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# Nickels Soil Lab Projects

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**Project No.:** 07-HORT6- Edstrom

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## 1. Pruning Systems for High Density Orchards

### Objectives:

The objective of this trial is to evaluate tree training/pruning methods for maximum early production while maintaining long-term yields in tightly spaced (16' x 22'), almonds.

### Interpretive Summary:

Now after the 11<sup>th</sup> season of testing minimum pruning (i.e. "Unpruned" treatment), we are still optimistic about the viability of a minimum pruning system for almonds, particularly under conditions of moderate vigor. The primary concern involves the shading out of lower/middle fruitwood and potential yield reduction from the teen years onward. So far, Nonpareil and Monterey seem quite well suited to the system, while Aldrich and Carmel are questionable. Accumulative yields are equal between minimum and standard pruned trees for Nonpareil and Monterey while Carmel produced less on the "unpruned" trees. The "temporary limb" concept, as practiced here, is not worth the extra labor and is of questionable value. Mechanical topping appears to have value but was not adequately evaluated in this test.

Past results have shown that:

1. Minimally pruned trees and temporary scaffold trees out yield standard trees in the early years.
2. Temporary limb training is expensive and probably uneconomical
3. Production between all treatments leveled out at the 6<sup>th</sup> year.
4. Accumulated cost savings of \$ 500-800 per acre to the 11<sup>th</sup> year are possible with minimum pruning methods.
5. Aldrich growth habit is incompatible with the temporary limb method.
6. Some minimal amount of secondary and inside branch removal may be necessary under minimum pruning.
7. Nonpareil is most compatible with minimum pruning followed to Monterey, Aldrich and Carmel in decreasing order of compatibility

- 8. No increase in disease or sticktight was found for minimum pruning.
- 9. Tree height appears shorter with minimum pruning.

*A common misunderstanding concerning the “Unpruned” treatment in this test needs clarification. The “unpruned” trees did receive some limb training. Three primary limbs were selected and all other competing limbs were removed the first dormant pruning. This method should actually be called minimum pruning.*



Nonpareil Unpruned center



Nonpareil Standard center

**PRUNING TEST YIELDS**  
lbs/acre

	<u>Aldrich</u>		<u>Carmel</u>		<u>Monterey</u>		<u>Nonpareil</u>	
	<u>accum</u>	<u>2007</u>	<u>accum</u>	<u>2007</u>	<u>accum</u>	<u>2007</u>	<u>accum</u>	<u>2007</u>
Standard	17,073	<b>2,963</b>	15,230	<b>2,370</b>	15,951	<b>2,764</b>	16,390	<b>3,276</b>
Temp Scaffold	---	---	15,567	<b>2,126</b>	16,217	<b>2,634</b>	16,747	<b>3,333</b>
Mech hedged	16,782	<b>2,991</b>	16,414	<b>2,560</b>	15,608	<b>2,516</b>	16,406	<b>3,086</b>
Minimum/ Unpruned	16,396	<b>2,734</b>	13,281	<b>2,066</b>	18,576	<b>2,719</b>	17,243	<b>3,273</b>
No statistical difference between treatments								

## **Material and Methods:**

Four training systems were selected using 4 replicates of 33 trees using Nonpareil, Carmel, Monterey and Aldrich, microsprinkler irrigated and planted at 16'x22', 124 trees/acre:

### Standard Method

Three primary limbs selected at 1<sup>st</sup> dormant, long pruned, secondaries selected 2<sup>nd</sup> dormant, centers kept open, limb tying/staking as necessary. Yearly traditional, moderate pruning continued.

### Unpruned

Three Primary limbs selected at 1<sup>st</sup> dormant pruning then no additional pruning unless needed for equipment or wind damage, etc. Minimal staking as necessary.

### Mechanically Topped

Same as unpruned, but, adding machine topping to remove half of prior seasons top shoot growth beginning at 2<sup>nd</sup> dormant with selective dormant thinning and topping in spring, if needed.

### Temporary Scaffolds

Train limbs at 1<sup>st</sup> dormant to favor 3 permanent primary scaffolds, but also retain many other temporary branches below these on the trunk, removing only those which compete strongly with permanent scaffolds. Retain as much wood as possible. Temporary limbs scheduled for gradual removal during years 5-8 after producing some crop or sooner if they threaten primaries.

## **Results and Discussion:**

The central questions concerning minimum pruning are:

1. The number of primary limbs to select
2. The necessity of heading primaries
3. The feasibility of retaining multiple scaffolds
4. The shading of fruitwood and eventual yield decline
5. The range of varieties and growing conditions/vigor amenable to minimum pruning

## **Publications:**

Nickels Soil Lab-Annual Report -2007

## 2. Organic Almond Production Systems Evaluation:

### Objectives:

Evaluate the economics and productivity of different organic almond production methods suitable for the Sacramento valley region in keeping with USDA and CCOF requirements and in comparison to standard production methods.

### Interpretive Summary:

Leaf mineral analysis data from samples collected in July 2007 is presented in the following table. The only significant difference between organic and standard samples concerns nitrogen that indicates a higher % N in the standard trees, 2.95 % versus 2.57 % for the organic. Both values are above the critical N level for almonds

	Leaf Analysis				
	Nitrogen %	Phosphorus %	Potassium %	Zinc ppm	Boron ppm
<b>Organic</b>	2.59	0.17	1.91	14	41
<b>Standard</b>	2.95	0.17	1.93	16	40

Through the second season tree observation and trunk circumference measurements of 22 cm have indicated no significant differences in rate of growth between any of the treatments. To this point weed control has been the most challenging. While flaming has been effective it is slow and expensive. During the second season the organic plots were flamed 14 times and required about 7 hours of application time per acre and 53 gallons of propane per planted acre. Additionally about 13 hours of hand labor per acre was required to control the weeds that got too big for flaming. Flaming is not effective during wet conditions and only marginally at cold temperatures necessitating hoeing weeds. The weed block fabric is performing well but was expensive and time consuming to install. The initial cost was 7 cents per square foot. Initially we had trouble with the fabric lifting off during wind storms which required reinstallation. This could be minimized by burying the edges of the fabric and using a solid 6 ft strip instead of two three foot strips or gluing the strips together instead of stapling them.

### Materials and Methods:

In April of 2006 a new block of almonds was planted at the Marine Avenue location of the Nickels Estate in Arbuckle. The treatments are conventional, transitional and organic. The conventional trees are being grown using practices typical for conventional almond production in the area. The transitional trees will be grown conventionally for 2 to 3 years and then converted to organic. The organic trees are being grown using practices approved for organic production by the USDA and CCOF. The primary weed control method in the organic plots has been flaming using a tractor drawn propane flamer. In one row of each of the three organic plots, a six-foot wide strip of woven plastic mulch in the tree row is being used for weed control. The

conventional and transitional plots are strip sprayed with glyphosate/Goal® to control weeds. In the conventional and transitional plots, nitrogen rates typical for conventional production are being applied through the drip system as UN 32.

In the organic plots organic formulations of N have been applied through the drip system. During 2007 this included 1 oz. actual N in the form of Chilean Nitrate in the spring and 2 oz. of N as Agrolizer (6-2-0) in the summer. In the fall of 2006, 8 tons per acre of compost were applied to the organic and transitional plots and 6 tons per acre were applied in the fall of 2007. All of the trees have been pruned and trained the same. Dr. Tom Lanini we will be testing different organic weed control materials this summer. The entire irrigation system was converted to buried drip to best manage weeds without uneconomical propane and hand labor methods. In the organic plots spinosad has been used to control Peach Twig Borer and Ecotrol has been used to control mites. We expect that as the trees come into production controlling bloom and leaf diseases will become a major emphasis and we will be testing different organically acceptable strategies. Bloom weather 2008 was not conducive to disease evaluations.

**Publications:**

Nickels Soil Lab-Annual Report - 2007