THE FOREST DISEASE SITUATION[1]

IN THE PACIFIC NORTHWEST

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Introduction

To sum up accurately the forest disease situation in an area such as the Pacific Northwest is a task requiring the use of the fabulous seven league boots in covering the territory and a magical "nose" for scenting out the incipient attacks of newly introduced or epidemic types of disease hidden in almost inaccessible places. Lacking these necessities, however, a reasonably accurate analysis of the situation based on our present knowledge may be made. And as the subject develops you may find much that discloses a distinctly optimistic trend in our forest disease and wood disease situation.

Tree diseases, measured by the total damage, produce a less spectacular effect than most of the types of damage, such as those resulting from fire, insect attack or windthrow. While fire eats its way rapidly through a stand and in its wake leaves an annual loss of startling proportions, yet the control of fire is primarily concerned with keeping the loss at a minimum and, unlike certain tree diseases, there is little danger of the complete destruction of a species of valuable timber over its entire range. If the blister rust or similar agency should gain the upper hand in the struggle for forest protection, our western white pine forests would virtually be doomed.

The West has not been asleep, however, and I wish to summarize briefly the progress made in fighting blister rust and other diseases which either

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[1] Presented before the Western Forestry and Conservation Association, March 3, 1930, Portland, Oregon.

threaten our stands of timber or are working slowly, taking their annual toll of our valuable forest capital.

Fortunately, under our present methods of forest management, the economically important forest tree diseases are not very numerous. With the rapid establishment of intensive forest practices and in step with the disappearing virgin stands, we will find this list increasing. At this stage of our forestry practice the most important diseases may be classed under three heads: 1) the killing diseases of living trees, such as those caused by parasitic fungi (Blister rust, chestnut blight, larch canker); 2) decay or stain producing diseases, such as heartrots, storage rots, decay of wood products and sap stain; 3) diseases of living trees caused by the dwarf mistletoes.

All the work that the forester and scientist accomplish in the study of tree diseases is ultimately crystallized into control methods which must meet the practical operations of growing and harvesting the timber crop. We are faced with the triple problem of 1) preserving the present merchantable stand from further loss before harvesting; 2) providing for reproduction on all cut-over areas; and 3) applying forest management to the stands of the future. In all three of these problems the question of protection against disease demands an answer in practical terms. No better example of this can be found than the present-day control methods developed in the fight against the blister rust fungus in the West.

Blister Rust Control

Since blister rust needs two types of plants, the pine and the Ribes bush, in order to complete its life cycle, the control of this disease has been centered upon the destruction of the Ribes plants.

The disease has been spreading steadily in the Pacific Northwest region since 1910 and today we find it established, temporarily at least, in the

white pine stands of Idaho. During 1929 an extensive center of pine infection was discovered near Elk River, Idaho. This area covers about 60 acres of young and valuable timber. During the year numerous infections on Ribes were found scattered throughout the white pine belt, extending to its southern limit in the Clearwater river region. In general, it may be said that, potentially, the white pine belt in Idaho is infected with the rust.

Although an invasion has occurred, the counter-attack has already begun and in 1929 we find that 21,500 acres of timber land in the Clearwater region and 57,010 acres of timber land in the Potlatch region of Idaho have already been protected by the large-scale application of the chemical eradication method to the Ribes plants growing along the streams, supplemented by a certain amount of eradication by hand pulling the bushes. Such a statement merely presents the results in concrete form and in no way gives a picture of the immense amount of work involved in the development of the methods now in use.

Through research, the Blister Rust Office has discovered a chemical which when sprayed on the leaves kills certain Ribes bushes outright, and work is now in progress to develop additional chemicals which will accomplish a similar result with the other species of Ribes. Contrary to common opinion, all of this work is not of the sheltered laboratory type. A great amount ~~of~~ it involves roughing it in the mountains so that practical tests may be made in the timbered areas. Problems of transportation; building of trails; development of methods to carry large quantities of chemicals and equipment into remote places; the best designs and layout for the spraying lines, and for portable pumps; methods of laying out the area before work commences;and methods of checking the work to determine its efficiency have all been met and satisfactorily solved by the blister rust workers. A type of one-man, portable knapsack sprayer mounted on a modified Nelson trapper board with a

hand-pump attached has been developed for use in regions where power spraying by means of gasoline pumps is impracticable. These improvements and discoveries coupled with the development of more efficient methods of handling eradication crews in the most difficult terrain increases our confidence in the belief that the control methods when properly applied will check the disease. To complete a hopeful picture it is found that these same improvements and discoveries are gradually lowering the cost of eradication and bringing it within reasonable limits. Where the estimated cost of control on an experimental basis in 1922 near Elk River was around $1.44 per acre, the actual cost in 1929 of chemical eradication on an average area such as the Potlatch operation was but 53 cents per acre. Both of these areas represent the stream type of eradication containing large quantities of highly susceptible Ribes.

There is additional cause for optimism in the theory recently developed that selective cutting of timbered areas discourages the development of certain Ribes plants on those areas. The residual stand if dense enough may thus help to shade out ambitious Ribes plants and may also aid in reducing the fire hazard. To complete the picture, the next field season will open with an increased budget available for use in greatly extending the amount of local control work which will be applied to the white pine forests of Idaho. Much of this increase is chargeable to the excellent cooperation of the Californians who realized Idaho's emergency and were willing to join us in fighting the common foe.

The Larch Canker

Good news has reached us this year through the statements made recently by Dr. H. Metcalf of the Office of Forest Pathology. It will be recalled that much concern was expressed last year by Pacific Coast foresters and lumbermen over the possible introduction of the larch canker disease into the magnificent stands of Douglas fir timber. You will also recall that this disease had been

introduced into this country from Europe where it has made the growing of larch almost impossible. This disease gained a foothold in Massachusetts and Rhode Island on planted Douglas firs and other conifers and was causing serious damage. Vigorous action on the part of Federal and state agencies resulted in an intensive campaign of scouting and eradication with the result that two to three thousand infected trees have been destroyed and a network of scouts thrown out to discover any new infections. With such speedy removal of infected trees and the careful inspection of the remaining susceptible conifers in the infected and adjoining zones, there is little likelihood of the disease spreading. A warning must be sounded, however to guard against the chance introduction into the Pacific Coast forests of shipments of conifer stock from the eastern part of the United States where the disease may still be prevalent and difficult to detect. Such a loophole as this one presented us with the blister rust and it is just such loopholes that quarantine regulations are efficient in plugging.

Winter Injury

Turning now from the parasitic type of disease to a type which is produced by abnormal weather conditions, we find much to interest the holder of timber or the forester operating in the Pacific Northwest region. It has often been stated that a man may not see the forest because of the trees. Those of us who are very close to the forests frequently do not see and interpret all the changes taking place therein.

During 1924 to 1930, there are on record certain years in which various types of winter injury have been quite common in the coniferous forests. These types of injury are characterized mainly by the reddish discoloration of the foliage over the entire tree or on the southerly side of the crown. Again it may express itself by the discoloration and death of the tops of young trees exposed above the snow line. The first type, known as "red belt", injures a large number of trees by retarding their growth, but is most cases new needles develop and the trees recover. In the second type, known as

"sun scorch", the tops are killed due to a rapid thaw in the presence of sunlight, and the tree assumes a scrubby dwarfed shape. These types of injury are widespread in years when weather conditions favor such diseases, and we find that, in general, rapid thawing accompanied by bright sunlight or warm winds, following low winter temperatures are responsible for the damage. In 1929 widespread injury, due to sun scorch, extending from British Columbia through Washington, Idaho, and Montana, was common on exposed young trees of the various species of conifers. In 1924-1925 the red belt type of disease was common over a similar area.

In red belt there is usually a more uniform discoloration of trees over a large area. The trees frequently show signs of having been killed but under careful observation it is noted that most of them develop new needles and soon recover.

Although the above emphasizes caution in developing an alarmist attitude toward tree diseases and the resulting losses, yet a certain amount of over-anxiety is sometimes of value. It is this sense which may some day save us a great deal of post mortem grief by preventing the introduction and development of potentially damaging diseases. There are certain parasitic needle, branch and trunk diseases which must be watched from year to year. Some of these have been brought to your attention by foresters and pathologists familiar with our western situation.

The mistletoe disease is, fortunately, one easily controlled on logging areas or near nurseries, since the cutting of the infected tree kills the mistletoe plant and prevents further spread of the disease from that particular source. This, as you know, is not the case with heartrots and the numerous diseases caused by fungi. In many cases a greater spread of the disease is brought about by cutting down a heart rotted tree and leaving it upon the moist and shaded ground where numerous conks may develop, produce thousands of spores which act as sources for new infections in the neighboring stand.

The Problem of Decay in Wood

Since forest pathology also includes wood pathology or a study of the causes and control of the deterioration of wood by organic agencies, I see no good reason why a few statements on this subject would not be of interest to foresters and lumbermen, particularly since these observations may contain additional justification for an optimistic outlook.

The decay of standing timber, as well as the decay and stain of wood products in storage or in use, are problems which should draw the attention of lumbermen at a time when the prevention of such waste would mean much in this year of "cafeteria prosperity", a year in which the business man must "go and get it". Much has been accomplished by studies of the heart-rot diseases of trees, by investigations into the cause and control of blue stain and by studies on the cause and control of decay in wood products. In some cases forest sanitation can be brought about by certain methods of forest management, but as our virgin stands disappear, shorter cutting cycles become the rule and more and more products are made from young trees of relatively small size, we will find that pathological cutting cycles will eventually eliminate a large amount of the heartrot losses. The step from lumber to derived products and to synthetic products from wood pulp is not great and the future will see lumber and other wood products manufactured from pulp obtained from small trees and young stands. A stand cut in its youth has developed little heartrot and no fungous fruiting bodies. It, therefore, leaves no great legacy of disease to the oncoming stand and suffers but slightly from cull due to decay. But a stand cut in its later years carries with it an accumulation of heartrot and of conks which in turn spread infection to the oncoming forest. The financial risk of carrying a stand of timber 40 to 60 years when contrasted with the risk of carrying it 100 or more years leaves but one choice - favoring the shorter cutting cycle.

Wood preservation and sanitary measures are rapidly developing protection against decay of wood products and the study of blue stain in wood has yielded

many new facts of value in the prevention of blue stain as well as in the utilization of blued lumber. Many of the fallacies which have caused us to ignore or discard useful wood products are rapidly disappearing before the new light of careful investigation.

We can well afford to examine the developments in other industries, borrow a page from the industrial chemist's notebook and begin to apply some of the newer ideas of utilization to the forest and its products. For many years chemists and bacteriologists have put their heads together and evolved simple, economical chemical processes in which some organism was used to produce a valuable chemical or by-product from a mass of raw material. I have traced down more than fifteen such processes ranging from the manufacture of alcohol, acetic acid, gallic acid, the retting of flax, down to the production of ensilage on the farm. Through the use of tiny organisms powdered wood may now be converted into commercial lactic and acetic acid. What is to prevent the development of such an idea applied to our present problems? Why not use some of our wood rotting and staining organisms to advantage, turn the tables on them, and train them to produce some useful product from our unused wood? There is more than a mere suggestion in this statement - it is a hopeful possibility.

No really great industry has yet failed to make progress when it placed its faith in constructive research, and I firmly believe the lumber industry will be no exception.