

POPLAR, ELM, AND COLORADO SPRUCE INVESTIGATIONS
AT THE UNIVERSITY OF MINNESOTA

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D. P. Duncan

The work in forest genetics at the University of Minnesota School of Forestry, aside from that which Dr. Schantz-Hansen has already discussed, consists of three projects, all of which are tree selection projects. None involves any active tree breeding. One of these is a Populus selection study, a second is concerned with elm selections, and the third involves a seed source study of Colorado blue spruce (Picea pungens).

POPLAR WORK

The poplar selection work was begun at the School in 1947 and additional collections were made during 1948. About 150 selections, including both hybrids from many sources and selected strains of several species, are included. The major objectives of this work have been three: (1) to find selections which are hardy under Minnesota climatic conditions; (2) to determine which selections show most rapid growth; and (3) to ascertain which selections are resistant to disease (including canker, leaf spot, and rust) and to insect injury.

The original collections included materials provided by the University of Wisconsin, by the Northeastern and Lake States Forest Experiment Stations, by the Cabot Foundation, by the Indian Head Station in Saskatchewan, by the Soil Conservation Service, and by many others, in addition to selections of material from promising cottonwoods in Minnesota and Wisconsin made by the School. The cuttings were assembled at Rochester, Minnesota at the Mayo Forestry and Horticulture Institute, where they were planted initially in nursery rooting beds. These rooted cuttings were planted out in 1948 in 12 tree blocks at a spacing of 8x8 feet, and additional field plantings were made in 1949. The site conditions in the planting area are extremely favorable with bottomland loam soils lying just a few feet above the fluctuating water table. The area on which most of the plantings were made is subject to periodic spring flooding.

Each year since establishment, records have been taken on these plantings with the cooperation of the Departments of Plant Pathology and Entomology at the University. These records provide data on the height and diameter growth, the form, and resistance to disease and insect injury of the 150 selections.

At the time of the last inspection of the plantations, when the trees had gone through five growing seasons beyond rooted cuttings, a number of selections had attained average heights of 30 to 35 feet and average diameters at breast height of 5 to 6 inches. Many showed severe cankering. A most interesting relationship between insect attack, cankering

1/ Assistant Professor, School of Forestry, University of Minnesota.

and wetwood has become increasingly apparent and is now being studied. However, considerable additional work must be done before this problem can be completely clarified.

We recognize that it is still far too early to draw any significant conclusions relating to the success of these poplars. Nonetheless, there are among the number in the plantation several which appear to give promise for wider planting in Minnesota. Seven of these have been selected for larger block plantings at Rochester and for trial under the much more difficult site conditions encountered at the Rosemount Agricultural Experiment Station. These seven include:

Mayo	<u>Populus</u>	No. 21	<u>Populus deltoides</u> (U. of Wis. No. 6)
M.P.		No. 51	<u>P. angulata</u> x <u>P. berolinensis</u> (Oxford Paper No. 32)
M.P.		No. 56	<u>P. charkowiensis</u> x <u>P. balsamifera</u> (Dow No. 88)
M.P.		No. 58	x <u>P. robusta</u>
M.P.		No. 93	<u>P. nigra</u> (Cabot Foundation No. 18)
M.P.		No. 123	<u>P. deltoides</u> (collected at Waukesha, Wisconsin)
M.P.		No. 165	Urban poplar (collected from 30-year-old plantation in S. Minnesota, parentage unknown)

These selections are also being planted on the campus in St. Paul where they can be more closely observed.

Populus robusta which gives every indication of being an extremely good prospect for Lake States planting has been pulped on an experimental basis by the Central Research Division of the Marathon Corporation of Rothschild, Wisconsin. Although the final evaluation is not yet completed, these results should soon become available.

In addition to this work with poplars, a small trial is under way to determine whether an extremely fine group of quaking aspens discovered at the Quetico-Superior Wilderness Research Center is the result of a favorable genetic make-up or of exceptionally good site conditions. Aspens 34 inches in diameter without defect discovered there, have been reproduced by root cuttings. In 1949, they were planted along with root cuttings of aspen from medium and poor sites at the Research Center, at the Cloquet Experimental Forest, and at the North Central Agricultural Experiment Station at Grand Rapids.

ELM WORK

The work with elms has been undertaken to find whether species or strains which are resistant to Dutch elm disease and to phloem necrosis have other desirable growth characteristics and are hardy in Minnesota. Hardy selections of Ulmus pumila showing the rapid growth so desirable in windbreak and shelterbelt plantings, which at the same time are resistant to wind and ice-storm breakage, are also being sought. Japanese elm (Ulmus japonica) is being propagated since older trees in the state show many

highly desirable characteristics, particularly for ornamental and shade tree use. The Dutch-elm-disease resistant strain of Ulmus campestris (the Christine Buisman elm) has been found not to be hardy in Minnesota. Ulmus parvifolia, the true Chinese elm, is being tested but appears of questionable hardiness. In order to facilitate vegetative regeneration of elms, as well as other trees which appear to be desirable, a humidity chamber has been constructed in the School's St. Paul greenhouse where experimental regeneration studies will be undertaken during the next few years.

COLORADO BLUE SPRUCE

In addition to its ornamental value, Colorado blue spruce has been found to show the highest survival among all conifers on the heavy soils of western Minnesota. Here it is in high demand for windbreak plantings as well as for ornamental use. However, at least over much of Minnesota, this species shows susceptibility to Cytospora canker which destroys both its ornamental and its protection values. Since Cytospora is usually considered to be a species attacking only weakened trees, a selection which is fully hardy in Minnesota could be expected to show resistance.

In U.S.D.A. Miscellaneous Publication 287, Munns shows the range of Colorado spruce as extending from the Canadian border nearly to Mexico although it is most abundant in Colorado and Utah. An effort has been made by the School to obtain seed from as wide a geographical and elevational range as possible. To date, 14 sources have been secured from locations scattered throughout the Colorado, Utah, and Wyoming ranges of the species. Although Munns shows three small areas in Montana in which the species occurs, seed from these areas has not yet been obtained and appears to be very difficult to secure.

During the spring of 1952, eight sources were planted at the Cloquet Forest nursery and the remainder will be planted there this spring. When transplants become available, they will be planted in various areas throughout the state to ascertain whether any superior strains have been located.