REFORESTATION IN CANADA

BY ELLWOOD WILSON

Two Nurseries are operated by the Tree Planting Division of the Dominion Forestry Branch, under Mr. Norman Ross; one at Indian Head, Saskatchewan, 480 acres in area, and the other at Sutherland, Saskatchewan, of 320 acres, the combined output of stock from these two Nurseries in 1929 was 8,808,445 seedlings and cuttings. The whole area in these two nurseries is not devoted to nursery stock, considerable space being occupied by ornamental grounds, shelter belts, demonstration plantations, experimental plots, and acreage required for growing oats and hay for the work horses.

Under favorable conditions the combined annual capacity for nursery stock output from the two Nurseries could probably be brought up to 10,000,000, but up to date the demand has not been sufficient to absorb as large an amount of stock as this.

The Province of Ontario has three large nurseries, St. Williams, under Mr. Newman; Midhurst, under Mr. Adamson, and Orono, under Mr. Linton. These nurseries are splendid examples and the plantations made with stock originating there have given excellent results,—the red pine at St. Williams being one of the best plantations anywhere.

Most of the stock raised at these nurseries has been used in farmers' woodlots, municipal forests and demonstration forests in various parts of the Province, and pine has been the principal species. For the past few years spruce has been added and a spruce nursery in the northern part of Ontario will soon be established. These nurseries are capable of being much enlarged and stock can easily be supplied to any company desiring to make plantations, or can be used for extensive plantations on Government lands.

The Province of Quebec has had a nursery at Berthierville-en-Haut, Que., since about 1912, and has sold or otherwise distributed a large quantity of trees; and they have also made experimental plantations on drifting sands Lachute and at Berthier Junction. These plantations of Scots Pine and Norways Spruce have been very successful, and the trees at Lachute now have a breast high diameter of eight to ten inches. Stock has been sold to a number of the paper companies. Two years ago a large seed house was erected and some twenty thousand bushels of cones collected. Some of the seed from these has been sold and some has been used in broadcasting burned-over land on a large scale. The results will be awaited with great interest. Although it does not come under the head of reforestation, properly speaking, the planting of trees along the highways by the Department of Roads should be mentioned. This work was done by contract with a private nurseryman along most of the main highways, and will do much to beautify the roads and add to the attractions of the Provinces.

The Province of New Brunswick, so far as I have been able to ascer-

tain, has not done any planting, but has carried out some experiments in seeding in co-operation with the National Research Council.

The Province of Nova Scotia has started a nursery and has been delivering stock to the farmers for planting.

The Abitibi Power and Paper Company, Iroquois Falls Division, started reforestation work a number of years ago, but has had difficulty in locating a proper nursery site. The soil of the region is a heavy blue clay which is bad for nursery purposes, and after trying two sites the work had to be temporarily abandoned, until a satisfactory site can be found. Such stock as has been grown and outplanted has done well and the Company is perfectly satisfied that planting can be successfully carried on in that region. To date they have sown some hundred and seventy pounds of seed and have planted out one million trees, spruce with 6x6 spacing. As the work is entirely experimental, no costs can be given.

Brown Corporation have a tract of land at Lake Beauport, Que., which they are trying to manage on a sustained yield basis. The work at present consists of the cutting of hardwoods in varying degrees of intensity, and as there is a good market the thinnings can be disposed of at a reasonable profit. In connection with this work, and entirely secondary to it, a small experimental nursery is being developed. They have done no extensive planting to date and will do none except where they are unable to induce regeneration naturally. All planting so far has been in the form of sample plots near Lake Beauport.

About 1917 the Riordon Pulp & Paper Company, now the Canadian International Paper Company, started a nursery at St. Jovite, Que., and did also considerable outplanting with purchased stock. Since that date a small nursery has been maintained and the outplanted stock is said to be doing well.

The Donnacona Paper Company at Donnacona, Que., the year before last planted a hundred thousand trees, and I think the same amount last year, buying their stock from the Provincial Nursery.

The St. Lawrence Paper Company at Three Rivers two years ago bought a hundred thousand pine and spruce seedlings which they planted on freehold land in the valley of the Riviere du Loup above Louiseville, Que. They planted these trees in the fall and had a considerable loss from heaving. The surviving trees are doing well and they are going to plant again next Spring.

About five years ago the Shawinigan Water & Power Company planted the whole of Melville Island in the St. Maurice River at Shawinigan Falls, Que., with Scots Pine and White Spruce, and each year since have planted on burnt-over land between one and two hundred thousand trees. These have all done exceptionally well, the loss running about one per cent. and the annual height growth averaging nearly eighteen inches. Considerable thin-

nings have also been made in old hardwood stands and spruce underplanted. These are doing well. Some swamp draining has also been done; and the work in forestry undertaken by this important company might well serve as a model for our wood-using industries. The Shawinigan Company feels that the preservation and perpetuation of the forests is vital to the water power business from two standpoints,—equalization of steam flow and perpetuation of the wood-using industries.

The Spanish River Division of the Abitibi Power & Paper Company have had a nursery for several years, and up to 1928 planted 652,000 trees, mostly white spruce, and in 1928 planted 230,000. The spacing was 6x6 and the stock used was mostly two and two, with some three-year-old seedlings. The present nursery has a capacity of 500,000 two and two plants.

Price Brothers have carried out some experimental work in seeding. Some few years ago approximately 65 acres of burn were seeded by broadcasting at the rate of ten pounds of seed per acre. The seed was mixed with sand and was sown on the snow in March and April. As the mineral soil was exposed due to repeated burns there was little brush or slash. This area sown in 1921 was examined in 1928 and the seedlings were in a very healthy condition. The crowns were thick and bushy and of a deep green colour, with large and healthy roots well set. The average height was one foot, ranging from .5 to 4 feet; and the average age six years, range 5 to 7 years. The germination of established seedlings was 19 per cent. in 1921, the same year as sown; 79 per cent. in 1922, one year after sowing; and 2 per cent. in 1923, two years after sowing. In 1925 the experiment was continued and 30 acres sown by seed spots spaced 6 feet apart. The seed was old and poor, but results satisfactory. In 1928, 950 acres were seed-spotted at intervals of 6 feet.

The Wayagamack Company of Three Rivers, Que., have carried out some seeding experiments on burnt lands, and are going to try seeding on the snow from aeroplanes, which will enable them to cover a large area at a very low cost. The results of their experiments will be watched with a great deal of interest.

The Laurentide Division of the Canada Power & Paper Corporation commenced reforestation experiments in 1908, planting two acres with Scots, jack and white pine. The stock was two and two obtained from the Ontario Government Nursery. These are now five to seven inches at breast height. The next year a very small nursery was started and in 1912 planting was resumed with stock partly home-grown and partly purchased. From that time to date planting has been continuous, and for the last four years from three to four and one-half million trees per year have been planted. The early plantations were pine, then Norway Spruce, and since then white and Norway spruce. All seed of white spruce is collected in the vicinity of the area to be planted, and the Norway has been obtained from a favourable

location in Sweden. This year cones were collected from our own plantations of both white and Norway and gave satisfactory results in germination tests. It will be sown in the nursery next spring. The idea in this reforestation work is to build up a timber reserve close to the mill, and an area of ten by twenty square miles is being purchased for this purpose. This consists mostly of run-down farms where the soil is poor and sandy. There are some stands of softwood, some of hardwood, some mixed and considerable areas of brush land, small birch, poplar, willow and hazel. There are several large swamps and some of these were drained in 1915 and trees of different species were planted according to different methods. The area is intersected by three railroads, and by several highways, and transportation by rail, truck or by light portable railway will be easy and cheap.

The stock is all raised in the Company's nursery, which comprises about 75 acres, containing now about eighteen million trees, almost all white spruce. A large amount of experimental work has been carried on, in planting methods, in reducing the cost of nursery work, in swamp drainage and in insect and disease control, as well as in using seed from different sources. The most important thing which has been learned is that outplanting must be carried out with far more care than is the usual practice. If it is done properly, the period of retardation of growth can be reduced from three or four years to one year. It has been proved that trees carelessly planted so that the roots are bent or put in too deep often never recover and are a dead loss. Others lose as much as five years or more. Many experiments in direct seeding have been carried out, but these show that two and two transplants show six times the growth that trees from seeds do on the same sites, and that the stocking is much more satisfactory and even. Spruce and pine planted in 1914 now show growth enough to give one to two four-foot sticks of pulpwood per tree on the average. Norway spruce shows quicker growth and more cylindrical form than white spruce on the same sites, but it is very susceptible to late frosts and should never be planted in frost pockets.

The following cost figures may be of interest:

General preparation	per acre	\$2.368
Planting	per acre	7.941
Trees—2 and 2 stock	per acre	6.090
Fire protection	per acre	2.041
Taxes	per acre	1.968
Overhead	per acre	1.692
Trees planted per acre—1700.		

Spacing has gradually been reduced from 6x6 to about 4.5x4.5.

This report, while necessarily incomplete, shows that almost everyone is dissatisfied with the natural reproduction we are getting, and is feeling round for some way to increase regeneration. This situation is somewhat difficult, owing to the fact that most of the timber lands are held under license and

and that no one feels like planting on Government lands unless the tenure is certain, and there is some guarantee of what the stumpage will be when planted trees are ready to be cut. As the Governments really sell only the standing timber of a certain size, it would seem that they should look after reproduction of the next crop; but as the cost of this would probably be charged to the licensees in the long run, they might prefer to do it themselves.

The whole question of keeping our timber lands fully stocked is such a vital one to the whole country that the foresters of the Governments and those of the private companies should get together and work out some feasible and practical scheme for attaining this end.