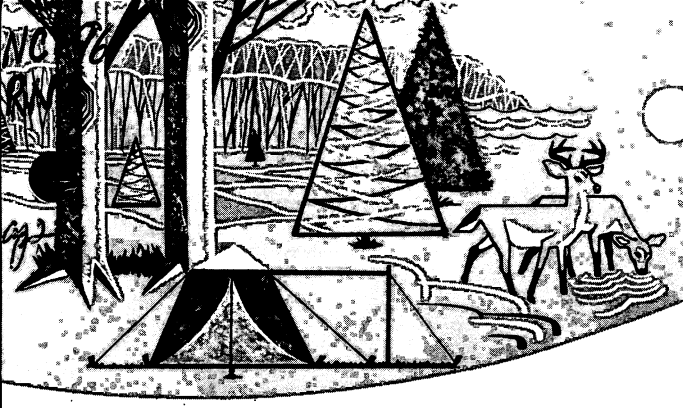

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NORTH CENTRAL FOREST EXPERIMENT STATION, FOREST SERVICE—U.S. DEPARTMENT OF AGRICULTURE

Folwell Avenue, St. Paul, Minnesota 55101

Antibiotic Treatment of Blister Rust Cankers in Eastern White Pine

ABSTRACT. — Cycloheximide (Acti-dione)[1] and Phytoactin antibiotics, applied as basal stem treatments, aerial spray treatments, and complete foliar drenches were not effective in controlling blister rust cankers in eastern white pine. Cycloheximide was effective in suppressing canker activity and growth if directly applied to scarified cankers.

OXFORD: 443.3—172.8 *Cronartium ribicola* — **414.19:174.7** *Pinus strobus* **—416.4+443—414.19**

This note presents the final evaluation of the antibiotics cycloheximide (Acti-dione) and Phytoactin when applied as basal stem treatments, aerial sprays, and ground foliar drenches for control of blister rust cankers on eastern white pine. The tests were established in Wisconsin and Minnesota during 1962. Preliminary evaluations were reported in Plant Disease Reporter 50(4): 224-228, 1966.

[1] *Mention of trade names does not constitute endorsement by the USDA Forest Service.*

METHODS

In the basal stem treatments, Phytoactin in three formulations (L 341, 439, 440), cycloheximide and cycloheximide semicarbazone were basally applied to 812 plantation trees 25 years old, averaging 35 feet tall and 6 inches d.b.h. Treatments were made during June, August, and October 1962 at different antibiotic concentrations (100-300 p.p.m.) in No. 1 or No. 2 fuel oil, with and without Triton B1956. There were three replications of four to five trees for each seasonal application. Approximately 1 quart of solution was applied to the nonscarified bottom 6 feet of each trunk and the first 18 inches of each branch in that area. Data were recorded from directly treated cankers as well as from those above the treated area (transport).[2]

[2] *Transport cankers are those that would be above the treated area on the tree and hence would not receive direct applications of chemotherapeutants. Thus the chemical would have to be translocated to these cankers by the tree's vascular system.*

An additional antibiotic direct canker treatment test, including scarification, was established during October 1963. Cycloheximide (200 p.p.m.) and three formulations of Phytoactin (L 440, 414, 415) were directly sprayed or painted on scarified and nonscarified cankers on 165 plantation trees. These trees were 9 years old, averaging 12 feet high and 3 inches d.b.h. The antibiotics were applied in No. 2 fuel oil, lanolin paste, and slurry paste.

For the aerial applications, cycloheximide semicarbazone (100-200 p.p.m.) and Phytoactin L318 and 444 (200 p.p.m.) were applied by helicopter to plantation trees 25 years old, averaging 35 feet tall and 5 inches d.b.h. Seven 4-acre blocks were treated and 50 test trees with active bole cankers were selected in each block. The materials were applied in No. 1 fuel oil as a 20-percent oil-water emulsion or in water with rhodamine dye at 10 gallons per acre.

Three formulations of Phytoactin (L 318, 319, 346), cycloheximide semicarbazone, and streptimidone (100-800 p.p.m.) were applied by pressurized sprayers during August 1962 as complete drenches to plantation trees 8 years old, averaging 10 feet tall and 2 inches d.b.h. Twelve 10-tree plots were treated. The antibiotics were applied in water or 20-percent oil-water emulsion at the average rate of 1.5 quarts of spray solution per tree.

RESULTS AND DISCUSSION

Five years after treatment cycloheximide and Phytoactin applied as basal stem treatments, aerial spray treatments, and complete foliar drenches, had not controlled blister rust cankers in eastern white pine. Phytoactin had little or no effect on canker development with any of the application methods tested. Cycloheximide suppressed canker growth and activity when it was applied directly to cankers as a basal stem treatment, especially to scarified cankers. However, it had little effect on cankers above the treated area.

Results also showed that although a few individual cankers were apparently inactivated by the basal stem treatment with cycloheximide, other cankers in the same treatment were still alive and active. The most effective treatments, as determined by canker measurement and activity scale, were also the most phytotoxic to the trees.

There were no significant statistical differences among treatments including untreated check trees according to the F-test in the analysis of variance. Therefore, treatments were not effective enough to warrant their use as a control method.

Thorough canker scarification before direct treatment with cycloheximide — at least 4 inches in all directions beyond the visible canker margin — showed the most promise for complete canker inactivation.

It is evident that there is either a wide variation in blister rust cankers and their reaction to antibiotic treatments, or else a great difference in the amount of antibiotic absorbed by the tree. All our tests indicated clearly that the most effective treatments killed the host tissue occupied by the blister rust fungus, thus isolating or suppressing the canker rather than selectively killing the rust mycelium itself.

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