United States Department of Agriculture

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

PASTURE AND HAY PLANTING

CODE 512

(ac)

DEFINITION

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

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Improve or maintain livestock nutrition and health.
- Provide or increase forage supply during periods of low-forage production.
- Reduce soil erosion.
- Improve water quality.
- Improve air quality.
- Improve soil health.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on all lands suitable for the one-time establishment of perennial species for forage production that will likely persist for 5 years. This practice does not apply to the establishment of annually planted and mechanically harvested food, fiber, or oilseed crops planted on designated cropland.

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 Zones.
- 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. Utilize ecological site descriptions' pasture states and forage suitability groups if available.
- Intended use, level of management, realistic yield estimates, maturity stage, and compatibility with other species.
- Resistance to disease and insects common to the site or location.

Follow recommendations for planting rates, methods, and dates obtained from the plant materials program, NRCS State guidance, land grant university extension, and applicable published research documents.

Calculate seeding rates to be consistent with State and local criteria.

Plant at a depth appropriate for the seed size or plant material, while assuring uniform contact with soil.

Implement site preparation and seedbed preparation methods that avoid restricting plant emergence.

Plant when soil moisture is adequate for germination and establishment.

Utilize seed and planting materials that will meet State quality standards.

Do not plant Federal, State, or local noxious species.

Apply all plant nutrients and soil amendments for establishment purposes according to a current soil test taken within 4 years of the proposed planting date. Nutrient application rates, methods, and dates are obtained from the plant materials program, NRCS State guidance, land grant university extension, and applicable published research documents.

When planting legumes, use preinoculated seed, inoculum coated seed, or inoculate with the proper viable strain of rhizobia immediately before planting.

Exclude livestock until the plants are well established. Ensure the plants have reached the full start grazing heights or the recommended hay cutting heights (late elongation phase or later) before the first grazing or cutting begins. See NRCS Conservation Practice Standards (CPSs) Prescribed Grazing (Code 528) and Forage Harvest Management (Code 511) for details. There may be conditions and time of the growing season that require letting the plants reach maturity before any haying or grazing takes place to avoid the risk of killing the new plants.

Additional Criteria for Improving or Maintaining Livestock Nutrition and 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 grazed or fed.

Select species mixtures with similar palatability to avoid selective grazing.

Select species with low or no toxic effects on grazing livestock.

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 or ranch forage production are not adequate.

Additional Criteria for Reducing Erosion

Selct plants that provide adequate ground cover and root mass needed to sufficiently protect the soil from wind and water erosion.

Additional Criteria for Improving Water Quality

Use State and locally recommended species when using this purpose for filtering runoff.

Additional Criteria for Improving Air Quality

Select deep rooted perennial plants that are recommended for sequestering carbon and reducing greenhouse gases. Use site preparation and planting techniques that will minimize airborne particulate matter generation and transport.

Additional Criteria for Improving Soil Health

Minimize disturbance by using seedbed preparation tools and techniques that minimize damage to soil aggregates such as a no-till drill to seed into an existing cover that will be chemically terminated. When

chemical termination is not an option, use low-disturbance tillage methods such as a soil spader or rotovator (rototiller) set at reduced speeds with faster forward driving speeds. A roller crimper may be an option for low disturbance also.

Use one or more of the following techniques to apply soil health prniciples:

- Select forage species and establish at the proper time for adequate density to provide maximum ground cover. Planting a perennial wtih a specific nurse crop can quickly maximize ground cover during the establishment period.
- Maximize biodiversity by selecting plants from at least two of the four functional groups (cool season grass, cool season broadleaf, warm season grass, warm season broadleaf).

CONSIDERATIONS

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

Follow details for protecting pasture plants and soil to promote soil health in NRCS CPS Prescribed Grazing (Code 528) with appropriate plant species that increase deep rooting, soil carbon, and plant resiliency. Use native species if practicable.

For organic and transitioning-to-organic systems, all materials and methods used in the implementation of this CPS should comply with the National Organic Program (NOP) Rules.

For the wildlife species of concern, select and plant species in a designated manner that will meet the cover and the critical life cycle needs. Where wildlife and pollinator concerns exist, consider plant selection by using an approved habitat evaluation procedure using native species if at all practicable. Use NRCS CPS Wildlife Habitat Planting (Code 420) where planting herbaceous plants with wildlife habitat is the primary concern.

If planting forage for feedstocks for biofuel, select herbaceous plants that provide adequate kinds and amount of plant materials needed for the desired fuel and energy production.

During and upon stand establishment, planning and application of NRCS CPSs Forage Harvest Management (Code 511), Herbaceous Weed Treatment (Code 315), Nutrient Management (Code 590), or Prescribed Grazing (Code 528) should be considered as applicable.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for the establishment planting for each site or management unit according to the criteria, considerations, and operations and maintenance described in this standard. Record them on a site-specific job sheet or in the narrative of a conservation plan.

Address the following elements in the plan to meet the intended purpose:

- Field number and acres.
- Species of plants to be established.
- Activities needed to ready the planting area and the establishment procedure to be used.
- Seeding rates and depth of seeds planted.
- Seeding dates.
- Rates, timing, and forms of nutrient application and other soil amendments (if needed) from approved soil test analysis results and recommendations.
- Type of legume inoculant used (if applicable).

- Seed analysis (tag).
- If applicable, note all seed coating details.
- Supplemental water for plant establishment (if applicable).
- Protection of plantings (if applicable) such as livestock exclusion periods and through NRCS CPSs Forage Harvest Management (Code 511) and Prescribed Grazing (Code 528), as needed.
- Describe successful establishment and when evaluation of establishment should be completed (e.g., minimum percent ground/canopy cover, percent stand, and stand density).

Record specifications and operation and maintenance using an implementation requirement document or equivalent.

OPERATION AND MAINTENANCE

- Inspect and calibrate equipment prior to use.
- Continually monitor during planting to ensure proper rate, distribution, and depth of planting material is maintained.
- Monitor new plantings for water stress.
  - Depending on the severity of drought, drought or water stress may require reducing weeds, early harvest of any companion crops, irrigating when possible, or replanting failed stands.
  - Monitor new plantings for prolonged wet conditions, which may cause failure of the plant establishment.

REFERENCES

American Forage and Grassland Council. https://www.AFGC.org/i4a/pages/index.cfm?pageid=1 (Accessed 9/10/2019)

Ball, D.M., C.S. Hoveland, and G.D.Lacefield, 2015. Southern Forages, 5th Ed. International Plant Nutrition Institute, Norcross, GA.

Barnes, R.F., C.J. Nelson, K.J. Moore, and M. Collins. 2007. Forages, The Science of Grassland Agriculture, 6th Ed. Iowa State University Press, Ames. IA.

Cornell University Department of Animal Science. 2019. Plants Poisonous to Livestock. http://poisonousplants.ansci.cornell.edu/

Forages and biomass crop production project. Department of Plant Sciences. North Dakota State University. Fargo, ND.

https://www.ag.ndsu.edu/plantsciences/news/berti-leads-forages-and-biomass-crop-production-project

Skinner, R.H. and C.J. Dell. Yield and Soil Carbon Sequestration in Grazed Pastures Sown with Two or Five Forage Species. Crop Science 56:20135-2044 (2016). Crop Science Society of America, Madison, WI.

Smith, R. The Value of Coated Seed. Article in March 2016 under Establishment/Renovation, page 2, Master Grazer Educational Program, University of Kentucky College of Agriculture, Food and Environment, Lexington, KY. http//www2.ca.uky.edu/grazer/2016 Newsletters/March/seed-coating php.

USDA NRCS. 2003. National Range and Pasture Handbook (Title 190) . Washington, D.C. https://directives.sc.egov.usda.gov/.

USDA NRCS. 2017. The PLANTS Database (http://plants.usda.gov, 11 July 2017). National Plant Data Team, Greensboro, NC.

USDA NRCS. 2009. Technical Note 3 (Title 190). Planting and Managing Switchgrass as a Biomass Energy Crop. Washington, D.C. https://directives.sc.egov.usda.gov.

USDA NRCS. 2016. NRCS Organic Farming Handbook (Title 190) Part 612, and other resources for conservation in organic systems at: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/organic/