

# Almond Orchard Profitability and Longevity Under Differential N Fertility and Irrigation

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## PROJECT SUMMARY

### Objectives:

- Document the incidence or lack of alternate bearing which may develop after several years of high yields followed by a very low yield. Is this a one year carbohydrate recovery or the start of a regular “on-year / off-year cycle”?
- Determine the impact of differential N fertilizer rates and two rates of conservative to full irrigation on long-term yield, tree health/decline and orchard longevity.
- Track nitrogen and water use efficiency (NUE and WUE) of respective treatments.
- Estimate overall profitability and final efficiency of each treatment for 18 to 24 years of orchard life given achieved yields and tree decline.

### Background and Discussion:

The recently completed 2008 - 2012 project Development of a Nutrient-Budget Approach and Optimization of Fertilizer Management in Almond (12-PREC2-Brown) in western Kern County examined the yield impact of varying types of N fertilizer and rates (125 to 350 lb/ac N) and the type/rate (100-300 lb/ac K) of K fertilizer. The secondary objective of this trial was to insure non-stressed water status in the orchard through optimal irrigation scheduling and document actual tree ET. Very careful records of site applied water, soil moisture to a depth of 9 feet and in-orchard daily ET using eddy covariance heat flux were tracked over 5 years. The result was an average January through December measured almond ET of

54.3 inches for microsprinklers with no cover crop for the southern San Joaquin Valley.

The average for completely unstressed conditions is probably closer to 58 inches, but was reduced for this study in an attempt to reduce hull rot through deficit irrigation during hull-split. However, hull rot was still a problem and the trees exhibited significant chloride toxicity and defoliation by early October.

This season long ET of 54.3 inches is 29% higher than the old standard of 42.2 inches for April 1 to November 15 published by the University of California more than 20 years ago (Snyder, et.al., 1989). Individual tree ET ranged from 48.3 to 63.1 from 2008 to 2011. The individual tree kernel yields over the same period ranged from 1,700 to more than 6000 lb/ac. There was no relationship between yield and ET at the individual tree level. The 4 year average yield for the 275 lb/ac N treatment exceeded 4,000 lb/ac from 2008 to 2011 and crashed to less than 1,000 lb/ac in 2012. Frost was partly to blame. The incidence of fungal pathogens and loss of lower canopy has increased over the last 4 years and the researchers accused of “killing the trees with kindness”.

This trial now compares a more moderate water regime vs. the higher level of applied water across 3 rates of N fertilizer (UN32) to determine if there is a benefit to orchard longevity and profitability using more conservative inputs.

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**Project Cooperators and Personnel:** Patrick Brown, Ken Shackel, Bruce Lampinen, Andres Olivos, University of California, Davis; Mario Viveros, UCC E – Kern County (Retired)

### For More Details, Visit

- Poster locations 51, Exhibit Hall A and B during conference; or on the web (after January 2014) at [www.almondboard.com/researchreports](http://www.almondboard.com/researchreports)
- 2012.2013 Annual Report CD (12-HORT11A-Sanden/Shackel); or on the web (after January 2014) at [www.almondboard.com/researchreports](http://www.almondboard.com/researchreports)
- Related Projects: 13-HORT17-Shackel; 13-PREC2-Brown, 13-PREC5-Brown, 13-PREC4-Hopmans, 13-AIR2-Smart, and 13-HORT13-Lampinen