



Enhancing Chickpea Production and Productivity Through Stakeholders' Innovation Platform Approach in Ethiopia

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Abstract

Chickpea (*Cicer arietinum* L.) is the third important food legume both in area and production after common beans and faba beans in Ethiopia. However, the productivity of the crop was very low compared to the potential as a result of non-use of improved varieties and technologies generated by the research system. To enhance the use of the improved and associated research technologies a National Chickpea Stakeholders Innovation Platform was established in 2013 with the objective of bringing together various stakeholders acting on the value chain in order to identify major challenges and find solutions that would be implemented through synergistic efforts. The platform identified seed shortage as a major bottleneck in the sector. This issue has been addressed through establishing farmers' seed producer

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associations with the help of R&D partners and currently they are the major suppliers nationwide. Side by side, the platform strengthened the extension effort and triggered dissemination of improved technologies to a large number of farmers. As a result, productivity of the crop by model farmers increased by fourfold and the national productivity has been doubled to 2 ton ha⁻¹ in the last decade. The platform also worked on improving access to market and recently chickpea joined the Ethiopian Commodity Exchange market. Cognizant of the huge development potential of the crop, the platform is striving to further strengthen the intervention and reap opportunities.

Keywords

Stakeholder innovation platform · Chickpea value chain · Seed dissemination

7.1 Introduction

Chickpea (*Cicer arietinum* L.) accounts more than 17% of legumes in Ethiopia with a production of 0.47 million tons on an area of 258,486.29 ha (CSA 2016) with the engagement of over one million households. Chickpea is also an important export commodity where both export volume and export earnings of the country are increasing, especially in the last decade (FAOSTAT 2016). Ethiopia is the leading producer, consumer and exporter of chickpea in Africa, and is among the top ten most important producers in the world.

However, its production is challenged by low productivity of landraces, poor farming practices, biotic and abiotic stresses, among others. The chickpea improvement program in Ethiopia made considerable efforts to overcome the aforementioned constraints and developed 27 improved varieties and management technologies coupled with their dissemination to farmers. This resulted in paradigm shift of the Ethiopian chickpea production that progressed from landrace cultivars to improved varieties together with enhanced adoption of production packages recommended by research.

Although considerable improvement has been attained, it has not been to the level expected, due to lack of efficient coordination and collaboration among the concerned stakeholders for the enhancement of the sub-sector. Moreover, there was critical shortage of seed to push the technologies to the producers. This could highly be attributed to low interest of the formal seed system in the country that comprises of the few public seed enterprises and private seed companies to produce seed of pulse crops in general (Chichaybelu et al. 2018). In addition to this, less attention was given with regard to the extension of pulses as compared to cereal crops.

Cognizant of the aforementioned bottlenecks, attempts were made to tackle them through joint effort of concerned stakeholders. To this effect National Chickpea Stakeholders Innovation Platform was established with the objective of bringing together various stakeholders in order to identify major challenges and opportunities of the chickpea sub-sector to pave ways of synergetic actions to facilitate interaction

and collaboration within and between networks of farmers, governmental and non-governmental service providers, policymakers, researchers, private sector players, and other stakeholders along the chickpea value chain. Innovation Platforms are equitable and dynamic spaces designed to bring together heterogeneous stakeholders to share their knowledge and find solutions to a common problem (ILRI 2012). These heterogeneous stakeholders are more easily able to identify the innovations adapted to a given context than homogeneous groups like agricultural cooperatives which only include a single type of stakeholder (Gabriel and Jean-Joseph 2016).

7.2 Establishment of the Multi-Stakeholder Platform

Stakeholder platform for chickpeas in Ethiopia was necessitated initially out of the need for technology promotion. Technology promotion could not stand alone without a functional seed system, regulatory system, market system, input system, etc. which must operate in tandem for successful adoption of new technologies. This brought about the concept of “coming together” to fill gaps. Hence, following this, a brainstorming session followed by diverse group dialogue forum was organized which finally gave the platform called common interest groups or stakeholder platform. It was instrumental to respond to issues which only one system could not be able to answer completely. This story was fundamental in the birth of the chickpea stakeholder platform, which is big in diversity and in number this time.

The conventional approach to agricultural research emphasized developing new technologies mainly through on-station research that are then supposed to reach farmers through the public sector extension system. As this linear top down approach was not successful, an innovative multi-stakeholder approach was designed in which several parties contribute relevant insights to address the issue that impedes many value chain actors. The Ethiopian chickpea multi-stakeholder innovation platform was established on January 23, 2013 with the initiation of the ICRISAT led Tropical Legumes II project of the Debre Zeit Agricultural Research Center. It was established with 17 members comprising representatives from the agricultural research system, federal Ministry of Agriculture and regional agricultural bureaus, Agricultural Transformation Agency (ATA), farmers' primary cooperatives and unions, food processors, seed producers, chamber of commerce and export partners. The innovation platform (IP) was strengthened through time, that cause regional IP birth, and has 65 members currently, though only 5 are females. An estimated 60% of platform members were below 40 years old.

7.3 Composition, Roles and Responsibilities of the Platform Members

The chickpea stakeholders' innovation platform is composed of major stakeholders along the value chain. The platform members can be broadly categorized as (a) the agricultural research system, (b) public institutions that support agricultural development, (c) seed producers, (d) farmers' primary cooperatives and unions, (e)

entities working on bio-fertilizer and storage management, (f) food processors and (g) exporters. Responsibilities of the various stakeholders are presented in Table 7.1.

The composition of the platform has also expanded by including universities, private entities working on post-harvest handling and bio-fertilizer production and CG centres, in addition to the members at the establishment. The forum of the platform discusses major gaps of the chickpea value chain, proposes solutions and shares and assigns responsibilities among concerned stakeholders. The forum also emphasizes experience sharing among stakeholders through targeted presentations.

The forum assigned EIAR to lead the platform and organize meetings and related activities. The EIAR team involve professionals of different disciplines (breeding, agronomy, seed technology, soils, economics, extension, etc.). In order to give timely solutions to key problems in chickpea production, seed system and marketing, the IP sets its own principles, rules and regulations. The platform had a steering committee comprising three sub-committees, namely, (a) Technology generation and promotion sub-committee, (b) Seed and other inputs sub-committee and (c) Marketing and value addition sub-committee, whose leaders are members of the steering committee. The platform steering committee was assigned the following responsibilities.

1. Lead development of the chickpea value chain
2. Represent the General Assembly on various fora
3. Organize and call GA meeting

Table 7.1 Roles and responsibilities on chickpea innovation platform

Stakeholders	Roles and responsibilities
Agricultural Research Institutions	Technology generation, pre-extension demonstration, training development partners and farmers
Universities	Technology generation, pre-extension demonstration, develop trained human resources
Ministry of agriculture (extension, input and regulatory departments)	Identify farmers' production constraints, technical support to the development, popularize technologies at national level
Regional bureaus of agriculture (extension, input and regulatory departments)	Identify farmers' production constraints, technical support to the development, popularize technologies at regional level
Seed producers	Produce quality seeds of improved varieties
Bio-fertilizer producer	Produce bio-fertilizers
PICS bag producer	Produce PICS bag for grain storage
Exporters	Investigate export market niche, and export produces
Agro-processors	Value addition to the agricultural produce
Agricultural transformation agency (ATA)	Support the development sector to bring transformation
Farmers' primary cooperatives and unions	Facilitate input supply, support marketing of members' production
Farmers	Forward production problems, implement technologies

4. Report progress of the platform to the GA
5. Provide directives to the sub-committees
6. Lobby with policy makers and donors

7.4 Platform Activities

The major objective of the platform is to discuss major problems of the chickpea value chain, propose solutions and share and assign responsibilities among concerned stakeholders in order to enhance promotion of improved chickpea technologies to increase the productivity and production thereby improve the income and livelihood of the farming communities.

The identification of the production bottlenecks is mainly conducted by public institutions working in the agriculture sector jointly with key stakeholders. These are the federal Ministry of Agriculture and Natural Resource and the regional bureaus of agriculture and natural resources. These institutions have well organized hierarchical structure that reaches the farmers at the smallest administrative unit known as Kebele. The institutions have professional staff at various levels of the hierarchy and trained development agents located at Kebele level to provide on the spot technical support to the farmers. Hence, the problems raised by the farmers are collected and forwarded to the upper structure. These institutions also bear the responsibility of disseminating improved agricultural technologies and knowledge to the farmers through their extension systems.

Therefore, they bring the problems raised by the farmers to the platform. If there are technological solutions that answer the problem, they are presented by the research system and the forum assigns the extension system to take them to the farmers. On the other hand, if there are no technological options to respond to the problems, the research system takes the responsibility to conduct experiments and bring about solutions. Problems requiring policy intervention are forwarded to the concerned government office.

One challenge of the platform is problem related to inputs, mainly seed shortage. The issue was taken by the inputs directorate of the agricultural offices and the research system to provide the utmost support to the seedy producers. Farmers' primary cooperatives and unions in seed deficit areas take the responsibility of buying seed from the producers and supply to their member farmers. As a solution to alleviate shortage of seed many improvements have been attained by the efforts made with the platform in establishing farmers' seed producer association in different parts of the country and strengthening the extension system that enabled us to reach large number of farmers with improved technologies.

Another challenge of the platform is problem related to the quality of the grain produced by the farmers having mixture of varieties that incurred high cost of sorting by exporters. Efforts are being made in training farmers on the benefit of producing quality grain in order to reap the advantage of export market. Awareness has been created by the platform with regard to the use of bio-fertilizer and considerable proportion of farmers adapted the technology and improved their productivity.



Fig. 7.1 Tall and erect Dhera variety released for mechanical harvesting

Close to a million hectares area in the Arsi and Bale zone of Oromia regional state is wheat belt of the country dominated by mono cropping, where ploughing and harvesting are almost mechanized and weed is controlled by herbicide spraying. The attempts made to improve the farming system in such a way that wheat is rotated with pulse crops could not go further because farmers are looking for technology that can be harvested with machine harvesters. Hence the platform assigned the research system to develop varieties for mechanical harvesting. In response to this, the chickpea improvement program developed tall and erect variety called “Dhera” in 2015 (Fig. 7.1).

It has also been suggested to validate released desi popular variety *Natoli* (Fig. 7.2) which was recommended afterwards for mechanization.

Popularization of this variety has encountered problem related to weed management because farmers are not ready for hand weeding. Hence the chickpea improvement program is currently working on the development of varieties that have herbicide tolerance and fit for mechanical harvesting to satisfy the interest of farmers in these areas.

7.5 Facilitation of Platform Activities

The Ethiopian Institute of Agricultural Research took the initiative of establishing the chickpea innovation platform through the Tropical Legumes project. The Institute calls the platform annual meeting where problems related to the sector are discussed, solutions proposed, and assignments given to concerned members for action and progresses are evaluated. Key issues raised are critically debated and relevant decisions are made by the forum through consensus.

Farmers’ participatory variety selection trials and technology demonstrations are conducted by farmers who bear the responsibility to manage the trials. Those host farmers were purposely selected by development agents. After awareness on the



Fig. 7.2 Popular cultivar Natoli, validated and recommended for mechanical harvesting

technologies was created to the farming communities, the technologies were disseminated to those showing interest to produce based on the amount of seed available.

7.6 Achievements of the Platform

7.6.1 Access to Knowledge and Farm Advisory Services

The Ministry of Agriculture develops production package for the improved technologies in collaboration with the research system. Before any intervention with farmers' participatory variety selection and demonstration of improved technologies the research system provides detailed training to agricultural experts at various levels of the ministry and regional bureaus of agriculture on improved production technics and post-harvest handling of the produce. These experts then train development agents who are responsible to further train the farmers, as they are working at the lowest administrative unit (kebele) close to the farmers. Moreover, the development agents make close follow up of the farmers' fields and provide on-the-spot technical advice, whenever they need. Therefore, this shows that farmers have easy access to knowledge through trainings and receive advisory services from trained development agents in their vicinity.

Such trainings and awareness creation efforts equipped the farmers with the required knowledge and made real difference in the crop's farming system. For instance, the farmers traditionally used to plant chickpea at the end of the rainy season (late September) and grow the crop on residual moisture and harvest less due to terminal moisture stress effect. Because of the trainings, the farmers drew the planting time back to mid-August that gives the crop better growing period with

sufficient moisture that resulted in bumper productivity. The other common problem that chickpea suffers from is damage by pod borer (*Helicoverpa armigera* Hübner), merely due to the farmers' reluctance in taking timely and proper control action. As a result of routine advises given to them to make at least weekly pest scouting in order to take action on the early instars and use recommended insecticides significant improvements have been attained on the management of the pest.

Moreover, farmers' participatory variety selection (FPVS) trials are conducted by the research system where farmers learn about improved technologies and get chance to select varieties of their preference for future use. Such participation at the start of intervention is believed to build farmers' confidence on improved chickpea technologies (Chichaybelu et al. 2018). Following this pre-extension, demonstrations of the technologies selected by the farmers are conducted by the research system and bureaus of agriculture, where large numbers of farmers get awareness about the technologies on farmers' field day occasions. Because member farmers realized the benefit of using improved technologies, they access the development agents or agricultural experts whenever they have query.

7.6.2 Access to Improved Seed and Other Complimentary Inputs

In earlier times there was shortage of seeds of improved varieties largely due to the low interest of the formal sector (the public and private seed producers) to produce seeds of grain legumes in general and chickpea in particular. Due to this most farmers used their own saved local desi chickpea whose productivity is as low as 1 ton per hectare. The majority of smallholder farmers who grow chickpea as major crop have limited access to improved seed and many of the released varieties with superior traits have not been widely disseminated (Atilaw and Korbu 2016). Such low productivity of the majority of the farmers pulled the national productivity of the crop to about 1.3 ton per hectare.

To solve seed shortage problem, the platform identified the involvement of the informal seed producers as an immediate and innovative solution. To this effect, the platform worked on the organization of chickpea farmers in the vicinity of the centre on seed production (Chichaybelu et al. 2018). Trained on basic seed production techniques, farmers established seed producer associations as a legal entity and entered into the business under close supervision and technical backstopping of the project. The achievements obtained by these associations encouraged the platform to establish more in different parts of the major chickpea growing regions of the country. Hence production of chickpea seed showed drastic increment over the recent years (Fig. 7.3). These associations got significant strength in short time and became major chickpea seed suppliers of the nation and recently two of them grew to private limited company (PLC) level.

Earlier technology intervention was not adequate to access most chickpea farmers, especially those who are at a distant from research centres. With a joint effort of the stakeholders, improved chickpea technologies were disseminated to farmers in major production regions, where high productive Arerti, Habru, Ejere, Natoli,

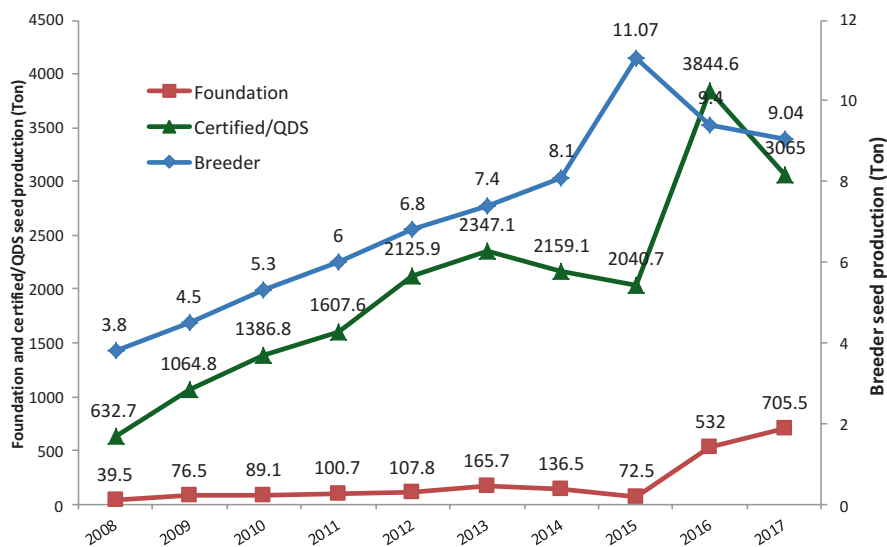


Fig. 7.3 Production of various classes of chickpea seed in Ethiopia (Source: CSA 2008–2017)

Dalota and Teketay varieties dominate the uptake. In 2015, for instance, 2.1–3.5 ton ha^{-1} average productivity of improved chickpea varieties were obtained by the farmers who handled pre-extension demonstrations at various districts. Atilaw and Korbu (2016) also stated that seeds of improved chickpea varieties have resulted in yield increase of some innovative model farmers by three to fourfolds over local varieties. As a result, there is huge gap between the national average productivity and the productivity levels attained by the model farmers; thus, investing on improved seed is a critical step and catalyst for agricultural transformation. Fikre (2014) reported that best adopter and medium adopter farmers of improved chickpea technologies produced 3.5 and 2.2 T ha^{-1} on average compared to 1.2 T ha^{-1} productivity of the farmers that had no access to improved technologies (Fig. 7.4).

The intervention thus completely changed the scenario and farmers are currently asking for new technologies. This generally brought drastic increment in chickpea production in recent years that could be largely attributed to the significant improvement in the national productivity of the crop that doubled to over 2 tons ha^{-1} , coupled with increased area dedicated to improved chickpea (Fig. 7.5) and increased number of chickpea farmers.

7.6.3 Access to New Markets and Finance and Other Services

The platform recognized problems related to chickpea grain market, though there was no quotable intervention made. Lack of a well-coordinated supply chain that links producers and buyers that increases the transaction costs and lowers the share of the consumer price that is received by small producers, absence of efficient

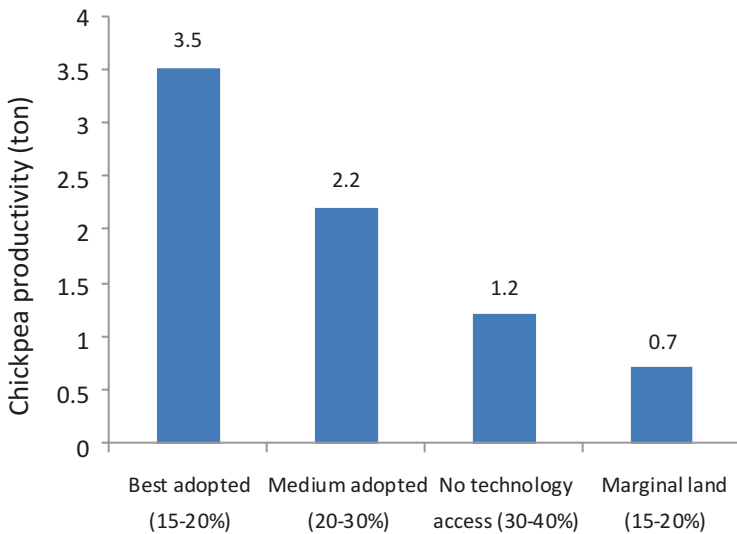


Fig. 7.4 Gaps among the strata of technology applications (Source: Fikre 2014)

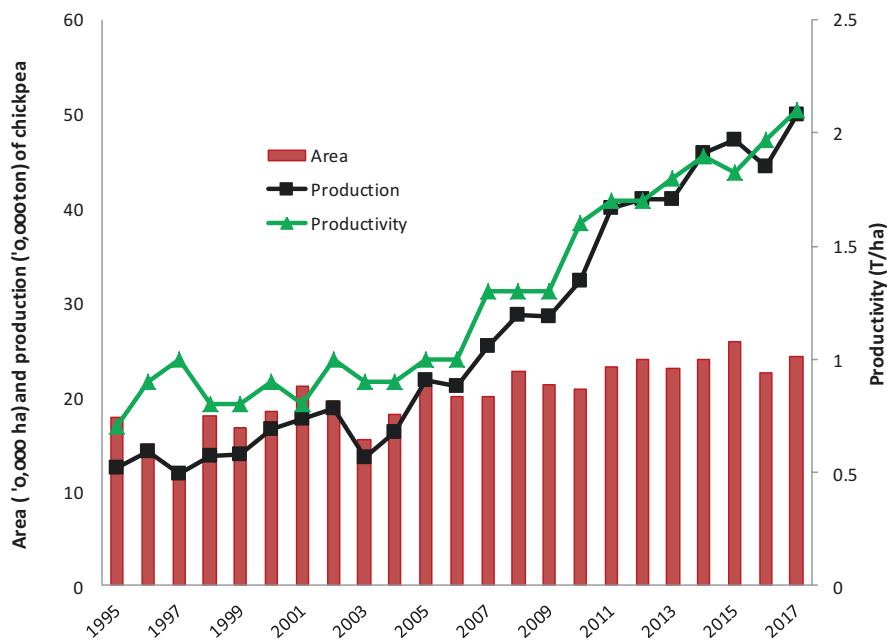


Fig. 7.5 Trends in area, productivity and production of chickpea in Ethiopia (Source: CSA 1995–2017)

mechanism for delivering market information to the producers and traders at local markets on issues related to seasonal prices, demand, and quality requirements in different markets across the country and lack of a well-established system of grades and standards in the chickpea marketing system are reported to be the major threats to chickpea marketing (Asfaw et al. 2010). Alemu et al. (2010) pointed out the high domestic demand, misbehaviour of brokers, capacity of exporters and wholesalers to store quality seeds, high transportation cost, and decline of demand in importing countries as major constraints to the export market of pulses in general. Despite these challenges, the market and price of grain chickpea have drastically improved. Ferede et al. (2018) reported the improvement and competitiveness of the Ethiopian chickpea in the export market and indicated the need for improvement in terms of quality, volume and continuity. Recently chickpea entered high marketing platform where it is traded through Ethiopian Commodity Exchange (ECX). Therefore, much needs to be done by the platform on the improvement of the chickpea marketing and related issues in order to exploit the huge potential both in the domestic and export market.

On the other hand, successful intervention was made with regard to the chickpea seed marketing. The platform linked seed producer associations to regional bureaus of agriculture, NGOs and other institution that buy and distribute seed of improved varieties to the farmers. Hence, seed producers have better market and sell their seed with a minimum of 15% higher premium price over the current grain price.

7.6.4 Social Assets

Day to day and on-the-spot awareness creation on the improved technologies has been made by agricultural development agents and leaders of the lowest administrative unit (Kebele) who invite the farmers to visit and evaluate technologies being demonstrated. Moreover, farmers from neighbouring kebeles also participate on farmers' field days and the information is conveyed to other farmers on various social events. Farmers who are interested to use the technologies interact with the demonstration farmers to get seed on buying or exchange basis. Atilaw and Korbu (2016) reported that farmer to farmer seed exchange is the major informal system playing unsubstituted role in the expansion and supply of chickpea technologies throughout the chickpea growing areas. Farmers preserve seeds not only for their own but also for exchange with other producers at planting time based on whether the new cultivars have better merit. Hence considerable number of non-member farmers accessed seed through the platform members. Such interactions improved socialization among farmers.

7.6.5 Addressing Gender and Youth Issues

Women are highly encouraged by the platform to engage themselves on the production of improved chickpea technologies. However, their participation in most areas

is not satisfactory (10–20%), as the male is largely responsible for field management of the farm in Ethiopia. Better participation of up to 30% women was observed in southern region of the country. According to Zegeye et al. (2016) women have increasingly benefited from research outcomes on account of the steps taken by the research system to improve their access to and control over, agricultural technologies in recent times. The author reported that among those who get improved technology directly from the research system, about 30% are female headed households (FHH). He also reported cases of successful women farmers who managed to produce about 4 tons ha⁻¹ of improved chickpea varieties and those benefited from being members of farmer seed producer associations; one of whom said that she had never thought chickpeas could bring her such high returns.

The Chickpea Improvement Program at the Debre Zeit Agricultural Research Center (DZARC) of the Ethiopian Institute of Agricultural Research, along with ICRISAT and ICARDA, devised a strategy to change the low representation of women in the chickpea value chains in Ethiopia. The strategy had objectives of (a) organizing women and youth into associations and provides them with skills and knowledge about chickpea production and (b) further enabling the women and youth to form clusters of seed production that would be linked with seed laboratories for certification. Hence DZARC organized a training workshop for 95 women and 22 youth organized in Ada'a district on the benefits of improved seeds, modern production practices and local and export market potential. Each member was then provided with 30–35 kg of chickpea seeds as a revolving loan, that were produced under technical support from the district Bureaus of Agriculture and DZARC.

Moreover, five women members per PA were selected to conduct farmers' participatory variety selection (FPVS) trials on their farms, which would act as learning centres for other women evaluating and selecting varieties, based on their own criteria and preferences for further testing on their own farms. These groups of women and youth implemented the skills and knowledge they are equipped with and currently became one of the seed producers that produce quality seed certified by the regulatory laboratories.

Farmers supported by the platform witnessed the benefit they got from using improved chickpea technologies. Before their engagement in this business they used to produce local varieties in small areas of less than 0.25 ha to meet their own consumption need, but currently produce chickpea as a cash crop on more than a hectare. Farmers who are engaged on seed production are doing good business out of it. Zegeye et al. (2016) reported a case of Denkaka Megertu Seed Producer association whose members' livelihood has improved and as a seed producing cooperative, they have a future plan to supply seed of improved varieties throughout the country and sufficient grains to meet the export market requirements. The author also reported that growing chickpea has relative advantages for women over growing other crops. This is largely because of low cost of production for chickpea as compared to other crops. This is the fundamental issue that makes chickpea more responsive to women farmers because of their limited resource base and in-ability to afford the production cost of other crops.

7.6.6 Sustainability of Multi-Stakeholder Platforms

Since the establishment of the chickpea innovation platform, the organization of events to bring the members together was handled by the research system, particularly Debre Zeit Agricultural Research Center, with the support from the Tropical Legumes project. It is well understood that despite the significant contribution the platform can make, institutional leadership appears critically a necessity from the perspective of coordination, resource soliciting and mobilization and sharing issues. Hence, we recommend that the Ministry of agriculture and the research system should look forward as host institution to ensure sustainability of the platform in the absence funded projects.

7.7 Reflections on the Process

The National Chickpea Innovation Platform identified major actors and enabled whole system understanding of the sector, where gaps are identified, solutions proposed, and responsibilities shared, and action taken. In general, the platform played significant role in supporting the sector and improving the productivity and production of the crop that in turn improved the livelihood of member farmers and associated communities. Achievements in the area of improving availability of seed through establishing and strengthening the informal seed system can be taken as a game changer success. Moreover, farmers' participatory variety selection (FPVS) approach at the start of intervention built farmers' confidence on improved chickpea technologies and enabled faster and smooth uptake. Demonstration of technologies selected by the farmers' participation and concomitant farmers' field day visit created awareness and raised interest of wider mass of farmers.

Despite the achievement made the platform in improving the availability, there still shortage of seed to satisfy the farmers' demand. On the other hand, gap observed among the members of the platform resulted in limitations in the achievements attained so far. It was also not possible to organize frequent gathering of the platform because of resource limitations. Therefore, in order to sustain and strengthen the platform extra dedication of the actors and fulfilling its resource requirement are crucial.

7.8 Areas for Focus in the Future

Interventions made by the platform largely focused on improving productivity, quality and production of chickpea through popularization and dissemination of improved technologies to the farmers. However, the crop has great opportunity with regard to mechanized farming, agro processing and wide export market. Therefore, future interventions should give due—attention in the improvement of quality of production for better local and export market and satisfy the local agro-industries and management of emerging threats such as diseases. In order to prove large scale

production, the cropping system needs to be mechanized. Therefore, efforts on the development of more and better machine harvestable and herbicide tolerant varieties are mandatory.

Hence ensuring sustainability of the platform and application and mainstreaming of its recommendations in the overall development of the sector would enhance efforts on improving the sector.

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