

## NEFTIC AFFAIRS

Chairman: Richard F. Droege

### REPORT OF THE NEFTIC COMMITTEE ON IMPROVEMENT OF VIRGINIA PINE

#### INTRODUCTION

Virginia pine (*Pinus virginiana* Miller) has long been considered as a tree of limited value. It is not regarded for production of high quality timber. Recent interest in Virginia pine increased because it has some desirable properties as a pulpwood tree. It is adapted to variable soil sites, grows rapidly at an early age, and offers fiber suited for production of high grade pulp.

The West Virginia Pulp and Paper Company lists Virginia pine as a principal species used for pulpwood at the Company's mills in Maryland, Pennsylvania, and Virginia. This industry is highly interested in genetic improvement of Virginia pine, and conducts research to learn more how to secure better stock for future demands. One of the largest research projects with Virginia pine is undertaken by the North Carolina State-Industry Cooperative Tree Improvement Program. This extends also into some natural stands of Virginia pine in the Northeast. Virginia pine is also of interest to some public tree growers. For instance, the Pennsylvania Department of Forests and Waters is engaged in establishment of seed orchards which will include Virginia pine as one of the major species.

The NEFTIC Committee on Improvement of Virginia pine was previously chaired by Albert G. Snow, Jr., who presently works in a region outside the range of Virginia pine. The present committee was formed in January 1963, following a meeting held in Annapolis, Maryland. As one of the first activities, the Committee has attempted to summarize past and recent research on Virginia pine, such as provenance studies, individual tree selection, establishment of seed orchards, and hybridization. However it is realized that this summary is not complete, therefore all research agencies working on genetics of Virginia pine, are invited to notify our Committee on their progress.

#### PROVENANCE STUDIES

Experiments to study racial variation in Virginia pine were initiated by the Natural Resources Institute of the University of Maryland, formerly known as the Maryland Department of Research and Education (table 1). The first trial with 16 provenances was planted in 1957 at five locations in Maryland (two plantations failed), one in Pennsylvania and one in Tennessee. In 1959, another trial with 20 provenances was planted again in the same states, and in Michigan.

Unfortunately, most of these research plantations were heavily attacked by the Nantucket tip moth (*Rhyacionia frustrata* Comst.). There is no evidence so far that any source studied was fully resistant to this insect-pest. Partial control measures in the past were ineffective. In 1963, all Maryland plantations were sprayed with DDT two or three times depending on the insect's life cycles. This control method, requiring considerable time and effort, gave positive results.

Measurements of the first-trial plantings, 7 years old from seed in 1962, showed significant differences between provenances in height growth and in survival. A progeny from Cumberland County, Tennessee, was among the best growing in most research plantations. Its survival in the Pocono Mountains, Pennsylvania, was only 17 percent, although some progenies survived there 100 percent.

Table 1.--Provenances of Virginia pine studied by the Natural Resources Institute of the University of Maryland and cooperators.

Seed origin, state	Number of provenances	
	Trial of 1957	Trial of 1959
Alabama	1	1
Delaware	1	-
Georgia	-	1
Indiana	-	1
Kentucky	-	3
Maryland	7	3
Mississippi	-	1
New Jersey	1	-
North Carolina	1	2
Ohio	1	1
Pennsylvania	2	1
South Carolina	-	1
Tennessee	1	1
Virginia	1	3
West Virginia	-	1
<b>Total</b>	<b>16</b>	<b>20</b>

#### INDIVIDUAL TREE SELECTION AND SEED ORCHARDS

An intensive work on individual tree selection in Virginia pine is conducted by the N. C. State-Industry Cooperative Tree Improvement Program in the Southeast (1). Some agencies in the Northeast are active cooperators in this program. For instance, West Virginia Pulp and Paper Company, located some plus trees of Virginia pine in the Ohio Valley of West Virginia and in Virginia. Twenty of such trees were classified as superior, ten of these being located in Wirt and Wood counties of West Virginia. Site-indexes of these selected trees range between 75 and 80. In April 1963, the West Virginia Pulp and Paper Company produced grafts representing all 20 selected Virginia pines. The severe drought of 1963 caused some failures, but enough grafts came through to establish a one acre seed orchard by 1964.

N. C. State-Industry Cooperative Tree Improvement Program has established six seed orchards of Virginia pine in five states, These total 43 acres and include 96 different selections. Some selected trees are listed as "striking" and "unbelievably good", but there are no data as yet on progeny tests.

An independent project to establish seed orchards of Virginia pine is also conducted by the Pennsylvania Department of Forests and Waters. A five-acre future orchard-site has been prepared for root stock planting which will be grafted with scion wood from selected Virginia pines in 1964 and 1965.

INTERSPECIFIC HYBRIDIZATION

Virginia pine has been included in hybridization programs by the Northeastern Forest Experiment Station (2), the Institute of Forest Genetics in Placerville, California (3, 4), and the N. C. State-Industry Cooperative Tree Improvement Program of the University of North Carolina (5). Results of past work are summarized in table 2.

Table 2.--Summary of past work on interspecific hybridization of Virginia pine (Pinus virginiana Mill.)

Female parent	Male parent	Results*/
virginiana	clausa	H <sup>1/</sup>
"	banksiana	F <sup>2/</sup> U <sup>3/</sup>
"	rigida	F <sup>2/</sup>
"	taeda	F <sup>3/</sup> U <sup>1/</sup>
"	thunbergii	U <sup>3/</sup>
rigida	virginiana	F <sup>1/</sup> F <sup>2/</sup>
contorta var. latifolia	"	F <sup>1/</sup>
tabulaeformis	"	F <sup>2/</sup>
attenuata	"	F <sup>1/</sup>
attenuradiata	"	U <sup>1/</sup>
pinaster	"	U <sup>1/</sup>
sylvestris	"	F <sup>2/</sup>
taeda	"	F <sup>3/</sup> U <sup>1/</sup>

\* H = hybrids obtained; F = failure; U = undetermined.  
1-3/ Control-pollination conducted by:  
<sup>1/</sup> Institute of Forest Genetics in Placerville, Cal.  
<sup>2/</sup> Northeastern Forest Experiment Station  
<sup>3/</sup> North Carolina State-Industry Cooperative Tree Improvement Program of the University of N. C.

Authenticated hybrids of *P. virginiana* x *P. clausa* were produced by controlled pollination in 1953 at the Institute of Forest Genetics (6). A single Virginia pine tree of unknown origin was pollinated with pollen of sand pine, *P. clausa* (Chapm.) Vasey, from Florida. This cross gave 442 seeds of which 366 were filled, indicating a high degree of crossability. Seven trees of these hybrids grow in California, and 47 in Maryland.

A suspected hybrid between *P. virginiana* and *P. banksiana* Lamb, from a cross attempted by Dr. J. N. Wright was later reported as a failure (4). The cross between *P. virginiana* and *P. taeda* L. attempted by Dr. B. Zobel and associates was also unsuccessful--the cones developed normally the first year, but fell the second year (6). Among other species that failed to cross with Virginia pine are the following- *P. rigida* Mill., *P. contorta* var. *latifolia* Engelm., *P. tabulaeformis* Carr., *P. attenuata* Lemm., and *P. sylvestris* L.

The results of attempted crosses of *P. virginiana* with *P. attenuradiata* Stockwell & Richter, *P. pinaster* Ait., *P. thunbergii* Parl. and *P. banksiana* (another attempt) are either undetermined, or not formally reported. A second attempt to cross *P. virginiana* with *P. taeda* has been repeated by the University of North Carolina and the results will be known only next year (6).

## LITERATURE

1. Anon. 1963, Seventh Annual Report, N.C. State-Industry Cooperative Tree Improvement Program School of Forestry, North Carolina State College, Raleigh N. C.
2. Wright, J. W. 1953. Tree breeding experiments by the Northeastern Forest Experiment Station 1947-1950. Northeastern Forest Exp. Sta., Station Paper No. 36-38.
3. Righter, F. I. and J. W. Duffield. 1951. Interspecies hybrids in pines Jour. Heredity 42 (2): 75-80.
4. Critchfield, W. B 1962 Hybridization of Southern pines in California Reprint, Forest Genetics Workshop Proceedings (SFTIC Pub. 22) 10 pp
5. Zobel, B. 1963 Personal communication.
6. Critchfield, W. B. 1963. Personal communication.

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