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# Shallow groundwater contribution to pistachio water use

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**Abstract**

Pistachio can be grown in the central desert of Islamic Republic (I.R.) of Iran with adverse conditions such as shallow saline groundwater tables. The contribution of water from shallow, saline groundwater to crop water use may be important in such conditions. The objectives of this study were to determine the contributions from shallow, saline groundwater to water use of pistachio seedlings, and how this contribution was affected by groundwater depth, salinitiy, and irrigation conditions. The results indicated that an increase in groundwater depth resulted in significant increase in root depth and significant decrease in seasonal evapotranspiration (ET), transpiration, and groundwater contribution to the plant water use. Non-saline shallow (30–120 cm depth) groundwater under irrigated and non-irrigated conditions contributed 72.4–89.7% and 90.7–100.0% of plant water use, respectively. However, these contributions were 57.2–74.8% and 79.3–100.0% for irrigated and non-irrigated conditions, respectively for saline shallow (30–120 cm depth) groundwater. The effect of groundwater depths ($D$, cm) on groundwater contributions ($q$, %) was found to be influenced by the salinity levels of the groundwater (EC, dS m$^{-1}$). The linear multiple regression equations were $q = 97.5 - 1.24(\mathrm{EC}) - 0.194(D)$ and $q = 105.9 - 0.48(\mathrm{EC}) - 0.154(D)$ for irrigated and non-irrigated conditions, respectively. The maximum reductions in relative plant dry weight of 80.3% and 44.8% were occurred under non-irrigated condition and saline groundwater depth of 30 cm and non-saline water depth of 60 cm, respectively. Root depth analysis indicated that vertical root growth caused the root to reach a moist layer near the groundwater. A very close to 1:1 relationship between relative reduction in top dry weight ($1 - y/y_m$) and relative reduction in transpiration ($1 - T/T_m$) was obtained.


*Keywords:* Irrigation–drainage system; Shallow water table; Pistachio; Water requirement

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