IMPROVING THE QUALITY AND QUANTITY OF PRODUCTION¹

By F. L. FLATT²

At present most of the forest products in Canada come from the virgin forest. Under these circumstances there is not much that a forester can do to improve the quality of present production except in the planning of operations. In the East, particularly in the pulp and paper industry, there are many cases where the amount of mature and over-mature timber is far out of balance with the requirements of the first rotation. Some hold to the belief that operations should be concentrated, as much as possible, in these over-mature stands. Actually, if operations were carried out in this manner, by the time the over-mature timber was logged, the stands that are presently sound, mature and top quality would have become over-mature and logging would have to be carried on in poor quality, poor production timber for a long time. The right answer has to be on an individual basis and is probably a combination of operations with the objective of logging as high a percentage of the mature timber as possible and securing the balance of requirements from the over-mature stands. This would involve treating some of the over-mature timber as young growth in the first rotation.

Certainly we should stay away from logging immature stands even if they are merchantable for these are the quality stands of the future.

Regarding the forester's obligation to improve the quantity of production, in present stands about all that can be done is to increase the percent utilization. Economics has to be the determining factor but every effort should be made to find ways and means of using as much of the stand as possible.

Therefore, it would appear that the job of improving the quality and quantity of present production is limited to good planning and good utilization.

However the forester's interest is not confined to or centred in virgin timber. His obligation is to so operate as to improve the quality and quantity of the future crop.

There are many people, and some of them are foresters, who would strongly disagree with the above statement. They say that our obligation is to grow as much wood fibre as possible without regard to species or quality. They point out the process changes that have taken and are taking place in the pulp industry, the use of what previously was considered weed species in the pulp and paper industry, the increase in the use of wallboard and the host of other wood-base substitutes for lumber in the building field and they say it is up to the chemist and wood technologist to devise ways and means of utilizing what is grown.

If such a programme is followed, many sections of the forest products industry presently relying on the quality of their product for their existence will be out of business once the virgin stands are exhausted. We have quality on our side now, we had better keep it.

¹ A paper presented at the Annual Meeting of the C.I.F., October 13-15, 1954, Victoria, British Columbia.

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Referring specifically to the pulp and paper situation, present operations are largely dependent on export markets built on high quality pulp from conifers. Do you think that there would be the same demand for pulp from inferior species or that newsprint made from Canadian hardwoods could successfully compete with newsprint made from U.S. hardwoods? There is a good deal of consideration being given to the production of newsprint from hardwoods in the States and there is at least one project nearing completion now to use chemi-ground hardwood to replace spruce groundwood in the production of newsprint. Recent estimates indicate that there are sufficient hardwood resources in the Mississippi Delta and in the North Eastern Lakes States to sustain a production of between 20 and 25 million tons of pulp annually. If only a small fraction of this were used in newsprint, it would certainly provide new competition for Canadian mills and, with wood costs at our mills at the highest level in history, this competition would be tough.

There is one main drawback to the use of hardwoods in newsprint manufacture. The hardwood groundwood hasn't nearly the strength that spruce groundwood has. As a result, a much higher percentage of the more expensive chemical pulp has to be added to produce a satisfactory sheet. Therefore, the cost at the mill of newsprint produced from hardwood may still be slightly higher than our Canadian product.

So far nothing has been said about the cost of transportation of the finished product. Generally speaking the Canadian industry is under a tremendous disadvantage in distance from market.

As an example, in Kapuskasing, Ontario the Spruce Falls Power and Paper Company operates a mill producing 800 tons of newsprint and 350 tons of sulphite pulp per day. The raw material is very high quality, largely slow growing black spruce. Kapuskasing is roughly 900 rail miles from New York which is one of its main newsprint markets. The freight from Kapuskasing to New York is \$12.00 per ton more than that of competitors producing newsprint from southern pine. Roughly the same situation would obtain if newsprint mills were built in the Mississippi Delta where they have cheap water transportation. In a strongly competitive market this would be a very great handicap. The only advantage Spruce Falls has is quality.

As far as pulp is concerned the picture is much the same as with newsprint. The one main reason for the manufacture of pulp at Kapuskasing is that the high grade sulphite pulp is needed to mix in with the pulp produced in the United States mills to give the final product the qualities required. If Spruce Falls does not continue to have high quality raw material, in the long run it will be out of business. It is suggested that the same need for quality applies to a large segment of our Canadian pulp and paper industry.

As to lumber, it is already meeting severe competition from substitutes. Some of these may be manufactured from inferior species, but many are not wood products at all. Lumber producers all know that the money is in the top grades. Can we be satisfied with inferior species in a new crop when even now good grades of quality species are having difficulty maintaining their share of the market?

Regarding the forester's obligation to improve the quantity of product, we are all aware of the relationship between stand per acre and costs. Stand per acre is one of the big advantages that you on the West Coast have. We have all heard enough about wood costs, at home if not here, to realize that we are in danger of pricing ourselves out of the market. From the viewpoint of an economic operation and a healthy industry, the forester certainly should make every effort to improve the quantity of production.

If we, as foresters, do not recognize our obligation to improve both quality and quantity of production to meet future needs, we are not doing our duty to our industry and, with the importance of our industry in the economy of Canada, we are doing a disservice to our country as a whole.

You might be interested in knowing what one forester has done toward fulfilling his obligation in this regard.

This forester came to Kapuskasing as Manager of Woodlands for the Spruce Falls Power and Paper Company in 1928. His basic training had been as a silviculturist and over the years his interest in this phase of operations has increased rather than waned.

At that time the company had no forestry program and operations were carried on entirely under the contractor or jobber system. This man believed that, in order to make any forestry program effective, direct control of all operations by the company was essential. Primarily for that reason, operations were changed over to company camps.

His first step in this direction was building up an adequate staff of technically trained foresters. These men, aside from those who were on what is normally considered forestry work, staffed the Company camps and ever since the Company has maintained a high proportion of technical foresters among the camp foremen and other operating supervision. Most of these men are still with the Company but no longer as foremen. The Company at the present time employs 31 graduate foresters and the Kimberly-Clark Corporation and its subsidiaries and affiliates employs a total of 110. No man, in Eastern Canada at least, has done more for forestry as a profession.

This was not accomplished overnight, but once a staff was available a forest research program was initiated covering growth and yield, regeneration of cut-over areas and the silvicultural effect of various cutting methods. The first permanent sample plot was established in 1930 and at the same time annual surveys of regeneration became a regular part of the program.

As this investigative phase began to produce results, it became apparent that the main silvicultural problem in the Clay Belt was to obtain adequate regeneration of spruce on the well-drained sites. Here, after cutting, regeneration is predominately balsam and poplar. Fortunately these high-land sites make up only about one third to one quarter of the total merchantable area. The remaining three quarters consists of spruce flat and spruce swamps where drainage is relatively poor. In these low-land sites advance growth of spruce is present in sufficient numbers at the time of cutting to assure an adequate new crop regardless of the cutting method employed.

The research program was then aimed at solving this major problem. The silvicultural aspects of the cutting systems in use were investigated and experimental areas, one which different cutting methods were used, were laid out. These included diameter limit cutting, seed tree, partial cuttings, cutting in alternate strips, shelterwood cutting and selection cuttings. Results have not been encouraging and although other trials are still being made, a system has not been developed that will economically assure an adequate natural stand of spruce on these well-drained sites.

The possibilities of direct seeding have been thoroughly investigated. Several small scale experiments have shown promise, but no large scale field trials have been even partially successful. Whether it be seed spotting or broadcast seeding, three main conditions are apparently necessary to success. These are ground disturbance and partial shade combined in a season of adequate rainfall. But if the shade is supplied by an overstory of hardwoods or brush, the leaf litter is then sufficient to smother the small seedlings. Thus the possibilities of successful direct seeding are so small as to be of no value except under very special circumstances.

During the last few years, LongLac Pulp and Paper Company, one of our sister companies, has been successful in securing good jackpine reproduction on clear cut high-land sites by scattering jackpine brush bearing cones on mineral soil. This has been tried with spruce at Spruce Falls but results to date are not conclusive.

The silvicultural system in use at the present time is to clear cut on all sites. On the low sites, this system gives satisfactory results without planting, but on the well-drained areas, which are our best potential growth sites, it is followed by partial planting of spruce to raise the quality of the new crop at least to the level of that removed.

The decision to clear cut and plant created an immediate need for nursery stock. Therefore, a company nursery was established in 1947. Finding a site with suitable soil was difficult but finally a sand esker was chosen. The topography is not good as the fields are all sloping or rolling but it is the best available and is working out satisfactorily.

The nursery is planned for an output of 3,000,000 2-2 spruce per year. In practice sufficient 2-0 stock is grown to supply LongLac Pulp and Paper Company Limited with 1½ million per year which they keep in their transplant nursery for a further two years before setting the seedlings out in the bush. In addition the output to meet Spruce Falls requirements will be 2,000,000 annually by next year.

The usual problems connected with opening and operating a new forest nursery were encountered, but with experimental work these are gradually being solved and a nursery practice has been developed that is suitable to the region and our needs.

The nursery grows almost entirely spruce in proportions of about 75% black spruce, 20% white spruce and 5% Norway spruce. The Norway spruce seed is imported from Sweden from a forest region with a climate similar to

that at Kapuskasing. The black and white spruce seed is obtained from cones collected on logging operations in the Kapuskasing region.

The main dependence for planting is on 2-2 spruce, although some 2-0 spruce are used on favorable sites with a minimum of competition. Results using 3-0 stock have not been satisfactory.

Planting operations are entirely in cutover areas and, except on burned cut-over, seldom more than 400 trees per acre are planted. Due to the stumps, slash heaps, brush and residual hardwoods, no attempt is made to plant these trees in straight lines or at regular spacings. They are planted throughout the cut-over in natural openings and avoiding as far as possible underplanting shrubs or young poplar. Dependence is placed on natural growth, including balsam and some spruce, to fill in the rest of the area. Thus the planted spruce are to improve the quality and quantity of the stand.

So far all planting has been by hand, usually by a crew of 12 to 15 men working individually. Mechanical planters offer some possibilities in the reforestation of old burns, but until new machines and techniques are developed, the great majority of planting must continue to be done by hand.

The first 2-2 spruce were planted in the bush in the fall of 1951. There were earlier plantings, with younger stock and on an experimental basis, but the main planting program dates from the fall of 1951. To date, Spruce Falls has planted 3,146,000 trees. About two thirds of the planting has been done in the fall and the balance in the spring.

The oldest 2-2 plantations have just completed their third season in the bush. Survival so far has been satisfactory, averaging 87% after two seasons. Growth, particularly of the black spruce, has been very encouraging. The black spruce has grown from 15" - 28" in the first three seasons and this species, if properly planted, shows no tendency to check. White spruce and Norway spruce are not matching this early growth, but we hope that they will catch up in a few years. Black spruce shows great promise as a competitive tree amongst low shrubs and raspberries. It has a fast getaway and seems to thrive on side competition, particularly if it has overhead light. This is a fortunate circumstance as black spruce is also the high quality species for pulpwood.

Undoubtedly some release cuttings will be necessary as the plantations become older. It is hoped that the planting methods will hold the need for release to a minimum, but some experimentation with various release methods, including chemical treatments and aerial spraying, are now being carried on.

This summary of the forestry program carried on by Spruce Falls Power and Paper Company has been very brief. It is the result of one man having the firm conviction and, the ability to sell that conviction to his staff, that as foresters, good business men and good citizens it was their duty to improve the quality and quantity of the second crop. The same basic conviction has resulted in other woodlands, in the Corporation of which he is Vice-President, developing similar forestry programs adapted to their conditions and requirements.

This man is R. W. Lyons, now Vice-President in charge of Woodlands of Kimberly-Clark Corporation of Neenah, Wisconsin.