

MORTALITY OF OUTPLANTED WESTERN LARCH SEEDLINGS  
PLUM CREEK NURSERY, PABLO, MONTANA

R. L. James  
Plant Pathologist

Cooperative Forestry and Pest Management  
USDA Forest Service  
Northern Region  
Missoula, Montana

July 1987

Nursery Disease Notes No. 55

---

Western larch (*Larix occidentalis* Nutt.) is one of the major reforestation species grown at the Plum Creek Nursery in Pablo, Montana. Several container seedlings planted during the spring of 1987 were found dead a few months later. Weather during planting was nearly ideal for good seedling establishment and there was evidence of more than adequate moisture on planting sites. However, several of the dead and declining seedlings had swellings on their stems (fig. 1) which would indicate phloem and cambial necrosis just below the swellings. Seedlings examined lacked actively growing root systems; most roots were black and in some stage of deterioration. Foliage symptoms appeared as red-purple discolorations and drooping of needles (fig. 2); needle tips were affected first. Premature needle abscission was also evident.

Because symptoms appeared similar to those produced by root pathogens (James 1985; James 1986b), isolations were made from the root systems of three seedlings with advanced symptoms. Root systems were washed thoroughly under tap water to remove soil particles. Ten lateral roots were randomly selected and aseptically severed. The point at which the root joined another root (joint) and the tip of each root were placed on a selective medium for *Fusarium* spp. (Komada 1975). Roots were incubated for 7 days at about 22 degrees C under a regime of diurnal fluorescent light. Fungi emerging from the roots were identified.

*Fusarium* spp. were not isolated from any of the three seedlings analyzed. However, a *Cylindrocarpon* sp. was isolated from all three seedlings, although at high levels from only one of the seedlings. Other fungi isolated from roots included *Trichoderma*, *Penicillium*, and *Phoma*. Although *Cylindrocarpon* may be associated with conifer seedling diseases (Booth 1966; Houten 1939), including those at the Plum Creek Nursery (James 1987), it is unlikely the major cause of the seedling mortality that occurred on outplanted larch seedlings.



Figure 1.--Stem swelling on recently killed western larch seedling that died shortly after outplanting.



Figure 2.--Foliar symptoms of containerized western larch seedling that died shortly after outplanting. Affected seedlings had red-purple foliage which often drooped.

Swellings at the base of some recently killed seedlings are indicative of heat damage in western larch (James 1986b; James 1986c). However, in previous cases seedlings were young and tender, and the damage occurred within greenhouses. Nevertheless, it is possible that very high soil surface temperatures shortly after outplanting could account for cambial and phloem necrosis near the groundline. With phloem tissues damaged, photosynthate produced by the foliage could not be translocated to the roots. Then a swelling above the point of tissue damage and deterioration of the root system would occur. There are also other possible explanations for the mortality, such as improper handling of seedlings (allowing the root systems to become excessively dry) or improper storage prior to outplanting. However, the consistent occurrence of stem swellings on recently killed seedlings would support the hypothesis of injury after outplanting.

#### LITERATURE CITED

- Booth, C. 1966. The genus *Cylindrocarpon*. Commonwealth Mycol. Inst., Mycological papers. No. 104. 56 p.
- Houten, J. G. 1939. Kiemplantenziekten van coniferen. Thesis, Univ. of Utrecht, 125 p.
- James, R. L. 1985. Decline of containerized western white pine seedlings at the USDA Forest Service Nursery, Coeur d'Alene, Idaho. USDA For. Serv., Northern Region. 4 p.
- James, R. L. 1986a. *Fusarium* root diseases of containerized Douglas-fir, western larch, and lodgepole pine seedlings at the Champion Timberlands Nursery, Montana. USDA For. Serv., Northern Region. 3 p.
- James, R. L. 1986b. Mortality of containerized western larch and western redcedar seedlings at the Intermountain Research Station, Moscow, Idaho. USDA For. Serv., Northern Region. 5 p.
- James, R. L. 1987. Root deterioration of containerized western white pine seedlings, Plum Creek Nursery, Pablo, Montana. USDA For. Serv., Northern Region. 5 p.
- Komada, H. 1975. Development of a selective medium for quantitative isolation of *Fusarium oxysporum* from natural soil. Rev. Plant Protec. Res. 8:114-125.