Combining Ability and Heterotic Patterns of Extra-early Maturing Yellow Maize Inbreds and Hybrid Performance under Stress and non-stress Environments in Nigeria

I.C. AKAOGU1, B. BADU-APRAKU2, V.O ADETIMIRIN3, AND B. ANNOR2, 3

1Department of Agricultural Biotechnology and Bioresources, National Biotechnology Development Agency, Abuja, Nigeria,
2 International Institute of Tropical Agriculture, Ibadan, Nigeria. C/o IITA Ltd., Carolyn House, 26 Dingwall Road, Croydon, CR93EE UK
3Department of Agronomy, University of Ibadan, Ibadan, Oyo State

Corresponding author: b.badu-apraku@cgiar.org.

Abstract

Maize is a major staple crop in West and Central Africa (WCA) and has the highest yield potential in the savannas of the sub region. However, Striga and drought severely constrain maize production and productivity in the savannas. There is therefore an urgent need for Striga and drought tolerant hybrids to combat the two stresses. Classification of maize inbred lines into contrasting heterotic groups is of critical importance in planning crosses and determining the potentials of lines for the development of high yielding hybrids. However, there is limited information on the heterotic patterns of the available extra-early inbreds in WCA. The objectives of this study were to classify 39 extra-early inbreds into heterotic groups using the SCA effects of grain yield and the general combining ability of multi traits (HGCAMT) methods and identify high yielding and stable hybrids across contrasting environments. One hundred and twenty testcross hybrids plus an open-pollinated check variety, 2008 Syn EE-Y DT STR were evaluated under Striga infestation, induced drought stress and optimal growing conditions for two years at four locations in Nigeria. Both the SCA effects of grain yield and the HGCAMT methods classified the inbreds into three heterotic groups each. However, the SCA effects of grain yield method classified only 24 of the 42 inbreds (57%) while the HGCMAT method classified all the inbreds into heterotic groups across research environments. The SCA effect of grain yield method classified the elite tester 63 into the elite tester 79 group whereas the HGCMAT method grouped the three testers into the three different established heterotic groups suggesting that the
HGCAMT method was more efficient. The hybrids, TZEEI 67 x TZEEI 79, TZEEI 88 x TZEEI 79 and TZEEI 81 x TZEEI 95 were the highest and most stable and should be commercialized in WCA.