

TIP DIEBACK OF NOBLE FIR SEEDLINGS  
PLUM CREEK NURSERY, PABLO, MONTANA

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Towards the end of the 1988 crop cycle at the Plum Creek Nursery, Pablo, Montana, several Noble fir (Abies procera Rehd.) seedlings began to display top dieback symptoms. Tips of affected seedlings initially turned chlorotic and then became necrotic. However, necrosis never extended more than a few cm from the tip of seedlings. These types of symptoms have been indicative of Fusarium root disease on other conifer species (James 1984c, 1985a, 1986a) as well as direct attack of terminals by several fungi including Sirococcus, Diplodia, and Phoma spp. (James 1983, 1985b, 1986b). Therefore, isolations from roots and necrotic terminals of affected Noble fir seedlings were conducted to evaluate role of associated fungi in disease symptom production.

Five seedlings with various levels of terminal dieback were evaluated. Necrotic terminals were initially examined under the microscope (10-70x) for evidence of fungal growth. When none was found, necrotic tissues were rinsed with tap water and placed in moist chambers. Tissues were incubated for 72 hrs. at about 22°C and examined for fungal growth.

Root systems of each seedling were washed thoroughly under tap water for several min. to remove adhering soil particles. They were then surface sterilized in a 10% aqueous bleach solution (active ingredient = sodium hypochlorite) for two min. and rinsed with sterile distilled water. Fifteen pieces of root (2-3 mm in length) were aseptically cut from each root system and placed on a selective agar medium for Fusarium (Komada 1975). Root pieces were preferentially selected from the tips of lateral roots. Plates with roots were incubated at about 22°C for 7-10 days under diurnal cycles of cool fluorescent light. They were then examined for presence of Fusarium spp. and other potential pathogenic fungi.

Necrotic tissues incubated in moist chambers were not colonized by potentially pathogenic fungi. The only organisms consistently found were Alternaria and Penicillium spp., common saprophytes of above-ground plant surfaces.

Results of root isolations (table 1) indicated that Fusarium spp. had not colonized roots of fir seedlings with terminal dieback symptoms. Also, Cylindrocarpon spp., which have previously been associated with root disease of western white pine (Pinus monticola Dougl.) seedlings at the Plum Creek Nursery (James 1987), were not consistently isolated from roots. However, most roots were extensively colonized with species of Trichoderma, which are common soil-borne fungi that may compete with or be antagonistic to pathogens (Papavizas 1985). The other major group of fungi isolated from fir roots was Penicillium spp.

These results indicate that pathogenic fungi were probably not responsible for terminal dieback symptoms of Noble fir seedlings. Other factors, such as excessive water stress during budset or chemical toxicity, might have been involved. If so, affected seedling may survive, although seedlings with extensive necrotic foliage should probably not be placed in cold storage because of possible damage from Botrytis that might occur (James 1984a).

Table 1. Root isolations from Noble fir seedlings with terminal dieback symptoms - Plum Creek Nursery, Pablo, Montana<sup>1</sup>.

Seedling No.	Percent Top Necrosis <sup>2</sup>	<u>Fusarium</u>	<u>Cylindrocarpon</u>	<u>Trichoderma</u>	<u>Penicillium</u>
1	10	0	6.7	100.0	33.3
2	0 <sup>3</sup>	0	6.7	73.3	13.3
3	10	0	0	86.7	26.7
4.	33 <sup>3</sup>	0	0	73.3	46.7
5.	10	0	6.7	93.3	6.7
Averages	--	0	4.0	85.3	23.3

<sup>1</sup> Values in table are percent of root pieces colonized with appropriate fungi. Fifteen root pieces were sampled per seedling.

<sup>2</sup> Percent of above-ground portion of seedlings with main stem necrosis.

<sup>3</sup> Exhibited lateral needle necrosis.

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