Developing an Almond Orchard for Top Production

John Edstrom UC Farm Advisor, Colusa County
Vigorous 3rd leaf trees produced
1,200 lbs/acre
4th 2,500 lbs.
5th 3,000 lbs.

... in Kern and Colusa
Too wide a spacing?  
Non-vigorous growth?  
Wrong rootstock?  
Too much pruning?

For each 10% inc in canopy shaded area  
500 lbs more crop produced

Canopy filled early
Today's motto should be …
Fill the Canopy Fast

Economics of almond production
demand early yields/return
Canopy/fruitwood development depends on:

- Site Preparation
- Soil
- Tree Spacing & Design
- Variety
- Rootstock
- Pruning
- Nutrition
- Irrigation
Complete field work early

Ripper shanks break up compaction

Compost, OM

Apply lime if soil pH below 6.0 ... always?

- Images of field work and soil改良示例
Ready to plant by February

Early planting promotes root growth before bud break...produces larger trees ...fills canopy sooner.

Berms/mounds in fall + herbicide

Machine planting saves time

Prune to 34-40 inches, whitewash, add carton
but, requires high degree of skill & precision .......... Stan “the GPS plan looked good on paper”
Almond and walnut trials at Nickels showed no advantage to slip plowing – **drip & micros**

For Arbuckle soils
pre-plant soil fumigation questionable

...only small increase in deep roots
“Tile” drainage may protect roots from river seepage, or shallow water table.
Spacing critical to early yields

Stanislaus County Spacing Trial

The Influence of Tree Spacing on Cumulative Yield During the Development Years (4th – 7th Leaf) of Carmel Almond on Nemaguard Rootstock (pounds per acre).

<table>
<thead>
<tr>
<th>Spacing</th>
<th>4th Leaf</th>
<th>5th Leaf</th>
<th>6th Leaf</th>
<th>7th Leaf</th>
<th>Cumulative Yield 4th – 7th Leaf</th>
<th>Cumulative Yield Difference Compared to 22 x 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 x 22</td>
<td>2518</td>
<td>3130</td>
<td>1819</td>
<td>3665</td>
<td>11,132</td>
<td>+ 1405</td>
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<tr>
<td>14 x 22</td>
<td>2363</td>
<td>2998</td>
<td>1731</td>
<td>3862</td>
<td>10,954</td>
<td>+ 1227</td>
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<tr>
<td>18 x 22</td>
<td>2049</td>
<td>2690</td>
<td>1617</td>
<td>3767</td>
<td>10,123</td>
<td>+ 396</td>
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<tr>
<td>22 x 22</td>
<td>1815</td>
<td>2700</td>
<td>1512</td>
<td>3700</td>
<td>9,727</td>
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</table>

Big yield difference yr 4-6 due to spacings for peach root

800 lbs
Variety Combinations & Planting Designs

N 1 N 2 N

Nonpareil-Monterey-Nonpareil-Fritz-Nonpareil

50% - 25% - 25%

✓ Preferred choice
### Planting Designs

<table>
<thead>
<tr>
<th>Design</th>
<th>Non</th>
<th>Monterey</th>
<th>Winters</th>
<th>Fritz</th>
<th>Aldrich</th>
<th>Sonora pollen preload hives</th>
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</thead>
<tbody>
<tr>
<td>N 1 N 2 N 1 N 3 N</td>
<td>50%</td>
<td>-25%</td>
<td>-12%</td>
<td>-12%</td>
<td></td>
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</tr>
<tr>
<td>✓N 1 N 2 N 3 N</td>
<td>50%</td>
<td>-16%</td>
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</tr>
<tr>
<td>N 1 2 N 1 2 N</td>
<td>33%</td>
<td>-33%</td>
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</table>

*Sonora pollen preload hives*
Orchard Designs for Gamblers
If Nonpareil price remains much higher

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3/4 Nonpareil, 1/4 Fritz

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<td>F</td>
<td>W</td>
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2/3 Non, 1/9 Winters, 1/9 Aldrich, 1/9 Fritz
Orchard Designs for Gamblers

If Nonpareil price remains much higher

3/4 Nonpareil, 1/4 Fritz

2/3 Non, 1/9 Winters, 1/9 Aldrich, 1/9 Fritz

Less pollen but 3 types close by
Root Development at 2\textsuperscript{nd} leaf

Krymsk 86       Lovell       M2624
Select strong scaffolds,
Two better than weak third

Bark Inclusion
Avoid limb breakage

won’t correct poor limb selection

Limb tying for heavy crops…
2 year old Nonpareil

- **Short Pruned at 1st winter**
- **Medium Pruned at 1st winter**
- **Long Pruned at 1st winter**
Stanislaus Pruning Trial Site

Pruned

Untrained & Unpruned

Pruning is Dwarfing
Test Sites Pruned vs Unpruned

More pruning = less fruitwood
## Accumulative Yields lbs/acre

<table>
<thead>
<tr>
<th></th>
<th>Colusa 1</th>
<th>Colusa 2</th>
<th>Kern</th>
<th>Stanislaus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years</strong></td>
<td>21 yrs</td>
<td>13 yrs</td>
<td>13 yrs</td>
<td>10 yrs</td>
</tr>
<tr>
<td><strong>Width x Height</strong></td>
<td>7’ x 22’</td>
<td>16’ x 22’</td>
<td>21’ x 24’</td>
<td>various</td>
</tr>
<tr>
<td><strong>Unpruned</strong></td>
<td>35,000</td>
<td>22,000</td>
<td>22,300</td>
<td>18,467</td>
</tr>
<tr>
<td><strong>Pruned</strong></td>
<td>34,000</td>
<td>22,600</td>
<td>20,700</td>
<td>17,507</td>
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**Mechanical Topping?**

Reduces crop on bearing trees

Adds fruitwood to NB trees but, may inc shade. Affect on yield unknown
Speaking of yield, get the crop to huller
Nitrogen Trial

Low N

High N

Row crop vs old orchard soil
early N rate varies 0-4oz/tree

N, K, Zn, B + others?

Irrigation Trial
1.0 Et vs 1.25 Et
..if water infiltrates
Single hose drip

Subsurface drip

Micro-jet + drip

Double hose drip

If frost risk high

2-2.5 ft sandy, 3-4 ft clay soil
Technologies to optimize water use and tree growth

Probes for soil moisture status

Dendrometer limb growth

Pressure chamber measures tree water stress
Questions?