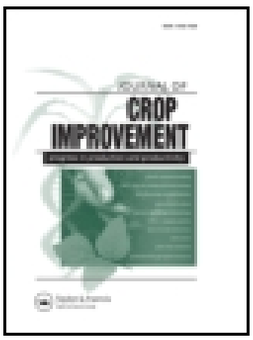

Journal of Crop Improvement

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/wcim20

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To cite this article: Innocent Iseghohi, Ayodeji Abe, Silvestro Meseka, Wende Mengesha, Melaku Gedil & Abebe Menkir (2021): Effects of drought stress on grain yield, agronomic performance, and heterosis of marker-based improved provitamin-A maize synthetics and their hybrids, Journal of Crop Improvement, DOI: 10.1080/15427528.2021.1949772

To link to this article: https://doi.org/10.1080/15427528.2021.1949772

Published online: 02 Aug 2021.

JOURNAL OF CROP IMPROVEMENT
https://doi.org/10.1080/15427528.2021.1949772

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Effects of drought stress on grain yield, agronomic performance, and heterosis of marker-based improved provitamin-A maize synthetics and their hybrids

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ABSTRACT

Provitamin A-enriched maize (*Zea mays* L.) is an important complementary food staple for combating vitamin A deficiency (VAD) in high maize-producing and maize-consuming countries of sub-Saharan Africa (SSA). However, frequent drought is a major abiotic factor that retards maize growth, resulting in yearly fluctuations in grain yield. Development of provitamin A-enriched maize varieties resilient to recurrent drought stress could enhance and stabilize maize grain yield. This study was conducted to assess the effects of managed drought stress (MDS) on the performance and heterosis of some marker-based improved provitamin A maize synthetics and their varietal-cross hybrids. The maize synthetics and their varietal-cross hybrids, along with a drought-tolerant check (PVASYN13), were evaluated under MDS and well-watered (WW) conditions at Ikenne, Nigeria, for two years. Genotype and year effects were significant for grain yield and some agronomic traits under MDS and WW conditions. Grain yield was reduced by 56% under MDS. Grain yield was significantly correlated with days to anthesis, days to silking and anthesis-silking-interval under MDS but not under WW condition. Under MDS, three varietal-cross hybrids (PVASYNHGBC0/PVASYNHGAC0, PVASYNHGBC2/PVASYNHGAC0, PVASYNHGBC0/ PVASYNHGAC1) had similar grain yields and tolerance indices as the drought-tolerant check, whereas PVASYNHGBC1/PVASYNHGAC2 produced 12.5% more grain yield than the check. Three of the varietal-cross hybrids (PVASYNHGBC0/PVASYNHGAC0, PVASYNHGBC0/PVASYNHGAC1 and PVASYNHGBC1/PVASYNHGAC2) had significant mid-parent heterosis for grain yield under the two test conditions, and were recommended for developing drought-tolerant varieties to combat VAD in drought-prone environments of SSA.

ARTICLE HISTORY
Received 1 May 2021
Accepted 27 June 2021

KEYWORDS
Grain yield; heterosis; maize synthetics; managed drought stress; varietal-cross hybrids

Introduction

Maize (*Zea mays* L.) is an important staple food crop and nutrient source for most people in sub-Saharan Africa (SSA) (Nuss and Tanumihardjo 2010;

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