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Seasonal Population Trends of Avocado Worm Pests

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The two main worm pests of avocados in California are the omnivorous looper, *Sabulodes aegrotata* (Guenee), and the western avocado leafroller, *Amorbia cuneana* (Walsingham). Although these insects have been reported as avocado pests for several decades (1, 5), very little information is available on their seasonal population trends.

To gain a better understanding of these pests, a population monitoring program utilizing blacklight traps was initiated during late 1979 and early 1980. Eight trapping stations were established throughout the major avocado growing regions of the state to monitor moth activity. The primary objective of this ongoing research is to determine the number of generations per year of each of these pests and when they occur. Such information is important for the proper timing of supplemental releases of the egg parasite, *Trichogramma platneri,* if they are demonstrated to be effective in controlling either or both of these worm pests. Moth flight activity data can also indicate when there is a potential for economic loss during the year.

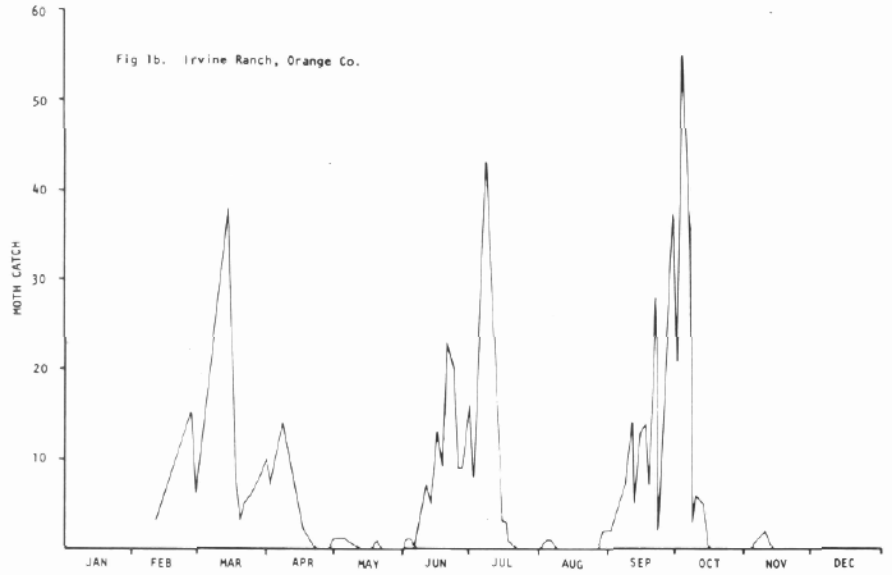
METHODS AND MATERIALS

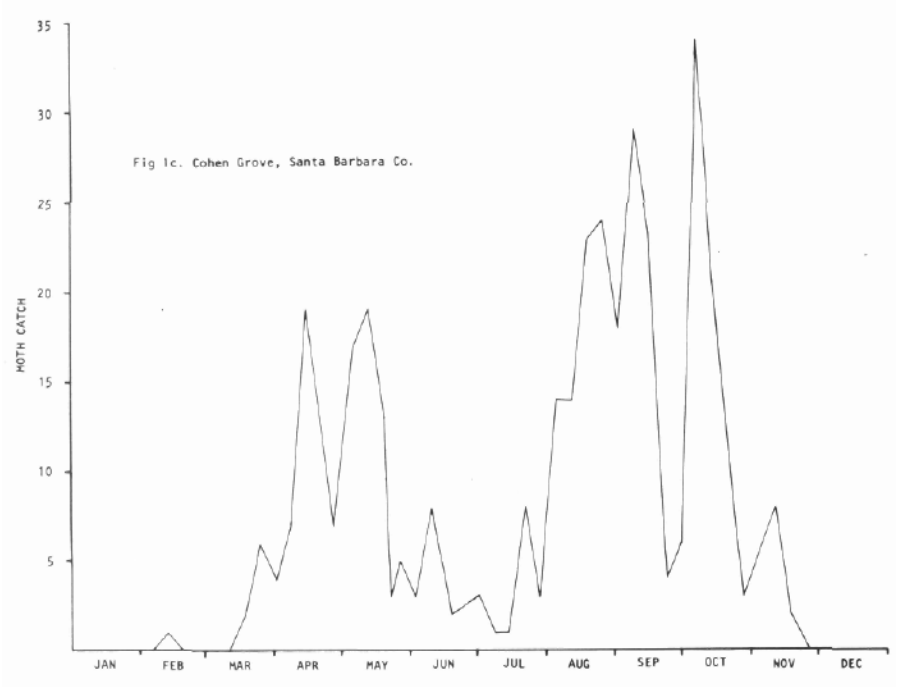
A standard blacklight trap design (2) with a 15 watt 110v ac fluorescent blacklight bulb is being utilized. The killing agent is either one dichlorvos strip (Shell No-Pest® Strip) per trap which is changed every 4 to 6 weeks or 70% ethyl alcohol contained in a one quart Mason jar.

Traps are maintained at the various sites by cooperators, who empty them 1 to 3 times per week and either mail the dry catches (dichlorvos strip) in for examination or retain the insect-filled alcohol jars for retrieval by UC personnel. All catches are sorted and counted at the University of California South Coast Field Station, Santa Ana, California.

Traps are all located in areas of heavy avocado production and are located within or adjacent to avocado groves. Four traps are located in San Diego County and one each in Orange, Riverside, Ventura, and Santa Barbara Counties.

Figs. 1a-c. Seasonal Population Trends of Amorbia.





RESULTS AND DISCUSSION

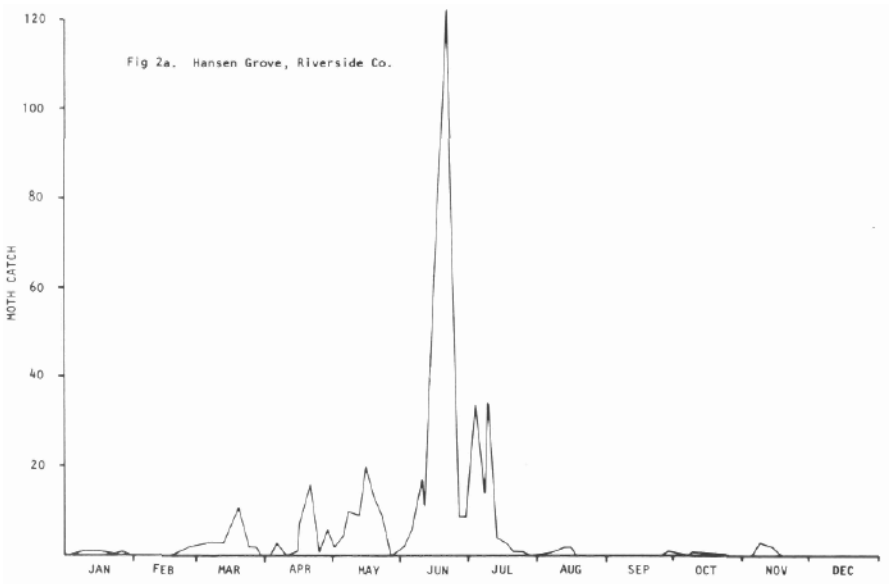
Almost 18,000 omnivorous loopers (OL) and over 3,600 amorbia moths were captured through early December of 1980 in this project. Though the population trends shown here (Figs, 1a-c, 2a-e) do not extend to the end of the year, we do not anticipate any additional significant flights of either pest until early 1981.

Insects captured at most of the locations were sexed. A total of 2,069 male and 1,022 female amorbia moths were captured. Omnivorous looper males numbered 13,431 and females 2,684, a 5:1 ratio in favor of males. We do not know the specific reason for the higher male catch, but speculate that the females, in particular the OL females, may be poorer fliers than the males.

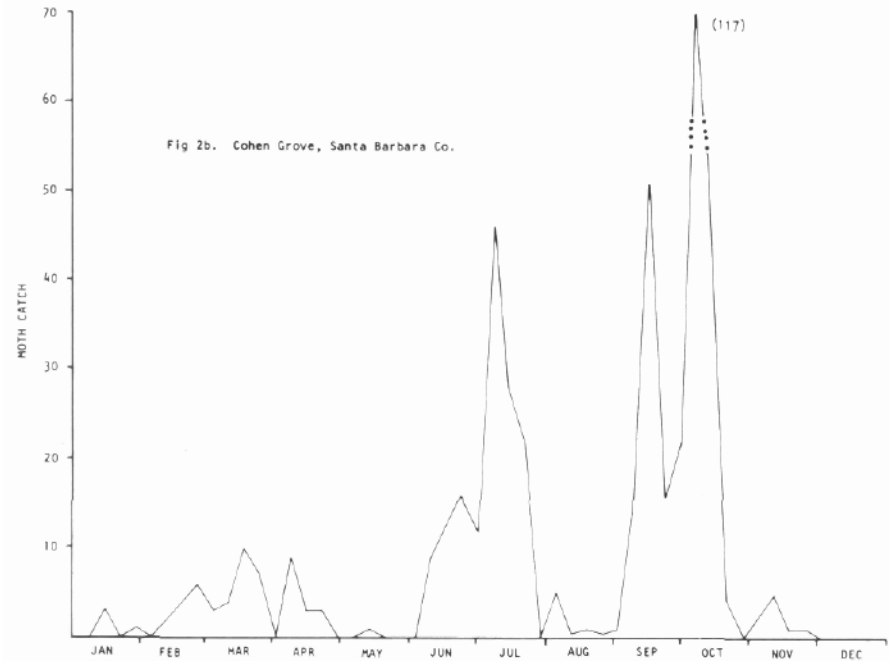
Seasonal population trends—Amorbia

Of the eight blacklight stations in operation, only three produced distinct population trends of amorbia adults (Figs. 1a-c). The other locations failed, either because the amorbia population was too light and flights could not be detected, or because extremely high OL catches interfered with the capture of amorbia moths.

Amorbia catches at the Leavens Grove and Irvine Ranch (Figs, 1a and b) indicate three fairly distinct generations per year. The first flight begins early in the year and extends through April, with a second in June and July, and a third during September and October. The traps at these two sites were emptied rather sporadically during the first flight, thereby magnifying some of the early season peak heights, but still indicating an obvious period of adult activity.



Figs. 2a-e. Seasonal Population Trends of the Omnivorous Looper.



Amorbia catches at the Cohen Grove (Fig. 1c) indicate two rather lengthy periods of adult activity. The first flight began in mid-March and continued for approximately 9 weeks. From late May to late July there was a period of reduced activity and then there was a second flight which extended into November.

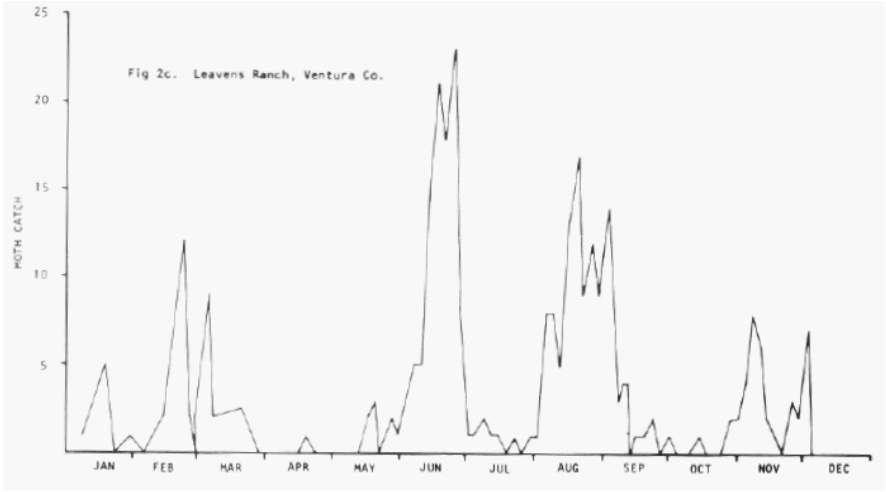
These data indicate that there are two to three generations of amorbia per year in the

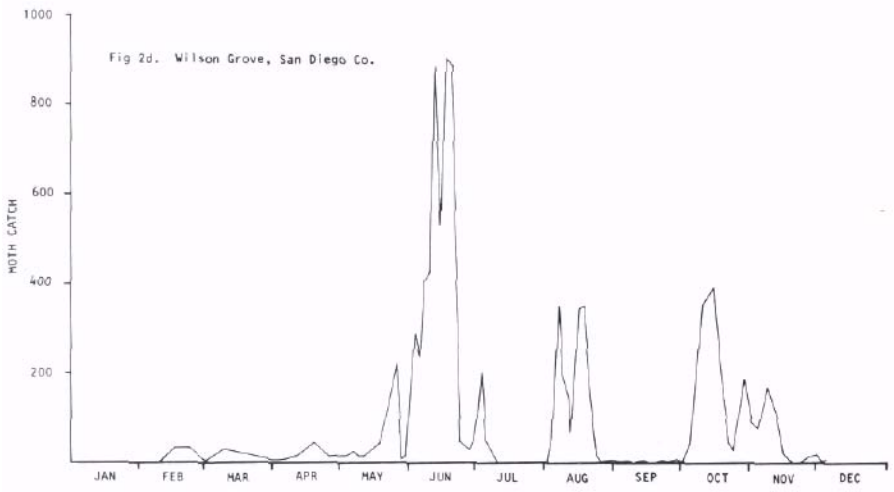
areas monitored. Earlier work by McKenzie (4) suggested that there are 4 to 5 generations per year and that approximately two months are required for a life cycle or generation (egg to adult) to be completed under summer conditions near Encinitas. In the areas monitored in this study, it appears that a typical generation requires a minimum of 3 months during the summer and a somewhat longer period during the cooler seasons or at cooler locations.

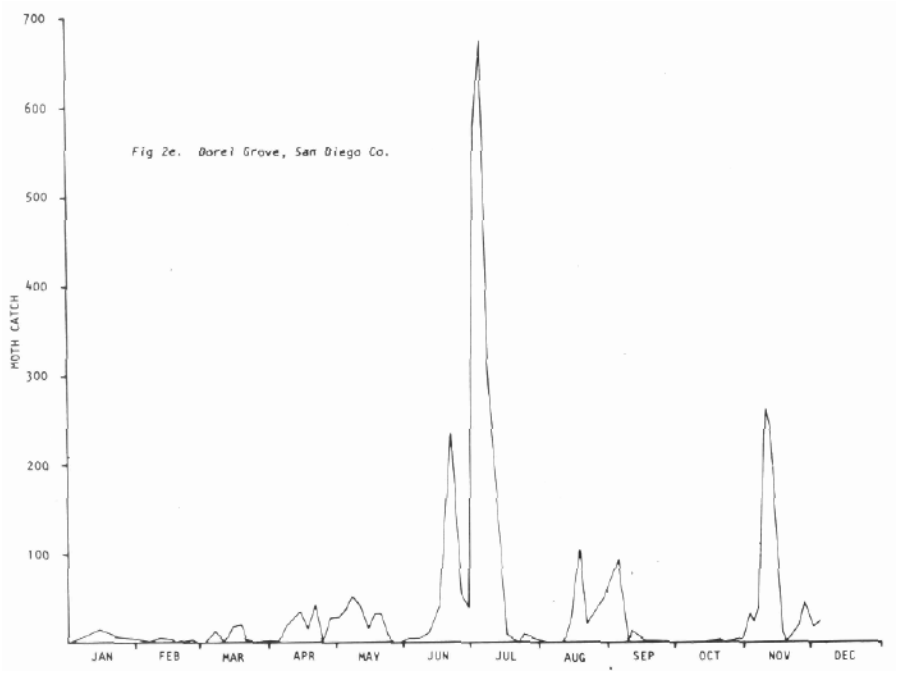
Seasonal Population Trends—Omnivorous Looper

Five of the eight monitoring stations showed relatively clear population trends for the OL. From this first year's observation it appears that there are 3 to 5 generations per year. McKenzie (4) suggested that there are 5 to 6 generations per year based on observations made near Encinitas.

There appeared to be varying levels of adult OL activity at all the locations monitored (Figs. 2a-e), beginning early in the year and extending until the start of the first large flight in June. Depending on location, we feel there are 1 to 2 generations during this period.







Following the large early summer flight, two additional flights occurred at all locations except the Hansen and Cohen groves (Figs. 2a and b). No August to September flight was detected at the Hansen grove because of a defective blacklight during this period and only a small flight appeared in November. OL catches at the Cohen grove indicated one lengthy flight period in September and October.

Based on peak flight periods, it appears that about 8 weeks are required to complete a single generation (egg to adult) in the summer and fall. Allowing for a 1 to 2 week adult life span, this agrees with McKenzie's (4) work near Encinitas. Generations occurring during the cooler seasons of the year are no doubt longer, but clear trends were not detected in this first year's study.

It is known that mated OL females begin laying eggs 48 hours after emergence (Bailey and Hoffmann, 1980, unpublished). Therefore, eggs are no doubt present in groves shortly after the adults appear. If supplemental releases of *Trichogramma platneri* are proven to be effective, and growers elect to release them, such releases should be made during these flight periods.

Catches depicted for amorbia (Figs, la-c) and OL (Figs. 2a-e) should be considered in a relative sense only. Comparisons of moth catches among monitored groves is difficult, because the trap placement, exposure and surrounding environment was different at each location. These factors affected the efficiency of the individual traps. Therefore, the number of moths captured does not relate directly to the actual number of moths present in the grove. For example, the Wilson grove blacklight (Fig. 2d) had very high catches during June, yet the grove sustained only light foliar damage. In comparison, the Leavens grove (Fig. 2c) incurred fairly heavy damage early in the year yet the blacklight catches were very low.

Therefore, it is difficult to use these data to make comparisons between groves or to

relate the magnitude of moth flights with subsequent damage. The primary purpose of this study was to identify when during the year such problems may occur.

None of the groves monitored had economic infestations of either pest except the Leavens grove, This grove had a very heavy OL population early in the year.

Though the population trends observed in 1980 will not be exactly the same in subsequent years due to seasonal temperature variations, the overall trends should be quite similar. The results of this first year's research are very encouraging. However, as with any long-term study, several years may be required to clearly define the population trends of these two pests.

A much more effective adult monitoring tool will soon be available for the amorbia moth. The sex attractant pheromone of amorbia has recently been identified, synthesized, and proven to be effective in the field (3). This attractant, when placed in a trap, has several advantages over the blacklight method and should provide us with a new and powerful tool for monitoring moth flights. The sex attractant pheromone of the OL has been identified, but has not yet been synthesized.

SUMMARY

There appear to be 2 to 3 generations of amorbia and 3 to 5 generations of omnivorous looper per year, depending on location. A typical amorbia generation reo.uires 12 weeks, while omnivorous looper generations are completed in approximately 8 weeks during the warmer season of the year. No obvious correlation was detected between number of moths captured and the extent of larval damage in any of the groves monitored.

ACKNOWLEDGMENTS

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