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

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PROJECT SUMMARY

Objectives:

- Evaluate the long-term effects of three key management factors—tree spacing (planting density), rootstock selection, and training/pruning techniques on orchard production and longevity.

Background and Discussion:

This project, initiated in 2000, integrates various minimal training and pruning strategies with different planting densities in the same orchard. The Nonpareil and Carmel varieties are planted 22, 18, 14 or 10 feet apart down the row while the rows are all 22 feet apart. The four pruning strategies range from the old standard of selecting three scaffolds and pruning every year to not selecting any scaffolds and not pruning at all except for safety and equipment access.

Summary of Long Term Results:

Effects of Pruning

- 2017 yield data were still being processed at the time of this writing. Nonpareil yields were similar among all pruning treatments in 2016, the 17th leaf of this orchard while unpruned Carmel trees yielded almost 400 lb/acre more than annually pruned trees.
- Cumulative yield in untrained / unpruned Carmel trees is 4,126 kernel pounds per acre, higher than annually pruned trees (through 17th leaf). Cumulative yield of unpruned Nonpareil trees is more than 1,300 lb/A more than annually pruned trees.
- Annually pruned trees have historically captured less photosynthetically active radiation (PAR) than unpruned trees. This indicates that pruned trees have a lower yield potential than unpruned trees.
- At an average of $3.00 per pound, annual pruning would have reduced gross revenue by over $13,000 per acre, including yield reduction, and the cumulative cost of pruning and brush disposal.

Effect of Tree Spacing

- Trees planted just ten feet apart continue to produce very well and had the highest yields in 2016 (17th leaf). Nonpareil trees planted ten feet apart yielded 867 pounds / acre more than trees spaced 22' apart. Carmel trees planted 10 feet apart yielded 821 lb/A more than trees planted 22 feet apart.
- In-row spacing has affected cumulative yields much more in the smaller Carmel variety than the larger Nonpareil. In general, the closer the Carmel trees are planted within the row, the greater the cumulative yield.
- Carmel trees planted 10 feet apart have cumulatively yielded about 4,400 pounds per acre more than trees planted 22 feet apart.
- Canopy light interception appears to be declining earlier and faster in the more widely spaced trees. The reason for this is unclear but may be related to more shaker injury, more scaffold failure, more trees falling over and substantially more replants in the larger, widely spaced trees.
- This may mean that higher density orchards may have a longer productive lifespan than low density orchards, a hypothesis counter to current assumptions.
- Currently we have not measured any disadvantage to closely planted trees, other than higher initial planting cost. However, there may be little advantage to very high-density planting in vigorous orchards.

Project Cooperators and Personnel: Bruce Lampinen, University of California, Davis

For More Details, Visit

- Poster location 82, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2018) at Almonds.com/ResearchDatabase
- 2016 - 2017 Annual Reports (16-HORT5-Duncan) on the web at Almonds.com/ResearchDatabase
- Related Projects: 17-HORT6-Niederholzer; 17-HORT30-Thorpe/Brar