

NATURE PROVIDES



PREVENT FOREST FIRES—IT PAYS

Report all fires regardless of size to forest rangers, by telephone; collect, if necessary.

Rangers:

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Percy Vibert, Cloquet.
E. H. Rhodes, Brainerd (court house).
Milton Rhodes, North Hibbing (502 3d ave.).
Mike Guthrie, Deer River.
H. I. Johnson, Hill City.
John H. Nelson, Bemidji.
A. W. Stone, Park Rapids.
Frank Pugh, Arago (Itasca State Park).
Homer Whiting, Waskish.
Dick Willems, Warroad.
J. C. Gonaway, Baudette.
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V. B. Lofgren, Little Fork.
L. R. Beatty, Orr.
E. V. Gafvert, Tower.
John Fritzen, Duluth (614 Manhattan Bldg.).
P. J. Bayle, Grand Marais.
G. M. Conzet, Commissioner of Forestry and Fire Prevention, Old State Capitol, St. Paul.
Parker Anderson, Extension Forester, University Farm, St. Paul.

Also, don't hesitate to call on these men for any out-
ing information and suggestions.



FIRE DESTROYS

Pamphlet No. 17

November 1930

Common FOREST TREES of Minnesota



How to Know Them

Published by the University of Minnesota, Department of Agriculture, Extension Division, F. W. Peck, Director, and distributed in furtherance of the co-operative agricultural extension work provided for in the Act of Congress of May 8, 1914. In co-operation with the Commissioner of Forestry and Fire Prevention of the State of Minnesota, and the Forest Service, United States Department of Agriculture.

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FOREST TREES

OF

MINNESOTA



A POCKET MANUAL
DESCRIBING THEIR MOST IMPORTANT
CHARACTERISTICS

By

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The University of Minnesota,
Department of Agriculture, Extension Division
In Co-operation with the
Commissioner of Forestry and Fire Prevention
of the State of Minnesota, and with the Forest Service,
United States Department of Agriculture

FOREWORD

Is it not strange to find that American people, who have been associated for generations with forest life and who have been dependent in so large a measure upon the resources of the forest, know so little not only of the forest itself but of the trees that compose the average stand of timber in their own locality? Minnesota has a great variety of trees producing useful and valuable timber and in this bulletin only those of greater importance are described.

The daily increasing interest in our outdoor life has brought home the need of becoming better acquainted with our friends who make up our forest and has brought out the need of treating our disappearing forests much differently than we have in the past.

Various characteristics are used to differentiate trees from each other, such as leaves, bark, flowers, fruit, and their local distribution and home, or "habitat." To know or to identify a tree, do not depend upon one characteristic only but look for others. Learn to know the trees in winter, spring, summer, and fall. Learn to know the seedling as well as the older parent tree for they differ in appearance in many kinds of trees.

To know the trees better is to add to your list of friends that will be ever with you in your rambles in the outdoors; friends who serve you in a thousand ways in your everyday life; friends who make the world a better place in which to live; friends who make possible our outdoor recreation; who increase the beauties of nature; and who protect our game, our fish, our water power, our lakes, our streams, and our economic development.

Purpose of This Manual

This manual is a simple description, in accurate and yet non-technical terms of the more common forest trees of the state.

It does not include the very rare trees, nor does it pretend to be a complete scientific treatise for the botanist and the forester. It is intended as a popular guidebook for the general public and is being distributed by the state to meet a pressing demand for something of just this sort. These requests are largely the

result of a widening appreciation that timber is a marketable commodity of increasing value, and that by rightly handling young timber it quickly grows into a merchantable product that will add yearly to the farm income as well as enhance the value of the farm, both as to salable property and as a comfortable and attractive home.

It is natural for young people to be interested in trees. Many will become farm and home owners of the future, and a knowledge of trees will add interest to their lives that will prove to be later a very material asset. County agents and other leaders dealing as they do with both present and future owners of timber land, will be aided by this manual in acquiring a better knowledge of the uses and value of our common forest trees.

Altogether, 48 trees are described, all of which are native to the state. Minnesota has a great variety of trees producing useful and valuable wood. Timber is the best crop to grow on certain soils and locations on the farm. Many farms have, for example, some hillsides, or worn out, gullied, sandy, wet, or cut-over and burned-over lands better adapted for growing timber than any other crop. To rightly utilize all farm land is a sign of good farm management.

The rapidly increasing interest in outdoor life, stimulated perhaps by good roads, the automobile, the boys' and girls' club and scout movements, and the widened outlook resulting from the spread of education, encourages the rational treatment of our trees and forests. It is highly important that this be done in order that our forests may continue to furnish the material so essential to the maintenance of the industrial and social life of the state and nation, to protect our farmsteads, lakes, and streams, and to provide places of pleasure and recreation for our people.

Acknowledgment

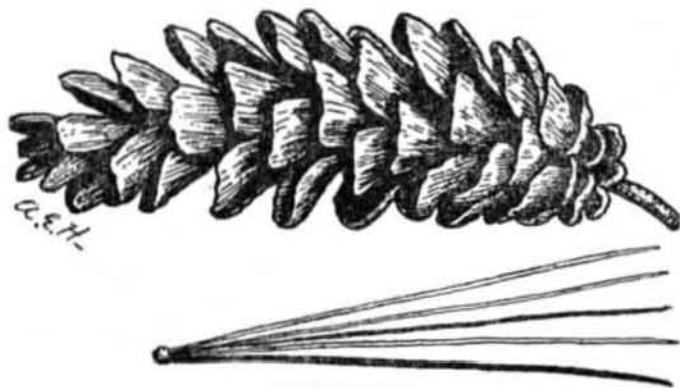
Grateful acknowledgment is hereby made to the United States Department of Agriculture for their assistance in the preparation of this publication, including the original drawings by Mrs. A. E. Hoyle of the Forest Service; and to the State Forestry Departments of Maryland, Virginia, North Carolina, and Tennessee for cuts used in this text.

We wish, also, to acknowledge the co-operative financial assistance of the Minnesota Forestry Department, which makes this publication possible.

WHITE PINE

(*Pinus strobus* L.)

The white pine is an important tree throughout the northern, central, and eastern parts of the state. It is found scattered along the Mississippi River as far south as to Houston County. It has been rightly prized for building purposes since the days of the earliest settlers. Old white pine paneling of the older



WHITE PINE
Two-thirds natural size.

houses is now greatly valued. The straight trunk, regular pyramidal shape, and soft gray-green foliage make it universally appreciated as an ornamental tree. Its rapid growth and hardiness, and the high quality of its wood have made it one of the most valuable and desirable trees for forest planting.

The straight trunk, when growing in the forest, is clear of branches for many feet. The branches extend horizontally in whorls in young trees, i.e., arranged in a circle on the stem, marking the successive years of upward growth. The bark is thin, smooth and greenish gray on young trees, but thick, deeply furrowed and grayish brown on older trees. The white pines in Itasca Park bear evidence to the size which this species can attain. Trees 130 feet in height and up to 44 inches in diameter may still be found.

The leaves, or needles, are 3 to 5 inches in length, bluish green on the upper surface and whitish beneath, and occur in bundles of 5, which distinguish the tree from other Minnesota pines. The cone, or fruit, which requires two years to mature, is 4 to 6 inches long, cylindrical, with thin, usually very gummy scales, each containing two small winged seeds.

The wood is light, soft, not strong, light brown in color, often tinged with red, and easily worked. The lumber is in large demand for construction purposes, box boards, matches, and many other products. White pine is often used for ornamental planting with good effect.

NORWAY PINE OR RED PINE

(*Pinus resinosa* Ait.)

The Norway pine or red pine is a very important timber tree in Minnesota. It is increasing in popularity for forest planting, and because of its general freedom from disease and insect attack is recommended in many instances to take the place of the white pine. It is a native of the state and is found in pure stands in many parts of northern and northeastern Minnesota.

In northern Minnesota the Norway pine sometimes reaches a height of 100 feet and a diameter of 30 to 40 inches, especially in Itasca Park, about Cass Lake, in the Chippewa National Forest, in the Superior National Forest, and the new state forests



NORWAY PINE
Cone and needles, natural size.

of Cook, Lake, and St. Louis Counties. Its rate of growth is about the same as that of white pine. As the tree matures, its bark becomes divided into large reddish brown plates which give the tree its characteristic appearance and one of its common names, red pine.

The leaves, which occur in clusters of two each, are about 4 to 6 inches long and dark green in color. In artificial plantations it might be confused with the Austrian pine which is not native but whose needles, however, are much stiffer and also longer.

The fruit is a cone about 2 inches long, light brown in color fading to gray. The thin, slightly concave cone-scales are without spines, or prickles, and are free from resin. Like all the pines, it requires two years for the cones to ripen. They ripen about the middle of September but persist on the branches until the following spring or summer. The seeds are small and about $\frac{1}{8}$ inch long, dark or mottled brown, winged, and widely scattered by the wind.

The wood is medium heavy, hard, and pale red with thin, nearly white sapwood. The lumber, which is coarser grained and harder than that of the white pine, is used for some general construction purposes.

JACK PINE

(*Pinus banksiana* Lamb.)

The jack pine is found in abundance over north-central and northeastern Minnesota where it occurs generally in pure stands on poor sandy soil. Following fire it is usually the first of the pines to spring up and occupy the land.

It is hardy and grows rapidly even under unfavorable conditions of soil and moisture, thriving on soil too poor for white or red pine. It has been considerably planted in places where the white or Norway pines are poorly adapted for growing.

It grows to a height of 30 to 90 feet, with a top, or crown, of spreading branches

and with scant or open foliage. The small dead branchlets are often persistent for many years.

The **leaves**, or needles, are shorter than either white or Norway pines, only an inch or so in length, rigid, sharply pointed, two in a bundle and slightly twisted. They remain on the branchlets for about 3 years.

The **cone**, or **fruit**, is about 2 inches long, often strongly curved, brown when ripe and turning gray later. They also are very persistent, sometimes remaining on the branches unopened and containing good seed for many years. The seed, which is small, winged, and triangular in outline, may be carried far in strong winds. Many trees have ripe cones when 7 years old.

The **wood** is rather pale brown and soft, coarse grained, and knotty. It is used for laths, box material, kraft paper, firewood, and increasingly for crossties and rough lumber. It is the least valuable of the native pines of Minnesota. It is used for windbreaks on account of its hardness.



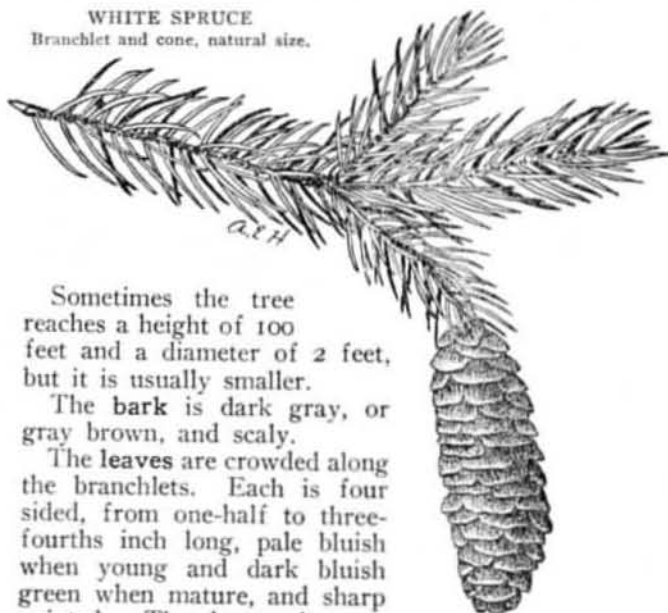
JACK PINE
Three-fourths natural size.

WHITE SPRUCE

(*Picea glauca* Voss.)

The white spruce is a tree extensively found in the forests of northern Minnesota extending southward into the St. Croix Valley. It occurs on dry soils associated with pine and on moist soils and in swamps with balsam and tamarack. It is very often found associated with mixed hardwoods.

WHITE SPRUCE
Branchlet and cone, natural size.



Sometimes the tree reaches a height of 100 feet and a diameter of 2 feet, but it is usually smaller.

The **bark** is dark gray, or gray brown, and scaly.

The **leaves** are crowded along the branchlets. Each is four sided, from one-half to three-fourths inch long, pale bluish when young and dark bluish green when mature, and sharp pointed. The leaves have a slightly disagreeable odor when crushed.

The **fruit**, or **cone**, is slender and about 2 inches long—noticeably longer than that of the black spruce. The cone-scales are rounded at their ends and soft, and are thin and flexible when mature. The seed matures in one season and the cones drop off during the winter, after opening and shedding the seed.

The **wood** is light, strong, soft, straight grained, and of a light yellow-white color. It is eagerly sought and used for the manufacture of various products including paper pulp. The larger trees are sawed into lumber and used for general construction—airplanes, furniture parts, canoe paddles, and sounding boards for musical instruments.

White spruce is planted quite extensively for ornamental purposes, windbreaks and shelter belts. It holds high rank as a Christmas tree.

BLACK SPRUCE

(*Picea mariana* B., S., and B.)

In Minnesota black spruce is found in almost pure stands in cold muskeg, low-land areas in the northern and northeastern parts where it often grows so slowly that trees 2 inches in diameter have been found that were as old as 127 years. In well-drained swamps it grows as fast as the white spruce.



BLACK SPRUCE

Branchlet and cone, one-half natural size.

This tree is associated often with tamarack, balsam, and white cedar.

It is usually a small tree having a straight trunk and somewhat drooping branches. The mature tree reaches a height of 50 to 65 feet.

The **bark** is dark colored, scaly, and similar to white spruce.

The **leaves** are of bluish green color, short, pointed, four sided, one-half inch in length, and are found scattered thickly over the branches; they are shorter than those of white spruce.

The **cones** are oval in outline, from one-quarter to one-half inch long, purple in color, and remain on the tree indefinitely. The seeds are small, dark brown, and winged, and mature in one season.

The **wood** is yellow-white in color, and is light, soft, and medium strong. It is used extensively for paper pulp, more than the wood of any other tree.

Black spruce is cut and extensively used for Christmas trees, but is not recommended for ornamental planting. On high land the tree is rather short-lived, loses its lower branches readily, and develops an unattractive appearance.

Spruce gum, which the tree exudes, is valued by most children and even grown-ups and is often gathered in large quantities.

TAMARACK (Larch)

(*Larix laricina* K. Koch)

This tree is found chiefly in swamps in the northern part of the state, associated with black spruce, white spruce, cedar, and hardwoods. Large trees are rare. Most of the old specimens were killed years ago by the larch saw-fly. It is the only conifer in Minnesota that sheds all of its leaves each fall. When in foliage, it is very beautiful. It reaches a height of 30 to 70 feet and is 14 to 24 inches in diameter in some instances.

The **bark** is rough and separates on the surface into thin purplish red or reddish brown scales. The twigs are light brown and are covered with numerous tiny spurs or short branches.



AMERICAN
LARCH
(Tamarack)
Three-fourths
natural size.

The **leaves** are flat, soft, slender, and about one-inch long, and are borne in clusters on the spur-like branches and distributed singly on terminal shoots. They are bright green in spring, soft and flexible, turning a dull yellow in September or October just before they fall.

The **cones** are small—only two-fifths of an inch wide and three-fourths of an inch long—nearly spherical, purplish red changing to light brown when ripe. They open in fall to liberate the small winged seeds. The open cones usually remain on the tree several years.

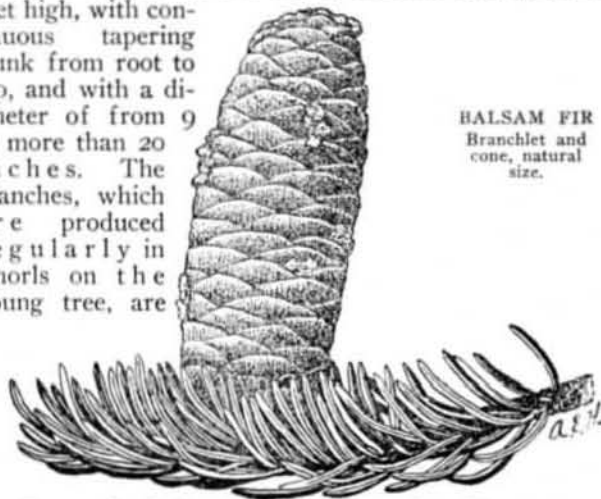
The **wood** is light yellowish brown, heavy, hard, and very durable in contact with the soil. It is used for posts, poles, ties, well cribbing, and locally for lumber. It is extensively cut for fuel and for kraft paper.

The tamarack is hardy and makes good growth on high land, but it is not as graceful or as beautiful a tree for ornamental planting as the European larch.

BALSAM FIR (Balsam)

(*Abies balsamea* Mill.)

The balsam fir is found in the forests of the northern part of the state and in a few scattered localities in the southeast corner. It is usually associated with the white spruce, from which it can easily be distinguished by its large upright cones and soft leaves. It prefers cool, damp, or shaded situations in either swamp or forest. It is a tree of medium size, 40 to 80 feet high, with continuous tapering trunk from root to top, and with a diameter of from 9 to more than 20 inches. The branches, which are produced regularly in whorls on the young tree, are



BALSAM FIR
Branchlet and
cone, natural
size.

usually retained down to the ground. The top, or crown, retains its pointed, spirelike or pyramidal shape throughout the life of the tree.

The bark on the younger trees is pale gray, smooth, thin, and prominently marked by "blisters" filled with resin or balsam pitch.

The leaves are needle-like but flat, one-half to one inch long, with rounded point, dark green and lustrous above, silvery white beneath, arranged on the twig apparently in two ranks, and are resinous and fragrant.

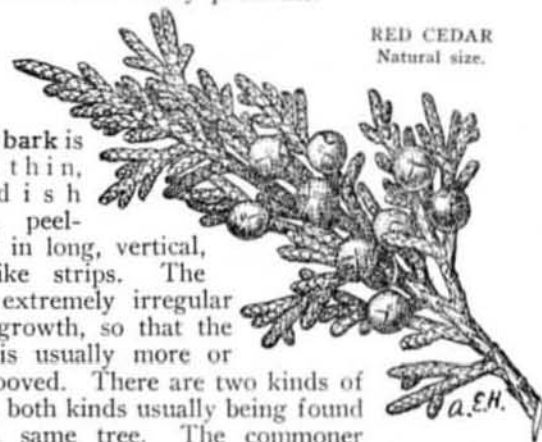
The cones stand upright on the top branches. They are purple, oblong, from 2 to 3 inches long, and become ripe in autumn of the first year. The cone scale is wider than long. The seeds have very wide wings, and when ripe, fall together with the scales of the cone, leaving the hard central axis standing upright on the twig like a spike.

The wood is light, soft, not strong or durable, and is coarse-grained. It is used only slightly for construction lumber, and is mixed with spruce wood for paper pulp. The tree has sometimes been used in ornamental planting but is not particularly desirable for that purpose and should be sparingly planted, chiefly because the species prefers shady, moist locations. This tree finds a ready use in Christmas tree markets.

RED CEDAR (Juniper)

(*Juniperus virginiana* L.)

This tree is commonly found in dry, gravelly regions, but is usually more abundant on the ridges and barren rocky hillsides of the uplands and along river bluffs, where few other trees are found. The red cedar reaches a height in Minnesota of about 25 to 30 feet. When growing in good locations it has a straight trunk; on poor rocky and dry locations the trunk may be very much divided or nearly prostrate.



RED CEDAR
Natural size.

The bark is very thin, reddish brown, peeling off in long, vertical, shred-like strips. The tree is extremely irregular in its growth, so that the trunk is usually more or less grooved. There are two kinds of leaves, both kinds usually being found on the same tree. The commoner kind is dark green, minute, and scale-like, clasping the stem in four ranks, so that the stems appear square. The other kind, usually appearing on young growth, on vigorous shoots, or on branches in deep shade, are awl-shaped, quite sharp-pointed, spreading and whitened on the under side.

The fruit, or "berry," which matures in one season, is pale blue, often with a white bloom, one-fourth inch in diameter, enclosing one or two seeds in the sweet flesh. It is a favorite winter food for some birds.

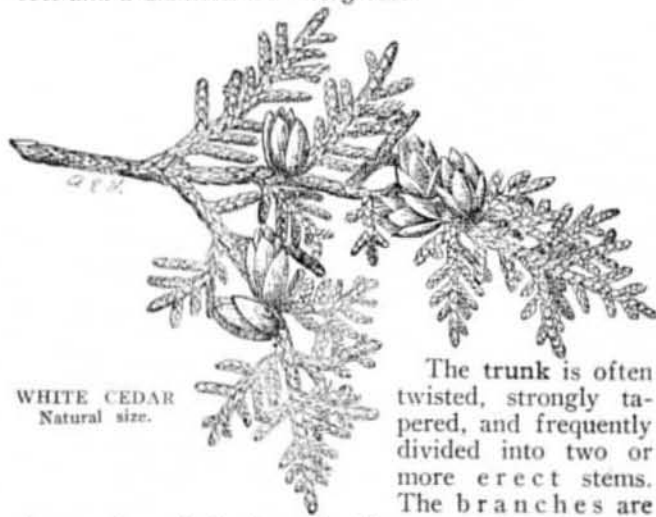
The heartwood is decidedly purplish red, and the sapwood is yellowish white—a color combination that makes very striking effects when finished as cedar chests, closets, and interior woodwork. The wood is aromatic, soft, strong, and of even texture. These qualities make it most desirable for lead pencils. It is very durable in contact with the soil, and because of this is in great demand for posts, poles, and rustic work.

As the red cedar spreads the cedar rust of apples it is not advisable to plant it in or near orchards, or anywhere in regions devoted to commercial apple production.

WHITE CEDAR (*Arbor Vitae*)

(*Thuja occidentalis*, L.)

White cedar is an evergreen of compact, pyramidal form. It is native in the northern part of the state, growing usually in swampy ground where it is often found in dense pure stands, and is sometimes also found on rather dry, stony ground, singly or in small clumps as far south as Winona County. In its more northern home it sometimes reaches a height of 70 feet and a diameter of 2 to 3 feet.



WHITE CEDAR
Natural size.

The trunk is often twisted, strongly tapered, and frequently divided into two or more erect stems. The branches are short and nearly horizontal. Trees sometimes form almost impenetrable thickets, as the dead branches are very stiff and persistent. In the open the tree develops a conical, symmetrical crown.

The bark is gray to reddish brown, separating in long, vertical, narrow, shreddy strips.

The leaves are scale-like, one-eighth inch or less long, and are so arranged as to make the small branches flat. They have a pleasant aromatic odor when crushed and a pungent taste.

The fruit is small, ripening in the fall of the first year. It is a yellowish brown oblong cone about one-half inch long with 6 to 12 scales borne singly or in large clusters on the ends of the branches.

The wood is light, soft, brittle, coarse-grained, durable, fragrant, and pale brown. It is used in Minnesota for making canoes, fence posts, railroad ties, telephone and telegraph poles, and shingles.

There are numerous ornamental or garden varieties of the arbor vitae. One species closely related to it is the Oriental arbor vitae (*Thuja orientalis*) also extensively planted for ornamental purposes.

BLACK WALNUT

(*Juglans nigra* L.)

This valuable and handsome forest tree occurs on rich bottom lands and moist, fertile hillsides in the southern part of the state. In the forest, where it grows singly, it frequently attains a height of 100 feet and a diameter of 3 to 5 feet with a straight stem, clear of branches for half its height. In open-grown



BLACK WALNUT
Twig, three-fourths; leaf and
fruit, one-fifth natural size.

trees the stem is short and the crown broad and spreading. It prefers rich, moist, and well drained soil, and requires much overhead sunlight.

The leaves are alternate on the stem, compound, 1 to 2 feet long, consisting of from 7 to 11 pairs of leaflets of a yellowish green color, each sharply pointed, smooth above, paler and hairy underneath. The leaflets are about 3 inches long, extremely tapering at the end and toothed along the margin. The bark is thick, dark brown in color, and divided by rather deep fissures into rounded ridges.

The fruit is a large round nut, borne singly or in pairs. It is enclosed in a solid green husk which is not sticky and does not split open even after the nut is ripe. The nut itself is black with a very hard, thick, finely ridged shell, enclosing a rich, oily kernel which is edible and highly nutritious. The fruit matures in the fall.

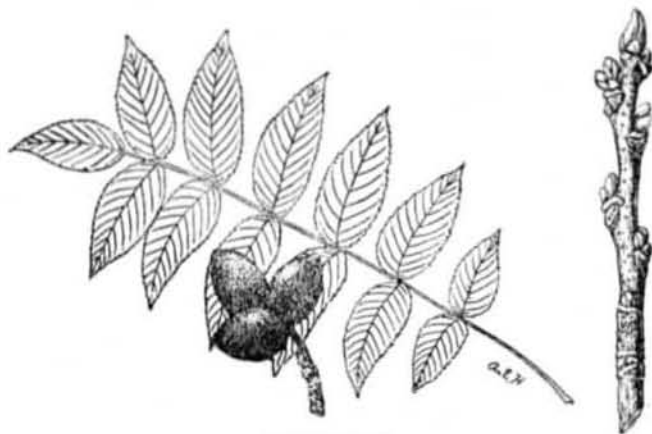
The heartwood is of superior quality and value. It is heavy, hard, and strong, of a rich chocolate-brown color and is comparatively free from warping and checking. It takes a high polish, and is very durable. It is highly prized for a great variety of uses, including furniture and cabinet work, gun-stocks, and airplane propellers. The finest veneers are made from burls and roots. Small trees consist mostly of sapwood, which is light colored and not durable.

Walnut is easily propagated from nuts and grow rapidly in good soil, where it should be planted and grown for both timber and nuts.

BUTTERNUT (White Walnut)

(*Juglans cinerea* L.)

The butternut tree is smaller than the black walnut, tho it often reaches a height of 80 feet and a diameter of 3 feet. It is found naturally in the same range as the black walnut, but ranges farther northward in the state, growing as far north as Mille Lacs County. The trunk is usually forked or crooked, and this makes it



BUTTERNUT

Leaf, one-fifth; twig, one-half; fruit one-third natural size.

less desirable for lumber. The top develops into an open broad crown.

The **bark** differs from that of the black walnut in being light gray on the branches and trunk of small trees, becoming darker on large trees. This tree may also be distinguished from black walnut by the velvet collars just above the scars left by last year's leaves.

The **leaves** are 15 to 30 inches long, each with 11 to 17 sharp-pointed, alternate, oblong, finely toothed, leaflets, each 2 to 3 inches long, yellowish green above and hairy underneath.

The **fruit** is a nut enclosed in an oblong, somewhat pointed, sticky, yellowish green husk about 2 inches long. The husk is covered with short, rusty, clammy, sticky hairs. The nut has a rough, grooved shell and an oily, edible kernel.

The **wood** is light, soft, and is not strong. It is coarse-grained, light brown, and takes a good polish. It is used for interior finish for houses and for furniture. A yellow dye can be made from the husks of the nuts and from the inner bark.

The tree should be planted in greater numbers on land not needed for agricultural crops, in its range.

SHAGBARK HICKORY (Shell Bark Hickory)

(*Hicoria ovata* Britton) (*Carya ovata* K. Koch)

The shagbark hickory is a large tree, averaging 60 to 100 feet high and 1 to 2 feet in diameter. Because of the small amount of hickory found in the state, it is of no great commercial importance. Its distribution is confined entirely to the southeastern corner of the state, extending northward into Wabasha County.

SHAGBARK
HICKORY
Leaf and fruit,
one-third; twig,
one-half natural
size.



It thrives best on rich, damp soil, and is found along streams and on moist hillsides.

The **bark** of the trunk is rougher than that of other hickories. It is shaggy, light gray, and separates into thick, vertical strips which are only slightly attached to the tree. The terminal winter buds are egg-shaped; the outer bud-scales have narrow tips that drop off early in the spring.

The **leaves** are alternate on the stem, compound, from 8 to 15 inches long, and are composed of 5, rarely 7, obovate to ovate leaflets. The twigs are smooth or clothed with short hairs.

The **fruit**, or nut, is borne singly or in pairs, and is globular. The enclosing husk is thick and deeply grooved at the seams and splits entirely into four parts. The nut is much compressed, or flattened, and is light colored. The shell is thin and the kernel is sweet. The nuts of this tree are the "shagbarks" of commerce.

The **wood** is heavy, hard, tough, and very strong. It is used largely in the manufacture of agricultural implements and tool handles, and in the making of spokes for automobiles, carriages, and wagons. For fuel the hickories are the most satisfactory of our native trees. It is the best of all woods for smoking meats.

BITTERNUT HICKORY
(Hicoria cordiformis Britton)
(Carya cordiformis K. Koch)

The bitternut hickory is a tall, slender tree with broadly pyramidal crown, attaining a height of 40 to 75 feet and a diameter of 10 to 24 inches. It is found in the original "big woods" area north as far as Mille Lacs and Cutfoot Sioux Lake. It thrives on low



BITTERNUT HICKORY
 Leaf, one-third; twig and fruit,
 one-half natural size.

ground along streams. It grows rapidly as compared to other hickories, and has a straight, clean trunk.

The **bark** on the trunk is granite-gray, faintly tinged with yellow, and is less rough than most hickories, yet it is broken into thin, plate-like scales. The bark does not strip off like that of shagbark hickory. The winter buds are compressed, scurfy, bright yellow, one-half inch or more in length, and is often without scales or at least quite different from those of its near tree relatives.

The **leaves** are alternate, compound, from 6 to 10 inches long, and are composed of from 5 to 9 leaflets. The individual leaflets are relatively much smaller and more slender than those of other hickories.

The **fruit** is about 1 inch long with a thin husk which usually splits only part way down the side; the nut is usually thin-shelled, smooth, and brittle. The kernel is very bitter. The nut is broader than it is long.

The **wood** is hard, strong, and heavy, and is reddish brown in color. It is used for hoop poles, fuel, and farm implements. It is said to be somewhat inferior to the other hickories, but is much used for the same purposes.

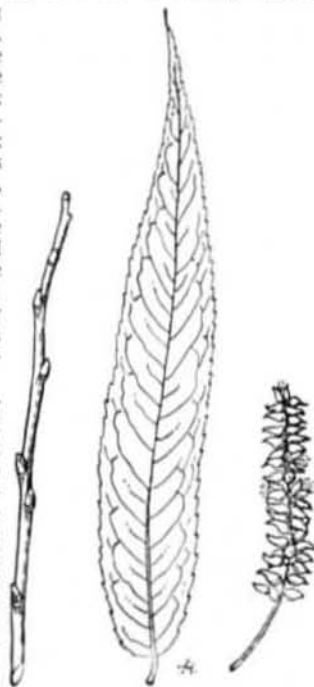
WILLOW
(Salix species)

There are four species of tree willows found in the state, of which the black and peach-leaf willows are native whereas the white and crack willows are foreign or "exotic." The two latter species, natives of Europe, are not commonly distinguished from each other but both are called "white" willow. Both have leaves whitish on the lower surface, and have become widely naturalized. The crack willow, however, is easily recognized by the twigs that crack or break from the branches very easily, and by the large, coarsely sawtoothed leaves. Those of the white willow are smaller, finely toothed, and often permanently silky. The white willow (*Salix alba* L.) is common but the crack willow (*Salix fragilis*) exceeds it in abundance and wide distribution.

The native black willow (*Salix nigra* Marsh.) is found in the southern counties from the West Des Moines River to the Mississippi River and northward along the Wisconsin border to the St. Croix. Its leaves are very narrow, and are green on both sides. The whole tree is dark green. The peach-leaf willow (*Salix amygdaloides* Ander.) has long-pointed, lance-shaped leaves, whitened beneath, and are borne on long, slender, and somewhat twisted leaf-stems or petioles. The whole tree is of a yellow green color, and the twigs are somewhat drooping. These points should afford the means of easy identification.

Besides the four tree willows, there are various shrubby species. All Minnesota willows have relatively narrow leaves, arranged alternately along the stem; buds consist of a single scale; flowers in dense elongated clusters, known as catkins; and very small seeds enclosed in a tuft of hairs. The flowers of some appear in early spring in advance of the leaves; of others, in late spring with the leaves; and of still others, in summer after the leaves. The willows may be propagated by seeds or cuttings, usually, however, by cuttings as the surer and more practicable way.

Uses. The willows are used for shade, ornament, and wind-breaks. They are relatively hardy to various conditions of soil and moisture. The wood is soft, light, and tough, and is light brown with the sapwood nearly white. It is used for fuel, charcoal, and large trees for artificial limbs.



BLACK WILLOW
 Twig, leaf, and fruit two-thirds
 natural size.

ASPEN (Popple) (Quaking Aspen)

(*Populus tremuloides* Michx.)

This tree is one of the most widely distributed in North America and is found in all parts of Minnesota. It is one of the first species to appear after a cutting or fire, being commonly found on cut-over lands. It does well on sandy, gravelly soils, but thrives better on good soil.

The aspen is a small to medium sized tree, reaching a height of 65 feet and a diameter of 12 to 20 inches, but usually somewhat smaller. The young branchlets are reddish brown and shiny, turning gray and becoming roughened after the first year. The winter buds are about one-fourth inch long, pointed, almost black, and shiny.

The bark is thin, greenish white to gray-green, almost smooth with black areas around the base of the limbs, and with a bitter inner bark.

The leaves are alternate along the stem, small, broadly oval, short-pointed at the end, and finely toothed along the margin. They are green and shiny above and dull green below, ranging in size mostly from 1 to 2 inches, but are often 4 inches or more in length as well as in width on vigorous young shoots. The leaf stalks are flattened at right angles to the leaves, causing the leaves to quake or tremble in a very slight breeze.

The fruit ripens in late spring (May or June) before the full expansion of the leaves, and consists of a cottony mass containing tiny rounded, brown seeds that usually germinate in a few hours after being released from the tree.

The wood is light brown, surrounded with nearly white sapwood, and is light, soft, and not strong. It is used extensively in manufacture of pulpwood for book and magazine paper, and for boards for food containers, such as lard pails, buttermilks, jelly buckets, and fish boxes. It is short lived when used in the ground. The aspen may be propagated by cuttings, seed, or suckers.



QUAKING ASPEN
TREMBLING ASPEN
SMALL-TOOTH ASPEN
Three-fourths natural size.

LARGE-TOOTH ASPEN OR POPLAR

(*Populus grandidentata* Michx.)

The large-tooth aspen is not nearly as common in Minnesota as the popple, or quaking aspen, except in the southwestern part of the state. The two species are frequently found growing in mixture or together. It grows rapidly, sometimes reaching a height of 60 to 80 feet and a diameter of 10 to 20 inches. It grows on sandy or rich soils that are moist, especially along the borders of streams, ponds, or lakes. It has a straight trunk and a somewhat oval crown.

The bark is smooth and is bronze green or gray. At the base of old trees the bark is dark, almost black, and divided into broad, flat ridges.

The buds are light gray and downy, and are larger than those of the quaking aspen.

The leaves serve to distinguish this species from the popple, or quaking aspen. The large-tooth aspen can easily be distinguished by its larger and coarse-toothed leaves which appear from 1 to 2 weeks later than those of the quaking aspen, and which at first are silvery white. They are 2 to 4 inches long and have a dark green upper surface.

The wood is light brown, weak, and soft, with a thin and nearly white sapwood. It is used in the manufacture of paper, excelsior, and to a small extent woodenware. Straight poles are used on farms for various purposes. It may be propagated by seed, cuttings, or suckers.



LARGE-TOOTH ASPEN

Leaf, twig, and fruit, one-half natural size.

COTTONWOOD

(*Populus deltoides* Marsh.)

The cottonwood, scattered widely and planted in all parts of the state, forms here and there quite extensive groves. It attains a height of 50 to 80 feet, a diameter of 3 to over 4 feet, and a long pyramidal top or crown. The tree is easily propagated by cuttings and grows rapidly, hence it has been widely planted to get shade quickly. For this purpose, however, the tree is unsatisfactory because it begins to shed the leaves by midsummer, the "cotton" from the female, or seed-bearing, tree is often a nuisance; the soft wood is easily broken by winds. The rank growth of the roots often results in stopping drain pipes and cracking and lifting sidewalks, if the trees are planted close to them.

The bark is light gray on young trees and dark gray and rough on older trees.

The leaves are alternate, broadly ovate or triangular, pointed, square at the base, finely toothed or wavy on the edges, 3 to 5 inches across each way, covered with soft white hairs on the under side, and have flattened slender stems from 2 to 3 inches long. The winter buds are covered with chestnut-brown, resinous scales.

The fruit, containing the seed, has a cluster of white silky hairs, which carry it for long distances. As already indicated the two kinds of flowers are borne separately on different trees.

The wood is soft, light weight, warps easily upon drying, and rots readily. However, it is used for many purposes, such as boxes, rough lumber for inside use, fencing, and fuel. It makes a high grade gloss magazine paper for the printing of halftone illustrations.

The cottonwood is used extensively in windbreak planting because of rapid growth and adaptability to soil. Altho used in ornamental planting it is not recommended, as it is much inferior to many other species.



COTTONWOOD
Leaf and fruit, one-half;
twig, one-third natural size.

BALM OF GILEAD (Balsam poplar)

(*Populus balsamifera* L.)

This tree grows to large size, attaining a height of 50 to 80 feet and a diameter of 1½ to 3 feet or more.

In Minnesota it is found through the northern part of the state where it occurs along streams, and edges of swamps or in other cool moist situations. The tree grows upright with a narrow, straight top which later becomes somewhat broad.

The bark is smooth and of a brown-gray color, deeply furrowed and ridged and gray-black on the old trunks.

The leaves are ovate and long pointed, the edges being finely toothed, dark green, and shiny above, pale and brownish white and with a bronze color effect as you

look up into the crown from below. The buds are large, pointed, and covered generously with a varnish-like resin or pitch, golden yellow in color, resembling balsam, and have a strong, pungent odor.

The fruit appears in May or June. It is very small and cotton-like and easily carried by the wind for long distances.

The wood is very heavy when green, light when dry, soft, not very strong, close-grained, light brown in color. The sapwood is white. The wood is used for pulp, boxes, packing cases, and rough lumber. It rots very readily in contact with the ground.



BALM OF GILEAD
Twig, one-third; leaf and fruit, one-half
natural size.

PAPER BIRCH (Canoe Birch, White Birch)

(*Betula papyrifera* Marsh.)

Paper birch is found generally abundant in the state except in the southwestern portions, growing in mixture with other trees or often in nearly pure stands covering only small areas. It attains good size and is often found 65 to 70 feet high with a trunk 14 to 20 inches in diameter. It is fond of cool and moist



PAPER BIRCH
Twig, one-half; leaf and
fruit, natural size.

locations. The twigs are dull orange or red during the first winter, but later become dark brown.

The tree trunk is covered with thin, papery bark, which becomes pure white with age, marked by many pores, or "lenticles," separating into thin sheets which often roll up. On old trees the bark thickens, becomes dark colored, nearly black and scaly. The paper birch is much planted for ornamental purposes.

The leaves are oval or heart-shaped, pointed and rounded at the base, and irregularly or doubly toothed. They are 2 to 3 inches long by 1 to 2 inches broad, and become thick and leathery in texture, dull green on the upper side and yellowish green on the lower side.

The fruit resembles a cone containing many tiny seeds each cone being one-sixteenth inch long, ripening in August and September. It propagates readily by seeds which are often scattered on the snow in winter.

The wood is hard, strong, tough, light in weight, brown tinged with red, with nearly white sapwood. It is in much demand for spools, shoepegs and lasts, toothpicks, turnery, paper pulp, toys, snowshoe frames, handles, interior finish, flooring and firewood.

The bark was extensively used by the northern Indians for covering their canoes and often their wigwams, also for making baskets, cups, bags, and other useful and ornamental handicraft.

YELLOW BIRCH

(*Betula lutea* Michx.)

The yellow birch is common in the woods in the northern half of the state where cool and moist conditions prevail. It is a large tree, often with a short or crooked trunk, occasionally reaching a height of 85 feet and a diameter of 2 to 3 feet.



YELLOW BIRCH
Leaf and twig, one-half; fruit, one-fourth
natural size.

The bark on the trunk and large branches is yellow-gray or straw colored with a few thin papery layers separating and often curling at the edges horizontally, giving the trunk a ragged appearance. The twigs are light brown, lustrous and slightly aromatic with oil of wintergreen.

The leaves are alternate, oval or approximately oblong, doubly and finely toothed, 3 to 5 inches long, dark green and lusterless on the upper surface, and much larger than those of paper birch.

The wood is heavy, strong, hard, close-grained and light brown in color, and takes a good polish. It is used for flooring, interior finish, veneers, woodenware, furniture, fuel, small wooden novelties, and many other uses. It is prized as firewood.

From the bark may be obtained commercial oil of wintergreen used in flavoring candies and other products.

RIVER BIRCH (Red Birch)

(*Betula nigra* L.)

This birch is found only in the southeastern corner of the state, chiefly in the Mississippi and Root River valleys, growing very commonly in the "bottoms." It is at home, as the name implies, along water courses, and inhabits the deep, rich soils along the borders of streams, ponds, and lakes, which are sometimes inundated for weeks at a time. It normally is a large tree, almost as large as the yellow birch, but in Minnesota it is of medium size, often forming extensive thickets.

The **bark** provides a ready means of distinguishing this tree. It varies from reddish brown to cinnamon-red in color, and peels back in tough papery layers. These loose

layers persist on all the branches as well as on the trunk, presenting a very ragged and quite distinctive appearance. Unlike the bark of our other birches, the thin papery layers are usually covered with a gray powder. On the older trunks, the bark on the main trunk becomes thick, deeply furrowed, and of a reddish brown color.

The **leaves** are alternate, 2 to 3 inches long, more or less triangular in shape, with double-toothed edges. The upper surface is dark green and the lower surface a pale yellowish green.

The **fruit** is cone-shaped, about 1 inch long, and densely crowded with little winged nutlets that ripen from May to June.

The **wood** is strong and fairly close-grained, and light brown in color. It has been used to some extent in the manufacture of woodenware, in turnery and for wagon hubs. Since, however, this tree is scattered in its distribution and mostly confined to the banks of streams, it does not figure largely in commercial lumbering, but is used for firewood.



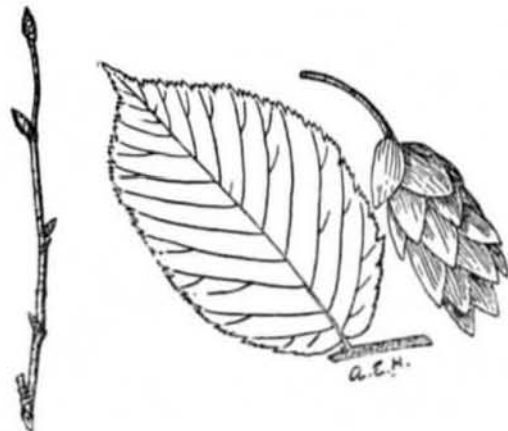
RIVER BIRCH
Two-thirds natural size.

IRONWOOD (Hop Hornbeam)

(*Ostrya virginiana* K. Koch.)

This tree gets its common names from the qualities of its wood and the hop-like fruit. It is a small, slender, generally round-topped tree, from 20 to 40 feet high and 5 to 12 inches in diameter. The top consists of long, slender, wire-like branches, commonly drooping toward the ends. It is found mostly in rich, not too dry soils, throughout the state except in northern Roseau and Lake of the Woods Counties, in the vicinity of Lake of the Woods.

The **bark** is mostly light gray-brown or gray and finely divided into thin scales which are easily rubbed off with the hand. By the last characteristic, after a little acquaintance, the ironwood can be easily recognized.



IRONWOOD
Twig, leaf, and fruit, one-half natural size.

The **leaves** are alternate, generally oblong with narrow tips, sharply toothed along the margin, sometimes doubly-toothed, and from 2 to 4 inches long.

The **fruit**, which resembles that of the common hop vine, consists of a cluster of sack-like bracts one-half to three-quarters inch long, each containing one flattened ribbed, hard nutlet.

The **wood** is very strong, hard, heavy, durable, light brown with thick pale sapwood. It is often used for fence posts, levers, handles of tools, parts of machinery, wedges, mallets, and other small articles.

The leaves of ironwood somewhat resemble those of the elm, with which this species might be confused were it not for the fruit and the bark, which are very different.

BLUE BEECH (Ironwood)
(*Carpinus caroliniana* Walt.)

The blue beech, often known as ironwood, hornbeam, and occasionally as water beech, is a small, slow-growing, bushy tree with a spreading top of slender, crooked, or drooping branches. It is found along streams and in low ground or moist woods scattered throughout the southern half of the state and as far north as Itasca Park and the White Earth Reservation. Its height is usually from 20 to 30 feet and its diameter 2 to 6 inches, although it sometimes grows larger. It frequently forms thickets.

The trunk is fluted with irregular ridges extending up and down the tree.

The bark is light brownish gray to dark bluish gray in color, hard, close fitting, always smooth and sometimes marked with dark bands extending horizontally on the trunk.

The leaves are alternate, oval, long-pointed, doubly toothed along the margin, 2 or 3 inches in length, and the veins are very prominent, and similar to those of the hop hornbeam.

The fruit is in clusters with leaf-like bracts each with a nutlet about one-third inch long attached on the outside. The leaf-like bract probably may act as a wing in aiding seed distribution by the wind.

The wood is tough, close-grained, heavy, hard, and strong. The wood is light brown in color with thick white sapwood. It is sometimes selected for use as levers, tool handles, wooden cogs, mallets, and wedges. The tree is of little commercial importance and often occupies space in the woods that should be utilized by the more valuable varieties.



BLUE BEECH
One-half natural size.

WHITE OAK
(*Quercus alba* L.)

In Minnesota white oak occurs mostly in the southeastern part of the state in mixture with other hardwoods. Commonly reaching a height of 60 to 100 feet and a diameter of 2 to 3 feet, the white oak may sometimes become much larger. It is found in a wide variety of soils and is a deep-rooted, massive tree. When grown in a dense stand it has a straight continuous trunk, free of side branches for over half its height. In the open, however, the tree develops a broad crown with far-reaching limbs. Well-grown specimens are strikingly beautiful.

The leaves are alternate, 5 to 9 inches long, and about half as broad. They are deeply divided into 5 to 9 rounded, finger-like lobes.

The young leaves are soft silvery gray, yellow or red while unfolding, becoming later bright green above and much paler below. The leaves sometimes remain on the trees most of the winter.

The fruit is an acorn maturing, like all of the white oak group, the first year. The nut is three-quarters to one inch long, light brown, about one-fourth enclosed in the warty cup. It is relished by hogs and other livestock. The acorn germinates in a few weeks after it is ripe and falls to the ground, sending down a long tap root before winter.

The bark is thin, light ashy gray and covered with loose scales or broad plates. The bark is astringent and used for tanning and medicine.

The wood is useful and valuable. It is heavy, strong, hard, tough, close-grained, durable, and light brown in color. The uses are many, including heavy construction, ship-building, tight cooperage, furniture, wagons, implements, interior finish, flooring, ties, posts, and fuel.

Notwithstanding its rather slow growth, white oak is valuable for forest, highway and ornamental planting.

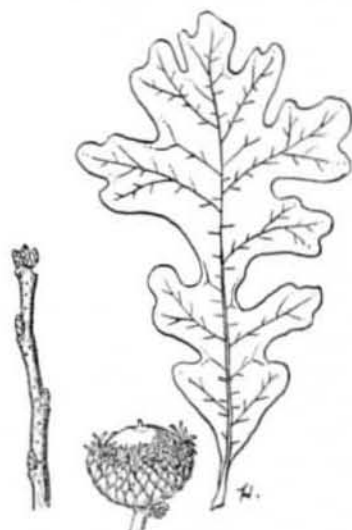


WHITE OAK
Leaf and fruit, one-third; twig,
one-half natural size.

BURR OAK (Mossy Cup Oak)

(*Quercus macrocarpa* Michx.)

The burr oak is one of the commonest trees in Minnesota, extending far out on the prairies in the western part of the state. The burr oak does not often form a part of the forest stand, as do some other oaks, but generally occurs singly in open stands and in fields. It requires a moist but well drained soil; it is easy to propagate but grows slowly. This oak takes its name from the fringe around the cup of the acorn. Under unfavorable situations it is stunted and not over 15 feet high, the branches being strong and gnarled and often covered with corky tissue. In dense forests, the trunk is straight with short branches. The tree usually has a broad top of heavy spreading branches and a relatively short body. In maturity in favorable situations it attains a diameter of 3 to 4 feet or more and a height of over 80 feet.



BURR OAK
One-third natural size.

The bark is light gray but darker than that of white oak, and is usually broken up into small narrow plates.

The leaves resemble somewhat those of the common white oak, but each has a pair of deep indentations on its border near the base and wavy notches on the broad middle and upper portions. The leaves are crowded at the ends of the twigs and in size from 6 to 12 inches long and 3 to 6 inches wide.

The fruit consists of an acorn set deeply or almost enclosed in a fringed burr-like cup, and is ovoid in shape. It is sometimes one inch or more in diameter but varies widely in respect to size and the degree to which the nut is enclosed in the mossy fringed cup. The seed is somewhat bitter.

The wood is heavy, hard, strong, tough, durable, and rich brown in color. It is used for much the same purposes as the other white oaks—for lumber, cross-ties, posts, and fuel.

SWAMP WHITE OAK

(*Quercus bicolor* Willd., formerly
Q. Plantanoides Sudw.)

The swamp white oak, as the name implies, inhabits the low grounds and bottom lands, and in general appearance is much like that of the true white oak. It is found only along the river bottoms in the southeastern part of the state, in association with other oaks, maples, ashes, and other species. This oak grows to a height of 65 feet.

The bark is deeply and irregularly divided by fissures into broad ridges of a grayish brown color. The bark on twigs is ragged, often peeling.

The leaves are generally broader at or beyond the middle length (pear-shaped) and wedge-shaped toward the base.

wavy and indented along the margin, dark green and shiny above and grayish and fuzzy beneath, and from 5 to 6 inches in length by 2 to 4 inches in width. Leaves are often found at the end of the twigs and turn brown in autumn.

The acorn, or fruit, occurs commonly in pairs and requires only one season to mature. It is borne on slender stalks from 2 to 4 inches in length. The nut, or acorn proper, is about 1 inch long by two-thirds of an inch thick and enclosed for about one-third of its length in a thick narrow cup.

The wood is light brown, heavy, hard, strong, and tough and used for similar purposes as the true white oak, such as furniture, cabinet work, flooring, cooperage, ties, fence posts, and fuel.



SWAMP WHITE OAK
One-half natural size.

RED OAK

(*Quercus borealis* Michx. formerly *Q. rubra* L.)

The red oak occurs throughout the state, but is most common and of best quality in rich soil of southern, central and southeastern Minnesota. It usually attains a height of 55 to 80 feet and a diameter ranging from 2 to 3 feet, and sometimes larger. The forest-grown tree is tall and straight with a clear trunk and narrow crown.

The bark on young stems is smooth, dark gray to dark brown, on older trees thick and broken by shallow fissures into regular, flat, smooth-surfaced vertical plates.

The leaves are alternate, 5 to 9 inches long and 4 to 6 inches wide,

broader toward the tip, divided into 7 to 9 lobes, each extending one-half the way to the midrib. Each lobe is somewhat coarsely toothed, bristle-tipped, firm, dull green above and paler below, often turning a brilliant red after frost. The buds are thick and pointed at the top.

The fruit is a large acorn maturing, like all of the "red" or "black" oak group, the second year. The nut is from three-fourths to nearly two inches long, blunt-topped, flat at base, with only its base enclosed in the very shallow dark-brown cup. The acorn is bitter.

The wood is hard, strong, coarse-grained, with light reddish brown heartwood and thin lighter-colored sapwood. It is used for cooperage, interior finish, construction, furniture, crossties, posts, and fuel.

Because of its average rapid growth, high-grade wood, and general freedom from insect and fungus attack, the red oak is widely encouraged in the southern portions of the state for timber production and as a shade tree. It is less valuable than white oak. It is easily transplanted on account of its comparatively shallow root system.



RED OAK

Twig and fruit, one-half; leaf, one-third natural size.

SCARLET OAK (Jack Oak)

(*Quercus ellipsoidalis* Hill)

The scarlet oak or jack oak occurs usually on dry ridges in the southeastern part of the state and as far north as Cass Lake, except on limestone soils. It is nowhere very abundant or of first importance. It usually reaches a height of 40 to 65 feet, with a trunk diameter of 2 or 3 feet. The branches droop at the ends and form a narrow, open crown. The trunk tapers rapidly.

The bark on young stems is smooth and light brown. On old trunks it is divided into irregular ridges and plates not so flat-topped as those of the red oak. The bark is often mottled or spotted with gray.

The leaves are alternate, somewhat oblong or oval, 3 to 6 inches long, 2½ to 4 inches wide, usually 7-lobed, the lobes bristle-pointed and separated by rounded openings extending at least two-thirds of the distance to the midrib, giving the leaves a very deeply "cut" or lacy appearance. The leaves come out in the spring, bright red and hairy, turning green later on, and a brilliant scarlet in the autumn.

The fruit, or acorn, takes 2 years to mature. The acorn is one-half to 1 inch long, reddish brown, often striped, and about half enclosed in the cup. The kernel is bitter.

The wood is heavy, hard, strong, coarse grained, and reddish brown in color. The lumber is sold as red oak and has the same uses. The wood is used mostly for fuel. Scarlet oak is used somewhat in ornamental planting, and is easily grown from seed.



SCARLET OAK

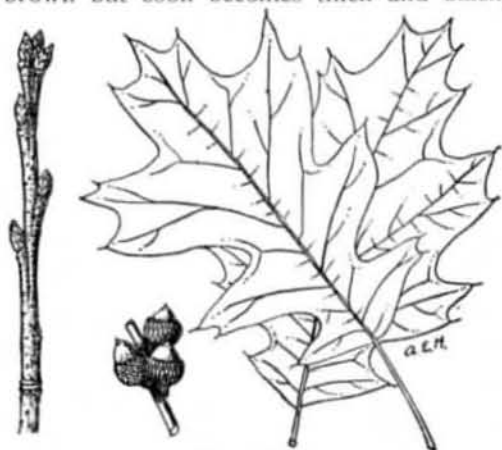
Twig and fruit, one-half; leaf, one-third natural size.

BLACK OAK

(*Quercus velutina* Lam.)

The black oak usually grows to a height of 35 to 75 feet and 9 to 30 inches in diameter. It is found almost wholly in southeastern Minnesota on dry hill ridges. The crown is irregularly shaped and wide, with a clear trunk for 20 feet or more on large trees.

The **bark** on the very young trunks is smooth and dark brown but soon becomes thick and black, with



BLACK OAK

Twig and fruit, one-half; leaf, one-third natural size.

deep furrows and rough broken ridges. The bright yellow color and bitter taste of the inner bark, due to tannic acid, are distinguishing characteristics.

The **leaves** are alternate, 5 to 10 inches long and 3 to 8 inches wide, and are lobed one-half way to the midrib into broad, triangular, bristle-pointed lobes of which there are usually 5 to 7. When mature, the leaves are dark green and shiny on the upper surface, pale on the lower, thick, more or less covered with down, and with conspicuous rusty brown hairs in the forks of the veins. In the spring the leaves appear crimson, turning to silvery when half grown, and to brown in autumn.

The **fruit** matures the second season. The light brown nut is from one-half to 1 inch long, more or less hemispherical in shape, and from one-half to three-quarters enclosed in the thin, dark-brown scaly cup. The kernel is yellow and extremely bitter.

The **wood** is hard, heavy, strong, not tough, coarse-grained and checks easily. It is a bright red-brown with a thin outer edge of paler sapwood. It is of little commercial value except for fuel, but as lumber is sometimes mixed with red oak commercially. The bark is used for tannin and as a yellow dye.

AMERICAN ELM (White Elm)

(*Ulmus Americana* L.)

This elm is a large tree sometimes 80 to 90 feet high, and 2 feet to over 4 feet in diameter. It is fairly common throughout the state, and prefers rich bottom land but is not confined to these areas.

The **bark** is dark gray, divided into irregular, flat-topped, thick ridges, and is generally firm, though on old trees it tends to come off in flakes. An incision into the outer or dead bark will show alternate layers of brown and white.

The **leaves** are alternate, 4 to 6 inches long, rather thick, somewhat one-sided, doubly toothed on the margin, and generally rough above and smooth below. The veins are very pronounced and run in parallel lines from the midrib to the edge of the leaf.

The **fruit** is light green, an oval shaped wafer-like samara (winged fruit), with the seed portion in the center and surrounded entirely by a wing. A deep notch in the outer end of the wing is distinctive of the species. The seeds hang in clusters, ripen in the spring and by their wings are widely disseminated by the wind. The seed can be collected easily by sweeping them up from the ground, particularly under street trees.

The **wood** is heavy, hard, strong, tough and difficult to split, and light brown in color. It is used for hubs of wheels, saddle trees, boats and ships, furniture, barrel staves and hoops, and veneer for baskets and crates.

The elm is very hardy, is used for prairie planting, and is a fairly rapid grower. Because of the graceful form and general suitability it is a very desirable ornamental and shade tree.



AMERICAN OR WHITE ELM

One-half natural size.

ROCK ELM (Cork Elm)
(*Ulmus racemosa* Thomas.)

The rock elm is of about the same size as the American elm. In Minnesota it is found in the eastern and south central part of the state in the Minnesota Valley, and northward to Clearwater County. Its trunk grows straight while that of the white elm divides into many branches to form the crown of the tree.



ROCK ELM
Fruit, two-thirds; leaf and twig,
natural size.

Small branches often have corky ridges along their sides. The **bark** on old trees may be 1 inch thick and cut into broad flat ridges by shallow grooves.

The **leaves** resemble those of the American elm, but are smaller, smoother on both sides, leathery, and more elliptic in shape.

The **fruit** is ripe in early summer, ovate, one-seeded, wafer-like, only slightly notched at the outer end and about one-half inch long.

The **wood** is the best of any of the elms, close-grained, compact and strong and is used wherever it is necessary to resist shocks and jars, splitting with difficulty. It is light reddish brown in color, with a thick, lighter colored sapwood. It is used for agricultural implements, hubs, sills of buildings, railway ties, bicycle rims, wheel chairs, hockey sticks, and furniture.

SLIPPERY ELM (Red Elm)
(*Ulmus fulva* Michx.)

The slippery elm, or red elm, is a common tree in all sections of the state. It is found principally on the banks of streams and on low lands in rich moist soil. It is a large tree from 40 to 65 feet in height and 16 to 24 inches in diameter, altho trees of larger dimensions are occasionally found.

The **bark** on the trunk is frequently 1 inch thick, dark grayish brown, and broken by shallow fissures into flat ridges. The inner bark on trunk and branches is used to some extent for medicinal purposes, as it is fragrant and, when chewed, affords a slippery, mucilaginous substance, from which the tree gets its name.

New twigs are scurfy and winter buds are covered with brown silky hairs.

The **leaves** are ovate, alternate on the stem, 4 to 6 inches in length, sharp-pointed, their bases unsymmetrical, doubly-toothed on the edges, thick, dark green, and rough on both sides; the leaves turn to a yellowish color before falling.

The **fruit** consists of a seed surrounded by a thin, broad, greenish wing, about one-half inch in diameter, which ripens when the leaves are about half-grown.

The **wood** is close-grained, tough, strong, heavy, hard, moderately durable in contact with the soil. It is used for fence posts, crossties, agricultural implements, ribs for small boats and for many other purposes. The wood is dark brown with light colored sapwood. It is a fairly fast growing tree of good shape and is hardy.



SLIPPERY ELM
Twig and fruit, one half; leaf,
one-third natural size.

HACKBERRY
(*Celtis occidentalis* L.)

The hackberry is found sparingly in the southern part of the state and extends northward through the Red River Valley. It occurs most abundantly and of greatest size on rich alluvial lands, but thrives, however, on various types of soil from the poorest to the richest. It is never found in pure forests; it seems to do very well on limestone soil. The hackberry grows from 40 to 75 feet high and 10 inches to 3 feet in diameter. Its limbs are often crooked and angular. The tree bears a head made up of slender, pendant branches, or short, bristly, stubby twigs. In the open the crown is generally very symmetrical. It makes an excellent shade tree.

The bark is grayish and generally rough with scale-like or warty, corky projections of dead bark. In some instances the bark is smooth enough on the limbs to resemble that of the beech.

The leaves are alternate on the twig, ovate, 2 to 4 inches long, the edges toothed toward the long point, oblique at the base, with prominent veins, and hairy on the upper side.

The fruit is a round and somewhat oblong drupe, or berry, from one-fourth to one-third inch in diameter. It has a thin, purplish skin, and sweet, yellowish flesh. From this characteristic it is sometimes called sugarberry. The berries frequently hang on the tree most of the winter. The fruit ripens in September.

The wood is heavy, rather soft, weak and coarse-grained, but is fairly durable in contact with the soil. The color of wood is light yellowish or greenish brown with narrow white sapwood. This tree is used in ornamental planting in southern Minnesota, and also in manufacture of cheap furniture. The wood is often used in place of elm. It is used chiefly for fuel, only occasionally for lumber.



HACKBERRY
Leaf, one-third and twig, one-half natural size.

MOUNTAIN ASH
(*Sorbus americana* Marsh.)

A small tree reaching heights of 20 to 30 feet with a trunk diameter of 4 to 12 inches. The mountain ash is found scattered in the woods of the northern part of the state as far south as Pine and Mille Lacs Counties, typically along the edges of swamps. It reaches its best development in the northeastern counties of the state.



MOUNTAIN ASH
Leaves and fruit, one-third; twig, three-fourths natural size.

The compound leaves are from 6 to 8 inches long, composed of from 13 to 17 leaflets, each from 3 to 4 inches long and about an inch wide in the middle. The leaflets have long points with toothed edges, bright green in color above, turning to a bright yellow in the fall.

The bark is smooth on the trunk with horizontal markings on branches.

The fruit is a bright orange "berry," about one fourth inch in diameter, rounded, and with thin flesh, having a sour taste. The fruit gives the tree a very ornamental appearance, remaining on the trees after the leaves are fallen. Its astringent properties make it useful for medicine. It prefers open moist situations but also does well on drier areas and on thinner soils.

The wood is light, soft, and weak, pale brown in color with light colored sapwood; the slow growth of the tree gives it a very close grain. It is of no commercial importance. It has, however, a good ornamental value on account of its bright colored fruit. The inner bark has some medicinal qualities.

JUNE BERRY OR SERVICE BERRY (Shad Bush)

(*Amelanchier laevis* Wieg.)

The June berry, also known as service berry, or shad bush, is found throughout the state but attains its best development along banks of streams, shores of lakes, or open upland woods. In Minnesota it is a small tree, may be 30 feet high, but seldom over 20 feet high, and 4 to 8 inches in diameter, with a rather narrow, rounded top. It is often little more than a shrub.

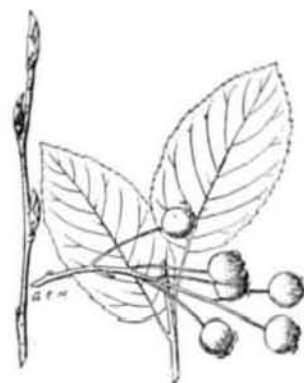
The **bark** is thin, ashy gray, smooth on the branches and upper part of the stem, and breaking into shallow fissures on the short trunk.

The **leaves** are alternate, slender-stalked, ovate, rounded finely toothed, 2 to 4 inches long, purplish brown until nearly mature, then becoming a light green, and early covered with scattered silky hairs.

The **white flowers** appear in erect or drooping clusters in April and May, before or with the leaves, making the tree quite conspicuous in the leafless or budding forest.

The **fruit** is sweet, edible, rounded, dark purple when ripe, one-third to one-half inch in diameter, ripening in July or August. Birds and other denizens of the forest are very fond of the fruit. Persons have been known to cut down and destroy the trees only to gather the fruit.

The **wood** is heavy, exceedingly hard, strong, close-grained and dark brown. This is a desirable ornamental tree and should be planted for this purpose, also to encourage the birds. In this state it is of no commercial importance.



JUNE BERRY
Service Berry, Shad Bush
One-half natural size.

BLACK CHERRY (Wild Cherry)

(*Prunus serotina* Erh.)

The black cherry is the largest of the cherry trees, growing to about 70 feet high and from 8 inches to 2 feet in diameter under favorable conditions. Forest-grown trees have long clear trunks with little taper; open-grown trees have short trunks with many branches and irregular spreading crowns. This tree is fairly common in the hardwood region of the state.

It grows to good commercial size in the southeastern part of the state only.

The **bark** on the branches and young trunks is smooth and bright reddish brown, marked by conspicuous, narrow, white, horizontal lines, and has a bitter-almond taste.

On the older trunks the bark is thin, darker brown in color, becoming rough and broken into thick, irregular plates.

The **leaves** are alternate, simple, oval or lance-like in shape, with edges broken by many fine incurved teeth; thick and shiny above, and paler beneath.

The **fruit** is dull purplish black, about as large as a pea, and is borne in long hanging clusters resembling the choke cherry. It ripens in late summer, and is edible, altho it has a slightly bitter taste. It has some medicinal value.

The **wood** is reddish brown with yellowish sapwood, moderately heavy, hard, strong, fine-grained, and does not warp or split in seasoning. It is valuable for its luster and color and is used for furniture, interior finish, tools, and implement handles. With the exception of black walnut, cherry lumber has a greater unit value than any other hardwood of this state.



WILD BLACK CHERRY
Twig, two-thirds; leaf, one-third; fruit,
one-half natural size.

PIN CHERRY (Wild Red Cherry)

(*Prunus pennsylvanica* L.)

The pin, fire, or wild red cherry grows in woods, thickets, and clearings, commonly through the state except in the southwestern portion. It is often abundant on cut-over lands, old fields, and along roadsides.

It is usually a shrub or a medium-sized tree, with slightly bitter **bark**, reddish brown in color, which



PIN CHERRY (Wild Red Cherry)
Leaf and fruit, natural size; twig, one-half natural size.

breaks up into papery layers, marked by horizontal pores, or lenticels.

The oblong pointed **leaves** are 3 to 4 inches long and an inch wide, shiny green when fully grown with finely incurved teeth along the edge.

The **fruit** is borne on a long stalk, and ripens in middle or late summer. It has a bright red skin with thick, sour flesh surrounding the stone. This cherry is used somewhat for home uses as jellies and for cough medicine. The flowers and fruit are borne in flat or rounded clusters, or umbels, which will distinguish this cherry from the choke and the black cherries.

The **wood** is medium light and medium soft, brownish in color with thin yellowish sapwood. It has no special commercial uses. The tree is hardy and well adapted to planting on rather hard situations, especially suited for planting about houses for home beautification and to attract our more useful song birds.

CHOKE CHERRY

(*Prunus virginiana* L.)

The choke cherry is a shrub or small tree usually not over 20 to 25 feet high with a trunk diameter of from 4 to 8 inches.

In Minnesota it is fairly common throughout the state along stream courses, open woods, and in cut-over and brush areas.

The **bark** is thin and of a grayish brown color and with age it becomes rather roughened. The inner bark has a very bitter cherry flavor and odor, more so than either the black or pin cherry.



CHOKE CHERRY
One-third natural size.

The **leaves** are alternate

on the twig, broadly oval, and abruptly and sharply pointed. The leaves are finely toothed, and of a bright green color above and paler underneath. They are usually from 2 to 4 inches long and 1 to 2 inches broad.

The small **flowers** appear in dense clusters from 3 to 6 inches in length. The petals, or flower "leaves" are round and white. The flower buds open in May or June.

In the latter part of July or early August the **fruit** is ripe, being of a reddish color turning darker when fully ripe. The skin of the fruit is thick, the flesh thin and a dark color, and very astringent to the taste.

The **wood** is hard and heavy but not very strong, and is of no commercial value in Minnesota. It is a very popular tree for birds and is extensively used for ornamental planting.

WILD PLUM

(*Prunus americana* Marsh.)

The wild plum is a shrub or a small tree not exceeding 35 feet in height and with a maximum trunk diameter of 10 inches. Its usual height, however, is from 15 to 25 feet.

It is found generally scattered through the state occurring in thickets here and there particularly along banks of streams. It prefers, however, rich soil or moist situations but will grow elsewhere. The trunk is usually short and thorny, dividing a short distance from the ground.

The bark is thin, reddish brown and breaks up into thin plates.

The leaves are alternate, more or less oval in shape, long and narrow-pointed, and doubly-toothed along the margin. They are dark green above, paler below, 3 to 5 inches long, and about 2 inches wide.

Flowers appear about April or May when the leaves are partly grown and are a beautiful white or pink color. The flower has a strong pleasant odor.

The fruit is about three-fourths inch in diameter and ripens in late summer. The flesh is somewhat sour, clinging to the seed; the outer skin is orange-red when ripe with yellowish, sweet flesh.

The wood is strong, hard, close-grained, dark brown in color with light-colored sapwood. The tree has no special commercial use, except as an ornamental and for its fruit, which is prized by many people for making jellies and preserves. Its hardness makes it desirable also for planting in rather severe situations.



WILD PLUM
Three-fourths natural size.

HONEY LOCUST (Black Locust)

(*Gleditsia triacanthos* L.)

The honey locust occurs in rich wooded areas and on borders of streams. It is a medium-sized tree 40 to 60 feet high, but under favorable conditions may grow taller. In Minnesota it occurs only in scattered stands or as individuals. It occurs particularly on and near the Mississippi bottom lands of southern Minnesota, especially in Houston County, also in some of the other southern counties along the Root River Valley. It sometimes occurs in the forest, but more commonly in corners and waste places beside roads and fields. It reaches a diameter of 20 inches and may reach a height of 65 feet.



HONEY LOCUST
Twig, three-fourths; leaf, and seed pod,
one-fourth natural size.

The bark on old trees is dark gray or brown and is divided into thin tight scales. The strong thorns are straight, brown, branched, sharp and shiny, growing on the 1-year-old wood and remaining for many years. These points are sufficient to identify the honey locust.

The leaf is pinnate or feather-like, with 18 to 28 leaflets; or it is twice-pinnate consisting of 4 to 7 pairs of pinnate or secondary leaflets, each 6 to 8 inches long.

The fruit is a pod, 10 to 18 inches long, often becoming twisted as the seeds ripen, 1 to 1½ inches wide, flat, dark brown or black when ripe and containing seeds and yellow, sweetish pulp which later becomes astringent. The seeds are very hard and each is separated from the others by the pulp. The pods are eaten by many animals, and as the seeds are hard to digest they are passed out. Many are thus widely scattered from the parent tree.

The wood is red or reddish brown in color, coarse-grained, hard, strong and not durable in contact with the ground. However, it is used for fence posts, crossties, hubs for wheels, and makes good fuel. The tree has been planted a little for wind-breaks and hedges in southern Minnesota. Honey locust wood should not be confused with the very durable wood of the black locust. The honey locust tree sprouts readily from the root, and is not generally hardy in Minnesota.

SUGAR MAPLE (Hard Maple)

(*Acer saccharum* Marsh.)

The sugar maple, often called hard maple, is common only in cool rich situations in the eastern half of the state. It has a very symmetrical, dense crown, affording heavy shade, and is therefore quite extensively planted for that purpose.

The **bark** on young trees is light gray to brown and rather smooth, but as the tree grows older it breaks up into long, irregular plates or scales, which vary from gray to almost black. The twigs are smooth and reddish brown, and the winter buds sharp-pointed. The tree may attain a height of more than 80 feet and a diameter of 2 feet or more.

The **leaves** are 3 to 5 inches across, opposite on the stem, with 3 to 5 pointed smooth margined lobes, the divisions between the lobes being rounded. The leaves are dark green on the upper surface, lighter green beneath, turning in autumn to brilliant shades of dark red, scarlet, orange, or clear yellow.

The **fruit**, which ripens in the early fall, consists of a two-winged "samara" or "key," the two slightly divergent wings about 1 inch in length, each containing a seed and carried by the wind.

The **wood** is hard, heavy, strong, close-grained, and light brown in color. It is known commercially as hard or rock maple, and is used in the manufacture of flooring, furniture, shoe-lasts, and a great variety of novelties. The wood possesses a high fuel value. "Bird's eye" maple is highly prized in furniture making. Two valuable products of this tree are maple syrup and maple sugar made by tapping the trees and evaporating the sap. Hard maple is used considerably in ornamental plantings.



HARD MAPLE (Sugar Maple)
Leaf, one-third; fruit and twig,
one-half natural size.

RED MAPLE

(*Acer rubrum* L.)

The red maple, or swamp maple, is distributed throughout the eastern half of the state as far south as Houston County and as far west as a line running south from Mahanomen to Redwood Falls. It is usually a medium-sized tree, from 40 to 65 feet high with a trunk diameter of 10 inches to 2 feet. It is quick growing and relatively short-lived. It is used as a shade tree, though much inferior for this purpose especially when compared to the sugar maple.

The **bark** is smooth and light gray on young stems, and dark gray and rough on the old limbs and trunk. The old bark is divided by shallow flaky ridges at the surface, making the tree look shaggy. The bark is sometimes used in dyeing.

The **leaves** are opposite on the stem, 2 to 5 inches long, and have from 3 to 5 pointed, saw-toothed lobes, which are separated by sharp angular openings. The upper surface when mature is light green and the lower surface whitish and partly covered with pale down. In autumn the leaves turn to brilliant shades of red, orange, and yellow. It is the first of the maples to turn in the fall.

The winter buds are small, red, and round or blunt-pointed. The **fruit** ripens in late spring or early summer. It consists of pairs of winged seeds, or keys, one-half to 1 inch in length, on long drooping stems, red, reddish brown or yellow in color.

The **wood**, which is commercially known as soft maple, is heavy, close-grained, rather weak and of a light-brown color. It is used in the manufacture of cheap furniture and for turnery, woodenware, and also for fuel. Because its foliage colors so beautifully in the autumn, red maple is planted for ornamental purposes, but the wood has little commercial value. It can be used in roadside planting and in parks, but should not be planted extensively in city streets.



RED MAPLE
Leaf and fruit, one-third natural size.

SOFT MAPLE (Silver Maple)

(*Acer saccharinum* L.)

The soft, or silver, maple is found commonly in the southern part of the state but scattered in the north. It may attain a height of 100 feet or more and a diameter of 3 feet or over. It usually has a short trunk, which divides into a number of large ascending limbs. These again subdivide, and the small branches droop but turn upward at the tips.

The bark on the old stems is dark gray and broken into long flakes or scales; on the young shoots, it is smooth and varies in color from reddish to a yellowish gray. The silver maple grows rapidly and has been much planted as a shade



SILVER MAPLE
Twig, one-half; leaf and fruit, one-third
natural size.

tree, but is less desirable than many other trees because of its brittleness and its susceptibility to insects and fungous diseases.

The leaves are opposite on the stem, have from 3 to 5 lobes ending in long points with toothed edges, and are separated by deep angular sinuses or openings; they are pale green on the upper surface and silvery white underneath.

The buds are rounded, red or reddish brown, blunt-pointed; generally like those of red maple.

The fruit ripens in late spring. It consists of a pair of winged seeds, or "keys," with wings 1 to 2 inches long on slender, flexible, threadlike stems about an inch long.

The wood is light brown in color, strong, fairly hard, even-textured, rather brittle, easily worked, but decays readily when exposed to the weather or used in the ground. It is occasionally used for flooring, furniture, and fuel. It is classed as soft maple but is often mixed with red maple commercially.

BOX ELDER

(*Acer negundo* L.)

The box elder is a fairly rapid-growing tree, found commonly throughout the state but less often in the northeastern portion. It grows naturally along streams and in cool ravines. It is generally a tree of medium size, may reach 18 inches in diameter and 60 to 70 feet in height on favorable soils, but is rather bushy



BOX ELDER
Twig, two-thirds; leaf, one-third natural size.

on unfavorable soils. Because of its hardness it has been planted considerably for shade and windbreaks in the prairie regions. In good soil its growth is rapid. Its limbs and branches, however, are fragile, and the tree is somewhat subject to fungous diseases and insects. It is prolific in reproduction but the young trees are largely destroyed by grazing and by cultivation. It is one of the hardiest of trees for severe locations.

The bark on young branches is smooth and green in color; on old trees it is thin, grayish to light brown and deeply divided.

The leaves are compound, with usually 3 leaflets (rarely 5 or 7), opposite, smooth, lustrous, green, and borne on a leaf stem or petiole 2 to 3 inches long. The leaflets are 2 to 4 inches long by 1 to 2 inches wide, making the whole leaf 5 to 8 inches in length.

The fruit is a samara, or key, winged similarly to that of a sugar maple, but smaller. It ripens in late summer or early fall often persisting on the tree all winter.

The wood is creamy white in color, soft, light, weak, close-grained, and decays rapidly in contact with heat and moisture. It is used occasionally for fuel. It has no general commercial value.

WHITE ASH

(*Fraxinus americana* L.)

The white ash is found only in the southeastern part of the state. It grows to best advantage in rich moist soils. It reaches an average height of 50 to 90 feet and a diameter of 1 to 2 feet, though much larger trees are found in some instances.



WHITE ASH

Twig, one-half; leaf and fruit, one-third natural size.

The **bark** on young twigs and branches is dark and nearly smooth; on older trees the bark is gray brown. The rather narrow ridges are separated with marked regularity by deep, diamond-shaped fissures.

The **leaves** on the white ash are opposite on the stem, compound, from 8 to 12 inches long and consist of from 5 to 9, usually 7, plainly stalked, sharp-pointed leaflets, dark green and smooth above but pale green or whitish beneath. This last characteristic in itself provides a ready means of identifying the white ash.

The **fruit** of the ash is winged, 1 to 1½ inches long, resembling the blade of a canoe paddle in outline with the seed at the handle end. The seeds mature in autumn and are distributed effectively by the wind.

The **wood** of the white ash is light brown, coarse-grained, heavy, and is valuable on account of its toughness and elasticity. It is preferred to all other native woods for making tool handles, and such athletic equipment as tennis rackets, bats, and oars; it is much used for agricultural implements, buttertubs, furniture, and interior finish, and often for posts, ties, and fuel.

White ash trees are used in ornamental and farm forest plantings. It is a fairly rapid grower.

GREEN ASH

(*Fraxinus lanceolata* (Bork.) Sarg.)

The green ash is a common tree throughout the state except in the western prairie region. It is most abundant in valleys along streams. In Minnesota it is the best and most abundant of the ashes. It attains a height of 50 feet or more, and has spreading branches and a trunk from 2 feet or more in diameter. The twigs are smooth, round, and ashy gray, marked by pale lenticels and rusty bud-scales.

The **bark** is one-half inch thick or more, dark brown, or gray, tinged with red, and strongly furrowed or ridged. The **leaves** are attached opposite on the stem, compound, 10 to 12 inches long, 7 to 9 stalked



GREEN ASH

Twig, two-thirds; leaf and fruit, one-third natural size.

leaflets which are pointed and slightly toothed on the margin. This species differs from the white ash in having leaves that are bright green or yellow-green on both sides.

The **fruit** is flat and winged, 1 to 2½ inches long and one-fourth to one-third inch wide, with the wing portion extending well down past the middle of the seed-bearing part, and with the wing sometimes square or slightly notched at the outer end.

The **wood** is heavy, hard, rather strong, brittle, and coarse-grained, light brown, with a rather broad layer of lighter sapwood. The wood is valuable and desirable commercially and is used for the same purposes as that of the white ash.

Green ash is used quite extensively for ornamental planting and for farm forest planting. It is a fairly fast grower, will stand severe conditions of both soil and climate, and is readily grown from seed.

BLACK ASH (Swamp Ash)
(*Fraxinus nigra* Marsh.)

Black ash is fairly plentiful in the state except in the western half, occupying generally the cold moist situations and low banks of streams. It is a tree of fairly large size from 35 to 75 feet in height and from 1 to 2 feet in diameter at maturity.



BLACK ASH
Leaf and fruit, one-third; twig, natural size.

The **bark** is grayish on older portions of the tree. It is furrowed and separates somewhat into thin scales, being easily rubbed off with the hand. The newer growth is of lighter green color.

The **leaves** are opposite on the stem, smooth on both surfaces, compound, consisting of 7 to 11 leaflets oblong in shape and not stalked except the terminal leaflet, thus differing from the white ash or the green ash. The terminal bud is large and pointed.

The winged **fruit** is usually twisted and is generally similar to that of all ashes; however, the thin wing nearly surrounds the seed part. The **seeds** do not usually germinate the first year after being planted but come up the second year.

The **wood** is medium dark brown with sapwood of a lighter color, coarse-grained, heavy, and rather soft but fairly durable in contact with soil. Not as strong or valuable as that of the green or the white ash.

The wood of black ash can be separated into thin layers and thus it finds a ready use for baskets, hoops, and other articles. It is also used in cabinet making and for fence posts. The tree is not a fast grower.

BASSWOOD (Linden)
(*Tilia glabra* Vent.)

The basswood grows to a height of 60 to 80 feet and a diameter of 1 to 3 feet. In Minnesota it is fairly common throughout the state, except in the extreme northeastern part, growing chiefly in rich alluvial soil. The trunk often continues straight into the top of the dense rounded crown. The **bark** is light brown with



BASSWOOD
Twig, one-half; leaf and fruit, one-third natural size.

shallow vertical ridges. The inner bark furnishes bast or fiber for making mats.

The **leaves** are more or less strongly heart-shaped, 3 to 6 inches long and almost as wide; thin, saw-toothed, sharp pointed at the tip. At maturity the leaves are thick, shiny, green above, paler underneath.

The **flowers** are very fragrant and from them the bees make large amounts of choice-grade honey.

The **fruit** is berry-like, dry, 1 to 2 seeded and rounded, one-fourth to one-half inch in diameter, covered with short, thick, and brownish wool. It remains attached in clusters to a leafy bract, which later acts as a wing to bear it away on the wind. The fruit often persists on the tree long into winter.

The **wood** is light, soft, tough, not durable, light brown in color, with scarcely distinguishable sapwood. It is used in the manufacture of paper pulp, woodenware, furniture, trunks, excelsior, crating, drawing boards, kegs, barrel heads, inner soles for shoes, and lumber. The freshly sawed lumber warps badly if not properly taken care of. The tough inner bark is used for mat fiber, cordage, etc. Basswood trees are used in ornamental plantings, for which purpose they are highly recommended where growth conditions permit.

FORESTRY IN MINNESOTA

The early settlers found Minnesota a forested state, fully two thirds of the area being covered with hardwood and coniferous forests. These early pioneers looked upon the forest as an enemy hindering their progress of homemaking and cultivation.

It was perfectly natural and proper in a great many cases that land should be cleared for cultivation. However, in our enthusiasm for land clearing, we have allowed forest destruction to go too far, and very little timber now remains to furnish us with the needed raw forest material for our industries and for the common needs of our people.

Much of the land that once supported these wonderful forests has become waste and too poor for profitable farming.

We import millions of feet of timber for our own needs from the West Coast and elsewhere at a cost, for transportation alone, of from \$11 to \$18 per thousand board feet. Our annual transportation bill runs into the millions of dollars—this is the price we pay for not having protected our forest resources or for not producing another forest crop on our millions of acres of idle, tax delinquent, non-agricultural lands.

There are large areas of land in the state that still carry some forest growth. If fires are kept out and good management plans are instituted, they will help in a large measure to meet our future state timber needs.

Fire Prevention

Fire is the worst enemy of our forests. No forestry, outdoor recreation, or game conservation can be successful if our fire problem continues because of human carelessness and thoughtlessness.

The best way to fight a fire is through education and co-operation of the people so that fires will not result through human carelessness. Public opinion does remarkable things and the future success of reforestation and protection depends on the attitude of our people.

We may play the part of good citizens by becoming better informed on the use and proper protection of our forests. A better treatment of our existing forests and a saner land-use policy with respect to our non-agricultural lands will serve to supply, in the future, forest products so essential to the proper maintenance of our economic, social, and industrial life.

Farm Woodlands

More and more wood-using industries are turning for raw material to the farm woodlands. The farm woodlot is the anchor of hope of the timber future. Every acre in timber on the farm should be made a source of regular and continual income.

Much land on the farm, now lying idle, could be made to produce sawlogs, fence posts, ties, poles, and fuel wood. **Timber is the best poor-land crop we have.** If handled with better forest-cutting practices, these timber tracts can be made to produce revenue on a par with other farm crops. **Idle land pays no taxes—builds no towns, roads, or schools.**

It is easy to fell a tree or destroy a forest but it is difficult to restore it. Nature stands ever ready to help; we alone have been backward.

What Can You Do to Protect the Forest?

1. Enjoy but do not destroy living trees. Do not cut, girdle, hack, or mar healthy living trees.
2. Use dead wood for camp fires and cooking in the woods.
3. Build a small camp fire in an open cleared place, away from inflammable material and on mineral soil.
4. Do not go out of sight of burning camp fires, unless some other responsible person is watching it.
5. Extinguish your camp fire **dead out** with water. Put your hand in the coals; if too hot, put on more water, as the fire is not safe to leave.
6. Twist the burnt end of the match between the fingers before throwing it away.
7. Grind thoroly into the dirt all lighted cigarettes, cigar stubs, or pipe embers when through smoking.

8. Pick up and burn all refuse of the camp. Be a clean camper.

9. Instruct people you meet in the woods to be careful with fire.

10. Observe the game and forest laws.

11. Help keep the water clean and pure.

12. On finding fire in the woods, try to extinguish it. If unable to do so, report the fire to the nearest forest officer, whose address is found on the back cover.

TREES

*I think that I shall never see
A poem lovely as a tree.*

*A tree whose hungry mouth is prest
Against the earth's sweet flowing breast.*

*A tree that looks at God all day
And lifts her leafy arms to pray.*

*A tree that may in summer wear
A nest of robins in her hair.*

*Upon whose bosom snow has lain;
Who intimately lives with rain.*

*Poems are made by fools like me,
But only God can make a tree.*

JOYCE KILMER