NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

HERBACEOUS WIND BARRIERS

(Ft.)

CODE 603

DEFINITION

Herbaceous vegetation established in rows or narrow strips in the field across the prevailing wind direction.

PURPOSE

- Reduce soil erosion from wind.
- Reduce soil particulate emissions to the air.
- Protect growing crops from damage by wind or wind-borne soil particles.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to lands where crops or forages are grown.

CRITERIA

General Criteria Applicable to All Purposes

Herbaceous barriers will be designed to reduce wind velocities to meet purposes and resource objectives.

Vegetation. Criteria for the establishment of perennial or annual herbaceous vegetation needs to be used on guidelines developed locally (provide in specifications) or referenced in the Field Office Technical Guide (FOTG). See Florida NRCS conservation practice standards, Critical Area Planting, Code 342, and Vegetative Barrier, Code 601, and their accompanying guidance for information on establishing perennial species. Refer to Chapter 2: Soil and Fertilizer Management for Vegetable Production in Florida (http://edis.ifas.ufl.edu/pdffiles/CV/CV10100.pdf) of the University of Florida, IFAS Vegetable Production Handbook or other accepted technical references for criteria to establish annual herbaceous vegetation. Do not plant any species found on the Florida Dep. of Agriculture and Consumer Services or the Florida Dep. of Environmental Protection noxious or prohibited weed lists. Additionally, do not plant any species listed as a Category 1 invasive species by the Florida Exotic Pest Plant Council (see FOTG Section I [f] [4]).

Impact to cultural resources, wetlands, and Federal and State protected species needs to be evaluated and avoided or minimized to the extent practical during planning, design, and implementation of this conservation practice in accordance with established National and Florida NRCS policy, General Manual (GM) Title 420-Part 401, Title 450-Part 401, and Title 190-Parts 410.22 and 410.26; National Planning Procedures Handbook (NPPH) FL Supplements to Parts 600.1 and 600.6; National Cultural Resources Procedures Handbook (NCRPH); and The National Environmental Compliance Handbook (NECH).

Herbaceous wind barriers may be composed of perennial or annual vegetation, growing or dead.

Plant materials used need to have the following characteristics:

- Adaptation to local soil and climate conditions.
- Stiff, erect non-spreading growth habit.
- Resistant to lodging.
- Good leaf retention.
- Tolerance to soil deposition.
- Minimum competition with adjacent crops.

Barrier Direction, Spacing, and Composition. The barrier direction, spacing, and composition needed to achieve the desired purpose shall be designed using the currently approved wind erosion technology.

Number of Rows. Barriers may be as small as one row of plants, providing the required porosity can be achieved with a single row and that the row contains no gaps and the previous criteria is met. More than one row needs to be planned for each barrier on sites, such as sandy soils, where establishment and/or survival of the barrier is questionable.

When two or more rows are required to achieve the required porosity and to avoid gaps, space the rows no more than 36 inches apart.

Additional Criteria to Reduce Soil Erosion and/or Particulate Generation from Wind

Barrier Height. Barriers designed for this purpose need to have a minimum expected height of 1.5 feet during the wind erosion period for which the barriers are designed.

Barrier Porosity. For this purpose, barriers need to be designed to have a porosity of 40-50 percent when fully functional.

Barrier Direction and Spacing. Plan barrier direction based on the prevailing wind erosion direction during the critical wind erosion period (s) on the field. When planning barrier spacing, do not exceed 10 times the expected height of the barrier plus additional width permitted by the soil loss tolerance (T) or other planned soil loss objective. Calculations need to take into account the effects of other practices in the conservation system.

Additional Criteria to Protect Growing Crops from Damage from Wind-borne Soil Particles

During those periods when wind sensitive crops are susceptible to damage by wind and wind-borne soil particles, wind erosion shall not exceed the crop tolerance as specified in the National Agronomy Manual (Part 502), other accepted references or other planned crop protection objectives. Assessments shall account for the effects of other practices in the resource management system. Table 1 groups crops commonly grown in Florida by their tolerance to blowing soil.

Table 1. Crop tolerance to blowing soil[1]
Tolerant (>2 ton/acre)
Barley Grain sorghum Millet Oats Rye Wheat
Moderately tolerant (2 ton/acre)
Corn Onions (>30 days) Soybeans Sweet Corn
Low tolerance (1 ton/acre)
Broccoli Cabbage Cotton Cucumbers Garlic Green/snap beans Peanuts Potatoes Sweet potatoes
Very low tolerance (0 to ½ ton/acre)
Cantalope Carrots Celery Eggplant Lettuce Muskmelons Onion seedlings (<30 days) Peppers Spinach Squash Strawberries Tomatoes Watermelons

[1]Adapted from National Agronomy Manual, 4th Ed., February 2011 NRCS eDirectives - National Agronomy Manual

Barrier Height. Minimally, barriers designed for this purpose need to be 0.5 feet high during those periods when growing crops are susceptible to damage by wind or wind-borne soil particles. The designed height of the barrier will depend on the distance between the barrier and the crop being protected, and the crop height at which it will no longer need the protection of a barrier.

Barrier Porosity. Barriers established for this purpose need to have a porosity of 40-50 percent during the period when growing crops are to be protected.

Barrier Direction and Spacing. Plan barrier direction based on the prevailing wind erosion direction during those periods when sensitive crops are susceptible to damage to wind-borne soil particles. For spring planted crops in Florida, this usually means protection from westerly or northwesterly winds. When planning barrier spacing, do not exceed 10 times the expected height of the barrier plus additional width permitted by the crop tolerance to damage from wind erosion. Table 1 groups crops commonly grown in Florida by their tolerance to blowing soil.

In addition, calculations need to account for the effects of other practices in the resource management system.

CONSIDERATIONS

Transport of wind-borne sediment and sediment-borne contaminants offsite are reduced by this practice when used in a resource management system. Consider need for other practices in combination with herbaceous wind barriers to meet the resource objectives.

Herbaceous wind barriers are more suitable than field windbreaks for use under center pivot irrigation systems due to height considerations. Windbreaks may be located outside the windward edge of the circle.

Spacing between barriers may be adjusted, within the limits of the criteria above, to accommodate widths of farm equipment to minimize partial or incomplete passes.

Selection of plants for use in barriers should favor species or varieties tolerant to herbicides used on adjacent crops.

Plants, that may be alternate hosts for pests injurious to adjacent crops, may not be satisfactory for use in barriers.

Alternately, plants in barriers can serve as a home for beneficial, pest-eating insects, pollinators, and pest predators, which could result in less injury to the crop. When enhancement of insect pollinator habitat is a secondary objective, diversity of flowering plant species should be encouraged.

In addition to using barriers to prevent wind erosion, barriers can be used as trap strips to attract undesirable insects such as virus spreading aphids.

When compatible with the primary purposes of the practice, priority should be given to plant species that will also provide food and cover for wildlife. The selected species should be adapted to the site and meet the needs of the targeted wildlife species.

Selection of plant species less palatable to animals may reduce damage to barriers from grazing wildlife.

In addition, when enhancement of wildlife habitat is a secondary objective, plant species diversity should be encouraged. Barriers that result in multiple structural levels of vegetation within the barrier will maximize wildlife use. For wildlife, include plants in the barrier that will have a minimum expected height that provides adequate cover for the targeted species. If the barrier is also designed to provide escape or nesting cover for wildlife, locate barriers where they connect areas of existing perennial vegetation whenever possible. Barriers that connect areas such as woody draws often provide additional escape and travel cover. Two or more rows are often more effective than one row, with a minimum width of two feet between rows. Stiff stems are important in providing cover during severe winter storms.

Encourage the use of adapted native plant materials whenever possible.

Consider using species of plants that sequester more carbon and/or increasing the width of the herbaceous barrier to improve carbon sequestration.

Consider barriers to enhance the micro-environment for plant growth.

Where water erosion is a resource concern, supporting erosion control practices, such as residue management can reduce the hazard. Where feasible, aligning barriers across the slope can enhance moisture infiltration and reduce erosion from runoff.

PLANS AND SPECIFICATIONS

Plans and specifications for the establishment and maintenance of this practice at minimum shall include:

1. Purpose
2. For individual barriers
    a. Vegetative type (annual or perennial
    b. Species
    c. Number of rows per barrier
    d. Distance between barrier rows
    e. Seeding/planting rate
    f. Seeding/planting depth
    g. Planned effective barrier height
    h. Barrier width
3. For a barrier system
    a. Number of barriers in system
    b. Distance between barriers
    c. Total area in barriers
    d. Total amount of seed/number of plants required
4. Site preparation requirements
5. Method of seeding/establishment
6. Fertilizer and soil amendments needed
7. Mulch material (if required)

Record specifications on an approved specification sheet, job sheets and narrative statements in the conservation plan, or other acceptable documentation.

The plans shall include a sketch map or photograph of the field showing the approximate location of the barriers.

OPERATION AN MAINTENANCE

Re-establish or relocate barriers as needed. Re-establish annual barriers each year by planting at recommended dates, leaving rows standing, and maintained throughout the critical period for which the barrier was designed. Replant gaps in perennial barriers as soon as practical to maintain barrier effectiveness.

After establishment, fertilize annual and perennial barriers as needed. Control weeds by cultivation, spot treatment when using chemicals, or other acceptable methods.

Remove wind-borne sediment accumulated in barriers and distribute over the surface of the field as determined appropriate.

Do not mow barriers composed of perennial vegetation that are designed to enhance wildlife habitat unless: 1) their height or width exceeds that required to achieve the barrier purpose, or 2) they become competitive with the adjoining land use. When mowing is necessary, do it outside the nesting season. Use Florida NRCS conservation practice standard, Prescribed Burning, Code 338, to enhance plant vigor after nesting/resting periods.

Harvest of hay or seed from perennial barriers, grazing, burning, or mowing for weed control, shall be managed to allow regrowth to the planned height before periods when wind erosion, or crop damage are expected to occur. Annual barriers will be managed so barriers are of sufficient height and condition to meet their intended purpose.

REFERENCES

USDA, NRCS, Florida Agronomy Field Handbook.

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USDA-NRCS. Plants Database. 2010. http://plants.usda.gov. (verified April 2010)

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