International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2020; 3(1): 42-44
Received: 22-11-2019
Accepted: 25-12-2019

Tegegn Belete
Ethiopian Institute of Agricultural Research, Jimma Research Center, P.O.Box 192, Jimma, Ethiopia

Leta Tulu
Holeta Agricultural Research Center; P.O.Box: 31; Holetta, Ethiopia

Tsegau Senbetay
Mehoni Agricultural Research Center; Mehoni, Ethiopia

Corresponding Author:
Tegegn Belete
Ethiopian Institute of Agricultural Research, Jimma Research Center, P.O.Box 192, Jimma, Ethiopia

Performance evaluation of released tef variety, kora at different locations of Southwestern Ethiopia

Tegegn Belete, Leta Tulu and Tsegau Senbetay

Abstract
A field experiment was conducted during 2016/17 using one released variety Kora and local check at different locations of southwestern Ethiopia. The objective of the trial was to
to check adaptability and stability of grain yield of kora variety. The trial was conducted at Jimma/Melko, Somodo, Gooma, Bedele, Saja and Omonada using single plot design with the plot size of 10m x 10m and spacing was 20cm between rows and 10cm between plants. Phenological, agronomic and grain yield data were taken. There was significant variation in grain yield indicated the differential response of the varieties to test location for the trait. The variety Kora was performed well over the local check in across locations.

Keywords: Kora, Performance, Tef

1. Introduction

Tef *(Eragrostis tef (*Zucc.) Trotter) belongs to the family *poaceae*, subfamily Eragrostideae, tribe Eragrosteae and genus *Eragrostis.* It is a C4, self pollinated, chasmogamous anuual cereal. It has a fibrous root system with mostly erect systems, although, some cultivars are bending or elbowing types (Mulu, 1999) [7]. The genus contains about 350 species of which tef is the only cultivated species. Fifty four *Eragrostis* species are found in Ethiopia, out of which fourteen are known to be endemic. Tef is the major Ethiopian cereal grown on 3.02 million hectares annually (CSA, 2015) [2], and serving as staple food grain for 70 million people. The crop constitutes 30% of the total area allocated to cereals and contributes more than 20% of the total cereals production (CSA, 2015) [2].

The major constraints in Ethiopia's tef husbandry are low productivity (national average 1.6 ton ha^{-1}) and susceptibility to lodging. The straw (*chid*) is an important source of feed for animals. Tef was also a resilient crop adapted to diverse agro-ecologies with reasonable tolerance to both low (especially terminal drought) and high (water logging) moisture stresses. Tef, therefore, is useful as a low–risk to farmers due to its high potential of adaptation to climate change and fluctuating environmental conditions.

Studies on genotype and environment interaction have been considered an important progress in contemporary statistical genetics. As such, the adaptability of tef varieties should be evaluated before they are produced and promoted. The main purpose of multi environment trial is to evaluate the adaptability, yield and stability of tested cultivars and to provide a scientific basis for maximizing the value of cultivars. These trials are keys to demonstrating and popularizing new crop cultivars (Correa *et al*., 2016; Tao *et al*., 2016) [1]. Therefore, the objective of the study was to check adaptability and stability of grain yield of kora variety across different locations of southwestern Ethiopia.

2. Materials and Methods

2.1. Description of Kora Variety

DZ-Cr-438 (RIL No.133B) is released as Ethiopian tef variety christened "Kora" in 2014 (MoA,2014.Kora is white seeded high yielding potential variety resulting from a simple cross and released as an alternative variety to Quncho. The grain yield performance on research station ranged from 2.5-3.2 ton ha^{-1} and farmers fields, the grain yield ranged from 2-2.8 ton ha^{-1}. Kora takes 46 days to emerge panicles (head) and 113 days to mature. It is 102.5cm tall in total plant height with average panicle length of 37.3cm which account for over 36% of the total plant height. It has variegated (yellow and red) lemma color, purple anther color, loose panicle form and very white seed color. It got an immense farmers attention due to its yielding potential, very white seed color and good straw yield (straw yield is no less important than grain yield) at participatory variety selection trials.

2.2 Description of the Study Areas

Table 1: Description of Experimental areas

No.	Locations	Altitude	Coordinates	RF	Temp	Soil type
1	Jimma/Melko	1753	$7^0$47'N 36^0 47''E	1639	22	Nitosol
2	Somodo	1770	7°45′N 36°45′E.	1624	18.9	Nitosol
3	Gooma	1,560	7°51′N 36°35′E	1764	19.7	Nitosol
4	Gechi	2087	8°27′N 36°21′E	1800	20.7	Nitosol
5	Omonada	1975	7° 41'N 37°12'′E	1600	20	Nitosol
6	Saja	1950	NA	1800	19	Nitosol

NA=Not available RF=Rainfall

2.3. Experimental Design and Management

The trial was conducted using single plot design under rain-fed conditions. Sowing was done manually in rows and spacing between rows and plants was 20cm and 10cm respectively. Spacing between plots was 1m and plot size of 10m x 10m with the total of 50 rows per plot. Seed rates were based on the recommendation which was 6g/plot for plot size 2m x 2m and the trial planted in two farmers in all locations. Plots were fertilized with 40kg of N and 60kg P_2O_5 per hectare for light soils and 60kg N and 60kg P_2O_5 per hectare for black soils (Vertisols). All DAP was applied at planting while urea was applied in split; half at the time of planting and the remaining half at tillering stage. In addition, other relevant field trial management practices were carried out throughout the experimentation period across all locations as per the recommendations

2.4. Data collection

Data on days to heading, days to maturity, shoot biomass and grain yield were assessed on plot basis. On the other hand, plant height and panicle length were recorded on previously selected and tagged five random samples of plants from the central parts of each plot. Mean values of the five random samples of plants per plot were then used for the analysis of data collected on individual plant basis.

3. Result and Discussion

3.1 Days to Heading and Maturity

Many studies have indicated the presence of substantial variation among tef genotypes for different traits of tef. Habte *et al.*, (2011) [3] reported highly significant genotype variation for days panicle emergence and maturity, plant height, culm and panicle length, basal culm diameter, shoot biomass and grain yield, harvest index, lodging and thousand seed weight. Both days to heading and maturity differed significantly among the tef genotypes (Kora and local check). Days to heading ranged from 43 to 52 Kora variety and 41 to 48 local check with mean of 46.6 and 45 both Kora variety and local check respectively. Similarly, days to maturity ranged from 86 to 97 for Kora (Table 2) and 83 to 100 with the mean of 91.5 for local check (Table 3).

Table 2: Mean performance of Kora variety at different locations

Locations	Traits					
	DH	DM	PH (cm)	PL (cm)	SHB (Qt/ha)	GY (Qt/ha)
Saja	48	92	75	42.8	28.5	10.7
Omonada	52	86	78	42	33.8	13.7
Gooma	43	97	62	46	31.5	9.5
Bedele	45	93	70.2	42	35.2	9.5
Melko	48	86	75	23.8	30.5	6.5
Somodo	44	95	75	41.4	28.5	6.6
Mean	**47**	**91.5**	**72.53**	**39.67**	**31.33**	**9.42**

DH = days to heading, DM= days to maturity, PH=plant height, PL =panicle length, SHB=shoot biomass, GY =grain yield, Qt=Quintal, cm =centimeter

Table 3: Mean performance of Local check at different locations

Locations	Traits					
	DH	DM	PH (cm)	PL (cm)	SHB (Qt/ha)	GY (Qt/ha)
Saja	45	86	78	40.3	25.3	12
Omonada	48	83	68	44.2	29.3	11.2
Gooma	41	100	79.6	47.4	24.5	10.7
Bedele	43	95	61.8	42.2	28.8	10.3
Melko	47	87	71.2	23.8	21.2	4.8
Somodo	45	98	71.2	41.4	25.3	5.2
Mean	**45**	**91.5**	**71.6**	**39.9**	**25.7**	**9**

DH = days to heading, DM= days to maturity, PH=plant height, PL =panicle length, SHB=shoot biomass, GY =grain yield, Qt=Quintal, cm =centimeter

3.2. Plant height and Panicle length
Variation in plant height ranged from 62 to 78 for Kora variety with the mean of 72.5cm and local check ranged from 61.8 to 78cm with mean of 71.6cm.Pancile length ranged from 23.8 to 46cm with the mean of 39.7cm and local check ranged from 23.8 to 47.4 cm with mean of 39.9cm.Similar results variation in tef genotypes were reported by (Kebebew *et al*., 2001b) [4].

3.3. Biomass yield and Grain yield
Mean difference was observed among the tef genotypes for both biomass and grain. Biomass yield ranged from 28.5 to 35.2 with the mean of 25.7qt/ha for the variety Kora and 21.2 to 29.3 with the mean of 25.7qt/ha for local check. Grain yield from 6.6 to 13.7 with the mean of 9.42qt/ha for Kora variety and 4.8 to 12 with mean of 9qt/ha for the local check. The variation in quantitative traits for location to location was due to the diversity of locations and presence of significant genotype by environment interaction. The mean yield of a genotype depends on type of genotype (G), environment (E) and interaction of genotype and environment (GEI) among them. Evaluation of Genotype by environment interaction among them. Evaluation of genotype by environment interaction was considered as the most important for agronomists to develop improved genotypes as the mean yield performance of genotypes grown at different environments may differ significantly creating difficulties in the selection of genotypes (Medinan, 1992) [5].

4. Conclusion and Recommendation
It is apparent that the phenotype of crop plants is a joint contribution of both genes as well as environment. The genotype by environment interaction reduces association between phenotypic and genotypic values and leads to bias in the estimates of gene effects and combining ability for various characters sensitive to environmental variation. Such traits are less amenable to selection. The process of identification of stable genotype is difficult because of genotype by environment interaction. Generally, based on field evaluation and data result in tested locations, variety Kora was recommendable, but further evaluation needed using a large number of released variety and different seasons.

5. References

1. Correa AM, Gonçalves MC, Teodoro PE. Pattern analysis of multi-environment trials in common bean genotypes. *Biosci. J*., 2016; 32: 328–336
2. CSA, 2015. The Federal Democratic Republic of Ethiopia, Central Statistical Agency (CSA), Agricultural Sample Survey 2014/15 (2007 E.C.),Volume I, Report on Area and Production of Major Crops (Private Peasant Holdings, *Meher* Season), Statistical Bulletin 278, May 2015, Addis Ababa, Ethiopia.
3. Habte J, Endashaw B, Kebebew A. Genetic variability in released tef [*Eragrostis tef* (Zucc.) Trotter] varieties of Ethiopia. Crop Science Society of Ethiopia (CSSE). Sebil Vol. 13. Proceedings of the Thirteenth Biennial Conferences, 31st Dec. 2008 to 2nd Jan. 2009. Addis Ababa, Ethiopia. 2011.
4. Kebebew A, Hailu T, Arnulf M, Tiruneh K, Fufa H. Variability, heritability and genetic advance in pheno-morphic and agronomic traits of tef [*Eragrostis tef* (Zucc.)Trotter] germplasm from eight regions of Ethiopia.tef., 2001b.
5. Medinan RC. Some exact conditional tests for the multiplicative model to explain genotype environment interaction. *Heredity*, 1992; 69:128-132.
6. MoA. Ministry of Agriculture, Plant Variety Release, Protection and Seed Quality Control Directorate, Crop Variety Register, Addis Ababa, Ethiopia., 2014, 17.
7. Mulu A, Hailu T, Kebebew A, Nguyen HT. Genetic characterization of two *Eragrostis* species using AFLP and morphological traits.*Hereditas.,* 1999; 130:33–40.
8. Tao L, Ali J, Marcaida M, Angeles O, Franje NJ, Revilleza JE *et al.* Combining Limited Multiple Environment Trials Data with Crop Modeling to Identify Widely Adaptable Rice Varieties. Plos One, 2016; 11:e0164456.