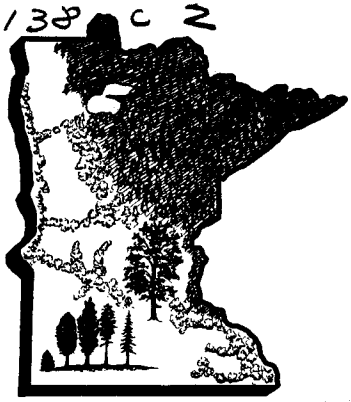


MN 4610
MFRN 138 C 2



MINNESOTA FORESTRY NOTES

COPY 2

OCT 12 1970
UNIVERSITY OF MINNESOTA

No. 138
July 15, 1963

RESULTS OF ASPEN SCREENING TESTS: III. F₁ HYBRID PROGENIES OF QUAKING X EUROPEAN ASPEN

S. S. Pauley, A. G. Johnson and F. S. Santamour, Jr.^{1/}

Under sponsorship of the Maria Moors Cabot Foundation for Botanical Research of Harvard University, several unreplicated outplantings were established near the village of Weston, Middlesex County, Massachusetts during the period 1951-54 with the objective of screening various seed sources and hybrids of native and exotic aspens of possible usefulness in the Foundation's tree improvement program. Results of the quaking aspen and European aspen seed source screening tests were reported in Minnesota Forestry Notes No. 136 and No. 137.^{2,3/}

This note summarizes the performance of 14 F₁ hybrid progenies derived from controlled crosses of Massachusetts-source quaking aspen (P. tremuloides Michaux) with various pollen sources of European aspen (P. tremula L.) (Table).

All crosses were made in late winter by the "greenhouse method", in which flower-bud-bearing branches of the female parent were cut, placed in jars of water on the greenhouse bench, and forced into flowering. The foreign pollen sources employed were similarly forced by cooperating individuals and supplied by airmail. The crosses were made in the greenhouses of the Bussey Institution and Arnold Arboretum, Jamaica Plain, Massachusetts. The methods of propagation and outplanting in Plantation VIII were the same as those previously described for quaking aspen.^{2/}

Survival and growth of the progenies derived from these crosses indicate surprisingly little relationship between regional pollen sources at the age levels represented in the 1954 measurements, i.e., 2-5 years. Survival at the age levels represented in the 1962 measurements (10-13 years), however, suggests that progenies derived from crosses involving mid-latitude and Italian paternity are better adapted to the test site. All but two of the six progenies of Scandinavian male parentage are now represented by only a single survivor.

Of particular interest in the series of crosses involving European aspen pollen sources of Mid-latitude origin is the hybrid progeny derived from the cross 187 x 10-50 (Mass. x Poland). At the time the 1962 measurements were recorded it was discovered that only two of the original 48 plants in this progeny were living. A ring-count revealed that all plants surviving to the 1957 growing season (ca. 85%) had died late in that season or immediately thereafter. The plants were then eight years of age. Average height of the dead plants was ca. 23 ft. and average d.b.h. ca. 4 inches. Mortality in adjacent plots of trees of the same age showed no such mortality-age association. Examination of the stems and branches indicated no surviving evidence of disease or insect damage, though death from such causes is by no means discounted. The fact that such heavy mortality occurred in a single hybrid progeny in a single year in separate plots suggests the possibility of some sort of age related physiological breakdown characterizing this particular gene combination. A cataclysmic event of this kind also suggests that final decisions on genetic superiority of other potentially promising aspen hybrids should be delayed, at least beyond the age of eight years.

In spite of the inadequacy of the sample, the performance of the progenies of Italian paternity, particularly the two produced in 1953, is of particular interest. The Mass. x

^{1/} Respectively, Professor, Sch. of Forestry, Univ. of Minn.; Assoc. Scientist, Hort. Dept., Univ. of Minn.; Geneticist, Northeastern For. Exp. Sta., U.S. Forest Service.

^{2/} Pauley, S.S., A.G. Johnson and F.S. Santamour, Jr. 1963. Minn. For. Notes No. 136.

^{3/} _____ 1963. Minn. For. Notes No. 137.

Cuneo, Italy cross (427 x 3015-53) shows a survival of 79 percent at 10 years and all plants are healthy and vigorous. Only one of the two hybrid plants derived from another cross of the same female parent and an Italian pollen source of extreme southern origin (427 x 3016-53) has survived. This tree, now 41 feet in height at 10 years, is the single most vigorous and handsomest tree in the plantation.

The results of this screening test suggest that selected sources of mid-latitude or, preferably, southern European tremula and east-central North American tremuloides should provide vigorous hybrids adapted to the Northeast, Lake States, and adjacent Canada. Reciprocally, such combinations should be well suited to some southern, central, and northern European habitats, especially those having maritime climates and long growing seasons.

TABLE

F₁ Progenies: P. tremuloides x tremula.

(Survival and average height.)

Cross	Parent Sources		Acc. Year	No. Plants	Survival (%) - Av. Ht. (Ft.)			
					1954		1962	
	Fem.	Male			%	Ft.	%	Ft.
187x1-50	Mass.	Swed.	1950	15	74	9.0	7	23.0*
1102x2-50	"	"	1950	3	67	11.0	33	17.0*
187x17-50	"	Nor.	1950	60	97	10.8	20	21.0
187x5-50	"	"	1950	2	100	12.5	50	28.0*
187x3-51	"	"	1951	16	100	14.0	44	22.0
187x10-51	"	"	1951	24	80	5.8	4	25.0*
187x9-50	Mass.	Ger.	1950	64	94	14.0	19	26.0
427x9-50	"	"	1950	48	84	11.0	34	26.0
187x10-50	"	Pol.	1950	48	96	15.2	4	30.0
427x10-50	"	"	1950	4	100	9.9	75	25.0
187x1-51	"	Ger.	1951	12	92	7.9	25	18.0
187xItaly-2-50	"	Italy	1950	48	94	14.5	8	24.0
427x3015-53	"	"	1953	24	96	2.5	79	20.0
427x3016-53	"	"	1953	2	100	3.0	50	41.0*

* One surviving plant.