

North Central Cooperative Regional Project NC-51: Forest Tree Improvement through Selection and Breeding: 1962 Progress Report

by

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This project was begun in 1960 with the support of federal funds allocated under the Hatch Act. There are 14 state agricultural experiment stations cooperating as well as the Lake States Forest Experiment Station of the U.S. Forest Service. The administrative advisor is R. W. Hougas (Illinois) and the technical chairman is Jonathan W. Wright.

New geographic origin studies or new sets of outplantings undertaken during 1962 were as follows: (1) The Ohio station distributed 1-0 stock of 16 origins of red oak (Quercus rubra L.) for the establishment of permanent tests in Illinois, Indiana, Kansas, Michigan, Minnesota, Nebraska, Ohio, and Wisconsin. The station also furnished forms for the transmission of future measurement data. (2) The Michigan station distributed 2-0 stock of 50 origins of ponderosa pine (Pinus ponderosa Laws.) for the establishment of field tests in Michigan and Nebraska. (3) The Wisconsin station continued the assemblage of balsam fir (Abies balsamea[L.] Mill.) seeds from the entire range, bringing the total to 84; sowing is planned for autumn 1963. (4) The Minnesota station continued the assemblage of tamarack (Larix laricina Du Roi] K. Koch) seeds from the entire range, and sowed more than 50 origins in the autumn. (5) The Michigan station sowed 18 origins of white fir (Abies concolor-Glend. Lindl.) and 150 of Douglas-fir (Pseudotsuga menziesii [Mirb.] Franco) in the spring.

In the spring of 1962 most trees which died in the 1961 planting were replaced with stock which had been reserved for the purpose. After replacement, over 95 percent of the Scotch pine (Pinus sylvestris L.), 80 percent of the Japanese larch (Larix leptolepis [S. et Z.] nigra Arn.) test can be considered as successfully established and capable of giving precise information. The cause of most failures (wrong site in larch, poor nursery handling in black pine) was determined. Four states also practiced chemical weed control on some of their plantings to increase growth and to aid in measurement work.

The Japanese larch tests described in the 1960 and 1961 reports were also represented in Germany. A correlation analysis was completed (34 variables in all) using data on climate at place of origin, performance in a Michigan nursery, and performance in the German nursery. Height correlations and color correlations between the two countries were significant, as were other relationships whose biological meaning is doubtful. In both countries, some origins exceeded the mean in growth rate by more than 20 percent.

Some stations reported outstanding growth on the part of their Japanese larch

tests, some trees being 6 to 8 feet high in Nebraska and Iowa. Such growth is considered sufficient to warrant limited introduction of the species into commercial reforestation practice.

A study of genotype-environment interactions in Scotch pine was started during the year, using as material ten of the 1961 permanent tests in Wisconsin, Illinois, and Michigan. In no character were the interactions as large as the primary genetic and site effects. That is, seedlots which were yellowest while in the nursery were yellow at all test sites. In some cases, the interactions are so slight as to be detectable only with the most refined methods of analysis. Form differences became noticeable for the first time during 1962 and cone production started.

The use of machine planting, first tried in 1961, was perfected in 1962 so that it can be used on large experimental plantings of almost any complexity. Two record systems were tried during the year, each aimed at convenience in handling the large amounts of data which will be forthcoming by 1963. Both systems envisage the use of computers for all statistical analyses.

USEFULNESS OF THE FINDINGS

An increased number of Christmas tree growers asked for and were guided by information on color and growth rate of Scotch pine origins which would make acceptable Christmas trees. In about 10 years, the tests will give reliable information on four characters so that recommendations can be made to growers of Scotch pine who plan to harvest pulpwood and timber. In the region as a whole, these recommendations will influence choice of seed for the production of 50 to 100 million trees per year.

Japanese larch is already known to be one of the fastest growing conifers for large parts of the North Central region, but has been planted little because of historical reasons. The fact that some Japanese larch origins exceed the average by 20 percent in growth rate means that almost all commercial plantings of this species in the region can be much more productive than if made with average seed.

By using seed of tested origins rather than average seed, the productivity per acre can probably be increased another 5 to 10 percent. Planters could embark on a rational large-scale planting program with little danger of repeating mistakes of the past by using the data accruing on site preferences and interactions.

WORK PLANNED FOR 1963

The directions and emphasis of research will remain as outlined in the original work plan.

The eight states which participated in the red oak study in 1962 will complete the establishment of their tests with an additional 16 to 20 origins furnished by the Ohio station. Where desirable, chemicals will be used to insure complete weed control in the red oak plantations.

All states with 1960 or 1961 outplantings of Japanese larch, black pine, or Scotch pine will make mortality counts and prepare establishment reports. These will be incorporated into 1, 2, or 3 journal articles describing the regional aspects of the tests. In addition, Iowa, Illinois, and Michigan plan publications describing growth results in some of their own plantings. If flowering occurs in sufficient quantity, Michigan will start interracial hybridizations in Scotch pine.

Minnesota will sow and measure the tamarack study in the nursery. Nebraska and Wisconsin will add to the ponderosa pine and balsam fir seed collections, respectively. Michigan will distribute 1-0 stock of fir via air express, such stock to be lined out and outplanted in future years. Iowa will start controlled environment studies of red oak origins .