

Biological Control of Thrips and Mite Pests of Avocado

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The following report includes information presented April 5, 1989, to the Avocado Research Advisory Committee and information presented October 2, 1989, at the annual meeting of the California Avocado Society.

Research continues on the imported wasp, *Thripobius semiluteus*, as a biological control agent of the greenhouse thrips, *Heliothrips haemorrhoidalis*. Since this parasite was introduced from Australia in August 1986, nearly 400,000 females (males are unknown) have been colonized on avocado in about 40 different sites in four counties. Parasite activity, evidenced by the presence of parasitized (distorted) thrips larvae and black parasite pupae, has been observed in nearly all sites surveyed; and in one site, more than two years subsequent to the last parasite release. The maximum distance observed was 20 rows in one direction between August and June.

Surveys at some release sites have shown a high percentage parasitization of thrips by *T. semiluteus* (up to 70% of the second stage thrips larva plus pupa population) and an apparent suppression of the thrips population to low levels. A critical factor in the success of this parasite will be its ability to recover from severe reductions of thrips populations resulting from early picking, parasitization, or severe weather conditions. Although two annual cycles of both thrips and parasite populations were observed at one of our initial parasite colonization blocks, more information is needed on this subject.

An experiment was conducted to determine if *T. semiluteus* caused sufficient thrips mortality to reduce fruit damage. Thrips numbers, percent parasitization, and fruit scarring were monitored in three areas of an orchard when parasites were established and three areas where they were absent or scarce. There was a trend of lower thrips numbers and fruit damage ratings in the areas where parasites were established, but early picking necessitated termination of the experiment.

Although greenhouse thrips were common in all of the six southern states surveyed in Brazil during a two-month period beginning in March 1988, parasitized thrips were found at only one location, an agricultural college in Lavras, in the state of Minas Gerais. Over 200 parasites were hand-carried to the University of California at Riverside, cultured, and processed through quarantine. Although the parasite has been identified as *T. semiluteus* (a new record for the New World), it could be a different strain (biotype) which might be better adapted to certain ecological conditions than the Australian stock.

Field colonization of the Brazilian strain has commenced in sites separate from those of the Australian strain.

1988-89 Program

Greenhouse Thrips

Scheduled research: Survey release plots to determine establishment and spread of the introduced parasitic wasp, *Thripobius semiluteus*.

Thrips parasitized by *T. semiluteus* have been recovered in most release plots except those which subsequently have had very low numbers of thrips, precluding adequate sampling. Parasitization was evident two (and in one case three) seasons after the parasite releases. These surveys indicate that this natural enemy is established in southern California and that it has survived both cold and hot weather extremes of the region. Extensive surveys in one orchard indicate spread of the parasite throughout the orchard by the end of the second season.

Scheduled research: Continue insectary production and field release of both Australian (introduced in 1986) and Brazilian (1988 introduction) strains of *T. semiluteus* for release in additional areas.

Totals of about 106,000 wasps of the Australian and 78,000 of the Brazilian strains were colonized in four counties during the period of September 1, 1988 to August 31, 1989. No differences between the two strains were noted in relation to life history, ease of rearing, or establishment at release sites.

Scheduled research: Determine percentage parasitization (mortality) on thrips population by *T. semiluteus*, and evaluate the effectiveness of the parasite.

Thrips and parasite populations were closely monitored in two orchards in which the parasite has been established for at least two years. Samples during the summer indicate an increasing mortality of second stage thrips larvae to a peak of 60-70%, and a gradual decline of thrips populations on most sample trees. Although few comparisons (control) trees were available on which few or no thrips were parasitized by *T. semiluteus*, such trees showed delayed or no declines in thrips numbers.

Avocado Mites

Scheduled research: Survey selected orchards to determine establishment and spread of previously introduced beneficial phytoseiid mites.

Establishment of the predaceous mite *Typhlodromus rickeri* has been observed in San Luis Obispo County, where six-spotted mite has been a problem. This predator is closely associated with six-spotted mite. An apparently new species of phytoseiid mite,

also from avocado in San Luis Obispo County, is being cultured in our laboratory to determine its ability to attack avocado mites.

Practical Applications and Summary

The introduced parasitic wasp, *Thripobius semiluteus*, has become established in southern California and has survived both hot and cold weather conditions in some orchards. Populations surveys have shown that it can cause a high mortality of greenhouse thrips. More information is needed on the ability of the parasite to maintain economic control of greenhouse thrips.