



Analysis of the Formal Sesame Seed Supply System in West Gondar Zone, North West Ethiopia

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ABSTRACT

Background: Improved Sesame Seed is a key input for improving Sesame production and productivity. However, the supply sector could not satisfy the growing demands for improved Sesame Seed in West Gondar Zone, North West Ethiopia. The study, therefore, aims at the assessment of the formal sesame seed supply system in West Gondar Zone.

Method: The information was collected from a total of 230 sample household heads, selected using a systematic random sampling technique was collected through interview. Secondary information was also collected from published documents and reports of different agricultural organizations. Descriptive statistics were used to analyses the information.

Result: The study reveals that the Gondar research center and organizations like International Seed Sector Development, Seed Business Network, Agricultural Transformation Agency and Agricultural Growth Program was the strong actors of Sesame seed supply in the study area. The supply of improved Sesame seed through formal sources is constrained with various factors like shortage of improved seeds supply, cost of improved seeds, lack of awareness and delay in seed supply. It is important to strengthen community-based improved seed multiplication centers to produce an adequate amount of Sesame seed and supply the same time to smallholder farmers at a fair price.

Key words: Chain, Formal, Seed supply, West Gonder zone.

INTRODUCTION

Seeds are considered as one of the most economical and efficient inputs to agricultural development for their ability to increase the yield potential of the crop significantly (FAO, 2006). For the seed system to act as a catalyst, seeds of improved varieties have to be made available to the farmers at right time, with affordable price, quantity and quality consistently. However, most of the farmers in Ethiopia are having limited access to high-quality seed through convenient outlets. Many varieties of different crops with superior traits have not still been disseminated widely. The formal seed system is not able to match the demand for improved seeds (Atilaw, 2010).

The overall annual average seed requirement for cereals, pulses and oil crops is estimated to be over 400,000 tons (Marja *et al.*, 2008). However, the average yearly supply of improved seed doesn't exceed 20,000 tons since the establishment of Ethiopian Seed Enterprise. One of the reasons for this mismatch is the limited capacity to supply quality seeds of the public system dominating rainfall dependent seed production. Moreover, the improved seed production system in the country has focused only on hybrid maize and wheat varieties limiting farmer's option to diversify to other crops like Sesame having economic potential (Abebe and Lijalem, 2010).

In west Gondar zone, Sesame is a major crop used widely for consumption and marketing purposes. The availability of quality inputs mainly seeds is critical to improving the production and productivity of Sesame. Despite the importance of seeds, the formal seed supply system has not been able to meet the demand of farmers in

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the study area. With this background, it was considered pertinent to study the formal Sesame Seeds Supply System present in the study area. The study was specifically focused on examining aspects as listed below:

- Map the formal Sesame seeds supply system operating in the study area.
- Examine different aspects of the seeds supply chain prevailing in the study area.
- Identification of the constraints faced by the formal sesame seed supply system in meeting the demand of the farmers.

Definition of terms

Formal sesame seed supply

The dissemination of certified sesame seed to farming households through governmental and non-governmental organizations.

Informal sesame seed supply

The exchanging of local seeds via informal channels through local markets, friendships and relatives.

MATERIALS AND METHODS

West Gondar zone has four districts and three of them are city administrations. It is located in the North-western part of the country capital city Addis Ababa. The boundaries of the West Gondar Zone are North Gondar and Tigray Region to the North, Awe Zone and West Gojam Zone to the South, Central Gondar Zone to the East and Sudan to the West. A multi-stage sampling technique was used to draw the sample household heads. First, Quara and Metema Districts were selected from the West Gondar zone purposively based on the researchers' observation and farmers complaining on the issues of poor quality and inadequate sesame seed supply system. At the second stage, two potential sesame seed producer kebeles were selected purposively from the selected districts based on their potential to produce Sesame. At the final stage, a total of 230 farm household heads were selected from the identified kebeles by using a systematic random sampling technique. To clearly map the Sesame Seed Supply chain, 15 key informants covering Agricultural extension experts, Metema union experts, Gonder research center coordinators, multipurpose cooperative administrators and farmers' organization leaders were included in the study. The information was collected both from primary and secondary sources. Primary information was collected through a personal interview by the trained enumerators under the close supervision of the researchers. Secondary data were obtained from District and Zonal Agriculture offices, published and unpublished research documents. Descriptive statistics covering frequency, mean, standard deviations. Chi-square test used to check whether there were significant associations among the dummy/categorical variable with the dependent variable and a T-test were used to check whether there were significant relationships among continuous variables with the dependent variable. Garrett rankings were also used to analyze the information collected under the study. First, percent position value was calculated based on the following formula:

$$\text{Percent position value} = \text{TSr}(\text{Rij}-05) / \text{Nj}$$

Where,

TSr represents the total number of sample respondents, Rij represents the 1st, 2nd, 3rd, 4th, 5th, 6th10th ranks, Nj represents total number of constraints to be ranked by respondents. To convert percent position value into Garrett value we have used the Garrett ranking conversion table.

This research was conducted in the 2017 and 2018 academic calendars. To conduct this study, the authors were obtained the necessary financial and transport facilities from the University of Gondar, Ethiopia.

RESULTS AND DISCUSSION

Socio-economic characteristics of sample respondents

The information compiled under the study suggests that the respondents are in the energetic age group with an average age of 44 years. The average family size was observed to be 5.68 members per family in the study area. The labor force available with each family contributes to transport improved seeds from formal sources. At an average, each household is having access to 8 hectares of land and 8.73 livestock (Table 1).

Livestock was measured in Tropical Livestock Unit and household heads with large livestock sizes have been found to have better access to improved seeds than household heads with lower livestock size.

The information as depicted in (Table 2) indicates that the majority of the respondents are male household heads. The table also reveals that the use of improved Sesame seeds from the formal sources has been marginally better in the case of male headed households in comparison to their female counterparts. This may be due to males having better access to information.

From the total users of sesame seed through the formal seed supply chain, about 19.91 respondents can read and write whereas 9.29 percent of the respondents could not able to read and write. The result revealed that the level of literacy was found to increase the farmer's ability to get improved sesame seeds from the formal sesame seed supply.

Sesame seed supply chain in the study area

In the study area, the process of seed production starts with an assessment of seed demand, which is carried out by the Development Agents (DAs) on *kebele* (village) level. Information on seed demand is then passed upwards to the government administration ladder and collected by the Bureaus of Agriculture (BoA). The Amhara seed enterprise gets the pre-basic and basic seed from the Amhara Region Agricultural Research Institute and Gondar research center. The then, the Amhara Seed Enterprise and the "Worqe Amba" Seed producers cooperative Duplicate Sesame Seeds for wider distribution to the farming community. Seed distribution is usually managed by farmer cooperative unions who bring the seed to the zones and the primary (multipurpose) cooperatives that pick the seed up in the zonal warehouses and bring it to the *woredas* (districts) and *kebeles*. Unions charge for transport, uploading and unloading but they make only small profits with Transaction Costs of Formal Seed Market seed distribution. Woreda office of agriculture has Technical support and Facilitation of improved Seed distribution and information sharing on feedbacks and demand claims (Fig 1). The Formal Sesame

Table 1: Use of improved sesame seeds as influenced by different socio-economic characteristics of the respondents in percentage.

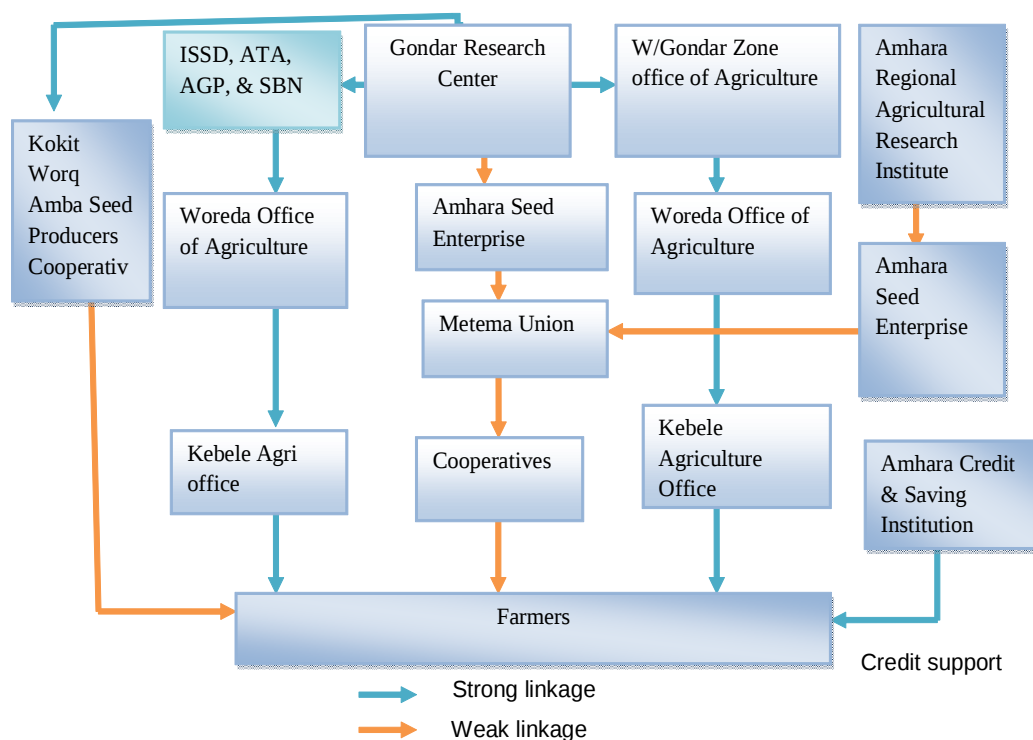
Variables	Sesame seed user (formal Source)	N	Mean	SD	T-value
Age of respondent	Yes	85	45.1875	9.88426	0.706
	No	145	44.1633	10.73085	
	Total	230	44.4348	10.39241	
Family size	Yes	73	5.5556	2.13892	-0.431
	No	157	5.6781	1.99978	
	Total	230	5.6806	2.04376	
Livestock size	Yes	90	9.8102	8.17319	1.721*
	No	140	8.0704	6.78318	
	Total	230	8.7306	7.31316	
Farming experience	Yes	80	19.0864	10.57379	0.332
	No	150	18.6190	9.93426	

Source: Own survey, 2018.

Table 2: Use of improved sesame seeds as per gender and education level.

Characteristics	Category	User (%)	Non-user (%)	Total (%)	Chi-square
Gender	Male	33.3	56.58	89.91	7.302a*
	Female	3.07	7.02	10.1	
	Total	36.4	63.6	100	
Education level	Cannot read and write	9.29	19.47	28.76	6.200a
	Can read and write	19.91	23.89	43.8	
	Grade 1-8	7.08	18.14	25.22	
	Grade 9-12	0.44	1.77	2.21	
	Total	36.73	63.27	100	

Source: Primary information collected under the study, 2018.


Fig 1: Formal Sesame Seed Supply Chain in West Gondar zone.

Seed Supply chain in Metema and Quara woreda are stated in Fig 1.

As it has depicted in (Fig 1) the Gondar research center plays a critical role in seed multiplication and delivering improved seeds in collaboration with Metema Union and kebele multipurpose cooperatives. The Focus Group discussion result revealed that the Gondar research center was strong in providing basic seeds to farmer's organizations and model farmers. They also effectively and efficiently guided the seed multiplier organizations to produce and supply the required amount of improved sesame seed varieties at the required time. This indicates that the Gondar Research Center gives too much attention to Sesame production may be due to its central proximity and priority to serve the society through quality Seed production and supply to the sesame seed producers.

The Integrated Seed Sector Development, Seed Business Network, Agricultural Transformation Agency and Agricultural Growth Program have been supplied the improved sesame seeds to the farmers through the Woreda and kebele agriculture office. This channel is found a strong and effective channel that might be due to the nongovernmental organizations' financial capability, limited area coverage and short bureaucracy to address the needs of farmers in terms of providing quality seed at the right time.

Constraints of the seed supply system

Rural households' improved Sesame seed utilization from the formal sources is very limited in the study area. The survey results have shown that about 63.6 % of the total households could not access improved seeds from the

formal sources in the study area (Table 3). The rural households could not access the Improved Sesame seeds from formal sources due to different constraints. The constraints were identified from the seed provider's and user's perspectives independently. The results of the survey are discussed below.

Although strong linkage among actors has vital importance to transfer knowledge and provision of improved sesame seed variety efficiently and effectively, a focused group discussion (FGD) held with Sesame seed supply stakeholders showed that there was a weak linkage among different actors within the Sesame seed supply system. The suppliers were working separately without coordination. This results in the duplication of efforts, production of a poor quality sesame seed, the dalliance of seed distribution and high transaction costs. Hence, creating a strong relationship among relevant actors through workshops and symposia platforms can smoothen and fasten the seed transfer process down to the smallholder farmers (Table 4).

Lack of strong seed producing farmer's organization is another critical challenge facing seed suppliers to not deliver the required amount of improved seed at the required time. Organizing farmers' seed multiplication cooperatives can have significant importance to deliver improved sesame seed variety with fewer transaction costs. The FGD discussants indicated that the adequate amount of sesame seeds could be distributed to the farming community at the right time through strengthening the farmer's organizations to involve in improved seed multiplication and distribution system.

It was also noted that the shortage of infrastructure facilities is hindering the supply of improved sesame seed

Table 3: Rural households' status to use improved sesame seed variety.

Utilization of improved seed		Frequency	Per cent	Valid per cent	Cumulative per cent
Valid	Yes	83	35.9	36.4	36.4
	No	145	62.8	63.6	100.0
	Total	228	98.8	100.0	
Missing	System	2	1.2		
Total		230	100.0		

Source: Own survey result, 2018.

Table 4: Henry garrett ranking of the constraints of using sesame seed from a formal source.

Constraints	Average score	Rank
I did not hear the existence of the improved variety	20.04	6 th
Depleted soil nutrient	13.5	9 th
The test is not preferable for consumption	9.06	10 th
Inability to use the full package	30.03	5 th
Lack of awareness	44.01	3 rd
Shortage of improved sesame seed variety supply	65.04	2 nd
It has low quality	17.8	7 th
It is expensive	34.6	4 th
It didn't available on time	85.51	1 st
I didn't need improved seed	15.8	8 th

Source: Own survey result, 2018.

variety through formal sources to the farming community at the required time. However, rural infrastructures related to road and public transportations are vital for reducing illegal market brokers and the transaction costs involved in the seed supply system.

Lengthy and complicated production systems contributed to providing an inadequate amount of seed to the farming community. Effective production and scaling of improved seed varieties is a multi-step process. After the improved variety has been developed and released, there are four stages of multiplication that need to occur: from initial seed to breeder seed, breeder seed to pre-basic seed, pre-basic seed to basic seed and then basic seed to the certified seed, which will flow into distribution channels that will be distributed. As each stage occurs over a growing season, this process totals 3 to 4 years which resulted in the delayed seed distribution to the farming community (Table 4).

Rural farm households were interviewed separately about their access to improved sesame seed variety and the majority of smallholder farm households did not use improved sesame seed varieties through the formal seed supply system. About 63.6 per cent of the sample respondents were not using improved sesame seeds from the formal sources due to the inadequate amount of improved seeds that were not distributed to the farming households through the formal seed supply system. Even the improved sesame seed variety which is delivered in small quantity does not reach farmers' disposal at the right time and hence farmers preferred to use their own saved seed for their sesame production. A related study conducted by Dhedhi *et al.* (2017) in Gujarat, India, stated that the majority of farmers use their own saved seeds for the sowing of groundnut crops every year rather than using certified seeds from formal sources.

The insufficient delivery of inputs forced farmers to search alternative local market sources where the quality of inputs is in question. So, they informally exchange seeds by their seed exchange system from the local market. The smallholder farmers have also used the local sesame seed exchange system with their neighbors and families to sow sesame at the recommended time. This results in the low productivity of sesame production due to the local variety of exposure to crop pests and diseases. Besides, as it was informed by the key informants, the quality of seeds sold from the local market was very poor for increasing sesame production and productivity.

According to (Table 4) a considerable number of farmers have also voiced that access to the improved sesame seed through the formal system is challenged by the lack of information about the existence of improved sesame seed in the formal distribution system. Even they have information some of the respondents couldn't afford the cost of improved sesame seed from the formal seed distribution system. The formal sesame distribution systems are followed long

procedures starting from pre-basic seed production up to final seed distribution to the farmers. These create high transaction costs on the farming community.

A similar study conducted by Bishaw *et al.* (2008) confirmed that smallholder farmers are not using improved seeds because the smallholder farmers are living in remote areas and they have also limited financial resources to purchase the certified seed distributed through the formal seed supply system. Besides, an adequate amount of improved sesame seeds are not delivered at the right time through the formal sesame seed supply system. Although, efforts have been done to satisfy the Ethiopian seed demand through the formal seed system; the formal seed system could not satisfy the seed demand of the vast majority of the nation's farmers, who live in remote areas.

CONCLUSION AND POLICY IMPLICATIONS

In the study area Amhara Seed enterprise, Gondar research center, Integrated Seed System Development, Seed Business Network, Agricultural Transformation Agency and Agricultural Growth program are the main suppliers of improved sesame seed variety. Gondar research center plays a vital role in providing basic seeds to seed suppliers. It is found to be the strongest seed source for multiplication amongst Seed Business Network, Amhara Seed Enterprise and Ethiopian Seed Enterprise.

Improved sesame seed variety supply systems through the formal seed supply system were challenged by the following factors. These include weak linkage among different actors in the seed supply system, long bureaucracy, lack of infrastructure, lack of credit services, lack of strong farmers' seed multiplication organizations. As a result, about 63.6 percent of rural households' were not using improved sesame seed variety from the formal seed supply system. Rural farming households' access to improved seeds from formal sources were limited due to delayed improved sesame seed supply, high seed cost, lack of awareness and shortage of improved seeds. Therefore, the following points are recommended to improve the Sesame seed supply through the formal system.

- ❖ The strong relationship among relevant actors should be created through seed supply innovation platforms, workshops and symposia to bring efficient and effective seed supply systems.
- ❖ Attention has to be given for the establishment, strengthening and expansion of public and private seed multiplication farms supported with irrigation facilities.
- ❖ The local administration should improve infrastructural developments (road and public transportations) to supply the required amount of sesame seed at the required time.
- ❖ Channeling efficient and effective credit support services has to be given to facilitate and expand improved sesame seed multiplication and distribution system.
- ❖ Further research should be conducted on the determinants of sesame seed supply channel outlet choices.

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