



## POLLINIZERS AND POLLINATORS – DO THEY MAKE A DIFFERENCE?

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*Note: For an expanded view on avocado flowering terminology, refer to the enclosed Avocado Flowering Basics insert on page 4.*

Two common questions for those considering ways to increase Hass avocado productivity are: 1) Will pollinizer varieties (these are avocado varieties which can serve as pollen donors to Hass) enhance yield and 2) Is it worthwhile to use honey bees as pollinators? The answers to these questions are complex and depend on a number of factors. Previous research supports the use of pollinizers for enhancement of yield, but other findings suggest no substantial benefit. The introduction of pollinators into orchards to enhance yield is also contentious. Questions regarding the actual need for honey bees, spatial placement in the grove,

and hive density are controversial. A project currently funded by the California Avocado Commission is looking for answers to these questions. Below we present some of the preliminary evidence gathered during the first year of the project.

### ► Do pollinizers enhance yield?

In 1999 M. L. Arpaia and B. Faber established a research plot in Ventura County designed to look at whether there were differences in the siring capabilities of pollinizer varieties and whether distance between pollinizer and Hass trees can affect yield. We selected seven varieties of “B”-flower-type avocados grown on clonal Duke 7 rootstock. These were Zutano, Bacon, Ettinger, Fuerte, SirPrize, Nobel (BL667), and Marvel (BL516). We also included Harvest, which is an “A”-flower-type. The latter three varieties are unreleased

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## Canopy Management as a Strategy to Increase Returns

Guy Witney, Production Research Manager, California Avocado Commission

UC Farm Advisors have long advocated that the most cost-effective way to increase per-acre production in the immediate future is to renovate existing acreage and return low-yielding, crowded orchards to their full-yield potential. This, they surmised, could be achieved and sustained through careful canopy management.

The Production Research Committee (PRC) has bought into this concept, using the CAC Visiting Researcher Program to invite world leaders in the field of canopy management to California to help growers learn the concepts of grove renovation. Piet Stassen (South Africa), Cliff Lahav (Israel), and Greg Partida (Cal Poly Pomona) have recently presented both

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## RESEARCH UPDATE

► Research in Dr. Joe Morse's lab indicates that avocado thrips have developed resistance to sabadilla (Veretran D) in groves where the product has been used multiple times. This is of real concern and growers should limit the number of sabadilla treatments to preserve the efficacy of this thrip control tool.

► Although the abamectin (Agri-Mek) label limits treatments to two per year, resistance potential with this material is perhaps of greater concern because of its much longer persistence (field and lab studies indicate a two to three month impact on thrips mortality). Dr. Morse continues to monitor potential resistance development this season.

Watch for meeting notices in the CAC Greensheet or log onto [www.avocado.org/growers](http://www.avocado.org/growers) for more information.

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# Canopy Management as a Strategy

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the theory and practical aspects of canopy management to local audiences. In the field they have demonstrated pruning techniques used to return groves to their yield potential.

## General Concepts

Even though there are several different approaches to canopy management, they all work around the idea that both light penetration and interception are critical components of overall tree productivity. In order to produce fruit, avocado trees need to initiate floral buds. This process occurs from late July through November (based on data developed on Hass by S. Salazar and C. Lovatt). Shoots that are fully exposed to sunlight tend to produce more flowers that will set fruit as compared to shaded shoots. So when pruning trees, we need to constantly examine whether we are maximizing both light interception and penetration into the tree canopy. If all the light and growth is near the top of the tree – this is where the fruit will be next year!

### A pyramid-shaped hedgerow

Piet Stassen and Cliff Lahav both advocate a pyramid-shaped tree, which is essentially a central leader tree with the base of the tree wider than the top. This shape, they argue, provides the maximum amount of leaf canopy area per acre exposed to sunlight and so, in turn, will produce the most fruit. The basic shape can be achieved by having a single central leader (a main limb that dominates the central axis of the tree) with a hierarchy of side branches forming a wide base with sequentially shorter and weaker branches to the top. However, they acknowledge that in avocados it is often more feasible to have two or even three major limbs as central leaders forming the axis of the pyramid (this is sometimes called a closed-vase system).

Their idea is to manage the trees in a hedgerow if possible. Ideally, tree rows should be oriented in a north-south direction and planted at a spacing of 20 x 10 ft. (225 trees per acre). Training the trees to fill the pyramid-shaped hedgerow can be achieved by developing the central leader early on

in the nursery or just after planting by selecting or forcing a strong vertical shoot just above the graft union. When starting a newly-planted tree in their system, Cliff and Piet recommend that any strong branches growing from the central axis that are more than 1/3 the thickness of the leader should be removed and replaced with a weaker branch. Also, all side branches should be selected so that they are nearly horizontal, because vertically-growing branches (with an acute angle to the leader) will grow too vigorously and produce few flowers and fruit. Side branches should form a whorl (spiral) around the central axis of the tree and should be selectively pruned out and replaced so as to open up the tree for light penetration. These pruning rules are followed through the life of the orchard.

In most California groves, however, we are dealing with older, over-crowded trees. This involves making large cuts to get existing crowded orchards into a general pyramid shape and then following up with small cuts to manage re-growth and maintain the trees in place. This system requires trees to be no higher than 80% of row width on flat ground (15 to 16 ft.). On slopes, tree height should be adjusted lower to ensure that the base of each tree receives enough light to flower and set fruit.

If left unpruned, avocado trees have a tendency to return to having several large limbs without a dominant leader. So to maintain a central-leader pyramid shape, follow-up pruning is essential.

If the orchard requires major cuts to get the trees into a general pyramid shape, this should be done from late January on (after fruit is harvested) and should always be followed up by whitewashing exposed bark on major limbs. The frequency of follow-up

pruning cuts will depend on the vigor of the trees and the availability of manpower.

### An open vase

Greg Partida has spent more than 10 years experimenting with canopy management systems at Cal Poly Pomona's Pine Tree Ranch in Santa Paula. Greg advocates a different canopy management system based on his experience with California orchards and growing conditions. Because more than 90% of our acreage is mature, planted on slopes at a spacing of around 20 x 20 ft., and much of it over-crowded, Greg considers pruning trees back to an open-vase system an easier option under many local conditions.

Much of the same principles apply that were outlined above for the pyramid-shaped hedgerow system, so to avoid repetition I will cover the main differences between systems.

In an over-crowded orchard, Greg recommends selecting three or four well-spaced major limbs per tree as the main structural components of the tree. These major limbs will form the basic vase-shaped structure of the tree. This will generally

mean cutting back or removing over-dominant leaders (branches), leaders that encroach on neighboring trees, and poorly-positioned branches (crossing one another, etc.). The object is to achieve a balance in the vigor of the remaining structural limbs by pruning them back so that the overall tree height is reduced to 15 to 20 ft.

As in the previous system, the open-vase system requires diligent follow up pruning to keep the trees shaped, allow light to penetrate the canopy to lower limbs, and to maintain the trees at a manageable height. Also, side branches are selected to carry fruit that are well positioned around the tree, at a wide angle to the main scaffold trunks, and no more than 1/3 the diameter of the main trunks at their point of attachment. Upper

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– Guy Witney

branches that are too large or shade out the lower parts of the tree are selectively removed. Greg has several demonstration blocks at Pine Tree Ranch and Cal Poly Pomona and several growers are testing the method in their own blocks.

The PRC has set up three long-term demonstration trials that are being used to teach these concepts and demonstrate long-term canopy management techniques to all interested. Please watch for field meeting notices in the California Avocado Commission *Greensheet* for opportunities to visit these trials. 🌱



Canopy management trials at ACW Ranch, Fallbrook