

**NATURAL RESOURCES CONSERVATION SERVICE  
MONTANA CONSERVATION PRACTICE SPECIFICATION  
FORAGE AND BIOMASS PLANTING (ACRE)**

**CODE 512**

**DEFINITION:** Establishing native or introduced species for pasture, hay or biomass production.

**PURPOSE:** The purpose of this practice is to establish adapted and compatible species, varieties, or cultivars for forage or biomass production. Implementation of this practice can also serve to improve or maintain livestock nutrition and health while balancing forage supply and demand during periods of low forage production. Establishing pasture and hayland will effectively reduce soil erosion and improve water quality, increase carbon sequestration, and improve soil quality. This practice can also be used to produce feedstock for bio-fuel or energy production. This practice applies to all lands suitable to the establishment of annual, biennial or perennial species for forage or biomass production. It does not apply to establishment of annually planted and harvested food, fiber or oilseed crops.

**CONSERVATION MANAGEMENT SYSTEMS**

The forage and biomass planting practice is established as part of a conservation management system to address the soil, water, air, plant, animal, and human needs as related to the owner's goals and objectives. It is important to consider crop rotation, nutrient and pest management, agricultural waste utilization, and other supportive conservation practices when designing a seasonal residue management system.

**SPECIES**

Plant species and their cultivars shall be selected based upon:

- Climatic conditions, such as annual rainfall, seasonal rainfall patterns, growing season length, humidity levels, day length, radiation, heat, wind, temperature extremes and the USDA Plant Hardiness Zones.
- Soil condition and position attributes such as pH, available water-holding capacity, texture, aspect, slope, drainage class, fertility level, salinity, sodicity, depth, flooding and ponding, and levels of toxic elements that may be present.
- Resistance to disease and insects common to the site or location.
- Desired plant characteristics relative to site and objectives including tolerance to flooding, regrowth ability, root system, relative stand life, drought tolerance, response to irrigation, tendency to produce bloat, forage quality, palatability for livestock, tolerance to grazing, and soil protection characteristics.

**SEEDING RATES**

Seeding rates will be calculated based on a Pure Live Seed (PLS) basis. Use tables in the Montana Plant Materials Technical Note No. 46, Seeding Rates and Recommended Cultivars to determine pounds of PLS required for a pure stand or full seeding.

Use Forage Suitability Group Descriptions located in the Field Office Technical Guide (FOTG), Section II, to assist in species selection and production estimates for planted stands that have reached maturity.

For planting mixtures of two or more species, determine the total pounds of PLS required by multiplying the full seeding rate of each species by the percentage desired within the total mixture. Use the job sheet for step-by-step calculations.

If planting is to be completed by broadcasting the seed; (1) seeding rates must be doubled if no other operation will take place after seed broadcasting, (2) standard seeding rates may be used if the seedbed is

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roughened, seed is broadcast, then covered with a spike-tooth harrow or similar implement, and then rolled with a packer or culti-packer.

### **SEEDING DEPTH AND ROW SPACING**

Plant to proper depth ensuring seed or planting material will contact soil moisture uniformly (seed to soil contact). Small grass, forbs, and legume seeds will be planted no deeper than 1/2-inch. Large grass seed will be planted no deeper than 3/4-inch. All species will be planted in 14 inches or less row spacing with the exception of Russian wildrye. The minimum row spacing for Russian wildrye is 18 inches where little hazard from wind or water erosion exists. Where an erosion hazard does exist, consider two seeding operations, with the second operation perpendicular to the first or alternate rows with alfalfa 18 inches wide. All other species will be planted with 14 inches or less row spacing.

Where slopes are greater than 5 percent, planting will be completed on the contour or across the general slope of the land.

### **SEEDBED PREPARATION**

Prepare site to provide a medium that does not restrict plant emergence. Seedbed preparation should be completed that provides a firm, weed-free seedbed that eliminates seedling competition from weedy species. A seedbed is sufficiently firm when an average-sized man sinks to approximately 1/4-inch into the soil.

A seedbed preparation method should be selected that best suits the site. The selected seedbed preparation should retain the maximum amount of soil moisture.

Some planting sites require only one or two tillage operations to prepare a seedbed. Usually tillage is for the purpose of killing all weeds to eliminate competition. Using no till methods to plant species should reduce wind or water erosion. Weeds must be controlled to ensure good stand establishment. Chemical weed control may be substituted for one or all of the tillage operations when preparing a seedbed.

### **PLANTING DATES AND METHODS**

Planting shall be scheduled during periods when soil moisture is adequate for germination and establishment. *Spring seedings* will be completed by May 15. Seedings are allowed after May 15 *only* when there is a minimum of two feet of moist soil. The soil must also be moist to within two inches of the surface. These seedings must be completed by August 15. As a good rule of thumb, if the soil is wet enough to stick to the coulters, it is too wet to plant.

*Dormant fall seedings* can be made after October 15 or when soil temperatures two inches below the soil surface remains at 40° F. or less for 10 or more days.

*Species with a high percentage of dormant seed* such as green needlegrass and Indian ricegrass must be planted as a dormant fall seeding unless germination by standard seed test is greater than 50 percent. If dormant species are a minor component of a mixture; spring seeding is acceptable. *When irrigation is provided*, planting may be completed at any time during the growing season that allows adequate root system development prior to a killing frost (45 days).

For chaffy grass seed, especially native species, planting should be done at three to five miles per hour. The fluffier the seed, the slower the drill speed. Rice hulls or other carriers may be required for adequate flow through the drill box. Recommended amounts for rice hull or other carriers can be found in the Montana Plant Materials Technical Note No. 52.

Very light grass seed such as Garrison creeping foxtail may require the use of a carrier in the drill box to assure uniform flow through the planter.

Avoid backing up the drill when it is in the down position to eliminate plugging of the drop tube. Minimize making sharp turns as to cause one end of the drill to back up.

When planting around a field rather than back and forth, drill with the drive wheels to the inside. Avoid figure-eight turns.

Alternate row plantings may be used to improve establishment where species competition is a problem. Planting two or three rows of one species with one row of another may also be used to reduce competition. When planting on previously cropped land, the kinds of residual herbicides used in the cropping system the last several years must be considered to prevent planting failures.

#### FERTILIZER

Fertilizer and soil amendment recommendations shall be based on results from a current soil test. Application shall be appropriately placed and timed to be effective. If needed, legume seed shall be inoculated with the proper species of viable *Rhizobia* before planting. If using coated seed, recalibrate the planting equipment to deliver the same number of seed per area as would be applied with non-coated seed.

High levels of nitrogen fertilizer broadcast before seeding may promote weed growth more than it aids the establishment of grass. Where soil tests indicate low nitrogen levels, additional nitrogen needed to promote high levels of production should be top dressed after stand establishment.

For Biomass production of crops such as Camelina applying a “starter” fertilizer consisting of 20 pounds of Nitrogen (N), and 20 pounds of Phosphorus (P<sub>2</sub>O<sub>4</sub>) will ensure newly planted seedlings have nutrients available during the early growth stages. Applying Potassium (K) and Sulphur (S) on ‘test strips or plots’ when planting would help to identify whether applying the nutrients as a “top dressing” after planting would be beneficial.

#### COMPANION CROPS

Irrigated companion crops may be used at full or reduced rates and harvested for forage or grain. Irrigation will be applied to meet the needs of the seeding.

Under dryland conditions companion crops are not recommended for establishing pasture or hayland where annual precipitation is less than 16 inches. In areas where annual precipitation is 16 inches or greater, and where erosion is a concern, a spring grain companion crop may be seeded at the following rates:

Spring wheat	10 lbs./acre (3.3 seeds/ft.)
Barley	10 lbs./acre (3.0 seeds/ft.)
Oats	10 lbs./acre (3.3 seeds/ft.)

Companion crops are best removed early as hay or silage leaving a tall stubble (6-8 inches) for snow trapping. However, they may be harvested for grain. When grass and/or legumes are seeded with the companion, crop seeding depth will not exceed one inch.

#### REQUIRED DOCUMENTATION (PLANNED AND APPLIED CONDITIONS)

All forage and biomass planting plans will include the following information:

1. Location map – field numbers with measured acres of the area to be planted
2. Fertilizer application (if applicable)
3. Seedbed/planting bed preparation
4. Methods and depths of seeding/planting
5. Date practice scheduled and applied
6. Planned and actual mixture and seeding rate (PLS), of selected species/cultivars

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7. Erosion prediction before and after (WEPS or RUSLE2)
8. Type of legume inoculants and/or seed treatment used (if applicable)
9. Current seed analysis tag with seed source, percent germination and purity
10. Current soil test including Nitrogen, Phosphorus, Potassium, Organic Matter, Electrical Conductivity (EC), pH
11. Supplement Water for Plant Establishment (if applicable)
12. Protection of Plantings (if applicable)
13. New seedlings will not be grazed or hayed until the stand has matured beyond the seedling stage.
14. The Montana Forage and Biomass Planting (Code 512) job sheet is applicable to this practice and is required.

#### **OPERATION AND MAINTENANCE**

Inspect and calibrate equipment prior to use to ensure proper rate, distribution and depth of planting material. Continually monitor during planting to insure proper rate, distribution and depth of planting material is maintained. Growth of seedlings or sprigs should be monitored for water stress. Water stress may require reducing weeds, early harvest of any companion crops, irrigating when possible, or replanting failed stands.

Invasion by undesirable plants should 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).