THE SCOPE AND MAGNITUDE OF FOREST GENETICS RESEARCH

by

V. L. Harper, Assistant Chief for Research
Forest Service, U. S. Department of Agriculture

This large group of scientists and practicing foresters meeting here to discuss forest tree improvement is one of the outstanding recent developments in American forestry. Twenty years ago such a meeting would not have been possible. Even 10 years ago, we would have been hard-pressed to have found more than a dozen or so persons in our whole country sufficiently interested to attend a meeting concerned with forest genetics or forest tree improvement. Now, however, there are five regional forest tree-improvement committees or associations actively organized and holding meetings regularly to talk over problems and projects in this relatively new and fascinating subject-matter field.

Why this rapidly developing interest in tree improvement? Why has it taken forest tree improvement so long to catch on? in comparison with farm crops, the interest in improving forest crops has taken a long time to develop. The basic reason, I suppose, is that up until recently there hasn't been a widespread interest in growing timber as a crop. But now that we are concerned about forest production, it is only natural that we turn to tree-breeding, selection, and all the other factors of tree improvement as a promising means to the end of better quality forest trees and trees that are faster growing and pest-resistant.

We have faith in what tree-improvement research can do for forestry. Plant improvement has done a great deal to improve agriculture, so, why can't we improve forestry along the same line? I certainly think we can. But at the same time, I wouldn't want any of you to expect overnight miracles. If we make real progress it will come from substantial and sustained effort of competent scientists who have the understanding and cooperation of the forestry industries, the State and Federal forestry agencies, and the forest land owners interested in producing better crops of timber.

Fortunately, we have the benefit of early efforts in *tree* improvement on which to build. These early efforts give substance to our feeling that tree improvement is important and can be counted upon to fulfill promising expectation. For example, some 30 years ago, Phil Wakely began his study of the growth and development of loblolly pine from different seed sources. The results of this study, not large or time-demanding but executed with care, have been so impressive that *few* foresters in the South are now unaware of the great importance of

planting seed obtained from the proper source. I'm not saying we know, as yet, anywhere near as much as we should about the proper seed source; but surely, this study pointed-up the problem and the need to find a solution, I suspect that Wakeley's early study had a significant bearing on the decision--in which you as a group made--a few years ago to launch a cooperative, South-wide seed-source study which extends from Maryland to Texas involving participation of many agencies and individuals.

Other early efforts aimed at tree improvement are: The racial studies of Douglas-fir in the Pacific Northwest, started before World War I by the Forest Service; the development of hybrid poplars by the Oxford Paper Company in the 1920's; the preliminary work in the 1930's by the Forest Service in exploring the possibility of selecting slash and longleaf pine for high gum-yield; the establishment of the Eddy Tree Breeding Institute at Placerville, California, in the 1920's—established by Mr. Eddy, a lumberman, and later deeded to the Forest Service. These are only a few of the early efforts which were the beginnings of the larger programs of forest tree-improvement research which we have today that are being conducted by Federal, State, and private agencies.

Just how big has this research program become? In the Forest Service research organization we have at the present time about 24 man-years of technical time going into forest genetics and the closely related work in tree improvement of forest physiology, forest pathology, forest entomology, and wood anatomy. Assuming a cost of about $12,500 per technical man-year--including besides the salary of the technical man the cost of clerical, subprofessional help, and other expenses--the total annual expenditure of the Forest Service for tree-improvement research is about $300,000. The research is conducted at 7 of our regional forest experiment stations and at our Forest Products Laboratory. Some of our Forest Service projects are concentrated at centers such as at our Institute of Forest Genetics at Placerville, California, and at our Southern Institute of Forest Genetics near Gulfport, Mississippi, and at a new center being developed at Rhinelander, Wisconsin. At these centers we maintain a team of scientists drawn from the various disciplines needed in a well-rounded attack on the problems of tree improvement. Others of our projects are conducted at lesser installations. Some are pretty small. Much of our work is conducted in cooperation with other agencies. A good example of such cooperative research is that going on here in the State of Georgia where a private foundation, forest industry, the State forestry agency, the University of Georgia, and the Federal Government combine their efforts in a well coordinated program.

A recent survey of forest genetics in the United States by Jonathan Wright showed that in 1955 there were 28 colleges or universities with one or more tree-improvement projects underway. In addition, 8 states had projects being conducted by their State forestry agencies. The survey also showed 8 private foundations and industry groups working in this field of research. This survey did not show dollar amounts being expended. A fair estimate of the non-federal expenditure, however, is about $600,000 per year.

The Forest Service's annual expenditure for tree-improvement research is believed to be about one-third of the total expenditures of all agencies for such research. It was about one-third in 1953 when Kaufert made his survey for the Society of American Foresters. Since 1953, all agencies have increased their expenditures. Assuming the increases have been somewhat uniform among agencies, I accordingly estimate that all agencies together are now spending about $900,000 per year on this type of research.

In contrast, according to Kaufert in 1953, the money being expended yearly for breeding and improvement programs on such farm crop plants as cotton and corn is in excess of $5,000,000. He asks whether we should not be spending more for forest crop plants considering their relatively higher economic value in our economy. I would say yes.

Nevertheless, $900,000 per year for forest genetics and closely related research is a sizable outlay and we are all naturally concerned that we get as much for the money as possible. The fact that these expenditures are spread over many agencies and projects lends weight to the concern and has caused some people to wonder whether coordination is as good as it could be, i.e., whether there might not be some wasteful duplication of research going on.

Frankly, my own study of the question leads me to believe that the coordination of tree-improvement research is good and that, considering the newness of the expanded effort, there is less waste on than one would normally expect.

First of all, some aspects of tree- improvement research, such as determining the bearing of geographic races on breeding of superior strains of trees, require replicating the research in several localities, and this can best be done through the participation of several agencies, often through small outlays on the part of each. For example, most, if not all, species of southern pines are made up of several distinct geographic races. Loblolly pine from Maryland and from Texas seed, tested in both Maryland and Texas in connection with the Southwide pine seed-source study of the Committee on Southern Forest Tree Improvement, showed startling different responses in the two places. In a Maryland nursery, seedlings of Texas origin were conspicuously killed back by low winter temperatures which left Maryland stock uninjured. In Texas, by contrast, the majority of Maryland seedlings succumbed the second summer after planting to high temperatures under which Texas seedlings throve. None of the foregoing important information could have been obtained except by layering out t plantations in both Maryland and Texas, The second plantation was not wasteful duplication, but necessary replication.

Secondly, our regional stations have the benefit, as do the States and other agencies involved, of advisory committees including Tree Improvement Committees such as this one meeting here today. It is especially good for the program as a whole for research workers and representatives of action agencies to get together and discuss each other's projects and problems. In this way research administrators can determine gaps in the

tree-improvement research program and where current program may need reorientation to meet as squarely as possible the important problems disclosed. So far as the Forest Service is concerned, there is a pretty good mechanism in effect which helps to assure coordination. In Washington we maintain a record of all Forest Service projects in tree-improvement research and seek to coordinate this activity among our various regional stations.

Finally, the selection of projects with the desire to avoid wasteful effort is an inherent quality expected of competent scientists. No scientist worthy of his profession, would care to unnecessarily duplicate the research of another. Each wants to make an original contribution. It is hollow glory to him who merely confirms someone else's findings without extending the general knowledge of tree improvement. A scientists standing is determined by his contributions to knowledge and by the regard in which he is held by his colleagues. There are no second prizes for research.

So, I say that I believe there is pretty good coordination and a minimum of wasted effort going on in the tree-improvement research field. In summary, my reasons are that what may appear superficially to be duplication may, in truth, be needed replication required by the biological nature of the material dealt with; that the system established for achieving coordination, including advisory committees and very active regional tree improvement committees, is functioning very well; and that the scientists concerned want a coordinated program and by themselves naturally strive to avoid duplication.

In closing, I want to pay tribute to the large amount of cooperation which is going on in this important field of research. I have already mentioned the Southwide seed-source study of southern pines involving many agencies and individuals throughout the entire South. Similar studies are underway or being started in other sections of our country with eastern white pine and ponderosa pine. The exchange of hybrid seed and of informs• tion on techniques and progress in forest tree breeding is not only on a regional and national basis in this country, but is on a world-wide basis.

I especially want to express my deep appreciation to all of you who are giving your time and effort as members of and participants in the Southern Tree Improvement Committee. It is a fine thing for the South that it has such a public-spirited group. It is a fine thing for forestry. It augurs well for the future progress of tree improvement.