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AVOCADO PESTS AND THEIR CONTROL

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After hearing Mr. Newman's talk ("The Oriental Fruitfly"—John V. Newman), you are not going to feel so bad about hearing about the pests that you have here at the present time in California. If it is permissible to be facetious about such a serious problem, I am going to venture the opinion that if the Oriental fruitfly does get into California, we entomologists are going to come closer to justifying our two complimentary tickets to this fine banquet each year, which we enjoy so much, and the time that we take on your programs.

To come back to our present California problems, the pest situation is not so serious compared to that of other sub-tropical fruit crops. That is no consolation to those of you who have had from fifty to ninety percent of your avocados scarred by greenhouse thrips. However, such serious infestations are not very widespread. You in the more interior areas may be wondering what we have in the way of insect pests on avocados in this state.

We must not infer from this situation that the avocado is a tree that is inherently resistant to insect pests. The people who originally designed those emblems with which Messrs. Hardison and Haas who were honored today could tell you otherwise, because in the areas where the avocado is indigenous, such as in Mexico and Central and South America, they have a very serious condition with respect to avocado pests. We don't have them here because of the effectiveness of our quarantine program, in my estimation.

Mr. Griswold and I were reminiscing about the situation around Atlixco, Mexico, the home of the Fuerte. There they have a weevil, called *Copturus,* which bores into the twigs of the avocado. The larvae are inside, and you can't get at them. The twig breaks off and the tree becomes smaller as the years go by. The trees look terrible. Then they have seed weevils which bore into the seed and the flesh of the avocado, and our quarantine against Mexican avocados is based on the presence of the seed weevil in Mexico. They also have a bug that kills back avocado twigs by laying its eggs in them. They have tiny insects called psyllids, something like an aphid, which lay eggs in the foliage, and galls are formed around these eggs and the subsequent larvae. Many avocado trees in Mexico look like Christmas trees. They have millions of these red galls on them. In Mexico they have caterpillars that defoliate the trees. They have white flies, aphids, and many other pests.

In California, the avocado industry is relatively young. It started back somewhere

around 1910, and gradually our native insects have accustomed themselves to this fruit crop. The avocado today has its full complement of pests, but they are not as serious as they might be. We might expect to find more and more species as the years go by.

You may be interested in some of the present problems and the insects involved. We believe that the most serious problem on avocados today is that of the greenhouse thrips, which is mainly a problem in coastal areas, especially San Diego and Ventura Counties, where it also attacks Valencia oranges. It is a tiny little insect, blackish in color, which lays its eggs under the cuticle of the leaf and fruit. Unfortunately, it takes these eggs about a month or more to hatch, so the insecticide has to be of such a nature that it will last over that period and kill the nymphs of these thrips as the eggs hatch out. Fortunately DDT will do that, and the recommended treatment at this time is one and one-half to two pounds of wettable DDT powder applied as a spray. The dust doesn't work so well. Power sprayers are used, and the hoses are dragged from the picking rows or from the street. Both our experimental and the commercial work we have observed has resulted in thrips control for a period of a year or two.

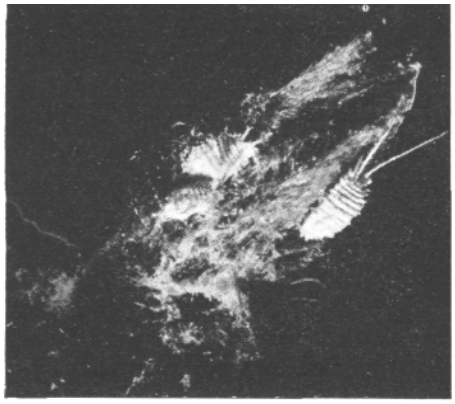
We have made some life history studies on the greenhouse thrips on the avocado. We found that there were in 1947 five and a half generations in Carlsbad in San Diego County compared to four and a half on the UCLA campus, which shows the inhibiting effect of the cooler temperatures farther north and farther inland.

Fortunately DDT is almost a cure-all for avocado pests. That is far from the situation on other crops. However, avocado brown mite infestations may be increased by the use of DDT spray. Two pounds of wettable sulphur have been added to 100 gallons of DDT spray, as used for greenhouse thrips, in order to control the mites. We observed damage to avocado trees and fruit, in one instance at Vista, where this dosage of sulphur was used at a temperature of 84° F. One pound per 100 gallons suffices as a control for mites in the inland areas, and probably even this reduced dosage should not be used at a temperature as high as 84° F. Neotran and DN-111, as used for citrus red mite, may also be used for avocado brown mite, but are much more expensive than sulphur.

The latania scale was once your most important pest. You are probably familiar with it. It is a little whitish circular scale which is closely allied to the scale which is so abundant on ivy. At one time they were fumigating and spraying avocados for this pest. We think it has become less important in recent years mainly because of the effectiveness of natural enemies, chief among which is the twice-stabbed lady beetle which eats little holes in the back of this scale insect. This beetle carries a little predaceous mite under its wing covers. You can imagine how small it is. We think the mite is probably just as important as the beetle itself. The interesting thing about this mite is that the traveling form looks entirely different from the form that gets under the scale and does the feeding. They are two forms of the same individual, yet you would never recognize them as being the same species

You have mealybugs on avocado trees. At one time they constituted the most important problem, but due to the dissemination of hymenopterous parasites by the University and the San Diego Commissioner's Office, that problem has largely disappeared except in one connection. When you graft the avocado tree in the coastal areas—and there is a lot of grafting being done these days—then the mealybugs may destroy the scion before

the natural enemies have a chance to build up and destroy the mealybugs. In that case also, you can depend on DDT for protection. You can spray with 2 pounds to 100 gallons, using perhaps a knapsack sprayer, or you can dust with a 10 percent dust. We think the best thing to do is to make a thick slurry of the DDT and water in a bucket and take a paint brush and paint this slurry on the top of the trunk and six inches or more down the side. If you apply it in this manner and then the grafter comes back later and reseals the graft, as they often do, then you have to put some more insecticide over the sealing substance. Otherwise it forms a bridge by which the mealybugs may reach the place where they can do their damage.



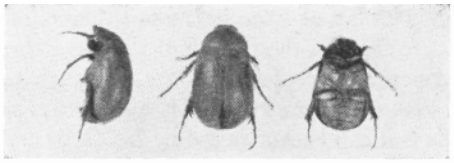
Long-tailed mealybugs attacking newly-formed foliage on the scion of a grafted avocado tree.

You have June beetles in some areas near uncultivated lands, and they are quite destructive to young trees. The avocado tree can take quite a beating, fortunately, and these beetles can cause defoliation, and yet the tree comes back remarkably well. However, it would probably be better if these leaves were not lost, even though they grow back later.

There are two species of June beetles with which you are all familiar. These are the ordinary June beetles, which are about a quarter of an inch long and robust and brown in color. Then there is a smaller species which began attacking young avocados and nursery stock near Fallbrook in 1946. It starts feeding about February 1, about two months before the other species of June beetles. Since 1946 it has continued to extend the area of its infestation. It is probably with us to stay as an avocado pest.

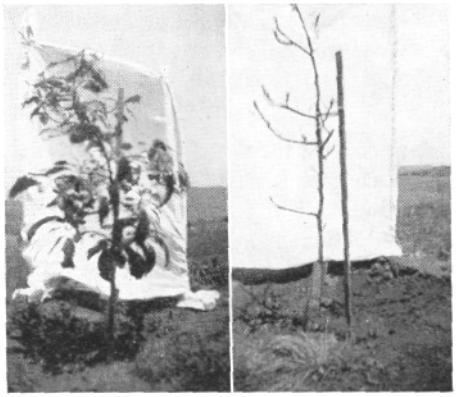
All June beetles can be controlled by applying 5% DDT dust to the trees and to the ground beneath the trees.

The Fuller rose beetle is a grayish brown snout beetle about a third of an inch long which spends its larval stage in the soil then climbs up the trunks of the trees as an adult, to feed on the foliage of the lower branches. It causes a characteristic ragged appearance of the foliage, in much the some manner as may be commonly seen on citrus trees. If sufficiently abundant to justify control measures, this pest can be controlled by DDT or cryolite dust.



Adult June beetles (Serica fimbriata)

Coenonycha Testacea, Cazier — a new pest of young avocado trees.



Left, an avocado tree partially defoliated by June beetles before being treated with 5 % dust on May 12, 1946. Right, a nearby untreated tree which was completely defoliated by beetles. The treated tree suffered no further damage after the dust was applied, while on the untreated tree the beetles continued feeding until defoliation was complete. Photographs made on June 2, 1946.

Occasionally, sickly avocado trees will be attacked by small beetles which bore straight into the heartwood and may cause the death of trees which might otherwise survive and yield profitable crops despite their weakened condition. These pests are called ambrosia beetles because of their habit of rearing fungi in their tunnels upon which they feed. We have found that these beetles can be controlled by painting the infested portions of the tree, usually the trunk and lower branches, with DDT fly spray.

The false chinch bug, a small light or dark gray bug, may fly in from dried up grasslands in the spring and attack avocado trees. DDT, benzene hexachloride, or chlordane dusts have been used with success, with the latter appearing to be the most effective.

The omnivorous looper is the larva of a yellowish nocturnal moth which may occasionally be found resting on the undersides of avocado leaves. The larva is called a "looper" because of its habit of crawling by means of a looping motion of its body. Nearly any avocado tree will show some signs of the damage done by these insects, which consists of feeding on the foliage. However, there is seldom sufficient damage to justify control measures. We have noticed that when DDT spray is applied for greenhouse thrips the omnivorous loopers are also killed by the spray. The larvae of another species of moth, the amorbias, feed on both fruit and foliage, but are even less abundant than the omnivorous looper.

Some growers wish to control the Argentine ants in their avocado orchards. It appears to us that ant control is seldom justified. Occasionally the mealybugs become sufficiently abundant in a few orchards to cause a smutting of the fruit. Aphids may become abundant in avocado trees planted near citrus trees heavily infested by aphids. In such rare cases, ant control may be justified. A 5% dust or 2% of a 40 or 50% emulsion may be applied to the trunk of the tree and to the areas where the tips of drooping branches touch the ground. The ants will take advantage of any point of contact with the ground which is not treated.

Snail control is sometimes necessary and may be accomplished by spreading poison bran mash on the ground beneath the trees, using about a pound per average-size tree. Ducks and geese are allowed to run free in some avocado orchards, and they destroy the snails by feeding on them.

Most of you have seen avocados partially devoured on the tree or on the ground, and in most cases this damage is caused by rats. I won't take your time now for a discussion of control methods except to point out that a good bulletin has been prepared by the University on the control of rats and mice. The rat that commonly occurs in avocado orchards is the roof rat, which is sometimes called the gray rat or Alexandrine rat. It is a small gray species and quite prevalent everywhere where avocados are grown. There is also a black species that is about the same size, but occurs only around port towns where they are carried in on ships, and they don't get very far inland. Then there is the famous Norway rat, a large species, which sometimes occurs in avocado trees. Opossums get in the trees and eat some fruit. The pack rat will eat avocados, but its damage is more apt to be a chewing on the bark of green twigs.

A roof rat about to feed on an avocado.