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Assessment of Seed Systems in North Western Ethiopia; with Special Emphasis on Community Based Seed Multiplication Scheme

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ABSTRACT

This study was aimed at providing an overview and assessment of the current seed systems and performance of Community Based Seed Multiplication Scheme (CBSMS) as well as reviewing challenges and ways for sustainability in Metekel Zone. CBSMS came in to existence in Metekel Zone of Benishangul Gumuz region seed systems in 2008 to narrow the gap between the galloping demand and stagnant supply of improved and quality seed. Pawe Agricultural Research Center (PARC) and its partners have come up with CBSMS with multidimensional support from the former to produce in 2013/14 3279 quintal and in 2014/15 1275 quintal of quality seed. Seed systems in Metekel Zone were observed to be complex and the role of PARC is observed to be vital. The study suggests strengthening the CBSMS as they are the main source of improved seed in the zone. Moreover, proper training of farmers, market information network, incentive mechanism, and controlling the quality of seed should be given emphasis. To make CBSMS sustainable coordination among key partners and proper institutional arrangements is of paramount importance. Strengthening farmers' association/ union through institutional support should be given priority for sustainability of the scheme.

***Keywords*:** Seed system, Community based seed multiplication scheme, Metekel Zone

1. INTRODUCTION

Seeds are basic agricultural input. More importantly quality seeds of any preferred varieties are basis of improved agricultural productivity since they respond to farmers needs for both their increasing productivity and crop uses (Pelmer, 2005). Unavailability of quality seeds at the right place and time coupled with poor promotion system, is one of the key factors accounting for limited use of improved seeds, which further contributing for low agricultural productivity in Ethiopia. Poor availability and promotion of improved seeds is due to inefficiency of the seed systems of the country.

In Ethiopia farmers, particularly smallholder ones, are involved in multiple kinds of seed systems, which can guarantee them in obtaining the quantity and quality of seeds they need and to market their produce. Seed systems in Ethiopia can be divided into two broad types: the formal system and the informal system (sometimes called local or farmers seed system). Both systems are operating simultaneously in the country and difficult to demarcate between the two.

There is however, a fact that the formal system is the original source of improved seeds in the informal system. There is also a system referred to as integrated seed system. Other forms of seed systems operating in both systems also exist such as Community Based Seed Multiplication Scheme (CBSMS). Though not well developed, few commercial seed systems, as part of the formal system, are also operating in the country (Abebe and Lijalem, 2011).

It has been shown and documented in a number of countries that with some technical support, farmers can produce clean and potentially certifiable seed. This can help in reducing the cost of seed and grain production; enhance accessibility of good quality seed in a timely manner and facilitate faster dissemination of improved and local varieties (David and Oliver, 2010).

Such farmerled seed production and marketing enterprise could produce farmer-selected seeds and thereby strengthen and upgrade the current seed supply system at a time when the commercial seed system is not yet capable of supplying needed seeds. Moreover the community based seed production system could be involved in multiplying seeds of locally tested and selected varieties based on farmers' preferences, linking seed demand with seed production at local level, and adopting appropriate seed quality standards relevant to small farmers.

This will also reduce costs of transporting, marketing and distribution, enable to develop a low cost cleaning/ treatment facility at the farm level, and ensure technology transfer and improvement in the quality of farm saved seed (Kiros Meles *et al.*,, 2009).
CBSMS came in to existence in Metekel Zone of Benishangul Gumuz region seed systems in 2008 to narrow the gap between the galloping demand and stagnant supply of improved and quality seed. Metekel Zone is one of the less favored area despite its immense agricultural potential in the past regimes in terms of infrastructure and basic agriculture services resulted in very low improved seed consumption and availability.

In order to fill this widening gap Pawe Agricultural research Center (PARC) has taken the initiative and became the front runner. As a result presently the scheme is operational in all districts of the zone. This paper, therefore, aimed at providing an overview and assessment of the current seed systems and performance of CBSMS in Metekel Zone and reviewing challenges and ways for sustainability.

2. HOW CBSMS ESTABLISHED IN METEKEL ZONE

CBSMS is a multi-disciplinary and multi-stakeholder task which needs coordination across disciplines and active involvement of stakeholders for its success. So that the following activities have been undertaken throughout the course of the task by the different stakeholders at different level and districts to come up with such a viable scheme.

Setting the foundation

- Identification of stakeholders, creating awareness and common understanding about what to accomplish and the target to achieve based on the challenges of the farmers in the locality towards accessibility of selected improved seeds.
- A common plan was set, tasks allocated and responsibilities were shared among stakeholders based on their role.
- Action plan has been scheduled based on the cropping calendar of the specific crop including monitoring and evaluation of the activities on the ground.
- Memorandum of understanding signed by all the stakeholders including PARC, Metekel Zone Agriculture Department (MZAD), Pawe, Dangur, Mandura, Dibate and Bullen District Agriculture and Rural Development Offices (DARDO), Metekel Zone Cooperatives Organizing Department (MZCOD), and World Vision Ethiopia Metekel Office which has stated the role and responsibility of each partner.

Implementation of the plan

- Farmers, agricultural experts and Development agents were trained on the crop specific and the general seed production techniques including quality seed production agronomic practices, crop protection and post-harvest handling. More over seed production guidelines, manuals and leaflets were distributed to the trainees.
- The important inputs mainly foundation seeds were distributed to the participant farmers prior to the planting period.
- Development agents were actively participated in the sowing activity in their locality.

Monitoring and evaluation

- A team of researchers and district experts have been actively involved in periodic follow up and inspection of each and every seed multiplication field to assure the desire quality and standards of quality seed production. Accordingly some fields were rejected due to poor management and performance at different stages of the crops.
- The necessary data were collected and submitted to the concerning partners for the desired actions.
- Seed sample were collected and sent to PARC for germination and purity test and those who fulfilled the desired standard were accepted as Certified - 1 seed.

Marketing and distribution

- Collection/ marketing and distribution of the produced and to the standard seed were supposed to be facilitated by the cooperatives/ unions in the zones but couldn't be achieved. Rather NGOs like CPAR and World Vision have taken part.
- DARDOs in some cases also took initiative to insure the distribution of the produced seed to end users.

3. LOCATION

The Benishangul-Gumuz region is one of the nine administrative regions of Ethiopia located in the western part of the country, sharing an international border with Sudan in the west. In a national setting, the region shares borders with the Amhara, Oromiya, and Gambella regional states (Figure 1). It occupies an estimated total area of 50,380 km^2 (BGRS, 2004), and has a total population of 670,847 (CSA, 2008). The population consists of indigenous ethnic minority groups of Berta, Gumuz, Shinasha, Mao and Komo. It is also inhabited by settlers with a diverse ethnic background from other regions.

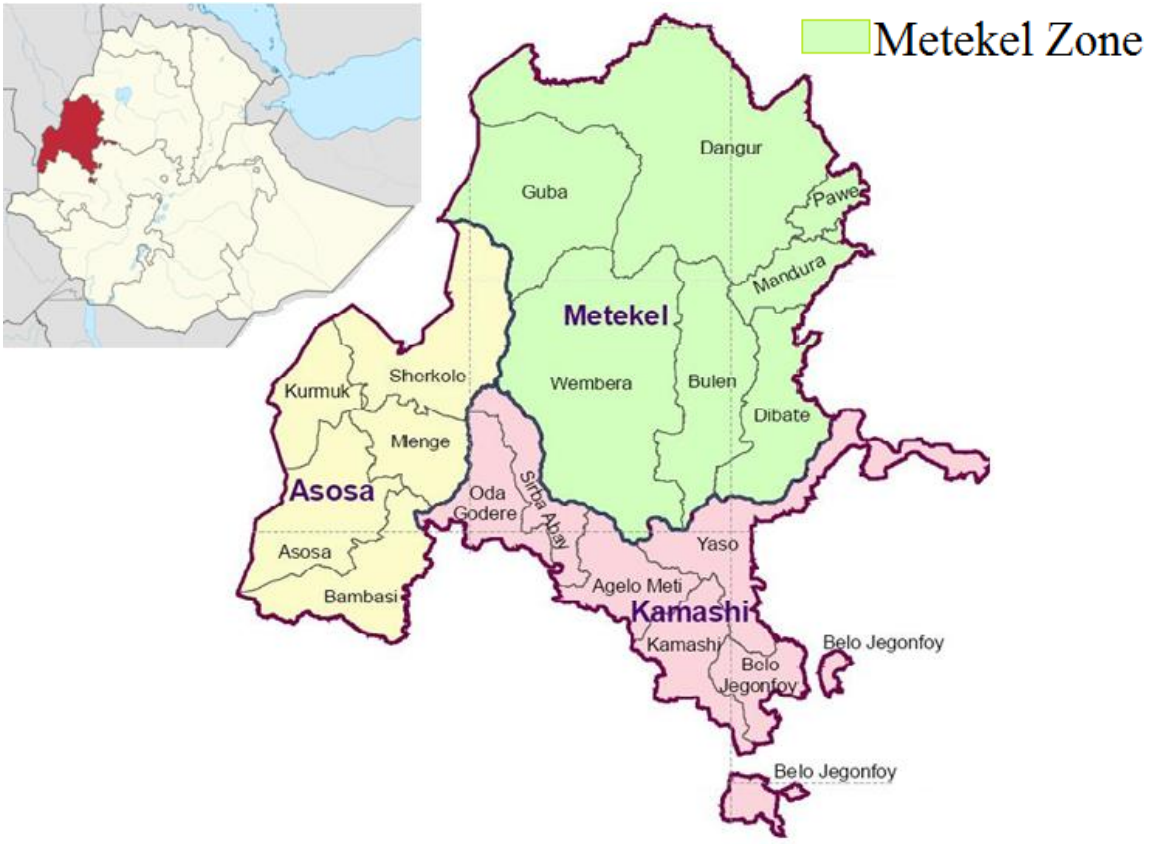

Figure 1. Map showing Benishangul Gumuz Region and the three administrative zones.

Metekel is one of the three administrative zones in the Benishangul Gumuz Regional State, covering seven districts namely Dangur, Guba, Womera, Mandura, Dibate, Bullen, and Pawe. It is lowland with a high rainfall and hot temperatures. Its diverse agro-ecology provides potential for cultivation of different crops. Farmers practice a mixed crop livestock production system. Cereals (maize, sorghum and finger millet) and oilseeds (soybean, sesame, and groundnut) are the most important food grains mainly cultivated in the zone.

4. RESULT AND DISCUSSION

Seed system in Metekel zone of Benishangul Gumuz Region

The seed system of Metekel zone includes mainly PARC and CBSMS in addition to the formal seed system. PARC, through its effort to scale up/out the available improved agricultural technologies, has been engaged in improved and quality seed multiplication and distribution of different crops and varieties. This has helped mainly the small holder farming communities to easily access seeds of improved cultivars and commercial farms to some extent. In the technology pre-scaling up effort in Metekel zone the seeds multiplied by the center have been distributed to DARDOs to reach to technology pre-scaling up participant farmers. The center has also been the sole source of foundation seeds for CBSMS. In 2013/14 cropping season the center has distributed more than 360 quintal of quality seeds for pre-scaling up activities, more than 202 quintal foundation seeds for CBSMS. Similarly, in 2014/15 cropping season 62 quintal of certified-1 seeds and more than 131 quintal foundation seeds disseminated for pre-scaling up and for CBSMS respectively.

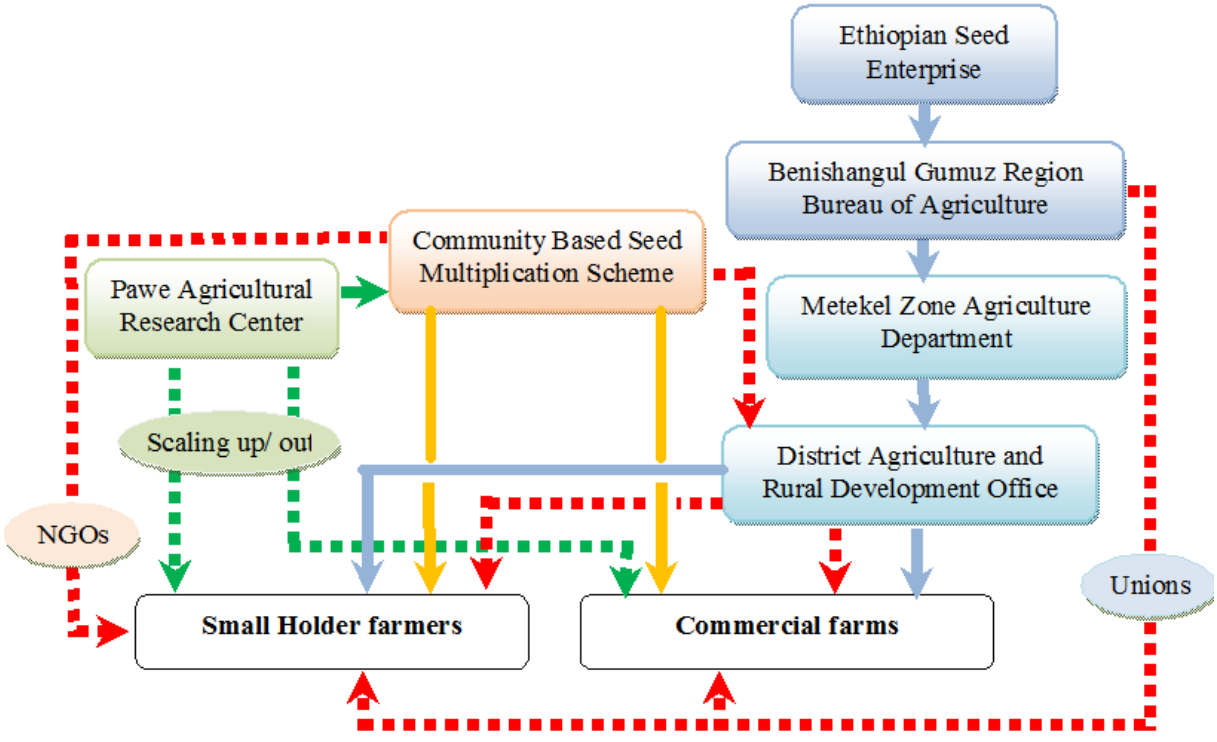

Figure 2. The current Seed System of Metekel zone; Sources, Channels and End users.

Improved seed is also delivered to Metekel zone from the Ethiopian Seed Enterprise (ESE) mainly through the regional Bureau of Agriculture (BoA) to (MZAD) and then to

DARDOs to reach end users (small holder farmers and commercial farms) and in some cases from BOA to end users through the respective districts cooperative unions. Under this system in 2013/14 2003 quintal of certified-1 seed distributed in the zone (CSA, 2014).
The seed produced under CBSMS has reached end users directly. Under the facilitation role of DARDOs seed from these sources has reached end users. More frequently in districts where NGOs are supporting the rural development activities it is not unusual to collect the seed from the CBSMS participants and distribute to food unsecured small holder farmers. There were circumstances where the DARDOs have collected the seed from CBSMS and distribute it to scaling up participant small holder farmers (Figure 2).

Availability of Improved Seed in Benishangul Gumuz State

In 2013/14 cropping season area under improved seed from total cropped area (TCA) in BG region was observed to be one of the lowest in the country (about 4%) which was much lower than the national average (7.33%) indicating the importance of the indigenous seed and informal seed source in the region. It is also evident that BG region contribute 253258 ha TCA but its improved seed consumption is only 3307 quintal (Table 1).

Table 1. Area under improved seed from the total cropped area in the country and states in 2013/14 cropping season.

Regions	TCA (hectare)	Area under improved seed (hectare)	Quantity of improved seed distributed (quintal)	% of area under improved seed from TCA
Tigray	921,604	25,483	32,412	2.77
Afar	7,273	646	338	8.88
Amhara	4,549,374	359,533	141,254	7.90
Oromiya	6,488,366	488,428	179,763	7.53
Benishangul Gumuz	253,258	10,050	3,307	3.97
SNNP	1,795,108	152,335	57,476	8.49
Gambella	17,275	27	-	0.16
Harari	17,266	191	185	1.11
Diredawa	13,431	388	68	2.89
All Ethiopia	**14,144,112**	**1,037,361**	**414,878**	**7.33**

Authors' calculation based on data from CSA, GOE

Status and Achievements of CBSMS in Metekel zone

In 2013/14 cropping season a total of 503 farmers (373 male and 65 female) and 42 Agriculture Officers and Development Agents (DAs) have been trained on seed multiplication techniques. Seven improved crop varieties namely potato, haricot bean, rice, sesame, soybean, finger millet and wheat were multiplied on a total of 110.34 hectares of land through participating 279 farmers (246 male and 33 female) in six districts of Metekel zone.

A total of 202.085 quintals of foundation seeds were distributed both in cash and in kind (revolving seed system) from PARC. The scheme has resulted in production of about 3279 quintal of certified -1 quality seed which was found to be more than the improved seed distributed in the formal seed system.

The field performance of each and every participating farmers plot was evaluated by multidisciplinary seed multiplication committee as well as monitoring and evaluation committee three times at a different stage. Furthermore germination and purity of the produced seed samples were assessed for 103 participant farmers. Quality of the produced seeds have been assessed using germination and purity tests (Table 2).

Table 2. Community based seed multiplication details in 2013/14 production season.

Commodity	Variety	Number of participant farmers			Quantity of seed distributed (quintal)	Area cover (hectare)	Quantity of seed produced (quintal)
		Male	Female	Total			
Potato	Jalene & Gudene	90	10	100	165	8.05	1016
Wheat	Denda'a	20	0	20	12.5	10	272
Haricot bean	Nasir	9	3	12	3	3	42
Finger millet	Baruda & Dibatse	46	16	62	4.3	42.79	1273.62
Soybean	Belesa-95	43	0	43	14.27	22	525
Sesame	Abasena	35	4	39	1.81	23	118
Rice	Pawe-1	3	0	3	1.2	1.50	32
Total		**246**	**33**	**279**	**202.08**	**110.34**	**3278.62**

Authors' calculation based on data from PARC

In a similar manner during 2014/15 cropping season the scheme has stretched to cover all the seven districts of Metekel zone and 299 farmers (264 male and 65 female) participated. More than 197 hectare area of land covered under 7 crops namely soybean, rice, sesame, finger millet, haricot bean, groundnut and wheat which has produced about 1275 quintal of Certified-1 seed quality (Table 3).

Table 3. Number of participant farmers, area covered and seed produced under different crop varieties in CBSMS in 2014/15 cropping season.

Commodity	Variety	Number of participant farmers			Quantity of seed distributed (quintal)	Area cover (hectare)	Quantity of seed produced (quintal)
		Male	Female	Total			
Soybean	Belesa-95	62	4	66	44.85	40.25	346.00
Rice	Pawe-1	23	0	23	8.52	12.00	102.50
	Nerica-4	8	2	10	3.00	5.00	0
Sesame	Abasena	70	6	76	4.05	51.75	125.00
Finger millet	Baruda	22	6	28	3.60	30.00	152.00
	Dibatse	16	3	19	1.68	18.00	146.00
Haricot bean	Nasir	29	7	36	29.00	19.00	153.00
Groundnut	Maniputer	5	0	5	14.00	3.50	34.00
Wheat	Denda'a	8	1	9	5.62	4.50	5
	Shorima	21	6	27	16.88	13.50	211
Total		**264**	**35**	**299**	**131.20**	**197.50**	1274.50

Authors' calculation based on data from PARC

Sustaining CBSMS to overcome seed shortage in Metekel zone

According to Setimela and Kosina (2006) most of the CBSMS have not been sustainable. Once external support is terminated the schemes have collapsed and the farmers have reverted to experiencing shortages of improved seed. If a CBSMS succeeds and becomes efficient and sustainable, the farmers could become future contract seed producers for seed companies, and continue meeting their communities' seed requirements. Information on new improved varieties, their characteristics, and prices should be provided to farmers by the producers and extension workers. Accordingly PARC through its network with the partners, small holder farmers and commercial farms has taken the initiative to strengthen the CBSMS.

Challenges in the CBSMS in Metekel zone

The following were the major challenges encountered during the implementation of CBSMS in Metekel zone in 2013/14 and 2014/15 cropping seasons.

- Unlike the criteria set prior to farmers selection, some farmers were found to be subsistent so that they sold the produce immediately after harvest or even prior to harvesting. This has resulted in the sale of sesame seed produced as grain from 53 participant farmers in Mandura district.
- Farmers were observed managing the seed multiplication plots not differently from the normal grain production plots resulted in dropping of plots from the scheme mainly in Dangur district where 10 rice seed multiplication participant plots rejected for poor performance.
- It was difficult to monitor each and every seed multiplication plot due to resources limitation like vehicle, multiple commitment of the committee members and inaccessibility of some of the plots.
- Price volatility and early maturity of sesame and soybean make them to be marketed early to fill the cash shortage that will be needed to pay for the labor cost of harvesting and threshing other crops. Farmers were tempted by cash and marketing problems to sell the seed as a grain before the following planting season. This, despite the potential demand, also limits the availability of improved seed to other farmers in need just because they lack the cash in time to secure the seed.

Lessons Learnt

The CBSMS had left important lessons that should be considered in establishing and improving informal seed production with partners some of which were also shared with Endeshaw *et al.*, 2011:

- Seed production is an investment. It requires higher level of management compared to grain. Accordingly, farmers who would be engaged in seed production need to be food secured, capable to efficiently manage the seed production plot and absorb some shocks related capital. Otherwise they will be tempted to poorly manage the crop and siphon the seed into the grain market to fill their cash requirement.
- Unless there exist a significantly differentiated price between seed and grain, it may force seed producing farmers to lose interest in seed production. There must be a price reward for producing seed.
- Potential connection of seed producing farmers with the formal seed sector as well as strengthening the link with projects/ institutions working on seed business can enhance their complementarities and provide for exchange of experience and building of local capacities towards developing seed business. Furthermore, systematic and strategic integration of the informal and formal seed sector would be instrumental in enhancing and sustaining the production and delivery of quality seed.
- Capacity development both technical and institutional is crucial if CBSMS has to thrive and sustainably address the demand for seed. Farmers' and extension workers' need to be equipped with all the necessary knowledge and skill for production of quality seed. Besides, farmers' association/ unions and other small scale entrepreneurs' capacity to deal with marketing of farmer produced seed including storage facility should also be developed.

- Establishing important quality parameters and sharing the same with farmers through developing their technical capacity and setting seed quality standards together with corresponding premium is crucial to ensure availability and sustainability of quality seed. Besides, this may facilitate the growth of small scale entrepreneurs in the informal seed sector. The interest developed with some institutions, particularly NGOs, with regard to enhancement of small scale entrepreneurs in the informal seed sector need to be exploited as an opportunity.

6. CONCLUSIONS

Seed systems in Metekel zone were observed to be complex and the role of PARC is observed to be vital. Absence of government supported seed enterprise and private seed producers coupled with poor rural infrastructure and distribution mechanism in the region have made access to improved seed one of crop production bottle neck of Metekel zone. The study suggests further strengthening the CBSMS in the zone. Proper training of farmers, market information network, incentive mechanism, and controlling the quality of seed should be given emphasis. To make CBSMS sustainable coordination among key partners and proper institutional arrangements is of paramount importance. Strengthening farmers' association/ union through institutional support should be given priority to avoid sale of produced seed as grain and sustainability of the scheme.

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