

## NATURAL RESOURCES CONSERVATION SERVICE CONSERVATION PRACTICE STANDARD

### WINDBREAK/SHELTERBELT ESTABLISHMENT

(Feet)  
CODE 380

#### DEFINITION

Linear plantings of single or multiple rows of trees or shrubs or sets of linear plantings.

#### PURPOSES

- To reduce wind erosion.
- To protect growing plants from wind related damage.
- To alter the microenvironment to enhance plant growth.
- To manage snow deposition.
- To provide shelter for structures, livestock and recreational areas.
- To enhance wildlife habitat by providing travel corridors.
- To provide living noise or visual screens.
- To provide living barriers against airborne chemical drift.
- To delineate property and field boundaries.
- To improve aesthetics.
- To improve irrigation efficiency.
- To increase carbon storage

#### CONDITIONS WHERE PRACTICE APPLIES

On any areas where linear plantings of woody plants are desired and suited.

#### CRITERIA

##### General Criteria Applicable to all Purposes

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service.

The location, layout and density of the planting will accomplish the purpose and function intended within a 20 year period.

The maximum design height (H) for the windbreak or shelterbelt shall be the expected height of the tallest row of trees or shrubs at age 20 for the given site. Certain species are not adapted outside of MLRA 42. (See Windbreak Suitability Groups, NM-T.G. II-Windbreak Interpretations, for expected heights and range of adaptation) Windbreak Suitability Groups list trees and shrubs recommended for the various soils.

Species must be suitable and adapted to the soils, climate and site conditions. Table 1 provides a description for a limited number of trees and shrubs. Certain species may be adapted to a site but should be given very careful consideration if they are a problem in the area or are considered a problem in the state. Russian Olive and salt cedar are very adaptable to most sites but are a serious problem plant in riparian zones and other areas.

Site preparation shall be sufficient for establishment and growth of selected species, not contribute to erosion and be appropriate for the site. Sites shall be essentially free of living plants prior to planting trees and shrubs. Mechanical, manual, or chemical methods may be used for site preparation. Minimum area of site preparation for each tree or shrub shall be a 3-foot diameter circle.

Only viable, high quality and adapted planting stock or seed will be used. Preferred seedling stock is a 1:1 shoot/root ratio. This ratio should not exceed 2:1. Seedlings shall not be less than 1/4" in caliper at 1" above the root collar. This ratio is critical for successful establishment in a desert environment.

Larger container plants will be very high quality and grown under the standards set by the NM Nursery Association. Particular care should be taken on plants larger than seedlings to assure the plants have adequate root development and do not exceed the 2:1 shoot/root ratio.

Planting stock that will be stored for long term will need a cool, moist environment (34-40 degrees F) or heeled in. During all stages of handling and storage, keep tops dry

## Standard - 380 - 2

and free of mold and roots moist and cool. Destroy stock that has been allowed to dry, to heat up in storage (e.g., within a bale or delivery carton), or that has developed mold or other pests.

The planting shall be done at a time and manner to insure survival and growth of selected species. Roots of bareroot stock shall be kept moist during planting operations by placing in a water-soil (mud) slurry, peat moss, super-absorbent (e.g. polyacrylamide) slurry or other equivalent material. Stock shall not be planted when the soil is frozen or dry. Stock will be planted in a vertical position with the root collars approximately 1/2-inch below the soil surface. The planting trench or hole must be deep and wide enough to permit roots to spread out and down without J-rooting or L-rooting. After planting, soil around each plant will be packed firmly to eliminate air pockets.

Bareroot and container plantings should be done in the spring after the frost is out of the ground and before the seedlings have started to break bud and local trees and shrubs have leafed out. High quality container stock can be planted in the fall if there is adequate ground moisture, supplemental water, and the planting will have a minimum of six weeks for root development prior to frost.

The planting will be protected from adverse impacts such as livestock damage, rodents, rabbits, insects, disease, wildlife and fire. Isolation strips for wildfire control shall be at least 8 feet wide and twenty feet from the edge of the windbreak species. The area between the plants and the isolation strip shall be mowed or maintained to prevent excessive growth of grass and weeds.

Avoid planting trees or shrubs within 15 feet of structures or any above or below ground utilities. For planting adjacent to any above-ground utility or facilities, position trees or shrubs so that crowns at maturity are at least 15 feet from the nearest line or structure. If space is limited, species with a mature height less than that of the facility or utility lines may be used.

State and local regulations or ordinances will be followed in locating plantings adjacent to roads or on species and placement. Avoid creating blind corners at road intersections. An ordinance example is the Albuquerque pollen ordinance.

On the windward side of a road in areas of heavy blowing snow accumulation, tree rows should not be planted closer than 150 feet from the centerline of the road to avoid piling snow on the road. Plantings made to the south or east side of roads or highways shall have their nearest row no closer than 100 feet to the road centerline to avoid ice buildup from winter shading and snow drifting.

Moisture conservation or supplemental watering shall be provided for plant establishment and growth. A variety of mulches can be used such as rock, fabricated mulches or organic mulch material like wood chips. Caution will be

exercised when using organic mulches like wood chips spread on or mixed into the soil since they will utilize existing nitrogen in the soil to break down the material, taking nutrients away from the plants. When fabricated mulches are used for water collection/conservation, the material should be woven black polypropylene with a minimum 5-year guarantee against UV deterioration. The material must allow water to go through it but eliminate most vegetation from growing through it. Minimum area covered by fabric mulch should be 6 feet by 6 feet. Mulches should accomplish three purposes: 1) reduce competing vegetation, 2) increase available water for plants, and 3) promote plant growth. Supplemental watering can be by hand watering, flood irrigation, or drip (see Irrigation System, Drip, Standard # 441). Thorough watering at less frequent intervals will promote desirable root development.

If conventional tillage methods are to be used for controlling competing vegetation, the area within six feet of young plants shall be kept clean tilled. No soil disturbance shall occur more than four inches below the surface to protect roots. As the trees grow, tillage should be maintained to the edge of the drip-line or within the expected root development zone.

To determine the acreage encompassed by a windbreak, calculate the area (length times width) with length being the length of the tree or shrub rows plus 15 feet at each end. Width is the distance between each row plus 15 feet on each side of the windbreak. Single row windbreaks would have a width of 30 feet. A double row windbreak with 20 feet between rows would have a width of 50 feet.

For optimal carbon storage, select plants that are adapted to the site to assure strong health and vigor and plant the full stocking rate for the site.

### **Additional Criteria to Reduce Wind Erosion; Protect Growing Plants**

The windbreak will be oriented as close to perpendicular to the troublesome wind as possible. This can vary depending on the time of year protection is being planned.

The interval between windbreaks shall be determined using current, approved wind erosion technology. Interval widths shall not exceed that permitted by the soil loss tolerance (T), or other planned soil loss objective. Calculations shall account for the effects of other practices in the conservation management system.

The distance sheltered by the barrier shall be considered to be 10 times the design height (H) on the leeward side and two times the design height (H) on the windward side. Some crop and soil blowing protection is achieved at 15 times H.

For wind erosion control, temporary measures will be installed to supplement the windbreak until it is fully functional.

On slopes greater than 6 per cent, plant windbreaks on the contour, consistent with any other contour practices in the area to be protected.

#### **Additional Criteria to Manage Snow Deposition**

The windbreak will be oriented as close to perpendicular to the snow-bearing wind as possible.

For snow distribution, the windbreak density (during expected snow producing months) shall not be less than 25 percent nor greater than 50 percent. The interval between barriers will not exceed 20H.

For snow accumulation, the minimum barrier density, during expected snow-producing months, will be 50 percent and the windward row will be at least 100 feet from the area to be protected. Where property lines allow, windbreak lengths will extend 150 feet beyond each side of the area being protected to keep snowdrifts caused by end effects from extending into the area being protected. Living snow fences for keeping and storing snow off roads will have the windward row located at least 200 feet from the centerline of the road being protected. Twin-row high-density designs may be used.

Windbreaks will be located so that snow deposition will not pose a health or safety problem or obstruct human, livestock, or vehicular traffic.

#### **Additional Criteria to Provide Shelter For Structures, Livestock, and Recreation Areas**

The planting will be oriented as close to perpendicular to the troublesome wind as possible.

Where prevailing winds come from more than one direction, a windbreak may have multiple legs. Figure 1 demonstrates proper protection.

For wind protection, the minimum barrier density will be 65 percent during the months of most troublesome wind and the area to be protected will fall within a leeward distance of 10H.

Drainage of snowmelt from the windbreak shall not flow across a livestock area.

Drainage of livestock waste from a livestock area shall not flow into the windbreak.

#### **Additional Criteria For Providing or Enhancing Wildlife Habitat or Travel Corridors**

Plant species selection shall benefit targeted wildlife species.

Design dimensions of the planting shall be adequate for targeted wildlife species.

To improve the wildlife value of conservation tree and shrub plantings, two or more rows of conifers, shrubs, or a combination of these are recommended on the leeward side. Increasing the number of rows and diversity of plant species increases the variety of wildlife species that may utilize the site.

Producers should be made fully aware of the full range of wildlife that may be attracted to a tree and shrub planting. Songbirds and game birds may be the preferred species, but other wildlife such as skunks, snakes and mice may also utilize this area. As trees mature they can serve as perches and nesting sites for raptors. They may also serve to attract crows or flocks of blackbirds and sparrows that may have an adverse impact on adjacent grain fields.

To enhance pheasant habitat, rows of shrubs planted to create a 0.1 acre or larger thicket 100 feet leeward of tree rows helps provide protection during winter blizzards. To create a thicket, between row spacing should be 6 feet.

#### **Additional Criteria for Visual screens**

Visual screens shall be located as close to the observer as possible with a density, height and width to sufficiently block the view.

Evergreen trees are most effective where year-round screening is desired. A single row of trees may be sufficient for this type planting.

#### **Additional Criteria for Noise Screens**

Noise screens shall be at least 65 percent dense during all times of the year, as tall as, and as close to the noise source as practicable.

The length of the screen should be about twice as long as the distance from the noise source to the receiver. Dense shrubs next to traffic lanes, or other noise sources, backed by rows of tall trees provide effective noise reduction. For maximum effect, use evergreen trees and shrubs for year-round control.

For high-speed traffic noise, the barrier shall not be less than 65 feet wide. For moderate speed traffic noise, the barrier shall not be less than 20 feet wide.

Species selected will be tolerant to noxious emissions, sand, gravel depositions or salt spray from traffic areas.

#### **Additional Criteria to Improve Aesthetics**

Use species that are evergreen or those species that have such features as showy flowers, brilliant fall foliage, or persistent colorful fruits.

#### **Additional Criteria For Improving Irrigation Efficiency**

For sprinkler irrigation systems, the windbreak shall be as tall as the sprinkler heads.

## Standard - 380 - 4

Trees and shrubs selected to be planted shall not interfere with the system.

### CONSIDERATIONS

Spacing between windbreaks and rows of windbreaks may be adjusted, within limits of the criteria above, to accommodate widths of equipment. Allow four feet next to each row, the width of the equipment and planned mature width of the species.

Selection of plants for windbreaks should favor species or varieties tolerant to herbicides used in the area.

Plants that may be alternate hosts to undesirable pests should be avoided. As an example, golden currant should not be planted close to southwestern white pine since it is an alternate host of white pine blister rust.

All plantings should compliment natural features. Species that have more aesthetic values should be included.

Tree or shrub rows should be oriented on or near the contour where water erosion is a concern. Where water erosion and/or runoff from melting snow is a hazard, it should be controlled by supporting practices.

Wildlife should be considered when selecting tree or shrub species. Species diversity, including use of native species, should be considered to avoid loss of function due to species-specific pests.

Consideration should be given to adverse off site effects.

Plants established in cropping systems should have root systems that do not affect crop growth and/or spread from root sprouts.

### PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

### OPERATION AND MAINTENANCE

The following actions shall be carried out to insure that this practice functions as intended throughout its expected life. These actions include normal repetitive activities in the application and use of the practice (operation), and repair and upkeep of the practice (maintenance):

Replacement of dead trees or shrubs will be continued until the barrier is functional. Single row windbreaks require a minimum of 90% survival to be functional. Multiple row windbreaks require a minimum of 75% survival to be functional. Where two adjoining trees in a row die, at least one will be replaced to avoid gaps in functionality.

Supplemental water will be supplied for the expected life of the trees or shrubs. Supplemental water should be provided for a minimum of five years for development and growth. Where fabricated mulches are used to collect/conservate moisture, they will be maintained for a five-year minimum establishment period. Drip irrigation systems will be maintained to avoid loss of plants. Dormant plants should be watered at least monthly if the ground is not frozen and adequate soil moisture is not present.

Thin or prune the barrier to maintain its function.

Inspect trees and shrubs periodically and protect from adverse impacts including insects, diseases or competing vegetation. The trees or shrubs will also be protected from fire and damage from livestock and wildlife.

Periodic applications of nutrients may be needed to maintain plant vigor. Nutrients should not be added to any nursery stock the first year of planting. Any nutrients to be added must follow recommendations based on soil test, and species. Most native plants will not need any additional nutrients. Over application can be harmful to plant growth and survival.

Root pruning may be used to control roots that are invading crops or other areas. Generally pruning at the drip-line will restrict roots and not effect the health of the tree. Planning should be adequate to not require any root pruning prior to maturity of the species. Columnar trees will have major roots outside the drip-line and root pruning can cause major tree damage. Extreme caution should be practiced with root pruning (because of sprouting) of species such as cottonwood and Russian olive. If it is not known whether pruning will encourage sprouting, do a small test area on one end of the windbreak. Sprouts should not be controlled with chemicals as those chemicals will be transported through the root system to the parent plant. Once root pruning is started, bi-annual pruning will be necessary to maintain the intent.

### REFERENCES

USDA-NRCS-NM, 1982. *Tree and Shrub Planting Handbook for Arizona and New Mexico*  
Editor: Terry Wildermuth and Bob Bruce et.al.

USDA-NRCS-UT, 1993. *Tree and Shrub Planting Handbook for Utah and Nevada*. Prepared by: David Schen et.al.

USDA-NRCS-NHQ *National Forestry Manual Windbreak Technology* 1986 Edited by: J.R. Brandle, D.L. Hintz, J.W. Sturrock et.al.