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Original Paper

Pre-scaling up of Improved Tef Variety in Chora District of Buno Bedele Zone Southwestern Oromia, Ethiopia

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***Abstract*— Pre-scaling up of improved Dursi variety was carried out in Chora district of Buno Bedele zone Southwestern Ethiopia with the objectives to popularize improved Dursi tef variety, to create wider demand towards improved Dursi tef variety and strength stakeholders' linkage in the study area. The variety was scaled up on ten farmers' fields those predominantly selected in collaboration with respective three kebeles' Development Agents based on farmers' willingness to provide the required land size. The land size of 25 m x 25 m was used where all the recommended agronomic practice like seed rate, fertilizer rate and weed control method were used for the accomplishment of the activity. Training was provided to Dursi growers, development agents and woreda agricultural experts to facilitate further production and dissemination of the variety. Data like number of participants on the training and yield data were recorded and analyzed using simple descriptive statistics. The result revealed that, about 124 (104 male and 20 female) participants were participated on the training. The mean grain yield of 1790 kg ha-1 was obtained which is greater than yield obtained during demonstration trial. Therefore, Dursi variety was recommended for further dissemination across numerous tef producers in the study area and similar agro ecologies.**

Keywords*— *Improved variety, Popularization, Pre-scaling up, TEF, Training and yield

I. INTRODUCTION

Globally, sustainable agriculture is viewed as one of the long-term strategic economic development approaches for inclusive growth [1]. Renovating agricultural production and productivity through improved originated and adapted crops is the nationwide first priority to feed the ever growing human population. Tef is an endemic crop to Ethiopia and a daily staple food for about 70% of the people in the country [2]. In the 2019/20 production season, 7.2 million farming households grew tef on 3.1 million ha of land. Tef shows great diversity in terms of yielding ability, adaptability to a range of environments and tolerance to biotic and abiotic stresses. As a result, it is favored by Ethiopian farmers Bayable, Tsunekawa, Haregeweyn, Alemayehu, Tsuji, Tsubo, Adgo, Tassew, Ishii and Asaregew [3] and considered a low-risk crop against stresses and postharvest storage losses [4]. Tef straw is used as animal feed, means of income and mad plaster while house construction.

Despite tef importance as food, feed and means of income for almost all Ethiopian smallholder farmers in general and Oromia regional state in particular, both the total production and productivity of tef is relatively low. The main contributing factor to the low productivity of tef is attributed primarily to tef growers low access to improved technology coupled with low adoption of full package recommended practices [5]. The finding of Ijara [6] also confirmed that, the low tef yield is attributed to low adoption of research outputs by the farmers, low yielding ability of landraces, and the susceptibility of the crop to lodging.

In Ethiopia, so many efforts have been made to overcome the low availability of improved tef varieties and its low adoption rate by stallholder farmers. Tef research program at Debre Zeit Agricultural Research Center in collaboration with other research centers has released more than 54 improved tef varieties and a number of recommendations for different agro ecology of Ethiopia [7]. However, in the 2020 growing season, more than 93% of the tef crop was grown from local or farm-saved seeds in the country [8].

The poor adoption of improved tef varieties by smallholder farmers could be due to one of the two reasons; (1) passive farmer's engagement while varietal development or (2) low popularization and dissemination of the released varieties (inconvenience of extension approach). It is pre-scaling-up activity that enhances the adoption and dissemination of agricultural technologies to the wider areas. Therefore, this activity was conducted with the intention to popularize improved Dursi tef variety, create wider demand towards the variety and to strength stakeholders' linkage in the study district.

II. Materials And Methods

A. Description of the Study Area

The per-scaling-up activity was conducted in Chora district of Buno Bedele zone in 2022 main rainy season (Fig.1). The district is bordered on the south by Setema, on the west by Yayo and Dorani, on the north by Dega, and on the east by Bedele. The administrative center of the district is Kumbabe and located 519 km away from Addis Ababa and 36 km from Bedele town. The district is located at an average elevation of 2000 m a.s.l and located at 8°13'33.7" to 8°33'55.0" N (latitude) and 35°59'59.7" to 36°15'15.8" E (longitude). It is generally characterized by warm climate with a mean annual maximum temperature of 25.5°C and a mean annual minimum temperature of 12.5°C. The average annual rainfall is 1440 mm. The dominant soil is Nitisoils. The dominant livelihood activity is the mixed cropping system which is livestock raring and crop production particularly coffee, tef, maize, sorghum, wheat and haricot bean.

B. Site and Farmers Selection

The district was selected purposively due to tef production potential and the consecutive conducted tef adaptation and demonstration trials in the district. From the district three potential kebeles were selected by considering road accessibility and ten experiment hosting farmers were selected by considering their willingness to participate in the activity, share experience and their gender disaggregation.

C. Materials and Research Design

The land size of 25 m x 25 m was used for the accomplishment the trial. All agricultural inputs like seed and both NPS and Urea fertilizers were provided by Bedele Agricultural Research Center whereas all activity management from land preparation to harvesting and threshing were carried out by hosting farmers. Dursi variety was sown by broadcasting with the seed rate of 25 kg ha-1. NPS fertilizer was applied at the rate of 100 kg ha-1 at planting time and Urea with the rate of 100 kg ha-1 was applied at vegetative stage.

D. Technology Promotion Events

Technology promotion is about catalyzing further dissemination of new technologies to farmers and other stakeholders. Training is the commonly used technology promotion events with the intension of creating wider demand and stakeholders' linkage. Accordingly, the training was provided for development agents, subject matter specialists (SMS) and farmers on improved Dursi tef variety production, the importance of scaling up and method of dissemination.

E. Data Collected and Method of Analysis

Both quantitative and qualitative data were collected. The collected quantitative data like yield, number of participants on the training and field day and qualitative data such as farmers, stakeholders' feedback and field observation were subjected to analysis using SPSS software version 20. The quantitative data was analyzed using simple descriptive statistics (mean and standard deviation) while qualitative data was narrated.

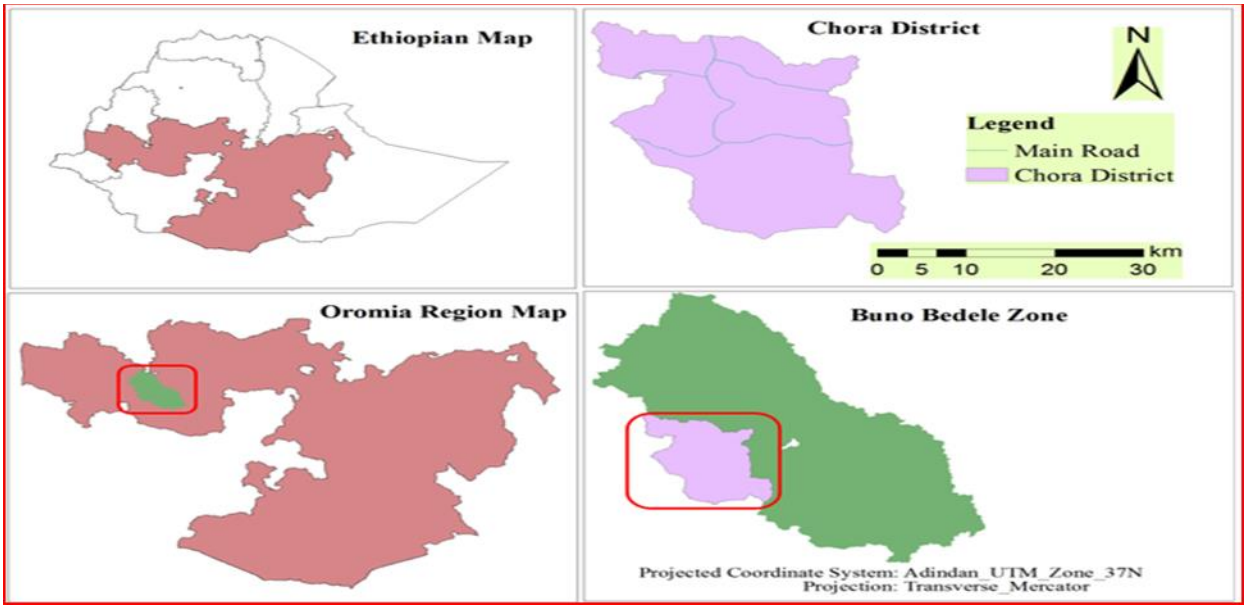

Fig. 1. Map of Chora district

III. Results And Discussion

A. Yield Performance

Using all the recommended agronomic practices for Dursi variety; the mean grain yield of 1787.3 Kg ha-1 was obtained which is greater than 1210 Kg ha-1 yield obtained during demonstration trial. Likewise, the present result was almost similar to the average tef yield obtained (1850 Kg ha-1) in Buno Bedele zone in the same cropping season. The mean grain yield deviation might be due to high soil acidity and other yield limiting factors. Yet, the mean yield obtained in Shengala kebele was somewhat greater than that of Tulu Mute and Ale Debeso kebeles of Chora district (Fig. 2).

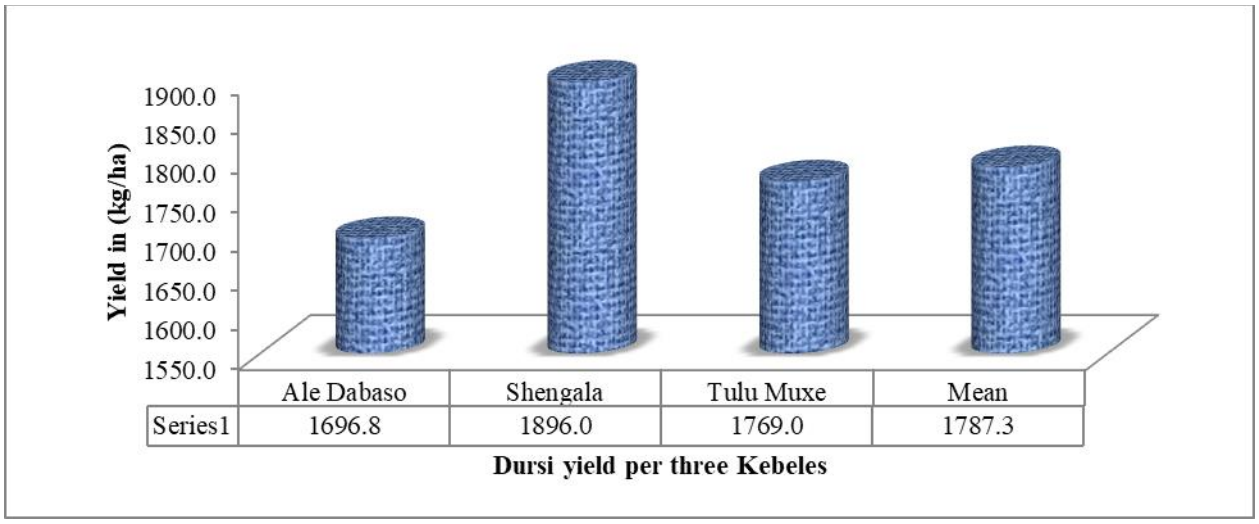

Fig. 2 Yield performance of Dursi variety across the three Kebeles of Chora district

B. Training Participants

Multidisciplinary researchers of Bedele agricultural research center provided the training to farmers, DAs and woreda agricultural experts on the thematic areas of recommended agronomic practices, importance of scaling up improved Dursi variety and its dissemination methods. Accordingly, about 124 (102 male and 20 female) participants had received the training (Table I). This training participant figure indicated that, more proportion of male farmers were participated on the training compared to female farmers and this might be affect further dissemination of Dursi variety.

TABLE 2. TRAINING PARTICIPANTS

Participant categories	Sex of the participants		
	Male	Female	Total
Farmers	94	13	107
Das	4	5	9
District Experts	6	2	8
Total	**104**	**20**	**124**

Source: Own computation 2022

C. Feedbacks from Training Participants

At the end of the training the trainees were observed the sampled Dursi variety scaling up fields and raised a number of feedbacks that enhance future dissemination. Accordingly; the participants stated some importance of the variety like disease tolerance, a number of productive tillers, high yield, high straw used for animal feed and mud plaster during house construction.

D. Exit Strategy

Sustainable agricultural transformation that aimed to improve the livelihood of resource poor farmers' requires strong institutional linkages of relevant stakeholders engaged in agriculture. The mandate and scope of Bedele Agricultural Research center is technology generation, adaptation and demand creation through demonstration and pre-scaling activities across the limited farmers' fields. Pre-scaling-up of improved technology is the termination point for the sequential research activities conducted on the farmers' field under researcher management on one hand and a best foundation for further improved technology dissemination by woreda agricultural offices on the other.

To this end, researchers from different department of Bedele Agricultural Research Center were prepared and distributed the training manual and leaflets to the concerned stakeholders for better dissemination of Dursi variety. Hence, further dissemination of Dursi variety across tef producers in the district requires the involvement of woreda agricultural offices and other agriculture supporting sectors in Bono Bedele zone.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Pre-scaling up of tef (Dursi variety) was undertaken at Chora district on ten farmers' field selected in three potential kebeles. The study findings showed that improved Dursi variety had a good performance in grain yield of 1787.3 Kg ha-1 compared with previous demonstration activity. This created greater awareness and motivated host farmers to adopt and disseminate the improved Dursi variety. These scaling up trails also enhance the relationship and confidence between farmers, extension workers, and researchers.

B. Recommendations

It is concluded that the pre-scaling up is a successful tool in enhancing the production and productivity of tef through improving farmers' attitude through strong linkage between famers, extension workers and researchers. Hence, Woreda Agricultural Office should further disseminate and scale-out Dursi variety to a large number of farmers in similar agro-ecologies. Cooperatives or organized farmers group should also be formed to continuously and consistently multiply and supply the seed of this variety so as to sustainable seed supply.

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DECLARITION OF COMPETING INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this research activity.

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