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COMPARATIVE GROWTH OF HYBRID POPLARS AND NATIVE NORTHERN BLACK COTTONWOODS

By

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Beginning in the early 1920's, some fast-growing hybrid poplars were developed by the Oxford Paper Company in New England. In 1938 cuttings of the 25 best hybrids developed were sent to the Northwest for trial. These were planted on Lady Island near Camas, Washington, on lands of the Crown Zellerbach Corporation. During 1946 the eighth-year measurement was made of this plantation and in addition a number of native northern black cottonwoods were measured for a comparison of growth.

Hybrid cuttings were planted in the Wind River Nursery in 1938 and held there for one year. In the spring of 1939 the rooted cuttings were outplanted at Lady Island. Mortality was heavy during the first year, amounting to 53 percent of the entire plantation. Early records indicate that grass competition was the principal factor of hybrid mortality during this first season. Grass similarly caused heavy mortality of native cottonwood planting stock. No effort was made to reduce the competition since its harmful effect was not known in advance.

Since 1939 yearly measurements of individual trees have been made. The 1946 check revealed that only 131 of the original 458 hybrids were still alive and that there was a great variation in gross growth and survival between the different hybrids. Several of the hybrids had reached 60 feet in height, and one individual had grown to 62 feet. Three lots had 100 percent mortality and five lots had a survival of greater than 50 percent. The loss following the first year is attributed primarily to competition, most of which consisted of competition with other hybrids and with native cottonwoods originating from sprouts and seed. Some release cutting was made to reduce competition from native cottonwoods, but they were never completely eradicated from the plantation.

During 1946, 25 native black cottonwoods from 10 to 13 years old, around the immediate border of the plantation, were measured to compare their growth with that of the hybrids. The natives selected were from dominant and codominant crown classes. By stem analysis the 8- and 9-year heights and diameters of each tree were determined, and the averages are compared with corresponding measurements for the hybrids below. Table 1 shows average growth and development of the better half of 10 different hybrids and of the dominant and codominant natives of like age.

Table 1.--Growth and Survival of Hybrid Poplars and Native Northern Black Cottonwoods

Source of stock	Tree form	Height in feet		D.B.H. in inches		Volume[1]	Survival
		Average	Taller 50%	Average	Larger 50%	cu. ft.	% living 1/24/47
Best 10 hybrid lots after 1 year in nursery and 8 years in the field							
Lot 53[2]	S, CL[3]	52.7	58.3	5.8	6.3	5.05	15.8
" 41	S, CL	52.8	58.0	6.0	7.0	6.20	25.0
" 11	C, L	48.3	55.1	5.2	6.7	5.40	66.7
" 34	S, CL	45.7	53.4	4.8	6.4	4.77	52.9
" 8	C	46.8	53.0	4.7	5.8	3.89	40.8
" 28	C	43.4	52.8	4.4	6.5	4.87	65.0
" 12	-	40.6	49.5	4.0	5.6	3.39	47.4
" 6	-	44.0	49.5	4.4	5.0	2.70	27.3
" 35	-	41.7	49.4	4.7	6.1	4.01	52.6
" 39	-	29.9	45.4	3.4	6.0	3.56	47.8
Dominant and codominant native cottonwood							
Volunteers:							
8 yrs. old	S, CL	-	41.7	-	5.7	2.96	-
9 yrs. old	S, CL	-	48.5	-	6.7	4.75	-

1/ Assuming from factor of 40%. Average of better 50% of hybrids used.
2/ The hybrids are still identified by Oxford Paper Company lot numbers.
3/ S = straight; CL = clean bole; C = crooked; L = excessive limbiness.

Both the 8-year and 9-year measurements for the natives are included for comparison in table 1, since the true age of the hybrid poplars includes one year of growth at the Wind River Nursery and eight years' growth on Lady Island. Compared with the 8-year-old natives, the better 50 percent of all the living hybrids shows moderate superiority. They average 48.7 feet in height, 5.5 inches in diameter, and 3.21 cubic feet in volume. This is a superiority of 7 feet in height, but owing to a 0.2-inch smaller diameter, the volume of the better hybrids averages only 0.25 cubic feet per tree greater or only 8 percent larger than the 8-year-old dominant and codominant natives. However, when compared with the 9-year-old natives we find the two average heights almost identical, the natives having a greater diameter by 1.2 inches, and a greater average volume by 1.54 cubic feet per tree.

While the tallest (lot 53) is almost 10 feet higher than average, its survival is only 15.8 percent, and only 25 percent of the second tallest (lot 41) survived. The third best (lot 11) shows the best survival but the lot is characterized by crooked and limby stems. Lot 34 seems to be the best from all standpoints, having good form, high survival, and marked superiority in height growth.

The native cottonwoods, which are generally trees of good form, show up quite well in this comparison. Eight-year-old natives are as large in diameter, and 9-year-olds are of greater volume than the average hybrid. The tallest of the 9-year-old natives from the 25 measured was 59 feet, suggesting that strains of our own natives may grow as fast as the best hybrids included in this test.