Research Article Open Access

Performance Evaluation of Maize (*Zea mays L.*) Varieties for Grain Yield in Buno Bedele, South West Oromia, Ethiopia

Oromia Agricultural Research Institute (IQQO), Bedele Agricultural Research Center (BeARC), Bedele, Ethiopia. P.O. Box, 167.

The objective of this study was to identify and recommend adapted and high yielding hybrid maize varieties for

Keywords: Adaptation; Highland; Hybrid; Yield

Introduction

Maize *(Zea mays L.)* is the most important grain crop in the world and is produced nationwide in various environments. Maize ranks rst in the global grain production (https: //www.statista.com/statistics/263977/world-grain-production-by-type/accessed 30.11.2018). It is an important staple crop of the world-third most important a er wheat and rice. Successful maize production depends on the correct application of production inputs that will sustain the environment as well as agricultural production (Boote et al., 1996; Eriksson et al., 2005; Bocianowski et al., 2016). ese inputs include adapted cultivars, optimum plant population, soil tillage, fertilization, insect and disease control, harvesting (Pandey et al., 2000; Costa et al., 2002; Szulc and Bocianowski, 2011; Szulc et al., 2011, 2013, 2018; Bocianowski et al., 2019b). Maize is a versatile crop due to its multifarious uses as feeds, food and industrial raw material. e crop serves as a source of basic raw material for a number of industries viz., starch, protein, oil, alcoholic beverages, food, sweeteners, cosmetics and biofuels [1,2].

In Ethiopia cereals account for about 80% of the annual crop production and maize is the rst in total production and yield per unit area and second a er tef in area coverage among all the cereals. Currently, Ethiopia is the fourth largest maize producing country in Africa, and rst in the East African region (FAO, 2017). It is also signi cant that Ethiopia produces non-genetically modi ed (GMO) white maize, the preferred type of maize in the neighboring markets. is strategy envisions export markets being a signi cant part of the demand sink for Ethiopian maize. Maize is the largest cereal commodity in terms of total production, acreage, and the number of farm holdings [3].

In Ethiopia, maize grows under a wide range of environmental conditions, between 500 to 2400 meters above sea level. Maize is Ethiopia's leading cereal in terms of production, with six million tons produced in 2012 by nine million farmers on two million hectares of land (CSA 200/21). Over half of all Ethiopian farmers grow maize, mostly for subsistence consumption, with 75% of all maize produced being consumed by the farming household. Currently, maize is the cheapest source of calorie intake in Ethiopia, providing 20.6% of per capita calorie intake nationally (Rashid, 2010).

Total area covered by maize during the 2006/07 growing season was 1.7 million ha and the national average yield was about 2.2 t ha^{-1} (CSA, 2020). Maize improvement in Ethiopia started half a century ago. During the late1960s and early 1970s, several promising hybrids and composite varieties of East African origin were introduced and evaluated at di erent locations. is resulted in the recommendation of several maize varieties for the maize growing regions of the country (Abdurahman, 2009).

Maize is an important crop for overall food security and also used for making local beverages. Additionally, the leaves and stover are used to feed animals and the stalks are used for construction and fuel. A small quantity of the grain produced is currently used in livestock and poultry feed, and this is expected to increase with the development of the livestock and poultry enterprises in the country. e green fodder from thinning and topping is an important source of animal feed and the dry fodder is used during the dry season. Moreover, the crop has potential uses for industrial purposes, serving as a starch, a sweetener for so drinks, an input for ethanol fuel production and oil extraction (FAO, 2012) [4,5].

As compared to other cereals, maize can attain the highest potential yield per unit area. e average yield in developing countries is 2.5 t/ha. In Ethiopia the national average yield is about 4.2 t/ha (CSA, 2020). While signi cant gains have been made in maize production over the past decade, there remains large potential to increase productivity. From 2001 to 2011, maize production increased by 50%, due to increases in both per hectare yields (+25%) and area under cultivation (+20%). However, estimates indicate that the current maize yield could

a, Ethiopia. Adv Crop

12: 660.

of 38.24% and 30.85% f, respectively over the national maize average productivity (42.37qt ha^{-1}). However, the performance of varieties was not consistent over years perhaps due to physical, chemical and biological factors (Tariku et al., 2018). e lowest grain (49 qt ha^{-1}) yield was recorded from variety BH 540. us, BH547 and BH549 were selected and recommended for further production at Dabo Hana and similar agro-ecologies (Table 2) [20].

Character associations

Results of the correlation coe cient for the pairs of characters are presented. e result shows that the association between grain yield and four yield components (plant height, ear height, maturity date and number of cobs per plant) were positive and signi cantly correlated ($P \leq 0.05$). e correlation coe cient between plant height, ear height, maturity date and number of cobs per plant and grain yield were 0.91, 0.86, 0.71 and 0.81, respectively. ese observations agree with the nding of Muhammed et al.(2002), who independently observed positive and signi cant correlation between grain yield and kernel rows ear-1, kernel row-1, ear height, and 100-kernel weight in maize (Tables 3 and 4) [21,22].

Conclusion and Recommendation

e experiment was carried out using ve improved maize varieties in randomized complete block design (RCBD) with three replications during 2021 to 2022 main cropping seasons. According to the study results, all the studied growth parameters, yield components and grain yield were signi cantly a ected by varieties. e analysis of variance showed signi cant variations among varieties (P 0.05) for male owering (MF), female owering (FF), Ear height (EH) and grain mean yield. e result indicated that variety BH-547 was superior in grain yield to others and gave 90.25 quintals per hectare followed by BH-549 with yield level of 72.82 quintals per hectare.

erefore, from this study it can be concluded that varieties BH-547 and BH-549 which had higher grain yield with appreciable yield advantage over the national productivity are recommended for commercial production at Dabo Hana district and similar environments.

Acknowledgements

e authors would like to thank Oromia Agricultural Research Institute for funding, and Bedele Agriculture Research Center, and cereal crop research case team for data collection and trial management.

1. by smallholder farmers in Central Oromia
2. Abdurahman B (2009)

The

. J Integr Agr