

**NATURAL RESOURCES CONSERVATION SERVICE (NRCS)  
CONSERVATION PRACTICE STANDARD  
FORAGE AND BIOMASS PLANTING**

(Ac.)

CODE 512

### DEFINITION

Establishing adapted and/or compatible species, varieties, or cultivars of herbaceous species suitable for pasture, hay, or biomass production.

### PURPOSE

- Improve or maintain livestock nutrition and/or health;
- Provide or increase forage supply during periods of low forage production;
- Reduce soil erosion;
- Improve soil and water quality; and
- Produce feedstock for biofuel or energy production.

### CONDITIONS WHERE PRACTICE APPLIES

This practice applies on all lands suitable to the establishment of annual, biennial, or perennial species for forage or biomass production. This practice does not apply to the establishment of annually planted and harvested food, fiber, or oilseed crops.

### CRITERIA

#### General Criteria Applicable to All Purposes

Select plant species and their cultivars based on:

- Climatic conditions, such as, annual precipitation and its distribution, growing season length, temperature extremes and the USDA Plant Hardiness Zone.

- Soil condition and landscape position attributes, such as, pH, available water holding capacity, aspect, slope, drainage class, fertility level, salinity, depth, flooding and ponding, and levels of phytotoxic elements that may be present.
- Resistance to disease and insects common to the site or location.

Installation guidance for this practice is found in South Dakota (SD) Range Technical Note No. 4, "Perennial Vegetation Establishment" which is located in Section I of the SD Technical Guide. It contains specific guidance on seeding dates, rates and depth, seedbed preparation, seeding equipment and calibration, seed requirements, species selection, use of cover and companion crops, management and protection during the establishment period, and stand evaluations.

Tables contained in the technical note contain specific information to be used in the installation of this practice as follows:

- Table 1 lists allowable varieties for use in SD.
- Table 2 provides seeding rate information.
- Table 3 provides information on species characteristics and adaptability.
- Table 4 lists allowable species for each forage suitability group by Major Land Resource Area (MLRA).

On slopes over 8 percent (%), 50% of the seed mixture (pure live seed (PLS) basis) will be rhizomatous species.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#), or visit the [electronic Field Office Technical Guide](#).

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In most instances, fertilization has not proven beneficial and may in fact be detrimental to seedling establishment due to increased weed growth caused by the addition of nutrients. Fertilization prior to seeding is generally not recommended. Fertilization of established stands is beneficial if soil tests indicate a response will occur and economics warrant the additional inputs. See NRCS Conservation Practice Standard (CPS) Code 590, Nutrient Management, for additional information.

**Additional Criteria for Improving or Maintaining Livestock Nutrition and/or Health AND for Providing or Increasing Forage Supply during Periods of Low Forage Production**

When more than one grass species is used, the percentage that each species makes of the mixture should be in near equal proportions. If a legume is used in the mixture with two or more species, the percentage of the mixture left after determining the percentage of legume used should be divided into equal or near equal amounts between the grass species.

Introduced legumes should generally only be planted with cool-season grasses. Do not mix native and introduced grasses, unless the phenology, morphology, and seedling vigor of selected species is similar. Generally, tall wheatgrass, reed canarygrass, and Russian wildrye will be seeded alone.

Species planned for seeding pastureland should be compatible with the planned management of the entire operating unit. Select species that provide good forage during the season pasture will be used for grazing.

For ease of management and proper use, pasture and hayland mixtures should generally consist of no more than two grass species having similar growth habits and seasons of use. These may be planted with or without legumes. Seeding mixes with large numbers of grass species do provide additional benefits such as improved wildlife habitat, improved forage quality throughout the season, and greater resistance to abnormal environmental conditions such as drought or insect pressures. They do, however, create additional management challenges due to the

seasonality of forage production and differing levels of palatability by livestock.

Cool-season pasture mixtures containing a legume will produce higher yields and better quality forage than will pure grass stands. For pasturelands, the percentage of legumes in the mixture will not exceed 50% (PLS basis) of the amount required for a full seeding. Pasture-type alfalfa or nonbloating legumes will be used. The land user should be aware of the bloat hazard when legumes are included in pasture mixes.

**Criteria Related Specifically to Hayland.**

Cool-season hayland mixtures containing legumes will produce higher yields and better quality forage than will pure grass stands. Hayland type alfalfa should be used. Generally speaking, limit the percentage of grass in the mixture to about 30% if high quality hay is desired for animals requiring a high quality diet.

Do not mix warm-season and cool-season grasses for hayland use.

Because of its basal leaf-growth characteristics, Russian wildrye is not suitable for hay production.

**Criteria Specific to Stand Enhancement.**

Stand enhancement (adding legumes to existing stands) is sometimes a viable option to improve an existing stand. Seeding rates for stand enhancement through the addition of legumes should be one-half of a full seeding on pasturelands and a full seeding rate for haylands. Seedbed preparation will follow procedures described in SD Range Technical Note No. 4. Stand enhancement with legumes is only recommended east of the Missouri River, on all irrigated lands, and within the Black Hills and surrounding foothills.

**Additional Criteria for Improving or Maintaining Livestock Nutrition and/or Health**

Use forage species that will meet the desired level of nutrition (quantity and quality) for the kind and class of the livestock to be fed.

Forage species planted as mixtures will exhibit similar palatability to avoid selective grazing.

### **Additional Criteria for Providing or Increasing Forage Supply during Periods of Low Forage Production**

Select plants that will help meet livestock forage demand during times that normal farm/ranch forage production are not adequate.

### **Additional Criteria for Reducing Erosion and Improving Water Quality**

Ground cover and root mass need to be sufficient to protect the soil from wind and water erosion.

### **Additional Criteria for Producing Feedstocks for Biofuel or Energy Production**

Select plants that provide adequate kinds and amount of plant materials needed.

## **CONSIDERATIONS**

In areas where animals congregate, consider establishing persistent species that can tolerate close grazing and trampling.

Where wildlife and pollinator concerns exist, consider plant selection by using an approved habitat evaluation procedure.

Where air quality concerns exist, consider using site preparation and planting techniques that will minimize airborne particulate matter generation and transport.

Where carbon sequestration is a goal, select deep-rooted perennial species that will increase underground carbon storage.

During and upon stand establishment planning and application of the following conservation practices should be considered as applicable; NRCS CPS Codes 511, Forage Harvest Management; 590, Nutrient Management; 595, Pest Management; and 528, Prescribed Grazing.

## **PLANS AND SPECIFICATIONS**

Prepare plans and specifications for the establishment planting for each site or management unit according to the Criteria, Considerations, and Operation and

Maintenance described in this standard. Record them on the form SD-CPA-4.

The following elements will be addressed in the plan to meet the intended purpose:

- Site Preparation;
- Fertilizer Application (if applicable);
- Seedbed/Planting Bed Preparation;
- Methods of Seeding/Planting;
- Time of Seeding/Planting;
- Selection of Species;
- Type of Legume Inoculant Used (if applicable);
- Seed/Plant Source;
- Seed Analysis;
- Rates of Seeding/Planting;
- Supplemental Water for Plant Establishment (if applicable); and
- Protection of Plantings (if applicable).

## **OPERATION AND MAINTENANCE**

Inspect and calibrate equipment prior to use. Continually monitor during planting to insure proper rate, distribution and depth of planting material is maintained.

Monitor new plantings for water stress. Depending on the severity of drought, water stress may require reducing weeds, early harvest of any companion crops, irrigating when possible, or replanting failed stands.

Invasion by undesirable plants shall be controlled by cutting, using a selective herbicide, or by grazing management by manipulating livestock type, stocking rates, density, and duration of stay.

Insects and diseases shall be controlled when an infestation threatens stand survival.

Evaluate forage stands each season or as needed to determine management inputs needed to achieve the desired purpose(s).

## REFERENCES

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