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Avocado IPM Progress Report

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During 1988-89, we worked on four projects. We requested $20,000 and were granted $10,000 to work with.

Monitoring Early Warning Project

We are now (September 22, 1989) within three months of completing this three-year project.

We are now monitoring for the Omnivorous Looper and the two "strains" of Amorbia moths at 40 sites in 10 counties. At each monitoring site, we have from one to four different insect trap designs, each baited with the appropriate sex pheromone; *i.e.,* the Omnivorous Looper, the low ratio Amorbia, and/or the high ratio Amorbia pheromones. At present, we have 27 monitoring cooperators, all volunteering their time and costs to this project.

In general, 1989, unlike the previous year, was not a bad "worm" year for most California avocado growers. Those who did find fairly high numbers of moths in their traps had adequate warning, based on the pheromone-baited trap catches, to order and release *Trichogramma platneri* wasps in time for the wasps to sting and kill the eggs of these moths before they hatched into caterpillars and began feeding on fruit and foliage. Those who practice this type of integrated pest management are now reaping the benefits of this type of IPM.

We are pleased to report that the Omnivorous Looper pheromone is now (June 1989) commercially available from Trece Corporation, Salinas, California. If you have a licensed pest control adviser (PCA) taking care of your pest control work, he can purchase these pheromone lures from Trece or their local dealers. In fact, anyone-can purchase and use these pheromones. Your local University of California farm advisor can help explain their most efficient use.

We ran a "mini" field study this summer, as did a number of other individuals, and found this Trece product to compare quite favorably with that of Dr. Les McDonough's — the pheromone chemist and laboratory research leader, USDA-ARS, Yakima, Washington, who worked with me to develop this pheromone for California avocado growers.

We still have one field study to complete with the pheromone; but the results of this study, when run, will not affect the commercial product that you or your PCA can order.

The two Amorbia pheromones which Dr. McDonough and I have developed for you, being somewhat more complicated and difficult to produce, require a little longer for Trece to commercialize. They now anticipate that they will be on the market by early next spring.

As is the case with the Looper pheromone, we still have two additional field studies to complete with the high and low ratio Amorbia pheromones. These studies, although not absolutely essential to their production and use, should substantially contribute to their more effective use and are well worth the time and effort we give them.

Amorbia Moth Trap Design Study

We set up a four-month-long field study to evaluate three different trap designs for Amorbia moths. Each trap design was replicated six times, for a total of 18 traps in this study. Six of the traps were "Unitraps" painted solid dark green, another six were "Unitraps" painted yellow and white, and the last six traps were the commonly-used "Pherocon 1C" sticky traps. All of the traps were baited with low ratio Amorbia pheromone lures produced by Dr. Les McDonough in his USDA-ARS laboratory. This study ran from April 24, 1989 to August 15, 1989. Traps were checked and serviced one to two times each week for this period, for a total of 25 times. All traps were separated by approximately 100 feet. After each trap was checked and serviced, it was moved to the adjacent trap position to compensate for bias of location in the grove. The results surprised us. Based on a study we ran during 1988 for Omnivorous Looper moths, using these and other traps, we expected both of the "Unitraps"; *i.e.,* the solid green colored traps and the multicolor traps, to catch many more Amorbia moths than the "Pherocon 1C" traps. The actual results were:

Treatments	**Number Amorbia Moths Caught**	**Percent of Total**
6 Pherocon 1C traps	481	44.3
6 Multicolor Unitraps	372	34.3
5 Solid green Unitraps	233	21.4

Amorbia Day Degree Laboratory Project

This project was started early this spring in our bioclimatic chambers at the South Coast Field Station. The purpose is to determine the development time for each growth stage of the two Amorbia "strains"; *i.e.,* egg stage, larval stage, and pupal stage, under six different temperatures. We do both "strains" of Amorbia simultaneously to eliminate certain variables. The development times of these insects at 55°F requires almost five months, and that for higher temperatures will be somewhat shorter. We are presently in the middle of the 75°F run. We expect to complete these studies by the end of December 1989.

The practical value of such studies to growers or licensed pest control advisors is that they can get an accurate "biofix"; *i.e.,* readily identify the stage of development that most of the insects are in, based on the temperatures in their groves and the resulting development times of Amorbia, whether they have the low ratio Amorbia population or the high ratio Amorbia population in their groves. Thus, they can predict very accurately which stage of growth Amorbia is in for any particular avocado grove, and thus be able to make more accurate pest management decisions than they could in the past.

Mating Crosses with the Two "Strains" of Amorbia Moths

This laboratory project was started several months ago in our bioclimatic chambers at the South Coast Field Station. The purpose is to see if we are dealing with two distinct species of Amorbia in the various avocado groves throughout the state.

Based on the fact that we had to develop two different pheromones to attract the two different "strains" or "species" of Amorbia moths in San Diego and Santa Barbara Counties, and on several other factors, we believe that we are dealing with two distinct "species." If this is true, by definition, they should not mate and produce viable progeny. To obtain answers, we are rearing both "species" of Amorbia in our laboratory and have begun mating crosses. To date, we find that when we cross 10 of high ratio moths with 10 other high ratio moths (HxH), we get a ratio of seven successful matings and viable eggs and three other matings with non-viable eggs. We obtained the same results when we crossed 10 pairs of low ratio moths (LxL). When we did the LxH moths crosses, we got a 50-50 success rate; and from the HxL moths crosses, a 60-40 success rate. We will repeat these mating crosses several more months in hopes of obtaining consistent results.