

Screening of Sugarcane Varieties for Tolerance to Water Deficiency Using Containers

Misheck Chandiposha, Godfrey E. Zharare and Muntubani D. S. Nzima

Abstract

The negative effects of water deficiency in sugarcane production caused by climate change on the productivity of sugarcane can be mitigated by drought tolerant varieties. A 14×2 factorial arrangement in completely randomised design replicated three times was used to screen 14 varieties for drought tolerance at the Zimbabwe Sugar Experiment Station (ZSAES). The first factor was the sugarcane varieties viz ZN1, ZN2, ZN3, ZN4, ZN5, ZN6, ZN7, ZN8, ZN9, ZN10, CP72–1312, NCo376, N14, and CP72–2086. The second factor comprised of two levels of irrigation, namely, well-watered (100% by volume) and water-deficit stressed (30% by volume). The parameters measured in this study which included tiller count, leaf SPAD index, total plant dry mass, photosynthetic rate, and leaf temperature were found not suitable for screening sugarcane for tolerance to water-deficit stress. Water-deficit stressed varieties ZN1, ZN8, ZN10, and N14 had the tallest stalks. Varieties CP72–2086, ZN2, ZN5, CP72–1312, ZN4, ZN6, and ZN9 were stunted, indicating that they were probably drought-sensitive. Leaf vapour pressure deficits of varieties ZN8, ZN10 and N14 were higher in water-stressed plants than in the well-watered ones. The vapour pressure deficit of well-watered NCo376 plants was higher than that of water-stressed plants. Furthermore, the stomatal conductance of water-stressed NCo376 plants was greater than that of the other varieties tested, showing more tolerance to drought. Based on stem height, stomatal conductance, vapour pressure deficit, transpiration rate and dry matter parameters measured in the present study, sugarcane varieties that are recommended to cane farmers in Zimbabwe when faced with drought are NCo376, ZN1, ZN8, ZN10 and ZN14.