IMPROVEMENT WORK WITH EASTERN WHITE PINE IN THE NORTHEAST

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At our 1956 Conference in Johnsonburg, I was appointed Chairman of the Eastern White Pine Improvement Committee with instructions to pick my own Committee. This Committee has been functioning on a skeleton basis; Dr. Baldwin, Dr. Schreiner, and I, have been responsible for the rather limited activities we've carried on. The job was largely a matter of sending out questionnaires to some of the organizations and individuals who provided information for Bill Gabriel's report; I hope you will forgive any duplication. We sent questionnaires to all the northeastern States and the Province of Ontario. Many who answered this questionnaire are here, and I would like to take this opportunity to thank you.

We sent out about 50 questionnaires, requesting information (covering eastern white pine and exotic white pines) on improvement work including racial studies; individual tree selection for blister rust and weevil resistance; growth rate; timber form; breeding work, including one-parent progeny tests, controlled intraspecific breeding and species hybridization; vegetative propagation by cuttage, graftage, and air-layering; and information on any other research related to the genetic improvement of white pine.

Under these several categories we asked for information on research under way, publications, if any, work plans, and whether or not the organization or individual was interested in cooperating; replies were almost unanimous in indicating willingness to cooperate. I will indicate some of the persons and organizations that are doing tree improvement work.[2]

Racial tests. The earliest work with eastern white pine was apparently undertaken by Dr. Baldwin beginning in 1934 and carrying through to 1942. Dr. Baldwin reported on plantations that included 32 eastern white pine seed sources, mainly from New England, but some from North Carolina and Virginia. Plantations, including the progeny from selected local mother trees and from seed sources throughout the range of eastern white pine, were established by the Cabot Foundation in 1941 and 1942 near the Harvard Forest. This work has been reported by Pauley, Spurr and Whitmore. The Cabot Foundation also listed three other eastern white pine plantations, each involving 20 seed sources collected throughout the species range. The Southern Research Station, Maple, Ontario, has published results on racial tests started in 1946. The Northeastern Forest Experiment Station in cooperation with the Southeastern, Central States, and Lake States Stations of the U. S. Forest Service, and the Southern Research Station, Ontario, started a range-wide racial test in 1955. Yale University also got under way in this field in 1955. Mr. Tabor, State Forester, Delaware, suggested that eastern white pine near Asheville, North Carolina, was deserving of attention in that the plantation appeared to be superior to that of the same species in other localities.

[1]Chairman, White Pine Improvement Committee, NEFTIC.

[2]Replies are summarized in tables 1-3. Editor.

Individual Tree Selection. There has been more work done in blister rust resistance than in any other field. Probably the major contributions have been made in the Lake States and we will hear from them shortly. However, Professor Hirt, of the New York State College of Forestry, started work in 1940 and has published results with both native and exotic species. A report by Dr. Heimburger was published in 1946. More recently blister rust resistance work has been started in Maryland (1955) and in Maine (1956). The Cabot Foundation has some sizeable plantations of so-called rust resistant strains.

Studies of weevil resistance were started in Ontario in 1947. The Northeastern Forest Experiment Station has been working on this problem since the summer of 1952. Kriebel's work at Yale was carried on in 1954. The New York State College of Forestry recently started work on weevil resistance and Maryland plans to initiate work in 1958.

There have been more individual tree selection studies on growth rate or timber form than on blister rust or weevil resistance, but the volume of work is less. Harvard undertook the earliest work in 1924. Work was started in Ontario in 1947, at the Great Mountain Forest in Connecticut in 1952, at the University of Massachusetts in 1953, at Yale in 1955, and the New York State College of Forestry has recently undertaken work in this field. As part of regional project NE-27, the University of Maine, in 1956, made tree selections in plantations and natural stands for the establishment of seed orchards. Maine and New Hampshire State Forest organizations are developing definite plans for locating, marking and making use of superior trees as a source of seed. Maryland reports an apparently superior eastern white pine: at 24 years this tree is 22 1/2 inches in d.b.h. and approximately 65 feet in height.

Because of widespread interest in individual tree selection, NEFTIC might well consider appointing committees or subcommittees to correlate this phase of our tree improvement program.

Breeding Work. Controlled intraspecific and interspecific breeding was started by the Northeastern Forest Experiment Station, at New Haven, Conn., in 1937. This work, interrupted by the war, was reactivated in Philadelphia in 1945: early results have been published. Intraspecific breeding and species hybridization was started in Ontario in 1948 and at Yale in 1955. One-parent progeny tests were undertaken in Ontario in 1946 and at Yale in 1955. Inbreeding was started in Ontario in 1957.

Vegetative Propagation. Research at the Northeastern Forest Experiment Station, started in 1938, was reported by Snow in 1941. Professor Doran, at the University of Massachusetts, was also a pioneer in this field. He undertook his first work in 1939 and has several publications on vegetative propagation of various species including pine. The earliest reported work on grafting was received from Ontario: the results of this work by Heimburger were published in 1947. Work on grafting was started by Maryland in 1956, and the New York State College of Forestry has recently undertaken work on grafting and air-layering.

Other Research. The Southern Research Station, Maple, Ontario, reported a 1940 study on the blooming habit of white pine, and a selection study, initiated in 1953, for winter hardiness of exotics and hybrids. The University of New Hampshire has a study on methods for inducing early flowering and cone production in eastern white pine.

Exotic White Pines. We received reports on the location of exotics from the Cabot Foundation, the Northeastern Forest Experiment Station, the Southern Research Station in Ontario, the New York State College of Forestry, the Great Mountain Forest in Connecticut, and Yale. The numerous exotics reported by the Cabot Foundation varied from 5 to 8 years old. Ontario reported a plantation of P. griffithii planted from seed collected at an elevation of about 11,000 feet, a 10-acre provenance test of P. monticola established in 1951, and a variety of exotics that had been grafted and are now approaching flowering age.

Table 1.--Organizations Reporting on Improvement of Eastern White Pine and on Location of Exotics

	Organization	Report by
1.	Cabot Foundation, Harvard University, Cambridge, Mass.	W. B. Critchfield
2.	Great Mountain Forest, Norfolk, Conn.	Darrell F. Russ
3.	Maryland Dept. Forest and Parks, Annapolis, Md.	H. C. Buckingham
4.	Maryland Dept. Research and Education, Solomons, Md.	Craig D. Whitesell
5.	Massachusetts Dept. Natural Resources, Bureau of Forestry, Boston 8, Mass.	John H. Lambert, Jr.
6.	New Hampshire Forestry and Recreation Commission, Concord, N. H.	Henry I. Baldwin
7.	New York State Conservation Department, Albany, N. Y.	E. J. Eliason
8.	Northeastern Forest Experiment Station, U. S. Forest Service, Upper Darby, Pa.	Ernst J. Schreiner
9.	Southern Research Station, Ontario Dept. Lands and Forests, Maple, Ontario, Canada.	C. Heimburger
10.	Pennsylvania Dept. Forests and Waters, Division of Forest Advisory Services, Harrisburg, Pa.	J. E. Ibberson A. B. Mickalitis
11.	Pennsylvania State University, School of Forestry, University Park, Pa.	Henry H. Chisman
12.	Petawawa Forest Experiment Station, Chalk River, Ontario, Canada.	M. J. Holst
13.	Rutgers University, Forestry Department, New Brunswick, N. J.	Richard F. West
14.	State University of New York, College of Forestry, Syracuse, N. Y.	Ray R. Hirt
15.	State University of New York, College of Forestry, Syracuse, N. Y.	F. U. Klaehn

Table 1 (continued)

16.	State University of New York, College of Forestry, Syracuse, N. Y.	R. A. Zabel
17.	University of Maine Dept. of Forestry, Orono, Maine	R. I. Ashman
18.	University of Massachusetts, Dept. of Forestry and Wildlife Management, Amherst, Mass.	R. P. Holdsworth
19.	University of Massachusetts, Dept. of Forestry and Wildlife Management, Amherst, Mass.	Robert B. Parmenter Arnold D. Rhodes
20.	University of New Hampshire, Forestry Dept. Durham, N. H.	Harold W. Hocker, Jr.
21.	Yale Forestry Research Center, Valhalla, N. Y.	Francois Mergen

Table 2.--Summary of Improvement Work with Eastern White Pine in the Northeast

Field of work	Past and/or continuing research	Publication	Work planned	Wish to cooperate
Racial studies				
Eastern white pine	1,6,8,9,10,[1/] 12,21	1,9	6	2,6,8,9,11, 12,17,21
Exotic white pines	9,12,21	9		2,8,9,12,17,21
Individual tree selection (or testing of progenies)				
Blister rust resistance	1,3,9,10,14 15,17	9,14		2,3,8,9,14,17
Weevil resistance	8,9,10,15 17,21	8,21	3	2,3,8,9,17
Growth rate and/or timber form	1,2,9,10,15, 17,18,19,21	18		2,8,9,17
Graftability, winter hardiness, resistance to needle blight.	9			9
Breeding				
One-Parent progeny tests (naturally pollinated seed)	1,4,8,9,21			2,8,9,21
Controlled breeding	1,8,9,15,21	8,9	4	2,4,8,9,21
Vegetative propagation				
Cuttings	8,12,18,19	8,19	4	2,4
Grafting	3,8,9,12,15	9	4	2,3,4,9
Air-layering	9,15		4	2,4,9
Other Research				
Bagging technique	8	8		
Dwarfism and early dominance	11	11		
Colchicine treatment	15			
Variation in durability of wood	16			
Induction of early flowering	20			
Needle anatomy	21			

1/ Numbers refer to organizations listed in table 1.

Table 3.--Reports on Exotics

Species	Specimen trees reported by #21/	#5	#9	#13	#21
	Age of specimen trees-years				
P. albicaulis	8				
P. armandi	1,6		10		
P. aristata	2,5				
P. cembra	22				
P. edulis	5,8				
P. flexilis	6,8		30		33
P. griffithii	8		35	50	33
P. koraiensis			35		33
P. lambertiana	8	25,30			
P. monticola	9		25		
P. parviflora	15		35		
P. peuce	10		10,35		33

Specimens of P. cembra, edulis, flexilis, griffithii, peuce, koraiensis, monticola, parviflora, armandi, ayacahuite, reported in the Philadelphia area (8)1/

The Cabot Foundation (1) reports "individuals of a large number of exotic white pines. All of these trees are 5 to 8 years old."

Exotics in Plantations

P. monticola (7); P. monticola, P. griffithii (seed from 11,000 ft. elevation), P. peuce (9); P. monticola, P. flexilis, P. aristata, P. strobiformis, P. excelsa, P. peuce, P. koraiensis, P. cembra, P. parviflora (14)

1/ Numbers refer to organizations listed in table 1.