THE PRACTICAL POTENTIAL OF A REGIONAL FOREST TREE IMPROVEMENT PROGRAM

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The basic aim of a tree improvement program, when stripped of its technical complexities, is to make available to the practicing forester better forest trees for producing forest crops that are currently available and, furthermore, to make this production possible with a minimum of losses owing to insects, disease, climatic damage, and failure to adapt to site conditions.

At the very beginning of a consideration of the practical potential of a forest tree improvement program we might ask, "Why do we need such a program at all?" Certainly, the figures that have been published on gross regional production of cubic feet of wood show that this should be adequate for some time to come, perhaps for the next 20 years, provided good forest management is carried out. There has been an estimate made that we will need an increase in production of about 50 percent to meet increased consumption, and that this 50 percent increase can be achieved through application of better forest management. Why then do we need a tree improvement program?

I would say we do so that we may get the help of new techniques of the type which can be obtained best through a tree improvement program. We need these to get assured production of the right species at the right time and in the right place. Regional inventory figures which yield gross cubic-foot figures for all species in all locations under all conditions that exist over a considerable area are usually misleading. Using such figures, for example, it can be shown that even a state like Indiana is producing more wood by far than is currently being used. However, when we consider the quality of the trees, their location in respect to markets and industry, and species requirements, we find that there is inadequate timber production in that state.

We have made considerable progress in the practical use of tree improvement to date. For example, genetics has aided in solving one of the earliest problems in silviculture, the choice of trees to leave as seed producers. For many years we have talked in silviculture of leaving superior trees as seed trees but have always given way to the so-called practical approach which is leaving trees that aren't suitable for harvest. I believe newer work in genetics has greatly strengthened our position in demanding that better trees be left as seed production agents for the future generation.

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Although we have come a long way on this road, in practice it is still almost impossible to distinguish between internal defects that are hereditary and those that result from external environment and are not inherited. Potential resistance to insects and diseases is practically an untouched field, although variations in resistance are well known. We take the attitude that to be safe, and until definite information is available, leave only trees that appear good. However, we could use more information that will help us definitely distinguish hereditary defects and resistance from those caused by environment.

Back about 1934, Professor Schadelin in Switzerland published a concept of "Thinning as a selection and improvement system of highest value." This school of thought put thinning on a biological basis rather than on a mechanical or economic basis and emphasized that production of large amounts of high-quality timber could be done only by careful tending of the stands. This meant that individual selection for improvement of forest stands must be carried out through all the various stages of stand development, beginning with weeding the young growth, and proceeding through cleaning and thinnings into harvest of mature timber. While this has been carried out for a number of years by a few silviculturists, particularly in hardwood areas, the question still remains of how to assess a tree at an early age as to its probable quality at the time of harvest. This calls for better techniques in actual selection of individual trees and is where a forest tree improvement program can help.

Since the beginning of forestry in the United States we have had experience with the introduction of foreign species. Many of these were simply "shots in the dark" where such trees as Scotch pine, Corsican pine, and Austrian pine or hybrids between North American and European cottonwoods were brought into the country, tested briefly, and unfortunately used for widespread planting. To date, I would venture to say that introduction of exotic species into our country has been of dubious value to the practicing forester. It has produced some very expensive lessons such as that experienced by pulpwood companies in the East with hybrid poplars before they realized that they would be damaged by poplar canker.

However, I am optimistic enough to believe there is still a possibility of introducing exotic strains into certain regions of the United States. In a country like Brazil, for example, the exotic eucalyptus is the backbone of the charcoal and pulpwood industry, and other promising exotics have been tested, some to fail and others to look very promising. The fact that Brazil is a country with a wealth of species, even beyond that of the United States, leads me to believe that there is still a great deal to be gained by us through testing foreign species in a tree improvement program, particularly where extensive reforestation is involved.

It should be a practical part of a tree improvement program to carefully test and evaluate promising introductions. These tests must extend beyond the nursery rows or the controlled plots of the researcher and be

introduced into field conditions in area plantings before any new trees are put into practical programs.

One of the most important contributions that tree improvement has made to forestry in this region is recognition of the importance of seed source in tree planting and reforestation. There are long-standing experiments in the Lake States that have yielded valuable information on this point. It has also been very impressive to read report after report on seed source tests over the country that almost invariably end with the statement that the local species or those from the nearest sources are best. I don't believe this will always be the case. As a matter of fact we have seen that this has not held true in certain regions and countries where exotic species have outperformed the local ones.

More recently techniques for selecting high-quality seed production areas have been emphasized through tree improvement programs. The value of collection of seed from high-quality stands has been an accepted theory for many years, but, unfortunately, even today it is not being followed owing to the pressure of expanded stock production and the consequent need for large quantities of seed by many nurseries. Sooner or later, however, one of the great contributions of a tree improvement program in this region will be acceptance and practical use of high-quality stands for seed production areas.

More recent developments in tree improvement programs have been in connection with breeding of selected, high-quality trees and the subsequent testing of the progeny or seeds produced by them. This is being done to develop improved races or strains from both exotic and native species, and has a great deal to offer if properly carried out and if regarded in its true light as a long-term project aimed to give a solid foundation for the future. I recall some time ago receiving a copy of the Wall Street Journal in which there was an article playing up the production of super-pines in the South. A note was attached to this article from the president of the university asking, "*Why* don't we do something like this?" My opinion at that time and now, too, is that this is not a crash-type of program that you rush into to get super-trees in the next few years, but it must be a long-term breeding and selection program that will have much to offer over a long haul if properly done. At that time, we were more properly interested in getting better stocking of forest stands with native species and improvement of production through better forest management than with tree breeding as a crash program.

To sum up the preceding analysis of practical applications of forest tree improvement, I believe the following potentials can be offered by a regional program:

1. We could get better information on how to select genetically desired seed trees and thus leave them, with more assurance that it is economic to do so. We should have better keys to internal quality in our selection of these trees than is currently possible.

2. We should be able to make a better selection of trees of potential high quality in young stands to favor in silvicultural operations.

3. We could through better testing of exotics prevent costly mistakes, and perhaps add some valuable species to our planting stock.

4. We could develop programs to select, locate, and maintain better seed sources from natural stands.

5. We could develop better strains of valuable species for future seed production in seed orchards.

6. We could develop disease and insect resistant trees. While this now is being done with some of our historically damaging diseases like the white pine blister rust and common insects like the white-pine weevil, a great deal more must be done. Help in reducing insect and disease damage is probably the most important potential of a forest tree improvement program.

I believe developing these potentials would lead to improved silvicultural management of our natural stands for higher yield and better quality, and make possible a more efficient planting program using better stock aimed for specific purposes. In other words, a tree improvement program can work towards producing the right species at the right place in the right time, and will, in the long run, help develop a better economic structure in our wood-using industries.