

## BIOLOGICAL CONTROL OF GREENHOUSE THRIPS AND MITES ON AVOCADO

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### Greenhouse Thrips

Surveys to determine establishment and carryover of the parasitic wasp Thripobius semiluteus.- In the majority of release orchards regularly surveyed (some for up to 5 years since initial parasite colonizations), greenhouse thrips declined to low numbers and have generally remained low. However, parasites have not been recovered again in surveys from some orchards in which thrips have been reduced to very low levels either from parasite activity or early picking.

Close monitoring of thrips and parasite populations to estimate thrips mortality .Studies were continued in two orchards (Rice Canyon and South Coast Field Station). In the former orchard, little thrips activity was evident until June, with some increase in July. Parasitized thrips were found on one survey date, indicating that Thripobius has persisted in this orchard. In the latter orchard, both thrips and parasites increased in July. Holding field-collected leaves with thrips larvae in the laboratory showed that the actual percentage parasitization was markedly higher than our estimates based on field counts of apparently healthy thrips larvae compared to the number of obviously parasitized (distorted) larvae plus parasite pupae. This is because parasitized thrips look normal until about 2 days before the parasite larvae mature and transform to the black pupal stage. A revised field method, in which only thrips adults, pupae, distorted larvae and parasite pupae are counted, gives a more accurate estimate of percentage parasitization, although it somewhat overestimates it when thrips populations are declining to low numbers.

Experiment to assess the effects of parasite releases. In order to create a more uniform thrips infestation, 16 Hass avocado trees in a block at South Coast Field Station were inoculated with greenhouse thrips on 4 dates from April 26 to May 17. Parasite releases were made on 8 of the 16 trees on 3 dates between May 29 and June 13 at 500/tree on each date. The other 8 trees in each block served as non release "control" trees. Biweekly fruit samples were taken from July through September and counts were made of thrips, of parasite pupae and distorted thrips larvae obviously containing a parasite. As a result of the inoculations, heavy infestations developed on fruit in areas of the trees where thrips-infested leaves were placed. Although parasites invaded the control trees early in the sampling period, percent parasitization was consistently lower and thrips population densities averaged consistently higher (ca. 2-fold) on control trees than on the release trees through September. Thrips declined to low numbers in both release and control trees by early September. These experiments showed that Thripobius could suppress locally heavy thrips infestations before adjacent trees or even other

parts of infested trees became generally infested. Studies on biology of Thripobius semiluteus. Mean survival time of adult female Thripobius wasps in the absence of thrips hosts at 74°F was 4.45 days when honey was available as a supplemental food and only 1.52 days when honey was not available. In the presence of thrips hosts, parasites with honey laid eggs for 2-5 days, for a mean of 104 eggs/female, while parasites without honey laid eggs for only 1 day, for a mean of 34/female.

Practical Applications.- Our results indicate that the parasitic wasp Thripobius semiluteus has been a major factor in reducing greenhouse thrips populations to low levels in many of our release sites. A high percentage parasitization usually results after parasite releases. However, carryover of the parasites to subsequent years may not occur after thrips are reduced to low numbers, unless some leaves are infested (uncommon in Hass orchards), or some fruit are held on the trees until mid-summer. Although additional surveys are needed, our tentative conclusion based on this limited amount of data is that recolonizations of the parasite may be necessary if significant reinfestations appear in subsequent years. Our laboratory studies on the biology of Thripobius indicate that a source of carbohydrate is necessary as a supplemental food to increase longevity and fecundity of the adult females. The possible presence of natural sources in the orchards needs to be investigated.