved technologies.
- Construction of Diffused Light Store (DLS)- in the first year, 68% of the women FRG constructed own diffuse potato light store using available local materials. Currently 58% of the total FRG members constructed their own diffused potato light store (Table 1). A day to day frequent follow up of stored seed potato to ensure quality of seed potato for the next cropping season had been implemented. Many of them were found devoted, trustworthy and patient to apply what they were told, trained and thought.
- Sharing of knowledge and information- *Wereda* experts took leadership and organized cross visits, field days and field visits to other farmers, development practitioners and other actors. At the end of the first year, a total of 100 farmers and 10 development agents, researchers and *Wereda* experts participated during cross visit and provided constructive feedbacks. In the following years, there were more and more farmers, researchers, technical assistance, development practitioners participated in cross visits, field days and field visits increased. FRG members had got chance to share their wealth of experiences, experts, views, opinions and challenges that they acquired while working in FRG and during cross visits, field days and field visits.
- Competition-competition in this regard is the ability of women FRG members to manage their trial plots as per recommendation. Since FRGs evaluated the performance of trial plot of individual women farmer during group evaluation, each farmer tried to manage to be ranked first or best. In this regards, it was observed that working together had encouraged them to develop spirit of competition. Some women farmers failed to manage because at initial phase of the intervention they allocated poor soil for the trial and hence in the processes lost competitive spirit.
- Accessibilities-accessibility is contextualized as the easiness of getting women FRG members during supervision, monitoring and feedback assessment. As compared to men farmers, many women

farmers stay and work around homestead and were easily available to transfer information, provide inputs and extension services and to arrange or change date of meeting due to unforeseen reasons. On contrary, men farmers in many cases stay far away homestead or engaged mainly on social or natural resource management activities and as a result were not easily available and hence received distorted information.

- Respect and patience-respect in this regard is perceived as the value women farmers provide to outsiders, such as research staff. Women farmers value outsiders and respect their ideas, information, and materials. They were very patient even at times outsiders get disappointed with their mismanaged plots. In general, they have respect and patience compared to men extension service targeted farmers.
- Wisdom and interest-women farmers have great desire to change or improve their livelihood. They are very much willing to participate in interventions that improve women's and their family income. They have their own indigenous knowledge that if can be complemented into scientific knowledge would shape development projects and interventions client-oriented, need based and problem centered. In addition, they are devoted and trustworthy in activities to which they are responsible and accountable.
- Persuasion of women farmers-women farmers are a good source of farmer to farmer information dissemination and hence have high acceptance among rural communities. Therefore, they have great potential to persuade, convince and mobilize other women farmers for development interventions.

### 3.7 Challenges

- Physical fitness-experiences with women farmers reveal that they faced difficulty to handle heavy duties such as cultivation (*kutkuato*), plowing, harvesting, transporting harvests to store and markets, ridging and constructing of DLS, management such as planting, field and store management and post harvest handlings. To make women farmers benefit from potato technologies, they need labor support either from household

members or community or labor augmenting technologies.

- Burden of work activities-experiences with women farmers show that potato production and marketing had added workload over existing household activities. This was because potato production was newly introduced to the farming communities as there was no potato production.
- Leadership and decision making-in traditional society such as the study area, it is assumed that men possess leadership and decision making power over household as well as community resources. Women farmers have limit knowledge about leadership and decision making in relation to groups because they did not have enough exposure to facilitation, leadership and decision making power. Hence concept of facilitation, leadership and decision making were not developed well with women farmers and thus took time to bring behavioral change. Yet it requires more interventions not only to women farmers but also to household members. As a result, they lacked confidence to start leading, facilitating and making decision on group matters.
- Men or husband influence-even if the project targeted women farmers, the husband had influence over activities such as wilt management, seed maintenance, DLS construction, and marketing of seeds.
- Priority-all intervened women farmers replied that they prioritize home activities than agricultural activities. This is therefore a challenge to outsiders who wanted to bring improvement in the livelihood of women farmers and their family.
- Entrepreneur concept- in many cases women farmers are engaged in subsistence mode of production where majority of their income balances majority of their expenditure. In other words, they do not have entrepreneur and profit maximization skills. In addition, they have weak experiences in organizing themselves into groups to access credit, information and market outlets. These are still challenges that women FRGs face and if cannot be solved will be threats to the opportunities. Therefore, FRG demands resources, time and energy of outsiders because it will take longer period to bring change and orient them towards profit making.

#### 4. CONCLUSION

In an attempt to empower women farmers by accessing improved potato technologies and knowledge, initially 25 women farmers were organized into potato women FRG. Trainings was given on potato production, management, input utilization, post harvest handling, entrepreneurship, decision making, facilitation and leadership skills and field visits were organized to enhance information and knowledge exchange. Moreover, women FRGs evaluated individual plots and provided constructive comments for improvement during the course of production. Close supervision and follow up were made both by research staff and development agents from *Wereda* bureau of agriculture.

Five years data indicate that the number of women farmers who accessed potato technologies increased from 25 to 383. A total of 137 DLSs were constructed by women FRGs which enabled them to store seed potato. Women FRGs reserved about 1,251 quintals of seed potato and made own plantation in consecutive years. In addition to own plantation, women FRGs sold about 2,521 quintals of both seed and food potatoes. During these years, price of food potato increased from 70 birr to 450 birr per quintal and that of seed potato increased from 180 birr to 600 birr per quintal. Unless uncontrolled social/household problem, women farmers were punctual to their meeting time. Even if they were absent due to series social problems, they leave message to at least one of the committees. Compared with men biased technology transfer approach, women farmers relatively share knowledge, information and technology better to non participating farmers. Many women farmers managed their trials before the evaluation day and tried to be best among groups creating a spirit of competition among members. Compared to conventional technology transfer approach, women farmers were found easily accessible to outsiders than men farmers during supervision, monitoring and feedback assessment. Many of them demonstrated their ability of respecting outsiders and portrayed patience in times when outsiders get disappointed with their mismanaged trials. In general, women farmers were fast learners and adopt technologies better than men farmers. Difficulty to handle heavy duties, burden of workload, poor leadership and decision ability, men influence over their interventions, prioritizing home activities and poor concept of

entrepreneurship are factors that challenged empowerment of women farmers. Further empowerment of women farmers through training, entrepreneurship skills, facilitation, market outlet choices, decision making and leadership capacity are potential areas for interventions. Moreover, encouraging them to produce potato at larger hectares and seek for market outlets are areas for further interventions.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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