

Soil and Groundwater Relationships with Pistachio Yield in the Rafsanjan Area, Iran

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This study was conducted to examine the spatial variability of groundwater quality factors and to determine soil physicochemical properties in order to distinguish their relationships with pistachio yield in the Rafsanjan area, Iran. One hundred fifty-seven water samples from the wells of the studied area were evaluated for electrical conductivity (EC), sodium (Na^+), calcium (Ca^{2+}), magnesium (Mg^{2+}), sulfate (SO_4^{2-}), bicarbonate (HCO_3^-), chloride (Cl^-), total hardness, and sodium adsorption ratio (SAR). Groundwater levels of the wells were also recorded. The EC and SAR values of groundwater for some of the wells separately compared with pistachio yield in the orchards irrigated with these wells. Six pistachio gardens with the same management but in different parts were selected, and each garden was divided in two (desired and undesired) parts. In each part of these orchards, soil samples were randomly taken in three replicates from depths of 0–40 and 40–80 cm to determine soil properties. One soil profile was also excavated for soil classification in each part of these gardens. Groundwater in most of the area had $\text{EC} > 8 \text{ dS m}^{-1}$ and $\text{SAR} \geq 13 (\text{meq L}^{-1})^{0.5}$. The lowest qualities of groundwater were found in the eastern, southern, and the northern parts of the area, where water's negative effects on pistachio yield have been reported. Statistical results for selected gardens showed that pistachio yield was affected considerably by salinity and clay content of the soils. Modern irrigation techniques and mixing high-quality water with poor-quality water in the area is necessary to prevent the reduction of the water table in the area. Preparing continuous soil salinity and texture maps are recommended for proper pistachio management in the area.

Keywords EC, groundwater, pistachio yield, SAR, spatial variability

Introduction

Pistachio is one of the most important exportable products in Iran. The Rafsanjan area in Kerman Province has been recognized as one of the most important regions for pistachio cultivation through the world. Groundwater is the main source of water for domestic, agricultural, and industrial uses in this arid area. One of the most severe

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