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Optimizing Pistachio Irrigation Management Using the Relationship between Echo-physiological Characteristics and Water Stress

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ABSTRACT

In this research, some of the echo-physiological characteristics of pistachio trees were studied to understand crop response to drought stress and determine the best irrigation interval. This experiment was carried out in an orchard with a sandy loam textured soil and a commercial cultivar of pistachio named Ouhadi grafted on *Pistacia vera L.* rootstock for three years. The irrigation system selected was surface flooding with intervals of 30, 50, 80, and 110 days. These intervals were chosen so as to resemble common irrigation intervals of pistachio orchards in the region. This enabled a comparison between the best and worst conditions of trees in respect to drought stress. Total irrigation water received was a constant depth of water to all treatments. Quantitative and qualitative yield such as weight of fresh and dry nuts, percent of blank and split nuts, and number of nuts per ounce, vegetative and echo-physiological characteristics were considered and measured. In terms of yield quantity and quality, the results showed vegetative and echo-physiological attributes to be significantly different between the treatments of 30, 80 and 110 days irrigation intervals. This means that with an increase in irrigation intervals and considering soil water holding capacity, soils were not able to provide enough moisture for the plant to carry out its normal metabolic activities. However, in the prolonged irrigation intervals, there were not much differences between treatments i.e. the pistachio tree could adapt itself to the naturally occurring environmental stress conditions.

Keywords: Drought stress, Relative water content, Water use efficiency.

INTRODUCTION

The Pistachio tree is a drought resistant fruit specie. As with other trees, irrigation increases the yield, but particularly in pistachio, it also improves the nut quality and dampens the normal alternate bearing pattern (Kanber *et al*. 1993; Goldhamer, 1995). Pistachio plantation areas in the Kerman province (Iran) are faced with the problems of water stress and shortage of water resources as the limiting factor. In these areas, water is the most important factor limiting economic development. The population is constantly increasing and demand for water goes up while the amount of water supply is limited. Therefore, conducting research for improving the utilization of water resources in the areas of pistachio production is needful. Sepaskhah *et al*. (1982) studied one-year-old pistachio seedlings under different irrigation regimes with different salinity and found that with increasing water stress, salinity effects increased. Gholipour and Zamani. (1999) studied the effects of water stress on some basic pistachio rootstocks and concluded the importance of proline as a stress index. Walker *et al*. (1988) studied the effects of water stress and salinity on the Kerman

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