

REPORT OF TECHNICAL COMMITTEE IV.  
INDIVIDUAL TREE SELECTION AND TESTING

This committee has been charged with the developments of two things: first, a working plan for the selection and testing of phenotypically superior trees of one or more of the important native species in the Northeast and second, a working plan for the establishment of clonal seed orchards of select trees. The committee has agreed on one thing to start with, namely, that these represent a couple of "king-sized" jobs.

The general problem that falls to this sub-committee can be summarized in a few words as: the improvement of selected species of trees native to our Northeastern forest, through the selection of "Elite" specimens for propagation, the final goal being to propagate and produce seedlings from these selected trees and make them available as planting stock.

The problem involves, first, the choice of the species to work on that will make the work a productive part of a forestry research program in the Northeast. Certain technical qualifications will, no doubt, guide the choice of species to be worked with such as: the need for quality improvement of an otherwise valuable species, the desire to improve growth rate and volume production for special products, or the needs of a given industry.

If we are to adhere strictly to Committee IV's prospectus and work on "important native species", the field narrows rapidly. The first basis of selection must be of a species that can be readily established by planting on open land. For practical purposes, this restricts our choice to the native conifers and to species of the genera. *Pinus*, *Larix*, and *Picea*. For economic and technical reasons, this means, white pine, red pine, and white spruce, a narrow field indeed. Your Committee feels that its work should be aimed at the most versatile and most economically valuable species, regardless of their place of origin. Sticking to the natives is equivalent to "giving the land back to the Indians". Let's broaden the scope for in the final analysis, the selection will lie in the direction of the interest of the particular investigator doing the planning.

After a species has been selected, the question must be answered as to the criteria to be used for individual tree selection. This undoubtedly will be guided by the material that is to be produced, whether it be timber, pulpwood, veneer, or some product such as Christmas trees.

The third problem in this planning will be the method of selection of the "Elite" trees and the actual physical program for getting at selection for a species that grows over a wide range. Also, after the trees are selected, one of the greatest physical problems is the collection of seeds, if this is to be done without destroying the parent tree.

A problem of no mean proportion after the seeds have been collected will be its storage and the subsequent growing of the seedlings in forest tree nurseries, which should be located within the range of the species that are being tested. After seedlings have been raised in the nursery, the matter of criteria to be used in grading the stock becomes an important problem. Finally, there is the matter of planting out the selected seedlings in suitable seed orchards. In such orchards, it is desirable to have the seedlings grouped according to their parent trees into clonal seed orchards.

From the above description of the work involved in forest tree improvement by single tree selection, it is obvious that a long time will be needed to

develop the necessary seed orchards for most of our valuable timber species. Selection of the "Elite" trees, collection of the seed, growing the seedlings in a nursery, and finally, development of seed orchards to an age and size where they produce suitable seed will take at least 25 years for a species like white pine.

In line with the general problem as outlined, it may be well to examine how a work-plan may be evolved for a given species and a specific product. As the current interest and activity of the committee chairman lies in the direction of Christmas tree production, in so far as tree selection is concerned, the following outline has been prepared as a plan for improvement of Scotch pine as a Christmas tree. This is one of the commonly-grown conifers that has proven acceptable as a Christmas tree. Scotch pine is being grown on a larger scale in Pennsylvania than any other single species and exhibits wide variability. The differences in seedlings from seed of various sources is of concern to nearly all growers.

In selecting criteria to be used for selection of desirable parent trees, the most important single feature that is giving trouble in Scotch pine has been the tendency of certain plantations to go off-color at the onset of winter months. Holding a desirable green color in the winter, therefore, would be criteria No. 1. Another second desirable characteristic that is often lacking in certain plantations is straightness of stem. Third, is length of needle and fourth, a dense growth habit and a moderate growth rate. Armed with the desirable criteria of good green winter coloration, straight stem, short needle length, and dense foliage at an early age, an investigator would be ready to select individual parent trees for propagation. It would appear advisable to consider racial differences along with selection of the "Elite" trees, and to restrict selection to stands of a good race. In other words, it would be desirable to select the best trees in a desirable stand rather than go into a stand of mostly inferior trees to find one outstanding specimen.

After the seeds have been collected, they should be grown in nurseries in various parts of the range where the Scotch pine is to be used as Christmas tree. As this species is relatively easy to raise in nurseries without irrigation, this should not be too much of a problem. However, when the seedlings are at an age when they should be lifted from the seed beds, usually at two or three years, it will be necessary to establish some seedling characteristics as criteria for grading of seedlings in the seed beds. It is obvious that not all trees grown from seeds from a desirable parent will be equally desirable. Also, it is not too well known how true the better-appearing seedlings will keep such seedbed characteristics as needle color, straightness of stem, and length of needle when mature Christmas trees at about 8 years of age in the plantation. It is, therefore, necessary to select desirable seedlings from those grown in the seedbeds and to plant them in seed orchards on productive sites. The final step would be the collection of seeds from successful seed orchards to distribute them to nurseries for propagation. To get any large scale production to fill the demand, it will probably be necessary to establish more seed orchards from the first crops of seeds from the original orchards. Along this line, it is becoming a habit among established growers to select and leave uncut, portions of their plantations which show promise for seed production of desirable Scotch pine.

Inasmuch as at least some of the critical characteristics of timber trees can be determined only after a decade, the need for prompt action in this field is imperative. Perhaps it would be well to organize work on at least

four species immediately, provided project leaders and facilities can be recruited. These would be white pine, red pine, white spruce, and the larches. In spite of a lot of good silvicultural work in the past there is surprisingly little real knowledge of the genetic variations in these species, nor do we know either how or where to look for "plus" trees.

The men in New York, represented here by E. J. Eliason, have made a sound start with the larches, European and Japanese. Plantations are now available that are old enough to demonstrate climatic adaptability, tree form, growth rate, and to bear seed. In fact, some "elite" stands have already yielded seed which has been grown, distributed, and field planted. For the purpose of Committee IV, it would be desirable that cones from the very best trees--admittedly, open-pollinated--could be collected separately.

It is our belief that the foresters already have a tremendous fund of detailed information concerning especially fine trees growing within their operating territory. What we need is a clearing house and pumping station, to gather in these data, collate, catalogue, and distribute them and then inspire agencies and perhaps, individuals to cooperate in the evaluation, collection, propagation, and field planting of the "elite" material. Even though we cannot expect to change the established pattern of seed collection and nursery work, it is high time we made a concerted effort toward better things.

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