TECHNICAL NOTES

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WINDBREAKS ESTABLISHMENT

This technical note was published by the Soil Conservation Service and the Cooperative Extension Service. It explains the basics of windbreak establishment. The understandable discussion and graphics make it suitable for public distribution. For additional copies contact the SCS State Staff Forester.

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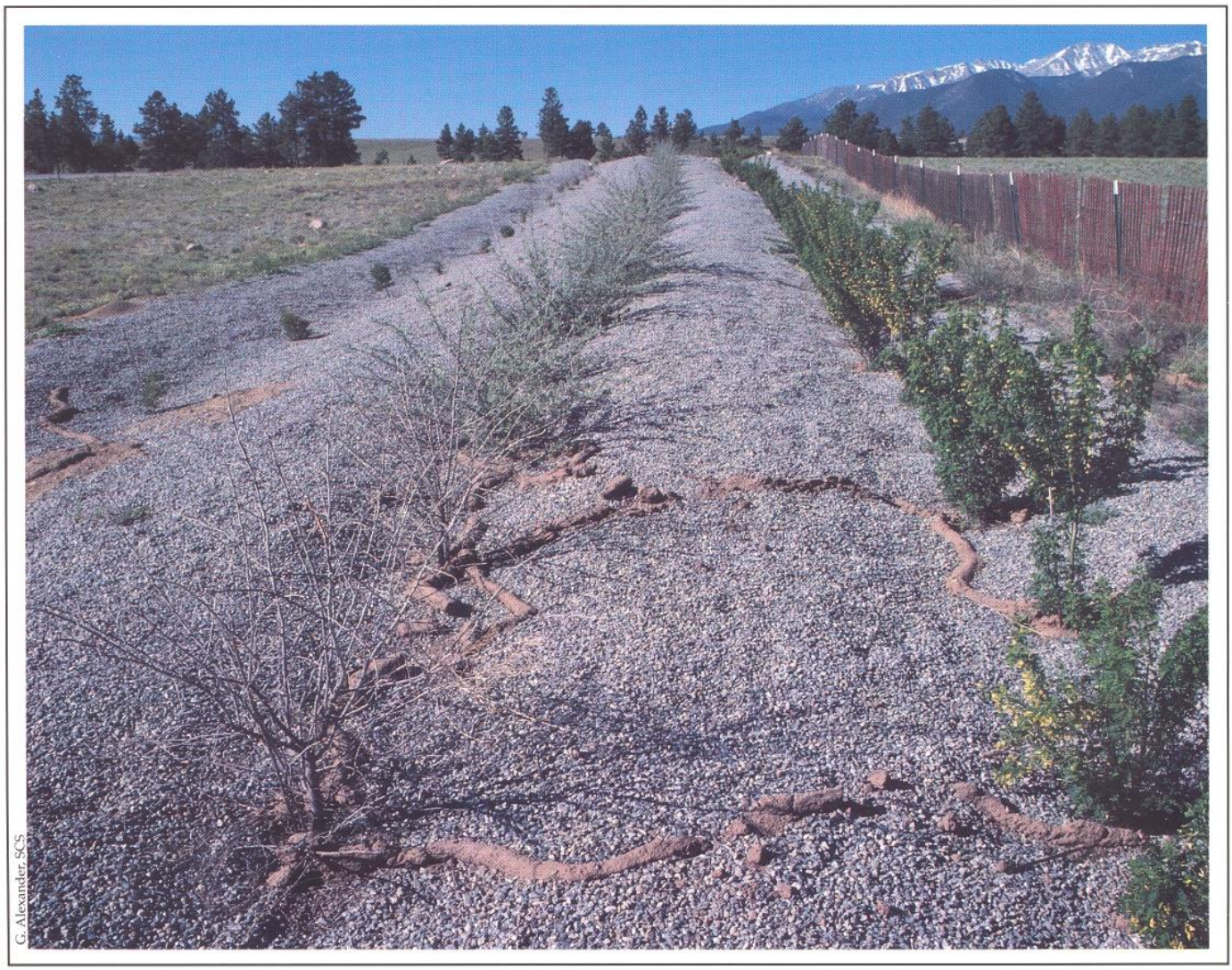
Windbreak Establishment

By Patricia Boehner and James R. Brandle, University of Nebraska-Lincoln
and Sherman Finch, Soil Conservation Service

A successful windbreak planting depends on proper establishment and care during the first few years after planting. Time spent in site preparation, weed control, and replanting is repaid many times during the lifetime of the windbreak. Take no shortcuts in the planning and establishment of your windbreak.

Windbreaks are investments in the future value of your property. Each windbreak system is unique and your windbreak should be designed for your site and objectives. Your local conservation office can provide help in designing and installing your windbreak. These organizations can also help with recommendations on where to buy planting stock, and how to treat your windbreak as investment.



G. Alexander, SCS

Time and effort spent on proper weed control and protection during the early years of a planting help ensure a healthy and functional windbreak.

Windbreak Layout and Design

Layout

Before planting, it is best to layout each row of the windbreak on the actual site. This will allow the design to be customized for the positions of buildings, roads or driveways, feedlots, field boundaries, utility lines, drainage ditches, and other features at your site. Layout the dimensions of the windbreak, including the spacing within and between tree rows. This process will help assure that your design will provide the protection needed and will fit within the desired area.

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For successful tree establishment in grasslands, killing the grass and breaking up the sod are essential preparation practices on most sites.

Site preparation

Proper site preparation is one of the best ways to improve the survival of your newly planted trees and shrubs. Preliminary groundwork reduces competition from weedy species, conserves soil moisture, and makes planting easier. Site preparation actually begins the year before planting and depends on the condition of your site. Soil type, existing vegetation, and possible erosion hazards should be considered in selecting the appropriate practices. If rodents are a problem in the area, begin control measures at least a year in advance. You may obtain recommendations for site preparation techniques from local conservation agencies.

Cropland

Depending on the current weed density, little or no site preparation is necessary on previously cultivated land. If many weeds are present, the land may require a single disking before planting. Otherwise, plant directly into the previous year's crop stubble. Avoid exposing erodible soils to the wind. If erosion is a threat over the winter, plant a fall cover crop. The following spring, treat the existing vegetation with herbicide, and plant the windbreak directly into the cover crop residue.

Grassland or Rangeland

On sites with heavy grass sod, site preparation begins with a herbicide application in the spring while the grass is actively growing. The site is then plowed in the fall and disked the following spring just prior to planting. Delaying disking until just before planting conserves soil moisture, controls early spring weeds, and reduces the potential for erosion damage.

In rangelands where erosion may be a major concern, chemical fallowing practices offer the best alternative to mechanical cultivation. To assure complete control, apply the chemicals in the spring, at least two weeks before tree planting and when the grass is actively growing. Planting directly into the dead sod reduces the chance of soil erosion but replanting costs may be higher since the matted sod, even when the grass is dead, may cause competition for the establishment of tree roots.

Planting

After you prepare your site, successful establishment depends on planting quality plant material, handling the plant material carefully, and using proper planting techniques.

Plant Material Selection

Purchase your stock from a reliable source. Most states sell trees through the State Forester's office at very reasonable prices. Private nurseries usually have comparable prices, and may have additional species.

Choose plant material that is suitable for your soils and can survive the environmental extremes at your site. Consult your county extension office or another local conservation agency for lists of suitable trees and shrubs. Your seedlings should come from nurseries using locally collected seed or seed from known origins. When available, select insect and/or disease resistant plants. Don't be too quick to buy the cheapest seedlings; they may not be the best value in the long run.

Conifers should be at least 8 to 12 inches tall, with a good, healthy root system. Trees may be either container-grown or bare-root. Container-grown plants are usually larger and cost more, but may be worth the extra cost in areas where establishment is difficult. Usually, quality bare-root stock is satisfactory.

Most nurseries sell hardwoods and shrubs as bare-root seedlings. They should be 12 to 24 inches tall,

with full, healthy root systems, and at least a one-quarter inch diameter just above the root collar (the point where the roots meet the stem).

Pre-Planting Care

A crucial step in the establishment process is the care of plant material upon arrival. Warm temperatures and dryness greatly reduce the survivability of seedlings. Immediately upon arrival, inspect the plant material for dry, moldy, or very small trees. Do not waste your time planting damaged trees.

Plant your windbreak as soon as possible after the seedlings arrive. Ideally, seedlings should be planted the same day they are received. This is not always possible and your seedlings may need to be stored until planting conditions improve. How well you store your seedlings will determine the success of your tree planting.

If seedlings need to be stored there are several methods that will minimize the stress of storage. Keep the packing material around the roots and making sure the roots are damp. Check them daily for adequate moisture and keep the box or bag closed so that the seedlings remain in the dark.

Refrigerated storage (34-40°F; 80-100 percent humidity) is best and will allow seedlings to be kept for several weeks. **DO NOT** allow the seedlings to freeze.

A cool, damp root cellar will provide satisfactory storage for up to a week. Placing several trays of ice cubes on top of the packing material covering the roots will provide cooling and moisture. Repeat the process daily. **DO NOT** use dry ice as this will freeze the plant material.

A cool basement or unheated room will provide satisfactory storage for several days. Again, ice cubes placed on the packing material will provide both cool temperatures and moisture.

The best time to plant tree seedlings is in the spring, before the buds begin to swell. Fall planting is usually not very successful. To minimize stress on the seedlings during planting, try to plant on a calm or cloudy day, and keep the trees moist. It is extremely important to avoid the exposure of seedlings, especially bare-root conifers, to air any longer than absolutely necessary. Keep seedlings in the original, moist packing material, or covered with wet burlap. If practical, placing the roots in a bucket containing a slurry of soil and water will provide a coating for the roots and keep them from drying out. Commercially prepared slurries are also available. Although dryness damages the roots, they do need some oxygen, therefore, **DO NOT** store the seedlings with their roots in water or in the slurry for more than several hours.

Planting Techniques

There are essentially two ways to plant trees - by hand or by machine. Both provide excellent results and the method of choice usually depends on the number of trees you are planting.

If you have many trees to plant, contact your local extension office to find out if help is available. Many state or federal agencies offer planting services, or cooperate with locally-owned tree planting services. Some offices will rent you a tree planter if you wish to do your own planting. If your windbreak is put in by machine, supply the equipment operators with copies of your site plan.

After planting by machine, walk the entire windbreak strip. Lightly tug on the seedlings while tamping the soil at the base of each tree to be sure they are vertical and firmly in the ground. Good root-soil contact is essential to a successful planting. If the soil is dry, the

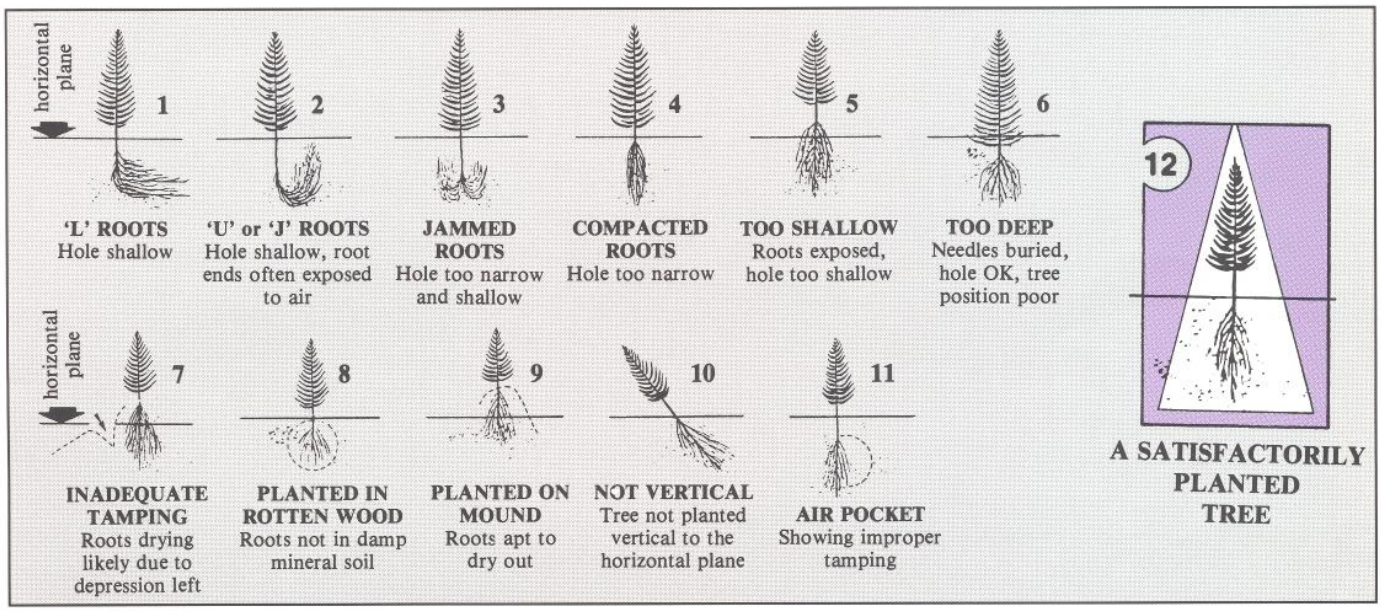

*Figure 1. Drawings 1 through 11 illustrate various ways that trees should **NOT** be planted . The ideal planting is shown in drawing 12.*

seedlings will benefit from a small amount of water (approximately 1 gallon) applied at planting.

Post-planting care

Windbreak establishment does not end once the seedlings are in the ground. The new planting is still susceptible to weed competition, hot dry winds, feeding by livestock and rodents, and damage from insects and diseases.

Weed Control

Competition from weeds is the leading cause for failure of newly planted windbreaks. Pre-emergent herbicides can reduce the weed populations and minimize cultivation. On areas subject to erosion, vegetation can be controlled with various herbicides. Consult your local conservation agency for the best herbicides for your planting. When using herbicides always read and follow label instructions.

G. Alexander, SCS

Various types of mulches may also be used to control weeds and conserve moisture. Plastic mulches and other mat-type weed barriers are cost effective and are especially useful at remote sites.

Consistent vegetation control insures a vigorous, well-established windbreak. Clean cultivation of newly planted windbreaks gives the trees an advantage in obtaining moisture. However, some vegetation between rows reduces soil erosion and drying caused by strong winds. Planting an annual crop such as corn or sorghum between the rows protects the soil and young trees (especially conifers) from wind damage and will trap snow in the winter for added moisture. At a minimum, an area thirty-six inches in diameter around each tree should be free of grass and weeds for 3 to 5 years.

Livestock

Keep livestock out of windbreaks at all times. Livestock browse and trample young seedlings, cause soil compaction, and reduce the effectiveness of the lower portions of the windbreak. Use fences to protect your windbreak anytime livestock are nearby.

Wildlife Damage

Newly planted trees and shrubs are particularly susceptible to damage by small mammals. If rodents are a problem, continue control measures initiated the previous year. An advantage of clean cultivation after establishment is that small rodents tend to avoid bare ground. If the planting is relatively small, fencing with chicken-wire or plastic guards provides a barrier to rabbits and most other small mammals. Commercial animal repellents are also available, but are not always reliable.

Insects and Diseases

Inspect your windbreaks regularly for signs of insects or diseases. Early identification allows early control of these situations - before damage decreases windbreak effectiveness. Stressed trees can conceal the effects of insects and diseases, so be particularly alert for outbreaks during dry years.

Irrigation

In low rainfall regions or under drought conditions, supplemental water may be necessary for the survival of newly planted trees and shrubs. Various types of drip irrigation systems are available, and in some regions may receive cost-share funding. In very dry areas, it is essential for newly planted trees to receive additional watering at the time of planting.

Replanting

Even under the best of conditions, some seedlings die. Check for and replace dead seedlings for at least three years. The effectiveness of a windbreak depends largely on the initial impact of the wind against full, compact rows of trees and shrubs. Gaps or low density areas within the windbreak concentrate the force of the wind, causing more problems than in unprotected areas.

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