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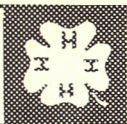
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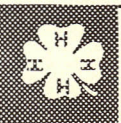
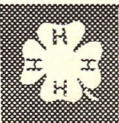


Nebraska

4H FARM FORESTRY

SECOND YEAR

THE UNIVERSITY OF
NEBRASKA AGRICULTURAL
COLLEGE EXTENSION SERVICE
LINCOLN, NEBRASKA



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EXTENSION CIRCULAR 17-11-2

FEBRUARY, 1941

Trees and shrubs are very useful for preventing soil erosion and also in helping provide a home for wildlife. Those who plant trees and shrubs and take good care of them are acting the part of good citizens. They are preserving for the future. 4-H forestry club members are doing their part in this worth-while program.

Extension Service of the University of Nebraska College of Agriculture
United States Department of Agriculture Cooperating
W. H. Brokaw, Director, Agricultural Extension Service
Lincoln, Nebraska

Nebraska

4-H Farm Forestry

EARL G. MAXWELL

DURING THE SECOND YEAR, forestry club members will continue the two main phases of the project, namely: tree planting and tree study. Problems provided for this year's project are:

- VI. Propagation of Trees and Shrubs
- VII. Farm Windbreaks
- VIII. Planting for Erosion Control
- IX. Planting for the Benefit of Wildlife
- X. Fence Posts for the Farm

Requirements

Each member will:

1. Continue the study of trees and other plants and learn to identify an additional number common to his or her locality.
2. Make replacements of trees lost during the first year, and in addition meet the first year's requirements regarding the number of trees to be planted and cared for.
3. Select winter twigs, leaves, and seed of ten trees or shrubs other than those selected previously for scrapbook or mounting on cards.

Problem VI--Propagation of Trees and Shrubs

IN NATURE trees reproduce their kind most frequently by seeds. Seeds come from flowers. To study the flowers of different species of trees and shrubs and the methods by which they are fertilized and the ways in which the seeds are distributed is very interesting.

Some trees, for example the elms and some of the maples, have both staminate (male) and pistillate (female) flowers on the same tree, while in others like the Cottonwood, Boxelder, and Kentucky Coffee Tree, the different kinds of flowers are on different trees. If you will examine the flowers as they develop on the various trees and shrubs, preferably with a hand lens, you will marvel at their beauty.

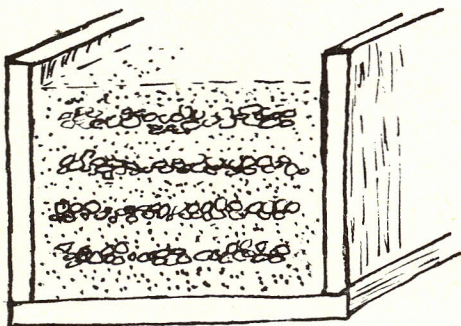
The seeds of several families of trees, the elms, the poplars, ash, maples, and many others, are so equipped that they are readily scattered by the wind. The Hackberry, Chokecherry, and Red Cedar seeds for example, are disseminated by the birds. Walnuts, hickory nuts, and acorns are distributed to a considerable extent by squirrels.

Most plants produce seed in large quantities and sometimes all will not grow. When collecting seed one should examine several by cutting them open to see if they are filled and the kernels plump. One should be sure that the seeds are ripe. Seed of conifers (cone bearers, such as pines, spruce, and fir) is ripe when the outer coat is brown and the seed is firm and no longer milky. Seeds having a more or less pulpy covering such as

the hawthorn, plum, and the like are usually mature when the fruits are well colored.

Seed Treatment

Autumn is the time to collect most seed. Collecting seed from many species may be extended well into the winter. Seeds of the Soft Maple and most of the elms mature early in the season, and, as they do not retain their vitality if stored, should be gathered and sown soon after they are ripe. Excessive drying often impairs the germination of seed. Therefore most late-maturing seed such as Honey Locust, Black Locust, Hackberry, Black Walnut, Wild Plum, and Chokecherry are planted in the fall or are stratified over winter and planted the following spring. Stratification consists of putting alternate layers of seed and moist sand or granulated peat moss one-half to one inch thick, depending on the size of the seed, in a box and this is kept in a cool cellar or buried in the ground in some well-drained location. It is well to cover the box with screen wire to prevent destruction by rats and mice.



Cross-section of Box of Stratified Seed

Some seed, such as that of the Kentucky Coffee Tree, Honey Locust, and Black Locust, if held over winter in a dry condition will develop hard bony seed coats and if planted in the spring without being treated will not germinate well, if at all. In such cases the following treatment is recommended.

When the ground has warmed up and is ready for planting in the spring, place the seeds in a tub or pail, and pour over them hot water which has been heated to 150° to 160°F., stirring vigorously during the operation. Cover the vessel and let stand for a few hours. The seeds which have begun to swell should be taken out and planted immediately, and the ones that show no signs of swelling should be given another treatment.

Preparing the Seedbed

A seedbed for planting tree seeds should be prepared the same as for vegetable crops. Thorough preparation of the soil will usually result in better germination of the seed and better growth of the seedlings.

Planting

The seed should be planted in rows far enough apart to permit hoeing and keeping the ground clean. Seeds are often sown in broad rows four or five inches wide with the seeds placed an inch or so apart. Some hand weeding will usually be necessary. For depth of sowing the seed, the general recommendation is two or three times their own thickness. It is necessary to make some provision to prevent the soil from blowing off the seed, and also to keep it from drying out. The seedbed should be mulched with either hay or straw or the dirt ridged over the row of seed. It will be necessary, of course, to watch the germination of the seed and remove the mulch so that the seedlings can get through.

It will be advisable to use water and keep the seedbed moist until the seed sprouts and later to keep the seedlings growing when the ground becomes dry. Watering of the seedlings should be discontinued after the middle of August in order that they may harden up properly before frost.

Evergreens from Seed

Growing evergreens from seed requires more exacting conditions and attention than is the case with broadleaf trees. The little seedlings are often killed by a "damping off" fungus as they are coming through the ground. Some shade must be provided throughout the first summer in order to protect the tender seedlings from the hot sun. Then, too, the growth is very slow for the first few years. The once-transplanted Clarke-McNary Austrian and Ponderosa pines distributed by the Agricultural Extension Service are three years old, and the Red Cedar are two years old when distributed to Nebraska farmers. Considering the great amount of time and attention necessary to grow evergreens from seed, it is considered more practical to purchase once-transplanted trees, rather than depend on growing them from seed.

In addition to propagating by seed other methods are employed, such as propagation by cuttings, layering, grafting, and budding.

Propagation by Cuttings

There are a good many woody plants that may be propagated by cuttings. Softwood cuttings, made from new growth or immature wood, are generally rooted under glass in summer, while hardwood cuttings, those taken from mature wood, are ordinarily planted in the open ground in the spring. Moist conditions are required, however, in order to have success in starting cuttings, even those which root easily. It is very necessary that the cuttings be planted where there is protection from drying winds.

Softwood Cuttings

Such varieties as Forsythia, Honeysuckle, Lilac, Mock Orange, and Privet may be started under glass in the summer. Clean, medium-fine sand is a good medium in which to start summer cuttings. A high degree of humidity in the air around the cuttings is necessary to keep them fresh while the roots are forming. Ordinary hotbed frames covered with glass sash are commonly used.

Short cuttings three to eight inches long are taken so that the cut is made just below or through the stem where a leaf is attached. The cuttings are placed in the sand and watered well. The hotbed sash must be kept over the bed in order to confine the moisture and heat. When the cuttings are well rooted the sash may be opened during the day time and later the rooted cuttings may be planted out in the open ground in a well protected bed.

Hardwood Cuttings

Among the trees which may be propagated by hardwood cuttings planted in protected locations in the open ground are the willows and poplars. Such shrubs as Tamarix, Spirea, Mock Orange, Barberry, and Dogwood may also be propagated from hardwood cuttings.

Wood of one season's growth of medium size and well matured is usually cut about eight or ten inches long in the fall or early winter, tied in small bundles, and buried in the open ground until early spring. It is best to cut the lower end of the cutting through or just below a bud as rooting occurs most readily where there is a bud. The upper end should be cut just above the top bud. The cutting should be planted in early spring with the top bud near the surface of the ground.

Root cuttings may be made from roots of plants which produce suckers such as Osage Orange, Bittersweet, Willow, and Black Locust. Rather young roots about one-fourth to one-half inch thick are dug, cut in pieces about three inches long, and planted in the early spring. The cuttings should be placed with the top end (end coming from nearest to the parent plant) near the ground level, with the soil packed firmly. The dirt should then be ridged five or six inches high to hold moisture around the cuttings. This is raked down when the shoots have grown about one inch. Some shade is advisable for the new shoots when they are first uncovered.

Propagation by Layering

Certain shrubs and vines may be propagated by a process called layering. This consists of bringing shoots or branches into contact with the soil to develop roots while still attached to the mother plant. Simple layers are made by bending branches to the ground and covering a portion with about six inches of soil. This is usually done in early spring before growth begins. The tip is left uncovered to form the top of the new plant. Rooting may be hastened by scraping or cutting a slit in the bark on the under side of the stem. Simply cut one-half way through the stem on the under side. A couple of stakes or a forked stick should be used to hold the stem solid. It is quite necessary that the soil be kept moist and it is, therefore, a good idea to place some mulch over the mound of dirt. When well rooted the layers may be severed from the mother plant during the fall or winter and transplanted the following spring. If the plant has not become well rooted it should be left for another growing season before being removed.

Propagation by Budding and Grafting

Budding and grafting are resorted to when it is difficult to increase certain trees or shrubs because they do not root easily or do not produce

plants that are uniform when grown from seed. These methods are used to propagate most of the fruit-tree varieties, ornamental trees like the Moline Elm, the silvery blue Colorado Spruce, and the many types of junipers.

A grafted tree is made by the union of a twig (scion) which develops the top, with a root stock, or the portion from which the root system develops. The cambium layer of both the scion and the root stock must be brought together and held until the two parts are grown together.

Budding is a special form of grafting in which a single bud from a plant to be grown, with little or no wood, is applied to the cambium layer of a plant which is to form the root stock. When the bud begins to grow, the plant on which it was placed is cut off just above the bud. Budding is widely used for propagating fruit trees, especially the stone fruits. Roses, lilacs, and many other ornamentals are propagated by this process. Improved strains of nut trees like the Black Walnut, Hickory, and Pecan are reproduced by budding.

Common Trees and Their Propagation

Some common trees and their methods of propagation are given below:

Maple: Silver Maple and Boxelder

Seed: The winged seed of the maples do not have a long period of vitality and do not germinate well when they become thoroughly dry. For this reason they should be sown as soon as they are ripe.

Cuttings: The maples, especially boxelder, are sometimes grown from hardwood cuttings.

Ash

Seed: Sow the seed late in the fall.

Honey Locust

Seed: When the pods become dry in the fall the seed may be easily extracted. Sow in the fall or stratify over winter and sow in the spring. If held over winter in a dry condition, the seed coat becomes very hard and impervious to moisture. In this case, the seed should be given the hot-water treatment described above before it is sown in the spring.

The thornless variety of honey locust is much preferred over the variety having numerous long sharp thorns. Seed from thornless trees should be selected for planting as a rather high percentage of the seedlings will be thornless if gathered from thornless trees.

Kentucky Coffee Tree

Seed: The seed should be gathered early in the fall and planted. If held over winter the seed should be stratified in moist sand or peat moss and sown in the spring. When held over winter in a dry condition the seed coat becomes very hard and impervious to water. In order to bring about germination, the seed should be given the hot-water treatment as described above, or treated with sulfuric acid. After the ground warms

up in the spring is the proper time to give either treatment and plant the seed. In treating with acid, pour commercial sulfuric acid over the seed in a glass jar, and allow them to stand in the acid from one to three hours; then drain off the acid, rinse, and plant the seed at once. This treatment should be done and the seed planted after the ground warms up in the spring.

Hackberry

Seed: Sow the seed late in the fall.

Walnut

Seed: The walnut is distinctly a tap rooted tree, and is difficult to transplant if allowed to become very large. It is therefore advisable to plant the seed where the trees are to grow and transplant the seedlings when they are only one or two years old.

Trees grown from seed from any certain tree will vary in their characteristics, and for this reason superior strains are propagated by budding. Some nurserymen now offer named varieties produced in this way.

Mulberry

Seed: The berries should be crushed when ripe, and the pulp separated from the seed. Seed should be dried and stored in a cool dry place and sown in the spring.

Elms

Seed: The seeds of elms soon lose their vitality and should be sown as soon as they are mature. This is usually in May. The seed should be barely covered and the surface of the soil kept moist.

Oaks

Seed: The acorns of many oaks need not be sown immediately. Acorns of chestnut oak should be sown at once as they sprout soon after they fall. Red, black, and pin oak acorns may be sown late in the fall before frost. They should not be allowed to dry out so may be placed in slightly moistened sand for a time before being planted.

Wild Plum and Chokecherries

These plants are very useful in erosion control, and for providing cover for wildlife. Their fruit is also valuable for home use. Some plants produce fruits which are better than average in size and quality. These should be propagated and increased.

Seed: Plums and cherries are easily grown from seed. They should be gathered when mature and cleaned of the pulp, and then dried and held in a cool place and sown late in the fall. Trees grown from seed will produce fruit that is somewhat variable, and not all will necessarily be as good as that from the parent plants. Trees that produce superior quality fruit should be increased vegetatively, that is, by budding, grafting, cuttings, or root sprouts.

Root sprouts: Root sprouts from trees that produce superior fruits may be dug and transplanted with success, and such better native chokecherries and plums should be found and increased in this manner.

Problem VII--Farm Windbreaks

OUR COUNTRY would be a dreary place indeed without trees. Their uses are many and their products indispensable. One of their greatest uses is in windbreaks to protect farm buildings, feedlots, and gardens, and to protect crop land.

The Farmstead Windbreak

Our most severe winter storms are driven most generally by north and northwest winds. Such winds are accompanied by lower temperatures. To break the force of such winds, and to reduce the blowing and drifting of snow, the windbreak should preferably be partly to the north and partly to the west of the farmstead. An L-shaped windbreak should be developed whenever possible.

There is a zone of calm existing for some distance from the trees on the leeward, or protected, side of a windbreak where drifts form during wind-driven snowstorms. It is, therefore, advisable to plant the windbreak a sufficient distance from the buildings to avoid snow drifting about them. A good rule is to plant the trees at least one hundred feet from the nearest building.

Ground where trees are to be planted should be in a good state of cultivation. Fall plowing or listing leaves the ground receptive to winter and early spring moisture. One year of summer fallow prior to planting is recommended on difficult upland sites. If the ground around the buildings has any considerable amount of slope, plantings should be made on the contour or the area to be planted should be terraced.

In preparing to replant a windbreak or an old grove, or start trees where alfalfa has been growing, some method of rebuilding soil moisture must be employed. At least one year of clean fallow is recommended and if possible, the diversion of runoff water to the area.

A snow fence on the north and west of the windbreak site will trap snow during the winter, and thus hold considerable soil moisture. Common picket fence is often used. A satisfactory snow fence can be made with cornstalks set in woven wire, bundles of sorghum leaned against a fence, or windrows of hay or straw.

During dry years trees draw heavily on the subsoil for their supply of moisture. The greater the number of trees on a given area, the sooner all available moisture may be used up. A wider spacing for trees than that commonly used seems highly desirable in view of heavy losses during dry years.

Recommended spacings for farm windbreaks in Nebraska are as follows: Rows 16 to 24 feet apart with spacing in the rows 2 to 8 feet (varying with the species) for an outside hedge row; 12 to 16 feet for interior broad-leaf trees; and 12 to 24 feet for evergreens. The closer spacings may be

satisfactory where moisture conditions are quite favorable. These spacings apply to windbreaks of three or more rows. For single or double rows the spacing within the row may be less.

Evergreens grow quite slowly and for that reason should not be planted too close to the more aggressive broadleaf trees. A spacing of 20 feet is recommended between evergreens and fast-growing trees like Chinese Elm. Should a new windbreak be started outside an old windbreak, there should be a clearance of at least 30 feet between the older trees and the new planting.

Clean cultivation of trees for several years is of extreme importance and wide spacing will permit cultivation with horse or power machinery with a minimum amount of time and expense. Wide spacing will also permit the growing of a few rows of potatoes or other garden crops, and since thorough cultivation for several years is so essential to insure success, it may be an advantage in many cases to grow some row crops to be cultivated along with the trees. However, no intercropping should be done which will compete for moisture to the detriment of the trees.

There are trees that will grow thrifty and attain a good size in practically every community of the state, and varieties known to be best adapted should be used. Such trees as Russian Olive, Russian Mulberry, Caragana (preferably in the north and west parts of the state), Wild Plum, Chokecherry, Tamarix, Indigo Bush, Lilac, and Chinese Elm are quite suitable for outside rows. These form dense growth near the ground, and are very effective in stopping surface wind and in dropping snow within or near the windbreak where the moisture will be of most value to the trees. Additional rows of some of the taller-growing species such as Chinese and American Elm, Cottonwood, Honey Locust, Hackberry, and one of the hardy pines or Red Cedar should be included. Chinese Elm has proved to be one of the outstanding trees for windbreaks in the plains states. Its ability to withstand drouth, combined with its fast growing qualities, makes it one of the best. Our native Hackberry has withstood drouth conditions exceptionally well also and should be planted in greater numbers. Chinese Elm and Hackberry have not been damaged to any great extent by tree borers during drouth years, and very much less than have the American Elm, Soft Maple, and others.

At least one row of conifers should be provided in every farm planting. Conifers are long lived, drouth-resistant, do not sap the soil moisture to so great a distance as do most broadleaf trees, withstand storm damage well, and add beauty to the landscape. Austrian and Ponderosa Pine and Red Cedar have proved very dependable and at least one of these should be included in every windbreak planting. Jack Pine is satisfactory in the sandhills but not dependable outside of this region.

Seedling broadleaf trees and once-transplanted evergreens are satisfactory for windbreak planting. The trees should be carefully set and cultivated the same as any other crop for several years and should be fenced to exclude livestock.

Pruning and Thinning

It is not advisable to prune the lower limbs from windbreak trees, particularly in the outside row or rows, because this will permit the wind to sweep under the trees, carry away leaves and litter, dry out the soil, and in some cases actually uncover the tree roots. Then, too, the snow will be carried through the windbreak instead of being held inside where it will be of most value in supplying moisture to the trees. Trees that are allowed to grow naturally stand climatic extremes much better than those which are pruned.

Garden Windbreaks

Even with irrigation, some wind protection on the south and west sides of the garden is of great importance in order to make it possible to grow vegetables most successfully.

Two or three rows of corn, cane, or a row of asparagus planted along the south and west sides of the garden will provide some protection during the summer. Protection early in the season, however, is important enough to justify a permanent planting of trees or shrubs for this purpose. Most large trees sap moisture to such a distance that it is impractical to use them, especially where the garden is small and ground is limited. If room permits, a single row of red cedar planted six to eight feet apart will, in a few years, give splendid protection. Cedar should not be planted, however, in commercial apple growing districts.

The Caragana or Siberian Pea Tree is very good for protecting gardens when planted in a hedge row 20 to 24 inches apart. It thrives best in the northern and western parts of Nebraska. Peach and apricot trees might also be considered for a planting of this kind at least in the southeast quarter of the state. Their bloom adds much beauty to the surroundings and in the more favored sections may occasionally produce some fruit. They can be easily grown from seed. The pits should be planted about two inches deep in the fall. A single row with trees eight to ten feet apart, headed rather low, will in a few years make an attractive and effective garden windbreak.

Chokecherry planted two feet apart will in a few years form an excellent barrier against damaging winds. In addition it will produce fruit for the table. Juneberry and Buffaloberry make satisfactory garden windbreaks, and they, too, produce edible fruit. Shrubs such as Spirea, Cotoneaster, Lilac (Persian), Indigo Bush (*Amorpha*), Honeysuckle, Wild Currant, and Tamarix may also be used for this purpose. A trellis covered with grape vines across the south side of the garden is helpful.

The Crop Shelter

The unobstructed sweep of the wind across a flat country causes mechanical injury to the crops, carries away rich top soil, and hastens the evaporation of moisture.

Many farmers feel that trees planted alongside cultivated fields reduce crop yields. It is true that trees in windbreaks always spread their roots extensively into adjoining fields in search of moisture and food materials, and it often appears that they have reduced yields. Actual tests, however,

show that effective windbreaks do materially reduce wind velocity and evaporation and increase crop yields within the zone of their influence.

Then, too, windbreaks slow down the wind during snowstorms, and cause the deposit of snow on the field where it will be of future benefit to crops. Without trees, much of the snow drifts into road ditches and gullies and when it melts the moisture is lost.

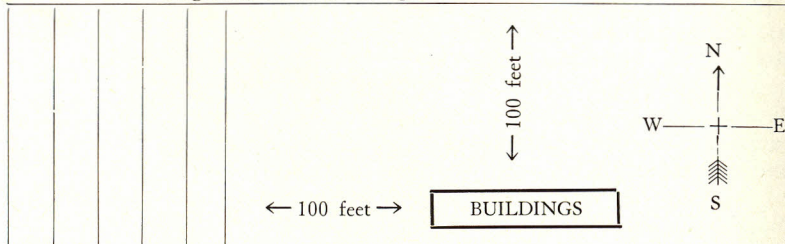
Unquestionably the greatest benefit to be derived from crop shelters is in breaking hot, south winds, and therefore such shelters should consist of a strip of trees planted east and west through the center or on the south side of the farm. North and south plantings may, however, prove most beneficial in sections where the most damaging winds come from the west. Narrow strips of trees—one to three rows—are recommended.

J. H. Stoeckeler of the U. S. Forest Service, in a report of investigations of shelterbelts in Oklahoma, says, "Inspection of many fields protected by shelterbelts showed that single or double rows of cottonwood or mulberry were practically as effective as windbreaks composed of 10 to 15 rows, required less labor, and occupied less ground." Single rows of Russian Mulberry, with trees 6 feet apart in the row, and rows 20 rods apart, have been very effective for several years in protecting crops and preventing wind erosion on the Ed Duhacek farm in western Pierce county, Nebraska. Single or double rows of Chinese Elm, Cottonwood, or Red Cedar will also prove satisfactory for field shelterbelts.

Suggested Windbreak for the Farmstead

(Rows 16 to 24 feet apart, trees offset in every other row)

Russian Mulberry, Russian Olive, or Chinese Elm, 6 to 8 ft. apart, or Caragana, Wild Plum or Chokecherry, 2 ft. apart
Broadleaf, 12 to 16 ft. apart.
Broadleaf, 12 to 16 ft. apart.
Broadleaf, 12 to 16 ft. apart.
Evergreens, 12 to 24 ft. apart
Evergreens, 12 to 24 ft. apart



Problem VIII--Trees and Shrubs for Erosion Control

TREES, shrubs, and other woody plants are very beneficial in preventing soil erosion. The part trees play in wind erosion control is discussed in Problem VII on "Farm Windbreaks." Therefore this problem deals only with the use of trees and shrubs for water-erosion control.

By permission of the Soil Conservation Service of the U. S. Department of Agriculture the following extracts from the booklet, "Planting of Woody Plants for Erosion Control," issued by that Service, are given as a guide for erosion control planting.

Gully-Site Plantings for Erosion Control

"The rough topography and the absence of good soil in many gullies and on eroded hillsides make trees and shrubs the only economically profitable crop that can be grown. Consequently the entire gully area, with the exception of that which is well sodded, should be planted to trees and shrubs. The gully planting program is separated into different phases to illustrate and clarify the locations and purposes of the different plantings. Structures are sometimes necessary as a means of temporary protection, and where it is evident that they are needed they should be built before doing any planting.

Source Planting

"Source plantings refer to group plantings made at the beginning or the source of a drainage area. The following species are suggested for the plantings on such sites: Oak, Green Ash, Honey Locust, Russian Mulberry, with Wild Plum, Chokecherry, Caragana, Russian Olive, Osage Orange and Cedar for border plantings. The trees should be spaced 3 x 6 feet or 6 x 8 feet and staggered, depending upon the severity of the erosion. All shrub borders should be planted 2 x 2 feet or 3 x 3 feet. As the trees increase in size, thinning may be necessary.

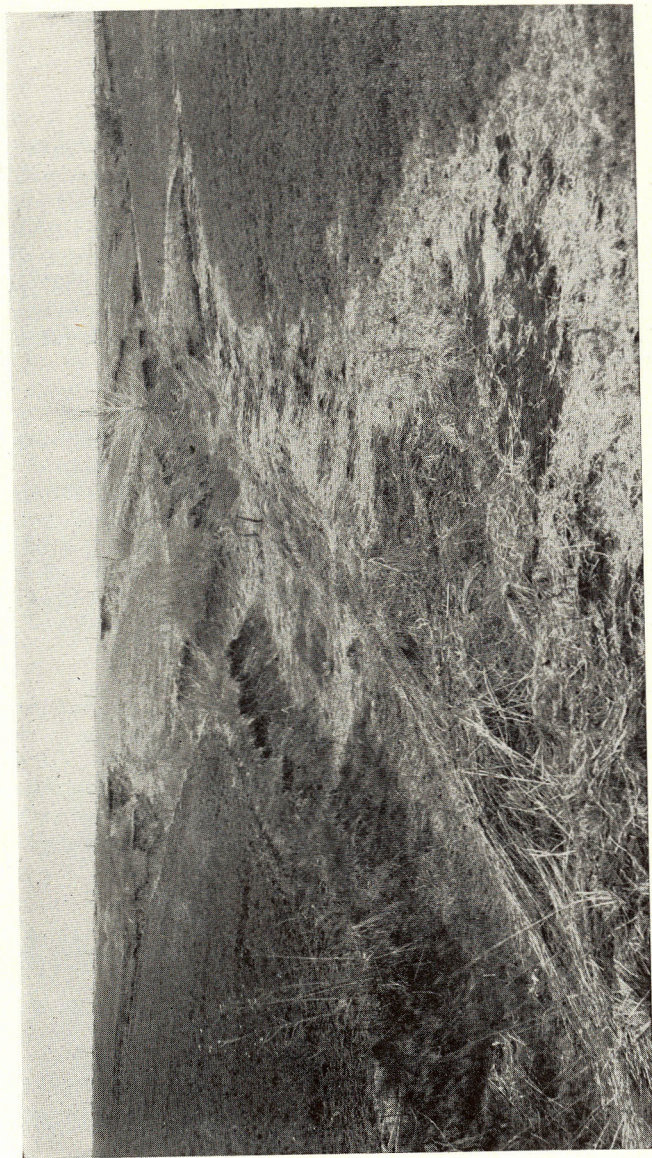
Gully-Head Plantings

"Gully-head planting is the planting made in the area just above the point where the runoff begins to concentrate in the gully itself. In gully-head planting, close planting is essential. Shrubby growth offers the best protection. For economic reasons some trees may be interplanted with shrubs. The planting should include a considerable area surrounding the gully-head. Where a diversion ditch is constructed, the planting should extend to the diversion ditch.

Temporary Dam Stabilization

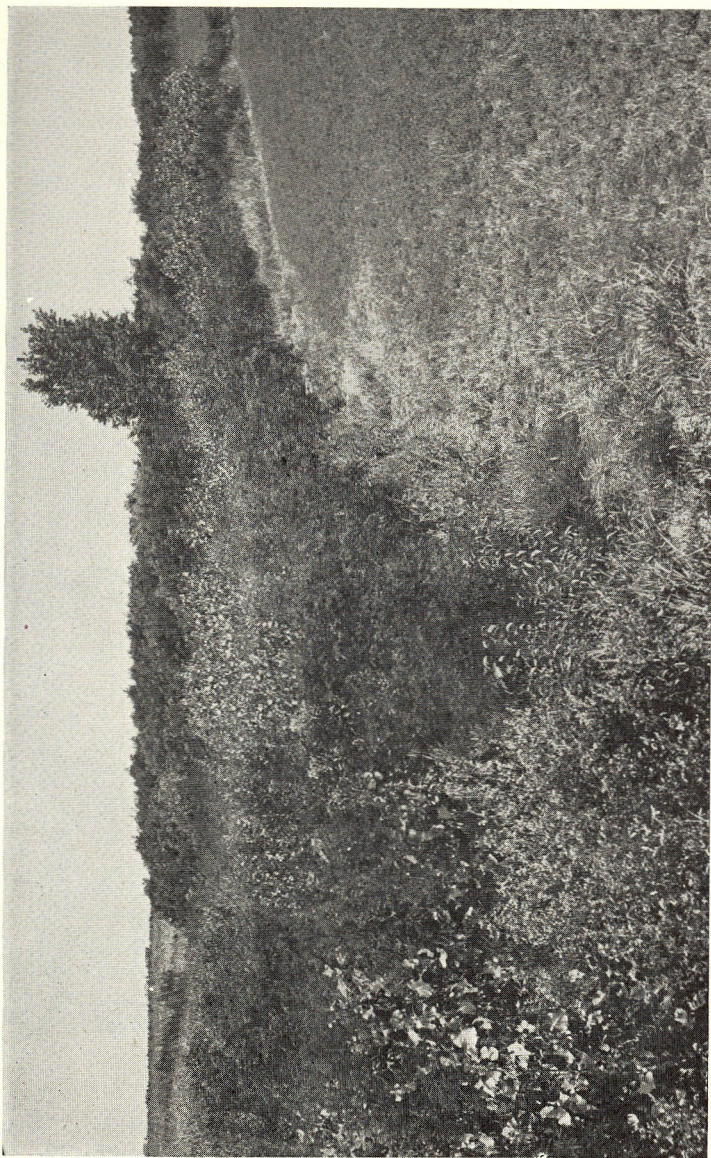
"This is self-explanatory. In these locations it will probably be more advisable to use shrubs or willows, and other trees sparingly. The spacing should be about 2 x 2 feet, or 3 x 3 feet, and the rows offset or staggered to slow down the flow. The rows should be straight across the sides, or curved slightly upstream, and high enough up the gully bank to prevent cutting on the sides. Plantings should be made below the dam, and from 25 to 30 feet above it. All plantings should be done after the dams have been completed, and when the basin back of the dam has silted in.

"In the water course, willows that are adapted to local conditions should be planted. These should not be set over 18 to 20 inches above the bottom of the gully. Willow cuttings may be used if there is enough moisture present. Cuttings should be made in the fall from good healthy stock. The



Courtesy of Soil Conservation Service, U.S.D.A.

A Good Site for Trees and Shrubs



Courtesy of Soil Conservation Service, U.S.D.A.

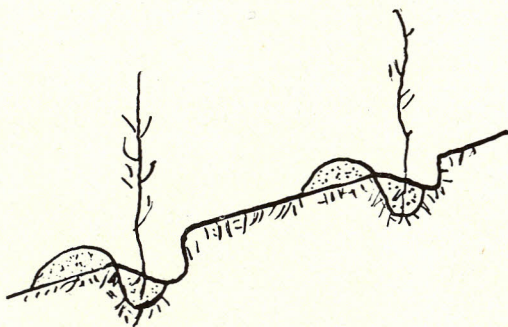
The Same Gully Two Years after Planting

cuttings are stored in moist sand over winter, so they will become calloused. Calloused cuttings are thought to give better root growth in the spring.

"When planting these cuttings, a hole should be made with some pointed instrument, as a sharpened shovel handle. The top cutting should extend about two inches above ground. Pack the soil tightly around the cuttings. In cases where the soil is soft enough, the cuttings may be pushed into the earth to the proper depth and at the same angle. If the bark and wood should become separated, the cutting is often worthless. In all cases, two good buds should be left on the portion above the ground.

Gully-Bank Plantings

"Gully-bank plantings refer to the planting of all gully-banks. Sloping of banks is necessary and justified in some cases before any bank planting is done. A slope of 1 to 1, or $1\frac{1}{2}$ to 1, is about right, depending on the amount of runoff from the ground above. Willow cuttings, cottonwood, or similar types of trees are often planted in the bottom of the gully. When cuttings are used, they should be planted in such a way that they will point down stream at an angle of 45° and staggered to break the rapid flow of water. On banks, the following species may be used: Green Ash, Honey Locust, Black Locust, Russian Olive, Russian Mulberry, Osage Orange, Hackberry, American Elm, Chinese Elm, Oak, Cedar, Pines, and a few others.



Position of Trees in a Furrow

"Close planting is advisable, with shrubs being spaced approximately 2 x 2 feet and trees ranging from 3 to 4 feet, depending upon conditions. If all trees grow, thinning may be necessary, but quick, heavy coverage is essential, and can be produced only by thick planting.

Bank Protection of Farm Ponds

"The banks of all farm ponds should be protected by plantings. Willows, cottonwoods, and several other species are adapted to their use. The distance the planting will extend from the water's edge is determined by local conditions. It is advisable to fence the area to protect the trees until they have made some growth if the pond is in a pasture.

Flood Plain Planting

“Gully outlet, or flood plain planting is that planting made in the area where the gully ends and the water spreads. These areas afford an excellent opportunity for establishing trees. Not only will they check erosion, but they will conserve moisture. Many valuable species of trees will grow on this site. Such a location, if extended to include the adjacent land, makes possible the development of a woodland sufficient to take care of farm needs. Gully outlet plantings will reduce the gully gradient and prevent secondary overfalls from starting.”

Black Locust, Catalpa, Osage Orange, Walnut, Hackberry are good species to plant in such situations.

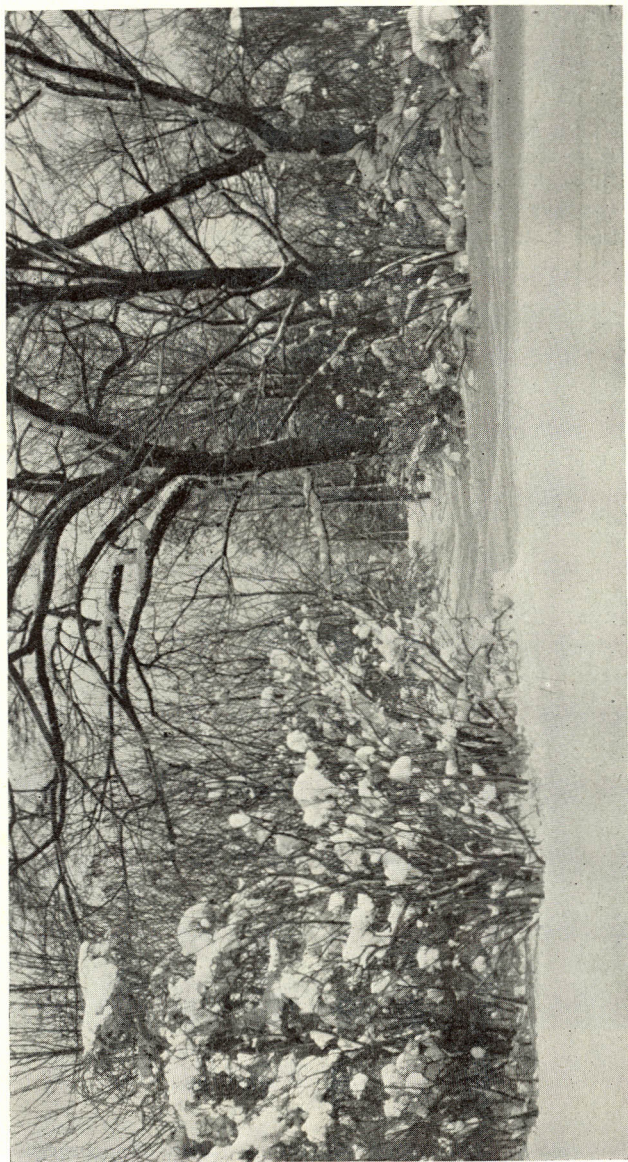


A Flood Plain Planting—Catalpas for Fence Posts

Wasteland Plantings

“On many farms, plots of ground may be found that are unused, such as corners of fields, barren hillsides, flood plains which silt badly, strips along fence rows, and other areas. Erosion is taking place on many of these areas.

“All such sites should be planted to trees and contour planting practiced where possible. The trees should be set in furrows. The distances range



Good Cover for Wildlife

from 4 to 8 feet, depending upon the tree species, moisture, and soil conditions."

It will be noted that a rather close spacing of both trees and shrubs is recommended for water-erosion-control plantings. Timely and adequate thinning will, however, be necessary if the plants are to survive during periods of low rainfall.

Since a rather close spacing of the woody plants is necessary in order to be effective in erosion-control plantings, shrubs may in some places be more practical to use than large trees, especially in the drier situations, because of their lower moisture requirements.

It must be remembered that in order for tree plantings to be successful, whether for erosion control or other purposes, they must be fenced to keep out livestock and must be cultivated to keep out weeds and grass. Much hand work in gully planting may be eliminated by planting the trees in rows on the contour. It is then possible to control weeds with the cultivator. Some hand work may be required for the first two or three years, and one should not undertake to plant more trees than can be cared for properly.

It must also be remembered that in order to start cuttings the soil must be very moist. It is useless to plant them where the ground is alternately wet and dry. Cottonwood as well as willow cuttings may also be started in situations where there is abundant moisture.

Problem IX--Trees and Shrubs for Wildlife

PLANTINGS of trees and shrubs have a great value in providing food and protective cover for wildlife. Without an abundance of food and adequate protection, birds and other forms of wildlife cannot exist.

Plantings must furnish not only an abundance of food, but there must be variety also since the same kind of food does not attract alike all species of wildlife. Some plants provide food only for a short time during the summer. Certain other ones whose fruits are available during the winter are especially desirable because at that season food is likely to be scarce and difficult to get. Such plants are especially important to our nonmigratory birds.

Food alone is not all that is required to insure suitable environment for wildlife. The different forms of wildlife—birds and animals—must be able to get away from their enemies and find adequate protection during severe storms and when snows lie deep.

What to Plant

Our native Wild Plum and Chokecherry deserve a great amount of consideration because of their thicket-forming habit and also the importance of their fruit as food for birds, and for our tables. Considerable value is placed on the protection afforded by plants of this kind, particularly to upland game birds. A plum thicket will provide fine protection for the Bob White quail and other birds from stray cats, hawks, and coyotes, and also from heavy snows which are at times very destructive to upland game birds.

Nowhere are chokecherry and plum thickets as plentiful as they once were and more of them should be planted. There are many gullies and waste places where these should be started. They may serve well also in checking soil erosion as well as providing a home for birds.

Hedges and Shrubs for Protective Cover

The Osage Orange hedges which were so numerous in parts of Nebraska years ago have largely been removed. The low bushy habit of the Osage and its spiny branches make it splendid protective cover. Many farmers have concluded that it has been a mistake to pull out the Osage hedges. These hedges serve as barriers to the drying hot winds and often increase crop yields.

There are numerous shrubs, many of them native to Nebraska, which are valuable for wildlife protection. Many of our shrubs provide an abundance of food for birds. Among these should be mentioned the native Dogwood, Sumac, Buffaloberry, Skunkbush, and Buckbrush.

Vining Plants for Food and Protection

Some of our native vining plants are very valuable for food and protection. Heading this list is the Bittersweet. Some years ago it was not uncommon to find great quantities of the orange and red berries of the Bittersweet in woods and along the streams throughout the state. The berries are attractive to many species of birds and since the berries hang on the vines throughout the winter, they are valuable as bird food when food is usually scarce.

Sprays of Bittersweet berries are prized for winter bouquets and that fact has been responsible for its almost complete disappearance, at least so far as its fruiting is concerned. For many years people have combed the country, pulling the vines from the trees, breaking them off, seriously injuring their fruiting. Because of the careless way in which it is often gathered, it is bound to become less plentiful. Bittersweet can be relied upon to fruit quite regularly if harvested carefully. Since berries have become so scarce in the wild, many people have planted it about their homes. The vines are interesting, the berries add a touch of color that is pleasing, and they do attract the birds.

Wild grapes, Virginia creeper, Smilax, Moonseed and other vining plants are important sources of food for birds and some wild animals. These are all attractive vines and could be planted for decorative purposes.

Fruit Bearing Trees

The berries of Eastern Red Cedar are relished by game and nongame species of birds. It is quite widely distributed and bears fruit almost every year. The cedar berries hang on the trees throughout the winter and thus supply food during a time when other food is less plentiful. Cedars also afford fine protection and nesting sites for birds. According to William VanDersal, biologist of the Soil Conservation Service, it has been observed

that 52 species of birds have taken the fruits of the Red Cedar. Glenn Viehmeyer, a student of birds living in the sandhills, states that in his opinion Red Cedar stands at the head of the list in value as a food source for migratory and nonmigratory birds of the sandhills region.

The fruit of our native Hackberry is relished by a large number of different species of birds. Its value as a source of bird food is enhanced by the fact that the fruits persist on the trees throughout the winter.

Russian Olive, although not so numerous in Nebraska as yet, furnishes important food for birds. And its low bushy habit of growth offers good protection for wildlife species.

More attention should be given to conserving most of our native plants, and actually increasing the more desirable ones. There should be less burning of fence rows and timbered areas. Trees and shrubs should be planted in large numbers for windbreaks, and in gullies for erosion control. The more such plantings are established the better it will be for wildlife. Those who live on the land are in a position to do more than anyone else to make conditions favorable for wildlife development. No individual or group of individuals is in better position than members of 4-H clubs to take an active interest in, and to encourage the planting and growing of natural cover which will benefit all species of wildlife.

Problem X--Fence Posts for the Farm

THERE IS CONSTANT NEED on most farms for fence posts. Steel posts have proved satisfactory, but in order to secure them a cash outlay is necessary. Therefore many farmers could well afford to consider growing their own supply of post material. There are trees suitable for all sections of the state which will produce durable posts. While the trees are growing to post size they will serve to reduce water and wind erosion and will furnish protection, food, and nesting places for birds. The fuel which may be salvaged will also be an item in favor of growing posts for the farm. 4-H club members should seriously consider tree planting for fence post production in connection with their wildlife conservation and restoration activities.

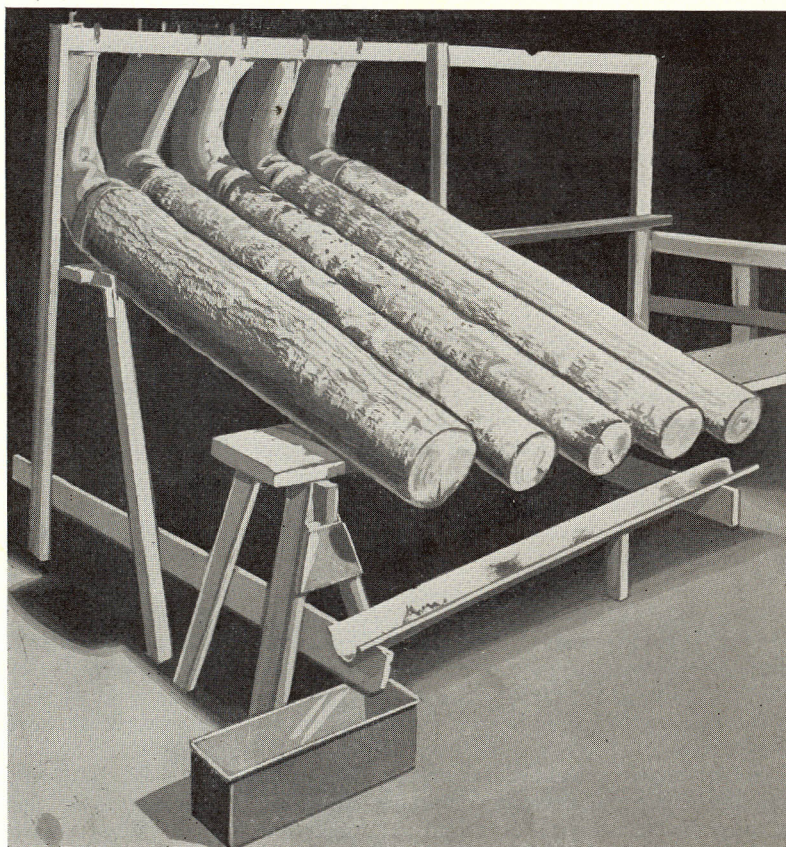
Durability of Fence Posts

Osage Orange (hedge), Red Cedar, Hardy Catalpa, Black Locust, and Mulberry will produce posts which are very durable in contact with the soil and that can be grown successfully on many farms. In planting any of these trees for post production, locations should be selected where there are good moisture conditions.

Some woods are more durable than others and a certain kind of wood may last longer under certain conditions than it will under others. Soil and moisture conditions will cause some variation. The Bureau of Agricultural Engineering of the U. S. Department of Agriculture reports the average life of untreated wood posts of several species to be as follows:

<i>Species</i>	<i>Years</i>	<i>Species</i>	<i>Years</i>
Osage Orange	30	Black Walnut	12
Black Locust	24	Pine	11
Red Cedar	20	White Oak	11
Mulberry	17	Cherry	10
Catalpa	16	Elm	9
Bur Oak	15	Red Oak	7
White Cedar	14	Willow	6

It has been determined by experimental work that the life of fence posts may be increased four or five times by properly treating them with creosote. This fact is especially true with certain nondurable woods such as cottonwood, soft maple, elm, pine, and willow. However, posts of Osage, Black Locust, Hardy Catalpa, Red Cedar, and Mulberry are long lasting; hence it is needless expense and trouble to treat them.



Method of Treating Posts

A Low-Cost Fence Post Treatment

A new process for fence post treatment, known as the "tire-tube method" has been developed by the U. S. Forest Service at the Forest Products Laboratory at Madison, Wisconsin. It consists of treating thoroughly green, round posts with the bark on by forcing a 10 per cent solution of zinc chloride endwise through the sapwood portion of the post.

The Forest Service describes the treating process as follows: "The bark is peeled for a distance of 4 to 6 inches from the large end of the post, to provide a smooth, clean surface. A section of inner tube about 2 or 2½ feet long is then slipped over the peeled surface and bound in place with cord, wire, rubber bands, or any other convenient and suitable material. The post is then laid on a rack, with the large end about 1½ feet or more higher than the small end. The loose end of the inner tube is then fastened to a frame so that the preservative cannot spill out but will be kept in close contact with the end of the post and a measured quantity of a 10 per cent solution of zinc chloride poured in. In a short time the preservative will begin to flow into the sapwood of the post, forcing the natural sap out at the small end. When all the preservative has flowed from the tube into the wood the tube is removed and the post taken from the rack.

"The tire-tube method of treating posts with zinc chloride is new and while no average life figures have been obtained on posts treated by this method, the information indicates that posts containing about one pound of zinc chloride per cubic foot can reasonably be expected to last 10 to 15 years under ordinary conditions and in some cases may last much longer."

Galvanized pipes 12 to 18 inches long and sharpened at one end may be used instead of tire tubes to carry the chloride. Pipes are also more convenient to use. The sharpened end is driven a little way into the post so that none of the liquid will be lost. Different-sized posts require pipes of different diameters. The diameter of the pipe should be not over one inch smaller than the post.

The cost of this method of treatment is not excessive. It will depend, of course, upon the cost of zinc chloride, but the cost, exclusive of labor, should not be over six cents for a four-inch post, seven feet long.

For those who have nondurable post material such as pine, cottonwood, and elm growing on their farms, this method of treatment is a means of providing durable posts for use on the farm at a very reasonable cost.

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