

Recent Advances in Forest Tree Improvement
at the University of Michigan

by Burton V. Barnes 1/

Forest tree improvement research at the School of Natural Resources of the University of Michigan centers in the Silviculture-Silvics and Pathology divisions of the Forestry department. The Botany department of the University has also assisted by giving space for some limited aspen flowering and pollination experiments. At present, however, there are no facilities for intensive breeding experiments or large-scale progeny tests. Research in forest tree improvement is stressed from the silvicultural point of view and it continues along the lines of variation and selection.

The initiative in tree improvement research is taken by Professor Stephen H. Spurr, Professor Dow V. Baxter, and graduate students who choose this field of specialization. Professor Baxter is continuing his research in the selection of individual trees of the Chinese chestnut that have proved satisfactory for culture in Michigan. The trees that have demonstrated their hardiness to approximately 30 Michigan winters are being selected for yield, size, and quality of nuts they produce. In cooperation with the Lake States Forest Tree Improvement Committee the annotated bibliography: "Forest Genetics in the Lake States" was published in June 1956.

The University owns an 800--acre tract northwest of Ann Arbor where several seed sources of Scots pine are planted. These plantings have been the subject of past research investigations and are presently used for student instruction in silviculture. A larch provenance experiment was begun in the spring of 1957 when seedlings representing several origins of European and Japanese larch were planted. Seedlings of the Dunkeld hybrid larch are now in the forest nursery. In a separate larch project, the University is cooperating with Professor Dr. R. Schober of the Lower

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Saxony Forest Research Station in undertaking the American trials of a mass collection of European larch seed. The larch seed was collected by Professor Schober from the best larch stands and phenotypically superior individuals throughout the range of European larch in Europe.

Another part of current research centers upon the genus Populus and is primarily concerned with the two native North American members of the section Leuce: Populus tremuloides (quaking aspen), and Populus grandidentata (bigtooth aspen). The initial phase of this work is a fundamental study of the natural variation of these aspen species in northern Michigan by Burton V. Barnes of the Forestry department. The University owns a 9,000 acre tract in Emmet and Cheboygan Counties near the tip of the Lower Peninsula, which is the home of the University Biological Station. In the summer of 1956, fieldwork was initiated by identifying and mapping 35 geographically isolated quaking aspen and bigtooth aspen clones on poor-quality glacial outwash sand soils. Differences within and between clones will be demonstrated by showing the morphological diversity of the leaves, bark, buds, flower parts, seeds, and seedlings. Branch diameter, branch angle, fall leaf coloration, time of leaf fall, and flushing time will further illustrate the clonal variation. Besides the detailed biological study, data have been collected to assess the growth performance and rate of spread for each clone. The clones will continue as permanent plots of the Biological Station and will afford future opportunities to analyze clonal development.

The purpose of the study is to give a clearer picture of clonal growth and development of aspen and to portray accurately the wide range of individual variation even when site conditions are uniform. It is felt that this type of information will help American and European tree breeders in understanding these highly variable species. It should give them valuable assistance in the selection of desirable parent material for future hybridization experiments. Succeeding studies planned to follow are: (1) The selection of superior clones on sandy sites in northern Michigan, and (2) the vegetative propagation of aspen by root and green cuttings. Seed from several selected and open-pollinated female clones will be germinated and seedlings out-planted on a variety of sites in Michigan and Europe.

Some work has already been started for the future Michigan progeny trials of the quaking aspen x European aspen hybrid. A small population of this hybrid was produced in the spring of 1957 and the seedlings will be transplanted in the spring of 1958. This year more breeding experiments are planned in order to have material in future years for comparison with the large quantities of the European aspen x quaking aspen hybrid produced in Europe. In Europe this hybrid is receiving more attention and seems more promising than diploid and triploid forms of the native European aspen.

In the spring of 1956, several spontaneous clones of the white poplar x bigtooth aspen and bigtooth aspen x quaking aspen hybrids were found in lower Michigan. Several clones of perfect flowered quaking aspen were also discovered. Again this year foresters and botanists of the University will be searching in lower Michigan for these infrequently occurring genetic types and also for natural triploids of both bigtooth aspen and quaking aspen.