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Efficacy of Morning vs. Afternoon Applications of Triadimefon for Controlling Fusiform Rust

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ABSTRACT. No differences were found between mornings (0800–1000 h) and afternoon (1600–1800 h) applications of triadimefon on loblolly pine (Pinus taeda *L.) seedlings for control of fusiform rust in nursery beds. Also, rates of 4, 6, 8, and 12 oz/ac were equally effective in protecting seedlings. Results indicate that a lesser rate than the standard 8 oz/ac/application can be used and that time of application is not important.*[1]

The first reports on the efficacy of triadimefon (Bayleton®, Mobay Chem. Corp.) in controlling fusiform rust (caused by *Cronartium quercuum* (Berk.) Miyabe ex Shirai f. sp. *fusiforme* Burdsall & Snow) were published in 1978 (Mexal and Snow 1978), 1979 (Snow et al. 1979), and 1980 (Kelley). This fungicide has since been registered and its use on loblolly and slash (*P. elliottii* var. *elliottii* Engelm.) pine seedlings in nurseries for control of fusiform rust has become an accepted practice.

Current recommendations are three to four applications of triadimefon as a foliar spray at a rate not exceeding 8 oz/ac/application; the spray mix also should contain 6 oz of the oil-surfactant blend Agri-dex® (83% oil: 17% surfactant, Helena Corp.)/acre-volume of spray. The first spray should be applied when 50 to 75% of the seedlings have emerged (about mid-April) and the last should be applied in mid-June. In addition to foliar applications, many southeastern nurseries are sown with seeds that have been soaked in a triadimefon solution (Mexal and Snow 1978); this treatment provides protection for newly emerged seedlings for about 14 days.

Although the recommended spray program has been successful at forest nurseries throughout the Southeast, no information is available concerning possible relationships between the time of day the fungicide is applied and fungicide efficacy. This paper reports results of a field study comparing morning versus afternoon application of four rates of triadimefon for control of fusiform rust.

MATERIALS AND METHODS

The study was established at the Stauffer State Nursery in Lee County, Alabama. Field plots were in randomized complete blocks with six replicate plots per treatment; plot size was 4 × 30 ft.

Loblolly pine seeds were sown on 30 April 1982, and the first of four applications of triadimefon was applied on 17 May; the final application was on 15 June. Rates of triadimefon tested were 4, 6, 8, and 12 oz ai/ac. Times of application were 0800–1000 h and 1600–1800 h. Triadimefon was applied as a foliar spray at a volume of 35 gal/ac at 60 psi using hollow-cone nozzles; each acre-volume of spray also contained 6 oz of Agri-dex.

With the exception of the applications of triadimefon, the study area was subjected to standard nursery operating procedures throughout the growing season. In January 1983, samples of seedlings were lifted and examined for rust galls. For each plot, 80 to 150 seedlings were lifted in groups of 8 to 15 seedlings from each of 10 random locations. Each seedling was examined individually

[1] The author thanks W. H. Padgett, chief, Nursery Section, Alabama Forestry Commission, and Eddie Kirkland, nursery superintendent, Stauffer State Nursery, for cooperation in conducting this research.

Table 1. Effect of four applications of triadimefon applied at various rates either in the morning or in the afternoon on the incidence of fusiform rust galls on nursery-grown loblolly pine seedlings.

Treatment	Rate (oz ai/ha)	Treatment time[1]	% Galled seedlings
Control	—	—	13.0 a[2]
Triadimefon	4	morning	0.2 b
Triadimefon	6	morning	0 b
Triadimefon	8	morning	0 b
Triadimefon	12	morning	0 b
Triadimefon	4	afternoon	0.5 b
Triadimefon	6	afternoon	0 b
Triadimefon	8	afternoon	0 b
Triadimefon	12	afternoon	0.3 b

[1] *Morning refers to 0800 to 1000 h; afternoon refers to 1600 to 1800 h.*
[2] *Means followed by the same lower case letter do not differ significantly (P = 0.01) according to Duncan's multiple range test.*

for fusiform rust galls; only definite swellings were counted as galls.

Data were subjected to analysis of variance, and means were compared for significant differences at the 1% level of probability by Duncan's multiple range test.

RESULTS AND DISCUSSION

The incidence of fusiform rust in control plots (13%) was sufficient to evaluate effectiveness of triadimefon in this study. All times of application and rates of triadimefon significantly reduced the incidence of fusiform rust; no significant differences in fusiform rust incidence were observed among plots receiving triadimefon (Table 1). However, the fact that 4 oz ai/ac was equally effective as the standard rate of 8 oz ai/ac may provide a lower cost alternative to the nursery manager. If the lower rate proves to be effective in large-scale field tests, it not only will be more economical but also should decrease effects of triadimefon on nontarget organisms such as mycorrhizal fungi (Kelley 1982).

Since the time of day that triadimefon is applied apparently is unimportant, the nursery manager should concern himself only with wind speed and other weather related factors in deciding when to spray.

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COMPUTER PROGRAMS

GROWTH AND YIELD

Two programs are available for IBM personal computers to predict growth and yield of loblolly pine stands on a diameter distribution basis. Both programs are menu driven and require specification of the stand-level characteristics—age, site index, and stand density. Results from both programs are in the form of trees per acre, basal area, and various volume-per-acre estimates by 1-in. dbh classes. *NATLOB* predicts diameter distributions for unthinned, natural stands. Distributions can also be projected through time with *NATLOB*. *PCWTHIN* allows prediction and projection of diameter distributions for old-field plantations. Simulated thinnings can also be specified any time during the projection period using one of *PCWTHIN*'s thinning "rules." Manuals for the programs are available at no cost. Diskette copies of the programs are also available: *NATLOB*—$20.00; *PCWTHIN*—$30.00. *Contact:* T. E. Burk and H. E. Burkhart, Department of Forestry, 319 Cheatham Hall, VPI & SU, Blacksburg, VA 24061.