

## Forest Tree Improvement Work in the Central States

by H. B. Kriebel 1/

At your meeting 2 years ago, G. A. Limstrom gave a report on current research in forest tree improvement in the Central States, in which he discussed the various species on which work was being done. Most of the research was and still is at the present time being conducted by two agencies, the Central States Forest Experiment Station and the Ohio Agricultural Experiment Station. Recently, however, other State organizations in the region have taken an increased interest in this type of research, and it is probable that activity will be expanded within the next 2 years. Some consideration is being given at the present time to regional planning and cooperation.

Rather than discuss current research by species, I will attempt to review briefly progress in each of several phases of forest tree improvement.

### Racial Tests and Seed Source Tests

A comprehensive study of geographical variation in sugar maple is now in its fourth year at the Ohio Agricultural Experiment Station. Fifty sources are included. Two permanent plantings have been made at Wooster, and another will be made in extreme southern Ohio in the spring of 1958. To date it has been possible to identify patterns of variation in draught resistance, winter hardiness, tree form, and time of leafing-out and of onset of winter dormancy. Little information has yet been obtained on racial variation in height growth. A research bulletin is now in press dealing with these studies, and will be in print in a week or two.

The yellow-poplar seed source study initiated by the Forest Service in 1952 includes established field plantings in Ohio, Indiana, and Illinois. The interregional white pine provenance tests will include a series of plots in the Central States region; seedlings will not be ready for field planting until 1960, however. The Ohio Agricultural Experiment Station is planning to cooperate with the Forest Service in provenance testing of white pine, and additional seed collections have been made from several isolated stands of native white pine in Ohio.

Replicated seed source tests of shortleaf pine from six northern sources ranging from New Jersey to Missouri are planned for Ohio; one test will be on strip-mine spoils. These plots will provide eastern supplements for the shortleaf provenance tests in Illinois and Missouri established by the Forest Service,

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Provenance tests are being conducted at Iowa State College on Scotch pine and European larch; nine sources of larch are included, and McComb plans to augment these with additional sources

#### Genetic Selection and Clonal Testing

In Ohio, cooperative State-Federal tests are planned of 10 selections of black locust, using stock grown from cuttings at Beltsville, Md. Plots will be established on four different sites in eastern Ohio to study variation, in borer resistance, form, and vigor.

Four promising clones of the hybrid Populus grandidentata x P. alba have been discovered in Iowa. Two have been distributed to other states for testing. One of these clones has a figured grain.

At Wooster we now have about 25 clones of sugar maple selected in Ohio and the northeastern states on the basis of high sugar content of the sap, and propagated vegetatively by grafting and budding. Several hundred ramets have been produced, and seed orchards will be established in the spring of 1958.

A program of individual tree selection for vigor has been started in eastern white pine; selections are being propagated by greenhouse and field grafting.

#### Hybridization

Some intraspecific crosses have been made on sugar maple to study inheritance of sugar content among progenies from selected trees. Crosses have been made among trees rating high, low, and intermediate in sugar content as determined by repeated refractometer tests over a period of several years. We hope to obtain information by progeny testing about inheritance of capacity for high syrup yield. This winter, small-tree tests of sugar content are planned for both clonal stock and seedling progenies, using special techniques for measurement.

In 1956 we began controlled pollination at Wooster of white pines, both within the eastern white pine species and between this species and other related five-needle pines. Flowering specimens of several species of the subgenus Haploxydon in our arboretum make this possible. In addition to eastern white pine these include Himalayan, Japanese white, and Korean pines. Phonological records are being accumulated of flowering and fruiting in the pines and several other genera in the arboretum, where a diversity of breeding material is available for use here or in exchange with other institutions. We are increasing our arboretum stock of potential breeding trees of documented seed source in a number of species.

### Techniques for Vegetative Propagation

In the spring of 1956 we conducted studies of factors affecting survival and growth of greenhouse-grafted sugar maples. Approximately 700 trees were involved and various factors investigated, including type of potting soil, time of bringing stock into greenhouse, time of grafting, vigor of scion, type of graft, and type of humidity enclosure.

The data have been transferred to IBM punch cards for multiple-factor analysis. Studies were also made of budding techniques for sugar maple.

Certain physiological studies either initiated or planned include experiments in flower induction and dwarfing variation in tolerance to low pH as indication of suitability to strip-mine planting, and continuance of research on juvenile selection criteria with respect to form, vigor, length of growing season, and other phenotypic responses.