

Avocado Thrips Subproject 1:
Laboratory Studies on Biology and Foreign Exploration for this Pest in
Mexico.

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Benefit to the Industry

Avocado thrips, *Scirtothrips perseae* (Thysanoptera: Thripidae) has recently emerged as a major pest of avocado in California attacking foliage and severely damaging fruit resulting in substantial economic losses. Nothing is known about the developmental and reproductive biology of this pest or from what area of the world this insect is endemic. Basic knowledge of avocado thrips biology is necessary if effective management with natural enemies and pesticides is to be achieved in California. Determining the geographic distribution of avocado thrips is essential if natural enemies climatically pre-adapted to California are to be located and successfully established for biological control of this pest.

Objectives

This project has two objectives: (1) to investigate the biology of avocado thrips under three temperature regimens (20°C [67°F], 25°C [76°F], and 30°C [86°F]) in the laboratory. Laboratory work will (a) determine development times for each stage of the thrips lifecycle, (b) determine the daily and lifetime fecundity of mated and unmated female thrips, (c) determine the longevity of adult male and female thrips. This information will be used to develop a day-degree model to predict thrips phenology in the field. Objective (2) is to determine the geographic distribution of avocado thrips by exploring wild and cultivated avocados in Mexico, Guatemala, and the West Indies. Locations of thrips finds will be used to match areas climatically most similar to California and prospecting for natural enemies will be conducted there.

Summary

An unknown species of *Scirtothrips* was found damaging avocado fruit and foliage in Ventura county in 1996. By July 1997 thrips were found north of Ventura in San Luis Obispo county and south in San Diego county. Seven Californian counties currently have thrips infestations. Avocado thrips was formally named as *Scirtothrips perseae* and described by Nakahara (1997). Avocado thrips appears to be more closely related to *Scirtothrips* species in Mexico and Central America than to species in North America. To better understand and manage this pest, studies on the developmental and reproductive biology of avocado thrips have been undertaken in the laboratory. Foreign exploration for avocado thrips has been conducted in Mexico and construction of a distribution map for this pest in Latin America is now underway.

Developmental Biology at 25°C. Adult thrips collected from the field were contained on young avocado leaves in round glass cells (2.8 cm diameter; 1.5 cm height) in groups of 5-7. Thrips were moved to new leaves daily until death. Leaves were kept on saturated foam rubber pads in stainless steel trays in temperature cabinets at 25°C. Leaves were checked daily for egg hatch and numbers of emerging thrips were recorded. Newly emerged first instar thrips were then isolated individually on young avocado leaves in plexiglass Munger cells and developmental stages determined daily until adulthood. Isolated adult male and female thrips were transferred to fresh avocado leaves and monitored daily for longevity. Daily fecundity of mated and unmated female thrips reared from; eggs at 25°C was determined by moving females to fresh leaves every 24 hrs and previously exposed leaves were held at 25°C and monitored daily for emergence of first instar larvae.

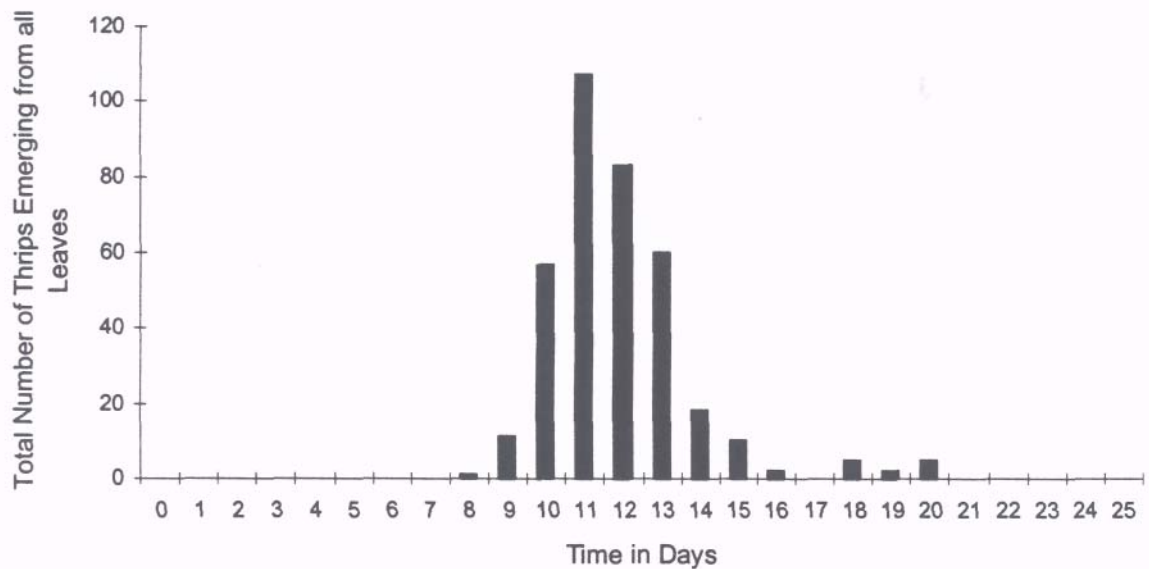
Foreign Exploration. Foreign exploration for avocado thrips was conducted October 8-13 1997 in Coatepec-Harrinas and Atlixco hi Mexico. With considerable assistance from Mexican colleagues, backyard plants and trees in abandoned orchards were sampled for avocado thrips. Collected thrips were sorted at UCR and 130 specimens were slide mounted and sent to Dr. Nakahara, USDA-ARS in Beltsville Maryland for identification.

Results: Developmental Biology at 25°C. The developmental biology of avocado thrips has been determined at 25°C and is presented in Table 1. Emergence times of first instar larvae at 25°C are shown in Figure 1. Work on reproductive biology at 25°C is still in progress. Developmental and reproductive biology studies at 30°C have begun.

Table 1. Developmental times in days for eggs, larvae, pupal stages and adult longevity of avocado thrips (*Scirtothrips perseae*) at 25°C. All means are presented with standard errors.

Stage	Mean time in days spent in stage (\pm SE)
Eggs	11.89 \pm 0.10
First instar larvae	1.76 \pm 0.12
Second instar larvae	4.09 \pm 0.19
Propupae	1.17 \pm 0.07
Pupae	2.50 \pm 0.10
Adult females (longevity)	9.85 \pm 0.90
Adult males (longevity)	11.20 \pm 1.20

Figure 1. Graph of emerging first instar larvae from avocado leaves at 25°C (76°F).



Results: Foreign Exploration in Mexico. Avocado thrips were found on avocados at Coatepec-Harrinas and Atlixco in Mexico (Figure 2). Of the 130 specimens sent to Dr. Nakahara for identification, 118 were positively identified as *Scirtothrips perseae*.

Figure 2. Location of avocado thrips in Mexico.



Research objectives for 1998. The major research goal for 1998 is to complete work on avocado thrips reproductive and developmental biology at 20°C and 30°C and to construct the day-degree model. Work will continue with Morse on establishing a vigorous avocado thrips colony at UCR for natural enemy and pesticide evaluations. Foreign exploration in Michoacán and Oaxaca for avocado thrips is planned for March 1998. Work will begin in cooperation with Koppert Biological Systems in the Netherlands to begin commercial mass rearing of predatory black hunter thrips and possibly *Franklinothrips vespiformis* another common predator that responds to high densities of avocado thrips. Collaborative work with an entomologist from Universität Bonn in Germany on predatory thrips has tentatively been planned to commence in December 1998.

References Cited

Nakahara, S. (1997) *Scirtothrips perseae* (Thysanoptera: Thripidae), a new species infesting avocado in Southern California. *Insecta Mundi* 11:189-191.