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TREES FOR EASTERN COLORADO

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Summary

1. Every farm, home and ranch headquarters in eastern Colorado needs shelter from the sun and wind.
2. Trees provide the most economical and practical shelter obtainable.
3. There are trees that will grow thriftily and attain a goodly size on any farm or ranch in eastern Colorado.
4. Only hardy, long-lived species should be planted.
5. It is necessary to have the ground in proper condition to receive the trees at time of planting.
6. It is necessary to give the trees such cultivations as they may require to keep them in a thrifty growing condition.
7. The proper cultivation is more important than irrigation without cultivation.
8. Continuous cultivation is desirable to insure a thrifty vigorous growth of the trees
9. The limiting factor in growing trees is the available supply of soil moisture.
10. Cultivation conserves the soil moisture for the use of the trees.

A burned-over mountain side in the vicinity of Pikes Peak. 15 years after it was planted with 3-year-old, once-transplanted, Western Yellow Pine trees. The trees at this age are now from 6 to 8 feet in height. This mountain side, like many others, had been practically destitute of tree growth since the time of the fire, some 60 or 70 years ago. These trees have never had a bit of cultivation or a drop of irrigation water. Trees that will grow under these conditions, will grow almost anywhere.

TREES FOR EASTERN COLORADO

CHAS. A. SCOTT, Extension Forester

Every farm home and ranch headquarters in eastern Colorado needs shelter from the sun and wind.

Trees provide the most economical and practical shelter obtainable.

More than this, trees add much to the beauty of the landscape, and enhance the value of the farm on which they grow.

There are trees that will grow thriftily and attain a goodly size on any farm or ranch in eastern Colorado if the three following points are observed:

1. Select and plant only hardy species that are suited to the soil and climatic conditions.
2. Have the ground in proper condition to favor tree growth at time of planting and plant the trees with care.
3. Give the trees the necessary cultivation to keep them in a thrifty condition, and protect them from injury and abuse by livestock of all kinds.

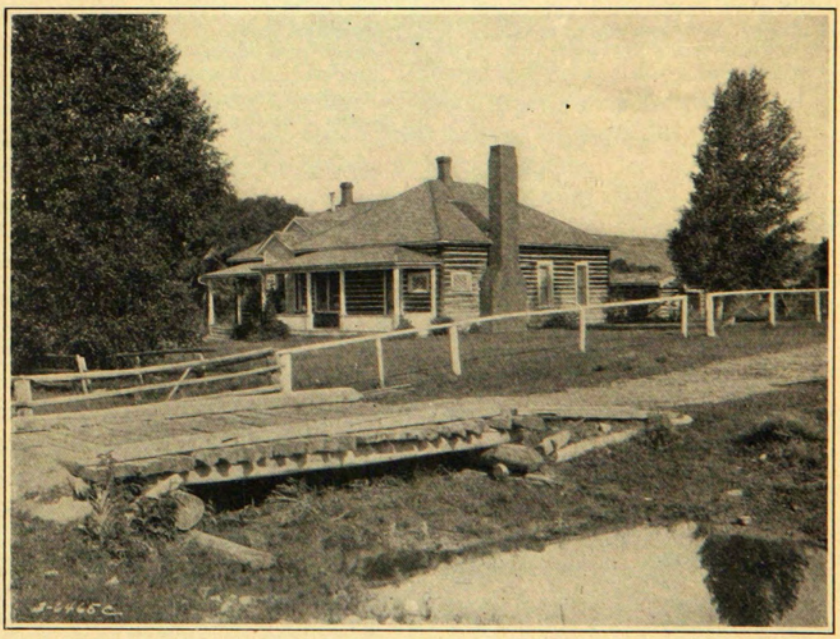

Fig. 1. Trees add immensely to the comfort and satisfaction of a home.

How To Select Hardy Species

In selecting trees for any proposed planting, look about in your community and profit by the experience of your neighbors. Call on your state experiment station and the U. S. Department of Agriculture, Washington, D. C., for information regarding hardy trees for your needs. Your neighbors, and the state and government experiment stations have been growing trees for the past 30 or 40 years. The information that they can give will help you select hardy kinds that are likely to succeed.

Professor W. J. Morrill, state forester, at Fort Collins, Colorado, recommends the following species for the different locations in eastern Colorado:

HARDIEST TREES FOR EASTERN COLORADO
(Under 5,500 feet elevation)

CONE-BEARING TREES

Non-Irrigated Land

First Choice—
- Western Yellow Pine
- Rocky Mountain Red Cedar

Second Choice—
- Limber Pine
- Eastern Red Cedar

Irrigated Land

First Choice—
- Western Yellow Pine
- Rocky Mountain Red Cedar
- Colorado Blue Spruce
- Limber Pine
- Douglas Fir

Second Choice—
- Scotch Pine
- Austrian Pine
- Black Hills Spruce
- Eastern Red Cedar
- European Larch
- Mugho Pine (dwarf)

BROADLEAF TREES

Non-Irrigated Land

First Choice—
- Honey Locust
- Hackberry
- American Elm
- Russian Olive
- Ash—(green or white)
- Siberian Apricot
- Boxelder

Second Choice—
- Native Cottonwood
- Norway Poplar
- Carolina Poplar
- Golden Willow
- White Willow

Irrigated Land

First Choice—
- American Elm
- Honey Locust
- Hackberry
- Green or White Ash
- Native Cottonwood
- Norway Poplar
- Carolina Poplar
- Silver Poplar
- Bolley's Poplar
- Golden Willow
- White Willow
- Russian Olive
- Soft Maple
- Bur Oak
- Black Walnut—(near foothills)

Second Choice—
- Sycamore
- Paper Birch
- Norway Maple
- Chinese Elm
- American Buckeye
- Boxelder

The purpose of any planting, as well as the type of soil in which the trees are to be planted, must be considered in deciding on what trees to plant. For shelterbelts, some of the conifers will give the greatest protection. For woodlot planting, the products desired must be considered. For shade, some of the broadleaved species will be the most desirable.

KINDS OF TREES

There are two distinct groups of trees that are desirable for farm plantings in Colorado. These are the conifers and broadleaves.

The conifers are also known commonly as evergreens. They are the pines, spruces, firs and cedars. They are called conifers because their seeds are borne in cones. The cones of the pines, spruces and firs have large, dry, woody or papery scales. The cedars have small berry-like cones, in which the scales are grown together making a hull or husk.

The name "evergreens" is given this group because they retain their green foliage thruout the entire year. The foliage is known as "needles" or "leaves."

Evergreen Tree

In this group of trees are found some of the hardiest and most drought resistant trees of America. Several of these are native to the mountains of Colorado and are valuable trees for planting on the plains. Inasmuch as they retain their foliage thruout the year, they are the best trees available for shelterbelt plantings.

The evergreens, as a group, are slow-growing, long-lived trees. Few of them reach maturity in less than 150 or 200 years and many of them live to a good old age of 300 to 500 years. The native Colorado evergreens suitable for shelterbelt planting on the plains are found growing naturally in the mountains. When these are planted on the plains, under favorable conditions, and given proper care, they grow more rapidly than they do in the mountains. While the evergreen trees now growing on the plains are comparatively young trees, their vigorous and thrifty condition would indicate that they may possibly grow to as large a size and live to attain as great an age as the same species do in the mountains.

A valuable feature of the evergreen tree is it's ability to withstand hail storms without serious injury. These trees grow in regions where hail storms are of common occurrence, but it is seldom that serious injury is inflicted. Hence, it is a safe tree to plant, from that standpoint.

The following native, hardy evergreen trees are recommended for eastern Colorado planting:

1. **Pinus ponderosa, or Western Yellow** Pine, also known by not fewer than 20 other common names. This tree grows over a wide range of mountainous country from Canada to Mexico and westward to the Pacific coast. In South Dakota it covers the Black Hills and extends eastward thru the Bad Lands and southward into the pine ridge region of western Nebraska, down to altitudes of less than 4000 feet above sea level and where the annual percipitation is not more than 18 inches. In Colorado the Western Yellow Pine grows thruout the eastern range of mountains up to about 9000 feet. The Black Forest, an isolated area of timber east of the foothills in El Paso County, is nearly a pure stand of this species. In this forest the trees grow thriftily under climatic conditions that are similar to the entire plains region of eastern Colorado.

This species has been used extensively by the Forest Service for reforestation plantings in the Sand Hills of Nebraska and on the denuded mountains in the vicinity of Pikes Peak as well as in other planting projects. Thruout it's range of growth, the Western Yellow Pine is an important lumber tree. It is the largest of American pines, exceptional trees attaining a height of over 200 feet and diameters of from 5 to 8 feet. Ordinarily it attains a height of from 60 to 90 feet with trunks of 2 to 3 feet in diameter.

It is entirely at home on all types of soil varying from light sand to heavy stiff clays. Thruout the Rocky Mountain region it is found

Fig. 2. A shelterbelt of Western Yellow Pines on Charles Green's farm near Fleming, Colorado. These trees grown from seed, are now 20 years old. Photographed in 1926. By courtesy of the Forest Service.

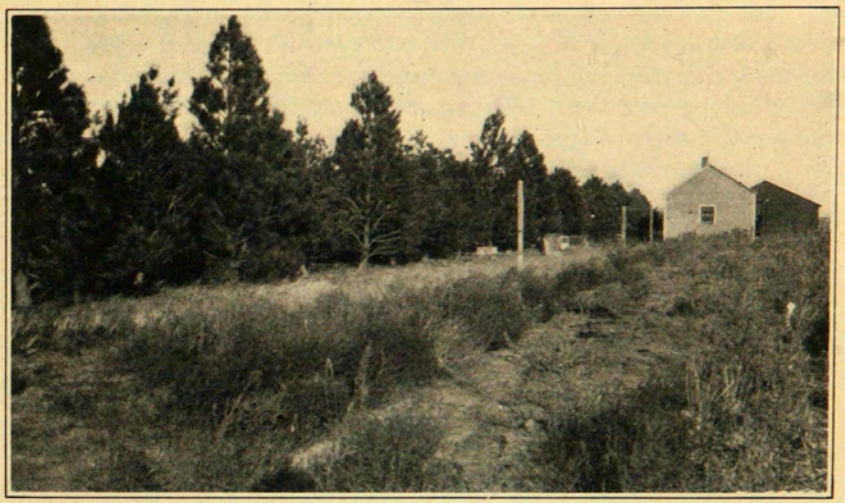

Fig. 3. A shelterbelt of Western Yellow and Scotch Pines on Philip Barton's farm near Fleming. These trees were planted in 1911. The taller alternate trees are Western Yellow Pines. The shorter trees are the Scotch Pines. By courtesy of the Forest Service.

growing in dry, gravelly or rocky places. It prefers south exposures and full sunlight after passing the seedling stage. It is a long-lived tree seldom reaching maturity short of 200 years. Some of the oldest known specimens are fully 500 years of age. All of these characteristics make it a valuable and desirable tree for eastern Colorado.

The oldest and most outstanding shelterbelts of this tree are in Logan County. Mr. Chas. Green of Fleming was the first man in his community to plant the Western Yellow Pine. He secured a quantity of seed in 1908, planted it in his garden, grew the seedlings and lined them out in nursery rows and later transplanted them to their present location in a shelterbelt. These trees have grown thriftily, are perfectly healthy and are now (1928) from 14 to 18 feet in height. Mr. Green is a staunch advocate of wide spacing and continuous cultivation of trees in shelterbelts, as well as a thoro believer in the value of shelterbelts. He has supplied a number of his neighbors with planting stock from his farm nursery, and without an exception the trees are making a fine showing. In some instances under very favorable conditions, after having been set 6 or 8 years, they are making a height growth of 18 to 24 inches a year. The average height growth of this tree in the mountains of Colorado is less than 8 inches a year.

Mr. Philip Barton, also of Fleming, Colorado, planted a shelterbelt of Western Yellow Pine and Scotch Pine in 1911. He planted 3-

year-old, once-transplanted trees and set them in rows 12 feet apart, and 12 feet apart in the rows. He alternated the species in the rows, and gave the trees continuous cultivation until the summer of 1926. They then covered the ground so completely it was impossible to go between the rows of trees with a team and disk. These trees are entirely thrifty and have made a splendid growth. The tallest Western Yellow Pines are now fully 20 feet in height. The Scotch Pines are equally as thrifty but they have not made as rapid growth. The tallest are about 15 or 16 feet in height. The soil in which these trees have grown is a deep sandy loam typical of that community.

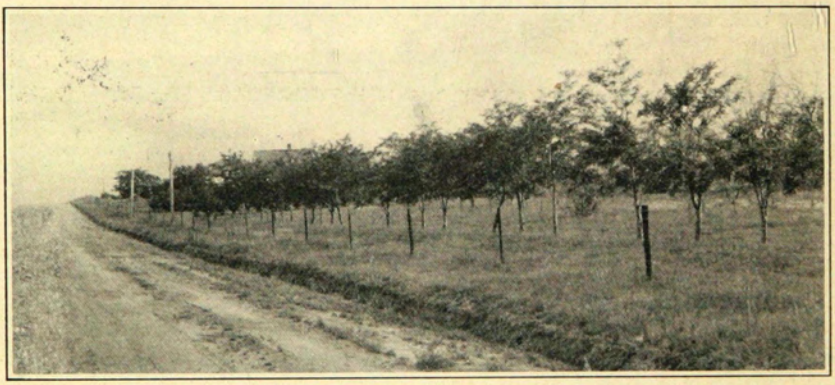

Fig 4. A honey locust shelterbelt on the Akron Experiment Station at 17 years of age. They are 17 feet in height. These trees were planted for a shelterbelt, but they have been pruned too high to offer much resistance to the winds. Cutting off the lower limbs has allowed too much sunlight to reach the ground, and a sod of grass has covered the ground greatly to the detriment of the trees. The grass uses the moisture needed by the trees and it is a constant source of danger by fire.

The Western Yellow Pines of Mr. Barton's shelterbelt bore a crop of cones in 1927. These were gathered and the seed was planted in a seedbed nearby, and about 2000 thrifty seedlings were grown in the summer of 1928. This fact is mentioned to call attention to the possibilities of growing the planting stock in a farm nursery.

The successful results of these two early plantings of Western Yellow pine in this community have established the reputation of this species as a valuable shelterbelt tree. As a result of these plantings, practically every farmer for miles around has planted shelterbelts of Western Yellow Pines. These are yet but small trees. They are, however, growing thriftily and in a few years will make a wonderful showing.

At the Akron Experiment Station the Western Yellow Pine, after 18 years standing in experimental plantings, is the largest and thriftiest of all the species under observation which includes 3 or 4 species of conifers and several of the recognized hardy broadleaved species.

At this station the Western Yellow Pine trees were spaced 5 by 8 feet and were given continuous and thoro cultivation for 8 years. Since that time they have not been cultivated. The tallest trees are now about 20 feet in height. They were 3-year-old stock at the time they were planted. The soil in which these trees have grown is typical eastern Colorado upland sandy loam. The average rainfall at the

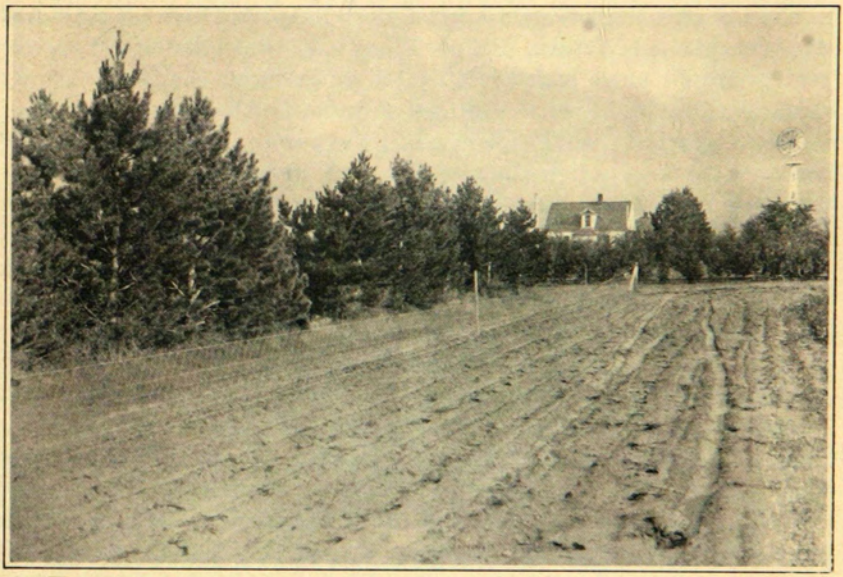

Fig 5. Western Yellow Pine shelterbelt on the Dryland Experiment Station farm, Akron, Colorado. These were 3-year-old, one-transplanted stock when set out in 1910. The trees are now from 16 to 20 feet in height and are growing vigorously. Note the density of the foliage of these trees and also the presence of limbs from the ground up that provide shelter from the wind. Compare these trees with the honey locust on the preceding page in regards to vigor, thriftiness and relative value as a protection from wind. The trees in the two shelterbelts were planted the same time and have been given the same cultivation and care.

station for the past 18 years has been 17.65 inches. The least rainfall in any one year was 11.87 inches in 1925. The greatest was 25 inches in 1915.

In the spring of 1928, Mr. Carl Martin of Genoa planted a 10-acre woodlot of Western Yellow Pines on high prairie land 3 miles north of Genoa. The soil in which these trees were planted is sandy loam. The ground was summer fallowed in 1927, and the trees were planted April 12, 13, 14 and 16. The ground at that date was in fine physical condition, moist enough not to require watering immediately after they were planted.

At the time of planting, the trees were 3-year-old, one-trans-planted stock from 4 to 8 inches in height. They were given thoro

cultivation thruout the summer of 1928, but were not irrigated or watered other than by natural rainfall. An inspection of this planting on September 15, 1928, showed that 94.1 percent of them were alive and growing.

In this planting the trees are spaced 10 by 10 feet. The 10-acre tract on which they are growing was fenced with woven wire to exclude the rabbits.

Mr. R. W. Pepper, of Amy, Colorado, planted 200 3-year-old, once-transplanted Western Yellow Pines in a 3-row shelterbelt on his farm, some 30 miles southwest of Hugo, in light, sandy loam soil, in furrows, one of which was in ground that had been under cultivation for several years. The other 2 furrows were in native grass sod. The trees were set in holes dug with a spade in the bottoms of the furrows, and received no attention from the time they were planted until woven-wire guards were placed about them to protect them from rabbit injury. On October 1, an inspection of this planting showed 140 living trees by actual count. These trees made a good growth in 1928 and were in a thrifty condition when inspected.

Mr. R. H. Demmler of Colorado Springs planted 1000 3-year-old, once-transplanted Western Yellow Pines on his farm in the Hanover Community, El Paso County, in 1926, on light sandy land that had been under cultivation for a number of years. This planting consists of a single row surrounding the field spaced 8 feet apart. Several rows were planted across the north end of the field spaced 8 by 8 feet, and 2 rows across the field about equally distant from the north and south ends, spaced 8 feet in the rows. The object of this planting was to hold the light sandy soil of the cultivated field from blowing.

An inspection of this planting on June 6, 1928, showed by actual count that 73 percent of the trees were in a thrifty vigorous condition, many of the trees having made as much as 8 inches of growth this year. These trees were planted in April, 1926, in cultivated land, but have received little or no cultivation, and no protection against injury from jack rabbits. All things considered, these trees are making a wonderful showing.

Mr. M. A. Wagner of Fleming, Colorado, planted 240 3-year-old, once-transplanted Western Yellow Pine trees in nursery rows, 3 feet apart and 2 feet apart in the rows, in sandy loam soil, in his garden on May 20, 1928. On July 20, 1928, when this planting was inspected there were 236 trees in a thrifty vigorous condition. These trees will be transplanted in 1930 or 1931 and set in a permanent location in a shelterbelt. At that time they should be from 15 to 24 inches in height, with stems large enough to be beyond danger of injury by jack rabbits.

Mr. Leslie Rice, of Fleming, Colorado, planted 200 3-year-old, once-transplanted Western Yellow Pines in his garden in sandy loam soil in the spring of 1926, about 85 percent of which survived. In the spring of 1928 he transplanted 56 of these and set them out in a shelterbelt north of his house. These trees were from 24 to 30 inches in height and were moved with frozen balls of earth on their roots. He lost only one tree in this operation. He would have moved more trees but the weather was too mild to freeze the balls of earth and Mr. Rice did not know that they could be moved without the earth being frozen.

These several plantings have been mentioned to show the successful results that have been attained in the different sections of the state, on the different types of soil, and under the different methods of planting. Many other equally successful plantings could easily be described, but would merely be duplications of some of the preceding statements.

2. **Pinus flexilis or Limber Pine** is a tree that grows at high altitudes in the Rocky Mountains of Colorado. It has been planted at elevations as low as 3600 feet, and is growing very successfully in comparatively dry soils. The possibilities of growing this tree in the plains region and it's value for shelterbelt purposes are relatively unknown. We do, however, consider it to be worthy of a trial. Very encouraging indications could be cited to show that the limber pine will be successful in eastern Colorado.

3. **Juniperous scopulorum, or Rocky Mountain Red Cedar,** also known by at least five other common names, is another of our absolutely hardy evergreen trees. It is a small-sized tree, seldom exceeding 40 feet in height or 2 feet in diameter. It grows readily at all elevations up to 9,000 feet; adapts itself to all types of soil in which a tree will grow, but naturally is found more frequently in lime soils. It is very difficult to propagate, but the young trees are readily transplanted and adapt themselves to almost any situation. The Rocky Mountain Red Cedar is a highly ornamental tree and is used extensively for landscape and decoration plantings. It is also a splendid tree for shelterbelt and woodlot plantings and should be used whenever planting stock is available. Some objections to this species arise when planted near apple trees, because it is capable of transmitting an infection to apples and the leaves of apple trees.

4. **Picea pungens, or Colorado Blue Spruce,** and known locally by about 10 other names, is America's most beautiful ornamental tree. It's range of natural distribution is thruout the Rocky Mountains in southwestern Wyoming, northeastern Utah, thruout the eastern range in Colorado and northern New Mexico.

It grows in canyons at elevations ranging from about 6,500 to 9,000 feet in cool relatively moist atmospheric conditions, and has a decided preference for moist soils. It is seldom found growing naturally in dry soil, yet in transplanted locations it thrives in the semi-arid situations such as exist in eastern Colorado and western Kansas. Likewise it grows remarkably well at sea level, where the rainfall is approximately 40 inches per year, and the humidity is greater than that of it's natural habitat. It grows readily in all types of soil from pure sand to heavy clay.

The Colorado Blue Spruce has been planted and is growing successfully as an ornamental tree in all states east of the Rocky Mountains, as well as in European countries. The demand for this tree for such plantings is constantly increasing. It is a tree that grows successfully under irrigation.

5. **Pseudotsuga taxifolia, or Douglas Fir,** known by not fewer than 20 common names, is a tree of wide natural distribution, extending thruout the Rocky Mountains from Canada to New Mexico and Arizona, and westward to the Pacific coast. It is the great lumber tree of the Pacific Northwest. It grows abundantly on the northeastern slopes of the eastern range of the Rocky Mountains in Colorado at elevations of 6,500 up to 8,000 feet or more.

This tree is used extensively for Christmas trees in Colorado. Like the Colorado Blue Spruce, it is used extensively in the eastern states and European countries for landscape plantings.

The Douglas Fir is not recommended as a desirable tree for shelterbelt planting in the plains region of Colorado, but it is a tree that can be grown for Christmas trees on many of the farms in mountainous sections of the state.

Broadleaved Trees

The broadleaved group is made up of trees having flat leaves of more or less width, as the cottonwoods, maples, oaks, elms, etc. These trees are also deciduous, shedding their leaves each fall, and growing a new lot the following spring. The trees of this group are well adapted for yard and street plantings. They are ideal shade trees, carrying as they do a full crown of foliage thruout the summer months when the shade is desirable, and they are naked in the winter when more sunlight is wanted in homes and on the streets. This characteristic, however, lessens their value for shelterbelt and protective plantings, and they should not be used for such, when evergreens will grow equally as well or better.

There is a definite place and need for shade trees on every farm and the kinds planted should be selected from the more hardy, drought-resistant, longer-lived species.

As a group of trees, the broadleaved species make a more rapid growth than the evergreen trees, under like conditions, but they are much shorter lived and are much more likely to fail entirely in a trying season, since they require more moisture than do the conifers.

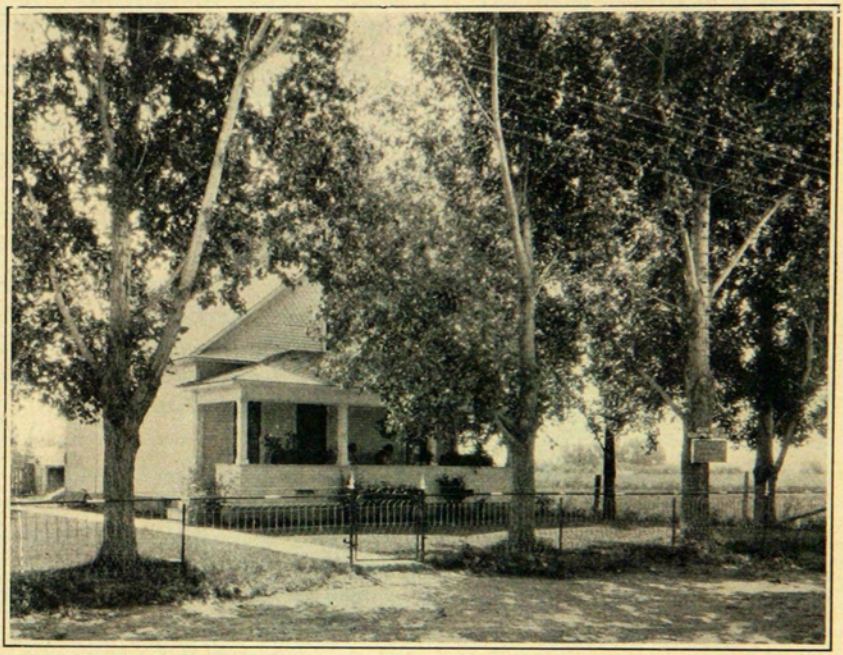

Fig. 6. A farmyard can look like this.

Some of the more desirable and hardy broadleaved species are:

1. **Ulmus americana, American Elm or White Elm.**—This tree's natural range of distribution in the United States is from the Atlantic coast west to the Rocky Mountains and from the Canadian border to the Gulf of Mexico. It prefers a deep, rich, moist soil and is usually found growing along the margins of water courses. It does, however, adapt itself to a wide range of soils and will thrive on thin rocky soils if there is a supply of moisture available. Yet it is one of our hardiest and most drought-resistant broadleaved species. It is comparatively free from diseases or serious insect attacks. It is wind-firm, long-lived and a highly satisfactory tree for yard plantings. It is a good tree to plant in pastures for shade for livestock.

2. **Gleditsia triacanthos, or Honey Locust.**—It's natural range is from the Allegheny Mountains west to eastern Nebraska, Kansas, Oklahoma and Texas. It prefers a moist, well-drained soil. It has

been planted extensively in western Nebraska, Kansas, Oklahoma and eastern Colorado. It adapts itself readily to practically all types of soil and is the most drought resistant of our native broadleaved species. The foliage of the locust is thin and sparse, hence it is not a favorite shade tree, but serves the purpose where other trees will not grow. This is a splendid tree to plant in pastures for shade for livestock.

3. **Celtis occidentalis, or Hackberry,** grows over a wide range in central United States, extending westward into eastern Nebraska, Kansas and Oklahoma. A few specimens have been reported in eastern Colorado. It attains its best development on creek and river-valley lands, but adapts itself readily to a wide range of soil conditions. Under adverse conditions it will grow anywhere that the elm will grow. The foliage of the hackberry is very dense and it is an ideal shade tree, with the one exception that the wood is straight grained and the tree frequently splits in windstorms. So far it is entirely free from diseases or serious insect attacks in Colorado. It's rate of growth is about the same as that of the American elm, under similar conditions. It is a highly desirable tree to plant for shade in yards or in pastures.

4. **Fraxinus pennsylvanica, or Green Ash,** is the most widely distributed of the ashes. It's range extends from the Atlantic States west to Montana, Idaho, Utah and Arizona. It grows on practically all types of soils, but prefers deep, rich creek or river-valley lands. It is a small or medium-sized tree at the best. It has been planted extensively thruout the plains region of the Dakotas, Nebraska, Kansas, Oklahoma and Colorado. On many "timber-claim plantings," it is the only surviving species. Under adverse climatic conditions it is a small-sized tree often attacked by the "ash borer" and killed back to the ground. It sprouts readily from below the point of injury and persists in growing. It makes excellent poles and fuel. The posts of this species are of only ordinary quality. The wood is hard and heavy, highly useful for farm repair purposes. The foliage is very dense and provides excellent shade. It is a very good species to plant in farm yards or in pastures as shade for livestock.

5. **Populus sargentii, or Cottonwood,** is a native species thruout the eastern foothills of the Rocky Mountains. It attains its greatest size in rich moist bottom lands, but adapts itself readily to any type of soil having sufficient moisture to satisfy its requirements. Under favorable situations the cottonwood will make a height growth of 6 or 8 feet in a single season. The wood is light, soft and very perishable in exposed situations. It is an ideal excelsior wood and is used extensively in the maufacture of veneer baskets, crates and other containers. It is the largest of our native broadleaved species and is

often used for lumber. The Cottonwood should only be planted within reach of an ample supply of soil moisture. The most commendable feature of the Cottonwood is its rapid rate of growth. In yards it should be planted only as a temporary tree to meet immediate needs and in mixture with American elms or hackberries that will grow up as permanent trees.

6. **Populus acuminata, or Lanceleaved Cottonwood,** is a native of eastern Colorado and western Nebraska. It is equally as good if not better than the Populus sargentii, under like situations. It makes about the same rate of growth and is used for the same purposes.

The annoying feature of the cottonwoods, is that of "shedding cotton." This may be avoided by growing the trees from cuttings, and being careful to take cuttings only from "male" trees.

7. **Populus alba, or Silver Poplar.** This is a European species that has been grown in the United States for the past 50 or 60 years. Under favorable conditions it is a tree of rapid growth and very pleasing in appearance. The leaves are dark green, almost black on the upper surface. The lower surface is covered with a white wooly pubesence. It is the silvery white color on the under side of the leaves that gives the tree the name "Silver Poplar." It is a moisture-loving tree and should be planted only where there is an abundant supply of moisture. Under droughty conditions it is a short-lived tree. The wood is light, not strong and perishable in contact with the soil. A striking characteristic of this tree is that it "suckers" freely from the roots. This characteristic frequently is annoying.

8. **Other poplars,** such as Carolina Poplars, Canadian Poplars, Northwest Poplars, Lombardy Poplars and others may be considered in a group. All of these are rapidly growing, short-lived species that require an abundance of soil moisture. They should be used only as temporary trees to meet immediate demands. They should be planted in mixture with some slower-growing, longer-lived trees that will take their places when they fail. On dry soils the poplars are not worth planting, since they never make a satisfactory growth, and soon die. The net results of such plantings are a disappointment and a loss of time. They cannot endure adverse climatic conditions more than a few years at the most.

9. **Elaeagnus angustifolia, or Russian Olive,** is an introduced species, a native of southern Asia where it has been grown by the natives for generations for protection against the drifting sands and for fuel and other domestic purposes. It is a long-lived tree and attains a height of 60 to 80 feet with trunks 3 feet or more in diameter. It is a tree that withstands droughty conditions to a remarkable degree, but does suffer from the effects of severe winters.

Fig. 7. This picture only suggests what trees mean to a home.

It was brought to the United States some 40 or 50 years ago and has been planted extensively thruout the plains region. It has grown quite successfully in Kansas and Nebraska. It is a tree of very poor form, unless it is carefully trained into desirable shape from the time it is set out. It is more valuable for protection planting than for shade. Its natural habit is to limb from the ground up and to spread around in an irregular manner. Inasmuch as it is highly drought resistant it can often be grown where other trees fail. It is a valuable tree for planting in chicken yards to protect the chickens from the wind, sun and hawks, and also along the outside of hog yards to provide shade for the swine.

When the top is cut out of Russian Olive trees they sprout very freely from the remaining stem. This characteristic makes them serviceable for hedges. When grown for hedges they should be planted in a single row not more than 2 feet apart, and should be cut back to stubs not more than 12 or 15 inches in height. This will make them throw out numerous shoots from near the ground. These should be cut back the following spring to stubs 12 or 15 inches in height. The same treatment should be repeated from year to year until the desired density and height is attained, then more frequent clippings will be required, to keep them at the desired height.

If planted in a hedge row and allowed to grow without being cut back, they will make a very effective summer shelterbelt, but on account of losing their foliage in the fall they afford very little protection thruout the winter.

10. Willows. There are several varieties of willows that are commonly planted in Colorado—the Black Laurel and the Golden willows. Like the cottonwoods, the willows make a very rapid growth and only serve a temporary purpose. At the best they are short-lived trees. They are moisture-loving trees and should be planted only where an abundant supply of soil moisture is available.

11. Ulmus pumila or Chinese Elm, is a tree of recent introduction into the United States from China. Probably the oldest trees of this species in the United States are not more than 18 or 20 years of age. It is a tree of very rapid growth and apparently of great hardiness. In recent years it has been planted quite extensively in the Great Plains region from Texas to the Dakotas. Up to this time it is proving to be a very satisfactory tree, excepting in the extreme north where it has suffered from winter-killing.

The Chinese elm is a medium-sized tree, with dense foliage that comes out early in the spring and hangs on until late in the fall. The crown is globular in form. The leaves are not more than one-fourth the size of the leaves of the American elm. The limbs have many slender graceful twigs. The wood is straight grained, and the limbs frequently split in windstorms or under a load of snow or sleet. Because of the drought-resistant qualities of this tree, its rapid rate of growth and pleasing appearance, it should be given a trial in every farm yard in the state. We recommend it as a desirable tree for trial planting as a shade and yard tree.

12. Siberian Apricot.—This tree has been planted in small numbers quite generally in eastern Colorado and almost without an exception it is making a remarkably good showing. It is perfectly hardy, showing no unfavorable effects of either cold or drought. It is a tree that should be planted in greater numbers in farm yards. It is shapely and attains sufficient size to afford a lot of shade and protection to the home. It is apparently free from insect attacks, withstands the effects of hail to a remarkable degree and appears to be comparatively long lived. While it is a fruit tree, it should be planted for the shade and shelter it will afford, the fruit production being of secondary consideration. Usually the late spring frosts kill the blossoms.

13. Acer negundo, or Boxelder, is a native tree thruout the region lying between the Allegheny and the Rocky Mountains and from Canada to Mexico. It is a medium-sized tree seldom exceeding 50 feet in height with trunks up to 2½ feet in diameter. It is found most

abundantly, and attaining its largest size, in deep rich soils along creeks. It is a tree of rapid growth, but short lived. The wood is perishable in contact with the soil. A remarkable characteristic of the Boxelder is that it is very hardy and drought resistant. It is one of the hardiest of our broad-leaved species, and has been planted extensively in western Nebraska and the Dakotas, in yards and shelterbelts. In such locations it is a very satisfactory tree, usually of good form with dense foliage, providing an abundance of shade. It is a very desirable tree for yard planting in eastern Colorado on non-irrigated lands. It is more desirable for such locations than the poplars.

14. Juglans nigra or Black Walnut is the most valuable of our American broadleaved trees, from an economic standpoint. Mature logs of this species sell at a higher price than logs of any other of our native trees. Its natural range of distribution is the Mississippi Valley, on deep moist soils. It is a tree that has been planted extensively in the plains region with very few successful results. It withstands the cold but cannot endure drought. It should therefore be planted only where it can be irrigated. There are some fine specimens of Black walnut growing in Fort Collins, Greeley, Sterling and other of our eastern-slope towns.

The walnut is a taprooted tree, and is therefore difficult to transplant. A nut should be planted where a tree is wanted. When planted in the fall, it will come up the following spring and make a growth of 15 to 18 inches the first year. A fair rate of growth is maintained throughout its youth. With age the height growth begins to decline and a broad spreading top is formed. While pleasing in general appearance, the walnut is not a satisfactory yard tree. Its foliage is rather sparse, consequently does not make a dense shade. It is slow in coming into leaf in the spring and is one of the first trees to shed its leaves in the fall. The sap of the stem, leaves and hull of the nuts make a dark stain on any objects with which it may come in contact. Because of this feature the walnut is objectionable as a yard tree.

The walnut requires an open moist soil. It is among the very first trees to suffer from the effects of livestock trampling and packing the soil over the roots, and is therefore unsatisfactory for yards in which livestock is kept.

Preparation of the Ground

It is very important that the ground in which trees are to be planted be in good physical condition at the time of planting and that it contain sufficient moisture to insure the immediate growth of the trees. The treatment necessary to put the ground in proper condition will vary with the character of the land and the type of the soil. Clay or heavy loam soils require cultivation to loosen the surface and de-

stroy the grass sod. On this type of land, trees should be planted only where the ground has been under cultivation for 2 years or longer. Summer fallowing is ideal preparation of such land for trees.

Fig. 8. These are not cow paths. They are furrows plowed in the sand hills of Nebraska preparatory to planting trees. The 3-year-old pine trees are planted in the furrows and left to shift for themselves. The furrows kill the weeds and grass for a small space around the little trees and direct the rain water to them. The land is fenced to keep out livestock and the separate areas are surrounded by fire guards to protect the trees from injury by prairie fires. By courtesy of the Forest Service.

Light sandy loam soils or the sandy land of the Sand Hills region will blow if plowed and cultivated. Consequently some method of preparing the ground for trees must be followed that will not allow the soil to blow. The Forest Service has been planting trees in the Sand Hills of Nebraska for the past 25 years. It has found that single furrows plowed for the rows give the trees the needed advantage over the native growth of the hills and at the same time do not expose the sand to blowing. This method can be safely followed in the Sand Hills of eastern Colorado. The furrows in such land should be plowed the fall before the trees are to be planted so that the sides of the furrows will weather down and fill to their natural level before the trees are planted. Small evergreen trees planted in newly plowed furrows are frequently buried by the sands that wash into them.

On rocky hillsides where it is impossible to plow furrows, and also where the natural vegetation is very sparse, the trees may be planted in holes made with maddocks at the time of planting. This method was developed by the Forest Service and has proved very successful in mountainous regions.

The limiting factor in growing trees in any kind of soil is the available supply of soil moisture. Hence any method of preparing the

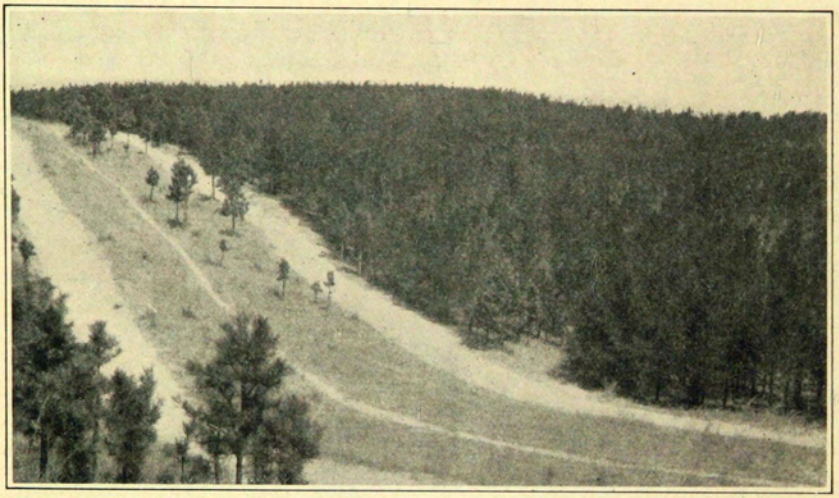

Fig. 9. This picture shows a portion of a pine grove in the sand hills of Nebraska. These trees were planted in furrows in 1911 and the picture was taken in 1927, when the trees were 16 years of age from date of planting. A fire guard is shown in the immediate foreground. The soil is white blow sand. The average rainfall in this locality is about 18 inches. These trees have never had a drop of irrigation water. By courtesy of the Forest Service.

ground for planting must be such as will conserve the moisture without subjecting the soil to blowing and at the same time destroy the native growth of grass or weeds that might rob the newly planted trees of the moisture needed to sustain their life and growth.

Fig. 10. A Forest Service planting crew, planting trees on a mountain side. The tree holes are opened up with maddocks. The loose soil is piled at one side of the hole. The men set the tree and cover the roots by hand, tramping it in firmly. A ridge of soil or gravel is thrown around the lower side of the tree to collect and direct the rainfall to the roots.

Fig. 11. A Forest Service planting crew, planting trees on burned-over mountain sides in the vicinity of Pikes Peak, Colorado. By courtesy of the Forest Service.

Method of Planting

The specific method of planting that should be followed will vary somewhat with each planting project. However, the principles involved are the same thruout and the precautions necessary in every instance are the same.

First of all remember that the roots are the vital organs of a tree. If they are exposed to drying conditions, the entire tree suffers. If they are over-dried or allowed to freeze while exposed to the air, it is fatal. While protection against drying in all species is necessary, it is especially necessary to protect the roots of the evergreen trees. The slightest exposure is fatal to them. Their roots can, however, be completely protected by dipping them in a puddle of clay and water of the consistency of cream. This gives them a coating of mud that protects them from the air. After they are puddled they should be kept covered with a moist sack or blanket to keep the mud coating from drying.

All evergreen nursery stock sent out by the State Forester is puddled before it is packed for shipment. It should be kept, unopened, in the package in which it is received, until it is to be planted; but it is well to wet the bundle upon its arrival. The package, however, should be kept in a protected place out of the sun and wind. When opened, the roots should be examined and if found to be dry, they should be puddled. If moist and well coated with puddle, they should be planted without additional puddling. The trees are more easily handled when the roots are in a semi-moist condition than when dripping with puddle.

In the field when planting, the trees may be carried from place to place as needed, wrapped in moist burlap or carried in a bucket or similar receptacle, if the roots are protected with a covering of moist hay, straw or burlap. The trees should never be carried in a bucket of water as it washes off the protective coating of puddle. Likewise, it is not desirable to carry them in a bucket of puddle, as it is likely to mud the roots together too completely. Then, too, a bucket of puddle is too heavy to carry conveniently.

The roots of the broadleaved species are not so susceptible to injury from exposure to the air as the roots of the evergreens, but it should be borne in mind that any drying of the roots is detrimental to the trees and that any precaution to protect them is well worth while.

The holes in which the trees are to be planted must be large enough to receive the roots in natural position. Cramping and twisting the roots to get them into a hole is always detrimental to the trees. The extra digging necessary to make the hole large enough to receive the roots is helpful to the extent that it loosens up a larger area of soil for the roots to feed in.

The trees should be set only slightly deeper than they grew in the nursery, and the soil must be tramped firmly over the roots to bring it and the roots into close contact. If the soil is very dry at the time of planting, the trees should be watered immediately. This is best accomplished by filling the soil in over the roots until the tree hole is two-thirds full. Tramp it firmly, then apply the water. After it has soaked away, fill the hole with dry soil to about the level of the surrounding surface.

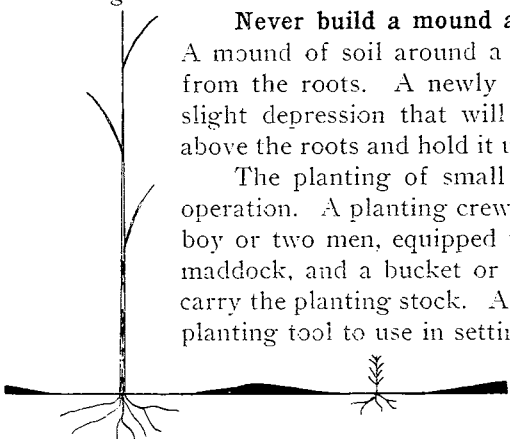

Fig. 12. The proper method of planting trees. Newly planted trees should always be in a slight depression so that the rain water will collect over their roots and soak down to them.

Never build a mound around a newly planted tree. A mound of soil around a tree diverts the water away from the roots. A newly planted tree should set in a slight depression that will collect the rainfall directly above the roots and hold it until it soaks into the ground.

The planting of small evergreen trees is a simple operation. A planting crew should consist of a man and boy or two men, equipped with a good sharp spade, or maddock, and a bucket or other receptacle in which to carry the planting stock. A spade is the most convenient planting tool to use in setting trees in cultivated ground or in furrows. A maddock is necessary if the planting is being done on rough hilly land.

On cultivated land, the tree rows should be marked by a furrow and the trees then set in the furrow. The distance between the trees may be paced by the planter—a variation of a foot or two would be of slight consequence. If exact spacing is required, a bamboo measuring pole, cut to the desired length is a very convenient device to use. The man with the spade opens the hole for the tree. The man or boy carrying the supply of planting stock, places the tree in the hole, being careful to see that the roots are spread naturally. The man with the spade covers the roots, using fresh moist soil as far as possible. The man or boy carrying the trees tramps the soil firmly over the roots, and should be careful to see that the tree is standing erect when the operation is completed.

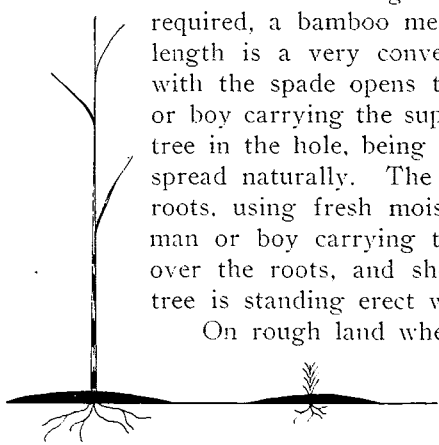

Fig. 13. Wrong method of planting trees. Newly planted trees should not be mounded in this manner. The mound diverts the rain water away from their roots.

On rough land where the tree holes must be made with a maddock, the man using the maddock opens the hole, using care to pile the loose soil at side of hole within easy reach. The tree carrier sets the tree in position, draws the soil over the

roots and tramps it firmly as in other plantings. Care should be taken to leave a ridge of soil around the lower side that will hold the rain water for the benefit of the tree as shown in the illustration.

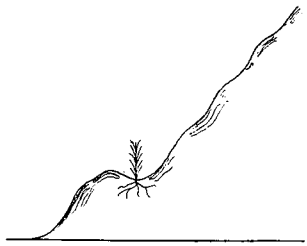

Fig. 14. Proper method of planting trees on a hillside.

If the ground on which the trees are planted is very dry at the time of planting, a third man should be added to the crew. His duty is to water the trees immediately after they are planted. Deferring watering the trees until the next day is often too late. It should be done immediately after they are planted. Small evergreen trees should each be given about a gallon of water at the time of planting. Larger trees should be given more in proportion to the amount of space occupied by their roots. After the water given has soaked into the ground the moist surface should be covered with dry soil to prevent it from crusting and drying by capillarity.

If extremely dry weather follows the planting, the tree should be watered again in about a week or 10 days after the first watering. Enough water should be given to insure thoro moistening of the soil about the roots.

Fig. 15. A slight ridge of soil surrounding the tree to hold the water over its roots.

Before the second watering is given it is advisable to rake the soil away from immediately around the stems of the trees, leaving a slight depression over the roots to hold the water and direct it to them.

When this precaution is taken, a smaller amount of water is required to meet the needs of the trees. After the water so given soaks into the ground the dry soil should again be raked in over the moist surface to prevent it baking and drying out.

Under ordinary working conditions, a crew of two men and a boy or three men can easily plant and water 500 small evergreen trees in a day. The planting of larger trees requires more work and consequently takes more time.

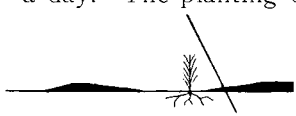

Fig. 16. A shingle set in the ground on the south side of the tree protects it from the sun and wind.

If the young trees are planted during a period of dry windy weather, a little shelter or protection from the sun and wind is of great value to them. This is most practically and economically provided by driving a shingle into the ground, a few inches to the south of the tree, in an inclining position so as to shade it during the heat of the day and protect it from the whipping effect of the south winds that often occur in early spring.

Time of Planting

Early spring is the logical season for tree planting in Colorado. Trees should be planted as soon as the ground is in condition to work after the frost goes out. Trees begin their growth early in the season and should be in their new location before growth really starts. Trees that are not transplanted until after the buds begin to burst experience a back-set that is a bad shock to them and many of them fail to recover. If their roots do not have time to develop new feeders before the heat of summer and the dry season sets in, those that do not die outright drag along a year or two and finally die.

Fall planting of naked rooted trees is not recommended in Colorado on account of the dry weather of the fall and winter months.

Evergreen Planting Stock.—For extensive planting, such as shelterbelts and woodlots, the best planting stock to use is 3-year-old plants that have been grown 2 years in the seedbeds and 1 year in the transplant beds. These will vary somewhat in size, according to the species, from 3 inches to 8 inches in height. The planting stock may be secured thru the State Forester, Fort Collins, under provisions of the Clarke-McNary Act at less than cost of production and handling, for shelterbelt and woodlot planting.

These 3-year-old trees may be planted in nursery rows in the farm garden to grow to desired size before they are planted out in shelterbelts, or they may be planted in their permanent location, when received from the State Forester. The trees of recent-year's planting thruout the state are doing equally well under both methods.

The advantage of planting them in nursery rows in the garden is that if they are grown on a smaller area of ground for 2, 3 or 4 years, less work is required to keep them cultivated, and they can be protected from injury by rabbits and livestock at a much less expense. To offset these items is the cost of transplanting the trees, 2, 3 or 4 years later when they are 15, 18 or 24 inches in height and above the size of injury by jack rabbits.

When planted in nursery rows, the rows should be 3½ feet apart and the plants should be set at least 2 feet apart so that they may be dug with balls of soil on their roots at the time they are to be transplanted to their permanent locations. When planted in nursery rows they should be set in shallow furrows in ground that has been under cultivation for a number of years, about 2 inches below the general level of the surface of the surrounding ground, so that all excess rain water will be carried toward the roots of the trees, rather than away from them. So far as possible, it is desirable when cultivating the trees to throw the soil away from them rather than toward them. It is not a safe policy to plant these small trees in deep furrows. The

first heavy rain will wash the sand and soil into the furrow and bury them.

When the small trees are planted directly in their permanent location the same precaution should be observed.

Broadleaved Planting Stock.—Planting stock of the broadleaved species should be secured from local commercial nurseries as far as possible and especially trees of the larger sizes. For shelterbelt and woodlot plantings seedlings may be secured from the State Forester at very nominal cost under provisions of the Clarke-McNary Act.

For extensive planting where several hundred or even thousands of trees are to be set, 1 or 2-year-old seedlings, ranging 18 to 36 inches in height, are very satisfactory-sized trees to plant. For farmyard planting where only a few trees are to be used, stock from 6 to 8 feet in height usually gives better results. However, trees 12 to 16 feet in height may be used if an abundant supply of water is available and if the trees are given proper care after they are planted.

Spacing.—There are several factors to be considered in determining the distances at which trees should be spaced. Spacing has little to do with the immediate results of planting. If the ground is in good physical condition for the growth of the trees at the time they are planted they will grow very satisfactorily, if given proper care, until the trees begin to compete with one another for the available supply of moisture. Then the rate of growth begins to decline. It is at this time that the spacing becomes a matter of great importance. The limiting factor in growing trees is the available moisture supply in the soil. In dry soils, the trees must be spaced farther apart than is necessary in moist soils, if they are to grow to their full size and perfection.

Another point that must be considered in shelterbelt planting is the time necessary to grow trees to such a size that they will begin to offer some protection from the wind. If the trees are spaced 16 by 16 feet in a shelterbelt, it stands to reason that it will take a much longer time for them to reach a size that will offer a solid front of resistance to the wind, than if they are spaced 8 by 16 feet.

When spaced 8 by 16 feet, the trees will probably make a normal growth until they reach a height of 12 to 15 feet. At that size, their limbs will be interlocking and they will offer almost a solid wall of resistance to the wind. But at about this size, their rate of growth will begin to decline and they will grow more slowly from year to year. When spaced 16 by 16 feet the trees will probably make a normal growth until they reach a height of 20 to 24 feet. At that size their limbs will begin to interlock and they will offer almost a solid wall of resistance to the wind. At this stage of their development

their height growth will also begin to decline because of the limitation of the soil-moisture supply.

The effectiveness of a shelterbelt is determined by the height of the trees and the amount of resistance they offer to the force of the wind. The object is to grow trees to the greatest possible height with a dense growth of foliage from the ground up. Any spacing of trees in shelterbelts that will accomplish this purpose is acceptable. We suggest that evergreen trees in shelterbelts be spaced not closer than 8 by 16 feet and not wider than 16 by 16 feet. In all shelterbelt plantings the trees should be alternated or "staggered" in the rows.

Trimming.—Trimming is a feature of little importance to a tree in a shelterbelt. It is far more important to keep the ground cultivated and keep the trees in a thrifty growing condition. Never cut a live branch off a tree in a shelterbelt. Let them limb from the ground up. Every time a limb is cut off a tree it leaves a hole for the wind to blow thru.

Evergreen trees planted for ornamental purpose in home yards should never be trimmed to bare stems. It disfigures them and allows the sun and wind to strike the ground over their roots and deprive them of soil moisture that they need.

Shade trees should not be trimmed to bare stems until they reach a sufficient size to support their crown without developing top heaviness. Contrary to popular opinion, trimming a tree to a bare stem does not increase its rate of growth, but on the other hand may seriously retard the normal growth. Shade trees may be trimmed to gain symmetry. All broadleaf trees should have two-thirds of the length of each branch trimmed off at time of planting in order to balance the crown with the reduced root system. Ordinarily not all of the root system is dug and shipped with the tree, but usually all of the crown is.

All dead or broken limbs should be removed when they occur. Limbs making an abnormal rate of growth should be clipped back to maintain uniformity of growth. When forked stems occur, one or the other should be removed early in their development. Branches arising from the stem of the tree at acute angles should be removed early close to the stem to prevent wind and snow breakage. When shade trees have reached a height of 16 to 20 feet, the lower limbs may be cut to a height sufficient to allow a person to pass beneath without having to stoop. All pruning should be done in early winter while the trees are dormant.

Care of Trees After Planting

Transplanting is a critical operation in the life of a tree. A transplanted tree is set in its new location with far less than half its former root system; hence the necessity for reduction of crown, if a broadleaf and the necessity of providing the most favorable conditions possible to encourage its growth. It requires an entire season or longer for a newly set tree to fully re-establish itself. If favorable conditions are not provided the tree perishes and all work and time are lost.

Cultivation that will keep the surface of the ground loose immediately around the tree, prevent the growth of weeds and conserve the soil moisture for the needs of the tree is the care required. In addition to the cultivation, they may need an occasional watering in extremely dry periods the first season. Whenever it is necessary to water them they should be given a liberal supply, enough so the soil in which the roots are imbedded is thoroly moistened. As soon as the surface soil dries sufficiently after watering, it should be stirred to prevent baking and drying. Watering should be resorted to only in extremely dry times. Thoro cultivation is more effective than any other treatment that can be given and it should be continued until the trees completely shade the ground allowed them.

On real sandy land where the soil will blow if cultivated, the trees may be planted in furrows and left to shift for themselves. Sandy soils do not bake and dry as the heavier soils do, and cultivation is not needed.

In gravelly or rocky land as on the hillsides, cultivation is impossible and is also unnecessary. The gravel and rocks are loosened with the maddock at the time of planting. This operation destroys the native vegetation that is very slow in recovering and so does not compete with the tree for the available moisture.

The newly planted trees must be protected from the ravages of livestock, and this includes chickens and dogs. Young trees cannot survive browsing and trampling of cattle, horses or sheep, the rooting swine, the gnawing by dogs or scratching by chickens. Even the clawing of young broadleaf trees by cats may kill them. Another source of injury against which they need protection is the girdling or chewing by rabbits.

Protection against injury by livestock can best be provided by fencing the stock off the ground on which the trees are planted.

There are several methods of protecting trees against injury by rabbits. The small evergreen trees are the most difficult to protect. A good method is to enclose the land on which they are planted with a woven wire fence that will keep the rabbits out. Another method is to make a guard of small meshed woven wire for each tree. For

this, the wire netting should be cut into strips 16 inches in length. The strip should be rolled into a cylinder about 4 inches in diameter, the cut ends of the wire should be twisted together and the guard then set around the trees. The guards should be 15 inches in height. The bottom wire should be cut at opposite sides and the base turned outward and covered with sand or soil as the case may be, to hold the guard securely in place.

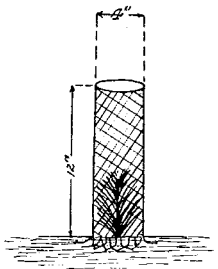

Fig. 17. A wire rabbit guard in position. Note the base turned out and covered with earth to hold the guard in position.

The broadleaved trees may be protected from rabbit injury by wrapping the stems with strips of burlap or other protective material to a height above the reach of the rabbits. Daubing the stems of the trees with some substance repellent to rabbits such as blood, waste oil, or whitewash, with an offensive odor added to it is another effective method of protecting them. Care must be taken not to use too much waste oil as an excess will be injurious to the trees. These materials are only of value for use on the stems and branches of broadleaved trees. Oil coming in contact with the foliage of evergreen trees would be fatal to them.

Shelterbelts

A shelterbelt is a strip of trees several rows in width, located so as to shelter fields or farmyard buildings from the objectionable winds. In eastern Colorado these winds are mostly from the north or northwest. Hence the proper location for a shelterbelt is to the north and west of the fields or yards.

The effectiveness of a shelterbelt is in direct proportion to its height and density. The taller the trees, the farther to the leeward will the velocity of the wind be retarded. Effective wind protection is provided one rod out to every foot of height of the windbreak. The denser the shelterbelt, the less air current will leak thru. A single row of trees affords but slight protection against the wind while several rows in a dense stand reduces the velocity of a gale to mere currents of air on the leeward.

Every farm home and farmyard in eastern Colorado needs protection from the wind and therefore needs a shelterbelt. It is the purpose of this bulletin to assist the farmers in selecting suitable trees for shelterbelt planting and to locate shelterbelts where they will give the greatest protection.

In addition to protecting the farmyards from the sweep of wind, the shelterbelt should be planned to serve as a snow trap that will catch the blowing snow and hold it in drifts on the orchard and

garden. The additional moisture secured for the fruit trees and garden, by the melting snowdrifts, will often mean the difference between success or failure in the production of fruit and vegetables. Moreover, the shelterbelt around the orchard will prevent much young fruit from being whipped from the fruit trees by wind.

To a very large extent the success or failure of many business enterprises depends upon taking the slight advantage offered by existing conditions. This holds true in farming. The successful farmer must make use of the opportunities offered by nature. If he works with nature, he succeeds. If he works against natural conditions, he fails. A properly located shelterbelt protects his family and his livestock from the severity of a winter storm and piles the snow in his garden that would otherwise drift around his farm buildings and impede his efforts. In the summer the shelterbelt will protect the garden soil from blowing, and the young tender plants from being whipped to shreds. Also a field protected by a shelterbelt will produce more crops, because there will be less evaporation of moisture from the soil and less transpiration of moisture from the leaves of the field crops.

The accompanying sketch shows the proper location for a shelterbelt in localities where the prevailing winds are from the north and northwest.

This plan provides for a shelterbelt of three rows of trees. Western Yellow Pines are recommended, along the west side of the farmyard, belt A; four rows along the north side, belt B; then 90 feet farther north, 3 more rows, belt C. The 90-foot space in between the two belts, B and C, is for a farm garden and orchard. The trees in Belt C will check the velocity of the wind and cause the snow to drift on the garden and orchard. This extra deposit of snow will provide a considerable amount of moisture for early spring growth, and, in many instances, insure an early crop of fruit and vegetables.

The trees in belt B immediately north of the farmyard will cause a further reduction in the velocity of the wind and protect the buildings and yards. The trees in belt A along the west will give further protection by preventing the sweep of the wind from that direction.

This plan also shows the location of shade trees for the house and for trees in the front yard, but makes no pretense of locating or prescribing the decorative planting for the yard. The main idea is to show the location of and to prescribe the composition of a shelterbelt that will give the desired protection.

These 3 belts of trees as located are each 400 feet in length. The rows of trees are 16 feet apart and the trees are 8 feet apart in the rows, providing for 50 trees in each row or 500 trees in the entire shelterbelt.

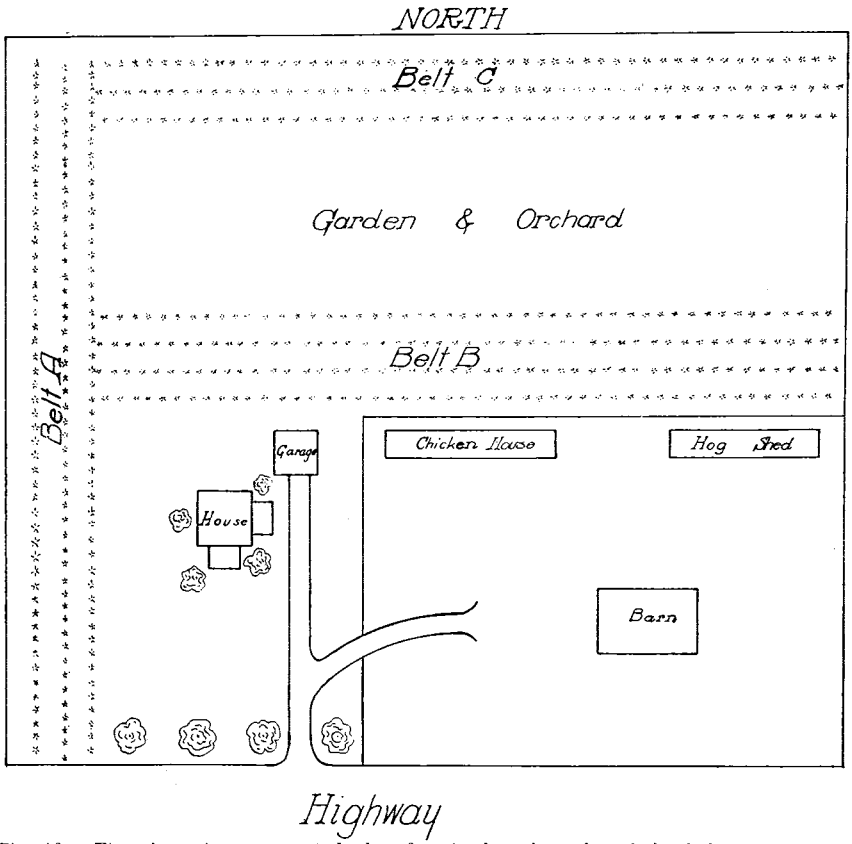

Fig. 18. The above is a suggested plan for the location of a shelterbelt to protect the home and farmyard from the sweep of the north and northwest winds. This shelterbelt is composed of three belts of trees each 400 feet in length, 50 trees in eachc row. The rows are 16 feet apart and the trees are spaced 8 feet apart in the rows. The advantages of this plan are discussed in the text.

The cost of these 500 trees, if bought from the State Forester, will not exceed $8.00 delivered at your door by parcel post. Can you make a better investment in the way of improvements on your farm than to buy 500 Western Yellow Pine trees and plant them in a properly located shelterbelt?

The man who plants a grove of evergreen trees on prairie land erects a living monument to his memory.

A farmyard with an evergreen grove growing on it is known thruout the entire countryside because of that one outstanding feature.

Fig. 19. Chickens need shade and shelter from the wind and hawks. Trees provide all this and more, too.

Shade and Shelter for Stock in Summer

Livestock of all kinds need shade and shelter during the summer months. Chickens need protection from the sun, the wind, the hail and the hawks. A few low-growing trees or shrubs about the farmyard will give this protection. The desirable species for such planting are the Russian olive, the Russian apricot, plums and the common lilac, or still better, the Persian lilac which is free from oyster-shell scale. The swine need shade from the heat of the sun. A few shade trees growing on the outside of the fence along a hog lot will provide the needed shade. If planted inside the hog lot, the swine will invariably root them out. The American elm, hackberry, Russian olive or green ash are suggested for such plantings.

Cattle, sheep and horses require shade during the heat of the day. This can be provided most economically by growing trees in well-distributed clumps on the range.

In planting trees for shade in the pastures, advantage should be taken of the natural locations favoring tree growth. They should be planted in ravines or near the base of inclines so that they will get the benefit of the run-off water that otherwise goes to waste. A slight advantage in securing the use of run-off water is a wonderful benefit to the trees.

The character of the land and the type of soil in which they are planted will determine the necessary preparation of the ground for the trees in such plantings. If at all possible, furrows should be plowed to define the tree rows and to catch the run-off rain water and hold it for the benfit of the trees. Where plowing furrows is not practical, then tree holes, dug with maddocks, must answer the needs. The groups of newly planted trees should be fenced to keep the livestock off until they are above the reach or danger of injury by the livestock.

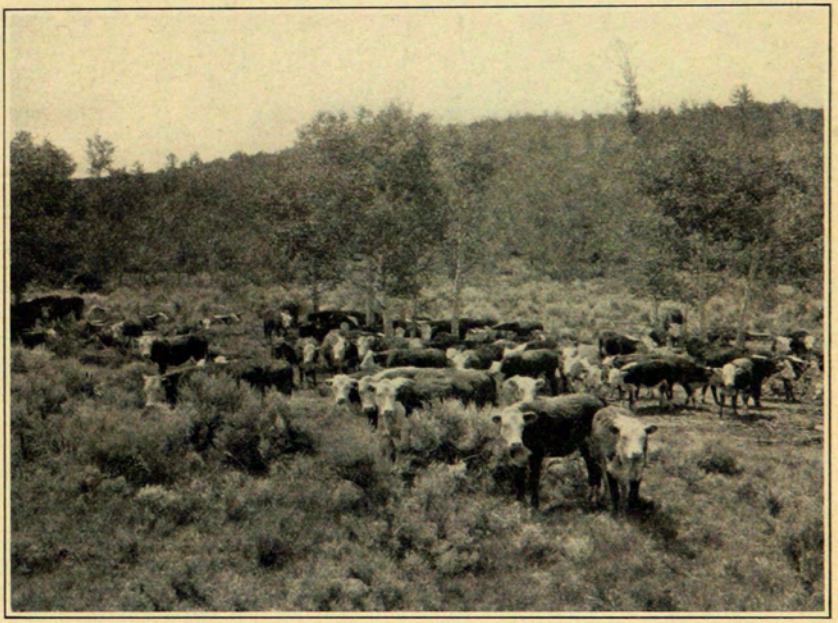

Fig. 20. Cattle appreciate shade and protection from the hoards of flies that follow them. Trees and brush offer this protection.

Woodlots

The farm woodlot is a body of timber of any acreage grown upon a farm for commercial returns. The products of a woodlot are sawlogs, cross ties, poles, posts, farm repair material and fuel. On account of the long period of time required to grow a crop of trees to merchantable size, the trees should be planted where they will serve a dual purpose. If the plans submitted for the arrangement of the shelterbelt do not suit existing conditions, then plant the trees in a solid body, and set them 8 by 10 feet, with the idea of making thinnings from time to time, as the trees begin to crowd each other.

Spacing the trees 8 by 10 feet requires 544 trees to plant an acre. A woodlot covering from 3 to 5 acres is about the size needed on most farms.

When a woodlot cannot be located so as to serve as a shelter to the farmyard, it should be located in a ravine where conditions for tree growth are more favorable than on high dry land. In ravines the trees will get the advantage of additional moisture that runs off the slopes and accumulates in the ravines in times of heavy rains.

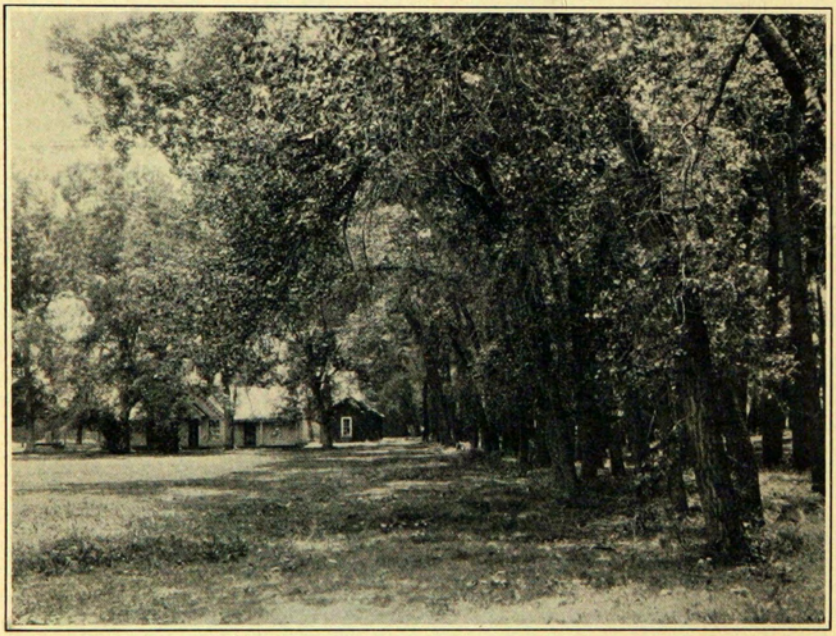

Fig. 21. A Colorado farm home protected from the prevailing wind by a shelterbelt of cottonwood trees. These trees provide a wonderful protection to the home and farm yard

Woodlots in such locations, after the trees reach a height above which livestock will not harm them, may be utilized for winter shelter for cattle or horses. A grove of evergreen trees provides a wonderful shelter to livestock all winter.

A third location to be considered for a woodlot is on land not suitable for agricultural crops. Land that is too rough to plow and cultivate can often be planted in trees to an advantage.

Land that is too light and sandy and blows when cultivated may well be utilized for growing a tree crop. On such land the planting may be planned so that the trees will protect the soil in the adjoining field from blowing.

Fig. 22. An exterior view of the shelterbelt shown in the preceding illustration.

Fig. 23. An interior view of the shelterbelt shown on the preceding page. On account of the trees having been planted thickly the stems are now clear of limbs up to 16 to 20 feet from the ground. The cottonwood is a diciduous tree, and is naked in the winter season. Even under these conditions this shelterbelt provides a wonderful protection from the winter winds. Many of the trees in this shelterbelt are large enough to cut for saw logs

The species of trees best suited for woodlot planting must be determined by the type of soil in which they are to be planted and also with regard to the ultimate product desired. If sawlogs and cross ties are wanted, the Western Yellow Pine would be the logical tree to plant. If poles and posts are wanted as the ultimate crop, then the Rocky Mountain Red Cedar, green ash or honey locust would be the logical trees to plant.

Christmas Trees

Growing Christmas trees as a commercial crop is a very attractive proposition. The young trees, 3 years old, should be planted in rows 3½ feet apart, and spaced 3 feet apart in the rows, on tilled land where they can be given thoro cultivation for at least 3 or 4 years. The cultivation is necessary to keep down all weed growth, conserve the soil moisture, and stimulate the growth of the trees.

The species suitable for Christmas tree trade are the Douglas Fir, Colorado Blue Spruce and Red Cedar. When 3-year-old transplanted stock is used for field planting, it will require from 8 to 12 years to grow them to salable sizes, 5 to 8 feet in height. Spacing the trees 3 by 3½ feet, requires about 4,000 plants to set an acre. Between 3,000 and 3,500 of these should grow into merchantable trees and should sell for at least 25 cents each, at present values. This would give a return of from $750 to $875 per acre. This amounts to an annual return of between $62.50 and $72.90 per acre, figured on 12 years to grow the crop. An acre or two of Christmas trees coming into marketable size each year as a side line is worth anyone's consideration.

For information regarding trees, tree planting, planning and locating shelterbelts and woodlots, or the care of woodlots, address The Extension Service, Colorado Agricultural College, Fort Collins, Colorado.