Site Preparation, Fertilization, Other Cultural Practices

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The prediction of future developments in almost any field of human endeavor is a chancy matter. Such predictions are uncertain because man is endowed with the intelligence not only to reach great heights of achievement but also to make colossal blunders. Few would have believed 40 years ago that we could reach the type of affluent society in which we now live or would have predicted on the other hand a second World War, more terrible than the one through which that generation had just passed. Now we see the possibilities for material and cultural progress menaced by forces which could wipe out most of the human race.

In spite, however, of such great uncertainties and the fears of a biologist like Dr. Ernst Mayr of Harvard that the human race may already have reached its peak in development of brain size and intelligence and the trend may be in a downward direction, I am optimistic that man can solve his problems and will continue to produce startlingly new methods of accomplishing constructive goals.

My optimism carries over into the field of forest management in which here in the South we have made notable progress. Favorable economic factors have enabled us to introduce forest practices which paralleled in intensity many of those developed in agriculture. Mechanized tree farming is no longer something to dream about but is here. In pine management we prepare sites with harrows and choppers, or by chemicals. To improve drainage some are throwing up ridges like the celery beds of south Florida, and digging canals in deep swamps. Fertilizing tree crops may be a practice just around the corner. Timber stand improvement with tractor-mounted mist blowers or by aerial spraying with silvicides has been carried out on extensive areas. All this is apart from forest genetics programs from which we anticipate sizable dividends.

The degree to which cultural practices will be intensified is dependent on demand and supply and a host of other economic factors of a national and international nature. Time does not permit a detailed discussion of these questions, but we cannot forget that wood is grown by the forest industries as a raw material for products and those products must be sold at a profit in order to continue in business.

The current over-abundance of available pine timber in many areas of the South is a matter of concern to private forest owners with wood to sell. Nor does this situation put any pressure on the forest industries to intensify cultural practices.

On the other hand, long-range forecasts indicate a tightening of wood supply against demand. In fact, the authors of the recent book, "Resources in America's Future" (Landsberg et al. 1963), in their interpretation of the Timber Resource Review (U. S. Forest Service 1958) and other source material, see some serious deficits by the year 2000. They suggest that the median demand, as projected in their report, is not likely to be satisfied without serious depletion of forest stands.

The pressures on timber supply will be of two kinds: increased demands for forest products, and a diminishing forest land area. Timber deficits, they believe, will have to be met by more intensive forest management, use of substitutes, and possibly more imports.

It is the judgment of the authors of this report that the land resource in the United States overall will be adequate only if yield and efficiency levels, as projected, will be reached.

I am not prepared to evaluate critically the assumptions and projections in this very comprehensive study. It could be, however, that a population of 330 million by the year 2000 will place demands on the forest resource which will force a high degree of intensity in forest practices joined with careful allocation of forest land to various uses.

However we may predict the future of forestry, intensification of forest practices by the wood-using industries on their own land will continue to be dependent as much on business considerations as on economists' projections to the year 2000. Management has to decide how much can be invested in the growing of the tree crop in relation to rate of return on its investment. On the more intensively managed forest lands I assume that present programs to build up growing stock to levels which will meet anticipated requirements will be continued.

This is not to say that the industries will disregard the results of research by the forest experiment stations, forestry schools, and their own research staffs where analysis shows that modest investments in new cultural practices will pay off. I simply want to emphasize the fact that the forest industries are spending more time and effort on cost analysis than ever before and must show a

good economic justification for additional investments in forest management.

In this connection it is instructive to take note of a statement made by Yoho and Muench (1962) in considering the fact that labor productivity in the woods must be increased in the South in order for the forest industries to remain competitive. I quote: "the only likely way of achieving this in forestry and logging would be through the means by which it has been accomplished in other sectors of our economy—namely, through increasing the ratio of capital to labor . . . . In this regard, perhaps the greatest contribution which the industrial forest manager could make would be to cast off many of the shackles of the classical concepts in forestry and to concentrate upon growing a uniform product. In this way he could increase the feasibility of substituting capital for labor all along the forest production line."

Will more intensive forestry cultural practices be adopted by the thousands of small forest landowners and farmers who produce the bulk of the timber in the South? One obvious answer is that they may find it profitable to do so if they have markets for their wood products at a profitable price. I am afraid, however, that the answer is not as simple as that.

W. B. Lord (1963) may have brought out the best answer to this question. He suggests that more important investments are open to farmers in the farming enterprise and forestry investments must take second place. Changes, therefore, are necessary in farm organization to form larger accumulations of capital before farm forestry becomes more attractive as a business undertaking.

Realizing all the economic uncertainties in the forestry enterprise, I shall make a few modest predictions about forestry cultural practices in the South with some data to back them up.

1. Site preparation of wild land for pine plantations will be intensified. Subsoiling on some sites may be practical. Bedding to improve drainage shows real promise. An analysis by my company of slash pine plantations growing on unbedded and bedded flatwoods land shows that bedding has increased present plantation value by $11.60 per acre. This discounted present value is based on the assumptions that 400 trees per acre will be harvested at age 30 and that bedded plantations will accumulate their current growth advantage to that age.

A company owning a 30,000-acre property in south-central Florida reports that it has obtained per-acre yields of pine by bedding, as contrasted with burning only and chopping, as follows:

Burning only 5 cords at 18 years
Chopping 5 cords at 15 years
Bedding 8 cords at 12 years

2. Fertilization of trees on sites where soil deficiencies exist will be widely practiced. Better knowledge of forest soils, including the part played by mycorrhizae and other micro-organisms, and the physiology of trees may well enable us to increase yields economically with fertilizers even on average and good sites.

On the basis of experiments with first-year applications of phosphorus to 1-year-old slash pine plantations on bedded sites, we have found that discounted present value is increased through fertilization by about $14 per acre. This, of course, assumes that the present growth advantage will be maintained.

We have fertilized 630 acres of young pine plantations this spring, applying 200 pounds of triple superphosphate per acre by airplane. This is wet "pitcher plant" land near Carrabelle, Fla.

If this pilot project proves successful in terms of increased growth, we shall assume a shortened rotation advantage and probably fertilize additional acreage. Fertilizer and application cost came to $7.25 per acre. The job was contracted to Christopher Dusting Service of Okeechobee, Fla. This firm used Grumman Ag-Cat planes carrying 1,200 pounds per load.

3. Thinnings in natural *stands will have* to *be highly mechanized* to be economical in the slash pine belt where stagnation occurs at such an early age. Mechanization of woods operations, however, has still so far to go that we cannot predict what economies there will influence stand treatments.

4. Plantations will be grown at wide spacings without thinnings and *clearcut.* Uniformity of growth will result in a more uniform product to the industries.

5. Plantations will be cultivated as well as fertilized.

6. Timber stand *improvement, widely practiced* today, *will be intensified* as new, more effective chemicals come on the market. Phil Briegleb, in reporting to the SAF meeting at Atlanta last fall on progress in technical forestry in the South, said that research has shown that an investment of $5 per acre for release work can raise the value of timber growth over the following decade by as much as $50.

7. Insect and disease control will have to be intensified. We are looking to the research organizations to find the answers. It is a serious question as to whether enough is being done now, or is being planned in the immediate future, to meet the many unsolved problems in entomology and pathology. I believe that a larger percentage of the research dollar should be going into basic and applied work in these fields.

These are a few of the cultural means, along with genetic improvement, that we shall probably employ to grow more wood and a more uniform product per acre. And I have little doubt that those of you who are on hand by the year 2000 will have seen other developments in forestry practice that will dwarf anything yet attempted in the sixties.