



Taxus brevifolia
Pacific Yew

Almost all places where Pacific yew (*Taxus brevifolia*) occurs in Washington are west of the crest of the Cascades. It is especially common on the Olympic Peninsula up to elevations of 3500 feet and at low to moderate elevations in the Cascades. There are small populations in the Okanogan Highlands (in the northeast corner of the state) and in the Blue Mountains (in the southeast corner). The latter two areas are connected to some extent by populations in northern Idaho (Little 1971). Although it is not shown in Little's range maps, Pacific yew also occurs at scattered locations along the east slope of the Cascades (Tom Brannon, personal communication, August 2000).

Among the species in this book, Pacific yew is unusual because it is extremely shade tolerant and typically found as an understory tree or small shrub. The species is very tolerant of environmental extremes; for example, it is found in some of the wettest and in some of the driest areas where forests grow in the state (Bolsinger and Jaramillo 1990). This suggests that there is ample opportunity for adaptive variation.

Pacific yew was largely ignored until it was discovered to be a source of a compound that showed potential for treating certain types of cancer in the late 1980s. As a result, no studies have been conducted specifically to determine seed transfer rules and only a few studies have examined genetic variation in this species.

Three groups of investigators have looked at genetic variation in allozymes of Pacific yew. Allozymes are different forms of enzymes that can be used to evaluate the relatedness of groups of plants, but are widely considered not to be related to adaptive characteristics. All three groups found that levels of genetic variation in this species were typical of what one would expect for similar species. All three also found that most of this variation was due to differences within regions; for example, differences among stands or among individuals within stands. El-Kassaby and Yanchuk (1994) found that isolated populations from the dry eastern side of Vancouver Island were very different from all other populations tested. They also found that populations from two widely separated coastal islands and Rocky Mountain populations formed three genetically distinct groups. This suggests that large differences in precipitation or discontinuous populations can result in genetic differences in this species. Doede *et al.* (1993) found that although differences among most widely scattered regions were small, the Sierra Nevada populations tended to be different from the other regions. They also found weak trends associated with latitude and elevation. Wheeler *et al.* (1995) found there was little relationship between geographic distances between populations and genetic differences between populations. They hypothesized that random events such as long distance seed dispersal by animals, founder effects, and genetic drift, rather than adaptive variation, are largely responsible for the differences they found among populations.

Wheeler *et al.* (1995) and Doede *et al.* (1993) and their associates examined the concentrations of taxol-like compounds in various populations of Pacific yew and found these results generally supported the conclusions they reached based on allozyme data.

Only Wheeler and his coauthors (1995) examined traits of apparent adaptive value; height, caliper, time of bud burst, and number of growing points. There were highly significant differences among populations within regions and among families within populations, but differences among regions were not significant, supporting the conclusions drawn from their allozyme data. Since they found differences among stands within an area to be large, the authors suggest that whenever possible, seed from the same stand be used. However, if this is not practical, the seed can be moved a long way. Other authors (Bolsinger and Jaramillo 1990) have noted the existence of shrub-like and tree-like forms of Pacific yew. Wheeler *et al.* (1995) found no difference in the progeny grown from populations of differing growth forms and concluded these differences are due to the environment, not the genotype of the plants.

If seed is needed for isolated populations of Pacific yew from the east slope of the Cascades, seed from that location or nearby populations should be used.

New recommendations for seed transfer zone boundaries

The large differences among populations within regions and among families within populations suggests that it is appropriate to move Pacific yew a long way. However, the lack of definitive information suggests some caution. The following seed zones should be recognized:

TWIN HARBORS (Zone 1): A relatively narrow strip along the coast. Consists primarily of the old 011 and 030 seed zones, and western portions of the old 012 and 041 seed zones.

ELWHA (Zone 2): The higher elevation portion of the Olympic Peninsula. Consists primarily of the northwest portion of the old 222 seed zone, eastern parts of the old 012 seed zone, and the southwestern part of the old 221 seed zone.

PUGET SOUND (Zone 3): Portions of the Puget Trough north of Tacoma and the west side of the northern Washington Cascades. The southern boundary is a line from near Capitol Peak in the Olympic Mountains, southeast toward South Mountain, east to Bay Shore, Lakebay, Tacoma, east to Highway 167, then south to Sumner, Highway 410 to Buckley and along the White River to the edge of the species range. Consists primarily of the old 201, 202, 211, 212, 231, and 401 zones, and the western portions of 402, 403, 411, and 412 zones.

UPPER CHEHALIS (Zone 4): Portions of the Puget Trough south of Tacoma and the west side of the southern Washington Cascades. Consists primarily of old seed zones 042, 232, 241, 242, 421, and 422, the western portions of 430 and 440, and the eastern part of 041.

UPPER COLUMBIA (Zone 5): Northeast corner of the state and nearby areas of Idaho and British Columbia. Consists of those portions of the old 801, 802, 811, 821, 822, and 830 seed zones where Pacific yew occurs.

GRANDE RONDE (Zone 6): Southeast corner of the state and nearby areas of Oregon and Idaho. Consists primarily of the old Washington seed zones 851, 852, and 861; and Oregon's old seed zone 861.

Elevation bands within geographic seed transfer zones

Within each seed movement zone, 2000 foot elevational bands should be established.