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Farmers Intuition on the promotion of Large-Scale Demonstration of Improved Teff Varieties in West Showa Zone Oromia Region, Ethiopia.

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Abstract

Teff is one of the most important cereal crops in Oromia region in general and in West Showa in particular. It serves as a source of both food and cash income. In order to achieve food security, a lot of attempts have been made by the government in Ethiopia over the last three decades to bring changes in agricultural production through pre scaling up of agricultural technologies among smallholder farmers. The objectives the study was to create smallholder farmer's awareness and knowledge, enhancing implementation of full packages of teff production technologies, exploring the perceptions towards and share best practices, experiences, and lessons learned from the large-scale demonstration of teff varieties. The Large-scale demonstration activity was carried out at Abuna Gindeberet and Gindeberet districts of West Showa zone Oromia region in six selected Kebeles. The sites were selected purposively based on the convenience of the area to the technologies, the potential area for teff production and accessibility for field monitoring and follow-ups. Finally, in Abuna Gindeberet, 122 farmers were selected to implement the LSD on 52 ha of land and in Gindeberet district 73 farmers were selected with 40 ha of land for the cluster activity. The recommended amount of fertilizers applied at the recommended stage for the development of the plant. The overall agronomic practices have been implemented as per recommendation. From the LSD of improved teff varieties in both districts average, the higher yield 21.5 qts/ha were gotten from Dagim variety and 18.5 qts/ha yield of Quncho variety were obtained in production year 2019. Farmers raised that improved teff varieties are better high yielder than local ones, more early maturity, better in terms of disease resistance, not lodge than the local, the grain straw are very strong and have the traits of white in color with high performance which are high price difference during marketing than the local one. Therefore, awareness creations, popularizing improved seeds, facilitating credit availability are the important point to improve production and productivity of farmers in the study districts.

Keywords: large scale demonstration; Quncho; Dagim; perception; productivity

1. Introduction:

In developing countries like Ethiopia, the agricultural sector is the most important sector in the economy that features strongly in the overarching economic policy of the country agricultural development led industrialization (ADLI). It serves as source of income and employment for the majority of the country's population. Currently, agriculture is contributing over 35.8 percent to the national GDP, almost 90 percent of export and 72.7 percent of employment (CIA, 2018). However, the production, productivity and efficiency status of the sector is well below world average. Mostly the farmers with the same resources are producing different per hectare output, because of management inefficiency inputs, limited use of modern agricultural technologies, obsolete farming techniques, poor complementary services such as extension, credit, marketing, and infrastructure; poor and biased agricultural policies in developing countries like as Ethiopia (ATA, 2016).

According to (CSA, 2018) Cereals are the major food crops both in terms of the area coverage and volume of production and accounts for 95 percent of agricultural production in Ethiopia and contributed 87.48 percent of the grain production. Of them, Teff (Eragrostis tef) is one of the most important and dominant staple cereal crops in Ethiopia. Cereal crops grown on 71% of the total area cultivated and about 61% of total

agricultural production shared CSA (2013). In addition, teff is the second most important cash crop next to coffee, which generates about 500 million USD per year for local farmers in Ethiopia (Minten *et.al*. 2013). Nutritionally, 100 grams of teff grains has 357 kcal, similar to that of wheat and rice (Cheng et.al. 2017). As the crop has high protein and amino-acid content and gluten-free and low on the glycemic index, which makes them suitable for people with type 2 diabetes, the recognition of teff has spurred global research interest by nutritionists and food scientists (FAO, 2015).

In Ethiopia, the main teff producing areas have been concentrated in the northwestern and central highlands of Ethiopia. Oromia region is the most important teff producing area in the country; and its share in total national production is estimated to be as high as 48 percent (Ibrahim *et.al*, 2018). According to the report of CSA, for the crop year of 4 2018/2019, from the total land allocated for cereal crops in Oromia region, teff stands in first by covering 29.46 percent of the total areas. In the production year, the total area covered by teff was 1.43 million hectares with a production of 2.56 million tonne and yield of 1.79 t/ha from 2.57 million holders (CSA, 2019). The average productivity was registered as 1.51 t/ha (CSA, 2017). Cereal crops sector in general and the teff producing in particular face serious challenges in Ethiopia. The most common challenges are lack of efficiency production system; climatic factors, improved varieties, production inputs, improved management practices, soil fertility management as well as weed and pest management (Fikadu *et.al.* 2019). Despite the aforementioned importance and area coverage, teff productivity is much less at national, regional and local levels due to factors like lack of high yielding cultivars, poor management practices and low input utilization (FAO, 2016). The average productivity of teff in Ethiopia is 1.75 t/ha at smallholder farmer level which is very low (CSA, 2019). However, through research and applying improved agricultural technologies, teff yield can be raised to 5 t/ha (Wassie, 2014).

Teff has a significant role on Ethiopian agriculture; food; and trade sectors. Major Ethiopian farmers rely on teff production because teff is their daily consumption. Therefore, Ethiopia has a great chance to assure food security by boosting teff production and exporting. With a numerous benefit (gluten free and high nutrition values); teff could be the next super-grain and Injera could be the next super-food in the worldwide. Despite of these facts; the productivity of teff is still lower due to spatial heterogeneity like climatic variability; technical inefficiency and other factors. Even though the Ethiopian government gives an attention for disseminating improved teff varieties; fertilizer and other modern agricultural technologies to small holder farmers; teff is untouched cereal crops to advocate its importance. There are limited comprehensive strategies for teff large scale production; adoption of farm implements at country level.

To improve the adoption of agricultural technologies, large-scale demonstration of improved teff varieties has been conducted by agricultural extension research process of Ambo agricultural Research Center in collaboration with Abuna Gindeberet and Gindeberet district office of agricultural and natural development which is one of the major teff growing areas in West Showa zone of Oromia region with the objectives of improving smallholder farmer' awareness and knowledge, enhancing implementation of full packages of teff production technologies, exploring the perceptions towards and to document and share best practices, experiences, and lessons learned from the large-scale demonstration of teff varieties.

2. Materials and Methods:

The Large-scale demonstration (LSD) activity was carried out at Abuna Gindeberet and Gindeberet districts of West Showa zone Oromia region in the production season 2019. The total selected kebeles from the two districts were six namely from Abuna Gindeberet: Yagot, Gitere and Chefe Hereri were selected and from Gindeberet: Bekebel'a, Haro berbedo and Damota were selected. The sites were selected purposively based on the convenience of the area to the technologies, the potential area for teff production and accessibility for field monitoring and follow-ups. Accordingly, the selection of PAs and participating farmers was carried in collaboration with district agricultural offices, Development Agents, and PAs leaders. The LSD participants were selected based on their willingness to contribute a land size of not less than 0.25 hectare, their willingness and interest and the ability to allot land for the intended purpose. Finally, in Abuna Gindeberet, 122 farmers were selected to implement the LSD on 52 ha of land and in Gindeberet district 73 farmers were selected with 40 ha of land for the cluster activity. The recommended amount of fertilizers applied at the recommended stage for the development of the plant. The overall agronomic practices have been implemented as per recommendation.

Trainings, exchange visit, leaflets and field days were the most approach used to popularize the teff varieties in the districts. Field day was arranged with collaboration of agriculture and natural resource office of respective districts. Before the field day organization, the activity and performance of the teff varieties were monitored and evaluated by Ambo agricultural research center Extension team at all levels.

2.1. Pre-Scaling Up Design:

All agricultural Input (seed, fertilizers DAP and UREA and others) supply was done by Ambo agricultural Research center. Improved teff (Quncho and Dagim) varieties were planted on clustered farmers selected lands. The improved seeds of teff varieties were incurred in advance from Ambo research center seed multiplication division and from Debrezeit Agricultural research Center. The varieties were treated with full recommended teff production packages (agronomic recommendations and practices). Row planting method and other crop management practices were used during the pre-scaling up activity.

2.2. Method of Data collection and Analysis:

Data such as total amount of inputs distributed for participants, total number of farmers in the training, field day, role of farmers and other stakeholders in technology dissemination, yield data and farmers perception towards the LSD were collected using checklists through interview and discussions. The collected data were entered into SPSS and analyzed using descriptive statistics and narrative.

3. Result and Discussion:

Teff is widely cultivated throughout Ethiopia as a staple cereal crop, which appears in everyone's dishes of everyday life. With a gluten free and high nutrition values; teff could be the next super-grain and Injera could be the next super-food in the globe. Teff productions in terms of cultivated area and number of producers are incredibly increases over the last several years. The agriculture cluster farming introduced in recent to increase the productivity of cereal crops; it aspires to gather farmers with pieces of land to farm together employing every means available to enhance their productivity, aims at transforming these clusters into commercial farms owned by the farmers themselves. The pre-scaling of improved teff (Kuncho and Dagim) varieties was conducted at Abuna Gindeberet and Gindeberet districts of West Showa zone. From the two districts sex PAs were selected based on the suitability of the area to the technologies, the potential area for teff production and accessibility for field monitoring and follow-ups. After selection of farmers held inputs used for the cluster was distributed for selected farmers and sown on totally 92 ha of land at both districts.

After selection of farmers, 13qts of improved seeds, 50 qts NPS and 50qts of UREA distributed for selected farmers in Abuna Gindeberete and 10 kg of seed, 40qts of NPS and 40qts UREA distributed in Gindeberet district. Totally 23qts of seed, 90qts of NPS and 90 qts of UREA distributed and sowing takes place on 92 ha of land covered by the improved teff varieties in the selected peasant associations in both districts (Table 1).

Districts	Input distribution in selected Districts/qts/			Land Covered/ha/
	Seed	NPS/DAP	UREA	
Abuna Gindeberet	13	50	50	52
Gindeberet	10	40	40	40
Total	**23**	**90**	**90**	**92**

Table 1: Input distribution in selected Districts
Source: from annual report

3.1. Training given for the technology users:

Training is one of the means by which farmers acquire new knowledge and skills and it is measured in terms of level of participation (Dawit, 2020). It is the components of capacity building and research-extension activities and given on the contents of improved teff production, agronomic practices, disease and pest management, as well as extension techniques and clustering approaches have been given by different multidisciplinary researchers from Ambo agricultural research center together with districts agricultural office.

Figure 1: D. As and Experts on training

Development agents, agricultural experts and farmers from selected district offices were involved in the training. Table 2 shows the number of farmers, development agents, district office of agriculture experts and other participants who attended training related with teff production and management before starting the activity.

Participants	Training given for stakeholders		
	Male	Female	Total
Farmers	165	36	201
Experts	21	2	23
Development Agents/D. A/	39	15	64
Total	**264**	**68**	**352**

Table 2: Participants from both districts on the given training.

3.2. Field days:

Field day is one of the extension methods used to convey information and creation awareness for larger clients and which bad and good practices evaluated on the field (Korji Dembi, *et al* (2020). Accordingly, field day was arranged on the selected peasant association in the Abuna Gendeberet and Gindeberet districts to share experiences among farmers participating on the event. Feedbacks given after observation were very important to deliver more technologies on farmer's field. During the occasion farmers, development agents, experts from agricultural offices and other stakeholders participated and pleased by observing the clustered varieties and they required for these technologies for father pre-scaling up activities. Alongside, further promotion of teff technologies the field day organized enhanced the linkage between research and agricultural offices as agricultural problems were raised and discussed by participants. A total of 511 farmers (373 male and 138 women) from Woreda agricultural offices and around 12 researchers were participated on field day (figure 2).

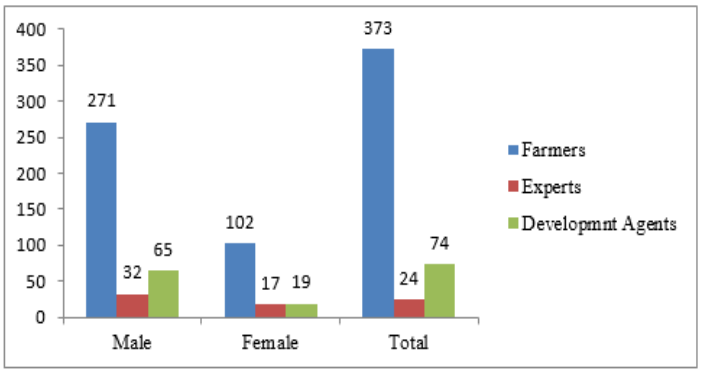

Figure 2: Summary of participants on field day

3.3. Yield performance of improved Teff varieties:

Yield performance has been measured on both clustered varieties using quadrant estimation method. Accordingly, the estimation per hectare across all selected PAs improved varieties had been better by far than the local varieties that the farmers used for several years back. From Table 3, below the LSD of improved teff varieties in the both districts in average the higher yield 21.5 qts/ha were gotten from Dagim variety and 18.5 qts/ha yield of Quncho variety were obtained in production year 2019. The highest yield of Dagim variety (approximately 22 qts/ha) was recorded in Abuna Gindeberet district and followed by 21 qts/ha in Gindeberet district from the same variety. In Abuna Gindberet 19 qts/ha of yield from Quncho variety and 18 qts/ha in Gindeberet District was recorded (District annual report 2019).

Varieties	**Yield performance from Abuna Gindeberet**		**Yield performance from Gindeberet**		**Total Average yield (qts/ha)**
	Total covered area(ha)	Average yield (qts/ha)	Total covered area(ha)	Average yield (qts/ha)	
Quncho	31.2	19	24	18	18.5
Dagim	20.8	22	16	21	21.5

Table 3: Yield performance of improved teff varieties in both districts
Source: Own computed data

3.4 Farmers and stakeholder's perception and Feedbacks

Farmer's perception on improved teff varieties were highlighted in this study by using checklist during the data collection. Some of the key issues raised by farmers during the field day were about the difference between the improved varieties compared with local variety which was common in the area. The agreements that the author used for perception of the farmers were mainly on yield, maturity level, tolerance to the diseases, lodge and grain straw of the improved teff varieties in the study area. Farmers raised that the clustered improved teff varieties are better high yielder than local ones, more early maturity observed, better in terms of disease resistance, not lodge than the local, the grain straw are very strong and have the traits of white in color with high performance which are high price difference during marketing than the local one.

Even if the advantages of the varieties are more for smallholder farmers in the area special those of clustered farmers, some other farmers are disheartened to accept the improved varieties because of reason such as demand more inputs, the lack of credit services, insect pest problem, lack of awareness and extension support on the technology. Therefore, the extension and research system have to look into these factors to give solution for the adoption of the improved varieties to enhance the production and productivity of smallholder farmers in both districts.

4. Conclusion and Recommendation:

The study was conducted in Abuna Gindeberet and Gindeberet districts of West Showa zone Oromia region to increase production and to evaluate the perception of beneficiaries towards of improved teff varieties in the rural community of the districts. Teff is the potential crop in the area and commonly used for home consumption as well as cash crop in generating income for farmers. Even though the widely cultivation of teff in the area, the production and productivity of the crop is very low. The case of low productivity was due to inaccessibility of improved varieties, lack of awareness, high price of inputs for production, lack of credit etc. By considering these factors, Ambo agricultural Research Center planned and conducted different operations like capacity building for farmers and other stakeholders, input distribution for pre scaling up activities, field day on demonstrated varieties and gathering information or need assessments of the farmers and stakeholders and perception were undertaken through pre scaling up among small holder farmers in both districts to solve the problem observed above.

Therefore, awareness creations, popularizing improved seeds, facilitating credit availability are the important point to improve production and productivity of farmers in the study districts.

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