Red Mite on Pears

new acaricides included in early spray tests for control of European red mite

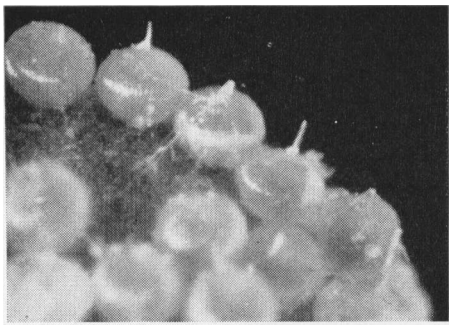
Harold F. Madsen

Prebloom spray treatment against the overwintering eggs of European red mite on pears reduced populations and prevented an early season build-up. Thus far, Genite-923 is the only material which has given consistent control—at a dosage of 1½ pints of 50% emulsion per 100 gallons—combined with lime-sulfur or organic fungicides regularly used for pear scab control.

In order to evaluate some new acaricides as prebloom treatments, experimental plots—consisting of single trees, replicated eight times and randomized throughout the plot area—were established in an Anjou pear orchard near San Jose. The orchard had suffered a heavy attack of European red mite the previous season, and overwintering eggs were numerous on the twigs and limbs.

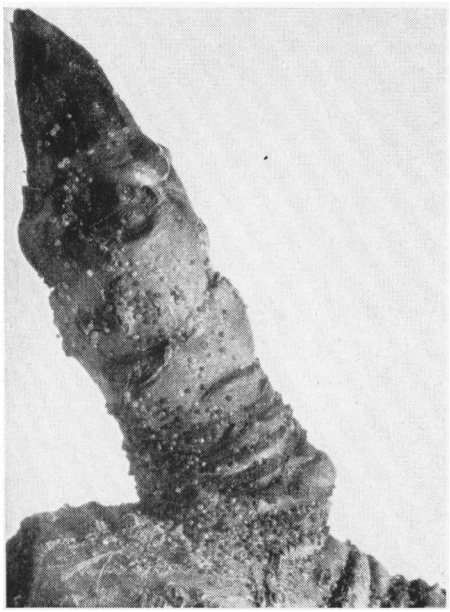
A combination program of dormant oil as a winter spray preceding a prebloom treatment of Genite-923 was also tried. One plot received a dormant oil spray followed by a cluster-bud spray of Genite-923; another, dormant oil alone; and a third plot was sprayed only at the cluster-bud stage with Genite-923.

The new materials tested included FW-293, Mitox, 1303, Sulphenone emulsion, Karathane emulsion, and Systox. Since Karathane and Sulphenone wettable powder had been previously tested with poor results, it was thought that the emulsion concentrate formulations—because of their wetting properties—might give better control. Applications were made with conventional ground equipment and orchard spray guns and averaged 550 gallons per acre. With the exception of Systox—because of its incompatibility when combined with highly alkaline materials—all of the sprays applied at the cluster-bud stage were in combination with lime sulfur-wettable sulfur.



European red mite eggs enlarged to show stipe.

Pear bud showing eggs of European red mite.



At intervals throughout the spring and summer, mite counts were made by selecting 100 leaves at random from each treatment and running them through a mite-brushing machine. This machine brushes the mites from the leaves onto a plate coated with vaseline. The plate is then placed under a binocular microscope and the mites are counted. This method of counting is not only faster but is also more accurate than field observations.

When the mite counts reached an average of four to five per leaf—a population known to be capable of producing leaf injury on pears—the plots were resprayed with a standard acaricide. As only the effects of the prebloom treatments were under study in the experiment, no further mite counts were made after respraying.

The materials used, dosages, time of application, and the seasonal mite counts are summarized in the table on this page. FW-293, Sulphenone, and Karathane were not effective against the overwintering mites and required treatment at the same time as the check plot. The fact that FW-293 has since been found to be incompatible with lime sulfur may explain the poor results in the experiment, and it will be retested in the coming season.

Although Systox held the mites in check until June, it is not clear whether this was because of a systemic effect in the developing foliage or whether a percentage of the overwintering mite eggs

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Summary of 1955 Prebloom Treatments for Control of European Red Mite on Pears
Variety—Anjou Location—San Jose, California
(Mite counts expressed as average number of mites per leaf)

Material	Dosage per 100 gallons	Time of application	Seasonal mite counts					
			April 11	April 25	May 31	June 16	June 30	July 11
Dormant oil	5 gallons	Dormant (Jan. 13)	0.3	0.1	2.8	5.4*	..	..
Dormant oil + Genite-923	5 gallons + 1½ pts. 50% Emulsion	Dormant (Jan. 13) + Cluster bud (March 7)	0.1	0.01	0.1	0.1	0.1	0.6
Genite-923	1½ pts. 50% Emulsion	Cluster bud (March 7)	0.1	0.05	0.4	0.3	0.4	1.0
FW-293	2 qts. 25% Emulsion	Cluster bud (March 7)	0.8	0.4	4.7*	..	..	..
Mitox	2 lbs. 20% wettable	Cluster bud (March 7)	0.2	0.1	0.2	0.1	0.4	0.7
Compound 1303	1 pt. 50% Emulsion	Cluster bud (March 7)	0.2	0.1	0.6	0.1	1.7	6.0
Sulphenone	3 pts. 50% Emulsion	Cluster bud (March 7)	0.5	0.2	5.7*	..	..	..
Karathane	1 qt. 25% Emulsion	Cluster bud (March 7)	0.5	0.2	6.6*	..	..	..
Systox	1 pt. 21% Emulsion	Cluster bud (March 7)	0.5	0.1	2.8	5.0*	..	..
Check	..	..	2.0	1.2	9.4*	..	..	..

(All cluster bud treatments, with the exception of Systox, were in combination with lime sulfur—wettable sulfur. The check and dormant oil plot also received lime sulfur—wettable sulfur.)
* Respray at this point.

CORN

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Residue analyses were made from samples of approximately 10 pounds taken—from the same location in the silo on each sampling date—about 1′ below the surface of the ensilage.

The first sample—from fresh ensilage being put into the silo—analyzed 290 ppm of DDT. The second sample taken after 47 days in the silo analyzed 96 ppm of DDT. In view of the analyses of later samples, it is apparent that this sample was abnormally low. Samples taken 73 days after storage and subsequent samples were divided and analyzed both on the basis of their wet weight and

DDT Residues on Sweet Corn Ensilage at Various Depths from Approximately One Foot Below the Surface to the Bottom of the Silo. Kern County, 1952.

Depth below surface of ensilage in feet	DDT residue ppm	
	Wet wt.	Dry wt.
1	125	500
2	68	325
4	98	394
6	70	308
8	88	337
10	83	314

on the basis of air dry weight. The differences in residues point out the importance of moisture content in such analyses. With a given amount of insecticide, the dryer the sample the greater is the rate of DDT to total weight of the sample. The data clearly indicate that DDT residues do not break down rapidly on sweet corn ensilage. In one sample of ensilage, 148 ppm of DDT were present—expressed in terms of wet weight—165 days after preparation. This represents approximately a 50% reduction under the initial residues.

Because first series of samples were taken from approximately 1′ below the surface of the ensilage, additional samples were taken at greater depths. On the last sampling date—165 days after initial preparation of the ensilage—samples were taken at approximately 2′ intervals from the top to the bottom of the pit. The sample nearest the surface—approximately 1′—contained 125 ppm of DDT on a wet weight basis which was higher than any of the rest. Probably this was because the temperatures near the surface were lower than those at greater depths in the silo. At lower temperatures DDT is broken down more slowly. There was relatively little difference in residues on samples taken below the 1′ level, indicating a rather uniform distribution of DDT throughout the ensilage.

Some of the sweet corn analyzed in these experiments was being fed to beef cattle, but none to dairy animals, so no studies were conducted to determine DDT residues in milk resulting from the feeding of treated sweet corn. However, work by other investigators has shown that even when very low residue is on cattle feed, appreciable DDT will appear in the milk. In one extensive series of experiments, seven cows were fed alfalfa hay with a DDT residue averaging 7 ppm and 8 ppm. After the first few days, the amount of DDT in the milk remained steady at about 2.3 to 3.0 ppm. Butter made from this milk was found to contain 65 ppm of DDT.

In other studies, five cows receiving pea silage containing about 100 ppm DDT for approximately four months had 15.6 ppm DDT in their milk.

Because there is no practical method of eliminating DDT residues from sweet corn once the insecticide has been applied, it is apparent that treated corn forage fed to dairy cattle could result in appreciable quantities of DDT in milk. Consequently, sweet corn fodder that has been treated with DDT should never be fed to dairy animals and it should not be fed to meat animals being fattened for slaughter.

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Determinations of DDT residue on corn were made at Riverside by L. D. Anderson, Entomologist, and F. A. Gunther, Associate Insect Toxicologist, University of California.

The investigations with DDT on alfalfa hay were conducted by Ray F. Smith, Associate Professor of Entomology, and W. M. Hoskins, Professor of Entomology, University of California, Berkeley; and O. H. Fullmer, formerly Research Assistant, University of California, Berkeley.

The studies with pea vine silage were made by H. F. Wilson, Professor of Economic Entomology; N. N. Allen, Professor of Dairy Husbandry; G. Bohstedt, Professor of Animal Husbandry; J. Betheil, Graduate Assistant in Biochemistry; and H. A. Lardy, Assistant Professor in Bacteriology, University of Wisconsin.

MITES

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was actually killed. The plot sprayed with dormant oil alone also required retreatment in June. This seems to be typical of the results obtained in past seasons with dormant oil. Even with a carefully hand sprayed plot, the mites build up to damaging populations by early June, and when air carrier equipment is used, the results have been even less satisfactory.

Genite-923 and Mitox held the mites in check until July, and if two-spotted mite had not become a problem in the orchard at that time—necessitating treatment with an acaricide to prevent foliage damage—seasonal control might have been obtained. There was little difference between the plot sprayed with Genite-923 alone and the plot which received dormant oil followed by Genite-923, although some differences might have been observed if it had been possible to continue the experiment for a longer period of time.

Compound 1303 also showed considerable promise. The mites did not build up to significant numbers until July, at which time the plot required retreatment. This has been the first phosphate compound—in tests made over the past several years—which has shown an ability to kill the overwintering eggs of European red mite.

Of the materials which were effective in the experiment, only Genite-923 is available for use by growers at the present time. The other materials are, as yet, experimental and will be further tested in the coming season.

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RUSSET

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during April 1955 was 6F below normal and the temperature in a shelter near the orchard dipped to 28F on the morning of April 2. Frost injury was evident by blackened centers in 80% to 95% of the flowers and small fruits. It is also possible under these low temperature conditions that a spray may cause more russet than a dust.

Bentonite dust, used as the carrier for streptomycin in the 1953 and 1954 trials, appeared to have some russet-reducing properties again in 1955. In the earlier experiments, fruit from trees dusted with streptomycin-bentonite had less russet than that from trees given no blight control treatment.

In the 1955 studies, three applications of a 200-mesh bentonite dust were superimposed on a portion of the check, the copper, and certain of the streptomycin plots in the three test orchards. The bentonite was applied at 10- to 12-day intervals during the blight control period.

In the Sacramento Valley orchard, fruit from trees in the copper-lime plot which were dusted three times with bentonite had less russet than fruit dusted only with copper-lime. This was the orchard where fruit subjected to either the copper-lime or streptomycin applications developed more russet than that from the check trees receiving no blight control treatment. However, the bentonite did not reduce the amount of fruit russet in the check plot. Out of seven other comparisons with and without ben-

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