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TREES FOR NON-IRRIGATED REGIONS IN EASTERN COLORADO

BY
W. J. MORRILL
State Forester, Colorado Agricultural College

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TREES FOR NON-IRRIGATED REGIONS IN EASTERN COLORADO

By W. J. MORRILL
State Forester,
Colorado Agricultural College

INTRODUCTORY

Eastern Colorado, generally speaking, is a newly settled country; its uplands are naturally treeless, and tree planting for beautifying the homes and for economic reasons is only beginning. Successful tree growing as shown by early plantings, however, is possible and practicable, in spite of climatic factors unfavorable to the growth of many or most species. But success is dependent, in the majority of instances, upon the proper choice of species, correct planting methods and subsequent care.

The matters of chief consideration naturally group themselves around three heads, namely, ***what to plant, how to plant,*** and ***where to plant.*** The material in this bulletin is based on several years of observations; yet it is felt that more study is required in order to write more than merely a preliminary report. There are, however, many inquiries for the advice of the Forestry Department of the Colorado Agricultural College in regard to trees and tree planting in eastern Colorado, and this, it is hoped, will serve temporarily to give some assistance. To Professor B. O. Longyear I am indebted for the material concerning vines and shrubs, and for criticism.

What To Plant

TREES

The choice of species naturally adapted to resist drought and winter-killing in our climate is rather limited at present. Probably with more experimenting a number of other species will be added. In this connection, this office is very grateful for information it receives from those who are growing trees on their farms in Colorado. Trees successfully grown in some communities have not proven hardy in adjacent localities. As time elapses, it may be possible to map eastern Colorado into divisions in which certain lists of trees and shrubs are known to be uniformly hardy. This has not been done yet. In general, the following species have been most frequently recommended, after field investigations, by this department for eastern Colorado, exclusive of the Arkansas Divide:

Black Locust (Robinia pseudaccacia)

A rapid-growing hardwood tree, valuable for shade, posts, fuel and farm repairs. No species is capable of serving better for general farm purposes where this species will grow and where the Black Locust borer has not yet appeared. It will not withstand winter-killing quite as well as Honey Locust. Posts will last 30 years without preservative treatment. It can be recommended for the southern half of eastern Colorado, except in the vicinity of Denver and Boulder, and near the Kansas boundary, where the Black Locust borer kills or badly injures all trees of this species. In sheltered locations the species will grow in the northern half of eastern Colorado.

The Black Locust borer has rendered the planting of Black Locust largely inadvisable in the states to the eastward, but at present in most parts of Colorado the tree can be planted with the assurance of little probability of loss due to the borer, except in the localities mentioned. As time elapses, more groves of this species are sure to be planted and it is probable that the borer will then spread, rendering it inadvisable to grow Black Locust, but this time may be a generation or two in the future.

Honey Locust (Gleditsia triacanthos)

A hardwood tree of moderate growth, a bit faster than Green Ash. The wood is good for fuel, farm repairs, and of fair durability for posts (about 12 or 13 years). It can be distinguished from the Black Locust by its having longer thorns, which are branched. This species will endure stiff, hard soil and alkali better than other species, but all trees prefer soils fairly loose. Altogether, no species can be more safely recommended for trying conditions in all parts of eastern Colorado. The seeds, when ground, are said to have a nutritive value equal to corn as feed for stock, while the unripe pods are eaten by cattle, when accessible. A thornless variety is sometimes available in nurseries. Both the Black Locust and the Honey Locust enrich the soil by the storing of nitrogen in it, the same as alfalfa and other legumes, to which family these trees belong.

Russian Olive (Elaeagnus angustifolia)

A rapid-growing tree of small dimensions, not very straight-boled and with low-branching habit. Wood is not durable and probably of little commercial use. The species can endure extreme drought conditions and much alkali. It has attractive, bright silvery-green foliage, its leaves resembling in shape those of some willows, while the bark is dark-colored, suggesting that of some plum trees.

Russian Olive will be largely used for windbreaks, either alone or mixed with other species. It promises to become one of the most popular species for trying conditions along with Honey Locust. It also is suitable to grow as a trimmed hedge. As a small ornamental tree in our yards it will meet with favor.

Green Ash (Fraxinus pennsylvanica var. lanceolata)

This species is widely recommended for dry conditions, yet the writer prefers the three species already discussed. It is not quite as rapid in growth as Honey Locust and much slower than Black Locust and Russian Olive. Its wood, however, is, technically, one of the best which can be grown in the region for farm repairs, and is good fuel; but as posts it is not durable, lasting only about six years. Some plantations have suffered from borers when about seven or eight years old.

Hackberry (Celtis occidentalis)

Hackberry is slow-growing, small, fairly long-lived, very hardy, and attractive. It is found growing naturally in the sandhills of west-central Nebraska and occasionally in our foot-hills bordering the plains. Some authorities consider the species of Hackberry found in our foot-hills as a distinct species called ***Celtis reticulata.*** This species will find use in yard planting. As yet, it has not been much used in eastern Colorado. Its wood is similar to Elm, to which family the Hackberry belongs.

American Elm. White Elm. (Ulmus americana)

This species is a favorite all the way from humid New England, where its graceful, vase-like form adorns the meadows and other well-watered sites, to the regions of light precipitation in Colorado. Its adaptability to changes in environment is marked. In its drought-resisting qualities, however, Honey Locust, Russian Olive, Black Locust, and Hackberry must be ranked slightly ahead of American Elm. Nevertheless, American Elm will be accorded a place in eastern Colorado tree growing. It is found growing naturally along the river-bottoms as far west as the extreme northwest corner of Nebraska and the extreme northeast corner of Colorado.

While its wood is naturally not durable in contact with soil, it is tough, strong, and suitable for farm repairs. It is capable of being creosoted and rendered very durable for fence-posts.

Burr Oak (Quercus macrocarpa)

This species has not been used, so far as this office is informed, but all its characteristics point to its probable adaptability in this region. It is slow growing and long-lived. As Burr

Oak grows wild in northwestern Nebraska, it promises to be the most hardy Oak for eastern Colorado. Its wood is practically the same as the esteemed White Oak.

Cottonwood (Populus Sargentii)

Although planted more generally than any other, it is advisable to plant Cottonwood only in the moister soils, preferably in tilled bottoms, where it will make a rapid growth. Black and Honey Locust and Hackberry will withstand more drought. The Carolina Poplar, a species of Cottonwood, is not as long-lived nor as hardy as our Native Cottonwood. In a suitable location, Cottonwood will produce more volume of wood in a given period than any other species suited to our climate. The trees require full light to develop properly. Cottonwood can be readily grown from cuttings, which, when rooted, may be moved to the permanent site. Cuttings 12 or 14 inches long may be made in the winter, kept in moist sand to form a callous over the cut surface, and finally set at an angle of 45 degrees in moist soil with an inch or two of wood containing a strong bud protruding above-ground. In order to avoid the unpleasant features of the cotton, the cuttings may be taken from the staminate, or male, trees, which, of course, never produce seed with the cottony appendages to float it in the air. Cottonwood, although not naturally desirable for fence-posts, absorbs coal-tar creosote readily and after proper treatment at a reasonable expense can be made to last 20 years as a post.

Jack Pine. (Pinus divaricata)

A native of the Lake States and dry, sandy plains of Canada. It is a rapid-growing pine found hardy in the sand-hill region of Nebraska, where it is a favorite in planting on the ranches and in the few places in eastern Colorado where it has been tried. The wood is light, coarse-grained, moderately strong, and absorbs creosote very readily, making, after preservative treatment, durable posts. The Superintendent of the Dry-Farm Experiment Station in Akron, Washington County, Colorado, is enthusiastic over this species for non-irrigated conditions. As a windbreak, it is useful in winter and in summer as is true with conifers, and promises to become popular in this State, as it has in Nebraska. Three-year-old stock one or two years in transplant beds is suitable.

Western Yellow Pine. Bull Pine. (Pinus ponderosa)

A native of our mountains, making slower growth than Jack Pine in the first few years but later overtaking the former and becoming a larger, more beautiful and more valuable tree. It will not withstand quite so much drought. Three-year-old trans-

plant stock should be used. The long needles of this species, its sturdy, symmetrical growth and the ultimate value of its wood are points in its favor as a suitable tree for the region.

Rocky Mountain Red Cedar. (Juniperus scopulorum)

This resembles the eastern Red Cedar *(Juniperus virginiana)* but is hardier. It is successfully grown on non-irrigated farms in several places in eastern Colorado. As this species is a native in rough country called "breaks" in this region, it is not surprising that it should succeed when planted and tended anywhere in eastern Colorado. It is hardier than Arborvitae. As is well known, fence-posts from either the eastern or the western species of Juniper, often called Cedar, are very durable, lasting from 25 or 30 years to even a longer period.

Chinese Arborvitae. (Thuya orientalis)

This species is highly recommended by the State Forester of Kansas for use in western Kansas, and should be given a trial in our State. Until more information is obtained, the Chinese Arborvitae cannot be unreservedly recommended. The Junipers and Cedars should not be grown near apple trees on account of the "cedar apple" fungus which affects apple leaves and fruit. However, our Rocky Mountain Red Cedar is said not to serve as a host to this fungus of apples, although in a minor degree it does to pears and quinces.

GENERAL REMARKS

Broad-leaf trees may be planted when one year old. Such small stock is cheap and more likely to survive. The evergreens should be at least three years old, one or two of the three having been spent in the transplant beds. The stock may be purchased from any commercial nursery. Buying from reliable nurseries in Colorado or neighboring states is preferable to obtaining stock from distant states, because the young trees arrive in fresher condition.

Beginning with the year 1918, the State Forester at Fort Collins will sell the above-mentioned species, excepting Arborvitae, in lots of not less than 25, at cost of production. A contract was made with the United States Forest Service to grow yearling broad-leaf trees and three-year-old stock in the large government nurseries in Colorado and Nebraska. In the terms of sale, the purchaser agrees to report to the State Forester annually regarding the condition of the trees.

The office of the State Forester is conducting experiments in tree culture in co-operation with the federal government on the non-irrigated experimental farm at Akron, Colorado. The

following data is furnished by the superintendent of that station:

Species	Height in Feet (1916)	Condition in 1916
Planted in 1909—		
Honey Locust	9 — 14	Fair
Cottonwood	18 — 25	Poor to Fair.
Green Ash	6 — 12	Poor
American Elm	7 — 14	Fair
Black Cherry	7 — 10	Good
*Osage Orange	8 —	Good
Russian Olive	10 — 15	Good
Russian Mulberry	5 — 9	Poor
Black Locust	12 — 18	Good
Planted in 1910—		
Honey Locust	8 — 16	Good
American Elm	8 — 15	Good
Hackberry	8 — 15	Good
Black Locust	10 — 16	Good
Russian Mulberry	5 — 8	Poor
*Catalpa	3 —	Poor
European Larch	None living	
Scotch Pine	2.5 — 5.5	Good
Austrian Pine	4 — 8	Good
Jack Pine	6 — 11	Good
Western Yellow Pine.	3 — 4	Good
Black Hills Spruce.	None living.	
Douglas Fir	0.5 — 2.5	Good

*Kills back badly during the winter.

Since Akron typically represents eastern Colorado in location and climate, and the care given the plantations has been no more than any farmer can give, the results obtained to date are very suggestive.

The broad-leaf, or hardwood, trees require more moisture than the evergreen, or coniferous, trees, and consequently need more cultivation. Many favorite species commonly planted in the Missouri River Valley cannot be used in eastern Colorado. The Catalpa is not usually hardy, Mulberry succeeds in a few localities but cannot be uniformly recommended, and Osage Orange generally kills back each winter, as does Black Walnut. Box Elder will thrive, but other species of broad-leaf trees more attractive in form and foliage, and free from the red slugs, will grow where Box Elder will.

In cities or in door-yards, where some water can be supplied, the Colorado Blue Spruce, the Douglas Fir, Scotch Pine, Austrian Pine, and probably other conifers can be successfully grown.

INTRODUCED SPECIES OF SHRUBS

Japanese Barberry (Berberis Thunbergii)

Grows two to three feet high, forming a dense, rounded prickly bush with small leaves which turn scarlet in autumn and with

bright red berries which remain on over winter. This is undoubtedly the best low shrub to plant in dry situations and is excellent for placing along the foundations of the house and in front of taller growing shrubs.

Buckthorn (Rhamnus cathartica)

A tall, tree-like shrub or bushy small tree with spine-tipped branches, shiny leaves and black inedible berries in autumn. Suitable for low windbreaks and as a large shrub for background planting.

Japanese Bush Honeysuckle (Lonicera Morrowi)

Grows six or eight feet high with a spreading habit, and suited to forming a background for lower plants. Needs some irrigation to produce best growth.

Common Lilac (Syringa vulgaris)

A familiar flowering shrub which grows eight to twelve feet tall, forming in time large clumps of upright habit. Useful for a background for lower shrubs and as a tall hedge plant.

Siberian Pea Shrub (Caragana arborescens)

A handsome shrub of erect habit, six or eight feet tall, with fine foliage and numerous yellow pea-like flowers in early spring. Suitable for a low windbreak or tall hedge.

(Spiraea Van Houttei)

This shrub, often called "Bridal Wreath," is beautiful when in bloom, the graceful arching branches being loaded with clusters of small white flowers. It grows to a height of from four to six feet and should be given some water during especially dry seasons. It should be planted in sheltered situations.

Tamerisk (Tamarix parviflora)

(Several other suitable species)

A large, spreading shrub, or sometimes small tree, with slender branches, feathery foliage and delicate pink flowers. Suited to alkaline soils and dry situations; a good hedge shrub.

NATIVE SPECIES OF SHRUBS

Golden Currant (Ribes longiflorum)

A hardy native shrub with fragrant yellow flowers followed by reddish or blackish berries. It grows four to six feet high with a spreading tendency by means of underground stolons.

Western Choke Cherry (Prunus melanocarpa)

Grows to a height of from eight to twelve feet, forming thickets. The small white flowers appear in dense dropping clusters in early spring and are followed by the black cherries in midsummer. They are used for jelly where obtainable.

Dwarf Sand Cherry (Prunus Besseyi)

This is a dwarf shrub with spreading habit, two to four feet tall, with narrow, shining leaves and white flowers. The cherries are reddish-black, similar to the Morello variety. The shrub is very hardy, drought-resistant, and the fruit is excellent for jelly.

Shrubby Cinquefoil (Potentilla fruticosa)

A low spreading shrub with divided leaves and bright yellow flowers. It is well suited to planting in the foreground where a low, compact plant is desired.

Buffalo Berry (Shepherdia argentea)

A large shrub, or sometimes a small tree, six to ten feet tall, with silvery leaves and spine-tipped twigs. Pistillate-flowered individuals bear small, scarlet, acid berries, sometimes used for jelly. This is one of our hardiest and most ornamental native shrubs adapted to a wide range of conditions, from dry, exposed bluffs to alkaline bottom-lands. It forms thickets and is suitable for low windbreaks and hedges.

Lead Plant (Amorpha canescens)

This is a half-shrubby plant native to the plains and suited to planting in the foreground where a dwarf shrub is desired. Its height is one and one-half to two feet. The small purple flowers are borne in upright clusters.

New Mexican Locust (Robinia Neo-Mexicana)

Usually classed as a small tree, but it frequently grows as a large shrub, especially when left unpruned. Its foliage resembles that of the common Black Locust, but the flowers are a beautiful rose-pink, fragrant, and followed by hairy pods. It is adapted to varying conditions of soil moisture and will form large clumps six to twelve feet high if left undisturbed.

Opulaster (Opulaster Ramaleyi)

This is a native shrub closely related to the Nine-Bark of the eastern states and sold as an ornamental shrub by nurserymen. Our western species forms a large shrub six to eight feet high with dense clusters of whitish flowers. It is one of our hardiest and most showy native shrubs.

Sumac (Rhus glabra minor)

Similar to the Staghorn Sumac of the East, but more dwarfish in growth and especially hardy and drought-resisting. The foliage takes on the most vivid autumn colorings of red and scarlet. Height, three to six feet. It suckers freely.

Squaw Bush (Rhus trilobata)

A low spreading shrub three to five feet tall, with three-parted leaves which color beautifully in autumn. The small yellowish

flowers produce clusters of red berries in summer. It does not sucker from the root.

Spanish Bayonet. Bear Grass (Yucca glauca)

While hardly a shrub, this native plant is well suited to planting in the most exposed and driest situations, where it possesses an ornamental value apt to be overlooked by those to whom it is familiar. The stiff, spreading, pointed evergreen leaves and the tall flower stalk with its large whitish blossoms followed by thick pods give this plant a character which fits in well with semi-arid conditions.

VINES FOR THE PLAINS

It is believed that the vines here listed are those best suited for use on trellises and arbors, or for porches and screens.

Woodbine (Ampelopsis vitacea)

A native woody climber suitable for all purposes demanding hardiness and permanence. Scarcely distinguishable from the eastern Virginia Creeper. Occasional watering during dry seasons will promote a luxuriant growth.

Matrimony Vine (Lycium vulgare)

An old-fashioned, hardy, vine-like shrub commonly used in the East for covering low objects, as it does not readily cling to an upright support.

Hop (Humulus lupulus)

This common vine dies to the ground each winter but grows up quickly each spring and makes a dense shade.

Wild Cucumber (Echinocystis lobata)

A rapid-growing herbaceous vine which dies completely at the end of the growing season but usually starts from scattered seeds each spring. The seed may be planted either in autumn or spring.

How to Plant

Orders should be placed in late winter in order to receive early shipment. The earlier the trees are planted after the first or the middle of March, the better, although successful tree-planting may be continued a month or more later than this.

Too frequently a bundle of trees received in good order by the express agent is not called for by the purchaser until after several days. In this interval the roots dry and die, and finally the trees are set out by the purchaser, who wonders afterwards why he has no success in raising them. One should endeavor to receive the trees the day they arrive; moisten the roots immediately, and when home is reached dig a shallow trench (Fig. 1.) and cover the roots, together with most of the stems, with moist

soil. The young trees may be safely kept for weeks "heeled in" in this manner.

Preparing Holes

Raw prairie soil is not suited to trees, especially the hardwoods; it should be cultivated a year or two previous to tree-planting. In the deep hole method the holes should be deeper and broader than the roots of the tree (Fig. 5). Rich top soil, mellow or free from sod and lumps, is thrown back into the hole to make a good bed to receive the roots. The roots are covered with wet gunny-sacks from the time the trees are removed from the "heeling in" trench until they are covered with soil in the hole. An exposure of the roots of some species of trees, the evergreens, for instance, to the sun and dry air for even a minute will cause the death of the roots. Many a tree has been dead when planted because of a short exposure of the roots to the air and sunlight.

The conifers, or evergreens, may be planted in furrows in which slits are made with the spade (Fig. 3), especially in very light soil.

In non-irrigated planting, the trees must have two or three times the spacing given in irrigated conditions. If too closely spaced, the trees stop growing well after the roots meet those of other trees and competition for moisture becomes keen. The root-spread is somewhat greater than the crown-spread on non-irrigated land. As a rule, it is advisable not to space trees closer than one rod apart. As the trees become sizable, even this will be too close and a thinning will be needed.

First observe whether the roots are bruised by dull tools in digging. If so, prune them with a sharp knife. With broad-leaf trees, also cut back the limbs from two-thirds to three-fourths of their original length, leaving a strong bud near the end of the reduced lengths.

Place the tree only an inch or two deeper in the ground than it stood originally in the nursery. With the hand, firm the earth tightly around the fibrous roots in order that the young root-hairs may soon get nourishment. Plant the tree very firmly and carefully; this is an essential secret in successful tree growing. Correct and incorrect methods are illustrated in Fig. 2.

Some prefer watering the dirt before planting, while others attend to this afterwards. Probably the former practice is somewhat better.

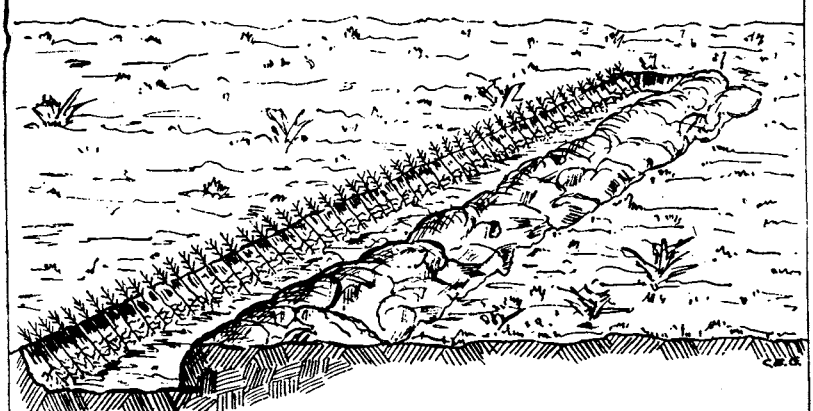
Care of Trees

The first year will probably be the critical one, so far as moisture is concerned. A little water during dry periods will be ap-

FIG. 1

HEELING IN

This should always be done if the trees can not be planted immediately.



Dig Trench in moist earth deep enough to bury the roots and part of the stems allowing the roots to hang down full length, covering each layer of roots as placed.

Do not double or curl them. Each layer of roots should not be more than two inches deep and the thickness of the soil over the roots should always exceed the depth of the layer of the roots.

(Courtesy U. S. Forest Service)

preciated by the trees during the first summer, but may not be absolutely necessary.

With only a few trees to attend to in one's door-yard, the following device, successfully applied by a resident of northern Weld County, may be employed: Dig a square depression five feet on the side and six inches deep. Dig the hole for the tree and plant it in the center of the square depression. With a soil-auger or crowbar make a hole two feet deep at each corner of the depression; fill these four holes with straw or broken bits of brick. Fill the depression with a mulch of straw until it is flush with the top of the ground around it. Apply occasionally water, which will seep down the holes in the corners and wet the soil under the roots, thus encouraging a deep root system. The straw is held in the depression with a chicken-wire staked to the soil. As mice will likely live in the mulch, the stem of the trees should be protected with fine wire mesh, such as window screen wire tied with fine wire. This protection will also serve lawn trees against clawing by house cats, which commonly injure young trees.

Another method successfully followed by one planter in eastern Colorado consists in spreading a layer of sand three or four inches deep around the tree after the soil has been filled in. This forms a fair mulch and does away with much of the cultivation ordinarily needed. Stake the tree to keep it from growing crooked; one stake may be a three or four-inch board placed six inches from the tree and on the south or southwest side to afford a little shade during the hottest part of the day.

Cultivation, however, is the usual practice in successful tree raising, especially with the broad-leaf species, as moisture is thereby conserved when the weeds competing for it are kept from appearing. Cultivate cleanly and frequently a grove or shelter-belt, as you would a fruit-orchard. Trees around a door-yard can be cultivated by spading near the tree. Not only is the cultivation advisable to conserve moisture, but with the removal of weeds mice and rabbits do not find a cover in which to live.

Rabbits are very destructive to young trees. Where they become a pest in a plantation, protection is afforded by several methods: (Kansas State Agricultural College Experiment Station Circular No. 17) (1) ***"Trapping:*** A simple and successful method is to sink a barrel in the ground, level with its surface. Fit the head slightly smaller than the top and allow it to swing freely on a rod or old broomstick. Pieces of apple or corn may ed; the stake may be a three or four-inch board placed six inches

FIG. 2

CORRECT AND INCORRECT METHODS OF PLANTING

GOOD PLANTING

The tree will live if firmly set.

CARELESS PLANTING

The tree set too deep and the roots crowded will very likely die.

VERY CARELESS PLANTING

The tree if set too shallow will surely die.

CARELESS PLANTING

Sod, grass, or dry sand tamped around roots will dry the roots, and the tree will die.

CARELESS PLANTING

The tree if set too deep on a hillside will be covered by soil rolling from above.

(Courtesy U. S. Forest Service)

FIG. 3

FIRST STEPS IN PLANTING

(Plant hardwoods on prepared ground and cultivate during first two years to insure success.)

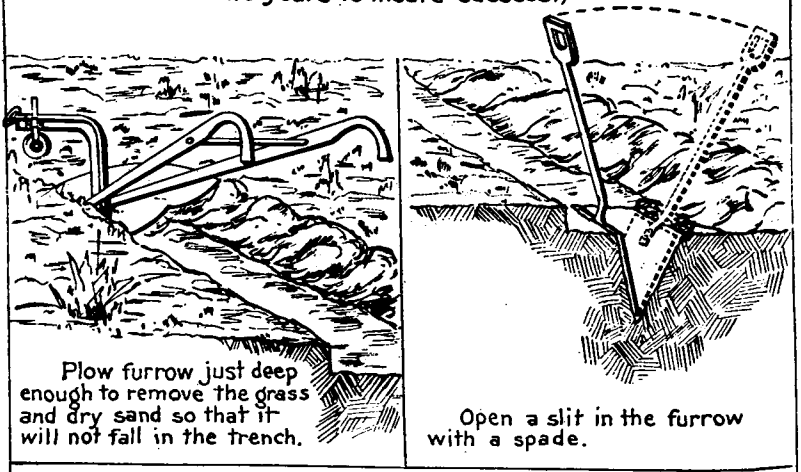
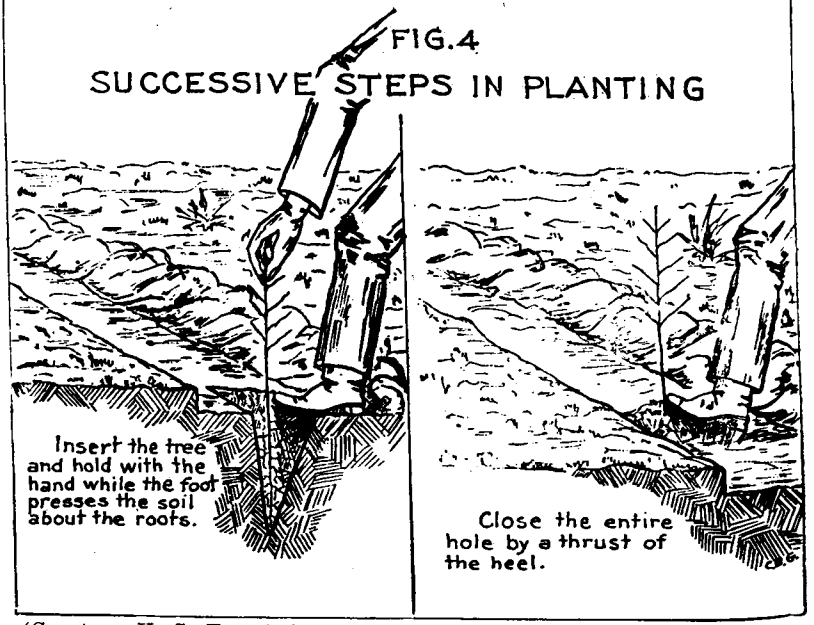


FIG. 4

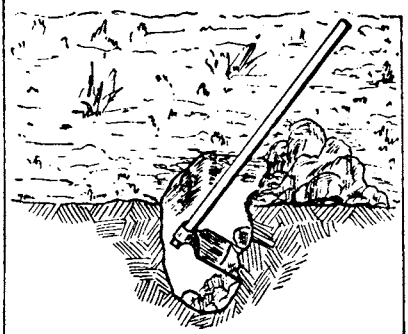
SUCCESSIVE STEPS IN PLANTING



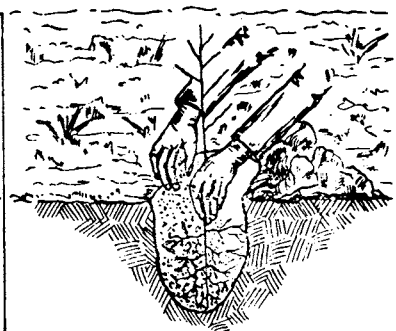
(Courtesy U. S. Forest Service)

FIG. 5

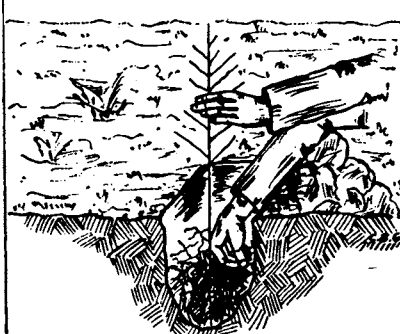
DEEP HOLE METHOD OF PLANTING



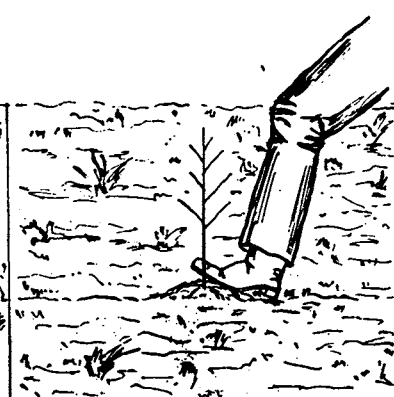
Digging the hole



Partially cover the roots with loose moist earth.



Tamp the dirt firmly about the roots before filling the hole.



After filling the hole press the soil firmly about the roots by a thrust of the heel.

(Courtesy U. S. Forest Service)

be placed on the outer edge of the cover, and when the rabbit attempts to get these, the lid tips up and he slides into the barrel, while the lid, which is slightly heavier on one side than the other, assumes its original position. The heavier side should strike against a heavy nail or bolt, so that only the lighter side of the lid will drop. The whole thing should be covered over with brush or light, flat stones."

(2) Wrapping: With only a few trees, the most satisfactory method is to wrap the stems from the ground up as high as a rabbit can reach, using as wrapping burlap, cornstalks or laths. The wrapping is removed each spring and replaced late in each fall.

(3) Repellants: (a) Blood smeared on the stems of the trees will repel rabbits, until the rain washes it off. Tallow melted with an infusion of tobacco and the mixture applied to the stems is a good repellant. (b) Aloes, obtained at drugstores, at the rate of one pound to four gallons of water, applied as a spray, will act as a repellant because of its bitterness. (c) Buttermilk, one gallon, and common stove soot, one-half pound; boil for twenty minutes, apply as a spray, and keep well stirred to prevent clogging the spray-pump. (d) Spray the stems with ordinary "lime and sulphur" spray.

Where to Plant

The purposes of tree planting will be many, but ordinarily in eastern Colorado tree planting is done chiefly (1) to beautify the home, or (2) to provide shelterbelts or windbreaks. In the course of time, it may appear feasible to grow farm groves.

Outside of making a living on the farm and having suitable schools and other social advantages, nothing will be more conducive to permanent, happy homes in eastern Colorado than trees and shrubbery. A country looks desert-like without them, and as if not intended for human habitation. But the trees and shrubs should be placed correctly and harmoniously for properly beautifying a home place.

The general ideal around a home is to have at least two or three trees back of the house, tall, spire-like trees preferred, a few on each side extending towards the road or street, leaving a clear, unobstructed view directly to the front. A grove in front of the house, regularly spaced like an orchard, is not as ornamental or tasteful as in the plan just outlined. The purpose of trees near the house is not to hide it, but furnish a setting to better display the home, as illustrated on the cover.

The lawn or front yard is left open, with possibly only an

individual tree here or there in it; while trees singly or in groups, and shrubbery are placed on the sides and especially in corners of the front yard. Evergreen trees may be used to advantage to screen unsightly buildings and form a setting back of the house; while broad-leaf trees are usually preferred in the front yard and along roads and streets. The most beautiful part of a lawn is the grass, but this is well-displayed by a frame of trees and shrubs as a jewel is shown to best effect in a proper setting.

From the porch or windows of the house, unobstructed avenues leading toward interesting views are planned, while, on the other hand, objectionable views of out-buildings, barns, etc., are screened with trees, shrubs, and climbing vines. Shrubbery looks best when grown in clumps and masses, never as individual specimens.

Flower-beds in the front door-yard in prominent circles or other geometric designs are no longer in vogue, but rows or narrow beds may border the sides of the yard, or with shrubbery, conceal to advantage the underpinning of the house. In mentioning the underpinning of the house, we are prompted to state that a mass of shrubbery or flowers, or both, at the base of the walls of a house will work a miracle in improving the appearance of the house. A real flower garden may be placed in the backyard. In order to maintain the proper appearance of the front yard of the average farm home in eastern Colorado a neat fence is required, or a trimmed hedge of Tamerisk or other hardy shrubs.

Shelterbelts

Three or more rows of trees may be considered a shelterbelt, while a single row is a windbreak. A suggested shelterbelt of three rows for eastern Colorado is as follows: Center row, Black Locust; side rows, Russian Olive on one side and on the south side Jack Pine. Another three-row combination is: Center row, Honey Locust; side row, Russian Olive; on the other side row, the shrub Tamerisk (Fig. 6).

For a wider shelterbelt, place the most rapid-growing trees in the middle row and less rapid-growing trees in flanking rows. If moisture permits, as in low land near streams or arroyas, Native Cottonwood or Black Locust in the center flanked on one side with Honey Locust and the other side with Jack Pine, Rocky Mountain Red Cedar, Wild Plum, and finally on the outside rows with Tamerisk.

The best direction for shelterbelts and windbreaks in this region is east and west. Shelterbelts of six or more rows will hold the snow within the area devoted to the trees, but a narrow shelterbelt and windbreak will cause snow to drift even as far as a

hundred feet from the trees. Consequently, attention should be paid to proper location of windbreaks in relation to corrals, barns, and home.

An effective windbreak and shelterbelt is one having branches or foliage from close to the ground all the way up. The "roof scheme" for shelterbelts given above provides for this. Otherwise, shelterbelts should be under-planted with trees or shrubbery as the lower branches die off.

Besides the ornamental value of a windbreak, we recognize the comfort and protection it affords to man and beast. There is little doubt that effective windbreaks exert an appreciable beneficial influence on field and orchard crops; transpiration of moisture from the foliage of crops is reduced because of retardation of wind velocity. The beneficial influence of a windbreak extends out about one rod for each foot in height of the windbreak; and the loss in crop production close to the trees is said to be more than regained in increased yields on the whole area protected.