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PROGRESS REPORT ON THE INTRODUCTION OF A THRIPS PARASITE FROM THE WEST INDIES

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The greenhouse thrips, Heliothrips haemorrhoidalis (Bouche), commonly occurs on avocados in coastal areas of southern California. Populations of this insect may fluctuate greatly from year to year and from orchard to orchard, and sometimes they may reach numbers sufficient to cause damage to a large portion of a crop. Only one parasite, the tiny trichogrammatid wasp Megaphragma mymaripenne Timberlake, and a few general predators have been observed to attack the greenhouse thrips on avocados (2, 3). None of these natural enemies has been observed to exert widespread control of the thrips.

The establishment of an effective natural enemy of the greenhouse thrips would be extremely valuable to the avocado grower, since it could reduce the necessity of using emergency insecticidal treatments, which sometimes upsets the natural balance between other potential pests and their natural enemies. With this ultimate objective, a program has been initiated to obtain new natural enemies of the greenhouse thrips for introduction and colonization in California.

The wasp parasite Dasyscapus parvipennis Gahan is known to attack several species of thrips. Early records indicate that this parasite was first collected in Java from the onion thrips Thrips tabaci Lind. It was later found attacking and apparently controlling the red-banded or cacao thrips selenothrips rubrocinctus Giard in the Gold Coast, Africa. It was introduced into Trinidad in 1933, into Puerto Rico in 1935, and into Jamaica in 1937, and became established in all of these areas (1). D. parvipennis was also known to attack the greenhouse thrips, and in 1936 was introduced into the United States by USDA entomologists in Beltsville, Maryland for possible use against this thrips in greenhouses. It was decided to introduce the parasite into California for laboratory study, and colonization on avocados. Through the cooperation of the Commonwealth Institute of Biological Control, a shipment of parasites was sent in 1962 from Trinidad, British West Indies, to the Department of Biological Control, University of California, Riverside. An insectary culture was established from a small number of parasites which survived in transit.

CHARACTERISTICS OF THE PARASITE

D. parvipennis is a minute wasp measuring less than one millimeter in length. The head and thorax are black and the abdomen a pale yellow. In the male, the first joint of the antenna is greatly swollen. This curious feature can be seen easily with the aid of a hand lens. The parasite deposits its eggs singly in the body cavity of the greenhouse thrips larva. Small-to medium-sized larvae appear to be required for successful parasitization. In the laboratory when all stages of immature thrips were available, the parasite examined each host larva contacted, but rejected larger-sized individuals. When confined with only large thrips larvae, some of the parasites deposited eggs in them, but none of the progeny completed development.

The parasite larva grows rapidly until it fills the entire body cavity of its host. The parasitized thrips becomes distorted and swollen (fig. 1) and is killed while still in the larval stage. The full-grown Dasyscapus larva breaks through the skin of the thrips and transforms into the pupal stage (fig. 2). Eight to ten days later the adult wasp emerges, the males generally emerging about one day earlier than the females, the entire life cycle occupies approximately 21 days in the laboratory at 75° F. Mating occurs almost immediately after the female emerges from the pupal stage. If the female has not mated all of the eggs laid develop into males, while mated females produce both male and female progeny. The adults live approximately seven to ten days in the laboratory.

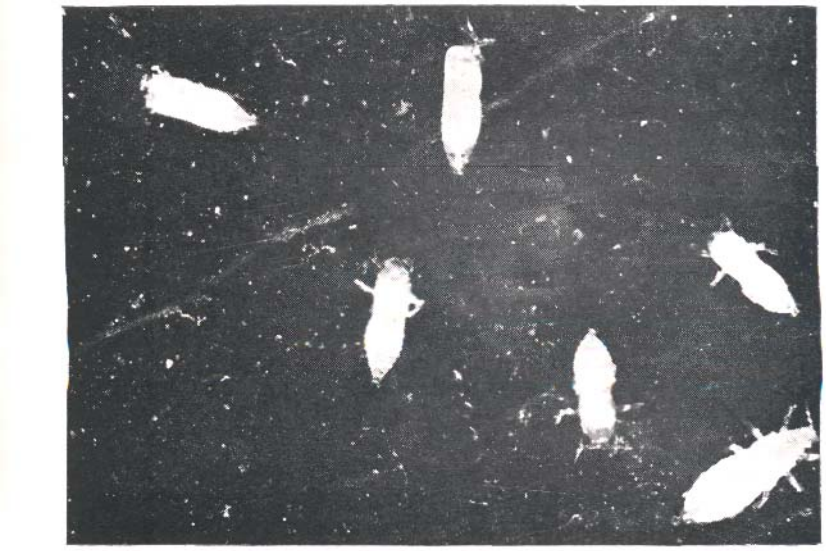

Fig. 1. Greenhouse thrips larvae parasited by Dasyscapus parvipennis Gahan, with a normal thrips larva at lower right.

Fig. 2. Pupae of the parasite Dasyscapus parvipennis Gahan, on surface of orange fruit.

PROPAGATION AND FIELD COLONIZATION

The host insect, the greenhouse thrips, can be reared in large numbers on orange fruit in the insectary. To obtain a concentration of the stage of thrips suitable for parasitization, adult female greenhouse thrips are allowed to lay eggs on clean orange fruit for approximately 10 days. The adults are then brushed from the fruit, leaving only the thrips eggs embedded in the fruit. The fruit are held until the thrips hatch and the maximum number have reached the desired size for parasitization. Each fruit is then placed in a small cage and ten female and 10 male parasites are introduced. The females begin depositing eggs in the immature thrips.

When the progeny of the parasites have reached the pupal stage, they are collected from the fruit and consolidated in another small cage and held for emergence of the adult parasites. When emergence of the adults is in progress, the small cages are taken to the field, tied to an infested avocado tree, and opened. Thus the parasites are colonized both in the adult and pupal stages. The yield of progeny per parasite female using this rearing procedure has varied considerably. Yields of 40:1 have been common, with the maximum being about 60:1.

Liberations of Dasyscapus have been made during the 1962 and 1963 seasons in five different avocado orchards containing trees heavily infested with greenhouse thrips. As of July 1, 1963, approximately 32,000 of the parasites had been liberated.

POSSIBLE PROBLEMS AND FUTURE OUTLOOK

Some parasite pupae and pupal cases from which adults have emerged have been recovered in the field several weeks after liberation, indicating that some parasites probably have completed development in the field. However, such early recoveries are of little significance, since a newly introduced parasite must be observed to survive and reproduce in the field for several seasons before definite conclusions regarding its

establishment can be made. D. parvipennis thus far has been reported only from tropical areas. It is unknown what effect a climate such as that which occurs in coastal southern California will have on the survival and reproduction of this species.

The extent to which the parasite attacks the greenhouse thrips in nature is also unknown. Published records indicate that its principal host is the red-banded thrips Selenothrips rubrocinctus which does not occur in California. Therefore, whether it is well-adapted to maintaining itself on the greenhouse thrips and will be able to significantly reduce its numbers is a question which can be answered only through critical observations.

The factors mentioned above serve to illustrate a few of the problems in procuring and attempting to establish more effective natural enemies of the greenhouse thrips. The program will continue in seeking new thrips parasites for introduction, study, and possible field colonization.

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