EVALUATION OF DEFICIT IRRIGATION AND IRRIGATION INTERVALS ON BANANA WATER USE EFFICIENCY IN KISII, KENYA

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ABSTRACT

Water is a scarce natural resource with no known replacement. Insufficient precipitation in arid and semi-arid regions of East Africa contribute to less water available to crops. Appropriate management of agricultural water is of utmost importance. This study evaluated the effects of three irrigation levels (IL) and three irrigation intervals (II) on the vegetative growth and yield of East Africa Highland Banana (Musa spp., AAA-EAHB), cv Ng'ombe. Banana plantlets were planted in a rain-shelter and laid out in a randomized complete block design (RCBD). Levels of water applications were 100%, 90% and 80% of evapotranspiration while 4, 6 and 8 days were used as irrigation intervals to develop treatment combinations noted as IL80.D4, IL90.D4, IL100.D4, IL80.D6, IL90.D6, IL100.D6, IL80.D8, IL90.D8 and IL100.D8. Based on crop, soil and climate data of the study area, CROPWAT 8.0 model was calibrated and used to calculate irrigation water requirements. Local Climate Estimator software of FAO (New_LocClim) was used to provide approximations of climatic conditions because actual data required were not available. Crop data collected over 18 months were subjected to analysis of variance (ANOVA) using the general linear model (GLM) procedure of SAS at 0.05 significance level. Deficit irrigation and irrigation intervals had a significant effect on some important growth parameters and yield of banana. Those parameters include pseudostem girth, plant height, leaf area and distance between leaves. Yield and most of those parameters were not significantly different at IL100.D4 and IL.90.D4. Calculated irrigation water productivity (IWP) was superior at IL90.D4 treatment with 6.2 $kg.m^{-3}$. Developed regression models revealed that pseudostem girth at all growth stages was a good parameter to predict banana yield. CROPWAT 8.0 model's estimation of the yield of East Africa highland Banana group at various levels of irrigation and irrigation intervals. Deficit irrigation implemented through short irrigation intervals on banana is an efficient way of saving water without affecting the growth and yield. The findings of this study will contribute to increased water use efficiency, especially in areas with water shortages, like arid and semi-arid regions.

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