# REPORT ON A COOPERATIVE SEED ORIGIN STUDY WITH VIRGINIA PINE

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Virginia pine (Pinus virginiana) has a botanical range extending from New Jersey and Pennsylvania southwestward to Georgia and Alabama, figure 1. It occurs from sea-level to elevations of about 3,000 feet. It is reported to reach its largest size in the southeastern part of Indiana. In Maryland it comprises 10 percent of the forested area and approximately one-quarter of the forested area of Southern Maryland.

Virginia pine is a pioneer species, seeding in rapidly on abandoned fields. It is usually found growing on the poorer, drier sites. This pine exhibits rapid early growth, with this tapering off after about age 15 (in Maryland). Several stands in Southern Maryland, with an average age of 40 years, produced an average of 30 cords per acre.

Relatively short-lived, the stands begin to open up by age 50. Limby, often crooked, and with a poorly developed crown, the species usually deserves the local name of scrub pine. The comment is sometimes heard that Virginia pine is the tree most urgently in need of improvement. However, in some areas stands have been located that are exceptionally tall and straight.

Virginia pine is in demand, primarily for pulpwood. It is interesting to learn that several pulpwood companies prefer Virginia pine to any of the other yellow pines. The fact that this industry, and others, recognize its value is emphasized by their increasing interest and participation in research on Virginia pine. Pulpwood cut in Maryland is moved to mills located in three states. Southern Maryland annually supplies pulpwood valued at over one-half million dollars.

## The Present Study

In 1955 the Maryland Departments of Forests and Parks, and Research and Education. initiated the present study. The objective was to learn the nature of racial and individual variation within the species, and to determine the sources best adapted to the conditions in Marylan. During the fall of that year seed was collected from 16 sources throughout the range. The seed was sown at the State Forest Nursery the following spring. Six outplantings were established during the spring of 1957 Four were located in Maryland, one in Pennsylvania, and one in Tennessee (Table 1).

Four of the outplantings were established very successfully, with survival averaging above 95 percent after two and one-half years. The outplanting in Tennessee failed during the first summer because of a drought. This outplanting was re-established during 1958. Failure of the Maryland outplanting was attributed to both the drought and severe browsing by deer. The Pennsylvania outplanting was successfully protected from deer browsing by a repellant.

Figure 1.--Botanical range of Virginia pine

Black squares indicate location of seed sources included in this cooperative study.

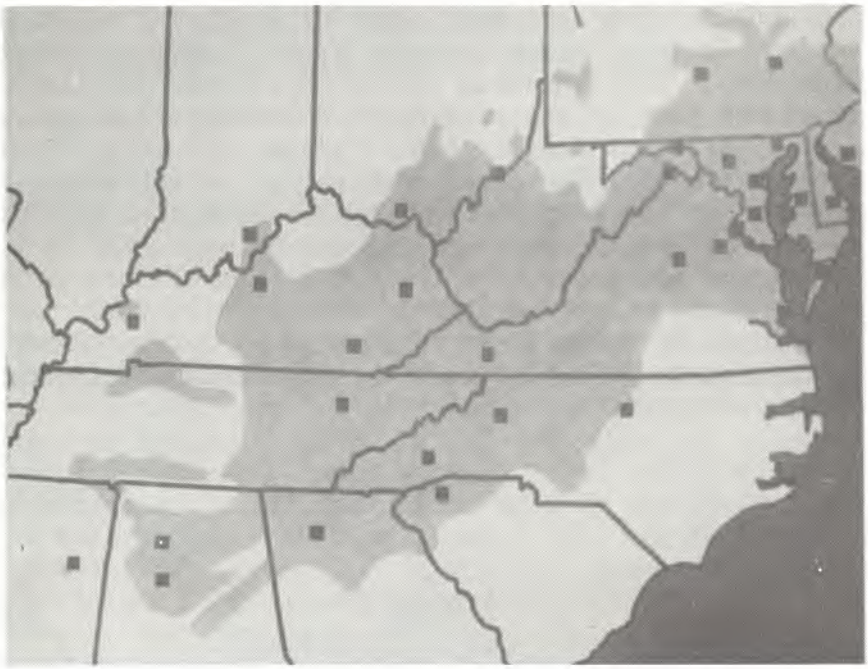

Table 1.--Virginia pine seed source study, 1957.

| No. | Location | Elevation | Cooperators | Survival 1/ |
|---|---|---|---|---|
| | | Feet | | Percent |
| 1 | Dilldown Watershed<br>Pocono Mts., Pa. | 2800 | Kingston Research Center, NEFES<br>Penna. Dept. Forests & Waters | 100 |
| 2 | Caroline Co., Md.<br>Coastal Plain | 10 | Glatfelter Pulp Wood Co.<br>Md. Dept. Research & Education | 99 |
| 3 | Rocky Gorge Reservoir | 340 | Washington Sub. Sanitary Comm.<br>Md. Dept. Research & Education | 97 |
| 4 | Prettyboy Reservoir<br>Baltimore Co., Md. | 800 | Balto. City Bur. of Water Supply<br>Md. Dept. Research & Education | 96 |
| 5 | Green Ridge State Forest<br>Alleghany Co., Md. | 900 | Md. Dept. Forests & Parks<br>Md. Dept. Research & Education | 2 |
| 6 | Anderson Co., Tenn. | 960 | Tennessee Valley Authority 2/<br>University of Tennessee | 2 |

1/ Survival end of first growing season in field.
2/ Replanted April 1, 1958.

The design for all of the 1957 outplantings followed one of the types advocated by Dr. E. J. Schreiner and Dr. J. W. Wright. It can be described as a randomized complete block experiment involving 16 provenances, with either 214 or 25 replications. Each replicate contained one seedling from each source. The initial spacing was 10 feet by 10 feet.

Lack of time has limited observations and the scoring of various characteristics. Variations in form, color, needle length, and duration of growing season have been noticed. The Tennessee seedlings represented the outstanding source at the end of the year in the seed bed. However, after two and one-half years from seed, no significant differences in height growth were present between sources on the three successful Maryland outplantings. Part of this may be due to the repeated attacks on the terminal buds by the Nantucket pine-tip moth.

A second trial was initiated with the collection of seed in 1956 and 1957, from 16 additional sources, four sources that were included in the first trial. Efforts were made to collect seed from as many outliers as possible. This effort was largely unsuccessful, since in many cases local foresters were unable to locate or even verify the existence of the outliers.

The seeds collected for Trial II were sown at the State Forest Nursery in April, 1958. The seedlings will be outplanted at six locations during the spring of 1959.

## Cooperation

It is obvious that the progress of this study is due to the willing cooperation and interest of many people. Over one hundred individuals have provided information, 36 agencies have collected seed, and to date six agencies have provided land. The Maryland Departments of Forests and Parks, and Research and Education sincerely appreciate this assistance. It is felt that the members of the Northeastern Forest Tree Improvement Conference have played an important part in the development of this project.

## FIELD SESSIONS

Two field sessions were included in the program for this Conference; a tour of the forest genetics plantations on the Beltsville Experimental Forest, and a tour of the Plant Industry Station.

### Beltsville Experimental Forest
### Northeastern Forest Experiment Station

Stop I. Maple Progenies. This is a plantation of 17- and 18-year-old progenies of Acer rubrum (red maple) and A. saccharinum (silver maple), including progeny of openpollinated seed from trees used as parents, intraspecific and interspecific crosses between these species, selfed progenies of A. saccharinum, and trees of both species propagated vegetatively.

The silver maples grew more vigorously than the red maples and the hybrids during the first 10 to 12 years from seed, but during the past 6 to 8 years many of the silver maple progenies have become noticeably decadent. This applies particularly to the selfed silver maple progenies where the present "complete" survival (including only trees on which the main stem has not died back) is less than 5 percent.

Since the soft maples can be propagated from cuttings, progeny averages may be of less interest for practical improvement than the inherently best individuals; the most rapid improvement should be possible through selection and clonal propagation of the very best seedlings. The following tabulation, based on the average height of the tallest trees in 16 of the progenies, indicates considerable variation in combining abilitv and some very good improvement pos sibilities:

Average height in feet of the five tallest trees in a progeny

| Female Parent | Male Parent | | | |
|---|---|---|---|---|
| | R 28 | R 60 | R 61 | R 62 |
| R 64[1/] | 16.90 | 21.40 | 25.90 | 20.50 |
| R 70 | 17.50 | 19.50 | 25.40 | 19.90 |
| S 58 | 10.70 | 14.90 | --- | 24.20 |
| S 202 | 18.10 | 24.20 | 29.80 | 25.60 |

1/ R = red maple. S = silver maple

The following selfed progenies of silver maple and reciprocal crosses are also of interest; the selfs because of their decadence and the reciprocals because of the difference in growth and survival.

| Parent trees | Ave. d.b.h. | Ave. Height | "Complete" survival[1/] |
|---|---|---|---|
| | Inches | Feet | Percent |
| Tree 58 (selfed) | 3.20 | 21.00 | 2.8 |
| Tree 201 (selfed) | 1.12 | 10.95 | 4.9 |
| Tree 58 × tree 201 | 2.34 | 17.88 | 83.0 |
| Tree 201 × tree 58 | 2.63 | 20.99 | 66.7 |

1/ "Complete" survival is based on the number of living trees on which the main stem has not died back.

Stop II. Ash Progenies. This is an 18-year-old plantation of white ash (F. americana) x green ash (F. pennsylvanica) and intraspecific progenies, in cluding progeny of a male "pitcher-leaf" white ash. The pitcher-leaf ash was first described by Shull in 1904. The base of some of the leaflets, usually the terminal but occasionally also the second and third sets of leaflets form small conical cups. A male tree of this type was used in our breeding work between 1937 and 1941. In this progeny 72 trees have pitcher-leaf and 65 have normal leaves; the observed fit a 1:1 ratio; P = 0.50 - 0.70. This character may be very useful as a marker for experimental breeding.

Beech Progenies. A plantation of 18-year-old trees derived from open-pollinated seed from a European copper beech (Fagus svlvatica atropunicea subject to pollination by green leaved trees of the same species. There are 62 "green" trees and 51 "copper" trees in the progeny; the observed numbers fit a 1:1 ratio; P = 0.30.

Stop III. Hybrid Poplar Clonal Test. This is a part of a uniform, region-wide test of 20 clones selected from more than 13,000, 18-year-old hybrids produced in 1925 and 1926. The test plantation was established with 100 dormant cuttings per clone, spaced 4 feet x 4 feet apart. The planting was machine cultivated during the first year and there have been two thinnings. The average height and d.b.h. of 3 of the best clones in this 25-clone, 10-year-old test plantation on an upland site at stop III, are given in the following tabulation:

| Clone | Female parent × male parent | Height | D. b. h. |
|---|---|---|---|
| | | Feet | Inches |
| NE-42 | P. maximowiczii × P. trichocarpa | 46 | 6.0 |
| NE-43 | P. maximowiczii × P. berolinensis | 41 | 5.6 |
| NE-49 | P. maximowiczii × P. berolinensis | 38 | 4.0 |

Plant Industry Station
Agricultural Research Service, U. S. Dept. Agriculture

A guided tour to see the fruit and nut tree breeding plots and basic physiology research on:

1. Photo responses of trees and other plants;
2. Effect on growth regulators on trees and other plants;
3. Influence of light on the germination of tree seed.