

NEEDLE-TIP NECROSIS OF CONTAINER-GROWN
WESTERN WHITE PINE SEEDLINGS -
UNIVERSITY OF IDAHO RESEARCH NURSERY

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Nursery Disease Notes #106

March 1990

During the 1989 growing season at the University of Idaho Research Nursery, several container-grown western white pine seedlings with needle-tip dieback symptoms were found. Affected seedlings had needles that turned chlorotic, then necrotic from their tips downward. Symptoms were usually present throughout the seedling crown. These types of foliar symptoms in white pine seedlings may be indicative of root disease (James 1985, 1987). However, roots of these seedlings with needle dieback symptoms generally appeared healthy, i. e., there was an abundance of white root tips and fine root hairs and little noticeable root decay. Previous experience (James and others 1987; James and Gilligan 1988) indicates that potentially-pathogenic fungi may readily colonize healthy-appearing root systems. Therefore, steps were taken to determine if such fungi were associated with roots of these container white pine seedlings.

Fifteen seedlings with various levels of needle-tip dieback symptoms were selected for analysis. Seedlings were carefully extracted from containers and their roots washed thoroughly under running tap water to remove particles of growing media. Fifteen pieces (2-3 mm in length) were excised from each root system; selected pieces were from both terminal and intercalary positions within root systems. Root pieces were surface sterilized in a 10% bleach solution (0.525% aqueous sodium hypochlorite) for 1 minute, rinsed in sterile water and placed on an agar medium selective for *Fusarium* spp. and related fungi (Komada 1975). Plates were incubated under diurnal cycles of cool, fluorescent light at about 26°C for 7-10 days. Fungi emerging from root pieces were identified using the taxonomic keys of Barnett and Hunter (1972). Selected *Fusarium* isolates were transferred to carnation leaf and potato dextrose agar for identification using the manual of Nelson and others (1983).

Roots of sampled seedlings were not commonly colonized with potentially pathogenic fungi (Table 1). *Fusarium* spp. were isolated from only five of the seedlings, and were found colonizing very few roots from these infected seedlings. *Cylindrocarpon* spp., another group of potential pathogens (Booth 1966; James 1988), were isolated from only 3 seedlings. The only other group of fungi

isolated that might be pathogenic was *Phoma* spp. (James and Hamm 1985). These were isolated at low levels from only 3 seedlings. Only two species of *Fusarium*, *F. solani* (Mart.) Appel & Wollenw. and *F. sambucinum* Fuckel, were isolated. *Fusarium solani* may be associated with diseased white pine seedlings (James 1983) and *F. sambucinum* is a common colonizer of the roots of container-grown seedlings (James and others 1989b), although this species is usually not pathogenic (James and others 1989a). In any event, *Fusarium* spp. were not isolated at high enough levels to be considered an important cause of needle dieback symptoms of the white pine seedlings.

The most commonly isolated fungus from white pine roots was *Trichoderma*. This common saprophyte is frequently isolated from root rhizospheres and does not usually cause seedling diseases (Papavizas 1985). The other group of isolated fungi was *Penicillium*, which was obtained infrequently. These fungi are also common saprophytes.

Roots of white pine seedlings with needle-tip dieback symptoms were not colonized with potentially pathogenic fungi at high levels. Therefore, some other cause of the foliar dieback was probably involved. Moisture stress or nutrient imbalances may cause foliar responses similar to those seen in these white pine seedlings (Sutherland and others 1989). Whether or not such factors were involved in needle-tip dieback is unknown.

Table 1. Fungal colonization of roots of container-grown western white pine seedlings displaying needle-tip dieback symptoms.

Percent of Root Pieces Colonized¹

Seedling	<i>Fusarium</i> ²		<i>Cylindrocarpon</i>	<i>Trichoderma</i>	<i>Penicillium</i>	<i>Phoma</i>
	FSOL	FSAM				
1	0	0	0	90	0	0
2	0	0	0	100	0	0
3	0	10	20	100	0	0
4	10	10	0	90	40	0
5	0	0	0	100	0	10
6	0	0	50	70	0	0
7	0	0	0	100	0	0
8	0	10	0	100	0	0
9	0	0	0	100	0	20
10	10	0	0	100	0	0
11	0	0	10	100	10	10
12	0	0	0	100	10	0
13	0	0	0	100	0	0
14	0	10	0	100	0	0
15	0	0	0	70	30	0
Average	1.3	2.7	5.3	94.7	6.0	2.7

¹ Fifteen root pieces sampled per seedling.

² FSOL = *Fusarium solani*; FSAM = *Fusarium sambucinum*

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