Minimum Pruning Systems for Almonds

John Edstrom, Stan Cutter & Bill Krueger

Objective:
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.

Pruning Methods

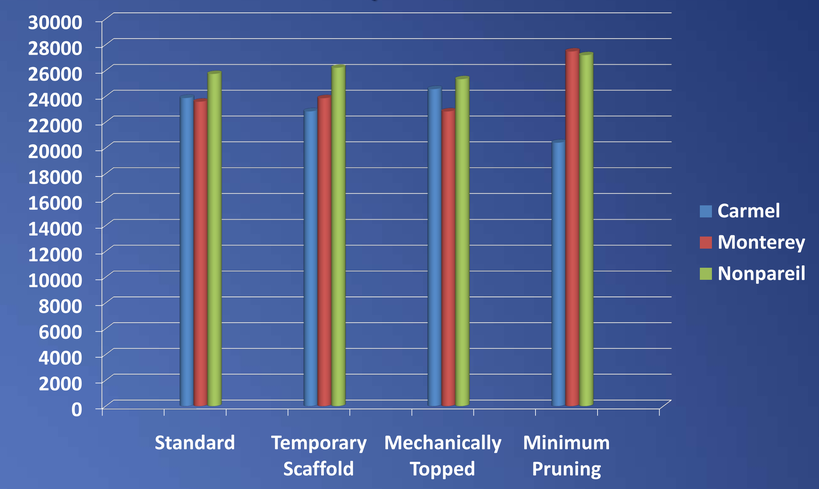
➢Standard - 3 primary limbs selected 1st winter, secondaries chosen 2nd winter. Balanced canopy with open centers. Yearly pruning.

➢Unpruned = minimum - 3 primaries chosen,tipped & left long, then no more pruning unless required for equipment, wind etc.

➢Mechanically Topped - Same as unpruned, plus machine topping, cut 1/2 of previous yr. growth in winter after 2nd leaf, then in spring of 4th leaf.

➢Temporary Scaffolds - Train limbs at 1st winter to favor 3 permanent primary scaffolds. Also keep many temp branches lower on the trunk, removing only ones competing strongly with permanent scaffolds. Retain as much wood as possible. Temp limbs gradually removed yr. 4-8 after cropping or sooner if threaten primary dominance.

Accumulated Yields
Lbs./acre



Nonpareil "Temporary" primary limbs dominant

Minimum Pruned Standard Pruned

Past results:

1) Minimally pruned trees and temporary scaffold trees out-yield standard trees in the early years.

2) Temporary limb training is expensive and uneconomical.

3) Production between all treatments leveled out at the 6th year .

4) Accumulated cost savings of $ 800-1100 per acre to the 14th year 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 beneficial under minimum pruning.

7) Nonpareil has been most compatible with minimum pruning followed by Monterey, Aldrich and Carmel in decreasing order of compatibility.

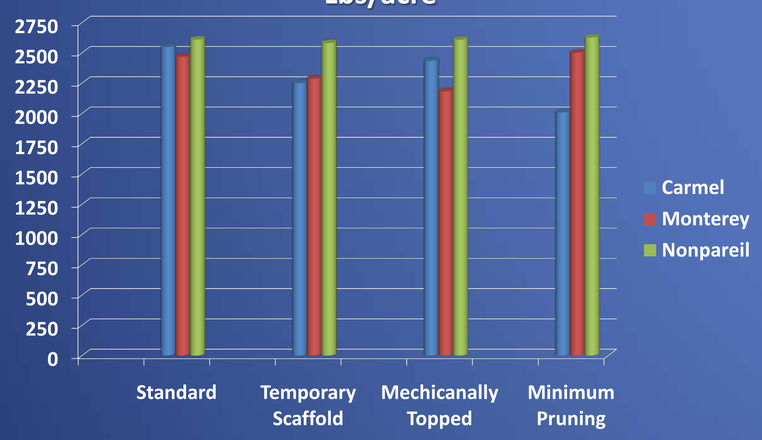
8) No increase in disease, but some increase in sticktights, as found for minimum pruning.

9) Tree height appears shorter with minimum pruning.

10) No problems drying crop on orchard floor.

11) Lack of pruning resulted in a higher % of leaning trees.

Pruning Trial 2010 Yields
Lbs/acre



Percent Leaning Trees

Mechanically Topped	45 %
Unpruned/Minimum	36%
Temporary Limbs	28%
Standard Pruned	21%
Sonora	43%
Monterey	41%
Nonpareil	34%
Carmel	26%
Aldrich	13%

Major questions concerning minimum pruning:

1) Number of primary limbs to select
2) Necessity of heading primaries
3) Feasibility of retaining multiple scaffolds
4) Need for limb tying
5) Shading of fruitwood and eventual yield decline
6) Range of varieties, growing conditions/vigor and tree spacings suitable for minimum pruning without resulting in undesirable consequenses.

Pruning Test Yields 2010

	Nonpareil	Carmel	Monterey	AVE
Standard	2,610	2,549	2,468	2,542
Temporary	2,582	2,251	2,287	2,273
Mech Topped	2,609	2,436	2,183	2,409
Trained but Unpruned	2,627	2,009	2,502	2,379

Pruning System Yields

Accumulative Yields - lbs. per acre

Pruning System	Carmel	Mont	Nonpareil	Average
Standard	23,972	23,585b	25,740	*24,432*
Temporary Scaffold	22,835	23,859b	26,217	*24,303*
Mech Topped	24,560	22,833b	25,334	*24,242*
Trained but unpruned	20,407	27,482a	27,195	*25,028*

years 4 -14

P= 0.5

Multiple Scaffold Problems

Organic Almond Production System

John Edstrom, Stan Cutter, Bill Krueger

Objectives:
Evaluate the economics and productivity of USDA and CCOF compliant organic almond production methods suitable for the Sacramento Valley Region in comparison to standard production methods.

75% Nonpareil/
25% Fritz

Weed control along edge of weed fabric problematic

"State of the Art"
Field test
Instrumentation

Field Test Results - four years experience

- Tree canopies well developed but less dense for organic.
- Weed control biggest challenge- propane expensive and ineffective in winter requiring hand hoeing/weed eater use multiple times/season.
- No significant disease problems except more leaf rust defoliation in Organic trees.
- Yields dramatically reduced in Organic vs. Standard, Transitional intermediate.
- Lab results show leaf nutrient levels equal between Organic and Standard except for lower nitrogen in Organic.
- Production cost $ 400/acre higher for Organic method vs. Standard.

Nonpareil Yields/Trunk Size- 4th leaf

System	Yield lbs/Ac	Kernels/oz	Trunk circ.cm
Standard	1,917	22	48.2
Transitional	1,087	21	46.8
Organic	822	22	45.6
Org & weed cloth	833	22	46.6

Compost Analysis - 5 tons applied October 2009

Percent							ppm			
N	P_2O_5	K_2O	S	Mg	Ca	Na	Mn	Cu	Zn	B
2.0	1.37	2.4	1.9	0.78	7.0	0.3	290	169	131	25

Leaf Analysis July 2010

	N %	P %	K %	Ca %	Mg %	S ppm	B ppm	Zn ppm	Mn ppm	Fe ppm	Cu ppm
STANDARD	2.82	0.13	1.72	4.17	0.82	2360	31	444*	92	263	6.2
TRANS	2.58	0.13	1.59	4.00	0.86	1687	32	17	78	223	7.9
ORGANIC	2.43	0.13	1.73	4.03	0.81	1610	34	16	67	250	7.6

Defoliation from Leaf Rust at Harvest

Organic

Standard

Production Cost Comparison

Field Practice	Standard	$	Organic/Trans	$
NUTRITION				
nitrogen	UAN 200 lbs N/ac	100	sodium nitrate 40lb.N/ac	80
boron spray	Solubor @2.5lbs/ac	25		
potassium	100 lbs K2O/ac + KNO3 @ 30 lbs	95		
zinc spray	Zinc sulfate 10lb/ac	30		
compost			5 tons/acre	175
WEED CONTROL				
herbicides	Glyphosate + Goal 3 x @ $15	50		
	Matrix + Rely	75		
propane			80 gal @ $3.00	240
			8 flamings @ .75 hr	100
hoeing	weedeater		5 times @ 0.5hrs @ $12	60
mowing	5 times@ $6	30	5 times @ $6	30
INSECTS				
dormant			2.5 gal veg oil + 10 lb cu Nordox	90
mites	Agrimek @12 oz	70		
PTB				
NOW	Asana @ 9 oz	30		
DISEASE				
blossom	5 oz Vanguard	38	2x Wettable sulfur @ 10 lbs	64
leaf	Pristine @ 12 oz	60	+ Thermx @ 6 oz	
			2x Actinovate @ 12oz +	
PF + 4 wks	Ziram @ 8lbs	40	ThermX @ 6oz	180
TOTAL COSTS	Includes applic costs	**$643**	Includes application costs	**$1,019**