Training and Pruning Almond Trees

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Almond bearing habit
Almond shoots and spurs form flower buds the previous July to October.
Almond

- Nuts are borne primarily laterally on spurs
- Some nuts laterally on shoots
Start bare root trees by heading at planting

- Cut back to about 36”– 40” & trim side branches
- Promotes good establishment
- Finish with a tree wrap
Potted trees – a bit different

- Ideal planting time is October-November
- Plant into good soil moisture & not too deep
- No need to prune at planting but use a tree wrap and be ready to water-in with drip or micros
We train young trees to...

- Develop good structural strength in primary branches
- Guide the tree to safely fill the available space
- Manage rapid growth and encourage early production
Time of pruning affects pruning response

- Dormant pruning is invigorating
- Spring & summer pruning reduces vigor
Wilbur Reil studied effects of pruning time on bearing almonds

He found whether trees were pruned in mid-October, November, or December, there was no effect on:

- Yield
- Tree growth
- Leaf nutrient levels
- Incidence of limb diseases
So, *when is the best time to prune?*

Anytime from October through January!

**Considerations…**

- Delayed dormant timing is better if there’s risk of bacterial canker on young trees
- Avoid pruning prior to heavy rains when training young trees in 1\textsuperscript{st} or 2\textsuperscript{nd} dormant season
  - *Phytophthora* or *Botryosphaeria* cankers
- Prune early to see dead wood on mature trees
- Typical thinning is easiest when dormant
Training: *first dormant pruning is most critical*

- Space scaffolds vertically at least 3 inches if possible
- Requires topping newly planted trees at 36 – 40 inches
- Save uncompetitive lateral fruitwood
- Avoid very flat or vertical growing scaffolds
- Avoid embedded bark
First dormant pruning

- Select 3-4 strong scaffolds, vertically and horizontally spaced
Avoid weak limbs with narrow crotches and embedded bark.

Select wider angled, well attached limbs showing branch bark ridges.
Other scaffold selections to avoid….

Opposite limbs can choke out the leader

Limbs originating from one spot may split later
Avoid these tree losses with proper training!
Remove suckers and water sprouts

- Suckers – vigorous shoots from rootstock
- Water sprouts - vigorous undesirable shoots from trunk or primary branches above the rootstock
Trials in Butte Co. (Joe Connell, 1980) and Glenn Co. (Bill Krueger, 2005) examined different training methods

- Multi-scaffold (Glenn Co. only) – removed problem limbs, opened center slightly, 6-8 scaffolds unheaded
- Long pruning – 3-4 scaffolds unheaded
- Intermediate pruning – 3-4 scaffolds lightly headed
- Short pruning – 3-4 scaffolds headed at 18 inches
Multi-scaffold & Long pruning

Thinning cuts

- Removal of entire branches or shoots
- Can prevent crowding & improves sunlight penetration
- Thinning defines main branches
Multi-scaffold pruning

Kept 6-8 primary unheaded branches. Thinned out problem limbs. Minimal thinning of secondary branches.

**Advantages**
- Less pruning needed at 2\textsuperscript{nd} dormant season
- Greater early yield, harvest in 3\textsuperscript{rd} leaf

**Drawbacks**
- Possible tying in 2\textsuperscript{nd} and 3\textsuperscript{rd} years
- Limbs become very crowded as trees age
- Larger pruning wounds if correction needed
Multi-scaffold pruning

- Tree at 3rd dormant season
- Thinned problem limbs, then left unheaded,
Long pruning (unheaded)

Select primary and secondary branches by thinning out upright vigorous competing branches.

Advantages

- Less pruning needed at 2nd dormant season
- Early yield, harvest in 3rd leaf

Drawbacks

- Tying recommended in 2nd and 3rd years
1\textsuperscript{st} dormant long pruning
**Long pruning**

Tree at 3rd dormant season

- Primary and secondary scaffolds selected by thinning out upright competing branches
- No heading
- Lateral fruitwood saved
Intermediate pruning

Select primary & secondary branches by thinning.
Head primaries by light tip pruning below closely spaced buds (~36-48 inch long primaries).

Advantages

■ Greater early yield and less need to thin water sprouts compared to short pruning
■ Possibly less need to tie trees in 2nd leaf compared to long pruning

Drawbacks

■ Less yield compared to multi-scaffold pruning
Intermediate pruning

Tree at 2nd dormant season

- Thin water sprouts to maintain primary selections
- Select two or three secondary limbs 24” to 36” from trunk on each primary, evenly spaced
- Remove competing limbs but save all lateral fruitwood
Intermediate pruning

Tree after 2\textsuperscript{nd} dormant pruning.

- Good structure but over pruned
- More fruitwood removed than desirable
- Lower yield will result
Intermediate pruning

Tree at 3rd dormant season
- Primaries tipped
- Secondaries not thinned
- More thinning is desirable
Short pruning

Heading cuts

- Terminal part of primary scaffold is removed
- Stimulates vigorous branch growth just below cuts
- Produces water sprouts on the primary scaffolds
- Increases need for thinning
- Reduce sunlight penetration
Short pruning (primary scaffolds headed at 18 inches)

Advantages

- Easily taught & learned, trees uniform
- Tying not initially required

Drawbacks

- Reduced early yields
- Guarantees need for significant thinning and pruning cost at the 2\textsuperscript{nd} dormant pruning
- Secondary limbs can become virtual primaries as they crowd into a limited space
- Tying in the 3\textsuperscript{rd} to 5\textsuperscript{th} years may be necessary
Short pruning leads to...

- Excessive water sprouts
- Need for excessive pruning the next year
- Delay in yield and increased cost can be significant
- Excessive pruning increases wounds and potential for canker diseases
3rd growing season...light crop on lateral fruitwood

Many thinning cuts at 2nd dormant pruning
Short pruning

Tree at 3rd dormant season

- Primaries headed at 18 inches
- Secondaries not thinned
- More thinning desirable
Conclusions of the Butte Co. Trial

- The more you prune the lower the yield
- Little to no pruning gives highest early yields

- Sacrificing some early yield for good scaffold development is worth it
  *(that’s when yield is lowest anyway)*

- Minimal training makes corrective pruning more costly later
### Almond Tree Training Trial, Glenn Co.

3rd Leaf Nonpareil Yield, 2007

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Kernel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-scaffolds, unheaded</td>
<td>608.6</td>
</tr>
<tr>
<td>Long pruned, unheaded</td>
<td>523.3</td>
</tr>
<tr>
<td>Intermediate pruned, light tipping</td>
<td>474.2</td>
</tr>
<tr>
<td>Short pruned, headed at 18 inches</td>
<td>337.7</td>
</tr>
</tbody>
</table>

105 trees per acre.

Numbers followed by different letters are significantly different, $P \geq 0.05$
Glenn Co. Trial observations

- Expect long pruned trees to open up and require more tying to support the tree and crop.
- Intermediate pruned trees with light tipping required some tying.
- Short pruned and multi-scaffold trees required less tying.
These trees should have been tied in 2\textsuperscript{nd} dormant season. They began to open up in April of 3\textsuperscript{rd} leaf. Very light mechanical tipping saved the day.
3rd through 5th dormant seasons

- With proper training in 1st and 2nd dormant seasons, should only need very limited touch-up pruning
- Allow the upper canopy to fill in
- Maintain the original structure
Nickels Estate results of 1979 Pruning Trial
John Edstrom, UCCE Colusa

- Trees trained to 3 scaffolds in first dormant season, then unpruned for 20 years
- Yield was equal to standard pruned trees
- Once trained and good structure was set, minimum pruning made sense
- Minimum pruning doesn’t mean no initial training

- Lower wood shaded out
- Crop at top of canopy
All yields were similar by the 8th leaf

Standard pruned trees – lowest early yield

Unpruned highest yield but had more blow over and early scaffold failures

Trees that were initially trained to 3 scaffolds & not pruned since 2nd leaf look very acceptable
  - No scaffold breakage
  - No problems for equipment operators
  - Not overly dense
# Effects of Pruning on Yield

## 15th Leaf & Cumulative

<table>
<thead>
<tr>
<th>Training &amp; Pruning</th>
<th>Nonpareil</th>
<th>Carmel</th>
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<tbody>
<tr>
<td></td>
<td>2014 Yield (lb. / a)</td>
<td>Cumulative Yield</td>
</tr>
<tr>
<td>Trained to 3 scaffolds; Annual, moderate pruning, open centers</td>
<td>3199 a</td>
<td>32,537</td>
</tr>
<tr>
<td>Trained to 3 scaffolds; unpruned after 2nd year</td>
<td>3092 a</td>
<td>33,762</td>
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<tr>
<td>Trained to 4-5 scaffolds; Three annual pruning cuts</td>
<td>3093 a</td>
<td>31,862</td>
</tr>
<tr>
<td>No scaffold selection; no annual pruning</td>
<td>3236 a</td>
<td>33,625</td>
</tr>
</tbody>
</table>
Reasons to prune mature trees

Prune mature trees to:

- Remove dead and diseased wood
- Control height by thinning to lower laterals to reduce blow over
- Facilitate other cultural practices (weed spraying, mowing)
- Improve worker safety
- Dry nuts at harvest through improved light penetration
Some sunlight penetrating inside the tree will promote more uniform hull split and crop maturity.
What we know for sure about pruning

- Pruning both dwarfs and invigorates trees.
- Pruning initially reduces yield.
- Lack of pruning in mature trees moves production to the outside of the canopy.
- Lack of pruning can reduce nut size.
- There are good reasons to prune....
  - Know why you’re pruning and what you’re trying to achieve
Overall, multiple pruning trials in different parts of California have consistently shown:

- Pruning reduces yield
- The more you prune, the more you reduce yield
- Sometimes you need to prune and accept a yield sacrifice
- Getting a new orchard off to a good start by selecting a strong scaffold framework for the first couple of years is one of those times.
Thank you!

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