COSTS AND USE OF MACHINES IN TENNESSEE

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Since 1947., the Roane-Anderson Company, as agent for the Atomic Energy Commission, has planted 6,305,000 tree seedlings in the Oak Ridge area-. These trees have been planted on approximately 6,550 acres, using a 6' x 6' spacing except for certain areas which were inter planted

Three Lowther tree planters were purchased in the winter of 1947-48 and have been in use when and where feasible in planting operations. These machines have been used to plant almost one-half of the seedlings planted. During the '48 season, some.65% of the trees planted were machine planted. About 504 of the trees planted in '49 were machine planted. Only 28% were planted by machine in 1950 and 204 were planted by machine in 1951. The last two years. we planted only 1,000,000 and 1,250,000 respectively. During the '48 and '49 seasons, 2,000,000 trees Were, planted each year. Common labor was utilized for hand punting during weather not suitable for machine planting.

The tree planting machines have been used inn the better type soils as found in old fields on the Oak Ridge area. Soil types found in the area cover a wide series. The common soils encountered are Fullerton, Clarksville, Dewey, Leadvale, Talbott, Nolichucky, Sequatchie, Pope, Allen, Roane, and Lehew. These come in every combination from sandy loam in the bottoms to cherty clay and bare rock on the ridges. The most common types found-where machine planting was done were Fullerton and Clarksville in the clay loam mixture. This was found where broomsedge was abundant and blackberry briars were taking over the old abandoned fields. The Lowther machine plants exceptionally well in all soil types found here as long as weather conditions are favorable. Gully-eroded areas and exceptionally rocky areas were left to be hand planted. But with these exceptions machines have been used profitably in all soil types present in the area.

Machine planting, to be successful, must be done, when the soil is the right tilth to plow. Thus, the operation has been limited by weather conditions prevailing during the winter months. Too much freezing weather, as well as too much rain, stops machine planting. However, due to the vegetative cover present in most areas here, we have, been quite successful in planting during some weather of 20 - 30 degrees temperature.

The main species planted by machine have been shortleaf, loblolly and white pine as well as black locust, white ash and tulip poplar. Machine operators liked the larger seedlings for machine planting, since they handled easier and did not become entangled (the roots) as did some of the smaller size plants. Also, the larger trees had stiffer roots which facilitated the planting operation. In this respect, the loblolly pine seedling was favored by machine planters since the roots were straighter and stiffer than those of the shortleaf or white pines. The black locust and tulip poplar also had such root systems but we had very-few hardwoods to plant. All trees could be planted very well by some adjustments and skill on the part of the operator.

We found that second gear (on a D-4 Caterpillar which we used for power is the optimum operating speed in most cases for tree planting with the Lowther planter. This pertains to planting when weather and soil conditions are correct for planting. First gear was used when the soil was too wet or on very steep slopes. We have also tried third gear, but found that speed too fast except with a particularly good and fast operator. We also found that in locations where the grade was 15 percent or more it paid us to plant up and down hill rather than on the contour. No erosion problem has resulted in using this. method. This may be because of the vegetative cover present on our hillside plantings. Gullied and bare areas on hillsides have been planted by hand and thus such a problem was avoided. Tree planters are now available with a hydraulic lift to change wheel levels for hillside planting.

Each year we have had some breakage on the tree planters. Generally this has consisted of breaks in the frame of the planter caused by excessive twists in crossing ditches or other field obstacles. After planting season each year, the planting machines have been thoroughly overhauled, painted, and generally put in good shape for the following year. We have used some twelve extra plow points (for the three planters) during four planting seasons. Other than points vie have had practically no replacements on our Lowther machines. It is estimated that these machines can be operated 6 more years, thus making a 10-year life for the planters.

Our experience at Oak Ridge proves machine planting to be much more economical than hand planting. The accompanying table shows the very appreciable difference in cost. For the four-year average on unit costs of machine versus hand planting, the cost of machine planting is just one-half that of hand planting. We have utilized excess labor during the winter months in our hand planting operation and therefore have planted by hand some areas which could very well have been machine planted. Machine planting has shown higher survival in most cases than hand planting. Survival percent on machine planting has ranged from 72.2% to 87.90. With conditions right there is no question about the superiority of machine planting over hand planting. Hand planting, of course, has its place in gully planting and interplanting. Properly integrated, however, on large-size operations, 'the machine planters are definitely a great boon to the tree planting job.

SUMMARY

TREE PLANTING - OAK RIDGE

Date Year	MACHINE PLANTING Number	Cost/M*	HAND PLANTING Number	Cost/M*	ALL PLANTING (TOTAL) Number	Cost/M*
1947			55,000	$15.70	55,000	$15.70
1948	1,282,000	$ 7.20	718,000	14.20	2,000,000	9.70
1949	978,800	9.70	1,021,200	16.70	2,000,000	13.30
1950	277,000	13.40	723,000	21.00	1,000,000	18.50
1951	251,000	11.50	999,000	19.70	1,250,000	18.10
(Averages)						
Totals	2,788,800	$ 8.90	3,516,200	$17.90	6,305,000	$13.90

The above table gives total trees planted and planting cost per thousand trees.

The steady rise in planting cost is due to two things 1, The improvement of the planting operation and 2. The steadily rising cost of labor and equipment.

The year of 1951 shows a decrease in cost - this leveling off shows that efficiency of the planting operation is off-setting the increased costs.

* Costs include the following items: Labor @ $.90 to $1.20 per hour; Foreman 9 $1.65 per hour; Forester's supervision @ $1.00 per thousand. Tractor operation and maintenance @ $2.00 to $4.00 per hour; Planting machine depreciation, ,maintenance, etc. @ $100.00 per machine per year; and Overhead Expense @ 10 percent of total yearly costs.

Planting rates:--Average of 3,300 per man day with machines (3 man crew). Average of 900 per many day using hand planting labor (14 man crew).