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Research Reports

Rapid Equilibration of Leaf and Stem Water Potential under Field Conditions in Almonds, Walnuts, and Prunes

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Covering a plant leaf with a reflective, water impervious bag ensures that **equilibrium** is reached between the nontranspiring leaf and the stem, and appears to improve the accuracy of determining plant water status under field conditions. However, the inconvenience of covering the leaf for 1 to 2 hours before measuring stem water potential (SWP) has constrained on-farm adoption of this irrigation management technique. A second constraint has been that the requirement of midafternoon determinations limits the area that can be monitored by one person with a pressure chamber. This paper reports findings from field studies in almonds (*Prunus dulcis*), prunes (*P. domestica*), and walnuts (*Juglans regia*) demonstrating modified procedures to measure midday SWP, making it a more convenient and practical tool for irrigation management. For routine monitoring and irrigation scheduling, an equilibration period of 10 min or longer appears to be suitable to provide accurate SWP measurements. Based on the large sample sizes in this study, we estimate that measurement error related to equilibration time for SWP can be reduced to

an acceptable level [0.05 MPa (0.5 bar)] with a sample size of about 10 leaves when using a 10-min equilibration period. Under orchard conditions where tree growth and health appears uniform, a sample of one leaf per tree and 10 trees per irrigation management unit should give an accurate mean indicator of orchard water status. Under more variable orchard conditions a larger sample size may be needed. Midmorning and midday SWP both exhibited similar seasonal patterns and responded alike to irrigation events. On some occasions, midday SWP was accurately predicted from midmorning SWP and the change in air vapor pressure deficit (VPD) from midmorning to midday, but both over- and underestimate errors [to 0.3 MPa (3.0 bar)] appeared to be associated with unusually low or high diurnal changes in VPD, respectively. Hence, direct measurement of SWP under midday conditions (about 1300 to 1500_{HR}) is still recommended.