



Demonstration of improved teff varieties at selected midland districts of Guji zone, Oromia regional state, Ethiopia

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ABSTRACT

The activity was conducted during 2014 and 2015/16 year at Adola Rede and Ana Sora districts, Guji zone to evaluate the performance of improved teff varieties along with management practices under farmers' circumstances and to raise farmers' knowledge and skill on improved teff production and management practices. Two improved teff varieties (Tseday and Boset) were demonstrated along with local varieties. Sites were selected with respective district agricultural offices based on the potential of the area for teff production. Training was given for farmers, Development Agents and experts on teff production. The Participating farmers were also capacitated through training, follow up, exchange visits and mini field days. According to the results, the two improved teff varieties demonstration showed better yield performance when compared to the local variety. Thus, farmers in the area should use Tseday and Boset variety in order to increase their teff production and productivity.

Contribution/ Originality

This research has typically shown the participation of different stakeholders who can influence the agricultural production on larger area. The study also enhances the farmers' agricultural experiment by Farmers Research Group approach. Further, it focuses on active participation of farmers in the whole process of research and evaluate the progress of crop at all stages of crop. The study links farmers, research center and agricultural offices for the agricultural development of the area through field days and trainings.

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1. INTRODUCTION

Teff (*Eragrostis teff*) is a self-pollinated and warm season cereal crop originated in Ethiopia and have been domesticated and used throughout the world due to its excellent nutritional value as grains for human consumption and as forage for livestock (Baye, 2014). Ecologically, teff is adapted to diverse agro-ecological regions of Ethiopia and grows well under stress environments better than wheat, barley and other cereals known world-wide (Refissa, 2012). 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. For better performance, it requires an altitude of 1700-2400 meter above sea level (Ayalew *et al.*, 2017), annual rainfall of 750-850 mm and a temperature range of 10-27°C (Adera, 2016).

In Ethiopia, teff is important cereal crops that 24.02% of all land under cultivation is covered by Teff (first among all cultivated crops in terms land coverage) and contribute 17.57% to grain production, second next to maize in terms of total grain production (CSA, 2015). Most of Ethiopian farmers motivated to cultivate *teff* because of its relative merits over other cereals in the use of both the grain and straw. Culturally, teff grain is used for human consumption which is called *Enjera* the most popular food of most of Ethiopians.

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 is believed to be gluten free. Teff straw, besides being the most appreciated feed for cattle, is also used to reinforce mud and plaster the walls of house and local grain storage facility called *gotera* (Adera, 2016; Minten *et al.*, 2016; Ayalew *et al.*, 2017). The teff straw is highly preferred by cattle over the straw of other cereals and demands high prices in the markets. It also serves to reinforce mud and plaster the wall in local house construction (Engdawork, 2009).

Teff is the main crop produced in the midland area of Guji Zone. Usually the crop is sown after other crops (maize and haricot bean) are harvested. The crop is produced for both household consumption and cash crop. Teff could be produced in both seasons (*meher* and *belg*) hence the crop is used for double cropping purpose which increases farmers’ production and income. The straw of teff is also used for construction of house and used as the main feed resource for cattle during drought. Despite the importance of teff the yield of the crop is low in the midland area of Guji zone due to lack of improved seeds, drought resistant and low application of the recommended packages of teff. To over-come these problems demonstration of teff was initiated with objectives of demonstrating and evaluating the performance of improved teff varieties along with their management practices under farmers’ circumstances, increasing knowledge and skill on improved teff production and management practices and enhancing the network between research, farmers and agricultural offices.

2. METHODOLOGY

2.1. Description of the study areas

Adola Rede district located around Adola town which is situated at a distance of 470 km from Addis Ababa and 120 Km from the zonal capital city, Negele Borena. It is an area of where a mixed farming and semi-nomadic economic activity takes place, which is the major livelihood of the local people. The total area of the district is 1254.56km². Astronomically, Adola Rede district is located between 5°44'10” - 6°12'38” northing latitudes and 38°45'10” - 39°12'37” easting longitudes. The district is characterized by three agro- climatic zones, namely Dega 11% humid, Weina Dega 29% sub humid and Kola 60% dry arid respectively. Most of the earth surface of the district is ups and down of the land surface with an elevation ranging from 1500 meters up to 2000 meter in the larger southern portion of North Western part. Plains, dissected hill plateau and mountain as well as valleys and gorges characterized the relief of the district. The major soil of the district are Nitosols (red basaltic

soils) and Orthic Acrisols. They are red brown and black brown in colors and they are found on sloping terrain. Therefore, their agricultural utilization is good under natural vegetation. The percentage coverage of each soil is red soils 80%, brown soil 15% and black clack 5% respectively.

Ana Sora district which is 410km from Addis Ababahas diverse agro ecology of midland and highland. In the midland area maize and teff were the most potential crop while barley, wheat, potato and enset were the most crops grown in the highland parts. In addition to these crops, livestock rearing is also observed in the district. White honey produced in this district is marketed to other area and generating incomes for farmers.

2.2. Sampling procedure

The demonstration took place in two districts of Guji Zone namely Adola Rede and Ana Sora. Three Kebeles from Adola Rede and one Kebele from Ana Sora districts were then purposively selected based on their potential to teff production. The selection of Kebeles and participating farmers was carried in collaboration with district agricultural offices, Development Agents, and Kebele leaders.

2.3. Trial design and management

The trial was done on a land size of 100m² (10m *10m) per variety. A seed rate of 30Kg/ha was used and 60Kg/ha DAP and 40Kg/ha UREA were applied. Weeding and threshing was done by Farmers Research Group (FRG). In each kebele 15 farmers were grouped as one farmer research groups. One Farmers research group subdivided in to three experimental farmer groups. Thus, there were 9 and 3 experimental farmers in Adola and Ana Sora districts respectively. Yield data was collected from these experimental farmers.

2.4. Method of data collection

Data was collected from 12 experimental farmers. Technical data sheets (for agronomic data), regular interaction with farmers, personal observations and four focus group discussions were used to collect the data.

2.5. Data analysis Method

Simple descriptive statistics and qualitative analysis of farmers' feedback were used to analysis the data.

3. RESULTS AND DISCUSSION

3.1. Training and Field day

Training were given for 120 farmers, 12DAs and Eight (8) experts on the demonstration of improved teff varieties. Technical support, Follow up and supervision were also done. Mini field day was arranged at Adola Rede district of Dole Kebele, so that, results and information about teff production was communicated among participating farmers. During the occasion farmers, DAs, agricultural office experts were satisfied by observing the demonstrated teff technologies and they demanded for these technologies for further pre-scaling up activities. Beside further promotion of teff technologies the mini field day organized enhanced the linkage between research and agricultural offices as agricultural problems were raised and discussed by participants.

3.2. Yield performance

The maximum yield performance (15.7qt/ha) was obtained from Tseday variety in Adama Diba Kebele during 2014/15 production year while the lowest yield performance was recorded from local variety in all production seasons. During the 2014/15 production year there was comfortable environment (good rain fall). But during 2015/16 production year there was frost and shortage of rain fall that reduced the yield performance of varieties. When compared the districts, good yield of tef was obtained from Adola Rede. This showed that Adola Rede is more potential area for teff production than Ana Sora district. The average yield performance of Tseday variety in midland

district of Guji Zone was 12.95qt/ha while Boset was 11.18qt/ha. During demonstration of teff the lowest yield (7.88qt/ha) was obtained from local variety. Generally, the improved varieties were not showed their maximum potential yield due to shortage of rain fall when compared to the adaptation yield of 15.82qt/ha for Tseday and 15.61qt/ha for Boset in midland agro ecology of Guji Zone (Aliyi *et al.*, 2016) and 14.27 qt/ha (CSA, 2015) in Guji Zone.

Table 1: Demonstrated yield of teff over two years

| Variety | The yield of Adola Rede (in qt/ha) | | | | | | | | The yield of Ana Sora (in qt/ha) | | Average yield (qt/ha) |
|---------|------------------------------------|------------|------|------|---------|------------|------|------|----------------------------------|-------------|-----------------------|
| | 2014/15 | | | | 2015/16 | | | | 2014/15 | 2015/16 | |
| | Gobicha | Adama Diba | Dole | Ave. | Gobicha | Adama Diba | Dole | Ave. | Sololo Kobo | Sololo Kobo | |
| Tseday | 14.5 | 15.7 | 15 | 15.1 | 14.6 | 13.1 | 10.3 | 12.7 | 13.5 | 10.5 | 12.95 |
| Boset | 11.6 | 14.4 | 11.7 | 12.6 | 14.4 | 14.8 | 9.1 | 12.8 | 11.3 | 8 | 11.18 |
| Local | 10 | 13.2 | 8 | 10.4 | 7.2 | 9.2 | 7.8 | 8.1 | 7 | 6 | 7.88 |

3.3. Farmers' teff preference

Farmers have their own preference to use certain technology. Yield per plot determines acceptability of teff by farmers. Higher yield than locally available teff variety increases farmer's motivation to grow recommended and improved teff varieties. Not only high yield but also early maturity among teff varieties is another important characteristics in teff variety promotion. In Adola district there was shortage of rainfall. Thus early mature teff variety was preferred by farmers in the area. More farmers were inclined to rank Tseday first and Boset second for further production. But some farmers yet prefer Boset variety for multiplication. Tseday and Boset showed better performance for most of the studied characters including grain yield (Aliyi *et al.*, 2016). Generally variety preference depends on farmers and each variety had its own unique trait for further production. The following table describes farmers' preferences among the demonstrated teff varieties based on their characteristics.

Table 2: Farmers' preference of teff

| Tseday | Boset | Local |
|---------------------------------|--------------------------------|---------------------|
| High yielder | Relatively low yielder | Lower |
| Early mature | Relatively late mature | Late |
| Tolerant to disease (Leaf rust) | Tolerant to disease(Leaf rust) | not at all |
| Not lodge | Not lodge | At some place lodge |
| White in color | White | Mixed |
| Thin and few straw | Has strong and more straw | Few straw |

In the midland area of Guji zone rain fall is not uniform and scarce. Thus, early mature varieties were preferred by farmers. As shown on the above table, Tseday variety was early mature than both Boset and Local varieties thus preferred by farmers to over-come drought. But Tseday variety can shatter unless harvested as soon as it matured.

Teff is multipurpose crop in Guji Zone. The grain of crop is used for household consumption while teff straw is used for house construction in rural and urban areas. The straw is also used as feed for cattle. This is an important characteristics of teff important for farmers. In the study area Boset variety was preferred as it has strong and more straw than Tseday which has thin straw that can easily be broken in to pieces.

Besides the above characteristics, Teff seed color was another important characteristics farmers see to increase the market demand of their teff products as white seed teff was preferred on the market

and preferred during cultural occasions. With regard to color, both Tseday and Boset varieties have white and attractive seed color than the local variety farmers produce.

4. CONCLUSION

The teff demonstration was conducted in midland district of Guji zone, Adola Rede and Ana Sora districts. The two improved variety of tef demonstrated were Tseday and Boset. Training, exchange visit and field day encouraged the promotion of teff varieties in the study area. Farmers Research was enhanced the linkage between research, agricultural district offices and farmers on development activities. Farmers Research Groups evaluated Tseday and Boset during belg season of 2015 and 2016 on their farm. These varieties get acceptance over local varieties due to their better yield, early maturity and no-lodging status.

4.1. Recommendations

Farmers should use Tseday and Boset varieties in their teff farming. These varieties were promised for further extension since they have good yielder, early mature and have importance against local varieties. Thus farmers should multiply both varieties to improve their teff production and income from teff. Tseday variety should be harvested as soon as it matured to minimize the shattering problem.

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