

UPCOMING MEETINGS of INTEREST

NITROGEN MANAGEMENT: The rush is on to get all growers in the San Joaquin Valley to register their acreage with the appropriate Ag Water Coalition for their basin as specified by the Irrigated Lands Regulatory Program. At the core of this new regulation is the development of NITROGEN MANAGEMENT PLANS (NMP) aimed at increasing the efficiency of fertilizer nitrogen use in irrigated ag. Various Ag Coalitions in the south valley are rolling out meetings from Feb-Apr to provide training to growers. The next one in Bakersfield is March 5 sponsored by the Kern River Watershed Coalition Authority (<http://www.krwca.org>). (<http://www.curesworks.org/WCNWinter14.pdf> comprehensive newsletter from the The Coalition for Urban/Rural Environmental Stewardship (CURES) for more into.)

The California Almond Board has made a big investment in “sustainability workshops” to not only help growers meet the expectations of these new regulations, but to also deal with the drought and survive profitably in a world that demands optimal efficiency due to the high cost of inputs and environmental expectations. UC Cooperative Extension with UC Davis and the Almond Board has developed the research and outreach grower workshops that will help you improve almond fertilizer nitrogen use efficiency.

ALMOND BOARD OF CALIFORNIA EDUCATIONAL SUSTAINABILITY WORKSHOP SERIES

SERIES 1: WATER & NITROGEN MANAGEMENT

Workshops begin at 8:00 a.m., and conclude by 12:30 p.m. (lunch complimentary)

Expert speakers include farm advisors and Almond Board-funded researchers

discussing the following topics:

Irrigation Distribution Uniformity from Design to Maintenance - Why Care?

Practical Irrigation Scheduling, Technology and Deficit Irrigation

Nitrogen Decision Support Based on UC Modeling and Management Plans

CENTRAL VALLEY

March 5 - Modesto

Stanislaus County Ag Center
3800 Cornucopia Way

March 10 - Merced

Hampton Inn & Suites
225 S. Parsons Ave.

SOUTH VALLEY

March 12 - Visalia

Visalia Convention Center
303 E. Acequia Ave.

March 13 - Bakersfield

Kern County Farm &
Home Advisors
1031 S. Mount Vernon Ave.



Stay tuned for Series 2 + 3 workshops returning to these areas featuring ‘Pests and Bees’ and ‘Air and Energy.’ Featuring new CASP modules: Financial Management, Ecosystem Management and Workplace and Communities. Bring your laptop or tablet, if interested in completing assessments online.

RSVP to Rebecca at rbailey@almondboard.com or 209-343-3245

Agenda

- 8:00** **Arrival, Sign-in and Refreshments**
- 8:15** **Almond Board Update**
Almond Board of California
- 8:30** **Almond Sustainability Program Highlights and Online Features**
SureHarvest
- CASP overview and rationale for workshop topics
 - *Online demo* of features pertinent to self-assess
- 9:15** **Self-Assessment Activity (online/paper) – New Module**
- Assess new module(s) (priority is Ecosystem Management)
- 10:00** **Break**
- 10:15** **Irrigation Distribution Uniformity from Design to Maintenance – Why Care?**
University of California Cooperative Extension, Blake Sanden or David Doll
- Spatial design for optimal irrigation
 - Infrastructure maintenance
 - Importance of and testing for distributional uniformity
- 10:45** **Practical Irrigation Scheduling, Technology and Deficit Irrigation**
University of California Cooperative Extension, Blake Sanden or David Doll
- Irrigation 101 elements (incl. ETo/ETc) similar to Almond Conference
 - Technology fits = CIMIS, plant & soil moisture monitoring
 - Managed deficit irrigation esp. given drought
- 11:15** **Nitrogen Decision Support based on UC Modeling and Management Plans**
SureHarvest and University of California
- Background re: nitrogen dynamics and management in almonds
 - New UC nitrogen modeling using mid-April tissues and incorporation of the California Almond Sustainability Program (CASP) online nitrogen calculator
 - *Online demo*
- Noon** **Lunch and Informal Q&A**
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KERN UCCE SPRING IRRIGATION WORKSHOP March20 - April 10, 2015 (Date not yet set. Decided next week.)

This is your chance to cast your vote on the irrigation topic that you need information on, email comments to bsanden@ucdavis.edu. The current topics I propose covering are:

- Update on almond yield by ET – statewide UC trials
- Understanding soil nitrogen contribution calculations for Nitrogen Management Plans
- Salinity calculations/management for almonds. New findings on rootstock salt tolerance
- Pistachio salt tolerance update – Kern regional trials
- Real-time web-based monitoring options to assess field water status – Hortau (tensiometer/soil moisture ‘suction’), Phytch (dendrometer directly measuring tree stress/growth), volumetric soil moisture probe systems (RainBird Climate Minder, Jain irrigation taking over PureSense sites),
- Remote sensing / aerial imagery – CERES imaging for water stress and nitrogen
- Rain dance lessons?

2013-14 PROJECT REVIEW / SUMMARY

Defining a Central Valley ET/Yield Production Function for Almonds

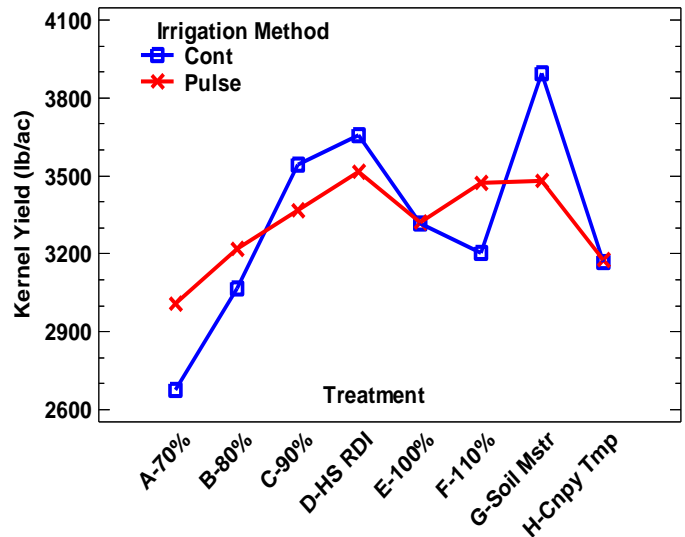
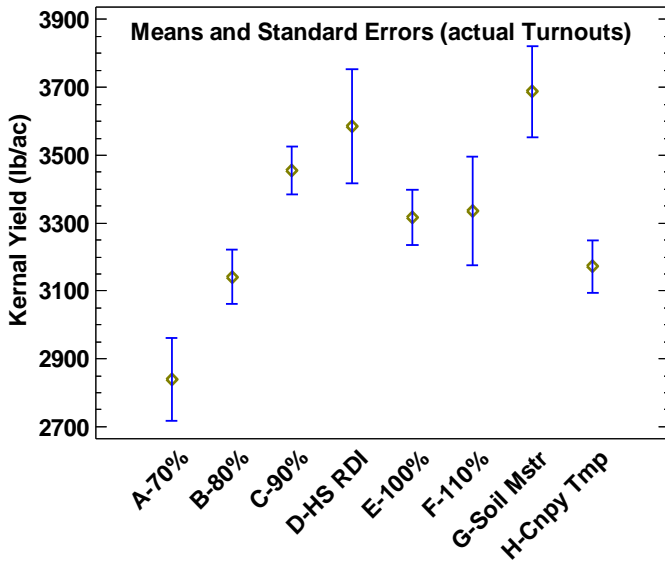
Kern - Blake Sanden, Merced – Dave Doll, Tehama –Allan Fulton, Ken Shackel – UC Davis

Kern County Site Trial (largest effort of all 3 counties) Collaborator: Paramount Farming Company

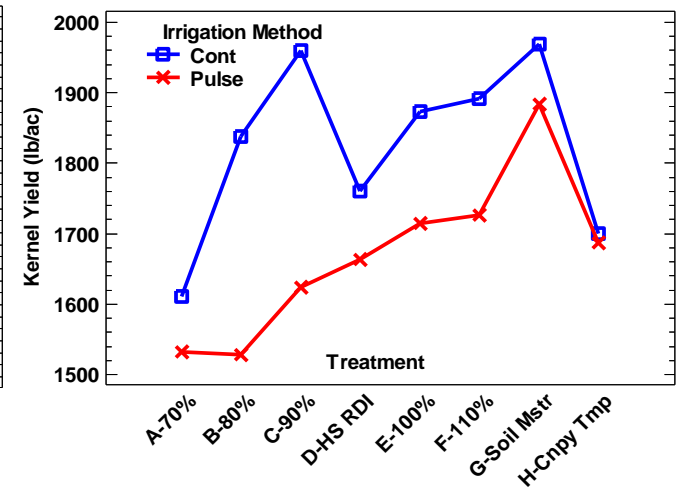
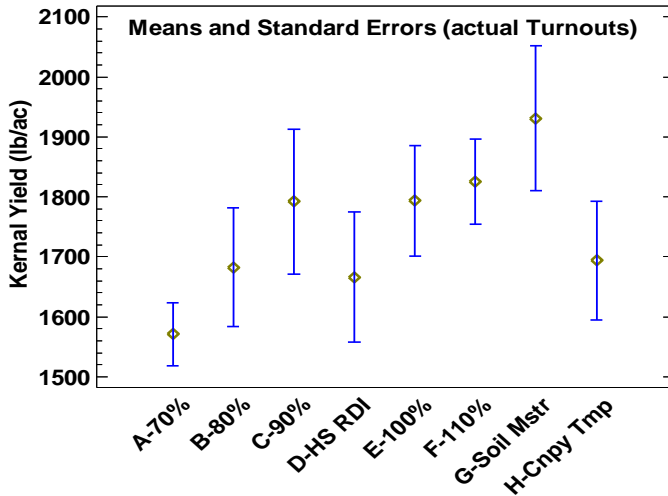
a. Objectives

- 1) Quantify **kernel yield in lbs/inch actual ET** (applied water + soil moisture depletion – leaching) under non-limiting fertility levels by varying depths of applied irrigation and using various continuously monitoring plant and soil sensor technologies to provide irrigation scheduling “triggers” for precision irrigation.
- 2) Quantify the interaction of hull-split Regulated Deficit Irrigation on the yield function. Use precision irrigation scheduling to maintain uniform RDI plant stress across varying soil types.
- 3) Assess long-term tree health given differing amounts of applied water and scheduling methods.
- 4) Assess the yield benefit of “pulsed” vs. continuous irrigation and automated, high frequency irrigation driven by plant-based measurements.
- 5) Assess the feasibility, final water use and yield of high frequency “on-demand” plant stress and soil moisture triggers for irrigation scheduling (Unavailability of extra water due to drought canceled these treatments.)

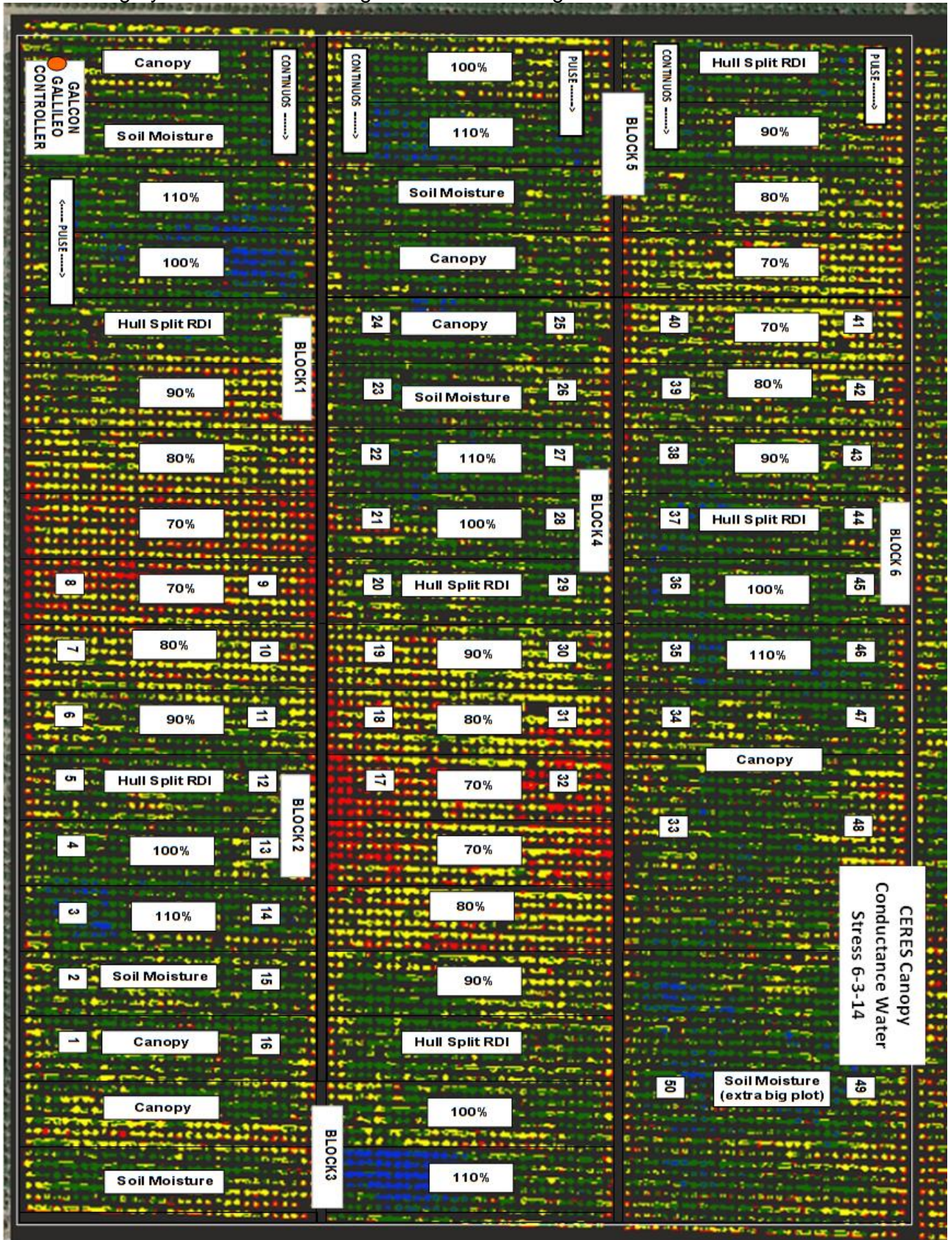
Eastside ET Yield Trial (8th leaf) 2013 YIELDS (1st year of treatments)



Eastside ET Yield Trial (9th leaf) 2014 YIELDS (2nd year of treatments)



CERES imagery from 6/3/14 revealing stress in deficit irrigation treatments.



Almond Orchard Profitability & Longevity Under Differential N Fertility & Irrigation

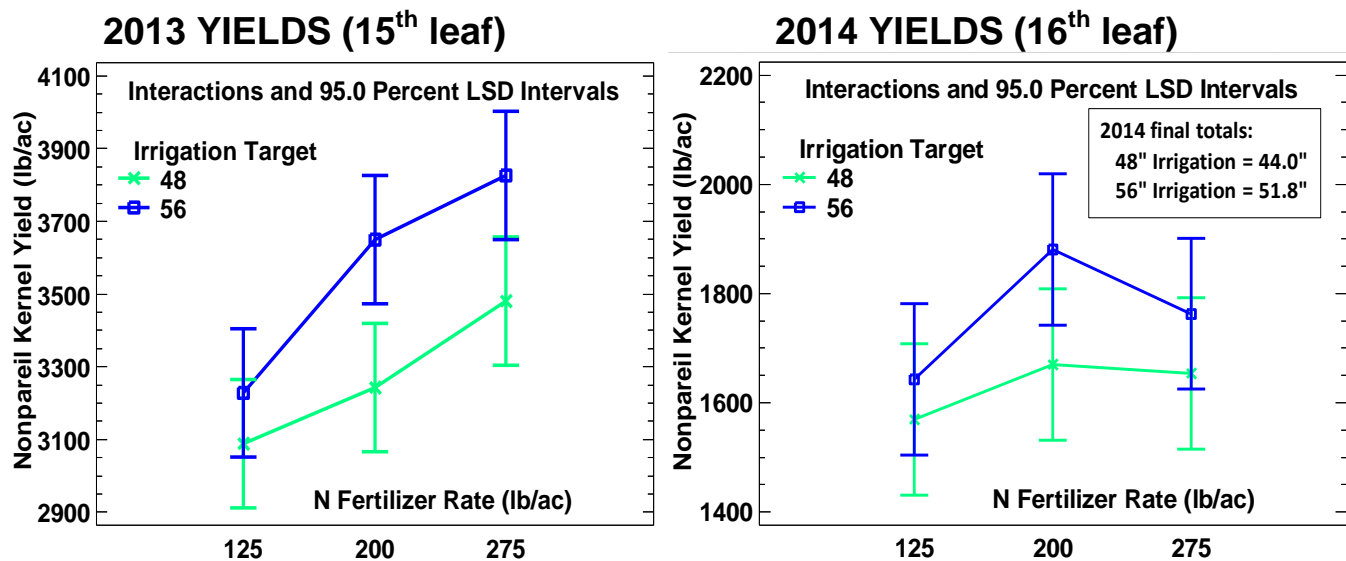
(Follow-up to Brown fertility trial Westside) Blake Sanden, Patrick Brown, Ken Shackel, Bruce Lampenin

Objectives: Using the former Belridge fertility trial site (Ranch 336 Block 12-2) document:

1. The degree of long-term 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”?
2. 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.
3. Track nitrogen and water use efficiency (NUE and WUE) of respective treatments.
4. Estimate overall profitability and final efficiency of each treatment for the life of this orchard (18-24 years?) given cumulative yields and tree decline.

Treatments: 3 N rates: 125, 200 and 275 lb/ac (continued on same rate plots from last 5 years)

2 irrigation rates: 48 inch (standard), 56 inch (Sanden ET) (Irrig reduced in 2014 due to drought)



Suitability of potassium nitrate and continuous fertigation (spoon-feed) under drip and micro sprinkler irrigation to optimize California almond productivity

Blake Sanden, Andres Olivos, Patrick Brown, Ken Shackel, Bruce Lampinen

Cooperators: Haifa Chemical, SQM, Potassium Nitrate Association (providing funding), Paramount Farming Company, Grundfos Pumps Bowsmith Irrigation, Toro Irrigation

Why this trial

- Nutrients should be provided in a continuous supply more coincident with tree/nut accumulation.
- In the late maturity fruit stage there is a relatively greater demand for K than for N.
- Potassium applications in Almond are generally too low to replace total K removal.
- SOP remains the predominant K source and is generally applied as a banded winter or spring application.
- Continuous fertigation (every irrigation) is uncommon but could provide additional benefit
- K Nitrate is not widely used in CA

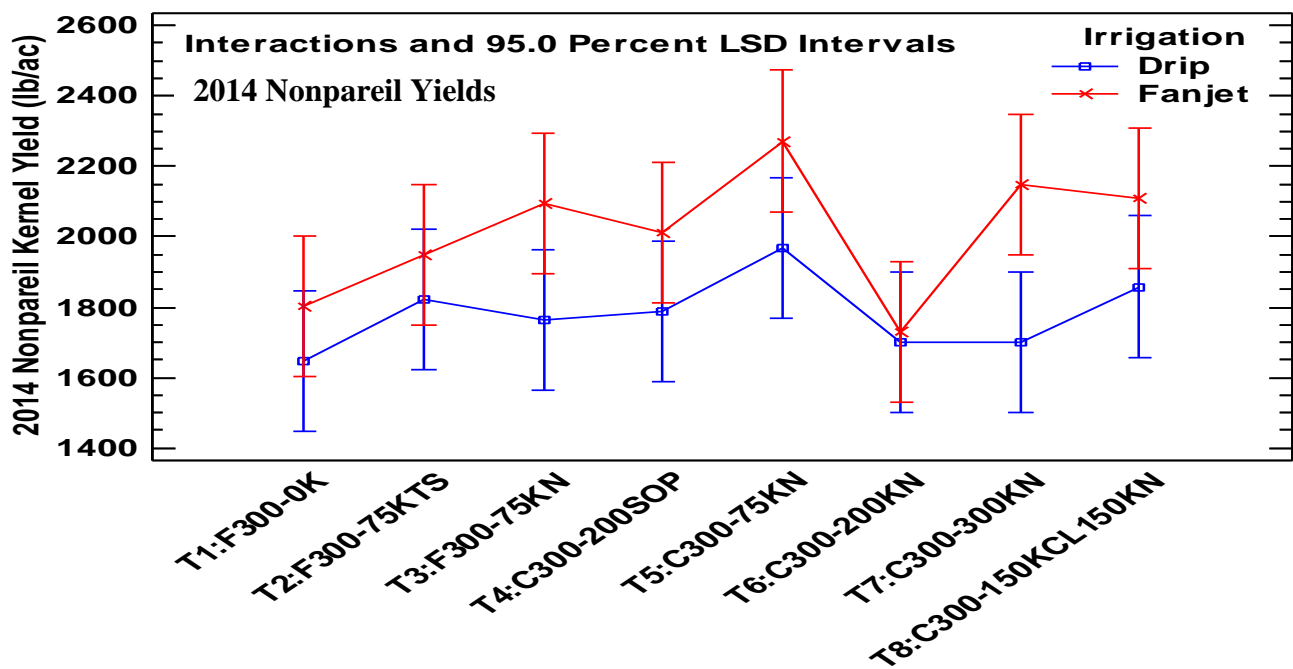
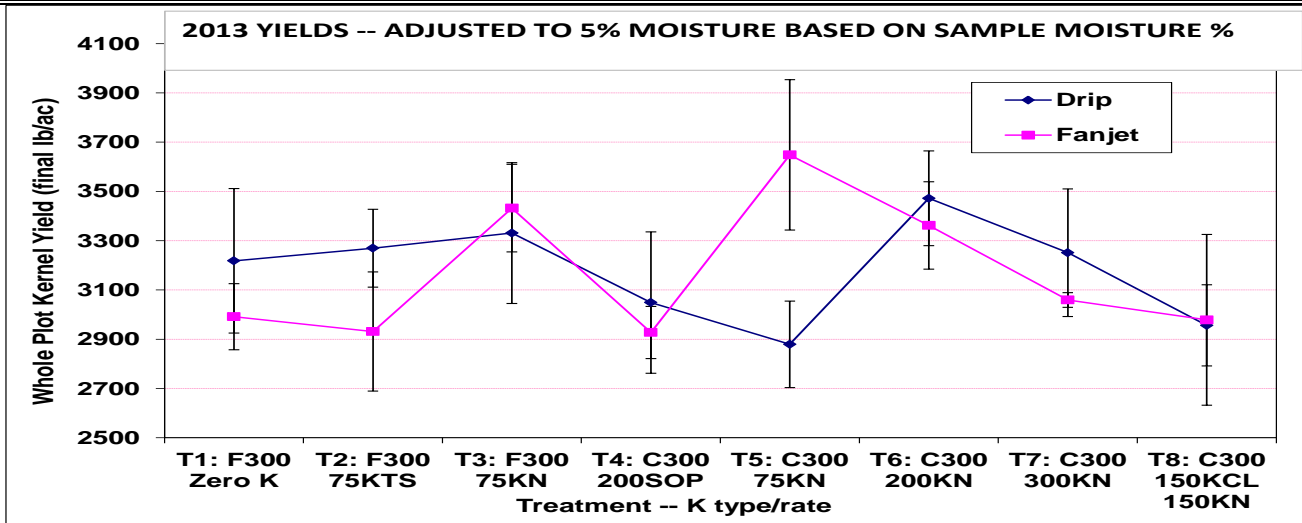
Objectives:

- 1) Determine the benefit of K fertilizer to both Nonpareil and Monterey varieties
- 2) Determine the impact of episodic (4 times/season) versus continuous fertigation under microsprinkler and double-line drip irrigation

- 3) Determine the effect of fertigation regime on K reaction in soils.
- 4) Determine the effect of fertigation regime and variety on crop ET and stress
- 5) Introduce and validate the concept of continuous nutrient feeding in Californian almond production

FERTILIZER TREATMENTS

F300-0	1: No K, 300 lbs N as UAN in 4 in-season fertigations 20% Feb, 30% April, 30% June, 20% post-harvest.
F300-75KTS 125 SOP	2: 200 lb K. 125 lb K as SOP band February, 75 lb as KTS and 300 lb N as UAN in 4 fertigations 20% Feb, 30% April, 30% June, 20% post-harvest (Grower Standard).
F300-75KN 125 SOP	3: 200 lb K. 125 lb K as SOP band February, 75 lb as KNO3 and 273 lb N as UAN in 4 in season fertigations 20% Feb, 30% April, 30% June, 20% post-harvest.
C300-200SOP	4: 200 lb K as SOP dissolved in gypsum mixer and 300 lbs N as UAN (total N 300), continuous application.
C300-75KN	5: 200 continuous.lb K. 125 lb K as SOP in band February, plus 75 lb K as KNO3 and 273 lb UAN
C300-200KN	6: 200 lb K as KNO3 and 193 lbs N as UAN (total N 300) as continuous application.
C300-300KN	7: 300 lb K as KNO3 and 128 lbs N as UAN (total N 300) continuous.
C300-150 KCl 150 KNO3	8: 150 lb K as KCL, 150 lb K as KNO3, 248 lbs N as UAN continuous fertigation.



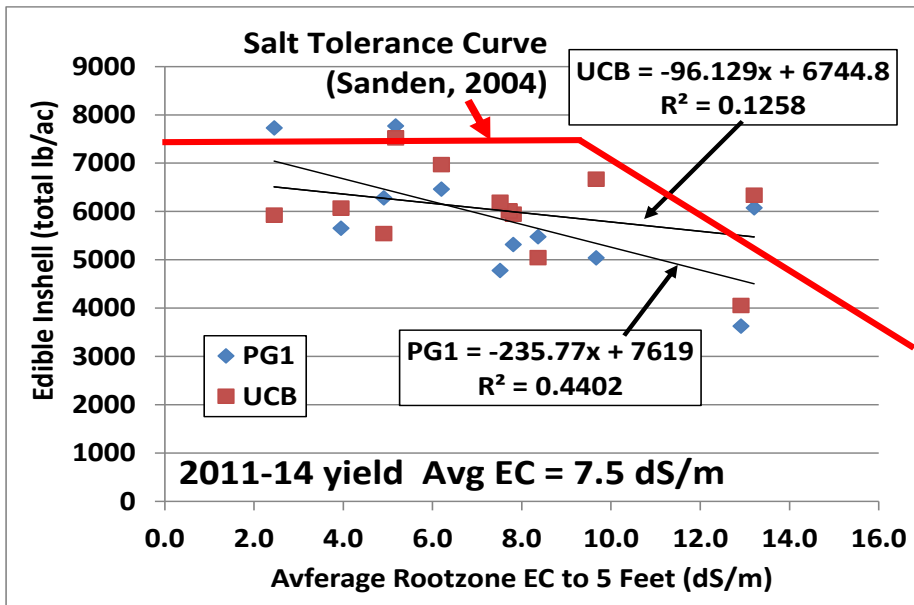
Large-Scale Utilization of Saline Groundwater for Development and Irrigation of Pistachios – Defining a ‘Real World’ Salt Tolerance Curve for San Joaquin Valley Pistachios

Blake Sanden, Louise Ferguson, Craig Kallsen, Dennis Corwin – USDA Salinity specialist
Cooperators: Starrh & Starrh Farms (11 years), Buttonwillow Land & Cattle, Cauzza Farms, Bone Farms, Houchin Farming, Waterhouse Farms, Maricopa Orchards and Warren Farms

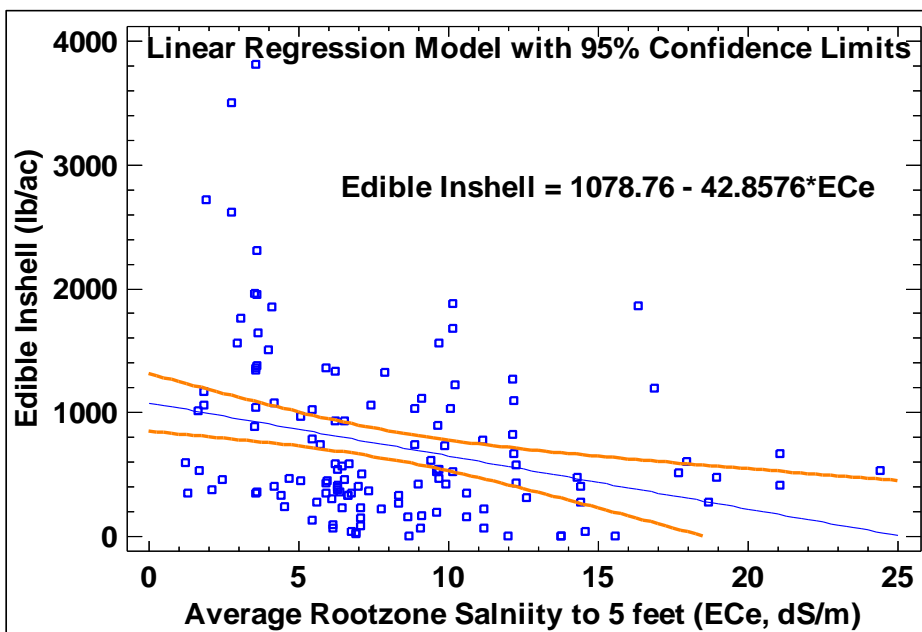
GOAL: Define a real-world salinity tolerance curve for pistachios using Kern commercial fields

Objectives:

1. Using remote sensing (CERES Stanford Group) /aerial imagery, identify 3-5 zones of variable tree stature/vigor as an indication of salinity throughout the Starrh and 9 other orchards.
2. Verify salinity differences with ground-truthing using soil sampling and EM38 surveys.
3. Obtain tree harvest yields and quality for each field area to correlate with tree specific soil salinity and generate a production-scale pistachio salt tolerance curve across all blocks.



Total edible inshell yield over 4 years (7th first harvest-10th leaf) as a function of average rootzone salinity in the long-term Starrh trial. The red line shows the older salt tolerance curve published by me and Louise Ferguson back in 2004.



2014 individual tree/salinity zone edible inshell yields (per acre basis) by rootzone salinity from 10 fields in western Kern County -- ages 9th-13th leaf. The yield loss regression model (shown by the curved red lines) is highly significant

CONCLUSION SUMMARY

Almond deficit irrigation:

70% ET (30% water deficit) costs you about 20% kernel yield in high production years and results in about a 15% yield reduction under low yield conditions. This is about the same reduction in yield seen in the Merced County trial, but greater than that of the Tehama County trial.

Long-term almond yield under reduced N and irrigation:

A 15% reduction of irrigation water off the optimal 56" for 100% ET on the westside dropped yield about 10% (statistically significant) in 2013 (high yield) and 6% in 2014. Long-term reduction of applied N from 275 to 125 lb/ac significantly dropped kernel yield by 16% in 2014 (high yield year) regardless of applied water, but only dropped yield by 6% in a low-yield year (<1800 lb/ac).

“Spoon-feed” fertigation vs. 4 times/year, drip vs. microsprinkler (fanjets), different K sources:

For Nonpareil, after 4 years of replicated testing we found no benefit of intensive continuous (every irrigation) low concentration fertigation vs. more conventional higher doses of fertilizer 4 times/year. A “0 lb/ac” application of K did significantly reduce yield, but the other forms of K all gave equivalent yields. The one surprising result was that for 2014 the fanjet irrigation gave a statistically higher yield by 11% compared to the double-line drip. When looking at the 4 year total yield this irrigation system effect is still statistically significant but drops to a 3.8% difference. There was very adequate “subbing” with the double-line drip system and most of the time the pressure chamber measurement of stem water potential (SWP) showed less stress in the drip compared to the fanjet.

Pistachio salt tolerance:

The good news is that pistachio is still the most salt tolerant tree we have in our SJV permanent crop arsenal. Also good news is that the current study indicates the decline in yield as salt increases is not as bad as previously found. The bad news is that the threshold is now closer to an average rootzone ECe of 5 to 6 dS/m instead of the 9.4 dS/m we published back in 2004. You can still make economic yields, however, at the old threshold recommendations, but it will cost you yield.

DROUGHT RESOURCES



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http://ciwr.ucanr.edu/California_Drought_Expertise/Insights_Water_and_Drought_Online_Seminar_Series/



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