

# INTERIOR DOUGLAS-FIR: USE AND MANAGEMENT IN WINDBREAKS IN THE INLAND NORTHWEST

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## ABSTRACT

The establishment of Douglas-fir (*Pseudotsuga glauca* Mayr./*Pseudotsuga menziesii* var. *glauca* [Beissn.] Franco) in windbreaks necessitates the use of larger stock than would be used for reforestation purposes. Establishment and management of Douglas-fir as part of a mixed species windbreak requires aggressive control of grass and weeds. Douglas-fir has a medium growth rate and develops a crown which is dense and symmetrical. Growth is generally slow without supplemental watering on most sites with less than 18 inches (45.7 cm) annual precipitation.

Douglas-fir is susceptible to several pathogens, primarily Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) and several root and heart rots. When used as a component of windbreaks, Douglas-fir pathogens occur as a result of landowners using Douglas-fir for firewood on the farmstead.

Douglas-fir, though almost always a component of a windbreak with other species, does require care and maintenance. Windbreaks with Douglas-fir as a component can be renovated by maintaining the weed free environment, pruning of dead limbs, and installation of additional rows along with the removal and re-establishment of individual trees.

**Keywords:** Douglas-fir (Rocky Mountain form), windbreaks, renovation, establishment and management

Windbreak forestry in the Inland Northwest or the management of existing or newly established field, farmstead and urban windbreaks as a component of a wind erosion system is experiencing a modest increase in interest. Installation of wind erosion systems has grown with the advent of concerns about the loss of valuable productive top soil and air and water quality. Barriers to the erosive forces of wind take a variety of shapes, configurations and sizes. These barriers can be grasses, shrubs, and medium and tall deciduous or coniferous trees. They can also include stripcropping and man made barriers.

Windbreaks consisting of a variety of tree and shrub species have been in use in the midwestern United States since the dustbowl era. Inland Northwest windbreaks, for use as controlling factors against soil erosion by wind have been confined to Douglas, Grant, Lincoln, Franklin, Kittitas, Yakima, Benton, Klickitat and Walla Walla counties in Washington state; to Payette, Ada, Canyon, Gem, Elmore, Gooding, Twin Falls and the northern portion of Owyhee counties in Idaho; Wasco,

Gilliam, Moro, Umatilla, and portions of Union and Baker counties in Oregon. Coniferous species used in wild erosion control systems in the Inland Northwest generally consist of ponderosa pine, Scotch pine, Austrian pine, rocky mountain juniper and eastern redcedar as the major species and Norway spruce, blue spruce, northern whitecedar and Douglas-fir as components of a windbreak. Windbreaks should be used as a part of a wind control system. Traditional farmstead and field windbreaks slow the erosive force of winds, reduce damage to crops, conserve energy, act as barriers to dust around residences, provide wildlife habitat, add beauty to the landscape, provide barriers to unwanted sound and can act as living snow fences. They protect dryland wheat in Idaho and Oregon and asparagus and grapes in the Columbia Basin. Resource managers plan windbreak systems to meet the landowners objectives, whatever they may be. Protection is planned based on the 10H principle; that is protection from erosive winds will be exhibited on crops to an area that is 10 times the height of the tallest plant species in the windbreak. Soil erosion will begin again at or near the 10H figure, but saltation, the movement of soil particles in small jumps which generally begins at 15 miles per hour of wind speed, will not begin until the 15H to 20H figure.

The use of Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) has not gained region wide acceptance as a major windbreak species. Douglas-fir is used primarily as a component of a single or multiple row windbreak. It offers the landowner a moderate growth rate but develops a crown that is dense and symmetrical. In a well designed windbreak, with proper spacing, the species will develop dense lower limbs that combine to impede ground winds and also provide wildlife habitat. Growth is generally slow in areas of less than 18 inches of precipitation unless supplemental water is provided. As a part of the planning process, concerns for management of competing vegetation need to be expressed. Management of competing grass and weeds is necessary to maintain the growth and vigor of Douglas-fir.

In 1946, a collection of Inland Douglas-fir was planted at the Washington State University Dryland Experiment Station at Lind, Washington. The Lind station experiences an average annual precipitation of 8 inches (20.32 cm). It is located at 1625 feet (500 M) of elevation and experiences cold winters with some snow. The primary soil series mapped at the planting site is Ritzville silt loam, Calciorthidic Haploxerolls, coarse silty, mixed, mesic family.

The trees that survived were evaluated in 1960. In September of 1981 and again in May of 1990, a cursory evaluation of the remaining trees was conducted. The evaluation consisted of ring count and analysis, diameter and height measurements. Three complete rows of 10-12 trees have survived. Comparison of data collected in 1960 with 1981 and 1990 show a 1-2 inch diameter increase and 2-3 feet of height growth.

The trees were irrigated initially for five years to get them established. Due to the location of the Lind station and the planting, the trees have been subjected to repeated pesticide and herbicide drift events from adjacent crop fields.

The present stand is fairly healthy and tolerant to drought situations. Seeds have been collected and seedlings are currently being grown in the Lind station green house.

The most cost effective irrigation method for establishing farmstead and feedlot windbreaks are drip systems. Field windbreaks can be irrigated with drip systems fed by large plastic tanks hauled to a site and gravity fed to the trees or off of the primary irrigation system being used to irrigate the crop. Emitters are sized to provide water to each individual tree depending on the design of the system and water requirements of the tree. It is important that in the early life of the tree, when roots are near the surface, that the top 12 inches of the soil profile be kept moist. When this area begins to dry it is time to rewet this zone and the zone below it. After the first year the soil profile should be soaked to a depth of 3-5 feet at each watering. Normally this will result in a decrease in the frequency of watering and an increase in the amount of watering as the plant gets older. In certain locations and depending on the species used, watering can be curtailed and the tree will survive on the annual precipitation.

Inland Douglas-fir being grown at the Lind Dryland Experiment Station holds promise for use as an important component of farmstead, field and urban windbreak installations in low precipitation areas of the Inland Northwest.

The USDA-Soil Conservation Service has national leadership in the planning and installation of wind erosion control systems, including windbreaks.

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