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EFFECT OF WATER STRESS ON WATER USE EFFICIENCY AND YIELD OF NIGELLA SATIVA IN KERMANSHAH PROVINCE IN THE WEST OF IRAN

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ABSTRACT Irrigation water is the most important limiting factor for agriculture during the hot and dry summer period of specific regions. Limited availability of irrigation water requires fundamental changes in irrigation management and urges the application of water saving methods. A generally applicable procedure is to assess the benefits of changing irrigation water management based on deficit irrigation, which is the practice of deliberately under irrigating field crops. Under these conditions, there is one way for farmers to maximize their profit. The way is to determine the water-yield relationships to choose the most appropriate irrigation scheduling for saving irrigation water. In this study drip irrigation tape and furrow irrigation methods for water use efficiency and the response of Nigella sativa to water deficit were investigated. This experiment conducted at the Agricultural Research Station, Water engineering department, Razi University of Kermanshah in April 2008. For this purpose an experiment a completely randomized block design with three replications was used. Treatments were a combination of furrow irrigation (100%), drip irrigation tape (100%), drip irrigation tape (75%) and drip irrigation tape (50%). Criteria such as seed yield, straw yield, plant height, follicles diameter, follicles per plant, seeds per follicle, 1000 seeds weight, harvest index, number of plants and water use efficiency parameter were measured. The result of experiment indicated that water use efficiency, seed and straw yield, seed per follicle and harvest index were significantly affected by irrigation treatments ($p < 0.01$). There was no significant effect on plant height, follicle diameter, follicles per plant, 1000 seed weight and the number of plants. The highest water use efficiency (0.858 kg/m3) was obtained with drip irrigation tape 50% and lowest water use efficiency (0.398 kg/m3) was obtained with furrow irrigation 100%. There was no significant effect on water use efficiency in 50%, 75%, 100% treatments. The highest seed yield (2935.3 kg/ha) was obtained with furrow irrigation (100%) and the lowest seed yield (1378.8 kg/ha) were obtained with drip irrigation tape (50%). Irrigation efficiency of different tape treatments (50%, 75%, 100%) and furrow irrigation were estimated 100%, 100%, 90.96% and 49.14% respectively. Uniform Efficiency was obtained 89.3%. It was suggested that the deficit water condition drip irrigation tape (50%) be used to produce Nigella sativa.

Keywords: Furrow irrigation, Tape irrigation, Nigella sativa, Water use efficiency.