Forage Identification and Use Guide

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Introduction

Forage crops occupy approximately 7 million acres in Kentucky. They provide most of the feed for beef, dairy, horse, sheep, and wildlife. In addition, forage crops play a critical role in soil conservation, water quality, and air quality. Many publications are available with detailed information about species and varieties grown in Kentucky. The purpose of this publication is to provide both agronomic and identification information on several forage grasses and legumes. Additional material is available in each county through the University of Kentucky Cooperative Extension Service as well as from the Natural Resources Conservation Service, wildlife organizations, livestock organizations, the Kentucky Forage and Grassland Council, and many industry groups.

Morphology of Grasses and Legumes

Understanding the general structure, or morphology, of forage grasses and legumes aids in their identification. Generalized drawings of a legume and a grass are shown in Figures 1 and 2. These drawings are composites and contain characteristics of several different legumes or grasses.

Forage Identification and Use

To properly manage and understand a forage system—whether it is used for hay, pasture, wildlife, conservation, or some combination of uses—it is important to be able to identify the species present and understand their establishment, management, and productivity. The following section includes photographs and descriptions of the major forage grasses and legumes for Kentucky and their definitive characteristics as well as some general guidelines for their establishment and use. Some characteristics and advantages are common to all grasses or legumes. For example, nearly all legumes are able to convert atmospheric nitrogen into plant-available nitrogen through Rhizobium bacteria in root nodules. Erosion control is a good example of a common benefit of most grasses. Such common traits will not be listed specifically for individual grasses or legumes unless they are major distinguishing uses or characteristics.

Grasses and legumes in this guide are listed alphabetically. The common name of the species is shown at the top of the page, followed by the scientific name in italics. Harvest dates are approximate.
Alfalfa

Medicago sativa

Alfalfa leaflets are longer and narrower than red clover, do not have a prominent watermark, or V-shaped pattern, on the leaflets like red clover, and are serrated only at the tip. Alfalfa can have purple or yellow flowers.

Description
High-yielding, high-quality perennial legume with good summer production. Provides multiple cuttings during growing season. Grows 2 to 3 feet tall.

Uses
Hay, haylage, pasture.

Advantages
High yield and quality, more productive during summer than other cool-season forages. Palatable to livestock.

Disadvantages
Requires well-drained, fertile soils and better management for good yield and persistence. Potential for bloat. Alfalfa weevil and potato leafhopper are economic pests.

Seeding
Rate: 12-20 lb/a
Depth: ¼-½ in
Date: Mar 1-Apr 15/Aug 1-Sep 15

Harvest
First harvest: May 1-May 15
Annual yield: 3-6 tons dry matter/a
Bermudagrass
*Cynodon dactylon*

**Description**
Sod-forming, warm-season, perennial grass that spreads by rhizomes, stolons, and seed (common types of bermudagrass spread this way). Extremely drought tolerant. Hybrid bermudas should be used because of their improved quality and palatability compared to common types.

**Uses**
Hay and pasture.

**Advantages**
High yielding and highly responsive to nitrogen applications. Grows well during summer. Good sod former.

**Disadvantages**
Some varieties are more winter-hardy than others. Hybrids must be started from sprigs. Poor quality when overmature. Short growing season. Weeds can be a major problem during establishment.

**Seeding**
Rate: 30-50 bushels of sprigs/a*
Depth: 1-2 in
Date: Apr 15-Jun 15

**Harvest**
First harvest: Jun 15-Jul 1
Annual yield: 3-7 tons dry matter/a

*Higher rates give quicker ground cover.*
Big Bluestem
*Andropogon gerardii*

**Description**
Tall-growing, native perennial, warm-season bunchgrass. Deep-rooted grass that sometimes has rhizomes. More drought tolerant than most warm-season perennial grasses. Grows 3 to 7 feet tall.

**Uses**
Wildlife, pasture, hay.

**Advantages**
Desirable for wildlife. Good summer production that complements cool-season forage growth. Palatable over a wider range of maturities than switchgrass. Efficient user of fertilizer nitrogen.

**Disadvantages**
Slow and expensive to establish. Will not tolerate close, continuous grazing. Short growing season. Seed is light and requires planters that can handle fluffy seed.

**Seeding**
Rate: 6-10 lb/a pure live seed (PLS)*
Depth: ¼-½ in
Date: Apr 15-Jun 1

**Harvest**
First harvest: Jun 15-Jul 15
Annual yield: 2-4 tons dry matter/a

*Pure live seed, or PLS, is equal to the percent germination multiplied by percent purity, both expressed as decimals. For example, a big bluestem seedlot that is 70% pure seed and 50% germination would be 35% pure live seed.
Birdsfoot Trefoil

*Lotus corniculatus*

**Description**
Short-lived perennial legume.

**Uses**
Pasture.

**Advantages**
Palatable, non-bloating legume. Tolerant of low fertility and pH. Excellent for mine reclamation.

**Disadvantages**
Plants subject to crown rot and must be allowed to reseed each year to persist. Low seedling vigor compared to other legumes. Slow to establish in existing sod.

**Seeding**
Rate: 6-12 lb/a
Depth: ¼-½ in
Date: Mar 1-Apr 15

**Harvest**
First harvest: May 1-May 15
Annual yield: 1-3 tons/dry matter/a

Birdsfoot trefoil has a bright yellow flower and seed pods that are arranged in the shape of a bird’s foot.

Leaf consists of five leaflets, with lower pair smaller than upper three pairs. Leaflets have a triangular shape and have very prominent stipules (leaflike structures) on the lower stem.
Bromegrass
Bromus inermis

**Description**
Tall-growing, cool-season, perennial grass.

**Uses**
Hay, pasture.

**Advantages**
Later maturing than orchardgrass or tall fescue. Highly palatable as hay or pasture. Forms sod from rhizomes.

**Disadvantages**
Only adapted to the northern tier of counties in Kentucky and even then only on north- or northeast-facing slopes. Seed is fluffy and may fail to flow in some seeders. Somewhat slow to establish. Subject to foliar diseases. Little production after first harvest.

**Seeding**
Rate: 15-20 lb/a
Depth: 1/2 in
Primary Date: Aug 15-Oct 1
Secondary Date: Feb 1-Apr 15

**Harvest**
First harvest: May 15-Jun 1
Annual yield: 2-4 tons dry matter/a
Caucasian Bluestem

*Bothriochloa caucasica*

Description
Leafy, warm-season, perennial bunch-grass. Deep rooted and drought tolerant with fine stems. Grows 2 to 4 feet tall.

Uses
Pasture and hay.

Advantages
More uniform growth rates over summer season, more tolerant of close grazing than native warm-season grasses. Multiple cuttings possible.

Disadvantages
Fluffy seed that is hard to handle, slow to establish. Can become a weed in crop fields. No cover value for wildlife. Quality and animal acceptance declines rapidly with maturity compared to big bluestem and indiangrass.

Seeding
Rate: 2-4 lb/a PLS*
Depth: ¼-½ in
Date: Apr 15-Jun 1

Harvest
First harvest: Jun 15-Jul 15
Annual yield: 3-5 tons dry matter/a

*C*See page 8 for definition of PLS.
Crimson Clover
Trifolium incarnatum

Description
Winter annual legume 1 to 3 feet tall with dark green leaves densely covered with hairs.

Uses
Hay, silage, soil improvement.

Advantages
Nitrogen fixation, improves protein content of small grain silage. Will grow at lower temperatures than do other clovers.

Disadvantages
Short growing season, unpalatable as pasture, low quality when mature. Not adapted to poorly drained soils.

Seeding
Rate: 20-30 lb/a
Depth: ¼ - ½ in
Date: Aug 1-Oct 15

Harvest
First harvest: May 1-May 15
Annual yield: 1-2 tons/dry matter/a
Eastern Gamagrass
*Tripsacum dactyloides*

**Description**
Coarse, tall-growing, highly palatable, native warm-season perennial bunchgrass with thick rhizomes. Grows 4 to 6 feet tall.

**Uses**
Pasture, hay, and haylage.

**Advantages**
High yields and highly palatable to livestock. More even growth over entire season than switchgrass, big bluestem, or indiangrass. Will grow on wet sites.

**Disadvantages**
Somewhat expensive to seed. Seed can have high levels of dormancy leading to slow, uneven emergence and establishment. Must be rotationally grazed and rested in fall to persist.

**Seeding**
Rate: 7-10 lb/a
Depth: 1 in
Date: Apr 15-Jun 15

**Harvest**
First harvest: Jun 15
Annual yield: 4-6 tons dry matter/a
Indiangrass
*Sorghastrum nutans*

Description
Tall, warm-season, perennial bunchgrass that is deep rooted, drought tolerant, and is spread by rhizomes and seed. Produces seed heads in late summer. Grows 3 to 6 feet tall.

Uses
Wildlife, pasture, and hay.

Advantages
Summer production. Matures later in summer and extends grazing season into late summer. Its late maturity helps preserve some forage value after bird nesting season.

Disadvantages
Light and fluffy seed, slow to establish. Not tolerant of close, continuous grazing.

Seeding
Rate: 6-10 lb/a PLS*
Depth: ¼-½ in
Date: Apr 15-Jun 1

Harvest
First harvest: Jul 15-Aug 1
Annual yield: 2-3 tons dry matter/a

*See page 8 for definition of PLS.
Kentucky Bluegrass
Poa pratensis

Description
Perennial, dark green, sod-forming grass with rhizomes, grows 1 to 3 feet in seed head stage. Leaves are narrow and fine bladed with tips shaped like a boat’s bow.

Uses
Pasture, with limited use for hay.

Advantages
High quality, highly palatable, long-lived pasture plant. Tolerates close, frequent grazing better than most grasses. Forms tight sod.

Disadvantages
Low yields, low summer production, becomes dormant and brown during hot, dry summers. More susceptible to grubs and insects than other pasture grasses. Slow to establish. Limited adaptation area (central, northern, and northeastern Kentucky).

Seeding
Rate: 10-15 lb/a
Depth: ¼-½ in
Primary Date: Aug 15-Oct 1
Secondary Date: Feb 1-Apr 15

Harvest
First harvest: May 1-May 15
Annual yield: 1-3 tons dry matter/a
Lespedeza, Annual
Kummerowia stipulacea—Korean
K. striata—Kobe or Striate types

Description
Fine-stemmed, leafy, annual legume with shallow taproots. Tolerant of low fertility and acidic soils. Grows 1 to 2 feet tall. Annual lespedeza leaves are a pale green color with light-colored, easily visible veins. Flowers and sets seed in late summer and early fall. Prolific seed producer. Kobe and Korean are examples of annual lespedeza.

Uses
Hay, pasture.

Advantages
Productive during summer months. Tolerates soil acidity and low fertility. Naturally reseeds itself. Fine stemmed and nonbloating.

Disadvantages
Short growing season. Low quality after frost or if it matures. Low yielding. Must set seed each year to persist. May fail to reseed if overgrazed, autumns are dry, or early frost occurs.

Seeding
Rate: 20-30 lb/a
Depth: ¼-½ in
Date: Feb 15-Apr 15

Harvest
First harvest: Jul 15-Aug 15
Annual yield: 1-3 tons dry matter/a
Sericea lespedeza has a very stiff and woody main stem and leaves extend from it. It tends to branch only near the tip of the main stem and only when allowed to become mature.

Description
Erect-growing, warm-season, perennial legume. Grows 18 to 40 inches tall. Deep rooted and tolerant of drought, soil acidity, and low fertility. Most varieties have high levels of tannin that reduce digestibility and animal acceptance. Low-tannin varieties are available.

Uses
Erosion control, hay, pasture.

Advantages
Tolerant of drought, soil acidity, and low fertility. Nonbloating. Good summer growth.

Disadvantages
Unpalatable as pasture. Low yielding. Stemmy and low quality when mature. Low quality as hay due to high leaf loss during raking and baling.

Seeding
Rate: 20-30 lb/a
Depth: ¼-½ in
Date: Mar 15-Apr 15

Harvest
First harvest: May 15-Jun 1
Annual yield: 1-2 tons dry matter/a
Orchardgrass
*Dactylis glomerata*

Description
Perennial bunchgrass. Leaves have bluish green color compared to tall fescue. Leaf veins are much less prominent compared to tall fescue. Grows 2 to 4 feet tall in seed head stage, stems are flattened at the base. Leaves emerge from stem base folded.

Uses
Hay, pasture.

Advantages
High quality and high yields, more likely to get summer cuttings. Palatable to livestock, in high demand for hay. Well suited for use in mixtures with alfalfa and red clover.

Disadvantages
Seed heads in many varieties can appear in late April, which is a difficult time to get hay cured without rain damage. Stands become clumpy with age and have a short life (usually less than five years). Not tolerant of close cutting or continuous close grazing. Susceptible to leaf diseases.

Seeding
Rate: 10-15 lb/a
Depth: ¼-½ in
Primary Date: Aug 15-Oct 1
Secondary Date: Feb 1-Apr 15

Harvest
First harvest: May 1-20
Annual yield: 2-4 tons dry matter/a
Red Clover

*Trifolium pratense*

**Description**
Cool-season, perennial legume with hairy stems. Stands last two to three years. Erect, leafy plant that grows 2 to 3 feet tall. Leaves are large and often have prominent V-shaped watermark.

**Uses**
Hay, pasture, haylage.

**Advantages**
Widely adapted, good seedling vigor, complements tall fescue and other cool-season grasses. Established easily, high yields.

**Disadvantages**
Shorter stand life than alfalfa and white clover. Heavy first cuttings are difficult to cure. Hay is dusty. Overmature second cutting red clover hay may have a fungus that causes animals to slobber.

**Seeding**
Rate: 8-12 lb/a
Depth: ¼-½ in
Primary Date: Feb 1-Apr 15
Secondary Date: Aug 1-Sep 15

**Harvest**
First harvest: May 1-May 15
Annual yield: 2-5 tons dry matter/a

Red clover leaves are large and nearly always have a prominent V-shaped pattern, or watermark, on the leaflets. Red clover has very hairy, fleshy stems and dark, pink flowers. Red clover plants form crowns around a taproot and grow erect.
Reed Canarygrass
*Phalaris arundinacea*

**Description**
Coarse, sod-forming, perennial grass with short rhizomes and short, broad leaves. Grows 2 to 5 feet tall in seed head stage. Thrives in wet soils and tolerates drought. Older varieties have alkaloids that limit palatability and animal performance. Low-alkaloid varieties are available.

**Uses**
Pasture and hay.

**Advantages**
Well adapted to wet, saturated, flooded sites. High yielding and highly responsive to nitrogen applications.

**Disadvantages**
Slow to establish. Shorter stand life than tall fescue. Does not tolerate close, continuous grazing.

**Seeding**
Rate: 8-12 lb/a
Depth: ¼-½ in
Primary Date: Aug 15-Oct 1
Secondary Date: Feb 1-Apr 15

**Harvest**
First harvest: May 10-June 10
Annual yield: 1-5 tons dry matter/a
Ryegrass, Annual
*Lolium multiflorum*

**Description**
Shiny, dark green, annual bunchgrass with smooth leaves. Grows 2 to 4 feet tall in seed head stage.

**Uses**
Fall and winter pasture, hay, erosion control.

**Advantages**
High nutritive quality and palatability, excellent seedling vigor, reseeds itself easily, tolerates close grazing.

**Disadvantages**
Not always winter-hardy. Low quality after heading. Can be overly competitive in mixtures. Reseeds prolifically and can be a troublesome weed in crop fields.

**Seeding**
Rate: 20-30 lb/a
Depth: ¼-½ in
Date: Aug 15-Oct 1

**Harvest**
First harvest: Apr 20-May 15
Annual yield: 1-3 tons dry matter/a
Perennial ryegrass leaves are flattened in the bud, in contrast to annual ryegrass leaves, which come out rolled. By comparison, annual ryegrass heads typically have more florets per flower and usually have awns (fine hairs extending from the ends of each seed), while perennial ryegrass has fewer florets and doesn’t have awns.

Perennial ryegrass leaves vary from narrow and fine (like bluegrass) to broad and coarse like tall fescue. In all cases, leaves have a very waxy or shiny appearance. Perennial ryegrass has a distinct purpling at the base of the stem.

Ryegrass, Perennial
Lolium perenne

Description
Shiny, dark green, short-lived, perennial bunchgrass with smooth leaves. Grows 2 to 4 feet tall in seed head stage. underside of leaves is glossy. Forage types have broad, coarse leaves. Turf types are lower growing and have narrower, finer-bladed leaves that resemble bluegrass.

Uses
Pasture, hay, and erosion control.

Advantages
High nutritive quality and palatability, excellent seedling vigor, high yields.

Disadvantages
Short stand life (two to three years). Stands are damaged by high temperatures and drought.

Seeding
Rate: 15-25 lb/a
Depth: ¼-½ in
Primary Date: Aug 15-Oct 1
Secondary Date: Feb 1-Apr 15

Harvest
First harvest: Apr 20-May 15
Annual yield: 2-4 tons dry matter/a
Sweetclover
*Melilotus* spp.

**Description**
Upright, coarse-stemmed, biennial, cool-season taprooted legume. Grows 4 to 8 feet tall. Leaves have serrations completely around the edge.

**Uses**
Primarily cover crop for wildlife.

**Advantages**
Nitrogen fixation, drought tolerant, winter-hardy.

**Disadvantages**
Intolerant of soil acidity. Contains coumarin, which reduces palatability and causes hemorrhaging in livestock.

**Seeding**
Rate: 10-15 lb/a
Depth: ¼-½ in
Date: Feb 1-Apr 15

**Harvest**
First harvest: Not applicable
Annual yield: 1-3 tons dry matter/a

Sweetclover leaflets are thicker than those of alfalfa and have serrations, or indentions, around the border. The petiole, or stem, of the middle leaflet of sweetclover is much longer than those of the other two leaflets. Sweetclover grows taller than alfalfa and can have either yellow or white flowers.
Switchgrass

Description
Tall-growing perennial native warm-season bunchgrass. Deep-rooted rhizomatous grass. Some varieties tolerant of wet sites. Grows 3 to 7 feet tall.

Uses
Hay, pasture, wildlife.

Advantages
Drought tolerant, grows on poorly drained soils, seed is easy to handle in conventional seeders. Efficient user of nitrogen. Good summer growth.

Disadvantages
Slow establishment and low seedling vigor. Poor animal acceptance when mature. Short growing season. Not tolerant of close, continuous grazing. Major growth occurs while cool-season forages are also productive.

Seeding
Rate: 6-10 lb/a PLS*
Depth: ¼-½ in
Date: Apr 15-Jun 1

Harvest
First harvest: Jun 1-Jun 15
Annual yield: 3-5 tons dry matter/a

*See page 8 for definition of PLS.
Tall Fescue  
*Festuca arundinacea*

**Description**  
Perennial, long-lived bunchgrass with short rhizomes; shiny, dark green leaves with prominent veins. Grows 2 to 4 feet tall in seed head stage. Tolerant of soil acidity, low fertility, and poor drainage, and relatively tolerant of drought and overgrazing. Most older fields are infected with an endophytic fungus, which reduces animal performance but aids in survival of plant.

**Uses**  
Pasture, hay, erosion control.

**Advantages**  
Tolerant of low fertility and acidic soils, well suited for winter stockpiling, long growing season. Endophyte-infected varieties are more tolerant of overgrazing than any other forage. Endophyte-free tall fescues are available and result in better animal performance. Generally not affected by insects and diseases.

**Disadvantages**  
Endophyte-infected plants hinder animal performance. Low-endophyte varieties must be well managed (not overgrazed) for persistence. All tall fescue produces minimal growth in hot, dry conditions.

**Seeding**  
Rate: 15-20 lb/a  
Depth: 1/3-1/2 in  
Primary Date: Aug 15-Oct 1  
Secondary Date: Feb 1-Apr 15

**Harvest**  
First harvest: May 1-15  
Annual yield: 2-4 tons of dry matter/a
Timothy has a very recognizable cylindrical seed head and a corm, or bulb, just above the roots.

Description
Perennial bunchgrass. Grows 2 to 5 feet in seed head stage. Has a swollen, bulb-like structure at base of stem. Leaves have a bluish green color compared to tall fescue.

Uses
Primarily a hay plant, but may be used for pasture when a part of a mixture.

Advantages
Large, first-cutting yields, high demand for hay either pure or in mixtures, grows well with alfalfa and/or red clover. Good nutritive quality when first cutting made in boot to early head.

Disadvantages
Short stand life, low quality when cut late, little regrowth after first cutting. Clumpy growth habit and sensitivity to hot temperatures limit its use in pasture.

Seeding
Rate: 3-6 lb/a
Depth: ¼-½ in
Primary Date: Aug 15-Oct 1
Secondary Date: Feb 1-Apr 15

Harvest
First harvest: May 15-June 1
Annual yield: 2-4 tons dry matter/a
White (Ladino) Clover
Trifolium repens

Description
Long-lived perennial cool-season legume spread by stolons. Plants are leafy and are 8 to 12 inches tall. Leaves and stems are non-hairy. Ladino is a taller-growing form of white clover.

Uses
Pasture and wildlife.

Advantages
Ease of establishment into existing cool-season grasses. High quality and high animal acceptance. Long stand life. Tolerant of wide range of soil and climatic conditions (especially cool and wet). Good seed production under grazing.

Disadvantages
Poor summer growth. Low yielding. Not good for hay. Potential for bloat (especially in spring and with thick, lush stands). Thick stands of established white clover can be extremely competitive with interseeded forages.

Seeding
Rate: 1-3 lb/a
Depth: ¼-½ in
Primary Date: Feb 1-Apr 15
Secondary Date: Aug 1-Sep 15

Harvest
First harvest: Not applicable
Annual yield: 1-3 tons dry matter/a