DEGRADATION OF DISLODGEABLE PROPARGITE RESIDUES ON NECTARINE FOLIAGE IN TULARE COUNTY JUNE - AUGUST 1988

by

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SUMMARY

As part of an investigation of reported dermatitis among nectarine harvest workers, four orchards previously treated with Omite^{R} 30W were monitored to profile dislodgeable foliar residues of propargite. Fields were sampled approximately weekly for five weeks. Propargite residues degraded following a first-order decay model, with a median half-life of 13.5 days.

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INTRODUCTION

In June, 1988 the Worker Health and Safety Branch received a report that nectarine harvest workers experienced dermatitis possibly associated with pesticide residues. As part of the field investigation, several orchards previously treated with Omite^{R} 30W were identified for serial sampling to characterize the dissipation of propargite residues.

Specifically, the objective of this study was to determine the rate of propargite dissipation on nectarine foliage in Tulare County treated from late May through mid-June. This was done to enable estimation of residue levels present in orchards suspected of causing the dermatitis problems in workers from samples that were taken several days after exposure in suspect orchards.

Degradation of propargite residue has previously been characterized on grapes (Maddy 1986 and O'Connell 1987) and oranges (Saiz 1986). The half-life reported for oranges was seven to 14 days. The reported data on grapes did not display a first-order decay behavior. No previous studies of dislodgeable propargite residues on peaches or nectarines were identified.

METHODS

Four fields were selected to conduct a dislodgeable residue degradation study on nectarine foliage. Dislodgeable residue was chosen because it is considered the best index of available pesticide residue exposure to workers contacting treated foliage (Gunther 1973).

Fields were identified from treatment records of a grower not involved in the illness episode. Fields were chosen on the basis of: (1) geographical proximity to the orchards suspected of involvement in the dermatitis incident; (2) applications of Omite^{R} 30W made during the time period of interest, late May to mid-June, 1988; and (3) similarity of application rate and method to the orchards involved in worker injuries (Appendix 1).

Two blocks of trees, ten rows wide by ten trees long, were selected randomly and marked in each orchard. Within each block, two samples were collected by sampling each of the ten trees on both diagonals of the block. Each sample consisted of 40 five square centimeter leaf discs, collected in a four-ounce glass jar attached to a Birkestrand leaf punch. Four discs were collected from each tree, one from each of four sides, at a height of approximately four to six feet. After collection, each sample was sealed with aluminum foil and a screw cap, and placed on ice for shipment to the analytical laboratory for next day extraction and analysis.

Sampling was initiated 13 to 35 days after application and continued at seven- to ten-day intervals for approximately five weeks, or until residues became non-detectable. Field 1 was harvested 12 days after application, and before sampling began. Fields 2, 3 and 4 were harvested before application.

Analysis for dislodgeable residue was conducted using standard methods by the Department's Chemistry Analytical Services. Residues were washed from leaf discs by immersion and agitation three times, for 20 minutes each time, in 50 ml of a 2 percent aqueous solution of dioctyl sodium sulfosuccinate

(Sur-Ten^R), a surfactant. The solution was then decanted and extracted with methylene chloride, which was evaporated and replaced with hexane. Analysis was by gas chromatograph with a sulfur Hall detector. The minimum level detectable was 0.07 ug/cm^2.

Sample results reported as "none detected" were treated as having residues of 0.07 ug/cm^2, the limit of detection.

RESULTS

The results of analysis are listed in Appendix 1 and plotted in Figure 1. Results were used to calculate the rate constant for decay of propargite using a first order log-linear model of decay. The table below shows the calculated rate constant, the coefficient of correlation (r^2-value), corresponding half-life, and estimated initial deposition for each field.

Field	Rate Constant	r^2-value	Half-life (days)	Estimated Deposition (ug/cm^2)
1	-0.019	-0.96	15	1.75
2	-0.024	-0.74	12	1.05
3	-0.027	-0.98	11	1.49
4	-0.006	-0.34	53	0.59
Median	-0.022		13.5	1.27

DISCUSSION

The of first-order rate constants calculated in the four fields studied ranged from -0.006 to -0.027, with associated half-lives of 11 to 53 days. Since these data include monitoring only during the period of two to nine weeks after application, half-lives derived can only be considered representative of the later stages of decomposition. For the same reason, estimates of deposition should be considered theoretical. The median half-life of dislodgeable propargite residues found during the period two to nine weeks after application was 13.5 days. The median first-order decay rate constant was -0.022.

The relatively high r^2-values in three out of four fields demonstrate the data fit reasonably well with the log-linear model of decay. The lower r^2 value in Field 4 is associated with a slower observed dissipation and a lower residue level at first sampling. The median decay rate constant of -0.022 is consistent with findings of others investigating propargite residues on other crops (Saiz 1987).

REFERENCES

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O'Connell, Linda, Harvard Fong, Donald Richmond, Margaret Bisbiglia, Sheila Margetich, and Cathy Cooper. (1987). An Investigation of Possible Causes of Dermatitis in Grape Vineyard Workers Kern County 1986. California Department of Food and Agriculture, Worker Health and Safety Branch, HS-1405, 6/11/87.

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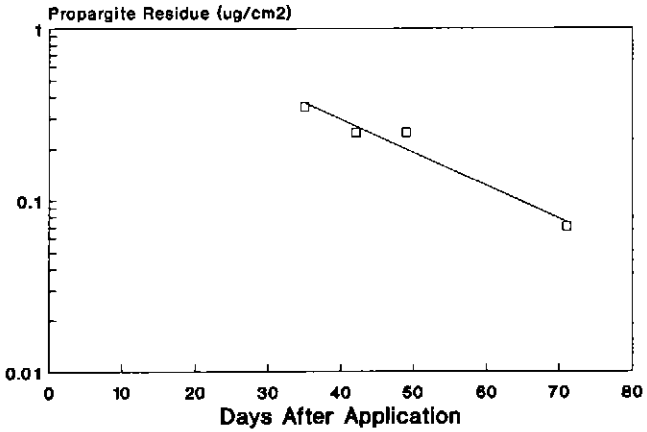
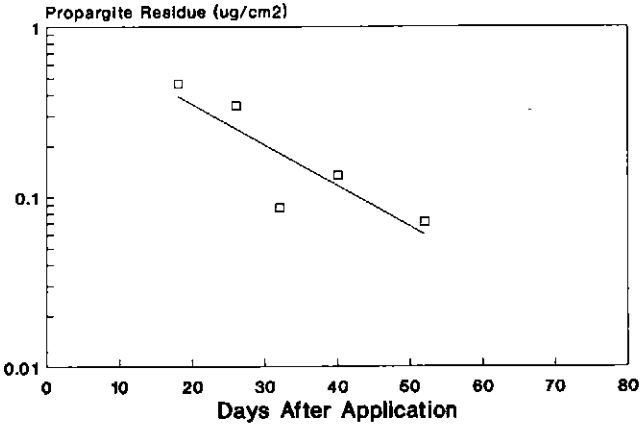
Figure 1: Dislodgeable Propargite Residue Dissipation

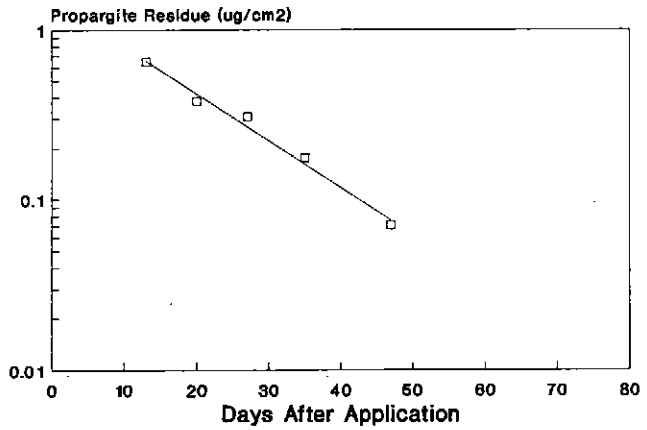
Field 1



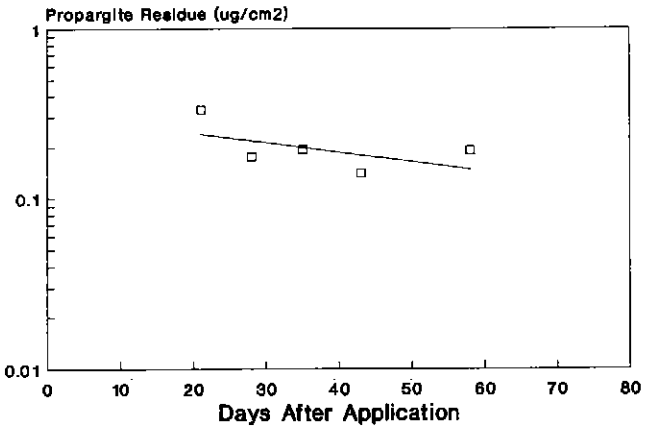
Field 2



Field 3



Field 4



Appendix 1

Results of Dislodgeable Residue Sampling
in Nectarine Orchards Previously
Treated With Omite^{R} 30W *
June - August 1988

Field	Date of Omite^{R} Application	Sampling Date	Days Post Application	Results of Sampling Analysis (ug/cm^2) Sample Replicates				Mean
1	25-May	29-Jun	35	0.20	0.21	0.49	0.50	0.35
		06-Jul	42	0.15	0.24	0.34	0.26	0.25
		13-Jul	49	ND	0.12	0.46	0.34	0.25
		04-Aug	71	ND	ND	ND	ND	0.07
2	11-Jun	29-Jun	18	0.48	0.52	0.40	0.44	0.46
		07-Jul	26	0.19	0.37	0.46	0.34	0.34
		13-Jul	32	0.13	ND	ND	ND	0.09
		21-Jul	40	ND	ND	0.32	ND	0.13
		02-Aug	52	ND	ND	ND	ND	0.07
3	16-Jun	29-Jun	13	0.59	0.71	0.53	0.74	0.64
		06-Jul	20	0.43	0.30	0.31	0.47	0.38
		13-Jul	27	0.32	0.23	0.32	0.36	0.31
		21-Jul	35	0.15	0.14	0.20	0.21	0.18
		04-Aug	47	ND	ND	ND	ND	0.07
4	08-Jun	29-Jun	21	0.35	0.43	0.28	0.27	0.33
		06-Jul	28	0.18	0.14	0.15	0.23	0.18
		13-Jul	35	0.23	0.11	0.09	0.34	0.19
		21-Jul	43	0.14	0.14	0.14	0.14	0.14
		04-Aug	58	0.27	0.13	0.17	0.17	0.19

* All orchards were treated at 7.5 pounds (2.25 pounds active ingredient) per acre with Britz Buffer in 70 gallons water per acre, using an orchard (air blast) sprayer.

ND = None Detected (Minimum Level of Detection = 0.07)