

**NEEDLE NECROSIS OF CONTAINER-GROWN LODGEPOLE PINE SEEDLINGS
USDA FOREST SERVICE NURSERY, COEUR D'ALENE, IDAHO**

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The first crop of container-grown seedlings at the USDA Forest Service Nursery in Coeur d'Alene, Idaho was sown in February, 1990. After seedlings were about one month old, several lodgepole pine (*Pinus contorta* Dougl.) seedlings began displaying needle tip necrosis. Necrosis was concentrated at the ends of needles throughout the crown. Necrotic foliage symptoms had developed quickly. An evaluation was conducted to determine if pathogenic organisms were associated with the symptoms.

Seven seedlings with various levels of needle necrosis were selected for analysis. Since infection by root pathogens may often result in needle tip dieback in conifer seedlings (James 1984a, 1984b), seedlings were analyzed for presence of potential pathogenic fungi on their roots. Roots of sampled seedlings were washed thoroughly under running tap water for a few minutes to remove particles of growing media. Roots consisted of a major taproot with smaller lateral roots just beginning to develop. The major taproot was divided into four pieces of approximately equal length. Root pieces were surface sterilized in a 10% bleach solution (0.525% aqueous sodium hypochlorite) for 1 minute, rinsed with sterile, distilled water, and placed on an agar medium selective for *Fusarium* spp. and related root-inhabiting fungi (Komada 1975). Plates were incubated under diurnal cycles of cool, fluorescent light at about 24°C for 7-10 days. Fungi emerging from root pieces were aseptically transferred to potato dextrose agar (PDA) slants for identification to genus. of *Fusarium* were grown on PDA and carnation leaf agar for identification to species using the taxonomic system of Nelson and others (1983).

Isolation results are summarized in Table 1. Although *Fusarium oxysporum* Schlecht. was isolated from three of the seedlings (42.9%), intensity of root colonization was only 28.6% (based on number of root pieces colonized as a percentage of those sampled). No other potential root pathogenic fungi, including other species of *Fusarium*, were isolated from lodgepole pine seedlings with needle necrosis. Saprophytic species of *Phoma*, *Trichoderma*, and *Penicillium* were commonly isolated (Table 1). Also, unidentified bacteria were found colonizing roots of some seedlings.

Table 1. Fungal colonization of roots of container-grown lodgepole pine seedlings with needle necrosis from the USDA Forest Service Nursery, Coeur d'Alene, Idaho.

	Percent Colonization				
	<i>Fusarium oxysporum</i>	<i>Trichoderma</i>	<i>Penicillium</i>	<i>Phoma</i>	<i>Bacteria</i>
Seedlings ¹	42.9	100.0	71.4	57.1	42.9
Colonization Intensity ²	28.6	57.1	21.4	28.6	10.7

¹ Seven seedlings sampled

² Based on percent of root pieces colonized (four sampled per seedling).

These results indicated that pathogenic fungi were not common enough to account for the needle necrosis symptoms seen on affected seedlings. *Fusarium* colonization conifer seedling roots is quite common (James and others 1987). When disease symptoms are produced, most of the root system is thoroughly colonized with *Fusarium* (James 1986b). Because relatively low rates of root colonization by *Fusarium* in affected lodgepole pine seedlings, these fungi probably did not cause needle necrosis.

Possible causes of needle necrosis include abiotic factors such as chemical damage or high temperatures. Weather was unusually warm and dry for many days after sowing. Temperatures within greenhouses were above normal and cooling equipment had not been installed. Coolers are usually needed during late spring or summer but not in February when this crop was sown. Fungicides are usually applied to control damping-off during seedling establishment. It is possible that needle necrosis was due to interactions between fungicides and unusually warm temperatures. Similar damage has been previously reported for container-grown conifer seedlings (James 1986a). Mortality of affected lodgepole pine seedlings was not common.

LITERATURE CITED

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