

Summary of Forest Tree Improvement Work
in the Northeast

by W. J. Gabriel 1/

This report on the recent advances in forest tree improvement in the Northeast is based on 40 replies to questionnaires sent to northeastern State forestry organizations, agricultural experiment stations, forestry extension services, private industry, foundations, institutions, forestry schools, and research centers of the Northeastern Forest Experiment Station. The various types of studies reported have been segregated into classes such as provenance, propagation, and progeny tests, and a summary of the work in each class is presented. 2/

Stand and Individual Tree Selection

There are 16 projects now in progress, involving 13 different organizations and 9 species. Seven projects have as their objective the development of seed orchards established from selected phenotypes of Scotch pine, white pine, white spruce, and Norway spruce. About half of these seed orchards will be used for production of improved Christmas tree planting stock.

The remaining projects are concerned with selection for improving tree quality and timber-growing potentialities in larch, white pine, loblolly pine, Norway spruce, chestnut, and sugar maple, presumably through the establishment of seed orchards of superior trees and through hybridization of selected individuals.

Progeny Tests

The bulk of the progeny testing of control-pollinated hybrids in our region is being done by two organizations, the Hartford Foundation at the Yale School of Forestry and the Northeastern Forest Experiment Station. The majority of these hybrids are of hard, pine, spruce, and 5-needled white pine parentages, and were developed mainly by the Experiment Station. Several other organizations are engaged in control-pollinated progeny tests on a cooperative basis.

One-parent progeny tests of selected phenotypes of black cherry, Scotch pine, sugar maple, oak, Norway spruce, and several species of 5-needled white pines have been listed by several organizations.

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2/ A list (originally accompanying this report) of the forest tree improvement studies in the Northeast and cooperating organizations may be obtained from the Lake States Forest Experiment Station, St. Paul Campus, St. Paul, 1, Minn.

Provenance Tests

There have been 17 provenance tests reported by 9 organizations in the Northeast. Three tests each are listed for Douglas-fir, Scotch pine, red pine, and Norway spruce; 2 in white pine; and 1 each in paper birch, white ash, and larch. Several organizations have cooperative provenance test plantings.

Hybridization

Hybridization programs are being conducted by 6 organizations on at least 28 species. With the exception of 5 hardwood species, all are conifers.

The large part of the hybridization work in conifers has been done by the Northeastern Forest Experiment Station, where a total of 17 pine species have been used in determining crossability patterns in the hard pines and white pines.

Propagation

There are 10 organizations working on 12 propagation projects covering 37 species.

Rooting of cuttings of white pine, Virginia pine, poplar, black locust, larch, and sugar maple is being investigated for, or is in use as, a means of vegetatively propagating selected trees for clonal tests. One of the largest of these investigations is a sugar maple rooting experiment now in progress at the Burlington, Vt., unit of the Northeastern Forest Experiment Station. Here nearly 8,000 cuttings from 46 selected sugar-producing trees are being, tested for effect of clone and rooting medium on rootability in cooperation with the Vermont Agricultural Experiment Station. This study is preliminary to a more extensive one designed to clonally test phenotypically high sugar producing sugar maples.

Most of the grafting work at present appears to be centered at the State University of New York, College of Forestry. The work has been primarily in the genus Acer, where scion wood of 23 species of maple has been grafted on sugar maple root stocks for purposes of studying floral morphology and ecology.

Seed storage by freezing methods has been investigated in ponderosa pine, Sitka spruce, western hemlock, western redcedar, and Douglas-fir, at the Boyce Thompson Institute. Seed germination studies have been reported in black cherry by the Armstrong Forest Company.

Physiology and Morphology

Nine organizations list 14 physiological projects, nearly half of which are related to growth studies in the following species: Norway spruce, Scotch pine, white pine, aspen, and hybrid poplars. The remaining projects are concerned with sap flow mechanisms, seed studies, bud resin color variation, flower induction, and development of flower primordia.

Five studies have been reported in morphology. An example of one of the more outstanding of these is the identification of putative pine hybrids by means of stomates; this work has been done by the Hartford Foundation.

Cytology

A large part of the work in cytology is being done at the Hartford Foundation. Here a study of chromosome behavior during fertilization is in progress in Austrian pine, studies in induction of polyploidy in slash pine and in staining techniques are also reported. The Boyce Thompson Institute for Plant Research is studying polyploidy induction in larch.

Soil-Site Studies

Six soil-site studies are now in progress in the Northeast. The Cornell University Agricultural Experiment Station is studying the soil and climatic requirements for optimum growth in red pine. It is also investigating the degree to which known geographic races maintain desired characteristics in a range of soil and climatic conditions. A somewhat similar study, also in red pine, has been listed by the New York Department of Conservation, Division of Lands and Forests.

The first year's fieldwork of a hardwood soil-site study, conducted jointly by the Northeastern Forest Experiment Station and the Vermont Agricultural Experiment Station, is nearly complete. The study has as its objective the determination of factors which control site productivity of northern hardwood species.

The Northeastern Forest Experiment Station also has a soil-site study in progress in white pine, and the University of Maine Department of Forestry has a similar study in spruce.

Miscellaneous Studies

Nursery Work.--A program of nursery and outplanting studies designed to investigate seeding and planting techniques suitable for commercially important northern hardwoods is in progress at the Burlington, Vt., unit of the Northeastern Forest Experiment Station.

Arboreta Establishment.--Two arboreta are now being established. The Hartford Foundation is building an arboretum of all species which they feel would be of importance in their future tree breeding programs. The Northeastern Forest Experiment Station is beginning to build a birch breeding arboretum of native and exotic species near its Burlington unit.