

Photosynthetic responses of forage sorghums to salinity and irrigation frequency.

ABSTRACT

The responses of forage sorghum [*Sorghum bicolor* (L.) Moench] varieties to salinity and irrigation frequency were studied from December 2007 to December 2008. Two salt tolerant varieties of forage sorghum namely Speedfeed and KFS4 were grown under salinity levels of 0, 5, 10 and 15 dS m⁻¹ and irrigated when the leaf water potential reached -1(control), -1.5 and -2 MPa. Salinity and irrigation frequency significantly (P<0.01) affected leaf water potential, chlorophyll content, photosynthetic rate and stomatal conductance. Variety×salinity interaction was significant on leaf water potential and stomatal conductance. The three factors interaction was significant (P<0.01) on photosynthesis and stomatal conductance. Though both varieties were sensitive to salt and water deficit, the KFS4 variety had 7.4, 13.3, 9.1 and 5.8% higher leaf water potential, chlorophyll content, photosynthetic rate and stomatal conductance, respectively, compared to Speedfeed, hence KFS4 is more tolerant to stress conditions compared to Speedfeed variety. Combination effect showed when irrigation frequency is delayed at salinity level of 10-15 dS m⁻¹, the differences between irrigation at -2 MPa and other two irrigation frequencies (-1 to -1.5 MPa) were evident. Combination effect of high salinity and low water availability had an adverse effect on photosynthesis rate and stomatal conductance. As photosynthesis required water in the process, when irrigation was delayed from the leaves water potential of -1 to -2 MPa, the chlorophyll content, photosynthetic rate and stomatal conductance decreased by 43.4%, 13.8% and 27.6%, respectively. The decline was mostly between irrigation at -2 MPa and other two irrigation frequencies, it means irrigation of forage sorghum can be delayed till leaf water potential reaches -1.5 MPa, which takes about two weeks time.

Keyword: Salinity; Irrigation frequency; Physiology; Forage sorghums.