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Research Article

Large-Scale Demonstration of Improved Teff Varieties in Oda Bultum and Chiro Districts, West Hararghe, Ethiopia

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Abstract: This activity was conducted during the 2024 cropping season to promote improved teff varieties Bishoftu and Dagem in the Oda Bultum and Chiro districts of West Hararghe Zone, Ethiopia. The research activity aimed to enhance farmers' knowledge of improved technologies, increase teff productivity, and create demand for high-yielding teff varieties. 12 hectares were used for the demonstration, 8 hectares for the Bishoftu variety in Oda Bultum district, and 4 hectares for the Dagem tef variety in Chiro district. The Results indicated that Bishoftu and Dagem significantly outperformed to local varieties, yielding 27.5 and 26.3 quintals per hectare, respectively, compared to 15.4 and 13.2 quintals for local teff. Field days engaged 469 participants, including farmers, experts, and administrators, and feedback highlighted improved traits such as yield, tillering, seed color, and disease resistance. The demonstration helps to increase awareness and demand for improved varieties. The concerned body should further scale up the coverage of Bishoftu and Dagem teff varieties to similar agro-ecological areas.

Keywords: Tef varieties, Yield, Demonstration, scaling up.

Introduction

Teff (Eragrostis tef), a warm-season annual cereal, is one of the underutilized crops that can contribute to food security and crop diversification. Teff contains high and unique nutritional values, which will meet the need of health-conscious consumers. It is also a low risk crop, which resists many biotic and abiotic stresses [1]. Currently, Ethiopia is the largest teff producing country, and the only country to have adopted teff as a staple crop [2]. However, the teff production and value chain in Ethiopia largely rely on traditional practices, and the teff market is limited by the government's export ban. Instead, other countries such as USA are increasingly participating in the teff market [2].

In Ethiopia, teff is a major staple. It is the most important crop in terms of cultivation area and production value [3]. In 2017, teff accounted for about 24% of the nationwide grain-cultivated area, and nearly half of the smallholder farmers grew it between 2004 and 2014[3]. For dietary requirements, the country relies on teff for two-thirds of the daily protein intake and 11% of the per capita caloric intake [3,4]

The most common utilization of teff in Ethiopia is the fermented flatbread called injera described this traditional flatbread as a soft, thin pancake with a sour taste. The most preferred form of the injera is one made from pure teff flour [5]. Injera mixed with other flour such as wheat or sorghum is considered inferior. Other utilizations of teff include local alcowwholic beverages called tela and katikala, and porridge [3].

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Additionally, teff plant residues could be used as fodder for livestock, and often incorporated as construction materials [6].

Teff is an economically superior commodity in Ethiopia. It often commands a market price two to three times higher than maize, the commodity with the largest production volume in the country [4], thus making teff an important cash crop for producers [7,8]. Due to the high price, the urban affluent consumers consume relatively more teff than the rural poor [9]. Studies estimate that annual urban consumption of teff was 61 kg per capita on average whereas 20 kg for rural [9]. Outside Ethiopia, global consumers following the super-food wave are willing to pay premiums for teff [7]. Various teff-based products are developed to capture the premium market in the form of bread, porridge, muffin, biscuit, cake, casserole and pudding. The crops' potential is also explored as a thickener for soup, stew, gravy and baby food [10]

35% of teff producers adopted improved teff seeds in 2012, compared to 7% in 2002. Although increased over the decade [7]. In terms of production, at national level, average yield of teff was 17.48 quintals per hectare (CSA, 2017/18). On the other hand, improved varieties of teff can produce more than 24 qt/ha [11].

According to WHOA, in the west Harerghe zone, around 16,610.5 ha of land is cultivated for teff production, but only 5% of the total cultivated land is covered by improved Seed. This figure shows that there is a lack of teff extension service and other potential factors for the lowest adaptation in the area.

So far, improved teff varieties have been tested for their adaptability by CNSRTC, but outreach efforts are still pending. Therefore, this activity was intended to increase awareness among the farming community and enhance the utilization of improved teff varieties in West Harerghe.

Objectives

1. To improve farmers' knowledge and skill in applying improved teff production technologies.
2. To create wider demand pull by reaching a large number of users.
3. To increase teff productivity by replacing traditional varieties with improved, high-yielding types.

Materials and Methods

This research activity was conducted during the 2024 cropping season in the Oda Bultum and Chiro districts of the West Hararghe Zone. Bishoftu and Dagem, was selected for demonstration for advantageous agronomic characteristics.

Totally, 12 hectares were used for the demonstration, from this, 8 hectares for the Bishoftu variety in Oda Bultum district and 4 hectares for the Dagem variety in Chiro district. The Site selection was conducted based on factors such as accessibility, farmer willingness, and agroecological representativeness. The Local farmers, development agents (DAs), and experts from zonal and district agricultural offices were involved throughout the implementation process.

All essential inputs were delivered to selected farmers in both districts, such as improved seed, fertilizers, training and technical guidance. Training sessions were held on key agronomic practices such as land preparation, seed rate and sowing, fertilizer application, and integrated pest and disease management. Additionally, DAs and field experts received training to ensure continuous support throughout the production cycle

Based on the recommendation, 15 kg/ha of seed was used. 158 kg/ha NPS and 65.2 kg/ha UREA were used for demonstration. Overall, the materials and methods were designed to reflect typical farming conditions while integrating scientifically validated approaches. This ensured that the demonstration was both practical for local farmers and informative for extension agents. Simple descriptive statistics (Percentage and average yield) were used to compare the yield and yield advantages of improved variety over local varieties

Results and Discussion

1. Yield and Yield Advantage of Improved Varieties

The table presents below indicates yield data for Bishoftu and Chiro varieties of a teff across two districts Oda Bultum and Chiro. The improved varieties (Bishoftu and Dagem) significantly outperform the local varieties in both districts.

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Similarly, Bishoftu variety showed a positive and significant yield advantage and potential in all the locations [12]. The improved teff varieties, Bishoftu and Dagem, are likely to significantly outperform local varieties in both districts, as evidenced by similar studies on improved crop varieties. Improved varieties generally show higher yields and better adaptability to local conditions, which is a consistent finding across various crops and regions [13]. For example, the demonstration shows that Bishoftu yields 77% more than the local variety in Oda Bultum (27.5 vs 15.5 Q/ha).

Dagem yields 62% more than the local variety in Chiro (26.3 vs 16.2 Q/ha). Other Study shows that performed better than the two check and other test genotypes. Thus, Dagim was identified and released as best promising tef variety for production in the country [14]. Despite the higher yield, improved varieties are grown on a very small area in the districts compared to thousands of hectares under local varieties. Improved crop varieties often demonstrate higher yields compared to local varieties [15]. This indicates limited adoption or access to improved teff seeds in the study area.

Table 1: Improved crop varieties demonstration

Sn	District	Variety	Area coverage (ha)	Average Yield (Q/ha)
1	Oda Bultum	Bishoftu	6	27.5
2	Chiro	Dagem	3	26.3
3	Oda Bultum	Local	2721.5	15.4
4	Chiro	Local	631	13.2

2. Participants and Farmer Feedback

A diverse group of stakeholders participated in the field day; A total of 469 participants were involved in the event, including farmers, researchers, development agents, and representatives from administrative and academic institutions. The distribution is summarized below:

Table 2: Group of stakeholders participated in the field day

Participant	Female	Male	Total
Farmers	70	359	429
Researchers	3	11	14
Zone & District Administration	1	2	3
Zone & District Agricultural experts	2	15	17
University	0	2	2
DAs	0	4	4
Total	76	393	469

According to the farmers' opinion, the demonstrated improved varieties are better than local varieties in both districts on different parameters such as yield, tillering, whiteness in color, good biomass, and past disease resistance, whereas local varieties are weak in all the above parameters. Various stakeholders, including farmers, researchers, development agents, and administrative officials, exchanged knowledge with each other. Farmers' demands for new varieties were increased in both districts for both varieties. The event was reported by OBN TV.

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Figure 1: Field Day at Oda Bultum District Kara Village.

Conclusions

The feedback from participating farmers and stakeholders was positive regarding both varieties. Key attributes highlighted include yield, disease resistance, high tillering capacity, white seed color, and excellent biomass production, the yield per hectare significantly outperforming that of local varieties.

The large-scale demonstration of the Bishoftu teff variety in the Oda Bultum and Dagem in Chiro districts in 2024 showcased significant advantages compared to local varieties. These new varieties displayed exceptional agronomic traits, particularly in terms of yield and disease resistance, color, and tillering capacity. Additionally, the demonstration served as an effective platform for engaging stakeholders and sharing knowledge, supported by media outreach and collaboration with institutions.

Recommendations

Agricultural extension agents should use the created demand as a starting point to scale up to other similar agro ecological areas. Both varieties have significant potential to boost teff production and productivity.

Concerned, stakeholders should take advantage of the opportunity to support seed distribution, farmer training, and access to markets or inputs.

The zone and district administrations should extend demonstrations to other districts and villages.

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