STREPTOMYCIN-RESISTANT CONTROL STUDIES, 1972

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TABLE 1. WEATHER DATA—HERINGER EXPERIMENT 1972

Week ending	Hours per week over 65°F	Hours per week with rel. hum. over 90%
March 19	66	32
March 26	14	36
April 2	17	51
April 9	16	51
April 16	20	32
April 23	38	19
April 30	53	21

TABLE 2. PEAR FIREBLIGHT INFECTIONS—1972—HERINGER RANCH

Treatment	Concentrate or dilute spray	Amount material per acre per application	Blight strikes per plot (16 trees)*
Kocide	Conc.	1 lb.	0.3 d
Kocide	Dilute	2 lb.	1.0 d
Kocide	Conc.	2 lb.	1.2 d
Terramycin 17% + Streptomycin 17%	Conc.	8 oz.	1.2 d
Terramycin 17%	Conc.	8 oz.	1.3 d
Kocide + Streptomycin 17%	Conc.	2 lb. 8 oz.	1.8 cd
COCS	Conc.	2 lb.	1.8 cd
COCS	Conc.	1 lb.	2.2 cd
Kocide or Streptomycin 17% (alternated)	Conc.	2 lb. 8 oz.	2.7 cd
Kocide + Streptomycin 17%	Conc.	1 lb.	
Streptomycin 17%	Conc.	8 oz.	3.3 cd
Streptomycin 17%	Dilute	28.8 oz.	5.3 c
Tri Basic Copper	Conc.	2 lb.	10.0 b
Check	–	–	15.3 a

* Values followed by different letters are significantly different at the 0.05 level.

midity over 90%) are summarized in table 1. Rain occurred March 20, 21, 22, and April 5, 8, 9, 11, 12 and 22. Irrigation was applied March 31 and April 1.

Blight infections were first noticed on April 10 and the total infections in each plot were counted on May 4 and 5. Counts were made on the inside 16 trees (2 rows by 8 trees) in each plot and the average number of infections per treatment are reported in table 2.

As the data indicate, less than one strike per tree was obtained in the unsprayed trees. All treatments gave better control than this, but to evaluate materials effectively, the amount of blight received was much less than desirable; however, some generalizations can be made.

From the data obtained, Kocide and COCS were statistically better than either 28.8 oz of 17% streptomycin or 2 lb of tri-basic copper. No statistical differences were obtained between the Kocide or COCS treatments. The number of strikes per plot showed that Kocide averaged slightly better than COCS. Terramycin was also as good as the two copper materials. When streptomycin was combined with copper, the controls were poorer than when Kocide was used by itself. In some further tests in the laboratory, it was obvious that the combination of materials caused over-wetting of the foliage, resulting in excessive runoff of the material. This may have accounted for poorer control when Kocide and streptomycin were combined. Tri-basic copper gave statistically poorer control than COCS or Kocide at equivalent rates of copper per 100 gallons of spray. Equivalent blight control was obtained with one and two pounds of COCS per acre and between one and two pounds of Kocide per acre. Since both materials contain approximately 50% copper, it appears that ½ lb actual copper gave good blight control under the conditions of this test.

Blight infections found in the plots were primarily of the streptomycin-resistant strain, indicating that the resistant strain first detected in the previous season was stable and had persisted through the winter.

In summary, it is evident that copper materials (COCS or Kocide) gave better blight control than the highest registered rate (28.8 oz per acre) of streptomycin. Combinations of Kocide and streptomycin gave better control than streptomycin alone but inferior to Kocide alone. Streptomycin-resistant fireblight can be controlled by copper materials (COCS and Kocide) at one or two lbs per acre of formulated material, if sprays are applied every five days.

EFFECTS OF CONTROL SPRAYS ON RUSSETTING OF BARTLETT PEARS

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RUSSET (small, corky, brown spots on the surface of fruit) makes pears less attractive to buyers and so reduces prices paid for fresh fruit even though it does not affect the eating or keeping quality. Several studies have shown that sprays, dew or rain on the surface of young fruit increase russet. For this reason, fireblight control sprays applied to pear trees with young russet-susceptible fruit were evaluated for their effect on fruit russet in 1971 and 1972.

Russet evaluation consisted of estimating the percentage of lenticels russetted on a random sample of outside fruit hanging 5 to 7 feet above ground on trees in each plot. For uniformity, one person made all russet estimates for all plots in each orchard. The evaluations were made two to three weeks before harvest.

In 1971, two russet estimates were averaged per tree and 40 trees were evaluated in each treatment. This blight control test was in the C.E. Sullivan orchard of 12-year-old trees planted 15½ by 15½ ft near Yuba City, and was conducted in a year of minimum russetting. In 1972, five russet evaluations were averaged per tree and 60 trees were evaluated in each treatment. The 14-year-old orchard used for this test was planted in hedgerows 11 by 22 ft apart and owned by Heringer Enterprises of Gridley. Russet was severe in 1972. Each orchard received a total of 10 sprays between bloom and the first 40 days following fruit set.

The results of the 1971 test, shown in table 1, indicate that streptomycin sprays caused significantly less russet than copper sprays. As the amount of streptomycin applied per acre increased,

TABLE 1. RUSSET EVALUATION OF 1971 SULLIVAN PEAR FIREBLIGHT CONTROL TEST

Treatment	Spray* or spray/acre (gallons)		Material per acre per application	% lenticels russetted†
Check	———		0	9.4% a
Streptomycin 17%	conc.	50	4.8 oz.	10.6% b
Streptomycin 17%	conc.	50	9.6 oz.	10.9% b
Streptomycin 17%	dilute	200	9.6 oz.	11.3% c
Streptomycin 17%	conc.	50	19.2 oz.	13.8% c
Streptomycin 17% + COCS (2 times)	conc.	50	9.6 oz. + 16.0 oz.	19.1% d
COCS (copper)	conc.	50	16.0 oz.	23.8% e
Kocide (copper)	conc.	50	16.0 oz.	24.7% e

* Concentrate at 50 gal. per acre or dilute at 200 gal. per acre.
† Values followed by different letters are significantly different at .05 level.

TABLE 2. RUSSET EVALUATION IN 1972 HERINGER PEAR FIREBLIGHT CONTROL TEST

Treatment	Spray per acre (gallons)	Material per acre per application	% Lenticels russetted*
Check	0	0	42.3% a
Terramycin 17%	50	8.0 oz.	46.7% b
Streptomycin 17%	200	28.8 oz.	46.7% b
COCS copper	50	2.0 lbs.	59.9% c
Tribasic copper	50	2.0 lbs.	60.4% c
COCS copper	50	1.0 lbs.	60.8% c
Kocide alternated with Streptomycin	50	2.0 lbs. 8.0 oz.	65.4% d
Kocide plus Streptomycin 17%	50	1.0 lbs. + 8.0 oz.	65.8% d
Kocide	50	1.0 lbs.	67.1% d
Kocide	200	1.0 lbs.	67.3% d
Kocide	50	2.0 lbs.	67.4% d
Kocide + Streptomycin 17%	50	2.0 lbs. + 8.0 oz.	79.4% e

* Values followed by different letters are significantly different at .01 level.

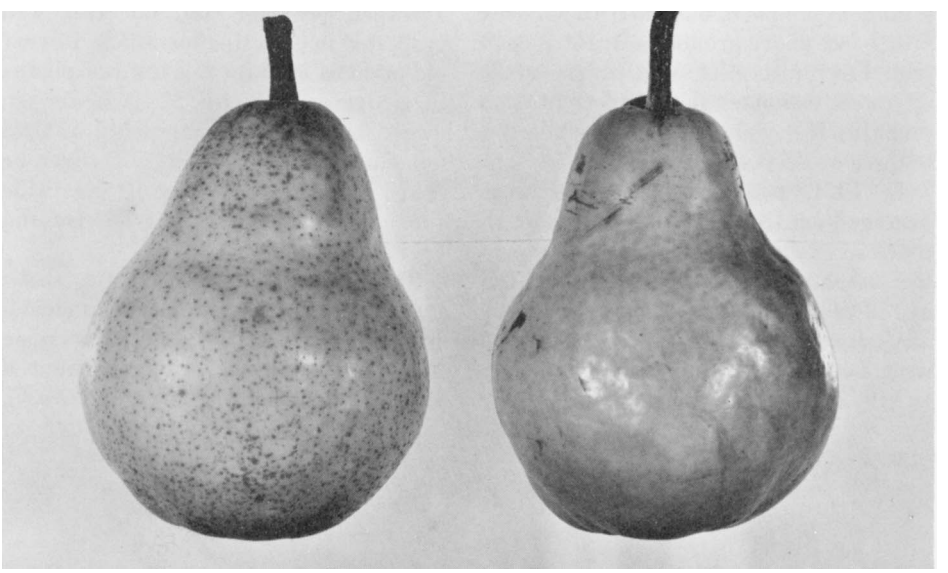
so did the amount of russet. The addition of only two copper sprays (COCS) to the 9.6 oz per acre rate of streptomycin during the season significantly increased the russet compared with using streptomycin alone. The checks, which received only normal insecticide sprays (no blight sprays), had significantly less russet than any of the plots sprayed for blight.

In the 1972 test, russet was three to four times worse than in the 1971 test. This variation in russet from year-to-year and area-to-area is quite common and is generally considered to be due to variation in such climatic factors as low temperature, dew, rate of fruit growth, amount of natural wax on the surface of fruit plus other conditions. In 1972, a light frost occurred shortly after petal fall and could have been a major cause of increased russetting.

Russet data measured in the Heringer blight control test are summarized in table 2. Despite a high level of russet in this orchard in 1972, the pears on the check trees which received insecticides, but no blight control sprays, had significantly less russet than fruit from all other treatments. The antibiotics, streptomycin and terramycin, caused significantly less russet than did the copper sprays. The various copper materials produced different amounts of russetting with Kocide producing significantly more than COCS or tribasic copper. The amount of copper applied per acre as Kocide or COCS did not cause a difference in russet in this test. When copper as Kocide was mixed with streptomycin sprays or when sprays of Kocide and streptomycin were alternated, the amount of russet on pear fruit was similar to that obtained from Kocide spray alone; this indicates that copper is the primary cause of increased fruit russet, especially since it is applied when fruits are small and most susceptible to russet.

After two years of evaluation on the effect of blight sprays on russetting of pear fruit in the Sacramento Valley, these results clearly demonstrate that copper sprays increase russet more than antibiotics such as streptomycin and terramycin. Even where the number of copper sprays was reduced by alternating with streptomycin, the amount of russet was significantly higher than where streptomycin was used alone. The fact that blight is resistant to control with streptomycin in several Sacramento Valley orchards precludes its use in these orchards. Russet is primarily a problem of pears shipped fresh and does not affect the sales of pears used for canning.

Pear fruits showing russetted lenticels compared with smooth finish of normal fruit.



FIREBLIGHT

THIS REPORT evaluates a method used to determine the uniformity of spray coverage in a pear fireblight control experiment in 1972. Trees used for the experiment were mature 14-year-olds in a hedgerow planting at 11 by 22 ft spacing. The trees were uniform in size, vigorous in growth (many 5-ft shoots per season) and completely grown together in the hedge. Standard vase-shaped pruning was practiced, giving a diameter of approximately 14 ft, with a height of 15 ft after dormant pruning.

The sprayer used was a Hart-Carter Spray Master 432G. The sprayer had one manifold with shut-off valves for concentrate and dilute nozzles. The dilute nozzles were calibrated to apply 400 gallons per acre on a 22-ft spacing and the concentrate nozzles were calibrated to apply 100 gallons per acre at the same spacing. Pressure was maintained at 125 psi, with an engine speed of 2900 rpm. Speed was maintained at 2 mph for all plots. Rhodamine B concentrate 500% powder was used at 8 oz per 100 gallons of water in all target-card tests.

Eight white target cards measuring 2½ by 4½ inches were attached to a pole at 2-ft increments to a height of 16 ft. Three sets of cards were placed in each tree with one set approximately 1 to 2 ft within the canopy of the tree closest to sprayer. The second set of cards was placed near the center of the tree, with the third set located on the side of the tree farthest from the sprayer. The sprayer was then driven by at 2 mph, cards allowed to dry, and nozzles readjusted where necessary to give complete pattern coverage. Target cards were used for both the concentrate and dilute patterns and cards were resprayed until the desired pattern was achieved.

The experiment was of a randomized complete block design with 5 replications of 11 treatments, plus an unsprayed