

**NATURAL RESOURCES CONSERVATION  
SERVICE CONSERVATION PRACTICE  
STANDARD  
FORAGE AND BIOMASS PLANTING**

512

(Ac.)

**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**

Plant species and their cultivars shall be selected based upon:

- Climatic conditions, such as annual rainfall, seasonal rainfall patterns, growing season length, humidity levels, temperature extremes and the USDA Plant Hardiness Zones.
- Soil condition and position attributes such as pH, available water holding capacity, aspect, slope, drainage class, fertility level, salinity, depth, flooding and ponding.
- Resistance to disease and insects common to the site or location.
- Plant compatibility with other forage species in their rate of establishment, maturity, and growth habit when seeded together as a forage mixture.

Specified seeding/plant material rates, methods of planting and date of planting shall be consistent with documented guidance cited by research institutions and/or agency demonstration trials for achieving satisfactory establishment.

Seeding rates for cool season grasses and legumes will be listed in the jobsheets and calculations to determine appropriate rates have already been determined by the University of Kentucky. Adequate

PLS calculations are already included in the tables provided.

Seeding rates for Native Warm Season Grasses will be calculated on a pure live seed (PLS) basis.

Do not plant federal, state, or local noxious species.

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

Planting by conventional or no-till methods are acceptable. Planting methods shall provide a firm weed-free seedbed that ensures good seed to soil contact.

All seed and planting materials shall meet Kentucky quality standards if there are questions pertaining to seed materials contact NRCS State Agronomist.

Fertilizer and soil amendments shall be based on University of Kentucky lime and fertilizer recommendations for the desirable species. Application shall be appropriately placed and timed to be effective.

Livestock shall be excluded until the plants are well established.

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

Forage species must be capable of meeting minimum daily requirements for the kind and class of the animals being grazed. KY31 fescue dominates most cool season pastures in Kentucky and creates animal performance and numerous health issues. Adding legumes and other cool season grasses to a KY31 pasture can dilute the endophyte effects on the animals. Seedings may include a totally new seeding or interseeding with other species to obtain the desired results.

#### **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 selected shall help balance the daily nutritional needs of the animals for the desired period of time. In Kentucky, consider including legumes in cool season pastures and hayland and replacing cool season grasses with warm season grasses to fill in forage availability gaps. Use KY Graze to determine forage deficiencies.

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

Plants shall provide adequate ground cover, canopy cover, root mass and vegetative retardance to protect soil against erosion. Seed a companion crop from the KY 340 Cover Crop Standard at half rates to help reduce erosion during establishment.

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

Contact UK extension for Biofuel information. Typically, Switchgrass has been utilized for this purpose, but other NWSG species may be desirable as fuel. Plant the kinds and amount of plant materials needed.

### **CONSIDERATIONS**

In areas frequented by high density of animals, establish persistent species that can tolerate close grazing and trampling.

Where wildlife management is a compatible objective, use plant species beneficial to the desired wildlife species. Consider converting between 20 and 30% of the pasture and hayland to native warm season grass and/or adding legumes to existing predominantly cool season grass fields to improve both forage availability and habitat.

Use the Kentucky Wildlife Habitat Evaluation Procedure (KWHEP) to aid in selecting plant species and providing for other habitat requirements.

For pollinators include diverse legumes (e.g. alfalfa, clovers) or other forbs that provide pollen and nectar for native pollinators.

## **PLANS AND SPECIFICATIONS**

Specifications for the establishment of pasture and hay planting shall be prepared for each site or management unit according to the Criteria and Considerations described in this standard, and shall be recorded on specification sheets, job sheets, in narrative statements in the conservation plan, or other acceptable documentation.

## **GENERAL SPECIFICATIONS**

Procedures, technical details and other information listed in this section provides guidance for carrying out the Pasture and Hay planting.

### **Soil Fertility Requirement**

Cool season grasses and legumes apply lime and fertilizer according to University of Kentucky lime and fertilizer recommendations. The per acre soil test requirements for N, P & K may be waived when the soil test calls for a total per acre requirement of less than 25 lbs and/or the total amount of fertilizer to be applied is less than 50 pounds. Lime requirements may be waived when the soil test calls for per acre requirements of less than 2 tons and/or the total amount of lime to be applied is less than 4 tons.

Warm Season Grasses and legumes; the application of lime and fertilizer is not required on warm season grasses during the establishment phase. Based on field experience in Kentucky, the application of fertilizer at or prior to seeding tends to stimulate weed competition. For forage production purposes, after establishment, apply lime and fertilizer according to University of Kentucky lime and fertilizer recommendations.

### **Seed Bed Preparation**

Conventional Tillage: Where erosion is not a concern conventional tillage may be performed to prepare a firm seedbed. The seedbed will be made firm by rolling or cultipacking prior to seeding. The seedbed is firm if you can walk on it without sinking more than ½ inch.

On soils with an EI greater than 8, particular attention to seed bed preparation and/or use of companion crops for protection during the relatively short erosive short establishment period is encouraged.

Mulch Tillage & No-till: Where erosion is of primary concern no-till establishment procedure should be used. When using any reduced tillage system a burndown herbicide application is required to reduce weed competition.

A winter annual small grain should be used as a companion or nurse crop where erosion is a major concern and the seeding will be performed later than the optimum planting dates.

### **Approved Forage Species**

Forage species shall be used that best address the resource concerns and meet clients plan objectives selected from **Table 1–KY Forage Use and suitability guide**. A species or use will not be recommended for use with a rating of P= Poor.

## **Species Selection and Site Suitability**

Select combinations of plant species that are adapted to site conditions. Adaptation is based on KY FOTG Section II – K-1 Soils Information Pasture and Hayland Suitability groups. For guidance in determining species suitability refer to

### **Table 1 – KY Use and suitability guide.**

Droughty and Severely Eroded Soils: Pasture and Hayland Suitability Groups 6, 8, 9, 10, 13 & 14

Moderately Well to Well Drained Soils: Pasture and Hayland Suitability Groups 1, 5, 7 & 11

Somewhat Poorly to Poorly Drained Soils: Pasture and Hayland Suitability Groups 2, 3, 4, & 12

## **Seeding Rates**

Seeding rates are based on the optimum amount of seed necessary to provide vegetative cover in a reasonable amount of time. The seeding rates for pure and mixed stands may be developed from **Table 2 KY Seeding rates for Pasture and Hayland planting.**

Frost seeding

Increase seeding rates in Table 2 by 20% for frost seeding. Perform when ground is snow covered if possible.

## **Seeding Dates**

Seeding dates vary slightly in Kentucky from North to South due to latitude and West to East based on elevation and weather patterns. The following dates are based on weather records averaging 50 percent probability that temperatures will fall to 32 degrees in spring and fall.

Cool-Season Grasses and Legumes:

Acceptable: 02/01 -- 04/15 & 08/10 -- 10/01; Frost Seeding: 1/01 – 03/15 ( Legumes only )

Warm Season Grasses: Acceptable: 04/15 -- 06/15; Dormant: 11/15 – 3/1

Native grass species may be planted during the dormant season to allow for an appropriate stratification period (Nov 15 – March 1); or in the spring (April 15 – June 30). Dormant plantings may require a nurse crop to assist in establishment. Seeding rates may need to be increased up to ten percent (10%) for dormant season plantings. Refer to conservation practice (340) Cover Crop for species using the additional criteria for weed suppression.

## **Weed Control During Establishment**

Perform weed control during the establishment year to ensure survival of the new seeding. Approved herbicides may be used on both cool and warm season grass planting to control weed species. Read and follow label carefully to assure that all grass and legumes species are resistant to selected herbicide.

To manage severe weed competition, warm season grass species may be mowed no closer than 8 inches and cool season grasses/legumes species not closer than 4 inches. Mowing will both reduce

weed canopy and stimulate grasses to tiller resulting in improved forage stand.

### **OPERATION AND MAINTENANCE**

The operator will inspect and calibrate equipment prior to use to insure proper rate, distribution and depth of planting material.

Invasion by undesirable plants shall be controlled by mowing and/or using a selective herbicide according to Label.

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). As the percentage legumes declines in pastures and hayfields, consider pasture renovation following the guidance in extension publication AGR-26 "Renovating Hay and Pasture Fields."

Prescribed Grazing (528A), Forage Harvest Management (511), Nutrient Management 590), and Pest Management (590) as appropriate will be planned to protect and achieve the intended life span of the seeding practice.

### **REFERENCES**

Ball, D.M., C.S. Hoveland, and G.D. Lacefield, Southern Forages, Third Edition. Potash and Phosphate Institute, Norcross, GA.

University of Kentucky Department of Agronomy publications: AGR-1 Lime & Fertilizer recommendations for Field Crops.

University of Kentucky Department of Agronomy Publication AGR-18 Grain and Forage Crop Guide for Kentucky.

University of Kentucky Department of Agronomy Publication AGR-145 Warm Season Perennial Grasses for Forage in Kentucky.

Lacefield, G.D. and Smith, S.R., University of Kentucky Department of Agronomy publication AGR-26 "Renovating Hay and Pasture Fields"

University of Kentucky Department of Agronomy publication 172 Weed Management in Grass Pastures, Hayfields, and Fence rows.



**Table 1. KY Forage Use and Suitability Guide (E= Excellent, G= Good, F=fair, P=poor).**

Forage Species	Plant Type	Use Suitability			Site Suitability		
		Continuous Grazing	Prescribed Grazing	Hayland	Droughty	Mod to	Somewhat to Poorly
<b>Grasses – Cool Season Introduced Species</b>							
KY Bluegrass	Perennial	F	G	P	P	G	P
Orchardgrass	Perennial	F	E	E	F	E	F
Redtop	Short lived	P	F	F	F	G	P
*Novel Endophyte Tall Fescues	Perennial	G	E	G	G	E	G
Timothy	Perennial	P	G	E	P	G	P
<b>Legumes</b>							
Alfalfa	Perennial	P	G	E	F	E	P
Alsike Clover	Short lived	P	F	F	P	F	G
Annual Lespedeza	Perennial	F	G	F	F	G	F
Ladino Clover	Perennial	F	G	E	F	G	F
Red Clover	Short lived	F	G	E	F	G	F
White Clover (common)	Perennial	F	G	F	F	G	F
<b>Warm Season Grasses</b>							
Bermudagrass (Wrangler**)	Perennial	G	E	G	F	G	F
Big Bluestem	Perennial	P	G	F	G	G	P
Eastern Gama Grass	Perennial	P	G	F	G	G	E
Indiangrass	Perennial	P	G	F	G	G	P
Switchgrass	Perennial	P	G	F	G	G	F

\*According to UK guidance, only Novel Endophyte Tall Fescues and Wrangler Bermudagrass should be utilized in new pasture or hay seedings. Endophyte-free fescues and all other varieties of bermudagrasses are not typically not hardy enough to meet the 512 lifespan.

**Table 2. KY Seeding Rates for Forage and Biomass Planting.**

Mixtures of introduced grasses must include a minimum of ten (10) pounds grass per acre.

Mixtures of native grasses must include a minimum of eight (8) pounds PLS.

Forage Species	Single	Multiple Species Seeding Rate Minimum lbs/ac	Seeding Dates		Native Warm Season Grass Dormant Seeding
			Spring	Fall	
<b>Cool Season Grasses-Introduced Species</b>					
Ky Bluegrass	15	10	2/15-3/15	<b>8/20 - 9/20</b>	
Orchardgrass	15	10	2/15-3/15	<b>8/20 - 9/20</b>	
Redtop	8	4	2/15-3/15	<b>8/20 - 9/20</b>	
Novel Endophyte Tall Fescue	25	15	2/15-3/15	<b>8/20 - 9/20</b>	
Timothy	10	5	2/15-3/15	<b>8/20 - 9/20</b>	
<b>Legumes</b>					
Alfalfa	20	15	2/15-3/15	<b>8/20- 9/20</b>	
Annual Lespedeza's	10	5	2/15-3/15		
Ladino Clover	3	1	2/15-3/15	<b>8/20- 9/20</b>	
Red Clover	10	5	2/15-3/15	<b>8/20- 9/20</b>	
White Clover	3	1	2/15-3/15	<b>8/20 - 9/20</b>	
<b>Warm Season Grasses (PLS basis)</b>					
Bermudagrass* (Wrangler)	40 bu/ac	n/a	<b>4/14-5/15</b>	n/a	
Big Bluestem	8	2	<b>4/15-6/01</b>	n/a	
Eastern Gama Grass	8	3	<b>4/15-6/01</b>	n/a	
Indiangrass	8	2	<b>4/15-6/01</b>	n/a	
Switchgrass	8	1	<b>4/15-6/01</b>	n/a	
Switchgrass (Biomass Only)	6	n/a	<b>4/15-6/01</b>	n/a	
<b>Notes: Bold dates</b> indicates primary Optimum seeding dates See 512 page 3 for acceptable and dormant seeding dates.					