

Status of improved crop seed utilization system across small scale farmers in southern Ethiopia: The case of Sodo Zuiryra in Wolaiyta, Mareka in Dawuro and Kacha Birra in Kambata Tambaro zones

Abstract

The small scale farmers and other producers in Southern Ethiopia challenged by lack of quality seeds at the right place and time, poor farmers seed preservation and reutilization practices, high price of seeds, lack of awareness for farmers, erratic rain fall and related crop failure that are one of the key factors accounting for low adoption of improved seeds and failure to exploit the potential of improved crop seeds, which further contributing for low agricultural productivity. Therefore, the study aimed to asses improved seed utilization system and constraints related to improved seed utilization in Wolaiyta, Kembata, Tembaro and Dawuro Zones. The study used key informant interview, literature reviewed, and household survey in three respective districts (Sodo Zuiryra, Kacha Birra and Mareka). The survey adopted random sampling techniques for sampled producers and purpose sampling techniques in selecting the study districts in relation to experience of seed utilization, secondary information gathered and key informant interview undertaken. The survey result justified that there was variation in level of improved crop and forage seed utilization across districts and producers, increment in production of source seeds at research centers and improved participation of producers and other stakeholders in production and utilization of seeds. Total amount of improved seeds disseminated and utilized from 2015 to 2016 showed decreasing trend for crops like: teff, and faba bean. In relation to climate variability and concurrent erratic rain fall, the extent of improved seeds disseminated and utilized showed different trend in the two consecutive years across the study districts. The major sources of improved seed sources identified were government, market and farmers themselves for major crops produced in the districts. The interviewed sampled producers confirmed that the major challenge for not adopting and using improved seed were, farmers experience of reutilization of seeds, Unaffordable price of seed, untimely supply of seeds, lack of seeds inform of credit, lack of difference in productivity in comparison to local seeds and packaging problem and lack of varieties demanded by producers. Therefore the study result pointed out that it is possible to increase trend of improved crop seeds dissemination and utilization through awareness creation, undertaking demonstration of improved seed packages, experience sharing promotion and improving access and quality seeds supplied for producers.

Keywords: improved seed utilization, constraints, relation, seeds, major crops, agriculture sector, agriculture, seed enterprise, promotion system

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Introduction

Agriculture is a back bone of Ethiopia's economy, supporting 85 percent of the population's livelihoods, and accounting for 46 percent of gross domestic product, and 80 percent of export value. Given the significant current and future role of the agriculture sector, a vibrant seed system that provides quality seed to meet the demands of farmers is an essential enabler to continued economic and social development small scale farmer in particular and country of Ethiopia in general.¹ Seed is a key input for improving crop production and productivity. Increasing the quality of seeds can increase the yield potential of the crop by significant folds and thus, is one of the most economical and efficient inputs to agricultural development.² Agriculture low productivity is partly due to limited use of improved varieties and associated technologies, so the availability and use of improved varieties and seeds play an important role in this endeavor. The annual potential seed requirement is estimated to be more than 150,000 tons, but the formal sector supply does not exceed 20,000

tons, of which 80-90% comes from the Ethiopian Seed Enterprise (ESE). The ESE, under the supervision of the Ministry of Agriculture and Rural Development, is expected to support the rural development strategy and the improvement of the seed supply to smallholder farmers in particular, by filling the gap for economically important crop varieties.³ The study findings by Abebawu et al.,⁴ suggested that strengthening the Community based seed system as key option and the main source of improved seed. Moreover, proper training of farmers, market information network, incentive mechanism, and controlling the quality of seed should be given emphasis. To make Community based seed system 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. Programs of emergency seed provision may undermine the informal institutions that people employ to cope with food and seed shortages, thus creating dependency on external interventions.

Seed is a key input for improving crop production and productivity. Increasing the quality of seeds can increase the yield potential of the crop by significant folds and thus, is one of the most economical and efficient inputs to agricultural development. An enhanced seed availability through formal or informal or both sources will improve smallholder farmer's access to seed and enhance improved variety adoption.⁵ Generation and transfer of improved technologies are critical prerequisites for agricultural development, particularly for an agrarian based economy such as of Ethiopian. Despite the release of several superior crop varieties, there has been limited use of improved seeds by the majority of farmers (CSA, 2016). Unavailability of quality seeds at the right place and time coupled with poor promotion system, lack of awareness for farmers, erratic rain fall are one of the key factors accounting for the failure to exploit the potential of improved crop seeds, which further contributing for low agricultural productivity. Seed demand forecasting system is an important function to produce and avail seed for the farmers at the right time and required quantity.⁶ The study results in Ethiopia justified that the level of improved seed was low due to different social, economic, institutional and environmental reasons. In relation to low level of improved seed utilization and low level of adoption in improved crop production full packages, the productivity of agricultural sector is very low in Southern Nations, Nationalities and Regional State. Therefore, the study initiated and proposed undertakes rapid assessment on improved crop seed system in selected areas of southern Ethiopia.

Methodology

Sampling techniques and method of data collection

Table 1 The study used combination of random and non-random sampling techniques for gathering the study information on improved seed source and status of improved utilizations. The study districts selected purposely based on experience in improved seeds, literatures interviewed and key informant interviews done. The small scale farmers and study kebele selected randomly based on accessibility,

willingness to participate in the study and experience in improved seed utilization.

Table 1 Number and type of participants in survey

Zone	Wolaita	Dawuro	Kembata tambaro
Woreda	Sodo zuriya	Mareka	Kechabira
No. of sampled producers interviewed	19	20	21
No. of key informants interviewed	7	6	5

Data types and methods of data collection and analysis

The data collection instruments were checklist and structured questionnaires. The survey collected both primary and secondary data from the study zones and respective districts. In addition to these, the study used literature review and observation for supplementing the collected information. The survey used Key informant interviewed and household interview for study data collection. The collected information analyzed using SPSS version 20 and Excel 2013.

Results and discussions

Source: zonal agricultural input coordination work process

Table 2 Major maize varieties introduced to Wolaita zone in 2015 production calendar comprised of BH-140,PHB3243, PHB 30G19,Shalla and limu. The major common bean varieties introduced to the production system in Wolaita zone include Hawassa Dume and Nassir. The only Sorghum variety introduced was Gubye. The only Irish potato variety introduced to Wolaita area was Belete in 2015 production year Table 3.

Table 2 Improved crop seeds disseminated across districts in Kembata Tambaro Zone

Woreda	Improved crop seed supplied in quintal & cuttings in 2016 in Kembata zone in qt					Improved crop seed supplied in 2015 in Kembata zone in qt				
	Teff	Wheat	Common bean	Faba bean	Barely	Barely	Wheat	Common bean	Fababean	Teff
Kedida gamela	98	303	0	0	0	0	1124	0	3	
Damboya	100.1	900	0	1	0	0	1461.125	50	0	
Angetcha	90	1462	0	9	0	5	2234.5	0	3	
Doyogena	27.55	2859.5	0	196.3	20	6.5	2138.5	0	26	
Kacha Bira	88.5	549.75	0	0	0	0	484.5	30	0	
Hadaro tunto	70	318	36	5	0	0	1158	30	0	
Tembaro	95.95	424	172	0	0	0	1188	30	30	
Sum	566.5	6816.25	208	202.25	20	11.5	9788.625	140	62	778.5
Trends from 2015 to 2016 years	Decreased	Decreased	Increased	Increasing	Increased					

Source: Zone agricultural input coordination department

Table 3 Improved crop seed supplied in quintal & cuttings in 2009EC in Wolaita zone

Woreda	Teff	Wheat	Common bean	Chickpea	Maize
Sodo zuriya	115.45	230.5	206	0	317.65
Damot Gale	142.1	142	160	64	366
Damot woide	80	30	215	16	500.5
Damot Pulasa	244.5	33	183.5	40	364.13
Damot sore	133	235	85	0	258.1
Boloso Sore	168.65	207	276	0	588
Boloso Bombe	134	100	268	0	240
Duguna Fango	214.95	0	618.5	0	1004
Humbo	229.9	0	450	308	1245.4
Offa	62.35	101	30	10	384
Kindo Didaye	27.5	50	70	0	118
Kindo Koisha	170	35	495	10	724.25
Sodo town	15.5	59	30	0	101.5
Bodity Town	12.65	153	20	0	25
Areka Town	9	0	20	0	45
Supplied	1759.8	1376	3127	448	6281.5
Used	1750.8	1352.5	3123.5	448	6281.5

Source: zonal agricultural input coordination work process

Major crop varieties disseminated and its proportion in different in wolaita

The secondary collected from Wolaita zone in the table below indicated that there was change in utilization level, proportion and type of improved seed disseminated to the area. The small scale farmers increased the level of improved seed utilization for production calendar of 2007/8 to 2008/09EC for crops like maize in BH-540 varieties, BH-140 Varieties and PHB varieties, whereas the level of utilization for Limmu varieties in maize crops decreased. From common bean varieties, the farmers showed increment for Hawassa Dume Variety as compared to Nassir variety, which indicated decreasing trend. The proportion of dissemination and utilization for newly released crop varieties increased for crops including tef (cros-37) and common bean (Hawassa dume). (Table 4 & Table 5) According to secondary information gathered and key informant interview done, the amount of improved crop seeds disseminated and utilized in Dawuro zone varied across different districts in the two consecutive production year 2015 and 2016. Total amount of improved seeds disseminated and utilized from 2015 to 2016 showed decreasing trend for crops like: tef, and fababean. The extent of improved seeds disseminated and utilized showed increased trend for common bean, irish potato and maize crops from 2015 to 2016 production calendar. The major reason for increment in dissemination and utilization for common bean, irish potato and maize was climate variability and concurrent erratic rain fall.

The Figure 1 above indicated that the amount of source seed produced across the last three years showed variation for different crops. The amount of wheat produced in the last three year showed incremental trend, while, it was showed ups and downs for Boloso 1 taro and decremented trend for common bean. The major reasons for variation in the amount of source seed multiplied at Areka Agricultural Research center was erratic rain fall. The overall extent of production for source seed showed undulating feature. The collected data confirmed also that amount of wheat increased in quintal from 2016 to 2017. Thw major causes for increment in amount of wheat seed were improved linkage between extension and research wings, demand created by farmer for improved seed, awareness created and improved productivity of improved wheat variety by its own promoted the farmers to use more of improved seeds. Even if the amount of seed produced decreased for the last two years for common bean in relation to erratic rain fall, extent of seed utilization increased consecutively. The common bean and faba bean crop is seed type that produced and majorly used as seed due to higher market demand and better linkage created between research and extension wings. The Table 6 above indicated that amount of Desho grasses disseminated from Areka Agricultural centre to Wolaita zone in 2015 was 841680 cuttings, but it increased to 5031600 in 2016. The amount of Elephant grass disseminated to Wolaita was 883370 in 2015, but it increased to 3821320 in 2016. The improved forages data indicated existence dynamic change not only in number of improved forage cuttings disseminated, but also proportion of districts participated in technology dissemination. In 2015, only few districts were accountable for larger proportion of improved forage technology utilization, but in 2016 it observed dynamic change. Erratic rain fall and related climate issues force the farmers to adopt improved technologies in general and improved forages in particular. The improving in amount of improved forage seeds produced and disseminated to the districts were the witness of improvement in agricultural extension and research wings cooperation and increased demand for improved forage for livestock production and option for biological soil and water conservation measures.

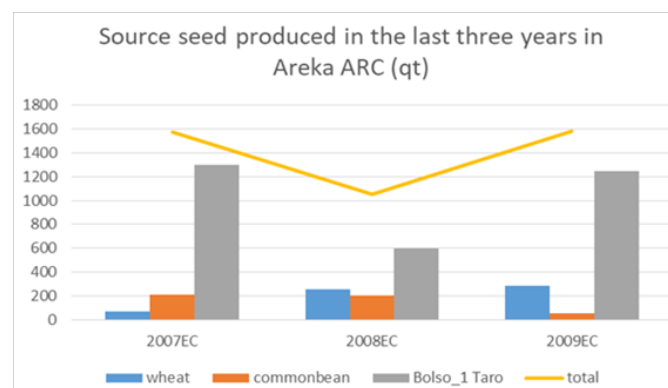


Figure 1 The graph above indicated that the amount of source seed produced across the last three years showed variation for different crops.

The Table 7 above clarified that the overall study districts of average age, total land in ha and family size of sampled producers was 44, 1 and 7. The maximum experience of using improved seed was 25 and 2 respectively.

The Table 8 above justified that the extent of land holding varies across districts. The amount of land size held in mareka was higher than that of Mareka and Sodo zuriya; and Kachabira was higher than that of Sodo zuriya district. The maximum land holding of Sodo

zuiriya district was 1.75, where as it was 4 in case of markeka and 2 in kacha Bira District. The Table 9 above indicate that small scale farmers used different source of seed for cropping across districts. The major sources of common bean seed identified as government (68%), own stock (18%) and market (14%). The Table 10 above illustrates that the proportion of seed source for farmers differs across different study districts. The major seed sources for improved maize were government (68%) and market (32%). The Table 11 above indicated that farmers collected wheat seeds from different sources for cropping. The major seed sources for wheat crop in the study districts were 72% government and 28% market and own stock. The Table 12 above indicated that the major sources of teff seed for small

scale farmer were government(56%),own stock (31%) and market (13%).The research finding is in line with⁷ that stated most farmers source seed from informal seed systems, including own-saved seed, exchanges with neighbours, and local seed markets. At the local level, informal seed systems are preferred by farmers because of proximity and local varietal preferences (Table 13). The study result showed that the education level of farmers varies across districts. The proportion of small scale farmers attended formal education summarized as 23%,23% and 30% for Sodo zuiya, Mareka and Kecha Birra from total sampled farmers and respectively. The proportion of famers attended informal education was higher for Mareka and Sodo Zuirya than Kacha Bira District.

Table 4 Major crop varieties disseminated and its proportion in different study districts

Zone	Crop	2007/8 EC		2008/9EC		
		Varieties	Proportion (%)	Crop	Varieties	Proportion (%)
Wolaiyta	Maize	BH_540	44.5	Maize	BH_540	46
		MHB	0.11		-	-
		BH-140	33.3		BH-140	35
		PHB-3253	22.02		PHB-3253	14
		PHB-30G19	0.05		PHB-30G19	4
	Wheat	Limmu	0.02	Limmu	0.01	
		Danfe	71	Wheat	Danfe	78
	Common bean	Digalu	29	Common bean	Kekeba	22
		Nassir	98		Nassir	86
	Tef	Hawassa Dume	2	Tef	Hawassa Dume	14
		Cr-37	33		Cr-37	82
	Sweet potato	Kuncho	67	Sweet potato	Kuncho	18
		Hawassa-83	43		Hawassa-83	100
		Kulfo	57		-	-

Source:Wolaita Zone Farming and Natural Resource management office, 2017GC

Table 5 Improved crop seeds dissantiated in Dawuro Zone

Woreda	Improved crop seed supplied in quintal & cuttings in 2009EC in Dawuro zone								Improved crop seed supplied in 2008EC in dawro zone						
	Tef	Wheat	Common bean	Faba bean	Barely	Selite	Maize	Potato	Tef	Wheat	Common bean	Fababean	Barely	Maize	Potato
Mareka	15	170	45	0	0	0	210	180	35	220	65	25	0	199.125	0
Lomma	15.1	120	495	0	0	2	351	300	28	110	286	0	5	245.125	100
Tocha	11	265	110	10	2	0	640	0	22	290	135	0	50	458.5	50
Gena Bosa	20	112.5	140	0	0	0	386	100	70	140	198	0	10	394.625	0
Essera	0	150	54.95	0	0	0	330	0	3	201	190	24	0	265.75	100
Supplied total	61.1	817.5	895	10	2	2	1957	580	158	961	874	49	65	1563.125	250
Used total	61.1	817.5	895	10	2	2	1957	580	158	961	874	49	65	1563.125	250

Table 6 Last two years improved forage distribution across Woreda in Wolaita Zone

No.	Districts in Wolaita zone	Desho grass in 2016 (cuttings)	Desho grass in 2017(cuttings)	Proportion of changes in the two consecutive years	Elephant grass in 2016 (cuttings)	Elephant grass in 2017 (cuttings)	Proportion of Changes in the two consecutive years
1	Boloso Sore	199080	672000	29.625	112570	0	-
2	Damot Sore	58800	420000	14	0	542300	-
3	Sodo town	63000	168000	37.5	0	25520	-
4	Bodity	0	25200		0	446600	-
5	Areka town	0	1176000		0	542300	-
6	Damot Pulasa	0	336000		0	0	-
7	Offa	75600	25200	300	0	31900	-
8	Humbo Taabala	25200	168000	15	0	542300	-
9	Duguna Fango	63000	84000	75	31900	0	-
10	Boloso Bombe	75600	672000	11.25	267700	542300	49.36
11	Damot Gale	147000	0	-	159500	0	
12	Sodo Zuriya	134400	1260000	10.67	311700	733700	42.48
13	Damot Woide	0	25200	-	0	414400	-
	Total	841680	5031600	16.73	883370	3821320	23.12

Table 7 Household characteristics of the study districts Statistics N=60

Statistical measures	Age	Total family size	Experience in improved seed utilization (years)	Total land holding (ha)
Mean	43.47	6.67	11.05	1.14
Std. Deviation	11.98	2.32	5.96	0.84
Minimum	25	2	2	0.25
Maximum	80	13	25	4

Table 8 Land holding of famers

Land size in ha	Sodo zuriya	Mareka	Kechabira	Total
0.25-0.75ha	16	3	10	29
1-1.75ha	3	5	10	18
2 haand above	0	12	1	13
Total	19	20	21	60

Table 9 Sources of seeds for common bean across districts

Worada	Seed source for improved common bean variety			Total
	Own stock	Gov't	Market	
Sodo Zuria	2	5	1	8
Keca birra	2	10	2	14
Total	4	15	3	22

Table 10 Major sources of Maize seed for farmers

Worada	Seed source for improved maize variety		Total
	Market	Gov't	
sodo Zuria	3	8	11
Mareka	3	6	9
keca birra	0	17	17
Total	12	25	37

Table 11 Major seed sources for wheat for farmers

Worada	Seed source for improved wheat variety		Total
	Market and own stock	Gov't	
Sodo zuria	3	9	12
Mareka	0	8	8
Total	7	18	25

Table 12 Major sources of Teff seed for farmers

Worada	Seed source for improved teff variety			Total
	Own stock	Gov't	Market	
Sodo zuria	5	2	2	9
Mareka	4	4	0	8
Kecha birra	1	12	2	15
	10	18	4	32

Table 13 Education level of sampled farmers

Educational level	Frequency of education level			Total
	Sodo Zuria	Mareka	Kecha birra	
Illiterate	4	5	2	11
Read and write	1	1	1	3
Primary (1-8)	4	3	3	10
Primary (5-8)	4	6	10	20
High school (9-10)	4	4	5	13
Preparatory and above	2	1	0	3
Total	19	20	21	60

The Table 14 above illustrates that farmers usually use improved crop seeds for their better productivity in comparison to local seeds. In relation to erratic rain fall, it has been reported that disease and pest prevalence of crop has been increased, it is better if the farmers not only focus on productivity, but also disease and drought tolerance (Table 15). The survey result indicated that there were different reasons across districts for not using improved crop seeds. The major reasons for not using improved crop seeds were limited financial capacity (42.86%), high price of seeds (21.43%), erratic rain fall (14.29%), lack of demanded seeds (14.29%) and lack of difference in productivity between improved and local seeds (7.14%). The study summary pointed out that financial capacity problem, price

Table 15 Main reason for not using improved seed across district

Worada	Main reason for not using improved seed					Total
	No difference in productivity	No supply in the required amount and type	High price	Limited financial capacity	Erratic rainfall	
Sodo Zuria	0	1	1	2	1	5
Mareka	1	1	2	4	1	9
Total	1	2	3	6	2	14

Table 16 Trend of utilization of improved seed across districts

Worada	How do you evaluate the trend of utilization of improved crop seed?			
	Increased	Decreased	No change	Total
Sodo Zuria	13	3	3	19
Mareka	8	12	0	20
Kacha Birra	8	11	2	21
Total	29	26	5	60

of improved seeds, inability to get what demanded, erratic rain fall and lack of significant difference in seed challenged the small scale farmers adoption and utilization of improved seeds (Table 16). The survey result justified that the trend in the utilization improved crop seeds showed up ward and down level of change and no change in various level across districts. From surveyed sampled households in Sodo Zuriya, Mareka and Kecha Birra showd increment in proportion of 68 %, 40% and 38% respectively. From overall sampled producers, the proportion of households showed increment, decrement and no change were 48.33%, 43.33 and 8.33% respectively (Table 17). The constraints of improved crop seeds acquiring and utilization varied across the study districts in various proportions. Majority of sampled producers (60%) confirmed that the major challenge for not adopting and using improved seed was Unaffordable price of seeds. In addition to these, untimely supply of seeds, lack of seeds inform of credit, lack of difference in productivity in comparison to local seeds and packaging and lack of varieties demanded by producers. The small scale farmers suggestions for betterment in dissemination and utilization of improved seeds summarized as providing seeds in form credit (40%), seed quality improvement (24%) and supplying agro ecology based seeds (23%) and introduction and demonstration of newly released seeds. The survey result finding is in line with Adefris et al.,⁶ that confirmed that unavailability of quality seeds at the right place and time coupled with poor demonstration and promotion system, is one of the key factors accounting for the failure to exploit the potential of improved seeds utilization.⁷

Table 14 Main reason for using improved seed across Woreda

Worada	Main reason for using improved seed			Total
	Disease tolerance	Drought tolerance	Productivity	
Sodo zuria	0	0	15	15
Mareka	0	1	11	12
Kacha Birra	1	0	20	21
Total	1	1	46	48

Table 17 Major constraints you face in acquiring and utilization of improved crop seed

What are the main constraints you face in acquiring improved seed?						
Worada	No difference in productivity	Untimely supply	No supply on the required amount and type	Unaffordable price	No loan basis provision	Total
Sodo Zuria	0	2	1	11	5	19
Mareka	0	3	1	15	1	20
Kacha Birra	5	4	1	10	1	21
Total	5	9	3	36	7	60

Conclusions and recommendations

The survey result confirmed that there was variation in level of improved crop and forage seed technology utilization across districts and producers, increment in production of source seeds at research centers and improved participation of producers and other stakeholders in production and utilization of improved forage and crop seeds. In relation to climate variability and concurrent erratic rain fall, the extent of improved seeds disseminated and utilized showed different trends (increment, decrement and no change) in the two consecutive years across the study districts. The major sources of improved seed sources identified were government, market and farmers themselves for major crops produced in the districts. The interviewed sampled producers confirmed that the major challenge for not adopting and using improved seed were, farmers experience of reutilization of seeds, quality problem of seeds, Unaffordable price of seed, untimely supply of seeds, lack of seeds inform of credit, lack of difference in productivity in comparison to local seeds and packaging problem and lack of varieties demanded by producers. Therefore the study result recommended major agronomic activities improvement by awareness creation, undertaking more demonstration of improved seed packages, experience sharing promotion and improving access and quality seeds supplied for producers that believed to increase trend of improved crop seeds dissemination and utilization.

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Conflict of interest

The author declares there is no conflict of interest.

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