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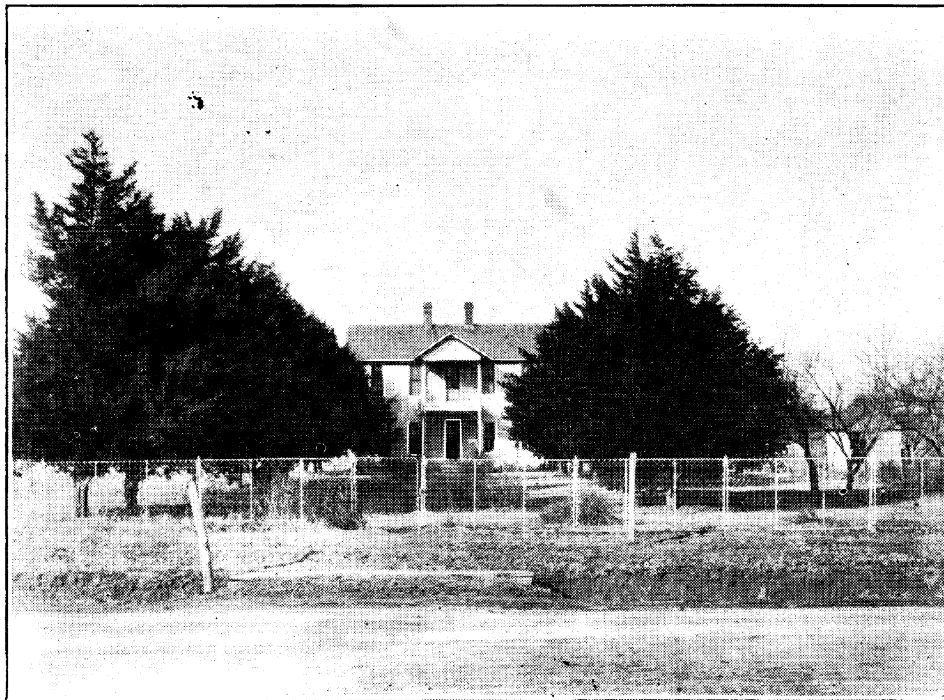
OKLAHOMA
AGRICULTURAL EXPERIMENT
STATION

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FEBRUARY, 1910

TREE CULTURE

HORTICULTURE



A double row of Red Cedars forming an attractive entrance to the home of F. C. Lincoln, Stillwater.

STILLWATER, OKLAHOMA

A. & M. COLLEGE PRINTING DEPARTMENT

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TREE CULTURE

O. M. MORRIS, *Horticulturist*

The planting and growing of trees is becoming more popular each year on the farm and in town. Oklahoma has passed through her pioneer stage of development, and citizens are rapidly growing and developing about their dwellings the comforts and conveniences that are part of the highest realization of the home. It is the ambition of every farmer to have shade trees about the house and yard, and a grove or wood lot in some appropriate spot or nook on the farm. The trees about the house add to the appearance and comfort of the home and add greatly to the value of the farm.

I—SHADE TREES

Season of Planting.

In Oklahoma trees may be planted any time during the late fall and winter. Late fall planting gives better results than early spring or winter planting, and it is generally to be preferred as there is less rush of work at that time. Fall planted trees are in better condition to begin growth in the early spring, than those planted later. The condition of the soil at the time of planting has more influence over the success of the work than does the definite time of the operation. If the soil is in good condition, the planting should be done in the fall if possible, but if it is too dry, the planting should be delayed until the soil is in good condition for the work.

Age of Trees

Trees desired for shade around the house and yard, or along the street, should be over six feet high, and should have a trunk diameter of over one inch at the time of planting. Trees twelve feet high, with the trunk diameter of three or four inches can be safely transplanted. The large trees are much higher priced

and are more expensive to handle, but with good care a very small percentage of them will be lost by transplanting. If large trees are planted only those of the best form and vigor should be used. Nursery grown trees are much better than trees taken from the native forest. The nursery grown tree is more accustomed to the surrounding conditions into which it will be transplanted. Its exposure to light and wind in the nursery has prepared it to some extent for the conditions to which it will be exposed, and it does not suffer a change of environment. The tree is usually well formed with branches that are about the proper height from ground and with a good clean, vigorous root system. The forest grown tree seldom has a well developed root system that is suitable for transplanting. The top is frequently crooked, or one-sided. It has ordinarily grown under the shade of larger trees and is much older than the nursery tree of the same size. Such trees sunburn when set in open ground where the trunks are not shaded.

Pruning

The top of the tree should be pruned back very closely at the time of transplanting. Large trees have developed a root system that reaches through a large space of ground and only a small proportion of this can be transplanted. The top of the tree must be cut back so that the root system retained with the tree will be capable of nourishing it. Trees twelve or fifteen feet high should have all of the small limbs cut off, and the top cut back almost to a pole. Some of the large branches may be left, but all young wood should be "cut away." The roots of the tree should be cut back no more than is positively necessary, in order to handle the tree. The end of the roots should be cut smooth, and all broken and mashed portion of the root should be cut off. If possible the large trees should be moved by digging a circle around them and retaining a ball of earth three or four feet in diameter with the tree. The tree holes should be dug some weeks in advance of the transplanting work. They should be large enough to receive the tree without bending or further cutting back the roots. If the subsoil is poorly adapted to growing trees, the holes should be dug specially large and deep.



NO 1—AMERICAN ELM.

This tree is seventeen years old and has received very little attention in the way of pruning and cultivation. The tree was set when three years old.

Planting

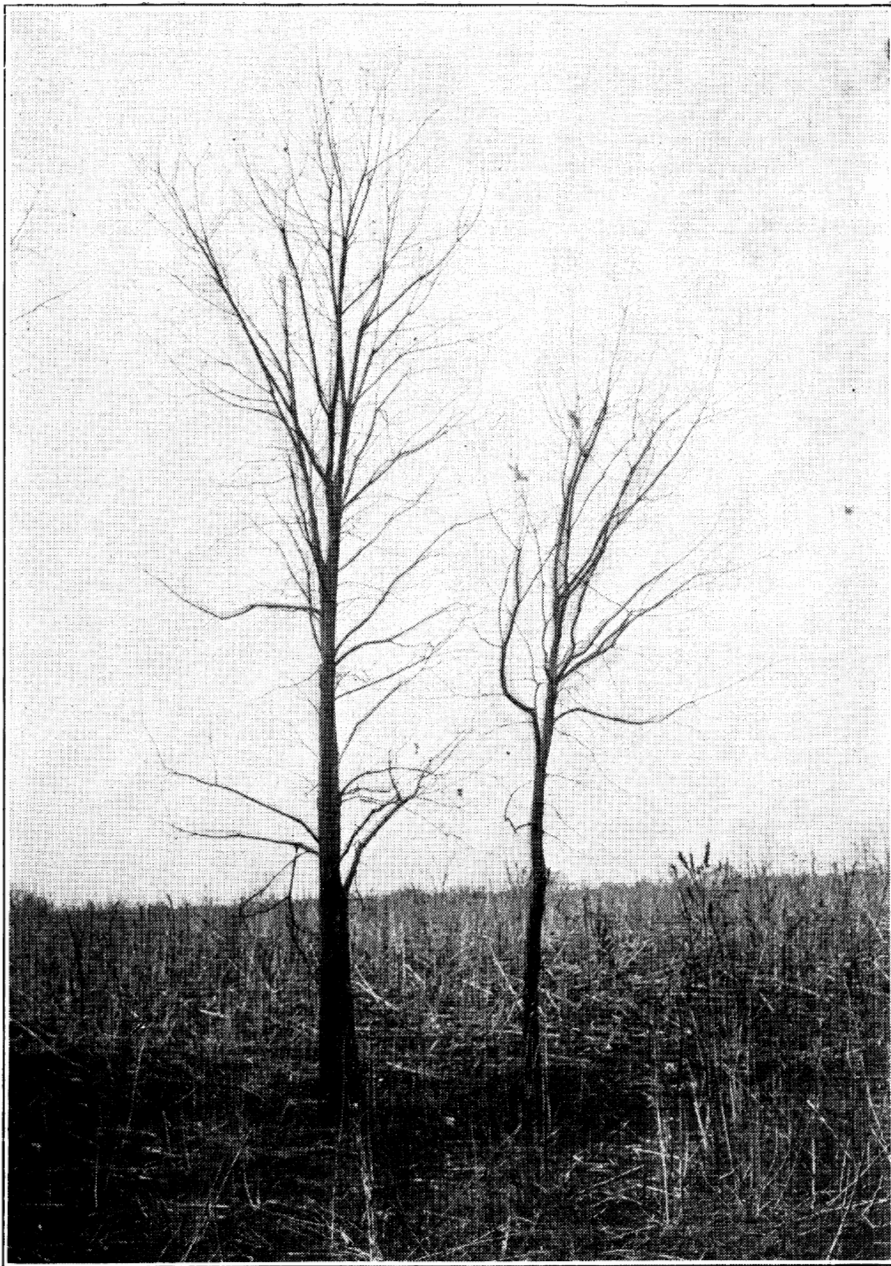
The trees should be set a little deeper in the soil than they stood in the nursery row. The soil must be worked in underneath the large roots and tamped firm about them. The top of the tree should be leaned slightly to the southwest to enable the tree to resist the hard southwest winds and before the end of the first season the tree will be standing in an erect position. It is a good plan to shake the tree several times while tamping the dirt around the roots, and to pour water about the tree in order to bring the soil in contact with every bit of root surface. After the watering has been done, another inch or two of dry and good surface soil should be thrown about the tree to prevent baking.

Shade and Street Trees

Shade and street trees should not be planted closer than fifteen or twenty feet between trees. The usual practice is to set the trees close together with the expectation of cutting out some of them when they grow large enough to crowd each other. This is not always a good practice; it results in none of the trees receiving as good attention as they should receive, and finally at the time of thinning out, it is not possible to leave the best trees and cut out the poor ones, without sacrificing locations. Extremely rapid growing trees may be used for temporary positions, and permanent trees set in the proper positions. This method is often used successfully in securing shade and protection in a short time.

Cultivation

The soil around the tree should be thoroughly cultivated. The tree roots are long and slender, and reach far into the soil. The circle of soil about the tree in which the roots feed should be well cultivated. Mulching is sometimes resorted to as a substitute for cultivation, and if the soil is worked every year under the mulch it is a great help to the tree. As usually practiced, however, the soil is mulched for two or three years and receives no further attention in the way of cultivation. When the first mulch applied decays, and no other soil covering is provided the trees suffer more than if they had not been mulched in the first



NO. 2—PECAN.

These are native trees. The large tree, about twenty years old, is thirty-five feet high. The small tree is twelve years old. These trees are suitable for top grafting to improved varieties.

place. The soil should be spaded up around the trees every spring and the surface kept free from weeds and thoroughly pulverized throughout the entire growing season. Working well rotted barnyard manure into the soil around the tree is a good plan, and one of the best methods of fertilizing the land that can be practiced.

Trees planted along the street are frequently injured by stock. The "town cow" is a menace to good trees, and nothing but a good fence will protect the trees. Individual trees may be protected by setting strong stakes about them, and nailing cross pieces to form a crate. This crate will also protect the trunk of the tree from the sun and be of value in that way. Borers attack tree trunks that are sunburned more than those that are protected by shade. A lattice that shuts off half the sun's rays, and cultivation that will keep the tree growing, are the best protection against borers that can be used. Whitewashing the trunk, and wrapping the trunk with gray building paper, are methods of protection that are less efficient, but frequently worth doing.

Varieties

To be suitable for general planting, trees should be hardy, make a rapid growth, and should require a minimum amount of care and attention. There are many trees that are hardy and make a rapid growth, but do not last long and for that reason are generally considered unsatisfactory for shade and street planting. Some of the slower growing trees are worth the effort of bringing them to valuable size, because of their desirable form and permanence. In the following list the trees are so described as to give the principal characteristics that should be considered in selecting varieties for planting:

BLACK LOCUST.—This tree grows rapidly and attains a height of sixty feet, and a trunk diameter of three feet. The top is of good form with a main central stem, when grown in close plantings, but is thickly branched and forms a large round head when grown in the open. It grows fastest when set in mixed plantings. It casts a poor shade and is slow to occupy the ground to the exclusion of other plants. It sprouts badly from the roots and stump of cut trees and is difficult to clear from the land when once established. The wood is heavy, hard, strong, and durable



NO. 3—SCOTCH PINE.

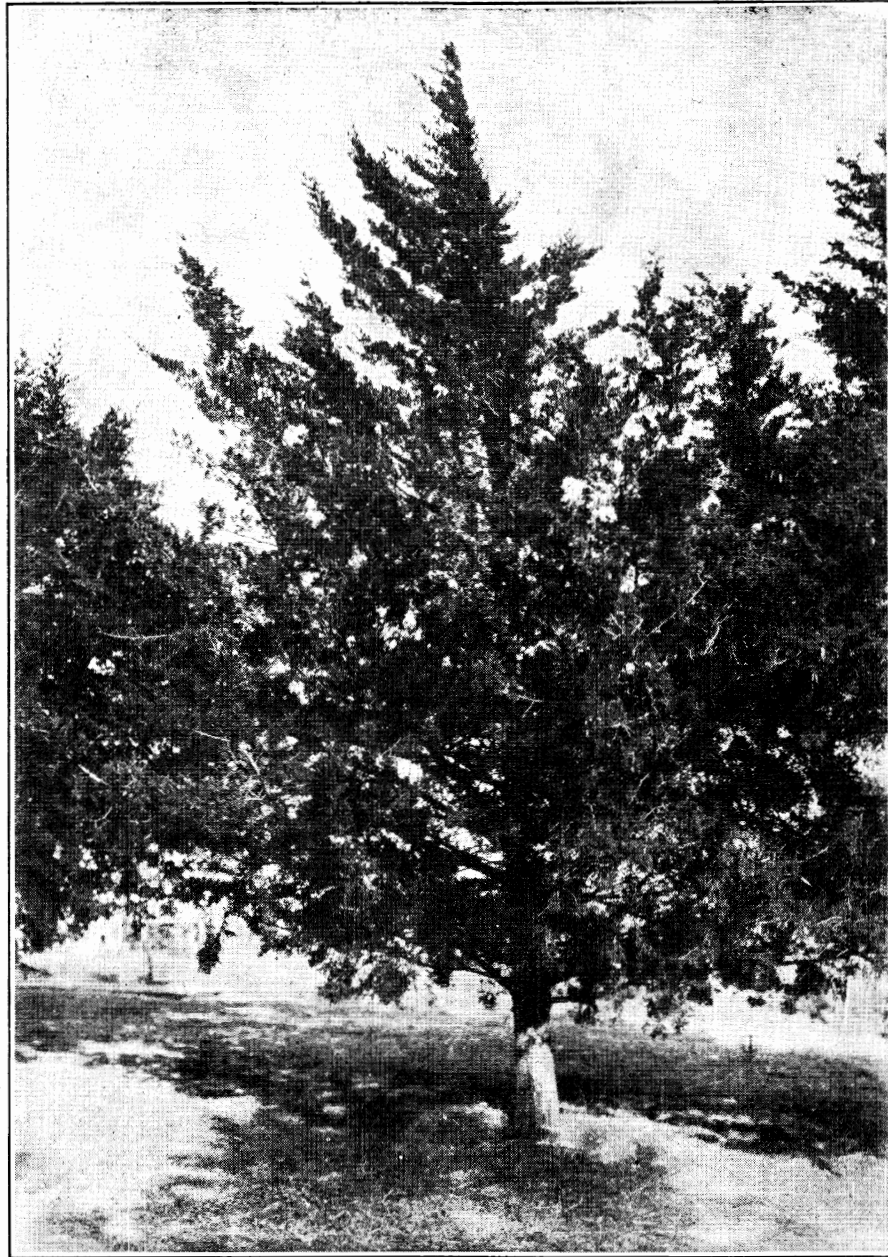
This tree is growing on the College campus and is twenty years old. It is eighteen feet high and is set in a Bermuda grass lawn, and has received no cultivation for the last seven years. It is the best variety of evergreen for general planting.

when placed in contact with the ground. It makes a first-class post and good fuel. The tree is especially adapted to growing on poor land, and for quick results on all kinds of land it is the best tree that can be planted in Oklahoma. It blows over badly when exposed to the wind, and is especially subject to the attack of the borer, commonly known as Black Locust Borer. This insect is now working on the trees in the northwest part of Oklahoma. It will probably spread over the entire state, and do great harm to the Black Locust plantings.

WHITE ELM (AMERICAN ELM.)—This is a large native tree and when full grown often attains a height of one hundred feet, and a trunk diameter of five or six feet. It forms a round, broad, spreading top and casts a good shade. It is a medium rapid grower and adapts itself well to all kinds of soil. The wood is hard, heavy, strong, durable, and difficult to split. It has a high fuel value, but the principal value of the tree lies in its use as a shade tree, and for that purpose it ranks first among the trees grown in Oklahoma.

SOFT MAPLE.—This tree grows rapidly and often attains a height of sixty feet and a trunk diameter of three feet. The top is upright, spreading to oval in form, and casts a good shade. It should be planted on good soil, as it does not make a satisfactory growth on poor land. It responds quickly to cultivation, but suffers badly if neglected. It is not adapted to extremely close plantings. The wood is soft, easily broken while green, light, of little fuel value, and rots quickly when placed in contact with the ground. Its principal value is shade and wind break formation. It is a handsome tree when well developed, and makes a nice tree for yard planting.

RUSSIAN MULBERRY.—This tree grows very rapidly and is one of the most hardy trees that can be planted. It is adapted to many kinds of soil and will make some growth under the most adverse conditions. The tree branches profusely and unless it is continually pruned, forms a very dense top and short trunk. Close planting should be practiced with this tree. It is one of the best trees that can be grown for wind break formation and when mixed with the catalpa or black locust, the two form an ideal wind break. The wood is hard, of high fuel value, and durable when



NO. 4—RED CEDAR.

This tree is eighteen years old and is nineteen feet high. It received good cultivation for six years, but has received no cultivation since. This tree has a large number of cedar apples, a gall formation of the limb in the top, and is objectionable for planting near an orchard on that account, as the apple rust and cedar apples are caused by the same disease.

placed in contact with the soil. The male and fruit bearing blossoms are borne on different trees. The male (staminate) trees when well pruned form quite acceptable shade trees. The fruit bearing trees are constantly developing and ripening fruit. The fruit is of little value, but very objectionable, as it constantly attracts flies and creates a filthy and unsatisfactory condition about the house and yard.

HACKBERRY.—This tree is a native of Oklahoma and often attains a height of seventy feet with a trunk diameter of three and one-half feet. It grows rapidly on good soil and will make some growth on the very poorest soil. The top of the tree is round or oval in form, and when grown in the open becomes broad or flat. The tree is best adapted to second bottom land and endures the wind well. It is an especially good shade tree to be planted in locations where it will be exposed to wind. The wood makes good fuel, but it is not especially durable in contact with the soil.

SYCAMORE.—This is a very large native tree usually found along the streams and on moist land. It can be grown on upland, and when given reasonable cultivation it makes a fairly rapid growth. The tree is tall, conical in form while young, but broadens at the top as it grows older. It is especially valuable for planting where the single specimens are wanted, as in parks, and on school grounds. The bark peels, leaving the tall almost white trunk smooth and very striking in appearance.

HONEY LOCUST.—This is a native tree, that often attains a height of sixty feet with a trunk diameter of three feet. The top is broad, open, and conical or oval in shape. The foliage is light, and casts a poor shade. It is a medium rapid grower when cultivated, and grows slowly under adverse conditions. It suffers badly from transplanting, and should be very carefully handled during that operation. It endures pruning well, and is sometimes used as a hedge plant. The wood is heavy, hard, strong, durable when placed in contact with the soil, and has a high fuel value. This tree should not be planted as a shade tree, but has some value as an ornamental tree when placed in special locations.

OSAGE ORANGE (BOIS d' ARC.)—This tree attains a height of forty to fifty feet, with a trunk diameter of eighteen inches to two



NO. 5—ARBOR VITAE.

These trees, growing on the College campus, are twelve years old. The large tree is seven feet high. The small tree is a dwarf variety. These trees were well cultivated for five years and have since received no care. They are growing in a Bermuda grass lawn. This is a splendid tree for hedge formation.

feet. It grows rapidly on moist bottom land, but is not well adapted to light upland soil. It sprouts vigorously from the stump and broken roots, and is very difficult to kill and eradicate from the land when it is once well established. It endures pruning remarkably well, and is often used as a hedge plant. The wood is heavy, hard, strong, has high fuel value, and is very durable when placed in contact with the soil. The posts made of young wood check, and drop fence staples very badly when used green. It ranks high as a post timber, but is inclined to be crooked and unsatisfactory for pole production. It is adapted to moderate close planting, and when so planted makes a very satisfactory growth.

COTTONWOOD.—Our native cottonwood is too common to require description and although it is usually disliked, it is frequently used to good advantage in planting where quick results are desired. The tree is not unsightly, is not difficult to kill, and the stump rots away quickly after the tree is cut. It is a splendid tree to use where quick results are desired. The wood is of little value, either for post or fuel purposes. The cottonwood trees produce the male and female blossom on separate plants and as the male trees do not produce seed they are cleaner. They are frequently referred to as the “cottonless cottonwood.”

WHITE ASH.—This is a native tree of medium size, attaining a height of forty to fifty feet, and a trunk diameter of two feet. The top is rather upright in form, spreading in the mature trees. It casts a good shade, and the foliage is always bright and green. It is especially adapted to planting in dusty locations along the street where the foliage is especially exposed to dust. It is not a rapid grower, but is hardy, and a tree worthy of general planting. The wood is hard, strong, and of high fuel value, but it is not suitable for post or pole production.

BALD CYPRESS.—This southern tree is generally supposed to grow only in swamps, but in Stillwater it is growing well on upland of rather inferior quality. It is of medium slow growth, but forms a very symmetrical, coneshaped tree. It has the characteristic fine foliage of cone bearing trees, but is not an evergreen. In the fall the foliage develops some very fine autumn

colors before dropping from the tree. This tree is especially worth planting as an ornamental tree about the yard.

PECAN—This tree is a native of Oklahoma and grows to a large size, attaining a height of eighty feet, and trunk diameter of four or five feet. The top is upright, oval in form, and casts a splendid shade. It is a slow to medium grower, but is long lived, and should be considered one of the trees for permanent planting. Its nut bearing qualities should commend it.

TAMARIX (TAMARACK.)—This plant scarcely attains tree size and form. It branches profusely, endures pruning well, and is a good plant to use for forming screens and hedges. The foliage resembles that of the Red Cedar, but it is not so dense. The leaves drop in the fall. The tree is bare and unattractive during the winter.

BLACK WALNUT.—This is a native tree of large size, attaining a height of seventy to eighty feet, and a trunk diameter of four feet. It is a slow to medium rapid grower, and especially adapted to growing on bottom land. The top of the tree is upright to round, or broad, when planted in the open, and casts a splendid shade, but is not generally used for such on account of its slow growth. The wood is hard, medium strong, durable when placed in contact with the soil, and of high lumber value. The principal value of this tree for planting is for shade and lumber production; for the latter purpose, however, the planter should understand at the time of planting that it is a very long time investment.

OAK.—There are several kinds of oak that are native of Oklahoma that could be used for permanent plantings. The most promising are: Burr Oak, Mossy Cup, Red Oak, White or Post Oak, and Pin Oak. Oak trees usually suffer from being transplanted, and are frequently started by planting the seed where the tree is to grow. The form varies from broad, spreading top, as in the Burr Oak and Mossy Cup Oak, to an upright, oval form, with the Red and Pin Oak. All of the oaks cast a splendid shade, and for park or public ground plantings, should be commonly used.

SCOTCH PINE.—The Scotch Pine is one of the best evergreens for planting in eastern and central Oklahoma. It forms

a tall tree with horizontal or sometimes drooping branches, and dense, rigid foliage of bluish-green color.

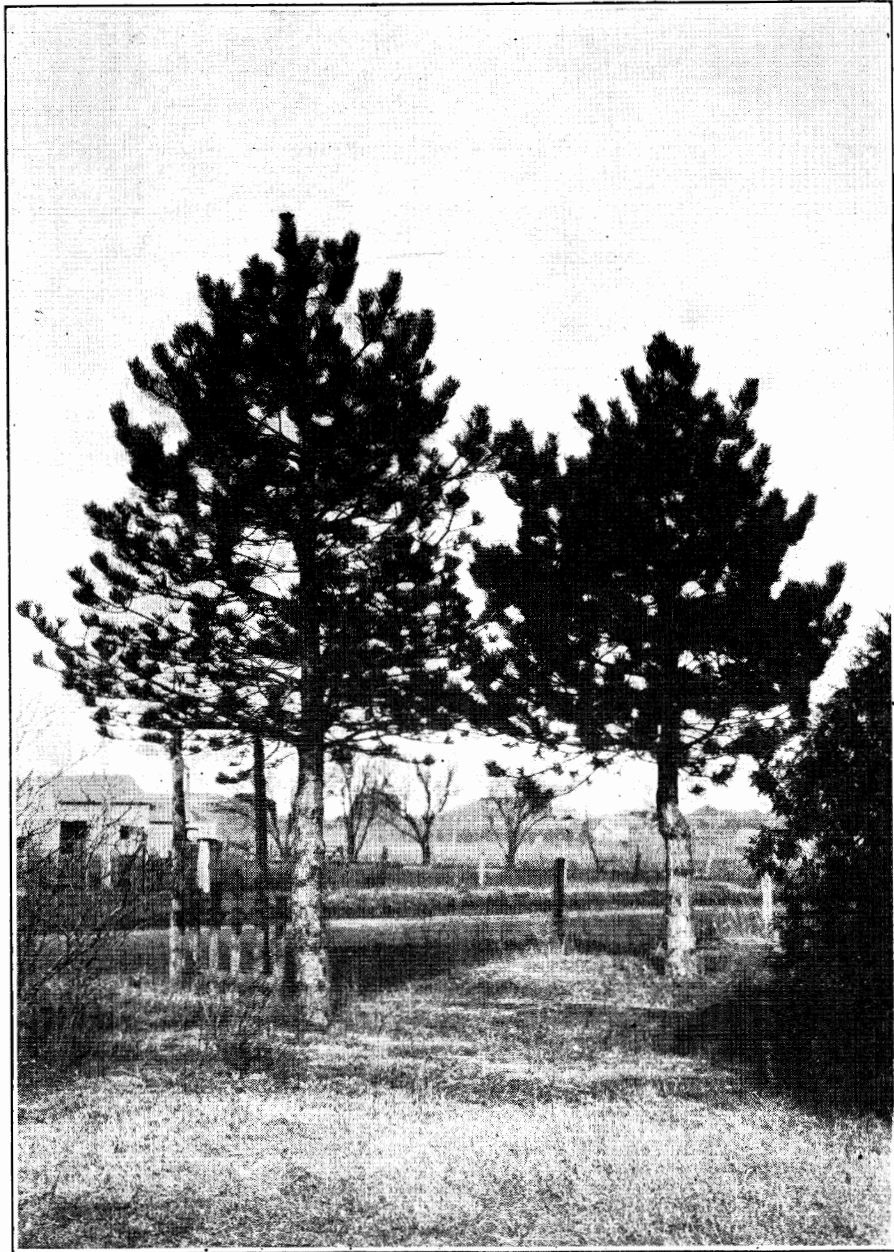
RED CEDAR.—This is a native plant and is hardy, and can be grown on almost any kind of soil. The top is conical, sometimes broad, and low in form. It endures pruning well and can be used as a hedge with good results. It is one of the best evergreens that can be planted in Oklahoma, but should not be used for wind break plantings around apple orchards. The cedar and apple rust fungus, are well distributed over Oklahoma and when well established where the apple and cedar trees are in close proximity, it becomes very troublesome in the apple orchard.

WHITE PINE.—A tall, stately tree with regular whorls of horizontal branches, forming a symmetrical, pyramidal crown. The leaves are long, and of a soft bluish-green color. This is the most beautiful and rapid growing of the American pines. This tree cannot be generally recommended for planting in western Oklahoma.

AMERICAN ARBORVITAE.—This is a tall, upright tree, with bright green foliage that assumes a bronze tint in the winter. It is very hardy and especially beautiful while young.

GOLDEN ARBORVITAE.—This tree in general form and character is like the American Arborvitae, but the foliage is yellowish-green, or gold in color. It is hardy, and a very good tree for ornamental planting.

IRISH JUNIPER.—This tree is erect and forms a very dense, slender column. The foliage is very fine, and of a glaucous-green color. It grows rapidly, and is a splendid tree for ornamental planting.



NO. 6—SCOTCH PINE.

These Scotch Pine trees are growing at the entrance to the farm of G. W. Lewis, west of Stillwater. These trees are on the edge of the public road and are very attractive.

II—POST AND POLE PRODUCTION

The price of post and pole timber in Oklahoma impresses every farmer with the fact that it is wise for him as far as possible to produce on his own farm his own supply of post and pole timber. The length of time required for the production of trees of post size requires several years, but it is well to look ahead as the price of timber is constantly advancing. There is on almost every farm more or less waste land. The land that is classed as waste land because it is of such poor quality that it cannot be made productive, should not be considered available timber land. It requires fertility to grow trees the same as any other crop, and soil that is too poor for cultivation in the ordinary farm crops will seldom be found profitable when planted to trees. There are on many farms small nooks and corners that contain good soil, but by reason of their size and shape can not be profitably cultivated and planted to the ordinary farm crops. The small streams of Oklahoma are very crooked and have high, steep banks. The soil in these creek bends is badly washed by occasional overflows. This land can, in nearly all cases be profitably planted to trees. Two or three years' cultivation will place the trees where they can take care of themselves without much help on the part of the owner. Such waste land becomes profitable under such management and the post and pole supply that can be drawn from it is as great as though it were in the most convenient form possible for cultivation.

Preparation of the Land

Land should be prepared for tree planting by being brought into a thorough state of cultivation. It should be plowed well and freed from roots, weeds, and grass as much as possible. Weeds and grass are very destructive to young trees, but after the trees are well established the weeds and grass will make no headway in crowding them out.

Planting the Trees

In preparation for planting the land should be surface cultivated, and can then be laid off in rows with a lister or common turning plow. It will usually pay to go twice in the same furrow



NO. 7- MAPLE TREES.

Maple trees twenty to twenty-five feet high. This plat of maples was planted at the same time that the Black Locust grove shown in Plate No. 9 and the mixed plat in Plate No. 8 were shown.

in order to deepen the furrow and reduce the amount of hand labor that would be necessary to place the tree in position. The simplest method of setting trees rapidly and satisfactorily is to have the planters work in teams; one man carrying the trees and another using the shovel, throwing out when necessary a shovel or two of the earth to give room for the little tree. The tree is placed in position and two or three shovels of soil placed over the roots and firmed down by tramping and the men then pass to the next tree. The furrow, or trench thrown out can be filled with a plow or cultivator.

Age and Size of Tree

The trees set should be one or two year-old seedlings, the one-year-old are usually preferred. These trees vary in size from one to three, or three and one-half feet in height, and are usually sold by the thousand in grades ranging from twelve to eighteen inches, eighteen to twenty-four inches, and from two to three feet. The medium size trees are usually as satisfactory for planting as those of extreme size. The larger trees are seldom larger because they possess uncommon vigor, but usually because they have grown in thinned places in the row and have had the advantage of a large area of soil. The small trees on the other hand are usually small in size because of extreme crowding in the row.

Distance Between Trees

The rows should be five or six feet apart. The trees usually do best where they have about twenty-five square feet of soil surface per tree. Trees five feet apart each way form a good planting that can be cultivated in every direction for the first two years, and later thinned with profit. Rows six feet apart with trees four feet apart in the row are well placed, but more care is necessary in such planting to avoid wide branching of the tree and consequently unsatisfactory top formation for the production of posts and poles. *Catalpa Speciosa* and Black Locust will grow to post size without thinning, if planted five feet apart each way.

Pruning

The young seedling tree requires very little attention before planting. As they come from the nursery the roots are seldom



No. 8—Mixed plot of trees in which were planted black locust, catalpa, soft maple, elm, honey locust, box elder, and white ash. The large trees are black locust. The smaller trees shown are catalpa, maple and elm.

mashed or broken to an injurious extent, and the pruning work is completed when the tops are cut off two or three inches above the surface of the soil. This can be done best at the time of planting. Some attention should be paid to the young trees during their first summer's growth to see that only one sprout starts and forms the trunk of the future tree. Once or twice through the planting, pulling off the extra sprouts will suffice and start the tree in good condition. The plantation should be gone over each winter for two or three years, and the most prominent and objectionable branches should be removed in order to maintain a straight upright growth of the tree tops. If a stunted and unsatisfactory growth of trunk is obtained the first year, it is usually advisable to cut off the top of the tree the next winter after the planting is done. The following summer watch to see that only one sprout develops to form the single tree trunk. The second year's growth should produce a strong, straight sprout practically free from branches and should start the tree in the right form. Catalpas are especially helped by this cutting back process.

Cultivation

The cultivation given the wood lot or tree planting during the first few years of its growth can very well be done with a common corn cultivator. The five-toothed, one-horse cultivator does splendid work. This is the form of cultivator that has been used in the forest plats of the Experiment Station. The cultivation should consist of clean cultivation throughout the entire growing season. The soil should be stirred to a depth of two and one-half to three inches, and should be kept in a fine state of cultivation, free from weeds and grass. The cultivation early in the season is most important as the tree makes its growth at that time and a drought during the spring retards the growth much more than a drought in any other season of the year. Thick plantings are liable to suffer unless given cultivation throughout the summer. Tree plats that are well cultivated during the summer, pass through the winter in much better condition, and are better able to form a good growth the following season.

The elm, hackberry, sycamore, and several other trees of the same character, develop and store in the tree a great deal of food that is used the following spring in the formation of new wood.

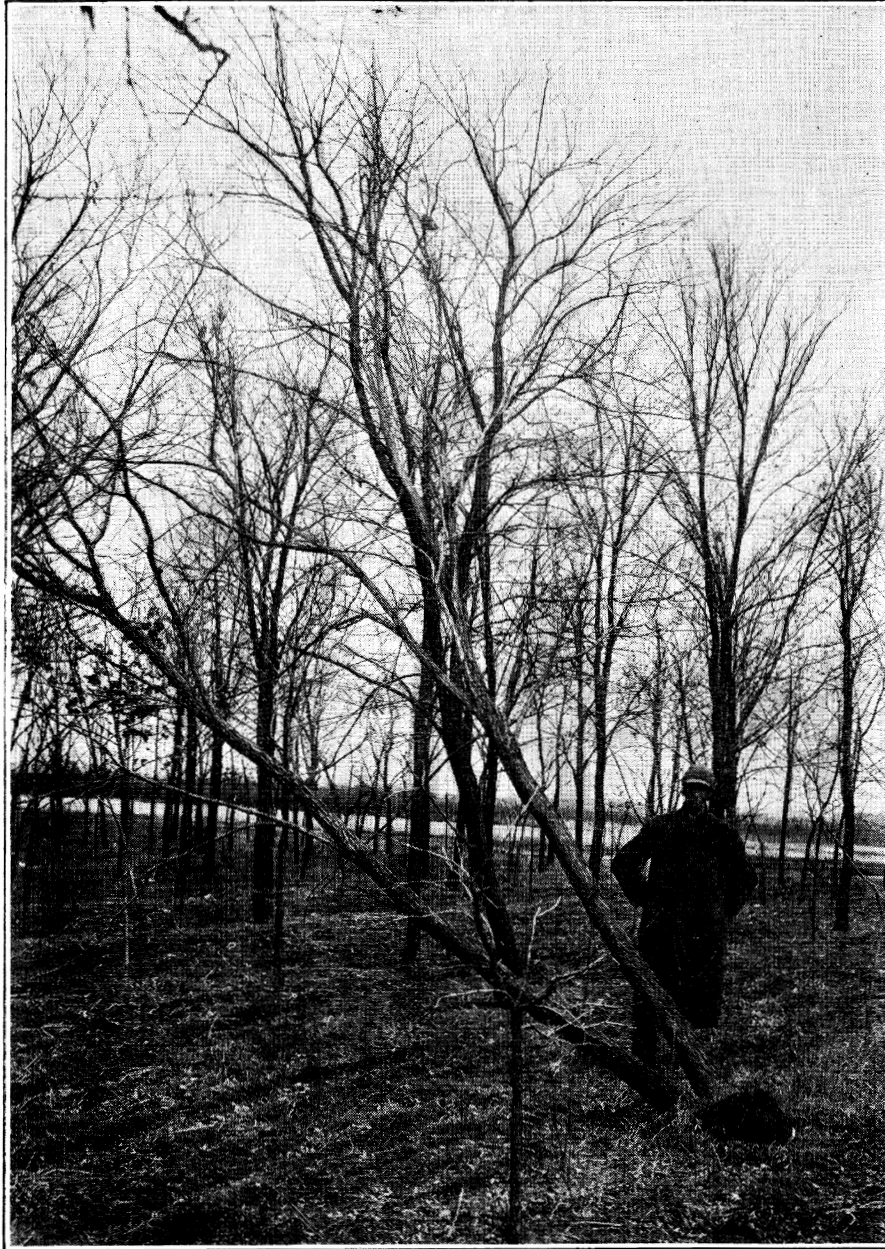


Plate No. 9 illustrates a serious fault of the black locust. This tree blows over badly. For that reason it is an unsatisfactory tree to grow in places where it will be especially exposed to the wind.

The number of leaves that each winter bud is capable of producing the following summer is definitely fixed the summer that the bud is developed. If the elm tree suffers from drought during the latter part of the summer and early fall, the buds will be small and contain but few leaf scales. No amount of feeding and cultivation will cause these buds to develop more than the definite number of leaves provided for when the bud was formed. This characteristic makes it imperative that these trees receive good care and cultivation throughout the year. In transplanting large trees and especially if they have been forest grown, all of the last season's growth of wood should be removed, and the trees caused to develop adventitious buds. The twigs growing from such buds will continue to grow as long as the food supply and the weather are favorable, and can be induced to make a much stronger growth than the branches starting from the normal winter buds. The Black Locust is not of that character, but will continue to grow throughout the summer if food and water supply are maintained.

The cultivation of the grove may be discontinued as soon as the stage of development is reached where the trees will ordinarily occupy the ground to the exclusion of other plants, and will gradually cover the ground with a mulch of leaves and small twigs. This is the natural forest floor and will retain moisture as well as a mulch of straw and litter, and to a large extent obviates the necessity of cultivation. Deep cultivation should be avoided as it breaks the roots of the plants, and with some varieties of plants causes a great number of sprouts to come up between the rows. This is especially true of the Black Locust and Osage Orange. The breaking of the roots is injurious to all kinds of trees.

Thinning

When the trees they begin to crowd each other, they should be thinned by cutting out some of the trees. The time this should be done will depend to a large extent upon the form of planting, the kind of trees, and the distance between trees. If the trees are set in check form an equal distance from each other the thinning should conform to the demand of the grower and the grove. If the larger trees are of suitable size for posts they may be cut and used for such, but if their cutting can be delayed until the



Plate No. 10—This shows a section of a grove that has never been pruned. The trees were cultivated for two years and since then have received no attention. Note the branched and unsatisfactory character of growth of the trees.

least desirable trees are large enough for post timber, the larger trees grow rapidly in value as they attain size and length that will permit them to be used for pole timbers. The thinning should be so done that the remaining trees will be evenly distributed over the land. The first thinning should take out one-fourth of the trees and the second should leave about one-half of the original stand. If the tree is cut away at this time, the stump will usually produce sprouts that will in time grow into good formed trees. The second growth of timber is always more valuable than the first, and the grove can be maintained as long as is desired.

Pure Planting

There is one plat of each of the following kinds of trees on the Experiment Station farm: Black Locust, Catalpa, Elm, Soft Maple, Box Elder, Ash, and Honey Locust. The Honey Locust is not a fair test, because it is on ground that is totally unsuited to tree growth and has since been abandoned as a tree plate. The black locust made a better growth in the mixed plats than it did in the pure plat. The following trees have made the best growth in the pure plantings: Catalpa, Elm, Soft Maple, White Ash, and Box Elder. The black locust practically crowded out every other specie in the mixed plats. Plate No. 8 is an illustration of the character of growth that has taken place in practically all of the mixed plats. The Black Locust has made the most rapid growth, and has grown and developed at the expense of all other trees in the plat. The pure planting of Black Locust placed the tree in the position of contending with its own specie, and it did not make as good growth as in the mixed plats. In the mixed plats the slow growing trees have been killed by the more rapid growing and drouth resistant trees.

Mixed plantings may sometimes be recommended for tender trees, such as cedars and pines. These trees make a slow growth for a few years and ordinarily do well when grown under the shade of rapidly growing trees. The cottonwood and soft maple are good trees to use as nurse crops for the slow growing species. The oak also has grown well under the shade of the catalpa and maple. Considering the conduct of the trees while growing and the value of the wood for posts the Catalpa, Black Locust and Bois d'Arc are the best for planting in the order given.



No. 11—A plot of catalpa trees grown from the stumps of cut-back trees. Note the long, slender bodies of these trees. The first trees were low in form, with many spreading branches. Many of these trees shown here grew to the height of the first branches the first season from the stump.

Line Planting

A single row of trees is frequently placed on the boundary line of fields and farms. The Black Locust has been used in some sections of Oklahoma for that purpose. For a few years it makes a satisfactory growth in such places, but it cannot be recommended. A common fault with such plantings is that the trees are grown for the double purpose of forming a wind break and serving as posts at the same time. Wire fastened to trees for such purposes is always destructive to the tree and the tree is usually short lived as a post. The best plan is to plant two or rows of catalpas along such line and give them thorough cultivation. Russian Mulberry will answer the same purpose, and is usually more hardy, but does not produce good post material when so planted. The Catalpa and the American Elm for line planting for permanent fence posts have given the best results in order mentioned.

Germination of Tree Seed

The germination of tree seed is not especially difficult, but the special conditions required by the different seed must be met before a large percent of the seed will germinate. The Black Locust seed will not germinate if planted and treated like ordinary seed. The best method of treating it is to place it in a water tight vessel, and pour in enough boiling water to cover the seed. Let the seed stand in this water for about twelve hours, and then plant without drying. This is severe treatment, but the Black Locust seeds will endure extreme heat. In tests made here in 1904, ten percent germinated after it had been boiled in water for ten minutes. Soaking the seed for twenty-four hours in warm water gave a very small percent of germination, and the method outlined first germinated as high as ninety percent. The planting should be done as soon as danger of frost is passed, and the seed should be planted deep enough to place them in moist earth. The plants grow rapidly and should be transplanted when one year old.

Catalpa seed germinates without any special treatment. It should be planted in well prepared soil as soon as danger of frost is passed, and should not be covered with more than an inch of soil. The commercial seed of the catalpa is frequently of very



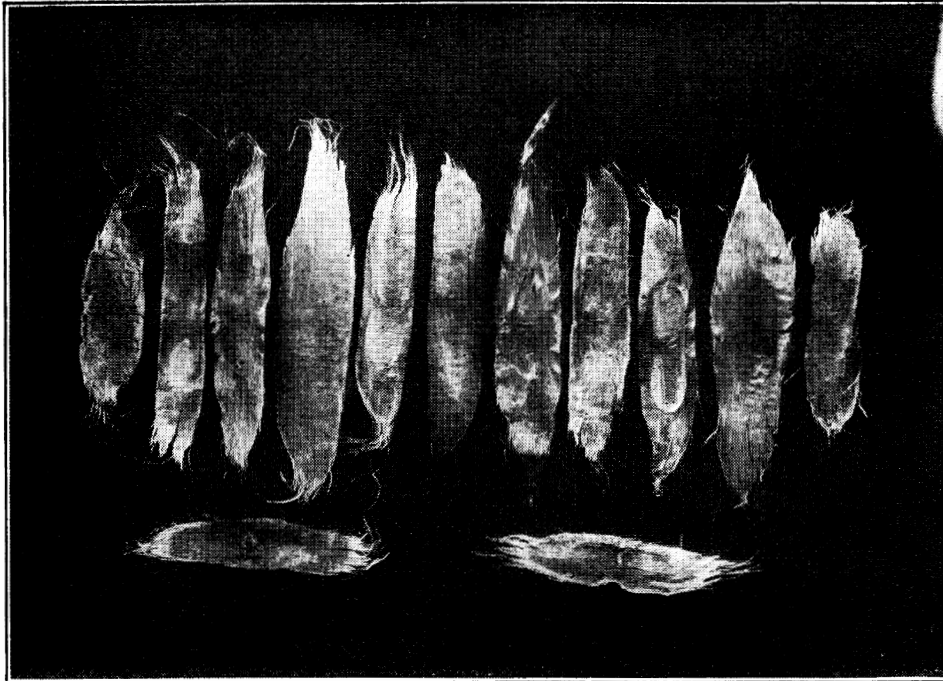
No. 12—A black locust planting nine years old on the farm of S. E. Morris, two miles north of Stillwater. This grove is in a creek bend that could not be easily cultivated. The trees have received very little attention since the second year after planting.

poor quality. There are a great many seed hulls that have no developed seed germ. These can be detected easily by sight as the outline of the seed within the seed hull is not distinct, but is not always easily distinguished. Compare plates number 13 and 14 and note that the seed of *Catalpa Speciosa* and the Southern *Catalpa* vary in form, and there is not as clear a line of demarcation in fact, as there is in theory. The young trees cannot ordinarily be distinguished.

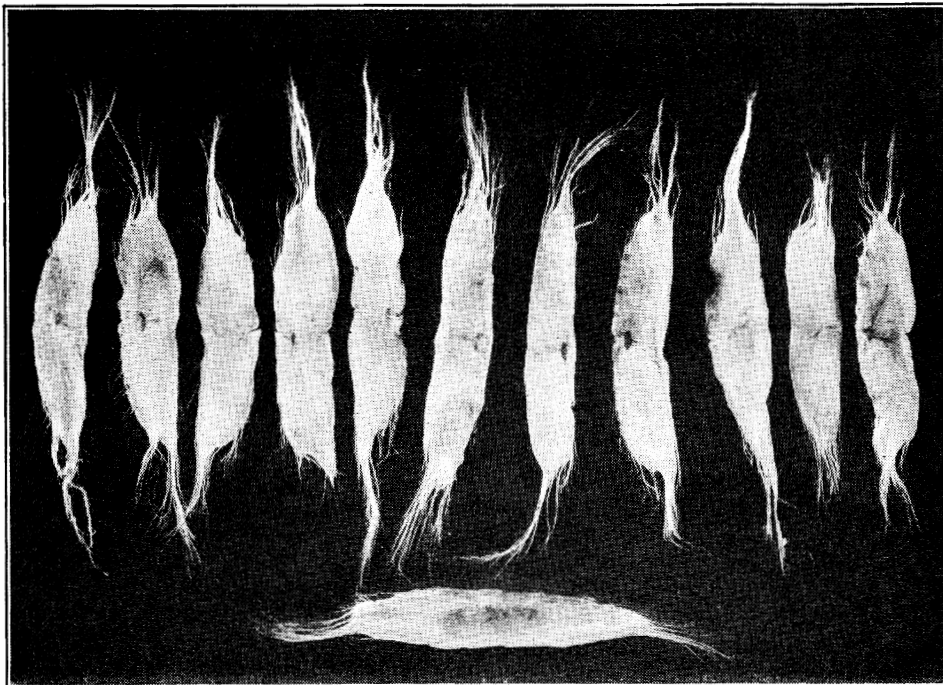
Seeds with hard coating like the nuts and hackberry, can be prepared for germination by soaking in warm water for twenty-four hours. The nuts are frequently placed in boxes of sand or moist earth and exposed to the frost during the winter. This process will break and soften the shell so that the young plant is able to force its way out. Freezing the nuts gives better results than soaking the seed in warm water.

The seed of the Red Cedar is difficult to germinate. The best method is to free them from the pulp as soon as gathered in the fall or winter by soaking for a day or two in lye water, and then rubbing through a sieve. The seed may be stored in moist earth through the winter, or may be kept in ordinary storage and planted in a small bed, prepared the same as an onion bed. Keep this bed free from weeds and grass throughout the summer and protect it from the hot sun by some form of screen made of lath or brush. Most of the seed will not germinate until the second spring, but a fair stand should be expected by that time.

The seeds of the common deciduous trees, such as maple, ash, etc., should be planted in the nursery and the tree transplanted when one year old. The seeds that mature in the early spring, like the elm and soft maple, should be planted as soon as ripe. During the summer in the nursery the tree should be thoroughly cultivated and the soil kept in good tilth, free from weeds and grass. Many of the trees can be grown from cuttings, but this is usually more laborous than growing the same kind from seed. The willows and cottonwood grow quite well from cuttings. *Tamarix*, commonly called tamarack, is grown almost entirely from cuttings.



NO. 13—SEED OF CATALPA SPECIOSA
Notice the broad, short seed and blunt ends with short threads.



NO. 14—SEED OF HYBRID CATALPA
Notice the long, narrow seed and the threads on the end in comparison with those in plate No. 6. Seeds of this shape and with these threads are never found on true Catalpa Speciosa seed. The hybrid catalpa is short branched and not suitable for post production.

Inspected Nurseries

The following is a list of the nurseries of the state that have been inspected by Prof. C. E. Sanborn, Entomologist of the Experiment Station, and granted certificates by the the State Board of Agriculture:

Name of Company, Proprietor or Manager, and Where Located.

Ada Nurseries, L. C. Cales, Ada.
Antlers Nurs. Co., —————, Antlers.
Ardmore Nursery, Mrs. Sallie McCullough, Ardmore.
Bernardi Wholesale Nurs., H. H. Cummins, Bernardi.
—————, J. L. Blackman, Marlow.
Backs Nursery, J. W. Back, Altus.
Bokchito Nursery, T. E. Ramsey, Bokchito.
Bowers Nursery Co., M. G. Bowers, Claremore.
Erick Yard Nursery, F. M. Huffstutler, Hartshorne.
Cates & Wayman Nursery, Cates & Wayman, Weatherford.
Checotah Nursery, John Merriwether, Checotah.
Chickasha Nursery, Springer & Hansen, Chickasha.
Chilocco Nursery, C. A. Preston, Chilocco.
Choctaw Nursery, T. B. Bledsoe, Hugo.
Cleveland Nursery, W. G. Dugan, Cleveland.
Comanche Nursery, J. T. Morris, Comanche.
Creek Nursery, N. D. Hufustedler, Dewar.
Crescent Nurseries, J. T. Pfrimmer, Crescent.
Chickasaw Nurs. & Seed Co., H. M. Wolverton, Duncan.
C. V. Nurseries, J. W. Tetirick & Son, Blackwell.
Cobb & Bobbitt, Cobb & Bobbitt, Perry.
Deep Red Nursery, W. E. Conner, Grandfield.
D. M. McNally Plant & Fruit Co., —————, Durant.
Durant Nursery Co., W. A. Wagner, Durant.
Elk City Nursery, F. W. Bodurtha, Elk City.
Fain & Waters Nurs. Co., Fain & Waters, Marlow.
—————, E. C. Finney, Shawnee.
Frederick Nursery, R. H. Flood, Frederick.
Forest Tree Nursery, Leonidas Furgeson, Mt. View.
Furrow & Co. Nursery, Furrow & Co., Guthrie.
Furrow & Co. Nursery, Furrow & Co., Crescent.



NO. 15—HYBRID CATALPA.

It resembles closely the *Catalpa Speciosa*. This tree could, with little difficulty, be made to grow in a reasonably good form for the production of posts. It is not as good, however, as the true *Catalpa Speciosa*, as that tree grows more upright in form, with fewer branches than the tree shown in this figure. The bark of this tree is almost identical with the true *speciosa* bark.

Great Western Nursery Co., C. Galeener, Oklahoma City.
 Greer Co. Home Nursery, J. C. Wright, Mangum.
 Glasscock & Taylor, J. T. Glasscock, Paden.
 Hartshorne Nursery, D. D. Forman, Hartshorne.
 ———, A. E. Hayes, Sapulpa.
 Henryetta Nursery, W. W. Waldo, Henryetta.
 ———, T. M. Henry, Okemah.
 Hudson's Nursery, Irl Hudson, Wilmoth.
 Hugo Nursery, J. M. Hale, Hugo.
 Hyde Park Nurs. Co., Hyde Park Nurs. Co., Muskogee.
 I. A. Richardson, I. A. Richardson, Vinita.
 Jones Nursery, ———, Choctaw.
 Jones' Bros. Nursery, ———, Tulsa.
 Lamont Nursery, ———, Lamont.
 Johnson's Nurs. & Fruit Farm, A. A. Johnson, Yukon.
 McLoud Star Nursery, W. W. Garner, McLoud.
 Mustang Valley Fruit Farm, Karl Hermann, Mustang.
 ———, J. S. Naylor Okeene.
 Nursery No. 1, J. F. Prewitt, Gracemont.
 N. W. Britt Nursery, N. W. Britt, Minco.
 Okemah Nursery Co., W. E. Rose, Okemah.
 Oklahoma City Nursery, W. E. Rey, Oklahoma City.
 Oklahoma Nursery Co., Milstead & Tallant, Edmond.
 O. K. Nurseries, ———, Wynnewood.
 Ozark Nursery Co., Ben Davis, Tahlequah.
 Parker Nurs. & Orc. Co., Jim Parker, Tecumseh.
 Pawnee Nursery, J. D. Dougan & Son, Pawnee.
 Pyeatt Townsend Nurs., Pyeatt & Townsend, Pauls Valley.
 ———, C. M. Redmond, Okemah.
 Riverside Nursery, Almon Hall, Oklahoma City.
 Roff Nursery, Zorn Bros., Roff.
 Rose Valley Nurseries, J. D. Durksen, Korn.
 Sapulpa Nursery, Douglass Lanning, Sapulpa.
 Sentinel Nurseries, T. M. Meler, Sentinel.
 Shawnee Nursery, L. H. Taylor, Shawnee.
 Sheffer Bros. Nursery, Sheffer Bros., Yukon.
 Southwestern Nursery, F. F. Furgeson & Son, Minco.
 Spring Valley Fruit Farm, H. Emerson, Enid.
 Star Nursery, D. B. Garriott, Stroud.
 The Cleo Nursery, S. M. Crossman, Cleo.
 The Clinton Nurseries, W. A. Tucker, Clinton.
 The Dix Nurseries, J. A. Coffman, Cleveland.
 The Enid Nurseries, J. A. Lopeman, Enid.
 The Glens Nursery, J. H. Parker, Kingfisher.
 The Ihloff Nursery, M. M. Ihloff, Fairview.
 The Kingfisher Nurseries, J. W. Preston, Kingfisher.

The Kingfisher Nurseries, J. W. Preston, Stillwater.
The Lawton Nurseries, Lewis Olson, Lawton.
The Noble Nurseries, Garee & Garee, Noble.
The Rose & Grape Nursery, A. S., Baldrige, Oklahoma City.
The Tuttle Nursery, L. C. Brodie, Tuttle.
Tishomingo, L. M. Chisholm, Milburn.
Tillman Co. Nurseries, Johnson & Snow, Frederick.
V. P. Siler, V. P. Siler, Crescent.
W. C. Trimble & Sons, W. C. Trimble & Sons, Durant.
Whittaker's Nursery, H. S. Whittaker, Shawnee.
Witcher Nursery, B. W. Black, Witcher.
Woods Co. & Augusta, E. D. Hunt, Augusta.

