

## The Study on Effects of Magnetic Saline Water on Soil Chemical properties and permeability, Growth and Yield of Pistachio Trees

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### Abstract

Unsustainable withdrawal of agricultural water resources in the province of Kerman has caused an annual average of one-meter drop in ground watertable. Drop in groundwater levels, in addition to decreasing water resources, has caused their gradual salinization. Thus, it is necessary to carry out research to find the ways for increasing water use productivity (WUP) and new guidelines to use saline water. This research was conducted in randomized complete block design, consisting of two types of irrigation water (normal and magnetic saline water with a salinity of about 19 dS/m) and two amounts of irrigation water (85% and 100% of the water requirements of pistachio trees). Treatments were compared with a mixture of non-saline and saline water treatment as a control (with a salinity of 6.5 dS/m). Irrigation was done every 30 days, based on the irrigation frequency of the experimental plots before the project. The results showed that, in most cases, there was no significant difference ( $p < 0.05$ ) in the average growth characteristics and qualitative and quantitative characteristics of the yield in different treatments of saline water (both magnetic and non-magnetic water). In certain cases where the difference was significant, there was no clear trend. In all cases, treatment of mixed non-saline and saline water compared to non-magnetic and magnetic saline water treatments was significantly ( $p < 0.05$ ) better. Overall, in comparison with the control, the use of saline water (in both normal and magnetic treatment), caused decrease in leaf area about 20 cm<sup>2</sup>, 10% reduction in reproductive bud formation, reduced length and diameter of branches 5 cm and 1.5 cm, respectively, decreased dry weight per tree by 0.5 kg, increased blanking by 7%, decreased splitting by 10%, and increased 1.5 units in number of nut in ounce. Also, the use of saline water reduced the yield by 120 g dry weight per cubic meter of applied water (WUP). There wasn't significant difference between treatments for soil nutrient concentrations. Magnetic water had no effect on the improvement of soil salinity and sodium adsorption ratio. In all treatments in both non-magnetic and magnetic water, the final infiltration rate of water in the soil at the end of the second year, was reduced up to 31.6%, while it did not change in the control treatment. Permeability reduction in treatment with 100 percent water requirement was more compared to treatments with 85% water requirement. Seemingly, increase in the amount of irrigation water led to more sodium entry into the soil and, eventually, infiltration rate was reduced. Thus, the results showed no positive effect in the magnetic water on reducing the negative effects of salt water on the pistachio trees and soil. It seems that the effect of magnetic water on perennial plants requires longer studies (5-10 years old).

**Keywords:** Final Infiltration rate, Salinity, Water Use Efficiency

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