

WATER MANAGEMENT AND EFFICIENCY

Almond Irrigation Improvement Continuum

Water Management and Efficiency is one of four key components of the Accelerated Innovation Management (AIM) program adopted by Almond Board of California's (ABC) Board of Directors. ABC has long been a research-based organization and will continue to support traditional research and sustainability initiatives, but is now placing greater emphasis on the innovative almond farming practices that will be required to meet the future needs of the California almond industry, as well as the consumer, the community and the planet. The Water Management and Efficiency initiative focuses on accelerating almond grower transition and adoption of research based, commercially available, and increasingly water efficient irrigation management and scheduling tools. An Almond Irrigation Improvement Continuum has been developed to describe the steps of this transition and is summarized on the reverse.



The continuum denotes three proficiency levels with a comprehensive program of irrigation management and scheduling practices in five key areas and how to effectively integrate them at each level:

- Measuring irrigation system performance and efficiency
- Estimating orchard water requirements based on evapotranspiration
- Determining the water applied
- Evaluating soil moisture
- Evaluating plant water status

Proficiency level 1.0 (minimum) outlines research-based irrigation management practices that are within reach for all California Almond growers.

Proficiency level 2.0 (intermediate) and level 3.0 (advanced) advance practices to more sophisticated levels that attain even more "crop per drop."

The Almond Board's objective through this AIM initiative is to assist all almond growers in meeting level 1.0 proficiency. Beyond this, the Almond Board will work with growers to progress along the continuum to levels 2.0 and 3.0 proficiency. This will be done in partnership with the many trusted and respected technical experts and resources available to California Almonds, such as University of California Cooperative Extension.

A full Irrigation Improvement Continuum and comprehensive background materials are in development and will be posted on the Almond Board's website, providing "one stop shopping" for almond irrigation management at all levels. It will answer questions like: What do I need to know? What are the key resources I need? How do I execute?

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Use the proficiency levels and guidance below to adopt good irrigation water management (IWM) practices for almonds. Each level of the Almond Irrigation Improvement Continuum will provide the tools necessary to obtain measurements needed to best schedule and manage almond irrigation.

Measurement	1.0 Minimum	2.0 Intermediate	3.0 Advanced
Orchard Water Requirements	Estimate orchard water requirements using “normal year” regional ETc to estimate irrigation demand on a monthly time step.	Estimate orchard water requirements using “normal year” regional ETc – adjusting for current weather and cover crop use on a bi-weekly time step.	Estimate orchard water requirements using “normal year” regional ETc to plan irrigations then use real time ETc data to correct the schedule on a weekly time step.
Irrigation System Performance	Evaluate irrigation system for pressure variation and average application rate at least once every 3 years. Correct any diagnosed system performance problems.	Assess distribution uniformity and average application rate by measuring water volume at least every 3 years. Correct any diagnosed system performance problems.	Assess distribution uniformity and average application rate by measuring water volume at least every 2 years. Correct any diagnosed system performance problems.
Applied Water	Use application rate and duration of irrigation to determine water applied.	Use water meters to determine flow rate and water applied.	Use water meters to determine applied water and compare to crop water use (ETc, evapotranspiration) to determine irrigation efficiency.
Soil Moisture	Evaluate soil moisture based upon feel and appearance by augering to at least 3-5 feet. Monitor on a monthly time step.	Use manually operated soil moisture sensors to at least 3-5 feet and monitor on a bi-weekly time step. Use information to ensure calculated water is not over/under irrigating trees.	Use automated moisture sensors that store data over time. Review weekly to ensure calculated water is not over/under irrigating trees.
Plant Water Status	Evaluate orchard water status using visual plant cues just prior to irrigation or on a bi-weekly time step.	Use pressure chamber to measure midday stem water potential just prior to irrigation on a monthly time step. Ensure calculated water applications are not over/under irrigating trees.	Use pressure chamber to measure midday stem water potential prior to irrigation on a weekly time step. Ensure calculated water applications are not over/under irrigating trees. Use it to assess when to start irrigating.
Management			
Integrating Irrigation Water Management IWM Practices	Combine irrigation system performance data with “normal year” regional ETc to determine orchard-specific water requirements and schedule irrigations. Check soil moisture with an auger and/or monitor plant water status to verify scheduling.	Use irrigation system performance data with regional estimates of “normal year” ETc to schedule irrigations and adjust based on feedback from monitoring soil moisture or crop water status.	Develop an irrigation schedule based on predicted “normal year” demand, monitor status using soil and plant based methods. Adjust irrigation schedule with real-time ETc as the season progresses.