

A TAXONOMIC STUDY OF SHRUBS IN KANSAS
WITH SPECIAL REFERENCE TO THEIR LANDSCAPE USE AND
ADAPTABILITY TO SOILS AND CLIMATE:
INCLUDING THE LOCATION OF TYPICAL SPECIMENS REPRESENTED
ON THE CAMPUS OF KANSAS STATE COLLEGE
IN 1933-1934

by

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INTRODUCTION

A study of shrubs with reference to their landscape use and adaptability to Kansas soils and climatic conditions has never been completed in a systematic way. To meet this need the compilation of material included in the thesis was made.

The subject matter of Parts I and II of the thesis is a review of literature relating to shrubs, their landscape use and adaptability to soils and climate of Kansas.

These descriptions have been presented in two ways, those of major importance for Kansas plantings and those of minor importance and varieties of important species. Those of major importance are discussed under the following headings; general description, including landscape use, character of growth and native habitat; leaves; flowers; fruit; twigs; soil and culture; propagation; and distribution in the state. One-hundred-seven species and subspecies are described in this manner. The less important species, those of doubtful hardiness, and varieties are given a short description so their characteristics could be noted without particular emphasis. Sixty-one descriptions are

included in this classification.

A summer botanical key of the shrubs on the Campus of Kansas State College in 1933-1934 constitutes Part II of the thesis. It is divided into two sections, the key to the genera and the key to the species. The specific key includes the species of those genera which are represented on the campus by more than one species. For those represented by only one species reference is made to the general text of the thesis.

For Part III of the thesis a location on the campus is given for a typical specimen of each important species.

PART I

DESCRIPTION OF SHRUBS FOR KANSAS PLANTING WITH REFERENCE TO THEIR LANDSCAPE USE

Abelia grandiflora, Glossy Abelia*. Abelia is a graceful half-evergreen shrub with glossy dark green leaves. The blooming period extends until late in the fall. The white bell-shaped flowers are flushed with pink. Although this shrub has remained alive in a protected place in the trial

* Nomenclature as accepted by American Joint Committee on Horticultural Nomenclature and published in Standardized Plant Names, Salem, Mass.

nursery on the campus, it has not grown to greater height than 2 feet and has not been tried as yet in shrubby plantings. However, after 4 years in the nursery, it has proved to be half hardy. If it is used for Kansas plantings it must be protected against alternate freezing and thawing and from the winter sun. It is a hybrid of A. chinensis x A. uniflora.

Acanthopanax pentaphyllum, Five-leaved Aralia. Although this aralia, a native of Japan, does not have conspicuous flowers or fruits, its foliage will recommend it as an excellent shrub for massing or as a filler. It is suitable either in formal or informal surroundings, attaining a height of 5 feet or more. It grows satisfactorily on rock banks and slopes or in partially shaded locations; will tolerate dust and smoke in cities, and is drought resistant.

Leaves: Palmately compound leaves composed of 5 decorative, fine textured, bright green leaflets. No insects or diseases commonly trouble the foliage which is maintained well to the base of the plant.

Flowers: Inconspicuous greenish yellow in umbels.

Twigs: The slender, gray, arching branches have a stipular thorn at each node which increases its value as a barrier or hedge planting.

Soil and Culture: It is adaptable to many types of soils, preferring a dry sandy one, and is easy to transplant.

Propagation: By root cuttings or cuttings of mature growth taken in autumn.

Distribution in the State: For planting in the central and eastern part of the state.

Aesculus arguta, Texas Buckeye. The Texas buckeye, a shrub growing 7 feet, is native from eastern Texas to Kansas. It is suitable for planting in naturalistic areas and is very hardy but slow in growth. Its native habitat is in woods near streams.

Leaves: Compound, 7 to 9 leaflets, $2\frac{1}{2}$ inches to $4\frac{1}{2}$ inches, deeply toothed, hairy when young.

Flowers: Light yellowish green, in April or May.

Twigs: Stout; the terminal bud is brown and turns pink when opening.

Soil and Culture: Grows in any good moist soil.

Propagation: Seed.

Distribution in the State: Native in the eastern one-third. Planted occasionally in the same section.

Amelanchier canadensis, Downy Shadblow. Shadblow is an old garden favorite, native to North America and very popular in New England gardens. This graceful, upright shrub grows from 8 to 15 feet in height. It is ornamentally useful in the wild or informal garden and is very desirable to attract birds, for they are quick to feast on the dark pomes, and is especially fine as a companion for redbud or

in close proximity to the spicebush (Benzoin aestivale).

Both the spring and autumn coloration is attractive. It has most of the pests of the Rose family and should be kept away from orchards.

Leaves: The ruddy tinted young foliage gives to it distinction and character and, associated with other deciduous shrubs, it is most effective in the springtime. The beautiful autumn coloration of bright golden yellow tints enables the shadblow to close as well as open the season with a show of beauty. The leaves are obovate, pointed at the tip and heart shaped at the base. When young they are densely hairy beneath, less so above.

Flowers: Pure white, disposed in short drooping racemes and so numerous that the foliage and branches are often hidden from sight. They open before the leaves are fully expanded, in April.

Fruit: "June Berry" or "Service Berry", the maroon purple pome, which ripens in early summer, is tasteless and often falls early.

Twigs: The typical form of this species of shadblow is horizontal branching, a form rare among plants.

Soil and Culture: Prefers a cool, moist soil but will grow in any good soil if partially shaded.

Propagation: Seeds sown either as soon as ripe or stratified in the fall and sown the following spring. It is also propagated by division.

Distribution in the State: Native in the eastern tier of counties. Planted in eastern and central parts.

Amorpha canescens, Leadplant. Leadplant is native to the central states. It is a handsome free-flowering shrub, reaching a height of but 2 to 4 feet. It is well suited

for use in rockeries or as an edging to shrubbery borders where its silvery foliage will add a touch of contrast.

Leaves: Whitish or lead colored; quite decorative, giving a delicate silvery effect. The leaves are pinnately compound, being composed of 14 to 24 leaflets which are so crowded they overlap.

Flowers: The flowers are borne in June and July in densely clustered terminal panicles of bluish-purple.

Twigs: Covered with the whitish hairs.

Soil and Culture: Leadplant thrives best in well-drained, sunny situations in almost any soil.

Propagation: Seeds, layers, suckers, hardwood cuttings or those taken of growing wood in summer, rooted under glass.

Distribution in the State: It is found native in the eastern three-fourths of the state, growing in open sunny pastures and is planted in the western fourth of the state.

Amorpha fruticosa, Indigobush. Indigobush is found growing wild along the streams from Maine to the Mississippi Valley, south to Florida. It is of a loose, spreading habit of growth and varies in height from 6 to 12 feet. While useful for massing purposes or for planting in the shrubbery border, it is also useful for planting along margins of streams where the soil is moist.

Leaves: Opposite, pinnately compound, the lower leaflets on long petioles and the upper ones nearly sessile. The 11-25 leaflets are a trifle grayish green.

Flowers: The flowers are very tiny, produced in May or June in compact spikes 2 to 7 inches long. The dull

purple color is set off by the orange anthers which protrude beyond the rim of the cup.

Fruit: Pods are very tiny, hardly over $\frac{1}{4}$ inch long and covered with resinous glands, which cause them to give off a pleasant odor. They are usually one seeded and curved.

Twigs: It has numerous free growing shoots which are slender and slightly angled beneath the nodes.

Soil and Culture: Thrives best in moist soil. It is not difficult to transplant, but should be cut back severely at the time of planting to encourage branching and to reduce its legginess.

Propagation: Seeds, suckers, hardwood cuttings or soft wood rooted under glass are used. Layers or cuttings made in the autumn will be easy to root provided they are planted in protected situations. The cut should be made immediately below the node and the cuttings allowed to remain undisturbed for at least one year.

Distribution in the State: Native in central and eastern Kansas and planted throughout.

There are several other species of Amorpha in the Trial nursery on the campus, but they have not been tried for general Kansas planting. Amorpha angustifolia resembles A. fruticosa. The flower spikes are somewhat shorter as is the much curved pod.

Amorpha microphylla is a dwarf shrub, seldom exceeding 2 feet in height, having rosier flowers and smaller, more graceful foliage than A. fruticosa.

Amorpha tennesseensis very closely resembles A. fruticosa but contains more leaflets in each leaf. The

pod is more conspicuously gland-dotted.

Aralia spinosa, Devil's-walkingstick (Hercules Club). The devil's-walkingstick is a tree-like shrub growing from 8 to 16 feet in height. The stout prickly stems hold up umbrella-like leaves which give the plant a very tropical appearance. It is native in the southern states, north to Tennessee. The weight of the leaves requires that the plant be given shelter from high winds. It is well adapted to shady locations where it may be used as an accent plant, for specimen plantings, or as a background for shrubbery borders. It could be planted around a chicken house to discourage night thieves.

Leaves: Twice or thrice pinnately compound, 2 to 3 feet long and often $\frac{1}{2}$ as broad, forming a cluster at the top on petioles 15 to 20 inches long, which clasp the stem with a thickened and enlarged base. Very bold and decorative.

Flowers: White, tinted with green, massed in umbels and compound panicles, the large clusters being $1\frac{1}{2}$ to 2 feet in length. The plant looks like a tropical palm in full bloom during the blooming season which is in midsummer.

Fruit: The decorative round, black fruit is $\frac{1}{2}$ inch in diameter.

Twigs: The branches are spiny, especially at the nodes.

Soil and Culture: Comparatively indifferent to soils and situation though when growing well is found most often

in moist localities. It is not difficult to transplant.

Propagation: Seeds sown in the spring or root cuttings. Bottom heat is of much assistance in encouraging growth.

Distribution in the State: Planted in the eastern half of the state.

Aronia arbutifolia, Red Chokeberry. Aronia arbutifolia is an attractive upright shrub, generally not over 6 feet tall. It is very valuable because of its attractive red fruits which hang on the plant for a long time. This fruit is not sought by the birds, notwithstanding the fact that the flavor is palatable. The vivid red autumn coloration also recommends this as a useful shrub. It is a useful shrub for planting towards the front of the shrubbery beds, and is quite hardy in the north.

Leaves: The oval leaves are handsome, rich glossy green, changing to vivid red in autumn.

Flower: The beautiful white flowers are borne in small clusters in May and June.

Fruit: Red, $\frac{1}{2}$ inch across, and ripens in September. It remains plump and persists on the branches until early or midwinter.

Twigs: Brown, somewhat hairy.

Soil and Culture: Prefers moist, even wet soil, but will succeed in ordinary soil as well.

Distribution in the State: Found more extensively in the eastern half of the state.

Aronia melanocarpa, Black Chokeberry. Black chokeberry is very similar to the Red Chokeberry with the exception of the color of fruit and A. melanocarpa has smooth leaves, not hairy beneath. The fruits do not remain on the plants as long as the red. This species is low growing and suckers freely so it serves as a filler shrub among others with bare stems.

Benzoin aestivale, Spicebush. The spicebush is native from Maine to Ontario and Kansas, south to Florida and Texas. It is a trim, fine appearing shrub with dense foliage growing from 6 to 12 feet in height. The aromatic fragrance of the leaves, fruit, and bark and the bright yellow autumnal tints assumed by the foliage are its outstanding characteristics. It is most effective when planted in clumps or masses along banks of streams or in surroundings which are informal or naturalistic. Since this rapid grower is hardy and the plant is usually not troubled with insect pests or diseases, it is long lived.

Leaves: Alternate, oval or almost round leaves which are spicy when crushed. Their autumn coloration of brilliant gold closes the season in a blaze of color.

Flowers: The small clusters of pale yellow blossoms which are borne profusely, in dense clusters, stand out attractively against the bareness of the branches. They open in March and April.

Fruit: Ripen in September or October and are about $\frac{1}{2}$

inch long, red in color, and very strong in flavor.

Twigs: The branches are green, even in winter, and are pleasant in flavor. The winter buds are produced one above the other.

Soil and Culture: Grows best in sandy, moist soil, containing a reasonable amount of humus in the form of leaf mold or peat. It may be easily transplanted if supplied with ample moisture.

Propagation: Seeds or greenwood cuttings under glass, about 50 per cent of which can be expected to root. In seeding it is necessary to sow the seeds as soon as they ripen as they soon lose their viability. Peaty soil should be used and the pulp should be removed from the seed.

Distribution in the State: Widely distributed but more common in the eastern half of the state.

Berberis thunbergii, Japanese Barberry. This native of Japan has become one of the most popular shrubs, used particularly for foundation plantings or in groupings around the doorway or entrance to the home. These are not all the uses to which this barberry is suited for it is perhaps the most universally useful shrub. It is small, a rounded mass usually not exceeding 4 feet. Ability to withstand abuse has led to its being greatly overused.

Leaves: In alternate whorls of usually 4 leaflets. It is without teeth, oval, but quite variable in form. Throughout the summer the leaves are bright green, but in the autumn they take on a glorious red and are retained for several weeks in autumn.

Flowers: Solitary or 2 to 5 flowers together distributed along the branches. They are light yellow, reddish on the outside, appearing in April.

Fruit: The bright red oval fruit is attractive for it contains little pulp and juice so they shrivel very little and persist on the branches throughout the winter.

Twigs: Reddish, brown, or purple and have simple unbranched spines scattered over them.

Soil and Culture: Grows in any good soil but should have some protection from the extreme heat and drought of some Kansas summers.

Propagation: Seeds stratified in the fall as it prefers a fluctuating temperature for germination. Cuttings from desirable types will preserve the habit of growth, color of foliage and often the profusion of fruiting.

Distribution in the State: Used more extensively in the eastern two-thirds of the state.

Berberis vulgaris, European Barberry. Berberis vulgaris, a native of Europe, but naturalized in North America, is seldom obtainable from nurseries since it is an alternate host for the fungus causing wheat rust. However, it is an excellent plant for landscape purposes. It is best when the stems are few for the hanging racemes of bright red berries are then most clearly seen. It is excellent for mass effects, in the shrubbery border and for specimen plantings in informal gardening and is also adapted for an untrimmed hedge. It is hardy, long-lived and easily transplanted in either fall or spring.

Leaves: The leaves are borne in groups of 4 to 8 at alternate nodes. They are small, finely toothed, smooth and rather glossy.

Flowers: The bright yellow flowers are produced in April or May in drooping racemes.

Fruit: The panicle of oval, bright red fruits, produced from each node, persist until late winter as they are acid and are not eaten to any great extent by birds.

Twigs: The main stems are erect and arching toward the ends. There is a three-parted spine at the base of each leaf group.

Soil and Culture: Will grow in either sun or partial shade and is not particular as to soils.

Propagation: Seeds.

Distribution in the State: Will grow in most sections of the state.

Berberis vulgaris atropurpurea, Purple Leaved European Barberry. The character of growth is similar to that of Berberis vulgaris. The leaves are purple, the depth of color of which is enhanced by vigorous pruning. For best results it should have plenty of sunshine.

Berberis ilicifolia, Holly Barberry. Holly barberry is a hybrid between the Oregon hollygrape and common barberry. The dull evergreen, spiny leaves are of variable size and form. The flowers are large orange red, borne on rigid branches. It drops its leaves from the winter sun but this does not materially injure the shrub.

Berberis thunbergii Var. minor, Box Barberry. The box bar-

berry is smaller in growth and leaf than B. thunbergi. Due to its slow growth it may be kept very low in height, seldom exceeding 5 to 6 inches. It may be used for a low hedge; is not an evergreen.

Berberis wilsonae, Wilson Barberry. Wilson barberry is beautiful in rock gardens where a slow growing plant is desired. It is of spreading or somewhat prostrate growth. The leaves are small, pale green, assuming a brilliant coloration in the fall. The branches are very spiny, with three-parted slender prickles. The fruits are salmon-red. It is an evergreen barberry.

Buddleia davidi, Orange-eye Butterflybush. Butterflybush, a native of China, is often planted for ornamental purposes, both in formal and informal arrangements. It is excellent for accent plantings in gardens or large perennial borders. Transplanting is easily accomplished. It may winter kill in some sections but grows up again in the spring, sometimes reaching a height of 8 feet. The spikes of lilac blooms are unexcelled for cut flower purposes.

Leaves: The foliage effect is rather scanty, a dull gray green in color. The leaves are long and rather narrow, coarsely toothed.

Flowers: The flowers are lilac, with an orange yellow

throat. They are produced abundantly in terminal clusters 4 to 6 inches long. Blooms appear over a long period, from July until late autumn.

Twigs: Somewhat four-ridged and hairy.

Soil and Culture: It prefers a sunny location in rich, well drained soils which are sufficiently light and porous to be warm.

Propagation: Greenwood cuttings are preferable, but cuttings of mature wood, taken in the fall will root if kept in a frost proof room during the winter.

Distribution in the State: Planted in the central and eastern portions.

B. davidi var. magnifica is generally considered the best of all. The panicles are dense, the flowers large, violet-purple with a deep orange eye and the margins of the petals somewhat rolled.

B. d. var. superba resembles magnifica but the panicles are larger and the margins of the petals are not rolled.

Bumelia lanuginosa, Chittawood. Bumelia is not of great ornamental value and although a native of Kansas, is not planted to any great extent. The flowers are minute, white, clustered in the axils of the leaves in summer. What decorative value it has lies in its autumn coloration of brilliant reds and in its retention of the leaves until late fall. The black berry-like fruit is nearly $\frac{1}{2}$ inch long, usually with one shining seed. It will grow in dry

rocky situations.

Buxus sempervirens, Box. Box is the aristocrat of southern gardens and it has been used as specimens, enclosures, hedges, for bordering flower beds and topiary work. This compact evergreen shrub must be given protection from winter winds and sun. Since these requirements are difficult to fulfill in Kansas it is used but very little for planting in this state. It grows very slowly. It is native to southern Europe, northern Africa, and western Asia.

Callicarpa purpurea, Chinese Beautyberry. Beautyberry, a native of China and Korea, is a very graceful shrub which deserves more consideration. It has a peculiar habit of flowering. As the stem elongates new flowers are produced, so there are often both flowers and berries on the branches at the same time. Although the flowers are rather inconspicuous, this plant supplies color in the border during October and November when its purple berries may be seen most effectively. It appears best when planted against an evergreen background. The wood frequently dies back severely. It grows to a height of about 4 feet.

Leaves: Opposite, elliptical with small rounded teeth except towards the base and apex.

Flowers: Tiny, lilac tinged with pink, forming on wood

of current season's growth. It blossoms from July to frost.

Fruit: Clusters of brightly colored, lilac-violet, berries are produced in the axils of the leaves during the autumn months.

Twigs: Rather rough and hairy.

Soil and Culture: Should be grown in partially protected situations and prefers a light warm soil.

Propagation: Seeds, layers, hardwood cuttings or cuttings taken of growing wood in the spring or summer and rooted in a shaded frame.

Distribution in the State: Planted in the eastern and central parts of the state.

Calycanthus floridus, Common Sweet Shrub. While the flower of Calycanthus floridus is not conspicuous in color, it is interesting for another characteristic. The whole shrub emits a spicy perfume somewhat resembling camphor. This shrub has been associated with American gardens ever since America was colonized. It is not overly easy to get established but once established it does excellently. As undershrubs, it does well whether planted singly or in masses. It is native from Virginia to Florida.

Leaves: Ovate, opposite, bright green, slightly hairy and rather leathery. The leaves vary in length from 2 to 4 inches.

Flowers: Deep blue shading to purplish brown, $1\frac{1}{2}$ inches across. The petals are somewhat fleshy. When crushed they have the odor of crushed strawberries. Blooms appear

during late spring and early summer but not abundantly.

Twigs: Also expel a spicy odor, are hairy and compressed at the nodes.

Soil and Culture: Prefers moist, well drained soil; protected from severe winds and preferably in partial shade.

Propagation: The methods of propagation employed when seed is not available, are cuttings, division, or layers made during the summer.

Distribution in the State: It is planted in the central and eastern part of the state.

Caragana arborescens, Siberian Pea-tree. Siberian pea-tree is almost tree like in growth, attaining a height of 12 feet. It is rather stiff but fine textured and excellent for an accent shrub or for planting toward the back of the shrubbery border. It is tall and narrow in growth and is often used in windbreak plantings. This native of Siberia is hardy and easily transplanted.

Leaves: Pinnately compound, consisting of 4 to 6 pairs of oval leaflets which are rounded at the apex.

Flowers: Pale yellow, pea-like, tiny, but very numerous, blooming in April or May.

Fruit: The pod is $1\frac{1}{2}$ to 2 inches long.

Twigs: The branches are somewhat spiny and hairy.

Soil and Culture: Grows well in any good soil but prefers those which are sandy and in warm, sunny situations.

Propagation: Easily accomplished by root cuttings or by seeds sown in the fall as soon as ripe or in early

spring. If not sown until spring germination will be facilitated by soaking the seed a few hours in tepid water. Root cuttings may be made in winter or spring and it layers readily.

Distribution in the State: Widely distributed over the state for planting purposes.

Caragana microphylla, Littleleaf Pea-tree is spreading and open in habit but not growing as tall as C. arborescens, attaining only a height of 4 to 6 feet. The yellow flowers are larger. It is readily distinguished by the more numerous hairy leaflets and its thorny nature.

Caryopteris incana, Common Bluebeard. This shrub is recommended for its lavender blue flowers produced when the garden is almost devoid of blossoms, from late August until frost. Since it is rather low growing, seldom exceeding 2 feet, it is useful for planting as a "facier" to taller shrubs, in the perennial border or wherever a small specimen is desired.

Leaves: The foliage effect is not of much decorative value for the leaves are thinly distributed over the branches. They are coarsely toothed, opposite, and oval, having an odor of varnish and bearing grayish hairs beneath.

Flowers: Lavender blue, abundantly produced in axillary or terminal clusters.

Soil and Culture: Bright sunny location in soil which is well-drained and sandy. Protecting the plants with a light mulch is also advisable. The shrubs should be pruned

to the soil each spring to insure that blossoms cover each shoot.

Propagation: Readily accomplished by seeds sown in the spring, or cuttings taken of half ripe wood in late summer or fall or rooted under glass.

Distribution in the State: It does best in the south eastern and south central sections of the state.

Caryopteris tangutica, a government introduction of greater hardiness than C. incana. It has withstood the winters of 1932-'33, 1933-'34 with little injury. It grows 4 to 6 feet high; has opposite, ovate leaves 1 to 2 inches long and numerous axillary cymes of violet-blue flowers in summer.

Ceanothus americanus, Jersey-tea. Although rarely cultivated, Jersey-tea, a native from Canada to South Carolina to Texas, is rather an interesting shrub. Its landscape value is principally for the effect produced during the blooming season. It is appropriate for both formal and informal gardening and is a useful plant for low clumps or for planting toward the front of shrubbery beds as a facer for taller shrubs or in rock gardens. It grows to a height of 2 to 3 feet forming a compact, low shrub. Although deeply rooted it can be readily moved in the spring, provided the plants are not excessively old.

Leaves: Foliage effect somewhat scanty. Leaves dark

green, serrated, pubescent on under sides, 2 inches long, oval with 3 prominent veins.

Flowers: Clusters of attractive, very tiny, white flowers, which crown the tips of the branches, which are of value not only for their beauty but also because their blooming period comes during June, July and August and lasts until October.

Fruit: A three-celled capsule which ripens in September and is shed to leave a cup with a silver lining.

Soil and Culture: Preferably dry soils which are light and rich, either in sun or shade.

Propagation: Seeds sown in spring or cuttings of either growing wood taken in early spring or of mature growth in the fall, or layers.

Distribution in the State: It is native in the eastern one-third. Not planted a great deal but should be used more throughout the state.

Cephalanthus occidentalis, Common Buttonbush. This shrub is native from New Brunswick to Florida and west to California. It has proved hardy and excellent for naturalistic plantings, especially in informal groupings, bordering streams or lakes. This interesting ornamental shrub has an advantage of being long lived and not difficult to transplant. It may attain a height of 10 feet but is usually found averaging from 4 to 7 feet.

Leaves: The foliage is inclined to become unsightly as the season advances. The leaves are opposite or in whorls of 3 or 4. They are lustrous, bright green, somewhat hairy below.

Flowers: Curious but attractive balls crowded with

many tiny cream colored flowers filled with a nectar loved by bees, blooming in July and August.

Fruit: The fruit balls are composed of many small capsules each containing 1 or 2 dry seeded nutlets.

Twigs: Four-sided, reddish at tips, glossy, slender.

Soil and Culture: Although it prefers a sandy, somewhat moist soil, it will thrive in practically any soil which is reasonably fertile.

Propagation: Seeds, cuttings of ripe wood taken in early summer and those of growing wood taken in early spring, from plants which have been forced.

Distribution in the State: It is native in the eastern two-thirds and is planted throughout the state.

Chionanthus virginica, White Fringetree. Fringetree, an ornamental shrub or small slender tree, seldom exceeds 10 feet in height, is of landscape value principally because of the attractive effect produced by the pendulous panicles of white flowers which appear during May and June on wood of the previous year's growth. It is excellent for either specimen planting or in a shrubbery border in informal gardening. It is native in Pennsylvania, Florida, and Texas.

Leaves: The leaves, which do not appear until late in the spring, are deep green, glossy and leathery, and opposite. They are large and somewhat scanty, changing in the fall to a clear shade of yellow.

Flowers: Each flower has 4 very long, narrow, greenish white petals, giving a fringe-like drooping effect, the panicles being from 5 to 10 inches long.

Fruit: Consists of oval berry of livid blue black

containing hard, oblong, pointed seed.

Twigs: The twigs are almost 4 sided.

Soil and Culture: Prefers a bright sunny location in soil which is fertile and sandy, but somewhat moist. It needs protection from hot winds.

Propagation: Seeds stratified in fall, layers, grafting or budding.

Distribution in the State: Planted sparingly in eastern third.

Clethra alnifolia, Summersweet. *Clethra* is a rather stiff growing shrub, growing to a height of 4 or 5 feet. It does best in half shady situations, is good for masses or as a specimen. It is excellent for naturalistic plantings and is most effectively used in clumps or mass plantings along the banks of streams. Summersweet is easily transplanted, not often troubled by insect pests or diseases and is a moderately vigorous grower. It does well in garden soils suitable for *Rhododendrons* and other peat loving plants. Although not well adapted to Kansas conditions, it will do well in proper locations.

Colutea arborescens, Common Bladder-senna. Bladder-senna is a rapid growing, hardy shrub, useful for planting in the shrubbery border and can be made more compact by means of judicious pruning which may be done in early spring as the

flowers form on the current year's wood. The pea-like flowers are continuous in their blooming if the weather is not too hot and dry, so the plants have flowers and fruits on the branches at the same time. It will reach a height of 6 to 8 feet. Its native habitat is southern Europe and northern Africa.

Leaves: Pinnately compound, composed of 7 to 15 dull green leaflets with a rounded notch at the apex. The leaflets are opposite and are sometimes clustered at alternate nodes.

Flowers: The yellow to brownish red pea-like flowers continue to bloom in succession over a long period, commencing in May, and are found in the axils of the leaves in 6 to 8 flowered clusters.

Fruit: Bladdery pods which hang among the green leaves become tinged with bronze or reddish hues and are rather ornamental.

Twigs: The young branches are hairy.

Soil and Culture: Prefers a sunny situation and well drained, sandy soil, but will do well in good garden soil.

Propagation: Seeds in the spring, by cuttings taken in the fall of ripe wood, and by softwood cuttings taken in the summer.

Distribution in the State: It grows best in southeastern and south central parts.

Cornus, Dogwood. There are several excellent species of Dogwood which do very well under Kansas conditions. Some of them are native and are remarkably hardy and some are outstanding in their winter effects, due to the color of bark.

They may range in size from 5 feet to 20 feet, resembling a small tree. They may be used in an informal or wild garden with good effects.

Cornus stolonifera, Red-Osier Dogwood. In the dull gray days of midwinter nothing could be more cheery than the crimson stems of this native dogwood for at a distance, in great mass, it looks like a sheet of fire. It is most suitably used in informal or wild gardening as a winter accent plant and attains a height of 7 or 8 feet. It is native to a wide range of territory; Canada, south to Virginia, Kentucky, Nebraska and Kansas.

Leaves: Opposite, entire, dark green above and whitish below with a long pointed apex.

Flowers: Dull white in color, borne in compound umbels in May.

Fruit: White, stone is as broad as long and rounded at the base.

Twigs: Main stem prostrate and wholly or partially under ground, whence it throws up an abundance of small straight shoots, 6 to 8 feet in height. Produces suckers freely. The branches are blood-red in the winter.

Soil and Culture: Thrives with specimen luxuriance in most moderately boggy soils, but grows well in any good soil, either in sun or shade.

Propagation: Seeds stratified in fall, hardwood cuttings in fall, suckers and divisions.

Distribution in the State: Native in the eastern half;

used in plantings in eastern and central areas.

Cornus mas, Cornelian-cherry. Cornelian-cherry is a handsome, sturdy shrub with an iron clad constitution and a compact habit of growth; its slender branches forming a well-rounded head. It is appropriate for use in shrubbery or as a specimen on grounds which are more or less formal and well kept, and outstanding for park plantings where large plantings are desirable for this shrub may attain a height of 12 or 15 feet. It is a native of southern Europe and the Orient.

Leaves: Opposite, hairy on the veins below, glossy smooth above, turning to scarlet in the fall.

Flowers: Flower buds form in the summer in the axil of the leaves. It is one of the very first bloomers, the bright golden yellow, tiny flowers being borne in clusters in March.

Fruit: Scarlet globose to oblong, plum-like; mature in July and August.

Twigs: The small branchlets are quadrangular, greenish-yellow when young and turn reddish-brown toward winter.

Soil and Culture: Will grow in ordinary garden soil in any situation but a moist soil is preferred.

Propagation: Seed, hardwood cuttings in fall.

Distribution in the State: Planted in the eastern and central part of the state.

Cornus paniculata, Gray Dogwood. This dogwood, native from Maine to North Carolina to Minnesota and Kansas, has proved

its worth for background plantings, varying in height from 5 to 12 feet. The plants are of good form, with regular branching and splendid foliage.

Leaves: The long, narrow leaves are its outstanding character. They taper into a sharp point.

Flowers: Creamy-white flowers.

Fruit: Birds are fond of the white or pale blue fruits which are stripped from the plants soon after ripening. The fruits are borne on red panicles.

Twigs: Reddish-brown, slightly rough.

Soil and Culture: Grows most luxuriantly in partial shade but will grow in any good soil.

Propagation: Hardwood cuttings in fall or seed stratified in the fall.

Distribution in the State: Native in the eastern two-thirds; used in plantings in the central and eastern portions.

Coral Dogwood, (Cornus alba sibirica). This dogwood is one of the most common ones used for their brilliant twigs. It is broad and spreading, growing to a height of 5 to 10 feet. It is native from Siberia to Manchuria, northern Korea.

Leaves: Opposite, oval, rounded at the base, dark green above, grayish beneath.

Flowers: Creamy white, appearing in May or June, arranged in dense small clusters.

Fruit: Bluish-white, a little larger than a pea, produced in July. The stone is longer than wide and flattened,

narrowed at the ends.

Twigs: The branches are rather stout, bright coral red, covered with a bloom when young, and with white pith.

Soil and Culture: Any good soil.

Propagation: Hardwood cuttings.

Distribution in the State: Planted throughout.

Spaeth Dogwood, (Cornus alba spaethi). Spaeth dogwood is a variegated sort in which the leaves have a mixture of gold and green through the surface of the leaf and with an irregular margin of gold green surrounding the leaf. The coloration is better when it is shaded during part of the day. The foliage does not scorch in bright sun as much as some variegated sorts.

Cornus sanguinea, Bloodtwig Dogwood. Bloodtwig dogwood is more upright growing than Coral Dogwood. It is very showy in winter when planted where contrast is available. It is native in western Europe and Asia.

Leaves: Hairy on both sides; the hairs beneath are woolly whereas most dogwoods have straight hairs.

Flowers: Greenish-white, in dense cymes, produced in May.

Fruit: Black.

Twigs: Darker, duller red than the coral dogwood.

Soil and Culture: Prefers moist soil.

Propagation: Hardwood cuttings.

Distribution in the State: Planted in the eastern two-thirds.

Cornus alternifolia, Pagoda Dogwood. Pagoda dogwood is one of the few Dogwoods with alternate leaves. Although this shrub has been growing in the Kansas State College nursery it has not been tried in shrubbery plantings and cannot be recommended for general Kansas plantings until tried for a longer period.

Cornus coreana has also been grown on the Kansas State College campus since 1932 but should be tested longer before it is recommended.

Corylus avellana, Filbert. *Corylus avellana* is a tree-like shrub, reaching a height of 15 feet. Although usually grown for the production of nuts, it is sometimes used in ornamental planting in the shrubbery border. It is a native of Europe. It has been grown in the trial nursery since 1929 but has not been tested in a general shrub planting.

Cotoneasters. The cotoneasters are beautiful shrubs of upright or spreading habits, some species of which are half evergreen. They make excellent shrubs for specimen

work in the open or among rocks, for group plantings, or as a ground cover on slopes. The leaves are alternate, usually thick and white hairy below.

Cotoneaster divaricata, Spreading Cotoneaster. This is a broad, upright, intricately branched shrub, often attaining 5 feet in height. The small pink flowers, borne in June, are followed by the bright red fruit, which appear in clusters, usually of 3, produced in amazing profusion. These plants are best suited for planting in groups or as individual specimens in the open or among rocks.

Cotoneaster horizontalis, Rock Cotoneaster. A prostrate growing species suitable for use as a ground cover for slopes and becoming justly popular as a rock garden plant. The leaves remain most all winter. The fruit is red, $\frac{1}{4}$ inch across.

Cotoneaster salicifolia floccosa is a very desirable and decorative shrub in warmer locations but it needs a longer period of trial before it can be recommended for general planting in Kansas as the tops winterkill badly, though coming up again each year.

Cotoneaster acutifolia, Peking Cotoneaster, is a very

shapely shrub often used for hedges in the east. It is very hardy, 10 to 12 feet high. The black fruit is attractive. The foliage is grayish green and not very dense. It is planted throughout the state.

Cydonia japonica, Flowering Quince. Flowering quince, one of the old garden favorites, is one of our earliest blooming shrubs. It welcomes the spring with its gay flowers which crowd the branches as it bursts into a blaze of color during March and April, with a variety of color, ranging through the various shades of rose to scarlet and white. It is frequently used for specimen plantings but is also suitable for shrubbery borders or for informal ornamental hedge purposes. It varies in height from 4 feet upward, some specimens being very spreading. It is a native of China. Sometimes scale insects prove a serious pest.

Leaves: The foliage is handsome and ornamental and the leaves often remain green until Christmas. The leaves are alternate, oval, very glossy and leathery. Rounded, toothed stipules are present at the base of each cluster of leaves.

Flowers: Usually single in many shades of pink or red, and white appearing before the leaves appear. Most of the flowers appear on short spurs.

Fruit: Yellowish green, slightly pear-shaped. Most specimens do not bear fruit every year.

Twigs: The branches are often irregular and thorny which recommends it for hedge planting. The branches are

often cut and brought into the house after Christmas and forced.

Soil and Culture: Not fastidious as to soil requirements and demands only a sunny situation.

Propagation: Root cuttings made either in the fall or spring or by slips of half ripe wood rooted under glass. Layers or seeds stratified in the fall and sown in the spring may also be used as means of propagation.

Distribution in the State: May be grown over practically the entire state when given some care

Daphne cneorum, Rose Daphne. Daphne is an attractive procumbent shrub with slender trailing and ascending branches and clusters of bright pink fragrant flowers throughout the summer and autumn. As it only grows 6 or 8 inches high it is recommended for rock work, for borders of shrubberies, and planting in groups where masses of color are desired. It is native in the mountains of southern and central Europe.

Leaves: The evergreen leaves are arranged in spirals so that they resemble small rosettes. They are very small and thin, dark green lustrous above, and grayish beneath.

Flowers: The fragrant rose pink flowers, appearing from time to time in early summer, may break forth anew in autumn and cover the whole bush a second time. They are borne in dense heads at the ends of the branches.

Fruit: The yellowish-brown berries are rarely seen.

Soil and Culture: Does well in a variety of garden soils in sun or partial shade, but light warm soils are preferred. Perfect drainage is very essential.

Propagation: The trailing branches may be layered in

spring. Stratified seeds are not very satisfactory as germination is slow and irregular.

Distribution in the State: Planted in eastern half in protected areas.

Deutzia. The various species of deutzia comprise a group of old garden favorites. They are useful for planting in the shrubbery border, as a specimen, in clump plantings, or as accent plants in large flower gardens or perennial borders. The flowers, dainty white or flesh pink, are produced in May or June. In well drained soils it has proved to be hardier.

Deutzia gracilis, Slender Deutzia. Deutzia gracilis, a native of Japan, is one of the favorite species. It is exceedingly attractive in May with its abundant pure white flowers which bloom with the late tulips. It is a dwarf form, seldom exceeding 3 feet.

Leaves: The leaves are opposite, smooth, long pointed and unequally toothed, hairy above and smooth and paler below.

Flowers: The white flowers are produced in graceful, upright clusters about the time that tulips are in bloom, generally in May.

Fruit: The fruit is deciduous.

Twigs: The branchlets have yellowish-gray, smooth bark.

Soil and Culture: The culture is simple, the only

pruning required is to thin out the old branches after blooming. Lighter soils, which are fertile and well drained, are preferable.

Propagation: Cuttings of either growing wood in June or July or mature wood in the fall; seeds sown in pans or flats in the spring; also layers or division of old plants.

Distribution in the State: For planting in the eastern half.

Deutzia lemoinei, Lemoine Deutzia. Lemoine deutzia is a taller growing shrub, reaching a height of 3 feet. It is more vigorous in its habit and more conspicuous when in bloom than D. gracilis and is excellent for greenhouse forcing. The branches bend gracefully with their masses of pure white flowers, borne in broad 20 to 30 flowered clusters. It should be used in all extensive shrub combinations because of its profusion of bloom. It is a hybrid between D. gracilis and D. parviflora. The leaves are slender, elliptic, finely toothed, sparsely hairy above and smooth beneath $1\frac{1}{2}$ to 3 inches long.

Deutzia scabra, Fuzzy Deutzia. Deutzia scabra is a desirable shrub but the least hardy. It is suitable for planting in the shrub border or as a specimen. It is hardy and rapid in growth.

Leaves: The dull green leaves are oval to narrow oblong, 2 to 3 inches, finely toothed, and hairy.

Flowers: The flowers are white, pinkish on the out-

side, produced in May or June. The petals are toothed.

Fruit: The fruit is not conspicuous.

Twigs: The hairy twig is red-brown.

Soil and Culture: Will grow in any good soil.

Propagation: Hardwood cuttings.

Distribution in the State: Eastern half.

Deutzia scabra crenata is one of the best of the Deutzias, equally hardy with other species. The slender wiry stems are wreathed for a considerable distance with racemes of pure white flowers. The leaves are less rough than those of D. scabra.

Elaeagnus angustifolia, Russian-Olive. Although this shrub is treelike, attaining a height of 20 feet, it has many uses. Its silvery foliage lends a touch of contrast to the shrub border, either as a specimen or in the back of the border. It is used for windbreak plantings when planted with other trees. It can be depended upon to do well under trying conditions of the city. It is native in southern Europe and western and central Asia.

Leaves: The alternate leaves are long, narrow, 2 to 3 inches in length, light green above and silvery beneath.

Flowers: The inconspicuous yellow flower is very fragrant and is produced in axillary clusters of 2 or 3 in June.

Fruit: Yellowish, covered with silvery scales,

sweet, mealy, $\frac{1}{2}$ inch long, and ripens in August. It is not edible.

Twigs: Silvery, without brown scales, and sometimes spiny.

Soil and Culture: Any well drained soil is suitable but it demands a sunny location.

Propagation: Seed and hardwood cuttings.

Distribution in the State: Planted throughout. Other species of Elaeagnus have not been tried at the college.

Euonymus. The genus Euonymus offers several shrubs which are outstanding in their value for Kansas planting, both deciduous and evergreen and upright or climbing in habit of growth. Their bright scarlet fruits are enough to recommend them for use in shrub borders, naturalistic plantings and plantings for winter effects. Not only is the foliage effect excellent for the summer season, but their brilliant autumnal tints should not be omitted from a Kansas shrub border.

Euonymus alatus, Winged Euonymus. Winged euonymus is a large, well shaped, handsome, broad, flat topped ornamental shrub growing from 5 to 8 feet in height. It is not so attractive in the summer for the leaves are dull green and the flowers quite inconspicuous. In the winter, however, the shrub is conspicuous with its rigid, wide spread-

ing branches with prominent corky wings. It is of value in fall for its beautiful rose to scarlet tints assumed by the foliage and is at its best when used as a specimen shrub. It is native of Japan and China.

Leaves: Opposite, finely toothed, rather leathery, dull green turning to beautiful autumn colors.

Flowers: The early buds in the spring are marked with pink. The flowers are inconspicuous, yellow, in threes.

Fruit: Smaller than the other species of *Euonymus*, but produced freely, dull purple in color with scarlet coated protruding seeds.

Twigs: The twigs are the outstanding feature of this shrub. They have 2 to 4 corky wings, brown in color, borne along the green twigs.

Soil and Culture: Not particular as to soils.

Propagation: Seeds stratified until spring; the pulp should be removed before stratification. Hardwood cuttings.

Distribution in the State: Planted in the eastern and central parts.

Euonymus atropurpureus, Wahoo. Wahoo, a native from New York to Florida, Nebraska, Oklahoma, and Texas, is open in growth, sometimes appearing straggling or tree-like. However, its scarlet fruit, produced in abundance, and its brilliant scarlet autumnal tints will recommend it highly for naturalistic plantings or in the back of the shrub border. It is very hardy and ranges in height from 6 to 14 feet.

Leaves: The leaves are bright green, oblong, finely toothed and nearly sessile. It assumes a brilliant scarlet autumnal tint.

Flowers: The anthers and flowers are purple, containing 4 petals, and are somewhat showy. Their blooming period is May or June. Seven to 15 flowers are borne on a slender stalk.

Fruit: The fruit is strawberry color with the pulp darker than above, produced in great abundance. The four-lobed capsules are suspended on long stalks. It adheres long into the autumn.

Soil and Culture: Wahoo will grow in sun or partial shade, but requires ample space in which to grow to its full development. It is not particular as to soils.

Propagation: Hardwood cuttings and seeds stratified in the fall after removing the pulp.

Distribution in the State: Native in the eastern and central parts of the state and planted in that section.

Euonymus europaeus, European Burningbush is a shrub or small tree which delights to grow in the shade, reaching a height of 20 feet occasionally. The leaves are ovate, round toothed. The branches are quadrangular. The flowers are yellow-green, appearing in May. The fruit is pink, or orange inside.

Euonymus americanus, Brook Euonymus is an upright shrub growing from 5 to 8 feet tall. The flowers are greenish purple, the fruits rough, warty, light scarlet with orange pulp. They ripen in September and October. It likes partial shade and rather moist soil.

Euonymus radicans, Wintercreeper. Wintercreeper, a native of Japan and Korea, is suitable for edgings for paths and borders, covering buildings, particularly on the north and east faces, and as a ground cover under trees. It grows quickly and is easily transplanted; however, it is very subject to scale insects. It must be grown in the shade in Kansas.

Leaves: The leaves are dark lustrous evergreen, oval, and opposite.

Flowers: The flower is greenish white, but not showy.

Twigs: The branches cling to stone by aerial roots but need some support until established. The twigs are almost round, minutely warty.

Soil and Culture: Takes kindly to partial shade and does not thrive so well in hot southern exposures.

Propagation: Cuttings root easily in summer from July to August 15 in shaded frames. Layers root naturally when branches touch the soil.

Distribution in the State: Planted in the eastern half.

E. radicans acutus, Sharpleaf Wintercreeper has sharp, pointed, narrow leaves, 1 to 2 inches, and is perfectly prostrate upon the soil or else climbing.

E. radicans vegetus, Bigleaf Wintercreeper. This is an ornamental fruiting sort with quite rounded elliptical leaves. It clings to stone or brick but not to stucco. It

is low and spreading and can be cut back to become bushy but any height which it attains is due to a piling up of its branches. It is not upright.

E. radicans argentea marginatus, Silveredge Wintercreeper. Very similar to E. radicans with small leaves bordered white.

Exochorda grandiflora, Common Pearlbush. The common name of this shrub is derived from the white buds which are globular and pearl-like. It prefers partial shade and should be pruned to form a compact shrub for if left alone has a tendency to have naked stems and branches. Since it may reach 10 feet in height and requires facing down with lower growing shrubs it is excellent for the back of the border. It is a native of China.

Leaves: The foliage effect is rather scanty, but fine textured. The leaves are alternate, oval, and smooth. On the leafy shoots the leaves have a few teeth near the tip, but on the flowering shoots the leaves are without.

Flowers: The flowers are white, borne about the time the leaves unfold; the blossoms transforming the whole bush into a bower of beauty. They are produced in 6 to 10 flowered racemes. The green calyx is visible between the 5 petals.

Fruit: The fruit is the most characteristic feature by which one may recognize the plant in all seasons. It has 5 bony, smooth, united divisions which surround the central axis. From the top view they look very star shaped. It hangs on the plant from one year to another.

Twigs: The twigs are smooth.

Soil and Culture: It prefers sunny situations in well drained, fertile soils that are somewhat moist. It does satisfactorily in almost any well drained soil.

Propagation: Propagation by any method is slow. Seed sown in spring after stratifying through the winter, layers.

Distribution in the State: Planted in the central and eastern parts.

Forsythia intermedia, Border Forsythia. The forsythias are heralds of spring for in early spring, before the leaves unfold, the landscape is often a mat of gold with their blossoms. They are rapid growers. The border forsythia is a hybrid between weeping and greenstem forsythias.

Leaves: The leaves are opposite, glossy, coarsely toothed and often three-parted. They are somewhat brittle.

Flowers: The flowers are solitary, bright yellow and very numerous, borne on the previous year's growth.

Twigs: The new growth is reddish while the older wood is brown. The pith is solid at the nodes but chambered throughout the rest of the stem.

Soil and Culture: The forsythias are not particular as to soil requirements. Since the flowers are borne on the previous year's growth pruning should be done at the end of the flowering period.

Propagation: Roots easily from hardwood cuttings. Summer cuttings may be used.

Distribution in the State: Planted in eastern two-thirds.

Forsythia suspensa, Weeping Forsythia. Weeping forsythia has long slender branches which are slightly pendant at their terminals. It is good for training over walls or trellises where it may have a wide spread. It is also excellent for specimen planting, but is not suitable for planting in combination with less vigorously growing shrubs in the border. It is native in China.

Leaves: The leaves are broader and shorter than the leaves of Forsythia viridissima and are frequently three-lobed and occasionally three-bladed. They are opposite, oblong oval, and coarsely toothed.

Flowers: Four-petaled produced in clusters of 1 to 3, sometimes more. Golden yellow with orange stripes within the short tube. The calyx equals the corolla in length.

Twigs: The twigs are hollow but solid at the nodes.

Soil and Culture: Not particular as to soil requirements.

Propagation: Hardwood cuttings, summer cuttings, but more commonly rooting from its procumbent branches.

Distribution in the State: Planted in eastern two-thirds.

Forsythia viridissima, Greenstem Forsythia. Forsythia viridissima is of upright growth and has proved a little less hardy than F. suspensa. Usually used for borders of shrubbery and group planting. It is native in China.

Leaves: Narrow, dark green with sharp notches from center to tip, opposite.

Flowers: Golden yellow flowers produced, 1 to 3

flowers produced at a node on pendant stems. Blooms later than F. suspensa. Calyx one-half as long as the flower tube.

Twigs: Pith of stem chambered, even at the nodes. The branches are somewhat four-sided and greenish instead of brown.

Soil and Culture: Not particular as to soils.

Propagation: Hardwood and softwood cuttings, layering.

Distribution in the State: Planted in the eastern and central portions.

Halesia tetraptera, Great Silverbell. Halesia tetraptera is an ornamental shrub or tree of loose growth, sometimes reaching a height of 20 feet. The flowers are pure white, enveloping the whole plant in fascicles containing 9 or 10 bellshaped blossoms each produced in April. It enjoys shady positions and prefers moist sandy soils. It requires situations more or less sheltered from high winter winds. It has not been tested sufficiently in Kansas plantings to justify its widespread use.

Hamamelis virginiana, Common Witch-hazel. Witch-hazel, a hardy shrub or small tree, 10 to 25 feet, bears its flowers while the foliage of the surrounding shrubs and trees is falling. In late autumn the golden yellow flowers appear in "tousled clusters" in the axils of its dying leaves. It is useful for planting in shrubberies and ex-

cellent for informal plantings, bordering wooded areas or along margins of streams. It is a splendid shrub for use in naturalistic or informal plantings, preferring situations which are moist and shady.

Leaves: The leaves have coarse, round teeth and are 6 to 8 inches long. As fall approaches the foliage assumes clear yellow tints, the leaves usually dropping as the flower buds unfold.

Flowers: Each blossom has 4 long crumpled, twisted, narrow petals. The fragrant flowers borne in October or November stand out effectively against the bare branches, adding a grateful touch of color to the winter landscape.

Fruit: The fruit is a two-celled, two-seeded, woody capsule, borne just after blooming, remaining on the shrub throughout the year. They are especially peculiar in the method and vigor of seed shooting which occurs about the time of new bloom.

Twigs: Round, zigzag. The buds are long.

Soil and Culture: Not fastidious as to soil requirements, but has a preference for soil which is somewhat moist and contains a fair amount of sand and peat.

Propagation: Since propagation by seed is so slow a process, layering and grafting are most often used.

Distribution in the State: Planted in the eastern one half.

Whittier immortalizes the Witch Hazel in these lines:

"Thru the gray and somber wood,
Against the dusk of fir and pine,
Last of their floral sisterhood
The hazel's yellow blossoms shine."

Helianthomum chamaecistus, Sunrose. Sunrose is an attractive little woody plant forming an evergreen procumbent mat. It is often considered a perennial but is truly a shrub. Some varieties have green leaves while others are covered with grayish hairs. They are ideal rock garden plants and are sometimes used on steep banks. The plants are frequently used in perennial borders. This species is exceedingly variable.

Leaves: The very small leaves are semi-evergreen or evergreen. They are linear lanceolate, borne in opposite groups on long petioles.

Flowers: An abundance of single or double flowers in shades of pink, white, yellow or red are produced from June to August. They are about 1 inch across, borne in loose, many flowered racemes. They open in the morning and close later in the day.

Twigs: The brown stems are hairy.

Soil and Culture: A sunny situation is their chief requirement. They thrive in rocky or sandy soil.

Propagation: Easily grown from seeds sown in spring or summer, preferably under glass. Germination is quick and blooming plants can be obtained in one year. It may also be propagated by division or cuttings of growing wood taken in summer.

Distribution in the State: Planted in the eastern one-third.

Hibiscus syriacus, Shrub-althea (Rose of Sharon). Shrub-althea is an old garden favorite. It is upright and stiff in habit of growth, making a good single specimen shrub.

It is useful for informal hedges or as enclosures to simple old fashioned gardens. Due to its ability to withstand smoke and heat and its resistance to serious pests it may be recommended for city planting. Shrub-althea is hardy, easily transplanted, rather long-lived, a rapid grower, varying in height from 6 to 12 feet. The late blooming period of July to September aids in giving the garden a touch of color in the fall.

Leaves: The more or less three-lobed leaves have a tapering base. They are rather coarsely toothed and the foliage effect is rather scanty.

Flowers: The hollyhock-like flowers are produced in the axils of the leaves from July to September. The double and single flowers may be obtained in pink, lilac, red, or white.

Soil and Culture: Thrives in either sun or partial shade and any good garden soil, provided it is well drained.

Propagation: Seeds; hardwood cuttings in the fall; mound layering; greenwood cuttings which must be protected the first winter.

Distribution in the State: Planted in the eastern and central parts.

Hydrangea arborescens, Smooth Hydrangea. Hydrangea arborescens, although rather coarse in growth and not so graceful as some other shrubs, is often used for the strength of effect developed by its coarse, light green foliage and immense size and whiteness of its flowers. It

is more appropriate in a formal composition than in a naturalistic development and may be effective in accenting certain portions of the design.

Leaves: The leaves are smooth above, rounded or heart-shaped at the base, ovate to elliptical.

Flowers: Large clusters of snow white flowers, somewhat flatter than those of the other species. The flowers turn greenish after blooming. The blooming period is during early summer after the flowers of other shrubs have fallen.

Soil and Culture: They are rather heavy feeders, especially just before and during the flowering season. The flowers are, therefore, larger and more effective if grown in a reasonably moist and fertile soil and if judiciously pruned in early spring when the weaker and older shoots should be removed. It does best in partial shade.

Propagation: Mound layers, division, hardwood cuttings, softwood cuttings.

Distribution in the State: Planted in the eastern half.

Hydrangea paniculata grandiflora, Panicle Hydrangea (Peegee). The peegee hydrangea is a shrub which attracts attention in late summer and early fall by the abundance and immense size of its compact clusters of sterile flowers. The flowers, a pale green when they first appear, change to a creamy white as summer merges into fall. Later they turn to pink and finally to a dull, somewhat bronzy red, the color they retain until the flowers are beaten from the branches by the winter storms. It may be

used for a flowering hedge, for late summer and fall effects in formal gardens or in plantings on the small city lot where an artificiality of effect characterizes the entire environment.

Leaves: The leaves are large, elliptic or ovate, coarsely toothed, hairy beneath on the midribs, but nearly smooth above.

Flowers: The sterile flowers, borne in late summer, are white, changing to pink and then to bronze green.

Soil and Culture: The size and effectiveness of the flowers depends upon the fertility and moisture of the soil and the efficiency of the early spring pruning. It grows either in sun or shade.

Propagation: Hardwood cuttings, softwood cuttings, mound layers.

Distribution in the State: Planted in the eastern half.

Hypericum moserianum, Goldflower. Goldflower is a subshrub hybrid between H. patulum and H. calycinum. It is more frequently used in herbaceous gardens than in shrubbery borders. It is also useful for edging foundation plantings and is most effective when planted in masses. It reaches a height of 18 inches, and blooms during a season after most shrubs have finished blooming, July and August.

Leaves: The leaves are blunt but with a very abrupt, fine tip.

Flowers: The flowers are 2 inches in diameter, with

hundreds of anthers in the center. In July and August the golden yellow flowers make an ornamental display even in regions where the plants die down to the ground during winter.

Twigs: The stems are round and reddish.

Soil and Culture: Any good moist, loamy or sandy soil in partial shade.

Propagation: Seeds, or softwood cuttings in September.

Distribution in the State: Eastern part.

Hypericum patulum, Japanese Hypericum. This arching, spreading shrub will reach a height of 2 feet. The golden yellow flowers are about 2 inches in diameter, borne either singly or in clusters. It is useful for the perennial border, in front of other low shrubs, or in the large rock garden. It blooms during a season when many of our shrubs have finished blooming, during July and August.

Leaves: The leaves are half evergreen, ovate-lanceolate 1 to 2½ inches long, rather narrow pointed, gray beneath and nearly sessile.

Flowers: The golden yellow flowers are large with many stamens. There are 5 upright styles which are about as long as the stamens. The calyx has a few teeth and is about half as long as the petals.

Twigs: The stems are purplish, two-edged.

Soil and Culture: Any good moist, loamy or sandy soil in partial shade.

Propagation: Seeds, or softwood cuttings in September.

Distribution: Eastern half.

Hypericum konytchense. This Hypericum is a much-branched shrub about two feet high, of upright rounded habit with ovate-elliptic nearly sessile leaves, 1 to 2 inches long, and numerous golden yellow flowers about 2 inches across, in three-flowered clusters.

Iberis sempervirens, Evergreen Candytuft. This low growing sub-shrub is from 9 to 12 inches high, spreading out to make a low mat which is covered with flat, dense clusters of pure white flowers. It is often used as a border for flower beds or in group plantings at the base of taller shrubs. It is native in southern Europe and western Asia.

Leaves: Evergreen, linear-oblong, obtuse, and entire.

Flowers: Dense, flat, white clusters from April through June.

Fruit: Orbicular-elliptic, slightly or deeply emarginate.

Soil and Culture: Prefers sunny locations, a moderately rich soil and plenty of water.

Propagation: Seed, or cuttings made in September and wintered over in a cold frame where they can be kept moist.

Distribution in the State: Planted in eastern half.

Iberis gibraltarica, Gibraltar Candytuft is the largest of the candytufts but is somewhat more straggly in growth. It is very showy because the clusters of white flowers are deeply tinted rose-lavender.

Ilex decidua, Possumhaw. Possumhaw is a tree-like shrub growing to a height of 30 feet. It is native from Virginia to Florida, west to Texas. The native habitat in southeastern Kansas is in wooded areas. The most suitable location for this shrub is in large naturalistic plantings. The leaves are partly fascicled, obovate, lustrous above and with impressed veins. They are pubescent on the mid-ribs beneath. The staminate flowers are borne on slender stalks about $\frac{1}{2}$ inch long. The orange to scarlet fruit is very decorative and hangs on most of the winter.

Ilex verticillata, Common Winterberry. Common winterberry is excellent for early winter effects, though not especially attractive in summer. The crimson scarlet berries hold their place long after the foliage is gone. It must have a moist situation and transplanting is difficult. Protection is necessary for several years after planting. Due to the difficulty in its establishment and requirements, it is not grown extensively in Kansas.

Kerria japonica, Kerria. Kerria is of landscape value for its decorative golden yellow flowers which are produced quite abundantly in early June and for its numerous slender green branches which retain their bright color throughout the winter months, adding a touch of color and interest to

the landscape at that season. It is recommended for planting on the north side of a building, and it is useful and ornamental for the shrubby border as a winter accent plant or for clump plantings. Severe annual pruning is sometimes essential. It ranges in height from 3 to 6 feet. It is native to Japan.

Leaves: The alternate leaves are coarsely and doubly toothed and prominently veined, smooth above but paler and hairy below.

Flowers: The orange yellow flowers are solitary, blooming in June. The blossoms are five-petaled with numerous stamens.

Fruit: Brownish black, inconspicuous.

Twigs: The smooth, striped branches remain green all winter.

Soil and Culture: Not fastidious as to cultural requirements and will thrive in any ordinary garden soil if well drained. It will grow in sunny locations but thrives best in partial shade.

Propagation: Cuttings, layers, and division. Cuttings of growing wood may be rooted successfully in a shaded frame. Generally propagated by cuttings made in the fall of mature wood.

Distribution in the State: Planted in the central and eastern portions.

Kerria japonica florepleno, Double Kerria is sometimes called Globeflower. It is more vigorous and is more frequently planted. The plants are taller and somewhat more leggy.

Kolkwitzia amabilis, Beautyshrub. This rather new importation from China by E. H. Wilson in 1901 promises to be a valuable acquisition to American gardens. It grows 6 feet tall and is an arching shrub with the center always upright. The pink, bell-shaped flowers are very attractive. More experimentation is needed regarding its requirements.

Leaves: The leaves are opposite and long pointed, slightly hairy on both surfaces. The wavy edge bears minute prickles on each wave. The ends of the branches are reddish leaved.

Flowers: The attractive, pale pink, bell-shaped flowers which unfold in early June, are produced in great profusion and are extremely effective with the orange veins in the throat, the buds being deeper in color. The blossoms are produced in pairs, forming a cluster of about 25 flowers.

Twigs: The young winter twigs are very woolly; the older twigs are brown and flaky barked.

Soil and Culture: Soils of good drainage should make for perfect hardiness. It prefers a sunny exposure.

Propagation: Cuttings of half-ripe or ripe wood taken in late summer or September.

Distribution in the State: Planted in the eastern half.

Laburnum vulgare, Goldenchain. Laburnum has long pendulous clusters of yellow flowers in May or June which are succeeded by fruit pods which continue on the tree for a period and are by no means unsightly. It grows to a height of 15 to 20 feet and is quite upright in growth. The leaves

are three-parted, rounded at the tip and bristle pointed. It has been grown in the trial nursery for 5 or 6 years but has not been tested long enough to recommend it for general planting. Southern Europe is its original home.

Lespedeza formosa, Purple Bushclover. The rosy purple flowers of Lespedeza formosa come at a season when most of the shrubs have finished blooming and are a welcome addition to the shrub border during the late summer. The shrub usually does not attain a greater height than 3 feet but may grow taller where it does not winterkill to the soil each winter. The blossoms are pea-like, produced in long drooping racemes. It is an excellent specimen shrub or in front of taller shrubs where its beauty may show to advantage. It is native to Japan.

Leaves: The leaves are three-parted, the leaflets pointed, 1 to 2 inches long. The lower surface is somewhat hairy.

Flowers: The rosy purple, pea-like flowers are produced in long drooping axillary clusters. Their period of bloom, September, highly recommends it for shrub plantings.

Fruit: Seed is seldom produced.

Twigs: The branchlets are lightly hairy and smooth.

Soil and Culture: Deep rich soils are best, although they do thrive in real dry soils. The tops must be pruned each spring.

Propagation: Division and summer cuttings, if taken in the soft stage in early spring. Will root readily and

live over winter when planted out. Otherwise they must be kept in the greenhouse for the first year.

Distribution in the State: Planted in the eastern and central sections.

Lespedeza formosa albiflora, Japanese Bushclover has practically the same cultural requirements as the purple bush-clover. The flowers are white, marked with violet and the leaflets are smaller.

Ligustrum, Privets. The privets are excellent shrubs. Many of them are suitable for hedges or for specimen planting. Some are nearly evergreen while others have attractive black berries or beautiful flowers. They can usually be depended upon to succeed under adversity. The flowers are white and somewhat resemble the lilac, but are usually produced in smaller clusters.

Ligustrum amurense, Amur Privet. Amur privet is a valuable hedge or specimen plant. It resembles ibota but may be distinguished by its upright, rather than spreading habit, forming an upright, nearly pyramidal shrub growing to 15 feet tall. The lateral branches are erect and the terminal flower clusters larger. It is very hardy and does well in partial shade. It is native to northern China.

Leaves: The leaves remain on the branches until very late in the fall. They are oval, 1 to 2½ inches long,

rather blunt, pubescent on the midrib below.

Flowers: The white flower clusters appear in June and July. The calyx is smooth or slightly hairy at the base.

Fruit: The fruit is shiny black and persists on the branches throughout the winter.

Soil and Culture: Not particular as to soils, but prefers a light soil.

Propagation: Hardwood cuttings, seed or softwood cuttings.

Distribution in the State: Planted throughout.

Ligustrum ibota, Ibota Privet. Ibota privet is one of the most commonly used species. The creamy white drooping racemes of flowers are fragrant. It endures a great deal of cold. The branchlets are spreading at a wide angle and curved. It is native to Japan.

Leaves: The small dark green leaves turn purplish in the fall. The petioles and veins of the leaves are very hairy.

Flowers: The creamy white drooping racemes, produced in May and June, are fragrant.

Fruit: A great profusion of small, black bloomy fruits are produced in small clusters.

Twigs: The branchlets are very hairy.

Soil and Culture: Thrives in any good soil.

Distribution in the State. Planted throughout.

Ligustrum ibota var. regelianum, Regal Privet. Regal Privet is of special value for its black berries which are pre-

duced in great abundance, persisting on the branches until late in the winter. It is used for hedges but does not make such a compact growth as other species of privet so it is at its best in a shrubbery border where its natural grace and the individuality of each shrub may be allowed to develop. It is very drought resistant and free from insects and diseases. A height of 8 to 10 feet is common. It has a more horizontal habit of growth than L. Ixota.

Leaves: The margins are wavy.

Fruit: Black berries produced in great profusion.

Propagation: Hardwood cuttings.

Distribution in the State: Planted in the eastern two-thirds.

Ligustrum vulgare, European Privet. European privet is a nearly evergreen type which is very hardy and upright in growth, and is used for hedges as well as specimen planting. It may attain a height of 15 feet. Blight infests this species badly and so its popularity is declining.

Leaves: Oblong-ovate to lanceolate, $1\frac{1}{4}$ to $2\frac{1}{2}$ inches long, smooth.

Flowers: White, produced in May and June, in large erect terminal clusters $1\frac{1}{4}$ to $2\frac{1}{2}$ inches long.

Fruit: Large, black berries, borne on the tips of the upright branches, shiny.

Soil and Culture: Thrives in any good soil.

Propagation: Hardwood cuttings.

Distribution in the State: Planted throughout.

L. vulgare var. lodense is a dwarf form, growing to a height of 12 to 18 inches. The leaves are smaller.

Thompson's Privet, a hybrid introduced by Mr. J. H. Thompson at Junction City, Kansas, has become a favorite for Kansas plantings. As it was originally brought from Russia the parentage is unknown. The growth is compact, making an excellent hedge. It retains its leaves much longer than the other privets, being an almost evergreen plant. It is exceedingly hardy.

Lonicera, Honeysuckle. The Loniceras offer several species of shrubs which demand recognition for Kansas plantings. Both the semi-evergreen and deciduous sorts are represented. They are long lived shrubs, growing from 6 to 12 feet in height. They not only make good specimen shrubs, but are excellent in the general shrub border. Their colored fruits will recommend them for their winter effects. Some may be used in windbreak plantings. In all species the leaves are opposite.

Lonicera fragrantissima, Winter Honeysuckle. Winter honeysuckle is a semi-evergreen shrub with wide spreading branches, native to eastern China. It is the first of the honey-

suckles to bloom; the tiny fragrant flowers opening before the leaves are expanded. It is useful either as a specimen or in the general shrub group.

Leaves: The leaves are semi-evergreen, leathery, dark green above and gray beneath. They are oval and often persist on the shrub quite late.

Flowers: The creamy-white flowers come out before the leaves expand. They are very fragrant and are produced in great profusion.

Fruit: The oblong, red berries are scarce.

Twigs: The branches are reddish and smooth with solid white pith.

Soil and Culture: Thrives in a variety of soils.

Distribution in the State: Planted in eastern two-thirds.

Lonicera maackii podocarpa, Late Honeysuckle. This honeysuckle is exceedingly hardy. It is widespreading, growing about 12 feet in height. It is recommended for windbreak plantings due to its hardiness, spreading, compact habit of growth.

Leaves: The dark green leaves are 1½ to 3 inches long and downy on the veins.

Flowers: The flowers are white, fragrant, borne in great profusion in axillary pairs on stems shorter than the stems of the leaves in May and June.

Fruit: The red fruit is produced in abundance in September, persisting until late in the winter.

Soil and Culture: Will thrive in any good soil.

Propagation: Hardwood cuttings.

Distribution in the State: Should be planted throughout.

Lonicera morrowi, Morrow Honeysuckle. Morrow honeysuckle, native to Japan, is excellent as a specimen where it can be given sufficient space in which to develop its natural grace and individuality. The handsome bright red fruits borne abundantly in the fall make this shrub of high landscape value. It often becomes twice as broad as high, reaching a height of 6 feet, and needs no smaller shrubs to face down. It hybridizes easily with L. tatarica and the hybrids are more common in gardens than the true species.

Leaves: The leaves are gray, hairy beneath, rounded at base.

Flowers: The flowers are white, changing to yellow, appearing in April and May in great profusion. They are produced on axillary stems longer than the leaf stems. The upper lip is divided nearly to the base, with spreading lobes.

Fruit: The blood-red, translucent berries are very persistent, remaining brilliant on the branches until early winter.

Twigs: The branches are softly pubescent and hollow.

Soil and Culture: Will thrive in any good soil.

Propagation: Hardwood cuttings or seed.

Distribution in the State: Planted throughout.

Lonicera tatarica, Tatarian Honeysuckle. Lonicera tatarica is an erect, ascending and spreading shrub, usually attaining a height of 8 feet. It is very hardy. The old branches give a grayer landscape effect than most shrubs. It is used as a specimen, or in the back of the shrub border. It is native from southern Russia to Turkestan. Facing shrubs may be needed in the border as it sometimes gets somewhat leggy. It is beautiful in both flower and fruit.

Leaves: The leaves are ovate-lanceolate, cordate at the base, glabrous beneath.

Flowers: The white or white tinted with pink flowers do not change to yellow as they age. They are produced in April and May. The tubular part of the flower is short and swollen.

Fruit: The attractive red fruit ripens in July and August and remains until late autumn.

Twigs: The young twigs are often slightly hairy. The old branches are grayer in landscape effect than most shrubs.

Soil and Culture: Will thrive in any good soil and does well in sun or shade.

Propagation: Hardwood cuttings or seed.

Distribution in the State: Planted throughout.

Magnolia. Magnolias are not well adapted to Kansas

climate. In the eastern part of the state there are several specimens growing in favorable locations. They usually require moist, rich, sandy loam which is somewhat acid. They will not withstand the drying winds of summer, but should have good morning sun. They are often injured in city yards where the protection afforded there allows the buds to unfold before the danger of frost is over. They are rather difficult to transplant since the roots decay badly after they have been bruised. Two of the hardiest species are M. soulangeana, Saucer Magnolia and M. stellata, Star Magnolia

M. soulangeana, Saucer Magnolia has large white flowers, purple at the base. The cone-like seed pods have orange seeds or fruits which are suspended by threads.

M. stellata, Star Magnolia. The white, somewhat star-shaped flower unfolds 2 or 3 weeks earlier than the other varieties. They are borne just below the terminal bud, in thick racemes, 3 inches in length.

Mahonia aquifolium, Oregon Hollygrape. Oregon hollygrape is an evergreen shrub with leaves resembling those of holly. As it sometimes spreads rapidly by means of underground stems, it makes a good ground cover. It may be

easily transplanted. Sometimes the mature leaves take on a beautiful red coloration in the fall. The bloomy black fruits are highly decorative. It is splendid for massing in semi-shaded places where it retains its foliage better than in the sun. The foliage is often used for house decoration or combining with cut flowers.

Leaves: The leaves, resembling holly, are nearly evergreen, leathery, spiny toothed and very glossy. There are 3 to 7 leaflets in the compound leaves. The new leaves are bronze.

Flowers: The terminal fascicles of attractive, bright yellow blossoms are produced just below the terminal buds in thick racemes, three inches or so in length. The blooming period is in April.

Fruit: The highly decorative black berries are covered with a blue or violet colored bloom. They ripen in September.

Twigs: The shrub spreads by means of suckers.

Soil and Culture: Prefers soils that are more or less dry and sandy but will grow in any good loam.

Propagation: Seeds stratified in the fall and sown the following spring; by suckers, layers or cuttings of half-ripe wood rooted under glass.

Distribution in the State: Planted in the eastern two-thirds.

Malus ioensis, Prairie Crab. This tree-like shrub grows to a height of 25 feet. It is native from Minnesota and Wisconsin to Nebraska, Kansas and Missouri. Prairie crab is suitable for planting in the back of the shrub border,

as a specimen, or in groups in naturalistic areas. It is planted for its picturesque habit of growth and its spring flower effect. It is susceptible to cedar apple rust.

Leaves: Ovate-oblong or elliptic-obovate, $1\frac{1}{2}$ to 3 inches, coarsely serrate or shallowly lobed, tomentose beneath.

Flowers: White, or bright pink, about $1\frac{1}{2}$ inch across, pedicels stout and tomentose, April or May.

Fruit: Subglobose, sometimes angular, greenish and waxy.

Twigs: The branches are tomentose.

Soil and Culture: Well drained loam or sandy soil.

Distribution in the State: Native in northeastern and southeastern counties and along the Kansas river at least as far as Manhattan. Planted in eastern two-thirds.

Bechtel Crab, (Malus ioensis plena) has large double pink, rose-like flowers. It is a profuse bloomer often making the entire shrub a mass of pink in early April. It is very subject to cedar apple rust.

Parkman Crab, (Malus halliana parkman) has small green leaves which remain on the shrub until quite late. The dark rose bud opens into a rosy white, very double flower. The reddish fruit is the size of a pea.

Malus floribunda, Japanese Flowering Crab is one of the handsomest and one of the most profuse bloomers of the

crabs. The carmine buds change to pink, then white as the single flowers open. The small round fruit is red.

Philadelphus, Mock Orange. The mock orange vies with the lilac for widespread popularity. Its white blossoms, often sweet scented, form a parade throughout the spring and summer as there are so many varieties that may be chosen. The height may vary from 5 to 20 feet. The majority of species make excellent specimens, the taller growing ones being suitable for the back of the shrub border. They may be pruned after flowering.

Philadelphus coronarius, Sweet Mockorange. Philadelphus coronarius is a tall growing shrub, reaching a height of 8 to 10 feet. They are very fragrant. Although it is rather coarse in texture and high in growth, it makes an excellent shrub for planting in the back of the border or a screen planting. If given plenty of space it will prove a long lived shrub which does well in the environment of our cities. It is a splendid specimen and when planted by itself, with ample space in which to develop, it is extremely floriferous. It is native to southern Europe.

Leaves: The leaves are ovate, smooth above, hairy below at the axils only.

Flowers: Large, single, white flowers with yellow

stamens, yielding a heavy fragrance. Borne in great numbers in late May or early June.

Fruit: A four-valved capsule with numerous seeds.

Twigs: Smooth with chestnut brown bark.

Soil and Culture: Is generally tolerant to a wide range of soils, demanding hardly more than a bountiful amount of sunlight and space to spread its vigorous branches both upward and outward.

Propagation: Hardwood cuttings.

Distribution in the State: Planted throughout.

Philadelphus grandiflorus, Big Scentless Mockorange. The big scentless mockorange is often planted for its large flowers. It is a little taller than P. coronarius, reaching a height of 10 to 12 feet. It may be used in the back portion of the border. Big scentless mockorange is very hardy but slow in growth. It is native from North Carolina and Tennessee to Florida and Alabama.

Leaves: The leaves are elliptic-ovate, 4 to 7 leaves on shoots 5 inches long. They are toothed, dark green and smooth.

Flowers: Each flower is 2 to 3 inches in diameter, white and scentless. They are solitary and somewhat four-cornered. It blooms in June.

Fruit: A four-valved capsule with numerous seeds.

Twigs: The branches are smooth.

Soil and Culture: Does well in any good soil.

Propagation: Hardwood cuttings.

Distribution in the State: Planted throughout.

Philadelphus microphyllus, Littleleaf Mockorange. Philadelphus microphyllus is a lower growing shrub, not exceeding 3 feet in height. Both the leaves and flowers are small, the flowers being 1 inch in diameter. The abundant flowers are fragrant, having an odor somewhat resembling that of pineapple. It has a pleasing winter effect due to its compact habit of growth.

Leaves: The leaves are $\frac{1}{2}$ to 1 inch long, entire edged.

Flowers: The deliciously fragrant flowers are produced abundantly in clusters of 1 to 3.

Fruit: A four-valved capsule with numerous seeds.

Twigs: The stems are slender.

Soil and Culture: Does well in any good soil.

Distribution in the State: Planted in the eastern half.

There are several varieties of Philadelphus grown on the campus which have proved suitable for Kansas planting. Among these are:

Bouquet Blanc, Semi-double arching plant; low growth; bouquet-like clusters.

Conquete Double, Broad clusters; arching bush.

Dame Blanc, Semi-double arching plant; low growth; bouquet-like clusters.

Favorite, Semi-double, rather compact in growth.

Girandole, Semi-double, more profuse and like Virginal; tall.

Glacier, Double, dense clusters of creamy white flowers; small leaves, 4 feet.

Vaie Lactee, Single, large flowers, attractive stamens; leggy, 8 to 10 feet.

Virginal, Double, 2½ inches in diameter; sweet; tall; leggy. Perhaps best and most hardy of all.

Physocarpus opulifolius, Ninebark. Ninebark is a hardy vigorous shrub, useful for planting in masses for background or screening purposes, attaining a height of 8 to 10 feet. It is easily transplanted, will endure partial shade and does not often become diseased. The branches are excellent in large flower arrangements during June and early July, due to their graceful arching habit. The bark of the older branches peels off. It is native from Quebec to Virginia, Tennessee and Michigan.

Leaves: The five lobed, doubly serrate leaves are bright green, giving a beautiful foliage effect.

Flowers: The spirea-like flowers are borne in clusters of fluffy white in late May or early June.

Fruit: The bladderly pods, consisting of 5 lobes, turn purple as the autumn approaches.

Twigs: The bark of the older branches peels off in narrow thread-like strips. The branches are recurved.

Soil and Culture: Prefers a moist soil but will grow in almost any soil.

Propagation: Seeds, cuttings taken of either growing wood in summer, or of mature growth in the fall.

Distribution in the State: Planted throughout.

Physocarpus amurensis, Eastern Ninebark. Similar to P. opulifolius but the leaves and flowers are larger.

Potentilla fruticosa, Shrubbery Cinquefoil. Shrubbery cinquefoil is often used in naturalistic treatment in sunny or partially shaded situations. It is a low, dense plant, growing 3 feet in height. It is native to the northern hemisphere.

Leaves: The finely divided, compound leaves are from 3 to 7 bladed. The blades are linear, pointed, $\frac{1}{2}$ to 1 inch long with a silky surface and a rolled edge.

Flowers: The flowers are golden yellow, resembling strawberry blossoms. The numerous single blossoms are produced from June through the summer. They are one inch or more broad, with 5 petals and many stamens.

Fruit: Dry seeds with achenes on a hairy calyx, but not showy.

Twigs: The peculiar bark is shreddy.

Soil and Culture: It is a native of boggy places but also grows well in dry soil.

Propagation: Seeds; division, layers, or greenwood cuttings taken in the summer and rooted in a shaded frame.

Distribution in the State: Planted state-wide.

Prinsepia sinensis, Cherry Prinsepia. Prinsepia sinensis has a dense foliage effect. It makes a good shrub for

hedge planting and is a useful addition to the shrubbery border. When allowed to assume its natural form it develops into a tall, broad, graceful shrub, especially effective in the spring when the branches are profusely clothed with the bright yellow flower clusters. It has been growing in the trial nursery for 4 or 5 years.

Prunus glandulosa, Flowering Almond. One of the earliest blooming shrubs of the spring, flowering almond is usually covered with a profusion of very double, pink or white flowers. It is an old garden favorite, serving as low shrubs for beds or for use in front of taller sorts. The plants sucker freely so they usually form large clumps. It is native to central and northern China and Japan.

Leaves: Ovate to oblong-lanceolate, acute at the top, 2 to 3 inches long.

Flowers: The rosy-pink or white double flowers are set close to the wand-like branches.

Soil and Culture: Often persist in old gardens under gross neglect.

Propagation: Division is the best method of propagation.

Distribution in the State: It is planted in the eastern two-thirds.

Purpleleaf Plum, (Prunus cerasifera pissardi) is one of the

earliest shrubs to bloom. It attains a height of 20 feet. The flowers, even though small, are produced in such a great abundance that a wonderful effect is obtained. The purple color of the leaves does not fade. Only sparing use of this plant is recommended.

Prunus tomentosa, Nanking Cherry. The Nanking cherry is a most desirable shrub to plant in the shrubbery border. The flowers are produced in such quantities as to almost hide the branches from view. It is hardy and resistant to diseases and insects. This native of northern and western China and Japan grows to a height of 5 feet, spreading to a greater width.

Leaves: The leaves are crowded, obovate to elliptical unequally toothed, rough, densely hairy beneath.

Flowers: It blooms early in April, each node producing a flower, pink in the bud, but white when open, with a red calyx.

Fruit: Highly decorative for garden or indoor display. It is red, $\frac{1}{2}$ inch across and edible.

Soil and Culture: Good, well drained loam.

Propagation: Seeds or softwood cuttings.

Distribution in the State: Planted in eastern half.

Prunus japonica, Chinese Bush Cherry has been growing in the Kansas State College trial nursery for 4 years and has

proved hardy in Kansas. The flowers are pink or nearly white, opening with the leaves. The fruit is wine-red. It will grow to a height of 4 or 5 feet.

Ptelia trifolia, Hop Tree. The hop tree is an aromatic shrub or small tree, the foliage, fruits and branches of which, if bruised or crushed, exhale a rather unpleasant hop-like odor. The greenish flowers are not attractive but the elm-like seeds hang in decorative clusters. It may be used in the back of the shrub border for it may reach a height of 15 feet. The hop tree is native from Ontario to New York, to Florida; west to Minnesota.

Leaves: The alternate leaves are usually in threes. When held to the light the leaves may show pin holes like transparent dots.

Flowers: The greenish white flowers are small with a short calyx, 4 to 5 parted, and somewhat imbricated, with 4 to 5 petals of greater length which are also imbricated.

Fruit: Elm-like winged fruit, borne in clusters.

Twigs: The young branches are slightly hairy and reddish brown the second year.

Soil and Culture: Prefers a moderately moist, well drained soil, in partial shade.

Propagation: Seeds grow readily when sown as soon as ripe or stratified until spring.

Distribution in the State: Planted in the eastern two-thirds.

Rhamnus cathartica, Common Buckthorn. Buckthorn is a shrub, rather coarse in character and prone to get bare and leggy at the base. It attains a height of 12 to 15 feet. It is sometimes used as a specimen, often for planting in the back of the shrub border or for hedges. It stands pruning and is thorny, two features of advantage. The leaves remain on the branches much longer than do those of most deciduous shrubs. Buckthorn is rather slow in growth. It is native to Europe and Asia.

Leaves: The leaves are dark green, elliptical to ovate, with only 3 to 5 pairs of veins, deeply impressed, and opposite.

Flowers: The minute greenish, four-petaled flowers are not showy. They are fragrant and numerous, growing in clusters.

Fruit: The fruit is a small drupe becoming black when ripe and hanging late into the autumn.

Twigs: The branches are smooth and gray or olive tinted with numerous stiff thorns.

Soil and Culture: Thrives in either sandy soil or clay.

Propagation: Seeds stratified or sown in the fall or hardwood cuttings.

Distribution in the State: Planted over the entire state.

Rhamnus dahurica, the Dahurian Buckthorn, is similar but more spreading and with yellow-green leaves.

Rhamnus caroliniana, Carolina Buckthorn is native in the eastern one-third of Kansas. It grows to a height of 25 feet. The fruit is red, changing to black and is sweet, containing 3 nutlets. It is not planted as extensively as R. cathartica.

Rhodotypos kerrioides, Jetbead (White Kerria). This native of Japan is often mistaken for the true kerria but its leaves are opposite, the branchlets are black, not green, and it produces black fruit. The flowers are white while those of true kerria are golden yellow. Both the flowers and fruit are attractive. It is useful for planting on the north side of buildings, and thrives well under adverse conditions. The average height is 4 feet.

Leaves: The leaves are opposite, doubly-toothed, silky underneath, and appear plaited.

Flowers: The flowers resemble large, single white roses, borne in profusion at the end of branches, continuing in succession for a long time.

Fruit: The chief landscape value of this shrub lies in its clusters of shiny black berry-like fruits which persist on the branches throughout the fall and winter. The four black nutlets are clustered together, surrounded by the persistent calyx.

Twigs: The branchlets are black.

Soil and Culture: Thrives in sun or partial shade and in any garden soil which is reasonably fertile. It will thrive even in heaviest clay soil.

Propagation: Seeds or cuttings of ripe wood in the fall or of growing wood taken in early summer and rooted under glass.

Distribution in the State: Planted in the central and eastern portions.

Rhus, Sumac. Among the array of shrubs which brighten the autumn landscape with the glowing tints of their foliage, none can surpass the vivid scarlet and orange hues of many of the sumacs. They are decorative for garden or lawn planting, but the majority of sumacs are more appropriate in informal or naturalistic surroundings. The fruits of some species are of ornamental value, but the flowers of most species are not conspicuous.

Rhus canadensis, Fragrant Sumac. This native of Kansas should find a place in every shrub border. The autumn effect of yellow, orange, red, and scarlet makes this species one of the most useful for fall effects and it is also frequently planted as an undershrub on dry rocky slopes. Its growth is half trailing, growing 2 to 6 feet high, but always wider than high. It is an excellent shrub to use as "facer" for taller shrubs. When the leaves are crushed they give an agreeable odor.

Leaves: The leaves are three-foliolate compound. The leaflets are pubescent when young, with rounded teeth, except at the base. They take on a beautiful autumn color-

tion of yellows and reds.

Flowers: The bright yellow, catkin-like flowers are rather showy for they are borne in closely clustered spikes in advance of the foliage.

Fruit: The red fruits are hairy and more or less hidden by foliage until the leaves fall in the autumn.

Twigs: The aromatic, slender stems grow slantingly from 1 to 4 feet high.

Soil and Culture: Grows well on dry rocky slopes, where fall coloration is better for in low rich soil the changes are not so vivid.

Propagation: Often collected from its native habitat; division, hardwood cuttings.

Distribution in the State: Native in the central and eastern parts of the state and planted in those sections.

Rhus cotinus, Common Smoketree. The autumn foliage of smoketree has lovely shades of orange and scarlet and whether it is used in groups or as a specimen, it is certain to attract attention. It is well adapted for shrubbery or group planting but is often not so desirable for use as a specimen as the foliage is rather scanty. Its chief ornamental value lies in the large feathery panicles, somewhat purplish in color which crown the branches in late June and July giving to the shrub an appearance of a dense cloud of smoke. It is preferably transplanted in the spring and is rather rank in growth, sometimes reaching a height of 20 feet.

Leaves: The leaves are alternate, oval, smooth and somewhat bloomy, assuming a brilliant fall coloration.

Flowers: The flowers are loose panicles of light purple or flesh colored blossoms on pedicels becoming hairy after blossoming and spreading over the whole bush, giving it a misty appearance. They develop in July and August when most shrubs have passed their blooming period.

Fruit: A few fruits are scattered through the mass of sterile flower stems; the seed is kidney shaped.

Twigs: The new twigs are grayish.

Soil and Culture: Prefers sunny situations in well drained soils.

Propagation: Hardwood cuttings, root cuttings, and seeds.

Distribution in the State: Planted in the central and eastern portions.

Purple Smoketree, (Rhus cotinus atropurpurea). Purple smoketree has panicles with dark purple hairs.

Rhus glabra, Smooth Sumac. This is another native shrub of Kansas which has become a favorite for the back of the shrub border. Because of its beautiful autumn foliage of brilliant crimson and its heads of fruit, made up of velvety berries arranged in cones or spikes, it is among the most showy shrubs of field or forest. It does well under adverse conditions, is excellent for naturalizing in masses in dry, stony, or poor soils. If they were rarer they would be prized more highly.

Leaves: The compound leaves are often more than 1 foot in length with 15 to 31 leaflets on a long, smooth stalk. The leaflets are nearly sessile, oblong, pointed at the apex, though rounded at the base. They assume a brilliant scarlet coloration in the fall.

Flowers: The flowers, produced in large, much branched heads at the ends of the stems are 10 to 12 inches in length. They are greenish yellow and slightly fragrant.

Fruit: The velvety red berries, arranged in cones or spikes, remain longer than the leaves.

Twigs: Sometimes assumes a rather unshapely form due to its method of irregular branching.

Soil and Culture: Will grow in dry, stony, and poor soil.

Distribution in the State: Native over the entire state and planted throughout.

Rhus typhina, Staghorn Sumac. Staghorn sumac resembles the smooth sumac in leaf character but the stems of the staghorn are densely covered with soft hairs. It is usually planted among other shrubs which will face it down. It does well in adverse conditions but is not easily transplanted except when young. It is a vigorous grower and is well suited for wild, informal treatments. It has a brilliant scarlet autumn foliage effect. It may reach a height of 20 feet, but usually approximates 8 feet. It is native from Quebec to Ontario, south to Georgia, Indiana and Iowa.

Leaves: The compound leaves are composed of 15 to 21

leaflets. The leaflets are oblong lanceolate, finely toothed, smooth above and slightly pubescent beneath. The autumn coloration is scarlet.

Flowers: The flowers are greenish yellow, in dense, hairy terminal panicles.

Fruit: The fruit display is splendid, the crimson clusters persisting well into the winter months.

Twigs: The branches are blunt and clumsy looking, usually thickly covered with hair, and almost wholly lacking in symmetry of arrangement. The buds which are almost cone-shaped are deeply set in the middle of the large leaf scar and protected by a mass of hairs.

Soil and Culture: Not particular as to soils.

Propagation: Seeds sown in the fall, or by suckers.

Distribution in the State: Planted throughout.

Rhus typhina laciniata, Cutleaf sumac is similar in form to staghorn but the leaves are cut. Its autumn coloration is a fiery orange.

Rhus cismontana, Rocky Mountain Sumac. A shrub growing 3 to 7 feet tall, native on the hillsides and canyons of lower elevations throughout the Rocky mountain region. The leaves turn scarlet or orange in the fall and its deep red fruit masses make this an attractive shrub. It suckers quite freely. It has 9 to 31 leaflets.

Rhus copallina, Shining Sumac. Shining sumac, a native of eastern Kansas, is an excellent shrub because of its lue-

trous leaves. It does well under adverse conditions and has a beautiful autumn color effect. It suckers freely and is more spreading in habit of growth than R. glabra or R. typhina.

Leaves: The compound leaves have 9 to 21 leaflets, winged between the leaflets; they are usually hairy beneath. The leaves are lustrous and assume a beautiful fall coloration.

Flowers: The greenish white flowers are tiny, and open later than the other wild sumacs, in August.

Fruit: The fruits are hairy, red.

Soil and Culture: It suckers so badly that it may become a nuisance except upon dry, barren banks.

Propagation: Root cuttings or by suckers.

Distribution in the State: Native in the eastern one-fourth and planted in that region.

Ribes odoratum, Golden Currant. The golden currant grows to 6 feet in height and is irregular in growth. It may be used in naturalistic plantings or for covering shady banks. It is native east of the Rocky mountains, South Dakota to west Texas, east to Minnesota and Arkansas.

Leaves: Ovate to orbicular-reniform, deeply 3 to 5 lobed, with coarsely denoted lobes.

Flowers: Borne in 5 to 10 flowered nodding racemes, the calyx tube being yellow and the petals reddish. The flowers are clove scented.

Fruit: The black fruit is globose.

Twigs: The young branches are pubescent.

Soil and Culture: Any good soil in shade situations.

Propagation: Layering or hardwood cuttings.

Distribution in the State: Native in the western three-fourths and planted in that portion.

Ribes alpinum, Mountain Currant is a native of Europe. It is dense in growth, reaching a height of 7 feet but generally considered a low growing shrub. It is a good shrub for dry soils. Although slow in growth it is very hardy. It is very similar to R. odoratum but the fruit is scarlet.

Robinia hispida, Rose-acacia. Rose-acacia is an unusual shrub, the twigs and new growth being covered with soft bristles. In May and June it is covered with beautiful soft rose-colored clusters of pea-shaped flowers. It needs to be planted in a sheltered position as the wood is brittle and the limbs are easily broken by high winds. It is useful in the shrub border, or as a specimen planting on lawns and is often used to cover banks as it spreads rapidly due to its characteristic habit of suckering. Transplanting is easily accomplished as it grows rapidly while young. Although not often exceeding a height of 3 feet, it may be grafted on black locust as a standard tree. It is native from Virginia and Kentucky to Alabama.

Leaves: The leaves are pinnately compound. There are 9 to 13 oval leaflets, which have a pointed tip at the apex.

Flowers: The soft rose-colored, scentless, pendulous clusters are produced in May and June. The flowers are pea-like.

Fruit: Pods, hispid, rarely developed.

Twigs: The branches are covered with long red bristles.

Soil and Culture: It does well in any well drained soil and prefers a sunny location but will grow in partial shade.

Propagation: Root cuttings, softwood cuttings.

Distribution in the State: Planted in the central and eastern portions.

Rosa hugonis, Hugonis Rose. The Hugonis rose is a splendid shrub from northern China, which is rapidly gaining in popularity. It is hardy, about 6 feet in height with graceful arching branches. The single pale yellow flowers thickly cover the shrub in May or early June. It may be used in the shrub border or as a specimen.

Leaves: The leaves are compound, consisting of 5 to 13 leaflets, and are finely toothed and smooth.

Flowers: The single flowers are sulphur-yellow, produced solitary, and blooming in May.

Twigs: The shoots are covered with thorns mixed with finer bristles, straight, and compressed.

Soil and Culture: Not particular as to soils.

Propagation: Propagated by seed.

Distribution in the State: Planted in the eastern two-thirds.

Rosa rugosa, Rugosa Rose. The rugosa roses are valuable because of their hardiness, everblooming quality and resistance to the attacks of insect pests and diseases, dark green, glossy foliage, and for the brilliant scarlet fruits which cover the plant in the fall. They should be kept within bounds by annual pruning. The twigs are very thorny. The flowers may be pink, carmine, or white, and single or double. It is native of northern China, Korea, and Japan.

Leaves: Rough, dark green, and glossy, wrinkled and hairy below.

Flowers: By making a selection of the varieties of rugosas one may have blossoms throughout the growing period. The color variation will run from white, through pink, to carmine. Single or double flowers may be had, depending upon the varieties chosen.

Fruit: The fruits are brilliantly scarlet, covering the plant in the fall. They are round, somewhat flattened and smooth.

Twigs: The branches are very thorny.

Soil and Culture: Not very particular as to soils, but in hot, limey soils it is apt to become yellow and the growth to become irregular.

Propagation: Softwood cuttings, seed and horticulture varieties by grafts.

Distribution in the State: Planted throughout.

Rosa setigera, Prairie Rose. Rosa setigera is the climbing rose of the western prairies. It is a floriferous, hardy plant with clusters of pink flowers in June and July. The tall arching branches can be trained over fences or trellises but it is more beautiful when allowed to grow in its natural form. It is a satisfactory retaining cover for barren slopes and steep banks which have a tendency to become gullied by heavy rains. Its chief merits are its broad, clean, healthy foliage, its immunity from insect attacks and diseases and the conspicuous charm of its immense clusters of deep rose-colored flowers. If planted at intervals of 6 or 8 feet, with a pocket of good soil about each root, it will soon form a dense mat of surprisingly beautiful appearance. It is native from Ontario to Nebraska, Texas and Florida.

Leaves: Beautiful foliage effect with 3, rarely 5 leaflets. The leaflets are toothed and hairy below.

Flowers: Rose colored single flowers, produced in great profusion, are nearly scentless.

Fruit: Decorative fruit as seen along the roadside in fall or winter.

Soil and Culture: Not particular as to soil but thrives best in a heavy clay.

Propagation: Softwood cuttings or seed.

Distribution in the State: Native in the extreme east. Planted in eastern half.

Rubus odoratus, Flowering Raspberry. Although of minor importance, the flowering raspberry is sometimes useful for naturalistic plantings. It is a strong, vigorous shrub, 3 to 6 feet in height, with arching branches and quite straggly in its habit of growth. It suckers badly when in good soils and is at home on the margins of ponds, and on woody hillsides. The fragrant, rosy-purple flowers are produced from June to September. The red berries are not particularly palatable. It is native from Nova Scotia to Michigan, Tennessee and Georgia.

Salix caprea, Goat Willow or French Pussy-willow. This pussy-willow is a very desirable tree-like shrub for spring effect during the time of the unfolding of the catkins. It is native from Europe to northeastern Asia. It may reach a height of 25 feet and may be used in the back of the border.

Leaves: Variable, ovoid to oval, rounded, somewhat heart-shaped at the base, felty beneath and broader than most willow leaves.

Flowers: The catkins are showy, of a reddish color as they open.

Twigs: Branchlets brown or purplish and the twigs are brown, pubescent when young.

Soil and Culture: Moist, to any good soil.

Propagation: Hardwood cuttings.

Distribution in the State: Planted in eastern two-thirds.

Salix discolor, Pussy-willow. The common pussy-willow is native from Nova Scotia to Manitoba, south to Virginia and Missouri. It grows only to a height of 12 feet and may be used in the back of the border.

Leaves: Elliptic oblong to oblong-ob lanceolate, 2 to 4 inches, irregularly toothed or nearly entire.

Flowers: The catkins are smaller and have a yellow tendency and open before the leaves appear.

Twigs: Pubescent at first, yellow; buds blackish.

Soil and Culture: Moist, to any good soil.

Propagation: Hardwood cuttings.

Distribution in the State: Planted in eastern two-thirds.

Sambucus canadensis, American Elder. Elder is one of the most ornamental of our native shrubs. It is especially well adapted for informal group plantings. The fragrant, white flowers are quite decorative as is also the purple or black fruit. Although it is a rather coarse branching shrub, reaching a height of 6 to 10 feet, and about as broad, it adapts itself well to cultivation and is a very desirable shrub about the home grounds for background plantings to be seen at a distance. On more extensive developments it is used for large mass effects in moist sit-

uations, or grouped about the borders of ponds. It is native from Nova Scotia and Manitoba to Florida and Texas.

Leaves: The compound leaves consist of 5 to 11 leaflets, mostly smooth and three parted. They are finely divided and healthy looking, but the foliage effect is not as dense as would be desired.

Flowers: Large, flat clusters of white, produced in late June and early July.

Fruit: Dark purple or black fruit is desirable for cooking purposes though insipid. The lustrous berries are $\frac{1}{2}$ inch broad with 3 to 5 seeds.

Twigs: The yellow-gray stems are vigorous and rather coarse.

Soil and Culture: Prefers rich, moist soil and a sunny location but practically any situation will meet its requirements.

Propagation: Suckers, by seeds sown or stratified as soon as ripe, by cuttings of mature or growing wood, and root cuttings.

Distribution in the State: Native in the eastern two-thirds and used for plantings throughout the state.

Sapindus drummondii, Western Soapberry. This tree-like shrub is native in southern Missouri, Kansas, New Mexico and Louisiana. The fruit is very decorative and often used in winter bouquets. As the yellow fruit becomes dry the flesh becomes semi-translucent with the black seed showing inside the drupe. Due to its height, 25 feet, it may be used in the back of the border.

Leaves: Pinnately compound with 8 to 18 leaflets,

glaucous above, pubescent beneath. The rachis is marginless.

Flowers: Yellowish white, in loose panicles.

Fruit: Subglobose.

Twigs: With scaly red-brown bark, young branches pubescent.

Soil and Culture: Any good soil

Propagation: Seed, or hardwood cuttings.

Distribution in the State: Native in scattered counties from Riley to Meade to Wilson. Planted some in eastern half.

Shepherdia argentia, Silver Buffaloberry. Shepherdia argentia, a silvery leaved shrub, is especially adapted for accent planting in bold positions. It is very hardy and may grow 12 feet tall. As an excellent shrub for planting on the banks of streams, it is cultivated chiefly for its clusters of bright red berries. Its native habitat is from Minnesota and Manitoba to Saskatchewan, Kansas and Nevada.

Leaves: The leaves are opposite, ovate and a silvery gray green on both sides and dotted with rusty brown scales beneath.

Flowers: The flowers are small, inconspicuous, yellow blossoms, produced in compact clusters in April or May in great profusion.

Fruit: The fruits are globular scarlet berries, hanging in great bunches sometimes covering almost the entire bush. They have an agreeable acid taste and are edible for man or beast. They have a high decorative value.

Twigs: The branches are covered with gray bark and are slightly thorny.

Soil and Culture: A cool soil and partial shade are desirable.

Propagation: Seeds sown as soon as ripe or stratified and root cuttings.

Distribution in the State: Has been collected in Finney county and is probably native in other counties. May be planted throughout.

Sorbaria sorbifolia, Ural False-spirea. The Ural false-spirea is a never to be forgotten spectacle when in bloom. The pyramids of white flowers are held erect in showy terminal panicles. The foliage effect is beautiful with its many pinnately compound leaves. It is used in shrub borders but due to its suckering habit it is not so desirable in small yards. It attains a height of 3 feet, occasionally 6 feet. Its native habitat is in northern Asia from Ural to Japan.

Leaves: The leaves are numerous, large, dark green, pinnately divided, 13 to 23 parted. The leaflets are irregularly doubly and deeply toothed, with 20 pairs of veins. This shrub bursts into leaf early in the spring, before most other shrubs.

Flowers: The flowers are white, reared on rigid stems in showy terminal panicles. They have prominent stamens, 40 or 50. The flowers are produced in June and intermittently until August.

Twigs: The branches are not very woody, crooked, stout and smooth.

Soil and Culture: A rich, rather moist soil is pre-

ferred.

Propagation: Hardwood and softwood cuttings, root cuttings, suckers, seeds.

Distribution in the State: Planted in the eastern half.

Spiraea, Spirea. The spiraeas are numbered among the best known and most ornamental flowering shrubs in cultivation. They are of landscape value, principally, for their showy and abundant pink, white, or carmine flower clusters produced from April to September, according to the species. Many species will grow in any good soil, requiring but little care. They are used in mass effects, as specimens, for "facers" as background plantings, hedges, or screen plantings.

Spiraea arguta, Garland Spirea. Spiraea arguta is a hybrid, S. thunbergi x S. multiflora. It grows 4 to 5 feet tall and has the same characteristics as S. thunbergi; however, it is a more profuse bloomer and has wider leaves. The leaves often become yellow in the summer and it is sometimes subject to winter injury. It is used as a "facer" for taller shrubs and may be used as a specimen.

Leaves: The leaves are alternate, narrow lanceolate, very finely serrated. Several leaves are clustered at the base of the flower clusters.

Flowers: The small pearly white flowers are borne in

such abundance as to envelop the whole bush in very early spring, April or May.

Twigs: The numerous slender branches produce an open headed shrub.

Soil and Culture: Any good soil in full sun or partial shade.

Propagation: Hardwood cuttings.

Distribution in the State: Planted in the eastern half.

Spiraea billiardi, Billiard Spirea. This spirea is a cross between S. douglasii and S. salicifolia. The leaves are narrow, acute at both ends. The flowers are bright rose. It is a compact growing species with good foliage, profuse in flower and adapted to rather shaded places. Pruning heavily delays the bloom and keeps the plants more sightly in appearance. It grows to a height of 6 feet.

Leaves: The leaves are narrow, acute at both ends, doubly toothed except on the lower third, usually grayish beneath.

Flowers: The bright rose flowers are borne in narrow panicles, 4 to 8 inches long, with stamens nearly twice as long as the petals. They are produced in July and August.

Twigs: The brown branchlets are hairy.

Soil and Culture: Any good soil.

Propagation: Hardwood cuttings.

Distribution in the State: Planted in eastern half.

Anthony Waterer Spirea, (var. Spiraea bumalda). Anthony Waterer spirea is one of the favorite spireas. It is compact and shapely, usually not exceeding 18 inches in height. The clusters of pink flowers cover the shrub from midsummer until frost. Although it is well adapted as in edging of borders or paths, it is beautiful when planted in masses or as an accent in formal gardens.

Leaves: The foliage effect is good throughout the summer. The leaves are narrow, ovate, dark green, and toothed. Sometimes the leaves are irregularly variegated with streaks of white. Frequently the foliage turns to a deep red in the fall.

Flowers: The clusters of carmine or deep rosy pink are produced from midsummer to cold weather, enveloping the whole shrub.

Twigs: The twigs are smooth.

Soil and Culture: Any good soil.

Propagation: Hardwood or softwood cuttings.

Distribution in the State: Planted in eastern two-thirds.

Fröebel Spirea, (Spiraea fröebeli). Fröebel spirea resembles in many ways Anthony Waterer spirea. However, it blooms two weeks earlier and is taller with broader ovate-oblong leaves. The new growth covers the old seed heads of the first crop of flowers. It may be used in any way that Anthony Waterer might; as facer for taller shrubs, for group planting, as single specimens, and as an edging

shrub.

Leaves: Broader than those of Anthony Waterer, ovate oblong.

Flowers: Light rosy pink clusters produced in more profusion than Anthony Waterer, particularly in June and early July, blooming again in the fall, but is not a continuous blooming variety.

Twigs: The twigs are smooth.

Soil and Culture: Any good soil.

Propagation: Hardwood or softwood cuttings.

Distribution in the State: Planted in eastern two-thirds.

Spiraea douglasii, Douglas Spirea. The landscape value of Spiraea douglasii lies in its abundant terminal spikes of deep rose-colored flowers borne during July and August. It reaches a height of 5 feet or more and may be used in groups and masses where a shrub of moderate height is desired for summer flowering.

Leaves: The leaves are broadly ovate or oblong, and rounded at the ends.

Flowers: The deep rose-colored flowers are borne in terminal spikes of deep rose-color, during July and August.

Twigs: The branches are reddish-brown, woolly, and striped.

Soil and Culture: Any good soil.

Propagation: Hardwood or softwood cuttings.

Distribution in the State: Planted in eastern half.

Spiraea prunifolia, Bridalwreath. Bridalwreath is an old garden favorite, growing 4 to 6 feet in height. Its early period of bloom and glossy green foliage makes it an attractive shrub for borders or massing. It sometimes sprouts badly when the tops or roots are severely injured. The autumn coloration of bronze also lends interest.

Leaves: The leaves are oval, 1 to 2 inches long, smooth above, very finely toothed except at base.

Flowers: The small white, usually double, flowers are buttonlike, and are produced at the end of April or first of May in small clusters. Each flower has a short pedicel but the cluster itself is stemless.

Twigs: The branches are slightly arching even when in bloom, smooth and angled.

Soil and Culture: Grown in any good soil.

Propagation: Seed, hardwood and softwood cuttings, and division.

Distribution in the State: Planted in eastern two-thirds.

Spiraea thunbergi, Thunberg Spirea. Thunberg spirea is a bushy, slender branched, tiny-leaved, shrub of arching habit growing 3 feet in height. It is often used for facing down taller shrubs or for group planting where a low shrub is needed. Its small white flowers are so numerous that they often cover the whole shrub. Although it is hardy the tips of the branches are apt to winterkill in severe winters and the leaves become yellow in the summer.

Leaves: The finely divided leaves, which are numerous and small, take on a beautiful shade of gold, bronze, and green in the fall.

Flowers: This is one of the first spireas to bloom. The blossoms are produced in 3 to 5 flowered clusters, the cluster being stemless. They are produced in April and May before the leaves.

Twigs: The twigs are slender and wide spread.

Soil and Culture: Grown in any good soil.

Propagation: Seed, hardwood and greenwood cuttings.

Distribution in the State: Eastern and central portions.

Vanhoutte Spirea, (*Spiraea vanhouttei*). Vanhoutte spirea is a cross between *S. reevesiana* and *S. trilobata*. This species is perhaps the most widely planted shrub in Kansas. A fountain of white flowers covers it in early spring. Its value for landscape planting lies in its suitability to so many conditions and situations. Hedges, foundation or specimen plantings are a few of the uses to which it may be placed. It grows 3 to 6 feet tall.

Leaves: The leaves are dark green, rhombic-ovoid, deeply toothed, small and attractive.

Flowers: The flowers are white, produced in clusters on short, leafy shoots and are so numerous that they literally cover every branch from end to end in May.

Soil and Culture: It is very easy to grow, requiring little care except an occasional pruning or thinning. Any good soil in either partial shade or sun will be found suitable.

Propagation: Hardwood or greenwood cuttings.

Distribution in the State: Planted throughout.

Staphylea trifolia, American Bladdernut. This native shrub of Kansas is of value chiefly for the curious, inflated, pale green seed pods which are more or less suggestive of small balloons. It is well adapted for the back of the shrubbery border but not desirable for specimen planting as it will become bare at the bottom. The plants rather like shade and grow to a height of 10 to 15 feet.

Leaves: The foliage effect is good, the leaves being tri-foliate, bright green, slightly hairy beneath but often smooth at maturity.

Flowers: Although the flowers are not showy the general effect during the blooming period is pretty. The flowers are white with greenish white sepals, produced in nodding clusters in April or May.

Fruit: The 2 or 3 celled inflated pod, with one to few rather large bony seeds in each cell, hang on the shrub until late.

Twigs: Smooth, striped bark.

Soil and Culture: Almost any soil and location will do but it will reach the height of its beauty in partially shady situations in soils which are rich and somewhat moist.

Propagation: Seeds stratified as soon as ripe and sown the following spring; layers, suckers and cuttings.

Distribution in the State: Native in the eastern portion and planted in the eastern half.

Stephanandra flexuosa, Cutleafed. *Stephanandra* is a small shrub, beautiful in both foliage and flowers. It is especially suitable for specimen planting but may also be used in mixed shrubbery plantings. The flowers are small, white, and very numerous. The leaves are deeply and finely cut or toothed and take on a purplish red tint in its young growth and again in the autumn. It is subject to winterkilling and, since a peaty soil is preferred, does not do well in Kansas.

Symphoricarpos racemosus, Common Snowberry. Snowberry is another native shrub of Kansas. Throughout the spring and summer it attracts little attention; its foliage though healthy and bright has no special interest and the small pale pink flower clusters which appear in June and July are inconspicuous. It is not until the large snowy white berries which succeed the flowers in late August or September appear that this little shrub becomes effective. It is useful for clump planting in semi-shady situations, toward the front of shrubbery borders, as a facer to taller shrubs, or in poor soils where planting of other shrubs, more demanding in requirements, might not prove successful. It is appropriate for use in both formal or naturalistic surroundings, attaining a height of 2 to 3

feet.

Leaves: The leaves are opposite, oval, smooth, short stemmed, feather veined with entire edges, somewhat downy beneath.

Flowers: The flowers are pink, not very showy, but dainty, appearing in June and July.

Fruit: The large pure white, round berry not only persists on the branches until late fall but retains its plumpness until severe frosts of early winter cause it to shrivel and dry.

Twigs: Slender upright branches.

Soil and Culture: It will grow in sun or partial shade and in almost any soil from poor gravelly banks to heavy clay.

Propagation: Hardwood or greenwood cuttings, seed, suckers, division.

Distribution in the State: Planted throughout.

Symphoricarpos vulgaris, Coralberry (Buckbrush). Symphoricarpos vulgaris, a native of Kansas, is so common here that its landscape value is often overlooked. It is hardy, withstanding all kinds of adverse conditions, and is of high decorative value during the fruit period. It is useful for facing down taller shrubs, for group planting or for winter effects, and is often used on steep banks to hold the soil. The height is from 2 to 3 feet.

Leaves: The gray green leaves are elliptical oval, opposite, and hairy beneath.

Flowers: The pink flowers, not showy, are produced

in short, dense terminal spikes in July.

Fruit: The purplish-red fruits, $\frac{1}{2}$ inch in diameter, are clustered together in the axils of the leaves. They ripen in October and remain on the branches until after the leaves have fallen, giving a very decorative winter effect.

Twigs: The slender branches are hairy when young.

Soil and Culture: Grows in any good soil either in full sun or dense shade.

Propagation: Division, seed, hardwood or softwood cuttings.

Distribution in the State: Native throughout and planted throughout.

Syringa, Lilac. Of all the shrubs that enrich the landscape the lilac holds a place that no other can so successfully fill. It is not alone for the beauty of its fragrant flowers that it is of such high value but also for its association with gardens in the past. The lilac has been a well loved garden subject in this country since the days of the early settlers of New England. It is used in the back of the shrub border, as a specimen, for hedge, or screen plantings. Its most serious pests are San Jose scale and borers. A dormant spray of lime sulphur applied in March will help in controlling the scale.

Syringa chinensis, Chinese Lilac. The Chinese lilac is a hybrid of S. persica var. laciniata x S. vulgaris. It is

often confused with S. persica but has longer panicles of bloom. This species is a more profuse bloomer and more compact in growth. It is one of the most valuable of the lilacs and grows with a round open head from 7 to 10 feet high. The foliage is of finer texture and more graceful in habit of growth than the common lilac. The shrub is also more rapid in growth.

Leaves: Long, ovate lanceolate.

Flowers: The loose panicles of reddish purple, red or white are very fragrant.

Soil and Culture: Thrives in any moderately fertile, well drained soil, withstanding almost all conditions of environment except excessive heat and drought.

Propagation: Semi-mature greenwood cuttings or grafting.

Distribution in the State: Planted throughout.

Syringa persica, Persian Lilac. Syringa persica is often used as a hedge, in groups or as single specimens, growing 8 feet in height. The leaves show a tendency to be somewhat lobed. It is a desirable species to plant in the foreground of the larger growing types where a small growing, delicate textured lilac is most suitable. It was a very popular shrub of older gardens but in recent years the superior vigor, size and intensity of flower color of its hybrid, Syringa chinensis, has made the latter gener-

ally preferable.

Leaves: The opposite leaves are small, narrow, lanceolate, smooth and light green.

Flowers: The flowers are purple with a bluish cast, or white; very attractive, and fragrant. The compact rather short clusters are produced in April or May, appearing shortly after S. vulgaris.

Twigs: The branches are drooping and willowy with 1 terminal bud.

Soil and Culture: Grows in any good soil.

Propagation: Semi-mature greenwood cuttings, grafting, and budding.

Distribution in the State: Used in plantings throughout.

Syringa vulgaris, Common Lilac. The common lilac needs very little description. It is seen in practically every shrub border. The panicles, various colored, are large and showy. However, its hybrids are used more perhaps than the original form. It will withstand cold and excessive heat, full sunlight or partial shade, soil of almost any type providing it is fairly fertile and fairly well drained. It may be used in the back of the shrub border, as a specimen, in the development for distant effects, or in screen plantings.

Leaves: The leaves are heart shaped or blunt at the base, smooth and glossy green.

Flowers: The flowers of purples and white are produced in large showy panicles.

Twigs: The twigs are stout and smooth.

Soil and Culture: Will grow in any good soil.

Propagation: Semi-mature cuttings, budding or grafting on common stock or privet.

Distribution in the State: Used throughout.

Syringa oblata, Broadleaf Lilac. In general appearance Syringa oblata somewhat resembles S. vulgaris, having broadly cordate and sharply pointed leaves. The large purple flowers appear 10 to 12 days earlier than most of the species, before and with the expanding foliage. The foliage often assumes brilliant shades of color.

Syringa oblata var. dilatata is a variety of the above. Both are being grown in the nursery on the campus but have not been given a test long enough to prove their adaptability to Kansas planting.

Tamarix odessana, Odessa Tamarix. The Odessa tamarix grows to a height of 10 to 12 feet. The fine foliage and racemes of pink flowers made it a desirable shrub for the shrub border or hedge plantings. It is a native of the Caspian region. The habit of growth is slender and upright.

Leaves: The leaves are lanceolate, awl-shaped, decurrent (has lines which extend down the stem).

Flowers: Pink racemes of flowers are 1 inch long on naked pedicels. The petals are persistent, wilting. It blooms in July and August.

Soil and Culture: Thrives in any good soil but prefers a sandy one.

Propagation: Hardwood cuttings, suckers, seed.

Distribution in the State: Planted throughout.

Tamarix pentandra, Pivestamen Tamarix. This shrub with fine graceful foliage is very hardy, producing flowers in profusion. It grows to a height of 15 feet and may be used in the back of the shrubbery border or is sometimes used for a hedge or screen planting. It is native of south eastern Europe to central Asia.

Leaves: The foliage is pale and gray green, but not hairy. Leaves lanceolate to ovate.

Flowers: The disk at the base of the flower has ten lobes. The flowers are rosy pink in dense or slender racemes, forming large terminal panicles in July and August.

Soil and Culture: Thrives in practically any good soil, but does best in a sandy one.

Propagation: Hardwood cuttings, layers, seed.

Distribution in the State: Planted throughout.

Virurnum, Viburnum. The viburnums form an interesting group of woody plants and rank among the most important flowering shrubs in cultivation for fall effect as well as that for the summer landscape. Many of them have decora-

tive berries as well as creamy white flowers produced in large terminal clusters. They are useful for planting in the back of the shrub border, for specimens, for screens or in a planting for winter effects. The viburnums are so varied that a type may be found which will fit nearly every need.

Viburnum dentatum, Arrowwood. Arrowwood assumes an autumn coloration of deep blackish purple or dark red. It is excellent for naturalistic treatment, either as a specimen or in mass planting, and although it prefers a sunny situation it will grow fairly well in the shade. Its shiny blue black berries are ornamental but are soon eaten by the birds. It is of upright habit, reaching a height of 8 to 10 feet. As the branches bend to the ground it does not need smaller shrubs to face it down.

Leaves: The leaves are round or oval, coarsely toothed, lustrous above, hairy only in the axils of the veins beneath. They change to purple or red in the autumn.

Flowers: The white flowers are produced in umbel-like cymes in May or June.

Fruit: The dark bluish black berries are small, ripening in August and September and are readily eaten by the birds.

Twigs: The branchlets are gray. The wood is heavy, tough and hard, capable of a high polish.

Soil and Culture: Although it prefers moist soil it

will grow in any good garden soil in sun or partial shade.

Propagation: Hardwood cuttings and seed.

Distribution in the State: Planted in eastern half.

Viburnum opulus, European Cranberrybush. This vigorously growing shrub is showy while in flower and fruit, and beautiful in leaf as well. The leaves are 3 to 5 lobed. In the large flat clusters, the central flowers are small and inconspicuous, the outer ones being larger. It is from these smaller flowers that the beautiful scarlet berries are produced. It is suitable for planting in the back of the border; or perhaps it is more suitable for naturalistic plantings than for the development of a more refined, subdued and cultivated effects of the small home grounds. It grows to 10 feet in height.

Leaves: The leaves are coarsely 3 lobed, wavy margined, smooth above and softly pubescent below. It has disk-like glands at the sides of the grooved petiole.

Flowers: The broad cyme of soft delicate flowers are surrounded by an irregular circle of snow white stars; in May or June.

Fruit: The scarlet fruits remain attractive well into the winter making the shrub very suitable in landscape scenes for late season effects.

Soil and Culture: It thrives upon upland soil, withstanding drought better than most of the other species.

Propagation: Cuttings of ripe wood in the fall, or seed.

Distribution in the State: Planted state wide.

Common Snowball, (Viburnum opulus sterile), has all the characteristics of V. opulus except that the flowers are sterile and so no fruit is produced. It is a very effective shrub and may be used for the same purposes as the European cranberrybush.

Viburnum prunifolium, Blackhaw. Viburnum prunifolium is a tree-like shrub. The foliage effect during the summer is not dense but is attractive. It is the first of the native viburnums to open. The blossoms are pure white, in flattened clusters, slightly convex; in late May or early June. As it sometimes reaches a height of 20 feet it is best used as a background plant, for specimen planting, or winter effects. It is native from Connecticut to Florida, west to Michigan and Texas.

Leaves: The leaves are rounded at the tip, the petioles lacking the wavy wings. They are thick, lustrous, and dark green, turning to a shade of scarlet and purple as the season wanes.

Flowers: The pure white flowers are borne in flattened clusters, in late May or early June.

Fruit: The fruit changes from shades of pink as it ripens to dark blue at maturity, when it is covered with a glaucous bloom. It is borne in pendulous clusters. It is edible, oval and flattened and remains on the branches until early winter.

Twigs: The branchlets are smooth, the terminal winter

buds being short-pointed. The branching is twiggy and horizontal.

Soil and Culture: Will grow in any good soil.

Propagation: Hardwood cuttings, seed.

Distribution in the State: Native in the southeastern part and planted in the eastern half.

Vitex agnus-castus, Lilac Chaste-tree. Vitex, a native to China and India, is a neat appearing shrub which winter-kills each winter but grows up again, the shoots starting very vigorously from the base. The spikes of pale lilac-blue flowers are fragrant and are produced in August and September when flowers are not common. It may be used in the shrub border.

Leaves: The palmately compound leaves are composed of 5 to 7 leaflets, each leaflet being long, narrow-pointed. They are dark green above and hairy below. The leaves are opposite and aromatic.

Flowers: The pale lilac-blue flowers are produced on a panicle spike 6 inches long. The blossoms are verbenalike, the stamens extending beyond the calyx. The blooming period is from August until frost. There is a variety with white flowers.

Twigs: The branches are 4 angled.

Soil and Culture: A deep, moist, but well drained soil suits vitex, especially when a trifle acid.

Propagation: Seeds in spring, greenwood cuttings, layers or suckers.

Distribution in the State: Planted in eastern half.

Vitex negundo incisa, Cutleaf Chaste-tree has less con-

spicuous flowers and the leaves are coarsely serrate, light green and smooth.

Weigela rosea, Pink Weigela. Weigela is a spreading shrub, bearing sprays of beautiful rose colored tubular flowers. Its ornamental value is primarily during late May and June when the branches are heavily laden with these pink, white, or red flowers. It does well in partial shade, hence is a shrub often planted at the north side of a building, but does fairly well in full sun. It grows 5 to 6 feet in height and may become scraggly if not pruned back somewhat after flowering. The foliage effect is somewhat coarse.

Leaves: The leaves are ovate lanceolate with finely toothed edges, holding their color well throughout the summer.

Flowers: The tubular flowers are rose colored, with a lighter shade inside the funnel and borne in a panicle.

Twigs: There are two rows of brown hairs on the branches.

Soil and Culture: A light warm soil is preferred, but it will grow in any good soil; must be cut back severely and at the proper time if a more regular and compact head is desired.

Propagation: Easily propagated by hardwood cuttings in the fall or growing wood during the summer and rooted in a shaded frame.

Distribution in the State: Planted in central and eastern parts of the state.

Weigela rosea var. Eva Rathke is a variety bearing

red flowers. It has more of a dwarf habit than has Weigela rosea.

Yucca filamentosa, Common Yucca. This stiff leaved woody plant is often used as a specimen or planted among shrubbery, particularly in Spanish gardens. It grows to a height of 10 to 30 inches. It is native from South Carolina to Mississippi and Florida.

Leaves: Stiff, broad, sword-shaped, evergreen, arising from the ground in rosette formation. It has curled threads at the margin.

Flowers: Borne on a long stalk, often rising to a height of 6 feet. They are white and pendulous.

Soil and Culture: Remarkably drought resistant and will thrive where trees rob the soil so that more dainty plants cannot exist.

Propagation: Seed, suckers.

Distribution in the State: Planted throughout.

Yucca glauca, Soapweed Yucca. This yucca is often used as specimen planting, particularly in a garden following Spanish style. It grows to a height of 1 to 3 feet. It is native from South Dakota to New Mexico.

Leaves: One to 3 feet long, 2 to 4 inches wide, gray green with a white margin.

Flowers: Greenish white, 2 inches across and 3 inches long, panicle, the stalk being 3 to 6 feet high. It blooms in June.

Soil and Culture: Will grow in any good soil.

Propagation: Seed or suckers.

Distribution in the State: It is native in the western two-thirds, but is planted throughout.

PART II

SUMMER BOTANICAL KEY OF SHRUBS

ON THE CAMPUS OF KANSAS STATE COLLEGE IN

1933 - 1934

Key to the Genera of Shrubs on the Campus of Kansas State College, Manhattan, Kansas, 1933-1934.

1. Leaves compound
2. Leaves palmate
 3. Leaves alternate, glossy, leaflets 5 to 7, nearly equal in length. Shrub with 1 to 3 straight prickles above each leaf. Acanthopanax, 3
 3. Leaves opposite
 4. Leaflets 7 to 9, lanceolate ($2\frac{1}{2}$ to $4\frac{1}{2}$ inches), deeply toothed, pubescent beneath when young, nearly glabrous at maturity. Aesculus, 4
 4. Leaflets 5 to 7, unequal in length, velvety, elliptic ovate, toothed. Vitex, 106
2. Leaves pinnate.
 3. Leaves opposite.
 4. Leaves leathery, spiny toothed, resembling holly. Mahonia, 61
 4. Leaves thin, sharply toothed, bright green, 7 leaflets, Sambucus, 85
 3. Leaves alternate.
 4. Leaves even pinnate, leaflets rounded at apex. Shrub tall and slender. Caragana, 18
 4. Leaves odd pinnate.
 5. Margins of leaflets entire.
 6. Leaflets 3.
 7. Leaflets rounded at tip, abruptly bristle pointed; elliptical; grayish green, silky

- when young. Shrub tree-like. Laburnum, 55
7. Leaflets pointed.
8. Leaflets hairy beneath, elliptic to elliptic-oblong. Lespedeza, 54
9. Leaflets oblong to ovate; when held to light show pin-hole effect. Ptelea, 71
6. Leaflets usually more than 3.
7. Branches armed with prickles or spines.
8. Low shrub, branches armed with soft prickles; leaflets 7 to 13. Robinia, 80
8. Shrub tree-like; leaves often 20 to 40 inches long; bipinnately compound, divisions 2 to 3 inches. Midvein with prickles. Aralia, 8
7. Branches unarmed.
8. Leaflets 3 to 9.
9. Leaflets 3 to 7, sessile, elliptic to linear-oblong, acute; margin of leaf frequently rolled. Potentilla, 68
9. Leaflets 7 to 9, short-stalked; lanceolate ($3/4$ to $1\frac{1}{2}$ inches) glabrous above, pubescent beneath, rachis broadly winged. Tree-like shrub. Sapindus, 86
8. Leaflets 9 to 49.
9. Leaflets 9 to 17, elliptic to ovate ($3/4$ to $1\frac{1}{2}$ inches) rounded at tip, grayish beneath. Height 4 feet. Colutea, 23
9. Leaflets 11 to 49, grayish green marked with minute dots or glands. Amorpha 117
5. Margins of leaflets toothed.
6. Leaflets 3.
7. Shrub with prickles. Rosa, 122
7. Shrub without prickles.
8. Leaflets deeply toothed, twigs and leaves aromatic. Rhus, 122
8. Leaflets finely serrate, slightly hairy beneath, twigs greenish and striped; bark gray, not aromatic. Staphylea, 95
6. Leaflets 5 or more.
7. Shrub with prickles. Rosa, 122
7. Shrub without prickles.
8. Sap milky. Rhus, 122
8. Sap clear, leaflets irregularly doubly and deeply toothed with 20 pairs of veins, hairy when young. Sorbaria, 88

1. Leaves simple.
2. Leaves on mature twigs not lobed.
3. Leaves in rosettes, arising from ground in stiff, long pointed bayonet-like leaves. Yucca, 125
3. Without these characters.
4. Leaves opposite or in whorls.
5. Margin of leaves entire.
6. Leaves silvery-scurfy dotted with rusty brown scales. Shepherdia, 87
6. Leaves not silvery-scurfy.
7. Stipules present, leaves usually in threes, ovate to elliptic-lanceolate, acuminate, lustrous bright green above, lighter and somewhat pubescent beneath. Cephalanthus, 21
7. Stipules absent, leaves in pairs.
8. Line connecting leaf petioles to form a ring.
9. Stems hollow.
10. Shrub procumbent; 12 inches in height; leaves scaly or pubescent beneath; very small. Helianthemum, 45
10. Shrub upright.
11. Shrubs low ($1\frac{1}{2}$ to 2 feet); more or less transparent dotted, ovate lanceolate, twigs often reddish. Hypericum, 121
11. Shrub taller than 2 feet. Shrub (2 to 5 feet), leaves short petioled, often with clusters of red berries in axils of leaves; leaves oval to ovate, rounded at base, grayish green and pubescent beneath. Symphoricarpos, 124
9. Stems solid
10. Shrub tree-like. Leaves ovate-elliptic, acute, pubescent, lustrous above with 3 to 5 pairs of veins. Cornus, 118
10. Shrubs not tree-like.
11. Leaves broadly ovate or obovate; acute, ($1\frac{1}{2}$ to 2 inches), very short petiole; shrubs (5 to 6 feet). Lonicera, 121

- 11. Leaves long petioled, obtuse at base, ovate or oblong lanceolate (2 to 5 inches). Twigs red or gray. Cornus, 118
- 8. No line connecting leaf petioles.
- 9. Leaf scars on older growth very small and flat.
- 10. Petioles short; leaves linear lanceolate (1 to 2½ inches), shrubs large. Ligustrum, 121
- 10. Petioles very short; leaves less than ½ inch long. Shrubs 6 inches to 1 foot. Buxus, 16
- 9. Leaf scars on older growth round.
- 10. Leaves without hairs or down, often cordate. Syringa, 124
- 10. Leaves hairy, softly pubescent or pimply beneath.
- 11. Branches thorny; leaves oblong ovate, rounded at apex, lustrous dark green above, rusty or pale woody tomentum beneath. Bumelia, 15
- 11. Branches not thorny.
- 12. Bark of branches and twigs four-sided; leaves ovate to narrow elliptic, acute, grayish green. Odor of leaves camphor-like. Calycanthus, 17
- 12. Bark of current wood brownish gray with numerous lenticels; leaves generally oblong. Chionanthus, 22
- 5. Margin of leaves toothed.
- 6. Margins of leaves shallowly toothed or nearly entire, dull green above and sparingly hairy on veins beneath, petiole hairy, broad ovate, acuminate rounded at base. Kolkwitzia, 53
- 6. Leaves distinctly serrate.
- 7. Leaves opposite or in whorls of three, large, elliptic or ovate. Hydrangea, 120
- 7. Leaves strictly opposite.
- 8. Buds hidden within the base of the petiole. Philadelphus, 122
- 8. Buds not hidden.

- 9. Leaves coarsely toothed.
 - 10. Leaves grayish, silky, hairy beneath, lanceolate. Caryopteris, 118
 - 10. Leaves not grayish, silky, hairy beneath.
 - 11. Leaves broadly ovate. Viburnum, 124
 - 11. Leaves ovate lanceolate, sharp pointed, coarsely and doubly toothed. Rhodotypos, 73
- 9. Leaves finely serrate.
 - 10. Twigs of current and previous year with corky wings, four lined or minutely warty. Shrubs procumbent or upright. Eunymus, 120
 - 10. Twigs without these characters.
 - 11. Line connecting leaf petioles to form a ring.
 - 12. Stems hollow; leaves rough, elliptic lanceolate to oblong lanceolate. Deutzia, 119
 - 12. Stems solid.
 - 13. Leaves hairy on veins beneath, petioles hairy, elliptic to ovate (2 to 4 inches) short petiole. Weigela, 107
 - 13. Leaves softly pubescent beneath, ovate lanceolate to lanceolate. Buddleia, 14
 - 11. No line connecting leaf petioles.
 - 12. Leaves finely serrate, except at base and apex; shrubs 4 to 5 feet tall. Callicarpa, 16
 - 12. Leaves irregularly or coarsely serrate.
 - 13. Leaves irregularly toothed, sometimes partially three-lobed, lenticels prominent. Shrubs 4 to 5 feet tall. Forsythia, 120
 - 13. Shrubs 5 feet or more in height. Petioles wide and glandular. Viburnum, 124
- 4. Leaves alternate or fascicled.
 - 5. Shrubs armed with spines with fascicled leaves. Berberis, 118
 - 5. Shrubs with alternate leaves.

- 6. Leaves very small, scale-like. Tamarix, 101
- 6. Leaves not scale-like.
- 7. Leaves spiny toothed; leathery; occasionally pinnate or three-foliate. Berberis, 118
- 7. Leaves not spiny toothed.
- 8. Margins of leaves entire.
 - 9. Leaves silvery, branches spiny; tree shrub-like. Elaeagnus, 35
 - 9. Leaves not silvery, branches not spiny.
 - 10. Low growing or procumbent shrubs.
 - 11. Leaves usually white hairy beneath, small, thick. Cotoneaster, 119
 - 11. Leaves not white hairy beneath.
 - 12. Leaves very small, leathery, in spirals, rosette appearance. Daphne, 32
 - 12. Leaves narrow linear lanceolate, leathery. Iberis, 50
 - 10. Tall shrubs.
 - 11. Leaves crowded at tip of twigs.
 - 12. Leaves oval, rounded or slightly emarginate at apex, glabrous. Rhus, 122
 - 12. Leaves ovate, acuminate, nearly glabrous above, glaucous beneath or appressed pubescent. Cornus, 118
 - 11. Leaves not crowded at tip of twigs.
 - 12. Leaves small, thick, usually white hairy beneath. Cotoneaster, 119
 - 12. Leaves large.
 - 13. Leaves obovate, leathery. Magnolia, 60
 - 13. Leaves (3 to 5 inches) oval, spicy when crushed, stem solid. Benzoin, 10
- 8. Margins of leaves toothed or serrate.
- 9. Leaves with 3 distinct palmate veins, ovate to ovate oblong ($1\frac{1}{2}$ to $2\frac{1}{2}$ inches) acute, pubescent or nearly glabrous beneath. Ceanothus, 20
- 10. Leaves unequal at base. Hamamelis, 43

10. Leaf bases equal.
11. Shrubs with spines or thorns.
Leaves without hair or down glossy above; round, toothed stipules. Cydonia, 31
11. Shrubs without spines or thorns.
 12. Leaves blunt or round at tip.
 13. Leaves finely serrate at apex, entire at base, bristle pointed, ovate lanceolate. Exochorda, 40
 13. Leaves coarsely toothed.
 14. Leaves not bristle pointed. Spirea, 123
 14. Leaves 2 to 3 inches on oblong order with sides nearly parallel for a distance or of nearly equal width, gradually tapering above, but not acuminate; apex blunt or crenate serrate.
Prunus, 69
 12. Leaves acute to long pointed at tip.
 13. Leaves long pointed or acuminate.
 14. Leaves broadly ovate, pubescent beneath, particularly on nerves.
Corylus, 29
 14. Leaves linear to ovate lanceolate.
 15. Leaves linear to lanceolate.
 16. Leaves long (3 to 6 inches) finely toothed. Halesia, 43
 16. Leaves (1 to 3 inches) coarsely and doubly toothed.
Kerria, 51
 15. Leaves ovate lanceolate; deeply incised, small, leaves less than 1 inch long, twig very fine. Stephan-

andra, 96

13. Leaves acute but not long pointed.

14. Leaves glaucous or nearly so; obovate (2 to 4 inches) acute, short petioled, sharply serrate at least above middle.
Clethra, 23

14. Leaves usually pubescent or tomentose beneath.

15. Leaves pubescent when young; may become glabrous at maturity.

16. Leaves coarsely or incisely serrate.

17. Leaves ovate-oblong (2 to 3½ inches) sometimes glabrescent at maturity except the veins; petioles stout, tomentose.

Malus, 62

17. Leaves obovate, rarely ovate, subcordate, teeth broad, densely white-tomentose when young, somewhat hairy beneath on petioles at maturity.

Amelanchier, 4

16. Leaves coarsely wavy toothed, broad-elliptic to oblong, rarely rounded at base. Salix, 123

15. Leaves glabrous or slightly pubescent beneath throughout development, ovate or elliptical (1½ to 3 inches) regularly crenate serrate.

Rhamnus, 72

2. Leaves lobed.
3. Leaves opposite.
 4. Shrubs large. Petioles usually with stipules and glands. Viburnum, 124
 4. Shrubs small. Leaves crenately lobed. Symphoricarpos, 124
3. Leaves alternate.
 4. Bark many layered, splitting into shreds.
 5. Tall shrubs, stems not hairy. Physocarpus, 67
 5. Shrubs (3 to 6 feet); stems, leaves, petioles hairy. Rubus, 84
 4. Bark firm.
 5. Leaves round to obovate, three-lobed, coarsely crenate dentate, often with only 2 or 3 teeth, glabrous beneath, petioles about as long as blade. Ribes, 79
 5. Leaves rhombic ovate.
 6. Leaves small (1 to 2 inches) acute, rounded at base, dark green above, pale bluish green beneath. Spiraea, 123
 6. Leaves large (3 to 6 inches) deeply three-lobed, coarsely toothed with rounded or acutish teeth, three-nerved, glabrous except a few hairs on veins beneath. Hibiscus, 45

Key to Species of Shrubs on the Campus of Kansas State College, Manhattan, Kansas, 1933-1934.

Amorpha

1. Tall shrub (4 to 6 feet); leaflets 1 to 2 inches long, oblong, rounded at tip, green. Flowers very numerous, purple; stamens exserted with bright orange anthers. Pod with numerous dark glands, thick stalked. A. fruticosa.
1. Low shrub (2 to 4 feet); leaves densely white pubescent, leaflets 21 to 49; oblong-elliptic, rounded at base; flowers deep purple, stamens orange-yellow; pods one-seeded, slightly exceeding calyx in length. A. canescens.

Berberis

1. Leaves thin, deciduous.
2. Notched, in clusters above thorns; leaf notches hair tipped.
3. Branches gray and grooved; flowers yellow in elongated racemes, May and June. Many varieties.
B. vulgaris.
3. Branches purplish and grooved; leaves purple. B. v. atropurpurea.
2. Leaves usually without notches.
3. Branches brown, grooved, flowers pale yellow, nearly solitary (1 to 3); fruit bright red; leaves small ($\frac{1}{2}$ to $1\frac{1}{2}$ inches long), spatulate, dense shrub (2 to 4 feet). B. thunbergi.
3. Branches brown, grooved, leaves very small, spatulate, low shrub (1 to $1\frac{1}{2}$ feet). B. t. minor.
1. Leaves evergreen, in alternate clusters; coarsely toothed, each tooth with a bristle; leaves resemble holly.
B. ilicifolia.

Caragana

1. Leaflets 8 to 12, $\frac{1}{8}$ to 1 inch long; flowers $\frac{3}{4}$ inches long, 2 to 4 in a cluster, May and June. (10 to 20 feet high). C. arborescens.
1. Leaflets 12 to 18, $\frac{1}{8}$ to $\frac{1}{4}$ inch long; flowers yellow $\frac{3}{4}$ inch long, 1 to 2 in a cluster; shrub 4 to 6 feet.
C. microphylla.

Caryopteris

1. Leaves ovate to oblong-ovate, $1\frac{1}{2}$ to 5 inches long, acute or obtuse, coarsely serrate, dull green and pubescent above; shrub $2\frac{1}{2}$ feet high. C. incana.
1. Leaves ovate, $\frac{3}{4}$ to $2\frac{1}{2}$ inches long with few coarse rounded teeth, gray tomentose beneath; shrub $1\frac{1}{2}$ feet high. C. tangutica.

Cornus

1. Flowers white or greenish white in open clusters or without bracts.
2. Leaves alternate, pale and whitish beneath, 3 to 5 inches long; branches peculiarly arranged in horizontal tiers. Berries dark blue on red stems; shrub to 25 feet. Flower clusters 1 to $2\frac{1}{2}$ inches broad.
C. alternifolia.

2. Leaves opposite. Flowers in broad, umbel-like, compound clusters. Fruit white or nearly so. Leaves nearly smooth but whitish with straight close pressed hairs.
3. Branches blood red; main stem prostrate and rooting; shrub to 8 feet, broad and bush-like; fruit white, stone wider than high. C. stolonifera.
3. Branches gray, fruit white on red stems in more elongated clusters, ripe in August and remaining till January. Shrub 6 to 15 feet, beautiful in bloom and fruit. C. paniculata.
1. Flowers yellow; fruit red, plum-like. Leaf smooth, oval; blooms very early in spring. C. mas.

Cotoneaster

1. Plant prostrate or of low prostrate growth; branchlets arranged in fishbone fashion. Leaves $\frac{1}{2}$ inch, rounded or broad elliptical, sharp pointed, glossy dark green above and hairy beneath; flowers pinkish white, fruit bright red, abundant, $\frac{1}{4}$ inch in diameter. C. horizontalis.
1. Plant erect or upright.
2. Fruits red.
3. Plants frequently 6 feet, leaves 1 inch long, elliptical, generally pointed, glossy green above, lighter and sometimes a little hairy on midrib below. Flowers pink in three-flowered clusters, June. Fruit less than $\frac{1}{2}$ inch, oblong, August to September. C. divaricata.
3. Leaves entire, smooth, narrow, lanceolate, lustrous above, felted with white hairs beneath, in groups of 4 at alternate nodes on older growth. Flowers white in dense corymbs, June. C. salicifolia floccosa.
2. Fruits black; shrub slightly spreading. Leaves dark, shiny, 2 inches long, rather smooth, pointed (acute but rarely acuminate) lighter green beneath, sparingly hairy, but generally not so at maturity. Flowers in 2 to 5 flowered clusters. C. acutifolia.

Deutzia

1. Flowers in elongated clusters with petals edge to edge, not lapping.
2. Low plant, 3 feet, with small bright green, rather smooth leaves and flowers in nearly simple clusters racemes. D. gracilis.

2. Tall plant, 6 feet, with dull green, rough leaves (1 to 3 inches long); flowers in compound clusters, panicles. D. scabra.
1. Flowers in broad clusters, corymbs; spreading shrub to 3 feet; flowers white with petals partially lapping in bud. D. lemoinei.

Euonymus

1. Leaves evergreen, thick and glossy, 1 to 3 inches long.
2. Trailing, procumbent or climbing. E. radicans.
2. Erect to 10 feet. E. japonicus.
1. Leaves thinner and deciduous.
2. Stem broadly ridged with wing-like corky growths. E. alatus.
2. Stem usually somewhat four-angled but not winged; fruit more or less deeply 3 to 5 lobed.
3. Flowers yellowish or whitish.
4. Shrub to 15 feet; clusters 3 to 7 flowered, capsule deeply four-lobed. Leaves 1 to 2 inches long. E. europaeus.
4. Flowers yellowish or whitish; tall shrubs or tree to 25 feet; leaves 2 to 5 inches long and under 1 inch broad. E. hamiltoniana.
3. Flowers purple with purple anthers. E. atropurpureus.

Forsythia

1. Shrubs upright.
2. Branchlets olive green; pith partitioned. Flowers dark yellow with greenish tinge. F. viridissima.
2. Branches with partitioned pith but solid at the nodes; branches somewhat arching. F. intermedia.
1. Shrubs with pendulous branches. Branches hollow. F. suspensa.

Hydrangea

1. Flowers abundant in large pyramidal clusters; leaves not lobed, large, 2 to 5 inches, serrate; flower clusters 6 to 12 inches, flowers whitish, large sterile ones changing to purplish (August, September). Capsule with calyx about the middle.
2. About one-half of flowers sterile, July to September. Shrub or tree to 20 feet. H. paniculata.
2. Nearly all flowers sterile in extra long clusters. H. p. grandiflora.
1. Flowers in broad flat or globular clusters; styles of

- pistil usually two. Capsule with calyx at tip.
 2. No large deciduous bracts; erect shrubs, 4 to 10 feet; leaves 3 to 6 inches long on stalks. H. arborescens.

Hypericum

1. Flowers $1\frac{1}{2}$ to 2 inches in diameter, solitary or in cymes, July to September. Shrub to 3 feet high. H. patulum.
1. Shrub about 2 feet high. Branches reddish, arching. Flowers 2 to 3 inches in diameter in cymes of 1 to 5, July and August. H. moserianum.

Ligustrum

1. Slender-flowered privets, tube 2 to 3 times as long as four-lobed border; branches hairy or velvety; leaves broad, oval to ovate, 1 to $2\frac{1}{2}$ inches long, deciduous.
2. Flowers in erect, 1 to $2\frac{1}{2}$ inches long clusters with flowers on short stems. June and July. L. amurense.
2. Flowers in nodding 1 to $1\frac{1}{2}$ inches long clusters with flowers stalked. June and July.
3. Not horizontal in growth habit. L. ibota.
3. Branches horizontal; dwarfer, denser, and more hairy than L. ibota; leaves wavy margined. L. i. var. regelianum.
1. Short flowered privets, tube usually shorter than spreading border. Branches more or less hairy. Leaves half overgreen or deciduous. Shrub to 15 feet with many named varieties. June to July. L. vulgare.

Lonicera

1. Flowers two-lipped, small, growing together at the base and forming a more or less double berry; flowers white or yellowish. L. fragrantissima.
1. Flowers with ovaries separate and thus forming two berries on one stem; shrub 5 to 12 feet; bloom May and June.
2. Flowers white, changing to yellow when old; branches pubescent.
3. Flowers hairy outside; leaves usually wider near center or base; dark green above, grayish hairy beneath, (1 to 2 inches). Upper lip of corolla divided to base with spreading lobes. L. morrowi.
3. Upper lip of corolla divided to about the middle into oblong lobes. Leaves elliptic-ovate or elliptic, abruptly acuminate, pubescent (2 to 3 inches); shrub to 12 feet, spreading. L. maackii podocarpa.
2. Flowers pink, red or white and not changing to yellow

when old. Fruit red, yellow or orange; young branches often heart-shaped at base, smooth beneath; very variable and common; to 10 feet. L. tatarica.

Philadelphus

1. Flowers in clusters.

2. Flowers creamy white, very sweet-scented, in large 5 to 9 flowered dense clusters; leaves dentriculate, usually pointed at both ends, slightly hairy below, (2 to 4 inches long). P. coronarius.
2. Flowers large on leafy branchlets with few, 1 to 3, rarely 5 together, slight but delicate fragrance, calyx lobes twice as long as tube. Large shrub with recurved branches. P. grandiflorus.
1. Flowers nearly solitary, 1 inch broad, very fragrant; leaves entire (1/2 to 1 inch). P. microphyllus.

Rhus

1. Leaves compound.

2. Leaflets, 3; berries bright red, blades crenate, sometimes lobed, aromatic. R. canadensis.
2. Leaflets 7 to 31.
 3. Stem of leaves winged between leaflets; fruit red, berries hairy. R. copallina.
 3. Stem of leaves without wings between leaflets.
 4. Leaflets not hairy beneath.
 5. Leaflets 9 to 31. Shrubs 3 to 7 feet tall. R. cismontana.
 5. Leaflets 11 to 15, sharply serrate; not poisonous, berries red; shrub to 15 feet. R. glabra.
 4. Leaflets hairy beneath; berries red; stem velvety hairy; tall, 10 to 30 feet.
 5. Leaflets 11 to 31, regularly notched. R. typhina.
 5. Leaflets deeply and irregularly cut. R. t. laciniata.
1. Leaves simple, rounded at tip, entire; inflorescence fine, smoke-like. Shrub tree-like, 10 to 15 feet. R. cotinus.

Rosa

1. Leaves 3 or 5 on flowering branchlets, pubescent beneath. Stems armed with stout, recurved spines or prickles and without soft hairs. Straggly bushes with slight tendency to climbing habits. Flowers deep red, fading to whitish. Fruit globular and bristly, about 1/3 inch long. R. setigera.

1. Leaves of flowering branchlets not very large of firm, mostly with 5 to 11 leaflets. Fruit smooth.
2. Flowers clustered, prickles of two kinds, straightish and slender at least toward base of plant and others more or less bristle-like. Leaves rough, thick, shining, oval blades; flowers about 3 inches broad, either white, pink or red; fruit 1 inch brick red with long, more or less spreading sepals. R. rugosa.
2. Flowers usually solitary, flowering branchlets usually not bristly; flowers yellow. Stipular wing scarcely evident on petiole. R. hugonis.

Salix

1. Leaves variable, egg-shaped to oval, rounded, somewhat heart-shaped at base, felty beneath; catkins large, having a red color. S. capre.
1. Leaves elliptic-oblong to oblong-oblancoate, (2 to 4 inches), irregularly toothed or nearly entire. Catkins smaller, having a yellow color. S. discolor.

Spiraea

1. Flowers borne along stem.
2. White flowers in sessile umbels along stems in April and May before leaves expand, earliest blooming.
3. Flowers double; a slender shrub (to 6 feet) with flowers usually fully double and about 1/3 inch in diameter; leaves dark green, oblong, denticulate, and hairy beneath, 1 to 2 inches long. S. prunifolia.
3. Flowers single.
4. A spreading shrub with arching branches; flowers in 3 to 5 flowered clusters, with 5 petals much longer than the short stamens; leaves oval, 1 to 1 1/2 inches, slender, willow-like. S. thunbergi.
4. Similar to last but taller and more free-flowing with broader and less willow-like leaves, better for spring blooming but not so fine in its summer condition. S. arguta.
2. White flowers in umbel-like clusters on short, leafy, side shoots. Blooming at time of leaf expansion, May and June. Margin of leaves decidedly notched and surface smooth on both sides. Stamens not longer than petals. Leaves 3/4 to 1 3/4 inches long, somewhat lobed; petals twice length of stamens; to 6 feet with arching branches; very common. S. van Houttei.

1. Flowers in clusters at tip of branches.
2. White, pink or red flowers in broad and flat compound clusters, blooming in June and later, some as late as August. Stamens longer than petals, free-flowering with many clusters; small, rarely 2 feet high, July to September. S. bumalda.
3. Bright with crimson flowers. S. s. var. Anthony waterer.
3. With rose flowers. S. b. var. froebeli.
3. With white flowers. S. b. albifolia.
2. Flowers elongated and very compound clusters of small white or pink flowers. Leaves usually with whitish or brownish hairs beneath, flowers bright pink, July to September. Shrub 6 to 8 feet with brown hairy branches.
3. Leaves narrow and acute at both ends. S. billardii.
3. Leaves obtuse, tomentose beneath. S. douglasii.

Symphoricarpos

1. Fruit, white; stamens and style short and are included in the bell-shaped corolla. Shrub 2 to 6 feet high with globular white, abundant persistent fruit, nearly $\frac{1}{2}$ inch in size, solitary; leaves 1 to 2 inches long, lobed. S. racemosus.
1. Fruit rich dark red, in clusters rather compact bush, leaves nearly evergreen, round. S. vulgaris.

Syringa

1. Leaves subcordate or truncate at base.
2. Leaves truncate at base, long, acuminate. S. oblata dilatata.
2. Leaves usually subcordate.
3. Leaves ovate, subcordate to broad-cuneate at base. S. vulgaris.
3. Leaves broad-ovate, subcordate at base. S. oblata.
1. Leaves cuneate at base.
2. Leaves ($1\frac{1}{2}$ to $2\frac{1}{2}$ inches), always entire; inflorescence large and loose. S. chinensis.
2. Leaves ($\frac{1}{2}$ to 1 inch), often pinnately lobed, inflorescence small. S. persica.

Viburnum

1. Flowers large.
2. Snowball group, with all flowers enlarged and sterile and thus forming no fruit. Leaves radiate-veined and

- broadly three-lobed. V. opulus sterile.
2. Mixed group; some of flowers fruit producing but marginal ones enlarged and sterile; leaves three-lobed; berries bright red. V. opulus.
 1. Flowers small; leaves not lobed.
 2. Leaves coarsely dentate, usually decidedly less than 25 teeth on a side. Flower clusters with long stems, drupes blue, changing to black glaucous, eaten by birds and disappearing before frost. V. dentatum.
 2. Leaves finely dentate (rarely entire); drupes dark blue or black when ripe. Flower clusters practically without stems. Leaves blunt pointed. Stone of fruit oval; flat on one side; leaves 1 to 3 inches long; shrub or small tree. V. prunifolium.

Yucca

1. Leaves sword-like, stiff, broad, with curled threads at the margin. Grows to a height of 10 to 30 inches. Y. filamentosa.
1. Leaves sword-like, stiff, 2 to 4 inches wide and 1 to 3 feet long, gray-green with a white margin. Grows to a height of 1 to 3 feet. Y. glauca.

PART III

LOCATION OF A TYPICAL SPECIMEN OF EACH SPECIES OF SHRUBS REPRESENTED ON THE KANSAS STATE COLLEGE CAMPUS IN 1933 - 1934

Abelia grandiflora, Glossy Abelia. Trial nursery.

Acanthopanax pentaphyllum, Five-leafed Aralia. In central part of shrubbery group west of north entrance to Fairchild Hall.

Aesculus arguta, Texas Buckeye. Trial nursery.

Amorpha canescens, Leadplant. Trial nursery.

Amorpha fruticosa, Indigobush. In shrubbery planting north of wild flower garden.

Amorpha nana, Dwarf-indigo. Trial nursery.

Amorpha tennesseensis, Tennessee-indigo. Trial nursery.

Aralia spinosa, Devil's-walkingstick. Northwest corner of north shrubbery border in President's perennial garden.

Aronia arbutifolia, Red Chokeberry. Trial nursery.

Benzoin aestivale, Spicebush. Trial nursery.

Berberis ilicifolia, Holly Barberry. Trial nursery.

Berberis thunbergi, Japanese Barberry. Base of planting west of north entrance to Fairchild Hall.

Berberis vulgaris, European Barberry. In center of triangular group planting north of Auditorium.

Purple Barberry, (Berberis vulgaris atropurpurea): Fifteen feet east of south entrance to Dickens Hall.

Berberis wilsonae, Wilson Barberry. South of west pier of Class of 1916 Memorial Gate.

Bumelia lanuginosa, Chittamwood. Trial nursery.

Buxus sempervirens, Common Box. North side of Fairchild Hall near northwest corner.

Callicarpa purpurea, Chinese Beautyberry. North of steps leading from President's drive to nursery.

Calycanthus floridus, Common Sweetshrub. West side of center planting north side of Chemistry Annex No. 2.

Caragana arborescens, Siberian Pea-tree. Northeast corner of Library.

Caragana microphylla, Littleleaf Pea-shrub. Trial nursery.

Caryopteris incana, Common Bluebeard. North shrub border of President's garden, 15 feet from west end.

Caryopteris tangutica. Trial nursery.

Cephalanthus occidentalis, Common Buttonbush. Trial nursery.

Chionanthus virginica, White Fringetree. Trial nursery.

Clethra alnifolia, Summersweet. Trial nursery.

Colutea arborescens, Common Bladder-senna. In shrub border east of north radio tower.

Cornus alternifolia, Pagoda Dogwood. Trial nursery.

Cornus mas, Cornelian Cherry. Twenty feet south of Lover's Lane, 150 feet west of President's drive.

Cornus paniculata, Gray Dogwood. In shrubbery planting north of wild flower garden.

Cornus stolonifera, Red-osier Dogwood. In shrubbery planting north of wild flower garden.

Corylus avellana, Filbert. Trial nursery.

Cotoneaster acutifolia, Peking Cotoneaster. Upper terrace of iris garden.

Cotoneaster divaricata, Spreading Cotoneaster. Trial nursery.

Cotoneaster horizontalis, Rock Cotoneaster. Trial nursery.

Cydonia japonica, Flowering Quince. Next to building, south of walk leading to west entrance to basement of Library.

Daphne encorom, Rose Daphne. East perennial border in north section of formal garden, 20 feet from north curve.

Deutzia gracilis, Slender Deutzia. Trial nursery.

Deutzia lemoinei, Lemoine Deutzia. Trial nursery.

Deutzia scabra, Fuzzy Deutzia. Trial nursery.

Deutzia scabra crenata. Trial nursery.

Elaeagnus angustifolia, Russian-olive. Seventy-five feet northeast of northeast corner of President's home.

Euonymus alatus, Winged Euonymus. Either side of walks leading to east entrance of Calvin Hall.

Euonymus atropurpureus, Wahoo. Shrubbery planting north of wild flower garden.

Euonymus europaeus, European Burningbush. Thirty feet south of Kedzie Hall.

Euonymus hamiltonianus, Trial nursery.

Euonymus japonicus, Evergreen Burningbush. Trial nursery.

Euonymus radicans var. vegetus, Bigleaf Wintercreeper. North wall of Library.

Euonymus radicans var. argenteo-marginatus, Silveredge Wintercreeper. Northeast wall of Van Zile Hall.

Exochorda grandiflora, Common Pearlbush. East of service drive to Thompson Hall.

Forsythia intermedia, Border Forsythia. In planting along east wall, 20 feet from southeast corner of campus near pumping station.

Forsythia suspensa, Weeping Forsythia. In large shrubbery planting west of drive west of President's home.

Forsythia viridissima, Greenstem Forsythia. North side of east shrub group, 75 feet south of Auditorium.

Halesia tetraptera, Great Silverbell. Trial nursery.

Hamelis virginiana, Common Witch-hazel. One-hundred fifty feet east of Fairchild Hall.

Helianthemum chamaecistus, Common Sunrose. Thirty feet north of west entrance to north section of formal gardens.

Hibiscus syriacus, Shrub-althea. Foundation planting, east side of Auditorium.

Hypericum konytchense. Trial nursery.

Hypericum moserianum, Goldflower. Trial nursery.

Iberis sempervirens, Evergreen Candytuft. Hedge planting around beds in bulb section of formal garden.

Ilex verticillata, Common Winterberry. West end of shrub border north of tennis courts.

Kerria japonica, Kerria. Fifteen feet west of northeast corner of Fairchild Hall.

Kolkwitzia amabilis, Beautyshrub. Trial nursery.

Laburnum vulgare, Goldenchain. Trial nursery.

Lespedeza formosa, Purple Bushclover. Trial nursery.

Lespedeza formosa albiflora, Japanese Bushclover. Trial nursery.

Ligustrum amurense, Amur Privet. Main nursery.

Ligustrum ibota, Ibota Privet. North of service drive to Library.

Ligustrum vulgare, European Privet. Forty-five feet northeast of junction of Vattier drive and drive to Education Hall.

Ligustrum sp. var. Thompsoni, Thompson's Privet. Trial nursery.

Lonicera fragrantissima, Winter Honeysuckle. Twelve feet north of walk leading to office of campus foreman, east of Education Hall.

Lonicera morrowi, Morrow Honeysuckle. At northwest corner of Chemistry Annex No. 2.

Lonicera tatarica, Tatarian Honeysuckle. At northeast corner of Chemistry Annex No. 2.

Lonicera maacki podocarpa, Late Honeysuckle. Trial nursery.

Magnolia acuminata, Saucer Magnolia. Trial nursery.

Mahonia aquifolium, Oregon Hollygrape. South portion of rock garden, east of insectary greenhouse.

Rechtel Crab, (Malus ioensis plena). Triangular group planting north of Auditorium.

Philadelphus coronarius, Sweet Mockorange. Fifty feet northwest of Education Hall.

Philadelphus grandiflorus, Big Scentless Mockorange. In shrubbery group west of north entrance to Fairchild Hall.

Philadelphus microphylla, Littleleaf Mockorange. First shrub north of west entrance to Fairchild Hall.

Potentilla fruticosa, Shrubby Cinquefoil. Upper terrace of iris garden.

Physocarpus amurensis. Trial nursery.

Physocarpus opulifolia, Common Ninebark. Foundation planting north side of Nichols Gymnasium.

Prinsepia sinensis, Cherry Prinsepia. Trial nursery.

Prunus glandulosa, Flowering Almond. Ten feet west of south entrance to girls gymnasium.

Prunus japonica, Chinese Bush Cherry. Trial nursery.

Prunus tomentosa, Hanking Cherry. Trial nursery.

Purpleleaf Plum, (Prunus cerasifera pissardi). Trial nursery.

Ptelea trifolia, Common Noptree. Three feet north of south wall, southwest of pumping station.

Rhamnus cathartica, Common Buckthorn. Thirty-seven feet south of Vattier entrance drive.

Rhamnus dahurica, Dahurian Buckthorn. Trial nursery.

Rhodotyphos kerrioides, Jetbead. Five feet north of north-east corner of Fairchild Hall.

Rhus copallina, Shining Sumac. Shrubbery border 40 feet west of Kodzie Hall.

Rhus cotinus, Common Smoketree. Large shrub at back of shrubbery group west of north entrance to Fairchild Hall.

Rhus cismontana, Rocky Mountain Sumac. Trial nursery.

Rhus canadensis, Fragrant Sumac. Shrubbery planting north of wild flower garden.

Rhus glabra, Smooth Sumac. West side of Anderson Hall.

Rhus typhina, Staghorn Sumac. Trial nursery.

Rhus typhina laciniata, Shredded Sumac. East side of Shops.

Ribes odoratum, Goldencurrent. Sixty feet north of Dennison Hall.

Robinia hispida, Rose-acacia. Top of rock garden, east of Insectary Greenhouses.

Rosa hugonis, Hugonis Rose. Southeast corner of Thompson Hall.

Rosa rugosa, Rugosa Rose. Southeast corner of Dennison Hall.

Rosa seteriza, Prairie Rose. North side of Chemistry Annex No. 1.

Rubus odoratus, Flowering Raspberry. Trial nursery.

Sambucus canadensis, American Elder. Center of native shrub planting at north side of stream south of Van Zile Hall.

Shepherdia argentea, Silver Buffaloberry. Trial nursery.

Sorbaria sorbifolia, Ural False-spirea. Twenty-five feet south of Thompson Hall, along west side of service drive.

Spiraea arguta, Garland Spirea, Shrubbery border 40 feet west of Kedzie Hall.

Spiraea billiardi, Billiard Spirea. Trial nursery.

Spiraea douglasii, Douglas Spirea. Trial nursery.

Spiraea prunifolia, Bridalwreath. Thirty-six feet west of southeast corner of Horticultural Greenhouses.

Anthony Waterer Spirea, (var. Spiraea bumalda). South end of island planting west of Horticulture Greenhouse.

Froebel Spirea, (Spiraea froebeli). North of west pier of Class of 1916 Memorial Gate.

Spiraea thunbergii, Thunberg Spirea. Triangular group planting north of Auditorium.

Vanhoutte Spirea, (Spiraea vanhouttei). Group of shrubs south of Dickens Hall, west of walk.

Stephanandra flexuosa, Cutleaf Stephanandra. Trial nursery.

Symphoricarpos racemosus, Common Snowberry. Foundation planting west of Chemistry Annex No. 2.

Symphoricarpos vulgaris, Coralberry. Three feet north of walk leading to office of campus foreman, east side of Education Hall.

Syringa oblata, Broadleaf Lilac. Trial nursery.

Syringa oblonga dilata. Trial nursery.

Syringa persica, Persian Lilac. Ten feet south of northeast corner, east shrub border, President's garden.

Syringa vulgaris, Common Lilac. Fifteen feet south of northeast corner, east shrub border, President's garden.

Tamarix sp., Tamarix. Twenty feet northeast of Conservatory.

Viburnum dentatum, Arrowwood. Fifty feet west of Bluemont

entrance.

Viburnum opulus, European Cranberrybush. North side of Nichols Gymnasium.

Viburnum opulus sterile, Common Snowball. Fifteen feet north of service drive to Pathology Greenhouses.

Viburnum prunifolium, Blackhaw. Twenty-five feet south of Lover's Lane, 60 feet west of President's drive.

Vitex agnus-castus, Lilac Chaste-tree. East side of the Grove, north of walk.

Vitex negundo-incisa, Cutleaf Chaste-tree. Trial nursery.

Weigela roses, Pink Weigela. Foundation planting north of Library.

Yucca filamentosa, Common Yucca. Thirty feet south of northeast corner of Calvin Hall.

Yucca glauca, Soapweed Yucca. Trial nursery.

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