

# The Mealybug Problem

## on newly grafted avocado trees

Walter Ebeling and Roy J. Pence

ON GRAFTED AVOCADO TREES, long-tailed mealybugs are an important problem.

In recent years much grafting has been done in the coastal areas on varieties which have been found to be commercially unsuitable in the localities in which they were planted.

The scions are covered with paper bags to keep the direct sunlight off the tender, new foliage. The shade afforded by these bags makes it possible for the mealybugs to attack this foliage, and unless they are controlled, the mealybugs usually kill the scion. The paper bags do not appear to encourage the mealybugs any more than to afford shade, for mealybugs were found to be just as abundant on the scions of trees which were shaded by parasols as they were on those scions covered by bags.

Every spring, tender terminal sprouts, in shady portions of avocado trees, are attacked by long-tailed mealybugs, but these infestations have not been considered to be of practical importance.

A similar infestation on the scion of a grafted tree, however, results in its death.

If "crypts"—*Cryptolaemus* beetles, natural enemies of the long-tailed mealybug—are liberated under the paper bags, they immediately try to leave the bag without attacking the mealybugs. For some reason they will not stay under the bags.

The parasites, if they should find the mealybugs, would not be able to result in their death rapidly enough to prevent the destruction of the initial growth of foliage which is so vital to the development of the scion.

The prevention by the parasites of the spread of incipient infestations of mealybugs is sufficient for control as far as the avocado tree as a whole is concerned, but on the newly foliated scions of grafted trees, prevention or immediate control is desirable. It is necessary, therefore, to turn to insecticides for the answer to this problem.

The long-tailed mealybugs appear to be most abundant in late winter and early spring, their numbers decreasing as summer approaches. This period happens to coincide with the period of greatest activity in the grafting of avocado trees.

### Insecticide Needed

Since prevention of attacks by the mealybug during the entire late winter-early spring period is the desired goal,

an insecticide with a prolonged residual effect against the young mealybug crawlers, likely to become established on the grafted trees, might logically be expected to be the solution to the problem.

Preliminary experiments with DDT in the spring of 1946, on scions already infested with mealybugs, showed that while DDT dust or spray did not kill the mealybugs on the foliage, it did prevent an increase in the infestation.

This pointed to the possibility of the use of the material for prevention of infestation, rather than for combatting the mealybugs after they have become established on the scions.

### DDT Tested on Grafts

In February, 1947, a series of experiments was made in cooperation with the District Inspector for the Carlsbad-Encinitas area.

DDT in the form of sprays, dusts, and slurries, was applied in six orchards in which grafting was being done, four of these orchards being in Carlsbad and two in Encinitas.

The dust contained 10% DDT. The sprays contained two pounds of 50% wettable DDT powder to 100 gallons of water. The slurries were also made of 50% wettable powder, with water added to make a mixture which could be applied with a paint brush.

The insecticides were applied to the top of the avocado stumps and for three or four inches down the side.

It is especially important to apply the insecticides thoroughly to the area around each scion, both on top of the stump and down the side.

On April 4, 1947, 10 trees, in an orchard at Encinitas, which had been grafted four days before, were treated as follows: 1. Four trees were dusted with 10% DDT dust and bagged; 2. Three trees were bagged, but not treated; and 3. Three trees were not treated and they were shaded by means of parasols which were made by stretching cloth over barrel hoops.



Long-tailed mealybugs attacking a scion on a grafted avocado tree.

A count of the number of mealybugs on the scions—two scions per tree—was made once every two days from April 5 to May 28, 1947. All the mealybugs found were removed.

In 12 examinations made, over the 23-day period of the experiment, one mealybug—average 0.25 per tree—was found on the DDT-dusted trees, 24 mealybugs—average eight per tree—were found on the untreated, bagged trees, and 45 mealybugs—average 15 per tree—were found on the untreated, shaded trees.

### Effect of Shade

This experiment showed not only the high degree of control from 10% DDT dust, but also indicated that, contrary to the generally accepted belief, the paper bags do not afford a specially good environment for the mealybugs as compared to that afforded by shade alone. The data indicate that the bags have some effect in keeping the mealybugs off the scions.

In another experiment in Carlsbad, two branches of an avocado tree were grafted. This afforded an opportunity of comparing a bagged graft and a shaded, but unbagged graft on the same tree.

Over a period of 28 days, seven examinations were made. Eleven mealybugs were found on the scions which were

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covered with a bag and 15 were found on the scions which were uncovered, but shaded with a parasol, again indicating no advantage to the mealybugs on the scions covered with a bag.

At the conclusion of the experiment made in the Encinitas orchard, the dust treatment was continued on the dusted trees, and, of the other six trees, three were painted with a slurry made with 50% wettable DDT powder, and three were painted with a slurry made of a wettable powder containing 10% of the gamma isomer of benzene hexachloride.

The slurries contained one ounce of powder to 100 cubic centimeters of water. They were applied with a paint brush to the tops of the grafted stumps and three or four inches below the top.

The treatments were applied on April 28, 1947, and observations were made on May 21, 1947. On that date, one of the trees treated with DDT dust had 17 mealybugs on the scions and one of the trees treated with the DDT slurry had 10 mealybugs. No mealybugs could be found on any of the other trees.

## Resealed Graft Clefts

When a graft cleft seal is cracked, it is the practice to reseal the cleft. Any insecticide applied before the second application of sealing substance is thereby covered over. In the experiment referred to above, it was learned that on the trees on which the mealybugs were seen, the grafting cleft had been resealed with a substance used for that purpose but not repainted with the insecticide. This made a "bridge" for the mealybugs and ants to reestablish connections with the scions.

In this orchard, as well as in all the other orchards in which experiments were made, it was only on trees on which the graft clefts were resealed after the application of the insecticide that it was possible for the mealybugs to become established.

When graft clefts are resealed, the insecticide should be reapplied on the affected trees.

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## NEW PUBLICATIONS

*BEEKEEPING IN CALIFORNIA, by J. E. Eckert. Ext. Cir. 100, revised December, 1947. (96 pages).*

*THE COMMERCIAL FREEZING OF FRUIT PRODUCTS, by M. A. Joslyn and Leonora A. Hohl. Bul. 703, January, 1948. (108 pages).*

*COST OF ALMOND PRODUCTION IN CALIFORNIA, by R. L. Adams and A. D. Reed. Cir. 375, January, 1948. (22 pages).*

*HOME ECONOMICS AT THE UNIVERSITY OF CALIFORNIA, by the Departments of Home Economics at Berkeley, Davis, Los Angeles, and Santa Barbara. Brochure. (18 pages).*

*SOILS OF A PORTION OF PALO VERDE VALLEY (Between the Levee and the River), by Walter W. Weir and R. Earl Storie. Lithoprinted, August, 1947. (14 pages).*

## CITRUS THRIPS

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The addition of benzene hexachloride to Black Leaf Dry Concentrate was of no benefit.

All DDT wettable powder suspensions gave only slightly better control than Black Leaf 155-sugar sprays.

This is in contrast to the results obtained in the first experiment where DDT wettable powder sprays were markedly better than nicotine-sugar sprays. A spray containing 20 pounds of 50% DDT wettable powder per 100 gallons gave slightly better control than one containing eight pounds. As in the first experiment the DDT-kerosene emulsion spray was less effective than the DDT wettable powder suspension.

## Vedalia Beetle

A fairly large acreage of citrus in the Coachella Valley has been treated experimentally with DDT each year since 1944 and thus far, there has been no abnormal increase in the population of cottony-cushion scale, in any of the plots, as a result of killing off the predacious vedalia beetle.

The plots have been widely scattered over the citrus-growing area so it is not possible, at this time, to predict what might happen if the entire citrus acreage were treated with DDT.

It is definitely known that the vedalia beetles are very susceptible to DDT and

until more information is developed on the length of time DDT residues will kill this beneficial insect, care should be used in applying sprays containing DDT.

## Recommendations Limited

Because of the many factors that are as yet unknown about DDT applications on citrus, it is not recommended for general use. It should not be applied commercially, for the control of thrips, in groves where nicotine-sugar sprays have given satisfactory results.

In groves where nicotine-sugar sprays

have failed to give satisfactory control, growers may wish to apply DDT. In such cases, eight pounds of 50% DDT wettable powder per 100 gallons of water per acre, applied with the spray-duster, should be used.

Further experimental work is under way in the Coachella Valley, using DDT as well as other promising materials.

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*The initial experiments mentioned in the second paragraph were conducted by C. O. Persing, then Assistant Entomologist in the Experiment Station, Riverside.*

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