

California Avocado Society 1948 Yearbook 33:93-95

Control of the Greenhouse Thrips, Long-Tailed Mealybugs and June Beetles on Avocados

Walter Ebeling and R. J. Pence

College of Agriculture, Division of Entomology, Los Angeles, California

March 31, 1948

Beginning in April, 1946, a program of research on pests of avocados and other minor subtropical fruits was initiated by the Los Angeles section of the Division of Entomology. The major pest problem on avocados was the greenhouse thrips, and the major portion of the research was directed against this insect. The long-tailed mealybug on grafted trees in the coastal areas of San Diego County, and June beetles, which were found to attack newly planted orchards near uncultivated areas, also were the object of investigation.

The Greenhouse Thrips

The greenhouse thrips is found only in greenhouses in temperate climates, but may attack a wide variety of hosts, including avocados and oranges, out-of-doors in subtropical areas such as coastal southern California. Its injury consists of a "scarring" of the tissue of the leaves and fruit. The thrips suck the cell contents out of the epidermal layer, causing the surface first to turn a whitish color, then brown. A cracking of the skin of the fruit also accompanies a severe manifestation.

The thrips deposit their eggs under the leaf or fruit cuticle. These eggs hatch in from 20 days to 3 months, depending on temperatures. Two nymphal instars, two pupal instars, and finally the adult stage, complete the development of this insect. It has a maximum number of 5 generations at Westwood, and possibly 6 in San Diego County, where development continues during the winter months. This year, however, the cold spell of the week of January 25 resulted in a reduction of about 90 percent of the active stages of the greenhouse thrips, even in the coastal sections of San Diego County.

Because of the success of the first experiments with wetttable DDT sprays and DDT dusts a 5 percent DDT-sulfur dust was recommended for the control of the greenhouse thrips. The sulfur was recommended because early work showed that DDT used without sulfur would result in an increase of the avocado brown mite. On the other hand, the DDT-sulfur dusts have controlled the brown mite.

Experiments made in 14 orchards in Encinitas, Carlsbad, Oceanside and Vista, as well as two years of commercial experience, have shown that the DDT-sulfur dust has not been as successful in controlling the greenhouse thrips as the early work indicated it might be. The past year has been especially favorable for the development of greenhouse thrips, and some untreated orchards have suffered severe damage. The severity of the thrips infestations is attested by the fact that some orchards sprayed with

a standard remedy of past years, the oil-pyrethrum extract solution, had to be retreated 3 months later. While the DDT-sulfur dust has no doubt been a great help in keeping down the thrips population in treated orchards, it has not succeeded in entirely preventing the scarring of fruit. Comparative counts of the thrips population in treated and untreated blocks might lead to optimism as to the efficacy of the dust program, but late in the fall a considerable percentage of the treated fruits will often be found to be thrips-scarred despite the treatments. This has been true even where 10 percent DDT has been used and where 2 treatments per year have been applied. With prices of fruit as they are now, a more effective treatment would be justified, even if the treatment should be considerably more expensive than dusting.

Experimental work, and a limited amount of commercial work, have shown spraying to be consistently effective in preventing the scarring of fruit, provided, of course, that the treatment is applied before a significant amount of scarring begins to take place; which is usually during the month of September. Although as little as one pound of 50 percent wettable DDT powder per 100 gallons has given good results, there is evidence from both experimental and commercial work that a higher dosage results in better long-term control, apparently mainly because of superior residual effect against the nymphs hatching from eggs which lie protected beneath the epidermis of the foliage and fruit at the time the spray is applied, but may not hatch for a month or more after the treatment.

There does not appear to be any advantage in using more than 2 pounds of wettable DDT powder to 100 gallons, and the greater part of the commercial work has been done with 1½ pounds to 100 gallons. Two pounds of wettable sulfur has been added for brown mite control, and sometimes ¾ pound of zinc oxide for zinc deficiency correction. In one instance in the Vista district avocado trees were severely burned and defoliated by spraying at 84°F with a DDT-sulfur spray in which 2 pounds of sulfur per 100 gallons was used. Our experiments have shown that 1 pound of wettable sulfur to 100 gallons of spray has been successful in controlling the brown mite, and at least in the inland areas, such as Vista, it would appear that this should be the maximum dosage of sulfur. Spraying with preparations containing sulfur should be avoided on hot dry days.

Suggestions for Control

For the control of the greenhouse thrips a spray is recommended, using 1½ or 2 pounds of 50 percent wettable DDT, 1 pound of wettable sulfur, and, if desired, ¾ pound of zinc oxide to 100 gallons of water. This spray should be applied in July or August before the thrips have a chance to scar the fruit.

The spraying of avocado trees is made possible by joining several lengths of hose and dragging the hose in from picking drives and from the outside of the orchards. This does not allow for the use of a tower, but experience has shown that good thrips control can be had if the tops of the trees are sprayed from below as well as from a number of angles from outside the tree. The topmost leaves rarely have thrips because they are directly exposed to the sun.

New Materials

This year in addition to further investigation of DDT formulations, several new materials, which preliminary work has shown to be promising, will be tested on a larger scale. Parathion and benzene hexachloride have been found to be more effective against the active stages of the greenhouse thrips than DDT, but fail to provide sufficient residual effect for insects hatching 2 to 4 weeks after treatment. Substitutes for sulfur will also be investigated, in view of the injury sometimes resulting from its use in the interior avocado districts. The effect of the addition of light medium spray oil at 0.5 or 1 percent to sprays containing DDT and other toxicants is also being studied.

Long-tailed Mealybugs

Long-tailed mealybugs were at one time serious pests of avocado trees in San Diego County, but since 1942 they have generally been adequately controlled by the parasites introduced to combat them. The parasites however, are not an adequate protection for the scions on newly grafted trees. Although the parasites will eventually wipe out an infestation of mealybugs, on grafted trees they do not work sufficiently rapidly to prevent the destruction of the scions once they are attacked. Therefore insecticides must be relied upon for control.

Experiments begun in 1946 and continued last spring, have shown that a mealybug infestation may be prevented if the tops of the stumps of the grafted trees, where the scions are inserted, are treated with DDT. A 10 percent dust may be applied by means of a small hand duster sometime before the foliage appears on the scions. The dust may be applied immediately after grafting and before the graft is covered with the usual paper bag. It should be applied not only to the top of the stump, but also 5 or 6 inches down the sides, especially in the section where the scion is inserted. A DDT slurry may be used instead of the dust. This is prepared by mixing about 2 pounds of 50 percent wettable DDT powder in a gallon of water. It may be applied by means of a paint brush. By using a slurry a greater quantity of DDT may be applied, and it will stick better than a dust. However, either treatment has been found to be effective in preventing damage to the tender young foliage of the scions. After the foliage reaches the length of 3 or 4 inches, it is no longer susceptible to important damage.

In our experience, treatment has failed only when the graft clefts have been resealed after the application of the DDT. It is the usual practice to reseat those graft clefts which show a cracking of the original sealing substance. The sealing material which is applied for this purpose covers up the DDT and forms a "bridge" over which the mealybugs and attending ants may gain access to the scion. The stumps of trees which have been resealed should again be treated with DDT.

During the past year mealybugs have increased considerably in some sections of San Diego County. In one orchard which was found to be especially heavily infested, the mealybugs were found to be just as abundant in the portion which was dusted with DDT-sulfur as in the untreated portion. Where DDT sprays have been applied, however, the mealybug population has been substantially reduced.

June Beetles

Two species of June beetles, ***Serica flmbriata*** and ***S. alternata*** commonly occur throughout southern California and often result in serious damage to young avocado trees growing near uncultivated areas, where the June beetles breed in enormous numbers. The beetles fly by night, and after once lighting on a young avocado tree they will drop to the ground in the morning and bury themselves beneath an inch or two of soil during the day, then resume their feeding the following night.

Formerly attempts were made to control these insects with lead arsenate spray, but without much success. It has been found that 5 percent DDT dust applied to the tree and the soil beneath the tree will effectively control this pest.

Beetles occurring on native vegetation, but not previously known to attack avocado trees, were discovered severely attacking young trees a few miles south of Fallbrook in 1946. These were found to be ***Coenonycha testacea* Cazier**. These beetles are also brownish in color, like the June beetles, but are smaller and more slender. They appear early, about the first of February; otherwise their habits are much the same as those of the June beetles. One grower with a small avocado nursery lost all his budded nursery trees because the beetles ate the growth from the inserted buds. Young orchard trees also were defoliated. These beetles may be controlled with DDT dust as applied for the species of ***Serica***.

Acknowledgment

The writers wish to acknowledge the helpful suggestions and aid of the San Diego Commissioner of Agriculture, particularly that of Mr. Howard Oldham, District inspector for the Carlsbad-Encinitas area, where the majority of the orchard trials were made.