

REPORT PRESENTED BY THE CONSOLIDATED WATER POWER AND PAPER COMPANY

E. S. Hurd and J. W. Macon 1/

Since the first meeting of this group 2 years ago, we of the Consolidated Water Power and Paper Company, Forestry Department, have not experienced nor generated any earth-shaking developments in the general field of tree improvement work. We should, however, like to make a few brief comments on several projects which fall within the fringe area of forest tree improvement work.

NURSERY AND PLANTING OPERATIONS

Consolidated has operated a forest tree nursery for the past 20 years in three different localities. Our present nursery, located at Monico in north-central Wisconsin, is operated primarily for the production of white spruce and black spruce transplant stock for our reforestation program.

We feel rather fortunate in operating our own nursery because we can control production of the kind of planting stock required for our field planting jobs. Furthermore, our nursery is so operated that interest in the stock does not end when the trees are hauled away from the nursery, but continues for many years as they develop into a vigorous and healthy forest. We believe that much can be done at the nursery level to improve greatly our future planted forests.

Our annual production of transplant stock runs to about one-half million trees a year. Presently we are starting to produce some balsam fir and Scotch pine for sale to the Christmas tree trade.

Before 1944 we purchased our seed from any and all seed dealers. The futility of such practice became very evident in 1943 when one sowing of spruce seed proved to be a colossal flop--no germination. After this experience we decided to collect our own white spruce seed; and we certainly became aware that a low price per pound of seed doesn't always indicate a bargain. We made our first cone collection in 1944, another in 1950, and are again collecting cones this year, 1955. This 5- to 6-year interval between bumper cone crops for white spruce indicates the need for some foresight to follow through with an annual seeding program. To date we have been more than pleased with our seed grown and collected locally, that is, in the general areas in which the trees will be planted.

1/ Forester in Charge and Research Forester, respectively, Timberland Division, Consolidated Water Power and Paper Company, Rhinelander, Wisconsin.

For seed collection work we select mature trees heavily loaded with cones and mark them for a harvest cut. Local pulpwood producers cut the trees, collect the cones, and follow up in the job of making pulpwood from the seed trees which have been cut. You see, we haven't as yet approached the ladder climbing stage to gather our cones, and we probably won't until a more practical method is perfected to gather cones from standing seed trees.

We cannot put our finger on definite facts which prove the superiority of locally collected seed to that of the general run of seedhouse seed. Observations, however, indicate that this was a good move in bettering the quality of our nursery stock, and we certainly plan to continue local collection of our required spruce seed.

Several years ago we established a series of white spruce test plots in our nursery in cooperation with the Soils Department of the University of Wisconsin. In general, the purpose of this study was to evaluate the effects and influences of chemicals, fertilizers, and humus on the growth and development of white spruce stock, both in the nursery and in the field. This study may not be followed through, however, because Mr. G. K. Voigt, who set up the study, now is affiliated with Yale University.

SUPER SPRUCE

To be up to date and conform with prevailing trends in investigative work, we have "Operation Super Spruce" under way. Anyone who has worked around a white spruce nursery cannot help but be impressed by the differences in growth rate exhibited by individual seedlings and transplants. Our 2-2 stock generally runs from 6 to 10 inches tall, yet here and there along the rows will be an 18- or 24-inch specimen. In order to satisfy our own curiosity we have set up a study to determine if this vigor carries through into the later life of the trees.

In 1950 and 1951 we selected about 2,500 "super spruce" at our Cavour Nursery and planted them in the field along with some regular nursery-run planting stock. We have kept a careful watch on about 450 trees each of the super and regular stock. This study is not yet old enough to be conclusive, but results at the end of 6 years indicate that the selected stock compares with our regular stock as follows (table 1):

1. Survival.--There is no appreciable difference between the two classes of stock.
2. Establishment.--The super stock required a longer period to recover from transplanting into the field. During the first 2 years of the plantation's life, growth and vigor of the regular stock was superior to that of the super trees.
3. Growth.--In spite of this early setback, 6-year growth on the super trees is 30 percent greater than that on the regular trees.

4. Height.--Average total height of the super trees is now 43 inches against 29 inches for the regular stock.
5. Rabbit damage.--Because of their greater height, the super trees have suffered less from rabbit clipping than have the regular trees. About 45 percent of the super stock are now so tall that they are not likely to have their leaders clipped. Only 8 percent of the regular stock are this tall.

Table 1.--Comparison between super and regular white spruce planting stock 6 years after planting

Item	: Super : spruce:	: Regular : spruce
Survival.....	92	90
Average height when planted.....	13	6
Average 6-year height.....	43	29
Average 1955 growth.....	9.8	7.2
Trees taller than 5 feet.....	10.3	.5
Trees shorter than 20 inches.....	3.6	26.1
Trees of good and excellent vigor.....	80	59
Best 20 percent of trees, average height.....	59	44
Best 20 percent of trees, average 1955 growth.....	13.9	11.5
Trees clipped by rabbits in 1954-55 season.....	8	15

HARDWOOD IMPROVEMENT WORK

During the past several years the chances of making high-order commercial hardwood thinnings have increased tremendously in certain parts of Wisconsin. If your lands and operations are located in a satisfactory radius of a chemical plant or a mill using hardwood pulpwood, you can now do a type of stand improvement work that foresters have only dreamed about for many years. The increased utilization of our mixed hardwood forests will leave a definite impact on our woods, and what the future may offer is open to wide speculation. I believe our local hardwoods will be an ever-increasing commodity in many Lake States mill yards in the quite near future.

We of Consolidated have been giving some thought to the growth and utilization of our hardwood forests for purposes other than that of growing just hardwood sawlogs. In addition to our experimental forest we have established an area of 1,400 acres for the express purpose of carrying out intensive hardwood management practices. Stand improvement jobs have been carried out in these 40- to 50-year-old hardwood stands.

This summer we treated for chemical debarking about 2,500 cords of hardwood pulpwood in a combined area of some 500 acres. Here, we believe, is a forester's opportunity to do some real stand and tree improvement work,

It seems reasonable to suppose that through the continuation of such stand improvement practices we can and will develop a superior type of hardwood stand. However, this thought may well be considered: Are we, as forest scientists, silviculturists, and forest managers, in a position at present to guide the orderly development of this new source of fiber and cellulose crop?

CHRISTMAS TREES AS A FOREST PRODUCT

I have a further consideration which. I would like to present to this group--although it might be received with reservation--and that is the growing of Christmas trees as a quick cash crop of the forest. Consolidated has recognized in its forest management plans that Christmas trees are a bona fide forest product, and we have been harvesting trees from our lands for several years, Since we have been engaged in the sale and cutting of Christmas trees--mostly balsam fir to date--we have become increasingly aware of numerous factors which influence and determine the marketability of a balsam fir as a Christmas tree. Several of these points may be listed as follows:

1. The possibility of definite strains in balsam fir, some of which may be especially suitable for Christmas trees because of needle color, density of foliage, size and arrangement of branches, and compactness and symmetry of the tree, Trees lacking these desirable features for Christmas trees might well be considered as good pulpwood trees. The big question is how much growth characteristics of good Christmas trees are inherited, Can seed from such parent trees be considered a good source for Christmas tree stock?
2. Frequently these two types of balsam fir grow side by side in the forest, but then again it is quite common that the quality type balsam firs, suitable for Christmas trees, occur in small groups. This could indicate that one parent seed tree had spawned a number of potential balsam fir Christmas trees. Such relationships and occurrences should be field-checked for reliability.
3. Full sunlight is not, in my opinion, the complete answer to growing select type balsam fir Christmas trees, Site conditions and soil characteristics certainly are important. But what about the genetics of the problem: Are not some of the traits of Christmas trees versus pulpwood trees a matter of inheritance?

There seems to be common agreement that forest genetics studies definitely are a long-range proposition, It would, therefore, seem that the factors of genetics when applied to Christmas trees would be a good testing ground,

for in a period of 8 to 12 years you would begin to have definite proof of your progeny test.

With the increased interest and the present tempo of forest plantings being made expressly for Christmas trees, I wonder if some attention and effort might not be devoted to discovering some facts relating to the problem of color, density of foliage, branch size and arrangement, and tree form for the several species commonly used as Christmas trees here in the Lake States region.