

ABIOTIC INJURY TO WESTERN LARCH SEEDINGS
AND YOUNG DOUGLAS-FIR TREES -
DRY CREEK TREE IMPROVEMENT SITE,
SANDPOINT RANGER DISTRICT, IDAHO PANHANDLE NATIONAL FOREST

R. L. James
Plant Pathologist

USDA Forest Service
Northern Region
1201 Ironwood Drive
Coeur d'Alene, ID 83814

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During October 1988 the Dry Creek Tree Improvement Site (Sandpoint Ranger District, Idaho Panhandle National Forests) was visited in order to investigate problems of three year old western larch (Larix occidentalis Nutt.) seedlings and Douglas-fir (Pseudotsuga menziesii [Mirb.]Franco) trees which were several years old. Both species were established in plantations as early selection trials.

Western Larch Seedlings

Affected western larch seedlings had distinct lesions on their main stem just above the groundline. These lesions resulted in cambial necrosis that sometimes extended around the entire circumference of the stem, thus girdling seedlings. Careful examination of the lesions failed to reveal evidence of insect or animal feeding. There was also no evidence of fungal invasion, i. e. sporulating fungi on or adjacent to lesions.

Roots of affected larch seedlings were examined and appeared mostly healthy; there was usually an abundance of fine roots and little or no evidence of decay. Affected seedlings were sometimes found in groups, although damaged seedlings were found throughout different portions of the plantation. In some seedlings, mortality had occurred following recent (1988) terminal growth.

Several seedlings with lesions were taken to the laboratory for isolation of possible fungal associates that might be involved with the injury. Stem tissues within and adjacent to lesions were washed thoroughly under tap water followed by surface sterilization in an aqueous 10% bleach solution (active ingredient = sodium hypochlorite) for 2 minutes and then rinsed with sterile distilled water. Pieces of stem were aseptically cut from edges of lesions and placed on potato dextrose and 2 % water agar. Plates were incubated at about 24°C for 5-7 days and emerging fungi transferred to potato dextrose agar and identified to genus using the taxonomic guide of Barnett and Hunter (1972).

None of these isolations consistently yielded organisms capable of causing lesions. Major isolated organisms included Trichoderma, Alternaria, Epicoccum, and Penicillium. Therefore, it was concluded that pathogenic fungi were not associated with lesion formation on the lower stems of these larch seedlings.

It seems more likely that lesions were the result of heat injury which occurred during the 1988 growing season. The summer had several periods of very warm, dry weather. During hot summer days, surface ground temperatures can become high enough to be lethal to plant tissues, particularly succulent tissues during the growth phase (Bloembergen 1978). Heat injury to stems of young western larch seedlings has been previously identified in nurseries (James 1986). Apparently, young western larch seedlings are more sensitive to heat damage than some other conifer species. There was some evidence that the fastest growing seedlings were more affected at Dry Creek, perhaps because they had more succulent stem tissues.

Overhead irrigation during periods of expected very hot weather may help reduce future heat damage. Also, as seedlings age and stem tissue becomes more lignified, there should be less chance for damage.

Douglas-fir Trees

Several Douglas-fir trees a few years old planted near the western larch early selection trial displayed branch and top dieback symptoms. Some isolated tree mortality had also occurred. A few trees were excavated and their roots carefully examined. Roots appeared healthy and root systems were generally well developed. Necrosis was restricted to above-ground portions of trees; no external evidence of cankers elicited by pathogenic fungi were found. Likewise, there was no evidence of animal or insect damage on affected trees.

Affected trees were concentrated near the western edge of the plantation where the adjacent stand of mature trees had recently been removed in order to provide space for additional tree improvement plantations. It is likely that damage to Douglas-fir trees was due to dessication resulting from the unusual persistent hot dry weather experienced during 1988. Prevailing westerly winds probably dried out trees on the plantation edge. These trees had previously been protected from drying winds by an adjacent tree canopy. This Douglas-fir plantation was not irrigated during the summer. Therefore, the soil dried out and trees could not replace moisture lost through respiration and became dessicated.

This problem should not recur in the future if summer weather becomes more "normal". However, during periods of drought, Douglas-fir plantation trees will be vulnerable to dessication, especially if their numbers are not soon reduced by thinning.

LITERATURE CITED

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