



Populus trichocarpa

Black Cottonwood and Populus Hybrids

Black cottonwood (*Populus trichocarpa*) is the largest broadleaf tree species of the Pacific Northwest (Fowells 1965). This tree is found throughout Washington at all elevations from sea level to 5000 feet, except for an area in the middle of the state centered around Grant County. It occurs mostly on river bottom lands, but can also be found on moist upland sites (Franklin and Dyrness, 1973).

Cottonwood stem cuttings root readily when they receive adequate amounts of moisture. Usually, the species is clonally propagated using unrooted stem cuttings and seedlings generally are not available from nurseries (Heilman *et al.* 1990). Individual clones differ for many traits including growth rate, cold hardiness, form, and disease resistance. The use of selected cottonwood clones has the potential to produce major gains for specific traits, but also increases risk of loss or poor performance due to insects, disease, or climate.

In addition to differences among clones, there are differences among populations. On the west side of the Cascades, populations that differ in latitude, longitude, and elevation tend to be genetically different. These genetic differences reflect regional climatic gradients (Weber *et al.*, 1985). Longitude is a better predictor of population performance than either latitude or elevation and material from mesic sources tends to grow better on mesic sites than material from xeric sources (Stettler *et al.*, 1993).

A number of common garden studies have shown there are genetic differences in growth, leaf flushing, photosynthetic rate, and *Melampsora* rust resistance between populations from the upper and lower portions of river valleys in Washington when they are grown at one location (Dunlap *et al.* 1993, 1994, and 1995). Genetic differences between populations from opposite sides of mountain ranges tend to be stronger than differences between populations on the same side of the same mountains (Dunlap *et al.* 1993, and Stettler *et al.* 1993). Material collected at upper elevations tends to be different from material collected at lower elevations (Dunlap *et al.*, 1993). Bud set and growth cessation tend to occur earlier in eastern than in western sources when they are grown at the same location. Cottonwoods from separate river systems can be distinct in branching habit and leaf shape (Dunlap *et al.* 1993).

Clones collected from elevations below 2000 feet tend to initiate growth earlier than clones from middle and upper elevation sources when planted at a common low elevation site. In addition, clones from middle elevations (2000 to 4000 feet) tend to be earlier than clones from above 4000 feet, when planted at the same site (data on file at Ochoco National Forest, Prineville, Oregon).

Many commercial cottonwood growers use hybrids between different species, for example, between black cottonwood and eastern cottonwood (*Populus deltoides*). A large number of these hybrids have been developed by Washington State University and grown successfully in Oregon, Washington and southern British Columbia (Heilman *et al.* 1990). The characteristics of these hybrids vary

depending upon which species and which clones within species are crossed. Hybrids that use black cottonwood from eastern Washington for one parent tend to be more tolerant of cold weather than hybrids that use black cottonwood from western Washington (McCamant and Black, 1995). Growing hybrid cottonwood for pulpwood has been a major success in south central and western Washington.

Since new hybrid clones are continually being made available, consult with the developer, your State Forestry Extension agent, or the Washington State University poplar specialists to choose ones appropriate to your needs. When planting any hybrid material, one should know where it has been tested and the test results. When selecting hybrids, plant only ones that have been tested and proven resistant to diseases and suitable for the climate in your planting area. Only male clones should be planted in urban areas, as they will not produce the fluffy white seeds which some people find objectionable.

Some non-native cottonwoods are useful for specific purposes. A notable example is Lombardy poplar (usually a single male clone, native to central Europe) that has been grown successfully over a large portion of the globe, as a wind break.

Depending on landowner objectives, material selected for planting can range from local black cottonwood clones to hybrid cottonwood clones developed for specific geographic locations or for specific growth and wood properties. When planting to reestablish local populations or to provide streamside vegetation for wildlife or fish habitat, native material may be considered more appropriate. Conservation and riparian restoration plantings with native material should use local material to safeguard local genetic diversity (Stettler *et al.* 1993).

General guidelines: (1) upper and lower elevation cottonwoods originating along a river drainage or from scattered areas are genetically different; (2) there are genetic differences between the two sides of the Cascades; (3) genetic differences are greater across mountain ranges than parallel to them; (4) know the genetic makeup of hybrid cottonwoods and their recommended planting zone; (5) A single genotype (clone) may be planted or a mixture of clones may be used.

Recommendations for hybrids and other non-native cottonwoods:

LOMBARDY AND WHITE POPLAR (*Populus alba*): Plant anywhere in the state below 4000 feet.

HYBRIDS FOR COMMERCIAL POPLAR PLANTATIONS: There are many clones available and new ones are constantly being developed. Consult with the developer or State Extension Forester for the latest recommendations.

New recommendations for black cottonwood

HOH (Zone 1): The coastal area on the west side of the Olympic Mountains. Consists of old seed zones 011 and 012.

PUGET SOUND (Zone 2): The east side of the Olympic Peninsula and most of the area surrounding Puget Sound. The eastern boundary follows the 2000 foot contour along the Cascade Mountains. Includes portions of old seed zones 201, 202, 211, 212, 221, 222, 231, and the western portions of 411 and 412.

CHEHALIS (Zone 3): The southwestern corner of the state from the coast east to the 2000 foot contour along the Cascade Mountains. Includes old seed zones 030, 041, 241, 232, and the western portions of 242, 430, and 042.

SKAGIT (Zone 4): The northern half of the Cascade Mountains west of the crest. The western boundary is the 2000 foot contour. The southern boundary is Interstate 90. The eastern boundary is the Cascade Crest. Includes old seed zones 401, 402, 403, eastern portion of 411, and northeastern corner of 412.

TOUTLE (Zone 5): The southern half of the Cascade Mountains west of the crest. The western boundary is the 2000 foot contour. The northern boundary is Interstate 90. The eastern boundary is the Cascade Crest. Includes the eastern portions of old seed zones 042, 242, 412, 421, 422, 430, and all of 440.

CHELAN (Zone 6): The northern half of the Cascade Mountains east of the crest. The southern boundary is Interstate 90. Includes old seed zones 600, 621, 622 and 631.

YAKIMA (Zone 7): The south central portion of the state, from the Cascade Crest east to, and including, a strip along the east side of the Columbia River. The northern boundary is Interstate 90. Includes old seed zones 632, 641, 642, 651, 652, 653 and the southwestern portion of 842.

OKANOGAN (Zone 8): The Okanogan highlands. Includes old seed zones 611, 612, 613, 614, 801, 803 and the northern portion of 842.

UPPER COLUMBIA (Zone 9): The northeastern corner of the state. Consists of the old seed zones 802, 804, 811, 812, 813, 821, 822 and 830.

SNAKE (Zone 10): Consists of the old seed zone 841, and the southeast portion of 842.

GRANDE RONDE (Zone 11): The southeast corner of the state. Includes old seed zones 851, 852, and 861.

New recommendations for seed transfer zone boundaries

Zones 1 through 3 – a single elevation band (0 - 2000 feet).

Zones 4 and 5 – two elevation bands split at 3500 feet.

Zones 6 through 11 (Eastside zones) – three elevation bands as follows:

below 2000, 2000 - 3500, and above 3500 feet.