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**RELATIVE MERITS OF
WESTERN LARCH AND DOUGLAS FIR
IN THE BLUE MOUNTAINS, OREGON**

BY

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THE RELATIVE MERITS OF WESTERN LARCH AND DOUGLAS FIR IN THE BLUE MOUNTAINS, OREGON.

This report deals with Douglas fir and Western larch as they occur in the Blue Mountains of Eastern Oregon, especially in the Umatilla and Whitman National Forests. In this locality, they are the two trees next in commercial importance to Yellow pine.

They each possess merits which are lacking in the other, and each reacts differently under different conditions so that a study of the two species dealing with their relative merits involves many complications. Public opinion also differs very greatly concerning the two species. The older mill men in Eastern Oregon consider these species very inferior and often leave them in the woods, taking out only pine. But it is certain that in time these species will become more valuable as the pine decreases in quantity, just as the hemlock and hardwoods left by the pioneer lumbermen in Michigan are now eagerly sought by the modern lumberman. Special uses have been found for nearly all varieties of wood, and by careful methods of manufacture the one time inferior material has been found to give excellent satisfaction. It is believed that some such history may be repeated in the case of Douglas fir and Western larch, towards which at the present time there is felt much popular prejudice in Oregon.

The reason for this prejudice is not that the wood of these species is bad but that the wood of the Yellow pine, which is abundant, is exceptionally good in quality. Until the supply of Yellow pine is reduced through consumption, larch and Douglas fir will not come into general use. It may be taken as a point in favor of these species that the opinions of mill men differ very widely regarding their faults. Rarely do two men agree as to the technical qualities of the two woods, whether good or bad.

Technical Qualities of Larch: Larch possesses a wood of great strength and durability in contact with the soil. It has considerable beauty, having a dark reddish heart and almost white sap wood. The grain of the wood is coarse and close and the wood is very heavy.

The uses to which the wood is put at the present time are restricted almost entirely to poles, posts, ties, rails, shakes, etc., and about all that is cut in Oregon is used locally on nearby ranches, farms and telephone lines, very little being shipped away to any great distance. The size of the tree in the Blue Mountains makes it particularly well adapted to the use of poles and posts. In the region of its optimum development in Western Montana the tree is characteristically thought of as large, but in the Blue Mountains it is usually a tree of small or medium size. Here it occurs usually in one of three types. The north slope type, where it attains its greatest size, is the most important. Here the tree usually occurs scatteringly in combination with a great variety of other species. The next most important type is the upland type where it occurs in combination with Lodgepole. In the third, or Yellow pine type, it forms an inconsiderable part of the stand, occurring only as scattering trees. Of course, these types frequently grade into one another. The north slope type produces trees typically 18" to 36" DBH, occurring very much scattered among a great variety of other species. The trees develop good form but, so far, have been used for very little else than locally for shakes and rails.

In the upland type, larch sometimes occurs in nearly pure stands, the trees averaging 10 to 16 inches on the stump and standing quite close together. Such stands would undoubtedly occur oftener if Lodgepole were not somewhat quicker to take advantage of burned over areas and get started sooner. When the two species get an even start, larch is usually able to hold its own in spite of the greater tolerance of the Lodgepole, due to its quicker growth. It seems probable that its most popular use in this type for a long time to come at least, will remain the same as at present, i.e. for use in the round. Considering the great number of telephone poles used annually, this alone would be no mean item. For example: in the year 1909, according to Forest Products Bulletin No. 9, Department of Commerce and Labor, Bureau of the Census, a total for all species of trees in the United States of 3,738,740 poles were used. It is safe to say that these figures amount now to at least 4,000,000 poles annually. Assuming that the average life of a pole is twelve years, and that it requires at least seventy-two years to grow such a pole, there should be six poles growing for every one in use, or 24,000,000 poles for renewal merely, besides what the extension of business would require. In the general riot of the natural forest, many thousands of acres are required to grow this number of poles. It is impossible to even guess at the number with any certainty. Under management, it would be possible to grow 150 larch poles to the acre. It would then require 160,000 acres to supply the demand for the maintenance of the present electrical transmission lines.

In this same report, Bulletin No. 9, larch ranked seventh with 29,889 poles, and Douglas fir eighth with 24,877 poles. Undoubtedly, the use of larch and Douglas fir for poles will increase greatly within the next few years as the supply of cedar, chestnut and oak decreases and as new parts of the west are opened up to settlement, producing an ever increasing demand for nearby material of the proper sort.

Larch growing in the north slope type forms an unimportant part of the stand. It is occasionally cut, when Yellow pine with which it is growing is cut, but is never sought except for shakes and rails.

Faults of Larch Wood: In the Blue Mountains lumber is generally manufactured in small mills in a very haphazard manner. One of the most prevalent ideas concerning larch is that it warps and twists badly on seasoning. It seems undoubtedly true that this is the case where the green lumber is not piled carefully and allowed to become thoroughly dry before removing from the pile but, once dry, it seems probable that larch does not show this defect in such a marked degree at least. Where the mills are small and the output 10,000 feet per day or less, as is usually the case, lumber is used about as soon as sawed, so that if a wood possessed any tendency to warp it would be given ample opportunity to do so. Of course, larch wood used in the round or as ties, shakes, or rails would not warp. It is only when sawed into lumber that this fault is laid to larch, and this difficulty it will certainly be possible to overcome by careful handling. In this way, the occasional large tree occurring on the north slope type will obtain a real market value instead of being considered only of use for shakes and rails which, after all, utilizes rarely more than the butt log. As an interior finishing wood larch will never prove satisfactory, being liable in boards to season crack.

The quantitative amount of merchantable material yielded by larch is always very high in proportion to the diameter and height of the tree. The crown is usually short and limbs short, small and scant. The problem of brush disposal in a larch stand is easier than in the case of any other species. Construction timbers are never materially weakened due to the prevalence of knots, as the knots are too small to be of importance in this regard.

Longevity: Larch is fastidious in its soil requirement. To reach large size, i.e. above 18" DBH, it must have a deep moist soil. On dry soils, however, it reaches pole, post and tie size in from 70 to 80 years, and could undoubtedly do much better than this, as is shown by the growth of individual trees which have through accident to their neighbors, received light and room such as would be accorded them were they growing under management.

Larch reaches an age in Montana of 600 to 700 years, but in the Blue Mountains the maximum age is much less, probably very rarely over 400 years. The average age is also much less in the Blue Mountains than in Montana.

Natural Enemies: Larch is singularly free from insect attack, and fungus attack except in the oldest trees is rare. The most common fungus appears at present to be *Trametes pini*. Fire rarely injures the old trees, due to the great thickness of the bark, unless frequently repeated and the wood, after the bark has been burned through, does not burn with nearly the readiness of pine under similar circumstances. Larch has a deep root system and is rarely thrown by the wind. On the whole, larch is singularly fortunate in the means of protection against the natural enemies of forest trees which it possesses.

Management: Larch is a prolific seed bearer but usually is not able to compete with Lodgepole in this regard. Lodgepole will usually get the jump on larch where an area has been opened up by fire. The seed require a greater amount of moisture for germination than Lodgepole and the seedlings as well as the grown trees are more exacting in their soil requirements. For this reason Lodgepole has the advantage on poor soils.

Stands of pure larch never produce a pure stand in the second generation unless through some physical accident. Larch is too intolerant to reproduce in sufficient abundance even under the light shade of old trees of its own species. Lodgepole and the various fir and spruce will form the greater bulk in the succeeding stand with larches occurring only here and there.

In lumbering in larch where it is desired to obtain larch reproduction, it will be necessary to cut clean in order to allow all the light possible to reach the ground. It will be especially necessary to cut all Lodgepole seed trees on the upland type as this is here the tree which is the chief competitor of larch in establishing reproduction. Larch reproduction is most successful on a mineral soil which has been exposed by fire.

Technical Qualities of Douglas Fir Wood: The Blue Mountain variety of Douglas fir, with which we are alone concerned in this report, has a lighter wood than larch and is not as durable or strong. It is coarse grained and brash and often resembles hard pine more than it does its western variety on the Coast.

It is not as easily seasoned as pine but is much more so than larch, and it can be sawed up into all forms of boards and lumber without fear of excessive warping or cracking. For construction lumber it is better than pine, being stronger, and better than larch, being less liable to twist in seasoning. Although less durable than larch, it absorbs preservatives more readily. It is not as well adapted for poles and posts as larch, having a greater taper and being weaker and less durable. It is more extensively used for cross arms in telephone line construction than any other wood. In 1909, 1,720,247 Douglas fir cross arms were used out of a total in the United States of 3,508,695. Practically no larch was used for this purpose. Douglas fir is not as well adapted for ties as is larch, being softer and less durable, nor for shakes being less durable and more difficult to split. It is, however, said locally that in very wet situations, or where the posts

are to be set in water, that fir will outlast larch. Douglas fir is more difficult to work than pine, which seems to be the chief reason why it is not used to a greater extent.

Types: By far, the greater part of Douglas fir occurs in the north slope type in combination with other firs. Here it reaches its best size and form. More or less scatteringly it occurs in all of the forest types except in the driest and most unfavorable of the yellow pine sites. Douglas fir is less exacting in its soil and moisture requirements than larch, and it ranks next to Yellow pine in its ability to survive unfavorable conditions. At least this is the case in the Blue Mountains. In the Deschutes country, however, lodgepole is apparently more hardy than any other species of tree with Yellow pine second.

The quantitative amount of high class lumber in Douglas fir is very low. The tree is characterized by having a very great taper and the limbs are very persistent, usually clothing the tree nearly to the ground. The excessive taper of the trunk results in a great deal of waste at the mill in squaring up the logs. Because of the great number of knots, there is very little high grade lumber in the majority of the Douglas fir cut east of the Cascade Mountains.

Resistance: Douglas fir is very rarely attacked by fungus when under 100 to 150 years old. Old trees are quite subject to insect and fungus attack. Frequently mistletoe injures the tree seriously. This is at present killing many of the mature and overmature trees on the Umatilla National Forest. Young trees are very easily killed by fire due to the pitch blisters on the stem. After the trees have passed the pole stage, the blisters no longer appear and the bark becomes rapidly thicker and very fire resistant.

Douglas fir is typical of the north slopes where it obtains its best size and form. It is also found growing with Yellow pine where it is comparatively short and bushy. Although not as exacting as larch, it yet requires a moist, deep, loamy soil in order to reach good development.

Management: Douglas fir is a good seed producer. The seeds have a high per cent of fertility. They prefer a moist mineral soil on which to germinate. Where the ground is dry and covered with grass, such as in the open Yellow pine stands, reproduction of Douglas fir is precarious. The seed is too easily dried out and, being light, has difficulty in getting to the soil. Yellow pine will, under similar conditions, reproduce abundantly. The reproduction of larch on such sites is even more difficult of establishment. However, as neither larch nor Douglas fir are desired on these sites the fact is of interest only from a silvicultural point of view.

Douglas fir in Eastern Oregon never forms pure stands of large extent as is the case west of the Cascades. It is always found in combination with white or grand fir, larch and spruce. White and grand firs are more tolerant than either larch or Douglas fir and they generally compose the greater portion of the timber of the north slopes. As no big use has been found so far to which these firs can be put, a method of management should in future be used which will prevent their appearance in succeeding north slope stands. This can only be accomplished by clear cutting all species and leaving only seed trees of Douglas fir and larch. Probably neither of these species should be favored over the other as they possess individual qualities which makes each valuable for particular uses.

Unfortunately, most of the north slope types are so decadent that it will probably be many years before there will be any inducement to log them. If it should ever become possible for the Forest Service to operate its own mills, these slopes might then be logged off and be prepared for raising crops of timber of good quality and volume. The rate of annual growth and total volume

of a stand of larch and Douglas fir on a north slope would far exceed anything that could be grown on a south slope, although under present conditions the south slopes are covered with the heavier stands.

Growth: In order to obtain an idea of the rate of diameter growth of larch and Douglas fir, the stumps of a few trees were analysed. The stumps were chosen from a typical north slope type where larch and Douglas fir formed at least eighty per cent of the stand and were in about the same proportion in the stand. The measurements of only a few trees of each species were obtained, but it is believed that these few examples will prove typical for this locality as only young or medium aged, representative trees were chosen for analysis.

The stump analysis data obtained in the field has been combined and evened off on a curve, based on diameter and age. These curves are shown on *{the diagram}*. Several points of difference may be noted in the manner of growth of Douglas fir and larch by referring to these curves. Larch shows a convex curve being an intolerant tree. It also shows a greater rapidity of growth than Douglas fir for most of its life. Douglas fir being a fairly tolerant tree, especially when growing on moist slopes, has a concave curve the same as spruce growing under similar conditions. Douglas fir can survive a period of considerable suppression in its youth, whereas larch, under like conditions, will be killed off. If larch can not receive enough light in order to make good growth it dies, but Douglas fir will survive if the shade is not too dense, until an accident to some of the old trees causes an opening in the crown cover, which gives it an opportunity to proceed more rapidly with its development.

At about 240 years the curves of Douglas fir and larch are seen to cross. The Douglas fir has caught up with the larch. This is due to the fact that Douglas fir will tolerate more suppression in youth than larch. Douglas fir, which were in their youth suppressed, have thus been included in the curve, whereas, larch trees which were at any time badly suppressed were killed out in early youth and so have not been included in the curve. Nevertheless, it is undoubtedly true that larch for the first 150 years of its life at least is naturally a faster grower than Douglas fir.

Yield: It is difficult to obtain even an empirical yield from observing north slope stands in which Douglas fir and larch, or both, occur as the dominant species. Such stands are nearly always decadent and badly damaged by fire, wind, insects and fungi, and support not more than a fifth or tenth of the possible stand. The average stand of timber in the north slope type on the Umatilla National Forest is below 5,000 feet. Under management these same trees would easily be expected to produce 50,000 feet in a rotation of 180 years. The North slopes will be capable, under management, of supporting much heavier stands than the south slopes will ever be able to support. In the upland type, composed of larch and lodgepole, it will be possible to grow 150 poles to the acre under management. At present, all the way from nothing to three hundred poles are found growing on this type.

Summary.

In summary, it may be said that Douglas fir and larch are the two trees next to Yellow pine in commercial importance in the Blue Mountains, and each is valuable in itself for particular qualities in which the other species is either weak or wanting. Although inferior to Yellow pine for general uses they yet, for particular uses, are better adapted than Yellow pine and it is certain that they have been frequently maligned out of proportion to their actual faults.

On north slopes where Douglas fir and larch occur in greatest abundance, a long rotation period should be allowed and Douglas fir should be favored somewhat over larch. The object should here be to grow timber of saw log sizes. Where each occurs in combination with Lodgepole at high and frosty elevations, the rotation should be shorter with the idea of growing timber that will be used in the round. Most of the timber will be used within a radius of not more than 100 miles and the separate operations dealing with it will be of small size but there will be many of them. The north slopes are at present understocked and nearly hopeless from a logging point of view but could be made to grow, under management, an amount of timber greater than the south slopes and typical Yellow pine types, from which practically all of the timber is cut at the present time.

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