THE RED PINE PROVENANCE TEST ON THE KANE EXPERIMENTAL FOREST

A. F. Hough

Silviculturist
Northeastern Forest Experiment Station
Upper Darby, Pennsylvania

In 1928 the Lake States. Forest Experiment Station began a study of the geographic strains of red pine. The late Carlos G. Bates started this work. By 1931 several seed source plantations had been established in the Lake States with 37 origins. Red pine seed from 144 sources had been collected, grown in the nursery, and outplanted by 1933 The Allegheny Forest Experiment Station cooperated in the collection of eastern seed sources of red pine in 1928-30. In the spring of 1934 plans were made for an eastern test plantation on the Kane Experimental Forest. The site was cleared, plowed and ready for planting, but beetle-grub damage to the nursery stock at Cass Lake, Minnesota, forced a postponement of planting until the spring of 1937.

This test plantation of fifty different seed sources is the only eastern locality for study of the red pine stock grown by Bates. The other two surviving seed source plantings of red pine from this project are on the Superior National Forest in northeastern Minnesota and on the Chippewa National Forest in northcentral Minnesota.

The Kane Experimental Forest site was divided into seven one-half acre blocks. Space was left for a weather station, an area for planting replacement stock, and isolation strips. A randomized row method of planting, using six foot equilateral spacing, was used in all blocks. The soil is a Clymer silt loam and is relatively well-drained and fertile. One block was fenced against deer and half of this against rabbits The second season after planting all except one block was fenced against deer.

A row consists of fourteen trees of a given seed source randomly located within each block. This type of planting permits a systematic sampling of differences in soils or site from one part of the plantation to another. The rows were run north and south to minimize the competition of various seed sources for light. No severe competition occurred during the first ten-year's growth of this plantation and survival of all seed sources was high.

The trees in this plantation have been systematically measured to determine initial mortality and height growth. Since differences in survival among seed sources were not significant during the first five years, average height growth was used as the chief criterion for comparing the trees from the fifty different seed sources.

In 1947, or ten years after planting, measurements were made of the total height of each surviving tree in each row. A two-man crew using an extensible measuring pole secured the field records. A statistical analysis was made by the analysis-of-variance method to determine the significance of differences in average height of each seed source. There was no significant difference due to the block arrangement of the plantation, but seed source was found to be an important cause of variation in the average total heights reached at ten years by each of the fifty seed sources studied.

Grouping of the fifty seed sources into nine geographic-climatic regions, with all northeastern sources classed as one region, brings to light highly significant differences, when analyzed by the analysis-of-variance method. These data support the regional groupings as made. Variation by seed source within regions is not significant and thus appears to be random. These results were reported by A. F. Hough in 1952 (Preliminary results of red pine seed source tests in northwestern Pennsylvania. Northeastern Experiment Station, Paper 49, 29 pp.)

Seed from those regions at the head of lake Superior and to the north and west in parts of Wisconsin and Minnesota is significantly poorer in hetght growth at ten years in the Kane plantation, than seed from regions south of Lake Superior, such as the Upper Peninsula of Michigan, northeastern and central Wisconsin, and the northcentral portion of the Lower Peninsula of Michigan. The most easterly seed sources in Maine and Massachusetts were poorer in average height growth than that from New York or from Tioga County, Pennsylvania. Local climatic differences account for the relatively poor showing of the red pine from seed collected in Tioga County, Pennsylvania.

Seed sources of red pine recommended for planting on the northern Allegheny Plateau on basis of this study are as follows:

(1) Use local seed if available within reasonable altitudinal and north-south limits of the planting site. Similar climate and soils at the seed collection and planting sites are desirable.

(2) If local sources are not available, use seed from certain Lake States sources proved to be adaptable to Allegheny Plateau conditions. These sources in order of priority are:

   (a) Central and northeastern Wisconsin.

   (b) The northcentral portion of the Lower Peninsula of Michigan (north and west of Saginaw Bay).

   (c) The Upper Peninsula of Michigan.

(3) Sources to be avoided are those to the north and west of Lake Superior such as Head of the Lakes, BrainerdCameran, and northeastern and northwestern Minnesota.

The plantation will be remeasured in 1957 using diameter breast height and a sample of the total heights to determine the 20-year growth. A light thinning was made in 1952 and all trees pruned in 1953. Further thinnings will be made as necessary to prevent stagnation.

It is of interest that trees of greater initial weight and size continue to grow at more rapid rates in total height as compared to those classed as medium or light in weight. This was true for the first 5-year period and second 5-year period following planting of this 2-1 transplant stock.

Figs. 1 and 2. Red pine provenance test on the Kane Experimental Forest of the Northeast. Forest Expt. Sta. These two views were taken in September, 1953, 17 growing seasons after the out-planting.

U. S. Forest Service Photos