INTRODUCTION

Windbreaks/shelterbelts require renovation when they are no longer functioning as intended. See Windbreak/Shelterbelt Renovation (650). The renovation of windbreaks/shelterbelts may include several operations, depending on existing conditions, such as:

- Removal of competing vegetation to reduce competition for moisture and nutrients needed by trees and shrubs,
- Replacement of gaps in a field windbreak in order to improve the degree of protection of crops and control wind erosion,
- Improvement of understory density in order to control wind erosion and improve wildlife habitat,
- Reduction of tree density to improve snow distribution,
- Root pruning to reduce competition between the windbreak and the crop for moisture,
- Replacement of an old windbreak to ensure continued protection of the field,
- Diversification of species in a windbreak to reduce the risk of insect or disease problems and improve wildlife habitat, and
- Elimination of overcrowding by the removal of individual or rows of trees to improve the health of the remaining trees.

All renovation practices are included under one or more of the following operations described below. Livestock must be excluded in all renovation activities. See NE Forestry Technical Note 70 for more details regarding windbreak renovation design and implementation.

UNDERPLANTING

1. Plant eastern red cedar or Rocky Mountain juniper\(^1\) approximately midway between the rows of an existing windbreak where any one of the following conditions occurs:
   a. Where trees and shrubs in two or more adjacent rows are scattered and a majority are dead or are in poor condition;
   b. Where the windward rows are inadequate for significantly reducing low-level winds or controlling drifting snow;
   c. Where leeward rows need to be improved for wildlife purposes;
   d. Where the current windbreak width or proximity to county roads or boundary fences does not allow for the planting of new rows on the outside.

2. Trees may need supplemental water because of dry soil conditions within the windbreak. See Windbreak/Shelterbelt Establishment Tree Planting Procedures Guide (380TPP) for supplemental watering guidelines.

3. Trees may be established in a shallow furrow 18 to 24 inches wide where grass and weeds are sparse or sod is native grass. For seedlings that are spot planted by hand, scalp or spray an area in a circle with a minimum diameter of 24 inches. When sod is cool season grass, a 4 feet strip must be prepared mechanically or chemically\(^2\) to eliminate competition.
before planting. For additional guidelines on site preparation refer to Windbreak/Shelterbelt Establishment Tree Planting Procedures Guide (380TPP).

4. Spacing within rows should be 6 to 12 feet.

5. Where natural regeneration of Eastern redcedar is present, thinning may be needed. Where natural regeneration is spotty, new plantings should be used to supplement regeneration. See Windbreak/Shelterbelt Establishment Tree Planting Procedures Guide (380TPP) and Forest Stand Improvement Design Procedures (666DP).

SUPPLEMENTAL OR ENLARGEMENT PLANTINGS

1. Cultivated plantings will be made in accordance with current specifications in the Windbreak/Shelterbelt Establishment Design Procedures (380DP), with the following exceptions:
   a. Supplemental or enlargement plantings should not be made closer than 20 feet from large spreading trees, such as Siberian elm, eastern cottonwood, or silver maple.
   b. Supplemental or enlargement plantings with small and medium sized trees or shrubs should not be closer than 15 feet.
   c. Root pruning should be encouraged between the supplemental planting and the old windbreak.
   d. Hardy, dense tree or shrub species, such as eastern redcedar or Rocky Mountain juniper, are preferred for use in supplemental plantings on the north and west sides of existing windbreaks where soils are suitable. New plantings on the south and east sides of existing windbreaks can be of any adapted tree or shrub (see Field Office Technical Guide, Section II-Windbreak Interpretations, Conservation Tree/Shrub Groups).

2. Scalp plantings will be made in accordance with specifications in the Windbreak/Shelterbelt Establishment Tree Planting Procedures Guide (380TPP), with the following exceptions (assuming original belt was scalp-planted and contains all conifers):
   a. Plantings should not be made closer than 15 feet from existing plantings if eastern redcedar or Rocky Mountain juniper is used. Hardy, dense tree or shrub species, such as eastern redcedar or Rocky Mountain juniper, are preferred for use in supplemental plantings on the north or west sides of existing windbreaks where soil permits.
   b. Plantings should not be made closer than 20 feet from existing plantings if a pine, or large spreading hardwood tree species, is used.

REMOVAL AND REPLACEMENT OF DEAD AND DYING ROWS

1. Designate the perimeter of the area to be cleared or killed with marking paint, flagging or other methods.

2. All trees, shrubs, or other debris from a cleared area which interfere with cultivation operations or planting will be removed from the site or disposed of within the site prior to planting. Use of ripper teeth on a dozer is recommended to remove all roots, disk afterwards to firm ground prior to planting.

3. If the debris is to be burned, it must be piled far enough away from the planting to prevent damage to the trees. All burning must comply with local burning regulations.

4. Prepare a site by acceptable methods in the Windbreak/Shelterbelt Establishment Tree Planting Procedures Guide (380TPP), and plant trees or shrubs on the prepared site.

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5. Select any tree or shrub species for replacement that is suited to the soil (see Field Office Tech Guide, Section II - Windbreak Interpretations, Conservation Tree/Shrub Groups).

6. Where only a portion of the interior of a windbreak is removed, replant the area with at least one row less than the number of rows removed.

**RELEASE OF SOD-BOUND TREES**

Apply where at least 70 percent of the stand exists and where heavy sod has curtailed growth.

1. Use appropriate herbicides to control grasses if they are applied according to label directions. For guidelines refer to Windbreak/Shelterbelt Establishment Tree Planting Procedures Guide (380TPP), Section V. Control of Competitive Vegetation After Planting.

2. Polypropylene fabric mulch can be used on existing trees. Sod should be killed first. See Mulching (484) for installation procedures on renovation sites.

3. As a last resort, plow shallow or cultivate no deeper than 3 inches between the rows. Do not plow or cultivate closer than 1 foot from the base of the trees. The optimum treatment time for this last resort cultivation treatment is midsummer or early fall.

**THINNING**

Thinning can be the removal or killing of certain trees within the row or removal or killing of entire rows to improve the growth of adjacent rows.

1. Trees and/or shrubs may be thinned within the row not to exceed the current recommended maximums for in-the-row spacing by more than 30 percent. See Forest Stand Improvement Design Procedures (666DP).

2. Marking of trees and shrubs or entire rows to be removed must be done prior to any removal operations.

3. Removal may be by any means that does not contribute to erosion or damage to residual trees and/or shrubs. Disposal must be in compliance with county and state regulations.

4. An effort will be made to retain trees, shrubs, or rows that have the most vigor. Removing or killing entire rows of broadleaf trees can improve the growth of adjacent rows of suppressed evergreens. Broadleaf rows to favor when overtopping or crowding occurs are common hackberry, green ash, honeylocust, bur oak, and black walnut. Conifer rows with pine or cedar should be favored if they are still in fair condition. Removing or killing overtopping deciduous rows is recommended.

5. The removal of trees by severing at the base may cause sprouting. Apply an appropriate herbicide to control sprouting where it is not wanted.

6. On windbreaks over 100 feet in width, an alternative would be to remove one half the width and replant seedlings in that area. The remaining older windbreak will continue to provide wind and snow control. Plan to remove and replant this area in 15 to 20 years.

**MANAGING NATURAL REGENERATION**
In some windbreaks there may be a sufficient number of small trees in the understory that could be managed to replace the overstory trees. Tree species to favor in managing natural regeneration are hackberry, eastern redcedar, bur oak, green ash, and honeylocust.

1. Thinning of the natural regeneration may be needed to provide growing space for the better trees. Thinning can be done in rows to conform to the original windbreak design or it can be managed similar to natural woodland.

2. Old overstory trees may need to be killed or removed to allow additional sunlight to reach natural regeneration.

CORRECTIVE PRUNING OF DECIDUOUS TREES AND SHRUBS

1. Prune branches from adjacent deciduous trees which may interfere with the normal growth of any evergreen species. Make cuts just outside the branch collar. Refer to Tree Pruning Design Procedures (660DP) and NE Forestry Technical Note 71.

2. Prune deciduous shrub rows which have become leggy (containing sparse or dead branches) and where a denser shrub row is desirable. Cut shrubs back to 4 to 8 inches above ground during the dormant season.

ROOT PRUNING

Root pruning may be needed to prevent crop yield reduction adjacent to the windbreak. Root pruning may be used to prevent competition from adjacent trees when supplemental or enlargement plantings are made.

1. Root plow at the drip line or further from the trees. Cultivation over the root plow furrow is necessary to prevent suckering from the severed roots.

2. Root plow to a depth of 18 to 24 inches. This will normally require two trips over the furrow, plowing 9 to 12 inches with each pass.

3. Repeat root pruning at intervals of 5 to 10 years.

4. Root prune when the trees are dormant if possible.

5. Locate all buried utilities before starting root pruning.

6. Root prune only one side for single row windbreaks.

SUPPORT REFERENCES


Nebraska Field Office Technical Guide:
- Windbreak/Shelterbelt Renovation (650),
- Windbreak/Shelterbelt Establishment Tree Planting Procedures (380TPP),
- Forest Stand Improvement Design Procedures (666DP),
- Windbreak/Shelterbelt Establishment Design Procedures (380DP),
- Section II, Windbreak Interpretations, Conservation Tree/Shrub Groups,

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Mulching (484),
Tree Pruning Design Procedures (660DP).

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1 Rocky Mountain juniper is not recommended for Nebraska Vegetative Zone IV.

2 CAUTION: Herbicides, their rates, and time and method of application may be found in the current Nebraska Extension Circular EC130, “Guide for Weed Management.” If using pesticides, apply them only when needed and handle them with care. Follow the directions; heed all precautions on the container label. If the pesticides are not handled or applied properly, or if unused portions are disposed of improperly, they may be injurious to humans, animals, fish and wildlife, desirable plants, honey bees, and other pollinating insects; they may contaminate water supplies; and they may degrade the environment. Apply only in accordance with federal, state, and/or local laws.