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# The Shade, Windbreak and Timber Trees of South Dakota

N.E. Hansen

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# The Shade, Windbreak and Timber Trees of South Dakota



Fig. 1.—Two trees of *Ulmus pumila*, a new Elm from North China. (Part of South Dakota State College Dairy Barn is visible in the distance). These two trees are now bearing seed. *Ulmus pumila* trees will endure close planting which will explain their use for windbreaks and hedges in North Manchuria and East Siberia. But for good specimen trees, they must be planted far enough apart to give abundant room for full development.

Horticulture Department  
Agricultural Experiment Station  
SOUTH DAKOTA STATE COLLEGE OF  
Agriculture and Mechanic Arts  
Brookings, S. D.



Fig. 2.—Two American Elms, Brookings. The one on the right is the feathered type. Neglect in pruning has caused the other to become forked, with two main stems. Such trees are likely to split down as they grow older.



# The Shade, Windbreak, and Timber Trees of South Dakota

N. E. HANSEN

A general summary of the experience with trees, shrubs, climbing vines and perennials, in all parts of the State and especially at this Station, is now ready for publication. It will be necessary to divide this material into several bulletins, of which this is the first. Following the reports on evergreen, and ornamental trees, a bulletin on the shrubs of South Dakota is planned as the next in order of publication.

In such cases as *Salix* (the willow), all the species are considered in this bulletin because some species are valuable for shade as well as for ornamental planting.

A study has been made of the geographical origin of all these trees and shrubs as related to hardiness against winter cold. This has led to some deductions and generalizations as a guide to future plantings. In order to present a wider basis of facts, it has been deemed best to postpone this to the bulletin of shrubs.

For hardiness we must look to the cold climate regions. Hardy trees cannot be expected to come from hot climates. For cultivation in the North, we should select the northern type of tree instead of the type from its southern limits. A tree native to low swampy lands of the far North cannot be expected to flourish on dry uplands of the western plains. Nature has provided trees for almost all conditions of temperature, moisture and soil. In our planting we should work with, rather than against, nature. The only rule is: Northern trees for northern planters.

## EARLIER SOUTH DAKOTA BULLETINS ON TREES AND SHRUBS

The present bulletin is really an extension and revision of Bulletin 72, *Ornamentals for South Dakota*, by N. E. Hansen, 112 pages, 1901.

For convenience, the essential material for the purpose of this bulletin has been added of the following:

South Dakota Agricultural Experiment Station Bulletin 43, *Native Trees and Shrubs of South Dakota*, by T. A. Williams, 31 pages, 1895.

South Dakota Agricultural Experiment Station Bulletin 64, *Ferns and Flowering Plants of South Dakota*, by D. A. Saunders, 132 pages, 1899.

South Dakota Geological and Natural History Survey, University of South Dakota, Vermillion, Series XXIII, No. 2, *Trees and Shrubs of South Dakota*, by W. H. Over, 13 pages, 1923.

Throughout the bulletin, credit is given by number for each quotation, as indicated under "Literature Cited."

## Literature Cited

In this bulletin the number at the end of a quotation refers to the corresponding number in the following list:

- (1) American Joint Committee on Horticultural Nomenclature 1923.

Standardized Plant Names.

A catalogue of Approved Scientific and Common Names of Plants in American Commerce, 564 p. Mount Pleasant Press, Harrisburg, Pennsylvania.

- (2) Bailey, L. H. 1914-17.

Standard Cyclopedia of Horticulture.

6 Vols. 3639 p., illus. The MacMillan Company. New York.

- (3) Bailey, L. H. 1924.  
Manual of Cultivated Plants.  
851 p., illus. The MacMillan Company. New York.
- (4) Bailey, L. H. 1923.  
Cultivated Evergreens.  
434 p., illus. The MacMillan Company. New York.
- (5) Bean, W. J. 1915.  
Trees and Shrubs Hardy in the British Isles.  
2 Vols. 1424 p., illus. E. P. Dutton & Company. New York.
- (6) Britton, N. L. 1908.  
North American Trees.  
894 p., illus. Henry Holt & Company. New York.
- (7) Dippel, Leopold. 1889-93.  
Handbuch Der Laubholzkunde.  
3 Vols. 1792 p., illus. Paul Parey. Berlin.
- (8) Green, S. B. 1902.  
Forestry in Minnestota.  
401., illus. St. Paul Press Company. St. Paul.
- (9) Hansen, N. E. 1901.  
Ornamentals for South Dakota.  
S. D. Agr. Expt. Sta. Bul. 72 112 p., illus.
- (10) Hansen, N. E. 1907.  
Evergreens for South Dakota.  
S. D. Agr. Expt. Sta. Bul. 102, 64 p., illus.
- (11) Hansen, N. E. 1927.  
Plant Introductions.  
S. D. Expt. Sta. Bul. 224, 64 p., illus.
- (12) Hough, R. B. 1907.  
Handbook of the Trees of the Northern States and Canada.  
470 p., illus. Published by the Author. Lowville, New York.
- (13) Huntington, Annie Oakes 1910.  
Studies of Trees in Winter.  
198 p., illus. Dana Estes & Company. Boston.
- (14) Keeler, Harriet L. 1913.  
Our Native Trees.  
533 p., illus. Charles Scribner's Sons. New York.
- (15) Kansas State Board of Agriculture, Topeka. 1928.  
Trees in Kansas.  
372 p., illus. By Albert Dickens, Margaret E. Whittemore, Charles A. Scott, Frank C. Gates.
- (16) Koehne, Emil. 1893.  
Deutsche Dendrologie.  
601 p., illus. Ferdinand Enke. Stuttgart.
- (17) Leslie, W. R. 1918-1919.  
Native Fruits of Manitoba.  
p. 225-236. Annual Report of the South Dakota State Horticultural Society.
- (18) Moyer, L. R. 1917.  
Report on Minnesota Trees.  
Annual Report of the South Dakota State Horticultural Society.
- (19) Over, W. H. 1923.  
Trees and Shrubs of South Dakota.  
S. D. Geological and Natural History Survey. University of S. D., Vermillion,  
Series XXIII, No. 2, 13 p.
- (20) Pammel, L. H. 1911.  
Manual of Poisonous Plants.  
Iowa State College. 977 p., illus. The Torch Press. Cedar Rapids, Iowa.
- (21) Pammel, L. H. 1923.  
The Relation of State Parks to the Commonwealth.  
P 131-134. South Dakota Horticultural Report.
- (22) Rehder, Alfred. 1927.  
Manual of Cultivated Trees and Shrubs.  
930 p. The MacMillan Company. New York.
- (23) Rosendahl & Butters. 1928.  
Trees and Shrubs of Minnesota.  
385 p., illus. The University of Minnesota Press. Minneapolis, Minnesota.

- (24) Rydberg, P. A. 1917.  
Flora of the Rocky Mountains and Adjacent Plains.  
1110 p. Published by the Author. New York Botanical Garden.
- (25) Sargent, Charles S. 1905.  
Trees and Shrubs.  
495 p., illus. 2 Vols. Houghton, Mifflin & Company. Boston and New York.
- (26) Saunders, D. A. 1899.  
Ferns and Flowering Plants of South Dakota.  
S. D. Agr. Expt. Sta. Bul. 64, 132 p.
- (27) Sudworth, George B. 1888.  
Forest Flora of the Rocky Mountain Region.  
In Forest Conditions of the Rocky Mountains. Forestry Division. U. S. Dept.  
Agr. Bul. No. 2, 37 p.
- (28) Williams, T. A. 1895.  
Native Trees and Shrubs of South Dakota.  
S. D. Agr. Expt. Sta. Bul. 43, 31 p.

### What Is The Right Name?

In the following descriptions the chief authorities quoted are: Standard Cyclopedia of American Horticulture, by L. H. Bailey (1900); Handbuch de Laubholzkunde, by Dr. Leopold Dippel (3 volumes, Berlin, 1893); Manual of Cultivated Trees and Shrubs, by Alfred Rehder (1927). The other references are noted under "Literature Cited." The geographical distribution of American plants is largely from Bailey and Rehder; that of foreign plants mostly by Dippel. This distribution has been given somewhat fully as an interesting study in plant adaptation. Some deductions may be made with profit from these facts, as a guide to further importations.

The nomenclature followed in this bulletin is from "Standardized plant Names," a catalog of approved scientific and common names of plants in American commerce. This was prepared under an American joint committee of fourteen of the leading horticultural associations. This was published in 1923. The members of the sub-committee were: Frederick Law Olmsted, Frederick V. Coville, and Harlan P. Kelsey of Salem, Massachusetts; with J. Horace McFarland, chairman, and Harlan P. Kelsey, Salem, Massachusetts, secretary.

The common names vary greatly in different regions. Hence in the following list of plants the Latin or botanical name is given first as it is the same all over the world. This is followed by the approved common name. But botanists do not always agree as to names. The work of revision is constantly under way. The following list is subject to change until the time comes when the botanists, nurserymen and florists of Europe and America unite in accepting the law of priority in botanical nomenclature. At present the rigid enforcement of this law is resulting in much confusion in trade catalogs, some names being discarded which have been in common use in nurseries for a generation past.

The name that was published first is the correct name, according to the law of priority. But this is not always easy to determine, especially when the same plant has been described and named long ago by several different botanists, or where the same name has been given to several different plants by botanists not advised of each other's work.

At the annual meeting of the American Society for Horticultural Science at Des Moines, Iowa, January, 1930 (meeting with the American Association for the Advancement of Science), it was deemed best to urge the postponement of the proposed revision of "Standardized Plant Names" until after the Fifth International Botanical congress at Cambridge, England, August 16-23, 1930. It is hoped that at this meeting the present conflicting codes of botanical nomenclature will be harmonized and a permanent international code adopted.

## List of Best Trees for Special Purposes

### Best Shade and Lawn Tree

*Ulmus Americana*—American Elm  
*Celtis occidentalis*—Hackberry  
*Ulmus pumila*—North Chinese Elm

### Shade Trees for Moist Land

*Acer dasycarpum*—Silver Maple  
*Acer negundo*—Boxelder

### Shade Trees with Valuable Timber

*Fraxinus lanceolata*—Green Ash  
*Fraxinus pennsylvanica*—Red Ash  
*Juglans nigra*—Black Walnut  
*Prunus serotina*—Black Cherry  
*Quercus macrocarpa*—Bur Oak

### Best Shade Trees with Edible Fruit

*Juglans cinerea*—Butternut (northern type)  
*Juglans nigra*—Black Walnut (northern type)  
*Morus rubra*—Red mulberry (northern type), for the southern district.

### Best Timber Trees for High Dry Land

*Fraxinus lanceolata*—Green Ash  
*Fraxinus pennsylvanica*—Red Ash

### The Timber Trees of Most Rapid Growth on Low Land

*Populus monilifera*—Northern Cottonwood  
*Populus laurifolia*—Certinensis Poplar  
*Populus acuminata*—Smoothbark Cottonwood  
*Populus angustifolia*—Narrowleaf Cottonwood  
*Populus balsamifera*—Balsam Poplar  
*Populus Sargenti*—Sargent Cottonwood

### Trees for the Farmers' Woodlot

*Fraxinus lanceolata*—Green Ash  
*Fraxinus pennsylvanica*—Red Ash  
*Juglans nigra* (northern type)—Black Walnut

### **The Best Street Trees**

*Ulmus Americana*—American Elm  
*Celtis occidentalis*—Hackberry

### **Shade and Lawn Trees for Limited Planting in the Southern District**

*Catalpa speciosa*—Western Catalpa  
*Gleditsia triacanthos*—Common Honeylocust  
*Gleditsia triacanthos inermis*—Thornless Honeylocust  
*Gymnocladus dioica*—Kentucky Coffeetree  
*Robinia pseudoacacia*—Common Locust

### **Four Good Elms for Shade and Ornament**

*Ulmus Americana*—American Elm  
*Ulmus glabra*—Scotch Elm  
*Ulmus laevis*—Russian Elm  
*Ulmus pumila*—*Ulmus pumila*

### **Trees for Shelter Belts**

*Ulmus Americana*—American Elm  
*Fraxinus lanceolata*—Green Ash  
*Fraxinus pennsylvanica*—Red Ash  
*Acer negundo*—Boxelder

### **Four Good Willows for Windbreaks on Low Land; Less Desirable on High Land**

*Salix pentandra*—Laurel Willow  
*Salix vitellina*—Golden Willow  
*Salix alba*—White Willow

### **Willows for Ornament or Shade**

*Salix regalis*—Royal Willow  
*Salix pentandra*—Laurel Willow  
Niobe Weeping Willow

### **Tree of Weeping Habit for a Specimen Lawn Tree**

Niobe Weeping Willow

### **A Native Willow Valuable for Fence Posts**

*Salix cordata vestita*—Diamond Willow

### **A New Native Willow Worthy of Trial**

*Salix discolor overi*—Apple-leaved Willow



## Descriptions of Deciduous Trees

### The Maples

#### Acer

The maples are cultivated chiefly for shade and for their ornamental foliage. There are about 110 species in North America, Asia (especially central and eastern Asia), Europe, and North Africa. There are a large number of garden forms in cultivation. Many species are valuable for timber, and some American species produce sugar.

#### Silver Maple

##### *Acer dasycarpum*

*Acer dasycarpum*, Ehrh.; *saccharinum*, Linn.; *Acer eriocarpum*, Michx.

Generally called Soft Maple in the Western States. An ornamental tree with wide-spreading branches. The leaves turn a clear yellow in autumn. This tree does best in rich, moist soil. The branches on old trees are inclined to break down in severe wind and open exposure.

"A fine ornamental tree; very rare in South Dakota, occurring only in the southeastern part of the state (Union and Minnehaha counties)." Thomas A. Williams (28).

"Extends up the Sioux river to Flandreau and up the Missouri river to the western edge of Union county—the southeastern county." D. A. Saunders (26).

"Soft Maple, Silver Maple. Native of eastern North America, west to eastern Dakota and Nebraska. The wide range of this popular tree gives rise to trouble from southern and western seed. One lot kills back on the Station grounds. It is a native of the Sioux Valley in this State and seed from native northwestern trees should be preferred." N. E. Hansen (9).

"Common over the eastern part of the State, where it is extensively planted for shade. Grows into trees of large size and is much used for fuel." W. H. Over (19).

In "Standardized Plant Names" the old name, *Acer dasycarpum*, has been restored to this species, replacing *Acer saccharinum*, which was taken from the sugar maple. "Linnaeus evidently supposed this species to be the sugar maple, and named it accordingly. He did not know the true sugar maple." Alfred Rehder, in "Standard Cyclopaedia of Horticulture" (2).

"Our native silver maple. . . is a fine large tree, well adapted to planting on river banks, and in deep rich soil. In such locations it makes a magnificent tree. If used as a street tree it is apt to be broken by the winds." L. R. Moyer, Montevideo, Minnesota (18).

#### Boxelder

##### *Acer negundo*

*Acer negundo*, Linnaeus; *Negundo aceroides*, Moench; *Negundo fraxinifolium*, Nuttall.

"This well known tree is plentiful all over the state and is widely cultivated. It is the *Negundo aceroides* of the manuals." Thomas A. Williams (28).

"Ash-leaved Maple. Abundant along lakes and streams throughout the state." D. A. Saunders (26).

"Native of Canada and eastern United States south to Florida, west to the Rocky Mountains. This is native all over the state and is one of

the best trees for the prairie planter for shade and windbreak. The dense foliage appears early. It is a good nurse tree for other more valuable trees, such as ash, which leaf out so late that grass gets a start. Only northern native seed should be used. Considerable loss has been experienced in this state from planting southern seed. On the Station grounds trees grown from seed from native Kansas boxelders killed to the ground the first winter and have killed back every winter since." N. E. Hansen (9).

"Common over the State along streams and flood plains. Extensively planted by the early settlers for shade, for which it was well adapted as it makes a rapid growth, but it is not a desirable tree as it is not attractive and matures too early." W. H. Over (19).

"This is a rapid growing tree, producing firewood of good quality about as quickly as any tree will. Very hardy and long lived; is not a beautiful tree but it is desirable in your windbreak or groves on the farm. We do not advise the planting of these for street trees or in city parks, but intersperse a row of boxelder in your grove on the farm for quick protection. When it has served its purpose, cut it down for firewood and the other hardwood trees like the Ash, Hackberry and Elm will make use of the room previously used by the boxelder and make better trees." D. B. Gurney, 1929.

Concerning the boxelder planted in England, W. J. Bean (5) writes: "It was cultivated by Bishop Compton at Fulham in 1688. Although the typical form is by no means common, it is a handsome tree, especially when isolated on a lawn. It is one of the maples that yield sugar in America." This confirms my own opinion that it is possible to make a handsome tree of the boxelder, providing it is properly pruned when young. Most boxelders are neglected and no attention paid to pruning, hence the tree becomes scrubby.

Under cultivation in European nurseries a very large number of garden forms have been developed. Another common name for this species is Ash-leaved Maple.

Maple sugar is sometimes made from the boxelder, but the sap is not so rich in sugar as the sap of the Sugar Maple.

"In the Minnesota river bottoms this tree grows seventy feet high and three feet in diameter, while in severe locations it becomes a low bushy tree." Samuel B. Green, in "Forestry in Minnesota." (8).

Often called Ash leaved maple or Manitoba maple. Under native conditions a quick growing sturdy tree, 50 to 70 feet high with irregular spreading top, regularly furrowed greyish bark, and stout, olive green or purplish twigs. The wood is soft, white, weak and close grained. Buds opposite, blunt; leaves opposite.

Boxelder has perhaps the widest range of any of the broad leaf trees. Ranging from New England across Canada to Alberta and south to Florida, Texas and Mexico. It thrives in high or low altitudes and in regions of little or much rain.

In early days this tree was planted extensively on the treeless prairies of the West. Its sure and rapid growth gave quick protection against the severe winds and scorching sun. It is still used extensively in shelterbelts where its dense foliage and sturdiness are a decided advantage. Boxelder is planted some as an ornamental tree but is rough in appearance and is generally quite an attraction for insects.

—L. S. Matthew, Extension Forester, Bottineau, North Dakota.

## Sugar Maple

### *Acer saccharum*

*Acer saccharum*, Marsh.

Formerly known as *Acer saccharinum*, but that name is now applied by botanists to Silver Maple. Maple sugar and maple syrup are made from the sap of this tree. An excellent street and shade tree of round dense habit. The leaves turn bright yellow and scarlet in autumn.

"Native of eastern United States west to Minnesota. It was recently found native in the coulees of the headwaters of the Minnesota river, Roberts county, South Dakota, by Professor D. A. Saunders of this station. The general experience with the eastern Hard Maple in this State is unsatisfactory. Minnesota and Dakota seed should be given a trial." N. E. Hansen (9).

"Abundant in coulees and ravines, containing a clear spring creek, at the headwaters of the Little Minnesota river. There are some ten coulees extending from one to three miles back into the coteaus in which the sugar maple is abundant. Many of the trees are sixty to seventy feet high and eight to ten feet in circumference. As soon as the creek emerges from the Hills into the open prairie all the trees except the white elm, box-elder and two willows disappear. The coulees are narrow and deep, and the banks are lined with springs which furnish a constant supply of water. The southernmost coulee in which maples were found is one-half mile south of Sisseton Agency." D. A. Saunders (26).

"This is the eastern sugar tree, introduced as shade tree only in the eastern part of the State." W. H. Over (19).

"This tree is chieftain of its clan; straight, spreading, symmetrical, of grand proportions, often 120 feet in height. It grows well and roots deeply. Its bold leaves have very rich autumn tints of clear yellow and scarlet. Hardy here when planted among other trees." D. B. Gurney, 1929.

## Ohio Buckeye

### *Aesculus glabra*

*Aesculus glabra*, Willdenow.

Native from Pennsylvania south to northern Alabama, west to southern Iowa and Oklahoma. No record is available of its being planted in South Dakota.

"The Ohio Buckeye is much hardier than the Horse Chestnut, and stands fairly well in this section as far north as St. Paul, where there are some very good small specimens in the parks. It is of value to give variety to ornamental plantings." Samuel B. Green, Forestry in Minnesota (8).

*Aesculus glabra* Willd. Ohio Buckeye. Found in Southern Iowa, along river courses as far north as Fort Dodge and common South and East. Cases of poisoning have been reported, especially where cattle eat the young shoots and seeds of the plants." L. H. Pammel, Manual of Poisonous Plants (29).

## Horsechestnut

### *Aesculus hippocastanum*

*Aesculus hippocastanum*, Linn.

The common horsechestnut is a native of Northern Greece, through Asia Minor and Persia, to the mountains of Northeastern India. This has been cultivated since ancient times in Europe and many varieties have been developed. It is one of the most popular shade trees in Europe and

is also much planted along roads, in parks and private gardens in eastern United States. It is not sufficiently hardy for general planting in South Dakota, although there are a number of specimen trees in the southern part of the State. Those planted in open exposure at Brookings winter-killed. The large seeds contain much starch which may be removed by repeated washings in pure water, but this is too expensive. The bitter principal, esculin, found in the seeds makes them poisonous for man although they are sometimes fed to livestock.

*Aesculus Hippocastanum* L. Horsechestnut. The seed of this species has long been recognized as poisonous in Europe. Frequently cultivated in the U. S. It contains aesculin, and argyraescin." L. H. Pammel, Manual of Poisonous Plants (20).

## Western Catalpa

### *Catalpa speciosa*

*Catalpa speciosa*, Warder

The catalpa has not proved sufficiently hardy at Brookings to be recommended for general cultivation although there are trees of blooming size in town. Even when the trees are killed to the ground the large leaves and flowers have a tropical effect. On the southern edge of the state the general experience with the hardy catalpa is more favorable. It is popular in the south because the wood is very durable in soil or water, hence well adapted for fence posts; but a tree grown for timber should be hardy throughout with no black heart in the center which is caused by severe cold. Hence a tree may be hardy enough for ornamental purposes in a small way but not hardy enough to be grown for timber. The distribution of this tree according to Alfred Rehder, in "Manual of Cultivated Trees and Shrubs" (22) is from southern Illinois and Indiana to western Tennessee and northern Arkansas. However, the Western Catalpa is much harder than the common catalpa with which it is often confused.

"*Catalpa speciosa*, Warder. Hardy Catalpa. Native of southern Illinois and Indiana to Louisiana and Mississippi. This beautiful tree has been tried in many places in the state but the general experience is unfavorable. E. D. Cowles reports its degree of hardiness at Vermillion as only six on a scale of ten." N. E. Hansen (9).

"In Yankton county there are some very large growers of the genuine *Catalpa Speciosa*, and in the city of Yankton there are large trees, some of them two feet through. . . . They are fine for ornamental or street purposes and grow very straight and fast. The leaves measure ten inches across and its beautiful white flowers give it a very tropical appearance." D. B. Gurney, Yankton, 1929.

"The Hardy Catalpa is not a very hardy tree in this section, and probably most of the specimens of it growing north of central Iowa are more or less injured by our winters; but they often hold on well in favorable locations as far north as St. Paul and Minneapolis and form good small trees. They are occasionally killed to the ground, but generally renew themselves by sprouts from the roots. The Catalpa is, however, unfit for a street tree in Minnesota; but may often be used in protected locations in parks and lawns, where it is valuable for variety in foliage and for its beautiful flower clusters. It is of remarkably rapid growth when young and has been used in some of the most successful tree plantings that have been made in Kansas and southern Iowa. The wood is used for railway ties, fence posts and rails, and occasionally for furniture and inside finish of houses.



The Hardy or Western Catalpa was for a long time confounded with the Catalpa of the Eastern State (*Catalpa bignonioides*), which is not nearly so hardy." Samuel B. Green, "Forestry in Minnesota" (8).

### Common Catalpa

#### *Catalpa bignonioides*

*Catalpa bignonioides*, Walt. ; *Catalpa syringaeifolia*, Sims.

Also called Indian Bean. Native from Georgia to Florida and Mississippi. The Common Catalpa, often confused with the Hardy Catalpa, is not hardy in South Dakota.

### Umbrella Catalpa

#### *Catalpa bignonioides*, Walt. var., *nana* Bur.

(*Catalpa bungei*, Hort., not C. A. Meyer)

The Umbrella Catalpa is a horticultural variety of the Common Catalpa and forms a bush; often grafted high on standard stocks forming a dense broad head, in outline resembling an open umbrella. Not hardy at Brookings.

"The name *Catalpa bungei* is commonly misapplied to the Umbrella Catalpa; . . . . .the true *Catalpa bungei*, the Manchurian Catalpa, a different and distinct species, is now coming into cultivation." The true Manchurian Catalpa, *Catalpa Bungei*, C. A. Meyer, is native of North China.

### Hackberry

#### *Celtis occidentalis*

*Celtis occidentalis*, Linn.

There are about 70 species of the Hackberry in the temperate regions of the Northern hemisphere and in the tropics. The wide distribution of the following species, *Celtis occidentalis*, should be regarded when seed is selected. At the substation at Marshall, Minnesota, in western Minnesota, about 75 miles northeast of Brookings, a lot of hackberries from the eastern Atlantic states were found lacking in hardiness while the native Minnesota hackberry proved perfectly hardy.

*Celtis occidentalis*, Linn. Hackberry. Sugarberry. Western Nettle Tree. Native from Ontario west to Manitoba and Dakota, south to Georgia and Texas. This is a handsome tree for the lawn and does well even on high, dry land. It is a common native tree along lakes and streams throughout South Dakota. It does well in open exposure at Brookings. This tree has been neglected too long by nurserymen and planters, possibly because of scarcity of seeds, the birds being fond of the small, sweet, dark purple berries which hang on the tree into winter. The tree resembles the white elm, but differs in the thin, taper-pointed leaves divided unequally by the midrib. A beautiful hardy lawn tree of rapid growth." N. E. Hansen (9).

"A medium sized tree with firm, yellowish wood and hard, rough bark. It is valuable for fuel and rails and is a pretty tree for use in groves and forest plantations. Common in woods along lakes and streams throughout the entire state." Thomas A. Williams (28).

"Found locally over the State. Makes excellent fuel where abundant. One of the latest trees to leaf out in the spring. Leaves resemble those of the elm but of a light green. The so-called "Medicine Tree" growing on a hillside near the old town site of Evarts, Walworth county, is a stunted form of this species. This little hackberry tree, while very small, is perhaps a hundred or more years old and is reported to have been held sacred

by the early Indians. Since the advent of the white man it has been enclosed by a fence." W. H. Over (19).

"The Hackberry is a native well into the Dakotas, and there are wonderful specimens of these growing along the rivers, creeks and ravines. It is a perfectly hardy, rapid growing beautifully shaped tree. When planted alone, allowing it to have plenty of room for spread, it forms into the best shaped of any of the hardwood trees. It is well to give it considerable room in planting. Heavy winds will not break them.

I have in my own yard, Hackberry trees 40 years old. These are wonderful trees, nearly two feet through, giving me a dense and perfect shade all summer. The Hackberry is very free from disease and insects, a clean, strong, desirable tree for all purposes. They are hardy as far north as you care to plant. In beautifying the school grounds, the home or on the farm; for park or street trees in the town or city or for a good rugged, centuries-long monument to the boy who lies in France, the Hackberry would be most desirable." D. B. Gurney, Yankton, 1929.

*Celtis occidentalis*, a native of wooded bench lands, is one of our very best shade trees. It is fine for street planting, its only drawback being its slowness to get its leaves in the spring. It ought to be more generally planted." L. R. Moyer, Montevideo, Minnesota (18).

"In Minnesota frequently in the southern half of the state, and not uncommon in the valley of the Red River even near the extreme northern limit of the state" . . . . "The Hackberry is of rapid growth, and is one of the best trees for general park, lawn and prairie planting here. No deciduous tree presents a more graceful appearance in the winter when the finely divided spray of the limbs and the small size of the young growth make it very attractive. In this section it is preferred to the White Elm for a shade tree by some experienced planters. It endures drouth well, but is probably not as hardy in this way as the White Elm. It is also less liable to split in the crotches. The wood to some extent is used to take the place of elm, as in harness making." S. B. Green, "Forestry in Minnesota" (8).

## White Ash

### *Fraxinus americana*

*Fraxinus americana*, Linnaeus; *Fraxinus alba*. Marsh.

The American Ash, also called Canadian Ash, is noted for its valuable timber which is largely utilized for building; furniture, and for handles of tools and implements.

"White Ash (*Fraxinus americana*, L.) A large and valuable tree reported from the southeast corner of the state. There is some doubt as to its being a native and further information is desired." Thomas A. Williams (28).

This has been repeatedly reported for this state, but the most authentic account of it in the state is the following from Prof. Williams' notebook: "Twigs sent by Mr. Jones from Sioux Falls to Dr. Trelease were pronounced to be this species." If it occurs in the Minnesota or Sioux regions it is exceedingly rare, as for two summers special effort has been made to detect it." D. A. Saunders (26).

"A large and valuable tree, commonly confounded in this section with the Green Ash and the Red Ash, both of which, however, are smaller trees and much hardier, produce seed at an earlier age and in larger quantities, and altogether are better adopted to prairie planting than the White Ash. Distribution.—From Nova Scotia west to northern Minnesota and eastern Nebraska and south to northern Florida and Texas. In Minnesota

the White Ash appears to be a rare tree. In the western part of the state and in the Dakotas it is wholly replaced by Green Ash, or what seems to be a hopeless mixture of Green Ash and Red Ash." S. B. Green (8).

### European Ash

#### *Fraxinus excelsior*

*Fraxinus excelsior*, Linnaeus

"Native of Europe and west Asia. This species of Ash winter-kills badly and is worthless. Our specimens from Germany planted in the spring of 1897, are now only three and one-half feet in height." N. E. Hansen (9).

The sprouts which grow up after the main stem of this tree killed to the ground were permitted to remain. The tree now consists of several

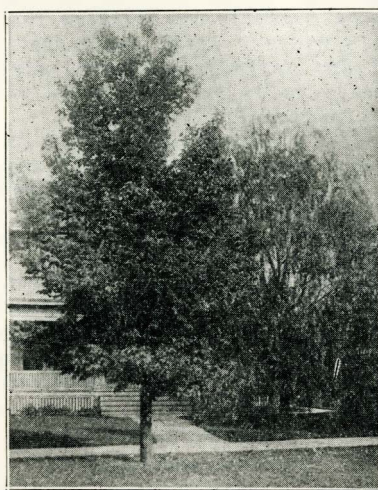


Fig. 3.—In front: Hackberry as a street tree. In rear: Niche Weeping Willow as a lawn tree. Brookings.

strong stems about 30 feet in height; open habit branched near the ground.

Many ornamental varieties of European Ash have originated under cultivation.

### Green Ash

#### *Fraxinus lanceolata*

*Fraxinus lanceolata*, Borkh.; *Fraxinus viridis*, Michx., in part; *Fraxinus pennsylvanica* var. *lanceolata*, Sarg.

A tree attaining a height of 60 feet; native from Maine to Florida, west to Saskatchewan, Montana and Texas.

"A medium sized tree, branches usually smooth; leaves green on both sides; fruits about one and one-half inches long, the edges gradually dilated into the linear or spatulate wing. One of the most valuable of our native trees; found throughout the state, though perhaps more plentiful in the eastern part. This is *Fraxinus viridis* of the manuals." Thomas A. Williams (28).

"Abundant along streams and bordering lakes throughout the state." D. A. Saunders (26).

"This is native throughout the state. Native trees from this vicinity have done well under cultivation at Brookings. The trees endure severe drought on dry knolls and are very tenacious of life. Of rather slow growth at first but is one of the most valuable of trees for the lawn and groves." N. E. Hansen (9).

"Common along creeks and rivers and in woods over the state and a favorite fuel. Has been planted to a great extent for shade and for groves over the state. None of the Ashes seems to attain a very large size in South Dakota." W. H. Over (19).

"In Minnesota one of the most common trees along water courses in the western part of the state. It is probable that about all the Ash in western Minnesota and the Dakotas is Green Ash, or a hopeless mixture of it with Red Ash."—"The Green Ash is one of the hardiest trees known, and is very valuable for windbreaks and ornamental plantings on the prairies of Minnesota and the Dakotas, and throughout this section should often take the place of the Cottonwood. Its great hardiness against cold and drouth, its easy propagation from seed and its rapid growth make it especially fitted for general planting. The wood is used for the same purposes as White Ash, but is of inferior quality." S. B. Green, Forestry in Minnesota (8).

"The Green Ash is another native tree. Like other trees having a long tap root it does best when grown from seed where it is to stand. While it never becomes very large its bright green foliage is always attractive." L. R. Moyer. (18).

### Red Ash

#### *Fraxinus pennsylvanica*

*Fraxinus pennsylvanica*, Marsh. ; *Fraxinus pubescens*, Lam.

"Much like the preceding (*F. lanceolata*) but with downy twigs and less toothed leaflets which are pale beneath. Found throughout the state but most plentiful in the western part." Thomas A. Williams (28).

"With the last (Green Ash) throughout the state and rather more common." D. A. Saunders (26).

"Only fairly common over the state. Wood makes excellent fuel. All the Ashes are slow growing trees." W. H. Over (19).

"Native of Canada to Florida west to Dakota and Missouri. Abundant with the Green Ash throughout the state." N. E. Hansen (9).

"The Green Ash closely resembles the Red Ash, from which it is distinguished in extreme forms by its glabrous leaves and branchlets and by its rather narrower and shorter and usually more serrate leaves, which are lustrous and bright green on both surfaces. However in western Minnesota and the Dakotas these species run together and are often indistinguishable. The flowers and fruit of the two species are alike although many forms occur on each. Professor Sargent regards the Green Ash as a variety of the Red Ash." S. B. Green (8).

### Common Honeylocust

#### *Gleditsia triacanthos*

*Gleditsia triacanthos*, Linnaeus

A graceful ornamental tree with beautiful fern-like foliage which turns a bright yellow in autumn. The word "honey" refers to the sweet pulp in which the seeds are set. Recently a tree has been located in Georgia with pods containing 29.7 per cent of sugar.



"A large and valuable tree with large branched thorns; long, thin, twisted pods and hard, heavy wood. Found in Union county." Thomas A. Williams (28).

"Along the Sioux river in the extreme southeastern county, Union county." D. A. Saunders (26).

"A fair sized tree in Bon Homme, Yankton, Clay, and Union counties. Trunk and larger branches usually support long spines." W. H. Over (19).

"Honey Locust, Three-thorned Acacia. From Pennsylvania south to Mississippi, west to Nebraska and Texas. In this state found native along the Sioux river in the southeastern corner of the state. The general experience with this valuable tree further north in the state is not satisfactory. Reported hardy at Yankton by C. W. Gurney and at Mitchell by E. C. Newbury, and at Vermillion by E. D. Cowles. Prof. S. B. Green reports it as not generally hardy in Minnesota." N. E. Hansen (9).

### Thornless Honeylocust *Gleditsia triacanthos inermis*

A thornless variety which has proved as hardy as the type at Hudson, South Dakota. The thornless variety is better than the thorny type for the lawn.

### Kentucky Coffeetree *Gymnocladus dioica*

*Gymnocladus dioica*, Koch; *Gymnocladus canadensis*, Lam.

The generic name *Gymnocladus* comes from two Greek words meaning naked branch, and the word *dioica* refers to the male and female flowers which are found on separate trees. There are only 2 species in the genus, one American and the other Chinese. The remarkable feature of the tree is the immense compound leaves, 2 to 3 feet long, twice pinnate, each part of the leaf stock bearing 7 to 13 ovate leaflets. It is one of the rarest forest trees of North America. When these large compound leaves fall in autumn the tree is remarkable for its thick stems without any perceptible buds.

"A (with us) medium-sized tree with rough, scalpy bark; large, compound leaves and large pods. A valuable tree, growing in rich woods in Clay and Union counties." Thomas A. Williams (28).

"Along the Missouri river in the two southeastern counties, Clay and Union." D. A. Saunders (26).

"Grows sparingly along creeks and flood plains in the southeastern part of the state. It is a tall, slim tree with open foliage and therefore not desirable as a shade tree. Fruit is contained in large beanlike pods." W. H. Over (19).

"In Minnesota it is found sparingly in southern and southeastern portions of the state north to near St. Paul and as far west as New Ulm." S. B. Green (8).

"Native from southern Ontario to Pennsylvania, Tennessee, Minnesota, Nebraska and Indian Territory. This tree is named from the fact that the seeds were used for coffee west of the Alleghanies before and during the Revolutionary War. In this state it is found native in Clay and Union counties, and has been reported in the Sioux valley as far north as Canton. It is a rare tree in southern and southeastern Minnesota, extending north to St. Paul and west to New Ulm. This tree is a handsome ornamental tree with large compound leaves and coarse branches. The large flat pods contain seed over half an inch long. It was planted at this

Station about ten years ago but it is not now in the collection. Reported half-hardy at Mitchell (Mr. Newbury), and Yankton (Mr. Whiting); hardy at Vermillion (Mr. Cowles), and Yankton (Mr. Gurney)." N. E. Hansen (9).

Kentucky Coffeetree: "In its foliage it is perhaps the most beautiful of all hardy trees."—"In autumn a curious effect is produced by the leaflets falling off and leaving the common stalk on the branches for some time. In winter, young trees have a very distinct and rather gaunt appearance, the branches being few, thick, and rough." W. J. Bean (5).

*Gymnocladus dioica* (L.) Kock. Kentucky Coffee-tree. This is widely distributed in the Miss. Valley, especially along the river courses in Eastern Iowa, although growing as far north as Sioux City in the north-western part of the state, and along the Mississippi into Minnesota. It is abundant in Missouri and Illinois. The fruit contains a sweetish, but disagreeable pulp which, as well as the leaves, is poisonous. In the South the leaves are used as fly poison." L. H. Pammel, Manual of Poisonous Plants (20).

"The Kentucky coffee tree grows wild as far north as Mankato. It is a tree of great individuality, a member of the Pea family. Its leaves are twice compound, and about 16 inches in length, and it bears its seeds in long curved pods. A few trees of this species lend picturesqueness to any plantation. This tree is not so well known as it deserves to be. It is slow in getting its leaves in the spring, but the young foliage is very attractive." L. R. Moyr, Montevideo, Minnesota (18).

### Shagbark Hickory

#### *Hicoria ovata*

*Hicoria ovata*, Koch; *Carya ovata*, Britt; *Carya alba*, Nutt.

A tree with valuable wood and nuts of excellent quality. Native from Quebec to Minnesota, south to Florida and Texas. Next to the Pecan this is considered the best of the American nuts and several improved varieties are now in cultivation.

"A sturdy, beautiful tree, often seventy to ninety feet high in forests; in the open farming an inversely conical top, with pendulous branches."—"In Minnesota common in a few counties in the extreme southeastern portion of the state." S. B. Green (8).

The trees of Shagbark hickory, source unknown, winter-killed at Brookings. The native hickory from southeastern Minnesota should be tested.

### Butternut

#### *Juglans cinerea*

*Juglans cinerea*, Linnaeus

When young the Butternut much resembles the Black Walnut but the fruit is oblong, oval and pointed. The leaves are very similar but the petiole or stalk of the Butternut leaf and the young twigs are covered with clammy hairs. According to W. J. Bean the Butternut is characterized by "a transverse tuft of down between the scar left by each fallen leaf and the bud above it." At Brookings Butternut trees grown from seed obtained at New Ulm, Minnesota, and not transplanted are hardy and began to bear the sixth year. Both Black Walnut and Butternut bear earlier if the seeds are sown in a permanent place and not transplanted. The nuts are of a delicious sweet flavor but very oily and do not keep long.

"Native from New Brunswick to Georgia, west to Minnesota and Arkansas. In Minnesota it extends north to Aitkin county and west to New Ulm. Brookings is beyond the natural limits of the Butternut; if found native in this state at all it must be very rare. The experience at this station does not enable us to recommend the Butternut. Reported hardy at Mitchell, Vermillion and Yankton; not reliable at Madison; tender at Gary and Huron. The source of seed of Black Walnut and Butternut will be found to have some relation to hardiness; and transplanting should be avoided if possible." N. E. Hansen (9).

"In Minnesota common in the southern part except far southwest, extends north to Aitkin county, where trees have been found two feet or more in diameter." S. B. Green (8).

***Juglans intermedia*, var. *vilmoreana*, Carr**

*Juglans intermedia*, var. *vilmoriniana*, Vilm.

A hybrid (*J. nigra*  $\times$  *J. regia*). Intermediate between the parents. Winter-killed at Brookings.

***Juglans mandshurica*, Maxim.**

"Native of Manchuria and the Ussuri and Amur sections of Siberia. This species of Walnut kills to the ground in severe but not in ordinary winters." N. E. Hansen (9).

This same species as collected by the writer at Harbin, north Manchuria in 1924, has proven hardy so far. This importation is described (11) in the South Dakota Bulletin 224, as follows: "Introduced 1926. The local Harbin form of the Manchurian Walnut, *Juglans Mandshurica*, Maxim. The nuts are larger than those illustrated in Bailey's Cyclopaedia of Horticulture under this species. Grown from native seed obtained at Harbin, in 1924, by N. E. Hansen."

**Black Walnut**

***Juglans nigra***

*Juglans nigra*, Linnaeus

The Black Walnut is one of the most valuable of American timber trees; so much so that the timber is now very scarce. Great care should be taken in planting only seed of northern origin as the trees from the far South winter-kill. The nuts are not equal in quality to those of the Persian Walnut as grown in California, but work is now being done in selecting trees bearing fruits superior in size and quality. These are propagated by grafting or budding. There is much work to be done in selection and hybridization which is worth while, and full of rich promise for the future. The Northwest needs bigger, better, and hardier Black Walnuts.

"A large tree with a thick rough bark, valuable for its wood and nuts. It is easily grown from the nuts and seems to do well in the eastern part of the state when once fairly started. It is found growing naturally in Union county and probably also elsewhere in the southeastern part of the state." Thomas A. Williams (28).

"Occurs native only in the southeastern part of the state; Union county." D. A. Saunders (26).

"Native in the southeastern part of the state and as far north as Bon Homme county. It is now cultivated over the state. Bearing trees are noticeable in Rapid City and Spearfish. It is a slow growing tree and heretofore has never been abundant enough for commercial purposes in South Dakota. The wood is used principally for furniture and gunstocks.

Since it does not readily splinter it is well adapted to the latter, especially those made for warfare." W. H. Over (19).

"Native from Massachusetts to Florida, west to Minnesota and Texas. The northwestern limit appears to be along the Minnesota river near New Ulm, Minnesota. In South Dakota it is found native in the southeastern corner of the State in Union county. A grove near Milbank from New Ulm, Minnesota, seed has done well for some fifteen years past. The experience at Brookings and elsewhere does not enable us to recommend the Black Walnut, at least for open exposure in the larger part of the State. Reported hardy at Yankton, Vermillion, Rapid City, half hardy at Mitchell, not hardy at Madison, Gary, Huron and Forestburg." N. E. Hansen (9).

"In Minnesota formerly a common tree along the creek and river bottoms of the southern part of the state and in a few locations is still rather abundant."—"The Black Walnut is frequently used for ornamental planting in the parks of the United States and Europe. In this section, however, we reach the northern limit of its range, and find that it is not generally satisfactory when planted in the open, but often does well in protected locations and on deep alluvial soils. It can sometimes be used to advantage in timber plantings in the southern half of Minnesota when surrounded by some hardier tree to protect it from the wind. It is liable to sunscald when the trunk is exposed in this section." S. B. Green (8).

### Persian Walnut

#### *Juglans regia*

*Juglans regia*, Linnaeus

A round-headed tree, 60 to 100 feet high; native of southeastern Europe to the Himalayas and China.

The Persian Walnut, also called English Walnut, is extensively grown in California, but is not hardy in the prairie Northwest.

### European Larch

#### *Larix europaea*

*Larix europaea*, DC; *Larix decidua*, Mill.

There are about 10 species of Larch native of the northern hemisphere.

"European Larch. Native of northern Europe and the Alps of central Europe. A graceful lawn tree. A conifer, but for horticultural purposes is reckoned with deciduous trees as the leaves fall in autumn. Only a small proportion of those originally planted at this station are standing. It is subject here to injury of the new growth from late frosts. The European Larch does better on dry land than the American Larch, but the general experience with it on northwestern prairies is unfavorable. A moist soil and shelter locality are needed. The Larches must be planted very early in spring, before the buds start, to insure a good stand." N. E. Hansen (9).

In Europe under favorable conditions this Larch attains a height of 140 feet, and is an important timber tree.

### Siberian Larch

#### *Larix sibirica*

*Larix sibirica*, Ledebour; *Larix europaea* var. *sibirica*, Regel; *Larix europaea* var. *rossica*, Regel.

The Siberian Larch is native of northeastern Russia to Siberia. It is closely allied to the common European Larch but starts earlier in the spring, the leaves are longer and more slender, and the scales of the cone are more concave.



"Siberian Larch. In Russia government forestry planting on the stepes this has been found much superior to the European Larch. Two specimens received from Russia in the spring of 1898 through the United States Department of Agriculture have proven perfectly hardy so far in open exposure." N. E. Hansen (9).

These trees are still thrifty, and have made good growth.

### Osage-Orange

#### *Maclura pomifera*

*Maclura pomifera*, Schneid; *Maclura aurantiaca*, Nutt; *Ioxylon pomiferum*, Linn.

"Native of Arkansas, Texas and the southwest. The Osage Orange is not hardy in northern Iowa, Minnesota and the Dakotas; south of that is popular with many for hedges which become stock-proof if properly trimmed. Some agents claiming to represent eastern nurseries canvassed many parts of the Dakotas and Minnesota last year, taking orders for "Siberian or Russian Pea trees" or "Russian Osage." but the samples sent to the writer for determination were in all cases common Osage Orange. There is no such plant as Russian Osage in existence, Osage being strictly an American plant. The name *Ioxylon* has priority but has not yet been generally accepted by nurserymen." N. E. Hansen (9).

Further south the Osage-Orange is grown much less than formerly because of its susceptibility to scale. The old hedges are being removed. The Osage-Orange is allied to the Mulberry. The fruit is like an orange in shape, 4 inches across, yellowish green, not edible. The male and female flowers are borne on separate trees.

The Osage Orange or "hedge" as it is commonly known in Kansas, is a medium sized spiny oramental tree, seldom exceeding 35 feet in height and 18 inches in diameter, The wood makes fence posts that last indefinitely. Trees in Kansas: State Board of Agriculture, Topeka (15).

"Although the flowering is dioecious, the pistillate tree even when isolated will bear large oranges, perfect to the sight but lacking the seeds. The fruit is eaten by cattle but is not good for them." Harriet L. Keller (14).

### White Mulberry

#### *Morus alba*

*Morus alba*, Linnaeus

Native of China, and has been cultivated from the earliest times as the leaves are used for feeding the silk worm. This has long been cultivated in the eastern states for the long white and violet-black fruits which are very sweet. There are some fine old bearing trees of this mulberry on the lawn at the old home of George Washington at Mount Vernon. There are many varieties differing in size of fruits and foliage. No test has been made of these many varieties but in general the *Morus alba* is not hardy in the prairie Northwest.

### Russian Mulberry

#### *Morus alba tatarica*

*Morus alba*, Linnaeus var. *tatarica*, Loudon.

"This was introduced into Nebraska and other western states during 1875-1877 by the Russian Mennonites. It was at first highly recommended by some western nurserymen as desirable for fruit, shelter-belts and timber, but experience shows it is of value mainly for low windbreaks to catch the snow, and the fruits of value only to feed the birds which prefer it to

more valuable fruit. The fruit varies in size and color on different trees, but is mostly very small and insipid. However, some housekeepers make good use of the fruit by mixing it with acid fruit. The tree is sufficiently hardy in the southern part of the state, fruiting satisfactorily as far north as Turner county. At Brookings the trees kill back too much to be desirable." N. E. Hansen (9).

"The Chinese Mulberry (*Morus alba*), with white fruit, is also growing by introduction in the State. The hardy Russian mulberry is derived from this species. The Chinese mulberry is the form that furnishes foods for the silk worm and the leaves of no other species will be taken as a substitute." W. H. Over (19).

"The Russian Mulberry—is not perfectly hardy in this section, but generally holds on well as far north as St. Paul, although it generally kills back considerably for the first few years after planting." S. B. Green (8).

### Black Mulberry

*Morus nigra*

*Morus nigra*, Linnaeus

"Native of western central Asia. As received from Turkestan the young trees kill to the ground. The large-fruited black mulberries grown in the eastern states, are not hardy in the Northwest." N. E. Hansen (9).

### Red Mulberry

*Morus rubra*

*Morus rubra*, Linnaeus

A tree with dark purple fruit. Native from Massachusetts to Florida, west to Nebraska, Kansas and Texas.

"A small to medium sized tree, bearing black-berry like fruit. It has been collected in Union county by Mr. Wallace." Thomas A. Williams (28).

"This tree is found naturally only in the extreme southeastern county of the state, along the Sioux river; Elk Point." D. A. Saunders (26).

"Has become naturalized in the eastern part of the State. It is said that the old wood is very lasting and makes excellent posts. The fruit is eagerly sought after by fruit-eating birds and a tree or two should be planted in every cherry orchard." W. H. Over (19).

"In Minnesota it reaches its northern limit in the southern part of the state." S. B. Green (8).

### Teas' Weeping Russian Mulberry

*Morus tatarica pendula*, Hort.

"This is a beautiful weeping variety with long slender branches pendent to the ground. Not in the Station collection; reported hardy at Yankton. The Minnesota Experiment Station reports it not sufficiently hardy for that vicinity." N. E. Hansen (9).

A weeping form of the Russian Mulberry. When worked high on tall straight stems, the long hanging branches make it a very interesting tree. Of the same degree of hardiness as the Russian Mulberry.

### American Hophornbeam

*Ostrya virginiana*

*Ostrya virginiana*, Koch; *Ostrya virginica*, Willd.

The Hophornbeams are members of the Birch family (*Betulaceae*). The four species, native of North America, Europe and eastern Asia, are small or medium sized trees with handsome bright green foliage.

The American Hophornbeam native from Cape Breton to northern Minnesota and the Black Hills of South Dakota, south to Florida and Texas, is a very beautiful hardy tree, but of slow growth.

"Hophornbeam or Ironwood (*Ostrya virginiana*) (Mill.) (Willd.) A small tree with thin bark and tough, heavy wood; leaves ovate taper-pointed, sharply and doubly toothed; fruit clusters hop-like in appearance. The wood is very valuable because of its strength and durability." Thomas A. Williams (28).

"On the wooded bluffs in the Minnesota region, and among the foothills in the Black Hills." D. A. Saunders (26).

"Ironwood (*Ostrya virginiana*). Grows in the eastern part of the State and in the Black Hills. In South Dakota hardly more than a shrub. Wood very hard but used only for fuel." W. H. Over (19).

(*Ostrya virginiana*). Noted at Bigstone Lake and in Long Hollow Cannon Hills, west of Sisseton North Slope, Roberts county, South Dakota by L. H. Pammel, 1917.

### American Planetree

#### *Platanus occidentalis*

*Platanus occidentalis*, Linnaeus

Native from southern Maine to southern Ontario, to central Iowa south to Florida, Mississippi and Texas. In the region of the Ohio and Mississippi rivers, the Sycamore grows to 120 feet in height and 30 feet in circumference. Also called Sycamore, or Buttonwood. This is not found in the recommended list of the South Dakota State Horticultural Society. Its habitat is more southern and does not give promise of real hardiness. In the southern edge of the state it will probably grow, especially if the trees are from central Iowa, the northwestern limit of the species.

"Early reports of this tree from southeastern Minnesota seem to be in error, at least there is no evidence at present of its occurrence there. It is occasionally planted and is entirely hardy at least as far north as Minneapolis." Rosendahl and Butters (23).

### POPULUS

"The Poplars and Aspens comprise some twenty-five species of trees native to the northern hemisphere, and together with *Salix*, or willow, make up the willow family, *Salicaceae*. The many kinds of Poplars planted at this Station have been tested mainly from the economic standpoint to determine their value for timber plantations upon the open prairie. The trouble with Cottonwood and other Poplars is, that they are, to use a forestry term, "light-demanding" and not "shade-enduring." They also demand a moist soil with water not too deep beneath the surface. Hence, in closely planted groves on dry upland they prove short-lived. As single specimens, or in single rows, where the roots can secure more moisture and the tops more light than in plantations, they do much better. Poplars, especially Cottonwood and its Siberian relative, *Certinensis* Poplar, owing to their rapidity of growth, low cost and ease of propagation from cuttings, are valuable pioneer trees for the prairie planter upon suitable soil. However trees of more permanent character should replace them when means permit. A discussion of their value as timber trees is given in "Forestry in Minnesota" by Professor Samuel B. Green." N. E. Hansen (9).

"The legitimate common use of poplars in ornamental grounds is the production of minor or secondary effects. As a rule, they are less adapted to isolated planting as specimen trees than to use in composition,—as

parts of general groups of trees,—where their characters will serve to break the monotony of heavier foliage. The poplars are “gay” trees, as a rule, especially those, like the aspens, that have a trembling foliage. Their leaves are bright and the tops thin. A few of them in judicious positions give a place a sprightly air. This is particularly true of the common aspen, *Populus tremuloides*, of the wood. Its light twinkling foliage and silver-gray limbs are always cheering and its autumn color is one of the purest golden yellows of our landscapes. It is well to have a tree of it standing in front of a group of maples or evergreens. Its whole expression is then one of familiarity.” L. H. Bailey (2).

### White Poplar

#### *Populus alba*

*Populus alba*, Linnaeus

“The green wood moved and the light poplar shook  
Its silver pyramid of leaves.”

—Barry Cornwall.

“The white poplar is a native of central and north Europe, in Asia from the Caucasus and the Orient to northeast Asia. Hardy at Brookings. This tree is generally considered hardy in the northwest, but its strong disposition to sucker from the root is objectionable for ornamental purposes. The variety *nivea*, Wesm., (*Populus argentea*, Hort., *Populus nivea*, Willd.,) is a variety most common in this country. Sometimes, but erroneously called Silver Maple owing to its maple-like leaves. The snow-white under surface of leaf make the tree too conspicuous to be used largely for ornamental planting. On the lawn the innumerable suckers are a nuisance. Not adapted for a street tree because the white down on the under side of the leaves and young shoot catch the soot and dust and gives the tree a dirty appearance.” N. E. Hansen (9).

“The contrast between the dark green upper surfaces of its leaves and the velvety white under surfaces causes a pleasing scintillating effect as they are agitated by the wind, and this gives to the White Poplar a peculiar ornamental value. The abundance of the trees about the sites of old country homes attests its long popularity as an ornamental tree and its hardiness, but the rapidity and persistence with which it spreads, by means of its long stoloniferous roots, makes it in some places a nuisance.” R. B. Hough (12).

### Silver Poplar

#### *Populus alba nivea*

*Populus alba* var. *nivea*, Ait.; *Populus alba* var. *acerifolia*, Hort.; *Populus alba* var. *aremburgica*, Hort.; *Populus alba aremburgiana*, Hort.; *Populus argentea*, Koch.

“The poplar that with silver lines his leaf.”

—Cowper.

The Silver Poplar or Snowy Poplar is the commonest form of the White Poplar in this country. It is known by the densely silver-white wool on the under surface of the leaves, which are 3 to 5-lobed, like a maple leaf.

The Gray Poplar, *Populus canescens*, Sm., is sometimes confused with *Populus alba*. “The true *Populus alba* is easily recognized by the leaves, especially the lobed ones, remaining white and woolly until they fall, and by their being palmately lobed on vigorous shoots. The foliage sometimes turns a fiery red in autumn.” W. J. Bean (5).

At Brookings a specimen of Silver Poplar, about 40 feet high, is 26 inches in diameter 10 inches above the ground.



"It is far too frequent about old yards, where its inveterate brood of suckers make it a perpetual nuisance. It is sometimes called "silver maple," from the resemblance of its foliage to that of the maple. As the street trees in cities it is particularly offensive, for the cottony covering of the under side of the leaves and of the shoots holds soot and dust, and it looks repulsively dirty. Useful for foliage effects in large plantings." L. H. Bailey (2).

### Smoothbark Cottonwood

#### *Populus acuminata*

*Populus acuminata*, Rydberg; *Populus coloradensis*, Dode.

A round-topped tree found on the borders of streams and lakes from Saskatchewan to western Nebraska and Colorado, New Mexico and Utah. Attains a maximum height of over 65 feet. "Rydberg's Cottonwood—The tree has been much planted for shade and ornament in and about cities and towns within its range." N. L. Britton (6).

"Rydberg's Cottonwood (*Populus acuminata*, Rydberg.) This is one of the so called black cottonwoods and is intermediate between the narrow-leaved black cottonwood and the balsam poplar. Mr. Rydberg, who discovered and named it, speaks of it as being a dark green tree with a pyramidal crown and spreading branches. It was first found in Scott's Bluff county, western Nebraska, in 1891, and was again found in 1893 in the Black Hills at Hot Springs." Thomas A. Williams (28).

"Near Hot Springs in the Black Hills." D. A. Saunders (26).

Fairly common at Spearfish and in a branch of Squaw Creek in the south part of the Black Hills. Grow into large trees." W. H. Over (19).

Dr. N. L. Britton (6), gives Rydberg's Cottonwood as a common name for *Populus acuminata*. Since this tree was discovered by Dr. P. A. Rydberg of the New York Botanical Gardens, this would be a better name than "Smoothbark Cottonwood."

### Narrowleaf Cottonwood

#### *Populus angustifolia*

*Populus angustifolia*, James; *Populus fortissima*, Nels. & Macbr.; *Populus balsamifera* var. *angustifolia*, S. Wats.

A pyramidal tree rarely surpassing 70 feet in height, with pale ashen gray branches. Native of Saskatchewan to Nevada, Arizona and New Mexico.

"It is the common Poplar of Southern Montana, Eastern Idaho, Wyoming, Utah and Northern Colorado." S. B. Green (8).

The Narrowleaf Cottonwood "is the commonest Cottonwood over a considerable part of its range skirting the banks of streams and moist places between the altitudes of 5000 and 10,000 feet above the sea. It is extensively planted as a shade tree in the streets of towns of Colorado and Utah." R. B. Hough (12).

"Narrowleaved Black Cottonwood, (*Populus angustifolia*, James.) This is a fine large tree, easily distinguished from other cottonwoods by its narrow willow-like leaves, which have a tendency to blacken in drying. It occurs in the Black Hills along streams." Thomas A. Williams (28).

"Narrow-leaved Cottonwood. In the Black Hills." D. A. Saunders (26).

"Abundant along Whitewood Creek and at Spearfish. Trees three feet in diameter at the latter place. It is said that the wood is very white and that Whitewood Creek derived its name from this fact." W. H. Over (19).

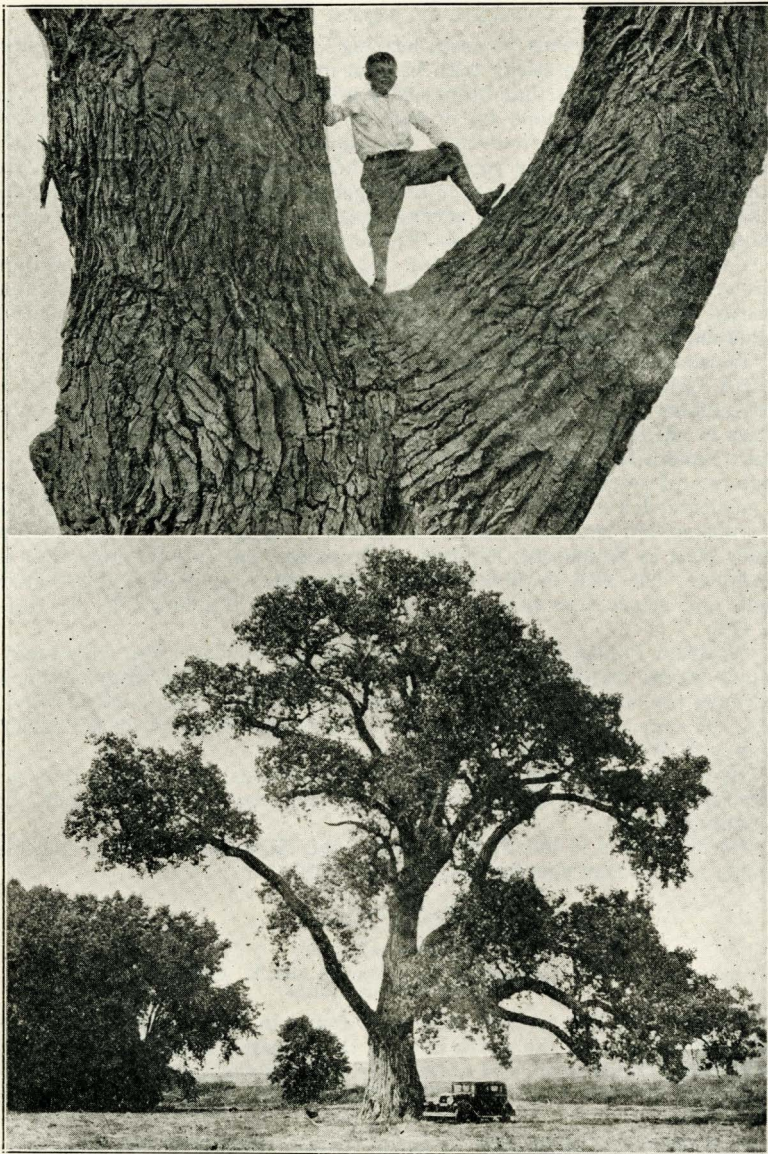


Fig. 4.—South Dakota's largest tree, found near Onida.

## Balsam Poplar

*Populus balsamifera**Populus balsamifera*, L.; *Populus tacamahacca*, Mill.

"*Balsamifera*" means "balsam bearing" referring to the resinous buds and leaves which are sticky with balsam or resin.

"There is no doubt that Linnaeus' original "*Populus balsamifera*" was a composite species made up in part of this species and in part of the southern form of the cottonwood. The name has been applied consistently for over a century to this species, and these seems to no good reason for transferring it at this late date to the other portion of Linnaeus' aggregate as has been done recently by several authors. On the other hand, such a change always leads to confusion." Rosendahl and Butters (23).

A tall upright tree with narrow top and smooth twigs; the terminal buds are sticky with balsam or resin. According to Bailey this tree is distributed from the "Mackenzie River to Newfoundland and to British Columbia, southward in the northern tier of states; not in Asia."

"Balsam Poplar. *Tacamahac*. Native from Newfoundland west to British Columbia, southward into the northern tier of states; also of northeastern Asia. Probably the most variable of Poplars; the many varieties in cultivation have come both from native and Russian sources. In South Dakota it is native in the Black Hills and the Minnesota valley. A large tree of erect habit, with large resinous fragrant buds which are used in medicine; leaves heart-shaped, whitish beneath. The Balm of Gilead, (*P. balsamifera candicans*, Gray) is native from New Brunswick to New Jersey west to Minnesota; is hardy at Brookings but sprouts more than is desirable. The rich dark foliage and spreading top makes it a better shade and street tree than most of the common Poplars." N. E. Hansen (9).

"Balsam Poplar (*Populus balsamifera*, L.) A large tree with heart-shaped leaves whitish beneath, and with large, resinous fragrant buds. The buds are used in medicines. Found in the Black Hills and at Sioux Falls. It may possibly occur also in the northeastern part of the state." Thomas A. Williams (28).

"In the deep, wooded ravines of the Minnesota valley; rare. It is reported also from near Sioux Falls, but no specimens have been seen." D. A. Saunders (26).

"Occurs locally in the Black Hills and the Minnesota valley in Roberts county; also in Day county." W. H. Over (19).

## Bolleana Poplar

*Populus bolleana**Populus alba* L., var. *pyramidalis*, Bge.; *Populus alba* L., var. *bolleana* Lauche;  
*Populus bolleana* Lauche

The Bolleana Poplar "was originally found in September, 1841, forming a little grove on the north side of the Karataw mountains, between Bokhara and Samarcand, and apparently wild. It was introduced to Western Europe between 1875 and 1878." The Garden, London, December 19, 1887.

"A slender pyramidal tree of great beauty, resembling the Lombardy poplar in habit, but wider in proportion to its height, and distinguishable in winter by its pale smooth trunk. There is a fine specimen about 70 feet high near the Sun Temple at Kew. Seen in a breeze this tree has an enlivening effect, caused by swift flashes of white when the under surface of the leaf is revealed." W. J. Bean (5).



"*Populus alba Bolleana*, Lauch. Bolles' Poplar. Dippel refers this to *Populus alba pyramidalis*, Hort. This tree was introduced into Europe in 1875 from Turkestan and named for Dr. C. Bolle of Germany. It has aptly been termed 'a glorified Lombardy Poplar' being of similar tall, very upright narrow-topped habit of growth, but the foliage and color of bark is much more ornamental. The leaves are rather deeply lobed, dark green on upper surface, snow white beneath; the bark is silvery gray. This is the characteristic tree of Turkestan; the writer found it to be very common in the towns along the Trans-Caspian railway from the Caspian Sea to Bokhara and Samarkand. The tree was very common at Tashkent and was found to extend through northern Turkestan to Kuldja, western China (lat. 43 degrees 50 minutes, long. 81 degrees 20 minutes east of Greenwich), the extreme eastern point of my journey. Specimens were noted over three feet in diameter and at least eighty feet in height. Some fine specimens were noted near some Chinese Mohammedan mosques. The habitat of this tree suggests its trial in the arid regions of the southwest for economic purposes.

"Its ornamental value is summed up in Bailey's *Cyclopedia* (21) as follows: 'Its fastigiate habit, combined with the white foliage and shoots, makes it a most emphatic tree and there is a great danger of planting it too freely. Seems to be short-lived.' The tree is not fully hardy at this Station, a large part of the original planting having disappeared but several trees that have become established are doing well.

"American nurserymen have found the tree somewhat difficult to propagate, as it does not sucker from the roots and does not really grow from cuttings. The cuttings require to be calloused before planting. Grafting has restored to, but this is expensive. In Turkestan, it is found to grow readily from long cuttings stuck full length along the edge of irrigation ditches." N. E. Hansen (9).

### Gray Poplar

#### *Populus canescens*

*Populus canescens*, Sm.; *Populus alba* var. *canescens*, Sm.; *Populus alba* Willd., not L.; *Populus hybrida* Reichenb; *Populus Steiniana* Bornm.

According to S. B. Green, (8) *Populus alba canescens* differs from *Populus alba nivea* "in having leaves broad or nearly circular in general outline, notched but not lobed, but like it in that the leaves and young shoots are downy."

Native of central Europe and western Asia. Often considered a hybrid between *Populus alba* and *Populus tremula*, but the leaves are gray rather than white underneath, except when quite young. A very vigorous tree which produces suckers freely.

### Carolina Poplar

#### *Populus Eugenei*

*Populus Eugenei*, Simon-Louis; Eugene Poplar

A hybrid (*Populus deltoides* x *Populus nigra* var. *italica*), which means that it is a hybrid of the Northern Cottonwood and the Lombardy Poplar.

"Carolina Poplar. A variety of the Cottonwood which is at present receiving considerable attention from nurserymen. Our specimens are, too young for a definite report. It is a very strong grower of very upright, erect habit of growth, leaves more gradually taper-pointed and less triangular." N. E. Hansen (9).

The Carolina Poplar as sent out from western nurseries apparently is the same as the Norway Poplar, Sudden Sawlog. The name Norway



Poplar came from its having been distributed from a Norwegian settlement in Minnesota, and it was prominently brought into notice in 1904. *Populus Eugenei* Simon-Louis is a male tree and hence does not spread cotton.

"This fine tree originated in the nursery of Messrs. Simon-Louis near Metz, about 1832, as a seedling. The original tree still stands where it was planted in 1837, and is now one of the most remarkable objects in that famous establishment. I saw it in July 1904, and Mr. Jouin gave me its dimensions as follows: Height 150 feet; girth of trunk at base, 38 feet; girth at 4 feet up, 23 feet. The extraordinary vigour indicated by these figures seems to show that this tree should be tried as a timber-producing tree in this country in places where there is a demand for soft wood suitable for packing-cases, toys, etc. Even in poor soil at Kew a tree planted in 1888 is over 80 feet high and 5 feet in girth of trunk. It produces remarkably little brushwood in proportion to its trunk." W. J. Bean (5).

"This tree is becoming extensively planted throughout the state and in the northwest generally, on account of its vigorous habit and very rapid growth, and hence the name "Sudden Sawlog"——According to Schneider (l.c.) this hybrid first originated in the garden of Simon-Louis at Plantieres near Metz. It is not known whether or not the common form in Minnesota is identical with the European form." Rosendahl & Butters (23).

On the open prairie in the Dakotas *Populus Eugenei* suffered in dry seasons.

"The Poplar which has for several years been largely planted as a street tree in the United States is believed to be a hybrid of European origin between the northern Cottonwood of the United States and the so-called Lombardy Poplar. It is a tree with rather a narrow hard of semi-erect branches and leaves which are cuneiform or rounded at the base. Only the staminate tree is known. The name of this hybrid appears to be—

*Populus Eugenei*, Hort. ex Dode, Extr. Monog. Ined. *Populus*, 46 (1905).—C. K. Schneider, Ill. Handb. Laubholz. i.9.

*Populus canadensis Eugenei*, Schelle, Beissner, Schnelle & Zabel, Hand b. Laubholz. 16, 1903.

"*Populus Eugenei* sprang up many years ago in the nurseries of Simon Louis Feres at Plantieres near Metz, in Alsace. It is hardly possible that all the cultivated trees of this hybrid are descended from the single individual at Plantieres, and it is probable that other individuals of the same parentage varying somewhat among themselves in habit and foliage have been propagated by nurserymen. Poplar trees apparently of the same origin have been much planted in Europe, where they are generally known as the Swiss Poplar and as the Black Italian Poplar, and it is probably this tree which Lamarck described under the name of *Populus nigra helvetica* (Dict. v. 234, 1834). In the United States this hybrid is usually called Canadian Poplar or Cottonwood." Charles S. Sargent (25).

### Largetooth Aspen

#### *Populus grandidentata*

*Populus grandidentata*, Michx.

A tall straight tree, 70 to 80 feet in height. Native from Nova Scotia to Minnesota, south to Tennessee and North Carolina. "Grandidentata" means "larger teeth." The teeth on the leaf margin are a little larger than those on *Populus tremuloides*, The Quaking Aspen. It grows more rapidly than the Quaking Aspen. The tree is characterized by the dull gray bark

and the brittle wood. The foliage turns bright red in autumn. The wood is weak and soft and is largely used for paper-pulp. Hardy at Brookings.

"The Largetooth Aspen can sometimes be planted in timber belts to advantage. It makes good straight poles for various farm purposes and for framing; it is also used for wood pulp and occasionally in turnery and for woodenware." S. B. Green (8).

### Certinensis Poplar

#### *Populus laurifolia*, Ledebour

*Populus balsamifera* var. *laurifolia*, Wesm.; *Populus balsamifera* var. *viminalis*, Loudon.

"*Populus laurifolia*, Ledeb. (*P. balsamifera*, var. *laurifolia*, Wesm., *P. P. Certinensis*, *P. Petrovski*, *P. Berolinensis*, Hort.) Certinensis Poplar. Native of Siberia, especially in river valleys at the base of the Altai mountains. A hardy tree of very rapid growth, somewhat resembling the Cottonwood; the young vigorous shoots are strongly angled or grooved; the growth more close and erect; the leaves have wavy or ruffled edges and are on shorter stiffer stalks. In the closely planted plats on the ground of this station Certinensis Poplar has not done any better than Cottonwood, in being quite short lived when crowded for room and water. Upon suitable soil with more space and access to water, both deserve to be planted." N. E. Hansen (9).

This tree is not listed in "Standardized Plant Names." The name Certinensis Poplar is commonly used in the prairie Northwest.

"Leaves on the old wood or slow growing twigs are very different from those on vigorous growing shoots. The former are broadly oval, with finely serrate margins and on cylindrical twigs. The strong shoots are deeply angled or grooved, and the foliage on them is wavy in outline. The trees are sometimes confounded with the Cottonwood, from which they are very distinct, especially in the leaves, which are on shorter more rigid petioles. A large tree of rapid growth."—"Properties of wood—light, soft, easily worked and reported as being valuable for many of the purposes for which pine timber is commonly used. The Certinensis Poplar has been tried largely in this section, and has proved to be a good, quick-growing tree for prairie planting. In some localities, however, it has been infested with a borer which has occasionally done much injury, and led to the impression that it is not so hardy as the Cottonwood. The foliage seems to resist the attacks of the leaf fungus better than the Cottonwood." S. B. Green (8).

"*Populus berolinensis*, Dipp. (*P. certinensis*, Dieck. *P. pseudo-balsamifera*, Fisch.) Columnar tree supposed to be of hybrid origin, with short ascending branches, the growths densely pubescent. Perhaps a hybrid between Lombardy Poplar and *P. laurifolia*. The name *P. certinensis*, was applied to the staminate plant."—"Whether the *P. certinensis*, grown in North America all belongs with *P. berolinensis*, is very doubtful. Some of it seems to have many of the characters *P. deltoides*. As grown in nurseries and collections here, it is a very rapid growing and hardy tree, with a strong central leader and very heavy dense foliage"—"The Certinensis poplar is a more rugged tree than the cottonwood, with healthier foliage in the presence of leaf rust, and its wood is said to be valuable. It has been much planted in the Northwest and deserves to be widely distributed." L. H. Bailey (2).

## Northern Cottonwood

*Populus monilifera*

*Populus monilifera*, Ait. ; *Populus balsamifera*, L. ; *Populus deltoidea* var. *monilifera*, Henry ; *Populus canadensis* Michx. f., not Moench. ; *Populus deltoide* Marsh. ; *Populus deltoidea* C. F. Hoffm. ; *Populus deltoidea* Bartr.

"With its massive pale stem, its great spreading limbs and broad head of pendulous branches covered with fluttering leaves of the most brilliant green, *Populus deltoidea* is one of the stateliest and most beautiful inhabitants of the forests of eastern America." Charles S. Sargent (25).

The Northern Cottonwood is native from western Quebec and New Hampshire to Alberta, south to Texas and Florida. "Deltoides" means "triangular" referring to the leaf. This tree has been much planted in South Dakota as a street tree but it attains too large a size to be satisfactory. Many old trees in Brookings have been removed as they had attained the "sawlog" size. This cottonwood is often called Necklace Poplar in the eastern states on account of the long necklace-like ripe fruiting catkins. The tree attains a maximum height of 150 feet with a trunk diameter of over 6 feet.

"Cottonwood. Native from Quebec to the Rocky mountains and south to Florida. See general notes under the heading *Populus*. A tree widely planted in this state. For lawns of moderate size the Cottonwood grows too large and robs the soil of moisture needed by other trees. It is not a good neighbor for other trees. In the summer of 1898, a well at Brookings failed; examination showed it to be clogged at a depth of twenty-five feet with a mass of roots from a large Cottonwood tree close by; upon removal of the tree and the mass of roots the well resumed activity.

"In the streets of Brookings there are many magnificent specimens about twenty years old, planted when the town was first laid out. Old trees give very little shade, the top being too spreading and open and foliage too thin. The leaves rustle with the slightest breeze and are of light, cheerful aspect. There are no sombre tints among Cottonwoods; they suggest sunlight; motion, not rest.

"In common with all Poplars, this tree is dioecious, that is, the male and female flowers are not borne on the same tree. Hence the 'cotton,' which flies when the seed is ripe, can be avoided by planting trees grown from cuttings taken from staminate or male trees." N. E. Hansen (9).

"Common Cottonwood or Necklace Poplar (*Populus monilifera*, Ait.). This well-known tree occurs throughout the state. It is one of our largest trees. It reaches its best development along the moist sandy bottoms of the Missouri. The variety with rougher bark and firmer wood of a yellowish color is of most value for timber. It is known as the 'Yellow Cottonwood'. Along the Cheyenne river the cottonwoods are much more closely branched than is common for this tree. This is probably due to the severe winds which come across the range and break off the tops and branches of the trees. A form occurs along Yellow Bank creek in the northeastern part of the state which may prove to be a hybrid between this species and the preceding. Mr. Rydberg reports a form from the Black Hills which he calls *Forma Cuneata* on account of the cuneate bases of the long-pointed leaves." Thomas A. Williams (28).

"Around lakes and bordering streams throughout the state; *coramon*." D. A. Saunders (26).

"The common cottonwood from the Missouri River and eastward in the state growing along all rivers and creeks. Usually the predominant tree of the islands and flood plains of the Missouri River.



"It is a rapid growing tree and in early times was extensively planted in groves for protection against the sun rays of the summer and the severe windstorms of winter. Today most of them are large trees, yielding wood for fuel and lumber for building purposes. It is said that cottonwood is remarkably adapted as wood pulp for paper making. Because of the abundance of cottonwood along the flood plains and islands of the Missouri River, and the rapid growth of this species, it would appear possible to make use of this wood commercially by establishing a pulp mill at Yankton, Chamberlain or Pierre for the manufacture of paper.

"Cottonwood trees attain the largest size of any species in the State. A fine, large specimen twenty-seven feet in circumference three feet above the ground is growing on Mr. Sutton's ranch near the mouth of Artichoke creek in Sully county. Another large tree twenty-seven feet in circumference at the ground formerly stood near the Big Sioux river at Sioux Falls." W. H. Over (19).

"Mostly on bottom-lands and along lake shores throughout the southern half of the state. Very extensively planted as a windbreak and shade tree around farmsteads of the prairie area. . . . .

"Wood light, soft, brownish, with nearly white sapwood, warping badly while drying and difficult to split; used for boxes, paper pulp, firewood, and to some extent as lumber." Rosendahl and Butters (23).

"The wood of the Cottonwood is used for cheap packing cases, trays and bowls, for paper pulp, excelsior and for fuel. For fuel and lumber the wood should be dried under cover, as it decays very quickly when exposed to moisture. Some figures collected at the Minnesota experiment station show that on good land cottonwood may yield as much as seven cords per acre per year increase." S. B. Green (8).

"Taking all things into consideration, the cottonwood is one of the best of the poplars for general ornamental planting. It grows rapidly and in almost every soil, and yet it possesses elements of strength and durability which most of the poplars lack. Its foliage is always bright and glossy, and the constant movement of the broad rich green leaves gives it an air of cheeriness which few trees possess." L. H. Bailey (2).

### Lombardy Poplar

*Populus nigra* Linnaeus, var. *italica*, Dur.

*Populus nigra* Linnaeus, var. *pyramidalis*, Spach.; *Populus italica*, Moench.; *Populus fastigiata*, Desfontaines.; *Populus dilatata*, Ait

*Populus nigra Italica*, Du Roi. (*P. dilatata*, Ait.; *P. nigra pyramidalis*, Spach.) Lombardy or Italian Poplar. Native of north Italy, the Crimea and the Himalayas. A well known tree remarkable for its very tall, narrow, erect habit of growth. Used by landscape gardeners to give variety to clumps of other trees, a specimen or clump behind a group of round-topped trees serving to break up the sky line, but it must not be used too freely. The trees on the Station grounds at Brookings show many dead branches and are not long lived." N. E. Hansen (9).

The Lombardy Poplar "is hardy in moist soil, and on our average prairie soil makes a good growth while young, but soon becomes ragged in the top, and loses some of its branches and occasionally dies. When it becomes ragged in appearance it should be cut back, as it will then often renew itself. The tree is generally shortlived in this section. It does not afford shade enough for a forest or shade tree, and does not make a good windbreak." S. B. Green (8).

"This well known and beautiful tree, the most valuable of all fastigate trees, differs only from the type in its slender tapering form and



quite erect branches. Nearly all the Lombardy poplars in cultivation are male, but a few female ones are known. There is one near Kew Palace over 50 feet high, but it is not so slender as the common male tree. For this reason, and still more because it litters the ground near with its cottony tufts at seeding-time, it is much less desirable. As the Lombardy poplar is propagated only by cuttings, the female tree must be of independent origin. The male, which is occasionally 100 to 125 feet high, is recorded to have been brought to England from Turin by Lord Rochford in 1758, and according to Loudon, one of the first importations existed at Purser's Cross in 1838." W. J. Bean (5).

"Lombardy Poplar. Branches closely ascending, forming a narrow columnar head; leaves usually more narrowly cuneate: usually staminate. Originated before 1750. Introduced to America in 1784. The few pistillate trees known have less strictly upright branches and a broader head.—A striking tree on account of its formal columnar habit; often planted as a street tree." Alfred Rehder (22).

"Lombardy Poplar (*Populus nigra* var. *italica*).—A tall, slender rapid growing poplar used for formal planting on very narrow streets. It is short lived, shallow rooted, liable to send root suckers and objectionable because of the "cotton." Lenthall Wyman, State Forester Bulletin No. 11, Agricultural and Mechanical College of Texas.

The quotations from Bean, Rehder, and Wyman indicate that both the staminate and pistillate trees are in cultivation. Where the Lombard Poplar is desired, care should be taken to secure cuttings from the staminate or male trees, as they do not spread the "cotton."

### Sargent Cottonwood

#### *Populus Sargentii*

*Populus Sargentii*, Dode.: *Populus deltoides occidentalis*, Rydb.

Native from Saskatchewan and Alberta to Nebraska, New Mexico and west Texas.

"This is the cottonwood of the western part of the State, but it is very similar to the eastern form except perhaps that it does not grow as high. Its tops spread more and its branches are more angulate. It grows more scatteringly along flood plains and in groves often suggests the appearance of natural parks." W. H. Over (19).

### Quaking Aspen

#### *Populus tremuloides*

*Populus tremuloides*, Michx.

"Quaking Asp (*Populus tremuloides*, Michx.) This is a small tree with smooth greenish-white bark. The leaves are usually fringed on the margins with minute hairs and the petioles are long, flat and thin, allowing the leaves to be moved by the slightest breeze. Found in the Black Hills, along the banks of streams and lakes throughout the Sioux valley and the Bigstone regions. A small clump of trees was also found at Iron Springs in the Bad Lands. Though a pretty tree it is not very valuable." Thomas A. Williams (28).

"Native of North America, north of Pennsylvania and Kentucky, extending to Mexico and the mountains. A small, handsome tree with whitish gray smooth bark, leaves soft green with whitish veins above, and bluish green beneath. Trees from Wisconsin proved hardy and have done better in closely planted groves on dry land than cottonwood. In its native haunts this is comparatively a short-lived tree." N. E. Hansen (9).

"On the dry bluffs and in the spring swamps in the Minnesota valley, in the higher altitudes in the Black Hills, and in isolated patches between the Missouri river and the Black Hills. It is reported also from the Sioux valley, but no specimens have been seen." D. A. Saunders (26).

"A small tree with whitish bark growing sparingly in clumps in damp shady ravines in the Big Sioux valley, the region of Big Stone lake and the Black Hills and the Cave Hills of Harding county." W. H. Over (19). *Populus tremuloides*, Michx. var. *aurea*, Daniels.

The Rocky Mountain form, with "leaves broadest near the middle, with a short slender point and more remotely and irregularly serrate, changing to bright or orange-yellow in autumn." Alfred Rehder (22).

*Populus aurea*, Small-leaved Poplar. A very small tree scattering on dry hillsides in the Black Hills. Leaves smaller than the latter species (*Populus tremuloides*)." W. H. Over (19).

## Black Cherry

### *Prunus serotina*

*Prunus serotina*, Ehrh.; *Cerasus serotina*, Loisel.; *Padus serotina*, Agardh.

"Rare in the Minnesota and Sioux valley." D. A. Saunders (26).

"Has become naturalized in the eastern part of the State, where it is a large tree. The fruit of these cherries is much sought after by birds." W. H. Over (19).

"*Prunus serotina*, Ehrh. Wild Black Cherry. Native from Nova Scotia to Dakota, south to Florida and Texas. In this state it is rare, in the Minnesota and Sioux valleys. Professor Sargent says it is "one of the stateliest and most beautiful trees of the eastern woods." Its white flowers, shining leaves and racemes of purple black bitterish fruit the size of a pea make it a desirable ornamental tree. In the Station forestry plantations this tree has proven hardy and desirable, especially in a mixture with Ash, European White Birch and White Elm. In open exposure specimens from Pennsylvania killed back severely in the winter of 1898 and 1899 and the trees became black-hearted." N. E. Hansen (9).

"*Serotina*" is the Latin name for "autumnal," referring to the late ripening of the fruit.

In Minnesota the Black Cherry "occurs practically throughout the state except in the region north of Lake Superior, most common in the southeast and in the Big Woods. Nova Scotia to South Dakota south to Florida and Texas. Blossoms in May or early June, nearly two weeks later than *Prunus virginiana*, fruit ripe in August and September.

"The wood is bright red-brown, close-grained and hard, weighing 36 lbs. It takes a beautiful finish, and is extensively used in cabinet-making—with the exception of black walnut, probably the finest of our native woods." Rosendahl & Butters (23).

*Prunus serotina* Ehrh. Wild Black Cherry. Most poisonous species in the north. The half wilted leaves are much more poisonous than the fresh leaves, and the seeds are very poisonous, all producing hydrocyanic acid." L. H. Pammel, Manual of Poisonous Plants (20).

## The Oak

### *Quercus*

"More than 200 species of oaks are known and distributed through the colder temperate regions of the northern hemisphere and in the mountains of the tropics. About 40 hybrid oaks have been recorded. Some of the oaks are the most important forest trees.—Most of the oaks are stately

trees of noble majestic habit—Oak leaves are always beautiful" (2). The disadvantage of oak trees as a class is their slow growth. They should be transplanted as young as possible. It is still better, although rarely feasible to plant the seed in a permanent place as for walnuts and other nut trees.

### White Oak

#### *Quercus alba*

*Quercus alba*, Linnaeus

"White Oak (*Quercus alba*, L.) This well-known oak is reported from the Black Hills by Mr. Rydberg, but with some doubt, as only young trees were found and these without fruit. His specimens were collected near Hermosa." Thomas A. Williams (28).

A noble timber and ornamental tree, attaining a height of 60 to 100 feet. Native from Maine to Florida, west to Minnesota and Texas. "*Alba*" refers to the pale leaves and bark.

"This is one of the noblest trees of the northern states, with stout spreading branches forming a broad open head and bright green foliage turning deep vinous-red or violet-purple in autumn." Alfred Rehder (22).

White Oak is abundant in southeastern Minnesota north to the Twin Cities; absent from the northern and western parts of the state.

### Mossycup Oak (Bur Oak)

#### *Quercus macrocarpa*

*Quercus macrocarpa*, Michaux

A large tree varying greatly in form, sometimes growing 100 to 160 feet high with a trunk 6 to 7 feet in diameter. Native from Nova Scotia to Pennsylvania, west to Manitoba, Montana and Texas.

"The bur oak is of vigorous growth and becomes a stately tree and is of picturesque appearance in winter with its corky branches. The crown is often fan shaped until tree is mature." L. H. Bailey (2).

"Mossy Cup or Bur Oak (*Quercus macrocarpa*, Michx.) This valuable tree is more or less common throughout the entire state. It may be recognized by the mossy fringe to the acorn-cups. The wood is firm, heavy and strong and is very valuable for fuel and fence-posts. In the eastern part of the state it frequently becomes a large tree but in the west it is smaller, seldom exceeding 20 feet in height in the Black Hills." Thomas A. Williams (28).

The Bur Oak is hardy in the timber plantations of this Station.

"*Quercus macrocarpa*. In rich, open woods and on dry bluffs, in the vicinity of streams or lakes throughout the state. The White Oak (*Quercus alba*) has been reported for this state, but wherever specimens were received or the locality visited, the tree proved to be one of the numerous forms of the Bur Oak. It seems very doubtful if the white oak occurs in this state." D. A. Saunders (26).

"Bur Oak (*Quercus macrocarpa*). May be found locally over the state in a scrubby form. However, along the outer edge of the Black Hills groves of large trees are abundant enough to have some economic value. The finest grove of large oak trees in the state is to be found at White-wood and is now used for their tourist's camping ground." W. H. Over (19).

"The Bur Oak is the most magnificent, most durable and longest lived tree for planting throughout this whole section. It is also one of the most valuable timber trees of North America. Although its wood is rather coarser grained and inferior in strength to that of the White Oak with which it is commercially confounded, yet it is used for the same purposes." S. B. Green (8).

"Bur Oak. Should there be any bur oaks in the vicinity they should be carefully protected; the acorns should be collected from them and planted where the trees are wanted. They are slow of growth when young, but when established they grow quite rapidly. The bur oak is the only native oak in southwestern Minnesota, and in its long struggle for existence it has become well adapted to prairie conditions." L. R. Moyer (18).

Noted at Long Hollow Cannon hills west of Sisseton north slope, Roberts county, and Big Stone lake, Roberts county, South Dakota, by L. H. Pammel, 1917.

### Northern Red Oak

#### *Quercus rubra ambigua*

*Quercus borealis*, Michx. f.; *Quercus rubra* var. *ambigua* (Michx. f.) Fernald.; *Quercus ambigua*, Michx. f., not H B K.; *Quercus coccinea* var. *ambigua*, Gray

A beautiful oak of rapid growth, native from Nova Scotia to Florida, west to Minnesota and Texas. A specimen collected in northwestern Minnesota is hardy at this Station and makes a vigorous growth. It has not yet borne acorns. It may perhaps be the type *Quercus rubra*, the common Red Oak, a somewhat larger tree with a very flat saucer-shaped cup that covers only the base of the acorn. This hardy type of red oak makes a brilliant display of dark red leaves in the fall; a very desirable tree for the lawn.

### Common Locust

#### *Robinia Pseudoacacia*

"Probably formerly introduced into the State and now naturalized. Usually shrubby in South Dakota, with very fragrant pea-like white flowers." W. H. Over (19).

"*Robinia Pseudoacacia*, Linn. Black Locust. False Acacia. Common Locust. Native from southern Pennsylvania to Indiana, Iowa and southward. Not native in South Dakota. Prof. Green reports it 'too tender for general planting in Minnesota, but in favorable locations it makes a desirable lawn tree on account of its pretty foliage and white flowers.' The Black Locust was planted in the early years of the station, but is not now in the collection. Reported hardy at Vermillion. The Black Locust is a striking example of how plants are often more honored abroad than at home. In Europe this is a popular ornamental tree and at least thirty named varieties are in cultivation. One nursery last year offered twenty-three varieties differing in habit, size, foliage, color of blossom and other characteristics." N. E. Hansen (9)

The greatest danger to this Locust is the locust borer. As soon as they are found working on the trees, the bark should be cut away with a sharp knife and the borers dug out with a pointed wire.

### White Willow

#### *Salix alba*

"*Salix alba*, Linn. White Willow. Native throughout Europe, in western and northern Asia and northern Africa. The White Willow is one of the best trees for windbreaks on the prairie." N. E. Hansen (9).

"Distribution.—Native of Northern Europe and Asia, but was early brought to this country, and has become naturalized from the valley of the St. Lawrence to the Potomac. There are many varieties, and probably many hybrids of this with the American and European species. The form of the White Willow commonly used for windbreaks on our prairies has been considered by some as a hybrid between *S. fragilis* and *S. alba*, and



by others as but a variety of *S. alba*. The pistillate tree is most commonly met with here." S. B. Green. (8).

"Alba," meaning white, refers to the ashy gray, silky leaves, giving a white appearance to the whole tree.

"One of the most beautiful of native trees. It varies considerably in the colour of the leaves and young shoots, some being much more silvery than others. It yields a useful timber although scarcely so valuable as that of the blue-willow (*S. coerulea*)." W. J. Bean (5).

### Sharpleaf Willow

#### *Salix acutifolia*

Probably native of eastern Russia to southern Siberia. Hardy in the experimental timber plantations of this station.

"*Salix acutifolia*. Leaves lanceolate-acuminate, dark green and shining above, pale glaucous below, crenate, those on strong shoots stipulate. Twigs yellowish green, older branches covered with a heavy purplish bloom. Catkins thick, stiff and very silky, appearing before the leaves. A very hardy tree or shrub of graceful habit attaining a height of twenty feet. More difficult to propagate than most willows, and occasionally blights severely." S. B. Green (8).

### Niobe Weeping Willow

"Niobe Weeping Willow.—This graceful yellow-barked weeping willow is *Salix alba vitellina pendula nova*, which was imported from Europe over twenty years ago. The Niobe Weeping Willow has become very popular in many states. It is hardier on upland, where it makes a fair growth than on low rich land where the growth is excessive. In 'Standardized Plant Names,' in 1923, Niobe Weeping Willow is listed as being a hybrid (*alba* x *fragilis*). The name Niobe was given by N. E. Hansen in the introduction circular sent out by this department (11).

### Peachleaf Willow

#### *Salix amygdaloides*

A tree 30 to 40 feet high.

"Frequent along streams, in moist or low places throughout the state except in the coniferous forest area. Western Quebec and New York to British Columbia, south to Ohio, Missouri, and New Mexico." Rosendahl and Butters (23).

"Almond Willow, 'White Willow' (*Salix amygdaloides* Anders.) A small tree, one of the prettiest of our native willows. It looks very much like the Black willow but may be distinguished by its broader leaves with pale undersurface. It is also a smaller tree generally than the Black willow. This willow was found at Huron and probably occurs throughout the eastern part of the state." Thomas A. Williams (28).

"Peach-Leaved Willow (*Salix amygdaloides*). Grows into a large tree fifty and sixty feet high along flood plains and lake shores over the state. Wood used for fuel." W. H. Over (19).

*Salix amygdaloides*. Noted at Big Stone lake, Roberts county, South Dakota, by L. H. Pammel, 1917.

### Babylon Weeping Willow

#### *Salix babylonica*

*Salix babylonica*, Linnaeus; *Salix pendula*, Moench

Also called Napoleon's Willow, as it was planted at the grave of Napoleon. A tree attaining a height of 65 feet. Native of China and Japan and perhaps western Central Asia.

"Native of China, in the western provinces of which it has lately been seen abundant in a wild state by Mr. Wilson. It is not native of the region of the Euphrates, as the name *babylonica* would indicate, but has no doubt been cultivated in E. Europe, N. Africa, and W. Asia from an early period. . . . .

"*S. babylonica* is a popular waterside tree, and its beauty is nowhere so telling as by the side of a stream or lake. The banks of the Thames above Richmond owe much of their charm to it." W. J. Bean (5).

The true Babylon Weeping Willow is not hardy at this station, but the Niobe Weeping Willow is a very acceptable substitute.

### Beak Willow

#### *Salix bebbiana*

*Salix bebbiana*, Sargent; *Salix rostrata*, Richardson, not Thuillier

One of the most widely distributed willows, attaining a height of 26 feet. Native from Newfoundland to Hudson Bay and Alaska, south to Pennsylvania, Illinois, Utah and California. Named in honor of M. S. Bebb, authority on willows.

"Beaked Willow (*Salix bebbiana*). Black Hills, Roberts county and Cave Hills of Harding county. Not much larger than a shrub." W. H. Over (19).

### Wisconsin Weeping Willow

#### *Salix blanda*

*Salix blanda*, Anders; *Salix pendulina*, Wender

"*Salix blanda*, Anders. A hardy hybrid willow (*S. Babylonica* x *fragilis*, Clemenc), of strong growth, rounded top, long slender somewhat drooping branches and long lanceolate leaves." N. E. Hansen (9).

"*Salix pendulina*, Wender. Wisconsin Weeping Willow. *S. Babylonica* x *fragilis*. *S. blanda*, Anders. Differs from pure *S. babylonica* in the somewhat wider leaves, in having 2 nectaries or glands instead of one at the base of the pistillate flower and in the longer pedicel of the capsule. (*Pendulina*, pendulous.)" Rosendahl and Butters (23).

### Kilmarnock Willow

#### *Salix caprea pendula*

*Salix caprea* var. *pendula*, Th. Lang.

"*Salix caprea pendula*, Hort. Kilmarnock Weeping Willow. This graceful weeping tree is very popular wherever it has proven hardy. *Salix caprea*, Linn., or Goat willow is a native of central and southern Europe and northern Asia. The general experience in the northwest is that the Kilmarnock Weeping is not hardy. A specimen planted in the spring of 1889, killed back severely the first winter and perished the succeeding winter." N. E. Hansen (9).

### Heartleaf Willow

#### *Salix cordata*

*Salix cordata*, Muhlenberg; *Salix rigida*, Muhlenb.

A shrub to 13 feet in height. Native from New Brunswick to British Columbia, south to Virginia, Colorado and California.

"Heart-leaved Willow (*Salix cordata*, Muhl.). A large shrub or small tree; the leaves, especially those of the young, vigorous shoots, with more or less rounded or heart-shaped base. It is found in various localities in the eastern part of the state and Mr. Rydberg reports it from the Black Hills." Thomas A. Williams (28).

## Diamond Willow

*Salix cordata vestita*, Anderson

"Diamond Willow, Red Willow (*Salix cordata vestita*, Anders.) This willow often reaches a height of thirty feet and always grows in rather dense clumps, the older stems dying after a time and thus making way for the newer growths. The older stems are more or less conspicuously marked by peculiar diamond-shaped places of arrested wood-growth. These places occur at the bases of lateral twigs which were starved or crowded out in the struggle for existence. The wood of this willow is very durable and is often used for posts. It is said to be as lasting as red cedar. It is also regarded as a valuable wood for fuel. The heart wood assumes a reddish color in the older trees, hence the common name of "Red Willow." It is very common along the low banks of streams and lakes throughout the entire state." Thomas A. Williams (28).

"Diamond Willow (*Salix cordata*.) Creek valleys and river flood plains through the State. Owing to the larger size and abundance of this willow it has some economic importance. The wood is fairly hard and makes good fuel, and in some localities is extensively used for fence posts." W. H. Over (19).

N. L. Britton (6) makes this species a synonym of Missouri Willow, *Salix missouriensis*, Bebb.

"The Missouri willow is known in the valleys of the Missouri and Mississippi rivers and of tributary streams, from Kentucky, Illinois, and Missouri to Iowa and Nebraska. It becomes 56 feet (17 or 18 meters) high, with a trunk up to 4.5 dm. thick.

The bark is gray, thin, and scaly, the young twigs green to greenish brown, densely velvety-hairy, becoming brown and smooth; the winter buds are densely hairy, somewhat flattened, pointed, very large, sometimes 2 cm. long.——The wood is more durable, and therefore more valuable than that of most other willows, and is used for posts; it is soft, weak, reddish brown, the sapwood much lighter in color than the heart." N. L. Britton (6).

## Pussy Willow

*Salix discolor* Muhlenberg

Native from Nova Scotia to Manitoba, south to Virginia and Missouri. "Worthy or more extended cultivation and thriving in dry ground." L. H. Bailey (2). "*Discolor*" refers to the contrast in color between the upper and lower surfaces of the leaf. The Pussy Willow is extensively forced for early bloom under glass. Flowering shoots placed in water come into bloom in a few days.

## Apple-leaved Willow

*Salix discolor overi*, Ball.

"Shrub or small tree, up to 20 feet in height, with dark brown bark; leaves broadly elliptical or ovate, remotely crenate-serrate, acute at apex, obtuse at base, bright green above and glaucous below; stipules small and deciduous; pistillate aments up to 2½ inches long on short peduncles. March-May. West shores of Big Stone lake and Lake Traverse." W. H. Over, 1929.

"*Salix discolor* var. *Overi*, Ball. Leaves broadly elliptical to oval or broadly obovate, 4 to 7 cm. long, 2.5 to 4.5 cm. wide. (*Overi*, named for W. H. Over.) In the region of Big Stone lake, South Dakota and Minnesota." Rosendahl & Butters (23).

This species was named and described by C. R. Ball, 1924, in honor of the discoverer, W. H. Over, curator of the museum, State University, Vermillion, South Dakota.

### ThurLOW Weeping Willow

#### *Salix elegantissima*

*Salix elegantissima*, K. Koch. ; *Salix Sieboldii*, Hort.

Origin unknown. Said to be of Japanese origin, probably only a form of *Salix blanda*. (Bailey's Cyclopedia of Horticulture.) According to Dipel, *Salix elegantissima* is "probably from northern Japan."

"The three Willows named *Salix elegantissima*, K. Koch, *Salix blanda*, Anderson and *Salix pendulina*, Wender, are hybrids between *fragilis* and *babylonica*. They are all intermediate in various degrees between the parents, having broader, usually deeper more glossy green leaves than *babylonica*. *Salix elegantissima* is the tree often grown as *Salix babylonica* on the continent, in places where the real tree is not hardy. They are all beautiful trees, worthy, along with *Salix Salamoni*, of attention—especially in the more inclement parts of Britian." W. J. Bean (5).

*Salix elegantissima* is hardier than *Salix babylonica*, with more spreading habit and larger head. Proved hardy at Brookings.

### Yellow Willow

#### *Salix flavescens*, Nutt.

"A shrub found in the Black Hills. It may be recognized by the nearly entire leaves which are downy, or smooth and dull green above, and pale with a rufous pubescence beneath." Thomas A. Williams (28).

### Hairy Willow

#### *Salix glauca villosa*, Anders

"*Salix glauca*, L., var. *villosa*, Anders. Three to seven feet: low meadow and foothills of the Rocky Mountains: a spreading shrub with leaves 2 to 4 inches long and entire margin." (27).

"Hairy Willow (*Salix glauca villosa*, Anders.) This willow usually occurs as a medium-sized shrub, but in Grant county it reaches 12 feet in height. The leaves are oblanceolate, more or less thickly covered with soft, fine hairs, distinctly veined, usually about two inches long, entire or the upper ones somewhat toothed. A very pretty willow growing along low banks. Found at various places in the Black Hills and on the Yellow Bank in Grant county." Thomas A. Williams (28).

### Prairie Willow

#### *Salix humilis*, Marsh.

An upland grayish willow, 3 to 8 feet high, variable in foliage. Native in the driest situations from Newfoundland to Minnesota, south to North Carolina.

"A small shrub reported from the Black Hills by Mr. Rydberg. Dr. Bessey suggests that it "might be used as a 'cover' in forestry planting, especially in the sandy regions of the state." (Nebraska). It is quite probable that this willow will be found elsewhere in the state." Thomas A. Williams (28).

"Common in the Minnesota region; it is usually found on the wooded bluffs or the edge of the open prairie, acting as the advance guard of the wooded formations." D. A. Saunders (26).

"Our smallest willow; only a small shrub growing on hillsides in Minnehaha and Roberts counties." W. H. Over (19).



### Longleaf Willow

#### *Salix longifolia*

*Salix longifolia*, Muhl.; *Salix fluviatilis*, Sarg., in part, not Nutt.; *Salix rubra*, Rich., not Huds.; *Salix interior*, Rowlee.

A shrub willow, native from Quebec to Athabasca, south to Texas, New Mexico and north Mexico.

"Narrow-leaved or Sandbar Willow. (*Salix longifolia*, Muhl.) A shrub or small tree with very narrow, toothed leaves. It is our commonest willow, found all over the state in moist soil. It is very abundant along the low, sandy banks and bars of our streams and lakes. On the broad bottoms along the Missouri river it is one of the first plants that appear on the newly formed sandbars, coming up so thickly as to completely cover the bar in a very short time." Thomas A. Williams (28).

"A small, slender shrub, along streams and lakes throughout the state; the commonest of the willows." D. A. Saunders (26).

*Salix fluviatilis* noted at Big Stone lake, Roberts county, South Dakota, by L. H. Pammel, 1917.

### Black Willow

#### *Salix nigra*

*Salix nigra*, Marsh.

A graceful tree to 40 feet; native of New Brunswick to South Dakota, south to Florida and Arizona.

"Black Willow (*Salix nigra*, Marsh.) This is the largest willow found in the state. It grows along the banks of streams, often at the water's edge, with the slender branches bending down to its surface. The leaves are long and tapering, often downy when young but smooth and green when old. The bark is brown, rough, and rather thick. Perhaps the most valuable of our native willows, especially in groves and windbreaks. It is very plentiful in the eastern part of the state and probably occurs throughout." Thomas A. Williams (28).

"A shrub or small tree, common along streams in the Minnesota, Sioux and James valleys." D. A. Saunders (26).

### Laurel Willow

#### *Salix pentandra*

*Salix pentandra* Linnaeus; *Salix laurifolia*, Wesm.

A tree to 65 feet high, native of Europe to Caucasus; escaped in the eastern states.

"*Salix laurifolia*, Hort. As imported by Professor J. L. Budd and known as Russian Laurel-leaved willow, this is probably a form of *Salix pentandra*, Linn. It is a small, open-topped tree valuable for its handsome foliage, the leaves glossy as if varnished. Native of northern and central Europe and Asia. The two foregoing species (*S. blanda*, Anders. and *S. Caprea pendula*, Hort.) are the best for ornamental purposes of the various species of willow well tested at this Station." Thomas A. Williams (18).

"*Salix pentandra* (*Salix laurifolia* of horticulturists). Laurel-willows, taper pointed, finely serrate with large stipules; upper surface of leaf dark green and shining as if varnished. Leaves are very thick, and so hard that the saw-fly larvae are seldom found feeding on it. A vigorous grower when young, making a small round open topped tree; valuable for variety. The only objection to the extensive planting of this tree here is a blight, which is occasionally injurious to it. On this account it

should be used only in a small way. The form planted here bears pistillate flowers. Native of Europe. Propagated by cuttings." S. B. Green (8).

"Native of Europe (including Britain) and North Asia. One of the handsomest of all willows in the brilliant green of its large, broad leaves, resembling those of a bay laurel. In high latitude it is a shrub, but in moist good soil it becomes a goodly sized tree. There is one at Kew 50 feet high and 7 feet 8 inches in girth of trunk. The leaves are fragrant when crushed." W. J. Bean (5).

### Royal Willow

#### *Salix regalis*

*Salix regalis*, Hort.; *Salix alba*, var. *splendens*, Anderss; *Salix alba*, var. *argentea*, Wimm.

"Russian Silver-Leaved Willow.—Introduced 1921. Brought some years ago from Russia. A silver-leaved willow under the name *Salix regalis*. The botanical status of this tree, according to Bailey, appears to be *Salix alba*, var. *splendens* or *Salix alba*, var. *argentea*, hence a form of the white willow. These trees have made a strong growth, are perfectly hardy, and are noteworthy for the silvery foliage. A rich silver satin on both sides. In "Standardized Plant Names," 1923, (11) this is given the name Royal Willow, but it is not certain that this is the Russian form." N. E. Hansen (11).

"*Salix alba*, Linnaeus, var. *argentea*, Wimmer (*S. regalis*, Hort.; *S. splendens*, Bray.) Silver Willow.—This is the most striking of all the forms of *S. alba* in the intense silvery hue of its leaves, conspicuous in their shining whiteness at long distances. Not so robust as the type." W. J. Bean (5).

### Common Osier

#### *Salix viminalis regelis*

*Salix viminalis*, Linnaeus

"Secured by the writer in Russia in 1897, for the United States Department of Agriculture. Very few cuttings grew and we have been propagating it ever since. A hardy strong growing willow noteworthy for its bright yellow bark in winter." N. E. Hansen (9).

The type *Salix viminalis*, Linnaeus, is the Common Osier willow native of Europe and Asia; used extensively for basket material.

### Golden Willow

#### *Salix vitellina*

*Salix vitellina*, Linnaeus

"*Salix alba vitellina*, variety from Russia, Hort. As imported by Prof. Budd from Russia under the name *Salix aurea* and commonly known as Russian Golden Willow, this is a hardy round-topped tree of very rapid growth, remarkable for its bright yellow bark in winter." N. E. Hansen (9).

"*Salix alba vitellina* (from Russia). Russian Golden Willow. A very rapid growing, round, close-topped tree, with glossy deep green foliage, bright golden colored bark in winter, and bright yellow, conspicuous, fragrant, staminate catkins, appearing with the leaves in the spring. One of the best quick-growing trees for this section, and very valuable for giving variety to lawn and timber plantings. Under favorable conditions a cutting of this has been known to make a tree ten inches through the trunk with a top that spread over thirty feet in eight years. The staminate form is perhaps the only one grown in this country." S. B. Green, Forestry in Minnesota (8).

### Bronze Golden Willow

#### *Salix vitellina britzensis*

*Salix vitellina* var. *britzensis*, Spaeth.

A variety of the Yellow Willow with bright red bark, which is conspicuous in winter. Hardy.

"A variety of the White Willow with attractive red twigs in winter, pyramidal form and rapid growth. Valuable for variety in timber plantings, parks, etc." S. B. Green, "Forestry in Minnesota" (8).

### Ural Willow

#### *Salix uralensis*, Hort.

*Salix purpurea*, Linnaeus var. *gracilis*, Gren. et Godr.; *Salix rubra uralensis*, Hort.

*Salix purpurea* L., is a native of south and central Europe north to central Sweden, in the Caucasus, the Orient, and eastward in Siberia to the Altai mountains and the Lake Baikal region.

"*Salix uralensis*, Hort. Dippel refers this to *Salix purpurea gracilis*, Gren. et Godr. As secured by the writer in Russia for the United States Department of Agriculture, this is a hardy ornamental shrubby willow with very slender purple drooping branches and small narrow leaves. The name refers to the Ural region separating European Russia from Siberia. Spaeth says it is excellent for tying purposes." N. E. Hansen (9).

"Ural Willow. Introduced 1906. An ornamental purple-branched basket willow (*Salix Uralensis*) from the Ural Mountains, Siberia. Useful for basket work, and for a very low dense snow-catcher. Also for tying nursery stock, for which it is excellent, especially for small bundles. It makes a dense dwarf hedge eight or ten feet in height by pruning; it now appears very promising as an ornamental hedge for the lawn. Some nurseries in Minnesota and elsewhere are now propagating this willow under the name Siberian Hedgewood." N. E. Hansen (11).

"Ural Willow makes one of the best heavy hedges I know of. It is not as desirable around small lawns but where room is not at a premium and the grounds pretentious it is valuable and then for the outside of a windbreak, is better than Caragana as the growth is more dense and stops the snow better and the snow does not damage it when it piles over and settles in the spring." J. B. Taylor, Ipswich, South Dakota, South Dakota State Horticultural Society Report, 1920.

### Siberian Basket Willow

"Introduced 1921. In the fall of 1913 in the dry steppes region of Semipalantinsk, Siberia, I walked along a small creek which had almost dried up. Stumbling, I seized hold of a willow and found that the branches simply would not break. So I brought home a few cuttings. You may tie bow knots in these pliable shoots, but it appears practically impossible to break them. They ought to be good as a tie willow for nursery work or for basketry." N. E. Hansen (11).

### American Linden

#### *Tilia americana*

*Tilia americana*, Linnaeus; *Tilia glabra*, Vent.; *Tilia nigra*, Borkh.

A tree attaining a height of 120 feet, frequently planted as an avenue tree.

"*Tilia americana*, Linn. Basswood, American Linden. Native from New Brunswick, west to Assiniboia, south to Georgia and Texas. A handsome hardy tree for the street and lawn but is subject to severe injury

from sunscald. The trees at Brookings proved short-lived for this reason, only a few sprouts remaining. The stem may be protected by hay bands or burlap. Professor Green gives the Minnesota experience as follows: "Newly transplanted street trees of this species are liable to injury from sunscald in this section until they are well established and for this reason should have their trunks protected from the sun for several years after they are set out." N. E. Hansen (9).

"Sparingly along the Missouri river from Running Water down to the mouth of the Big Sioux river, up the latter to Sioux Falls, along the west shore of Big Stone lake, and around smaller lakes in Roberts and Day counties. Grows to the size of a small tree and the blossom yields much nectar for honey." W. H. Over (19).

"Basswood (*Tilia americana*, L.) A large tree with broad leaves, gray bark and soft, white wood. The flowers produce an abundance of first class honey. Found in the Sioux valley, Big Stone and lower Missouri valley regions." Thomas A. Williams (28).

"Along streams and bordering lakes in the Minnesota and Sioux valleys; up the Missouri valley to Running Water." D. A. Saunders (26).

"For beauty of foliage, fragrance of its flowers, and as a pasture for the bees, no tree surpasses the basswood. As a specimen tree in the park, or grown as a great bush with none of its sprouts pruned it is sure to give satisfaction. It likes rich ground, and in the deep soil of some ravine, it will become a thing of beauty and a joy forever." L. R. Moyer (18).

*Tilia americana* noted at Big Bonanza springs and Big Stone lake, Roberts county, South Dakota, by L. H. Pammel, 1917.

## The Elm

### *Ulmus*

*Ulmus* is the ancient Latin name for the elm. There are about 18 species of elms distributed through the colder and temperate regions of North America, Europe and Asia. The elms are mostly tall ornamental trees grown for their handsome foliage and much planted as shade and street trees. Many elms vary greatly from seed so it is a common practice in European nurseries to grow select varieties by budding or grafting so as to insure uniformity in size and habit of the trees when planted in streets or avenues.

## American Elm

### *Ulmus americana*

*Ulmus americana*, Linnaeus; *Ulmus alba*, Raf.

The White Elm is the largest of the native American elms, attaining a height of over 130 feet, with a trunk of 6 feet or more in diameter. In isolated positions the American Elm forms a wide-spreading head with branches gracefully drooping at the ends.

Michaux, an early botanical explorer used the word in its larger sense when he said that the American Elm was "the most magnificent vegetable of the North temperate zone."

"White or American Elm (*Ulmus americana*, L.) A large tree found throughout the state. It is very common along our streams and lakes. The twigs and buds are usually smooth, but a form occurs (especially in the western part of the state) with these more or less pubescent. When growing in very moist situations the trees become abundantly supplied with sap while the wood becomes coarser and it is then often called "Water Elm." This is the best deciduous native tree for use as an ornamental



in the state. Under proper treatment it becomes one of the most graceful trees grown in the west. It transplants easily and has fewer insect and fungus enemies than any other native tree." Thomas A. Williams (28).

"Along streams and lakes throughout the state." D. A. Saunders (26).

"Common over the State along creeks and flood plains and extensively planted for shade trees. This elm has a stately form and wood tough enough to withstand wind storms, and probably stands at the head as a favorite for shade trees in the United States. In our state it has so far been immune from foliage-destroying insects. Wood is used for fuel." W. H. Over (19).

### White Elm, American Elm, Water Elm

*Ulmus Americana*, Linn.

Native from Newfoundland to the Rocky mountains, south to Florida and Texas. In South Dakota it is found along lakes and streams throughout the state. This is probably the best street, park and lawn tree for general planting. At Brookings it has made a good growth both in the timber plantations and in open exposure. Some white elms from New York have not done as well as native South Dakota trees." N. E. Hansen, 1901.

"It is the most popular of all street trees. It is planted over a wider range of country for ornamental and shade purposes than any other tree. It is the tree for the city and the town. It is the tree to produce the shade and stand the grief that the shade tree always receives on the farm as well as in the city." D. B. Gurney, Yankton, South Dakota, 1929.

### Feathered Elm

The White Elm has the remarkable habit of forming numerous small slender shoots the entire length of the main stem, even on old trees. Wherever possible, as on an isolated position on a lawn, these limbs which are called "feathers," should not be removed. They serve as stem-feeders because the leaves make plant food to thicken the stem. They also add much to the grace and beauty of the tree. If an occasional shoot becomes too long it can be nipped at the tip. A well-feathered elm is a desirable addition to any lawn.

To obtain the best results the main shoots of the White Elm should be cut back slightly to promote free branching and a more symmetric head. If left unpruned in the early years the tendency is to make shoots without branching, and these are sometimes split down in strong winds.

**Origin of Feathered Elms.**—"When several buds are crowded together one bud usually remains latent. Latent buds are sometimes caught in the growing bark of the tree and remain undeveloped for years, breaking out at length perhaps up and down the sides of the trunk as we see them in 'feathered elms.' These abnormal and irregular buds are called adventitious buds." Annie Oakes Huntington (13).

### Varieties of the American Elm

The American elm varies greatly in habit when grown from seed. The four leading varieties in habit have been distinguished as follows: vase form, plume form, weeping-willow form, oak-form. The feathery or fringed elm may appear in any of these forms but is most conspicuous in the plume form. In recent years in western nurseries the following varieties have been propagated:

**The Moline Elm**, originated at Moline, Illinois. This is of pyramidal, compact habit, of vigorous growth, with very large handsome distinct dark blue-green foliage, bark smooth and glossy.

The Vase Elm, of rapid growth, with a vase formation of limbs, the tops uniformly forming a broad-topped vase shape.

### Slippery Elm

#### *Ulmus fulva*

*Ulmus fulva*, Michaux.; *Ulmus rubra*, Mich.; *Ulmus pubescens*, Walt.

A tree attaining a height of 65 feet, native from Quebec to Florida, west to South Dakota and Texas.

"Tree with spreading branches forming usually a broad open head, with large handsome foliage turning dull yellow in autumn." Alfred Rehder (22).

"Red or Slippery Elm (*Ulmus pubescens*, Walt.) This well known tree is found more or less plentifully in the southeastern part of the state. The leaves are roughish and the twigs and buds downy or hairy. It is a smaller tree than the preceding (*U. americana*) with tough, reddish wood and a mucilaginous inner bark which is much used as a demulcent or emollient. This is the *Ulmus fulva* of Gray's manual. Found in Union, Minnehaha and Charles Mix counties." Thomas A. Williams (28).

"Extends up the Sioux river to Sioux Falls, and up the Missouri river nearly to Chamberlain. A few trees were also found around Buffalo Lake in northeastern part of the state, just west of the headwaters of the Little Minnesota." D. A. Saunders (26).

"Red or Slippery Elm (*Ulmus fulva*.) Probably found only along the flood plains of the eastern part of the State. Used for fuel and sparingly for shade trees." W. H. Over (19).

### Scotch Elm

#### *Ulmus glabra*

*Ulmus glabra*, Hudson; *Ulmus montana*, Withering; *Ulmus scabra*, Miller; *Ulmus campestris*, Linn., in part

Wych Elm, Scotch Elm. A very popular elm which is cultivated in many varieties in Europe. The name "glabra" refers to the bark which remains smooth for many years.

"*Ulmus montana*, With. Mountain Elm. Referred to *Ulmus scabra*, Mill., by Dippel. Native of central Europe, England, Sweden, and of Asia to the Amur region. Our four trees planted in 1897 have proven hardy. A hardy species of elm with large leaves." N. E. Hansen (9).

The two trees left after thinning, are now 35 feet high, without suckers, of pleasing upright vase-shaped head and hardy. The branches are heavy and have not the fine spray of the Common White Elm which is to be preferred for planting.

### Russian Elm

#### *Ulmus laevis*

*Ulmus laevis*, Pall; *Ulmus pendunculata*, Foug.; *Ulmus effusa*, Willd; *Ulmus ciliata*, Ehrh; *Ulmus racemosa*, Borkh., not Thomas.

A tall tree, attaining a height of 100 feet; native from central Europe to western Asia. The spreading branches form a broad open head; very similar to the American Elm. The trunk and limbs are, as in the American Elm, often "feathery" or clothed with short branchlets.

"*Ulmus effusa*, Willd. Native of north and central Europe and northern Orient. A hardy elm now seven feet in height. Dippel gives preference to the name *Ulmus pendunculata*, Foug." N. E. Hansen (9).

These two trees are now 40 feet high, with wide spreading top; with much fine spray of limbs and branches, even more so than in the American Elm.

## Chinese Elm

*Ulmus parvifolia**Ulmus parvifolia*, Jacq; *Ulmus chinensis*, Persoon.

*Ulmus parvifolia* has not been tested at this station, but it is sometimes confused with *Ulmus pumila*. It may be expected that seed of *Ulmus parvifolia* from Japanese seed will rank in hardiness with other trees from Japan, and that means they will be lacking in hardiness for South Dakota. This confusion of *Ulmus parvifolia* and *Ulmus pumila* may account for some conflicting reports concerning the hardiness of *Ulmus pumila*.

The flowers of *Ulmus parvifolia* appear in August or September in axillary clusters. This distinguishes it sharply from *Ulmus pumila*, which flowers in the spring.

*Ulmus parvifolia* attains 50 feet in height and is native of North and Central China, Korea and Japan. The branchlets are very slender and

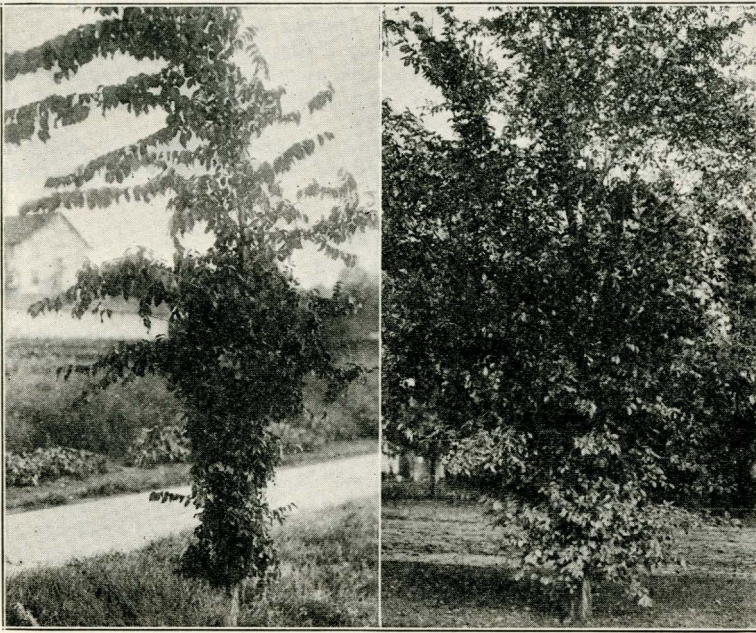


Fig. 5.—Two American Elms used as street trees, feathered type. Brookings. Leaving the feathers on thickens the stem.

covered with a close minute gray down; the leaves are leathery, oval ovate or obovate, pointed, toothed. The fruit is ovate oval,  $\frac{1}{2}$  inch long, not downy.

"*Ulmus parvifolia* is a handsome tree with slender branches forming a broad round head and with small leaves changing late in autumn to red or purple or in milder climates remaining green into the winter." Alfred Rehder (22).



## Pumila Elm (North Chinese Elm)

*Ulmus pumila*

*Ulmus pumila*, Linnaeus; *Ulmus microphylla*, Pers.; *Ulmus sibirica*, Hort.; *Ulmus campestris*, var. *pumila*, Hort.

The name "Dwarf Asiatic Elm" adopted in Standardized Plant Names (1) for *Ulmus pumila*, is not always appropriate "Pumila" is the Latin for small. While it is sometimes a shrub, in its native home in Eastern Siberia, Northern China and Turkestan it is really a tree, attaining 50 feet in height. The leaves are oval or ovate, pointed or with a long point, tapered or rounded at the base and not unequal-sided as elms usually are. The flowers are borne in clusters on very short stalks on the naked shoots in spring. The fruits are circular or rather obovate, deeply notched at the top; the seed situated at about the middle.

*Ulmus pumila* is becoming very popular in the prairie Northwest. There are hardy trees bearing seeds freely in both North and South Dakota. The danger at present is that of importing seeds from too far south in China. The seeds from the Pekin region would not be as safe as from points farther north since at Pekin the minimum winter temperature is about zero Fahrenheit. In the 1925 tour, the writer found this tree common at Harbin and points East and West on the Siberian railway. It was commonly used for hedges and as single specimens. The trees were noted for their rapid growth and their resistance to drought and cold.

The chief beauty of *Ulmus pumila* is that it branches freely on the present year's growth; giving the tree a birch-like effect in the fine spray of small branches. This with the small leaves gives a tree combining the sturdiness of the elm with the graceful fine spray of branches of a birch tree.

**Seed and Plant Introduction No. 40898.**—Seeds from China, collected by Frank N. Meyer, Agricultural Explorer for the United States Department of Agriculture. "The Chinese elm, used all over northern China and Manchuria as an avenue, shade and timber tree. Resists drought, extremes of heat and cold, and neglect remarkably well; will be a good shade tree for the semi-arid northern regions of the United States. The Chinese carts are mainly constructed from the wood of this tree. Has proven itself to be adapted as an ornamental tree over a very extended territory in the United States." Frank N. Meyer. This introduction is hardy and is bearing seed at Brookings.

The other specimens of *Ulmus pumila* on the grounds at this station are now 31½ feet tall with a spread of branches of 26½ feet across. One foot from the ground the main stem is 3 feet and 2 inches in circumference. They made a fine growth considering the fact that they were much crowded by other plants. They are bearing seed freely every year.

*Ulmus pumila* (S. P. I. 22975 collected by Frank N. Meyer at Fengtai, near Peking, Chihli, China. Received March 31, 1908): Report (with plate) from Plant Immigrants No. 125 U. S. Department of Agriculture, September 1916: "Specimens of this Chinese elm have attracted attention by their remarkable vigor and apparent adaptation to the severe winters and frequent dry summers of Iowa and the Dakotas, the rainy winters and cool summers of the Puget sound region, the intense dry heat of the interior valleys of northern California, and the humid subtropical summer climate of the Gulf states."

In 1894, in a tour of exploration to determine the northwestern limit of the hardy pear, *Pyrus Ussuriensis*, the writer found *Ulmus pumila* common as a native tree and much planted for tall hedges at Harbin, North



Manchuria and east and west along the Siberian railway. In this region of North Manchuria and East Siberia, seed of *Ulmus pumila* should be collected for planting at the North, instead of planting seed from too far south.

### Rock Elm

#### *Ulmus racemosa*

*Ulmus racemosa*, Thomas, not Borkh.; *Ulmus Thomasii*, Sarg.

The Rock Elm or Cork Elm attains a height of 100 feet and is native from Quebec to Tennessee, west to South Dakota and Nebraska. The wood is valuable but the tree is of slow growth and rarely planted.

"Rock Elm (*Ulmus racemosa*, Thomas.) A large and valuable tree; buds and young branchlets pubescent; branches often with corky ridges; leaves smooth; flowers in racemes. It has been reported from Minnehaha and Union counties and is found in Nebraska near the Dakota line." Thomas A. Williams (28).

"Rock or Cork Elm (*Ulmus thomasi*.) Sarg. Growing in ravines at Newton's Hill, four miles south of Canton, Lincoln county, and near Vermillion, Clay county." W. H. Over (19).

"Almost everyone will agree to place the American elm at the head of the list for park planting. It has many insect enemies; but notwithstanding this, it should be given the first place. A tree not so well known, but yet a native of southwestern Minnesota is the cork barked elm. It is a moderate sized, round headed tree, with very heavy dark foliage. The cork wings on its branches give it a sturdy appearance, so that it is a striking tree even in winter. At Montevideo it is very popular as a street tree." L. R. Moyer (18).