

woods be exempted from which the young and growing trees are cut, while only those that have reached their maturity, or stunted, ill-shaped young trees, are allowed to stand; such woods do not increase in value from year to year, as is the case where saplings and small trees are allowed to grow.

I have seen woodlands from which cattle were shut out, literally covered by young plants of one, two, or more years of growth that had sprung up from the seeds fallen from the mature trees. This shows that our forests only need to be preserved in order to keep them growing; but most of our natural forests could be made more valuable by a little care and attention from an experienced forester.

The first care in preserving our natural forests is to protect them against the depredations of cattle; it is just as necessary to keep cattle out of a forest to be preserved as it is to keep them out of a grain field. Cattle, if allowed to run in a forest, will cut off and destroy the young plants that are constantly springing up, and thus prevent the growth of new trees. No forest is worth preserving in which there are no young and growing trees. Forests must be replenished by young and growing trees, just as in the human family the place of the old and decayed is taken by the young and vigorous.

Fire is as dangerous to a forest at certain seasons of the year as to a building; a fire running through a forest may destroy in an hour the growth of half a century, or even a longer time. To prevent these bush fires, now unfortunately so common, we require, besides a more stringent law on the subject, a more enlightened public opinion as to the value of our forests—not only as sources of supply for timber, but, what is greater importance, their moderating influence on the climate. The man that sets fire to a forest should be punished as severely as if he had set fire to a building; the latter can be restored in a short time by a little expense, whereas it takes years to restore a forest.

Old and decayed trees should be removed from a forest intended for preservation; so should all stunted and crippled trees, in order to make room for those that are young and growing. Care should also be taken that any vacant space is planted with young trees. In planting, consideration should always be taken of future demands. If a forest is intended only for fuel, such trees should be planted as will yield the most and best fuel, as the beech, maple, and oak; but as the future generation will probably need wood for other purposes than fuel, it will be wiser to plant such varieties as will yield valuable timber for other purposes, while the refuse wood can be used for fuel. This brings us to the question of the kind of trees to be planted.

At the head of the list of native trees for forest culture I would place the pine. It is peculiarly adapted for our climate; it is a hardy, vigorous grower, and satisfied with the lightest of soils. The different species of it grow either on the most arid, sandy soil, or on the moist, rich soil of our swamps. Pine requires somewhat more care in starting than some other trees do, but when they have once taken root they become hardy, and will thrive on almost any soil, except, perhaps, a heavy clay. Care should also be taken in planting to select the kind most suitable for the soil to be planted. The white pine found in our swamps will not grow so well on light, sandy soil as the yellow and red varieties do; but while it is not suited for uplands, it is the best kind for planting on the rich, mucky soil of the swamps that are to be found in all parts of the Province. For uplands and sandy soils, the red and yellow, and especially the Weymouth pine, will be found the best varieties.

For very light soils, there is probably no tree equal to the Scotch pine (*Pinus Silvestris*). Large numbers of this variety are planted on Cape Cod, and in other parts of the state of Massachusetts. While it will grow on almost any soil, this variety is especially adapted for the barren driftsands that are found in many places along our lakes. The seeds of it are easily obtainable from some reliable seedsmen.

For general economical purposes there is probably no timber superior to pine. As a building material it has no superior. It is extensively

used in the manufacture of cabinet ware and household furniture, as also in shipbuilding. Its rapid growth will make it a valuable timber to grow for railway ties, for which purpose large supplies will soon be required, as our natural forests are rapidly becoming exhausted, and in a very few years will be inadequate to supply the immense demands made on them by our railways.

There is another reason why the pine should be extensively planted. Its innumerable needle-shaped foliage act as so many points for the distribution of the negative electricity of the earth, and the neutralization of the positive electricity of the atmosphere and clouds, thus preventing their violent discharge in the form of a thunder storm. Of all trees there are, perhaps, none so valuable in this respect as the pines and firs, to which belongs the European larch (*Larix Communis*), presently to be described. The height to which they grow, and their pointed, needle-shaped foliage, make them especially valuable in this respect; and all isolated dwellings and outhouses would be much safer by being surrounded by a cordon of thrifty pines, not to speak of the shelter they afford against the cold blasts of our long winters, and their value in an aesthetic point of view. Fuller says:—"A belt of these surrounding a farm, or such portions as are occupied by the buildings, give a cheerful, comfortable appearance, and both man and beast will live longer and be more happy under such circumstances, than when exposed to every gale, and for six months of the twelve with nothing life-like to look upon." He goes on to say: "If a man goes into the country to buy a farm, he will seldom call where he sees beautiful trees surrounding the house and outbuildings, for he knows instinctively that such places are not for sale, for the owner generally thinks more of his home than of money; but it is the bleak, uninviting farms that are usually for sale."

Perhaps a more valuable tree for many purposes than even the pine, is the European larch, of which large forests are planted in Scotland and on the continent of Europe. It is also extensively planted in some of the Northern States of the neighbouring Republic. It is a native of Southern Europe, but will thrive in colder climates, even to the limit of perpetual snow. It is a tree very similar to our tamarack, but much more valuable. It grows very rapidly on almost any dry soil, but will not thrive in damp grounds, and cannot bear stagnant water. Its timber is used largely in shipbuilding, and is very valuable for piles and railway ties. For posts and planks it is inferior to pine, as it is very apt to warp. Fuller says:—"It will last for ages when covered with water, or driven in wet ground. . . . Larch spiles have been taken up in Europe, where it is positively known that they were driven more than a thousand years ago, and yet they were sound and uninjured." Northrop says:—"When raised under right conditions, it combines the two qualities of rapidity of growth and durability of wood more than any other tree. . . . Julius Caesar spoke strongly of its strength and durability." Monville says:—"In Switzerland the larch, as the most durable of woods, is preferred for shingles, fences, and vine props. These vine props remain fixed for years, and so crop after crop of vines bear their fruit and perish, without showing any symptoms of decay. Props of silver fir would not last more than ten years." Evelyn says:—"It makes everlasting spouts and pent-houses, which need neither pitch nor painting to preserve them." "For out-door work it is the most durable of all descriptions of wood. I have known larch posts that have stood for nearly fifty years," says Michie; while Professor Sargent believes that "For posts it will equal in durability our red cedar, while in the power to hold nails it is greatly its superior." "The larch, while it holds iron as firmly as oak, unlike the latter, does not corrode iron," says Northrop. It is said to have no equal for railway ties. Ties in use for sixteen years on the Boston and Albany Railway were found to be still sound. It has also been largely used for this purpose in England. Ten acres of larch, it is said, will yield as much ship timber as seventy-five acres of oak. Its bark can be used for tanning purposes, though probably not equal to oak bark or our

hemlock. Containing a large amount of resinous substance, it makes good fuel, though it is not equal to our maple in this respect. As it grows very rapidly, it is much more valuable than oak for planting. Trees thirty years old are said to have been sold for \$15 a piece, while oak at that age were not worth over \$3. I have spoken thus freely of this tree, because from the description given of it, I believe it is one of the most, if not the most, valuable tree available for forest culture.

The most valuable of our native deciduous trees for cultivation are the ash, elm, hickory, oak, maple, beech, birch, basswood, butternut, black walnut, chestnut, willow, etc. Of these the white ash (*Fraxinus Americana*) is one of the most valuable. Its wood is highly valued by carriage makers and the manufacturers of agricultural implements. It grows very rapidly, but prefers a moist, deep soil. As it is a very ornamental tree, forming a splendid head, it should become popular for wayside planting. It is also one of the best to grow for its timber. For low, wet soils, the black ash will be found preferable, though its wood is not very valuable except for basket-making. It will also make good flooring and fencing. Of the elms, the white elm (*Ulmus Americana*) is the most valuable. It is a rapid grower, and its timber is valuable for many manufacturing purposes, where strength and durability are required. It grows to a very large size, and is a most beautiful tree. It is suitable not only for forest culture, but as an ornamental tree or for wayside growing. The elm prefers a deep, rich, moist soil. There are several varieties of the hickory that may be planted. The kind most suitable for the soil to be planted must be selected. They are rather slow growers, but yield valuable timber. By repeated transplanting when young, they form better roots than they do when growing in a natural state, and will consequently grow more rapidly.

The oak is a very valuable tree, but a slow grower. It takes many years before it attains a size large enough to make it valuable. When planting it for its timber, I would advise planting it in alternate rows with some rapidly growing tree, like the ash or the elm, which will reach maturity long before the oak, and can be removed, and thus permit the latter to expand and grow to maturity.

The maple is a slow grower, but valuable for timber and for fuel. Some varieties, like the red or soft maple, grow more rapidly than the better-known sugar maple, but their wood is not nearly as valuable. The maple makes very fine ornamental trees, and are consequently valuable for wayside planting. The sugar maple prefers a rich, loamy soil, while the red maple delights in low, moist situations, though it always grows on dry ground.

Though the beech is by no means a slow-growing tree, yet it takes many years before it attains a size to be of much value as fuel, for which purpose it is principally used. It is also to a slight extent used in manufacturing, especially for making planes and saw handles. It is a fine tree, and grows in almost any dry soil. It should not be overlooked for wayside planting. Its nuts are highly prized for the young, especially in sections where the chestnut and the walnut are not to be found.

Basswood grows very rapidly, and is valuable for many manufacturing purposes, on account of its toughness and the ease with which it receives a high polish. As an ornamental tree it has few superiors. It is highly valued by apurians, as the honey extracted from its flowers is classed as equal to that made from white clover. For wayside growing the linden should not be overlooked.

The butternut thrives best in moist, rich soils. It seldom grows very large, and though its timber is used by cabinet makers, it would hardly be advisable to plant it for that purpose. But on account of its splendid nuts it deserves to be found on every farm or orchard.

The black walnut will grow rapidly on a good, rich soil. It is a larger tree than the butternut and is much more valuable for its timber, though its nuts are much inferior. Its wood is probably the most valuable that grows in our climate. It should find a place in all tree plantations in southern Ontario, and more especially along the shores of Lake Erie.

The chestnut requires a dry, sandy or gravelly soil, upon which it grows rapidly. It will thrive well in most parts of southern Ontario if it is planted in a suitable soil. This tree is valuable not only as a nut bearing tree, but for its timber. Fuller says:—"There are other kinds of timber which may be more durable than chestnut, but I know of none that is more rapidly and easily grown." He also says:—"One crop of the nuts from a twenty year old tree will more than pay for the original cost of the land and planting them." While young the chestnut makes good rails, stakes, hop poles, etc., or it can be used for fuel. When the trees become large they make valuable timber for cabinet-work and house finishing. As an ornamental tree it always deserves attention, and is worthy of a place in even small gardens, where a suitable soil can be found. When intended for forest plantation it should be sown rather thickly, and thinned out when the plants become from four to six inches in diameter.

Willow loves a rich, moist soil, but will grow on poorer soil if not too dry. It is a fine ornamental tree, but is not greatly valued for its timber in this country, though in England it is extensively grown for that purpose. As it bears beating better than any other wood, it is used for making cricket bats, floats for paddle-wheels in steamers, brake-blocks for cars, shoe lasts, etc. It is also used for furniture making, plank-ing vessels, etc. Mr Sargent says:—"As willow timber could be produced far more cheaply than that of any of our native trees, it should soon come into general use here for purposes requiring lightness, pliancy, elasticity and toughness—qualities which it possesses in an eminent degree, and for which more valuable woods are now employed."

For low, wet soils the white cedar (*Cupressus thyoides*) will be most valuable. It grows rapidly, and is valuable for many purposes even while yet small. For swamps that it is desired to plant with trees, a mixture of pine, cedar, and black ash will be found desirable. The cedar can be cut for useful purposes long before it begins to creep the pine.

In districts convenient to paper mills, the growing of poplars for wood-pulp will be found profitable. It is also in some places on the prairies grown for fuel, but is worth very little for that purpose.

Nearly all the forest trees can be grown with ease, if the proper time for seeding is observed. No special skill is required, nor do they demand any greater care than is devoted to ordinary farm crops. Nor yet is it a matter of expense. Fuller says he has grown many thousands, and that the expense, taking one kind with another, does not exceed two dollars per thousand, though the expense will vary, according to the price of the seeds. Nearly all forest trees can be readily grown from the seed. Except when but a small number is required, it will be found cheaper and more convenient to grow them at home. Where seeds cannot be collected at home, it is best to obtain them from some reliable seedsmen. As a rule, the seeds of forest trees should be sown soon after they become ripe—this is the natural order—and many of the seeds are spoilt by keeping. It should also be remembered that many forest trees ripen their seeds in the spring or early summer, and that such should be sown at once after ripening.

SEEDING.—The seeding may be done directly on the soil to be occupied by the trees, or in a nursery. For many kinds of trees direct seeding will be found the best, but the foresters of Europe prefer seeding the pine and the larch in nurseries, from which they are transplanted in the second and third years. By transplanting they are made to form better roots, and will consequently grow more rapidly after they are started. Evergreens also require shading during the first year from the heat of the sun, and some protection against cold during the first winter. This can be more easily provided in a nursery than in an open field.

DRILLS.—The seeding should be done in drills. For most kinds a drill, or trench, about a foot wide and half an inch to an inch deep, is the best. The seeds should be sown pretty thickly over the trench, which is then levelled in even with the other ground. Where a cultivator is

(Continued on next page)