Control of European Red Mite

good control obtained with new acaricides but some resistance indicates future prebloom treatments may not be feasible

Harold F. Madsen and Stanley C. Hoyt

Previous experiments have demonstrated the feasibility of prebloom sprays for control of European red mite eggs. Genite-923 and Mitox—when used at the cluster bud stage on pears and at the pink bud stage on apples—considerably reduce mite populations and make the application of acaricides early in the season—when the problem of phytotoxicity is acute—less necessary.

In order to test some new materials, experimental plots—consisting of single trees, replicated eight times and randomized throughout the plot area—were established in a Bartlett pear orchard near San Jose. The orchard showed a heavy population of overwintering European red mite eggs on the twigs and branches.

The tests consisted of a series of acaricides applied at the cluster bud stage and a combination of two new phosphates with dormant oil applied during the dormant season. All acaricides applied at the cluster bud stage were in combination with lime sulfur, wettable sulfur, except Kelthane, which because of its incompatibility with highly alkaline materials, was used in combination with Dithane D-14. Since scab control was necessary, the check plot also received lime sulfur, wettable sulfur, which previous studies have shown does not materially affect mite populations when applied prior to egg hatching. Applications were made with conventional ground equipment and orchard guns and averaged 600 gallons per acre.

Two plots were also arranged to evaluate a current belief that the control of mite eggs is much improved when a lime sulfur cluster bud spray follows a dormant oil application. Both plots received dormant oil in January, followed by lime sulfur in the one plot and in the other by Dithane-14, which apparently does not exhibit any acaricidal properties.

Continued on page 15

Summary of 1956 Field Trials on Control of European Red Mite with Apparent Resistance to Prebloom Genite-923
San Jose
(Mite counts expressed as average no. mites per leaf, dosages expressed as amounts per 100 gallons)

Plot	Application and mite count dates					
	Prespray May 10	May 21	May 29	June 12	June 18	July 2
1	2.7	50% Ovotran ½ lb.	5.1	11.2*	....	..
2	3.2	50% Ovotran 1 lb.	4.1	10.4	50% Ovotran 1 lb.	11.8*
3	2.7	50% Genite-923, 1½ pints	4.1	13.0*	....	..
4	3.2	50% Genite-923, 3 pints	2.7	12.5	50% Genite-923, 3 pints	13.5*
5	2.1	25% Tedion 1 lb.	2.4	0.2	....	0.06
6	3.4	25% Trithion 1 lb.	0.2	0.0	....	0.04
7	2.6	....	5.3	12.2*	....	..

* Resprayed with other materials at this point.

Summary of 1956 European Red Mite Dormant and Prebloom Plots
San Jose
(Dosages expressed as amounts per 100 gallons, mite counts expressed as average number mites per leaf)

Plot	Dormant Spray Jan. 17	Prebloom Spray March 26	Mite Count Dates					
			Apr. 23	May 10	May 24	June 5	June 12	July 2
1.	Dormant emulsive oil, 4 gals.	2 gals. lime, sulfur, 4 lbs. wettable sulfur	0.4	0.5	1.6	3.4	9.2*	..
2.	Dormant emulsive oil, 4 gals.	2 qts. Dithane D-14	1.1	0.2	0.3	1.7	5.1*	..
3.	Dormant emulsive oil, 4 gals.	2 gals. lime sulfur, 4 lbs. wettable sulfur, 1½ pts. 50% 923	0.08	0.01	0.2	0.2	0.7	5.0*
4.	....	2 gals. lime sulfur, 4 lbs. wettable sulfur	8.8	2.2	11.8*	..	..	..
5.	Dormant emulsive oil, 2 gals. 1 pt. 50% Trithion	2 gals. lime sulfur 4 lbs. wettable sulfur	1.2	0.4	3.8	4.7*	..	..
6.	Dormant emulsive oil, Phostex mixture, 2 gals.	2 gals. lime sulfur, 4 lbs. wettable sulfur	6.7	1.1	8.4*	..	..	..
7.	....	2 gals. lime sulfur, 4 lbs. wettable sulfur, 1½ pts. 50% 923	0.4	0.1	0.3	1.0	1.8	4.7*
8.	....	2 gals. lime sulfur, 4 lbs. wettable sulfur, 2 lbs. 20% Mitox	0.2	0.08	0.4	0.7	1.5	4.5*
9.	....	2 qts. Dithane D-14, 2½ pts. 18.5% Kelthane	1.6	0.6	1.6	3.8	11.5*	..
10.	....	2 gals. lime sulfur, 4 lbs. wettable sulfur, 1 pt. 50% Trithion	0.4	0.1	0.8	0.6	3.0	6.0*

* Plots resprayed at this point.

Applying prebloom spray in test

FIG MOSAIC

Continued from page 12

termine what other potential virus vectors were to be found on the fig. The phytoseiid mites *Typhlodromus longipilus* Nesbitt and *Typhlodromus* sp. (Det. Baker) were the most abundant. Tetranychid mites were found only occasionally in southern California. Flower thrips, *Frankliniella* sp., and the aphids *Aphis gossypii* Glover and *Myzus persicae* (Sulz) were present in moderate numbers. The fig psyllid *Homotoma ficus* L., which research workers in Italy reported as the probable vector or cause of fig mosaic in Italy, has not been found in California.

A series of transmission tests to five plants each was made with these species. No evidence was obtained that any of these insects are vectors of fig mosaic.

Symptoms of fig mosaic are very erratic in occurrence. Some of the inoculated plants have shown only one small chlorotic spot for months before developing conspicuous markings. Symptoms developed more consistently at 90°F than at 80°F. Symptoms on the test plants were highly variable. Some markings consisted of faint, diffuse areas without clear-cut margins, while others were well delineated and contrasted sharply with the leaf in color. The markings varied greatly in size and shape. Many of the leaves showed severe distortion.

Demonstration of transmission of fig mosaic by the fig mite makes it important to determine whether or not the fig mite and fig mosaic can be controlled economically in the field. It will be necessary to study mite control on isolated fig plantings started with mosaic-free plants in order to determine the possibility and benefits of field control of fig mosaic. This will necessitate the finding of virus-free fig varieties from which propagations can be made. No such material is available locally.

R. A. Flock is Assistant Entomologist, University of California, Riverside.

J. M. Wallace is Plant Pathologist, University of California, Riverside.

RED MITE

Continued from page 6

Mite counts were made during the foliage season by selecting 100 leaves at random, running them through a mite-brushing machine, and counting them under a dissecting microscope. When the mite count reached an average of four or more mites per leaf, the plots were resprayed and the counts discontinued.

The materials used, rates of application, spray dates, and mite counts are shown in the lower table on page 6. Little effect was seen on the mite populations in the plot sprayed with dormant oil followed by lime sulfur, wettable sulfur; the counts paralleled those from the plot sprayed with dormant oil followed by Dithane. Phostex and Trithion in combination with oil did not give satisfactory control, as the former required retreatment in late May and the latter in early June. Dormant oil held the mites in check until June, which is consistent with results obtained in previous seasons.

Concluded on next page

CARTON FORMING

Continued from page 2

ance standard for this job, when the carton supply worker size stamps, is 488 cartons per man-hour. For the first two methods studied, carton-forming performance standards are 217 cartons per man-hour, and 316 for the third and fourth methods. The performance standard for carton forming by the improved method is 317, which includes inserting treated liners. With this method, no carton-feed worker is required. Size stamping is performed by the carton supply man. The performance standard for carton feeding in the first and third methods is 261 cartons per man-hour, and 373 in the second and fourth methods.

Adaptation of the improved method in an orange packing house is shown in the accompanying photograph. Right and left hand jigs are used to allow a carton former to form on two lines without walking around a work station. Tables are used for holding bundles of cartons. An elevated skate roll conveyor is used for carton bottles where a short distance between conveyor lines prevails. With more space and separate tables for each line, both carton tops and bottoms are placed on the table. Boxes holding treated liners are on center uprights.

Hourly labor costs for crew organizations based on performance standards in relation to filling rate are shown in the graph. For example, with labor costs at $1.00 per hour, forming costs per hour—at a filling rate of 400 cartons per hour—would be $5.11 for the first method and $2.71 with the improved method.

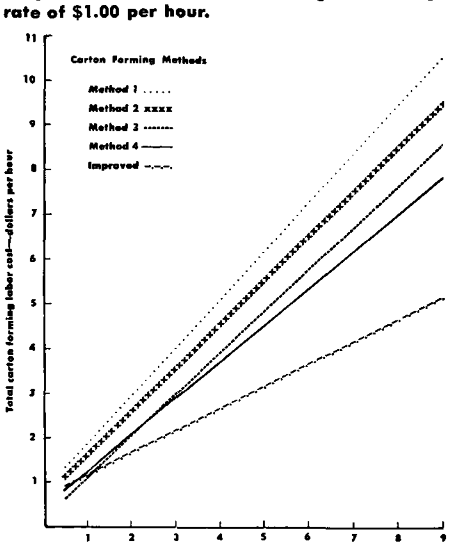
Estimated costs of the jigs as shown in the drawing are $25–$30 each, which is of minor importance when compared with the reduction in labor cost achieved.

Gordon A. Rowe is Extension Economist, Marketing, University of California, Berkeley.

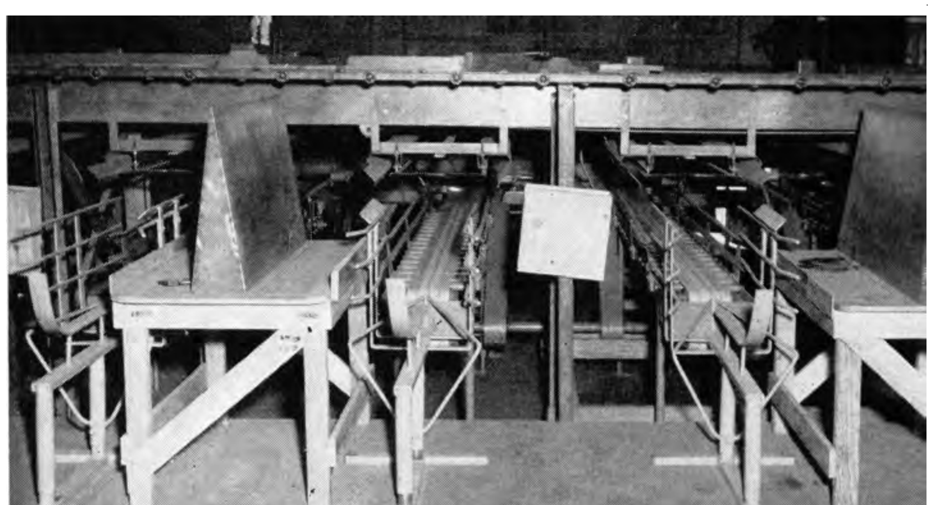
A more detailed report on the construction and installation of the improved jig described in the above article is available, without cost, at the local office of the County Farm Advisor.

The Tom Sims Packing House Equipment Company, the California Citrus Industry Research Association, the Fillmore Orange Association, and the Oxnard Citrus Association assisted in the studies reported here.

Hourly labor costs for forming cartons by different methods at various filling rates. Wage rate of $1.00 per hour.



Commercial installation of improved carton-forming jigs in orange packing house.



NEW PUBLICATIONS

—now ready for distribution—

Single copies of these publications—except the Manuals—or a catalog of Agricultural Publications may be obtained without charge from the local office of the Farm Advisor or by addressing a request to: Agricultural Publications, 22 Giannini Hall, University of California, Berkeley 4.

SPRINKLER IRRIGATION, by Verne H. Scott, Cir. 456.

MICROBIAL CONTROL—THE EMERGENCE OF AN IDEA, by Edward A. Steinhaus, Hilgardia Vol. 26, No. 2.

REST AND DORMANCY IN GARLIC, by Louis K. Mann and David A. Lewis, Hilgardia Vol. 26, No. 3.

EXPERIMENTAL STUDIES OF PREDATION, by C. B. Huffaker and C. E. Kennett, Hilgardia Vol. 26, No. 4.

DETERMINING THE PREVALENCE OF CERTAIN CEREAL CROP DISEASES BY MEANS OF AERIAL PHOTOGRAPHY, by Robert N. Colwell, Hilgardia Vol. 26, No. 5.

TO

Penalty for private use to avoid payment of postage, $300

University of California College of Agriculture, Agricultural Experiment Station, Berkeley 4, California

Paul F. Sharp.
Director

Free—Annual Report or Bulletin or Report of Progress
Permit No. 1127

RED MITE

Continued from preceding page

Kelthane also held until June but was not so promising as other materials. Genite-923, Mitox, and Trithion as cluster bud sprays held the mites in check until July, and there was little difference between the plot sprayed with Genite-923 alone and the one which received dormant oil followed by Genite-923.

Although the results of the test look promising, scattered reports of grower failures with the prebloom Genite treatments indicate that resistance might be expected in the near future. In one San Jose orchard, a definite resistance to Ovotran following foliage treatments was reported; also, a small plot of prebloom Genite-923 failed to give adequate control.

In order to investigate the possibility of resistance, a section of this orchard was treated with Genite-923 during the cluster bud stage. The trees were sprayed by hand and were thoroughly covered. Mite counts in early May showed no difference between the sprayed plots and the check, as both had an average of three or more mites per leaf. The rest of the orchard, which had been treated with dormant oil by the grower, showed less than 0.5 mite per leaf.

As a further test of possible resistance, the area sprayed with Genite-923 was divided into four-tree plots. Genite-923 and Ovotran were used at the suggested dosage and at double the dosage. To serve as a comparison, Tedion—a new chlorinated hydrocarbon acaricide—and Trithion—a phosphate compound—were also used. Applications were made with conventional ground equipment and orchard guns and averaged 800 gallons per acre. The materials used, dosages, and mite counts are shown in the upper table on page 6.

To both Ovotran and Genite-923 there was a definite resistance; even two sprays of a double dosage failed to provide control. Tedion and Trithion, however, gave excellent control, holding the mites in check for the duration of the experiment.

Because of the possible connection between Ovotran resistance—which has become fairly general throughout California—and failure of prebloom 923, a careful check will be necessary in 1957 to find out if resistance to prebloom Genite-923 is occurring in other areas. There is also a possibility that resistance will involve other materials—such as Mitox—and the prebloom spray program may not be feasible in future seasons.

Harold F. Madsen is Assistant Entomologist, University of California, Berkeley.

Stanley C. Hoyt is Research Assistant in Entomology, University of California, Berkeley.

The above progress report is based on Research Project No. 806.

DONATIONS FOR AGRICULTURAL RESEARCH

Gifts to the University of California for research by the Division of Agricultural Sciences accepted in November, 1956

DAVIS		
Bakelite Co.	4 large plastic sheets	For experiments with temporary outside storage of precooled fruit
California Packing Corporation	$500.00	For grape breeding project
Chipman Chemical Co., Inc.	10# carbagran 10	For experiments to control weeds in strawberries and lettuce
Food Machinery & Chemical Corp., Niagara Chemical Division	$500.00	For research on scale insects on stone fruits
Imperial County Board of Supervisors	$2,000.00	For alfalfa breeding program of Imperial Valley Field Station
Red Star Yeast & Products Co.	$2,500.00	For research in industrial fermentation
Stribling's Nurseries	400 S-37 peach seeds	For rootstock investigations
Union Ice Co.	10 tons of ice	For fruit cooling tests and demonstrations
RIVERSIDE		
Carbide & Carbon Chemicals Co.	$3,000.00	For studies on experimental insecticides
Citrus Industry Research Assoc.	$7,000.00	For fungistat research
Fruit Growers Supply Co. Sunkist Growers, Inc.	$30,000.00	For research on control of decay in carton-shipped citrus fruits
STATEWIDE		
Tokay Marketing Agreement	$1,000.00	For market study of fresh Tokay grapes