

Turkish Journal of Agriculture and Forestry

Turkish Journal

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
Agriculture and Forestry

Deficit Irrigation Analysis of Red Pepper (*Capsicum annum L.*) Using the Mathematical Optimisation Method

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Abstract: The objectives of this study were to analyse deficit irrigation with the mathematical optimisation method using the water-yield relationship and cost functions of red pepper, and to determine alternative deficit irrigation water levels. For this purpose, the effect of 5 different irrigation levels (I_1 , I_2 , I_3 , I_4 , and I_5) on dry yield (DY) was determined using a line source sprinkler irrigation system in Kahramanmaraş, Turkey in 1999 and 2000. The average water amounts applied with I_1 (non-water stress treatment) and I_5 (water stress treatment) for the 2 years were 913 and 296 mm, and I_2 , I_3 , and I_4 varied between these extremes. The quadratic production and cost functions were established between the average irrigation water and DY, and between water and total costs, respectively. Maximum irrigation water (W_m), economically optimum level of irrigation water for land-limiting (W_l) and water-limiting (W_w), and equivalent deficit level for land-limiting (W_{el}) and water-limiting (W_{ew}) for red pepper yield were calculated as 1026, 815, 752, 603, and 551 mm, respectively. The most economical irrigation levels, in terms of both net income from per unit of land and water, were 815 mm and 752 mm, respectively. At W_{ew} level, field irrigation was 1.86 times greater than at the W_m level, without reducing net farm income. The findings of this study suggested that water resources should be distributed over the entire farm, rather than concentrated to maximise yields on particular parts of the farm.

Key Words: Line source sprinkler, deficit irrigation, *Capsicum*, strategic water levels

Turk. J. Agric. For., **30**, (2006), 203-212.

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