DWARFING OF CONTAINERIZED WESTERN LARCH SEEDLINGS - NORTH WOODS NURSERY, ELK RIVER, IDAHO

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Towards the end of the 1988 growing season at the North Woods Nursery (Elk River, Idaho) several containerized western larch (Larix occidentalis Nutt.) seedlings were found to be considerably shorter than normal. Affected seedlings also had lower needles with rust-colored lesions. These needles were also prematurely shed. The grower indicated that shortened larch seedlings had been grown under a "larch" nutrient regime during the first few weeks, whereas taller seedlings had been grown under a "white pine" nutrient regime. The grower was concerned about the possible role of pathogenic fungi in causing dwarfing of her larch seedlings. Therefore, samples were collected for isolation of associated organisms.

Five seedlings were sampled for occurrence of potentially pathogenic fungi on their needles and roots. Four of the seedlings had been grown under the "larch" nutrient regime and were dwarfed; three of these had rust-colored lesions concentrated on their lower needles. The remaining seedling was of more normal size and had been grown under the "white pine" nutrient regime. Needles were extracted from each seedling and washed thoroughly under tap water. They were then placed in a moist chamber and incubated at about 22°C for 48 hours. Following incubation, they were examined under the microscope (10-70X) for fungal growth. Several needles were also examined microscopically prior to placement in moist chambers for presence of Meria laricis (Vuill.) using the cotton-blue staining technique described by Cooley (1981).

Roots of each seedling were thoroughly washed under running tap water for several minutes to remove adhering soil particles. They were then surface sterilized in 10% aqueous sodium hypochlorite (bleach) for two minutes and rinsed with sterile distilled water. Fifteen root pieces (2-3 cm in length) were aseptically cut from each root system and placed on an agar medium selective for Fusarium (Komada 1975). Root pieces were cut from the tip of lateral roots whenever possible. Otherwise they were extracted from intercalary locations along roots. Plates with root pieces were incubated under cool fluorescent light at about 22°C for 7-10 days. Emerging fungi

were identified to genus. Selected fusaria were transferred to potato dextrose agar and identified using the taxonomic scheme of Nelson, Toussoun and Marasas (1983).

Meria laricis was not detected on the needles of any of the examined seedlings (table 1). However, Botrytis cinerea Pers. ex Fr. grew abundantly from rust-colored lesions of three of the dwarfed seedlings. This species was also isolated from the roots of 2 of these same seedlings. Botrytis may cause disease problems on foliage of containerized western larch, particularly near the end of the growth cycle when seedling canopies begin to close and foliage does not adequately dry out after irrigation (James 1984). It appears likely that the rust-colored lesions on needles were the result of colonization by B. cinerea. This fungus has a wide host range, including several plants which may grow near greenhouses and can also be found on the seedcoats of conifer seed (James, unpublished).

Fusarium spp. were not consistantly associated with the roots of dwarfed seedlings, although the number of seedlings sampled was small. These fungi were isolated from the roots of both dwarfed and normal-sized seedlings (table 1). Colonization of roots of seedlings without disease symptoms by Fusarium is common (James and Gilligan 1988). Therefore, it appears that these fungi were probably not responsible for the dwarfing of western larch seedlings. Fusarium oxysporum Schlecht. and F. acuminatum Ell. & Ev. were isolated at approximately equal frequency from the roots of larch seedlings.

Of the other fungi assayed, only Phoma spp. were associated with dwarfed seedlings exhibiting foliar abnormalities. These fungi are capable of causing root and stem diseases (James and Hamm 1985), but they are usually not very aggressive.

This investigation failed to implicate pathogenic fungi as the major cause of western larch seedling dwarfing at the North Woods Nursery. It is likely that other factors, such as nutritional problems, were more important. However, Botrytis cinerea was probably responsible for the lesions on needles of some seedlings. It is possible that this fungus preferentially colonized seedlings which were stressed (dwarfed), whereas it may be less pathogenic on more healthy seedlings.

LITERATURE CITED

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Table 1. Occurrence of fungi on needles and roots of containerized western larch seedlings - North Woods Nursery.

	Seedling Number[1]				
	1	2	3	4	5
Needles					
Meria	-	-	-	-	-
Botrytis	-	-	+	+	+
Roots					
Fusarium	+	+	-	-	+
Colon. %[2]	27	73	0	0	7
Botrytis	-	-	+	-	+
Colon. %	0	0	13	0	20
Phoma	-	-	+	+	+
Colon. %	0	0	20	7	40
Trichoderma	+	-	+	+	+
Colon. %	53	0	60	53	47
Penicillium	-	+	-	-	-
Colon. %	0	7	0	0	0

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[1] Seedling #1 = normal sized seedling grown on "white pine" regime.
Seedling #2 = dwarfed seedling grown on "larch" regime without rust-colored lesions on needles.
Seedlings #3-5 = dwarfed seedlings grown on "larch" regime with rust-colored lesions on needles.

[2] Percent of 15 selected root pieces colonized by appropriate fungi.