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Updates on Water Use of Pistachio Orchards Grown in the San Joaquin Valley of California on Saline Soils

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Pistachio acreage is rapidly expanding in California thanks to its economic profitability and capacity to grow and produce in salt-affected soils. Our team at University of California is updating information on actual water use (ET) of mature pistachio orchards grown on saline soils under micro-irrigation methods. Actual Evapotranspiration (ETa) and Crop Coefficients (Ka) were determined for the 2015 and 2016 crop seasons on four pistachio orchards grown in the San Joaquin Valley (SJV) on grounds with increasing levels of soil-water salinity, using the residual of energy balance method with a combination of eddy covariance and surface renewal equipment. Tree canopy cover, light interception, and plant water status across the orchards were also measured and evaluated. Our preliminary results show that salinity strongly affects the tree water use, resulting in 10-30% less ET for medium to high salt-affected soils. Salinity also showed a strong effect on tree water status and light interception, as suggested by values of the Midday Stem Water Potential (ΨSWP) around 10 to 15-bar lower in salt-affected than in the control orchard, and by the intercepted Photosynthetic Active Radiation (PAR) decreasing from 75% in the control orchard to 25% in the severely salt affected grounds. The crop coefficient values we observed in this study are lower than those commonly used for irrigation scheduling in the SJV, suggesting that pistachio growers could better tailor irrigation management to the actual site-specific orchard conditions (e.g. canopy features and soil-water salinity) if they are provided updated information. Improved irrigation practices could likely lead to significant water savings and thus improve the resource-efficiency and competitiveness of pistachio production in the SJV.

Keywords: Pistacia vera L., salinity, stem water potential, surface renewal, canopy cover.