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CUTTING B. C. SPRUCE FOR AEROPLANE MANUFACTURE

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ROBSON BLACK, Editor.

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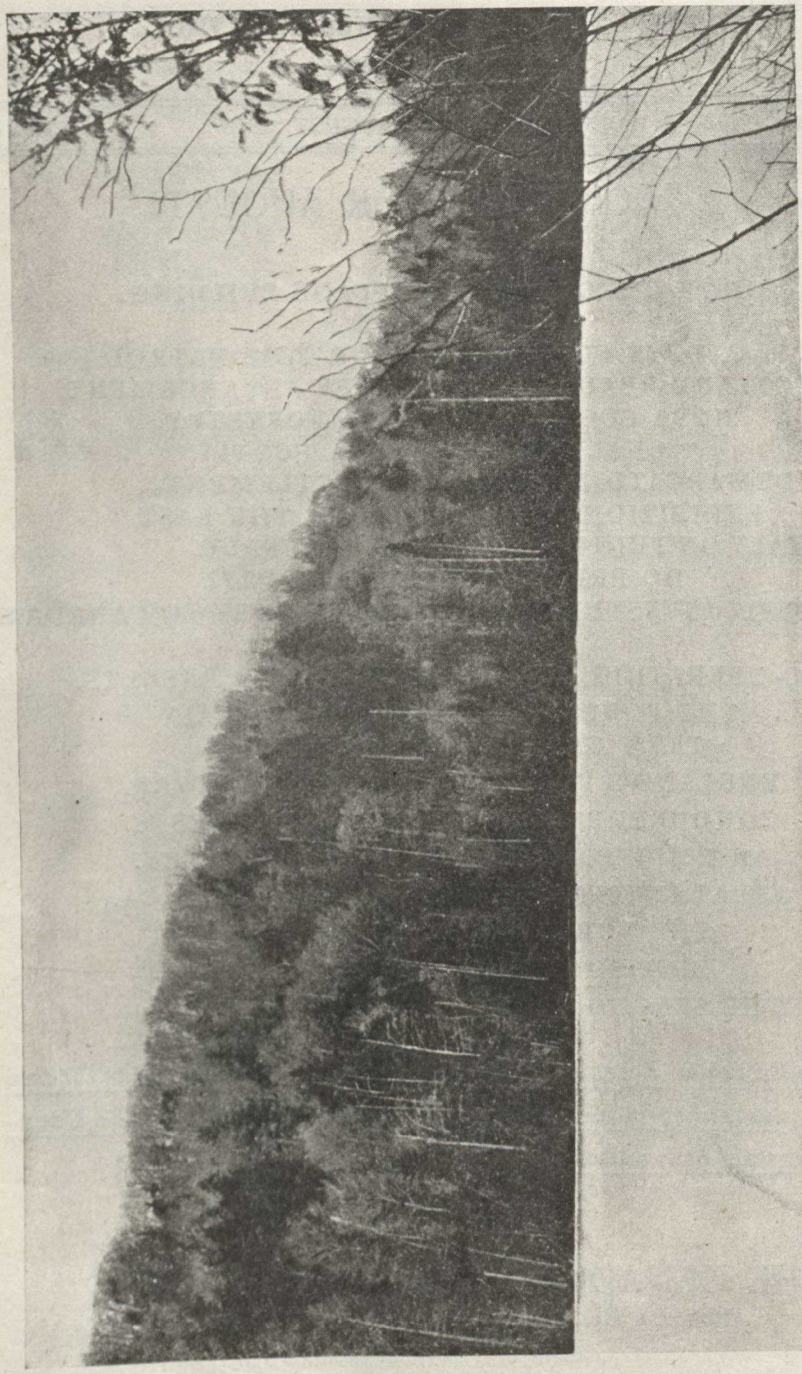

Courtesy Commission of Conservation.

CAN NOVA SCOTIA AFFORD TO LOSE THIS ?

Mixed Forest, Sugar Maple, Yellow Birch, Beech, Red Spruce with Fir on the Margin of the Lake. Nearly Three-Fourths of the Forests of Nova Scotia are of this type.

Grow Trees For Aeroplane Building

By Ellwood Wilson, Chief Forester of The Laurentide Co., Grand Mere, P. Q., and Member of Staff of Imperial Munitions Board.

The necessity for getting all the spruce possible for the construction of aeroplanes for all of the Allies has compelled an investigation of all the possible sources of supply.

Before the war most of the factories in the United States demanded spruce from West Virginia or the east, New England, and were not at all desirous of using Western spruce. Germany was buying up all the supplies of eastern spruce possible and it is on record that when a car of western spruce was included in a shipment, the German inspector refused it, on the ground that it was western spruce. When the war broke out, it was realized that large amounts of long, clear spruce could be most readily obtained from the huge trees of the west coast and every effort was and is still being made to exploit this source of supply.

Eastern spruce, best in quality.

The Forest Service of the United States, immediately, on the entry of that country into the war, made a careful study, with most practical and elaborate tests, of all the possible woods which might enter into aeroplane construction. These tests showed conclusively that there is no superiority of one kind of spruce over another, that the value of wood is dependent altogether on its density and straightness of grain. Eastern and western spruce with the same number of rings per inch and the same air-dry weight are of equal value. Speaking broadly, eastern spruce is a little better than western because it is slower of growth and therefore has more rings per inch. Since the western trees are very much larger it is possible to get longer and larger pieces of clear material out of them and these work up easier in the factory and consequently are preferred. At first this entailed a large waste as the factories took these long clear pieces and cut them up for the short parts. This source of waste has been reduced but not yet as much as it should be.

Only one in a thousand pulp logs is useful.

The great difficulty with eastern spruce is that it is very difficult to get long lengths and large pieces which are clear. As it grows naturally in the forest, the shade may not have been sufficiently dense during the early years of the tree to kill the lower branches, causing them to be shed. Consequently as the tree continues to grow the branches are gradually incased with new wood and cause knots. As the tree increases in size, these old short branches become entirely inclosed and a layer of perfectly clear wood is laid on. In Quebec spruce, for instance, this clear layer, rarely exceeds two inches in thickness for any length worth while. A careful estimate shows that about one log in one thousand of the run as cut for the pulp mills will contain sufficient aeroplane material to make it worth cutting up, that is, under present factory specifications. Of the spruce sawed up by mills manufacturing lumber from 1½ to 2% of the total cut may make aeroplane stock.

Factories demand easiest worked woods.

The great difficulty at present is this:—The Allies need every cubic inch of spruce stock which they can obtain. The Aeronautical Board in the United States is short of spruce as is also the French Government. The British

Government is said to have sufficient material for the immediate future. The factories, naturally wishing to operate at a profit, and with as little trouble as possible, are demanding material which is the easiest to handle, i.e., long and large clear lengths. They are disinclined and in fact refuse to accept, short lengths which could be laminated in various ways and would be stronger and lighter than solid beams. They will not accept material which contains small knots or other minor defects, although some of the buying specifications allow them, and although careful tests show that such material could be used with perfect safety. To sum up the situation briefly, the factories, and therefore the purchasing agents, act as though all they had to do was to demand the kind of spruce that is easiest to use regardless of the available supply, the amount wasted in cutting up, or the way in which the trees grow. There is not proper co-ordination between the producing and the consuming ends of the business.

Grow Trees Especially for Aeroplanes.

Everyone who stops to think, knows that the spruce, whether eastern or western, did not grow in ten years nor in one hundred. The supply available is known very closely. We shall want aeroplanes just as much or more after the war is over, and it is only common sense and good business to use our supplies with the greatest care possible to avoid waste and still turn out perfect machines.

By proper spacing in planting and care to preserve the proper density of stand, we shall be able to plant spruce especially for aeroplane stock and ensure a supply for the future, but there should be no delay in commencing.

The United States Navy are utilizing eastern spruce and are not only obtaining enough for their own requirements but are supplying the British War Mission. They are well organized and are handling the thing in a business-like way and "man-fashion" and an arrangement has been entered into by which they will extend their operations in Canada and get what they can in the east, supplying what is needed to the Imperial Government. This has been arrived at by the closest co-operation between the Imperial Munitions Board, The British War Mission and the United States Navy, and will do away with competition and useless duplication of effort and overhead charges

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"Forest Conservation in Canada," says the Forestry sub-committee of the British Reconstruction Committee, "is an Imperial Question of the first magnitude which deserves immediate attention."

B. C. Buys Flying Boat for Fire Patrol

First Official Experiment in Use of Planes for Forest Protection

In line with the decision announced some time ago to improve the system of forest protection, the British Columbia Government has contracted with the Hoffar Motor Boat Company, of Vancouver, for the construction of a patrol flying boat to be utilized for forest patrol.

Some two years ago this up-to-date method of forest protection was the subject of discussion at a gathering of Northwest lumbermen at Portland, and the idea of an air force of fire wardens was strongly advocated as both practical, economical and efficient. The great stretch of country that an airship could keep guard over, and the ability to distinguish the first beginnings of fire, and rapidly get help to the spot to prevent its spread, were factors that appeared to be especially within the province of an air patrol. The idea has been seized upon by British Columbia, and will within a month or two be put into operation.

At first it was thought possible to arrange with the Imperial Government for the leasing a machine from the naval force, one of the obsolete hydroplanes. But this idea has been abandoned in favor of the purchase of a flying boat type, which will be better adapted to the purpose. The machine contemplated will carry the pilot and one fire warden, it will have a wing spread of forty-two feet, and chord of five feet will develop 100 horse-power, and have a speed of seventy-eight miles per hour, and a climbing capacity of about 3,000 feet in ten minutes.

Scotland Ready for Forestry Advancement

That Scotland has been aroused by the experience of war time to the pressing necessity of national forestry policies is indicated by the following letter:

West of Scotland Agriculture College,
Department of Forestry, Glasgow, Scotland.

To the Secretary, Canadian Forestry Association,
Ottawa, Can.

Dear Sir;

I should like to indicate to you that for some time past in the West of Scotland here we have been very much interested in the development of the Canadian Forestry Association. As you are aware we have no analogous Association in Scotland, but there is a feeling at present that such an Association should be formed, and I had thought that you might be able to assist us with suggestions and advice regarding the formation of such.

I may say that a very keen interest in the development of Forestry is being shown by business people in the West of Scotland here, and we should value very much any advice sent us.

Yours faithfully,

(signed) G. P. Gordon.

Courtesy Commission of Conservation.

A Pure Stand of White Pine in Nova Scotia, supposed to have Started after a Fire in 1830. Second Growth White Pine is of the Most Common Occurence in Queens and Shelburne Counties, N.S.

Nova Scotia's Stake in Forestry

By Dr. B. E. Fernow, in
"Forest Conditions in Nova Scotia."

"Fully two thirds of the area of the Province consists of non-agricultural land covered with forest growth or not fit for any other use than timber growing. This forest resource which furnishes not less than four to five million dollars in value of product annually is in danger of exhaustion within the next two decades."

"The actual green forest area consisting of some five million acres and stated as occupying 52.5 per cent. of the area of the Province must, on the other hand be increased by the potential 5 per cent. of recently burned area and by nearly 12 per cent. of the better class barrens which can eventually be reforested so that the actual or potential forest area may be set down as representing 70 per cent. of the total land area. The balance, some 10 per cent. is hopelessly barren. This is a rather small percentage for waste land and only conservative treatment of the woodland area, protection against fire, and recuperative measures in the old burns and hopeful barrens will keep it there."

"Less than 100,000 acres of virgin or semi-virgin timber remain and altogether not over 1,400,000 acres, one quarter of the green forest area, are furnishing the log supply of the present mills.

Of the green forest area, pure hardwood forest is represented by less than 7 per cent. and pure coniferous growth by 20 per cent. the bulk of the forest, namely 73 per cent. being of mixed type.

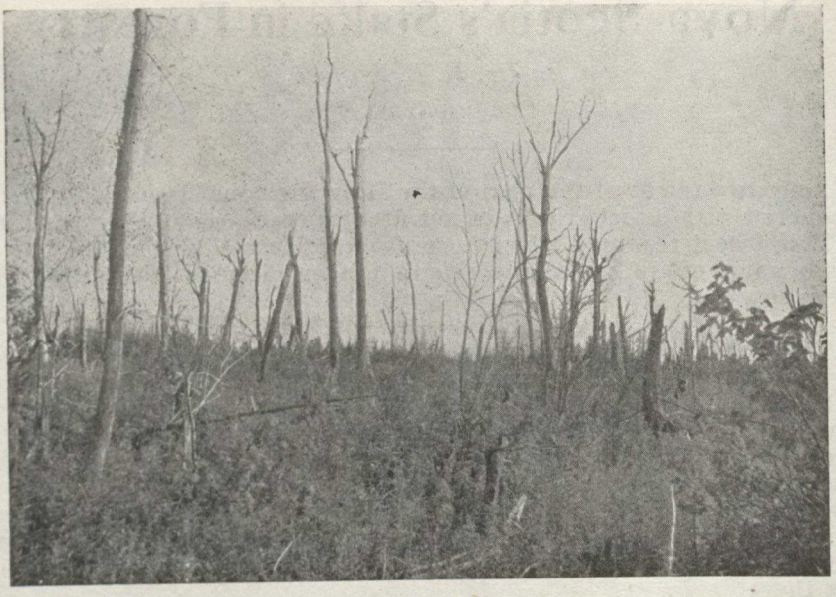
A Challenge to Nova Scotia

By the Editor of the Halifax "Echo"

Conservation of natural resources has been much talked of during the last decade, but it cannot be said that here in Nova Scotia there has been enough public interest in the matter to give us any material advantage. However, it is hardly to be expected that a country that wastes its infant life through carelessness and indifference would be particularly interested in protecting its forests and other resources. Yet the loss is almost immeasurable.

Unquestionably, it is impossible that a small province like Nova Scotia with a limited income, could provide forest rangers enough to assure the protection and preservation of the forest, but it does come within the limits of possibilities to reate a widespread public sentiment that will go far to doing the same work that a host of rangers might do. It matters not in which direction one turns, the lesson is again and again borne in upon us that the greatest drawback to development in this province is an active, enlightened, widespread public spirit.

Every avoidable forest fire is not merely a severe loss to the country at present and for the future, but it is in itself an accusation against our people's lack of public consciousness. We are too apt to think in terms of our individual interests. Community interests apparently have little weight with us, and that can only come from failure to think in community terms. Public schools, churches, institutes, and all other clubs and organizations should band



IN NOVA SCOTIA'S NO-MAN'S-LAND

A Characteristic Barren of the Sandy or Gravelly Soils. Burned in 1878—No Reproduction of Commercial Trees.

together for a complete campaign of public education. Perhaps no organization has such heavy responsibilities laid upon it as the church, because while many communities may be without any other organization it is difficult to find one that has absolutely no Church life. There should also be concerted effort on the part of the authorities, provincial and local, to create in the minds of every Nova Scotian, without regard to age or sex, that proper attitude toward public affairs, without which the Province can never hope to attain its full development.

Demarcation Promotes Settlement

It has been often thought that there is antagonism between settlement and forest demarcation. There is really no more antagonism between them than between two banking accounts in the same bank. If the bank is so badly conducted as not to keep these two accounts clear, the depositors cannot be blamed for taking each what he best can in the general confusion! But that is a poor bank in which to place one's confidence. Such a bank represents the country with no forest demarcation. All through Australia I have seen failure amongst forest settlers, dumped down without discrimination on ground which should have formed part of the national forest estates of the country, while what Australia is going to lose in the confusion we can get a glimpse of in the estimate of 588,000,000 pounds sterling as the loss through bad Forestry during the next 30 years. (*D. E. Hutchins, late Conservator of Forests, South Africa.*)

EXHIBITION RAILWAY COACH TO TOUR THE EAST

Canadian Forestry Association arranges a unique advertisement for forest Protection

By grace of the Canadian Pacific Railway Company and the Railway War Board, the Canadian Forestry Association has been placed in temporary possession of an Exhibition Railway Car to travel in Ontario, Quebec, New Brunswick, and Nova Scotia as an advertisement for forest protection.

The car will be outfitted by the Forestry Association with motion picture equipment and a travelling lecturer so that public meetings can be held at scores of smaller communities either in the lecture room of the car or at a local hall. Arrangements have been made to install wireless outfit, forest telephone and fire fighting pumps, all in actual operation. with miniature airplane, lookout tower, as well as a dimunitive forest nursery. Large quantities of instructive literature will be carried for free distribution. Banners containing such warnings as "Canada expects every loyal citizen to guard against forest fires" will adorn the exterior of the car from end to end and with flags and bunting will make a striking presentation.

Lectures will be given several times a day, according to the running schedule.

The coming of the Exhibition Car will be well advertised in advance. Several months will be occupied by the journey.

Italy on Thin Edge of Forest Supply

The yearly cut from Italian forests, without considering fuel wood, before the war amounted to not more than 600 million feet a year.

"Up to date the lack of imported lumber and the demands of the war have made such inroads upon the supply that for about 15 years no more timber can be cut. If the war ends within a year or two, Italy must import at least two billion board feet per year, but if lumber prices abroad are approximately the same in gold as they were before the war, it will impart from three to four billion board feet for about three years and two billion board feet for the 12 years following. Many Italian lumber concerns had their own tracts of timber and mills in that part of Austria bordering upon the Italian Veneto. These concerns will not go back into Austria if lumber can be imported from elsewhere and lumber prices are within reason.

"Outside of southern pine from the United States, virtually all the wood imported was of the kind known in Italy as "abete" (European pine or fir. In my opinion, there will be a postwar market for American spruce, hemlock, southern pine, swamp cypress, redwood and Douglas fir or Oregon pine, as well as for a fair quantity of American white oak, the last named in the form of railway ties particularly.

(U. S. Consular report.)

Do Private Woodlands "Pay"?

By John C. Archibald

Royal English Arboricultural Society

The practice of forestry has up to now been carried on in a very half-hearted manner, because the impression prevailed that it did not pay, and was at best an expensive fad. We all pay more or less for our fads, but we have no right to blame woodlands for not paying when they have been deliberately spoiled so as to attain some other object. Again, in times of stress upon an estate it is generally the woods that pay, and the exactment of this payment is not always done scientifically. No one has the right to view such mismanagement and say, "I'm sure my woods don't pay"; the blame lies with themselves. One result of the non-paying impression has been that there has been no definite trial on any scale to make forestry pay, and it is certainly more by the fortunes of war than by anything else that our timber, both old and young, is paying so well to-day.

Forestry in our country and in our varied climate is distinctly a profession in which hope plays a large part, but we nearly always find that with right treatment and judgment this hope is very often justified. We are now receiving a chance for improvement that may never be possible again if we allow it to pass by. On the other hand, if it be taken we can snap our fingers at foreign competition. We would have the timber, and not only that, but a very superior and more durable class of timber than any that could be supplied from abroad. We will have many difficulties to surmount, and we may make some serious mistakes but we gain the best experience from such tuition. Let us then go forward to our planting and regeneration in a large, a very large spirit of zeal, hope and trust, and without fail we shall not be disappointed in results.

LUMBERMEN AND PUBLIC WEAL

Commenting aptly upon the recent formation of the "New Brunswick Lumberman's Association" the Fredericton Gleaner says:

"It is unnecessary to dilate upon the importance of the lumber industry in this province; everybody fully realizes that next to agriculture, it is the greatest industry we have, both in the amount of capital involved, the returns it brings in, and the wages paid to those engaged in it. Under such circumstances, while the improvement of the conditions surrounding the industry is actually of most immediate consequence to those actively engaged in it, at the same time its ramifications extend in many directions, and the welfare of so many people depends to a greater or less extent upon its prosperity, that it becomes more or less a matter of public interest to see that the best is made of it.

There never was a time when the conservation of our forest resources was of greater moment than is the case at present, and their waste in every form should be reduced to the lowest possible scale, and if it is not practicable to quit, cut it out altogether. Because our forest wealth has been given to us freely by Nature without any effort on our own part, we have been prone to treat it as an asset which we might be as careless of as we pleased. Because we don't have to plant before we can reap, in the case of our timber crop, we have never troubled to look very far ahead in the matter of future years' supplies. When one particular district has been stripped of its trees, we have simply moved on further afield, and gathered in our year's cut elsewhere, without stopping to realize that such a plan of operations could not go on for ever.

Scientific Investigation Holds The Key to Canada's Future

To Stop Exportation of Raw Materials Demands Greater Faith in the Laboratory and Less in the Bank Loan

In current discussions of after-the-war industrial development in Canada a new and hopeful note is sounding:—that no permanent progress can be looked for until technical education and scientific research are more liberally provided for in our educational systems. and government policies. The newly-formed Canadian Industrial Reconstruction Association emphasizes these needs in Canadian life very plainly. The Canadian Manufacturers' Association also seems clearly apprised of the demand for a closer alliance with scientific effort. In a recent publication of the Canadian Railway War Board, the striking discrepancies between the value of many Canadian products at the time of export and their value in the form in which they reach the consumer is vigorously underlined, although the War Board declines to launch into a discussion of causes and confines itself to arousing national pride of manufacturers. The bulletin discusses the handicaps under which Canada must pursue her way until to the raw materials, so abundantly allowed to us by Nature, is added a greater degree of labor, skill and art. The point is illustrated by the following:

Raw eggs and icing.

"Raw material is the white of an egg. A housekeeper adds *labor* and makes it white froth—adds *labor* with *skill* and it becomes a stiff white froth."

"Employs, with her *labor* and *skill*, *art*—in putting into the dish first, the right amount of sugar and flavor—and creates a stiff, white highly-palatable material for icing a cake."

"There is nothing new in this.

"Her raw material is worth one cent.

"Plus labor—two cents.

"Plus labor and skill—five cents.

"Plus *labor*, *skill* and *art*—twenty cents.

"So with all industry."

"Yet Canada sells rough stone for grind-stones at $5.00 a ton and buys foreign-made grindstones at $100.00 a ton.

"Sells "fine copper in ore, matte or regulus" for 11.9 cents a pound and buys it back in ingots at 19.2 cents a pound; in strips, sheets or plates (unpolished at 22.8 cents a pound; in straight tubing at 28.6 cents a pound; in trolling spoons at $2.00 a pound; in cornets for the band at, say, five!

"Sells wheat at 1.8 cents a pound, when she could get 2.5 cents a pound for it as wheat flour. And buys it back in the form of unsweetened biscuits at 7.2 cents a pound!

"Sells a carload of pulp-wood for a six-gross carton of American tooth-paste!

"A train-load of nickel matte from Sudbury for two cars of medium priced automobiles!"

The Railway War Board economist, however, might have continued his interesting lesson to inform Canadian capitalists that advanced industrial processes are not set up by the mere construction of mill walls and the hiring of a staff. The success of scores of famous corporations all the world over may be traced back to the laboratories which in their own unadvertised corner apply scientific calculation to a thousand problems of industrial management. Canada has yet no reason to plume herself upon the amount of official

encouragement or public appropriations directed towards research work. The best that parliament could do at its last session was to try to make a jest of the Dominion Honorary Council for Industrial and Scientific Research, and to slice down its appropriation to a quite insufficient minimum. So we find in many fields that while the outside world has left many branches of our national activities far behind, banquet orators, purporting to represent important industries, insist on glorifying the "practical" man and deriding the expert who attempts to get behind phenomena.

The Brown Corporation.

Excellent examples of the profitable consequences of industrial research have come to hand in a list of industries which have sprung from the original sawmill founded by the father of the present owners of the Brown Corporation of Berlin Mills, N. H., and La Tuque, Que. The sons of the original owner began business and might have continued to old age with the initial equipment. They preferred, however, to take advantage of modern processes and market demands, and soon built up a group of mills for ground-wood pulp, sulphite pulp and kraft pulp. Here again, one might have expected the "practical" paper maker to limit his operations. Through the employment of a group of chemists, *one of whom is said to receive a larger salary than is paid to the entire staff of the Dominion Forest Products Laboratories at Montreal,* the waste materials of the mills were so utilized as eventually to establish a series of important industries maintained upon the otherwise wasted by-products. The following list shows in proper sequence some of the products derived in commercial quantities from what would ordinarily have been poured into the rivers or thrown on the mill-dump

Lumber
Ground Wood Pulp
Sulphite Pulp
Kraft Pulp
Kraft pipe
Caustic Soda
Chlorine
Bleaching Powder
Chloroform
Carbon Tetra Chloride
Sulphur Chlorides
Hydrochloric Acid
Acetone
Acetic Anhydride
"Kream Krisp" from Peanut Oil a cooking preparation.
Carbon bisulphide
Alcohol——hydrolysis
Oxalic Acid
Bark for fuel
Slabs and Edgings for pulp
Cottrell processon sulphate fumes.

Leaving the Sawmill behind.

Years ago the saw-mill was the whole business with *lumber* as the only product. As water power was available, the manufacture of *groundwood pulp* was taken up. The more technical process of *sulphite pulp* manufacture followed later and has expanded into the largest sulphite pulp mill in the world. In recent years the new *Kraft Pulp* process was started in the company's Canadian holdings at La Tuque, Que. Most of this strong pulp is used for the thin brown wrapping paper which is so widely used at the present time. An interesting development is the manufacture of Kraft pipe made by reeling a wet sheet of paper into a core, drying and impregnating with asphaltum. This pipe is water-proof, strong, resistant to many chemicals and takes a thread like ordinary iron pipe.

For the bleaching of sulphite pulp, large quantities of bleaching powder are needed. It was not long before the company undertook to make its own bleach by the electrolysis of common salt. This operation gives chlorine which forms *bleaching powder* solution with milk of lime, *caustic soda* which always finds a ready market and hydrogen gas which is usually a waste product.

Chloroform secured.

In order to keep up the efficiency of the cells it was found necessary to

run continuously and this gave spare chlorine at intervals to be disposed of. In looking for processes which would take care of this surplus chlorine gas, several by-product industries were started. *Chloroform* was made by treating acetone with chlorine under certain conditions. Instead of buying acetone, the company finally bought acetate of lime as raw material and made *acetone* by destructive distillation. *Carbon tetrachloride* is closely related to chloroform and was soon another by-product. As the sulphite mill had plenty of sulphur, the manufacture of *sulphur chlorides* was started. These are the ordinary chemicals used in making acetic anhydride from sodium acetate, and it was a simple step to convert acetate of lime into sodium acetate for treating with sulphur chloride to give *acetic anhydride*, now so much in demand for manufacture of cellulose acetate for airplane "dope."

"Kream Krisp"

All this time there was the loss of hydrogen gas from the cells. By bringing the hydrogen and part of the chlorine gas together in a combustion chamber and lighting a match, the hydrogen and chlorine burned one in the other to form *hydrochloric acid*, and the mixture has now been burning several years, with practically no attention, to form hydrochloric acid, which is one of the commonest and most important acids on the market. The widely advertised and highly nutritious lard substitutes are made by treating refined vegetable oils with hydrogen to form a harder fat of exactly the same composition as the main fat in lard. The company undertook to use up some of its waste hydrogen by combining with peanut oil and the well-known "*Kream Krisp*" of the Brown Company is now a standard by-product. Not content to buy prepared peanut oil, the company bought peanuts and made its own oil.

With water power and sulphur to spare, the electrochemical conversion of coke and sulphur into *carbon disulphide* was added to the list of by-product industries.

To make grain Alcohol.

There is now some talk of making grain alcohol (*ethyl alcohol*) from finely divided saw-mill waste by an improved process of heating the wood under steam pressure with mineral acid to form sugars by the breaking-down action known as "hydrolysis," and then extracting the sugars for fermentation into alcohol. It is claimed that *oxalic acid* can be made from the woody residue in the digester.

As a further example of careful attention to details, the company puts all its *bark* through a hydraulic press for use as fuel. *Slabs* from the saw-mill are barked in rotating "tumbling barrels" and the clean wood is then chipped for use in making sulphite pulp. Even the *edgings* are freed from bark by a hand operation of holding against a rotating drum set with knives and this material also goes into chips for the sulphite mill. In the kraft process the spent sulphate liquor always has to be evaporated and burned to recover the alkali, and the company has adopted the *Cottrell process* of electric percipitation of fumes from the incinerator to recover some alkali that would otherwise be blown out to waste.

How it came about.

All this complication of manufacture did not develop from the original saw-mill without careful study, technical skill, and financial courage on the part of the men in control of the company. At the same time there is hardly anything strictly original with the company in the whole list of by-products. What was necessary was an intelligent knowledge of the possibilities and painstaking experimental work to adapt each desired process to the company's own conditions. This has required first-class technical men with imagination and patience, as well as liberal advances of money by the company for experimental and development work. It is said that the number of dollars now spent by the company each year on re-

search work runs into six figures. This practical example of what one lumber company in America has done should show not only the possibilities for a country like Canada, but should also make the lumberman realize the broad field which he must enter in order to achieve full efficiency.

Canada Cannot Afford This!

It is safe to say that this chain of profitable and important industries, which in some departments are making great contributions to Uncle Sam's need for chemical products, were evolved from a laboratory table. It is unreasonable to contend, therefore, that the Dominion Government is overlooking the secret of industrial efficiency and commercial expansion when it permits, the staff of the Dominion Forest Products Laboratories to be picked off by private concerns, as is now being done, for lack of an adequate salary standard. While the United States Forest Product Laboratories at Madison, Wisconsin, has had its staff increased to over 300 men during was time, the parallel institution at Montreal has lost most of its handful of technical investigators to private firms. Germany, well knowing that industrial mastery had its tap root in Science, has persistently strengthened its research facilities while Canada apparently looks to "embargo" devices to supply a trade advantage of equal potency. That may suffice for the Canadian market but will nor carry a shipload of Canadian goods beyond Canadian territory.

Co-operation and Its Beneficent Results

By Clyde Lavitt

Chief Forester, Commission of Conservation.

Tke application of the co-operative idea has revolutionized the whole aspect of forest fire protection, in the province of Quebec. The four co-operative forest protective associations in that province now furnish protection to more than 44,000,000 acres of forest land, including about 80 per cent. of the Crown timber lands under license.

A more recent development is in connection with fire protection along the Canadian Government Railways, long a source of dissatisfaction on the part of timber owners. Under the new arrangement, protection will be furnished the forests along the Transcontinental railway in the Abitibi district, between Parent and the Ontario boundary, hitherto afforded but little protection from fire. At the direction of the Minister of Lands and Forests, and with the co-operation of the Government Railways management, the Quebec Forest Service has arranged for the placing of five power speeders, with two men for each speeder, on the railway between Parent and the Ontario boundary.

Worth Saving

This is a valuable pulp wood section, and the hazard is increased by the presence of many settlers, busily engaged in extending their clearings and marketing pulp wood, as well as in cultivating crops on lands already cleared. The danger from these settlers' clearing operations is minimized by the presence of some eleven fire rangers between Nottaway and La Reine, who patrol for fires and enforce the provisions of the law which prohibits the setting out of fires without a permit from a forest officer. Three portable fire pumps are to be purchased, with 1,500 feet of linen hose for each. Provision will be made at Amos for storage and maintenance of all this equipment.

Watching Engine Equipment

Another valuable development is the granting of authority, by the Government Railways management for the Quebec Forest Service to inspect fire protective appliances on their engines operating in forest sections in that province. The Forest Service has a special inspector for this line of work, who will now divide his time between the Government Railways in Quebec and the lines of railway subject to the jurisdiction of the Railway Commission, as well as lines holding provincial charters.

This outside inspection has been found by experience in Quebec and elsewhere to be of very great value in preventing the occurrence of fires due to railway couses.

The Government Railways management is also co-operating with the St. Maurice and Southern St. Lawrence Forest Productive Associations in maintaining a special fire patrol through forest sections between Parent and Quebec, and between Quebec and the New Brunswick boundary, respectively.

For right of way clearing to reduce the fire hazard, the Government Railways have employed an extra gang of 22 Indians to cut brush and dispose of inflammable debris between Parent and La Tuque. Labor is so scarce in that district that the hiring of the Indians was the only way to get the work done.

These developments, taken in connection with those of a similar character in New Brunswick and Ontario, show conclusively that the Government Railways Management is taking a much more active interst in forest fire protection than was ever the case in previous years.

The Forest Possessions of Spain

The Forest Possessions of Spain.

According to the data obtained for the year 1913-1914, the forests declared of public utility, which depend on the Ministry of the "Fomento," cover in Spain and the neighbouring islands an area of 11,886,349 acres, 29,888 acres less than in the year 1912-1913 due to a rectification of the boundaries. These figures include 609,379 acres (i.e., a little more than 5% belonging to the State, 11,261,746 acres belonging to communes, and 15,224 acres belonging to other public bodies.

Of the total area, 1,020,304 acres (*i.e.*, 8% of the acreage of public forests) are being divided up for cutting and 288,891 acres of mountain land are being regenerated and replanted.

The various kinds of trees found in the forests are distributed as follows: 5,263,223 acres of full-grown pine, oak and beech; 3,088,860 acres of brushwood and pasture land. The income from these forests is estimated at $412,247 (*at par*).

The forests, with fertile lands, are the great pillar of Canada's commercial existence. If the Kaiser can witness the ruin of our national foundations by our own indifference, why should he go to the expense of employing secret propagandists and T.N.T. kulturists? "Forest Conservation in Canada," says the British Reconstruction Committee, "is an Imperial question of the first magnitude which deserves immediate attention"; for Canada now holds the Empire's only timber supply.

It is clearly up to Canadians themselves to make this problem their personal concern. The growth of conservation sentiment is outside the zone of Government action. It cannot be done by "passing a law." Each Canadian must pass his own law.

Tank Cars in Fighting Fires

Mechanical equipment has demonstrated its value in controlling forest fires and its use is rapidly increasing, now that labour is scarce and it is often difficult to assemble men promptly to prevent a fire spreading. The upper illustration shows a fire-fighting tank car, equipped with 4,000 ft. of 2½-in. hose, hose rack and pump, maintained by the Canadian Pacific railway for the control of fires along its lines in the Muskoka district, Ontario. The lower illustration shows the equipment in actual use at a fire in cutover forest lands, where the debris on the ground constitutes a source of great fire danger.

Tank cars and pumping outfits are also in use, to a limited extent, on portions of the Grand Trunk, Transcontinental and Timiskaming and Northern Ontario railways, and have thoroughly demonstrated their effectiveness. Portable pumping outfits for forest protection purposes, are used by the Dominion Parks Branch, Dominion Forestry Branch, British Columbia Forestry Branch Ontario Forestry Branch, Canadian Pacific Railway Forestry Branch, and by the St. Maurice, Ottawa River, Laurentide and Southern St. Lawrence Forest Protective Associations.

The Last "White Man's Country"

British East Africa and German East Africa are probably the last examples of white colonization, in the strict sense of the word, that will take place on this globe, for no more "White man's country" remains. In both these countries there has been a new departure in the settlement of the land. In place of the waste and forest destruction which occurred when the Spaniards colonized Mexico and South America, the Anglo-Saxon, North America, and more recently, the British, Australia, *forest demarcatiom* both in German East Africa and British East Africa was the first step taken in the settlement of the country.

England's Forests Sacrificed to War

Nature Wears Another Aspect in the Once Splendidly Wooded Sections.

Although the Germans have not set foot in England and the horrors of invasion have been spared the country, nevertheless its natural aspect is undergoing a great change due to the war. The beautiful woodlands, forests, woods and groves that for centuries have made its landscape of unrivalled beauty are fast disappearing under the axes of the Government's lumbermen. It is only a question of time, according to the report of the forestry sub-committee of the Reconstruction Committee, before the whole of the country's growing timber which is fit for commercial use must disappear. Even if every acre felled is replanted, it will be many years before the present output can be repeated.

It is estimated that by the summer of this year the Government and the lumber trade will probably be converting trees into timber at the rate of 6,000,000 tons per annum, or more than half of our total imports of timber on the last year before the war. Indeed, the need of timber is so great and imperative that it is feared by the end of next year the Government will have to cut all the remaining substantial blocks of mature coniferous timber in the country. And by substantial blocks is meant any patches of any size whatever suitable for cutting. It is only too probable that this destruction of the beautiful woods of England will have to go on to the bitter end, as the demand for timber is a continuous and compulsory one so long as the war lasts.

A Picture of Destruction

What it means in a given district is illustrated quite close to London, at Farnham in Surrey, less than forty miles from the capital.

This district has been bled almost as much as any in the south, and what has been done is but a foretaste of what must follow. For miles it is hardly possible to be out of sight of areas which have been completely cleared or are littered with freshly gashed and trimmed trees or of woodlands in which the standing timber is already marked for destruction. From Crooksbury to Tilford, to Churt by Frensham and back to Farnham, everywhere is the same picture of destruction; forests cleared except for a shelter belt to protect new saplings, entire woodlands gone save for a few marked trees, trunks, and logs in thousands lying where they fell and awaiting removal.

At Blacklake a new camp is being erected for Canadian lumbermen who will cut down the tall red tufted pines and lay bare a great swath of country from the Farnham road across the woods of Waverley and Moor Park to Crooksbury Hill itself. This is just one example of what is going on all over Great Britain, Welsh, Scotch and the Lake country vales, that is, the Vale of Conway and the Vale of Llangollen and certain parts of Cumbria, show the forest loss most because whole mountains have been cleared and the destruction is most apparent on high country. In Devonshire great areas have been cut down to the north of Exmoor and many other localities, and several companies of the Canadian Forestry Corps are working in the country.

In the New Forest there has been a very heavy cut of the fine old timber. In Bedfordshire, the woodlands of the Duke of Bedford and of Viscount Peel have suffered tremendously. Virginia Water, Windsor Forest and the Sunningdale region have been cut over by Canadian lumbermen, who are also cutting near Wellington College and Sandhurst, as well as on the South Downs in Eartham Woods. In Suffolk and Norfolk the forests are falling rapidly. Historic seats are not spared. The woods of Beaulieu have been well cut out and the mag-

nificent silver firs at Longleat in Wiltshire, many of them six feet in diameter, are falling. From the magnificent high forests of Spanish chestnut trees at Welbeck Abbey at least a million feet are to be cut.

The Home of Trees.

These details give but a faint suggestion of what is going on from one end of Great Britain to the other. Without having put foot on England the destructive influence of the Germans is seen in the disappearance of its incomparable woodland beauties. It has been largely due to its trees and woodlands that England has always ranked among the most beautiful of European countries. Its climate and its extraordinary variety of soil have been peculiarly favorable for the growth of trees in unusual variety. Its freedom from great extremes of heat and cold have made it the home of trees unknown in many parts of northern Europe. In its limited area a greater variety is to be seen than can be observed in immensely larger areas on the Continent.

In a journey of fifty to eighty miles from London to the Channel one finds hedgerow elms, thorns and oaks of the meadows, silver birches, chestnuts and many conifers of the lower commons; the willows, alders and poplars of the valley; the ancient thorns and hollies of the higher commons; the beechwoods of the North Downs; the white bean, yew, juniper and box on the greens and ridges and the forests of mighty Scotch pines, silver firs, larch and the great oaks of the Weald; the conifers and chestnuts of the Hastings sand forest region, and then the elder, ash and thorn of the eastern end of the South Downs, and the beech, birch, sweet chestnut, ash and mighty yew at their western end. And this variety is not only typical of the nearby counties, but more or less of all England, Scotland and Wales.

With the exception of certain exotic trees brought here and there, perhaps by the Romans, it is pretty clear that the trees down to the seventeenth century were all native. In that century, the conifers were introduced, and Develyn, the great authority on British forestry, includes in his list the Scotch fir, the only native of the family, the silver fir, the Weymouth pine, the spruce and the larch. In the eighteenth century large plantings were made of the larch. This introduction of the larch and other conifers not only added new features to the beauty of the English woodlands, but also has proved to be as great a resource of England at war as the hearts of oak of old.

While most of England's woodlands had been created primarily for game coverts and landscape effects, state forests were for centuries cultivated to meet the needs of the navy. The oak of the Forest of Dean has been known as the best ship timber in the world, and English oak is still the finest for that purpose, while the best of the soft woods, spruce and pine, is second only to the finest woods produced in northern Europe.—*New York Sun.*

Conquerors Exploit Russian Forests

The thoroughness with which the Germans have set about to exploit the forests of that part of Russia which they have occupied is made evident in an account published in Traevaru Industrien, written by W. Franz, and translated by the Timber Trades Journal of London. The account says:

"We arrived from Warsaw via Brest-Litovsk over the Bug at the Gajnowska station. on the western edge of the extensive and valuable forest, which forms the southwest corner of Lithuania. After a further journey of an hour, we came to Bjelovjerska, a large clearing with three small villages and a hunting-box, formerly belonging to the Tsar. In the building, which is surrounded by a beautiful park, there now resides a German military forest admin-

istration, with all the necessary appurtenances stocks of materials, workshops, machinery, etc.—and the duty of this administration is to provide from the contents of the forest all the various productions which are necessary for the war. The long entrenchment warfare demands great quantities of round wood, and also enormous supplies of wood manufactured in the form of fuel, charcoal, wood wool, wood thread, etc. Wood saves blood is the motto, and regular and plentiful supplies at the front are therfore considered of the very highest importance.

War Prisoners Work

"It is very essential work which is here being undertaken; it requires skillful management and powerful arms. In the Bjelovjerska forest department there are about 25 wounded officers, who, with some hundreds of junior officers and others of lower rank, superintend the work, which is performed by many thousand prisoners of war and the civil population of the place. The huge forest which covers an area of more than 100,000 hectar, is divided into many inspection districts. At the head of each is a forest expert. To one of these we drove in a hunting carriage. Our lonely way led through the wonderful forest, whose century-old trees sheltered the soldiers of Charles VII and Napoleon. Predominant are unusually straight-grown pines, yielding a wood of excellent quality. About a quarter of the whole forest consists of deciduous trees, among which the oak and the ash are of special interest. As we drive, we feel very thankful that our armies have been successful in capturing and using rationally these enormous stretches of forest, to the great benefit of our own native supplies, which can thus be better conserved than would otherwise be the case. On either side of us lie felled the huge giants of the forest. The branches are first lopped off on the spot, and the trunks are then drawn by horses and oxen to the forest railway for transport to the mills. To get out the large trunks by cattle alone would be a work of great difficulty and, considering the need for horses for the army, would be a slow process. As it is, the locomotives convey daily hundreds of trees from the forest, as well as taking the workmen to the more distant parts for felling.

Boards for Front Trenches

"We take one of these trains, and find ourselves at a sawmill. Before it is the piling place where the logs are collected and sorted before being sawn. For the front are especially needed boards of certain dimensions, of which 'unterstande' and shelters are constructed. For this purpose, and in order to utilize the full capacity fo the railways, the saw mills have been erected in the forest. Each inspector superintends one of these mills, and they are so arranged that the raw material can be taken in at one side and the manufactured wood come out at the other. Those mills which cannot be established by the railway are connected by sidings with the main line. The saw frames are driven by engines fed with wood fuel; water and wood chips are the daily bread of these machines, which drive not only the saws, but deliver also electric power to the dynamos. The sawmills, the piling yards, the prisoner's quarters, and the barracks of the civil population are lighted by electricity.

Thousands of Workers.

The forest inspector who received us treated us with the greatest courtesy, and told us a good deal about the life and work in the forest. To support, in these primitive regions, and to look after many thousands of workmen—Russians, Poles, Jews, men women, and children—is no light task. It has been solved by quartering the prisoners as near to their place of work as possible in small camps, which have excellent sleeping arrangements, with washing-rooms, reserves of food, workshops, wells, hospitals and other hygienic arrangements; while, on the other hand, free dwellings have been provided for the civil population, as well

as free places of entertainment and amusement. Spreading the workpeople over such a wide area has naturally rendered the food problem very difficult, but at the same time it has been an advantage in the continual struggle against epidemics and disease.

Take off Bark for Tannin.

"In our journey we passed many of these work places. At one spot the trees were being barked, in order to obtain the tannin substances; at another, the branches were being lopped off, for the making of telegraph poles; at a third, a division of men were busy with the manufacture of railway sleepers; and at another, barrel-making was in progress. Now we pass a tar factory, which the former owners had attempted to render useless, but which the forest inspector had quickly repaired.

"What we saw in one inspector's division was repeated in the others; but the strongest impression was made by the great buildings and factories near Gajnowska Station. A great manufacturing town, with huge sawmills, has arisen, and probably the largest charcoal works on the continent are now established here, as well as numerous other industries."

WITH A FORESTER IN FRANCE

The following is an extract from a letter from Private F. Bruce Robertson, of the 3rd Canadian Division Artillery Signals, France, to the Director of Forestry, Department of the Interior, Ottawa, to whose staff he belongs:

It is Sunday. The outfit is out on rest and there are no parades. The old lady by whose fire I am sitting has asked me if I had plenty of tobacco. I thought it a hint so asked if she smoked. "Oui," says she, "mais tobacco fini en France." You can picture her now puffing away at an old clay pipe on the other side of the fire-place. She had an earache half an hour ago, but that is forgotten now. Coffee is making in a black saucepan on the fire, so I foresee a pleasant morning for both of us. Outside it rains. It is one of those big fireplaces, you know, extending across one side of the brick floored room, and I have a cozy seat under the arch. We have a brick oven in the wall also, in which she made bread for refugees yesterday. Old style baking and the best, in which a brush fire is made in the oven, then coal raked out and the bran loaves put in. Had a sample of the bread, just a little, in fresh warm milk last night, and it went fine.

"For the past month I have been mounted lineman on a cable section. We have been doing considerable work laying lines off the wagon. You may have seen the signal company in training practising the same about Ottawa. This is over for the present. Life is simplicity itself in this country village with a nightly game of ball to relieve the monotony. Our one other amusement is watching the local shepherd and dogs herd the community flock of sheep.

"As a "Y" worker you will be interested in knowing that our ball outfit is supplied by the Y.M.C.A. All sorts of sporting goods are handed out, including phonographs, and the troops appreciate the work.

AN INDUSTRIOUS PLANTER.

One of the good friends of the Canadian Forestry Association, residing at Boston, Mass., is Mr. Frank A. Cutting, a large dealer in hemlock bark. Mr. Cutting has taken a lively interest in tree planting and at the present time is setting out 25,000 pine trees a year and sowing a quantity of pine seed. With the cost of nursery stock, the value of the land, and expense of planting and protection, Mr. Cutting anticipates no profit from his venture, but is greatly interested in the idea of replacing some of the forest materials and thus conferring a benefit upon future generations.

Can we afford higher pensions?

Can we afford forest fires? Every fire cuts down the chances of higher pensions.

An Empire Partnership in Forestry

By M. C. Duchesne, well-known British Forester.

A Plan to Develop More Profitable Relations With Great Britain's Wood Consumers

Let us consider the position of Canada—and with Canada I include Newfoundland.

Canada contains the only vast resources of timber within the Empire.

Figures show that Canada in 1913 sent us only 10 per cent. of our imports of coniferous timber and pitwood. That country has the largest reserves of probably the finest timber in the world and of the varieties most suitable for our requirements. Is there any reason, apart from the matter of transport, why in the future the 10 per cent. should not be increased enormously?

In the past the cost of transport from the Baltic was low in comparison with that from Canada, partly on account of return freights and other special facilities. Given cheap freights and special exchange of trade with Canada after the war, this comparison might not stand in the future.

Canada's Advantages.

Let me enumerate some of the advantages of organising British and Canadian forestry on broad lines, looking to Canada for mature timber while creating reserves by afforestation in Great Britain.

I would first emphasise particularly:—

The geographical position of Canada and its distance from the war area.

That lumbering is one of the principal industries of Canada and can be extended promptly and indefinitely.

That Canada possesses exceptional natural facilities relating to water transport and other advantages.

Now as to mutual advantages:—

Firstly, Canada has unlimited supplies of Douglas Fir, the "Oregon Pine" of commerce, pre-eminently suitable for constructional work and many other important purposes, as has been abundantly proved in its world-wide markets.

Secondly, Canada possesses also unlimited resources of other species of timber, particularly varieties of Spruce, the "White Deal" of commerce. The timber of Spruce is used in great quantities in this country, and selected parcels of Canada's Sitka Spruce are in large demand for the construction of aeroplanes. Canada has also the *Thuya plicata* (known in British Columbia as "Western Red Cedar"), one of the most durable trees in the world, as well as Weymouth Pine (the "White Pine") of commerce and other important trees, including various hardwoods.

£5,000,000 *for Pulp.*

Thirdly, our annual bill for woodpulp for paper-making totals five million pounds. This material can be supplied in conjunction with pitwood from the forests of Canada, and the manufacture of pulp is one of the most flourishing industries of Canada.

I have said sufficient as to timber supplies, now as to forestry:—

(1) Douglas Fir, Sitka Spruce, and other timbers which Canada will send us and which our markets require are the very trees we should plant here on a large scale for afforestation. Spruce is the most suitable tree for much of our waste hill land, and Canada's Sitka Spruce is advocated for planting on a large scale. Spruce timber has unlimited uses here and is the best wood for pulp as well as for pitwood. For the valleys or the better soils, Douglas Fir is the most promising tree to plant. There are many other Canadian trees that may usefully be cultivated here.

(2) Canada can teach us many useful lessons, particularly in organ-

isation, the commercial utilisation and marketing of forest produce and the technology and uses of wood.

(3) Great Britain can give Canada facilities for studying the commercial utilisation of timber in this country, so as to develop the markets here for Canadian timbers.

(4) Canada has mature forests of Douglas Fir and other timbers which we desire to produce in this country, and therefore wish to study. We shall require also quantities of tree seeds of the best types from the forests of Canada.

(5) Great Britain has old scientific societies and unique facilities for scientific research, and is also in close touch with Continental centres and facilities for practical and theoretical forestry education.

We should make amends for our past indifference and start a national campaign to encourage forestry, not only in Great Britain, but throughout the British Empire.

Big Arrears in Building.

Enormous demands will be made for timber throughout this country and nearly all Europe for reconstruction after the war. The matter will, therefore, compel the utmost attention. After hostilities have ceased, there will naturally follow a transition period before normal conditions return. During this time, unless our main supplies of timber can be obtained from Canada, we shall be only one of many eager competitors for those of Russia and Scandinavia. A certain proportion of the Baltic supplies will be forthcoming from the sources developed before the war, but it is doubtful how far this quantity will go towards meeting our requirements or at what cost it will be obtainable.

There are big arrears of repairs and reconstruction on our railways, in industrial undertakings, and in private establishments. For these and other developments large quantities of timber will be required.

FORESTRY AFTER THE WAR.

Westminster Gazette; Nobody, except those of us who have seen something of life at the front during the last four years, can realize what an enormous quantity of timber has been taken from this country for war purposes, and what an enormous amount of planting and tending of trees will be necessary to replace it. Unfortunately foresters who really understand all that afforestation means are not numerous in England, and though the necessity of educating youngsters for the work has received much more serious attention in the last few years than it ever did before, when our methods—as in many other things—were haphazard, the facilities are still hardly sufficient to give us enough foresters to cope with the demand.

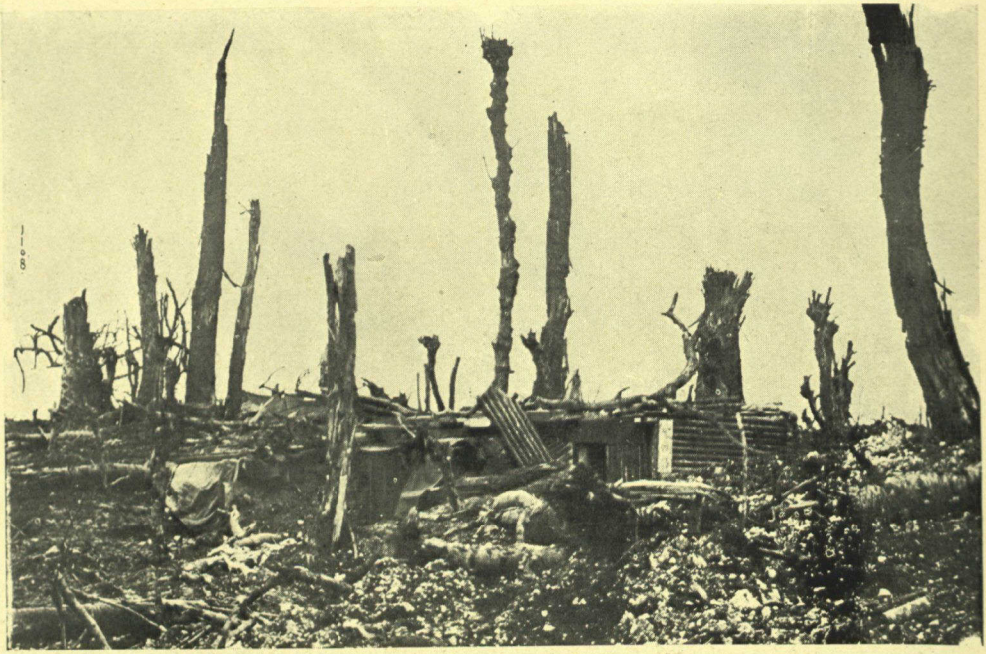
RUINED FORESTS OF VERDUN

Lovers used to stroll arm in arm through the well-ordered forests of Verdun. To stroll arm in arm where these forests once stood is no longer possible, Gouverneur Morris writes in Collier's. You must go alone. If there has been rain you should have nails in your boots. The smooth convolutions of the hills have been tortured and turned into ridges and hollows like the Atlantic ocean during the equinoctial gales.

I doubt if there is to be found one single square yard of the original forest floor. I doubt if there is to be found one single perfect example of a shell crater. One crater breaks into the next, and there, merged into one shocking hollow, are a dozen which at the first moment of looking appeared to have been but one.

It has been well but truly "worked," that forest floor; but not for 100 years can it ever again be worked by man in any peaceful and profitable pursuit. Rich soil (doubly rich now,) it will be shunned by the farmer with his plow; a prospect very rich in copper and iron, the prospector will shun it, for here, buried and half-buried, the shells, great and little, which did not explode at all, are as thick as temptation in the life of every man.

MALIGNE CANON, JASPER PARK.



"A short turn and the greenness vanished! All life succumbed, as if roared down by the cannons, by the howling and pounding that hammered in the valley like the pulsating of a colossal fever. Shell hole upon shell hole yawned down there. From time to time thick, black pillars of earth heaped up and for moments hid small parts of this desert burned to ashes, where the cloven stumps of trees, whittled as by penknives, stuck up like a leering challenge to recognize the landscape this once had been, this field of death and refuse, before the great madness had swept over it and sown it with ruins, leaving it like a dancing floor on which two worlds had fought for a loose woman."—From "Men in War," by Andreas Latzko.

A Lookout Station on Green Mountain, B.C., built by Dominion Forestry Branch. From this high point the fire rangers have an unobstructed view of great areas of forests and can easily detect an incipient fire.

Utilizing the smashed trunks of trees for trench protection.

Photograph taken on the Canadian front at Ypres.

Medicine Lake, Jasper Park, B.C

Waterton Lakes, from the Narrows

Great Timber Wealth of South America

By H. N. Whitford

Prof. of Tropical Forestry, Yale University.

Let us take a survey of some of the tropical forest regions of the world and see what the possibilities are. One of the most active industrial tropical and semi-tropical regions in the world is southern Brazil. According to a report of the Brazilian Government, the forested area of this region of Brazil is estimated at 1,058,000 sqquare kilometers (approximately 260 million acres). There are two fairly distinct forested regions—the coastal and plateau. The former has a high annual precipitation and, for the most part, a high temperature. In no place is it far distant from tide water. It is heavily forested. Unfortunately there are no estimates of the total amount of timber. H. M. Curran has examined a large timber property in the mountains back of Bahia and finds the forest has an average stand of about 10,000 board feet per acre; according to the types, the stand will vary from 6,000 to 13,000 feet per acre. About 10 species will furnish the bulk of the cut. He estimates that comprising 42 per cent of the cut are soft hardwoods similar to yellow poplar. Thirty per cent. are similar to maple and ash in hardness and 28 per cent. harder than white oak. The softer species are little known on the markets, but could be introduced and substituted for the uses for which imported pine is employed.

The plateau district lying behind the coastal mountain ranges has lower temperature and rainfall. In places it is fairly heavily forested with hardwoods and Parana pine.

The hardwoods are usually confined to the valleys, though patches of them are found on the uplands. Simmons states that in Parana one company claims ownership of connected forest tracts of Parana pine, a large part of which is in a primitive state, aggregating three billion feet and averaging about 4,000 feet to the acre. There are sections where the growth is thick and large; the stand scales as high as 15,000 to 20,000 feet to the acre.

Outdoes Southern States

The above are the only available figures that give any indication of the volume of the forests. Assuming that the estimate of an area of 260 million acres for the region under consideration is correct, divide this area by two to make a liberal allowance for non-merchantable forests, clearings, etc., there will remain 130 million acres covered with merchantable forests. At 5,000 board feet per acre this will give a total of 650 billion feet. It is believed that this estimate is very conservative. At any rate, for all practical purposes it is sufficiently accurate.

There is nearly twice as much standing timber in this region as in the southern yellow-pine forests of the United States, the most active, lumber-producing centre in the world with an annual cut of 15 billion feet.

Rich Amazon Regions

The Amazon forest can be regarded as the greatest reserve forest of the world. While it is not as near to lumber-consuming centres as the other forest regions that have been mentioned, water transportation alone considered, it is nearer to the great centres of the eastern United States and western Europe than the Pacific Northwest. Aside from climatic conditions, there is no other forest region that has its physical conditions so well adapted to lumbering. There are literally thousands of miles of navigable rivers and many more thousands that are drivable. Ocean steamers ply up to rivers over 2,500 miles from the coast. Moreover,

little of the area is over 1,000 feet in altitude. The climatic conditions are not so bad as non-dwellers of the tropics make them out to be. Besides Para, a city of 200,000 people, at the mouth of the Amazon, there are Manaos, a city of 80,000 people nearly 1,000 miles inland, and Iquitos, Peru, with about 20,000 inhabitants, about 2,500 miles inland. These cities now all have modern sanitary conditions and are otherwise modern. Yellow fever is practically a thing of the past. So far, a single forest product, rubber, has been the principal source of revenue for the region. Next to coffee it leads all others in the value of the exports of Brazil. The lumber industry is practically undeveloped. Only a small amount of lumber for local use and export is cut and some is imported.

The Forests of New Zealand

By Sir William Schlich

Forest including scrub, originally covered the greater part of the islands, but its area has gradually been reduced. In 1886 the area under forest amounted to 33,120 square miles, and in 1909 to 26,678 square miles, being a reduction of 6,442 square miles, equal to 20 per cent., in 23 years. In 1909 the proprietorship of the forests stood as follows:—

Crown forests, 12 per cent. of total area, 12,357 sq. miles.

Permanent reserves, 3 per cent of total area, 3,298 sq. miles.

Alienated forests, 11 per cent. of total area, 11,023 sq. miles.

Total, 26 per cent. of total area, 26,678 sq. miles.

It will be seen that 59 per cent. of the forest area is still the property of the State, and that 41 per cent. have been alienated, or is Maori owned.

The *output of timber* in 1913 amounted to about 358 million superficial feet. The implorts and exports in 1913 were as follows:

Imports, 33,484,952 superficial feet, value £303,012. Exports, value £319,650.

As regards value, the two items are, practically, the same. It is necessary to point out here that the value of the imports per 100 superficial feet came to just over 18s. The imports consist chiefly of Eucalypts from Australia, especially iron-bark and jarrah coniferous timber from the United States, Canada, and the countries around the Baltic. The exports were chiefly kahikatea, kauri, rimu and beech.

Future Management

As stated above, the output in 1913 amounted to about 358 million superficial feet. Experience has shown that the requirements of the Dominion are steadily increasing, and it has been estimated that they will have risen to double the present amount, or 720 million superficial feet, in the year 1945, by which time the present stock of milling timber would be exhausted. This conclussion was based on the assumption that the population would be doubled by 1945, and that the increment of the forests was far too slow to keep-pace with the annual cuttings. Starting from these premises, the seriousne ness of the position was recognised some time ago, and already in 1896 an Ordinance was passed inaugurating a system of State nurseries and plantations, so as to make the country self-sufficient in the future. Under this Ordinance, operations were at once commenced, and by 1909 an area of 12,715 acres had been planted with a great variety of exotic species.

The Returned Soldier Must Be Protected

The necessity of having all Canadian lands intended for soldier settlement properly examined by expert Agriculturists and Foresters has been championed again and again by the Canadian Forestry Association in its various publications, public meetings and newspaper campaigns.

A strong stand in favor of expert demarcation of lands is taken by the U.S. Secretary of the Interior, Franklin H. Lane who brings to the President's attention the duty of the republic to safeguard the returned soldier from locating on non-agricultural soils. Much of what the Secretary says is directly applicable to Canada.

"Any plan for the development of land for the returning soldier will come face to face with the fact that a new policy will have to be worked out to meet the new conditions. The era of free or cheap land in the United States has passed. We must meet the new conditions of developing lands in advance—security must to a degree replace speculation.

"Every country has found itself facing this problem of caring for returning soldiers at the close of a great war. From Rome under Caesar to France under Napoleon, and down even to our own Civil War, the problem arose as to what could be done with the soldiers to be mustered out of military service.

Not half Cultivatable.

"At the close of the Civil War, America had a situation similar to that which now confronts it. Fortunately at that time the public domain offered opportunity to the home returning men. The great part those men played in developing the West is one of our epics. To the great part of returning soldiers land will offer the great and fundamental opportunity. Official figures show we have unappropriated land in continental United States to the amount of 230 million acres. *It is safe to say that not one-half of this land will ever prove cultivatable in any sense.*

British Guiana's Timber Riches

British Guiana produces some of the finest timbers in the world. Those that are at present most commonly exploited are Crab wood; Greenheart, largely used in the construction of the Manchester Ship Canal and in the construction of lock gates for the Panama Canal; Wallaba; Balata or Bullet Wood; brown and yellow Silverballi, Letter or snake wood; red Cedar. These woods are suitable for building purposes and the making of furniture. Wallaba and several other kinds of wood are used for fuel as a substitute for coal. The forests also abound in soft woods which are suitable for making paper pulp, yet not a single pulp-making factory exists in the Colony.

Other products are Balata, the dried latex of the Bullet tree; the exports of this gum are over 1,000,000 lbs. per annum, the bulk going to the United Kingdom; Locust gum, used in the preparation of varnishes; Tonka beans; Vanilla beans; Palm nuts of various kinds which are plentiful and could doubtless be turned to commercial value as oil producing factors; Souarri nuts, larger and finer than Brazil nuts. Plants of medicinal value also abound, of which no use whatever is now made.

This is a dangerous season for forest fires! If you neglect to extinguish your camp fire, if you throw away lighted matches or tobacco, you have written an invitation to Disaster.

The Second Crop of Pulpwood

By H. C. Belyea

(Graduate, Forest School, University of New Brunswick; Instructor in Forest Engineering, New York State College of Forestry, Syracuse, N. Y.)

An Antidote to the Pessimistic conclusions Based on Rate of Growth in Virgin Forests.

The prediction of the rate of growth for second growth forests after lumbering, from the performance of the original stand is a common source of pessimism among lumbermen. Technical forestes have an unfortunate tendency of basing their growth predictions upon the performance of the species under virgin conditions. The conditions for growth after lumbering are much different than they were for the original forest, due principally to the freedom of the survivors from root and crown competition. Attention is called to an article on the reforestation of pulpwood lands, published in the December 1917 issue of the Canadian Forestry Journal, in the hope of a reinterpretation of some of its conclusions.

Virgin Forest Conditions

A forest as grown under virgin conditions, consists of two main divisions; an upper or main portion consisting of the actual merchantable and productive trees, and a lower or under forest of small and young trees which form the basis of the potential forests of the future. While the existence of the latter is dependent upon the presence on, or near the site, of trees big enough to produce seed, it is distinctly not a part of the productive portion of the forest.

The existence of a tree, big or small, in a forest, is absolutely dependent on the presence or absence of certain conditions for tree growth which are termed the factors or resources of the site. Only under stimulation of these factors is tree growth either initiated or continued. These site factors are several in number, but crown light and soil moisture are the most important.

The presence of a lower growth of seedling or small trees under the crowns of the main trees of the forest is concrete evidence that either the resources of the site for tree growth are in excess of the demands of the trees now present, or else the crown cover of the main forest is temporarily less dense and represents a less number of trees than the potential ability of the site for tree growth. This small seedling, and often suppressed, growth of stunted trees occupies both in the air above and in the soil below space properly ascribed and credited to other and bigger trees. Hence it cannot be reckoned as an item of the productivity of the site, but rather as a potentiality. It exists only by sufferance of the minimum demands of the overwood, and it is maintained only so long as these demands are not in excess of the supply. Hence it cannot be counted as part or parcel of the productive forest nor as an actual item of the forest production.

Growth in volume in the individual tree for any site is dependent upon the size of the crown, which in turn is indicative of the size of the bole and the development of the roots. Growth in volume is also more a factor of size than age. Twelve inch trees in any forest will show only the average growth of 12 inch trees as grown in that forest, irrespective of whether their age be 75 or 175 years.

The life history of softwood in virgin mixture is a series of struggles to get light and develop a crown; struggles that are feeble in early age and more progressive as the tree attains size. Each phase of suppression and release leaves its record in the alternating zones of dense and wider ringed wood in the bole of the tree. In virgin forest the release

of the overtopped softwood is directly dependent upon openings in the upper canopy. It is an undeniable fact that these openings are more readily and quickly seized by the closing together of the surrounding hardwood crowns than by the growth of the softwood from beneath. The effect of these openings is the acceleration of the growth of the understory softwoods, and the closing together of the crowns retards it. This continues until the individual softwood tree is able, by its height, to thrust its own crown into the opening and to seize it for itself.

The Effect of Cutting

The pulp man, however, is not interested in the time required by a tree to reach a place in the main canopy. The length of time covered by the period of initial suppression is variable and represents not so much a definite period of time as a condition to be endured in the young growth of all softwoods in mixture And as such it should be regarded in the predictions of growth. The lumberman is not so much concerned with the age of the trees remaining, as with their size, their number and their subsequent growth. Suppose that it does take 100 years to grow 5 inch Spruce or Balsam tree in virgin mixture. That is of very little consequence provided that there are enough of them and that in the period before the next cutting, 50 years perhaps, they will increase their diameter by 8 inches, making a total of 13 inches, a supposition not beyond expectation with either Spruce or Balsam. Increase in the rate of growth of all trees is the immediate effect of cutting. In illustration of this, Figure No. 1 is submitted, which shows the average diameter growth on the stump before and after cutting. It is based on the measurement of 313 Red Spruce trees on Brandreth Park in the Adirondack Preserve, New York State.

The recovery of a tree from suppression is dependent upon the proportionate size of the crown and the development of the roots. It is not to be thought that the immediate effect of the removal of the overwood and the entrance of the crown into the light is a corresponding increase in growth. Even when the tree is but lightly shaded, it takes some little time for it to make full and complete recovery and show an acceleration of growth. The removal of the overwood has not the same effect as if the trees came up into the light through the processes of growth, and a period of readjustment is necessary, before they begin to show an increase in the rate of growth.

The recovery is slowest on the biggest trees and most rapid on the smaller members of the underwood. Yet even with the smaller trees it takes from 4-5 years for the tree to make recovery and show an acceleration of growth. With the bigger trees this time is longer. Attention is called to Figure No. 2 in illustration of the period of readjustment in Spruce after cutting. While this figure is made out on the basis of height growth only, it will be understood that curves based on either diameter of volume growth for the same period would show exactly the same trend. This study is based on the measurements of 316 Red Spruce trees at Wanakena, N.Y. The first few years after the cutting there is no acceleration or increase in the rate of growth. It will be noticed that the recovery and acceleration of growth was quickest with the smallest sized trees.

Need of Light and Room.

In reality, the whole process of growth hinges upon the release and development of the individual tree. The development of the unmerchantable portion of the stand can only be accomplished by giving the component individuals their requisite light and room. In the meantime there is a potential forest immediately available represented by the 4, 5, 6, and 7 inch trees now present in the stand, on which the lumberman can depend for his wood supply until the small suppressed material can make the expected recovery, and begin to take its place in the actual productive portion of the stand.

TOTALS OF ALL CLASSES

Peeled Red Spruce
Brandreth Park, N.Y.
August, 1917.
313 Trees.

Cut over for Softwood during Winter of 1897.

Average Diameter inside Bark in Inches on the Stump			Diameter Growth in Inches in 20 Year Periods		D. B. H. Class		Number of Trees	Average Annual Height Growth in Feet
1877	1897	1917	'77-'97 Before Cutting	'97-'17 After Cutting	1897	1917		
6.0	7.9	10.3	1.9	2.4	6	8	57	.37
6.4	8.2	10.8	1.8	2.6	7	9	91	.435
7.1	8.9	11.9	2.1	3.0	8	10	80	.460
7.5	9.6	12.8	2.1	3.2	9	11	48	.490
8.0	10.5	14.1	2.5	3.6	10	12	29	.36
8.4	10.9	14.8	2.5	3.9	11	13	8	.344

FIGURE NO 1

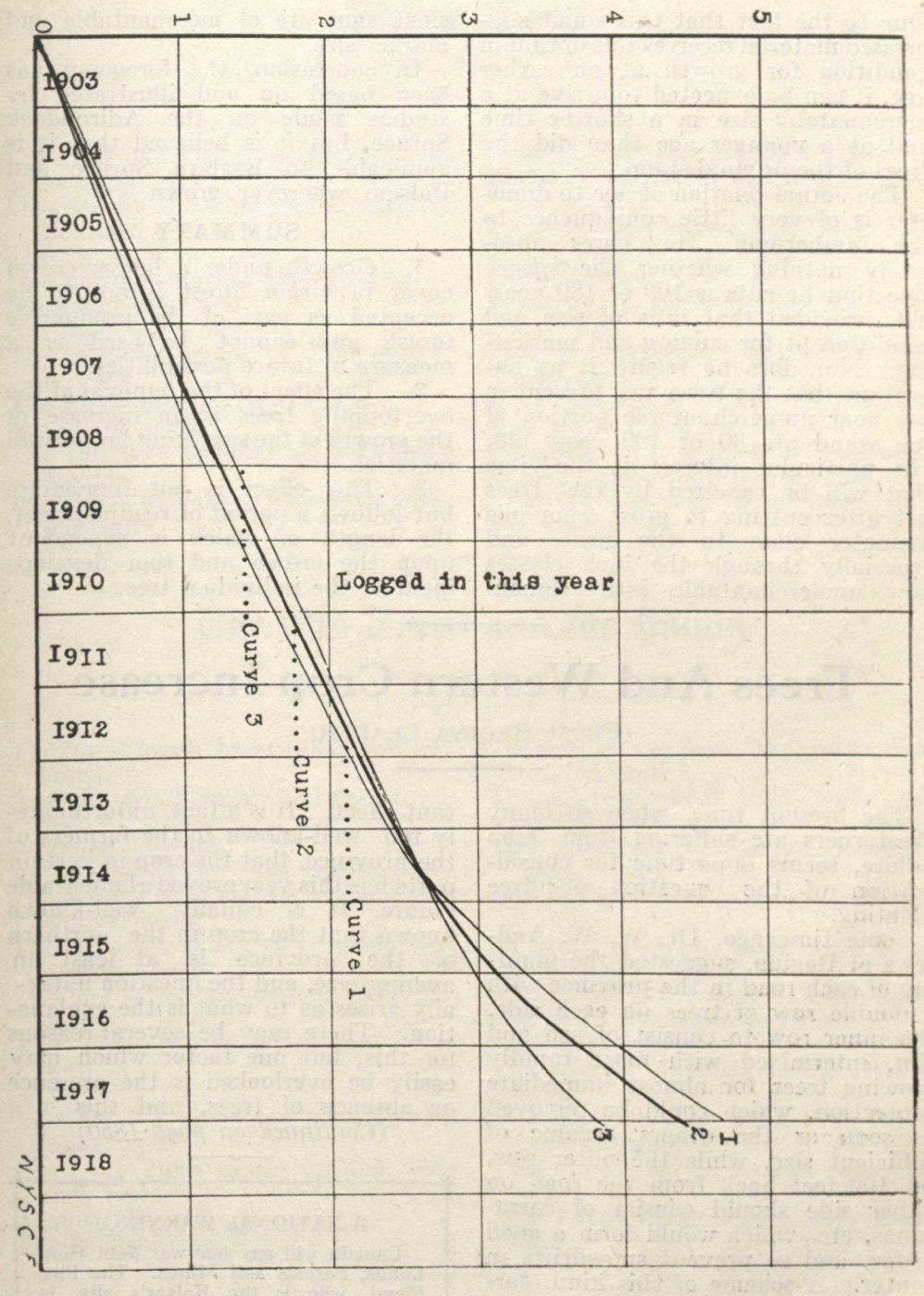


Figure: 2 Height, Growth of Red Spruce for the 15 years following, 1902. The area was logged in 1910. Note the 4-6 years of readjustment before the acceleration of growth following the cutting. Made from a study of 316 trees on the lands of the Rich Lumber Co., Wanakena, N.Y.

Curve 2. Average height growth of 36 trees, 1-11 feet high, '02.
Curve 1. Average height growth of 99 trees, 2 " " '02.
Curve 3. Average height growth of 29 trees, 10 " " '02.

Due to the fact that this small suppressed material receives this optimum condition for growth at an earlier age, it can be expected to arrive at a merchantable size in a shorter time and at a younger age than did the trees of the original stand.

The actual relation of age to diameter is of very little consequence to the lumberman. He cares absolutely nothing whether the spruce tree that he cuts is 100 or 180 years old, provided that it is of size and condition fit for cutting and marketing. Nor does he regard it as important that the trees now present in the near unmerchantable portion of the stand are 30 or 100 years old. His particular interest is the time that will be required by the trees left after cutting to grow from one diameter class to the next, and especially through the inch classes now unmerchantable into dimensions that are of merchantable and market size.

In conclusion, the foregoing has been based on and illustrated by studies made on the Adirondack Spruce, but it is believed that it is applicable to Eastern Spruce and Balsam wherever grown.

SUMMARY

1, Growth under a heavy crown cover in virgin forest is not to be accepted as part of the productive forest, and cannot be used as a measure of future possibilities.

2. The effect of the removal of the overtopping trees is an increase in the growth of the surviving suppressed material.

3. This effect is not immediate but follows a period of readjustment, the length of which is dependent upon the crown and root development of the individual tree.

Trees And Western Crop Increase

(FROM REGINA LEADER)

The present time, when so many Westerners are suffering from crop failure, seems opportune for consideration of the question of tree planting.

Some time ago, Dr. W. W. Andrews of Regina, suggested the planting of each road in the province with a double row of trees on each side, the inner row to consist of ash and elm, intermixed with more rapidly growing trees for almost immediate protection, which could be removed as soon as the others became of sufficient size, while the outer row, set 100 feet back from the road on either side should consist of carraganas, etc., which would form a good hedge, and so prevent snowdrifts in winter. A scheme of this kind, carried out throughout the province, would not only protect the roads, thus making travelling in winter much easier, owing to the absence of deep snow drifts, but it would have what is perhaps an even more important effect. It is a fact, unfortunately too well-known to the farmers of the province, that the crop in certain parts has this year proved a lamentable failure. It is equally well-known known that the crop in the northern of the province is at least an average size, and the question naturally arises as to what is the explanation. There may be several reasons for this, but one factor which may easily be overlooked is the presence or absence of trees, and this is a

(*Continued on page 1850*)

Piegan Pines

By Walter Prichard Eaton

I shall be one with these pines
Some happy day.
Dwarfed by the wind and molded by the snow,
They burst pink cones
In a meadow starred with violets.
No sound they hear
But the mountain wind,
The birdlike chirp of the ground squirrels,
The tinkle of ice-water brooks
Across the grass,
The far, soft thunder of outleaping streams
That glide like silver hair down dripping cliffs
From glaciers on the Great Divide—
The hair of *Melisande* grown white with peace.
All night I lay beneath the stars
And heard their breeze-borne thunder
I saw the sun
Blush on the glaciers while the world was dark,
Then pry the gloom out of the hole beneath;
I saw the golden violets
Nod in the rising breeze;
I drank from brooks of melting snow.
And said good-morning to a deer.
I shall be one with these pines
Some happy day.

The Old Trees and the Young

By Helen Foley

The forest leaves had turned to russet brown,
And the small cedars and the stump firs
Watched horrified,
And called to the oaks, moss-grown
"How long is't ere the spring and summer dim?"
The old trees shook their heads and, sighing, cried:
"We are so old we cannot count the years,
And Time is twisted in our every limb."

At night the winds and growing cold made wars;
Unto the elms whose crested head each rears
Against the stars,
The little birches sighed:
"Where is the sun, the birds that sang to him?"
The old trees shook their heads and, wailing, cried:
"We are so old we cannot count the years,
And Age is twisted in our every limb."

At last the young trees quiet grew, outworn,
And all the forest shed its silent tears;
Autumn's last warm day died.
Naked, forlorn,
The aspens shivered in the winter grim:
And the old trees bent their heads and, moaning, cried:
"We are so old we cannot count the years,
And Death is twisted in our every limb."

Germany doubled its Yield in a Generation.

Germany has for long spent 7,000,000 pounds sterling a year on its forests (or about 3,500,000 pounds sterling if we deduct the timber working), and it has got the yield doubled in a generation.

Hooverizing Tree Materials in England

How waste is cut to an almost irreducable minimum in the operations of the Canadian Forestry Corps in Great Britain and France is shown in the following report on the work of the corps received from overseas.

Every native Canadian of mature years has, in youth and after, observed the timber operations which form a striking part of the industrial life of Canada.

Everyone knows how the slabs were used for firewood and the sawdust scattered regardless over acres and acres of ground. With this knowledge to work on, one is in a position to intelligently appreciate the splendid work being done by the Canadian Forestry Corps in Great Britain and France. Economy and efficiency are characteristic of the Forestry Corps in a far greater measure than is generally realized in Canada. We are in the midst of the greatest war of all time. Working under the necessity of turning out huge quantities of material it might reasonably be expected that economy would go by the board in the hurried rush for production. This has not been the case. In spite of the imperative necessity for speed, the Canadian Forestry Corps are conserving material in a manner only practiced by the most modern peace-time mills in Canada.

Use Even the Bark.

In these military operations slabs are being cut into lumber until practically only the bark remains, and where practicable that is being used for tanning and in the production of wood alcohol used in manufacturing explosives. Short pieces and narrow pieces are sent to box factories to be made into boxes for munitions of war. The sawdust is the only fuel used to raise steam which provides power for driving machinery of the mill; the residue is used instead of straw for bedding horses. In fact, as already stated, all that remains of the original log is the bark, and it is seen that where feasible, even that is not wasted.

Men at Base Employed

With reference to the conservation and use of man-power, the same considerations hold good. A very good illustration of economy in timber, working in close relation with economy in man-power, is found at the Base Depot, Sunningdale. Here, timber which has passed maturity and has commenced to deteriorate, both as to beauty and utility, is being thinned out of the royal forest. This timber is saved by men who would otherwise be temporarily unemployed. For the base depot is a clearing house for the personnel of the corps. On arrival from Canada, men are held at the base depot, in quarantine, for two or more weeks. It is sometimes necessary to keep them for a longer period to complete their training. Men transferring from a unit which has completed its operations on one area, are sometimes held at the base depot for a short period. In various circumstances men are temporarily unemployed awaiting despatch to their units. These men are kept usefully employed.

Need Expert Surplus

Every employer of labor understands the necessity of keeping certain surplus labor to provide against the stoppage of machinery through exigences of operation. In private business the labor exchanges keep surplus labor tabulated so that requirements can be met and vacancies filled with the minimum loss of time. The base depot does this for the Forestry Corps. The fact that the men are mostly highly qualified experts, who can only be secured in Canada, which is 3,000 miles distant, makes the necessity of this arrangement abvious.

Base in Windsor Park.

The Forestry Corps established its base depot in the Royal Park at Windsor at the express invitation of His Majesty, King George the Fifth. The mill was set up at His Majesty's request and the trees to be cut down are designated by him.

The lumber secured is being used for building portable huts which are built in standardized sections. They can be easily transported and quickly erected. Four complete huts are turned out per day. There are also machines for making handles for technical tools used in the corps, such as axe-handles, cant-hook handles, etc.

The Canadian base depot is the only base depot where men who are awaiting further training or orders to report elsewhere, are occupied in constructive labor. What is most important is the fact that the base depot is typical of the corps.

"Petit Catechisme De la Foret"

Above is the title of a new sixteen page illustrated booklet which the Forestry Association is issuing for free distribution to French speaking children. The first edition will consist of 10,000 copies and will be followed by further editions.

An English edition will also be issued and given wide distribution.

The object of this booklet is to instruct the child of twelve to twenty years in some of the rudimentary points of forest protection. The adult reader has not been especially considered.

Following are some of the Questions for the Ontario booklet which are answered in the simplest form:

Who owns the Forests of Ontario?
What is the 'Government'?
Who are the Limit Holders?
Which is best, the Forest or the Farm?
How can I tell good and bad Land apart?
How big were the Forests in great-grandfather's Day?
How big are the Forests Today?
What is a Fire Ranger?
Can I be a Fire Ranger?
Tell me the Causes of Forest Fires.
Do Forest Fires cause much harm?
Will not Farms come when Forests go?
How do the Timber Lands make Ontario prosperous?

Forestry Societies in Other Lands

There are several forest societies in France:— "Societe des Amis des Arbres," etc.; there is the "Societe Centrale Forestiere de Belgique," with an extensive membership, and a useful monthly bulletin. There are six forest societies in England. The Danes have a moorland society doing practical work in planting up large areas of moorland. This society has planted something like 150,000 acres of moorland, the society getting a Government grant of some 20,000 pounds sterling yearly, and free transport for the marl and lime used in the moor planting. In the other European States, and in the United States of America, there are numerous forest societies. In Japan there are some 20 forest societies, with a special law, passed in 1907 for their recognition and governance; every private forest owner is compelled by law to belong to the local forest society of Japan.

BELGIUM'S SMALL FORESTS

Belgium is not one of the forest Countries of Europe. It is only recently that much attention has been given to Forestry; the total area of State-manged forest is only 430,000 acres. Yet Belgian Forestry, now gives winter employment to an average of 32,000 men, and permanent employment throughout the year to 750 men. At the same time it is computed that its forest expenditure is giving a return of between 4 per cent and 5 per cent. This high employment figure is due to the cost of much planting, now required in restoring the forests.

Heavy Losses in B. C. Forest Fires

(From "Pacific Coast Lumberman" Vancouver.)

For over a decade British Columbia has not experienced such a dry season as that of the spring and the early part of the summer of 1918. The last period of Sahra-like weather that touched this province was in 1907, when considerable damage was caused by forest fires, but that season pales into insignificance in comparison with that of the present year of grace. It was the banner year for drought, and has left behind a trail of destruction that has spelt ruin in many instances and that has, for the time being at least, thrown hundreds of men out of employment. With very few exceptions, there has not been a district in the entire province that escaped the flames caused, in some cases, through carelessness, and in others, if the statement of the District Forester is to be accepted—through sheer wantonness.

For weeks and months the woods and undergrowth were as dry as tinder. Only a spark was needed to set the country ablaze and unfortunately this spark was supplied too frequently. The big series of fires which followed has led to a condition of affairs that must be taken serious cognizance of by those who have the power of dealing with such matters with a view to preventing their repetition. Had it not been for the heavy rainfall that started on the evening of July 9, there is not the slightest doubt but that conditions would have been infinitely more serious. As it is, they are sufficient so to warrant the taking of measures that should, with strict enforcement, put a period to this indiscriminate destruction of the province's most valuable asset.

Much Damage Done.

It is impossible to give even a rough estimate of the amount of damage done by this series of fires. But it is safe in saying that the total will aggregate anything up to a million dollars. With a few exceptions every forest and bush district in B. C. has been partially or wholly devastated by the flames. This applies both to the mainland and the Island. Principal among the losses was that sustained by Bloedel, Welch, and Stewart, whose logging camp was almost completely destroyed, and the Eburne mills, which were entirely gutted.

Since the commencement of the spring and summer season, the series of outbreaks has continued to increase day after day until at the beginning of July the situation was such that the fire warden were unable to cope with it. In other words, there were insufficient and inadequate measures to handle the big task, with the result that an enormous stretch of timber and bush land has been laid waste. To some extent this could have been prevented if old style methods had been abandoned and more up-to-date plans followed that would have enabled the altogether too small band of fire-fighters to have dealt with the work in a more efficient manner.

The statement by District Forester A. C. Van Dusen, whose headquarters are at Vancouver, that there probably was malice in the start of some of these fires is one of which the most serious cognizance should be taken. Mr. Van Dusen stated that "there are some fires at any rate in which the causes are unknown, and it is possible they are being deliberately set." If this is so, then the most drastic measures are not too severe to handle a situation of this character. In support of his contention that incendiarism has played a prominent part in these fires, the fact that there are so many outbreaks simultaneously is significant, and it is a matter for the government to deal with promptly.

Attack Big Camp.

On the morning of July 1 three fires broke out simultaneously at

three different places. One of these was at Grief Point, about a mile and a half from the logging camp of Bloedel, Welch & Stewart, and the other two were slightly east of Powell River. That same night there was a strong breeze blowing, and it was as much as the employees at the camp could do to save the beach camp. But they did. The next morning the flames had reached the main camp, and cut the staff off from access with the other camps. In the afternoon of that day the Powell River outbreak travelling with some speed with the aid of a gale of wind, burned out the Bloedel, Welch & Stewart property in the twinkling of an eye. So rapid was its progress that the men had barely time to escape and some of them had to take to the creek to save their lives.

Some idea may be formed of the destructiveness of the outbreak when it is stated that, despite the fact that the district over which the flames travelled had been twice burned over this year, the fire was one of the fiercest that has been experienced in that locality for many years, Mr. F. C. Riley, manager of this company, told The Lumberman. As a result of this fire, which in some places traveled over two miles, the company lost all their camp cars on wheels, including the stock and fixtures, five other cars that were in the camp, three million feet of logs, principally fir, as well as some cedar. The work of reconstruction has, however, been started and tentative arrangements were made in the shape of a tent camp to go ahead about the 25th July, with operations in full swing. Within a few months, it is estimated a larger and better camp will spring up in keeping with the manner in which this firm conduct their business.

Ruin for many.

Apart from the bush fires, there is a long list of fires that in many cases has spelt ruin for sawmill owners, and the residents of the districts affected. Two of the most serious have already been mentioned. To these have to be added this season the McDonald mill at Fanny Bay, the loss at which

was in the neighborhood of $620,000; the Pearson Mill at Barnet, where the destruction wrought was something like $10,000. The Yarrow mills increased the amount by another $12,000, and the Apex mills at Cloverdale by $5,000.

Several thousand cords of shingle bolts were destroyed at the Campbell River Lumber Company's plant at Hall's Prairie and Pine Grove. Two thousand acres of lightly wooded country were swept in Columbia Valley in Cultus Lake district, flames in this region sweeping right across the international boundary. Between Powell River Townsite, and Powell Lake, one of the most serious fires raged for several days, threatening the mills of the Powell Lake Lumber Company and the Brooks-Bidlake Cedar Company. Here the obstacles in the path of the fire-wardens were of an almost insurmonntable nature, but despite these, good work was done with the means at their disposal. The International Timber Company's No. 4 camp at Campbell River was attacked with the result that five valuable logging engines were ruined and others had a narrow escape. It is estimated that the damage done there was approximately $75,000. As before stated, there is scarcely a region in the whole of the province, with the exception of Kamloops, Cranbrook, where rain fell, and Nelson, but has been the victim of the flames. And this applies also to Vancouver Island.

On the latter Courtenay was one of the greatest sufferers. No less than three outbreaks were raging at one and the same time. Camp 2 of the Comox Logging and Railway Company went up in flames and smoke, the Westholme Lumber Company's plant likewise suffered, a million feet of standing timber was razed near Courtenay, and the greatest difficulty was experienced in saving Mr. Berkeley Grieve's mill.

These are only a few of the most serious conflagrations during the season, in which the month of June contributed the greatest part. As a matter of fact, according to official statements, June of 1918 has established a record which could not be equalled again in this respect.

One of the strong chains between public sentiment in British Columbia and the forest conservation cause is the need for the regulation of stream flow, upon which so much of the fertility of the province depends. Deforestation has greatly aggravated conditions in the Kootenay Valley on the watershed of which about thirty per cent of the forest cover has been burned off. Reproduction, however, is most promising and is beginning already to act as a protective factor.

An interesting investigation is being developed by the Government of British Columbia for the reclamation of many thousands of acres of valuable lands now flooded each summer by the waters of Kootenay Lake. The soil thus rendered useless is capable of growing excellent crops.

B. C.'s Timber Stock Imperilled

To criticisms of the Forest Service by some British Columbia lumbermen who claimed that the facilities for fire protection were inadequate, Mr. P. Z. Caverhill, acting District Forester at Vancouver, retorted that British Columbia "has the most efficient forest protection service in the whole of the Dominion." In an interview in the Pacific Coast Lumberman, Mr. Caverhill made the following statements:

Peril to Coast Timber.

"There is no question that the probable increase in the demand for lumber after the war is going to make serious and heavy inroads on our supplies, and for that resaon I think this is a matter that should be taken into the most serious consideration by everyone concerned. This as you are aware, is the most destructive season from a fire standpoint that we have experienced in British Columbia for many years. Another few seasons like this, and it will mean that B.C.'s. greatest asset in the shape of timber would be greatly imperilled. But, with the means at our disposal and the effective steps we have taken to cope with the trouble, I do not think there is much danger of any further serious outbreak, at least this year. It is best, however, to be prepared, and with that idea in view, we are not neglecting any measures that we think will assist us in handling the situation should it arise."

"It has always been a debatable point," remarked the "Lumberman," "not only among the members of the trade, but also among the people of this province, not to say Canada, how long the cutting of the finest timber in B.C. can be carried on without there being any fear of a shortage." Mr. Caverhill's statement to "The Lumberman should set at rest all doubts that may exist on this subject. Some few years ago a survey was made of the timber limits in British Columbia by officials of the Dominion government. Their report to Ottawa stated that at that time there was 400,000,000,000 feet of merchantable timber in B.C. and that, said Mr. Caverhill, was altogether exclusive of the young timber.

Annual Rate of Cutting.

"Now if you consider that at the utmost, we are cutting at the rate of from a billion and a half to a billion and three-quarters annually, you will easily see the tremendous reserves we have before we touch the last tree trunk in this coast province. Even with the abnormally heavy logging that is being done at the present time in view of the demand for aeroplane spruce and other timbers for war purposes, the supply of timber in British Columbia is practically inexhaustible. So that I may say, we have a supply in sight that will last for over two hundred years more.

"And besides that," he continued, "there is the abnormal increment which is at the rate of about 6,000,000,000 feet every twelve months. This is entirely separate from the young trees and also distinct from the timber that is considered now to be inaccessible but which in the next century or even less, with improved methods of transportation, will be easily accessible. There is, therefore, not the slightest cause for anxiety on that score. I wish, however, at the same time to impress on everyone the necessity that there is for conservation in every shape and form. Naturally this comes mostly under the head of fire protection, and it is noticeable that while we have had so many serious fires this season, there is a disposition on the part of the campers and loggers and everyone whose business takes them to the woods, to more rigidly observe the laws that have been laid down."

The total initial cost of the new Forest Producers Laboratories at Vancouver, will be $20,000, of which the Dominion government will contribute $15,500, and the Provincial Government the balance.

(*Continued from Page 1840*)

factor in which we believe the north has the advantage. The matter therefore stands thus: the southern part of the province has few trees and a light harvest, the northern portion more trees and a heavier harvest. If then we are right in drawing conclusions from this it would certainly be a good investment to carry out the suggestion of Dr. Andrews to plant every road in the province with trees.

During the present summer, large numbers of farmers have lost their crops through the drifting of the soil, due to want of protection from the winds. These dry up the moisture and uncover the roots of the crops, which then are in danger of being burned up by the rays of the sun. On the other hand, trees attract moisture and protect the fields, and may therefore have an enormous effect in a dry summer such as the present. If the land is protected by trees it will warm up earlier in the day, and will stay warm longer at nights and the moisture in the soils would not, as now, be blown miles away. The trees would also protect the fields from snow in winter, and would thus facilitate spring plowing by enabling farmers to get earlier on the land.

From an aesthetic point of view, the matter is of the utmost importance One of the first things that strikes a person out from the old land is the bareness of the prairies. What an enormous effect it would have on the appearance of the country if well planted, and how grateful would be the protection from the rays of the sun.

It has to be confessed that a vast number of our people look more on the material side than on the aesthetic, and to these the prospect of better crops will surely appeal. From whatever side we may view the question, however, the planting of trees must be an immense advantage.

CORRECTION.

Under the heading of "Forest Legislation in Canada" in the July issue of the Canadian Forestry Journal, a reference was made to the increase of ground rent for Quebec Limit holders from "five dollars per acre to six dollars and fifty cents." Obviously, this ought to have been printed "per square mile."

It is computed that there are 70 million sleepers in use on the railways of Canada, of which 10 millions must be replaced annually. By creosoting it is estimated that a saving would be effected of five million sleepers per annum, equal to 350 millions of board feet of timber, as measured in the round log.

A B C DIRECTORY AND YEAR BOOK OF LUMBER TRADE OF B. C. CLOTH. 136 PP

Progress Publishing Co., Ltd., Vancouver-$2.00

The 1918 Edition of the "A B C Lumber Trade Directory of British Columbia," just off the press, is a valuable addition to the desk of the business man.

The directory section of the book contains an alphabetical list of every lumber and shingle mill in British Columbia with details of the management, capital, date of establishment, products, and capacity of the plant; a classified list of firms manufacturing various commodities in the lumber industry; an up-to-date list of the logging operators throughout the province; lists of timber cruisers, log brokers, lumber wholesalers, towing companies, and similar information.

A second section of the book, of particular interest to the lumber industry, gives details of the customs tariffs of various countries.

Another section gives the full text of all the legislation dealing with the lumber industry in British Columbia.

Another section gives a mass of technical and statistical information regarding the various woods of B.C. showing their strength, values, volume tables, and other information of that nature.

There is also a complete table showing the fees and royalties payable for the various licenses and leases, and information regarding timber marks and log marks.

A useful Buyers' Guide is included in the book, being a directory of mill and camp supply houses which should prove of use to lumbermen.

Every day that we Canadians tolerate wanton destruction of our natural resources, we tolerate a form of internal mischief that plays directly into the hands of the enemy.

Rabbits as a Business.

Rabbit growing enterprises are reported from various parts of the country, the animals being raised both for fur and meat.

A California company is to establish a large fur-rabbit farm and pack the meat as tin potted hare.

Business men of Hamilton, Canada, have taken over a fur-rabbit farm and will raise Siberian rabbits for fur and meat. This latter species is said to be comparatively new to Canada. It sometimes reaches a weight of 14 pounds is black in color, grows very quickly and one doe will produce about 100 young in eight months. The meat can be produced at 5 cents a pound, it is said, and the pelts are of very good quality for rabbit fur.

Uncle Sam is looking into the wild Western jackrabbit, which is killed by millions every year as a pest by farmers. It is maintained by the Department of Agriculture that jackrabbit meat is good game when fresh and that the hams, when corned and smoked, will compare well with German goose hams.

An Open Letter to Members!

To take up a gun—
—and get into step—
—and drill and march—

is one way, and a great way, of doing Canada a service.

But when a busy man—
—quietly turns to his neighbor—
—and says: "Join the Forestry Association"

He is doing a patriot's work in direct support of the man with the gun.

Hundreds of our members the last month or so, have gone to a little trouble to recruit a new supporter of the Forest Conservation Movement.

And hundreds haven't.

They have said, "I haven't time," little knowing that the Canadian Forestry Association gets most members from the rushed-to-death executive, the business man whose minutes are worth dollars.

We ask you to score a New Member to your credit in Sept. As a special inducement we will mark his membership and subscription paid up until December 31st, 1919.

BUT, to be a member of the Association means far more than subscription to the Forestry Journal. The latter is an incidental to membership, but we intend to make it a more attractive incidental during the remainder of the year.

Canadian Forestry Association

Booth Building, Ottawa.

Not affiliated with any government or commercial interest.

How About Operators?

Prospective users of wireless usually ask us: "But what about operators? Aren't they hard to get?"

The answer is: "Not if you use C & W apparatus."

The old style sets, with their high voltage, low factor of safety and numerous critical adjustments, could be operated only by an expert, with a specialized training,—and such men are hard to get.

But C & W sets have a voltage of only 200 volts as against from 8,000 to 20,000 volts in the old style sets, a factor of safety of ten as against one and a half, and no critical adjustments. These factors make a set so simple, rugged, reliable and easy to operate that anyone who knows the code can operate C & W sets and keep them in operation—and learning the code is a simple matter taking from four to six weeks. If C & W sets are installed in your forests, your wardens can operate them after a short training.

No C & W set has ever broken down in service; the initial cost of a C & W set is about one quarter that of other sets on the market; the upkeep costs are almost negligible; and you can always get operators for C & W sets among your own men.

May we help you solve your problem? Details and expert advice from our engineers upon request.

Cutting & Washington, Inc.

1083 Little Building - BOSTON, Mass.