

**FUSARIUM ROOT DISEASE OF CONTAINER-GROWN  
NOBLE FIR SEEDLINGS - NORTH WOODS NURSERY,  
ELK RIVER, IDAHO**

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*Nursery Disease Notes #91*

*November 1989*

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Several container-grown Noble fir (*Abies procera* Rehd.) at the North Woods Nursery in Elk River, Idaho recently displayed foliar symptoms possibly indicative of root disease. Affected seedlings were dwarfed and had various levels of foliar chlorosis and necrosis. Diseased seedlings were few in numbers and scattered throughout the crop. Several seedlings with disease symptoms were transported to the laboratory for analysis.

Seedlings were carefully washed under running tap water to remove adhering particles of growing mix. Most root tips appeared healthy, i.e., they were mostly white in color and lacked cortical decay. However, diseased seedlings had distinct necrotic lesions of their main stem, just below the groundline. These lesions were dark brown to black in color; epidermal tissues within necrotic areas easily sloughed off. Tissues within and on the edge of necrotic lesions were aseptically cut from seedling stems, surface sterilized for 1 minute in a 10-percent bleach solution (0.525 percent aqueous sodium hypochlorite), and placed on a selective agar medium commonly used for detection of root pathogens of conifer seedlings (Komada 1975). In one case, necrotic needles with an attached seedcoat were also placed on the selective medium after washing. Plates were incubated at about 24°C for 7 days under diurnal cycles of cool, fluorescent light. Emerging fungi were transferred to potato dextrose agar (PDA) and carnation leaf agar (CLA) for identification using selected taxonomic guides (Domsch and others 1980; Gerlach and Nirenberg 1982; Nelson and others 1983).

*Fusarium chlamydosporum* Wollenw. & Reinking was consistently isolated from stem lesion tissue on each diseased seedling sampled. No other fungus was isolated, except a *Trichoderma* sp., which was obtained from necrotic needle and seedcoat tissues. This is the first report of *F. chlamydosporum* being associated with diseased conifer seedlings in the northern Rocky Mountains. A detailed mycological description of this species is included in the Appendix.

*Fusarium chlamydosporum* has previously been reported as a soil inhabitant (Gordon 1960), including some forest soils (Dwivedi and Dwivedi 1971; Rama 1970). The fungus is capable of colonizing wood within soil (Sasaki and Yoshida 1971). This species has been isolated from a number of different crops, particularly within the root rhizosphere (Domsch and others 1980). Pathogenicity of *F. chlamydosporum* has been proven on pea (Seemuller 1968) and bean (Joffe and Palti 1974) seedlings.

On Noble fir seedlings at the North Woods Nursery, this species was causing stem lesions similar to those reported previously on bareroot spruce seedlings (James 1986). Ability of this fungus to successfully attack seedlings on the main stem indicates that it is probably quite aggressive. Sources of *F. chlamydosporum* inoculum introduced into container operations at the nursery is unknown. This species has not previously been detected on either seed or containers. Nevertheless, it is possible that the fungus was introduced on either or both of these. Continued monitoring of Noble fir seedlings to determine extent of infection, particularly among non-diseased seedlings, would be useful in evaluating extent and importance of the fungus at the North Woods Nursery.

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## APPENDIX

### *Fusarium chlamydosporum* Wollenw. & Reinking

#### Synonymy:

*F. fusarioides* (Frag. & Cif.) Booth

*F. sporotrichioides* Sherb. var. *chlamydosporum* (Wollenw. & Reinking) Joffe

*F. tricinctum* Corda

Teleomorph: None known

#### Colony morphology:

Growth is rapid on PDA, reaching 7.5 - 8.0 cm diameter in 8 days at 25°C. Aerial mycelium loosely to densely floccose, felt-like, somewhat powdery, white to pink to slightly brown in color.

#### Pigmentation:

Undersurface pigmentation is generally carmine (flesh to pink), but may also be tan to red-brown.

#### Conidia:

Microconidia are abundant, 0-1 septate (sometimes up to 3 septate), mostly spindle-shaped but not globose.

Macroconidia are generally rare (even on CLA), typically sickle-shaped with a somewhat hooked apical cell, 3-5 septate with a foot-shaped basal cell.

#### Conidiophores:

Microconidiophores are unbranched and branched monophialides or polyphialides. Macroconidiophores are unbranched and branched monophialides.

#### Sporodochia:

Rarely formed, even on CLA; on oatmeal agar they may form under near ultraviolet light in which case they are flesh to orange in color.

#### Chlamydospores:

Abundantly produced, globose to subglobose, smooth-walled to verrucose, terminal or intercalary, produced singly, in pairs, or in chains or clusters. In older cultures, chlamydospores cause the entire mycelium to become brown.