Lodgepole Pine

Forest Service
U. S. DEPARTMENT OF AGRICULTURE

LODGEPOLE PINE

(*Pinus contorta* var. *latifolia*)

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Lodgepole pine is a small to medium-sized, slow-growing tree with a straight, slim trunk. It has a wide distribution in the western part of the United States, largely in the mountainous regions. The commercial range is restricted to portions of the Rocky Mountain States where the wood is used mostly for rough construction lumber, mine timbers, railroad ties, and poles. The lodgepole forests along the eastern side of the Rocky Mountains are an important source of ties for the nearby railroads, partly because of the comparative scarcity of other suitable woods in the region. In other parts of its range, lodgepole pine is less important commercially because of the availability of more valuable timber trees.[1]

In addition to their commercial value, lodgepole pine forests are of marked importance as protective cover on watersheds. The tree is able to survive for long periods where it is crowded or shaded and then to recover and make increased growth if conditions are improved. Lodgepole pine often replaces other species within its range in the Rocky Mountain region largely because the seed, which is held in tightly closed cones, survives fires which destroy both seed and trees of other species. On the other hand, fire is important in the destruction of lodgepole pine forests.

Nomenclature.—Lodgepole pine is the name commonly used. Names occasionally used are knotty pine, tamarack, black pine, spruce pine, and jack pine.

Distribution and growth.—Lodgepole pine grows in southern Alaska, western Canada, and western United States. In the United States its range includes the Rocky Mountain region as far south as New Mexico and northern Utah, and also Washington, Oregon, and California (see fig. 1). It can grow in a variety of soils, but must have some soil moisture and considerable sunlight for satisfactory development. It requires less warmth than ponderosa pine, and often occupies a higher altitudinal belt in the mountains than that species. Throughout much of its range in the United States, especially in the Rocky Mountain region, lodgepole pine grows in pure, dense stands and develops a straight, slender trunk free of limbs and topped with a small crown. In the Pacific Coast States many stands are rather open and the trees limby. In typical fully stocked stands in Montana lodgepole pine reaches a diameter of 0.4 of an inch and a height of 3 feet in 10 years and a diameter of 3.8 inches and a height of 33 feet in 50 years. At an age of 140 years, such stands contain trees from

[1] The lodgepole pine that grows along the Pacific coast, more correctly known as shore pine, is *Pinus contorta* of which the true lodgepole pine of the Rocky Mountains (*Pinus contorta* var. *latifolia*) is a variety. Shore pine is commonly a small, stunted, scrubby tree of little commercial value.

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8 to 14 inches in diameter and are considered mature. Fire plays an important part in the establishment of lodgepole pine forests and in their destruction. Fire opens the seed cones which otherwise may remain sealed for many years and makes available an accumulated seed production. It prepares a favorable seedbed by exposing the mineral soil, and also partially removes the ground cover and allows the seedlings to receive the direct light which they must have. On the other hand, lodgepole is easily killed by fire, especially the dense, young stands, on account of its thin bark. At intervals the tree suffers

FIGURE 1.—Range of lodgepole pine (*Pinus contorta* var. *latifolia*) in the United States. The shaded strip along the coast of Washington, Oregon, and California indicates the growth range of shore pine (*Pinus contorta*).

severely from insect attack and to a less extent from fungi and mistletoe. Lodgepole pine trees killed by fire or insects generally decay very slowly as long as they remain standing, but often check so badly that merchantable lumber cannot be sawed from them. Dead trees may remain standing for 20 or 30 years.

Supply.—A recent estimate [2] gave the stand of lodgepole pine of saw-timber size in the United States as 38,620,000,000 board feet and

[2] UNITED STATES CONGRESS, JOINT COMMITTEE ON FORESTRY. FOREST LANDS OF THE UNITED STATES. 77th Cong., 1st sess., Senate Doc. 32, 44 pp. 1941.

placed about two-thirds of it in the Rocky Mountain region and one-third in the Pacific Northwest. A previous estimate [3] gave the stand as 43,276,000,000 board feet, with approximately the same proportionate distribution. The stands of greatest commercial importance are located in northern Colorado, western Wyoming, western Montana, northern Utah, and southeastern Idaho.

Production.—The recorded production of lodgepole pine lumber in 1909 [4] amounted to about 24,000,000 board feet. Since then it has varied from a minimum of 11,000,000 board feet in 1921 to a maximum of 76,000,000 board feet in 1938. (See fig. 2.) In 1943, production was 68,053,000 board feet. The average annual production for the 10-year period 1934–1943 was approximately 54,000,000 board feet. There has been a rapid rise in the cut of lodgepole pine lumber since 1935, and the annual cut for the 5-year period 1939–1943 averaged over 62,000,000 board feet. It is quite possible that part of this marked rise in lumber production is due to the increasing proportion of lodgepole pine ties that are produced by sawmills instead of being hewed.[5] Colorado and Wyoming have been the leading States in the production of lodgepole pine lumber. They furnished about 86 percent of the 1942 cut which came from seven States in all.

In addition to the lodgepole timber used in the production of sawed lumber (including sawed railway ties), considerable although decreasing amounts are used for hewed ties. A large proportion of all lodgepole pine ties (both sawed and hewed) are treated with a wood preservative. Annual records of such treatments are available beginning with 1924.[6] The number has varied from a maximum of 2,838,000 ties in 1930 to a minimum of 318,000 in 1925. In 1943, 1,612,000 lodgepole pine ties were treated. The average number of lodgepole ties treated annually for the 10-year period 1934–1943 was approximately 1,285,000. If it is assumed that one-half of these ties were hewed, this would mean 643,000 hewed lodgepole ties, equivalent to 19,290,000 board feet.[7]

Lodgepole pine telephone and telegraph poles are generally given preservative treatment. The average number of such poles treated annually during the 10-year period 1934–1943 was approximately 41,000, the equivalent of about 2,050,000 board feet. In 1943 only 4,704 lodgepole pine poles were treated.

The amount of lodgepole used for mine timbers is probably considerably greater than the amount used for hewed ties, but recent figures on mine timber consumption are not available. Quantities of lodgepole pine are also cut for posts, fuel wood, etc. The total cut of lodgepole for all purposes in recent years is estimated at not less than 100,000,000 board feet.[8]

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[3] UNITED STATES FOREST SERVICE. A NATIONAL PLAN FOR AMERICAN FORESTRY. 73d Cong., 1st sess., Senate Doc. 12, 2 v., 1677 pp. 1933.

[4] The first year in which information on the amount of lodgepole pine cut for lumber was recorded separately from other species.

[5] Ties produced by sawmills are reported as "lumber" in the lumber statistics furnished by the mills. The production of hewed ties is obtained from other sources.

[6] Proceedings of the American Wood-Preservers' Association.

[7] A railway tie contains about 30 board feet.

[8] The approximate total cut of lodgepole pine for all purposes for the year ending June 30, 1913, was 82,000,000 board feet. This was made up roughly as follows: Mine timbers, 25,000,000 board feet; lumber, 20,000,000 board feet; cordwood (fuel wood), 16,000,000 board feet; railway ties, 14,000,000 board feet; and fencing, 7,000,000 board feet. See MASON, D. T. UTILIZATION AND MANAGEMENT OF LODGEPOLE PINE IN THE ROCKY MOUNTAINS. U. S. Dept. Agr. Bul. 234, 35 pp., illus. 1915.

Properties.—The heartwood of lodgepole pine varies in color from a light yellow to a yellow brown. The narrow sapwood is nearly white. The wood is generally straight-grained with narrow growth rings in which the darker bands of summerwood are distinct. Lodgepole pine contains resin ducts which may be fairly numerous, but are not distinctly visible without a lens. These ducts are often indicated by exudations of resin. On the surface under the bark or on split tangential surfaces numerous slight indentations may be seen which give the surface a dimpled appearance. The wood is moderately light in weight [9] and fairly easy to work with tools. It has a moderately large shrinkage—somewhat less than the coast type of Douglas-fir but slightly greater than the Rocky Mountain type. In strength properties, it rates as moderately weak, moderately stiff, moderately soft, and moderately low in shock resistance. It is not considered durable when used under conditions favorable to decay, but can be satisfactorily treated with a preservative by proper meth-

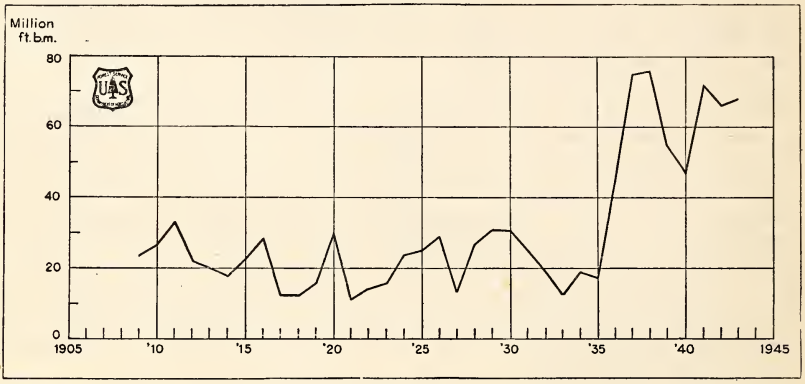

FIGURE 2.—Lumber production of lodgepole pine (*Pinus contorta* var. *latifolia*), 1909–43.

ods, although the heartwood is difficult to penetrate. In ability to hold paint the wood ranks below the white pines, but above southern pine and Douglas-fir. Small sound knots are characteristic of the lumber.

On account of the large amount of standing fire-killed lodgepole pine timber which was available some years ago, tests were made to determine the relative strength of fire-killed lodgepole pine poles as compared to poles cut from live timber. These tests showed that the fire-killed material, provided it was free from decay and insect damage and not checked excessively, was suitable for pole purposes. Material taken from a burn in Colorado, where it stood 10 years after being fire-killed, met the strength requirements for poles.

Tests on lodgepole pine grown in the Rocky Mountain regions indicate that it has excellent paper-making properties. Wood from these regions contains comparatively little pitch [10] and reduces readily by

[9] The average weight of lodgepole pine in an air-dry condition (12 percent moisture) is 29 pounds per cubic foot.

[10] Lodgepole pine grown in the Rocky Mountain regions has less pitch than that grown in the lowlands and coastal region.

the sulfite process[11] to produce an easily bleached, strong pulp of excellent color which is suitable for the manufacture of papers such as newsprint, wrapping, book, and high-grade printing. The wood with comparatively little pitch can also be ground readily by the mechanical process to yield a pulp of satisfactory color and strength, but the power required is about 20 percent more than for white spruce—a wood long used for ground-wood pulp. When pulped by the sulfate process, which can be applied satisfactorily to woods containing considerable pitch, lodgepole pine produces a very strong, dark-colored pulp suitable for making high-grade kraft wrapping papers and fiberboard.

Principal uses.—Lodgepole pine is used principally for lumber, mine timbers, railroad ties, and poles. Less important uses include posts and fuel wood. The ties and poles are nearly always treated with a preservative to increase their life. The lumber is used mostly for local rough construction and occasionally for boxes. It is also used in increasing amounts for siding, finish, and flooring, especially where the lumber of other species is not readily available. Mine timbers are generally in the form of round stulls and lagging poles.

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[11] Six processes are used commercially in making paper pulp from wood. One is the mechanical or ground-wood process, in which the wood is reduced to pulp on a grindstone. The yield approaches 100 percent of the weight of the wood. Four are chemical processes—the sulfite, sulfate, soda, and neutral sulfite. They depend upon the dissolving action of chemical reagents which remove essentially all of the binding materials (lignin) surrounding the cellulose fibers and leave them in a fairly pure state. The removal of the lignin is accomplished by cooking the wood chips with the proper chemical under steam pressure. The yield of pulp is about one-half the weight of the wood. In a sixth process, the semichemical, part of the lignin is removed by chemical means, and the resultant pulp, containing some lignin, is further refined by mechanical means. The yield of semichemical pulp is intermediate between the yields obtained with the mechanical process and the chemical processes.

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