

Time Between Application of Bayleton and Irrigation Not Critical for Fusiform Rust Control

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Rainfall or irrigation that occurs 5 or more minutes after a Bayleton foliar spray will not reduce the efficacy of the fungicide for control of fusiform rust in pine seedlings.

Fusiform rust (caused by *Cronartium quercuum* (Berk.) Miyabe ex Shirai f. sp. *fusiforme*) is the most important forest nursery disease in the Southeastern United States. Losses in unsprayed pine beds in southern nurseries averaged 9.8 percent from 1972 to 1976 (7). Rust incidence as high as 81 percent was observed in unsprayed slash pine at the Davisboro, Ga., nursery in 1973 (7). Ferbam, applied as a foliar spray, has been the standard treatment for control of fusiform rust since 1951 (1), but annual losses in ferbam-sprayed beds in Georgia and north Florida averaged 2.5 percent during 18 consecutive years of observations (3, 7). Ferbam, a fungicide with only protective qualities, will control fusiform rust when all susceptible pine tissues are covered during infection periods (1, 4, 5, 7). The protective and systemic fungicide Bayleton (triadimefon; 1(4-chlorophenoxy)-3, 3-dimethyl-1(1 H-1,2, 4-triazol-1-yl)-2-butanone) controlled fusiform rust with as few as three or four foliar sprays per year or as a soil drench applied 7 days before inoculation (2, 6, 8). Disease incidence was also reduced when it was used as a seed treatment (6, 8). Because of the dual activity of Bayleton, coverage of susceptible

pine tissue may not be as critical for control of fusiform rust as is the case with ferbam. However, rain or irrigation before spray residues dry may reduce the efficacy of the fungicide (5).

This paper reports the results of a greenhouse study in which the efficacy of Bayleton sprays was determined in relation to the time interval between spray application and irrigation.

Methods

Twenty 2- to 4-day-old slash pine seedlings were transplanted into each of 40 flats (33 by 13 by 11 cm) containing a sandy loam-sand-vermiculite soil mix (2:1:1 by volume). All seedlings were fertilized 2 weeks, 2 months, and 5 months after transplanting with Miracle-Gro, a commercially available liquid fertilizer.¹ During the fifth week after emergence, 35 flats were sprayed with a solution containing 600 milligrams (active ingredient) of Bayleton and 2.5 milliliters of Agri-dex² surfactant per liter at the rate of 8 milliliters per flat (282 liters/ha, 184 gallons/acre). Following application of the foliar spray, five replicate flats were allowed to dry 0.25, 1, 5, 15, 30, 60, and 120 minutes before 6.4 millimeters (0.25 inch) of simulated rain were applied in a rain chamber equipped with a cone Raindrop nozzle³ that

delivered 26 millimeters (1 inch) of simulated rain each 45 minutes. Two hours later, all seedlings, including five flats of nonsprayed (check) seedlings, were inoculated with the fusiform rust fungus (47,500 basidiospores/ml). Aeciospores collected in 1974 from loblolly pine galls from Clarke County, Ga., were used to produce the basidiospore inoculum on northern red oak seedlings. The percentage of seedlings infected (galled) was determined 10 months after inoculation.

Results and Discussion

The incidence of fusiform rust averaged 86.8 percent in control seedlings 10 months after inoculation (table 1).

Table 1.—Effect of Bayleton spray on fusiform rust infection of slash pine given different time periods between spraying and irrigation

Time to irrigation after spray	Seedlings infected
Minutes	%
Nonsprayed check	86.8a ¹
0.25	1.2b
1	1.2b
5	.0c
15	.0c
30	.0c
60	.0c
120	.0c

¹Means followed by a common letter do not differ ($P = 0.05$) according to Duncan's multiple range test.

Disease incidence was markedly reduced by the Bayleton foliar spray regardless of the interval between treatment and application of

¹ Stern's Nurseries, Inc., Geneva, NY.

² Helena Chemical Co., Memphis, TN.

³ Manufactured by Delavan-Delta, Inc., Lexington, TN.

simulated rain. The degree of control (only 1.2 percent infected) in seedlings irrigated 15 seconds after the Bayleton spray was applied is remarkable since the spray was not dry at that time, and some of the spray residue surely was washed off seedling foliage.

Irrigation or simulated rain applied at the same rate used in this study drastically reduced the efficacy of ferbam foliar sprays even when the application was made 60 minutes after seedlings were sprayed (5). Thus, equal quantities of Bayleton and ferbam were theoretically washed from surfaces of the pine seedlings. But, because of the systemic nature of Bayleton, the quantity of fungicide left on susceptible seedling tissues together with the quantity absorbed by the seedlings was sufficient for control of the disease. These results suggest that the time between application of Bayleton foliar sprays and irrigation or rain is not nearly as critical for fusiform rust control as it is when ferbam sprays are applied (5).

Greater quantities of irrigation or rain than the 6.4 millimeters used in this study would, theoretically, remove greater quantities of fungicide residues from foliar surfaces (4) and eventually nullify the effectiveness of Bayleton if such quantities were applied (or fell) before sufficient fungicide was absorbed by the seedling. Irrigation, therefore, should not be applied too soon (<60 seconds) after a foliar spray and, theoretically, the efficacy

of such a spray would be further improved if spray residues were allowed to dry before irrigation or rain.

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