

# OBJECTIVES AND SCOPE OF RESEARCH IN GENETICS OF SOUTHERN PINE

By

I. T. Haig, Director  
Southeastern Forest Experiment Station

## Introductory Remarks

It is indeed a pleasure to see a group of this size, representing a cross section of the leading forest interests and agencies in the South, gathered together to discuss a topic as technical and of as long range a character as forest genetics--southern tree improvement. To my knowledge, this is the first meeting of its kind in this area.

If we are successful in making a beginning in tree improvement-- and like all essentially pioneering efforts the beginning is certain to be difficult, our progress slow--the potential contribution that superior trees could make to the productivity of southern forests may well make this meeting in time one of the major milestones in southern forestry. Your attendance here today, the widespread interest it indicates, argues well for the success of this effort.

I think we are right to look forward with optimism. As all of us realize, the development of superior plants and animals through introduction, selection, and breeding is one of the great achievements of American agriculture. Poultry that produce more eggs, pastures that produce more beef, better wheats that are hardy and disease resistant, hybrid corns, hybrid cottons, hybrid tobaccos, these and many other products of the breeder's art are now commonplace in the agricultural world. Agriculture's remarkable production record over the past decade, a record of higher yields with less labor and, little or no more land, is due in no small part to superior plants and animals, the results of introduction and breeding. What farmer, except perhaps the poorest and most shiftless, would now plant an unimproved variety of wheat, or potatoes, or tobacco, or cotton--if indeed the seed of unimproved varieties could be obtained at all?

Yet, as we know, how different it is in forestry. Though we are now planting annually over 200 million trees in the South alone, few of those trees--for all practical purposes none--are of superior or selected stock. Most of our tree seed is undifferentiated except by species, without distinction as to race, type, or even point of origin.

Yet increasing knowledge of natural variation, including knowledge of racial strains varying widely in growth ratio, form, hardiness and wood quality; the occurrence of hybrid vigor; the possibilities offered by interspecific crosses, the existence of polyploids among trees; all promise the possibility of results with trees equal to those obtained by breeders in other plant fields. Admittedly, the difficulties are many and formidable. Yet with all of these, and it does not seem necessary to review them here, I doubt if we can continue to justify,

as professional foresters, the planting of unselected, unimproved trees on hundreds of thousands of acres in the South; in delaying any longer the initial steps necessary to take advantage of at least the preliminary improvements well within our grasp. Certainly we in America are already falling behind the Europeans in the use of superior seed and stock, though their knowledge is essentially no further advanced than our own.

#### What Can We Do Now

The objectives and scope of research in forest genetics in the South should ultimately be very broad--the production of superior trees for our region and climate--trees superior in growth rate, quality, disease resistance, naval stores production, and numerous other tree characters of biological and economic importance. At this working conference it is hoped that we can review present knowledge, outline a practical program for southern tree improvement, and plan for necessary cooperation and coordination. For practical reasons it might be well to focus our attention on the southern pines, with special emphasis on superior pines for planting.

Along this line could we not, now, take the following steps:

1. Insist on planting stock grown from seed of known and local origin. Comparable demands are commonplace with farmers with crop seed. Farmers are conscious of hereditary values and the seed industry is organized to supply them with stocks of known genetic quality. The same should be true in forestry. If seed and planting stock of known origin costs something more than seed of unknown origin, be willing to pay the difference. There is every indication that reasonable additional costs will be amply repaid.
2. Institute better methods of seed collection. Seed collections are now often made from trees and stands chosen solely for convenience in collecting and transporting. Indeed, the natural tendency is to make collections from recent fellings or from isolated broad-crowned, abundantly flowering trees where cones are easiest to reach. Collections, without control of mother tree or collection areas, involve a very serious risk of getting seed with bad hereditary properties, resulting in poor future timber production. In Sweden collections made in this way have already resulted in serious deterioration in plantations in northcentral Sweden, leading many owners to abandon their reforestation programs. It is a fair bet that many of our present plantations will also be somewhat disappointing due to the dysgenic character of past seed collections. Certainly we should not delay in improving our methods. This may require State seed collections, or strict State control of tree seed collecting.
3. Organize a survey to identify stands and trees of superior vigor, form, and other desirable quality. For the present this might be restricted to pines, though work should begin soon with other species. The U. S. Department of Agriculture sponsored such a survey of superior germ plasm for all crop plants and animals over 17 years age. Such a survey would be aimed at locating superior stocks for seed production and breeding.

Superior (elite) trees and stands should be preserved, preferably by direct conversion to seed orchards or by vegetative propagation in orchard form in State arboreta or similarly suitable places. Plantations now reaching seed-bearing age offer a particularly attractive source of identifiable superior germ plasm. Progeny from elite trees and stands should be tested in tree shows, i.e., by planting in small groups with average stock for comparison. The experience of the State agricultural colleges in handling and testing breeding stock in agriculture and horticulture would be a great aid in such tasks. Here is a chance for State agencies to expand their forest research, admittedly too small in the past, in a useful and challenging field. Someone should be responsible for collecting in a genetic arboretum representatives of the principal races of the native trees of the South, together with closely related species and exotics of probable value in the region, in a tree breeding program. Such a collection would have immense and irreplaceable future value. Here again an endowed, educational, or State agency might well take the lead. Amateurs, universities, foundations State agencies, the Federal Government, and private forestry societies might all well contribute to such a program. In Sweden, it is interesting to note, some of the most effective work is now being carried out by the "Society for Practical Forest Tree Breeding," an association of several middle and north Sweden forest industry

4. Stimulate an adequate controlled-breeding program similar in general outline to that carried on with other plant and animal groups, but omitted or badly neglected so far with trees. Such a program should involve cytological studies and studies of vegetative propagation, as well as controlled breeding experiments. Most of those things could be undertaken on a small scale if reasonable continuity and preservation of breeding stock could be assured.

In summary, the difficulties in any program aimed at producing superior trees for planting are admittedly great. But we now have available tools formerly lacking, better knowledge, better methods of grafting, seed stimulation and seed storage, and maturing plantations as a source of identifiable superior trees. And the way to begin is to begin. Some immediate steps can be taken now without great difficulty if the cooperative effort of existing agencies can be secured. The potential gains are so promising that we should begin now to produce "Superior Pines for Planting."