NATURAL RESOURCES CONSERVATION SERVICE
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.
- 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 and 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.

Follow recommendations for planting rates, methods and dates obtained from the plant materials program, land grant and research institutions, extension agencies, or agency field trials.

Seeding rates will follow guidelines established by local or state agencies and institutions; or, they will be calculated on a pure live seed (PLS) basis.

Plant at a depth appropriate for the seed size or plant material and ensure uniform contact with soil.

Prepare the site to provide a medium that does not restrict plant emergence.

Plant when soil moisture is adequate for germination and establishment.

Planting by conventional or no-till methods are acceptable. Planting methods shall provide a firm seed-bed that ensures good seed to soil contact. Prepare site to minimize weed pressure as much as possible before planting.

All seed and planting materials will meet state quality standards.

Do not plant species on federal, state, or locally recognized noxious plants lists.

Apply all plant nutrients and/or soil amendments for establishment purposes according to a current soil test. A soil test will be considered current if samples are collected within three years of intended use date. Analyses procedures at other soil testing facilities will be the same as those conducted by Auburn University. Convert soil test results from other facilities to Auburn University fertility recommendations.

When planting legumes, use pre-inoculated seed or inoculate with the proper viable strain of Rhizobia bacteria immediately before planting.

Select forage or biomass species based on the intended use, level of management, realistic yield estimates, maturity stage, and compatibility with other species. Verify plant adaptation to the area prior to planting.

Exclude livestock until the plants are well established (Refer to Alabama NRCS conservation practice standard, Prescribed Grazing – Code 528).

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 produce forage for use during periods when other on-farm forage does not meet livestock needs. Forage species shall help balance the daily nutritional needs of the animals for the desired period of time.

Additional Criteria for Reducing Erosion and Improving Water Quality

Use plants that provide adequate ground cover, canopy cover, vegetative retardance and root mass needed to protect the soil from water erosion.

Additional Criteria for Producing Feedstocks for Biofuel or Energy Production

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

Additional Criteria for Conversion of Forage Stands

When an existing stand of vegetation is not compatible with the new stand, then existing stands of vegetation will be removed by mechanical or chemical means prior to establishment of the desired vegetation. For example, on an existing remnant stand of fungus infected fescue, existing stands of the grass will be destroyed and extra efforts, such as repeat herbicide applications or disking, will be used to destroy the existing seed bank. This process will likely cause a delay in the planting of the desired vegetation.

Additional Criteria for Planting Native Warm Season Grasses

Apply nutrients according to soil test results. If pH is less than 5 apply lime. Maintain medium soil test levels of phosphorous and potassium. Do not apply nitrogen during the year of establishment. Proxy crops designations may be used for soil test purposes and include pearl millet, grain sorghum, corn, etc. Refer to Alabama NRCS Job Sheet, Planting Native Grasses for Grazing Systems – No. AL512A.

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. Consider including native warm season grasses as part of the forage base. When possible, interseed or establish pollinator plants that provide benefits during spring, summer and fall.

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

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

During implementation of this standard, also consider implementing the following Alabama NRCS conservation practice standards:

Forage and Biomass Harvest – Code 511
Herbaceous Weed Control – Code 315
Nutrient Management – Code 590
Prescribed Grazing – Code 528

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, or other acceptable method of documentation.

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)
- Protection of Plantings (if applicable)

PLANTING

Conventional tillage may be used when erosion will not be a concern. When used, prepare a firm seedbed by rolling or using a cultipacker.

When soils are particularly erodible, Erodibility index >8, consider use of companion crops to protect the soil while desired plants are establishing.

Mulch tillage or No-till planting procedure should be considered when erosion is a primary concern. Site preparation herbicides should be used to reduce weed competition and aid in the establishment.

Plant approved forage species. Refer to Table 1, Warm Season Forage Crops Commonly Grown for Pasture and Hay in Alabama, and Table 2. Cool Season Forage Crops Commonly Grown for Pasture and Hay in Alabama. Choose species that best address resource concerns.

Weed control during the establishment period shall be done to ensure the survival of the new seedlings and promote sound growth. When herbicides are used for weed control, follow the herbicide labels, extension system recommendations. Consider adopting the Alabama NRCS conservation practice standards listed below.

Brush Management – Code 314
Herbaceous Weed Control – Code 315
Integrated Pest Management – Code 595.

Mowing should be considered to assist in reducing weed competition. It will assist in reducing the weed canopy and stimulate desirable grasses to tiller.

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. Drought stress may require controlling weeds, early harvest of any companion crops, irrigating when possible, or replanting failed stands.

Monitor competition from invasive or noxious weeds. Control as needed. Insects and diseases will be controlled when infestations threaten the survival of the stand.

Maintain fertility requirements for the success of this planting. Evaluate the stand composition to determine if planted species are being maintained or if reestablishment of some plant species is needed to achieve the desired purposes.

Consider implementing the following Alabama NRCS conservation practice standards as needed.

Brush Management – Code 314
Forage Harvest Management – 511
Herbaceous Weed Control – Code 315
Integrated Pest Management – Code 595
Nutrient Management – Code 590
Prescribed Grazing – Code 528

REFERENCES

Ball, D.M., C.S. Hoveland, and G.D.Lacefield, 2007. Southern Forages, 4th Ed. International Plant Nutrition Institute, Norcross, GA.

Barnes, R.F., D.A. Miller, and C.J. Nelson. 1995. Forages, The Science of Grassland Agriculture, 5th Ed. Iowa State University Press, Ames

United States Department of Agriculture, Natural Resources Conservation Service. 1997. National Range and Pasture Handbook. Washington, DC. USDA, NRCS. 2008.

The PLANTS Database (http://plants.usda.gov, October 2008). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, NRCS. 2009. Technical Note 3. Planting and Managing Switchgrass as a Biomass Energy Crop.

Table 1. WARM SEASON Forage Crops Commonly Grown for Pasture or Hay in Alabama.

Forage Crop	Seeding Rate (lb/A)	Seeding Depth (in.)	Planting Date			Remarks
			North	Central	South	
GRASSES - Perennial						
Bahiagrass	20	¼ - ½	Mar 1–Jun 15 [1]	Mar 1-Jul 15	Feb 1-Nov 1	Adapted to sandy soils; tolerates drought and poor drainage.
Bermudagrass Seed (hulled)	5	¼ - ½	Apr 1-Jul 15	Mar 15-Jul 15	Mar 1-Jul 15	Adapted to sandy soils; tolerates drought; responds to nitrogen; potassium is important for survival and production.
Bermudagrass – Sprigs [2]			Apr 1-Jul 15	Mar 15-Jul 15	Mar 1-Aug 15	Adapted to sandy soils; tolerates drought; responds to nitrogen; potassium is important for survival and production.
Rows	30 bu.	3 – 6				
Broadcast	45 bu.	2 – 4				
Dallisgrass	10 lbs. PLS [3]	¼ - ½	Mar 15-Jul 1	Mar 1-Jul 1	Feb 1-Jul 1	Best adapted to moist sites & Blackbelt soils.
Eastern Gamagrass [4]	8 lbs. PLS Drilled	1 – 1½	Apr 1- Jul 1	Mar 15-Jul 15	Mar 1- Jul 15	Best adapted to moist bottoms & stream terraces. Do not continuously graze.
Switchgrass [4, 7]	5 lbs. PLS BC, 4 lbs. PLS Drilled	0 – ¼	Apr 1 – Jul 1	Mar 15-Jul 15	Mar 1 – Jul 1	Adapted to soils with good moisture. Tolerates poorly drained soils. Do not continuously graze. May be grown for biomass.
Big Bluestem	12 lbs. PLS BC, 9 lbs. PLS Drilled	¼ - ½	April 1 – June 15	April 1 – June15	April 1 – June15	Do not continuously graze. Deep well-drained soils preferred.
Little Bluestem	8 lbs. PLS BC, 6 lbs PLS Drilled	¼ - ½	April 1 – June 15	April 1 – June15	April 1 – June15	Does not tolerate poorly drained soils. Do not continuously graze. Drought resistant.
Indiangrass	12 lbs. PLS BC, 9 lbs. PLS Drilled	¼ - ½	April 1 – June 15	April 1 – June15	April 1 – June15	Adapted to well drained, fertile clay soils. Heat and drought tolerant. Do not continuously graze.

Table 1. **WARM SEASON** Forage Crops Commonly Grown for Pasture or Hay in Alabama. (con't)						
Forage Crop	**Seeding Rate (lb/A)**	**Seeding Depth (in.)**	**Planting Date**			**Remarks**
			North	**Central**	**South**	
GRASSES - Annual						
Millet, Browntop, Proso, and Foxtail	Drilled 20 B-Cast 30	½ - ¾	May 1–Aug 1	Apr 1-Aug 15	Apr 1-Aug 15	Well drained productive soils. Drought tolerant.
Millet, Pearl	Drilled 15 B-Cast 30	½ - 1½	Apr 20-Jul 1	Apr 15-Jul 1	Apr 1-Jul 15	Adapted to clay and loam soils with good summer moisture. Avoid calcareous Blackbelt soils.
Sorghum-Sudan Hybrids	Drilled 25 B-Cast 35	½ - 1	May 1–Aug 1	Apr 15-Aug 1	Apr 1–Aug 15	Well drained productive soils. Drought tolerant.
Sorghum, Sweet and Forage	Rows 5 B-Cast 20	1	Apr 20-May 15	Apr 20-May 15	Apr 20-Jul 1	Well drained productive soils. Drought tolerant.
Sudangrass	Drilled 25 B-Cast 35	½ - 1	May 1-Aug 1	May 1-Aug 1	May 1-Aug 1	Light sandy to heavy clay soils. Drought tolerant.

Table 1. <u>WARM SEASON</u> Forage Crops Commonly Grown for Pasture or Hay in Alabama. (con't)

Forage Crop	Seeding Rate (lb/A)	Seeding Depth (in.)	Planting Date			Remarks
			North	Central	South	
<u>LEGUMES - Perennial</u>						
Alfalfa	25	0- ¼	Aug 15-Oct 1	Sep 1-Oct 1	Oct 1-Nov 1	Requires deep, fertile, well drained soils. pH 6.0-7.0
Birdsfoot Trefoil	Alone 10 Mixtures 5	0- ¼	Sep 1-Oct 31	-	-	Requires well drained productive soils.
Lespedeza, Sericea	Drill 20 B-Cast 30	¼	Mar 15–May 15 Or Jun 15-Jul 15	Mar 1–May 1	Feb 15–May 1	Drought tolerant; best on clay or loam soils; tolerant of soil acidity and low fertility; slow to establish.
Perennial Peanut	Rhizomes 80 Bu/ac Sprigs 120 Bu/ac	1	-	-	Jan – March	Adapted to well-drained sandy or sandy loam soils. Do not plant north of line that runs between Brundidge, Luverne, and Grove Hill. (31.72°N LAT)
<u>LEGUMES - Annual</u>						
Clover, Alyce	20	¼ - ½	-	-	May 15-Jul 15	Fertile, well drained soils.
Lespedeza, Annual	30	¼ - ½	Feb 15-Apr 1	Feb 15-Apr 1	-	Needs good drainage; tolerant of Drought; low fertility and soil acidity. Avoid lime soils of Blackbelt.

Table 2. COOL SEASON Forage Crops Commonly Grown for Pasture or Hay in Alabama.

Forage Crop	Seeding Rate (lb/A)	Seeding Depth (in.)	Planting Date			Remarks
			North	Central	South	
GRASSES - Perennial						
Orchardgrass	15	¼ -½	Aug 15-Nov 1	--	--	Less tolerant of drought and poor drainage than tall fescue; Will not tolerate over grazing.
Tall Fescue [5/]	Drilled 20 B-Cast 25	¼ -½	Sep 1-Nov 1	Sep 1-Nov 1	Sep 15-Nov 15 [6/]	Best adapted to fertile soils with good moisture holding capacity.
GRASSES - Annual						
Ryegrass	25	0 – ½	Aug 25-Oct 1	Sep 1–Oct 15	Sep 15–Nov 1	Best adapted to clay loam soils.
Small Grains **Oats** **Rye** **Wheat** **Barley** **Triticale**	90-120	1 – 2	Sep 1–Nov 1	Sep 15–Nov 1	Sep 15-Nov 15	Rye is better adapted to well drained, sandy to loam soil and is more tolerant of soil acidity than wheat or oats; Oats are cold sensitive & subject to winter kill; Wheat more tolerant of heavy wet soils.

Table 2. Cool Season Forage Crops Commonly Grown for Pasture or Hay in Alabama. (con't)

Forage Crop	Seeding Rate (lb/A)	Seeding Depth (in.)	Planting Date			Remarks
			North	Central	South	
LEGUMES - Perennial						
Clover, White and Ladino	3	0 – ¼	Sep 1-Oct 31 Or Feb 1-Apr 1	Sep 1-Oct 31 Or Feb 1-Apr 1	Sep 15-Nov 15	Requires well-drained soil with pH 6.5+; drought tolerant; supply potassium, phosphorus, sulfur and boron.
LEGUMES - Annual						
Caley Peas	50	½ - 1	Sep 1-Oct 15	Sep 1-Oct 15	Sep 1-Oct 15	Adapted to alkaline and moderately acid Black belt soil. Seeds are toxic.
Clover, Arrowleaf	6	0 – ½	Aug 25-Oct 1	Sep 1–Oct 15	Sep 15–Nov 1	Overseed 5 weeks later. Best on well drained soils. Avoid Black Belt soils.
Clover, Ball	4	0 – ¼	Sep 1-Oct 31	Sep 1-Oct 31	Sep 1-Oct 31	Adapted to most soils. Reseeds well and tolerates wet soils and flooding.
Clover, Crimson	25	0 – ½	Aug 25-Oct 1	Sep 1–Oct 15	Sep 15–Nov 1	Avoid high pH soils. Best on well drained soils. Overseed 5 weeks later.
Clover, Lappacea	10	0 – ¼	-	Sep 1-Oct 31	-	Black Belt soils only.
Clover, Red	Drilled 8 B-Cast 15	¼ - ½	Sep 15-Nov 15 Or Feb 1-Apr 1	Sep 15-Nov 15 Or Feb 1-Apr 1	Sep 15-Nov 15	Fertile well drained soils.

Table 2. Cool Season Forage Crops Commonly Grown for Pasture or Hay in Alabama. (con't)						
Forage Crop	**Seeding Rate (lb/A)**	**Seeding Depth (in.)**	**Planting Date**			**Remarks**
			North	**Central**	**South**	
Legumes - Annual (con't)						
Clover, Subterranean	10	¼ - ½	Aug 25 – Oct 1	Sep 1- Oct 31	Sep 1-Oct 31	Best on well-drained productive soils
Vetch, Common	35	1-2	-	Sep 1-Oct 15	Sep 15-Nov 1	Best on well-drained soils. Certain varieties may freeze if planted late. Nova II is cold tolerant.
Vetch, Harry	25	1-2	Sep1-Oct15	Sep1-Oct 15	Sep 15-Nov 1	Best on Well-drained soils.

1/ Bahiagrass plantings:

- Sand Mountain variety: N,C,S
- Pensacola, Tift9, Tifquick, UF Riata: S,C and North counties contiguous to Central Alabama plus St. Clair, Calhoun, and Cleburne.
- Argentine: S
- Fall plantings of bahiagrass should include 45 lbs./ac of small grain to provide cover during winter months.

2/ Use broadcast rates for machine planting in rows 24 inches or less.

3/ Drill – Drilled; B-Cast – Broadcast; and PLS = Pure Live Seed.

4/ May be included in a mixture of other native grasses, Indiangrass & big bluestem, on a trial bases. See AL NRCS conservation practice standard, Conservation Cover – Code 327 for seeding mixtures and rates.

5/ Only endophyte-free or novel endophyte varieties of tall fescue shall be planted for forage.

6/ Fescue seeding in south Alabama is limited to subclass "w" soils except in MLRA 135.

7/ May be planted for biomass production purposes.

NOTES:

A. Where legumes are seeded with grasses, use the seeding dates for the grasses.

B. Where two or more grasses are used in a mixture, reduce the seeding rate of each by about one-third. Do not reduce the seeding rates of legumes when used in the mixtures.

C. Seeding rates for a cost-share program shall be the rate specified by the program.