Reprinted from the JOURNAL OF FORESTRY, Vol. 58, No. 9, September 1960

Forest Planting Practices Are Often Ineffective

Large-scale planting operations with loblolly pine have been and will continue to be made on recently cutover lands in the Coastal Plain. The time is rapidly approaching when seedlings from seed orchard sources will be outplanted. In Virginia, it is estimated these plantings may begin as soon as 1965. When the time comes, the land managers will surely want to make good use of this superior planting stock. What are the factors that make forest planting more costly, less certain, and assuredly less productive, when compared to old-field plantings?

Logging slash and stumps of harvested trees present barriers to man and machine and prevent precise spacing. Remaining live vegetation reduces survival, early growth, and maximum later growth of the planted trees. These facts

are obvious to all and the treatments used are primarily designed to move obstructions or reduce competition, with tillage often a secondary objective.

The problems of site preparation involve both engineering and silviculture, with the various costs and benefits yet to be evaluated.

A recent survey of forest land plantations at age 3[1] showed the relative effectiveness of cultural practices commonly used in 1955 and still widely used. One-third of the total plantations were bulldozed, one-third disked, and the remainder had no treatment. Logging was carried out on some areas and not on others. Large hardwoods were controlled by chemicals on all but the windrowed bulldozed areas.

The effectiveness of these plantings was seriously reduced by four factors. Alone or in combination, seedling mortality, irregular spacing, overtopping by competition, and unplanned for natural loblolly pine seedlings prevented good utilization of the planting stock. The average loss or ineffective use of planting stock is shown in the following tabulation:

	Per acre
Planted seedlings (estimated)	900
Survival at 3 years	579
Less seedlings clustered	68
Surviving seedlings well-spaced	511
Less well-spaced seedlings overtopped	91
Surviving, well-spaced, free-to-grow seedlings	420
Less well-spaced, free-to-grow seedlings duplicated by free-to-grow natural pine	180
Effective planted seedlings	240

The major loss was mortality, with other serious reductions attributed to competition and the presence of natural seedlings. If natural seedlings are acceptable, 27 percent of the planted seedlings were useful. In case natural regeneration is not acceptable, 53 percent of the planted pines may become a useful part of the young stands. For this higher percent to be useful, the planted pines must outgrow and suppress natural seedlings. This was not evident at age 3 except on a few bulldozed plantations where many natural seedlings were one or two years old.

[1]Trousdell, Kenneth B. Site treatment reduces need for planting at loblolly harvest time. U. S. Forest Service, Southeast. Forest Expt. Sta. Paper 102. 11 pp. 1959.

TABLE 1.—A COMPARISON OF THE BEST AND POOREST UTILIZATION OF 900 PLANTED SEEDLINGS

Factor	Effective planted seedlings per acre			
	Best practices		Poorest practices	
	Number	*Percent*	*Number*	*Percent*
Survived (3 years)	882	98	324	36
Well-spaced	882	100	233	72
Well-spaced, and not overtopped	882	100	133	57
Well-spaced, not overtopped and not duplicated by natural seedlings	829	94	23	17

The figures showing reduction in effectiveness of planted seedlings in the tabulation are average values and as such do not show the range encountered in this survey. The same estimates for each of the 36 plots were reviewed and the best and poorest utilization for each cause-reducing effectiveness in numbers of planted seedlings converted to percent.

With the best usage of planting stock, survival was 98 percent, all were well spaced and free of overtopping competition, and a nearby vigorous natural seedling was not present in 94 percent of the surviving planting stock. With the worst usage of planting stock, the poorest survival was 36 percent, only 72 percent of the surviving planted seedlings were well spaced, 57 percent of the surviving well-spaced were not overtopped, and only 17 percent of the surviving, well-spaced, free-to-grow planted seedlings were placed so that vigorous natural regeneration would not have adequately stocked the planting spot.

These percentages have been applied to a planting rate of 900 per acre to illustrate the wide range of seedling utilization that might have resulted if, on the one hand, everything was done well and, on the other hand, if everything was done poorly (Table 1). These values assume that natural seedlings are accepted as good growing stock.

From actual measurements, the highest number of effective planted seedlings per acre was 550 and the lowest 80. In these case histories the best utilization occurred beneath a pole-sized hardwood stand. There was no ground preparation or logging and large hardwoods were controlled by poisoning. The poorest utilization occurred where a pine sawtimber stand was logged and disked, leaving some large cone-bearing pines and with the large hardwoods poisoned. On the latter plantation, an excellent stand of natural regeneration made planting unnecessary.

This discussion points out the futility of evaluating the success of these forest plantations solely on the number of surviving planted seedlings. Site preparation and hardwood control methods found efficient for natural regeneration were used with only casual control of pine seed dispersal by harvesting. On these plantations the resulting natural pine regeneration often made planting unnecessary and hardwood brush and surviving trees overtopped planted seedlings.

In preparing for the day when seedlings from carefully selected parents will be available, our efforts should be directed toward refining field practices that increase survival; control or eliminate competition; and finally, exclude natural seedlings. Only when these problems are solved is it necessary to concern ourselves with spacing in planting cutover loblolly pine stands.

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