

Full Length Research Paper

Enhancement of tef production through popularization of improved Quncho tef variety at Northwestern Zone of Tigray, Ethiopia

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Tef [*Eragrostis tef* (Zucc.) Trotter] is a cereal crop resilient to adverse climatic conditions. Tef is the most important crop that serves as human food and has a great contribution to food security in Ethiopia, but grain yields are low. Towards enhancing the production and productivity of the tef, the government and non-governmental bodies is therefore promoting the adoption of improved varieties, fertilizers and improved practices. This study was conducted with the aim of enhancing tef production through popularizing the improved Quncho tef variety. The study was executed at three tef growing districts of northwestern Tigray, Ethiopia. A total of 222 farming households who are the safety net program beneficiaries were included in the study. An average grain yield of 1.43 and 1.05 ton/ha was obtained from Quncho and local tef varieties, respectively. This indicates Quncho tef gave 36/% yield advantage over the local tef variety. This will have a significant contribution to the efforts towards improving food security of the farm households. Moreover, Quncho tef were selected by the farmers in attributes like, tillering ability, spike length, biomass yield, seed color, market preference and grain yield as compared to the local one. Therefore, it is recommended that, the agriculture and rural development office of the respective districts and other stakeholders should further scaled out Quncho tef variety to large number farmers of the study areas.

Key words: Farmers perception, popularization, Quncho tef, *Eragrostis tef*, Tigray, Ethiopia.

INTRODUCTION

Tef [*Eragrostis tef* (Zucc) Trotter] is a cereal crop that belongs to the family Poaceae. Tef is indigenous to Ethiopia (Seyfu, 1991; National Research Council, 1996). According to Ponti (1978) the history of tef cultivation goes back to 6000 years. Tef is grown under diverse agro-climatic zones. It can thrive well in both waterlogged as well as drought condition (Assefa et al., 2010). Tef in

Ethiopia is cultivated in about 3.01 million hectare and accounts for 29.5% of the area allocated for cereals and 19.7% of gross cereal production (CSA, 2017).

Tef is primarily grown in Ethiopia as human food. However, its straw is highly valuable which is highly preferable by cattle and its price was higher than the straw of other cereals (Ketema, 1997).

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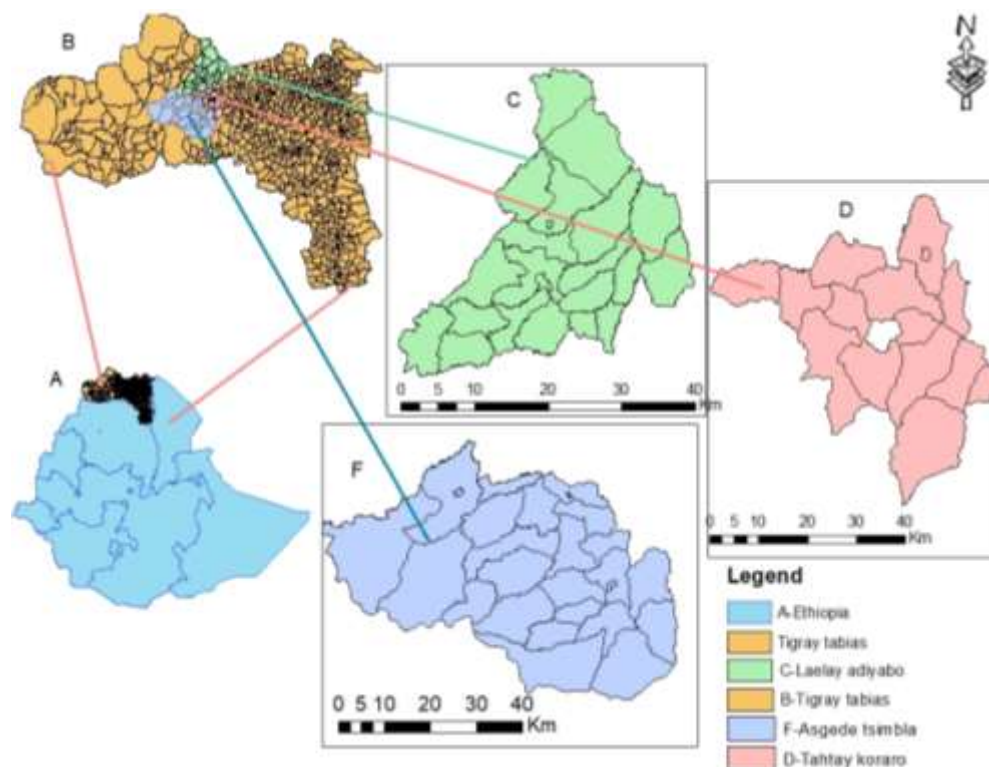


Figure 1. Map of the study area.

Tef is Ethiopia's most important staple crop. Tef has the largest value in terms of both production and consumption in Ethiopia and the value of the commercial surplus of tef is second followed by coffee (Minten et al., 2013).

It would seem that because of its superior nutritional qualities, tef would be available to all persons in Ethiopia to make Enjera. Tef with 11% of protein is an excellent source of essential amino acids, especially lysine (the amino acid that is most often deficient in grains) (Ayalew et al., 2011). Tef grain is rich in iron, calcium, and fiber and the grains are low on the glycemic index, which makes them suitable for people and the grain is also gluten-free (FAO, 2015).

However, despite its importance in Ethiopia, tef yields are low. In the production year of 2016/2017, the average tef grain yield 1.66 tons per hectare is low compared to other cereals, such as maize (3.67 t/ha), sorghum and wheat (2.52 and 2.67 t/ha) (CSA, 2017). This low yield of tef is mainly attributed to lodging, moisture stress, shattering, and poor pre- and post-harvest agronomic management and low modern inputs use (Assefa et al., 2011; Fufa et al., 2011).

However farmers using improved cultivars and management practices, can obtain yields up to 2.5 t/ha (Tefera and Belay, 2006), while the yield potential of tef under optimal management can give up to 4.6 t/ha (Teklu and Tefera, 2005).

Tigray specifically northwestern zone is among the potential tef producing areas. But, due to lack of improved technologies and management practices, tef production remained low. To improve tef production in the area, Quncho tef variety which was released in 2006 (MoARD, 2008) was introduced via Shire-Maytsebri Agricultural Research Center in collaboration with different research centers and projects. Thus, the study was aimed at boosting production and productivity of tef through popularization of Quncho tef variety and to collect the farmers perception towards the variety.

METHODS AND APPROACHES

Location of the study area

Quncho tef variety popularization was conducted at three potential tef producing districts of Northwestern Tigray, Ethiopia. A total of seven Kebelles/villages were included in the study based on their potential for growing tef. The study was executed in 2012/13 at Tahtay Koraro, Asgede Tsimbla and Laelay Adyabo districts. Farming system of the study area is mixed farming, mostly crop and livestock production.

Asgede Tsimbla is found at 13° 73'N to 14° 21'N and 37° 59'E to 38° 31'E. The district has 25 to 35°C of temperature and 500 to 900 mm annual rainfall. Laelay Adyabo district is located at 14° 08'N to 14° 69'N and 37° 89'E to 38° 46'E and annual rainfall is 605 to 1370 mm. While Tahtay Koraro district is found at 13° 9'N to 14° 27'N and 38° 05'E to 38° 45'E and annual rainfall ranged from 800 to 1000 mm (Figure 1).



Figure 2. Quncho tef variety performance at farmer's field at Laelay Adyabo, 2012/13 production season. Sources: Photo recorded with the researchers during the field day (November, 2013)

Beneficiaries selection and implementation procedures

Beneficiary farmers were selected based on the criteria and objectives of the operational research for technology dissemination project and interest of farmers to participate in the demonstration trials. In addition, the safety net program beneficiaries and disadvantaged households (youths and women headed household) were the main focus of the project. The participating farmers were selected by office of agriculture and rural development of respective districts (Figure 2). A total of 222 farming households (24 female and 198 male) were selected from the three districts for the intervention of Quncho tef variety. The major criteria for selection of the respondents were; their interest to join the program and their food security status. All the target groups were recipients of the Productive Safety Net Program.

Each farmer was allocated the plot size ranged from 0.25 to 0.5 ha. 3 to 8 kg of Quncho seed were offered to each of the respondents by Operational Research Technology Dissemination Project. Farmers, experts and development agents were trained about the improved varieties and improved agricultural practices such as seed rate, fertilizer rate, planting methods (row planting) and crop protection. All the technical implementation and backstopping was managed by researchers, district experts and development agents of the Kebeles. The host farmers were expected to apply all necessary management practices as the recommendations.

Methods of data collection and analysis

Both primary and secondary data were collected. Primarily data like qualitative and quantitative data were collected quantitative data (grain yield) were collected using quadrant from the plot area of 1 m*1 m and qualitative data were collected from the beneficiaries using the checklist. The scales of poor, same and good were used for the parameters including tolerance to insect and diseases, spike length, tillering ability, stand ability (lodging), plant height, drought tolerance, seed color, marketability, straw palatability, biomass yield and grain yield were used to collect the qualitative data from the farmers. Secondary data were collected from different relevant published and unpublished sources. The collected quantitative data was analyzed using descriptive statistics such as mean and percentages.

RESULTS AND DISCUSSION

Grain yield of Quncho tef variety

Production comparison between Quncho and local tef varieties were computed. The result obtained from the two tef varieties is presented in Table 1. As shown in Table 1, an average grain yield of 1.43 and 1.05 ton/ha were obtained from the improved tef (Quncho) and local tef variety, respectively. The result shows, Quncho tef variety was given 36% yield increment over the local tef variety. In line with this, the report of Kebebew et al. (2011) shows Quncho tef gave an average on-farm grain yield of 1.27 ton/ha. But, the on-station research result of Quncho tef variety shows the variety gave an average grain yield of 2.46 ton/ha (Kebebew et al., 2011). The higher grain yield of the Quncho tef variety is attributed due to less lodging, better tillering and the longer spike length of the variety.

In Ethiopia tef is cash crop and economically superior commodity for producers (FAO, 2015). Tef commands a market price of 2 to 3 times higher than maize (Abraham, 2015). So the higher grain yield, obtained from Quncho tef variety in the study area has higher contributions to improve income and food security of the household.

Farmers perception on attributes of Quncho tef variety

The perception and insight of farmers' on the overall performance of the improved tef variety as compared to the local variety were assessed. The attributes that was used to survey the farmers perception; tolerance to insect and diseases, spike length, tillering ability, stand ability (lodging), plant height, drought tolerance, seed color,

Table 1. Grain yield of Quncho versus the local tef variety in the stud area.

SN	Woredas	Kebelles	Grain Yield of Quncho tef (quintal/ha)	Grain yield of local (ton/ha)	Yield increment over the local variety in (%)
1	Tahtay Koraro	Maidmu	1.5	1.2	25
		Lemlem	1.4	1.0	40
		Adigdad	1.57	1.22	28.5
2	Laelay Adyabo	Hibret	1.4	0.95	47
		Adiabagie	13	0.8	62.5
3	Asgede Tsimbla	Lemlem	1.42	1.15	23.5
	Mean		1.43	1.05	36.19

Sources: Compiled from own data, (2012/13).

Table 2. Farmers' perception on attributes of Quncho tef variety versus local variety.

S/N	Parameter	Kebelles and perception levels								
		Adigdad			Belles			Lemlem		
		Poor (%)	Same (%)	Good (%)	Poor (%)	Same (%)	Good (%)	Poor (%)	Same (%)	Good (%)
1	Tolerance to insects and disease	28	29	43	33	50	17	17	33	50
2	Biomass yield		14	86		17	83		17	83
3	Tillering		29	71			100			100
4	Stand ability		29	71		17	83			100
5	Plant height		15	85		17	83		17	83
6	Spike length			100			100			100
7	Drought tolerance	71	29		67	33		67	33	
8	Grain yield			100			100			100
9	Seed color			100			100			100
10	Market preference			100			100			100
11	Straw palatability	28	29	43	17	33	50	33	17	50

Sources: Compiled from own data, (2013/14).

marketability, straw palatability, biomass yield and grain yield; along with the scales of poor, same and good. The farmers perception result shows that, the participant farmers perceive the improved Quncho tef variety as favour in its tillering ability, spike length, biomass yield, seed color, market preference and grain yield (Table 2). Similar to this study, the finding of Belay et al. (2008) also indicate that Quncho fits the most important farmers' selection criteria driven by market, seed colour and yield. On the other side, the farmers in the area criticized negatively the improved variety in the attributes like less drought tolerance and less straw palatability as compared to the local tef variety. But less straw palatability does not mean the animals are not feeding the straw but it means that they prefer the local tef straw than the improved one if you gave them aside. The straw of tef in the area is stored and serves as a very important source of animal feed, especially during the dry season.

CONCLUSION AND RECOMMENDATION

The study concludes that the Quncho tef showed higher grain yield and better perception by the farmers compared to the local tef cultivars. Quncho tef variety scored yield advantage of 36% over the local tef. This shows that the farmers who planted Quncho tef variety have high grain yields than the planted local varieties. Thus, Quncho tef is one of the alternatives that could help in enhancing production and productivity of tef and this play a vital role in improving household food security. Hence, the study recommended that:

1. The agriculture and rural development offices of the districts and other stakeholders should further disseminate the Quncho variety to large number of farmers of the similar agro ecologies.
2. Ensure sustainable seed supply both in quality and

quantity of Quncho tef variety.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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