JOURNAL OF
NEWS
Agricultural and Food Chemistry
• Biochemical Engineering
• Fermentation
• Food Processing
• Nutrition
• Pesticides
• Plant Nutrients and Regulators

Use of Antibiotics in Orchard Tests Called Success

Results against fireblight expected to stimulate research in use of antibiotics against other bacterial diseases

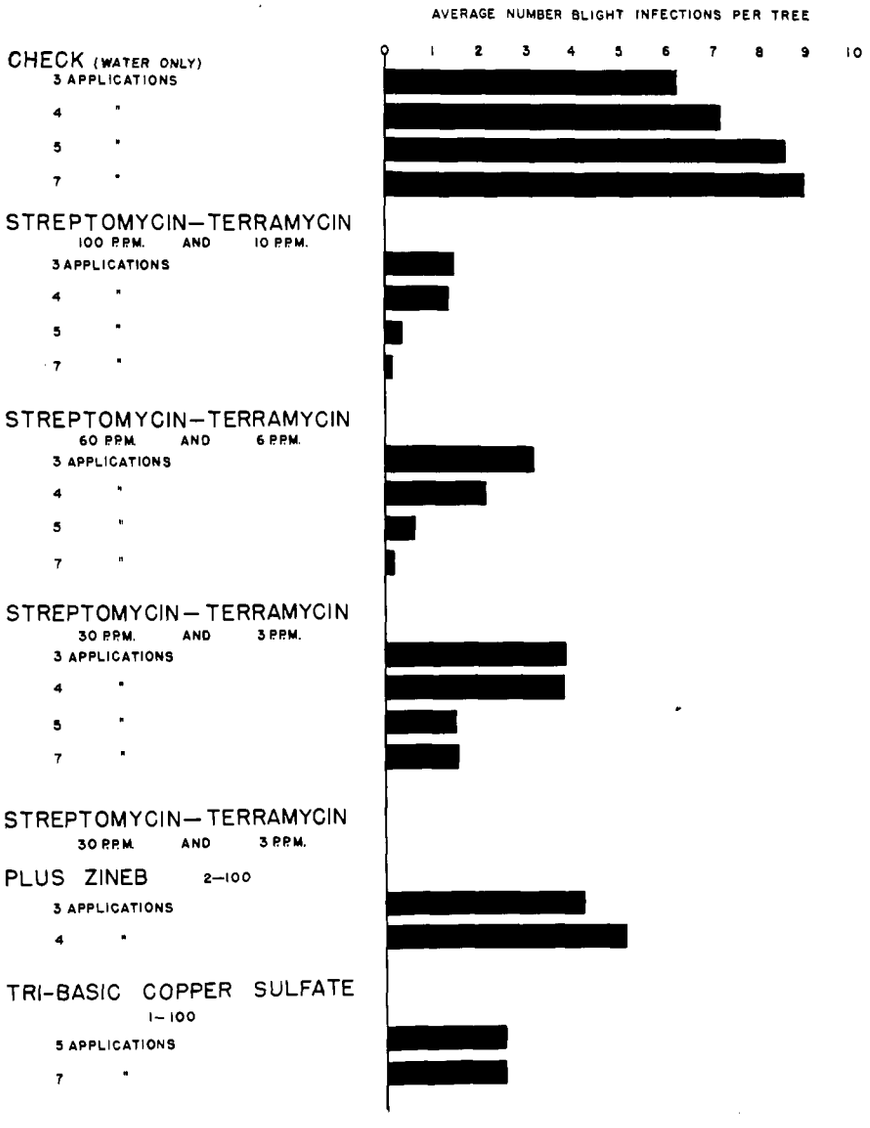
ESTES PARK, COLO.—Sizable reduction in the $70 million-annual damage to fruit trees is seen as a possible result of field and commercial orchard tests in 1954 employing antibiotic sprays, members of the American Phytopathological Society were told at its 46th annual meeting here Aug. 25 to 27. Three independent groups of pathologists reported tests using various formulations which gave in some cases degrees of control on both apples and pears which previously had not been possible with other materials or methods. Some observers indicated that limited tests have now been conducted with antibiotics in almost every state where pears and apples are grown, and in all known cases results have been favorable.

Large scale commercial orchard tests were described by John C. Dunegan, principal plant pathologist, USDA. A 400-acre orchard, containing 600 bearing Bartlett pear trees and located in Marysville, Calif., were involved in an experiment to determine the commercial feasibility of using antibiotic materials for pear blight control. In the tests, 420 trees were sprayed with streptomycin-terramycin mixtures, 60 with conventionally-used tri-basic copper sulfate, and 120 with water.

The effectiveness of three antibiotic concentrations applied, either 3 or 4 times at intervals of 14 days or 5 or 7 times at intervals of 7 days, was compared with tribasic copper sulfate applied 5 or 7 times at intervals of 7 days. Some tests employed a mixture of the antibiotic material and zineb. Each treatment was applied to 30 trees divided into six randomized groups of five trees, spraying operations starting last March 29, when approximately 20% of the blossoms were open, and continued through May 10. All the trees were sprayed from the ground using a 4-nozzle type broom at 600 pounds per square inch pump pressure.

A typical example of the control obtained was cited in the case of one untreated section of the test plot, where 268 cases of infection were found, whereas among the same number of Agri-Mycin treated, there were only five infections. The figure shows the average number of blight infections per tree on Bartlett pear receiving various

Average number of blight infections per tree on Bartlett pears receiving various spray treatments, Marysville, Calif., 1954



spray treatments at the Marysville tests in 1954.

Dunegan observed that in these tests, all the antibiotic treatments were significantly better at the 1% level than the check plots receiving a comparable number of applications of water, and that the number of blight infections increased in the check plots as the number of applications of water increased. Likewise, the number of blight infections, in general, decreased as the concentration and number of antibiotic sprays increased. However, there was no appreciable difference between the treatments receiving three applications of the streptomycin-terramycin mixture at 100–10 parts per million and those receiving five applications at 30–3 parts per million. Too, the additional sprays applied after April 26 at intervals of either seven or 14 days did not give a significant increase in blight control. It was also noted that at the lower concentrations, 14 days was too long an interval between sprays for efficient blight control. The addition of zineb to the spray did not enhance the control.

Dunegan said that the blight control obtained with five or seven applications of the minimum antibiotic concentration (30–3 parts per million) was as good as the results obtained with the tribasic copper sulfate spray. Higher concentrations were significantly better.

A distinct advantage of the antibiotic sprays is the fact that they caused no injury to the fruit. Typical copper injury appeared on the leaves after only one application, copper russet developing on the fruit as the season progressed, and at harvest all the copper-treated plots could readily be distinguished from the other plots because of the roughened, dull appearance of the fruit. The antibiotic treatments did produce chlorotic patterns on the leaves that unfolded early in the season. This reaction was most pronounced in the 100–10 p.p.m. treatments and was present in the 60–6 p.p.m. treatments but in the 30–3 p.p.m. concentrations, chlorotic symptoms developed only occasionally. Copper spray for blight control is still widely and satisfactorily used in many parts of California. In areas where humidity is sufficiently high, however, considerable fruit damage results.

Other large scale tests in California were described by Peter A. Ark and Emlen Scott, University of California. Eight pear growing counties were represented in trials involving 82 acres of Bartlett pear trees. Wettable streptomycin formulations were used at levels of 100, 50, 25, and 10 parts per million, while streptomycin dust, prepared by mechanical blending with Wyoming bentonite and containing 240 parts per million of streptomycin base, was used at the rate of 15 to 60 pounds per acre. In these tests, 232 pounds of 30% streptomycin base formulation and 500 bottles of 265 grams each Agri-Mycin containing 15% streptomycin were used.

Among the results reported by these workers was the control in plots containing 93 trees and in which formulations containing 100, 50, and 25 parts per million of streptomycin base were sprayed on March 29 (25% bloom), April 5 (two days past full bloom), April 13 (calyx), April 21, and 29, and May 6 and 13, or a total of seven sprays. By June 1, the number of blight cuts made per tree was 0.602, 0.645, and 0.924, respectively, as compared to 2.09 cuts per tree in the untreated check of 122 trees and 0.688 cuts per tree in an adjacent copper-lime dust plot of 363 trees.

In another pear orchard, higher levels of streptomycin showed good control of fireblight. Over 400 trees sprayed with 100 parts per million of streptomycin in form of Agri-Mycin required 0.75 cuts per tree, while 150 trees in an untreated check had 4.37 cuts per tree. Spraying 400 trees with 50 parts per million of streptomycin gave 1.61 cuts per tree while 694 trees sprayed with 25 parts per million developed 2.83 cuts per tree. In another experiment, 473 trees were treated with 10 parts per million and had 6.44 cuts per tree.

Prof. Ark, who presented the results, said that streptomycin base at the rate 50 to 100 parts per million can give satisfactory control of fireblight where pear or apple blossoms are sprayed at the right time. Aureomycin shows no tendency to check the blight while Neomycin at 50 parts per million exerts some protective action. He also pointed out, substantiating observations by other speakers, that streptomycin does not appear to cause much russetting on Bartlett pear fruit.

Winter and Young observed that Terramycin HCl and tetracycline were inferior to streptomycin, and Agri-Mycin, which is a formulation of streptomycin and terramycin in a 10 to 1 ratio, gave results equal to but not superior to streptomycin alone. In two tests in commercial orchards in 1954, it appeared that the early and full bloom applications of streptomycin contributed almost equally to blossom blight control on apples, and that the petal fall applications were of minor importances, they said. Tests were also conducted on five Commercial pear orchards and results were favorable.

The speakers, and observers, believe that the satisfactory results of the tests with antibiotics could be far reaching. In addition to being a possible answer for a major problem of the pear industry in the Pacific Coast states, it could conceivably result in a relocation of a part of the industry back to areas east of the Mississippi, where fireblight essentially destroyed the commercial pear industry years ago.

Other diseases which offer themselves to possible control by antibiotics include bacterial spot of tomatoes and peppers, halo light of beans, walnut blight, black leg and soft rot of potatoes, all of which already have yielded to Agri-Mycin in field trials.

Full scale commercial applications of control of blight by antibiotics depend on a downward adjustment in their costs. Though giving better control than any other materials yet used, spraying of antibiotics costs several times as much as other chemicals.

Plant Chemotherapy Held Promising in War on Disease

Direct introduction of compounds to render trees and crops disease resistant demonstrated

NEW HAVEN, CONN.—Plant chemotherapy is a fascinating new attack on tree and crop diseases which is getting pioneering experiments on test plots of the Connecticut Agricultural Experiment Station at nearby Mt. Carmel, James G. Horsfall, director, declared in an address at the station's recent annual field day.

Plant pathologists and other scientists on his staff have been working on the problem of plant disease for several years, but there were on view that day examples, among Dutch elm disease plots, which illustrated their work on a "new frontier."

They had long felt that if they could make plants resistant to disease they might be able to solve diseases which up to now have not been successfully brought under control, such as the Dutch elm malady. Station scientists are attempting to introduce, he said, compounds into the plant to make it resistant, not necessarily by killing the fungus through direct poisoning action, as is