

Pruning Almond Trees Does Not Pay

With almond trees in dormancy, growers start to think about the annual ritual of pruning their trees. It is something many do every year. It is something their father did every year and something their father's father did before that. The legend is passed on from generation to generation: "You have to prune out the branches in the middle of the tree to prevent shade out and keep the lower wood productive"... "You have to prune every year so new fruit wood will grow"... "You have to prune every year or the trees will get too tall"... "If you don't prune, yields will crash within a few years". We have all been told this from our fathers, our farmer neighbors and our college professors. As it turns out, all these reasons to prune may be either untrue or unimportant.

We have to remember that growing almonds is a business, not a popularity or beauty contest. Every dollar spent should earn or save you more than a dollar in return. Many growers spend \$150 per acre or more each year to prune their trees and dispose of the brush. So the question is, are you making money on your pruning investment?

Past and current University of California trials suggest that growers are not getting a return on their pruning investment. In fact, the numbers suggest the opposite: the more growers prune, the more they may reduce their yields and profits, even in the long term.

Let's look at the research. The first long-term trial to look at the effects of pruning on almond yield was at the Nickels Estate in Arbuckle. After 21 years, unpruned trees were still producing at least as much as trees that had been pruned every year for the life of the orchard. In the 21st leaf, unpruned trees produced 2307 pounds per acre compared to 2136 pounds per acre in the annually pruned trees. Over the 21 year span, cumulative yields were 35,082 pounds per acre in the "unpruned" trees compared to 34,176 pounds per acre for trees that were pruned every year. In this case, the grower would have paid to prune for 21 years so he could have had 906 fewer pounds of almonds in the end.

Nickels Estate Pruning Trial					
Cumulative Yields Through 21st Leaf (Pounds per Acre)					
7' x 22' spacing in Class III Soil					
	18 th Leaf	19 th Leaf	20 th Leaf	21 st leaf	Cumulative
Annually pruned	2624	2498	2494	2136	34,176
Unpruned	2833	2680	1958	2307	35,082

Since then, UCCE farm advisors, John Edstrom (Colusa County), Mario Viveros (Kern County) and I (Roger Duncan, Stanislaus County), have initiated long-term pruning trials in the northern, southern and central parts of the state to validate results from the first trial. These experiments are now 10 - 12 years old. In all three locations, unpruned trees have yielded as well or better than annually pruned trees. In the eleven-year-old Kern County trial, cumulative Nonpareil yields are 2291 pounds per acre higher in unpruned trees than trees that were pruned conventionally every year for the past eleven years. Carmel yields were 1879 pounds per acre higher in unpruned trees. Mechanical topping and hedging, whether done every year or every other year also did not increase yields. Yields were lowest in trees that were pruned by hand and also mechanically hedged each year.

	Kern County Pruning Trial Cumulative Yields Through 11th Leaf (Pounds per Acre) 24' x 21' Spacing in Wasco Sandy Loam Soil		
	Nonpareil	Carmel	Monterey
Unpruned trees	21,536	23,577	21,843
Annually Pruned	19,245	21,698	20,841
Pruned in alternate years	20,585	20,363	21,313
Topped & hedged annually	20,667	22,771	22,153
Topped & hedged in alternate years	20,088	22,561	20,831
Mechanical + hand pruned annually	18,643	20,248	20,090

Stanislaus County Trial.

Here in my Stanislaus County trial, I have four pruning treatments as follows.

1. **“Standard” training & annual pruning.** Three scaffold limbs were selected during the first dormant pruning. Trees continue to receive “moderate”, annual dormant pruning to keep centers open and remove crossing limbs.
2. **Standard training for two years, then unpruned thereafter.** Three permanent scaffolds were selected as in the “standard” treatment. Trees were pruned normally the second dormant season. These trees have been unpruned since the second dormant season except to occasionally remove limbs that interfere with cultural operations.
3. **“Minimal” training & pruning.** Shoots were tipped twice during the first growing season to stimulate secondary branching and establish a bushy tree. At the first dormant pruning, four to six scaffolds were retained to maintain a full canopy. Pruners are allowed only three cuts per tree each dormant season to maintain a minimally open canopy.
4. **Untrained & unpruned.** No scaffold selection was made except to remove limbs originating too low on the trunk for shaker access. There has been no annual pruning other than to occasionally remove limbs that interfere with cultural operations.

The table below shows cumulative yields and comparative gross income for the various pruning treatments through 2009 (10th leaf) in the Stanislaus County trial. Normal, annual pruning has resulted in significant yield and income losses in both Nonpareil and Carmel. Over the first ten years of the orchard’s life, standard annual pruning has reduced Nonpareil yields by up to 1134 pounds per acre and Carmel yields by up to 1998 pounds so far. Using the average grower price of almonds over the past ten years pruning would have reduced net income by over \$4000 per acre including yield loss and pruning costs so far! That’s over \$160,000 in lost income for a 40 acre grower.

Cumulative Yields and Comparative Income for Nonpareil and Carmel Trees in 10-Year-Old Stanislaus County Pruning Trial.						
	Cumulative Nonpareil Yield (lb/acre)	Yield compared to annual pruning	Income increase per acre @ \$1.75 per lb*	Cumulative Carmel Yield (lb / acre)	Yield compared to annual pruning	Income increase per acre @ \$1.52 per lb*
Annually Pruned Trees	19,185	--	--	16,379	--	--
Unpruned after 2 years	20,191	+1006 lb	+\$1761	17,575	+1196 lb	+\$1818
Minimally Pruned	19,177	-8 lb	-\$14	17,560	+1181 lb	+\$1795
Untrained & Unpruned	20,319	+1134 lb	+\$1985	18,377	+1998 lb	+\$3037

*Price per pound is the ten year average for Nonpareil and Carmel paid by Blue Diamond Growers. Pruning costs estimated at \$150 per acre per year.

Other things that I have observed in this trial include:

- Kernel size is not smaller in unpruned trees
- Unpruned trees are not taller than pruned trees. Untrained and unpruned trees are actually a few inches shorter. Similar results were documented in other trials.
- We have not observed more stick tights or mummies in unpruned trees so far.
- We observed more hull rot in untrained & unpruned trees in one year. We have not noticed any other disease problems in unpruned trees.
- The harder you prune, the more suckers and water sprouts grow the following year.

Summary. Untrained trees and trees trained to multiple scaffolds are more susceptible to blow over and scaffold failure during the development years. This is especially true for trees planted at wide spacings (larger trees). Untrained trees also have presented more safety hazards to equipment operators, requiring more safety pruning in later years in my trial. A good compromise may be to train the trees during the first two years (to reduce scaffold splitting and safety pruning in later years) and then abandon pruning in later years. Trees that were initially trained to three scaffolds but have not been pruned after the second dormant season look very acceptable, have not had scaffold breakage problems, have not created problems for equipment operators, are not overly dense, rarely need safety pruning and yield as much or more than annually pruned trees.

In the first University pruning trial at Nickels, unpruned almond trees maintained yields at least as high as annually pruned trees for a minimum of 21 years (I don't have any data past 21 years). The three current trials are only 10 – 12 years old, but so far are showing similar results. We don't know for sure what will happen over the next 10 or 15 years in these trials, but we can say with certainty that if yields decline in unpruned trees, it takes more than a decade to occur. That means that orchards older than 10 or 15 years should not be pruned for the purpose of sustaining yields, period. Realistically, almond orchards have to be pruned a little on occasion for reasons other than yield. Limbs that are dead, broken or diseased, interfere with cultural practices or are safety hazards for equipment operators have

to be removed. However, the notion that almond trees need to be pruned every year to increase or sustain yields appears to be just flat wrong.

I know that the “need” to prune almonds is so deeply ingrained in our brains that it may be difficult to change our ways. However, the scientific evidence is now so compelling that it is hard to ignore. Many of us grew up believing in the Easter Bunny and the Tooth Fairy, but at some point in our childhood we realized they were just fairy tales. As difficult as it may be, grown men will someday have to realize the same thing about pruning their almond orchards.