Drought Survival Strategies for Established Almond Orchards on Shallow Soil

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PROJECT SUMMARY

Objectives:

- Determine the second year carryover effects on almond production and tree survival of either reducing the tree canopy by 50% or treating it with kaolin (Surround) spray, under non-irrigated (rainfed) conditions.
- Determine the second year carryover effects on almond production and tree survival of restricting irrigation to 5" and 10" of water applied to both kaolin (Surround) sprayed trees and non-sprayed trees (control), compared with fully irrigated control trees.
- Relate shoot growth and spur survival patterns in the different treatments to the carryover effects observed.

Background and discussion:

California almond growers have been forced to contend with serious water shortages in the past, and future shortages are almost certain. Regulated water allocations remain contentious, and the state's collective thirst continues to mount.

This multiyear research project, under way at the Nickels Soil Laboratory, is designed to test various alternative strategies likely to enable established orchards situated on shallow soil to survive a one year drought, which was imposed in 2009. The site represents mature (19 years in 2009) trees irrigated with a single line drip system on a low water holding capacity soil. Hence, it should be representative of an extreme drought stress experience.

"Survival" is the operative phrase, not just for the trees, but also for the grower's business. Previous almond research has focused on almond production under various levels of irrigation, but not on what growers can do when faced with a single year of severe drought. Key questions being asked in this project are 1) how severe does stress need to be to cause tree death/decline, 2) is tree survival improved by distributing a small amount of water over the season, 3) how long do yield carry-over effects last, and 4) do severe pruning and/or kaolin sprays in the drought year reduce the negative effects of drought?

To date, all of the trees have survived, but some canopy dieback has been expressed in the most stressed (non-irrigated) trees. However, the degree of canopy dieback is small, compared to the 50% reduction imposed by pruning, and hence this practice was not effective. Soil moisture measurements showed water uptake to a depth of 10' during the drought year, indicating that even single line drip irrigated trees may establish a very deep root zone. Drought effects were reduced by even small amounts of seasonal applied water (3.6"), indicating that this is a reasonable approach to lessen the impacts of drought. Yield was more severely reduced by carryover effects (reduced bloom and set) in the year following drought, than by drought year effects (reduced nut size and number). Yield substantially recovered in the second and third year, although a trend for lower yield with stress still remained.

Project Cooperators and Personnel: John Edstrom and Franz Niederholzer, UC Cooperative Extension, Colusa County; Allan Fulton, UCCE, Tehama County; Bruce Lampinen, UCCE, Davis; Larry Schwankl, UCCE, Kearney Agricultural Center; Carolyn DeBuse, UCCE Solano / Yolo Counties

For More Details, Visit

- Poster location 6, Exhibit Hall A & B during conference; or on the web (after January 2013) at www.almondboard.com/researchreports
- 2011.2012 Annual Report CD (11.HORT8.Shackel); or on the web (after January 2013) at www.almondboard.com/researchreports