11. POSSIBILITIES OF GENETICS RESEARCH IN SOUTHERN HARDWOODS

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The principal purpose of these notes is primarily to try to assure that Southern Hardwoods will not be entirely overlooked in considering the possibilities and logical course of genetics research as they have too often been in the past in other connections. They supply 8 to 10 percent of the total saw timber requirements of the United States, serving many especially exacting and essential purposes for some of which we are already having to import suitable timber. Therefore, if there is any probability of substantial results, Southern Hardwoods should certainly command a commensurate proportion of the genetics effort.

None of us who are working on the problems of this sub-region is particularly qualified as a geneticist nor has anyone, so qualified, particularly considered any of our species but cottonwood. Therefore, we can only speculate and surmise. Nevertheless, we have become convinced that the possibilities may be even greater than in pine and perhaps easier of realization and that some definite immediate necessities are already in view. Accordingly, I presume to present here a sketchy outline of our observations and thoughts on the subject.

First; a few remarks upon the apparent possibilities and opportunities:

The simple fact that we have so very many species and natural hybrids, not only all together but within several genera, may in itself indicate great genetic possibilities. This especially since there are great and obvious inherent differences between species in site adaptation or ecological requirements, growth rates, form and branching habits, susceptibility to insect attack and other degrading and degenerating influences, technical properties of the wood, reproductive and competitive capacity, etc.

However, the greatest and most practical opportunities are no doubt to be found in the very great range in numerous apparently inherent characteristics within species. Such characteristics as general form and branching habit (incl. tendency to epicormic branching), susceptibility to attack by wood boring and bark scarring insects and to mineral stain, diameter and height growth rates, wood properties, tolerance of drought, tolerance of soil saturation and flooding, adaptation

1/ Maintained in cooperation with the Mississippi Agricultural Experiment Station and the Southern Hardwood Research Group.

to plastic soils, etc., appear more or less inherent in individual trees. It is not at all uncommon to find trees, conspicuously superior or inferior in one or more of these characteristics, growing in groups or groves of quite ordinary trees of the same species and approximate age class, under apparently identical circumstances.

For instance, perhaps Nuttall oak is the least drought tolerant bottomland species of great economic importance, especially on low waxy clay flats. Nevertheless, even on such sites an occasional lush, green tree; usually of superior stem quality, too; may be found within a grove of trees that are largely dead or dying under apparently the same ecological circumstances. Likewise, cherry bark oak is especially notable for rapid diameter growth and good quality, as to both prospective lumber grade and technical properties of the wood. Still, within a group or a grove, growing under apparently homogeneous conditions at a general diameter rate of 3 to 4 inches in 10 years, a conspicuous individual may often be found io be growing at the rate of 6 or 7 inches, and even more, in 10 years. Rather generally, such trees have notably superior stems in form and quality as well.

Next; as to silvicultural and economic needs and the advantages that may accrue in serving them: Although hardwoods on appropriate hardwood sites will grow even faster than pine, the urgency to attain rapid growth is relatively even greater because hardwoods must attain substantially greater size to have the same economic consequence. Likewise, although there are great economic advantages in good form and high quality in all species, not only are these advantages multiplied several times in hardwood but failure to attain them in some degree carries the insufferable penalty of economic extinction. Thus, there not only may be exceptional reward for genetic accomplishment but, considering the deplorable degeneration of our stands through over 40 years of high grading, such accomplishment is a definite necessity. Actually our most generally essential silvicultural measure, after protection, is improvement cutting and it is fundamentally a crude genetic measure.

Also, there are relative advantages in the carrying on of genetics work in hardwoods such that results in some lines may be more readily attained. The most obvious and perhaps greatest of these is the ability of perhaps all of the species to reproduce vegetatively. Some do so with complete freedom while others require special stimulus and coaxing, but so long as it can be accomplished with any dependable facility at all, the advantage must be very substantial. There is, too, the ability of the poplars and willows, at least, to fruit on cut twigs kept for a few weeks in protected receptacles in the greenhouse. Obviously, this vastly simplifies the breeding procedure. I frankly do not know whether we have other technical advantages or not but, considering the long list of diverse species which we must at least consider, it would be strange if we cannot discover other advantages to offset the complexity.

Finally, regarding what little we are doing and may do in the near future:

Through a long course of experimentation, we have discovered and established the prerequisites and techniques for successful direct field planting of cottonwood cuttings. This has comprised our principal effort, thus far, in planting and we chose this species for concentration because of its phenomenal growth rate and its very superior ability to reproduce vegetatively. The principal technical obstacle remaining to be surmounted is the extreme variability in vigor and quality and the high proportion of weaklings and runts in the woods-run lots of seedlings and .recent sprouts from which planting stock has had to be cut. Dependably uniform stock of the highest vigor and quality is needed to warrant the necessary outlay in site preparation and cultivation. Given it, however, we feel that we will be well on the way to realization of the species' potential production of about 4 cords per acre per year or about 1,000 feet of logs, plus 2 cords of wood.

Accordingly, we have made a small exploratory beginning at trying to identify and multiply clones of uniform, superior cutting stock from cuttings taken from selected trees of pole and small saw timber size. There are, as yet, only four such trees on trial and only a few cuttings from each rooted so that no definite report or even prediction can be made although indications are encouraging. This work will be greatly expanded this spring. We have, also, tried culling, by 30 to 40 percent, run-of-the-bar seedlings used for cutting stock in establishing two cutting nurseries. The produce will be culled still further before field planting. Although we are just now up to the first field planting, there is an apparent great improvement in the stock.

Finally, we are looking forward to work with a variety of species through experimenting with practical means of inducing cuttings to root more readily. Substantial possibilities are indicated with sycamore and green ash and meagre possibilities with Nuttall oak while sweet gum shows none. We hope to enable direct field planting of unrooted cuttings as with cottonwood but any success at all should facilitate future genetics work. The only breeding which we visualize undertaking, as yet, may be crossing of certain poplars in the hope of developing a good tree adapted to swamp planting.

So much for the hardwood situation as we now see it dimly and the little that we are already doing about it. However, the main points of my message are, simply, that there is certainly a large place for hardwoods in any long range genetics program for the South. Also, that we are most anxious for advice and guidance as to how best to cooperate in filling that place.