

Research Article

# Seed production and marketing experiences of producing cooperatives in Ethiopia

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## ABSTRACT

Seed producer cooperatives (SPCs) are important for improving the seed supply and thus contributing to increased access to seed. The aim of this paper is to assess the seed production and marketing experiences of SPCs and factors affecting their performance in the northwest of Ethiopia. Data were collected from 117 members of the two SPCs and from ten local experts. Both quantitative and qualitative data collection procedures were employed. The finding of the study was identified three 'market outlets' for the seed produced by cooperative members, namely seed sold to external buyers through SPCs, sold in the local market as seed, and used as seed (planting material) by individual members for the next cropping season. Results show that a large volume of seed (88.3%) has been sold through SPCs to external buyers, indicating less side-selling by cooperative members. Basic seed shortage, high basic seed price, market fluctuation, limited engagement and influence of SPCs in the seed value chain, weak competitor orientation, and limited management capabilities are key factors that limit the seed production and marketing performance of the SPCs. This study contributes to the increasing body of literature on the key role of cooperatives in agricultural-based economic development. SPCs should be able to develop their adaptation strategy to withstand the influence of internal and external factors that affect their seed production and marketing activities.

## INTRODUCTION

In the history of Ethiopian seed sector development, several actors have been involving in various nodes of the seed value chain. These actors mainly include public research institutes, public seed enterprises, universities, international research institutes, and private seed producers [1]. The aim of involvement, in a nutshell, is to provide good quality seed to the farming community and thus to contribute for improving agricultural productivity. These actors have been following the formal production procedure, which involves a chain of activities leading to certified seed of released varieties [2]. With all supports and efforts of the formal procedure [3], these actors have contributed a lot in the promotion/adoption of improved seed and the seed supply improvement of the country [4]. However, it remains difficult to satisfy the diversified seed demands of the farming community, who are smallholder and often subsistence farmers [3,5]. The contribution is also mainly limited to a few cereal crops/varieties particularly hybrid maize and bread wheat [5]. Hence, farmers are mainly dependent on the informal seed sources because the seed from the formal seed sources is not available in adequate quantities, at the right time and in affordable price [6].

The Ethiopian seed industry has recently seen the involvement of seed producer cooperatives (SPCs). The SPCs are businesses founded by a collection of independent farmers from a certain hamlet. They are cooperatives with a focus on the seed industry [7]. The SPCs, like other cooperatives, work for a shared objective that is impossible for individual members to achieve on their own [8]. The primary goals of SPCs are to grow and distribute high-quality seed to their members, non-members in the community, and others outside of it, to turn seed into a product for sale, and so to make money and improve the living conditions of their members [4]. Based on the interests of farmers, SPCs produce and supply seeds for a variety of crops and kinds [4].

They thereby help farmers have better access to seed. Policymakers and development professionals have given the SPCs' contribution to Ethiopia's seed industry a lot of attention, and the SPCs' importance is acknowledged in the country's agricultural development strategy [9].

SPC populations have grown across several regions of the nation. They can be found throughout the nation in both low- and high-altitude regions, as well as in locations with and without access to food [7]. The SPCs in Ethiopia share a number of significant internal and external conditions that account for their diversity, just like any other producer organizations in developing and transitional nations [10]. Regarding agroecological conditions, sociocultural context, farming practices (such as irrigation facilities), local market demand, technical, managerial, and financial capabilities, infrastructure development of their area (such as roads, electricity), credit access, external supports, and seed production and marketing skills, there are significant similarities and differences among them [4, 11].

The SPCs' ability to generate agricultural seeds for a variety of environmental circumstances is made possible by the geographically diverse regions in which they are found. The SPCs with better technical capabilities, better access to infrastructure facilities, and better support from the research and extension system can produce higher-quality seed and have better market access than the SPCs with lower technical capabilities, less access to infrastructures, and less market access. They offer a variety of sales channels for the seed, including direct sales to farmers, sales through agreements with middlemen (public and commercial seed businesses, research institutes), and direct sales to institutional customers [12]. In the SPCs context, member farmers can support their livelihoods through the better performance of their cooperative. In better-performing SPCs, members can sell the seed to the cooperatives and then the



cooperatives again sell to external buyers/customers with premium price, from which members benefit as dividend.

Several partner organizations are involved in creating and bolstering the SPCs in order to support government activities. Farmers who are organized into SPCs may be better able to adapt to changing ecological, socioeconomic, and other situations, as well as to improve and supplement current tactics used in both the formal and informal seed systems. Producer organizations frequently assist the rural community in which they are rooted politically and socially [13]. The SPCs are not unusual, but they can serve the society by supplying high-quality seed of popular crop and variety varieties [4, 14].

The northwest part of Ethiopia is one of the potential areas for agriculture production. To improve the seed supply in the area, as it has been experiencing in other parts of the country, large number of SPCs have been established in the northwest of Ethiopia too. The SPCs do differ in their level of performances and experiences in the seed business. Some of them are well-experienced and have already well-established linkage with several stakeholders along the seed value chains. Others, however, have limited experience. SPCs differ in their production and marketing experience, the volume of seed they produce, their potential customers/buyers, the type of crops/varieties they produce, and their organization and management practices. However, the specific practices and experiences of the SPCs in the northwest of Ethiopia regarding seed production (pre-and post-harvest management) and marketing have not been yet systematically studied. Therefore, this study aims: (1) to assess the specific seed production practices of SPCs' members; (2) to identify the existing market outlets; and (3) to identify factors that limit the seed production and marketing performance of the SPCs.

## METHODS

### Description of the study area

This study was conducted in two districts of the West Gojam zone of the Amhara region of Ethiopia. These were the Yilmana Densa and Mecha districts. The two districts are among the surplus production areas of the region as well as the country. They are suitable for crop-

livestock production and could potentially represent other agricultural potential areas of the West Gojam zone of the Amhara region [15].

Yilmana Densa district has a total area of 82,038ha. It lies between 11°16'N latitude and 37°29'E longitude, and its elevation is 2,216 m. The district encompasses 21 rural and 2 urban kebeles. The district's mean annual temperature ranges between a minimum of 15°C and a maximum of 27°C. It also exhibits an average annual rainfall of 1270 mm, with the main rainy season being from May to October. Mecha district has a total area of 159,898 ha. It lies between 11°24'31"N latitude and 37°9'39"E longitude, with an elevation of 1,901 masl. The district encompasses 40 rural and 3 urban kebeles. The mean annual temperature of the district ranges between a minimum of 17°C and a maximum of 30°C. It also exhibits a minimum of 820mm and a maximum of 1250 mm of mean annual rainfall [15].

### Sampling procedure and sample selection

The present study followed the multiple stage sampling procedure to identify and select the representative SPCs (at enterprise level) and members of the SPCs (at individual farmer level). Firstly, based on the existing information regarding the distribution and experience of the SPCs in Amhara region, this study purposely selected West Gojam Zone of Amhara region [15]. Based on experts' suggestions and with support of secondary information from various reports, two districts were purposely selected for this study. i.e. Yilmana Densa and Mecha districts. Secondly, using the same method, two representative SPCs were selected purposely: Avola Gosheye SPC from Yilmana Densa district and Kudme SPC from Mecha district. Avola Gosheye SPC has 528 members and it mainly produces hybrid maize, wheat, teff, malt barley and potato; whereas Kudmi SPC has 260 members and it produces wheat, hybrid maize and potato. Thirdly, sample size for individual interview was determined using a common sampling technique suggested by [16]. A total of 117 individual respondents (70 from Avola Gosheye SPC and 47 from Kudme SPC) were randomly selected from these SPCs using simple random sampling technique. Moreover, a total of ten local experts (five from each of the districts) were consulted to collect further information. These experts are well-experienced in seed production and marketing, and cooperative organization.

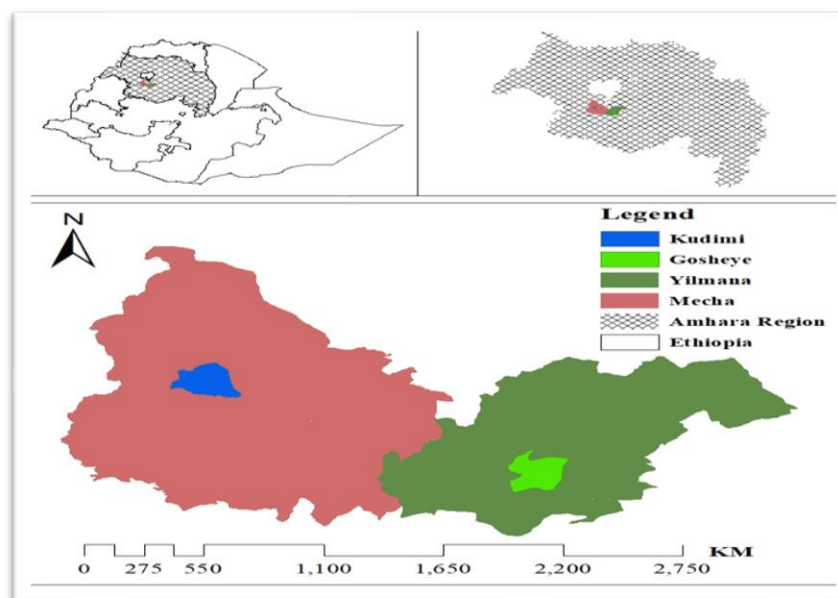


Fig. 1. Map of the study area.

**Data collection**

Data were collected using both quantitative (individual interview) and qualitative (focus group discussions) data collection procedures. For individual interview, face-to-face interview was conducted instead of sending the questionnaire to interviewees through different media (e.g. email, post). In prior research, face-to-face interviews based on structured questionnaires were used to collect data, which is a suitable technique in remote areas with inadequate infrastructure, limited access to electronic media, and respondents with low levels of literacy [17]. At a time that worked best for the respondents, interviews were done at the cooperative's office, at the respondents' homes, and on the farm. Prior to the interview, experienced experts were invited to reflect their ideas and suggestions for improvement on the contents of the questionnaire. Following experts' suggestions and comments, a pre-test was conducted by asking five respondents to get their opinions, suggestions and points for clarification. Considering experts' and sample respondents' remarks, those questions that seem confusing, ambiguous, repeated and difficult to understand/answer were reduced from the final version of the questionnaire.

Five-point Likert scale with different scale points/ranges (strongly disagree, disagree, neutral, agree, strongly agree) were employed to assess the opinions of the respondents for main factors that affect the performance of the SPCs. Trained enumerators were employed to interview individual respondents. The enumerators were supervised on daily basis to confirm the data collection as per the standard. Qualitative data were collected from experts using open questions to assess their reflections on the existing practices of the SPC members and their suggestions for further improvement. Two focus group discussions (FGDs) were executed in the two of the districts to gather further information from experts. The interview data were complemented with secondary information from various reports.

**Data analysis**

Data were analysed using different statistical procedures. Descriptive statistical tools including mean, minimum, maximum, percentage, standard deviation and ranges were employed to compare the proportion of respondents for specific variables under consideration. The total volume of seed produced by respondents for three years (2016 to 2018) were also collected to assess the trend of seed production by farmers over years. Moreover, the volume of seed sold through different market outlets were gathered from individual respondents and the proportion of various market outlets were calculated. Qualitative data were analysed using simple qualitative data analysis technique in which those issues which were mentioned frequently by the experts considered as the important topics.

**RESULTS AND DISCUSSION**

**Land allocation for seed production**

The trend of land allocation for seed production by member of the SPCs for three years (2016 to 2018) is presented in Figure 2. In general, the total land (ha) allocated by members has showed increment trend over years, though the size of land allocated by individual member varies from year to year. Most members allocated between 0.26ha to 1ha of land for seed production. About 73.5% of the respondents, in 2017/18 for instance, allocated 0.26ha to 1ha of land, and only 24.8% below 0.25ha. On the other hand, the total number of members who allocated below 0.25ha has reduced from 58.1% in 2015/16 to 34.2% (2016/17), then to 24.8% (2017/18). This clearly illustrated that members are increasing the size of land for seed production over years. The most likely explanation for this could be associated with the

better understanding of members about the benefit of seed production. It was mentioned by experts during FGDs that most members become aware the benefit of seed business and want to allot more land for seed production. However, their seed production capacity may be significantly determined by the availability of enough basic seed from seed suppliers as mentioned by experts. The trend of the volume of improved seed used by Ethiopian farmers has showed increment [18].

However, the number of members who allocated land above 1ha is very low. This may associate with the land management experience of farmers. Farmers are rational in allocating their small-sized land for various crops depending on several factors including the agroecological condition, the availability of inputs, the market value of the product, for family consumption etc.

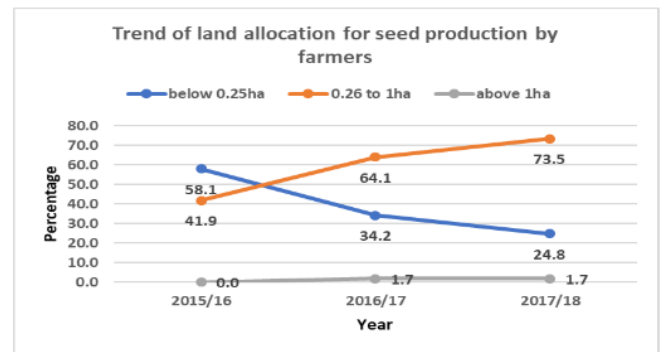


Fig. 2. Trend of land allocation for seed production by members for three years.

**Land rent and share for crop and seed production**

Land is the very critical asset in the farming community. In countries like Ethiopia where most of the people live in the rural areas and depend on farming activities, the issue of land ownership and land management is the central topic. The respondents were asked about their experience in land rent and share for crop production and seed production. Nearly 30% of the respondents do have experience in renting land from other farmers both for crop and seed production (Figure 3). However, their experience in sharing land from other farmers for crop and seed production is quite minimal indicating sharing land is not a common practice in the study area. Previous studies indicated that seed producer farmers commonly practice land renting for seed production. In some cases, producers exchange land to maintain the required clustered-farmland size for seed production. Experts mentioned that it is particularly important and inspire seed producers to rent land when the seed business venture is attractive.

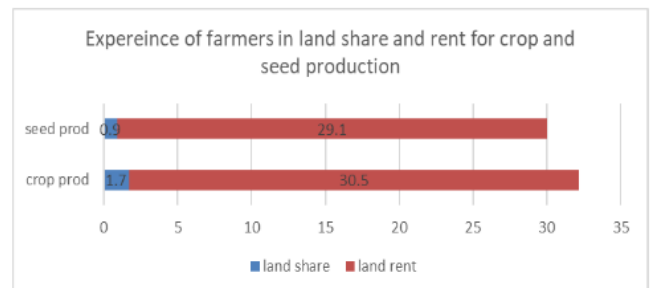
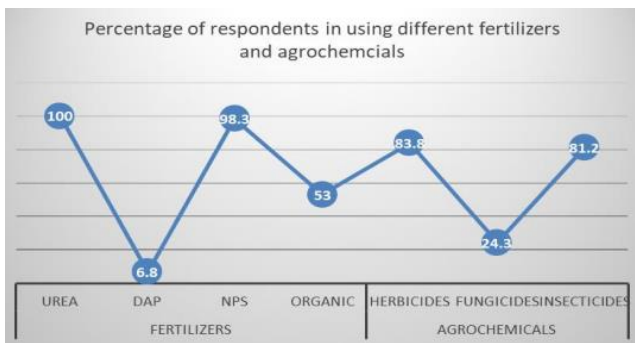


Fig. 3. Experience of the respondents in land share and rent for crop and seed production.

**Fertilizers application**

Figure 4 showed the experience of the members in applying various fertilizers, both inorganic and organic fertilizers, for seed production. Concerning the specific type of inorganic fertilizers, all of them applied urea fertilizer and 98.3% of them applied NPS. The experience of farmers in applying DAP is quite low (6.8%). The reason is that DAP is substituted by recently introduced NPS fertilizer in the country [19]. About 53% of the respondents used organic manure by preparing compost from locally available materials. Organic manures are valuable sources of nutrients. Many studies have demonstrated that the application of organic manure increases crop yields, and its yield-increasing effect is well-established [20,21].



**Fig. 4. Respondents’ practice in using different type of fertilizers and agrochemicals.**

Concerning the rate of fertilizers application, respondents were asked about their experience compared with the research recommendation. They have been also asked to mention the factors that force them not to follow the research recommendation. The experience of members in using the various rates of fertilizer in terms of the five categories and the associated factors that influence farmers ‘sometimes’ not to follow the research recommendations are presented in Table 1. The application of fertilizers by members is not always exactly as per the research recommendations for the specific crop production package. In other words, members sometimes follow the recommended fertilizers rate and sometimes do not follow. According to the Amhara region bureau of agriculture crops production package, the recommended fertilizer rates of urea, DAP and NPS in the study areas are 125kg, 150kg and 150kg for teff and 161kg, 100kg and 100kg for wheat, respectively. Results indicated that, depending on the type of fertilizers farmers are using, about 57.3% of the respondents said that they apply fertilizers exactly as per the recommendation. However, about 33.3%, 41%, 42.7% and 15.4% of the respondents said that they apply slightly below, by far below, slightly above and by far above the recommendation fertilizer rates, respectively. The responses of members were based on the aggregate experience for different type of fertilizers. In other words, for instance, a given farmer may apply the recommended fertilizer rate of urea but may not follow the recommended rates of the other type of fertilizers. Farmers may consider various factors (technical, economic, social) to determine the type and amount of fertilizers to be applied in their farmlands [22,23]. The experience of farmers in using own fertilizer rates in contrary to the research recommendation have already reported for different crops in earlier studies. This is particularly reflected with the lower rate of fertilizers application in Ethiopia [24]. During FGDs, experts mentioned that the blanket recommendation of fertilizer rates do not consider the actual environment of the specific context. Therefore, it is not uncommon to see farmers practically apply different rates of fertilizers against the blanket recommendation.

Respondents also have mentioned the key factors for not using/following the recommended rate of fertilizers. About 84.6% of the respondents said that the high cost of fertilizers is the main factor, and nearly 37.6% of them mentioned the shortage of fertilizers from suppliers. Shortage of fertilizers may include the limited amount of fertilizers available to the farming community and the late delivery [24]. High cost, price risk of fertilizers and limited supply are the key factors that force smallholders to use the different fertilizer rates [25]. In practice, Ethiopian smallholder farmers do not generally follow the national fertilizer recommendation rates due to high fertilizer cost [26], shortage of fertilizers [24], insufficient training in fertilizer use and farmers’ lack of knowledge about fertilizers [26] and limited access to credit for fertilizers [27].

**Table 1. Experience of respondents in applying the various rates of chemical fertilizers.**

Variables	Percent
Application rate	
Exactly as per the recommendation rate	57.3
Slightly below the recommendation rate	33.3
By far below the recommendation rate	41.0
Slightly above the recommendation rate	42.7
By far above the recommendation rate	15.4
Factors	
High cost of fertilizers	84.6
Shortage of fertilizers	37.6

**Application of agrochemicals**

Regarding the application of agrochemicals, majority (96.9%) of the respondents were applied agrochemicals such as herbicides, fungicides and insecticides. The application of agrochemicals depends on the occurrence of the pests in terms of time and intensity. With almost equal proportion, respondents had experience in herbicides (83.8%) and insecticides (81.2%) application. However, the application of fungicides was low, which was mentioned only by 24.3% of the respondents (Figure 4). Productivity of a given crop could be improved through, among other factors, the application of agrochemicals accompanied with better farming practices. However, application of agrochemicals should consider the threshold level mainly based on economic and environmental factors.

As mentioned by experts during FGDs, the use of better agricultural knowledge, technologies and skills have great contribution for higher production and productivity [28]. These technologies include use of required inputs such as quality seed, fertilizers and agrochemicals (type, rate, method of application), good agronomic practices such as appropriate planting techniques (time, method), weeding, rouging etc and better post-harvest management [25]. The use of these technologies is particularly important for seed production activities because seed production requires maximum management and care than ordinary crop production [29]. The explanation of experts revealed that most members of the SPCs do have experience in using better seed production technologies. Being members of the cooperative help farmers to familiarize with various agricultural production technologies [30]. It was reported in the earlier studies in Ethiopia about the impact of cooperatives on agricultural production, the adoption of agricultural technology, and farmers’ welfare [31,32].

**Labour use for seed production activities**

Result shows that all respondents have experience in hiring labour for various seed production and management practices (Table 2). About 78.6%, 54.7%, 52.1%, 47.9%, 41% and 19.7% of the respondents have experience in hiring labour for harvesting, threshing, weeding,



transporting, ploughing and planting, respectively. This shows that respondents hire labour during peak farming activities. The experience of farmers in hiring labour is common in critical farming activities that cannot be covered by family labour alone [33,34]. For the SPC-members, the seed business inspires them to hire labour to produce and maintain the best quality seed to meet customers' preferences [33]. However, the experience of farmers in hiring labour for other farming activities was low, which was referred to by 14.5% of the respondents for harrowing, 13.7% (agrochemical application), 12.8% (packaging), 12% (fertilizers application) and 9.4% (cleaning).

**Table 2. Experience of respondents in hiring labour for various farming activities.**

Farming activities	Percent
Ploughing	41.0
Planting	19.7
Harrowing	14.5
Fertilizers application	12.0
Weeding	52.1
Agrochemicals application	13.7
Harvesting	78.6
Threshing	54.7
Cleaning	9.4
Packing	12.8
Transporting	47.9

### Seed marketing experience

Seed producer cooperatives do have diversified market options for the seed they produce. Market arrangements and target customers vary among SPCs. The performance of the SPCs regarding marketing depends on their capacity of customer identification and gathering relevant information about customers' demands. SPCs can sell their seed through different ways including pre-arranged contractual agreement with big seed enterprises, sell directly to final users and sell to institutional buyers. The choice of SPCs for specific market arrangement depends on the type of crops they produce, the market price they expect after production and the contents of prior agreement with contracting party [4,7,34].

### Volume of seed sold through various market outlets

This study identifies three 'market outlets' for the seed produced by cooperative members. These include seed sold to external buyers through SPCs, seed sold in the local market as seed, and seed used as planting material for next cropping season (Table 3). Moreover, quite reasonable volume of seed sold in the local market as grain and used for home consumption. The SPCs then sold the seed potential buyers including individual farmers (non-members), institutional buyers such as government and non-government organizations, seed unions and other cooperatives. The large volume of seed (88.3% i.e. 423.1tons) was sold to external buyers through SPCs. This may explain the low level of side-selling by members of these SPCs. In principle, it is

expected from members to sell the seed directly to their SPCs and then the SPCs sell to other buyers/customers. The main reason for members in selling the seed to their SPCs may be a better price offered by SPCs than the price offered through other market outlets and the facilitation of SPCs in liking with potential buyers. Cooperatives collect the product from their members at a fair price and they keep the product properly until they find the appropriate buyers and sell it for good prices [35,36]. About 9.3% (44.5tons) of seed sold in the local market as seed and only 0.2% (0.9tons) sold in the local market as grain. This shows small volume of seed went to the local market. The amount of seed used for next planting season was quite small (only 2tons) may indicate that the SPCs' members frequently purchase the seed from seed suppliers. Frequent purchase of seed from suppliers is a common practice for smallholder producers when they have contractual seed production agreement with contracting party. The contracting party may include public seed enterprises, private seed companies etc. Recent study revealed the main reason of frequent purchase (every year/two years) of farmers from suppliers is related to those farmers who are frequently engaging in contractual seed production arrangement with public seed enterprises [37].

The results indicate the experience of seed producing farmers in using various market outlets to sell their product. However, as explained by experts, the choice of market outlets depends on both the internal factors (e.g. side-selling experience of farmers, limited storage capacity of the cooperative etc) and external factors (e.g. market fluctuations, disagreement with buyers particularly in contractual agreement with big companies, limited infrastructure development such as road etc). As reported by experts during FGDs, members are interested to sell their seed to their SPCs when the price offered by the SPCs is better than the price offered by other buyers. Cooperatives buy the product from their members at a fair price and sell to external buyers with better price [35,36].

Selling to external buyers through their SPCs is the main marketing channel preferred by members. This indicates the seed price members obtained through their SPCs is higher than the seed price offered by other market channels. Cooperatives can facilitate smallholder farmers to access markets and strengthen their economic position [38]. One aspect is that cooperatives enable members to bargain collectively with both sellers of inputs and buyers of farm products [39]. Moreover, cooperatives can support the information flow between members and the market and thus members can maximize their benefit from the existing market opportunities [40].

**Table 3. Volume of seed sold by farmers through different market outlets (2016 to 2018).**

Year	Amount sold to SPC (tons)	Amount sold to local market as seed (tons)	Amount used as seed for next season (tons)	Amount used for home consumption (tons)	Amount sold to local market as grain (tons)	Total (tons)
2018	163.1 (87.2)	20.3 (10.8)	0.5 (0.3)	3.2(1.7)	0 (0)	187.1 (100)
2017	139.3 (87.9)	13.8 (8.7)	0.7 (0.4)	3.9 (2.5)	0.8 (0.5)	158.5 (100)
2016	120.7 (90.5)	10.4 (7.8)	0.8 (0.6)	1.4 (1)	0.1 (0.1)	133.4 (100)
Total	423.1 (88.3)	44.5 (9.3)	2 (0.4)	8.5 (1.8)	0.9 (0.2)	479 (100)

NB: Figures in parenthesis are percentages

### Factors limiting the performance of seed producer cooperatives

The seed production and marketing performance of SPCs has been confronted with several factors (Table 4). The mean value of 4.48 shows that basic seed shortage from suppliers is found the most limiting factor. In Ethiopia, seed suppliers have limited capacity to satisfy the diversified seed demand of producers and farming community [5]. Basic seed shortage is a bottleneck for the success of effective seed sector development in the most developing countries including Ethiopia [1,41]. SPCs also have limited financial capital for seed production as it explained with mean value of 4.38. Because of financial limitations, it is hardly possible for SPCs to fulfil the required facilities which eventually affect the performance. Seed businesses by its nature requires financial investment to purchase inputs, collect market information, maintain relationship with suppliers, perform seed processing and promotion, build capacity and train members).

The mean value of 4.47 reveals the SPCs are constrained by weak competition capacity in the market. Ethiopian SPCs are characterized by their low competition-orientation attribute in the market [42]. Weak leadership capability of the cooperative is another factor (M=4.05). Most Ethiopian cooperatives do not manage by professionals. The absence of professional cooperative managers and the low literacy level of the existing cooperative leaders are key problems in many of the Ethiopian cooperatives [43]. The limited knowledge in seed production and management (M=4.22) is also another factor that confines the cooperative performance. The performance of cooperative is limited due to lack of proper training, conflict between members and poor management practices [44].

Weak seed promotion activity is also another factor that limits cooperative's performance, explained with mean value of 4.66. Low promotion may associate with the limited/weak competitive capacity of the cooperative. The mean value of 3.33 shows the limited access of SPCs to relevant infrastructures (e.g. road, electricity). The probable reason is that most SPCs are in areas where there are limited/poor infrastructure facilities. They are unable to use modern technologies because of insufficiently available electric power. Living in remote areas with poor access to infrastructure exposes cooperatives and their members to high input costs, which greatly reduce their incentives for market participation. Furthermore, the mean value of 3.69 showing the poor interfunctional coordination among committees within the SPC. Low price offer for produced seed was not mentioned a critical problem as it explained with mean value of 2.70. The reason, as explained by experts, was these SPCs mainly engage in contractual see production scheme with big seed companies. Such kind of pre-arranged seed production scheme guarantees the price after harvest. However, for other SPCs who are not working with contracting parties, they may face market problem [4]. There are progressing SPCs who are supplying quality seeds based on farmers' interests and market demand.

## CONCLUSIONS

The present study assessed the experience of Ethiopian SPCs regarding seed production and marketing. The study identified the area of land allocated for seed production and the volume of seed produced by SPCs have showed increment over years. The study also confirmed the good experience of seed producers in applying the relevant fertilizers and agrochemicals. However, they are sometimes do not follow the fertilizer recommendation rates due to high cost of fertilizers and limited supply. It is recommended, therefore, to improve the skill of members on using appropriate fertilizers and agrochemicals regarding time, methods and rate of application. Moreover, research institutes need to further test and recommend the specific fertilizer rates for most potential producing

areas to verify and/or amend the blanket recommendation rates that are in place.

**Table 4. Descriptive statistics on factors that limit the cooperatives' performance.**

Item	Descriptive statistics (N=117)	
	Mean	SD
Basic seed shortage from suppliers	4.48	0.55
High (basic) seed cost	4.43	0.55
Low price offer for produced seed	2.70	1.00
Fixed price mechanism system from suppliers (or buyers)	3.87	0.99
High field rejection (ha) by external/formal inspection	4.39	0.84
Limited market outlets	4.55	0.75
Limited engagement of SPCs in the seed value chain	4.45	0.50
Limited financial capital	4.38	0.87
Limited on a few crops production	4.11	0.55
Limited on a few varieties production	4.09	0.63
Weak competition capacity in the market	4.47	0.55
Weak cooperative leadership/management	4.05	0.91
Limited members knowledge on seed production and management	4.22	0.83
High buyers/customers demand fluctuations	4.43	0.71
Weak seed promotion activity	4.66	0.48
Limited infrastructure development (e.g. road, electricity)	3.31	1.21
Poor interfunctional coordination among committees	3.69	1.02

Three 'market outlets' identified through which farmers are selling the seed to buyers/customers. These are seed sold to external buyers through SPCs, seed sold in the local market as seed, and seed used as planting material for next cropping season. The study also identified the vast portion of the seed sold through SPCs to various external buyers indicating less side-selling of produced seed by members. Selling seed in the local market as grain is almost becoming less and less.

The various factors that limit the performance of the SPCs also have identified. These factors include both internal (i.e. factors that can be managed by SPCs themselves) and external factors (i.e. where SPCs have no or little control over them). The key factors, among others, include basic seed shortage, high basic seed price, market fluctuations, limited engagement of SPCs in the seed value chain, weak leadership/management capability of the SPCs and weak competition capacity of the SPCs. Improving the capacity of SPCs could help them to overcome the internal factors that hinder their performance. In this regard, integrated and target-oriented support is required from partner organizations who are supporting the development of SPCs-based seed business in Ethiopia. Moreover, SPCs should able to develop their adaptation strategy to withstand the influence of external factors that affect their seed production and marketing activities.

## ABBREVIATIONS

SPCs: Seed producer cooperatives; FGDs: Focus Group Discussions; DAP: diammonium phosphate; NPS: nitrogen-phosphate fertilizer with sulphur

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## AUTHORS CONTRIBUTIONS

EBM: design the study, coordinate the research activities, data collection, data analysis, drafted the manuscript. DTS: design the study, design data collection procedures, data analysis, drafted and edited the manuscript. DA: design the study, edited the final manuscript. All authors read and approved the final manuscript.

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## AVAILABILITY OF DATA AND MATERIALS

Data are not publicly available. However, data can be available from the first author upon request.

## DECLARATIONS

### **Ethics approval and consent to participate**

Concerns regarding ethical issues were approved from Bahir Dar University as part of MSc thesis research work of the first author. All data were collected from participants (both individual interview and focus group discussion) through their consents. Prior to data collection the first author briefed all participants about the objective of the study and the importance of their contribution as participants. Bahir Dar University then approved and certified the research findings.

## CONSENT OF PUBLICATION

Not applicable.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

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