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GIFFORD PINCHOT, Forester.

FOREST PLANTING LEAFLET.

RED CEDAR (Juniperus virginiana).

FORM AND SIZE.

The red cedar presents a wide contrast in form, varying in different parts of its range from the low, bushy type of the West to the conical and spire-shaped crowns of New England, Virginia, and Maryland. It grows to considerable size within the deep swamp lands of the eastern Gulf States, and attains its greatest dimensions on rich, alluvial bottomlands, where it occasionally has a height of 120 feet and a diameter of 3 feet. Its average size, however, is much less. It is a long-lived tree, and often reaches an age of several hundred years.

RANGE.

Few American conifers are more widely distributed than red cedar. Its range extends from southern Nova Scotia and southern New Brunswick to Florida, and from North Dakota southward to the Colorado River Valley in Texas, though over much of this territory only scattered individuals or small groups occur. It reaches its best development south of the Ohio River, where dense stands formerly occurred in the foothills of the Cumberland Mountains, and in the valley of the Tennessee River in Tennessee and Alabama. Red cedar usually grows in mixture, but on the cedar barrens of middle Tennessee pure stands occur.

For economic planting the range is restricted to localities where protection is needed and where there is demand for fence posts. These include the Dakotas, Nebraska, Kansas, Oklahoma, Texas, eastern New Mexico, Colorado, and Wyoming. In addition, it is advisable and economical to plant red cedar in the regions of its best development wherever natural reproduction is not satisfactory.

HABITS AND GROWTH.

Few trees of the eastern part of the United States exhibit a greater indifference to soil and climate than the red cedar. It thrives in the

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valley of the St. Lawrence and in New England; on the hills and limestone flats of the Southern States; on exposed, semiarid situations in Kansas and Nebraska, and on the deep soil of the hummocks of the Gulf Coast, where the annual precipitation is 60 inches.

In general, it may be said that the best growth is attained in a rather light, loamy soil, containing lime, and that heavy clay and sand are not so favorable.

Full enjoyment of light is necessary for complete development, but good growth may continue for a few years under the shade of other trees.

On account of the great variety of conditions under which red cedar occurs, its rate of growth varies widely, but is usually rather slow.

Fires are highly injurious to red cedar, owing both to its thin bark and to its flat root system. They generally kill all the trees in pure stands. In mixed forests, where the soil is fresher and the fire less fierce, the trees rarely suffer immediate death, but the butts are charred and the decay characteristic of old cedars begins.

Attacks of various forms of fungi cause such injuries as "cedar apple," "witches' broom," and white and red rot. In the nurseries large numbers of good-sized trees are sometimes destroyed by a blight. A number of destructive boring insects feed on both the living and the dead trees, and the foliage is eaten by certain species of caterpillars.

ECONOMIC USES.

The wood is light and soft, with a fine, compact, even grain, susceptible of a high polish. Its great durability makes it valuable for posts and telegraph poles. In addition to the lead-pencil industry, which annually consumes a large amount of the best grade of material, various arts and industries make use of the wood. In naval construction it is employed for many purposes.

The value of red cedar for planting lies in its superior adaptability to unfavorable soil and climatic conditions. It stands pruning well and hence is largely planted for ornamental purposes, and occasionally for evergreen hedges, though it is not so well adapted for the latter purpose as arborvitæ and similar trees. On account of its ability to endure great climatic changes it is a valuable tree for windbreaks on the semiarid plains. In Oklahoma, Texas, New Mexico, and in other regions where more rapid growing trees will not thrive, it can be profitably grown for fence posts.

Generally, faster-growing trees are to be preferred, since even on good soils red cedar timber of the best quality can not be produced in less than from seventy to one hundred and twenty years.

PROPAGATION.

Red cedar reproduces only by seed, which the pistillate trees bear in great abundance. Plantations should be started from nursery-grown trees and not from seed sown directly on the permanent site.

The seed germinates with difficulty, and seedlings, when a few weeks old, are subject to a fungus disease which occasionally causes heavy loss; hence the planter, unless he desires several thousand trees, should buy his stock rather than attempt to raise it himself.

Nursery-grown plants are generally rather expensive, but in many localities wild seedlings may be collected locally or purchased from dealers. These seedlings, if not large enough for planting, should be set out in the home nursery, there to remain for one or two years, when, having reached a height of from 10 to 12 inches, they will be of suitable size for permanent planting.

The seeds are inclosed in a globular, purplish-black berry, which is covered with a silvery bloom. These berries contain from 1 to 2 seeds each and mature in the fall of the first year, frequently remaining on the tree until late in the following spring. The berries should be collected late in the fall, or whenever they are thoroughly ripened. Once collected, the berries should be soaked for three or four weeks in cold water, until the pulp of the berry has rotted. The seed should then be separated from the pulp, mixed with sand, and kept moist until spring. Sowing may safely begin when garden vegetables are being planted. Seed beds are best made in fine, loamy soil, moderately fresh, but always well drained. For convenient cultivation they should be about 4 by 12 feet in size, and separated by a path 2 feet wide. The seed should be sown in drills 6 inches apart, and lightly covered with fine earth. One pound of seed will sow about 640 linear feet of seed drills, or about 320 square feet of surface.

After the seed bed is completed the surface should be "firmed" with a board or light roller. Some of the seed may not germinate until the second season.

Like those of most conifers, the plants will require artificial shade during the first season; after this they can stand full sunlight. In the spring of the second season the seedlings should be transplanted into nursery rows 18 inches apart with 5 inches space between the plants. By the end of the second year the plants will be 7 or 8 inches high, and well rooted. At the opening of the third season, usually in March or April, it is best to transplant again in the nursery, with 8 or 9 inches spacing.

PLANTING.

The plants should be from 10 to 12 inches high when set out in the permanent site. If they have been purchased from a nurseryman

they should be unpacked immediately upon arrival and their roots dipped in a "puddle" of earth and water. They should then be taken at once to a shady place and heeled-in. When planting begins, whether home-grown or purchased stock is used, the greatest care should be taken to keep the roots constantly moist. This can be done by keeping them wrapped in wet moss or by carrying them in a pail containing several inches of water. If the roots become thoroughly dry the plants will die.

For pure plantations on the dry upland soils of the West, spacing 4 by 4 feet is advised; on better and moister soils 4 by 6 feet or 4 by 8 feet. The planting must be done carefully and the earth packed firmly about the roots so as to give good contact and exclude the air.

The vicinity of orchards should be avoided, because the "cedar apple," a fungus very destructive to fruit trees, passes one of its stages on the branches of the red cedar. For windbreaks or shelter-belts on the high prairies in the Southwest a most desirable mixture is red cedar and Osage orange or honey locust. These should be planted 4 feet apart in alternate rows 6 feet apart. For fence posts the plantation should be made pure and the trees planted 4 feet apart in rows 6 feet apart.

CULTIVATION AND CARE.

Success with red cedar, especially in the semiarid region, will depend largely upon the character and extent of the cultivation. On such sites, for several years after setting, the plantation should be given frequent shallow cultivation. In river and creek valleys, where water is found near the surface, it is unnecessary to cultivate after the first two or three years.

Approved.

JAMES WILSON,
Secretary.

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