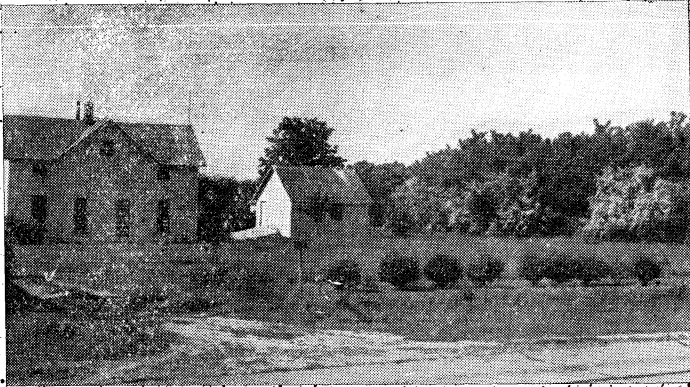


OSU
Collection



Windbreaks
and
Their Relation to Agriculture

Circular No. 398

1944

**OKLAHOMA AGRICULTURAL AND MECHANICAL COLLEGE
COOPERATING WITH
UNITED STATES DEPARTMENT OF AGRICULTURE
EXTENSION SERVICE**

SHAWNEE BROWN, DIRECTOR
STILLWATER, OKLA.

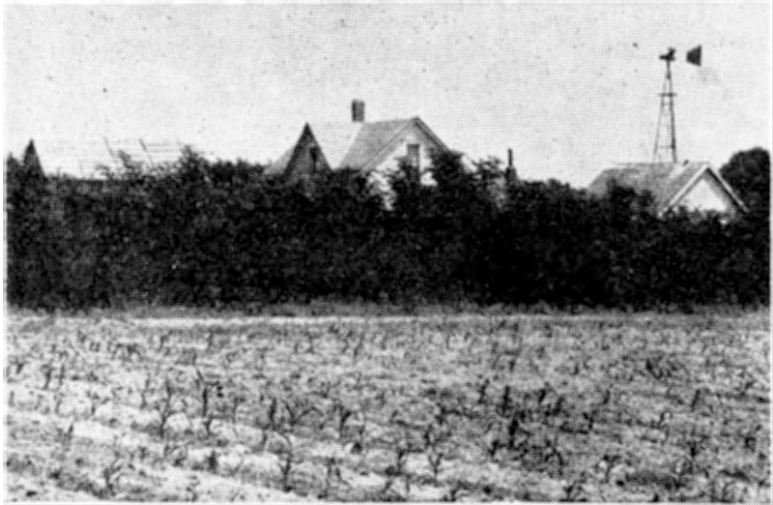
Windbreaks and Their Relation to Agriculture

HARRY P. RIGDON
Extension Farm Forester

VALUE OF WINDBREAKS

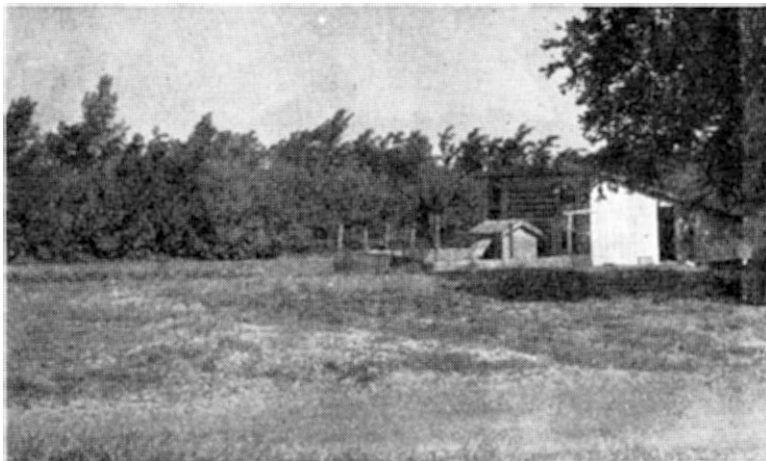
Farmstead windbreaks make a very important contribution toward stabilizing agriculture. However, this contribution is more indirect than direct. In most of the plains and prairie areas of Oklahoma, wind protection is beneficial to the farm home. This protection, in the form of established tree windbreaks, has a value both in summer and winter.

Snow drifting is not serious in most counties of the State, yet in the Panhandle counties, and occasionally in all northern counties of the State, it is often a problem. Whenever and wherever we face this situation, winter windbreaks will provide a snow trap, depositing the snow in designated areas instead of in driveways, dooryards, and other utility lots. The protection of the entire farmstead from cold raw winds is important. The amount of fuel necessary to keep the home warm is less if the home is protected by a good tree planting. The amount of feed necessary for livestock is less if there is good protection from the wind.



Same Farm Home As Page 5, Four Years Later. See Front Cover
Photographed Three Years Later Than This.

A summer windbreak reduces the amount of dust entering the house and creates cooler and more pleasant living conditions. Shade for horses and cattle adds to their comfort and increases their ability to work or produce. Shade for hogs may be the determining factor between success and failure. Poultry will thrive much better in cool, ventilated plantations.



Poultry House and Lot in Protection of Farmstead Windbreak.

Fruit and vegetable gardens which are protected against hot, dry winds will yield considerably more most years in Oklahoma. It is true that there is an area near the trees which yields very little, but this varies from one to four rods in width depending on species of trees used, depth of the soil, amount of rainfall, and the cultural practices of handling the planting. On the other hand, the protected area extends as far as 20 times the height of the trees.

The beauty aspect should not be overlooked. Trees on our plains are inviting to insectivorous, song, and game birds. Wind protection makes possible the growing of more delicate types of ornamentals than would be possible without it. The windbreak itself should be bordered with a shrub row, which may be a beautiful flowering one; such an arrangement would serve as a picture frame for the dooryard. This type of beauty always has been worthwhile and has an added value during this time of increased human strain.

Windbreaks carefully planned and properly cared for, will begin to provide some protection the second year after plant-



Payne County Farm Home, 1937. Windbreak Planted in the Foreground. Same Home Pictured On Page 3 and Front Cover.

ing. They will contribute toward winning the war and stabilizing agriculture by increased poultry returns; more abundant garden and fruit crops; extra amounts of milk, beef, and pork; improved living conditions; and higher morale.

LOCATION

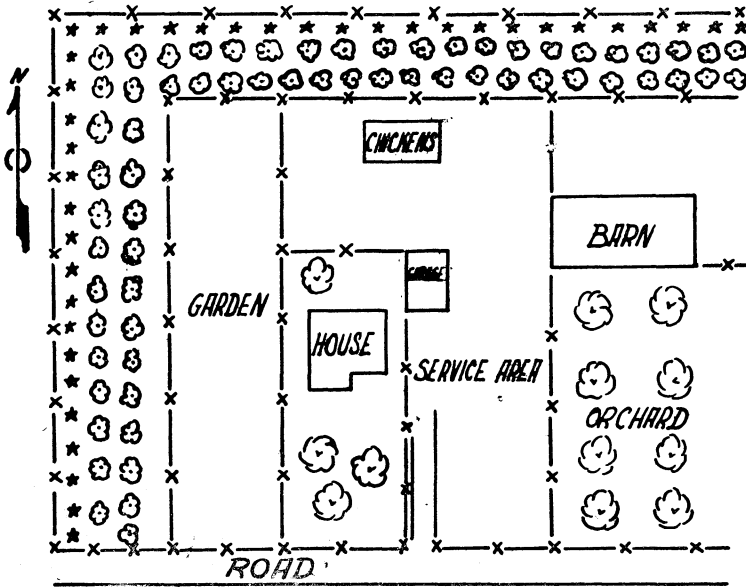
In providing summer wind protection for the farmstead, windbreaks should be placed on the south and west. In providing winter protection, they should be on the north and west. A need for wind protection on the east of the home site seldom exists.

When forest trees are planted, they are usually of such small size that many fail to realize how large they will be at maturity and, accordingly, plant them too close to the garden or driveway. It is well to plan winter windbreaks back far enough from the barns and yards that winter snow will not drift into these areas. It is better if narrow winter windbreaks are 100 to 150 feet back from the doorway, driveway, and barnyard. The areas protected by narrow winter windbreaks will accumulate added moisture in the form of snow banks some winters, and because of the added moisture, this area will make a good garden spot. Wider plantings will catch the snow within the belt. For this reason, stock lots should be protected by a planting of 10 or more rows, and the lots should be located comparatively close to the trees. Sum-

mer windbreaks should be planted 50 to 100 feet from the main dooryard, because there is an area immediately adjacent to the trees that will not grow good garden, grass, or other crops.

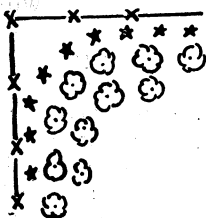
PLANTING PLAN

The number of rows necessary to make a good farmstead windbreak varies with species, topography, soil type, rainfall, wind velocity, and other factors. Farmers should be sure they plant enough rows to provide satisfactory protection.



Planting Plan for a Windbreak.

The smaller number of rows leaves a greater chance for holes to exist entirely through the windbreak when one or more



A Windbreak With a Rounded Corner Makes It Possible to Cultivate Without Stopping the Implement.

trees die. While a perfect stand of trees in a three-row windbreak with one row of evergreens will make reasonably satisfactory protection, it is usually safer to plant a five-row belt. If the space is available, seven to ten rows will be well worth the added land required.

It is not necessary that windbreaks run in straight rows, and have square corners. It may be desirable to develop such a belt in the form of a horse-shoe or some other curved outline by following the contour. If corners are made square, the trees and shrubs in the exact corner should be checked for spacing so cultivation implements can be gotten through from one direction then turned around and be brought in at right angles. This is the easiest way to prevent damage to trees in a square corner. The corner may be rounded so the implement can be pulled around without stopping. (See diagram, page 6.) If the proper protection can be secured by planting on the contour, this is certainly desirable. If they are planted on terraced land, plant on the ridge instead of in the channel. There are times when it is ineffective to plant a windbreak on the contour, but the more nearly the rows approach it, the better growth may be expected. All terraces within plantations should be maintained. Trees may be adjusted in the rows to permit such maintenance. If cultivation in a tree planting crosses a terrace, care should be taken not to cut furrows through it. Water diverted into the plantation from the eaves of buildings or from adjacent fields will result in increased growth of the trees.

SECTIONS OF THE STATE

As a matter of convenience, the state is divided in this publication into two sections—the eastern and western. There is no definite line of demarcation. But, in general, Highway 77 from Newkirk through Oklahoma City, Ardmore, and Marietta may be used as the dividing line between the eastern and western sections. The Panhandle represents a portion of the western section. The cotton root rot area is a special portion of eastern and western sections. The boundaries of each are designated by a map on page 9.

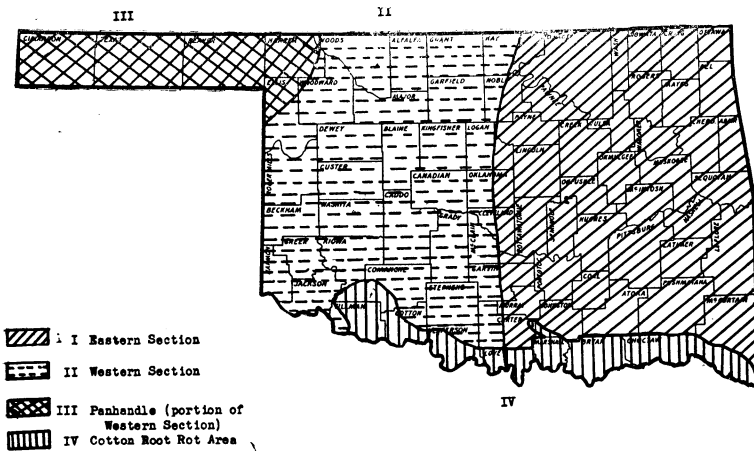
The following chart represents suggested species for individual rows in various farmstead windbreaks. Rows are numbered south to north or west to east.

7-Row Belt	Eastern Section	Western Section	Cotton Root Rot Area
Row 1	Desert Willow, Wild Plum, Tamarix	Desert Willow, Mulberry, Tamarix	Black Currant
2	Shortleaf Pine, Red Cedar, Austrian Pine	Austrian Pine, Red Cedar	Red Cedar
3	Red Cedar, Kentucky Coffee Tree, Black Walnut	Austrian Pine, Red Cedar	Japanese Red Pine, Red Cedar
4	Shortleaf Pine, Austrian Pine, Hackberry, Thornless Honey Locust	Hackberry, Mulberry, Green Ash	Hackberry, Kentucky Coffee Tree
5	Chinese Elm, Black Locust, Green Ash, Thornless Honey Locust	Green Ash, Thornless Honey Locust, Chinese Elm	Sycamore, Hackberry
6	Cottonwood, Chinese Elm, Black Locust	Chinese Elm, Thornless Honey Locust	Osage Orange, Red Cedar
7	Desert Willow, Mulberry, Osage Orange	Desert Willow, Mulberry, Osage Orange	Red Cedar
5-Row Belt			
Row 1	Desert Willow	Tamarix, Desert Willow	Red Cedar, Black Currant
2	Shortleaf Pine, Red Cedar, Austrian Pine	Austrian Pine, Red Cedar	Red Cedar
3	Kentucky Coffee Tree, Chinese Elm, Austrian Pine, Red Cedar, Black Locust	Thornless Honey Locust, Chinese Elm, Red Cedar	Hackberry, Japanese Red Pine, Red Cedar
4	Chinese Elm, Green Ash, Kentucky Coffee Tree, Thornless Honey Locust	Thornless Honey Locust, Chinese Elm, Hackberry	Hackberry
5	Osage Orange, Mulberry	Osage Orange, Mulberry, Red Cedar	Red Cedar, Osage Orange
3-Row Belt			
Row 1	Desert Willow, Red Cedar	Tamarix, Red Cedar, Desert Willow	Black Currant, Red Cedar
2	Chinese Elm, Green Ash, Thornless Honey Locust	Thornless Honey Locust, Chinese Elm, Hackberry, Red Cedar	Hackberry, Japanese Red Pine, Red Cedar, Sycamore
3	Osage Orange, Red Cedar, Mulberry	Osage Orange, Mulberry, Red Cedar	Red Cedar, Osage Orange

The following species should be planted only on moist bottomlands: Black Walnut, Green Ash, Kentucky Coffee Tree, Cottonwood.

PANHANDLE CONDITIONS

The three Panhandle counties—Cimarron, Texas, and Beaver—and the north portion of Ellis and most of Harper county constitute an area with planting problems different from those of the rest of the state. The wider spacing suggested should be followed throughout this area. Plans for perpetual cultivation are essential. The following species are the most likely to succeed: Desert Willow, Red Cedar, Thornless Honey Locust, and Chinese Elm. *Scopulorum* cedar may be substituted for Red Cedar and Leather Leaf Elm for the ordinary Chinese Elm. The soil in most of this area is reasonably deep and fertile. The moisture problem is the one that needs to be handled.



TREE PLANTING IN COTTON ROOT ROT AREA

Many species of trees are susceptible to cotton root rot. At present we know definitely that cotton root rot is prevalent in counties along the Red River Valley designated on the map, page 9. Certain trees are entirely resistant and will thrive in the presence of this disease; others are moderately resistant while some are completely susceptible and cannot exist. The degree of susceptibility will vary with the type of soil, the intensity of the disease, the age of the tree, and possibly some other factors. Some of the moderately resistant species may be satisfactory for planting with the full knowledge that a small percentage will pass out and have to be replaced.

The heavier the soil the more damaging the disease. On certain farms where heavy bottom land is completely infested

with root rot, a sandy area may be practically free from it. The area designated on the map means only that cotton root rot is found in this general territory. It does not mean that the entire area is infested. The list of trees and shrubs given on page 8 includes those which at present seem the most likely to succeed in the presence of cotton root rot. Not all of them are entirely resistant.

SPACING

In spacing rows and the trees within the rows of a wind-break, there are two factors to consider: First, the ability of the land to grow trees as determined by moisture, fertility and depth of soil, and, second, the type of implements available on the farm for cultivating. Be sure the rows are spaced wide enough apart to accommodate the cultivation implements available. That is, 8-foot rows may be satisfactory where one-row, horse-drawn implements are available, but if tractor implements are used it may be necessary to space the rows 10, 12, or even 14 feet apart. Several years of cultivation is important to thrifty windbreaks.

Because of the heavier rainfall in the eastern third of the State, trees will thrive fairly well on from 60 to 72 square feet of ground area. Farther west, or the middle third of the State, the rainfall is lighter, and the area should be increased to allow 80 to 100 square feet per tree. In the western third, where it is still drier, it should be increased to approximately 100 to 120 square feet. Even a larger ground area for each tree may be desirable in the extreme Panhandle. With deep soils, these areas may be reduced slightly, and with shallow ones they should be increased.

On this basis, a man using tractor implements in the middle third of Oklahoma would probably plant his tree rows 14 feet apart and his trees about six feet apart within the row. This would allow 84 square feet per tree. Be sure to space trees wide enough that they do not begin to over-crowd within a few years.

PREPARATION OF PLANTING SITE

Land should be deeply plowed as far in advance of planting as possible. Crop residue or weeds should be turned under by chopping up with a disc or stalk cutter before breaking. Then, if it is possible to harrow or disc several more times before the trees are planted, a good many weeds will be destroyed. In regions subject to blowing, follow the best land preparation methods for that type of soil.

PLANTING TIME

Windbreak trees may be planted from the time they become dormant in the fall until they leaf out in the spring, if there is ample moisture in the ground to insure their starting and if the temperature at planting time is not below freezing. Sometimes the presence of rabbits may make it undesirable to plant in the fall.

HOW TO HANDLE TREES

Careful handling of trees, from the time they are dug until they are planted, is most important.

Wildlings may be used, but should be carefully wrapped or packed where dug. Commercial trees will come to you packed. To keep all tree roots from drying, carefully wrap in wet sacks, or wet straw, carry in water, or cover with soil.

HOW TO PLANT

Trees should be carried for planting, as described above, without permitting the roots to become dry. The hole for planting should be a little larger and a little deeper than is necessary to accommodate the roots. Any damaged or broken



Proper Way to Handle Evergreen Seedlings.

roots should be cut away with a sharp knife. Avoid twisting the roots in the hole while planting. The tree should be planted one or two inches deeper than it grew originally. Small seedlings are easily planted by spreading the roots against the straight side of the hole and tamping the soil from the side. Only good fertile top soil should be used about

the roots of the tree. Keep straw, trash, or tufts of sod from coming in contact with the roots since these will cause air spaces and will prevent the roots from coming in close contact with the soil. Material of this kind should be shaken out of the soil and placed about the base of the tree after planting. The soil should be firmed about the tree by tamping with a spade handle or the heel of your shoe. A liberal amount of water added after the planting is helpful.

Larger windbreak and ornamental trees are planted best in the center of a hole. The hole should be large enough to accommodate the roots spread out in all directions. The tree should be set slightly lower than it grew originally. After the tree has been set and the roots spread, the bottom third of the hole may be filled with good top soil and then firmly tamped. It is necessary to get all the air spaces out of the bottom of the hole. The hole should then be filled at least two-thirds full and again tamped; the third filling will complete the job. The area immediately around the tree should be left slightly depressed.

MAINTENANCE AND CARE

The care of shelterbelts after they are once established is just as important as the proper plan and action in establishing them. The longer these tree plantings can be cultivated, the faster they will grow and the longer they will live. In the Panhandle, it is reasonable to expect that windbreaks should have perpetual cultivation. In the west half of the State, other than the Panhandle, thriftier belts will be grown if they can be cultivated five to eight years and, on drier sites, even throughout their life. In the eastern side of the State, cultivation can be discontinued after from three to five years. In no cases should weeds be permitted to grow.

Thorough and deep cultivation on newly planted shelterbelts will force the roots deeper into the soil; this will increase the ability of the trees to withstand drouth. Where irrigation is available, it is not necessary to water windbreak trees during the summer season. They may be irrigated during the winter; the water will sink deeply into the soil and will serve the trees during the following summer.

Very little trimming is necessary on this type of a planting, and yet, there will be little breakage in later years, **if, for** the first two years, the trees are trained to have a central leader instead of forked tops. This pruning should be done while the trees are small enough that it can be done with a pocket knife. Lateral branches that have a tendency to grow beyond the average spread of the tree should be cut back one-third to



Results of Good Cultivation and Protection. Notice Perfect Stand.

one-half their length, but practically no branches should be removed at the tree trunk. Windbreak trees should be permitted to retain their limbs to the ground line.

Tree plantings should be protected at all times from fire and livestock.

ORNAMENTAL TREES

Ornamental shade trees in the farm yard are not exactly windbreaks nor entirely landscaping. A complete landscaping plan is a lengthy discussion that will not be undertaken in this leaflet.

Since shade trees are the first foundation of any landscape job, they should be considered with the first planting around the farm home. It should be remembered that a good shade tree must have plenty of room, and, accordingly, should not be planted closer than 30 to 40 feet from its neighbor. If the initial plantings are put in carefully, any well-planned landscape job can be tied in with them without waste. Select the spot where shade is most desirable. For instance, plant them to protect certain windows of the house or where children can have sand boxes, swings, or other play equipment under them and still be in sight of the kitchen window or door. Locate them sparingly across the lawn, but limit them to the outside of the dooryard.

The species should be those that are found satisfactory in your own community. American Elm, Sycamore, Hackberry, Chinese Elm, Sweet Gum, Thornless Honey Locust and possibly others make satisfactory shade trees. While it is possible to go to the creek and dig wildlings for this purpose,

usually a well grown nursery tree has enough better root system and enough straighter top to be worth its cost.

The pruning of yard trees should be started as soon as the trees are planted. It is doubly important that they are limited to one central leader instead of forked tops. Just remember that any crotch or limb that forms at a certain distance from the ground will never grow any higher from the ground. So, if it is too low now, it will be too low when the tree is grown. Cut it off. The same care in handling and planting shade trees as suggested for windbreaks is applicable. Time, not money, is the big investment in your yard trees.

WHERE TO SECURE TREE INFORMATION

Trees for farmstead windbreaks (not ornamental) may be secured from the Division of Forestry and State Parks, State Capitol, Oklahoma City, and both windbreak and ornamental trees may be secured from commercial nurseries.

Valuable discussion may be found in the following bulletins: "The Windbreak As a Farm Asset," U. S. D. A. Farm Bulletin 1405; "Beautifying the Farmstead," U. S. D. A. Farm Bulletin 1087; "Planting and Care of Forest Trees," Publication No. 6, Division of Forestry and State Parks, Oklahoma City.

For additional information on farmstead windbreaks, consult your COUNTY AGENT, HOME DEMONSTRATION AGENT, EXTENSION FORESTER, OR DIVISION OF FORESTRY FIELD MAN AND U. S. FOREST SERVICE FIELD MAN.

THANK YOU

The following men have contributed material and criticisms that have been most helpful in the preparation of this publication: Glen R. Durrell, Director, Division of Forestry and State Parks, Oklahoma City; H. R. Wells, Soil Conservation Service State Forester, Oklahoma City; E. W. Johnson, Assistant Silviculturist, Southern High Plains Field Station, Woodward; Dr. K. Starr Chester, Head of Botany and Plant Pathology, Oklahoma A. and M. College; and Dr. Michel Afanasiev, Associate Professor of Horticulture, Oklahoma A. and M. College. The author is grateful for this assistance.

**Cooperative Extension Work in Agriculture
and Home Economics
Oklahoma Agricultural and Mechanical College
United States Department of Agriculture
Cooperating**

122044