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Performance Evaluation and Adaptation Trial of Tef Genotypes for Moisture Stress Areas of Borana, Southern Oromia

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Abstract

Tef is one of the most important staple food crop cultivated throughout the country. Nine tef varieties were brought from Debre Zeit Agricultural Research center and planted with one local check in randomized complete block design (RCBD) at yabello Pastoral and Dryland Agricultural Research Center main site for three consecutive years. The result of analysis revealed significant differences among genotypes in grain yield and biomass for all year under study. Tsedey was performed than other genotypes in 2011 cropping season in which low rainfall was recorded for the study area. Magna was performing well in study area relative to other genotypes in all cropping seasons except 2011 cropping season.

Keywords: Adaptation; Genotype; Local check; Moisture stress

Introduction

Tef (*Eragrostis tef* (Zucc.) Trotter) (2*n*=4*x*=40) classifed under *poaceae* family and *Eragrostis* genus. Tef is an annual cereal crop most widely grown over broad environmental conditions. Its owes its center of origin and diversity in Ethiopia and is widely cultivated throughout the country as a staple food crop [1]. Te harvested caryopsis is chiefy used for preparing "injera" (a fat, circular and very sof bread), porridge, and sometimes alcoholic drinks. Te bread made of tef four, "injera", is the mainstay of the Ethiopian diet [2-4]. Te nutrient composition of tef grain has high potential to be used in foods and beverages worldwide [5]. Tef annually occupies over 29% of the entire feld and contributes approximately 19.33% of the gross grain output of all cereals in Ethiopia [6]. Te production area of tef is increasing in extraordinary scale due to increased market demand, higher nutritional value, low incidence of damage by insects, better adaptation to drought and high value of straw [3].

Te performance of one genotype difer signifcantly from environment to environment [7]. Tef performs in diferent environments diferently. Genetically, tef is adaptable to a wide range of environmental conditions and even under unfavorable environmental condition. It can be grown at altitudes ranging from near sea level to 3000 mas, but it performs well between 1100 and 2950 masl [2]. Despite its versatility in adjusting to diferent environmental conditions, the productivity of tef in Ethiopia is very depressed with the national average standing at 1.5 t/ha [8]. In moisture stress areas of southern Oromia is lower than the average grain yield, which may be due to lack of improved varieties, non-adoption of improved technologies, disease and pests are some of the most serious production constraints. Currently diferent varieties of tef have been released from the regional and Ethiopian Agricultural Research Institutes [9]. Even though some varieties of tef have been released in Ethiopia, most of them were not evaluated around moisture stress areas of southern Oromia. So, the following experiment is objected to evaluate and recommend best performed tef genotypes with better performance and adaptability for the tef growers of moisture stress areas of Southern Oromia.

Materials and Methods

Description of study area

Te experiment was conducted at Yabello Pastoral and Dryland Agricultural Research Center on station for three consecutive main cropping seasons from 2010 and 2012. Yabello is found 563 km from Addis Ababa to southern direction. Yabello is situated at 04°52'49" and 038°08'55" latitude and longitude, respectively, at an altitude of 1635 masl. Te soil of study area is characterized by well-drained sandy loam (46% sand, 36% silt and 18% clay), with a pH of 7.03. It has 0.026% total nitrogen, 15.36 ppm Phosphorus and 20.4 meq of/100 gm soil CEC. Te total annual rainfall in 2010, 2011 and 2012 was 1019.1 mm, 851.6 mm and 719.0 mm respectively (Figure 1). Te average temperature in 2010, 2011 and 2012 was 21.5°C, 19.3°C and 20.6°C respectively (Figure 2). Te most commonly cultivated crops in its surrounding areas are maize (*Zea mays* L.), haricot bean (*Phaseolus vulgaris* L.), tef (*Eragrostis tef* L.) and wheat (*Triticum aesvivum* L.). Maize and haricot bean are the predominant crops and staple food crops in Borana.

Experimental materials and design

Nine improved tef varieties were brought from Debre Zeit Agricultural research center (Table 1). A total of ten varieties, including local check were planted in a RCBD with three replications at Yabello Pastoral and Dryland Agricultural Research Center main site from 2010 to 2012 cropping seasons. Each variety was planted in plot area of 12 m^2 on plot size of 3 m height and 4 m width and sown in hand broadcast method. All agronomic practices were equally performed for all treatments as per recommendation.

Collected data

- Days to fowering: the number of days from 50% of the plots showing seedling emergence up to 50% of the plants in the plot fower.
- Days to maturity: the number of days from 50% of the plots showing seedling emergence up to 50% of the plants in the plot

fowered later than all varieties. Fentie et al. Plaza-Wüthrich and Aliyi et al. [11,13,14] also reported

Zobel	36.67[b]	88.33[b]	1.67[ab]	30.00[cd]	68.73[a]	4.92[ab]	1.22[cd]	0.21[c-e]
Manga	36.00[b]	94.00[a]	2.33[a]	34.00[a]	66.60[ab]	5.75[a]	1.33[b-d]	0.18[e]

research and development-Proceedings of the international Tef Genetics and improvement, pp: 16-19.

3. Ketema S (1997) Tef-Eragrostis Tef (Zucc.). Bioversity International.
4. Kebebew A, Getachew B, Hailu T, Yu JK, Sorrells ME (2009) Breeding tef: conventional and molecular approaches. In New approaches to plant breeding of orphan crops in Africa. Proceedings of an International Conference, Bern, Switzerland, 19-21 September 2007. Organizing Committee of the International Conference on New Approaches to Plant Breeding of Orphan Crops in Africa, pp: 21-41.
5. Gebremariam MM, Zarnkow M, Becker T (2014) Tef (Eragrostis tef) as a raw material for malting, brewing and manufacturing of gluten-free foods and beverages: a review. Journal of Food Science and Technology 51: 2881-2895.
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