

Pre-extension Demonstration of Improved Teff Variety (Dagim) at Ambo and Dandi Districts of West Shoa Zone, Oromia Region, Ethiopia

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Abstract: The activity was conducted for two consecutive years, 2019 and 2020 cropping season at Ambo and Dandi districts of West Showa Zone with the objective to evaluate for grain yield, yield related traits and farmers' perception or preference and the performance of improved teff variety along with recommended package. Sites were selected based on teff production potential of the area. Two districts and three PAs from each district and eighteen target farmers were purposively selected on the ground that they are the leading producer of teff in the area. Training was given for farmers, Development Agents and experts on production of improved teff technologies from site selection up to postharvest practices of improved teff variety. Quantitative data such as yield data was collected and analysed using SPSS, whereas farmers feedback were analysed qualitatively. Recommended seed and fertilizer rate were used for the demonstration trial establishment. According to the result of Dagim variety, mean grain yield 18.79 qt/he and 25.51 qt/he were recorded in Ambo and dendi districts respectively. Thus, Dagim variety is recommended for further scaling up activities at Ambo and Dendi districts taking into consideration of its productivity. Farmers of those areas should use the variety in order to increase their teff production and enhance their income from teff.

Keywords: Demonstration, Teff, Yield, Dagim Variety

1. Introduction

Agriculture contributes 34.1% to the GDP, employs some 79% of the population, accounts for 79% of foreign earnings, and is the major sources of raw material and capital for investment and market [15]. More than 80% of the Ethiopian population earns their livelihood from crop cultivation and livestock rearing activities. Crop production is a major contributor to Gross Domestic Product from the sub sectors of agriculture. Among the crops, coffee, pulses, oilseeds, potatoes, sugarcane, vegetables and cereals are principal crops grown in Ethiopia [9]. As a result, teff is the most important cereal crop in terms of both production and consumption in Ethiopia [1].

Cereals are the major food crops both in terms of the area coverage and volume of production and accounts for 95% of

agricultural production in Ethiopia and contributed 86.68% of the grain production [6]. Maize, wheat, and teff are the most important cereals in terms of volume, accounting for a total of 77% of all cereal production [2], while maize, teff, wheat and sorghum have made 26.80%, 16.76%, 15.81% and 16.20% of the grain production respectively [5]. From the cereal crops, Teff is the most preferred staple food by majority of the Ethiopian population and its center of origin is in Ethiopia. Teff has high energy, phosphorus, and calcium and iron contents [8]. Moreover, the economic contribution of teff indicates that real Teff output on average accounted for 6.1% of the real GDP, while growth in real Teff output accounted for 6.4% of the total growth in real GDP i.e., 0.67% of the 10.7 percent growth in real GDP [7].

Teff (*Eragrostis tef*) is endemic to Ethiopia and its major diversity is found only in that country. It is a nutritious small

grained cereal, related to millet, there is no doubt that it is a very ancient crop in Ethiopia and domesticated by Ethiopian farmers between 3 and 6 millennia ago [10]. Teff is produced in five regions of Ethiopia in Tigray, Amhara, Oromia, SNNPR, and Benishangul Gumuz. However, grown mainly in Amhara and Oromia. It is reported that these two regions produced along about 85% of the total cultivation land of teff and 87% of production share of teff in the country during 2014/2015 production year [5].

Ecologically, teff is adapted crop in the diverse agro-ecological areas of Ethiopia and grows well under stress environments better than wheat, barley and other cereals known world-wide [11]. It tolerates low moisture conditions and often considered as a rescue crop that survives and grows well in the season when early planted crops fail due to moisture stress. Because of this, it is said to be a "low-risk" crop for farmers [3].

In Ethiopia, teff is traditionally grown as a cereal crop. The grain is ground to flour, which is mainly used for making *enjera*, make local alcoholic drinks called *Tela* and *Katikala* and sometimes for making porridge. The waste product of teff called straw, besides being the most important feed for cattle and also used to reinforce mud for construction of house purpose [12]. Teff has both cultural and economic value for Ethiopian farmers. In recent days, it is among the cash crops and has been attracting an export market due to its nutritional value and owing to its high mineral content, has started to be used in mixtures with soybean, chickpea and other grains in the baby food industry [4].

In West Showa, teff is the main crop produced by the majority of smallholder farmers. Usually, the crop is sown in this area early July up to end of this month and November - December harvested. The crop is produced for both household consumption and cash crop. In this area the straw of teff is also used for construction of house and used as the main feed resource for cattle. Despite the yield of the crop is low in the area of West Shoa Zone due to lack of improved seed and low application of the recommended packages of teff. To over-come these problems demonstration of improved teff variety was initiated.

To this end, in 2019-2020 production seasons, participatory variety selection trial was conducted in the West Showa zone, Ambo and Dendi Districts Ethiopia, using newly released teff variety called Dagim and well-known local teff variety. Therefore, this study was proposed with an objectives of demonstrating and promoting improved variety of teff, evaluating the performance of improved teff variety along with management practices under farmers' perception and to enhance awareness of farmers about newly released teff variety in the study area.

2. Material and Methods

2.1. Description of the Study Areas

The demonstration was conducted at Ambo and Dandi districts of West Shoa Zone for two consecutive cropping

seasons. Ambo district is one of West Shoa Zone districts a distance 120 km from Addis Ababa and capital city of the zone. Ambo District is found in altitude 2106 m.a.s.l and (8°59' N latitude and 37°51' E longitude). The temperature of the district ranges from 11 to 26°C with average annual rainfall of 1012 mm/year and major soil type of the District is Verti (silt) soil with Black color.

Dendi is one of district part of the West Shoa Zone. The annual rainfall of district 1078mm/year and altitude 2278 m.a.s.l. It has a mean maximum and minimum temperature ranges of 10°C and 24°C respectively. Major areas of district soil type Vertisol/silt soil with deep black and certain areas brown color [13].

2.2. Site and Farmers Selection

Two districts and three PAs from each district and eighteen target farmers were purposively selected on the ground that they are the leading producer of teff in the area. Three PAs from Ambo district and three PAs from Dendi were selected based on their production potential. Farmer's research and extension group (FREG) approach was followed to select farmers and group under trial farmers.

A total of 2 FREG's were organized having 22 male and 4 female members. Among the FREG member a total of eighteen (18) interested trial farmers were selected in both districts. The trial farmers were selected based on their willingness to contribute a land size of 2500 m² per variety. Packaged production technologies (seed rate, seed treatment, spacing, fertilizer management and weed management) recommended for teff production were used. Plots were kept free of weeds.

Table 1. Demonstration site, farmers and plot size.

District	Peasant Association (PA)	Number of selected HHs	Area (he)
Ambo	Amaro	3	4.5
	Bayo korbi	3	
	Gosu kora	3	
	Faji Gelila	3	
Dendi	Yubdo	3	4.5
	Lokloka	3	
	Total	18	

Source: Own data 2020.

2.3. Planting Materials and Design Used

One newly released and adaptable teff varieties (Dagim vs Local) were used. Planting materials (Seed) were acquired in advance from Debrezeit Agricultural Research Center and local variety from selected farmers in the study area. The land used for two varieties were total gross area (block) 2500m² for each farmer; 50x50m plot length, row spacing 0.2m and 1m spacing between plots.

2.4. Data Collection

Grain yield, Farmers' feedbacks and costs and income gained involved were collected [14]. The grain and economic data were collected using data collection sheets. The

feedbacks were collected using checklist by conducting group discussions and key informant interviews. Regular follow-up and interaction with farmers, personnel interview, observation and farmers' preference were used to collect the data.

Variety preference ranking: The variety preference ranking was conducted using group discussions. The farmers were let to observe and set selection criteria at the maturity stage of the crop. The selected criteria were then used to select the preferred variety.

Data analysis Method: Descriptive statistics were used to analyze the yield data. Pair wise ranking was used for traits of demonstrated varieties and simple ranking method was used to compare varieties.

3. Results and Discussion

3.1. Yield Performance of Demonstrated Technology

Dagim variety with local check was demonstrated at six (6) Kebeles of two Districts checked for two consecutive years. Single plot design (50x50m) was used, 25 kg/ha, 100kg/ha and 100kg/ha used Seed, NPS and Urea respectively. The result of teff variety demonstration revealed that, the newly released Dagim variety performed better than the standard check local variety at all demonstration sites. Accordingly, Dagim variety gave higher yield (18.79 qt/he in Ambo District and 25.51 qt/he at Dendi district than local variety which gave an average 14.86 in Ambo and 14.81qt/he at Dendi district.

Table 2. Main grain yield.

Variety	Ambo	Dendi	Overall mean
Dagim	18.79	25.51	18.79
Local Check	14.86	15.88	14.81

Source: Own data 2020.

Yield data per plot accepted by targeted farmers. At the side of yield data, as preference of farmers' Dagim variety higher yield than local check by early maturity and very white in color. Dagim variety was preferred by farmers' because of, the cane has strong and more straw than locally and very white in color this is also best for attracting beneficiary and increase demand of teff its quality, very white in color increase the demands and increase income of farmers than other variety of teff. In Ethiopia in general and in most areas of West Shoa zone specifically white teff (locally called Magna teff) injera also used for holidays and occasions.

3.2. Capacity Development

3.2.1. Training

Table 3 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. Totally 26 participants attended the training.

Table 3. Number of participated trainings.

Issue of training	Number of participants		
		M	F
Teff production and managements	Farmers	11	7
	Development agents	3	1
	Experts	2	2
	Total	16	10

Source: Own data 2020.

Training was given for participating farmers, DAs and Agricultural experts on the agronomic practices of teff and opportunities of demonstration improved teff variety. Follow up; technical support and super vision were done. And, evaluate periodically the performance of improved newly released variety by method of Participatory technology evaluation. Field day was conducted at both Districts. So that, results and information about teff demonstration was communicated among participating farmers from all targeted kebeles. During the perception of farmers, DAs, agricultural office experts and other stakeholders were very satisfied by observing the demonstrated Dagim variety as compared to local variety and raise their demanded for these technologies furthers pre-scaling up and scaling up activities. Beside demonstration of these tef technologies observation was enhanced the linkage between research center and agricultural offices as many agricultural problems.



Figure 1. Field day conducted at Dandi district, Lokloka Aba kebele.

Teff is multipurpose crop in West Shoa Zone as household consumption, as cash crop and the straw is used for construction house with making mud and best feed for cattle. Finally, motivation and attracting of farmers high to expand and produce Dagim teff improved variety.

3.2.2. Farmers' Preference on Demonstration

Farmers' preferences are most key elements for technology varieties selection and expanded. On this demonstration, higher yield of teff variety (Dagim) increases their motivation to grow recommended and improved teff variety. Participants of farmers raised their preference used by the below criteria:-

Table 4. Rank of the varieties based on farmers' selection criteria.

Preference	Dagim	Local check
Yield	High	Lower
Maturity	Early	Late
Tolerance to disease	Tolerate	Not at all tolerant
Lodge	Not lodge	At some place lodge
Grain color	Very white	Mixed
Straw	Strong and more straw	Few straw

Source: Own data 2020.

4. Conclusion and Recommendations

This demonstration was conducted at Ambo and Dendi districts of west Showa zone in 2019 and 2020 cropping seasons. The results indicated that the demonstrated variety gave promising yield having an average 18.79% yield advantage over farmers' variety. Moreover, the variety is profitable with an average return greater than the check in two production season. In terms of farmer's preference, Dagim variety was selected as first choice by the participating farmers based different level of agreements and got acceptance than local variety due to high yielder, early mature and very white in color. Therefore, *Dagim* is recommended for further scaling up to increases teff production and productivity in the area. Farmers of those areas should use the improved variety in order to increases their teff production and enhance their income from teff.

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