Control of Fusiform Rust in Pine Tree Nurseries with Bayleton

by

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Abstract.--The systemic fungicide Bayleton provided excellent control of fusiform rust on southern pine seedlings in nursery and greenhouse plantings. As few as three foliar sprays per year provided control. A seed soak treatment needs to be supplemented with foliar sprays to provide control throughout the rust hazard season.

The systemic fungicide Bayleton (triadimefon) is effective against several plant diseases including rusts and mildews on a wide variety of hosts (Siebert, 1976). The chemical is registered in the United States for control of azalea petal blight and has 24-C registrations in several Southern States for control of fusiform rust in nurseries. Previous data (Mexal & Snow, 1978; Snow et al. 1979) indicated that foliar sprays and seed soak treatments of Bayleton would control fusiform rust on pine, but that spray frequency or dosage rate needed to be reduced to avoid phytotoxicity. In those tests five or more sprays of 8 ounces per acre was phytotoxic. The seed soak treatment also needed further testing to determine if it would provide control for the duration of the rust hazard season (from date of seed sowing until the first week of July).

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I have tested seed soaks and foliar sprays of Bayleton in nursery and greenhouse conditions. My purpose was to determine: (1) the minimum number of foliar sprays needed to control the disease and (2) the duration of control obtained from a seed soak treatment.

Methods

Study plots were established in the Georgia Forestry Commission's Davisboro Nursery. A study plot was 4 feet wide and 50 feet long, and the study was arranged in three randomized complete blocks. Improved loblolly pine seeds were sown at a rate calculated to produce 25 seedlings per square foot of bed space. Treatments included: (1) a check on which no fungicide was applied; (2) Bayleton seed soak (24 hours in an aqueous solution containing 600 mg active ingredient (a.i.)/liter after stratification and before a bird repellant was applied; and (3) Bayleton foliar spray (125 gallons/acre of 600 mg (a.i.)/liter) applied (A) twice (5/3 & 6/25), (B) three times (5/3, 5/29, 6/25), and (C) four times (5/3, 5/22, 6/7, 6/25). Final observations were made in December on a minimum of 400 seedlings from the center of each plot.

In the greenhouse, a mixed lot of open-pollinated slash pine seed was used. Seed were soaked 24 hours at room temperature in aqueous solutions containing 400, 800, or 1600 mg (a.i.)/liter of Bayleton prepared from a 50% wettable powder formulation. The seed were air dried after treatment, germinated in a 50:50 (v/v) mixture of sandy clay loam and vermiculite, and transplanted (20 seedlings of each treatment) to each of five replicate flats.

Foliar sprays were formulated to contain 400 mg of Bayleton (a.i.) and 2.5 ml of Agri-dex spreader sticker (Helena Chemical Company) per liter. Sprays were applied at 8 ml per flat (184 gallons per acre) of seedlings. The sprays were applied by passing the flats on a conveyor belt beneath a fixed atomization nozzle. Sprays were applied 7 and 14 days before as well as 7 and 14 days after inoculation with the fusiform rust fungus.

Seedlings in all treatments were inoculated with a suspension containing 75,000 basidiospores of Cronartium quercuum f. sp. fusiforme per ml 51 days after seedling emergence (64 days after seed were sown) as previously described (Matthews and Rowan 1972). Numbers of galled seedlings were recorded 11 months after inoculation.

Results and Discussion

Foliar sprays of 125 gallons per acre of 600 mg Bayleton per liter (equivalent to 1.25 pounds of 50% WP Bayleton per acre) effectively controlled fusiform rust in the Davisboro Nursery when three or more applications were made. Only 7.0 percent of the seedlings from the seed soak treatment became infected, whereas 48.8 percent of the unsprayed check seedlings were infected (Table 1).

In the greenhouse, seed soaks provided some degree of rust control even though inoculations were made 64 days after treatment (Table 2). Thus, seed soaks provide some rust control from date of planting (4/15) through mid June (6/19), but the degree of

control is not adequate. Seed soak treatments need be supplemented with foliar sprays to effectively control the disease. Foliar sprays will effectively control the disease when applied 14 days before and nearly 14 days after infections occur (Table 2). A study is in progress to determine the degree and duration of control obtained from a combination of seed soaks and foliar sprays.

Bayleton appears to be a most effective control for fusiform rust in pine. Phytotoxicity noted in earlier studies (Snow et al., 1979) was not found when three or four foliar sprays were applied. Thus, when dosage rates are reduced, phytotoxicity is not a problem and effective rust control is obtained.

Table 1. Efficacy of Bayleton for control of fusiform rust of loblolly pine in forest tree nursery seedbeds at the Davisboro, Georgia nursery.

Treatment	Galled Seedlings (%)
Check	48.8 a
Bayleton foliar spray; 125 gal/acre of 600 mg/liter	
(A) Applied twice 5/3 & 6/25	0.4 c
(B) Applied thrice 5/3, 5/29, 6/25	0.0 c
(C) Applied four times 5/3, 5/22, 6/7, 6/25	0.0 c
Bayleton seed soak - 24 hours - 600 mg/liter	7.0 b

Treatment means followed by a common letter are not significantly different (P = .05) according to Duncan's Multiple Range Test.

Table 2. Efficacy of Bayleton for control of fusiform rust of slash pine in greenhouse culture

Treatment	Dosage (a.i.) mg/liter	Application versus inoculation	Galled seedlings (%)
Check	0		63.1 a
Seed soak	400	64 days before	66.6 a
Seed soak	800	64 days before	33.3 b
Seed soak	1600	64 days before	38.3 b
Foliar spray	400	14 days before	0.0 c
Foliar spray	400	7 days before	0.0 c
Foliar spray	400	7 days after	0.0 c
Foliar spray	400	14 days after	1.3 c

Treatment means followed by a common letter are not significantly different (P = .05) according to Duncan's Multiple Range Test.

Literature Cited

Matthews, F. R., and S. J. Rowan. 1972. An improved method for large-scale inoculations of pine and oak with Cronartium fusiforme. USDA Plant Dis. Reptr. 56: 931-934.

Mexal, J. G., and G. A. Snow. 1978. Seed treatment with systemic fungicides for the control of fusiform rust in loblolly pine. USDA For. Serv. Res. Note SO-238. 4 p.

Siebert, R. 1976. New approach to the control of rust diseases of cereals with Bayleton. Pflanzenschutz-Nahr. 29: 303-309.

Snow, S. A., S. J. Rowan, J. P. Jones, W. D. Kelley, and J. G. Mexal. 1979. Using Bayleton (triadimefon) to control fusiform rust in pine tree nurseries. USDA For. Serv. Res. Note SO-253. 5 p.