FIELD EXPERIENCES IN PRE-COMMERCIAL THINNING, PLANTING AND CONTAINER GROWING OF NORTHERN SOFTWOODS

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Abstract

In preparation for intensive logging mechanization and for the subsequent silvicultural treatments of clear-cut areas the Woodland Division of Georgia-Pacific Corporation started a pre-commercial thinning trials in young softwood and mixed wood stands during the spring and early summer of 1970. Pre-commercial thinnings were intended to be a backbone of a large scale silvicultural system which relied upon natural regeneration of clearcut areas and early thinning of subsequent pre-merchantable stands. It was hoped that through this cycle of treatments the average diameter growth occurring on individual stems could be more than doubled in comparision to natural stands. It was also automatically assumed that the treatments would make considerable shorter rotations possible.

Only a few years later when the techniques of growing viable seedlings in containers had been fully tested and proven, it came obvious that even further reductions in length of rotations were possible for a private landowner who was willing to risk a modest investment on productive greenhouse facilities. As a result of these observations the Woodland Division of this corporation initiated in the spring of 1974 a comprehensive program on intensive silvicl1tural practices which consisted of raising container-type planting stock in large numbers and hand planting it on clearcut sites which in turn had been prepared for planting by heavy mechanized crushing and rolling equipment. It is expected that pulpwood rotations of twenty-five to thirty years and sawlog rotations of forty-five years are possible within the scope of this approach.

PRECOMMERCIAL THINNING OF SOFTWOODS

During the summer of 1970, a twenty year old burn which had naturally regenerated to a mixed stand of spruce, fir and low-grade hardwoods was released of hardwood overstory and the remaining softwoods were spaced out. The entire work was carried out by a six-man crew using lightweight power saws. The total acreage thinned amounted to seventy-one acres and a total of one hundred twenty nine mandays were required to complete the project. A rate of productivity of 2,500 trees or 0.55 acres per manday was achieved. The original stand density was six thousand stems per acre and it was reduced to one thousand four hundred stems per acre when the hardwood overstory was removed and the softwoods spaced out. This was somewhat higher than desired but a fear of wind and snow damage prevented from removing any greater number of stems. The basal area of the stands prior to thinning was sixty-four square feet per acre and fifty-one square feet were removed leaving only a basal area of thirteen square feet per acre for residual stand. The average DBH after the thinning had taken place was 1.35 inches.

The major problem in this type of silvicultural work is the great number of stems to be handled. While the work is in progress, the stems which have been cut occasionally pile up to the waist height and thereby limit the movement and efficiency of workers. Some idea of the size of this problem is given by making reference to the total number of stems involved in this particular operation. We estimated that a total number of 322,500 stems in sizes of 0.5 inches DBH and larger were removed in the course of this seventy one acre operation. Another fifty thousand could have been easily removed if we did not have to worry about snow and wind damage. In order to minimize this problem with numbers we have opened corridors with mechanized crushers in all of our later precommercial thinning projects and thereby reduced the stems to be manually handled by half. So far approximately one thousand acres have been handled in this fashion.

The responses to thinning have been measured only on comparative terms to the average annual diameter growth of our natural spruce-fir stands. Observations extending over several decades have confirmed an average annual growth rate of 0.10 inches per year on med-

ium sites. Against this level of growth our permanently established plots in the thinned area indicate, at the end of the first five years, an average growth rate of 0.25 inches per year. If this rate of growth can be maintained over the next fifteen years, a harvestable crop of pulpwood with an average DBH of 6.25 inches had been raised in forty years. This in comparison to sixty to seventy years required to raise a crop of trees of a similar size in natural stands.

GROWING SEEDLINGS IN STYROBLOCK CONTAINERS

This system of handling and growing seedlings was introduced to Georgia-Pacific Corporation's operations by its Forestry Research Manager, Philip F. Hahn in Eugene, Oregon. He has further refined it to such a degree that it is presently known under his name as a Quarterblock System. The core of this system is a polystyrene moldable quarterblock container. It has proven to be the most superior among the several types of containers. It supports an outstanding seedling development at the nursery and also lends itself well for a high degree of mechanization at the nursery and in the field.

This container is produced in a quarterblock form in two different sizes. The smaller one, #2, is five inches wide, fourteen inches long and 4.5 inches high. It has forty eight cavities, each cavity being one inch in diameter and slightly tapered towards the bottom. The large type, #8, quarterblock container is five inches wide, fourteen inches long and six inches high. It has twenty cavities, each 1.5 inches in diameter and also tapered towards the bottom. One cavity in #2 container holds 2.5 cubic inches of soil and produces a smaller tree than is possible in #8 which contains eight cubic inches of soil. Each container has its place. The smaller container is used in routine operations and the larger one in special areas where higher costs for larger seedlings can be justified. Cleaned and disinfected blocks are reusable several times which saves material and cost. Since the cost of the containers is largest single expense item in container operation, considerable savings can be effected by recycling the blocks.

In the filling of containers a light weight mixture of peat and vermiculite is used. The soil loading and

seeding operation is mechanized and the last step in loading is the covering of seed with layer of grit. When the whole operation is fully automated over three hundred thousand container cavities can be loaded and seeded in eight hours.

Since the container cavities hold only small amounts of soil, frequent irrigation and fertilization are needed. This is done normally two or three times a week during the active growing season. In all cases before the seedlings are ready to go to the field they must be hardened. This is generally done with a combination of measures which include the exposing of the seedlings to systematic moisture stresses, the shortening of the photo period and the manipulation of the nutrient diet.

The type of houses used to shelter the growing seedlings by Georgis-Pacific Corporation in the Northeast are of a double layer polyethylene and steel frame construction. They are equipped with a heating and ventilation system which is controlled by thermostats. Two crops per year are raised and artificial lighting is used to accelerate growth. These types of houses give excellent shelter against the extremes of the weather in the Northeast and they also support an excellent seedling growth for a relatively low cost while staying close to natural growing conditions.

PLANTING

The fully grown and hardened seedlings are shipped to the planting site in their original quarterblock containers. They can be boxed for longer trips but they can be also conveniently transported as they are in slightly modified pick-up trucks. At the planting site the quarterblocks are placed in the backpack carriers which handle up to nine quarterblocks or approximately 430 seedlings and have a total loaded weight of twenty seven pounds. Each tree planter carries his own supply of seedlings while he plants the trees.

The carrier is so designed that a double lock system operated by the tree planter moves one quarterblock into the bottom compartment. This quarterblock could be then removed and placed in a belt holder where the seedlings are in easy reach to the planter. After punching a hole of the same shape as a rootplug into the ground, he can extract the seedling from the belt

holder and place it into the hole. As soon as the supply of seedlings is depleted from the quarterblock in the belt holder, the empty quarterblock is placed into the carrier through the top to return it for another use while it is replaced with a fully stocked quarterblock.

The planting rate with quarterblock containers is very good. It is generally twice as high as the bareroot planting rate under similar conditions. Planting rates of 1,500 seedlings per manday have been easily reached in the Northeast operations of this corporation and it is expected that a rate of 2,000 seedlings per manday will be reached in the near future.

PLANTING SITE PREPARATION

All the sites to be planted are prepared prior to planting, and two types of equipment are presently used. In New Brunswick operations of this corporation the so-called shark finned barrels with anchor chains are pulled by Caterpillar D-8 Tractor and in Maine a single drum-type Marden B10 brush cutter is being drawn by model 668 Clark rubber-tired skidder.

This work needs to be done in order to make the sites accessible to tree planters and to break up the heavier layers of humus. It also leads to elimination of great numbers of competive shrubs, seedlings and trees. No scalping and only very light scarification effect is being sought. No sedimentation of adjoining waters as a result of this work has been observed nor expected in the future.

HOW DO STYROBLOCK SEEDLINGS PERFORM

The West Coast Divisions of Georgia-Pacific Corporation have been engaged in large scale containerized seedling production since 1971. The annual growing capacity of the present facilities is about fifteen million seedlings, and all these nurseries use the quarterblocksystem developed by Philip Hahn. We are also raising 1.5 million seedlings annually by this same method in the nurseries located in Maine and New Brunswick, Canada.

Comparison tests to bare-root seedlings in all of West Coast locations have shown that the containerized seedlings nearly always out-produce bare-root stock in survival and growth rate. The survival difference is often substantial. A ten to twenty per cent higher survival rate is quite common. On harsh dry sites as high as forty per cent survival differences have been observed.

In the Northeast operations the experience with the styroblock container stock is limited more or less to one growing season but it shows that the styroblock seedlings can be planted throught the summer with excellent results and they do survive well even under the harshest conditions.