Top Blight of Bareroot Ponderosa and Lodgepole Pine Seedlings at the USDA Forest Service Nursery, Coeur d'Alene, Idaho

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ABSTRACT

Top blight caused by Sirococcus strobilinus was confirmed on bareroot ponderosa and lodgepole pine seedlings for the first time at the USDA Forest Service Nursery, Coeur d'Alene, Idaho. Fusarium oxysporum was also frequently isolated from blighted seedlings. Top blight was most prominent during the spring of 1984; by mid-summer little disease was noticeable. Although the disease was not severe enough to warrant direct control measures, alternatives to reduce losses in the future are discussed.

During the spring of 1984, 2-0 ponderosa pine (Pinus ponderosa Laws.) and lodgepole pine (Pinus contorta Dougl.) seedbeds at the USDA Forest Service Nursery, Coeur d'Alene, Idaho contained several pockets of top blighted seedlings (figure 1). Blighted seedlings were only found in certain portions of seedbeds; between pockets the disease was usually not noticeable. Occurrence of concentrations of blighted seedlings at the nursery was unusual. In previous years, only a few isolated seedlings with top blight symptoms were noticed scattered throughout seedbeds.

The tops of diseased seedlings were necrotic. Necrosis usually extended into the main stem and often progressed to the base of seedlings, resulting in mortality. At the base of the necrotic zone, distinct purple lesions were noticeable; some infected seedlings had a definite terminal crook. Small black pycnidia were usually evident at the base of necrotic needles and within the necrotic zone of the main stem. Examination of pycnidia under the microscrope (100-450X) and isolations from necrotic tissues indicated that the predominant associated organism was Sirococcus strobilinus Preuss. This fungus grew very slowly and produced a felty yellow-green mycelium on potato dextrose agar and produced hyaline, two-celled conidia with pointed ends, measuring 10-16 x 3-4 μ. These characteristics were indicative of S. strobilinus (Robak 1956).

Figure 1. 2-0 ponderosa pine seedlings with top blight caused by Sirococcus strobilinus at the USDA Forest Service Nursery, Coeur d'Alene, Idaho.

Sirococcus strobilinus has been previously reported on bareroot pine seedlings at other nurseries in northern Idaho (Schwandt 1981) and containerized Engelmann spruce seedlings at the Coeur d'Alene Nursery (James 1983; James and Gilligan 1985). However, this is the first report of the pathogen on bareroot pine stock at the Coeur d'Alene Nursery.

Reports of S. strobilinus in forest tree nurseries indicate that conifer border trees may supply inoculum (Croghan 1981; Kliejunas et al. 1983; Wall and Magasi 1976); the fungus often sporulates profusely on the cone scales of spruce species (Smith 1973). Infected seedlings at Coeur d'Alene were quite a distance from ponderosa pine that surrounds the nursery but relatively close to several blue spruce trees grown as ornamentals. The nearby spruce may have been the sources of inoculum. Futher investigations are needed to confirm inoculum sources for S. strobilinus at the nursery.

Severity of infection by S. strobilinus is related to light intensity; infection is greater on cloudy days when the relative humidity is high (Funk 1972; Wall and Magasi 1976). The fungus spreads from seedling to seedling through rain splashing of spores (Nicholls and Robbins 1984). This may explain why the disease was most noticeable in the spring and early summer and why it was restricted to pockets rather than generally spread throughout the beds.

Fusarium oxysporum Schlect. was also frequently isolated from top blighted seedlings. This common soil-borne fungus may have been partially responsible for the disease. However, pathogenicity tests will be required to elucidate its role. A detailed description of this fungus is included in the Appendix.

Top blight was generally not severe enough to warrant direct control efforts. By mid-summer the disease was difficult to detect and little seedling loss occurred. Previous experience with this disease in nurseries indicates that chlorothalonil (Bravo®, Daconil®, Exotherm®) usually controls the disease satisfactorily if applied at 3- to 4-week intervals or more frequently during rainy periods (Kliejunas et al. 1983; Nicholls and Robbins 1984; Smith 1972). Other chemical alternatives that have proven effective against S. strobilinus include tridimefon (Bayleton®) and ectaconazole (Vangard®) (Kliejunas et al. 1983) and captafol (Difolatan®) and Dithane® (Smith 1972). If the disease is particularly severe, inoculum sources such as adjacent large trees need to be removed. Disease intensity is probably related to conducive weather conditions combined with avaliability of inoculum.

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APPENDIX

Description of the _Fusarium oxysporum_ isolate frequently isolated from top blighted pine seedlings at the USDA Forest Service Nursery, Coeur d'Alene, Idaho:

Fusarium oxysporum Schlect. (Isolate 84-26)

- colonies fast growing reaching 7.5-9.0 cm in 7 days at 22°C on potato dextrose agar.
- colonies with floccose white mycelium, some portions almost peach in color.
- colonies produce a definite violet pigmentation which is most intense at the agar surface.
- microconidia abundant, borne on short, simple lateral phialides, one-celled, ellipsoidal, straight or slightly curved, and measure 5-8 x 2.5-3.5 µ.
- macroconidia fusiform, moderately curved, pointed at both ends, with distinct pedicellate basal cells, 3-5 septate, and measure 30-42 x 3.0-4.5 µ.
- chlamydospores abundant, terminal or intercalary, and average 8-10 µ in diameter.