



POLLINIZERS AND POLLINATORS – DO THEY MAKE A DIFFERENCE?

A. Elizabeth Fetscher*; Reuben Hofshi*; Nickolas Waser and Mary Lu Arpaia
University of California, Riverside; *Del Rey Avocado Co.

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 for more information.

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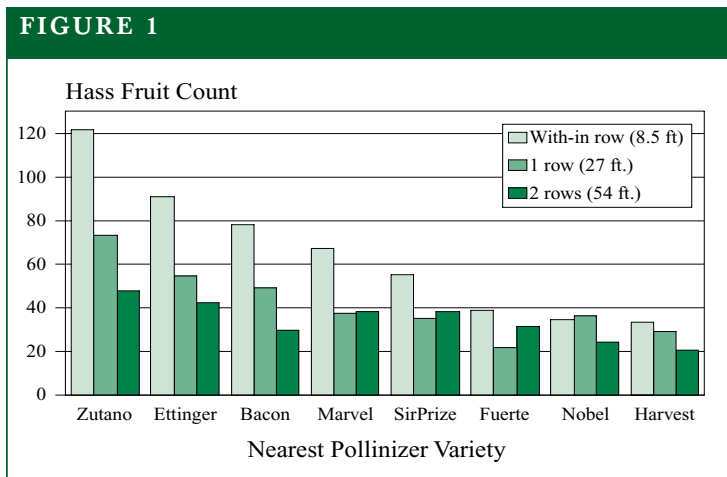


POLLINIZERS AND POLLINATORS

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selections from the UC Avocado Variety Selection Program and are currently being evaluated for commercial release. All varieties were interplanted into an established two-year-old Hass planting on flat ground in the Oxnard plains. Currently, none of the trees are touching and there is plenty of free space surrounding each tree. Hass tree spacing at the experimental site is 17 x 27 ft. The pollinizer varieties are planted every sixth row. In the pollinizer row, the pollinizer trees are offset at a distance of approximately 8.5 ft. from the Hass trees. We are then able to examine yield of Hass at the following distances from a pollinizer variety: 8.5, 27, 54 and 81 ft. The trees that are three rows (81 ft.) away are actually equidistant from two of the pollinizer varieties.

In March 2001, we harvested three of the six replicated blocks for a total of 340 three-year-old Hass trees. We looked at yield of the Hass trees as a function of distance from the pollinizer row. The preliminary harvest results are presented in Figure 1. The data corroborate the fruitlet count data that were presented both at the Fall 2000 Avocado Research Symposium and at recent avocado grower meetings. These data strongly suggest that distance from the pollinizer influences Hass yield. The data also suggest that there may be pollinizer varietal effects on Hass yield. The data from this first year show that the highest fruit counts were obtained when Zutano was the pollinizer variety followed by Ettinger and then Bacon. Of the two unreleased "B"-flower-type selections, it appears that the Marvel may also serve as a good pollen donor. This is of



interest since the Marvel tree is considerably smaller than the three top pollinizer varieties (Figures 2 and 3). The SirPrize, which has already been commercially released by UC, performed better than the Fuerte, although we suspect that the Fuerte did not bloom in 2000. Hass trees planted near Harvest, which is also an "A"-flower-type, had the lowest yields.

This season we are monitoring the flowering behavior of these pollinizers in more detail so that we can better understand potential differences when we harvest the Hass trees again in 2002.

► Do pollinators enhance yield?

Research in Israel by Dr. Gad Ish-Am and others clearly

demonstrated that the honey bee is an effective pollinator of avocados although it prefers other flower species such as citrus and wildflowers. As part of this project, we have been examining potential race differences between the Italian race honey bee and the New World Carniolan race honey bee as avocado pollinators. We monitored the percent of the honey bees visiting avocado flowers during the day. We used the presence of perseitol, a sugar unique to avocado, to assay for honey bee visitation to avocado flowers. We noted differences between the two races with regard to avocado visitation with the Carniolan race tending to have a higher visitation rate to avocado, depending on the research site.

This part of the project is being conducted in collaboration with Dr. Arnon Dag and Dr. Sharoni Shafir in Israel who are carrying out similar studies. The 2000 Israeli research results suggest that there are indeed race differences. The Israeli data showed a significantly higher percentage of perseitol in the honey of Carniolan race honey bees as compared to the Italian race honey bees. We are continuing this collaborative effort for the 2001 flowering season. This work is being carried out at two sites representing a coastal (Oxnard plains) and an inland (Fallbrook) environment. Additionally we are collaborating with Dr. Tom Davenport from the University of Florida and Dr. Thomas Chao from UC Riverside. With them, we are investigating whether pollination and subsequent fertilization can take place in the male phase of flowering. Dr. Davenport is also investigating pollination efficiency in an environment without insects. He is doing this by caging trees and collecting airborne pollen at a coastal (Oxnard plains) and an inland (Fillmore) site.

► What does it all mean?

Our results from this first year suggest that at least under certain conditions pollinizers can indeed enhance yield. More importantly, we also have data from young trees that there are differences between pollinizer varieties. Whether we will observe the same trends in the data in the upcoming year remains to be seen. We have also collected preliminary data, supported by the data from Israel, that suggests there are honey bee race differences in avocado flower visitation. These data will be important as we continue our efforts in identifying the many factors, which can enhance avocado productivity. 🍌

FIGURE 2
Relative tree size of Zutano



FIGURE 3
Relative tree size of Marvel

