

Abstract

In this study, the effect of four irrigation methods including irrigation via fixed furrow with fresh water (FF), irrigation via saline water (SS), irrigation via fixed furrow with saline and fresh water (FFS) and irrigation via alternate furrow with saline and fresh water (AFS) on growth parameters, yield, water and important nutrient uptake and the salt accumulation in soil was investigated as a complete randomized block design. Results showed that applying AFS treatment had a positive effect on growth parameters including leaf area index, crop growth rate, net assimilation rate, relative growth rate, leaf area index duration, leaf weight ratio while SS and FFS treatments caused a significant reduction in the mentioned parameters compared to FF treatment. Total crop evapotranspiration during the growing season under FF treatment was 901.2 mm. crop evapotranspiration for AFS, FFS and SS treatments were significantly 6.3, 9.9 and 12.3 percent lower than that for control treatment, respectively. Despite a significant reduction in the total biomass under FFS (6.34 Mg ha^{-1}) and SS (5.17 Mg ha^{-1}) treatments compared with that for FF treatment (7.89 Mg ha^{-1}), a favorable total biomass under AFS (7.7 Mg ha^{-1}) caused, 13.2 and 33.8 percent increase in water use efficiency under AFS treatments compared with those for FFS and SS treatments, respectively. Although, applying SS and FFS treatments caused a significant reduction in crop nutrient uptake, no significant reduction was observed in total crop nutrient content between AFS (150.3 N , 129.6 K and $21.4 \text{ P kg ha}^{-1}$) and FF (160.9 N , 134.8 K and $21.4 \text{ P kg ha}^{-1}$) treatments. Salt accumulation in soil under AFS treatment was also lower than those for FFS and SS treatments. Thus, it could be concluded that having 6.3 percent reduction in crop water use and supplying 50 percent of crop water demand by saline water resources and having reduction in crop nutrient demand, applying this irrigation method would protect the economic and environmental issues in the irrigated agriculture in the study area.

Key words: Nitrogen, Phosphorous, Potassium, Saline water, Sorghum, Root water uptake.



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