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Distribution of water loss via evapotranspiration in a pistachio tree orchard under drip irrigation and non-irrigation conditions

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The present study aimed to measure the distribution of water loss via evapotranspiration (ET) in a pistachio tree orchard under drip irrigation and non-irrigation conditions at the experimental orchard of the Pistachio Research Institute, Gaziantep, Turkey. The experimental design consisted of a 10 × 10 m² grid system constructed of PVC pipes spaced 2 m apart (horizontally and vertically) that was placed around each tree for the drip irrigation condition (water applied every 7 days) and the non-irrigated condition. Moisture content was measured using the neutron scattering method for both treatments. Water loss via ET was estimated based on the soil water balance method, which included measurement of soil moisture, precipitation, and irrigation. Total water loss via ET under drip irrigation conditions was 518 mm vs 220 mm under non-irrigated conditions. Water loss via ET for the total soil profile and individual layers under non-irrigated conditions was higher at the four outer corners of each 10 × 10 m² grid than under irrigated conditions. Moreover, water loss via ET was the highest at the grid system pipes closest to the two laterals under irrigation conditions. In addition, the total percentage of water loss via ET was the highest at the 60–80-cm and 20–40-cm soil layers under drip irrigation and non-irrigation conditions, respectively, and the total percentage of water loss via ET was the lowest at the 40–60-cm and 0–20-cm soil layers under drip irrigation and non-irrigation conditions, respectively. Lastly, it could be considered that root density increased as water loss via ET increased.

Keywords:

drip irrigation; evapotranspiration; pistachio; root; water loss

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