

FROST DAMAGE IN A CONIFER NURSERY

by

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There are two kinds of frost damage to nursery stock, The damage caused by the early fall or the late spring frost usually affects only the new growth. The frost damage that occurs to the seedling during the winter is caused by the heaving of the soil which damages the stems and the root system.

Frost can damage nursery stock from only slightly to complete loss. Some seed sources as well as species are more susceptible to frost damage. Seedlings from seed of the same species that is collected on a ranger district from different elevations may have different frost hardiness. Frost damage may occur either fall or spring. At Wind River east side douglas fir rarely ever is damaged in the fall.; however, because of the early bud burst it may be severely damaged in the spring. Southern Oregon coast sources are late to harden off and because of this can be severely damaged in the fall.

What can the nurseryman do to help control frost damage? What practices can he initiate? What must he know about weather conditions at his nursery?

First he must know how long the frost free season will be Nursery practices must be established so the trees will have set terminal buds before the first frost date. This can be done to a large degree by controlling irrigation and the application of fertilizers,

When nursery stock has hardened off in August and killing frosts can be expected in early September water and fertilizer must be withheld. If irrigation is continued and the buds burst again it is almost certain frost damage will occur. Heavy August rains can also cause bud burst which may result in frost damage.

Nursery stock not hardened off prior to the frost season should be protected if it is to escape frost damage. To protect the seedlings the temperature must be kept from falling below the freezing point. At present there are only two ways the nurseryman can do this. One is the use of an overhead irrigation system and the other is air movement. Usually the entire nursery cannot: be covered with water from the irrigation system as fast as it will be needed. To cover a large nursery with fans that would provide sufficient air movement is a costly investment,

The problem of early fall and late spring frost damage should be very carefully considered before an investment is made in a system to prevent it Items to consider are: How often and how much damage? What is the value of stock lost in comparison to cost of the preventive investment?

Winter frost damage is caused by the daily freezing and thawing of the soil when there is no snow cover. Some species such as silver fir and sitka spruce which have a shallow root system are very susceptible to frost

heaving. By mulching prior to the freezing a thawing period frost heaving can almost be eliminated. Here again the cost of mulching should be weighed against the value of stock losses. It is possible that a frost heaving loss could be figured into the sowing schedule that might be more economical than planned mulching. Mulch that has to be put on and then removed is very costly because of the hand labor involved.

The frost damage problem is something almost every nursery has experienced. Some locations have a greater problem than others. It is a problem that requires a very careful analysis of the way it is to be handled in each given situation and location.

DISCUSSION

Q: Was ground frozen when damage occurred?

A: No.

Q: What temperature did it get when frost damage occurred?

A: 26 .

Q: What was the proportion of damage by age classes?

A: Most damage occurs to 1-0 then 2-0; and 3-0 generally doesn't get hurt.

Q: What was date of frost?

A: 9-9 and pictures were taken in May. We tried to have our stock in shape for freeze by first of September.

Q: Was your rule of thumb that you took the water off about a month before you want the roots to set?

A: It works if you don't get any rain. As a rule, we have pretty high temperatures in September.