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During this period we worked on **four projects simultaneously,** they were:

1. **A monitoring study** of Omnivorous Looper and Amorbia moths.
2. **A Day Degree Study** at 75°F. for all developmental stages of growth for *Amorbia cuneana.*
3. **A trap design study** for *Amorbia cuneana .*
4. **A mating study** of high ratio and low ratio *Amorbia cuneana* moths.

Monitoring Study

We completed the three year Monitoring Early Warning Project for the omnivorous looper and Amorbia moths at the end of December 1989. You will recall that this rather ambitious project involved 27 individuals, including U.C. Farm Advisors, licensed pest control advisers (PCA's), growers, and myself as project leader and coordinator. The project included 40 monitoring sites in ten counties, namely, San Diego, Riverside, Orange, Ventura, Santa Barbara, San Luis Obispo, Kern, Tulare, Fresno, and Madera. All of these individuals volunteered their time and paid their own expenses during the entire period. Final trap counts are still coming in, thus I can not provide a final report showing counts and graphs depicting times and magnitudes of each flight from each of the locations. I will be submitting an article to the California Avocado Society Yearbook, with these details this autumn. As mentioned several months ago, we have given the omnivorous looper pheromone to Trece, Inc. of Salinas, Ca. and it is now commercially available. **See attachment, Monitoring Fact Sheet.** The two Amorbia pheromones are somewhat more complicated to reproduce. Trece says they should have it commercially available within a month or so.

Amorbia Dav Degree Studies

We recently completed the 75°F "day degree" study for the low ratio Amorbia in our bioclimatic chambers at U. C. South Coast Field Station. Our data show that the average development time at this temperature, for the egg, larval, and pupal stages combined, is close to 47 days or slightly over 1.5 months, while it requires approximately five months for this same insect to development at 55°F. The practical value of such studies to growers and PCA's is that they can accurately predict how long each stage of development of Amorbia will be in each avocado grove. Temperatures can and do vary widely from grove to grove, thus development times for your insect populations will also vary. Some people use the day degree information as a monitoring tool, starting from a biofix of their own choice, while others use "day degrees" in conjunction with pheromone traps. In the latter case, the pheromone traps provide moth flights as your biofix. I will be preparing a leaflet on the use of both of these monitoring tools as soon as possible.

Amorbia Moth Trap Design Study

Trap designs effect catches of insects. Trap designs also are of concern to the trap operators. They should ask themselves if the trap a substantial one that will withstand local climatic conditions for many months, or even years? Is the trap easy to operate and service? Does it have the capacity to hold all of the moths that might be attracted to the lure in the trap for a period of about one week? Is the trap commercially available from a company that is likely to be in business for years to come? Is it reasonably priced for its quality design and durability? All of these considerations are important to those who frequently run monitoring traps in their avocado groves.

Based on the above considerations, and on some preliminary field trials with three traps that meet the above criteria, we set up a replicated field experiment to evaluate three insect traps in a grove that had a history of high populations of low ratio Amorbia during the past several years. We elected to use three trap designs in this study, which we call treatments (tmt.) one, two, and three respectively. Tmt one was the widely used Pherocon 1C sticky trap; tmt two was the Unitrap (a so-called live trap) painted solid dark green; tmt three was also the Unitrap, but with Yellow, white and green colors, in other words a multicolored Unitrap. Each tmt. was replicated six times, giving us a total of 18 traps in the study. All traps were baited with our experimental low ratio Amorbia pheromone. The traps were hung in the scaffold branches of the trees in a randomized complete block experimental design, with no trap being located less than 100 feet from the next nearest one. Each time the traps were checked and serviced, they were moved to the adjacent trap position to compensate for bias of trap location. Traps were checked and serviced at 3 to 4 day intervals throughout the entire study, which ran from April 24, through August 15, 1989. Therefore we checked and serviced each of the 18 traps 25 times. Servicing the traps included counting the moths caught since the last time, and in the case of the Pherocon 1C sticky traps, counting, recording and removing the moths, and stirring the stickem in the inside bottom of these traps. In the case of the the Unitraps, moths were removed, counted and recorded. To each of the Unitraps we added a 1" piece of a No Pest Strip which emits a very small quantity of volatile DDVP organophosphate insecticide which kills the moths once they are attracted and caught in the traps.

The results surprised us. Based on a similar study that we ran during 1988 for Omnivorous looper moths, in which we used these and other trap designs, we expected both of the Unitraps, to catch many more Amorbia moths than the Pherocon 1C traps. The results were as follows:

Treatments	Number Amorbia Moths Caught	Percent of Total
6 Pherocon 1C traps	484	44.3
6 Multicolor Unitraps	372	34.3
6 Solid Green Unitraps	233	21.4

Amorbia Mating Study

This laboratory project was started several months ago in our bioclimatic chambers at the South Coast Field Station. The purpose was 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 "strains", or "species", of Amorbia moths, we believe we may be dealing with two distinct species. One strain is called "high ratio" and the othe "low ratio" based on the type of pheromone they produce. If this is true, by definition, they should not mate and lay viable eggs when crossed. To obtain answers, we have been rearing both strains of Amorbia in our laboratory and have conducted experimental crosses between the two strains. In the first experiment, 10 single pairs of high ratio moths and 10 single pairs of low ratio moths were mated. These were compared to crosses between strains. Between strain crosses included 10 matings of high ratio males with low ratio females and 10 of high ratio females with 10 low ratio males. Seven of the 10 high ratio pairs produced live larvae and were therefore successful. The same results were obtained with the low ratio pairs. Only four of 10 of both between strain crosses were successful.

These results suggest that some reproductive isolation has occurred between the high and low ratio populations

and that the two strains may be in the process of becoming two different species. We are presently conducting a similar experiment to confirm these results.

Attachment: Monitoring Fact Sheet - Omnivorous Looper Saved on Blair's Admin. 3 disk.

Monitoring Fact Sheet

Omnivorous Looper

Sabulodes aegrotata (caberata)

Lepidoptera: Geometridae

HOSTS: Acacia, alder, Algerian ivy, avocados, box elder, buckeye, California pepper, citrus, English ivy, magnolia, maple, sycamore, toyon.

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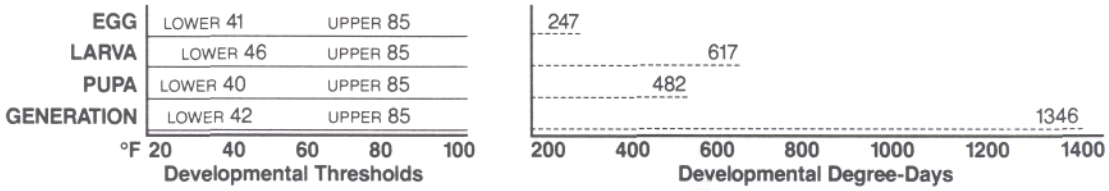
DESCRIPTION: Adult moth wingspan of 1.75"-2"; wings tan colored with a very faint black line running laterally across the wings.

BIOLOGY/PHENOLOGY: Generations overlap and all insect stages can be found in the winter. 3-4 generations/year. Major flight activity during January-March, May-June, August-September, and October-November. Developmental threshold and degree-days by Bailey and Olsen, University of California South Coast Field Station.



PRODUCT/MONITORING SPECIFICATIONS

LURE: Pherocon® controlled release septa.

LURE PLACEMENT: Lure should be hung from the top inside center of the trap using a straight pin.

TRAP DESIGNS: Pherocon 1C Trap; Oil Trap; Live Trap; or Trece Water Pan Trap.

TRAP PLACEMENT: Time of Year — adults area active all year and traps should be in place year long.

Within Block—grid pattern for interior and borders.

Within Tree - —place traps on peripheral branches; 5 to 7 feet high; set traps a minimum of 100 feet apart.

TRAP DENSITY: Use a minimum of 3 traps per block. No specific trap density numbers based on acreage are available at this time. Based on experience with other lepidopteran species; use 3 traps for 10 acre blocks; 6 traps for 20 acre blocks; 1 trap per 10 acres for 100 acre blocks; and 1 trap per 20 acres for 200 acre blocks and larger.

TRAP MAINTENANCE:

1) Reading Catch —Once or twice per week or more often as needed. Count and remove captured moths. Record.

2) Lure Replacement — 90 day intervals.

3) Adhesive Liner —Re-stir adhesive after removing captured moths. Replace as necessary when soiled and no longer sticky.

4) Oil/Water Traps — Maintain liquid level to the top of the container.

Trece Inc. recommends that users consult with qualified commercial pest management consultants or representatives of extension services, universities or governmental agriculture departments in their area, experienced in the use of pheromone monitoring systems and the omnivorous looper. For assistance, call the Trece Insect Monitoring Hot Line at 408-758-5328. Thank you.

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