FARM FORESTRY

II. FOREST SEEDING AND PLANTING.
4-H Club Circular 52

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COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE AND THE UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

J. W. BURCH, Assistant Director in Charge, Agricultural Extension Service

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*The Leader's Guide on Farm Forestry II—Forest Seeding and Planting is to be used with this 4-H club circular.

FARM FORESTRY II.*

I. FOREST SEEDING AND PLANTING.

Introduction—Why Plant Forest Trees

Throughout the entire period of agricultural development of our country, farmers have been clearing away the native forest. It was generally understood that all land which could be plowed would be used for agricultural crops, and lands too steep and rocky for cultivation would be used for stock grazing. Modern agricultural methods, improved and imported plant species and varieties, and substitution of farm machinery for hand labor, resulting in heavier yields, have changed the situation, and now it is known that only the more productive farm areas are needed to produce all marketable crops. Moreover, areas of low fertility, such as steep slopes and rocky, shallow, sandy or poorly-drained soils, have proven unprofitable for cultivation. Other areas, originally fertile and productive, have deteriorated through erosion and leaching, following continuous cultivation, to the point where they can no longer show a satisfactory return. These factors have resulted in many adjustments, including abandonment of entire farms, change of use of large areas from cultivation to grazing and the retirement of small areas from both crop production and grazing on almost every farm. This has resulted in a tremendous area of idle farm land, which in Missouri is estimated roughly at two million acres. The present outlook for this land is that a very low percentage will ever again be used for crop production, and it is necessary that it be put to some type of profitable use. Planting to forest trees which will in the future produce wood crops of value is a use which cannot be ignored. Inasmuch as the benefits and returns of trees planted today will be enjoyed chiefly by future generations, it is a responsibility of the youth of this state to promote forest planting of idle farm lands.

Definitions of Forestry Terms

Before taking up the work of planting it is necessary, first of all, to learn the meaning of a number of words and phrases that foresters use in telling what kind of trees to plant, as well as how and when and where to plant them. These terms are not hard to understand,

*This circular was prepared by Ralph H. Peck, Extension Forester, in collaboration with T. T. Martin, State Club Agent.

but some of them may be new to the club member. A list of definitions will be found on the last pages of this circular (pages 21 to 23), making their meanings clear.

Farm Areas Suitable for Forest Planting

Generally speaking, only areas of waste farm land should be reforested. Such areas include gullies and other eroded hillsides, steep, rocky slopes, unproductive sandy or gravelly fields and worn-out pasture land too rough for improvement. Occasionally, however

Fig. 1.—Typical Planting Area. Scott County, Mo.

small areas of fertile soil, separated from larger fields by new highways, creeks, etc., are too inconvenient for modern methods of cultivation and find their most profitable use in woodlots. Also, the average farm woodlot, often overgrazed and understocked with desirable trees, can be greatly improved by first eliminating all grazing stock and then interplanting with either seed or seedlings of valuable timber species. Only in the planting of windbreaks should better soils be reforested, and then the location is definitely fixed in relation to farm buildings or other improvements over which protection is desired.

Benefits Expected from Forest Planting

The main benefit expected from forest planting is the direct return in the form of crops of wood products. Such products consist of fence posts, fuel, logs from which farm lumber may be sawed, rough timbers for foundations, poles, etc., and salable products not used on the farms such as stave bolts, handle bolts, cross ties, telephone poles and hardwood logs suitable for furniture and other manufactured products. A considerable period of time, however, ranging from ten to fifty or more years, must elapse before these products are ready for harvest. Indirect benefits, sometimes apparent within a very few years, are often of sufficient importance to justify planting. A few are listed below.

Erosion Control.—Natural forest cover, such as develops rapidly in a protected plantation, is the most effective natural control against soil erosion. By planting bare, eroded hillsides to trees, more valuable lands below may be protected against a cover of gravel or subsoil washed down the slope. Not only is soil anchored in place, but raw, ugly gullies, eyesores on any farm, are soon hidden from view.

Soil Improvement.—Forests improve soil through returning each year a layer of leaves and litter, which in turn hold water and keep the soil moist. Moisture, combined with acids given off by the growing vegetation, hastens decay of litter and thus builds up humus in the soil. Black soil, often dug from the woods for covering garden and flower bed areas, and sometimes sold in sacks for window boxes, potted plants, etc., contains a high percentage of humus formed through this decay process. This type of soil, rich in nitrogen, disappears from fields after they have been cleared and cultivated for a few years. Certain forest trees, common to Missouri, belong to the legume family and tend to improve the soil rapidly through fixation of free nitrogen of the air by bacteria in the root nodules. Black locust, planted on farms more widely than any other tree, is an important legume tree, as are honey locust, Kentucky coffee tree, redbud and yellow wood.

Water Conservation.—Leaf litter, under forest trees, absorbs and holds back vast quantities of water. Forest soil, moist, loose and porous, and penetrated with holes formed by tree roots, insects, earth worms and wildlife, allows water to percolate deep into the soil, slowly releasing it to feed springs and streams, which are thus kept flowing at a fairly uniform level even through drought periods. Much of this ground water also is taken up by the tree for use in

the manufacture of tree food, and later released, or transpired, through the leaves into the air. Forests, therefore, not only conserve water and hold it in the soil where it falls, but also tend to cool the atmosphere through evaporation of water transpired through the leaves.

Wildlife.—Forest plantations furnish cover for wildlife nesting and breeding places and usually food supplies, protected from severe weather and hidden from natural enemies. All wildlife is dependent on food, shelter and water, and plantations established near streams, springs or ponds, and containing food-producing trees and plants, are natural wildlife breeding areas. Song and game birds, small game animals, and a few of the furbearers are often attracted as soon as the trees reach sufficient size to afford cover.

Sources of Tree Seed

Tree seed may be obtained in one of the following ways:

1. By personal collection.
2. By exchange with clubs in other sections.
3. By purchase from seed dealers.

Native tree seed often may be collected in nearby fields or woodlands and cleaned at home. Seeds of walnuts, hickories and oaks are available in all sections of the state during good seed crop years and require practically no cleaning. Seeds of other trees may be available only in certain sections of the state, and during certain seed years. Before plans are completed, therefore, the club member must find out whether or not the desired seed is available and where and when it may be collected. Seed collection data for some of our more important Missouri trees are given below.

TABLE I.—DATA PERTAINING TO COLLECTING, CLEANING AND SOWING NATIVE TREE SEED.

Species	Collection Date	Cleaning Necessary	Av. No. lbs. Clean Seed per bu. Fruit	Av. No. Clean Seed per lb.	% of Seed Expected to Germinate
E. Red Cedar	Sept.-Dec.	None	1.75	18,000	50
Shortleaf Pine	October	Dry and Extract	1.25	65,000	60
Southern Cypress	October	Dry and Extract	3.00	3,000	65
Black Walnut	October	None	40.00 (hulled)	28	80
Black Locust	Oct.-Jan.	Dry and Extract	1.25	26,000	85
Hickories	October	Hull	35.00	100	85
Oaks	October	Hull	50.00	150	75
Catalpa	Oct.-Jan.	Dry and Extract	1.50	19,000	85
Osage Orange	Oct.-Nov.	Macerate	1.25	12,000	75
Sugar Maple	October	None	15.00	7,000	55
Ash	Sept.-Oct.	None	12.00	6,000	80
Hackberry	Oct.-Dec.	None	15.00	2,500	85
Black Cherry	June-Sept.	Macerate	8.00	4,500	75
Tulip Poplar	October	Dry and Separate	13.00	16,000	15
American Elm	May 20-June 10	None	15.00	90,000	70

Methods of collection vary with tree species and type of seed produced. Cones of evergreen trees must be collected while attached to the trees, before they open and discharge the seed. This can best be done when trees are being cut and cones can be gathered from tops lying on the ground. Otherwise, trees must be climbed and the cones picked and dropped. Seeds of nut and oak trees may be gathered from the ground after the first frost. Fruit from berry or pod-producing trees must be picked from the tree when mature, while winged seeds, such as ash, elm and maple may be picked from the tree or raked from the ground after falling. Seeds raked from the ground must be carefully cleaned to avoid a mixture of several species.

In collecting, the best seed available should be secured. Cull out poor seed or fruit and save only plump, large, fully mature seed from well-formed, healthy, mature trees. Trees which are either too young or too old, poorly formed, diseased or otherwise unhealthy do not as a rule produce satisfactory seed.

After seed has been cleaned, it should be put into tightly covered cans or fruit jars and kept in a cool, moist place until time to sow.

Clubs in different sections of the state often will find it possible to collect surplus quantities of seed of a certain tree species, while other desired species are unavailable. County agents can furnish assistance in such cases through contacting other agents in counties where the desired seed is obtainable and arranging exchanges, based on market value of the various species.

In case the season for collection of native seed is past, seed is not available, or seed of trees not native is desired, it can always be purchased from dealers and professional collectors. County agents will have available lists of agencies dealing in seeds and prices at which they may be obtained. Pooling of orders often results in obtaining lower prices.

Sources of Planting Stock

Sub-projects 3 and 4, listed on following pages, deal with the planting of nursery-grown forest trees, and one of these projects may be taken up provided members can obtain the young trees from a nursery. This should always be done through the county extension agent, as he is familiar with the several sources of planting stock and can save members money both on cost of stock and transportation. Missouri does not operate a state forestry nursery, and trees are not now available to members free, as is the case in many states. However, trees grown at the U. S. Forest Service Nursery at Lick-

ing, Missouri, are distributed by extension agents to farmers at cost of production. Also, the Soil Conservation Service, Missouri C. C. C. camps, and Conservation Departments of adjoining states sometimes have surplus stock which may be obtained for planting on farms in Missouri. Trees are sometimes available at prices as low as $1.50 per thousand for hardwood seedlings one year old, and in no case should more than $5.00 per thousand be paid for seedlings. Larger, transplanted evergreen stock, often recommended for windbreaks, sometimes costs slightly more than $5.00, but usually 500 trees are sufficient for a farm windbreak, and the added cost is justified through the earlier protection afforded by the windbreak. Trees for forest planting are sometimes available from privately-operated commercial nurseries, although these are engaged chiefly in producing individual trees for shade and ornamental planting. However, there are no private nurseries in Missouri today which offer seedlings or transplants in quantity for forest planting.

II. SUB-PROJECTS

Direct Seeding

Trees recommended for direct seeding are those which produce a long tap root during the first year, and are therefore difficult to lift without severely damaging the roots. Such trees also require much time and labor in digging holes deep enough to plant the entire root without crowding or doubling up. Into this class falls our most valuable hardwood tree—*black walnut*, together with *white oak, bur oak, Northern red oak, pecan* and *shagbark hickory*. Other nut-producing trees, such as butternut and the other species of hickory and oak may be established by direct seeding but their value is relatively low and they cannot be recommended for pure planting. They may, however, be mixed with the better trees if desired for special purposes. Members should select the species which they wish to plant, after first making sure that they can obtain seed and that the soil of the planting site is suited to the trees which are to be planted.

Minimum requirements for the project are as follows:

(1) 2,000 selected seeds.

(2) One-half acre of idle land which can be completely protected against fire and grazing stock.

Planting should be done in the fall, soon after seed is collected, from October 15 to December 1, except where squirrels are too numerous and dig up the seed as soon as it is planted. To avoid this,

plant about ten seed spots and observe them for at least ten days before completing the work. If the majority of nuts have been dug up by squirrels it is best to stratify the seed over winter and plant as soon as the frost leaves the ground in the spring. Stratification prepares nuts for spring germination, as does planting, whereas nuts stored dry over winter often do not germinate until one full year after spring planting. Pit for stratifying, shown in Figure 2 should be located in shady, sheltered spot, preferably on north side of building, where freezing and thawing is not too frequent and soil should be light and well drained. Do not store nuts where squirrels are present as they are almost certain to locate and destroy the stored nuts during the winter. Nuts may be stratified, hulled or unhulled, the only advantage in hulling being that they require less than half as much space as do unhulled nuts.

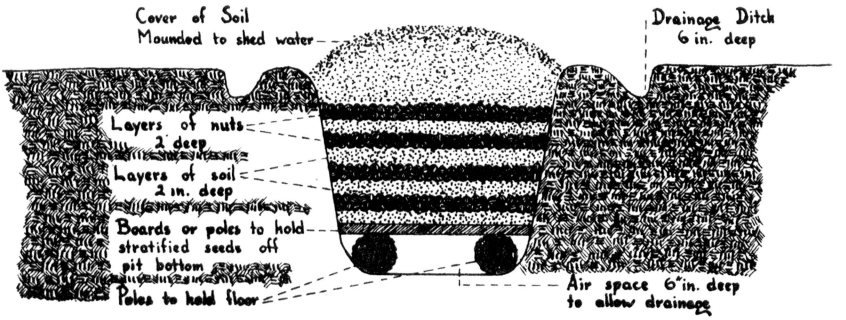

Fig. 2.—Cross-section of Pit for Stratifying Nuts.

The most convenient tool for planting nuts is the grubbing hoe, although a spade or shovel may also be used. Where sod is present it should be scalped away for a space about 18 inches square and the bare soil thoroughly loosened up. From three to five seed should be planted per spot, spaced about 6 inches apart near the center of the scalped area, and not more than two inches deep. Careful, unhurried planting of a half acre will require about two days work for the average boy.

Table II.—No. Trees Per Acre Required For Various Spacing.

Spacing (in feet)	No. Trees Per Acre	Spacing (in feet)	No. Trees Per Acre
5 x 5	1742	6 x 8	908
5 x 6	1452	7 x 7	889
5 x 7	1245	7 x 8	778
6 x 6	1210	8 x 8	681
6½ x 6½	1031	8 x 10	545
6 x 7	1037	10 x 10	436

The recommended spacing for both direct seeding and forest planting projects is 6½ by 6½ feet which requires approximately 1000 seed spots or seedlings per acre as shown in Table II.

Spacing as close as 5 x 6 feet, or as wide as 8 x 8 feet may be used if desired but the recommended distance of 6½ feet each way meets all requirements of growth, form and timber development as well as being simple to compute on a 1,000 per acre basis. Spacing need not be exact but can be measured roughly by pacing. A light pole, 6½ feet in length, is convenient to use in checking the spacing.

Fig. 3.—Mature Black Walnut Plantation Established by Direct Seeding Jackson County, Mo.

Operating a Farm Nursery

A small tree nursery on the farm, producing enough trees to reforest several acres of idle land each year, requires very little space, labor and equipment and no expense unless seed has to be purchased. Besides forest planting stock, trees for windbreak or hedge planting, shade and ornamental trees and stock for Christmas tree plantations may be grown at home with little expense within from two to five years of time. Trees grown in nurseries, where soil is generally fertile, and where they receive cultivation, weeding and water if necessary, grow faster, produce better developed root systems and are of better form than wild stock. Because of these advantages, they are more likely to survive when transplanted to permanent sites, continue to grow faster and develop into superior trees. Seeding data for various Missouri native trees are shown in Table III.

Table III.—Seeding Data for Native Species.

Species	Recommended Seeding Date	Lbs. of Seed Per 100 sq. ft. of Seedbed	Seeding Depth	Yrs. required in Nursery	Region
East. Red Cedar	Oct. 1-Dec. 1	1.0	⅛"	2	Entire State
Shortleaf Pine	Early March	0.25	Barely Cover	1-2	So. Missouri
Southern Cypress	Early March	3.0	⅛"	1	S. E. Missouri
Black Locust	June 15-July 15	0.25	⅛"-¼"	1	Entire State
Hardy Catalpa	March-April	0.25	Barely Cover	1	Entire State
Osage Orange	Fall or Spring	0.50	⅛"	1	Entire State
Sugar Maple	Fall or Spring	1.0	⅛"	1	Entire State
Ash, White or Green	Oct. 15-Dec. 1	1.0	⅛"	1	Entire State
Hackberry	Oct. 15-Dec. 1	3.0	⅛"	1	Entire State
Black Cherry	Oct.-Nov.	2.0	⅛"	1	Entire State
Yellow Poplar	Oct. 15-Dec. 1	6.0	Barely Cover	1	S. E. Missouri
American Elm	June 1	0.25	⅛"	1	Entire State

Minimum requirements for the 4-H Club nursery project are as follows:

(1) Seedbed 4 feet wide by 25 feet long.

(2) Recommended amount of seed.

The first step in planning the nursery project is to select the one or more species which will be grown, obtain the necessary seed and locate the nursery site. Selection of site is very important and upon this selection may rest the success or failure of the project. It is necessary that the soil be in cultivation, without sod and preferably free from weeds. A light, sandy loam, level or gently sloping, with well-drained subsoil and located near a supply of water is considered best, and good soil drainage is very important. Poorly drained, clay soils are sticky and difficult to work in early spring, are not conducive to good root development and stick to the roots so tightly when trees are being lifted that most of the lateral roots are broken off and remain in the soil. The site, if possible, should be located within one hundred feet south or southeast of buildings or windbreak, and protected from all grazing livestock, poultry and rabbits.

The proper time for seeding the various tree species is shown in Table III. The seedbed should then be broken up, either with a spade or plow, marked off with stakes and twine, and the surface smoothed up and crowned with a garden rake. A shallow ditch along each side of the seedbed is recommended to give proper drainage, as shown in Figure 4. Clean seed, such as pine, cedar, cypress, black locust or black cherry may be planted in drills six inches apart by using a garden seed drill similar to the "Planet Jr." Hardwoods such as maple, ash, yellow poplar, catalpa or elm, the seed of which is attached to "wings" not easily removed, must be seeded by hand in drills, or hand broadcast. Drill seeding is recommended over broadcasting. It allows the use of a hand or wheel hoe in summer cultivation and eliminates considerable hand weeding.

Tree seeds, as a rule, should be covered very lightly, especially seeds of conifers which give best results when a few seeds show on the surface after covering has been completed. Where seed is broadcast on the surface, the best method of covering is to lightly sieve clean sand over the bed until seed is barely covered.

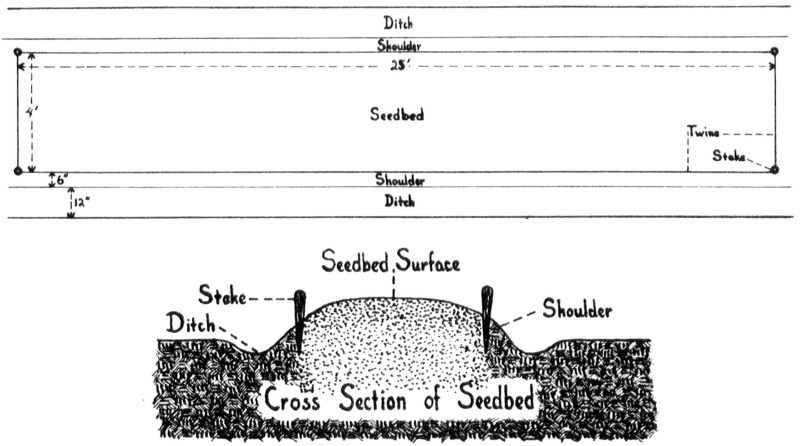

Fig. 4.—Detail and Cross-Section of Standard 4-H Club Seed Bed.

March 1. 1937 **November 1, 1937**

Fig. 5.—Hardy Catalpa. Farm Nursery Seedbed. Scott County, Mo.

Germination takes place in from five days to three weeks, depending on weather conditions, tree species and condition of seed when sown. As the tiny seedlings often resemble weeds during the first

few weeks of growth, it is best not to attempt weeding until the young trees can be easily distinguished. Seedbeds should be kept free of weeds until late summer, by which time the seedlings have shaded the ground sufficiently to keep down active weed competition. Watering of seedbeds is necessary during periods of prolonged summer drought and should always be done in the early evening, after sundown. To be effective, sufficient water should be applied to moisten the top three inches of soil.

As a general rule, hardwood trees reach planting size in one year and are ready for transplanting to the field in March of the year following seeding. Shortleaf pine and southern cypress also reach planting size in one year, but eastern red cedar and conifers not native to Missouri usually require two or more years in the seedbed. Conifers raised for windbreak planting should be transplanted at the end of two years and spaced two inches apart in rows six inches apart for at least one more year before they are finally planted as a permanent windbreak.

Young trees are hand lifted from the farm nursery bed by means of spade or spading fork. Care must be taken to keep the blade at least six inches away from the young trees and to dig enough to thoroughly loosen the trees and preserve the entire root system. Trees should be taken up immediately after loosening, counted, tied in bundles of fifty or one hundred and immediately heeled-in in a trench with the roots completely covered with moist soil as shown in Figure 6.

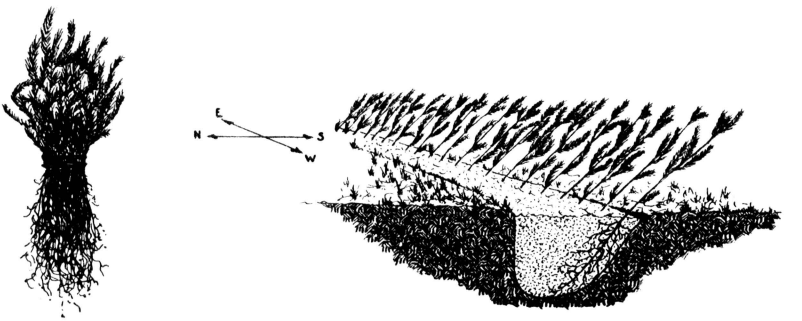

Fig. 6

Bundle of 50 Tree Seedlings.

Trees Properly Heeled-in May be Stored for Several Weeks.

If planting is to be done immediately, bundles of trees may be stood in tub or bucket containing enough water to completely cover the roots. Trees should never remain in water, however, for more than four days, as roots may become suffocated through lack of air.

The utmost care must be taken to prevent roots from drying out between lifting and transplanting and roots should never be exposed to the air for more than three minutes at any time.

Forestation of Idle Farm Land By Planting Young Trees

All of the trees recommended in Table III, Seeding Data, on page 11 are suitable for planting in Missouri. By far the most widely planted tree on farms, however, is black locust. This tree makes rapid growth on good soils, grows fairly well on fair and poor soils, has a wide-spreading, surface root system which makes it especially valuable for gully reclamation and erosion control, and produces hard, durable wood highly prized for fence posts and poles. Black locust is a legume, enriching the soil through fixing nitrogen in its root nodules, and reproduces rapidly through root suckers as soon as it is cut. Other trees planted for fence posts are catalpa, osage orange or hedge and eastern red cedar, while shortleaf pine, ash, tulip poplar, walnut, hackberry and black cherry are valuable for mixed planting in the farm woodlot. Minimum requirements for the forest planting project are as follows:

(1) 500 tree seedlings.
(2) One half acre of idle farm land.

Planting is done in early spring as soon as convenient after the frost leaves the ground and before any new growth takes place. This varies in Missouri from late February in the extreme southeast section to late April in the extreme northwest. For the state as a whole, March is probably the best month in which to plant.

Plowing is recommended as an aid in planting and to keep down competition from other vegetation during the first growing season. On land fairly level and not subject to washing, this may be done the fall before planting, but rolling land should be plowed and disked just before planting is done. Where plowing is impossible because of steep slopes or obstacles, all vegetation should be scalped away from the planting hole for a space 18 inches square, as recommended for direct seeding. Tree seedlings must be carried in a bucket containing sufficient water to keep the roots wet at all times while planting is being done. The entire planting operation is done by one person, carrying a bucket of trees and a planting tool, either grubbing hoe, spade or shovel. A deep hole, large enough to hold the entire root system is dug out and the tree suspended in the hole with one hand so that the tap root barely touches the bottom of the hole. Soil is then pushed in with the other hand until the hole is half full and thoroughly tamped with the fist so that no air pockets remain about the roots. The hole is then filled level and further

tamped by stepping heavily on either side of the young tree. By stepping distances between trees, approximate spacing may be kept and one inexperienced planter should be able to plant from 250 to 500 trees in a normal day's work. Care must be taken to plant trees neither too deep nor too shallow, but at approximately the same depth as they grew in the nursery. Recommended spacings are the same as those given in Table II, page 9 for direct seeding. Spacing as close as 4 x 4 feet is sometimes advisable in planting banks of gullies for erosion control, but for all other planting never closer than 6 x 6 feet.

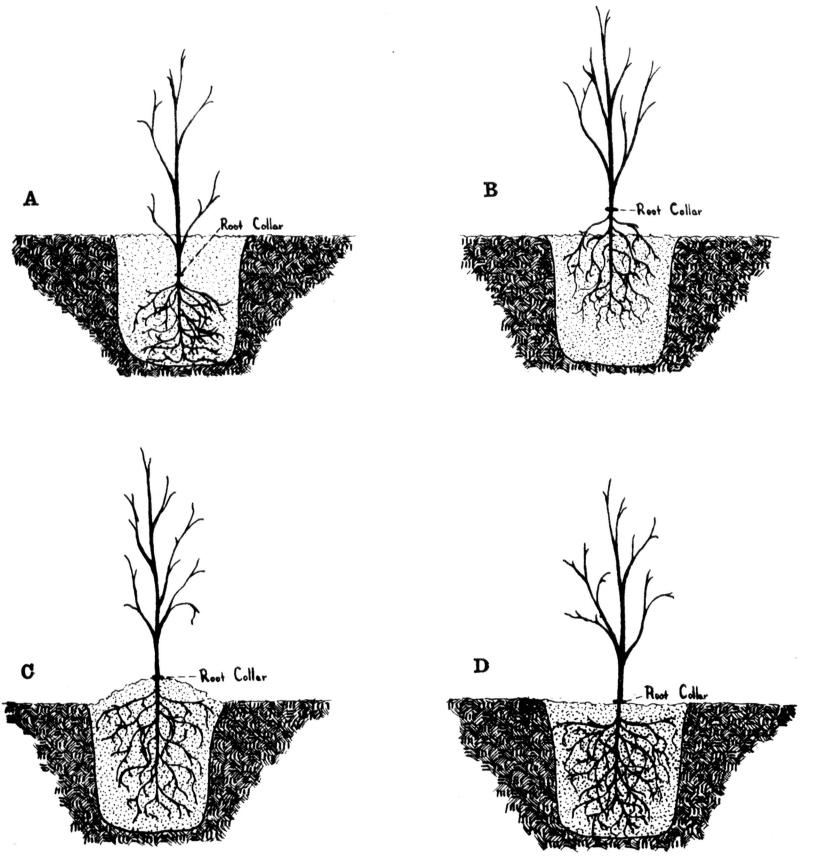

Fig. 7.—A, B, and C Represent Common Mistakes in Planting Which Should be Avoided. D Shows Tree Properly Planted.

Establishing a Farm Windbreak

Farm windbreaks have proven their worth in prairie states ever since the vast agricultural interior of this country was first settled, but it remained for the federally directed Prairie States Forestry Project, originated in 1934, to prove the tremendous value of tree plantings in long strips to conserve soil and moisture. Windbreaks are in reality small, narrow shelterbelts, especially designed to protect farm buildings, stock feed lots, farm ponds and field crops from wind. While wind protection around homes and stock is most greatly appreciated in winter, protection from summer winds during periods of drought is often even more valuable from an economic standpoint. Hot, drying summer winds are raised above the soil surface and evaporation of soil moisture appreciably reduced. Objection is sometimes raised to trees along the sides of fields because the sapping effect of the roots takes moisture away from the crops immediately adjacent to them. This is particularly noticeable in drought years, but at the same time it will be found that the crop beyond this narrow sapping zone is so much better than in unprotected fields that the small moisture loss through sapping is compensated for many times over. Osage orange hedges, common throughout prairie sections of the state, return considerable unseen profit to the owners through conserving soil moisture. Orchards, small fruits, truck crops, potatoes, as well as fields of corn and wheat, are benefited by properly spaced windbreaks. Areas adjoining windbreaks which are beneficially influenced, are shown in Figure 8.

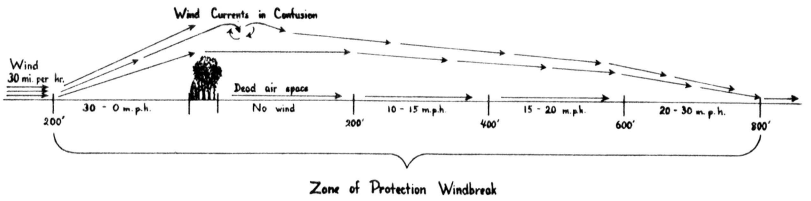

Fig. 8.—Diagram Showing Zone of Protection Afforded by Effective Windbreak 40 Feet in Height.

The common type of windbreak, planted for farmstead protection, should be located on the north and west sides of the farmstead and from 75 to 150 feet away from the buildings to be protected. It should be located in a strip, not less than twenty feet in width, and containing never less than three and preferably five or more rows of trees. These should be arranged as shown by cross section in Figure 9, with the tallest and most rapid growing species in the interior and lower growing conifers on the outside.

Windbreak sites should be plowed in the fall and allowed to lie over winter, unless on steep slopes where excessive washing will result. Steep slopes should be plowed in early spring and thoroughly disked before planting. Tree rows should be measured by tape and spaces marked with stakes before trees are planted. Windbreak

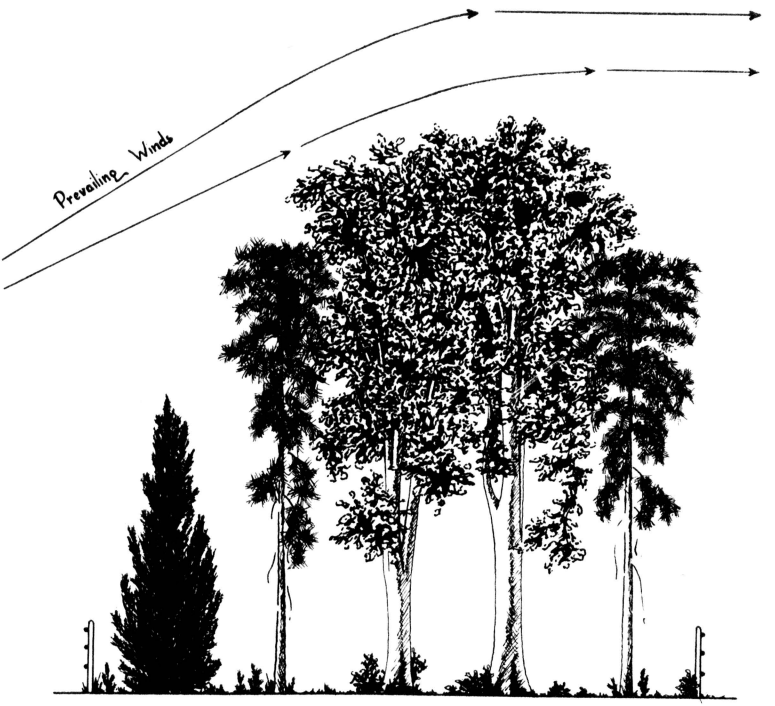

Fig. 9.—Cross-Section of Windbreak Containing 1 Row of Eastern Red Cedar, 2 Rows of Ponderosa Pine, and 2 Rows of American Elm or Other Tall Hardwood Tree.

trees should never be spaced closer than 6 x 6 feet, while 6 x 8, 8 x 8, 8 x 10 or 10 x 10 foot spacings are also recommended. Generally, where a wide strip is available, a spacing of not less than 8 x 8 feet is advisable, with trees staggered in rows, rather than opposite each other. Transplanted conifers, from 10 to 20 inches high, are strongly recommended over seedlings for windbreak planting. If only seedlings are available they may be lined out in a row in the garden, spaced a foot apart, and cultivated for at least one year before planting as a windbreak. Whenever wild seedlings of eastern red cedar are used for windbreaks, they should be carefully lifted with

a ball of earth and transplanted immediately. Cedars from one to two feet in height are recommended. Although cedar is probably the best windbreak tree which can be grown in Missouri, it is susceptible to cedar-apple rust infection and should not be planted near apple orchards.

Fig. 10.—Six Row Windbreak of Pure Ponderosa Pine, Planted in March, 1931. Many Trees Are Now 10 Feet in Height and Afford Effective Protection. Lewis County, Mo.

Windbreak trees should be clean cultivated for at least two years after planting, in order to maintain rapid growth and survival, and to hasten effectiveness, as usually ten years must elapse before the tree windbreak matures sufficiently to function properly.

III. PROTECTION AND MAINTENANCE OF PLANTATIONS

Fire and livestock must be excluded from stands of young trees. Fire can usually be avoided by care on the part of the owner, but in sections where woods fires are common it may be advisable to plow a firebreak not less than six feet in width completely around the young plantation. Firebreaks should be disked several times during the growing season to keep down growth of vegetation. All forest plantations and windbreaks must be fenced either before or immediately after planting is done. Fencing is recommended for existing farm woodlands, as well as planted stands, for stock damage in many sections even exceeds damage by fire. Not only do ani-

mals browse on the leaves, twigs and buds of both hardwoods and conifers, but injure and ruin many more by trampling.

Cultivation of young stands during the first growing season is advised for all types of plantations when topography permits, and for two or more years in windbreaks. Where cultivation is not possible due to steep slope, rock outcrop, or other physical features, the young trees should be watched during the first growing season to make sure that they are not choked out by weeds. Shortleaf pine apparently survives better during the hot months if partially shaded by a light growth of grass, weeds or brush, but black locust and many of the other hardwoods suffer heavy loss through shading. By hand cutting small areas of weeds about trees which are heavily shaded, many seedlings can be brought through which might otherwise be shaded out. Weed competition after the first year is seldom serious enough to warrant cutting.

As trees approach maturity, the crowns form a complete canopy over the ground and considerable competition for crown and root space takes place, resulting in the suppression and subsequent death of a number of trees. Whenever competition becomes apparent, through slowing down of growth and dying of crowded trees, a light thinning should be made, removing only enough trees to liberate the crowns of the better trees. Such thinning in dense stands also allows light to reach the forest floor and permits germination of seed and natural reproduction to take place, resulting in a young stand of seedlings. Thinning should not take place until after fifteen years, or whenever the stand shows definite evidence of overcrowding.

Several thinnings may be advisable before the tree crop reaches maturity, and, by careful selection, considerable usable material in the form of posts, poles and fuel wood may be obtained which will more than cover cost of labor in thinning.

Borers or other injurious insects occasionally infest young stands of growing timber and cause considerable damage. This is true especially in overcrowded stands, in slow-growing stands situated on very thin soils, or following severe drought injury when trees are in weakened condition. When serious insect infestation occurs it is best to ask the advice of a trained forester or entomologist before attempting control measures.

Aside from complete protection from fire and livestock, and occasional light thinnings when necessary, the planted forest stands require no labor expenditure for maintenance after the second year until trees begin to mature and are ready for harvest.

IV. DEFINITIONS OF FORESTRY TERMS

1. General

Forestation—Establishment of forest cover either by nature or man.
Reforestation—Forestation of land formerly covered by forest.
Afforestation—Forestation of land never before covered by forest, such as plains and prairie.
Conifers—Cone-bearing, or evergreen, trees having needle or scale-like leaves. Example, pine, cedar, spruce, cypress.
Hardwoods—Broad leaf trees, most of which shed leaves in fall. Example, oak, cottonwood, walnut, willow, maple.

2. Seed Collection and Treatment

Crop Years—Years when certain tree species produce heavy crops of seed. May be alternate years or once in several years.
Seed Tree—Tree of desirable form and size, from which seed may be obtained.
Extraction—Removal of seed from fruit, such as cone, bur, hull, berry or pod.
Maceration—Method of extraction of seed from fleshy fruit, such as cherry, osage orange, etc. Fruit is allowed to decay, then placed in tub of warm water and mashed and stirred until pulp rises to surface and seed sinks to bottom. Water and pulp is then poured off and clean seed collected and dried.
Stratification—Storage of seed in pit or box of moist earth to hasten sprouting.
Treatment—Soaking seed in water, acids or lye solution to hasten sprouting.

3. Nursery

Forestry Nursery—Nursery where young trees are raised from seed for forest planting.
Seedbed—Raised earth bed, usually four feet wide and of varying length, in which seed are sown.
Seedling—Young tree, one to three years old, grown in seedbed.
Transplant Bed—Area of nursery to which seedlings are transplanted. No special size or shape.
Transplant—Young tree which has been transplanted in nursery.
Mulching—Covering of nursery beds with straw, leaves, burlap or other material to protect over winter.
Lifting—Taking up young trees for transplanting.

Heeling-in—Temporary storage of lifted stock in shallow trench, tops exposed and roots covered with moist earth until planting can be done.

4. Forest Planting

Forest Plantation—Forest stand established by man through seeding or planting.

Direct Seeding—Sowing of seed on area where forest stand is desired.

Seed Spot—Spot where one or more seed are sown. Comparable to hill of corn or other crop.

Planting Stock—Young tree seedlings or transplants grown in forest nursery and ready for field planting.

Pure Plantation—Planting of one tree species.

Mixed Plantation—Planting of several species in mixture.

Planting Site—Area of land to be planted.

Site Preparation—Improvement of site before planting, such as plowing, disking, clearing brush, etc.

Contour Furrows—Furrows plowed around hill on level or contour, in which trees are to be planted.

Scalping—Scraping off sod, from one to two feet square, in center of which hole is dug for tree.

Spacing—Distance between rows and between trees in each row.

Deep Hole—Hole 8 to 10 inches deep, dug with grub hoe or spade.

Slit—Hole made by driving planting tool straight down and opening V-shaped slit large enough to insert roots of young tree.

5. Special Types of Planting

Windbreak—Narrow strips of trees planted around buildings, field, etc., to protect against cold and hot winds.

Shelterbelt—Strips of trees, roughly 100 feet wide, planted in forest formation for wind shelter, water conservation and farm wood products.

Underplanting—Planting seeds or young trees in woodlot under larger stand of trees.

Interplanting—Planting seed or young trees in woodlot between other trees to thicken stand.

6. Tree Classification by Size

Seedling Stage—Tree produced from seed, nor over 3 feet in height.

Small Sapling Stage—Tree 3 to 10 feet tall.

Large Sapling Stage—Tree over 10 feet tall, but not over 4 inches D.B.H. (Diameter at breast height).

Pole Stage—Tree 4 to 10 inches D.B.H.

Young Timber Stage—Tree 10 to 20 inches D.B.H.

Mature Timber Stage—Tree 20 inches D.B.H. or over, which has completed height growth but is still healthy and growing in diameter.

Over-mature Timber Stage—Tree which has completed active growth and is deteriorating in quality due to decay and other defect.

V. REFERENCE MATERIAL

The following bulletins and circulars are listed as additional reference to aid in carrying out the forestry projects described here, and it is suggested that leaders obtain those which pertain to the sub-projects under their direction as desired. Bulletins may be obtained free through your county extension agent or the College of Agriculture.

Mo. Ext. Circ. 342—How to Plant Small Trees.
Mo. Ext. Circ. 343—Tree Windbreaks for Missouri Farms.
Mo. Ext. Circ. 345—Tree Planting for Erosion Control.

U. S. D. A. Bulletins

These publications may be secured from the Bureau of Information, U. S. Department of Agriculture, Washington, D. C.

U.S.D.A. F 1117—Forestry and Farm Income.
U.S.D.A. F 1123—Growing and Planting Hardwood Seedlings.
U.S.D.A. F 1177—Care and Improvement of the Farm Woods.
U.S.D.A. F 1392—Black Walnut for Timber and Nuts.
U.S.D.A. F 1453—Growing and Planting Coniferous Trees.
U.S.D.A. F 1628—Growing Black Locust Trees.
U.S.D.A. F 1719—Improving the Farm Environment for Wildlife.