

Abstract:

Water is the most important factor limiting agricultural production over the country. One of the ways to optimize the use of water is to use the modern irrigation methods such as drip irrigation. In this research, the effect of two irrigation systems (surface and subsurface drip irrigation) on water used efficiency and yield of *Rosa damascena* under three levels of irrigation water requirement (100, 70, and 40% potential evapotranspiration) has been evaluated. For this purpose, an experiment was performed as a split plots design based on the randomized complete blocks with three replications in Agricultural and Natural Resources Research Center, Kerman Province at the research station Joopar in 1392. So, there were 18 experimental plots containing 4 trees per plot, 2.5 m apart. In subsurface drip irrigation treatment, the irrigation pipe was installed at depth of 30 cm. The number of branches per plant, shading diameter, plant height, number of blooms, petal weight and fresh weight of a flower were measured. These measurements were used to calculate the ratio of petal weight to full flower weight, total dry weight, flower dry matter percent and yield. In this experiment, irrigation water use efficiency was calculated as the ratio total yield to total water used. *Rosa damascena* essential oil was extracted using a Clevenger apparatus. Finally, the data obtained were analysed statistically and comparison of the means was performed by Duncan's test (at a 5% significance level). The results showed that the plant height, number of blooms, fresh weight of a flower, petal weight, the ratio of petal weight to full flower, flower dry matter percent, essential oil yield and efficiency, flower yield and irrigation water use efficiency are not significantly different in both irrigation systems. While different irrigation treatments have a meaningful effect on all traits except flower dry matter percent and ratio of petal weight to full flower. The highest yield (3588.9 kg/ha) was related to 100% potential evapotranspiration and the highest irrigation water use efficiency (3.68 kg/(ha.m³)) was related to treatment of 40% potential evapotranspiration. The highest essential oil percent was obtained from 70% potential evapotranspiration. Overall, the 70% potential evapotranspiration treatment was found to be the best treatment, because a reduction of 30% in irrigation water would result in only 16% reduction of flower yield and 7% reduction of essential oil yield. Meanwhile the saved water could be used for irrigation of more agricultural land. According to the survey results there was no difference between the two irrigation systems however surface drip irrigation system is eventually recommended as it has no cost of drilling and insertion of the drip tape below the soil surface.

Keywords: *Rosa damascena*, Drip irrigation, Essence and Irrigation water use efficiency.



*University of zabol
Graduate school
Faculty of Soil and Water
Department of Water Engineering*

*The Thesis Submitted for the Degree M.Sc.
In the Field of Irrigation and Drainage*

*Evaluation of surface and subsurface
drip irrigation systems on yield of Rosa
damascene in Kerman province*

*Supervisor:
Dr. M. Delbari*

*Advisors:
M. Sc. N. Koohi*

*By:
Asma Moghbeli*

September 2014