Integration of Tree Spacing, Rootstock Selection & Pruning for Efficient Almond Production

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Multifactorial Trial

- **2 varieties**
  - Nonpareil & Carmel
- **2 Rootstocks**
  - Nemaguard & Hansen
- **4 Spacings**
  - 22’ x 22’, 18’ x 22’, 14’ x 22’, 10’ x 22’
- **4 Pruning strategies**

Pruning Strategies:

- **Standard trained, standard pruned**
  - 3 scaffolds, annual pruning, open centers
- **Standard trained, unpruned**
  - Trained with 3 scaffolds and open centers
  - Unpruned after 2nd dormant season
- **Minimal training & pruning**
  - Trained with 4-6 scaffolds & open centers;
  - maximum of 3 cuts per tree annually
- **Untrained, unpruned**
  - No scaffold selection, no annual pruning

Influence of Tree Spacing on Cumulative Yield of 11th Leaf Nonpareil & 10th Leaf Carmel*

	Carmel on Nemaguard	Carmel on Hansen	Nonpareil on Nemaguard	Nonpareil on Hansen
22’ x 22’	**20,317**	**18,530**	**21,741**	**20,505**
18’ x 22’	**21,403**	**19,072**	**22,048**	**21,129**
14’ x 22’	**22,692**	**20,403**	**23,539**	**20,725**
10’ x 22’	**24,215**	**19,157**	**22,903**	**20,319**

*Yield data not collected 3rd leaf for either variety

Conclusions for Tree Spacing through 11th leaf:

- Cumulative yield for Carmel on Nemaguard is highest at 10’ x 22’ spacing and lowest for 22’ x 22’ spacing. Nonpareil on nemaguard is highest at 14’ x 22’ spacing.
- Yield for Nonpareil on Hansen (big trees) is similar at all tree spacings
- Carmel kernel size was smaller at the 10’ x 22’ spacing
- Widely spaced trees had 2.5 times more mummies per acre than closely planted trees

The Effect of Pruning, Tree Spacing & Rootstock on Nonpareil (11th leaf) & Carmel (10th leaf) Yield, Kernel Size and Mummies. 2010

	Yield (lb / acre)		Kernels per ounce		Mummies / acre*
Training / Pruning	Nonpareil	Carmel	Nonpareil	Carmel	
Standard training & annual pruning	3203 a	3359 b	20.7 a	22.7 a	9,268
Trained two years, then unpruned	3457 a	3736 a	21.2 a	23.1 a	8,547
Multiple scaffolds and 3 pruning cuts annually	3241 a	3508 ab	20.7 a	22.3 a	10,506
Untrained & unpruned	3395 a	3785 a	21.0 a	22.9 a	6,545
Spacing					
10’ x 22’	3397 a	3742 a	21.1 a	24.0 b	4,787
14’ x 22’	3379 a	3821 a	21.1 a	22.5 ab	7,116
18’ x 22’	3335 a	3529 ab	20.7 a	22.3 a	11,382
22’ x 22’	3186 a	3297 b	20.7 a	22.9 ab	11,581
Rootstock					
Hansen	3287 a	3268 b	24.4 a	22.7 a	9,666
Nemaguard	3324 a	3925 a	24.0 a	22.8 a	11,016

*Mummies counted on Nonpareil trees January 15, 2010

The Influence of Pruning and Training on Cumulative Yield (lb / acre) of 11th Leaf Nonpareil & 10th Leaf Carmel*.

	Nonpareil on Nemaguard	Nonpareil on Hansen	Carmel on Nemaguard	Carmel on Hansen
3 scaffolds; annual pruning	21,812	20,348	21,687	17,289
3 scaffolds; delayed non-pruning	22,995	21,307	22,212	19,683
Multiple scaffolds, three cuts annually	22,191	19,646	21,855	19,520
No scaffold selection; no pruning	23,233	21,346	22,874	20,667

*Yield data not collected 3rd leaf for either variety

Conventionally trained trees take longer to develop a canopy

Conclusions on Pruning:

- **Conventionally trained and pruned trees tend to have the lowest yields so far in this trial.**
- **Pruning did not affect kernel size**
- **Unpruned trees did not have more mummies in January than trees pruned annually.**
- **Using the average grower price of almonds over the past ten years annual pruning would have reduced net income by over $4000 per acre so far, including pruning costs and lower cumulative yields.**
- **Trees on Hansen are yielding less than trees on Nemaguard, probably due to less favorable soil conditions (heavy soil).**