GETTING THE MOST OUT OF EVERY DROP

IRRIGATION RESEARCH: THE BASICS + BEYOND

California Almond growers are leaders in water-use efficiency, largely due to decades of Almond Board-funded research and innovation. In fact, improvements in production practices and water-saving technologies over the past 20 years have helped almond farmers reduce the amount of water it takes to grow one pound of almonds by 33%[1].

To continue to be leaders in this area, Almond Board remains committed to funding irrigation research—both to better understand and refine the basics that support grower day-to-day needs, as well as providing a platform for creative, cutting-edge solutions key to innovation. Here is a sampling of projects currently underway:

BASIC RESEARCH

LYSIMETER WATER-USE MEASUREMENTS:

using a lysimeter (a very large, continuously weighing flowerpot) planted with an almond tree to precisely determine water used by the tree and soil (evapotranspiration) and increase understanding of water saved by reducing irrigation at nonessential times in the growing season[2]

WATER PRODUCTION FUNCTION:

relating water applied to almond yield potentials to help growers understand tradeoffs, make informed decisions with limited resources and achieve the most crop per drop[3]

CROP-WATER MODELING:

developing a water-demand model that accounts for the complex interaction between almond tree physiology, weather conditions and soil characteristics that can be leveraged to improve water-use efficiency while maintaining almond tree yield and nut quality[4]

BEYOND RESEARCH

SITE-SPECIFIC WATER-DEMAND INSTRUMENTS:

validating and optimizing field-level measures of water used by the tree and soil (evapotranspiration) for an irrigation management tool that could provide growers with site-specific amount and timing of irrigations to meet tree needs[5]

SAP-FLOW SENSORS:

developing and adapting sap-flow sensors for almonds—a research tool that can be applied to many trees within an orchard to quantitatively measure water use and even distinguish differences in water requirements between tree varieties—with an eye toward commercialization[6]

LEAF MONITORING FOR ZONAL IRRIGATION:

demonstrating an alternative to time-consuming and labor-intensive methods of measuring plant water needs using a network of leaf sensors installed on trees and tied into a wireless network that can account for in-field soil variations to make zonal irrigation management decisions[7]

DID YOU KNOW?

In 2016, Almond Board hired an expert in irrigation and water efficiency to interface with growers in the field and use existing tools and research to help those across the spectrum of irrigation management precision improve.

1. University of California, 2010. Food and Agriculture Organization of the United Nations, 2012. Almond Board of California, 1990-94, 2000-14.
2. 16-HORT22-Shackel. Lysimeter – Whole Tree ET Response to Mild and Moderate Water Stress.
3. 16-HORT17-Shackel. Almond Water Production Function.
4. 16-HORT27-DeJong. Development of an Operational Dynamic Crop Model for a Better Understanding of Water Management of Almond Orchards in California.
5. 16-HORT28-McElrone/Parry. Evaluating the Effectiveness of Surface Renewal and Other Technologies to Determine Almond Tree Water Use and Water Stress. 6.16-HORT21-Gilbert. Applying an Improved Heat Ratio Method Sap Flow Sensor to Almonds to Test for In-field Variation in Water Use.
7. 16-HORT24-Upadhyaya. A Leaf Monitoring System for Continuous Measurement of Plant Water Status to Assist in Irrigation Management of Specialty Crops.

california almonds
Almond Board of California

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BRINGING RESEARCH TO REALITY

Almond Board has led the way in translating years of research findings, both industry-funded and otherwise, into two web-based, interactive decision-support tools, also known as calculators. Focused on irrigation scheduling and nitrogen budgeting, these tools are available to growers at no cost and are designed to streamline decision making and regulatory reporting requirements while helping protect water quality and quantity.

IMPROVING IRRIGATION

Using grower-submitted data about orchard and irrigation system setup, this calculator links those factors with local weather data and other inputs to generate irrigation run-time schedules that advise the amount and timing of irrigations. This allows growers to better understand an orchard's irrigation needs, which has positive impacts on tree health and yields, leading to more crop per drop.

FINE-TUNING FERTILIZATION

A research-based predictive model, this tool advises how much and when to apply nitrogen fertilizer. Growers input data about yield estimates, tissue sampling and nitrogen available from other sources, which determines the orchard's nitrogen demand during the growing season and helps meet record-keeping requirements of California's Irrigated Lands Regulatory program. This allows growers to get the most out of their input investment while protecting water quality.

GROWING MORE THAN JUST ALMONDS

Just as irrigation research produces multiple benefits, such as improved practices, fine-tuned management and new technology, almond trees and the water used to grow them produce multiple products. In 2015, the California Almond industry grew[1]:

1.9 BILLION LBS OF
KERNELS
a healthy, nutrient-dense, protein powerhouse of a food

3.8 BILLION LBS OF
HULLS
a nutritious feed for dairy cows that reduces the amount of water used to grow other feed crops

1.3 BILLION LBS OF
SHELLS
a natural source of livestock bedding and other value-added uses

130 MILLION[2]
TREES
which clean the air and, at the end of their lives, are used to create alternative energy or even improve soil quality

1. Almond Board of California. Supplement to Almond Industry Position Report. July 2016.
2. USDA-NASS. 2015 California Almond Acreage Report. April 2016. USDA-NASS. 2016 California Almond Objective Measurement Report. July 2016.