

## SPRAYING BEFORE RAINS IMPORTANT FOR FUSIFORM RUST CONTROL

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The experiment reported here was designed to determine whether spraying with ferbam before the onset of conditions favorable for fusiform rust infection is better than spraying afterwards.

As natural infection occurs during prolonged periods of rain and high humidity, this information is necessary for nurserymen in timing their sprays.

### Methods

One-month-old slash pine seedlings were sprayed 24, 48, and 72 hours before, and 15 minutes, 24 hours, and 48 hours after inoculation with southern fusiform rust (*Cronartium fusiforme*). Each treatment was applied to an unreplicated 4- by 4-foot block of nursery bed. One half of each block was sprayed with ferbam in a mixture of 2 pounds per 100 gallons of water plus 1 pint of Santomerse S, the other half with the same mixture plus 200 grams of nickel chloride hexahydrate. One block of seedlings was not sprayed or inoculated and another was inoculated but not sprayed. To prevent chance infections, ferbam sprays were later applied to all the seedlings at approximately weekly intervals. A second application of both initial spray mixtures was made to the respective plots when the first rust symptoms (purple spots) were observed.

The plants were exposed to inoculation for approximately 24 hours in a wet canvas tent.<sup>1</sup> They were covered with a polyethylene sheet when there was a chance of wetting by showers during the spraying period. Just before inoculation all seedlings received 0.5 inch of simulated rain--a uniform sprinkling of tap water through small spray nozzles.

### Results and Conclusions

The seedlings were lifted in December and examined for gall development. Natural infection (seedlings neither inoculated nor sprayed) was 16 percent. Among seedlings inoculated but not sprayed, infection rate was 73 percent.

The amount of rust that developed was markedly less on seedlings sprayed before inoculation than on those sprayed afterwards (table 1). Thus, in plots sprayed with

TABLE 1.--Proportion of slash pine seedlings with fusiform rust

| Time of fungicide application | Ferbam         | Ferbam plus NiCl <sub>2</sub> 6H <sub>2</sub> O |
|-------------------------------|----------------|---|
| Before inoculation            | <i>Percent</i> | <i>Percent</i>                                  |
| 24 hours.....                 | 4              | 2   |
| 48 hours.....                 | 6              | 4   |
| 72 hours.....                 | 8              | 6   |
| After inoculation             |                |   |
| 15 minutes.....               | 38             | 22  |
| 24 hours.....                 | 59             | 39  |
| 48 hours.....                 | 63             | 40  |

<sup>1</sup>Jewell, F. F. Inoculation of slash pine seedlings with *Cronartium fusiforme*. Phytopath. 50: 48-51, illus. 1960.

ferbam 24 hours before inoculation, only 4 percent of the seedlings were infected, as compared with 38 percent infection where spraying was done 15 minutes after inoculation. While spraying immediately after inoculation was somewhat more beneficial than spraying 1 or 2 days afterward, it did not give adequate protection.

Nickel chloride hexahydrate with ferbam gave better rust control in all treatments than did ferbam alone. It may have had an eradicant action on the established fungus when used after inoculation or when the first rust symptoms were observed: Keil, Frohlich, and Glassick observed such an action on a cereal rust.<sup>2</sup>

For the nurseryman, this test shows the importance of having a fungicide on the plants at all times when there is a chance of fusiform rust infection. Such protection can only be obtained by spraying frequently with adequate and well-calibrated equipment. The most effective sprayings are those made just prior to the major wet periods in which infection is most likely to take place.

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<sup>2</sup> Keil, H. L., H. P. Frohlich, and C. E. Glassick. Chemical control of cereal rusts. III. The influence of nickel compounds on rye leaf rust in the greenhouse. *Phytopath.* 48: 690-695. 1958.