



# Reducing Water Use in Navel Orange Production with Partial Root Zone Drying

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*From 1 July 2007 to 20 September 2007, partial root zone drying (PRD) treatments delivering 25% and 40% less water per irrigation than the well-watered control reduced the total amount of irrigation water applied to 'Washington' navel orange trees by 41% and 45%. A conventional irrigation treatment delivering 40% less water than the control reduced the amount of irrigation water applied relative to the control by 55%. The effect of these differences in water-use on yield, fruit size and quality will not be known until our first harvest in January 2008.*

The California citrus industry produces "picture perfect" navel orange fruit for the fresh fruit market on 124,385 irrigated acres. The cost of irrigation water is a major expense associated with citrus production. Regulated deficit irrigation (RDI) and partial root zone drying (PRD) are irrigation strategies designed to increase water-use efficiency in fruit tree crops to further reduce production costs. Both methods limit vegetative shoot growth in favor of crop development with the goal that neither the current nor return yield is negatively affected. With RDI, water deficit is applied in an orchard in a carefully controlled manner during a specific period in the phenology of the tree. When using RDI, timing is critical. In contrast, PRD is the practice of alternately wetting and drying the root zone on two sides of the tree and is employed year-round.

Our research goal is to test the feasibility of using partial root zone drying (PRD) to reduce the amount of water used in citrus production and, thus, increase grower net income.

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applied to commercially bearing 'Washington' navel orange trees 41% and 45%. A conventional irrigation treatment delivering 40% less water per irrigation than the control reduced the amount of water applied relative to the control 55%. The effect of these differences in water-use on yield, fruit size and quality will not be known until our first harvest in January 2008.



This is Block 13 at UCR Citrus Research Center and Agricultural Experiment Station - data logger recording soil moisture content measured by in ground soil moisture meters. The data are used for scheduling when and how much water to apply to 'Washington' navel orange trees in the partial root zone drying (PRD), reduced conventional irrigation (CI-RR) and control irrigation (CI) treatments.

Our results, thus far, are consistent with results obtained using PRD in commercial sweet orange production in Australia. In a 4-year field study, 40% less water was applied by PRD than the fully irrigated control with no significant effect on fruit number, size or quality, (Loveys et al. 2000. Acta Hort. 537:187–197).



Block 13 at UCR Citrus Research Center and Agricultural Experiment Station - controls for applying the partial root zone drying (PRD) and reduced conventional (CI-RR) and control irrigation (CI) treatments to 'Washington' navel orange trees.

## **Collaborative Efforts**

The contributions of the UC Riverside Agricultural Operations staff (staff leaders, Steve Cockerham, Sue Lee, Lynn Morrison and Dan Bowles) to the success of our Prosser Trust project were critical. The Agricultural Operations team did an excellent job in designing and installing the complex irrigation system - multiple lines, valves, regulators, flow meters and timers - that was required for us to conduct our research with the precision and number of treatments and replications prescribed. When we took over the system, they had it all clearly labeled, color-coded and conveniently organized. Our thanks for a job well done.

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