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# AGRICULTURAL EXPERIMENT STATION.

## KANSAS STATE AGRICULTURAL COLLEGE.

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DEPARTMENT OF FORESTRY.

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### Trees for Kansas.

CHAS. A. SCOTT.

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There are two classes of trees: conifers and broadleaved.

#### CONIFERS.

The conifers are the cone-bearing trees. Most of them retain their leaves throughout the entire year, hence as a group they are commonly known as "evergreens." Evergreens include some of the hardiest drouth-resistant trees known. Several of them are well adapted to Kansas soil and climate, being most valuable for protective and ornamental planting. They make a height growth of from twelve to thirty inches per year, which compares favorably with the rate of growth of the broadleaved species. They are long-lived, comparatively free from insect attack, and suffer less injury from hail and windstorms than do the broadleaved species.

Because the evergreen trees retain their leaves, they afford greater protection from the wind during the winter than do the broadleaved deciduous trees. A few rows or a clump properly located makes the best windbreak that it is possible to grow. They will grow in the poorest rocky or sandy soils in the state, as well as in the driest clay soils. They should not be planted in gumbo, alkali, or poorly drained soils. Most of the evergreen trees are highly ornamental and merit greater consideration for yard planting than they have received in this state.

In planting evergreen trees only transplanted stock should be used. When several hundred are to be planted for hedges, windbreaks, or woodlots, transplanted stock twelve to eighteen inches in height gives the best results. Trees of this size cost less, are more cheaply planted, and sustain no greater loss than the larger sizes. When only a few are to be set, larger-

sized stock is more desirable, since they have ornamental value from the time they are planted. Trees from three to five feet in height may be used. However, this size can be handled safely only when balled and burlapped; *i. e.*, with balls of earth bound securely about the roots.

BROADLEAVED TREES.

The broadleaved trees are known commercially as "hardwoods" and include all trees not included in the evergreen group. Native trees, such as the elm, ash, oak, cottonwood, basswood, and maple, are included in this group. Some of these trees retain their leaves throughout the greater part of the year; as for example, the holly, magnolia, live oak, and the trees of the tropics. They are seldom referred to as evergreens, however, and are never grouped as such botanically. The hardiness of the broadleaved trees varies with each species. Many of them are well adapted to eastern Kansas conditions and the hardiest of them grow successfully in western Kansas.

Because of the great difference in climate between the eastern and the western part of Kansas, it is necessary to choose trees suited to the section in which they are to be grown. The following lists indicate the species adapted for the different sections of the state.

TREES AND NATIVE SHRUBS FOR THE SECTION IN WHICH THE AVERAGE RAINFALL EXCEEDS THIRTY-FIVE INCHES.

*Evergreens suitable for protective and ornamental planting:*

- White pine (*Pinus strobus*).
- Red or Norway pine (*Pinus resinosa*).
- Table Mountain pine (*Pinus pungens*).
- Pitch pine (*Pinus rigida*).
- Austrian pine (*Pinus austriaca*).
- Scotch pine (*Pinus sylvestris*).
- Swiss Mountain Pine (*Pinus mugho*).
- Colorado blue spruce (*Picea parrgana*).
- White spruce (*Picea canadensis*).
- Black Hills spruce (*Picea englemanni*).
- Norway spruce (*Picea excelsa*).
- Douglas fir (*Pseudotsuga mucronata*).
- White or silver fir (*Abies concolor*).
- Chinese arbor vitæ (*Thuja orientalis*).
- Bald cypress (*Taxodium dictichum*).
- Dwarf juniper (*Juniperus communis*).
- Red cedar (*Juniperus virginiana*).

*Trees for Kansas.*

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*Broadleaved species suitable for street and yard planting:*

Sugar maple (*Acer saccharum*).  
Silver maple (*Acer saccharinum*).  
White oak (*Quercus alba*).  
Red oak (*Quercus rubra*).  
Pin oak (*Quercus palustris*).  
Burr oak (*Quercus macrocarpa*).  
Hackberry (*Celtis occidentalis*).  
White elm (*Ulmus americana*).  
Rock or Cork elm (*Ulmus thomasi*).  
English elm (*Ulmus campestris*).  
Tulip tree (*Liriodendron tulipifera*).  
Sycamore or plane tree (*Platanus occidentalis*).  
Black cherry (*Prunus serotina*).  
Red bud (*Cercis canadensis*).  
Kentucky coffee tree (*Gymnocladus dioica*).  
Thornless honey locust (*Gleditsia triacanthos*).  
White ash (*Fraxinus americana*).  
Green ash (*Fraxinus lanceolata*).  
Russian wild olive (*Elæagnus angustifolia*).  
Pecan (*Hicoria pecan*).  
River birch (*Betula nigra*).  
Basswood (*Tilia americana*).  
Carolina poplar (*Populus deltoides* var. *caroliniana*).  
Tree of heaven (*Ailanthus glandulosa*).  
Red haw (*Cratægus mollis*).  
Cockspur (*Cratægus crus-galli*).  
Wild crab (*Malus cornaria*).  
Service berry (*Amelanchier canadensis*).  
Sumach (*Rhus copallina*).  
Smooth sumach (*Rhus glabra*).

*Trees suitable for wood-lot planting:*

Austrian pine (*Pinus austriaca*).  
Red cedar (*Juniperus virginiana*).  
Cottonwood (*Populus deltoides*).  
Black walnut (*Juglans nigra*).  
Hardy catalpa (*Catalpa speciosa*).  
Burr oak (*Quercus macrocarpa*).  
Red oak (*Quercus rubra*).  
Pecan (*Hicoria pecan*).  
White ash (*Fraxinus americana*).  
Osage orange (*Toxylon pomiferum*).

TREES AND SHRUBS FOR THE SECTION IN WHICH THE ANNUAL  
RAINFALL IS BETWEEN TWENTY-FIVE AND THIRTY-FIVE  
INCHES.

*Evergreens suitable for protective and ornamental planting:*

- Western yellow pine (*Pinus ponderosa*).
- Table Mountain pine (*Pinus pungens*).
- Austrian pine (*Pinus austriaca*).
- Scotch pine (*Pinus sylvestris*).
- Swiss Mountain pine (*Pinus mugho*).
- Colorado blue spruce (*Picea parryana*).
- Black Hills spruce (*Picea canadensis*).
- Douglas fir (*Pseudotsuga mucronata*).
- White or silver fir (*Abies concolor*).
- Chinese arbor vitæ (*Thuja orientalis*).
- Dwarf juniper (*Juniperus communis*).
- Red cedar (*Juniperus virginiana*).

*Broadleaved species suitable for street and yard planting:*

- Silver maple (*Acer saccharinum*).
- Red oak (*Quercus rubra*).
- Pin oak (*Quercus palustris*).
- Burr oak (*Quercus macrocarpa*).
- Hackberry (*Celtis occidentalis*).
- White elm (*Ulmus americana*).
- Rock or cork elm (*Ulmus thomasi*).
- English elm (*Ulmus campestris*).
- Tulip tree (*Liriodendron tulipifera*).
- Sycamore or plane tree (*Platanus occidentalis*).
- Black cherry (*Prunus serotina*).
- Kentucky coffee tree (*Gymnocladus dioicus*).
- Thornless honey locust (*Gleditsia triacanthos*).
- Green ash (*Fraxinus lanceolata*).
- Russian wild olive (*Eleagnus angustifolia*).
- Pecan (*Hicoria pecan*).
- Basswood (*Tilia americana*).
- Carolina poplar (*Populus deltoides var. caroliniana*).
- Norway poplar (*Populus deltoides var.*).
- Tree of heaven (*Ailanthus glandulosa*).
- Red bud (*Cercis canadensis*).
- Wild crab (*Malus cornaria*).
- Smooth sumach (*Rhus glabra*).
- Sumach (*Rhus copallina*).
- Red haw (*Cratægus mollis*).
- Cockspur (*Cratægus crus-galli*).

*Trees suitable for wood-lot planting:*

- Austrian pine (*Pinus austriaca*).
- Red cedar (*Juniperus virginiana*).
- Chinese arbor vitæ (*Thuja orientalis*).

Cottonwood (*Populus deltoides*).  
Black walnut (*Juglans nigra*).  
Hardy catalpa (*Catalpa speciosa*).  
Burr oak (*Quercus macrocarpa*).  
Red oak (*Quercus rubra*).  
Pecan (*Hicoria pecan*).  
Osage orange (*Toxylon pomiferum*).

TREES FOR THE SECTION IN WHICH THE ANNUAL RAINFALL IS  
LESS THAN TWENTY-FIVE INCHES.

*Evergreens suitable for protective and ornamental planting:*

Red cedar (*Juniperus virginiana*).  
Dwarf juniper (*Juniperus communis*).  
Chinese arbor vitæ (*Thuja orientalis*).  
Austrian pine (*Pinus austriaca*).  
Scotch pine (*Pinus sylvestris*).  
Western yellow pine (*Pinus ponderosa*).

*Broadleaved species suitable for street and yard planting:*

Thornless honey locust (*Gleditsia triacanthos*).  
Hackberry (*Celtis occidentalis*).  
White elm (*Ulmus americana*).  
Green ash (*Fraxinus lanceolata*).  
Russian wild olive (*Elæagnus angustifolia*).  
Osage orange (*Toxylon pomiferum*).  
Russian mulberry (non-fruiting only) (*Morus alba*).

*Species suitable for wood-lot planting:*

Austrian pine (*Pinus austriaca*).  
Red cedar (*Juniperus virginiana*).  
Chinese arbor vitæ (*Thuja orientalis*).  
Cottonwood (*Populus deltoides*).  
Osage orange (*Toxylon pomiferum*).  
Kentucky coffee tree (*Gymnocladus dioica*).  
Black walnut (*Juglans nigra*).  
Russian mulberry (*Morus alba*).

The selection of trees for any definite locality in this region must be determined by the character of soil in which they are to be planted. The following are well adapted for heavy loam upland soil :

**Red cedar.**  
**Scotch pine.**  
**Austrian pine.**  
**Western yellow pine.**  
**Chinese arbor vitæ.**  
**White elm.**

Hackberry.  
Honey locust.  
Osage orange.  
Russian wild olive.  
Green ash.

For planting on loam soil in valley lands along the water-courses or in ravines, the cottonwood, black walnut, and Kentucky coffee tree may be added to the above list.

For planting in light sandy soil, such as sand dunes or in sandy river valley soil, the following are satisfactory:

Red cedar.  
Austrian pine.  
Western yellow pine.  
Scotch pine.  
Jack pine.

In sandy loam soil the cottonwood, Osage orange, and Russian mulberry may be added to the above list.

The boxelder, soft maple, Carolina poplar, and others of the more rapidly growing species are omitted from this list because they are at best but short-lived in this section. They reach their development in about fifteen or twenty years, and then die. Whenever these species are planted they should be in a mixture with some of the longer-lived species, such as the white elm, hackberry, honey locust, and Russian wild olive. These trees, while slower in their development, will attain sufficient size to occupy the ground fully and take the place of the shorter-lived trees by the time the latter begin to die.

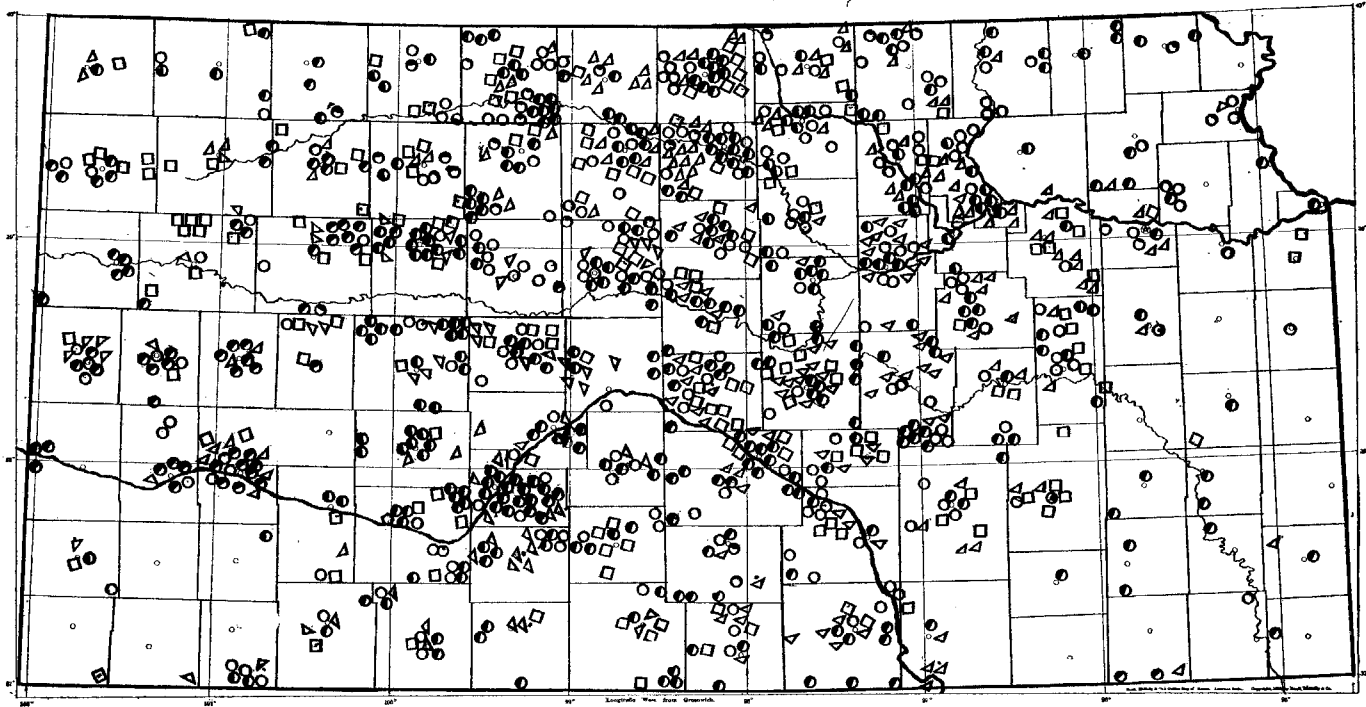
### **The State Forestry Nursery.\***

Because of the insistent and growing demand from the people of the western part of the state, the department of forestry of the Kansas Agricultural Experiment Station has established a state forest nursery at the Fort Hays Branch Experiment Station, Hays, Kan.

The purpose of this nursery is to supply stock suitable for planting in western Kansas. When the trees produced here reach sufficient size they are sold to the actual planters at cost of production. The price of this stock varies with the species, age, grade, and season.

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\* The state forest nursery is under immediate supervision of J. W. Preston. Much of the success of the undertaking is due to his skillful and efficient work.



Legend. ●=1 ○=2 ▲=3 □=4

The above map of Kansas shows the distribution of trees sent out from the state nursery during the years 1912, 1913, 1914, and 1915, as indicated by the several characters:

- 1 shows the points to which shipments were made in 1912.
- 2 shows the points to which shipments were made in 1913.
- 3 shows the points to which shipments were made in 1914.
- 4 shows the points to which shipments were made in 1915.

This chart, furthermore, shows the sections of the state in which tree planting is a factor in farm and home development.

GROWING NURSERY STOCK.

The growing of evergreen stock requires the attention of a skilled and experienced nurseryman. The seed may be sowed either in the fall or spring in well-prepared beds enclosed with a frame of boards and wire netting and covered with a lattice roof. The enclosure is to protect the seeds and seedlings from birds and animals, while the lattice roof shields them from the sun, wind, rain, and hail. Most of the evergreen seedlings, that survive under natural conditions, grow in partial shade. Very few of them can endure the full sunlight during the first summer. During their first season the seedlings are subject to several plant diseases, and it is this period that tests a nurseryman's skill in saving his stock.

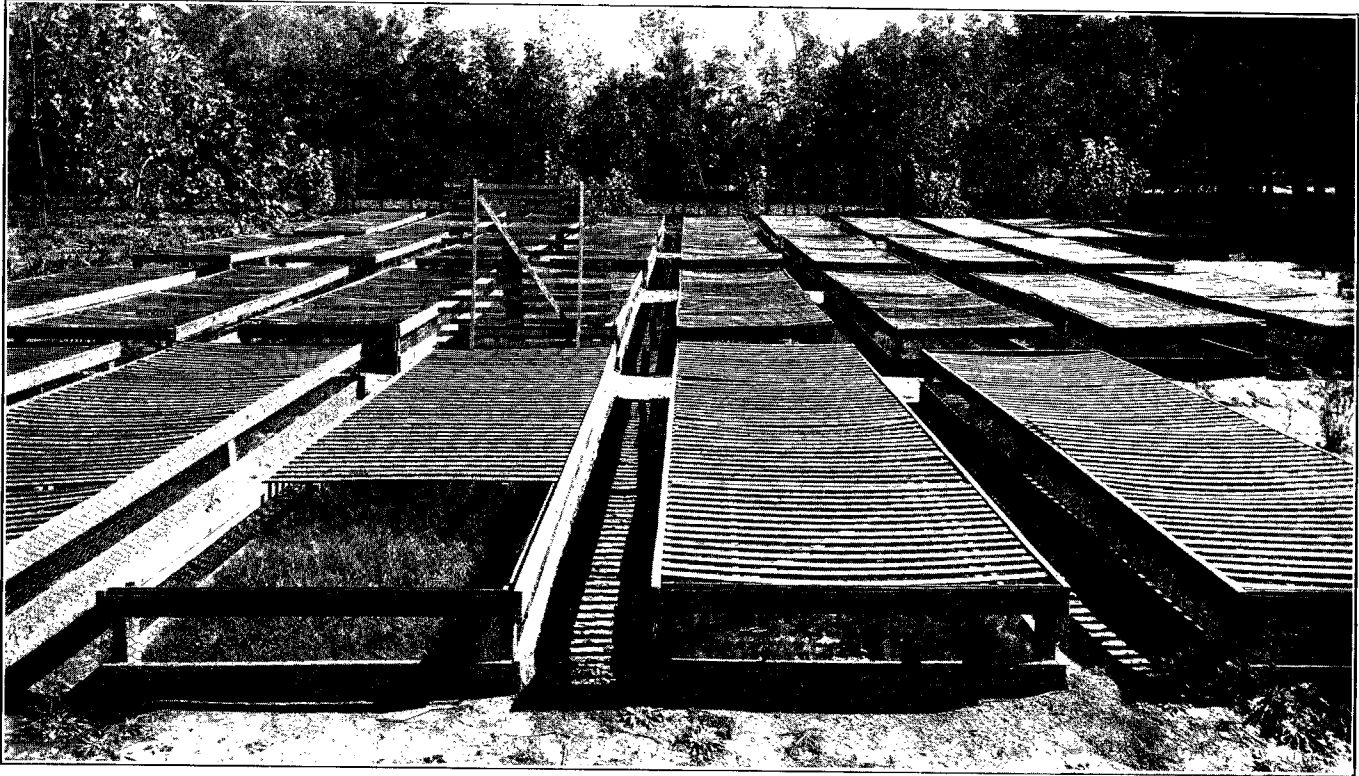
At one or two years of age they are transplanted to nursery rows, where they are grown from one to three years, or until of suitable size to plant in their permanent location.

The seeds of the broadleaved, species are usually sown in the open field in nursery rows, where the stock grows without being transplanted, until of sufficient size for permanent planting; but it is usually root pruned at one or two years of age. The broadleaved seedlings are less liable to plant diseases than the evergreen seedlings, and they grow with much more vigor, attaining heights varying from one to three feet in a single season. At one, two and three years of age this stock is of suitable size for wood-lot and windbreak planting.

PLANTING TREES.

The successful result of any planting depends on three factors: (1) the freshness and vigor of the trees; (2) the proper planting in a congenial soil; (3) the conservation of moisture by cultivation and the protection from injury by live stock and insects. The difficulty that many tree planters have experienced in growing evergreen trees is due to the dead or dying condition in which the stock was received. Evergreen trees are very sensitive and a few minutes' exposure of their roots to the air is fatal. All danger of such injury is easily prevented if the roots are puddled as soon as the trees are dug in the nursery and again when they are unpacked to be planted.

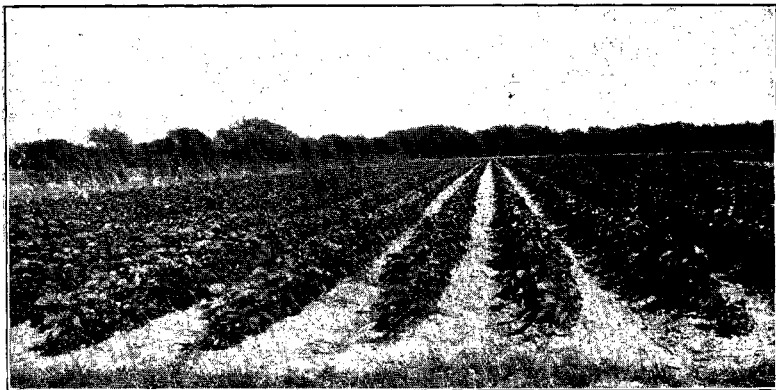




A block of evergreen seedling beds in the state forest nursery. Note construction of the seedbed frames and lattice covering to protect the plants from wind, sun, rain and hail.



Two-year-old transplanted red cedars in the nursery row in the state forest nursery.



A block of catalpa seedlings in the state forest nursery, Hays, Kan.



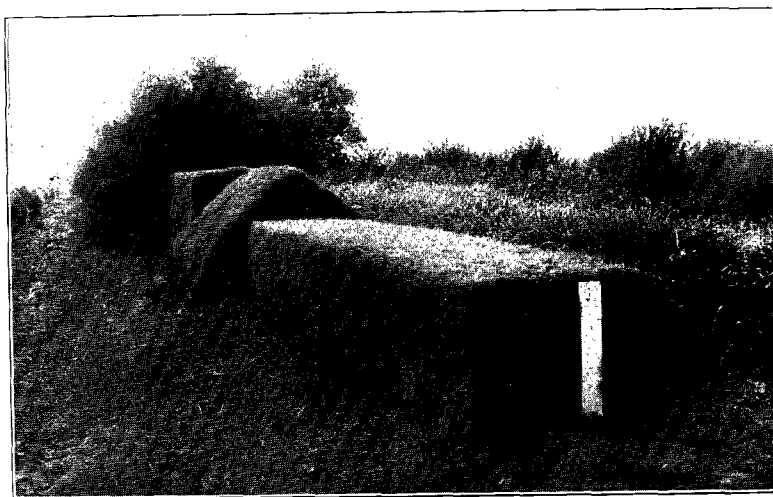
A block of 15,000 transplanted four- to eight-foot white elm trees in the state forest nursery.



A block of 20,000 three-year-old five- to nine-foot honey locust trees in the state forest nursery.



A block of 50,000 three-year-old four- to nine-foot green ash trees in the state forest nursery.



A tamarix hedge growing at the Fort Hays Branch Experiment Station, Hays, Kan. This hedge was grown without irrigation. It was sheared about once every two weeks throughout the summer to keep it in good form. The different forms show how the hedge may be developed. The clump at the further end shows the unshaped natural development. The tamarix is entirely hardy in western Kansas and it is well adapted for hedges and ornamental planting.

CARE OF PLANTING STOCK.

The care of the planting stock is of prime importance. The trees should be handled at all times with the greatest care, with full knowledge that they are perishable and that any exposure of the roots is injurious to their future growth. After the trees are received, they should be kept in a cool, shaded place or be heeled in. If they are to be set within a day or two, they will usually keep in perfect condition in the shipping bundle, if properly protected. A cellar is an ideal place in which to store them for a few days. When this is not available, they can be buried in an old straw pile. If several days are likely to elapse before planting, it is advisable to unpack them, heel them in, and tramp fresh soil firmly about the roots, after which the tops may be covered with hay or straw for protection against the sun and wind. If the trees are properly heeled in, they will keep for a week or longer without injury. It is seldom, however, that they need to be kept for this length of time before a favorable planting day occurs. Actual planting should be done only during favorable weather. It is impossible to protect a tree against exposure during periods of dry, windy weather. A cloudy or damp day is the best time for planting trees. The trees can then be handled without endangering the roots, and the soil can be exposed without serious drying.

PREPARATION OF GROUND FOR PLANTING.

The preparation of the ground for tree planting is, next to the selection of the species for planting, the most important step in successful tree growing. Trees can not grow unless there is sufficient moisture in the soil to keep them in a thrifty condition. A tree, when transplanted, is set in the ground with less than twenty-five per cent of its former root system; consequently the first thing a newly planted tree must do is to develop a new system of roots and establish itself in its location. To do this, and at the same time to support a growth of leaves, requires a liberal supply of moisture. The only way to supply this moisture is to have it in the soil when the trees are planted.

Virgin prairie soil is unsuited for trees. The ground should be broken and cropped at least one year before planting. If cropping is not practical, the ground should be broken, thor-

oughly disked, and plowed to a depth of eight or ten inches, and summer fallowed one season.

Ground that has been under cultivation for some time should be fallowed for a year before the trees are planted. This includes deep plowing in May or early June, followed by sufficient surface cultivation throughout the summer to keep down all weeds and to maintain a soil mulch. Deep plowing loosens the soil and puts it in condition to retain all the moisture that falls upon it. The surface tillage during the summer not only controls the weeds but also prevents the loss of moisture from the soil by evaporation. This is particularly important in western Kansas.

For street and yard planting, deep plowing and summer fallowing can not be practiced. Instead of deep plowing, deep spading may be substituted. Street and yard trees, with the most favorable treatment, are under a serious handicap. The grass sod or other native vegetation growing around them uses a large proportion of the soil moisture which is needed by the trees. The immediate location for such trees should be spaded up for an area at least six feet in diameter. The depth to which the ground should be loosened will depend entirely upon the character of the subsoil. If the subsoil is hard "jointed clay," it will be advisable to loosen the ground to a depth of three or four feet. In case the subsoil is loamy, spading to a depth of eighteen or twenty inches will be sufficient. When a supply of water is available, the ground for such planting need not be spaded up until within a few days of the time the trees are to be set. Immediately after being spaded up, the ground should be thoroughly wet and allowed to remain undisturbed for two or three days before the trees are planted.

The practice of digging the holes some weeks or months before the trees are to be planted is a serious mistake. Such a practice permits the exposed soil to become air dry, and if the subsoil contains clay, to bake and harden. Such a condition is difficult to correct. Tree holes should be dug only when the trees are ready to set. The moist soil taken out of the hole is then in good condition to fill in about the roots and will reunite readily with the bottom and sides of the hole. This can not occur when the hole is left open for some time before the tree is planted.

TIME TO PLANT.

Most successful results are secured from early spring planting. The latter part of March or early April is the proper time to plant either evergreen or broadleaved species. Early planting allows the roots to begin growth by the time the leaves are bursting and to supply proper moisture for the tree. Late spring planting is objectionable because the leaves come out before the new roots develop and the tree is likely to die and certain to suffer greatly from the lack of moisture. For the same reason it is unsafe to plant trees in the fall where the autumn and winter seasons are dry. Trees set in the fall do not develop feeding roots until the following spring, and during the winter months there is great danger of the stems and branches becoming thoroughly dry by transpiration through the pores in the bark.

METHOD OF PLANTING.

In planting trees, the holes should be dug fully twice as wide and twice as deep as the roots require in their natural position. By this method the soil is thoroughly worked over and pulverized, and is capable of absorbing and retaining a greater amount of moisture than would otherwise be possible. Loosening and aerating the soil liberates the plant food and induces a vigorous growth. The tree should be set in place at about the same depth that it grew in the nursery, and the roots should be spread naturally, covered with three or four inches of soil, and tramped firmly. The object of firming the soil is to bring the roots and soil in close contact. After this the hole should be filled with loose soil to the level of the surrounding ground. The surface should be left in a loose condition for a mulch.

CULTIVATION.

After the trees are planted, they demand as careful cultivation as any crop. This fact is too often overlooked in the care of trees. It is unreasonable to expect newly planted trees to compete successfully with the native plants of the region. Cultivation conserves the soil moisture by preventing evaporation and keeps down other vegetation which would use the moisture needed by the trees. The cultivation need not be deep, but must be thorough. The more intensive the cultivation, the greater the success will be.

PROTECTION.

Newly planted trees require protection against injury by the sun, wind, and animals. Protection against injury by the sun and wind is required by the evergreens more than by the broadleaved species. Furthermore, because evergreens are in full foliage when they are planted, there is considerable danger that they will suffer from the effect of excessive transpiration. To guard against this danger, a screen of some kind should surround them. When only a few trees are involved, small boxes with their tops and bottoms knocked out, can be set around the trees. Empty nail kegs will also answer the purpose. A screen of burlap tacked to three or four stakes at equal distances around the tree answers the purpose very well. For extensive planting, as in groves and shelter-belts, shingles or shortpieces of light box boards from six to eight inches in width, driven into the ground a few inches from the tree on the southwest side, provide excellent protection. Some protection of this nature is very necessary during the first month or six weeks after the evergreens are planted.

The broadleaved species will require no special protection, except from rabbits. Their stems should be wrapped with burlap, grass, cornstalks, or wooden veneer tree-protectors, or painted with crude oil.

Live stock of all kinds must be rigidly excluded from the area occupied by young trees. Browsing off the tips of the branches, rubbing against the stems, and trampling the ground around the trees, are all detrimental and can not be permitted if successful growth is to be secured.

When leaf-eating insects threaten, the trees should be sprayed with an arsenical spray. To protect against borers, the stems of the newly planted trees may be painted with a saturated solution of sal soda, to which enough laundry soap has been added to make a thick paint. Carbolic acid is then added to this mixture at the rate of one pint to ten gallons. This should be applied frequently enough to keep the stems completely coated from the first of May to the middle of August during the first and second seasons.



RESULTS.

The results secured from trees sent out by the state nursery during the past four years have been very satisfactory, as shown in the following tables, compiled from reports sent in by those who planted state nurserystock. It may be mentioned that the seasons of 1912, 1913 and 1914 were very unfavorable for planting trees.

TABLE I.—Showing result of planting in 1912.

Species.	Total number sold.	Total number reported.	Total number reported living.	Percent living trees reported.
Red Cedar .....	37,107	22,800	15,518	68
Catalpa .....	18,712	11,445	10,319	90
Green Ash .....	3,700	1,723	1,295	90
White Elm .....	4,952	2,191	1,912	87
Honey Locust .....	2,611	1,125	854	76
Total .....	67,082	39,284	29,898	76

TABLE II.—Showing result of planting in 1913.

Species.	Total number sold.	Total number reported.	Total number reported living.	Percent living trees reported.
Catalpa .....	68,210	64,401	47,835	74
Chinese Arbor Vitæ.....	26,010	10,739	6,552	61
Red Cedar .....	4,746	2,248	1,327	59
Russian Wild Olive.....	262	168	75	45
Honey Locust .....	11,497	6,303	4,570	73
Osage Orange .....	30,570	13,220	3,244	24
White Elm .....	1,917	1,160	738	64
Green Ash .....	650	332	258	75
Poplar .....	156	156	129	83
Mulberry .....	200	200	200	100
Total .....	144,218	98,927	64,928	65

TABLE III.—Showing result of planting in 1914.

Species.	Total number sold.	Total number reported.	Total number reported living.	Percent living trees reported.
Catalpa .....	35,100	32,500	30,809	95
Chinese Arbor Vitæ.....	36,543	17,571	11,228	63
White Elm .....	2,318	1,060	828	78
Green Ash .....	496	292	212	72
Honey Locust .....	1,495	580	393	67
Total .....	75,952	52,183	43,470	83

TABLE IV.—Showing result of planting in 1915.

Species.	Total number sold.	Total number reported.	Total number reported living.	Percent living trees reported.
Catalpa .....	5,497	5,201	5,199	99
Chinese Arbor Vitæ.....	14,150	8,035	7,310	91
White Elm .....	3,415	2,747	2,637	96
Green Ash .....	458	77	74	96
Honey Locust .....	8,249	4,598	4,272	93
Osage Orange .....	14,703	7,206	5,959	83
Russian Mulberry .....	406	159	158	99
Russian Wild Olive.....	355	88	83	93
Tamarix .....	484	473	458	97
Poplar .....	259	106	102	96
Cottonwood .....	2,875	400	260	65
Hackberry .....	697	110	108	98
Kentucky Coffee Tree.....	27	13	13	100
Red Bud .....	320	237	232	98
Total .....	51,895	29,450	26,845	91

SUMMARY.

Successful results in planting trees depend upon :

- (1) The trees.
- (2) Their proper protection.
- (3) Thorough cultivation.

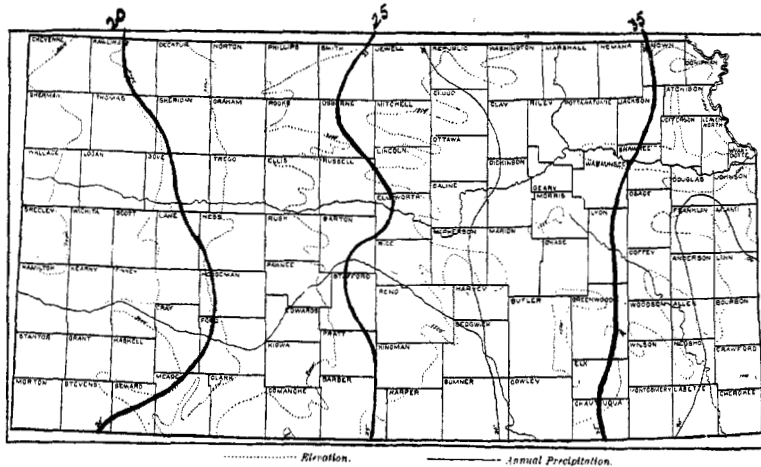
The trees must be fresh and vigorous, as well as carefully selected with regard to the soil and climate of the locality in which they are to be grown. Only transplanted evergreen stock that is from fifteen to eighteen inches in height should be used for permanent planting. Larger-sized evergreens for ornamental planting can be handled successfully only when balls of earth are bound securely about the roots. Broad-leaved trees desired for street and yard planting should be from eight to twelve feet in height, and from one and one-fourth to two inches in diameter, though stock ranging from four to six feet in height is better for extensive planting.

The protection of planting stock is of prime importance because it is highly perishable, and suffers greatly from exposure or drying. Planting should not be attempted during a dry, windy period, and newly planted evergreens should always be protected from the sun and wind. All young trees must be protected against insects, rabbits, and live stock. Early spring planting is preferable to fall or late spring planting.

Thorough preparation of the planting site is essential to good results. The soil should be very firmly tramped about the roots of the newly set trees and thoroughly cultivated until the trees are well established.

Many evergreens are among the hardiest trees for Kansas, because they are comparatively free from insect attacks, are long lived, and suffer less from hail and wind storms than broadleaved species. There is no locality in Kansas where at least one of the evergreens will not grow. These trees are very valuable as windbreaks, for wood lots, and for ornamental planting and hedges.

Trees, like other plants, vary in their soil and climatic requirements. Most trees require a deep, rich, moist, well-drained soil and a humid atmosphere during the summer months. Moisture is more important than temperature, although some trees, like the herbaceous desert plants, thrive in arid climates. Trees of this last type should be selected for planting in western Kansas.



Outline map of Kansas showing the limits of the average annual rainfall. The eastern section has a rainfall of thirty-five inches or more. In the central section it varies from twenty-five to thirty-five inches, while in the western section it is less than twenty-five inches.

For price lists of planting stock and for information of any nature concerning trees not given in this circular, address, The State Forester, Manhattan, Kan.