Windbreak Site Preparation, Spacing, and Arrangement

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Max R. Craighead
Extension Forester

Windbreaks reduce the force of wind, therefore, the total effect of all trees in the barrier is more important than the effect of any individual tree. However, the individual trees must have adequate growing space to contribute their share to the wind-reduction effect.

The spacing and arrangement of trees must often be a compromise between: (1) the space required for maximum growth and (2) the density required to make an effective windbarrier.

Trees require large amounts of moisture. Where soil moisture is low more space may be needed by each tree. Fortunately once tree stands are established, their very presence tends to increase the available soil moisture by trapping snow and reducing evaporation. Tree roots grow relatively deep and therefore have access to soil moisture which is not available to crop plants.

Why Prepare The Site?

Site preparation normally increases the survival and growth of trees especially in western Oklahoma. Reasons for site preparation include:

1. To reduce weed and grass competition.
2. To store moisture for the trees.
3. To reduce wind and water erosion.
4. To level the soil and reduce plant residues.

Competition for moisture and sunlight from weeds and grasses can kill newly planted trees and shrubs. Herbaceous vegetation usually grows so vigorously and tall that small tree seedlings cannot survive the competition without help.

Goals of Land Preparation

(1) Breaking up or loosening the subsoil to a depth of two to three feet stimulates penetration of moisture and tree roots.

(2) Summer-fallowing helps control weeds and increases the storage of moisture and nutrients. Some soils may require stubble mulch.

(3) Many sites should be disked and harrowed to control weeds and smooth the site for planting.

(4) If water erosion is a problem the site should be left in its natural cover and protective vegetation or terracing may need to be established.

Planting cover crops may seem to contradict the statements concerning the control of vegetation to conserve moisture. The seeding of an annual crop, however, can be controlled and may be necessary to prevent extensive wind and water erosion on light sandy soils. A cover crop planted between the tree rows will shield the newly planted trees from wind damage.

Suit Preparation To Soil Type

Very sandy soils should not be plowed, disked, or harrowed. Trees can be planted in such soils with a minimum of preparation. Plowing a narrow deep furrow after grass sod has been scalped and turned over is the best procedure. Temporary cover crops should be planted if sandy soils lack sufficient vegetative cover.

Medium to heavy-textured soils of cultivated land should be plowed, sub-soiled and summer-fallowed to improve soil moisture. If left in a rough condition through the winter, soils should be harrowed several weeks before trees are planted.

Grass and alfalfa lands, except on very sandy soils, may need to plowed and summer-fallowed before tree planting.

Growth and Development of Windbreaks

The characteristics of the different kinds of trees within a windbreak affect windbreak management and also the initial spacing of the trees. The height, density, cross section and profile of the barrier will change as the trees crowns emerge. Then, as the trees grow older, other changes occur which affect the structure and wind resistance of shelterbelts.

During the first 20 years shelterbelts develop rapidly in height and density. Spacing of plants should be moderately close so that barriers become effective as early as possible and cultivation can be discontinued. As the crowns close a continuous barrier will be formed. Thereafter, the growth and development will depend largely on the kinds of trees that are in the shelterbelt, their ability to sustain growth, and the way the stand is managed.

Shelterbelts composed entirely of broadleaf trees will gradually decline and lose effectiveness after 30 to 40 years. Shelterbelts containing conifers, however, will retain effectiveness longer. The pines will gradually replace the broadleaf trees as the tallest components.

Arrangements of Species

Arrangement and spacing of the different tree and shrub species in a windbreak will determine the cross section form. Windbreaks with an abrupt or nearly vertical cross section are more effective than those with an inclined cross section. The trees should therefore be arranged to form barriers with vertical sides toward the wind. This can be arranged by planting tall, fast-growing species as the outside rows. The conifers—pines and red cedars— should form the backbone of your windbreaks.

Fast-growing broadleaf trees should be planted no closer than 20 feet to conifer rows. This distance will prevent the crowding and over-topping of conifers which may lose foliage on lower branches and height growth if they are crowded and shaded.

Two or more species of different growth rates should not be mixed or alternated within the same row.

Spacing Between Tree Rows

The distance between tree rows can be varied considerably without appreciably affecting the density, height, and continuity of shelterbelts. The profile of a shelterbelt which, along with density, determines its effectiveness in slowing wind is approximately the same whether the tree rows are 10 or 20 feet apart.

Widely spaced rows will allow more space per tree for root development and greater moisture availability; this is important where soil moisture is likely to be limited. Widely spaced rows will also allow greater ease in cultivation with large equipment, but will need to be cultivated more years. Closely spaced rows will produce the densest, most compact barrier, occupying a minimum of land area, but competition for moisture, nutrients and growing space may slow growth.

Spacing between tree rows should be no less than 10 feet and no more than 20 feet. Spacing should be wide enough to accomodate large cultivation equipment. Wider spacings will help to prevent the faster growing broadleaf trees from whipping the tops out of the slower growing conifers.

Spacing Between Trees in the Row.

The distance between the trees within the row will directly affect the density of windbreaks. If trees and shrubs are spaced too far apart in the row, the time required for the shelterbelt to attain effective density will be needlessly prolonged. If trees are spaced too closely there will be danger of early crowding and loss of growth and vigor. Trees and shrubs should be spaced so that their crowns will close together and form a continuous barrier by the time they are 10 years old.

Because the various kinds of trees and shrubs used in windbreaks grow at different rates in height and crown spread, the spacing between them in the row will depend upon the species.

Tall fast-growing trees should be spaced 10 to 12 feet apart. Slower growing conifers should be spaced 8 to 10 feet apart in the row. Trees in adjacent rows should be staggered or alternated to give a more uniform foliage density.

Small shrubs should be planted 3 to 5 feet apart in each row. The closer spacing will provide a dense lower level in a shorter time. Medium size shrubs should have a wider spacing.

Planting Site Layout

Your Service Forester, County Extension Director or Soil Conservation Service can assist you in developing a planting plan.

Lay out the rows by setting stakes or flags every 100 to 150 feet, so that rows will be parallel. Crooked rows make cultivation difficult. Set stakes closer together where rows curve. Label the first stake in each row for the species to be planted. A row marker attached to the tractor or planter is the fastest and most accurate way of maintaining parallel rows.

When to Plant

Seedlings should be planted while they are in the dormant stage. In Oklahoma this period is usually from early December through March. Plantings made after growth has begun in the spring have less chance for survival. Problems may also be encountered by planting too early in the fall. Species which are subject to rabbit and rodent damage should be wrapped with aluminum foil or protected with fine mesh wire. Planting a winter crop adjacent to the trees, such as wheat, oats or rye may help reduce rabbit damage to the trees. A prolonged dry period, during cold weather, will cause heavy losses.

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