

PYRIFORM SCALE CONTROL ON AVOCADOS

D. O. WOLFENBARGER
Sub-Tropical Experiment Station
Homestead, Florida

Infestations of the pyriform scale, *Protopulvinaria pyriformis* (Ckll.), were reported by Wolfe, et al (1949), as, “. . . marring the fruit appearance due to the sooty-mold fungus which develops in the honeydew secreted by this insect.” Observations in recent years indicate continued increasing amounts of sooty-mold, more than in former years. Fruit blemishes are currently of more importance than formerly owing to higher standards of grading the fruit for market. Oil emulsion sprays occasionally used for scale control are effective but “shock” the trees and are sometimes injurious to new foliage, especially if the applications are followed by unusually high or low temperatures. Parathion and malathion have been used successfully for pyriform scale control but definitive data appear lacking on the effectiveness of the treatments. Three different concentrations of malathion wettable powder, a malathion emulsion and a water-base parathion were used as given in Table 1, and compared with an unsprayed check.

PROCEDURE

The 22-year-old trees of the Lula variety at the Sub-Tropical Experiment Station in Block 5 were plotted to give one, two or three trees for each treatment in each of four replications. Spray applications were made at irregular intervals depending somewhat on the time at which the scale infestations appeared abundant or to have approached equalization on trees in the different treatments. Dates of spray applications were August 1, 1955, September 13, 1955, April 4, 1956, and July 26, 1956. These sprays were applied with a regular grove sprayer and averaged from eight to ten gallons per tree per application, depending on the size of the tree. Fifty leaves, from various parts of a tree, from each treatment and from each replication, were collected as samples to determine treatment effects. Living pyriform scales, crawler and sedentary forms, were counted on the 50 leaves. Count days were August 20 and November 1, 1955, April 6, July 19, and August 27, 1956, March 27, and June 27, 1957.

RESULTS

The results are summarized in Table 1 and Figures 1 and 2. Treatment materials and amounts used per 100 gallons of water are listed and the results are tabled as mean number of scales per leaf on the day counted. Separations by Duncan's multiple range test showed that the means from the following treatments were significantly different from the others as follows:

1. Unsprayed leaves possessed significantly more scale insects than leaves from any other treatment.
2. Parathion was significantly more effective than malathion.
3. Malathion wettable powder treatments were similar, but six pounds was more effective than four pounds and four pounds was more effective than two pounds.

Statistical analyses by the analysis of variance showed significant mean square values for certain factors; these are listed in order from higher to lower values as follows:

1. Days on which counts were made,
2. Treatments,
3. Replications.

Significant interactions were found in which data on count days varied by treatment and by replication; interaction between treatments and replications, however, was no greater than might have occurred by chance.

TABLE 1. RESULTS OF SPRAY TREATMENTS AS MEAN NUMBER OF SCALES PER LEAF ON THE DIFFERENT COUNT DAYS AND PERCENTAGE CONTROL OF ALL TREATMENTS OVER ALL COUNT DAYS.

Date	Insecticide formulation amount/100 gal. water					Check
	Parathion	Malathion				
Counted	4 lbs./gal. water base ½ pt.	25% W.P. 6 lbs.	Emul., 1 lb. tech.	25% W.P. 4 lbs.	25% W.P. 2 lbs.	
1955						
Aug. 20	5.5	14.6	13.0	16.1	15.6	28.9
Nov. 1	1.9	1.7	1.7	1.7	3.3	19.8
1956						
April 5	0.5	0.3	0.2	0.5	1.3	4.9
July 19	0.7	0.8	0.6	0.7	1.5	4.9
Aug. 29	0.1	0.3	0.1	0.1	0.4	3.1
1957						
March 27	1.0	0.6	1.0	0.8	1.9	3.8
June 27	17.5	12.2	17.5	15.5	15.9	32.1
Avg. % control	67	62	58	56	53	—
Avg. No. scales per leaf	—	—	—	—	—	13.9

The variation of data among count days is an expected occurrence since counts were made at different days after spraying and in different seasons. A study was made to determine any relationship of the effect of time after treatment as based on percentage control. This is given in figure 1. Rapid control is indicated in figure 1 to 34 days after a treatment when maximum control was obtained. A slight reduction is indicated in the percentage control trend between 34 and 205 days after which the reduction assumes a more rapid trend. Control by parathion was very slightly higher in all cases except that after 336 days it was seven per cent less.

It is generally found that if dosages are plotted graphically as logarithms and if the percentages of control are plotted as probits straight line rela-

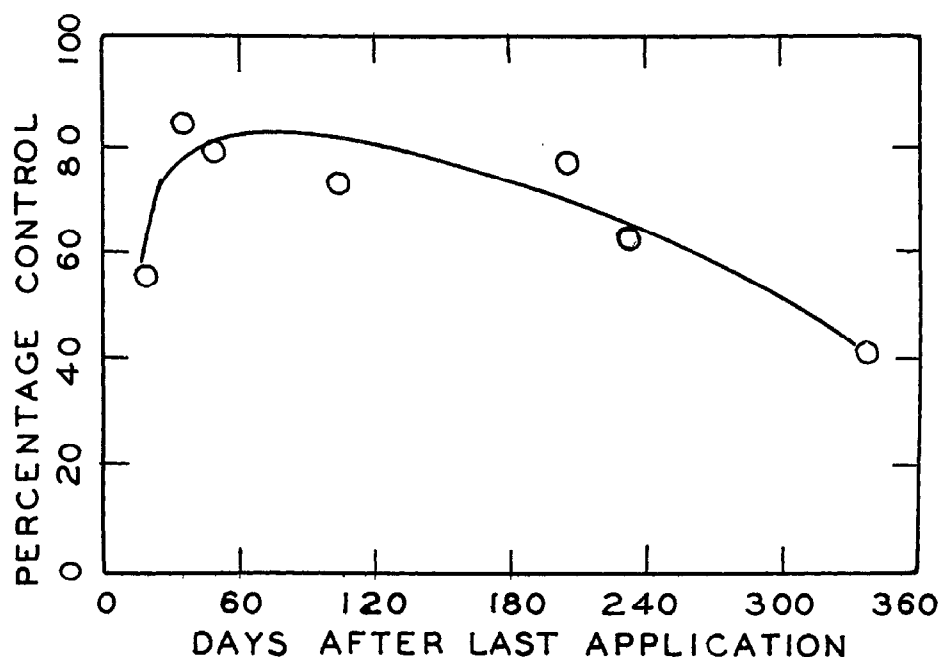


Fig. 1.—Percentage control at various times after spray application (curve drawn free-hand).

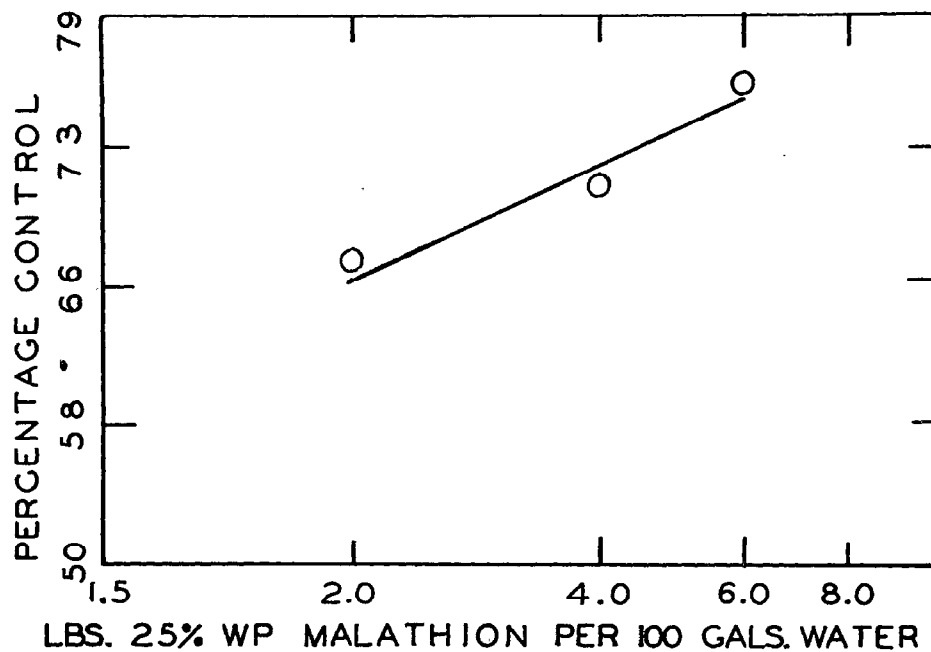


Fig. 2.—Log-probit relationships of malathion dosages and percentages of control (regression formula—expected probit = $5.56 + 0.57 (\log \text{ of dosage})$).

tionships are seen. Log-probit relationships of the three concentrations of malathion and the percentage control results are shown in figure 2. A regression line was determined by linear regression calculations and shows a slight departure from perfect linearity. A comparison between malathion wettable powder and an emulsion formulation shows a slightly greater effectiveness in favor of the emulsion. By graphic determination one pound of the technical toxicant in emulsion formulation is equivalent to one pound and two ounces of toxicant in wettable powder form.

SUMMARY

Parathion and malathion sprays were used over a period of two and one-half years in experimental plots for control of the pyriform scale on avocados. Leaf samples were collected from the experimental trees at irregular intervals following the spray applications. Summarization of the data showed that one pound of 15% wettable powder of parathion was more effective than two, four or six pounds of 25% wettable powder of malathion or of one pound of technical malathion in emulsion form. Scale infestations were significantly reduced by all treatments.

REFERENCES

- Duncan, David B.* 1955. Multiple range and multiple F tests. *Biometrics*. 11 : 1-42.
- Wolfe, H. S., L. R. Toy and A. L. Stahl (Rev. G. D. Ruehle).* 1949. Avocado production in Florida. *Fla. Agr. Ext. Bul.* 141 : 1-124.

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