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Effect of irrigation interval and water salinity on growth of vetiver (*Vetiveria zizanioides*)

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Abstract

The purpose of the present study was to investigate the limits of irrigation water salinity and soil water content for growth inhibition of vetiver. Moreover, different models were studied to describe the root water uptake and plant top growth under salinity and water stresses in a pot experiment. Irrigation treatments consisted of three irrigation intervals (3, 6 and 9-day). The salinity levels of the irrigation water were 0.8 (tap water), 10, 20 and 30 dS m^{-1}. It is concluded that by enforcing salinity and increasing its level up to 30 dS m^{-1}, no significant decline in the top dry matter (TDM) has been observed. However, in the salinity level of 30 dS m^{-1} increasing of soil water stress caused TDM to decrease. The maximum amount of leaf area index (LAI) was observed at water salinity level of 0.8 dS m^{-1} and as the salinity increased, it decreased. However, at different water salinity levels, the reduction of LAI was not significant. Moreover, the results showed that the water stress did not have significant effects on reduction of LAI separately, while the water salinity did. The thresholds of water salinity and irrigation intervals for affecting vetiver's root were between 20 and 30 dS m^{-1} and 6 days (80% soil available water depletion), respectively. Moreover, the threshold values of soil salinity were 13.8 dS m^{-1} for top and 19.4 dS m^{-1} for root growth. Then, it can be concluded that the top growth is more sensitive to the water salinity, than the root one. Therefore, in terms of economic, if using root is more substantial, root production would be more beneficial. The growth reduction per unit increase in soil salinity for top growth and root growth are 2% and 3% per dS m^{-1}, respectively. Therefore, top and root growth affected similarly by increasing the soil salinity. Relative yield response factor to water stress was 0.472 that showed the vetiver resistance to soil water stress. It is