Optimization of Water Use and Nitrate Use for Almonds Under Micro-Irrigation

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PROJECT SUMMARY

Objectives:

- Collect a full range of data, from both ongoing field tests and other sources, as inputs for evaluating the computer-based HYDRUS-2D simulation model as an optimization tool applicable to almond research and management.
- Evaluate the HYDRUS-2D model.
- Use the existing MATLAB software suite to customize the HYDRUS-2D model as a system-design and event-scheduling tool for use by the growers.
- Refine and orchard test the tool, piggybacking on an existing fertigation rate trial.

Background:

This new, multiyear project is premised on a dictum formulated by Tom Bruulsema and colleagues that optimal fertigation practice can be realized only by focusing on the "4 R's"—the right source, right rate, right place, and right time.

Accordingly, the project research team has devised a computer-based modeling methodology aimed at identifying the best management practices for operating micro-irrigation systems in almond orchards.

It is planned to encompass all of the complexities associated with the myriad and dynamic interactions of water, nutrients, soil, air, and root systems.

It will provide orchard managers with a data-rich and graphic management tool for tracking—and also predicting—the flow and transport of water uptake at any time or location throughout the root system. It also will reveal how and where nutrients move through the root system.

Another anticipated advantage of using this multifaceted tool will be in the form of resource conservation. It will help to minimize the loss of water from leaching and evaporation, of nutrients from leaching and denitrification, and of crop loss from water stress and salinity stress.

Further, the tool will minimize the loss of time and other resources, thanks to its predictive capacity, which is likely to enhance problem solving. In addition, it has the potential to prove useful in helping growers and the almond industry deal with emerging regulations.

This project is one of several currently being pursued as part of a broad-reaching and interdisciplinary research program focused on fostering best management strategies for almond and pistachio in California.

Supported jointly by the Almond Board of California, the Pistachio Research Board, and the U.S. Department of Agriculture, this program may be viewed figuratively and informally as a valuable and specialized information and management tool.

Project Cooperators and Personnel: Patrick Brown, Blaine R. Hanson, and David R. Smart, University of California, Davis

For more details, visit

- Poster location 17, Exhibit Hall, Session 3; or on the web (after January 2011) at AlmondBoard.com/AICposters

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