



What's Up with Nickels Soil Lab Research

December 10, 2015



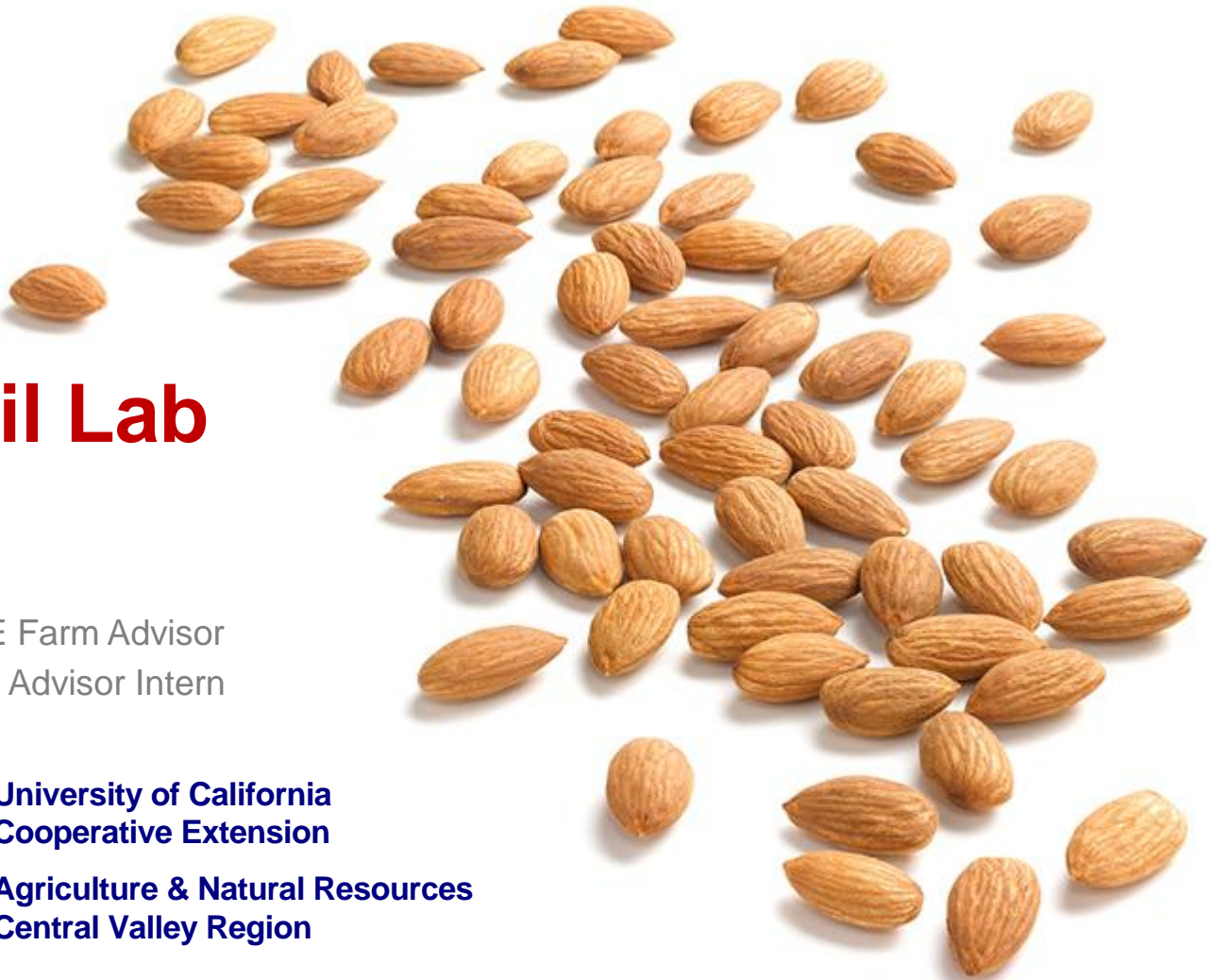
Speakers

Danielle Veenstra, Almond Board (Moderator)

Franz Niederholzer, UCCE Farm Advisor

Luke Milliron, UCCE Farm Advisor Intern





Nickels Soil Lab Update

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**University of California
Cooperative Extension**
**Agriculture & Natural Resources
Central Valley Region**

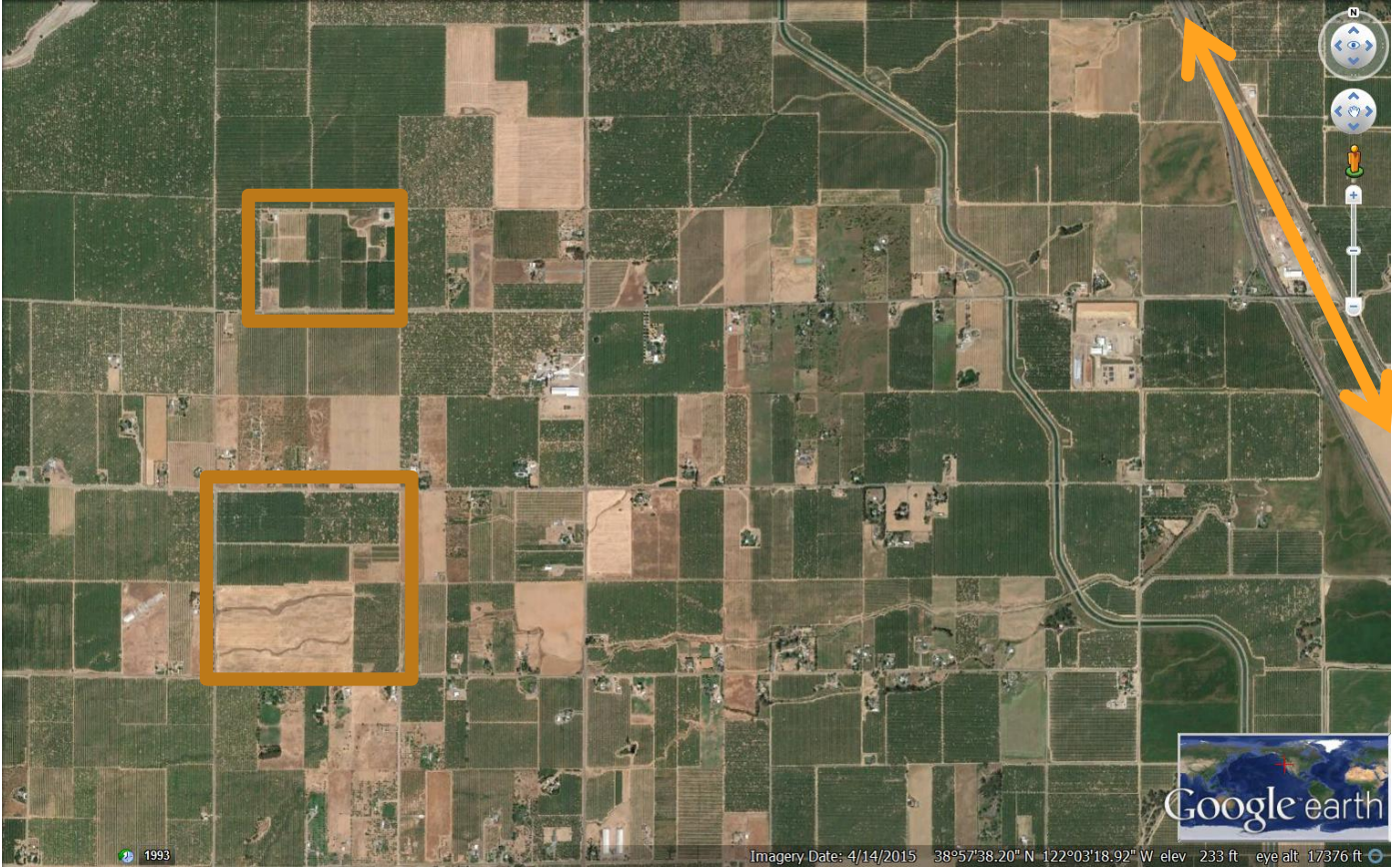
What we will cover in the next 30 minutes

- **What is the Nickels Soil Lab?**

Some of the current research at Nickels:

- **Pruning/No pruning**
- **Rootstock comparison**
- **Nonpareil pollinizer**
- **Self-fertile vs Nonpareil w/ pollinizer yield**
- **Organic demo**

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- Land donated by Mr. Leslie Nickels as a field laboratory to support local agriculture and held in Trust to the County Court of Colusa with research coordinated by University of California. Three trustees (2 growers and 1 UC CE advisor) oversee operations.
- Approx. 170 acres total: 95 acres of almonds (14 separate blocks); 17 acres of walnut (3 blocks); 2 acres of table olives and 60 acres of open ground.
- 2 full time employees and a half time farm manager paid by the Nickels Trust from crop sale \$. The Almond Board of CA provides some annual research support, plus invaluable help with major capital projects (for example, well on Marine in 2009). Walnut Board has supported researchers working at Nickels plus generous help with the new well we are developing on Green Bay site. Day to day input and research support from UCCE in Colusa County with support from Bruce Lampinen and crew from Plant Sciences Department at UC Davis. Colusa Water District is also a strong supporter of Nickels Soil

Pollinator impact on NP yield and per acre production value.

- Planted in 2006 by John Edstrom and Stan Cutter.
- Lovell root; 22' x 16' spacing; double lined drip
- All reps are w/in 900' of each other
- Compare NP and overall yield & value:
 - 50% Nonpareil; 25% Aldrich; 25% Winters
 - 50% Nonpareil; 25% Winters; 25% Monterey
 - 50% Nonpareil; 25% Fritz; 25% Monterey

Nonpareil yield was not changed by pollinator group in 2015.

Pollinator grouping	Nonpareil yield (lbs/acre)
Fritz Monterey	3165 a
Winters Aldrich	2992 a
Winters Monterey	3158 a

Case study: Organic almond production from the ground up at Nickels Soil Lab. Arbuckle, CA



Which are the organic trees?

Organic demo block planted at Nickels in 2006.

- **Site: Class 2-3 soil on rolling terrain, west of I-5 near Arbuckle, CA**
- **Planted by John Edstrom, Bill Krueger and Stan Cutter.**
- **Lovell rootstock; 75% NP & 25% Fritz. 16' X 22' planting.**
- **Every 4th tree in every row is a Fritz. Every NP has 2 Fritz adjacent.**
- **Double-line buried drip irrigation. No Treflan in organic hose.**
- **The orchard is not certified organic, but all practices/materials are certified organic.**
- **Half of the organic demo trees were started conventional and transitioned to organic, half were started as organic.**

Good production under organic management (after rust controlled in 7th leaf).

Year	Conventional (lbs./acre)	Organic (lbs./acre)
4 th leaf	1076	926
5 th leaf	1725	859
6 th leaf	2358	894
7 th leaf	2438	957
8 th leaf	2971	2113
9 th leaf	2450	1528
10 th leaf	2630	2079

Organic case study: Success & challenges

- **Success: Disease management (OK, in a drought year)**
- **Success : Yield recovery from 2014**
- **Success: Worm control in Nonpareil**
- **Challenge: Weeds**
- **Challenge: Maintaining adequate N in organic trees**
- **Challenge: Worm control in Fritz scattered down rows.**

Almond pruning Trial (planted in 1997 by Edstrom/Cutter)

- **50% Non-pareil**
(20% Monterey, 10% Aldrich, 10% Carmel, 10% Sonora)
- **Lovell rootstock**
- **22' x 16'; microject irrigation**
- **75% light interception (ave) Range is 67-84%**
- **Leaf N - 2.7% (255 lbs N/acre; 80% NUE in 2015)**
- **Leaf K – 2.3%; Leaf P – 0.11%**

Pruning Details

- **Standard** - 3 primary limbs selected at 1st dormant, secondaries selected 2nd dormant. Balanced canopy with opened centers. Yearly pruning.
- **Unpruned** - 3 primary limbs selected, tipped and left long at 1st dormant pruning, then no additional pruning unless required for operations, wind etc.
- **Mechanically Topped** - Same as unpruned plus machine topping, cut ½ previous yr growth in winter after 2nd year, then spring 4th leaf. Vertically hedged in spring, 2013.
- **Temporary Scaffolds** –Train limbs at 1st dormant to favor 3 primary scaffolds. Keep temporary branches lower on trunk, removing only ones competing with permanent scaffold. Temp limbs removed yr 4-8 after cropping.



Unpruned study trees in November, 2014.



Carmel

Nonpareil

Good, consistent yields with no differences with pruning.

2013

- Ave NP yield 3000-3500 lbs/acre; NO yield differences with pruning or hedging.

2014

- Ave NP yield 2600-3000 lbs/acre; NO yield differences with pruning or hedging.

2015

- Ave NP yield 2900-3200 lbs/acre; NO yield differences with pruning or hedging.

Almond Nonpareil Rootstock Trial

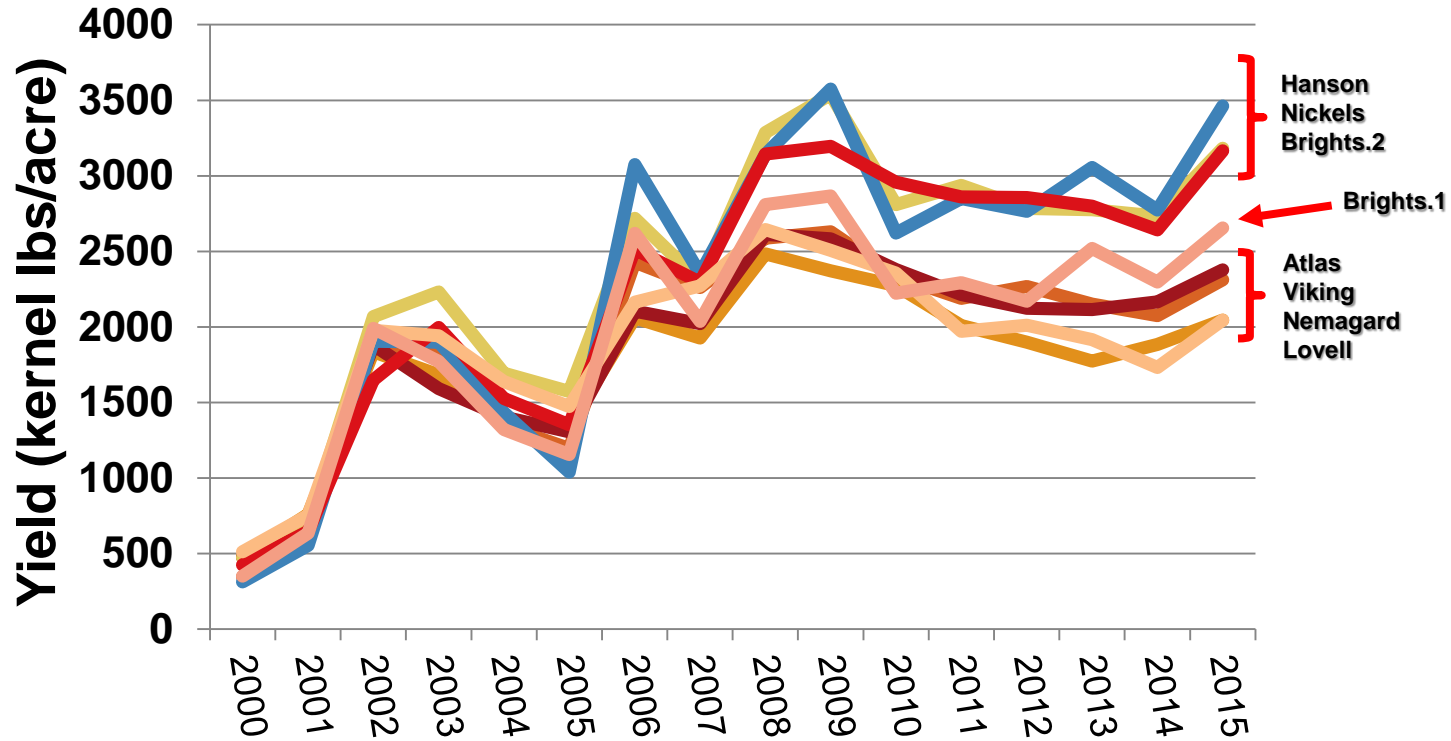
- **50% Non-pareil**
(16.7% Monterey, 16.7% Aldrich, 16.7% Carmel,)
- **All pollinators on Brights seedling root**
- **Rootstock trial under Nonpareil scion**
- **22' x 24'; microject irrigation** (complete coverage)
- **Leaf N - 2.7% (255 lbs N/acre)**
- **Leaf K – 2.4%; Leaf P – 0.11%**

Scion/Rootstock	% Trees missing: Fall, 2015
Nonpareil/Atlas	19
Nonpareil/Brights	18
Monterey/Brights.1	17
Nonpareil/Lovell	9
Nonpareil/Nemaguard	9
Aldrich/Brights	6
Carmel/Brights	4
Nonpareil/Nickels	4
Nonpareil/Brights.2	2
Nonpareil/Viking	1
Nonpareil/Hansen	0

Peach X almond hybrids produce the highest yield/acre at these wide spacings (82 trees/acre).

Rootstock	2015 Average Nonpareil Yield (lbs/acre) (w/o tree loss correction)
Atlas	2,029 ^a
Lovell	2,062 ^a
Nemaguard	2,344 ^{ab}
Viking	2,394 ^{ab}
Brights.1*	2,655 ^{abc}
Nickels	3,148 ^{bc}
Hansen 536	3,182 ^{bc}
Brights.2*	3,461 ^c

Annual production (lbs./acre). 2000-2015



Per acre yields are influenced by tree spacing.



Rootstock trial
24' x 22'

Pruning trial
22' x 16'

Compare production potential of solid self-fertile vs Sonora/Aldrich/NP planting.

- **Planted in 2013** by Niederholzer and Cutter
- **20' x 15' planting, double line surface drip**
- **'Viking' roostock**
- **Replicated 3x**
- **Solid 'Independence' planting vs 25% 'Sonora', 25% 'Aldrich' and 50% 'Nonpareil'.**
- **Compost incorporated into half of the berms at planting**

What the compost application looked like just before the berms were pulled.



Yard waste compost in the berm at a rate of 9 tons/acre (concentrated in the berms).

1.25% N dry wt.

0.25% P dry wt.

0.80% K dry wt.

First harvest – 3rd leaf



First harvest – 3rd leaf. No real yield difference.

Variety	Yield (kernel lbs./acre)
Independence	534 ^a
Nonpareil	406 ^a
Aldrich	495 ^a
Sonora	378 ^a

**+/- compost
did not
change
yield.**

Nickels Annual Field Day is in early/mid May.



Google UCCE Colusa for date, agenda

Thank you.

