

Irrigation Stress and Early Navel Fruit Maturity

Project Leader:

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The objective of this experiment is to measure the effects of three levels of water stress initiated approximately August 1 on navel orange fruit size, yield, sugar/acid, color, and juice percentage. The results of this experiment should provide information for early maturing navels on the relationship between fruit quality parameters such as color, sweetness, juiciness, fruit size and yield.

Unfortunately, the project was delayed a year as a result of not finding an available, suitable orchard for the experiment. Our first cooperator, after we conducted a small pre-experiment in a suitable orchard the previous year, informed us early in 2005 that they would be unable to continue cooperating with us as a result of proprietary information concerns.

On very short notice, another grower generously volunteered for our use an orchard of Beck navels in March 2005. However, after spending many hours in this orchard in the spring and early summer, including improving the water distribution uniformity of the orchard through an analysis of the irrigation design, installation of neutron probe tubes, tensiometers, water meters and a water monitoring station, we realized that the orchard would not give us data or results that would be transferable to most Beck navel orchards in the San Joaquin Valley. The trees in the orchard have an interstock, which was not obvious initially, and the top two feet of soil was heavy clay overlaying a coarse sandy loam soil. Soil water monitoring was difficult at this site because the clay portion of the profile was almost devoid of roots, and irrigation water had to pass through this thick layer before it could be absorbed by roots proliferating in the deeper sandy layer. Stem water potential measurements of well-watered trees in this orchard under hot, dry conditions are in the -11 to -13 bar range, which is lower than what normally exists for well-watered Beck navels under more typical conditions. It would be difficult to separate how much of the low water potential is attributable to the interstock and how much to the soil conditions.

In the late fall of 2005, we were able to find another interested cooperator with healthy, uniform Beck navel trees (without an interstock) on well-drained, level ground in the southern part of Kern County. The block of oranges in which the project will be established has been examined, and a tentative experimental plot has been designed. Installation of irrigation monitoring equipment will proceed in the spring, so that differential irrigation regimes can begin in late July or early August.