Effect of Partial Root Zone Drying Irrigation with Saline Water on Qualitative Yield of Sunflower

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Abstract

The scarcity of freshwater and increasing water demand for irrigation has led to the application of new irrigation methods and also use of saline water resources. For this purpose, a field study was conducted in two crop seasons (2014 and 2015) for evaluating the effect of quantity and quality of irrigation water on morphological attributes and quality of sunflower in the experimental farm of Sari Agricultural Sciences and Natural Resources University. Treatments were arranged as factorial based on randomized complete block design with three replications. treatments included full irrigation with fresh water (FI), full irrigation with saline water (SI), full irrigation with alternative use of saline water and fresh water (FSI), partial root zone drying irrigation with fresh water (PRD_1), partial root zone drying irrigation with saline water (PRD_2) and partial root zone drying irrigation with alternative use of saline and fresh water (PRD_3). Saline water with an electrical conductivity of 5.4 dS/m was obtained from 20 percent mixing of Caspian seawater with fresh water. The results showed that, in most morphological characteristics, significant difference was not found between the treatments of PRD_1, PRD_3 and FSI compared with FI. The highest oil content (56%) was obtained from PRD_2 and PRD_3. SI treatment had the lowest oil content. The maximum oil yield was found in treatments FI and PRD_1 with amounts of 1831 and 1783.5 kg per ha, respectively. The lowest level of oil and protein yield was found in PRD_2 and SI treatments in both years. It could be concluded that in the water crisis condition and the need to use less water or saline water instead of fresh water, PRD_3 and FSI methods are recommendable as the optimal management.

Keywords: Oil yield, Alternative use of saline water, Seawater irrigation, Mazandaran.

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