

This study intends to compare the phenology, crop water requirements and the diurnal behaviour of leaf water potential of the new maize variety Tohono O'odham Z16 and of the locally grown varieties, i.e. Makueni DLC and Katumani Comp. B. under different watering treatments. The major objective of this study was to evaluate the potential of the new maize variety in a semi-arid environment of SE-Kenya, with a view to making recommendations on its suitability for incorporation into the maize breeding programme at NDFRC, Katumani, Kenya. The results of this study showed that: a) Under optimum water requirements, Tohono Z16 attained full maturity within 70 days compared to 95 and 110 days for Makueni DLC and Katumani Comp. B, respectively. b) Makueni DLC and Katumani Comp. B maize varieties required about 41 % and 52% more water than Tohono Z16. c) Under rainfed treatment, leaf enrolling was more pronounced among the Tohono Z16 maize plants as compared to the other two maize varieties. This has been shown to be evidence for plant adaptation to water stress and results in a marked reduction in effective leaf area thus reducing the radiation load. d) Under rainfed treatment, Tohono Z16 maize attained a minimum LWP of about -2.38 MPa compared to -2.85/-3.00 MPa attained by Makueni DLC and Katumani Comp. B, respectively. The susceptibility of these latter two maize varieties to water stress is documented by the fact that they quickly leave their hydrature level early in the morning compared to Tohono Z16 maize which tends to maintain its level for a relatively longer period of time. As a result of this study, it is strongly recommended that Tohono Z16 be incorporated into the maize breeding programme at NDFRC, Katumani. It has been shown that Tohono Z16 maize possesses physiological characteristics which could be positively exploited by plant breeders at NDFRC, Katumani, in the search for drought adapted maize cultivars for the semi-arid areas of SE-Kenya.