

Canadian Forestry Journal
March 1920

THE MAPLE SUGAR SEASON.



Field, Stream and Road

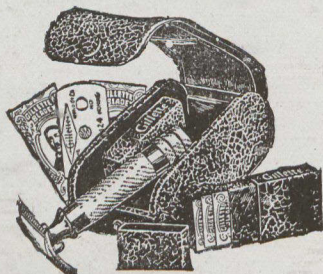
How strange the old-time pictures of sport would look today—baseball teams boasting at least half-a-dozen sets of whiskers—full-bearded cricketers—champions of the scull with their chins concealed.

Today the athlete knows the importance of the well-shaven chin. He is conscious that he is most keen when he is well-groomed—just as is the business man and the soldier.

For men who love outdoor life and sports, men of virile minds and active bodies, we have designed a Gillette Safety Razor with an extra stocky handle—the “Bulldog” Gillette, shown to the left.

Not that the Gillette needs a sturdy grasp. A light touch, with the angle stroke, removes the most stubborn beard with surprising comfort.

But there is a certain appeal in the thicker handle of the “Bulldog”. Ask to see this special set and appreciate the point for yourself.



The “BULLDOG” Set includes oval Morocco Case with two blade boxes to match, and 12 double-edged blades.

The case, you will notice, is almost as compact as the famous Pocket Edition Gillettes, and the price is the same, \$5.00.

Sold by all dealers catering to men's needs.



Gillette

Safety Razor

Canadian Forestry Journal

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No. 3

Why the Price of Lumber ?

By Robson Black

A Statement of Fact Concerning Changed Conditions in Lumber Manufacture Since 1913

To many a prospective lumber purchaser there seems a disheartening discrepancy between what looks like an abundance of trees in the forest and the amount of money demanded of him for 5,000 feet of serviceable boards. If logs were lumber, the price might indeed be sliced off many per cent., but trees and logs are merely one factor in production. The conversion of trees into merchantable products requires a very unusual application of expensive manual labor, and this factor alone is capable of accounting for the greater part of the lumberman's troubles and greatly increased expenses of producing his goods.

5,000 Men Missing.

Perhaps the fact that may impress the lumber consumer most emphatically is that since the declaration of war and the heavy enlistment from the ranks of Canadian woodsmen, more than 5,000 skilled workers in Eastern Canada alone, highly essential to the conduct of the lumber industry in this section, have been lost to their former employment, mostly through seeking easier and more congenial jobs in towns and cities. The deterioration of man power in Canadian woods operations has been most marked. Years ago a gang commonly accounted for eight to ten thousand feet, board measure, in a day's work. Today a gang of the same numerical strength will not average half that production. There

is a series of costly discrepancies also in the accuracy with which they do their work, so that the old-time skill and economy in turning a stand of timber into the maximum number of merchantable units is not today commonly in evidence. This depreciation in personnel is a development that the Canadian lumberman would go far to remedy, for it adds immeasurably to his worries, and, of course, reacts upon the market price of lumber products.

Inefficient Workers.

It has become a common saying today that timber cutting has changed from a one-gang system, to a three-gang system, the latter referring to the consequences of industrial unrest whereby quite frequently, while one gang is at work producing logs, another gang is going in to take its place and a third gang of disgruntled men is coming out. As a general figure, it is probably safe to say that coupling quality and quantity of work per day, the bulk of shantymen (in Ontario and Western Quebec at all events) are not above 50 per cent. efficient as compared with the standards of, say 1913.

The shiftlessness of such a large proportion of present-day lumberjacks is perhaps not very difficult to account for when one considers that 5,000 of the veteran workmen, who previously gave stability to the labor market, have quit their old employment and have left the jobs to a like

number of uninitiated workmen. To the latter class, shanty work lacks a good many of the social amenities of the town and city, and a few weeks restless employment is apt to make such a man give a willing ear to the camp agitator.

Labor Unrest.

Another interesting and vital fact taken from the 1919-20 experience of lumbermen in the Ottawa valley and in varying degrees over other parts of Eastern Canada, is that in the average camp that should have a staff of 80 to 100 men, labor unrest often results in stripping the camp of half its complement at the period of the year when production should be highest. The reader will bear in mind also that the fixed overhead charges remain about the same whether the woods operations are going at full blast or under a half crew. Foremen, superintendents, bookkeepers, and clerks must be held on the job and the cost of supervision itself has materially risen. At the sawmill end, also, the reduced hours of labor and advance of wages of from 80 to 100 per cent. between 1913 and 1920 bear upon the cost of lumber in the retail yard.

Feeding the Lumberjack.

The wages paid to shantymen always are in addition to board and lodging. Here we come upon yet another factor that helps to add dollars to the market price of a thousand feet of spruce or pine. Comparing the wholesale prices in 1913-14 and 1919-20 at Ottawa, the four big staple items of food have advanced approximately as follows:

Flour from \$4.80 per barrel to \$13.30.
Oats from 45c per bushel to \$1.00.
Hay from \$15.00 per ton to \$30.00.
Pork from \$23.00 per bbl. to \$48.00.

Plant and equipment, as between the six years mentioned, show an increase of 150 per cent. Blankets, which were \$4.50 a pair in 1913 are now \$12.50 to \$15.00 a pair.

Wages have increased 120 to 140 per cent. In 1913, wage rates in the woods ran from \$28 to \$30 a month,

and today are from \$65 to \$80 a month plus board.

Freight Rates Also.

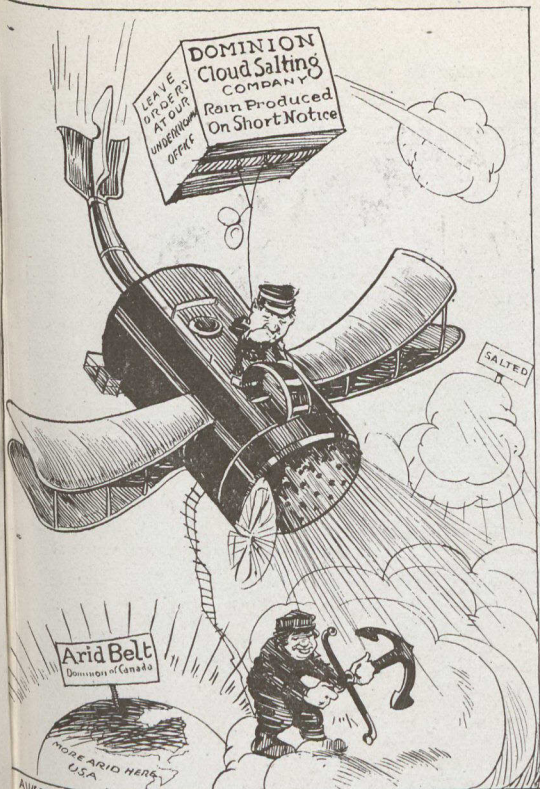
Another factor directly increasing the cost of lumber to the consumer has been the advance in freight rates by the railway companies. First came an advance of 15 per cent. with a maximum of one cent per hundred pounds, then a further scaling up of 25 per cent., with a maximum of 5 cents per hundred pounds.

It is well also to bear in mind that the popular notion that lumbermen obtained their limits for "a mere song" and are cashing in on a piece of good luck and government generosity, is not borne out by facts. The "mere song" may run into scores of thousands of dollars, and no investment in the world is so constantly exposed to depreciation through forest fires as is true of a timber limit purchase in most parts of the Dominion. Except for a small area in the Eastern States there is as yet no such thing as timberland insurance against destruction by fire. It is the purpose of the Forestry Journal in an ensuing number to explain some of the facts associated with timberland tenure in Canada, from which it will be seen that, except for a relatively small percentage, the great bulk of the timberlands now under operation represent a large capital investment with heavy carrying costs.

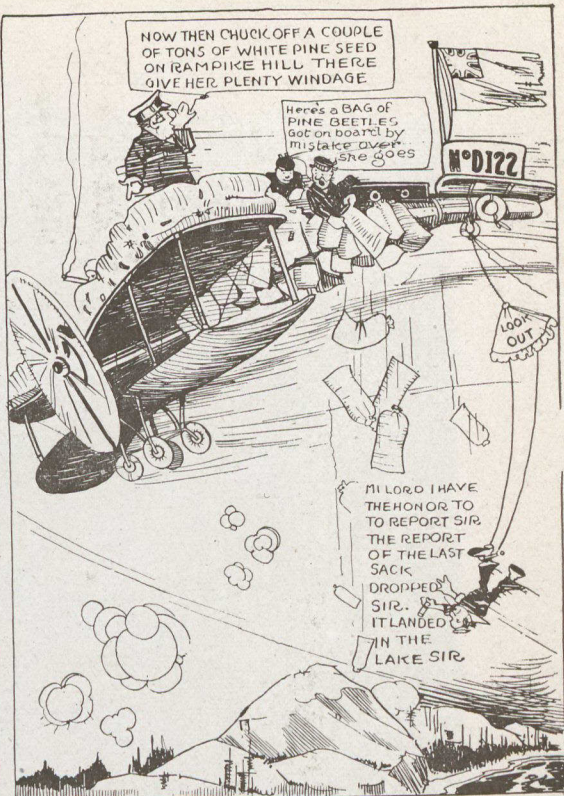
PLANTATION OWNER!

Exact data regarding small plantations, their costs and profits, are very meagre. The Canadian Forestry Journal invites its readers, many of whom own tree plantations, to place before the membership whatever facts are available.

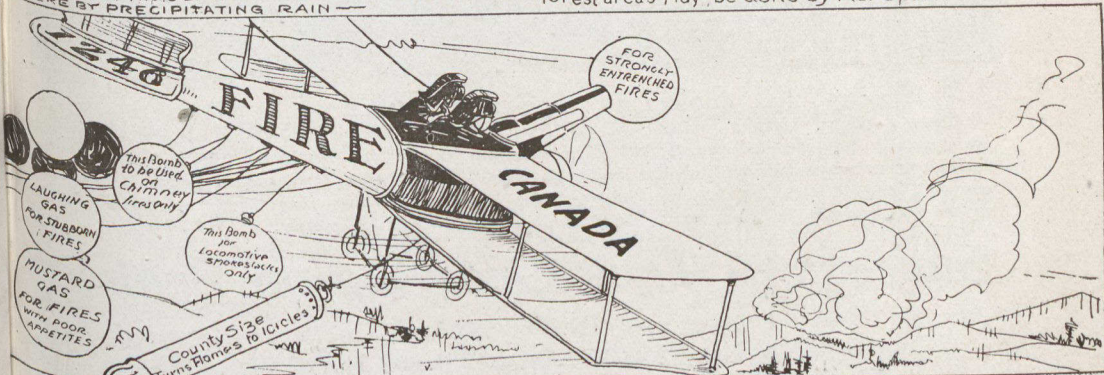
We would like to secure information particularly of those plantations now yielding fuel wood or other commercial material. Will you aid us in this search? It may be possible to arrange for expert studies to be made of a few of the more interesting examples.



WESTERN GOVERNMENT HAS BEEN ASKED BY AN ENTHUSIASTIC INVENTOR TO STOP FOREST FIRES BY SPRINKLING THE CLOUDS WITH SALT THERE BY PRECIPITATING RAIN



Someone Has Seriously Proposed Reseeding Canada's forest areas May, be done by Aeroplane



The Employment of Gas Bombs to Extinguish Forest Fires is Frequently Put Forward



Carrying Fire Fighters to a forest fire by Aeroplane May Become a Reality

The usefulness of the aeroplane in forestry is now so surely established that our artist has taken a few liberties with the radical suggestions making their appearance in the daily press from 'Vox Populi' and 'Constant Reader.'



DOES THIS LOOK LIKE HARDSHIP ON THE "BALD PRAIRIE?"

Tomato plants bending under luscious fruit; mammoth melons and other delectable products are regularly produced on the Brooks' Demonstration Farm in Southern Alberta. How? Two reasons, mainly: water, and shelter belts of trees. The shelter from prairie winds is absolutely essential, and in this instance the value of the laurel-leaf Willow has been splendidly demonstrated. The water is taken from the Canadian Pacific irrigation system.

Successful Tree-Growing on Prairies

By Norman Ross

Chief of the Tree Planting, Dominion Forestry Branch, Indian Head

Tree culture will, without doubt, eventually hold a very important place in the future agricultural development of the prairies. The desirability of encouraging tree growth in such a country as this is very evident, but naturally time is required to produce any very noticeable results over such an immense tract at present practically destitute of tree growth.

Natural conditions as we find them are not particularly favorable to tree growth, and success can only be attained by the expenditure of a considerable amount of labor, which, however, will be amply repaid by results, and the adherence to certain

main principles as to cultivation and choice of varieties which experience has demonstrated as essential.

The success of tree culture depends upon two things, namely, cultivation and the choice of varieties known to be hardy. Cultivation is required to put the soil in the proper physical condition, first so that the tree roots may become properly established, and second to form a reservoir for the storage and conservation of moisture. The necessary cultivation consists of as deep a ploughing as practicable, loosening up the soil to the greatest possible depth, and at the same time rooting out all native growths of



WHAT CANADA'S PRAIRIE FARMS CAN DO UNDER PROPER CONDITIONS.

This great crop of onions on the Brooks' Demonstration Farm in Southern Alberta, is the product of the irrigation system of the Canadian Pacific Railway, plus shelter belts of trees. The trees provide essential protection against blighting winds.

grass, weeds, etc. In most cases the tendency is to give insufficient preparation to the soil before planting, and this is nearly always fatal, and by far the greater percentage of failures can invariably be traced to this cause. When a settler once decides to plant trees he generally wants to see results in the shortest possible time, and for that reason, unless he should happen to have a piece of land which has been under cultivation for some time, is seldom willing to postpone the actual planting in order to put the ground in better condition, as he imagines that by so doing he is losing valuable time, whereas he is as a matter of fact inviting failure and practically throwing away valuable time and labor. Our experience in connection with the tree planting work of the Dominion Forestry Department, covering a period of the last sixteen

years, in which we have been instrumental in establishing thousands of plantations in the three prairie Provinces, has proved conclusively that thorough summer fallowing, taking one year with another, is the only preparation that can be absolutely relied upon. If following such preparation, suitable varieties are selected and properly planted, success is bound to follow providing reasonable protection from stock, fire, etc., and cultivation are subsequently given to the young plantations. Cultivation after planting is as necessary as before, as on account of our soils being very rich, weeds and grass will quickly work in among the trees if not carefully looked after. Grass is the worst enemy of established tree belts, and nearly always works in from the edges unless proper measures are taken to prevent it. Once grass gets



Part of the shelter belt of Laurel leaf Willow on the Brooks' Demonstration Farm in Southern Alberta, together with the irrigation lateral.

a good foothold in a plantation it is only a matter of time in most cases until the trees gradually die out. There is not sufficient precipitation to support a growth of grass and trees on the same piece of ground. This is a point which must be fully realised, as it is the whole secret of success. We have never yet seen a failure where proper methods of cultivation have been intelligently carried out.

To be successful in tree-growing requires patience and perseverance, as one is certain to meet with many discouragements. One season it may be damage from insects, next winter-killing, then hail or perhaps rabbits may destroy the whole of a young plantation a year or two after the trees are set out. However, such setbacks are generally only of a temporary character, and probably the majority of planters will largely escape such disasters. But even should one's

trees be occasionally more or less injured by winter-killing, which is perhaps the most serious of our difficulties, that is no more reason for giving up tree culture than for a farmer to stop growing grains because his crop is once in a while destroyed by frost.

A well-established and properly arranged system of tree belts is an enormous asset to any farm. We have in our office hundreds of letters from farmers who place the value of their belts at very large figures, running from some hundreds of dollars to, in many cases, three or four thousand. At present few farmers plant trees with a view to the ultimate value of the wood products. The first consideration is always to provide shelter and improve the appearance of the homestead. Only those who have lived on the open prairies can realise just how much such shelters add to

their comfort and convenience. In the summer time a properly sheltered garden makes it possible to produce as fine vegetables, flowers, berries and bush fruits as can be grown in any part of Canada, and although we do not predict that Saskatchewan will ever be noted for her commercial orchards of tree fruits, there is already ample evidence to show that standard apples and certain varieties of plums may be grown with a considerable degree of success for home consumption. It is only a question of the development and propagation of varieties suited to our conditions. In the winter time the shelter belts give protection from the sweeping winds and are of very practical value in holding back the snow from around the buildings. This in itself is worth a very

great deal, as any one will realise who has to dig his way morning after morning, through deep drifts before the stable doors can be opened.

From an æsthetic point of view, the building up of the home, and the influence on children, the importance of tree culture cannot be over-estimated. In fact in such a country as this it is doubtful whether such beneficial influences do not far exceed any intrinsic worth or money value that can be produced in actual wood materials.

That there is no difficulty at all in growing fuel supplies and fencing materials on the prairies in a comparatively short time has been amply demonstrated, but it will be many years before individual farmers are likely to seriously consider this phase of tree culture.

Short Facts about Canada's Paper Industry

While the bulk of Canada's pulp and paper exports go to the United States, they are also sent to Great Britain, Japan, China, Australia, New Zealand, South Africa, India, Cuba, Mexico, British West Indies and South America.

Canada's pulp and paper exports lead all manufacturing industries.

The United States consumes one-half of the world's production of paper. Canada, in proportion to her population, is a close rival of the United States as a paper-consuming country.

The newspapers of the United States consume 2,000,000 tons of newsprint every year, of which Canada supplies, approximately, one-fourth.

The daily consumption of newsprint paper in Canada is, approximately, 250 tons; in the United States, 5,750 tons.

Where coal is used to generate power in the operation of paper mills it takes, approximately, a pound of coal to produce a pound of paper.

Paper was first made in Canada at St. Andrew's, Que., in 1803.

Canada's first large paper mill was built in 1865, and produced 1½ tons of paper in 24 hours. Today a modern paper mill produces from 250 to 300 tons in the same length of time.

Canada's pre-eminence as a paper-producing country lies in the possession of thousands of acres of pulp-wood forests conveniently located to water powers.

Canada has the largest forest area of any country in the British Empire.

Canada's daily output of paper, made into a continuous strip three feet wide, would be long enough to girdle the globe at the equator.

The principal pulp and paper mills of Canada are located in the provinces of Quebec, Ontario, New Brunswick, Nova Scotia, and British Columbia.

Spruce, balsam fir, hemlock, jack pine, tamarack, poplar and bass-wood are used in the manufacture of pulp.

Quebec's annual production of pulp wood exceeds 1,000,000 cords. Ontario comes next with about 800,000 cords.

It takes approximately 1½ cords of wood to make a ton of paper.

The Maple Tree as a Profit Maker

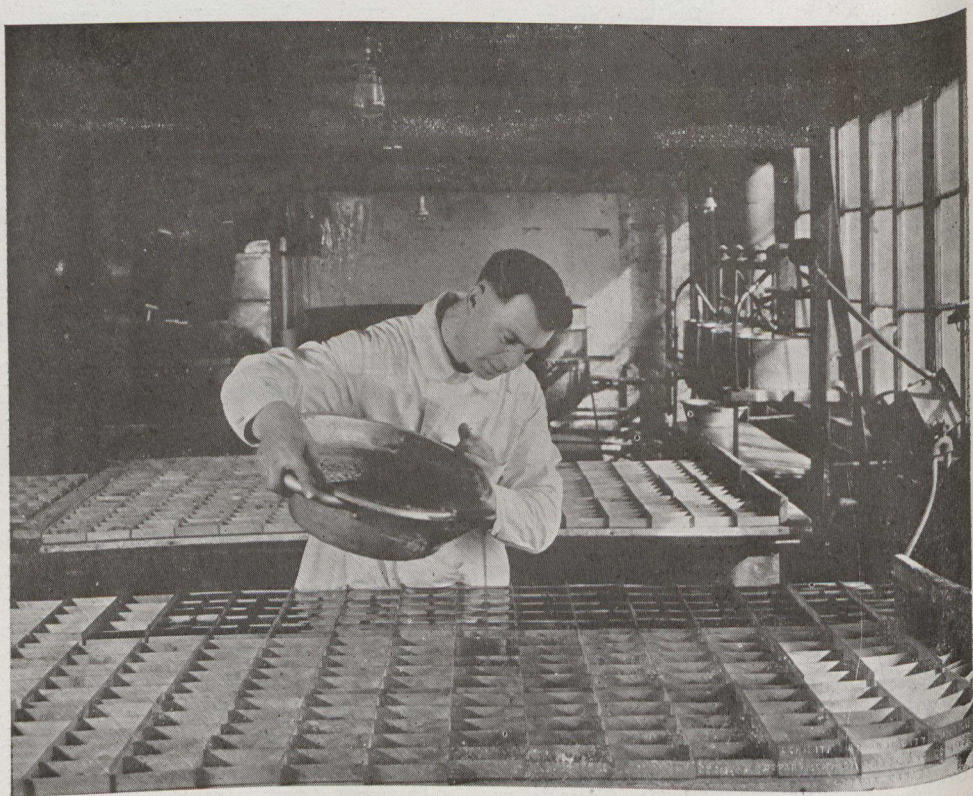
By Dr. George Fisk, Montreal

Proprietor of Maple Glen Reserve, Magog, P.Q.

The only natural forest tree in Canada which may be cropped while it is slowly growing to maturity for lumber is the maple tree. This may be tapped with profit for the production of maple sugar after it has grown to the size of six or eight inches, and so provide a revenue long before it is large enough to give the best returns as lumber. In twenty-five or thirty years after a tree the size of a broom handle has been transplanted, it should yield a very profitable return for the time and money invested.

The most suitable locations in this Province of Quebec for maple groves are along the ridges and hillsides and it is not difficult to find many hillsides gradually sloping,

which have been cleared or partially cleared, and are now grown up to thickets of hardwood, in which maple largely predominates. Mr. R. H. Campbell, Director of the Forestry Branch of the Department of the Interior, concludes an interesting comparison between the pine tree and the maple tree as follows: 'When one considers the revenue derived after the thirtieth year from the sap, and the higher prices obtainable for thinnings as fuel, or making acetic acid, wood alcohol and charcoal, there seems but little doubt that the maple would in the end be the more profitable tree. This is particularly true in the case of the small wood-lot owner, or farmer, who has many uses for the wood, and especially



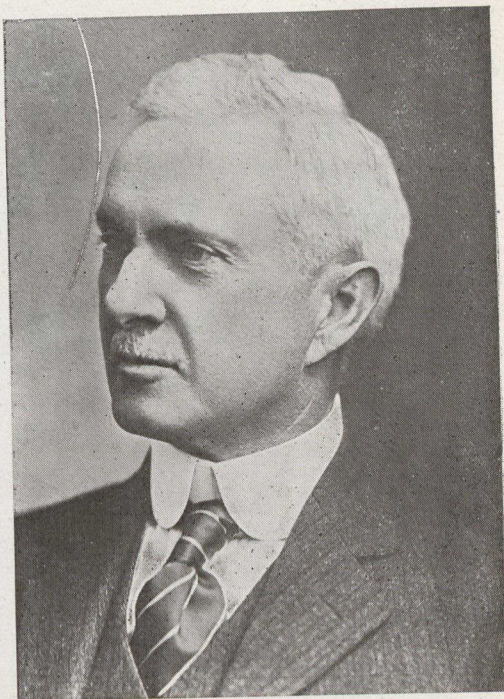
Pouring pure Maple Sugar cakes in a modern Quebec factory.

where the maple already exists in the stand and natural reproduction can be secured.'

Let us examine this problem of a maple orchard ideal in location, arrangement and outfit for producing maple sugar of the highest quality at the lowest possible cost. To produce an article economically is, of course, to produce it in fairly large quantities. It is, therefore probably wise to develop as large an area as possible in one sugar orchard. The chief expense in administering a sugar orchard is in gathering the sap from tree to tree. The quickest and most economical method of doing this is by gravity through a system of pipe lines. The orchard preferably should be placed around a sloping hillside, not too rough or steep for the necessary road where teaming is needed, and this entire slope should focus at some point lower down, where the sugar cabin and storage tanks should be placed.

It is not difficult to find in this Province of Quebec many suitable areas in which more than 30 or 40 acres of hillside are tributary to a suitable point for a sugar cabin. If we take, then, for illustration, a unit of thirty acres, sloping preferably to the east or southeast, we would in time be able, by proper planting, to have an orchard of 4,000 trees or more, estimating 133 trees per acre. This should mean 4,000 buckets, or, perhaps more if some trees are large enough to permit of more than one bucket. If this area contains maple trees already, it simplifies the undertaking very much, as it will not be necessary for the owner to wait twenty-five years for the full maturity of his orchard. If the other varieties of wood are first cleared out, and the vacant places filled by planting young maples where necessary, the orchard will go on improving year by year.

In considering the economical administration, small subsidiary cabins should be built at convenient points to allow for the storage of tanks, covers, spouts and piping, each cabin



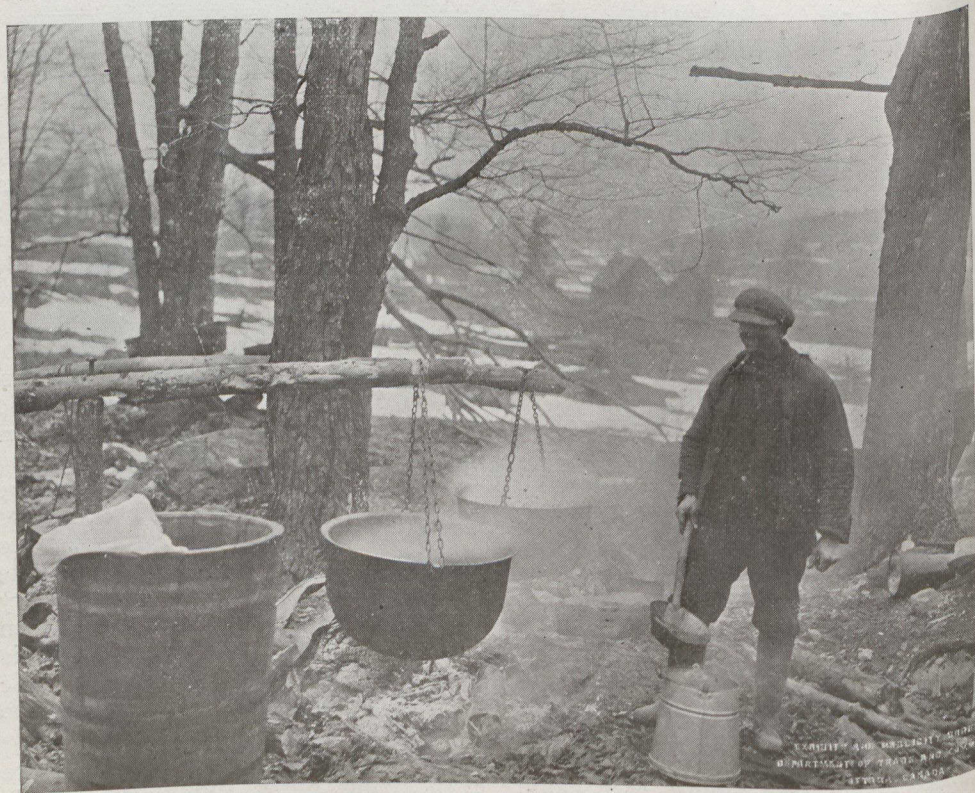
Mr. C. E. E. USSHER
President of the Canadian Forestry Association.

to contain from 500 to 1,000 buckets. This facilitates tapping in the early spring, when the snow is deep and the transportation is difficult. With a system of two-inch galvanized sheet iron pipe in ten ft. lengths, which can be placed in position on a series of posts, or suspended from a line of barb wire, so as to be easily taken up after the season is over and stored in the cabin, all long hauling of sap is obviated. The collector of sap, with a neck yoke and two pails, gathers the sap from tree to tree, and empties it at pleasure into the nearest pipe by means of a connecting hopper. The sap flows direct to the storage tank, and the collector wastes no time in needless journeyings to the storage tank. With a complete line of piping, it is never necessary for a collector to travel more than a few yards before emptying his load. A good man should be able to gather all the sap from 600 to 800 trees each day in this way.

It is very important that the evaporating outfit should be ample



Employing pipe lines to carry the maple sap to the evaporator.



The old-fashioned way of maple sugar making.

for the size of the sugar orchard. We see all too frequently small evaporating accommodation, necessitating much overtime work. The largest evaporator at the present time on the market is a 6 ft. x 24 ft. This is not at all unwieldy, and can be operated by one man with little more trouble than one of one-fourth the area. In most sugar orchards this size should be ample for an orchard of 4000 trees, by providing a night shift for boiling. The next point is to provide large buckets, covers, and satisfactory spouts to give the best possible returns from each tree tapped. It is a frequent observation that small buckets waste one-half of the sap which flows, and that uncovered buckets in rainy weather waste nearly all the sap.

It has been estimated that about 9% of the sugar content of the maple tree is obtained from a single tapping. It is also an opinion of experts that if 20% could be obtained no damage would be done to the tree. If some way is devised by which an increased flow could be obtained it would increase the commercial returns materially.

In administering a sugar orchard it is a well known fact that if the orchard is concentrated over a small area it is much more economical than where the trees are wide apart. Careful reforestation of the barren areas in the orchard will, in time, give an ideal orchard for economical administration.

There are many points in the cabin and woodshed which may be adjusted for economical administration. A large evaporator will frequently absorb three cords of wood during the day. This is a lot to bring in by the armful. An overhead rail from the woodshed with a truck suspending platform will simplify this very much. There are many other similar points of economy which we will not mention.

Let us estimate, then, the results at the end of twenty-five years after careful reforestation that one would expect to obtain. With an area of thirty acres, averaging 135 trees, or 135 buckets to the acre, and one large evaporator, it would be possible for six men to administer this with comparative ease. The average annual return should be about two pounds of sugar per tree, or one gallon of syrup to five trees. If a high quality of sugar and syrup were made, as it should be under these conditions, a high price should be obtained for the product.

The labor problem, of course, is a very important factor in any estimate of this kind, but the sugar season is a quiet one with those who work on the farm and in the lumber woods, and with proper accommodation for the men, preferably in the sugar orchard itself, it should not be difficult to provide and retain adequate skilled labor. To many a farmer who has a wood-lot and taps a few trees that nature has given him, the return is not large for the labor, but the same thing prevailed in the apple industry, when the farmer attempted to sell a few seedling apples from accidental fruit trees about the fences and clearings. Today select orchard lands are planted, drained, cultivated, and carefully tended, and I am free to say that, considering the initial cost of suitable apple tree land, and the subsequent expense of planting and caring for the orchard, the return is not greater, nor the investment more secure, than would be a maple orchard well located and well administered. Furthermore, much of the land suitable for maple trees is quite unsuitable for fruit trees, and young maple trees are found on every hand ready for planting, and require no spraying or cultivating. The necessary capital to plant a maple orchard is far below the amount required to plant a fruit orchard.

1,000 SPEAKERS ON PROTECTION OF THE FORESTS.

The Canadian Forestry Association has under formation a Speakers' Bureau, by which selected speakers in

1,000 communities will deliver addresses to school children and other gatherings on forest protection and kindred subjects. School boards are co-operating with the enterprise.

The Maple Sugar Industry in Canada

The making of maple sugar and syrup has become but a memory in the recollection of residents in many of the older parts of Canada where even the woodlots have given up their places to cultivated fields. The industry is still, however, an important one over large areas in Quebec, and to a less extent in Ontario and the provinces down by the sea.

Sugar making from the maple, which is confined entirely to this continent, had a very early beginning. Before the advent of the white man the Indian had learned to extract and concentrate the sap of the maple tree. On the approach of spring the trees were gashed, with the tomahawk, in a slanting direction and beneath the opening made was inserted a wooden chip or spout to direct the fluid drop by drop into the receptacle resting on the ground. The sap was caught in a birch dish and boiled in earthen kettles. The small quantity of dark, thick syrup this made, was the only sugar available to the Indians, and is stated by early writers to have been highly prized.

The early settlers from the Old Land learned from the Indians the art of sugar making, and indeed followed for many years their crude methods of manufacture. Even yet primitive equipment and methods are stated to be used in back sections of the country that turn out their annual crop of dark, inferior syrup and sugar.

For perhaps a century the white man followed very closely the primitive methods of the Indian, save the substitution of iron or copper kettles for vessels of clay or bark. In the early days before the timber acquired

much value the axe continued to be used for tapping the trees, the cap was caught in wooden troughs and conveyed in buckets on the shoulders with a sap yoke to a central point to be boiled. No sugar bush was fully equipped without snowshoes, which were frequently found necessary in gathering the sap. The boiling was done in large iron kettles suspended from a pole in the open woods in a sheltered location with no protection from the sun, rain or snow or the ashes, falling leaves, moss and bits of bark that were driven about by the wind.

The maple products made by this crude method were strong in flavor, dark in color and variable in quality.

Until about fifty years ago there was little improvement made in the methods of sugar makers; but since that time the advance has kept pace with that in other branches of agriculture until it has become a more or less highly organized commercial industry.

An early improvement was the substitution of the auger for the axe in tapping, coopered buckets took the place of the birch bark "cask" or hewn sap trough, while the kettle gave way to the evaporating pan, which has, in latter years, developed into the modern evaporator with corrugated bottom and separate compartments. Not alone for the preservation of the life of the tree, but also for the cleanliness in sugar making, the wooden spout has almost disappeared in the most advanced sections, in fact the tendency now is toward the use of metal in every article of equipment with which the sap, syrup or sugar comes in contact. Furthermore, the increasing cost of

labor is being met by the ingenious inventor, who has provided facilities for taking full advantage of the law of gravitation in handling the fluid which in a well equipped plant flows of its own accord from the collecting tank to the storage vat, from thence to the evaporator and, when boiled to a proper consistency, into the receiving can. Indeed where the profile of the sugar orchard will permit of it, pipe lines are laid to conduct the sap from outlying collecting centres to the camps where evaporation takes place.

With all the advance that have taken place in manipulation, sugar making has not lost its romantic side. "Sugaring Off" at the sugar camps in the woods is still looked

forward to by young and old, who regard the event as a social feature affording rare enjoyment. The tramp to the woods on a spring day, the aroma of the escaping steam, the partaking from a wooden paddle by means of a chip-like scoop, the hot syrup just on the verge of solidifying into sugar, or the tasting of the "wax" that has been allowed to harden on the clean snow, all serve to inspire the reminiscent story teller and to awaken the amorous instincts of the budding youths. Such was the sugaring off of decades ago and such it is today, where sugar orchards are operated for from two to four weeks in the spring in certain sections year after year.

—J. B. SPENCER.

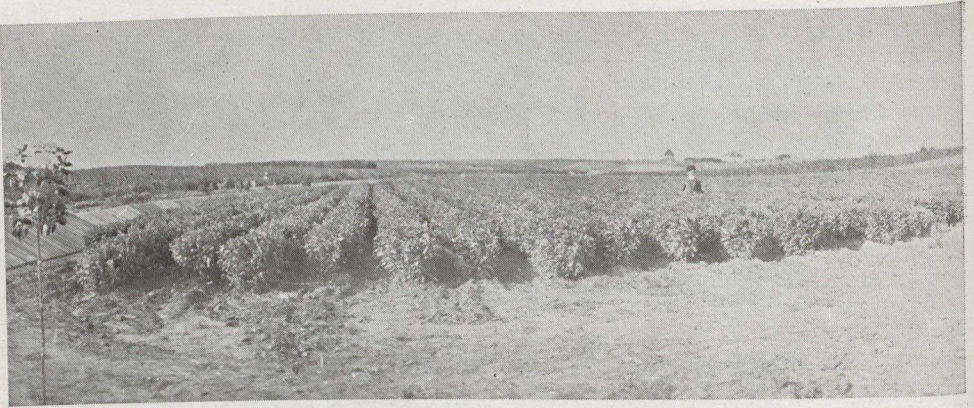
Extent and Importance of Maple Sugar Industry

The importance of the maple sugar industry is scarcely realized in many parts of Canada where it has long since ceased to be carried on. From 1850 to 1890, according to Dominion statistics, the production of maple sugar together with its equivalent in syrup, increased year by year. The average yearly production from 1851 to 1861 was about 13,500,000 lbs.; from 1861 to 1871 about 17,500,000 lbs.; from 1871 to 1881, 19,000,000 lbs.; from 1881 to 1891, an average of 22,500,000 lbs. was reached. During the next decade the yearly average fell to some 21,200,000 lbs.

In 1919, however, Quebec Province alone produced about 30,000,000 lbs., valued at 25 cents a pound, making a total of \$7,500,000. In 1911, Quebec's maple crop was about 10,000,000 lbs.

The industry is confined in Canada to Quebec, Ontario, New Brunswick and Nova Scotia. In the Maritime Provinces the yearly output has rarely exceeded half a million pounds, and Ontario, 5,000,000 lbs. per year.

It is estimated that this vast industry is carried on by about 55,000 growers. While many of these operate their larger or smaller woodlots preserved upon their good farms, a vastly larger number take their sap from rough and stony areas that would have comparatively little value if the trees were removed. The increasing value of maple wood and the comparatively low price of maple sugar and syrup, due to former unfair conditions in the trade led to the removal of many fine sugar orchards that had produced crops of deliciousness yearly for most of a century. It is regrettable that the sturdy kings of the maple forest have been cleared off in this way as an important yearly revenue at a season when badly needed, has been cut off, and one which is secured by the labor of a few weeks when it can best be spared from service on the farm. The conservation of the maple groves will, therefore, appeal to every one interested in the forest and the farm.



A block of 70,000 Caragana trees in the C.P.R. Nurseries at Wolsely, Saskatchewan. These are in their third season and were developed from seed.

Horticultural Work of the Canadian Pacific

By F. A. W. Boyd, C.P.R. Forestry Branch, Wolsely, Sask.

The Canadian Pacific Railway in the past fourteen years has been planting on its Western Lines, large numbers of trees, as snow fences on the right-of-way, and for ornamental purposes in the station gardens.

A large number of the snow-fence plantations have done well, and are taking the place of the unsightly wooden snow-fences; but in a few cases where the locations of the plantations are very high and exposed, the trees have not survived. The varieties used for this work have been the willows, Russian poplar, Manitoba maple and caragana. During the last few years some spruces have been planted as an experiment, and in some locations are doing well. It is the intention to make more use of the evergreens in future wherever conditions are favorable.

Outside of the many gardens planted and looked after by station agents and other employees, there are a large number of station gardens which are in charge of professional gardeners under the supervision of a horticulturist, who is on the staff of the Forestry Branch. In these gardens it is the aim to have a good lawn, several good specimens of the different varieties of trees suitable for the locality, a few ornamental shrubs

and some good groups of perennial flowers.¹ In some of the gardens annual plants also are used. These gardens not only serve to beautify the station grounds and afford some relief to the eyes of the travellers passing through, but serve as an example and an inspiration to the farmers and settlers, showing what can be accomplished in the way of home decoration and protection, and giving some idea of the varieties suitable to the locality.

An educational campaign is carried on from the office of the horticulturist among the company's employees, the object being to arouse interest in tree planting and allied horticultural activities. A series of bulletins have been prepared and are distributed extensively, dealing with the planting and growing of trees, ornamental shrubs and plants, fruit and vegetables. Trees and other nursery stock are also supplied to employees living on company's property who wish to have gardens round their houses. This work is meeting with great success, and an increasing number of employees avail themselves of these opportunities yearly.

The trees for all this work are supplied from the C. P. R. nurseries at Wolsely, Saskatchewan, which is

situated on the main line sixty miles east of Regina. Here the company's horticulturist makes his headquarters and supervises the nursery work.

These nurseries were established in the fall of 1907 when about thirty acres adjoining the town were chosen, and the ground broken. This area was sufficient for the first few years, but as the work increased and more stock was needed, it was necessary to acquire more land, and an additional seventy acres adjoining the original nursery were fenced, making the total area about one hundred acres.

The climate limits to a great extent the varieties of trees and plants grown. Only three coniferous trees are used to any extent, namely, white spruce, Scotch pine and tamarac or American larch. These are all quite hardy and do well. Among broad-leaved trees the Manitoba maple, green ash, elm, Russian poplar and several willows are the most useful. The list of ornamental shrubs is not long, but includes some very good kinds, such as honeysuckle, caragana, amorpha, Japanese rose, Ginnala maple, sand cherry, dogwood, and several varieties of spirea and lilac. Herbaceous perennial plants are very



A corner of the C. P. R. station at Moose Jaw, Sask. This garden is about seven acres in extent.



Is this result worth while? The station grounds at Virden, Manitoba, are an excellent introduction to the town.

useful in the gardens, and very much in demand. There are about thirty sorts which are hardy, but quite a lot of experimental work is being done,

and this number is being added to from time to time as other varieties are discovered which will live on the prairies.

Producer and Customer in Biblical Times

Geo. H. Montgomery, K.C.,

before 1920 Annual Meeting of Canadian Pulp and Paper Association

"The text I have chosen is from 1st Kings, verses eight to twelve:

"And Hiram said to Solomon, saying, I have considered the things which thou sentest to me for, and I will do all thy desire concerning timber of cedar, and concerning timber of fir.

"My servants shall bring them down from Lebanon unto the sea; and I will convey them by sea in floats into the place that thou shalt appoint me, and will cause them to be discharged there, and thou shalt receive them; and thou shalt accomplish my desire, in giving food for my household.

"So Hiram gave Solomon cedar trees and fir trees, according to all his desire.

"And Solomon gave Hiram twenty thousand measures of wheat, for food for his household, and twenty measures of pure oil: thus gave Solomon to Hiram year by year.

"And the Lord gave Solomon wisdom, as he promised him; and there was peace between Hiram and Solomon, and they two made a league together."

"That chapter is not only of interest in discussing the earlier description of the logging industry, including the drives, but it is of interest at this time in particular in discussing the relations which should prevail, and which have not prevailed in the past, between the consumer and the producer."

A FARMER'S EXPERIENCE.

Until this last two years I have always felt that, while tree plantations about the buildings were most highly desirable, they also had their drawbacks. While there is nothing

that protects the farm home like a grove of trees and gives it a home-like appearance, the trees take a lot of moisture, and it is almost impossible to grow a garden close to trees or inside a small wind break. Further, in the spring after a heavy snowfall the trees hold the snow and frequently keep the ground near them wet very late in the spring. A row of trees along the road sometimes makes the road impassible for weeks.

Last spring, however, and again this spring, I have come to put a higher value on the trees on my farm. I have a wind break running south from the road for about 20 rods. It was planted ten years ago and is 14 to 20 feet high. A field just east of this wind break was summer-fallowed and seeded to wheat in 1918. It ran south the full half mile and was 60 rods wide. Over half this field at the south end was completely drifted out. Where the shelter-belt protected the field from the west and north-west winds I never had a better crop and it checked the force of the wind right across the 60 acre field.

This year I noted the same effect on a neighbor's farm. On my own farm the field was spring plowed and none of it drifted badly. I have come to the conclusion that the policy of planting a system of wind-breaks is the only permanent measure of controlling soil-drifting. In planting I would suggest that they be planted in rows half a mile apart, running north and south. Nearly all the high winds that do the damage are almost directly due west winds.

I realize that such a plan must be started on a small scale, but it would soon grow to be the greatest tree plantation ever undertaken.

Sask.

G. H. SCOTT.

A Canadian Flag Staff's Strange Journey

For more than fifty years, that is to say, from 1861 to 1913, the flag staff of Douglas fir standing on a mound in the Berberis Dell, constituted a conspicuous landmark in the Royal Gardens, Kew. It was a present to Kew from Mr. Edward Stamp. The original staff was 159 feet high, and calculated to be about two hundred and fifty years old. It was repaired and rehoisted in 1896, but in 1913, when it was being varnished, it was found to be affected with dry rot, and consequently it had to be taken down and, as further repair was out of the question, there came an end to the finest flag staff of its kind in Europe.

The Search in B.C.

The provision of a new staff created a great deal of interest, not only at Kew, but throughout this country and in British Columbia, whence the original flag staff came. An interesting account of the history of the new flag staff, finally erected on October 18, 1919, is given in the Kew Bulletin. From this we gather that the Provincial Government of British Columbia offered to present a new spar of Douglas fir to the Royal Gardens, Kew, to replace the old one, and on February 25, 1914, this offer was accepted. As a result, the forests of British Columbia were searched by skilled woodmen until a tree was found that fulfilled the exacting ideal of the searchers; yet it was not until eleven trees had been felled that the requirements were met. The tree selected was found some thirty miles north of the city of Vancouver. After it had been felled, its length was reduced to about 220 feet, but its height as it stood in the forest was probably between 280 and 300 feet. The tree was conveyed by rail and water to Vancouver, and there shaped to its present form by expert axemen. It is square at the base for 15 feet up, then octagonal up to 157 feet, thence to the summit (214 feet) it is round. Its diameter at various heights, is as

follows: Base, 33 inches; 15 feet, 33 inches; 52 feet, $29\frac{3}{8}$ inches; 89 feet, $25\frac{3}{8}$ inches; 115 feet, $22\frac{1}{2}$ inches; 190 feet, 19 inches; 214 feet, 12 inches (summit). The pith is not in the centre, but five and a half inches from one side at the butt end; from the pith to the other side of the margin there are 360 annual rings. The first 100 rings occupy $17\frac{3}{4}$ inches, the next 100 rings, 7 inches, and the third hundred are compressed into $3\frac{1}{2}$ inches. The tree was 6 feet in diameter at the base when felled, and practically all the sap wood was taken off in shaping it. It is estimated to be about 400 years old, and the weight, roughly 18 tons, is about four times that of the old flag staff.

The Flag Pole's Travels.

The directors of the Shire Line of steamers undertook to convey the flag staff from Vancouver to the River Thames, and on December 29, 1915, the S.S. "Merionethshire" arrived safely at the London Docks and dropped the spar into the Thames. It was towed up the river to Kew, and finally conveyed through the gardens to the base of the flag staff mound, where it remained for a period of $2\frac{1}{2}$ years, and was a source of pride to the many Canadians who saw it. It was hoped at one time that the Canadian Forestry Corps would undertake the task of erecting the staff, but they were unable to do so, although the concrete blocks forming the base were set in the mound under the direction of engineers of the Canadian Forestry Corps. Messrs. Coubro and Scrutton eventually raised the flag staff, under the direction of H.M. Office of Works, by means of a derrick 100 feet high. A square block of steel, 7 inches in diameter, is fitted into a groove at the base of the staff and thus supports it. The new flag staff, which towers far above the surrounding trees, is a magnificent exhibit for Kew, a testimony to the generosity and Imperial spirit of the

Premier and Government of British Columbia, and an example of the marvellous tree growths that make the forests of that fine province some of the richest on the face of the globe. *The Gardeners' Chronicle*, Jan. 24th, 1920

Great Profits from Forests in the French Jura

By Theodore S. Woolsey, Jr. (Formerly Lt.-Col. U.S. Engineers)

Written for the Canadian Forestry Journal

71,000 Board Feet per Acre Produced Under Careful System of Forest Management

One of the questions asked by private forest owners and others interested in the yield of forests, is what will forests (naturally regenerated) return in lumber or money? The answers given to this question by normal yield tables, usually based on planted stands, are often so high that they cannot be applied to Canadian or American conditions without much guesswork and modification. Actual averages of compartments or whole forests are more reliable for purposes of judging what forestry can attain. Therefore the statistics* that follow, for fir-spruce forests in the Jura mountains of France, somewhat comparable to spruce-fir stands of northern New England or Southern Canada, are of particular interest and value. They show what forestry can attain (as a maximum) under favorable conditions on non-agricultural mountain land over whole compartments of 15 to 30 acres.

(a) Compartment 18, 5th working group, State Forest of La Joux (2nd Jura Plateau), 60% fir and 40% spruce, fully stocked thrifty stand, planted after a windfall in 1812; 100 years old in 1912.

*Based on unpublished data supplied by Devarennes, Inspector, French Forest Service, in charge of Jura working plans in 1912. Canadian Forestry troops operated on an extensive scale in the Forest of La Joux.

Per Acre.					
Diameter		No. of Trees	Vol. Cubic Metres	Approximate	
Breast High Inches	Board Ft. and			Cords	
10		45.6	32.4	5,700	4.8
16		63.6	112.0	32,300	15.0
22		24.8	88.0	23,400	11.8
28		3.2	24.0	7,200	1.6
Totals		137.2	256.4	68,600	33.2

(b) Same forest and working group but compartment 19, and from entirely natural regeneration; 100 years old, but 90% fir and 10% spruce.

Per Acre.					
Diameter		No. of Trees	Vol. Cubic Metres	Approximate*	
Breast High Inches	Board Ft. and			Cords	
10		67.2	47.2	8,400	7.2
16		98.0	170.8	45,300	22.6
22		35.2	123.6	33,800	16.4
28		4.0	24.0	7,200	1.6
Totals		204.4	365.6	94,800	47.8

*These conversions (a, b, c, d) were made as follows: For 10 inch trees 4 cubic metres were counted to the 1,000 feet, after 30 per cent. subtracted for cordwood. In the other diameter classes 3 cubic metres were counted to the 1,000 feet after subtracting 20 per cent. for the cordwood in the 16 and 22 inch classes, and only 10 per cent. of the 28 inch class. Two cords were considered equal to 1,000 board feet.

Such yields seem incredibly high and the larger number of trees and the higher yield on the area naturally regenerated is especially noteworthy. The fact remains that these yields



Spruce, Hemlock and Cedar, Moresby Island, Queen Charlotte Islands.



Muskeg Type of Country, south of Masset Inlet, Graham Island, Queen Charlotte Islands.

were attained within 10%, allowing for a possible 10% error in estimate.

(c) Pure spruce 100 years old from natural regeneration on a compartment in the forest of Ouhans (first Jura Plateau), altitude 2,300 feet.

Per Acre.

Diameter		No. of Trees	Vol. Cubic Metres	Approximate* Board Ft. and Cords
Breast High Inches				
10	97.2	60.8	10,600	9.2
16	84.8	151.2	39,600	21.6
22	13.2	54.4	14,500	7.2
Totals	195.2	266.4	64,700	38.0

(d) 90% fir, 10% spruce, 100 years old from natural regeneration on a compartment in the forest of St. Point (third Jura Plateau), altitude 3,280 feet.

Per Acre.

Diameter		No. of Trees	Vol. Cubic Metres	Approximate Board Ft. and Cords
Breast High Inches				
10	76.8	44.8	7,800	6.8
16	64.0	119.2	31,800	15.8
22	13.6	57.6	15,400	7.6
Totals	154.4	221.6	55,000	30.2

These four compartments average almost 71,000 board ft. per acre and indicate what can be attained under proper forest management, in 100 years on a maximum with thrifty, vigorous stands of silver fir.

Editor's Note.—The average yield of natural balsam fir and spruce stands in Eastern Canada is from 5,000 to 10,000 board feet per acre.

An Article for All Planters and Shade Tree Owners

Relative Value of Shade Trees, with Special Reference to Rapidity of Growth

By F. E. Buck, Central Experimental Farm, Ottawa

The sole object in planting shade trees is not merely to obtain shade; indeed one main object is to complete the architecture of the street or house surroundings, as the case may be. Quick realization of the objects in planting a shade tree is of course desirable, but rapidity of growth is generally looked upon as an undesirable characteristic of a shade tree. The reason is obvious perhaps. Rapid growth is generally correlated to weakness of wood and tendencies to decay, and therefore a short-lived tree is the result. A tree is a living beautiful thing, and its values reside in its more permanent qualities of beauty of form, cleanliness, longevity, etc., rather than in the temporary quality of quick growth.

Nevertheless, with these reservations recorded, it may be said that there is an advantage in having shade, especially where combined with other good qualities, just as soon



• In Cressman's Woods, of which Waterloo County Ontario, is justly proud.



as possible, and it is the purpose of these notes to indicate which trees may be relied upon to give, as soon as possible, satisfactory results in regard to both shade and the other qualities which should be required in all shade trees, especially street trees.

Soil and Location.

This should be recorded, namely that soil and conditions under which the trees are planted have a great deal to do with the rate of growth. For example, if Sugar maples are planted in a soil of a heavy clay type the rate of growth will be about one-fifth of what it would be were the trees planted in a loamy soil. Trees which are planted in wind swept positions, or where the extreme heat of summer affects them considerably, will make much slower growth than when located under favorable conditions.

It should be stated also, that as a general rule there is very little difference in the comparative rate of growth of most of the best trees for

shade purposes. Trees make the most rapid growth for a period of about twelve years after planting; they then settle down to an increase in height of about one foot per year, or slightly more in years which are favorable to growth.

1. Large Sized and Generally Rapid Growing Trees.

The trees in this group are suitable for planting in wide streets or for lawn and park planting, where there is an abundance of room.

American Elm (*Ulmus americana*)

Silver or White Maple (*Acer saccharinum*)

Cut-leaved Silver Maple (*Acer saccharinum* Wieri)

Basswood (*Tilia americana*)

White Ash (*Fraxinus americana*)

White Oak (*Quercus alba*).

The fastest growing trees in this group are the American Elm and the two Maples. The cut-leaved Silver Maple is a specially fine tree for lawn purposes; the first year after planting, until it has attained a height of seventy-five feet, it makes very rapid

growth. The same is true of the Elm, although the Elm is much more suitable for a street tree. As a lawn tree it is a great robber of soil food and moisture and in this way frequently injures adjoining vegetation.

Recorded Measurements of Tree Growth.

Average yearly growths of trees grown under lawn and avenue conditions, from records kept at the Experimental Farm:

American Elm	15 inches
Silver Maple	14 "
Cut-leaved Silver Maple	24 "
Basswood	12 "
White Oak	8 "
White Ash	

2. Medium Sized Trees of Fairly Rapid Growth:

The trees in this group are suitable for streets of ordinary width, or for use in home grounds, parks, parkways, etc.

- Sugar or Rock Maple (*Acer saccharum*)
- Red Maple (*Acer rubrum*)
- Norway Maple (*Acer platanoides*)
- Red Oak (*Quercus rubra*)
- White Birch (*Betulus alba*)

Horse Chestnut (*Aesculus Hippocastanum*)

The fastest growing trees in this group are the Birches and the Maples. The Sugar Maple is the best tree for general street planting in localities with a temperature similar to Montreal or Ottawa. The Red Oak is the fastest growing of the oaks and is a very fine street tree. It is greatly prized in some American cities. At Ottawa its rate of growth under favorable conditions is on a par with that of the Norway Maple and some specimens of the Sugar Maple.

Average Yearly Growths, Over a Definite Period, of Trees Grown under

Lawn and Avenue Conditions.

Sugar Maple	6 inches
Red Maple	about 6 "
Norway Maple	10 "
Red Oak	14 "
White Birch	8 "

In the record above the small amount of growth made by the Sugar and Red Maples has an explanation. Under other conditions these trees would have shown double this growth.

(To be continued.)



Consequences of a forest fire in Central Quebec. Photograph taken by Henry Sorgins immediately after the fire was extinguished.

COMMISSION OF CONSERVATION

Controlling Torrents in France

By H. R. MacMillan,

When the French Programme is Completed, Total Cost Will Not Exceed One Year's Damage

(Republished from an earlier Forestry Journal by request.)

The damage due to floods and torrents from denuded water-sheds is probably the least serious of the effects of forest destruction in Canada. Nevertheless very large sums are being expended annually by railways in protecting road bed and bridges and by municipal, provincial and Dominion authorities in protecting roads and public works against damage by torrents. The total amount so expended in Canada each year, while, unknown, must be very great indeed. Canadians may therefore be assumed to be interested in the manner in which the control of torrents has been accomplished in France. It will be observed that whereas the expenditure in Canada is usually at the bottom of the stream in protective works, which will be a source of expense, the expenditure in France is chiefly at the seat of the difficulty, in reforesting the catchment area of the torrent, a work which will require outlay for a few years only, and which in some cases may actually become a source of revenue. Certainly the French system is more far-sighted than the Canadian.

Since the sixteenth century the problem of control of torrents has been periodically before the French public. Investigation of torrential action in 1797 gave rise to local laws for flood control. Very little action was taken, however, and discussion proceeded spasmodically until the tremendous floods of 1856 in the valleys of the Seine, Rhine, Rhonde, Loire and Garonne, involved the whole of France in a loss reaching hundreds of lives and \$40,000,000 in property. Always as elsewhere both with forest fires and floods, discussion of flood prevention in France had

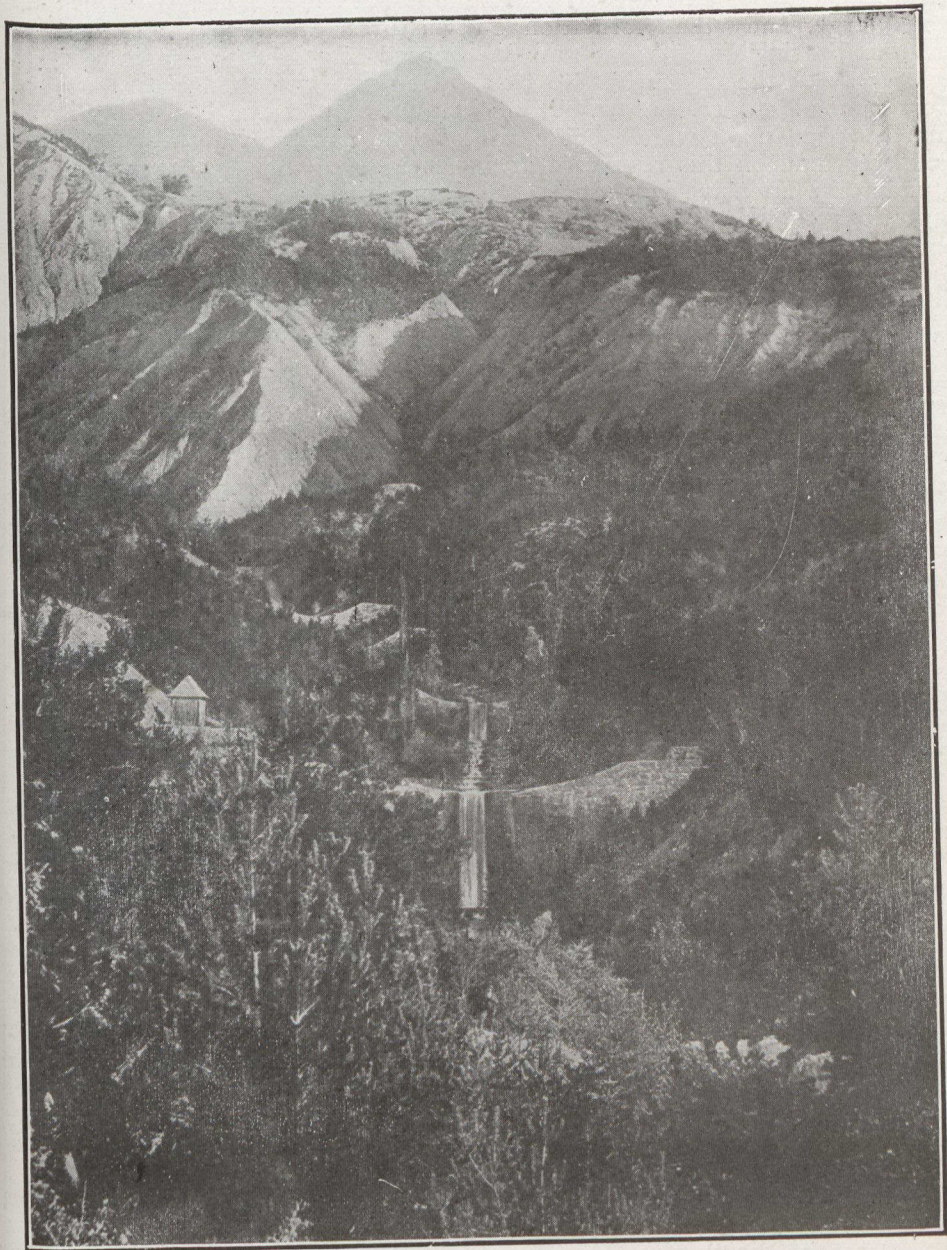
been most active after disasters which touched both the public imagination, and the individual family or pocket. Sufficient had already been learned concerning the causes of the mountain floods, both from the investigations of engineers and the work already carried out by the Government to point out the proper method of regulating destructive torrents and, accordingly, in 1860 a law was passed providing for the reforestation of the catchment areas of destructive torrents, the work to be carried out by the Forest Department. The defects of this law were that the money provided was not sufficient for undertaking the work on the scale designed, the reforestation of the mountain catchment areas decreased the grazing areas, upon which depended the mountain population, and the right assumed by the state to expropriate communal lands for reforestation purposes upon terms which threw the expense of the work largely on the mountain communities. Protest, culminating in armed resistance, led to the amendment of the law, substituting sodding for reforestation in areas where grazing was of paramount importance. Sodding did not prove a satisfactory means of stream control, and the other defects remained. Finally, in 1882, after 18 years of agitation, the work of torrent control was placed upon a new basis by the law at present in force.

All Interests Considered.

The Forest Service still remains responsible for the work of stream control. Works are undertaken only where soil erosion has begun. The projects of the Forest Service are examined by a government commis-



These pictures graphically illustrate the success of torrent control in France. The first shows a torrent in the Lower Alps, the bed of which has been built up by barrages behind which sediment collects. This photograph was taken in 1887; note what has happened since, as shown on opposite page.



A picture of the same area twenty years after. The barrages by preventing the cutting down of the bed of the river have also prevented the erosion of the banks which are now covered with forest.

sion on which local interests are represented and the boundaries of the area within which remedial works were large, and the formation of revenue bearing forests was an integral part of the scheme. Now an effort is made to restrict to a minimum the area upon which works are conducted, and on this restricted area to undertake intensive work, not only plantations to fix the soil and check the run-off, but also engineering works to break the descent of the water and support the banks and beds of the torrent. Large areas of forest are being established in the lower Cevennes.

The works conducted by the State are carried on only on land belonging in fee simple to the State. Should there be within the area necessary for the control of a stream and owned by bodies and persons other than the State, one of two courses is adopted.

Taking Private Lands.

The State may buy or expropriate the necessary land. The right of expropriation is rarely exercised. The State acquires by friendly agreement the land on all streams where the public interest in the control of the stream is paramount.

The owner of the land, whether a private individual or a community, may retain the property upon condition that an agreement is made to conduct within a term of years fixed by the Forest Service under the supervision of the Forest Service the improvement works necessary. Communities usually avail themselves of this privilege, and in such cases both the State and the departments in which the community is situated make money grants equal together on the average of one-half or two-thirds of the cost of the work. The State also assists with advice, and in the case of reforestation with seed and plants.

The law also names certain mountain communities in which, because of their important effects on stream flow, pasture lands must be treated according to conservative regulations

in order to prevent destruction of the sod cover by over-grazing. Any ordered management of mountain pastures has been strenuously opposed by the mountain population, even though the object of all such regulation of use is the improvement of the pasture. Money grants have been made by the State, and assistance has been given freely in all cases where private individuals or communities have shown a disposition to protect mountain pastures. Nevertheless, the opposition still persists. A commission was appointed in 1910 to study better means of improving conditions and amendments to the law were under consideration at the outbreak of war.

Developing Specialists.

The French Forest Service in vigorously taking up the responsibility placed on it by the law of 1882 has led the world in works for torrent control. Foresters and engineers have co-operated in checking the destructive headlong plunge of waters from the Alps, Cevennes and Pyrenees. Half a century of experience, dating from the earlier laws, has led to the growth in the Forest Service of specialists in stream control, who have developed several well-defined methods of accomplishing their object.

The reforestation of the catchment areas of the torrential streams and their tributaries was in the early years, the only means adapted for the control of water-flow. Even now, although in certain conditions it has been found necessary to rely on engineering works reforestation remains the greatest weapon in the hands of the Forest Service. The catchment areas have been re-clothed extensively by planting and seeding, both with broad leaves and conifers. It has been found that, except in the few situations where conditions are very favorable for forest growth, planting is much more satisfactory and even more economical when results are considered. Nurseries have been started near all the large projects.

and coniferous species are used for an overwhelming proportion of the work, the most common of which are the pines, *P. sylvestris*, *P. cembra*, and *P. uncinata*. Other conifers planted extensively are larch (*Larix europaea*) in the Alps and Pyrenees, and fir (*Abies pectinata*) in the Cevennes and Pyrenees. Broad leaf trees, chiefly various species of alder and willow, are planted in the beds of streams and on steep banks where it is important that a soil cover be rapidly established. Beech (*Fagus sylvatica*), chestnut (*castanea vulgaris*) are commonly used in the Cevennes and in the Pyrenees.

At the beginning of 1909, 629,488 acres had been reforested at a cost for establishing the forest cover of \$8,000,000 or \$12.70 per acre. Of the total, 363,151 acres have been reforested by the State, 134,005 by the communes, and 132,332 by private owners. The State has given valuable assistance to both the communes and the private owners, having paid 55 per cent. of the cost of the work accomplished by the communes and 37 per cent. of the cost of the reforestation carried on by private owners. The departments have also made small money grants for reforestation in the mountains amounting to 23.5 per cent. in the case of work done by communes, and 5 per cent. in the case of plantation by private individuals. The total cost of the reforestation work to the State up to 1909 has been \$5,568,683 on State projects; \$812,807 subventions to communal projects; \$348,744 subventions to private works; total, \$6,730,234.

The remainder of the expense of establishing cover on the catchment areas of mountain torrents has been shared as follows: Private owners, \$546,488; departments, \$400,723; communes, \$320,921.

Costs of Land Purchase.

The programme of work is by no means completed. The land already purchased by the State, 325,265 acres, represents only about 55 per cent. of

the area for the acquisition of which plans have been completed. There still remain 266,047 acres, the purchase of which will be necessary. The average cost of the land purchased in France for stream control is \$18.50 per acre. The expenditure in the purchase had reached in 1909, \$6,022,644, and it was estimated that a further \$3,500,000 would be required.

Over 92 per cent. of the land already purchased will be reforested. The remainder consists of rock outcrops and areas above timber line.

Reforestation alone is not always sufficient; where the catchment area of the stream is very small, where the immediate control of waterflow is an important consideration, where the slopes are very steep and the banks lack stability or where a very rapid fall of water must be broken, recourse must be had to the erection of barriers. The French Engineers in the Department of Waters and Forests are credited with leading the world in the construction of works for the artificial control of mountain streams. Over half a century of experience has developed several well-defined methods of correcting the flood tendencies of runaway streams.

The small tributaries, high in the mountains, which are dry during a portion of the year, but down which in the season of melting snow or rain the water sluices without obstruction, are first attacked. The most common method here is to cover the bed with a woven network of branches, held down by stakes or by poles criss-crossing the bed and driven into the banks. The bed of brush catches material brought down by the water, prevents the carriage of gravel and rock to the stream below, and prevents erosion.

Bracing Up a Stream Bed.

At other times when branches are not available barriers of faggots, sods and stone are constructed at frequent intervals across the bed of the stream, the purpose of which is to hold up the water, catch sediment and prevent the cutting of the stream bed or

banks. The barriers are rendered permanent by planting with shrubs or with cuttings of such species as willow and alder, which strengthen the banks, protect the bed of the stream, and form a living network of branches and roots to hold back flood waters and their burden of earth and rock.

Those portions of streams in which a large volume of water is flowing, where the bed and banks are rapidly cutting, and where torrential characteristics have already developed, require more serious treatment. In such cases masonry walls are built with the object of impounding the products of erosion, checking the headlong flow of water, preventing the cutting down of the bed of the stream, supporting unstable banks. The bed, banks and flow of the stream are carefully studied before work is begun, and walls and barrages, as they are called, are designed to meet the requirements of each particular case, both so that the masonry itself may meet the stresses to which it will be subject, and further that the detritus accumulated by the masonry will prove an indirect support to shifting banks and a valuable means of decreasing the grade and checking the speed of the stream. According to the gravity of conditions the barrages vary from simple dry stone sills set across the bed of the stream a few feet apart, to mortar-set stone walls three feet or more thick, fifteen feet high, crossing the stream from bank to bank, set so close together that the top of one wall is level with the base of the next barrage above it.

Sometimes it has proven easier to pave stream bottoms, canalize the waterflow, or create new stream beds than to correct the torrent by barrages; where necessary this is done. Occasionally also the constant sliding in of stream banks crushes the strongest barrages. Draining is then resorted to on a large scale in order that the banks may be fixed.

Preventing Snowslides.

The prevention of avalanches and snowslides is also undertaken. Snowslides usually follow definite courses. Stone walls five to six feet high, two and a half feet thick, are built across the upper courses of dangerous snowslides beginning at the point where the avalanche usually takes its start and continuing down the slope in ranks to the point below which snowslides are unlikely to start. Where stone walls are impracticable, the desired results are secured by low banks of loose rock or earth disposed in the same manner. When conditions permit of it, plantations of trees or shrubs are made under shelter of the walls or banks.

There have been very few torrents upon which work has been done by the French National Government upon which some or all of the above corrective works constructed up to 1909 exceeded the cost of reforestation on the same streams, being over \$6,560,000, including maintenance to the same date. The question of maintenance is a serious one. All the works require constant upkeep, and some have had to be rebuilt several times.

The opposition of the mountain population has been overcome in various ways, by employing them on the works, by money grants for pasture improvement, and by subvention to creameries and co-operative dairy associations. The total amount of such expenditure is about \$35,000 chargeable to the fund for the correction of torrents.

The work which the French have undertaken, re-clothing the drainage basins and remodelling the beds of thousands of mountain streams, should, when finished, rank with the great constructive public works of the world. The task is now half completed. The cost up to 1909 was \$20,650,000. The estimated cost for the remainder of the work in sight was then \$12,000,000, exclusive of upkeep and exclusive of the expenditure necessary by departments, com-

munes, and private individuals. Such works, however, should not be measured by cost, but by results. The obliteration of the torrents of France, impossible as it may have appeared in the beginning, will be practically accomplished with the completion of the programme now adopted. Torrential floods, which in one year wrought destruction equal to the total cost of stream improvement, will be

no longer possible, and neither the vineyards and farms of the lower valleys, nor that important mountaineering element of the population which clings to upland slopes and valleys will hereafter be in danger by flood or snowslide. The price of one year's flood carefully expended will permanently add millions of acres to the productive area of France.

Stopping Prairie Gales by Tree Planting

*"It is forty miles to water,
It's just as far to wood;
I'm leaving the short grass country,
And I'm leaving it for good."*

How many of the drought-stricken settlers of the arid plains of Southern Alberta and South-western Saskatchewan will carry out the purpose expressed in the verse above? For three years they have seen their crops blasted by hot winds. Their resources have steadily diminished and many of them last season have been forced to sacrifice their cattle. Their misfortune is largely due to hot winds. Stop the wind and you lessen the effects of drought.

Further east in the more humid country, thousands of acres of grain during the past three seasons have been lost through soil-drifting caused by winds.

The injury done by soil-drifting is not confined to the immediate loss of the crop. One storm will remove more fertility from the soil than five successive grain crops. The time has come when in all seriousness we should consider these problems, not as local, but as national. Every acre of crop lost increases the cost of living, and decreases the ability of Canada to carry her heavy financial load.

The most effective plan to check the force of the winds is a tree-planting scheme embracing the whole of the southern prairies. It is not the plan of one man; it is the plan of many; it was recommended by far-

seeing men before prairies were settled. It has been discussed in all its bearings for forty years. Briefly the plan is this: Plant shelter-belts around the farms and woodlots around the farm buildings.

In a certain district in Southern Manitoba is a farm largely protected by poplar bluffs. Across the road is a farm with a similar soil but without this protection. In 1919 this district suffered from hot winds. On the bluff farm the wheat in summer-fallow yielded 20 bushels per acre; the summer-fallow on the unprotected farm yielded 15 bushels per acre, a difference of ten dollars per acre. It is a conservative estimate that hot winds and drought together with soil-drifting caused a loss of one hundred million dollars to Western Canada in 1919. Is not the matter then of national importance?

Why Soil Drifts.

The one great cause of soil-drifting is the depletion of humus by continued cropping and pulverization of the soil in continued summer-fallowing. Putting fibre back in the soil by leaving the land in grass for a number of years will check the evil to a limited extent. This method has its limitations, however, for there is a lamentable lack of cultivated grasses

which will give a satisfactory yield of hay or pasture in a dry season in the dry belt. Annual sown crops under such conditions will give a more satisfactory yield. The dry belt was a "short grass country" before it was put under cultivation, and the grass has yet to be found that will turn a dry region into a "long grass country."

There is the difficulty of securing a catch of grass seed under arid conditions and on drifting soils. Land must be summer-tilled every second or third year to store up moisture to produce a crop, either by summer-fallow or inter-tilled crops. Summer-fallow causes soil-drifting, but is necessary to crop production. In an old settled country, tenant farmers cannot adopt a rotation which includes grasses. They work on the short term lease system, and a grass rotation would be unprofitable to them.

Again grass means stock, stock means that good buildings are necessary. At present the high cost of building material and of labor makes grain farming more profitable than stock farming. In other districts the lack of water makes grain growing the only kind of farming which can be carried on.

Methods to prevent and control soil-drifting must be carried out by all in the district affected, or they will fail. It has been found that if a shelter-belt is twenty feet in height it will protect the field for one thousand feet from wind. Under average conditions a shelter-belt will reach that height in six or seven years after planting.

It is suggested that the scheme be experimented with first in a given area, and if found practical, carried out by co-operation between federal, provincial and municipal authorities. It could be financed by bond issues paid off by taxation of the lands bene-

fited. Adoption of the scheme should be optional with rural municipalities by popular vote. Central nurseries would be established in each given area to grow the necessary trees.

There is one objection to the adoption of this scheme, and that is that the winter roads would be made impassable by snow drifts from the shelter-belts. This is not as serious as it seems, for in a district where shelter-belts were universal, snow-drifting would be greatly lessened. Winter roads are not impassable in bluffy districts throughout the West. The winter roads could be made across the farms, or the shelter-belts could be planted every alternate mile. The east-and-west roads in most of Saskatchewan are two miles apart. Could not the winter roads be the same?

Fence Posts and Fuel.

There are other benefits from such a scheme besides checking hot winds and preventing soil-drifting. Tumbling weeds, particularly Russian thistle, would be checked. Within ten years fence-posts and summer fuel could be cut from these plantations. This alone would far more than pay the costs of the scheme. We fondly imagine our timber resources are inexhaustible; they are not, and if the present rate of destruction by forest fire and settlement of the wooded country continues, within ten years fencing material and cordwood will reach prohibitive prices.

Summer and winter shelter for stock would be provided. There would be a great increase in the bird population and a corresponding decrease in the insect population.

Late spring and early fall frosts would be lessened. Practical horticulture could be carried on everywhere.

By J. H., in *Montreal Weekly Star*.



Douglas Fir, Red Cedar and White Pine, Columbia Valley, B.C.



Red Cedar in Columbia Valley, Interior Wet Belt of British Columbia.

The Forestry Problem in Ontario

By E. J. Zavitz, Provincial Forester

How the Province Can Take Highest Profits from 50 Million Acres of Forest Lands

A small beginning has been made in tree planting, but the great province of Ontario has scarcely awakened to the real needs of a progressive forest policy. Ontario is still in the primitive stages of exploitation, and is only beginning to feel the pinch of high wood prices and lack of supply. We have not yet begun to consider our forests as producing continuous wood crops.

I present this problem to you because it is your problem. You are joint owners in at least fifty million acres of forest lands which can never come under the plow and can only be kept productive by the growing of forest crops.

The Laurentian plateau, extending from the Ottawa river to the Manitoba boundary, comprises a potential forest area of fifty million acres, an area larger than that of England and Wales. This vast region of Archean rock formation has here and there pockets of soil which may be suited for agriculture, but in the aggregate this area must be managed for forest crops if it is to remain permanently productive.

As joint owners in this property you are interested in seeing it managed so that it will yield a perpetual revenue to protect you from the burdens of direct taxation. At present our gross revenue is about one and a half million dollars from this property. I need only point to the forest revenues of some other countries to indicate the possibilities of future revenues to be expected from our permanent forest regions. Previous to the war France had 2,700,000 acres of state forests producing an annual net revenue of about four and a half million dollars, or about \$1.75 per acre. Saxony, with 430,000 acres of state forests, realized an annual net reve-

nue of \$5.30 per acre. Throughout western Europe this story can be repeated of state and municipal forests producing splendid returns.

Example in France.

Many of our experienced lumbermen serving in France were amazed at the wonderful condition and productiveness of the French forests. That the timber from the forests of France helped save the situation in the late struggle is now a record of history.

Do you know the story of these French forests or that of the forests of a large part of central and western Europe? At the end of the 18th century conditions were similar to those to be found in many parts of Ontario today. Great regions of sand wastes—overcut and burned forest areas—this was the story in Central Europe at the time of the French Revolution. You have heard of the reclamation of the sand wastes in France. One area of two million acres known as the Landes, has been reforested during the last century, and is today covered with a forest valued at one hundred million dollars. Not only have they been reforesting waste areas, but the mutilated forests of western Europe during the past century have been brought up to a high state of productiveness.

At present we have great sand areas in Ontario denuded of forest growth and lying waste. In the non-agricultural regions of the Laurentian plateau we are still cutting and burning with little thought of the future. In many parts of this region where definite investigations have been made we find that unregulated cutting and burning have left a state of affairs which will cost a large amount of time and money to restore even to

normal forest conditions. Many of you are familiar with these waste areas, with their misdirected efforts at agricultural settlement. While a large portion of our permanent forest region is yet in undisturbed, virgin condition, should we not begin to think of managing this property with some thought for the future?

While you have a personal interest as citizens in the administration of the vast forest areas of the north, I will now refer more particularly to the forestry problems of older Ontario.

Township Conditions.

Southern Ontario has some three million acres of private woodlands and over three million acres of waste areas which can only be made productive by reforestation. This older portion of the province has about nine per cent. of indifferent woodland with many townships having less than five per cent. of woodland. While of relative importance it should be pointed out that none of the important countries of Europe are so low in percentage of woodlands. Italy has fifteen per cent., France had about eighteen per cent., and western Europe may be said to have from fifteen to twenty per cent. of forest area. So far as the chief forest products such as building materials, railway ties and pulpwood supplies are concerned, southern Ontario is absolutely dependent upon outside sources. The wood working industries of Southern Ontario are largely dependent upon supplies of the more valuable hardwoods from United States. We are fortunate in still having supplies of soft woods in Northern Ontario. These supplies are becoming increasingly inaccessible and costly, so that it is a common sight to see southern pine and British Columbia lumber successfully competing with our native pine for building purposes and construction. We are informed by the Forest Service of the United States that the virgin supply of southern pine can only last about fifteen years, and it is certain that

the United States will soon cease to export valuable hardwood in any quantity.

Must Look to Future.

The wood working industries of Ontario use approximately twenty million dollars' worth of raw materials. It is urgent that we make sure of the future supply of wood for these industries.

The census of 1911 gives the value of firewood and fence posts used in Ontario at \$5,700,000. A large proportion of this material comes from the three million acres of private owned woodlands in older Ontario. While many of you are fortunate in being able to secure anthracite coal, yet a large portion of our rural population depend almost entirely on wood as fuel. The frequent repetition of coal shortages should make us seriously consider the necessity of developing a policy of producing wood crops upon every foot of non-agricultural soil in this older part of the province.

What then is the forestry problem for Southern Ontario? Protection and improvement of the remaining woodlands; the replanting of waste areas held by private interests and the reforestation of the larger areas of public lands existing in older Ontario.

The improvement of forest conditions on lands held by private owners is a most difficult problem. Private forestry on small holdings has proven unsatisfactory even in the older countries of Europe, because of the long time element in producing a crop. Artificial stimulus by remitting taxes has been tried in many countries, and has failed. We have an Ontario statute giving municipalities power to remit taxes on woodlands, but no evident result has been accomplished.

In democratic countries mandatory measures must fail. The most we can hope to do with private woodland owners is to educate by bulletins or other propaganda and to supply state aid in securing forest planting material at a low cost.

Demonstrations Needed.

The most important measure towards solving the problem is by establishing demonstration forests on the larger waste areas of the older parts of the province. The successful planting and developing of forests upon these areas will have a very great influence and educational effect upon the private woodland owners of any given region. This policy was entered upon by the government when a demonstration forest station was started in Norfolk county. This station consists of 1,800 acres of non-agricultural land, and should eventually comprise about 2,500 to 3,000 acres. At this station is established a forest nursery for producing planting material and forest plantations of various kinds are being developed. The results of this work are very encouraging and wornout sand lands planted in 1909, are today covered with young forests of pine, averaging 15 to 20 feet in height. Private owners of similar soils in this region are being influenced by this example so that we have in this district some very fine private plantations. During the past 15 years we have been supplying free planting material to prospective planters and we have throughout the province a large number of demonstration plantations.

The war interfered seriously with this work and our chief difficulty at present is to secure nursery stock to fill the demands. You will realize that it takes two to three years to produce nursery material suitable for shipping and planting.

Our work up to the present has

been on such a small scale that it has not seriously influenced the problem. It must not be overlooked how-creation of similar stations to that in Norfolk, and undertake the problem of reforestation in older Ontario on a much larger scale, if we are to secure any real benefits from such a policy. ever, that it has pointed out the way. We should extend this work by the

CUTTING METHODS.

Ferd. van Bruyssel, before the Engineering Institute, Montreal.

"Personally, I favor wherever practicable, the plan of clear cutting with narrow strips. To illustrate this, let us suppose a limit extends five miles in depth from what is known as a "tote" road, marginal to a stream, this road being staked at distances of 250 feet. Imagine parallel lines originating at each stake and prolonged perpendicularly to the river and road over the whole depth of the limit; then number the strips in regular sequence from right to left. First raze the strips of even number, which thereafter will be seeded from the standing timber on the adjoining odd numbered strips. When the seedlings on the even numbers have grown enough to bear cones, then raze the odd numbers, which in their turn will be seeded by the young trees on the even numbers. By the time the seedlings on the odd numbers have themselves become cone bearing, a second crop will have matured sufficiently on the even numbers. Also this second crop will be far more productive than that obtained from the primeval forest."

"The Forestry Association is doing a splendid work along many lines, and is worthy of the greatest possible support from Dominion, Provincial and private agencies. It has become a very definite force in the direction of getting things done along the lines of forestry and fire protection. Its usefulness would be greatly increased by the establishment of a branch office in the West, possibly at Vancouver, and it is to be hoped that the necessary financial support may be made available to this end."

From Report of the Commission of Conservation's "Committee on Forests."

Should the Planting of Shade Trees be left to the Individual, or Controlled by the City?

By F. E. Buck

Assistant to Dominion Horticulturist.

Citizens of all classes are generally agreed that the trees are one of the biggest assets of a city. When any city can be described as a city of beautiful trees, it at once suggests that such a city is noted for its beautiful streets and homes. Cities of such a type attract population on account of the pleasing character of the residential sections. A problem which has presented itself for solution during the past few years is: Whether the planting and care of trees in cities should be undertaken by the city or left to the individual householder or landlord? Where this work has been left to the individual householder, the results have been in most cases unsatisfactory. Individual work in such matters fails to produce the best results for certain reasons which are obvious. For instance, certain persons will plant different varieties of trees on adjacent properties, others will not plant at all, while in some cases the trees will be planted at irregular distances between each other, and also from the sidewalk. The effect of such an irregularly-planted street, when compared with one properly planted, is strikingly different.

Control by the City.

The great advantage of investing one of the city departments with authority to deal with tree planting and control is that the mistakes resulting from individual planting are eliminated. Such points as, the choice of a proper variety, the use of one variety only to a street to obtain harmony and beauty, and the proper attention to heading and pruning, are difficult points for individuals to carry out harmoniously, but in the case of some central authority, such points are carried out as the first essential of a system.

In many large cities like Paris, New York, Chicago and others, this work of tree planting and care is carried out by a Shade Tree or Parks Commission. Many other cities of smaller size have also, during the past few years, put such work under the control of a special authority. In many cases this authority consists of an official, variously known as City Forester, Tree Warden, Street Commissioner, etc. In some cases the work has been added to the City Engineer's Department.

PERMANENT COAST FORESTS.

(Pacific Coast Lumberman)

As to the present situation at the Pacific Coast, opinions differ greatly. Men like H. R. McMillan, ex-chief forester, and Roland Craig, of the Commission of Conservation, Ottawa, claim that the growth of new timber is five times the annual cut, and that therefore all that is necessary is ample fire protection to guard securely this satisfactory state of affairs. On the other hand, practical lumbermen who have travelled extensively over the province during many years, hold quite the contrary view. They say, most emphatically, that right now the growth is not sufficient to off-set the steady loss from logging operations, fire, wind, insects and fungi.

This difference of opinion should be settled with some definiteness and without delay. The situation is serious and of immediate concern, in view of the fact that from now on hundreds of loggers and millmen from other regions will be moving to our province and to the states to the south of us, in search of timber. If our forests are being depleted now, what will the situation be shortly?



Natural Reproduction of Douglas Fir after logging and slash burning. The new forest is 20 years old. Near Grief Point, Malaspina Strait, B.C.



A new Douglas Fir forest re-establishing itself on Powell Lake, B.C. It is 20 years old.

Wind and Fire Damage to Forests

By Frank J. D. Barnjum, Annapolis Royal, N.S.

Is There Any Net Increment in the Nation's Stand of Timber? Enormous Loss by "Blowdown"

In considering the question of growth in our natural, or, rather, unnatural forests, as they exist on this continent today, we have to figure not on some individual stand or township, but on a state or the country as a whole, and in cycles of 100 years, as the average spruce tree as harvested will run but little short of the century mark. I am perfectly willing to acknowledge that there is a growth to every living tree that has not passed maturity, has not blown down, or has not been killed by fire or some species of the hundred and one different bugs. I also admit that there is a combined net growth in some sections of a township and, in rare instances, in possibly a whole township. But to offset this growth, as there must be a debit as well as a credit side, we must charge off the wastage.

We will take the State of Maine for one example, as it is the most important wood-producing section in the eastern United States. Now, if you will refer to the cruiser's map of almost any township, you will find a dotted path, in many instances running clear across the township of varying widths up to a mile or more, marked with the significant and familiar words "Blow-down" or "Wind-fall," which means that the timber in that designated section has been destroyed by wind.

The next most familiar word is "Burn," and quite often there may be two or three or more sections of a township that have been burned, running in size all the way from 50 acres up to 4,000 or 5,000, and in some cases, half or three-quarters of the township, to even, in the case of the Miramichi fire which swept across Maine, a burned area of more than three million acres. I can think of at least one fire in Maine, which occurred about 1903,

which burned 100,000 acres, while another fire, in 1909, in the same State, burned over 45,000 acres, and these are merely two examples.

In addition to the large, well-defined areas of fire and wind destruction, there is a continual dropping by wind of a tree here and a tree there. This is going on all the time, and when you realize that it is only necessary to lose one tree per acre per year, varying in size from 5 inches to 12 inches in diameter, according to location and consequent rate of growth, to wipe out the entire growth by this one source of loss alone, and then when you add to this the heavy losses from the large wind-falls, fire and bugs, you do not have to stretch the imagination very much to realize that not only is your growth increment wiped out, but also quite a little of your principal as well. For this reason, the thought uppermost in my mind is to try to arrive at a figure that will approximate what this net loss really is.

In British Columbia 665,000,000 feet of timber have been burned, and this amount very nearly equals the total stand of saw timber remaining in Canada today.

In Maine, in the gale of 1883, a billion feet of soft wood were blown down, in addition to a very large amount of hard wood, in the two counties of Oxford and Franklin alone, and the loss in the whole State was incalculable. I know of one township, which I afterwards bought, where one-third of the entire stand of timber was destroyed in this same gale.

I have in mind a windfall in Wisconsin, between Prentice Junction and Ladysmith, that covers a strip five miles wide and 50 miles long, where the timber was laid as flat as if tra-

versed by a steam-roller. All of this timber, the result of more than 200 years' accretion, was destroyed in an hour. I cannot help thinking of an experience of my own in my earlier days, in this connection. I had been planting 10,000 trees per year for two or three years, when a fire came in on an adjoining lot and burned up more trees in two hours than I had planted in the three years, which discouraged any more planting by me at that time.

But the final and most convincing figures of all are contained in the valuable report by the committee of the Society of American Foresters, which was recently published, which says:

"That of all the total forest area in the United States of 500,000,000 acres:

"One hundred million acres and more are so devastated as to be almost wholly non-productive:

"Over 210,000,000 acres have been cut over and more or less damaged by fire, but are producing new timber, usually in small amounts;

"One hundred and fifty million acres are in standing timber where growth merely balances decay, with no net increase in wood production from year to year. On a large part of this area the virgin timber is of poor quality and very inaccessible."

Half Timber Lost by Fire.

In Canada, the Canadian Forestry Association states, one-half of the forested area has been burned over within the past 100 years. That this enormous wastage by fire is still with us is in evidence by the loss of 1,000,000,000 feet of timber in Montana and the 540,000 acres destroyed in Alberta, which are only two of the larger burns of last summer. The bugs are also still with us; and the wind, as one of my own countrymen says, "She blow all de time."

Now, with all this wastage above enumerated, it does not take a forester or a woodsman, but any man of ordinary intelligence to figure out that there is not only no annual

growth to be counted on in the country or a state as a whole, but that there must be quite a net annual loss in addition. We have been simply fooling ourselves with regard to this question of annual accretion. I was myself a victim to this delusion up to three years ago, when I found a very large area which we had made preparations to log had all been logged for us by the wind over night. This so impressed me that I began figuring up this forest wastage, and the deeper I go into it the bigger it grows.

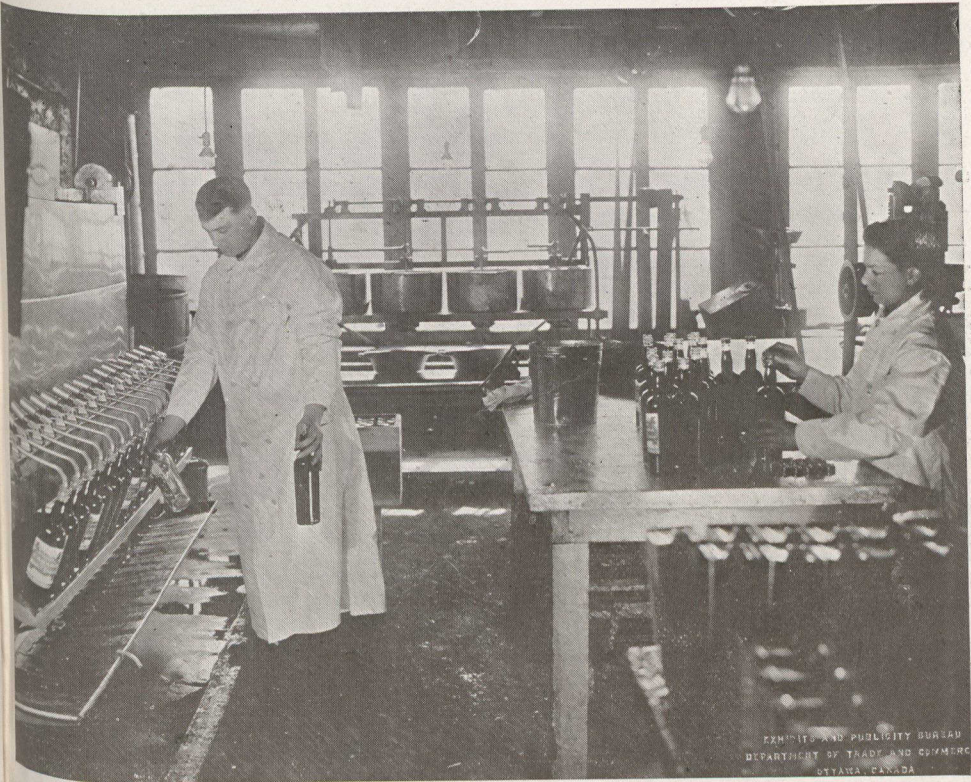
The vast amount of money that has been made and will be made in timberlands is not because of the growth of timber, but because of the great enhancement in values consequent upon the rapidly diminishing supplies.

Now, when you come to the destruction caused by the axe, and take figures compiled from the United States forest service statistics, which amount to 244,000,000 cords of wood of all kinds, including fuel wood, harvested in the United States per annum, if this were piled in a solid pile four feet high and four feet wide it would reach a distance of 369,000 miles, or 123 times across this continent, or more than 15 times around the globe.

In considering these appalling figures it would seem to me that it is now time to cease imitating the ostrich, and to begin to look this question of a rapidly vanishing timber supply on both sides of the line squarely in the face, and see where we are heading before it is too late; for a treeless continent is unthinkable.

Please send in your membership fee promptly.

The members are responding splendidly to our new plan of a Two-dollar Annual Fee, including subscription to the Forestry Journal.



EXHIBITS AND PUBLICITY BUREAU
DEPARTMENT OF TRADE AND COMMERCE
OTTAWA, CANADA

How modern machinery in a Quebec factory fills maple syrup bottles and cans.



COMMISSION OF CONSERVATION

A Quebec Fire Fighting Crew.
Complete equipment is kept at selected places for use in extinguishing fires.

The Progress of Forestry in Canada*

Prepared by Clyde Leavitt
Chief Forester, Commission of Conservation

A Careful Review of Measures Adopted Throughout the Dominion for Perpetuating Forest Resources

The year 1919 has been pre-eminently one of reconstruction. This is as true of forestry as of other lines of effort. During the war a very large percentage of the members of the forestry profession in Canada were engaged upon some phase of military service. With the return of most of these men to their previous occupation, forestry organizations throughout Canada have taken on a new lease of life and are showing greater activity along progressive lines than has ever before been the case.

There is also a keener realization than ever before of the prime importance which our forests play, not only in maintaining the industrial structure in Canada, but in the development of our foreign trade. The world-wide unsettling of the exchange situation has proved serious for Canada, as it has for other countries. Were it not for the large exports of forest products, particularly lumber, pulpwood, pulp and paper, the exchange situation, particularly with the United States, would be much more serious for Canada than is now the case.

Export of Forest Products.

The lumber industry is credited by the Bureau of Statistics with exports for the fiscal year ending March 31, 1919, to the value of \$70,487,288, of which the greater portion went to the United States.

The growth of the pulp and paper industry in Canada has been nothing less than phenomenal, ranking, as it now does, third in the volume and value of its product exported abroad, and second in the amount of capital invested. Exports of pulpwood, pulp and paper are now at the rate of over \$100,000,000 annually, of which about 80 per cent. goes to the United States. About 90 per cent. of the newsprint manufactured in Canada is exported. More than one-third of the newsprint used in the United States is of Canadian manufacture.

Obviously it is greatly to the advantage of Canada to manufacture at home as much of her raw forest materials as possible, instead of exporting them in an unmanufactured state. Home manufacture means the development of Canadian industries, the employment of Canadian

labor, and vastly more money coming into the country than would be the case were our natural resources exported in a raw state. So far as the pulp and paper industry is concerned, it is the policy of the Dominion and provincial governments to require manufacture in Canada of all pulpwood cut from Crown lands. That this policy is greatly to the advantage of Canada requires no argument.

In view of the rapidly approaching exhaustion of the pulpwood forests of the north-eastern United States, the great pulpwood forests of eastern Canada assume an added value and increased economic importance. The necessity for so handling this great heritage that it may be permanently productive, instead of merely transitory, as in so much of the United States, can scarcely be over-emphasized.

While enormous damage has already been caused by fire and by unregulated methods of logging, so that great areas have been rendered barren wastes, it is still not too late to save the situation so far as the bulk of the territory is concerned. Indeed, much progress has already been made in this direction, though still only a beginning.

Saving the Young Growth.

Adequate protection from forest fires is the first great essential. Notwithstanding great progress already made, the experiences of the past year, with millions of dollars of damage done to the forests of Canada, prove conclusively that far from adequate attention is being paid this important matter. Over great areas, expenditures upon fire protection average less than one-half cent per acre per year. That this is not sufficient is proved not only by results, but by the testimony of men most experienced in this line of work. Our young forest growth is not now receiving the protection which its potential importance justifies.

In addition to the appropriation of adequate funds, it is of the most vital importance that a thoroughly efficient personnel be developed. To this end it is essential that adequate salaries be paid, that so far as possible the year-long basis of employment be adopted through the combination of various lines of forest work in a single organization, that every vestige of political patronage be eliminated in the selection of the personnel, that a really

*Constituting the report of the Committee on Forests, Commission of Conservation annual meeting, 1920.

efficient business administration be made effective, and that there be much greater development of permanent improvements such as roads, trails, lookout stations and the use of mechanical equipment in transportation and fire fighting. Only in this way may the several forest organizations be brought to the required degree of efficiency. The partial progress already made in these directions goes only to prove the truth of this statement.

The elimination of unnecessary waste of merchantable material in logging operations would go far toward lengthening out the period of years during which our virgin forests will supply the demand, and thus allow more time for the growth to merchantable size of the large areas of natural reproduction. That there has been serious loss on this account in years past is well established.

Using Hardwoods and Balsam Fir.

In the mixed hardwood-softwood forests of eastern Canada, not accessible to rail transportation, it is of the greatest importance that some method be developed by which the hardwoods, particularly yellow birch and paper birch, may be transported and utilized. The problem of transportation has not yet been satisfactorily solved. So far as utilization is concerned, indications are that a material percentage of birch groundwood can be used in mixture with spruce and balsam groundwood in the manufacture of newsprint. It is to be hoped that the pulp and paper companies may be able to find some satisfactory way to utilize the great amount of birch which is so greatly retarding the growth of the spruce and balsam reproduction on cut-over lands. There are, of course, other possibilities of utilization, to which every possible attention should be given.

There is a considerable prejudice against the use of balsam in the manufacture of newsprint, caused largely by insufficient knowledge of the species. Some companies claim that balsam cannot be driven for any great distance because of the loss from sinking when the logs are in the water for any length of time, while other companies are actually driving balsam for quite a considerable distance. One company, at least, has been allowing only ten per cent. balsam in its annual cut of logs, regardless of the fact that the species forms upwards of fifty per cent. of its total stand. The greatest trouble in the use of balsam seems to be the presence of pitch pockets caused by the efforts of the tree to heal wounds while growing. When the wood is reduced to pulp the pitch gets into the pulp and may cause trouble on the screens and paper machine. In spite of this, however, balsam can be used, as demonstrated by many companies, some of whom are

using it indiscriminately in mixture with spruce, with quite satisfactory results. With the available supply of spruce decreasing so rapidly as to cause more or less alarm, and with balsam forming such a large percentage of the forests of Eastern Canada, particularly so in the young growth, the various governments and companies should and must see to it that this species is fully utilized if Canada is to maintain its position as one of the leading pulp producing countries of the world.

All these things are, however, not forestry, but are essential preliminaries to the practice of forestry. The forest can be reproduced naturally by intelligent regulation of the methods of cutting as well as by planting. For the great bulk of our forest area, natural regeneration must be our primary dependence for very many years to come. We are as yet only upon the threshold of developments along the line of scientific forestry practice as an integral part of regular woods operations. It is, however, a most encouraging sign that so much attention is being given the problem of how we may reproduce our forests by wise use.

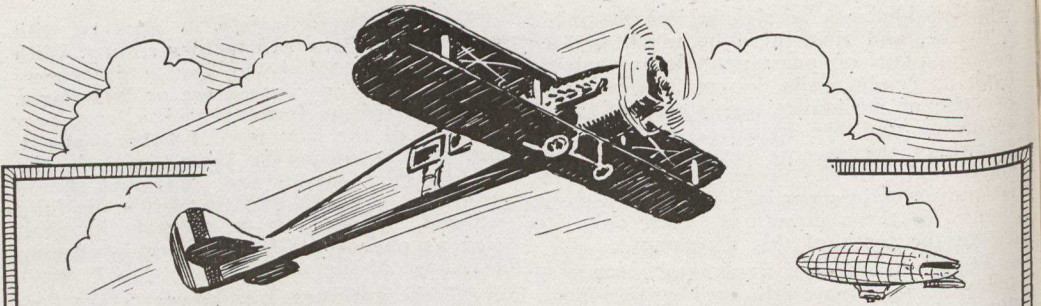
NEW BRUNSWICK.

The reorganization of the provincial Forest Service has proved a splendid success, with results alike favorable to the interests of the province as a whole and to the permanent welfare of the wood-using industries. The judgment of the provincial government has been completely vindicated in utilizing fully the technically trained staff of the Forest Service in the administration of Crown timber lands, thus following the example previously set by the provinces of Quebec and British Columbia and by the Dominion Government so far as the unlicensed portions of the Dominion forest reserves are concerned.

Efficiency and economy have at the same time been furthered by making the one organization responsible for the various lines of forest work, including fire protection, enforcement of cutting regulations, timber scaling, and enforcement of the fish and game laws. This combination has rendered possible the development of a year-long staff of experienced men, with obvious advantage to the province, as contrasted with the former conditions of seasonal employment.

The Forestry Advisory Board, consisting of three representatives of the Provincial Government and two representatives of the timber owners, has functioned splendidly in directing the Forest Service, especially in eliminating the patronage evil in matters of personnel, thus furthering the employment and retention of the best men available.

The development of the Forest Service has been greatly facilitated by the return



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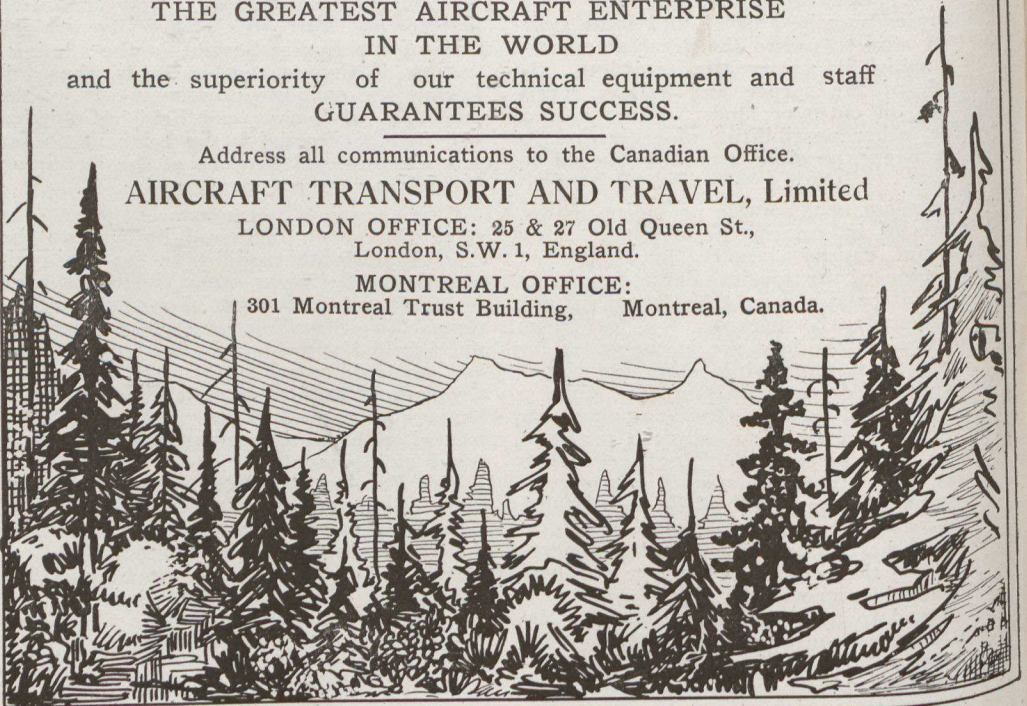
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from overseas service of many men experienced in the various lines of work with which the Forest Service is charged.

Particular attention has been paid to the revision and enforcement of regulations calculated to minimize unnecessary waste of merchantable material in logging operations. That such waste has in the past resulted in a drain upon the forest resources of the province as serious as it is unnecessary, is fully recognized.

Revenues Reach High Level.

The forest revenues have more than doubled during the past year, it being estimated that they will return a total of around \$1,500,000 to the provincial treasury. This is approximately three times the amount of the forest revenue for 1917, and closely approximates the forest revenue of Quebec. It falls only a few hundred dollars short of the forest revenue of Ontario. This is on a cut of some 343 million feet of logs, ties, poles and pulpwood, supplemented by some minor sources of revenue.

In fire protection, the work of the regular staff has been supplemented in a very valuable way by making 60 of the woods superintendents of the licensees, co-operative fire wardens, with full authority to call out men to fight fires. To the same end, there are 154 voluntary fire wardens. The co-operation of 490 Road Commissioners was made available through the Minister of Public Works. Forest rangers and inspectors numbered 40, and temporary fire wardens 32, making a grand total of 776 men throughout the province directly interested, in an official way, in forest fire protection.

The Public Works Department has issued special instructions relative to the burning of slash along all new road construction, thus greatly reducing the fire hazard.

The permit system of regulating settlers' clearing fires continues to give admirable results. In New Brunswick, during 1919, 2,053 such permits were issued, of which in only five cases did the fires escape and require extra assistance to extinguish. On the other hand, of 36 settlers fires reported set without permit, 28 escaped and caused serious damage.

Considerable progress has been made in the construction of lookout towers, telephone lines, ranger cabins, and other forest improvements.

Progress of the Survey.

The forest survey and classification of Crown lands continues to progress, 830 square miles having been covered during the past year, so that approximately 30 per cent. of the entire Crown land area has now been covered in this way. The results secured are proving of the great

est value in the every day administration of Crown lands, besides furnishing the foundation for a comprehensive plan for the handling of the Crown forests on a permanent basis. Where licensed lands are included in areas being surveyed, licensees can, upon the payment of certain fees, secure reports on their holdings. The revenue secured in this way is to a considerable extent helping to defray the cost of the survey.

In the soil classification, the Agriculturist of the Commission of Conservation has co-operated by personally directing the work. The object is, of course, to direct settlement to areas suitable for that purpose, while reserving non-agricultural lands for permanent timber production.

The Commission has also co-operated in the study of natural regeneration and rate of growth of commercially valuable forest species, upon which the Forest Service has been engaged. Dr. C. D. Howe, of the Commission's forestry staff, has directed the work in its general aspects. The Commission has further co-operated with the New Brunswick Forest Service and with the Bathurst Lumber Company by furnishing the chief of party for the conduct of an experimental cutting upon the Company's limits. The area in question has been set aside by the Provincial Government as a permanent experimental plot, and the results of the different methods of cutting and of slash disposal will be under careful observation for many years to come.

Professor R. B. Miller of the Forestry Department of the University of New Brunswick having resigned to become State Forester of Illinois, the position has been filled by Professor A. V. S. Pulling. This school has filled and is filling a very valuable service in providing trained foresters, not only for provincial and private work in New Brunswick, but in the other forest services in Canada as well. It is to be regretted that lack of finances has prevented the employment of additional men upon the teaching staff of the Forestry Department.

Incidental to the regular courses of instruction, a forest ranger course for returned soldiers has been maintained by the Forestry Department of the University, in co-operation with the Vocational Board.

NOVA SCOTIA.

Action is still pending with reference to the appointment of a Provincial Forester for Nova Scotia. Particularly during recent months, the matter has been receiving most careful consideration at the hands of the Provincial Government. An aggressive educational campaign has been carried on by the Canadian Forestry Association, calculated to enlist public sup-

port for such an appointment, the need for which has been fully recognized by the provincial authorities. Many of the timber owners and other public-spirited citizens have interested themselves in support of the movement. There now appears to be a very good prospect of an appointment being announced in the near future, which will bring Nova Scotia into line, in this respect, with the other forest provinces of Canada.

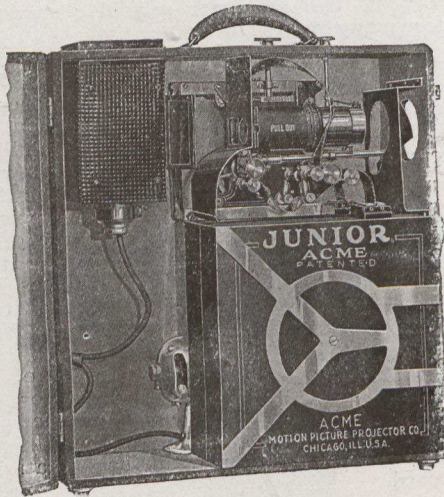
IN QUEBEC.

In Quebec, both forest protection and forestry practice continue to make excellent progress. Notwithstanding a season of great fire danger, the four co-operative forest protective associations have come through the year with a distinctly creditable showing. These associations cover nearly 85 per cent. of the licensed Crown timber lands of the province. Outside association territory, the provincial Forest Service has inaugurated a system of forest fire patrol in the Abitibi district, particularly along the Transcontinental Railway, west of Parent. It is announced that the effectiveness of this patrol will be further increased during the coming season by the assignment of additional personnel and equipment.

There is an increasing appreciation of

the effect upon the future productiveness of cut-over lands, due to the methods under which logging is carried on. It is realized also that the same rule for cutting is not applicable under all conditions, and that there may be a great waste, under some conditions, from unnecessarily leaving merchantable material uncut, as well as unnecessary injury to future productiveness, by cutting trees which, under other conditions, should be left uncut for seeding purposes or for protection against windfall. The Provincial Forest Service is looking forward to the time when cutting methods shall be in accordance with specific plans prepared at least a year in advance of cutting, on the basis of studies made on the ground by trained foresters of long practical experience. Preliminary studies of this character are already under way, particularly in areas of slow-growing, under-sized spruce, where the operators argue that cutting strictly to the standard diameter limit is not desirable from either their viewpoint or that of the forester.

There is much of promise in the appointment of a committee composed of representatives of the Pulp and Paper Association and of the Limit-Holders' Association, to consult with the provincial authorities relative to suggested changes



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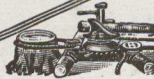
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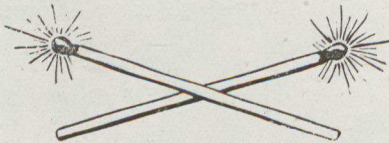
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in policies and procedure, with special reference to the revision of the cutting regulations.

Considerable attention is given by the Forest Service to land classification in advance of settlement. The Provincial Forester reports that classification has been completed on 17 townships, and partial work done in about 30 others. With the prevailing high prices of pulpwood, there is a great incentive for so-called settlers to enter upon well-timbered non-agricultural lands, under the guise of settlement, for the primary purpose of making a profit from the sale of timber, but with no real expectation of remaining after the timber is gone. Past experience proves conclusively the great desirability from the viewpoint of good public policy, of restricting settlement to lands actually agricultural in character. That this rule has been many times violated in the past, in all the provinces, is a matter of common knowledge, with results alike unfortunate for the individual and for the state.

The provincial forest nursery at Berthierville has shipped out during the year a total of nearly one million plants, the great majority of which have gone to pulp and paper companies for reforestation of privately-owned lands. A large extension of this nursery is contemplated to meet the rapidly increasing demands for planting stock in the province.

The provincial authorities have under consideration a plan under which denuded Crown lands of non-agricultural character may be made available for reforestation by private interests, such as the pulp and paper companies. It is greatly to be hoped that some equitable basis may be worked out, which will result in a large amount of forest planting on Crown lands.

The forestry course at Laval University has been materially strengthened by amalgamation with the School of Surveys. Graduates in forestry will thus have also the diploma for land surveyor, and their services will be correspondingly more valuable.

ONTARIO'S PLANS.

The Provincial Government has announced its intention to reorganize the timber administration of the province. It is generally assumed that this will include the extension of the responsibilities of the Forestry Branch to cover at least the technical features of administration as applied to all Crown timber lands. Such a consummation will be greatly in the interest of the province as a whole, as it will be in the best permanent interest of the lumbering and pulp and paper industries.

With the single exception of Nova Scotia, all the other forest provinces which control their own resources have regularly established forest services, whose duty, among others, it is to so guide and control the methods of logging as to facilitate, so far as may be practicable, the production of a new crop upon cut-over lands. In Ontario thus far, the timber administration has existed primarily for the sake of collecting revenue and has not contained any men specially trained along forestry lines. The provincial Forestry Branch, on the other hand, employing a number of trained foresters, has had its activities limited primarily to forest protection and forest nursery work. The time has now fully arrived for bringing the forest into first-hand contact with a technical forestry administration, and the declared intention of the Provincial Government along these lines is entitled to most hearty support. The employment of additional foresters will, of course, be necessary.

More Planting of Waste Land.

The Provincial Government has also under consideration the adoption of an extensive program of reforestation. Thus far, the provincial forest nursery at St. Williams, has been primarily engaged in producing planting material for the use of farmers in Old Ontario, and for reforestation at the nursery station. The suggestion is now made that municipalities purchase areas of non-agricultural lands, particularly those subject to damage by drifting sand, and turn them over to the Provincial Government for reforestation by the Forestry Branch. This would be a splendid line of development, and it is to be hoped that such a policy may be made effective. There is also a very large field for future development in the reforestation of denuded Crown lands of which there are very large areas. From one viewpoint, however, it would be illogical for the province to expend large sums of money upon the reforestation of denuded Crown lands, while at the same time perhaps millions of young trees reproduced naturally are being destroyed by fire every year for lack of sufficient funds to provide an adequate patrol. Obviously, so long as it is a question of funds, provision for really adequate protection of the natural forest reproduction from fire should take precedence over a general program of reforesting denuded Crown lands. The money spent on planting up a given area would suffice for protecting many times the same number of small trees over a considerable number of years. It is to be hoped, however, that a modest beginning can soon be made toward the reforestation of denuded Crown lands, this program to be increased with

A detailed black and white illustration of a forest fire scene. In the foreground, a Fairbanks-Morse fire fighting pump is shown in detail, featuring a large flywheel, various pipes, and a hose. The pump is positioned on the left side of the frame. In the background, a forest is engulfed in flames, with thick smoke rising into the sky. A fire hose is stretched across the field, leading from the pump towards the burning area. A person is visible near the hose in the distance. The sky is filled with stylized, swirling clouds, and a large eagle is depicted in flight in the upper left corner. The entire scene is framed by a decorative border with horizontal lines.

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