

## Abstract

The major objective of this study was to evaluate the potential of new maize variety in semi-arid environment of Southeast Kenya, with a view to making recommendations on its suitability for incorporation into the maize breeding programme at the national Dryland Farming Research Centre (NDFRC), Katumani, Kenya. Aspects like Phenology, crop water requirements and the diurnal leaf water potential (LWP) of Tohono O'odham Z16 (TOZ16) maize (*Zea mays* L.) were compared to those of locally grown varieties, Makueni DLC (MDLC) and Katumani composite B, (KCB) under two water treatments: irrigated and unirrigated, to determine its suitability for the maize breeding programme. The experiment design was randomized complete block design with four replicates per treatment. under irrigation treatment, TOZ16 attained physiological maturity within 70 days compared to 95 and 110 days for MDLC and KCB, respectively. under unirrigated treatment, leaf rolling was more pronounced with TOZ16 as compared to MDLC and KBC. These has been shown to be evidence for plant adaption to water stress and results in a marked reduction in effective leaf area thus reducing radiation load. MDLC and KBC are required ca. 41% and 52% more water than TOZ16, respectively. Under irrigation treatment, TOZ16 maize attained a minimum leaf water potential (LWP) of approximately -2.38 MPa compared to -2.85 and -3.00 MPa attained by MDLC and KBC respectively. The susceptibility of these latter two maize varieties to water stress was evidence by the fact that they quickly increased their hydrature level early in the morning compared to TOZ16 which tend to maintain its lower level for relatively longer period of time. Following these study it is strongly that TOZ16 be incorporated into the maize-breeding programme at NDFRC. The study shows that TOZ16 possesses physiological characteristics that could be positively exploited by plant breeders in the search of drought adapted maize cultivars for the semi-arid areas of southeast Kenya