

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
SOUTH DAKOTA SUPPLEMENTS ITALICIZED**

HERBACEOUS WIND BARRIERS

(ft.)
CODE 422A

DEFINITION

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

PURPOSE

This practice may be applied as part of a conservation management system to support one or more of the following:

- Reduce soil erosion from wind.
- Protect growing crops from damage by wind-borne soil particles.
- Manage snow to increase plant available moisture.
- Provide food and cover for wildlife.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland, or other land where crops are grown.

This standard includes the location of herbaceous wind barriers and their management for identified uses. Criteria for the establishment of perennial herbaceous vegetation are in practices standards for establishing permanent vegetation, or in other places in the *South Dakota Technical Guide*. Refer to locally accepted University or Extension agronomy guides, or other accepted technical references for criteria to establish annual herbaceous vegetation.

CRITERIA

General Criteria Applicable To All Purposes Named Above

a. Vegetation:

Barriers may consist of perennial or annual plants, growing or dead. Plant materials shall be selected for the following characteristics:

- Adaptation to the site.
- Erect non-spreading growth habit.
- Resistance to lodging.
- Good leaf retention.
- Minimal competition with adjacent crops.
- Minimal potential to act as a host for crop disease*

b. Barrier Height and Suitability

The following plant species are suitable for herbaceous barriers in South Dakota. Selection of a specific species will be based on the preceding characteristics listed under Vegetation above). For the effective height of barriers for wind erosion prediction, use the following in planning or when barrier heights are unknown:

<i>Field corn</i>	<i>4 feet</i>
<i>Flax</i>	<i>1.5 feet</i>
<i>Pearl millet</i>	<i>3 feet</i>
<i>Proso millet</i>	<i>1.7 feet</i>
<i>Popcorn</i>	<i>2 feet</i>
<i>Sorghum</i>	<i>5 feet</i>
<i>Sudangrass</i>	<i>3 feet</i>
<i>Sunflower</i>	<i>4 feet</i>
<i>Sweet corn</i>	<i>2.5 feet</i>
<i>Tall wheatgrass</i>	<i>3 feet</i>
<i>Switchgrass</i>	<i>3 feet</i>

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

c. Seeding Rates and Dates

Seeding rates will be determined using Table 1 (see pages 5 and 6 of this standard). The seeding rates in Table 1 represent the required number of established plants without regard to seed germination, purity, and stand establishment. Use a factor of 80 percent for stand establishment. Seeding dates are also listed by crop in Table 1.

d. Seeding Method

The seedbed must be free of competing vegetation and firm enough to permit proper seed placement. The barrier will be planted with a drill or planter capable of placing the seed uniformly in the row at the appropriate depth.

e. Number of Rows:

Barriers may consist of one row of plants, providing the required porosity can be achieved with a single row, and that the row contains no gaps.

Where two or more rows are required to achieve the required porosity and to avoid gaps, the rows shall be spaced no more than 36 inches apart. *The number of rows of plants for the barrier width shall be determined using Table 1 (see pages 5 and 6 of this standard). For "I" factors <134 the number of rows will not be less than 4 rows.*

Additional Criteria To Reduce Soil Erosion from Wind**a. Barrier Height:**

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

b. Barrier Porosity:

Barriers established for this purpose shall be designed to achieve a porosity of 40-50 percent. *The minimum number of rows at the specified plant populations listed under the subheading "Erosion Control" (Table 1, pages 5 and 6 of this standard) will attain a barrier porosity of 40-50 percent.*

c. Barrier Direction and Spacing:

When barrier direction deviates from perpendicular to the prevailing wind erosion direction, the spacing between barriers shall be correspondingly reduced.

The spacing between barriers shall be measured along the prevailing wind erosion direction during those periods when wind erosion is expected to occur. Spacing shall 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.

The effective spacing between barriers shall be determined using current approved wind erosion prediction technology (see Section I, *Erosion Prediction, Wind Erosion Prediction of the SDTG*).

Calculations shall account for the effects of other practices in the conservation management system.

Additional Criteria To Protect Growing Crops From Damage From Wind-borne Soil Particles**a. Barrier Height:**

Barriers designed for this purpose shall have a minimum expected height of 2 feet during those periods when growing crops are susceptible to damage by blowing wind or wind-borne soil particles.

b. Barrier Porosity:

Barriers established for this purpose shall be designed to achieve a porosity of 40-50 percent during the period when growing crops are to be protected. *The number of rows of plants for the barrier width shall be determined using Table 1 (see pages 5 and 6 of this standard). For "I" factors <134, the number of rows will not be less than 4 rows.*

c. Barrier Direction and Spacing:

When barrier direction deviates from perpendicular to the prevailing wind erosion direction, the spacing between barriers shall be correspondingly reduced.

The spacing between barriers shall be measured along the prevailing wind

erosion direction during those periods when sensitive crops are susceptible to damage by wind-borne soil particles (*see Section I, Erosion Prediction, Wind Erosion Prediction (Management Period Method) of the SDTG*). Spacing shall not exceed 10 times the expected height of the barrier plus additional width permitted by the crop tolerance to wind erosion* as specified in *Section I, Erosion Prediction, Wind Erosion Prediction of the SDTG*, or other planned crop protection objective.

* Crop tolerance to wind erosion is the maximum rate of soil blowing that crop plants can tolerate without significant damage due to abrasion, burial, or desiccation.

The spacing between barriers shall be determined using current approved wind erosion prediction technology to estimate wind erosion during specific crop stage periods (*see Section I, Erosion Prediction, Wind Erosion Prediction of the SDTG*). Calculations shall account for the effects of other practices in the conservation management system.

Additional Criteria To Manage Snow To Retain Additional Soil Moisture

- a. Barrier Height:**
Barriers designed for this purpose shall have a minimum expected height of 1.5 feet during periods of expected snow cover.
- b. Barrier Porosity:**
Barriers established for this purpose shall be designed to achieve a porosity of 60-75 percent during periods of expected snow cover. *The minimum number of rows at the specified plant populations listed under the subheading "Snow Management" (Table 1, pages 5 and 6 of this standard) will attain a barrier porosity of 60-75 percent.*
- c. Barrier Direction and Spacing:**
When barrier direction deviates from perpendicular to the prevailing wind direction, the spacing between barriers shall be correspondingly reduced.

The effective spacing shall be measured along the direction of prevailing winds

during periods of expected snow cover. For uniform distribution of drifting snow, spacing shall not exceed 12 times the expected height of the barrier.

Additional Criteria To Provide Food and Cover For Wildlife

- a. Vegetation:**
Barriers established for this purpose shall consist of plants that provide food and cover for the targeted wildlife species *identified in a Wildlife Habitat Management Plan.*
- b. Barrier Width:**
Barriers established for this purpose shall have a minimum width of two feet.
- c. Barrier Height:**
Barriers established for this purpose shall have a minimum expected height that provides adequate cover for the targeted wildlife species.

CONSIDERATIONS

Transport of wind-borne sediment and sediment-borne contaminants offsite are reduced by this practice when used in a conservation management system.

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, which may be alternate hosts for pests injurious to adjacent crops, should not be selected for use in barriers.

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

Where water erosion from melting snow, accumulated within the barrier system, is a 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. Refer to practice *Contour Farming (330)*, *Contour Stripcropping (585)*, or *Contour Buffer Strips (332)*.

In areas where saline seeps are present or there is the potential for saline seep development, barrier placement and management can increase or reduce soil salinity related problems. Refer to practice Soil Salinity Management (571).

When barriers are designed to enhance wildlife habitat, plant species diversity should be encouraged. The use of evergreens in barriers designed to provide winter cover may increase their value. Barriers that result in multiple structural levels of vegetation within the barrier will maximize wildlife use.

Some plants are damaged by blowing wind as well as by wind-borne soil particles. In such cases, the spacing between wind barriers may have to be reduced from that obtained using wind erosion prediction technology.

PLANS AND SPECIFICATIONS

Specifications for establishment and maintenance of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance described in this standard.

Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Annual barriers shall be reestablished each year by planting at recommended dates, leaving rows standing after crop harvest, or leaving standing strips when incorporating a cover crop into the soil.

After establishment, perennial barriers shall be fertilized at the same time and rate as adjacent field crops, or as needed by the barriers. Weeds shall be controlled with cultivation, mowing, chemicals, or other acceptable methods.

Harvest of hay or seed from perennial barriers, grazing, or mowing for weed control, shall be managed to allow regrowth to the planned height before periods when wind erosion, crop damage, or drifting snow are expected to occur. Annual barriers may be grazed or harvested after critical periods have passed.

Wind-borne sediment accumulated in barriers shall be removed and distributed over the surface of the field as determined appropriate.

Barriers shall be re-established or relocated as needed.

Barriers designed to enhance wildlife habitat should not be mowed or pruned unless their height or width exceeds that required to achieve the wildlife objective, and they become competitive with the adjoining land use. When mowing or pruning is necessary, it shall be done during the non-nesting season.

TABLE 1	Seeding Rate		Planting Date	Established Plants/10 ft. of Row	Minimum Number of Rows Required at Different Seeding Levels		Number of Rows Required for the Range at Different Seeding Levels
	Plants/Acre (Pure Live Seed)	Pounds/Acre (Pure Live Seed)			Erosion Control Soils with "I" of >134	Erosion Control Soils with "I" of ≤86	
Barrier Plant							Snow Management
Field Corn			May 1 to June 15				
(30" rows)	20,000			11	6	6	3 – 4
	25,000			14	5	5	3
	30,000			17	4	4	2
36" rows	20,000			14	5	5	3
	25,000			17	4	4	2
	30,000			21	4	3	2
Twin Rows (approx. 3' apart)	53000			37	-----	2	2
Flax			April 15 to June 15				
		30		282	4	3	2
		35		329	4	3	2
		40		376	4	2	1
Pearl Millet			May 15 to July 10				
(7" rows)		4		45	11	10	5 – 7
		5		57	9	8	4 – 6
		6		68	7	7	4 – 5
30"		4		195	4	3	2
		5		244	4	2	1
		6		293	4	2	1
36"		4		234	4	2	1
		5		293	4	2	1
		6		351	4	2	1
Popcorn			May 1 to June 15				
30" rows	13,000			8	14	11	6 – 9
	18,000			10	10	9	5 – 7
	23,000			13	8	7	4 – 5
36" rows	13,000			9	12	11	5 – 8
	18,000			12	9	8	4 – 5
	23,000			16	7	6	3 – 4
Twin rows (approx. 3" apart)	79,200			55	-----	2	2
Proso millet			May 15 to July 10				
(7: rows)		15		138	4	4	2
		30		276	4	2	1
		35		321	4	2	1
Sorghum			May 15 to July 1				
(7" rows)		20		40	4	3	2
		25		50	4	3	2
		30		60	4	2	1
30" rows	75,000	5		43	4	3	2
	150,000	10		86	4	2	1
	225,000	15		129	4	1	1
36" rows	75,000	5		52	4	3	2
	150,000	10		103	4	1	1
	225,000	15		154	4	1	1

TABLE 1 CONT.	Seeding Rate		Planting Date	Established Plants/10 ft. of Row	Minimum Number of Rows Required at Different Seeding Levels		Number of Rows Required for the Range at Different Seeding Levels
	Plants/Acre (Pure Live Seed)	Pounds/Acre (Pure Live Seed)			Erosion Control Soils with "I" of >134	Erosion Control Soils with "I" of ≤86	Snow Management
Sudangrass			May 15 to July 1				
(7" rows)		4		29	15	13	7 - 10
		5		37	12	10	6 - 8
		6		44	10	8	5 - 6
30" rows		4		126	4	3	2
		5		158	4	2	2
		6		189	4	2	1
Sunflower			May 1 to July 1				
(30" rows)	17,000			10	12	10	5 - 8
	22,000			13	9	8	4 - 6
	27,000			16	7	6	4 - 5
36" rows	17,000			12	10	8	5 - 6
	22,000			15	7	6	4 - 5
	27,000			19	6	5	3 - 4
Sweet Corn			May 1 to June 15				
(30" rows)	31,000			18	5	4	3
	36,000			21	4	4	2 - 3
	41,000			24	4	3	2
36" rows	31,000			21	4	4	2 - 3
	36,000			26	4	4	2
	41,000			28	4	3	2
Switchgrass			Nov. 1 to spring thaw or May 15 to June 15	152 on year one-223 in subsequent years			
(6" rows)		3.4			3	3	2
Pasture Suitability Groups for Switchgrass A,C,D1,E,F,G,H,I,J,K for the Eastern, East Central, and West Central Technical Guide Areas. Pasture Suitability Groups for the Western and Foothills Technical Guide Area are E,F,G,H,I,K. Pasture Suitability Groups for the Black Hills Technical Guide Area is B1.							
Tall Wheatgrass			Nov. 1 to April 15 or Aug. 1 to Sep. 1	150 on year one-227 in subsequent years			
(6" rows)		16.5			3	3	2
Pasture Suitability Groups for Tall Wheatgrass are A,C,D1,E,F,G,H,I,J,K for all South Dakota Technical Guide Areas.							