Effects of drought stress and potassium on the growth and yield of locally planted sweet corn

ABSTRACT

Drought stress is an abiotic factor affecting growth and yields of crop plants globally. The growth and yield performances of Thai Super Sweet (TSS) corn variety treated with drought stress levels (29.00%, 14.50% and 7.25% Soil Moisture Content, SMC) and potassium rates (30, 60 and 90 kg/ha) were investigated in an insect-proof net-house of Faculty of Sustainable Agriculture (FSA), Universiti Malaysia Sabah, Sandakan Campus, Malaysia. Drought treatment was applied at the flowering stage (period of tasseling to complete silk emergence) and lasted for 20 days. Experimental units were arranged factorial completely randomized design with four replications. Parameters of growth, chlorophyll content, proline content and yield were measured and analysed statistically in this study. Plant height, first cob height from the soil surface, fresh cob weight, grain number per cob, 100-grain weight and free proline content showed interaction effects among the drought and potassium treatments while cob length showed significant effect among drought stress treatments and relative chlorophyll content showed significant effect among potassium rates treatments. It may be concluded that 7.25% SMC + 60 kg/ha K was adequate for irrigation and fertilization for the corn plants as there was no significant difference observed when compared to the control treatment, 29.00% SMC + 60 kg/ha K. Corn plants treated with 7.25% SMC + 60 kg/ha K expressed tolerance response through the higher level of proline content which aid in resisting drought stress and hence was able to perform the best overall yield components. The irrigation cost that can be saved is RM722.90 per hectare with 7.25% SMC. Thus, irrigation reduced to 7.25% SMC can be recommended to the farmer to reduce the cost of irrigation and hence to obtain a better yield. Further research should be conducted to study the drought stress and potassium effects on other corn varieties and in the open field trial.