

Forage Identification and Use Guide

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Contents

Introduction.....	5
Morphology of Grasses and Legumes.....	5
Forage Identification and Use	5
Alfalfa.....	6
Bermudagrass.....	7
Big Bluestem	8
Birdsfoot Trefoil.....	9
Bromegrass	10
Caucasian Bluestem.....	11
Crimson Clover	12
Eastern Gamagrass.....	13
Indiangrass	14
Kentucky Bluegrass	15
Lespedeza, Annual	16
Lespedeza (Sericea), Perennial	17
Orchardgrass	18
Red Clover	19
Reed Canarygrass.....	20
Ryegrass, Annual.....	21
Ryegrass, Perennial	22
Sweetclover.....	23
Switchgrass	24
Tall Fescue.....	25
Timothy.....	26
White (Ladino) Clover.....	27

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.

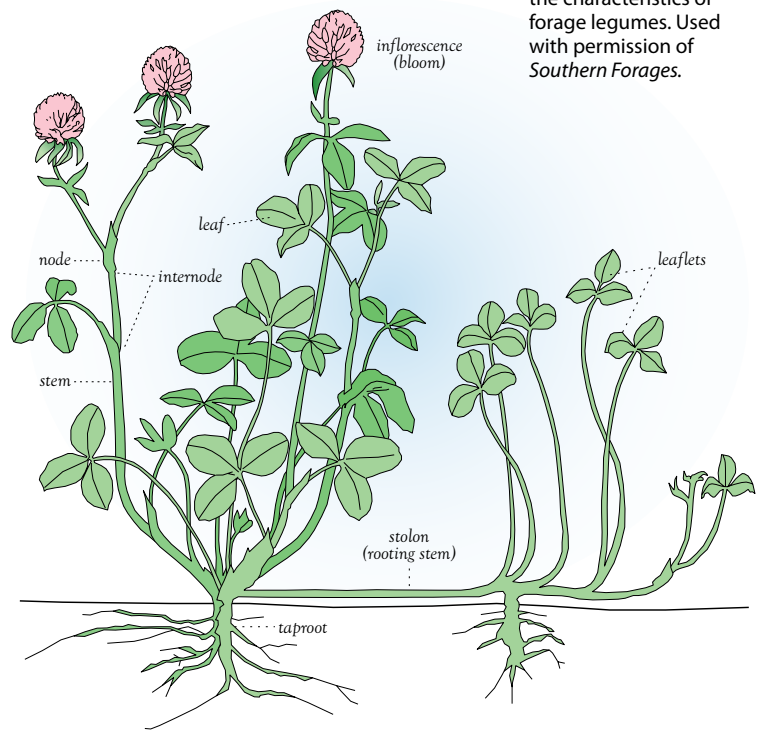


Figure 1.
A generalized drawing showing the characteristics of forage legumes. Used with permission of Southern Forages.

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.

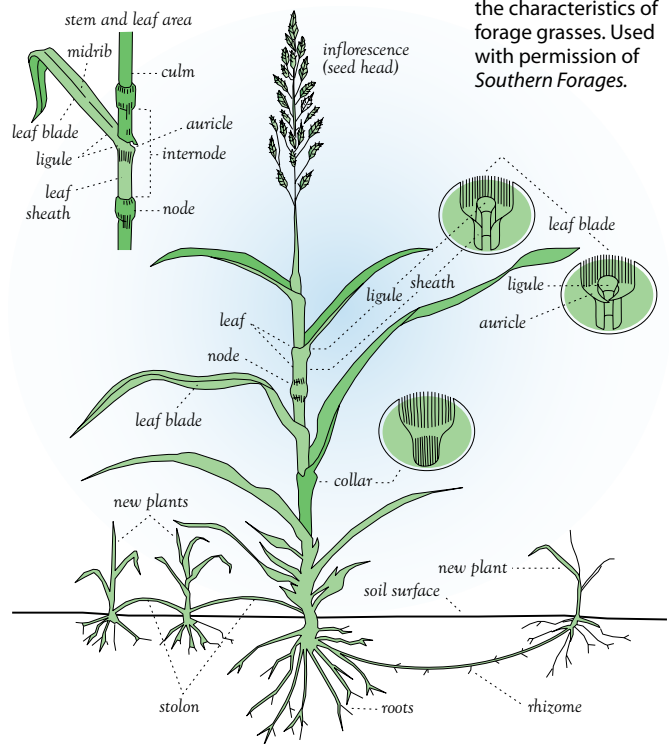


Figure 2.
A generalized drawing showing the characteristics of forage grasses. Used with permission of Southern Forages.

Alfalfa

Medicago sativa



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



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.

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

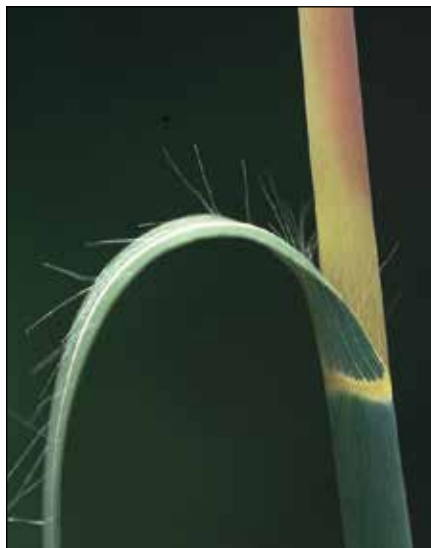
First harvest: Jun 15-Jul 1

Annual yield: 3-7 tons dry matter/a

*Higher rates give quicker ground cover.

Big Bluestem

Andropogon gerardii



Big bluestem is a tall, leafy, warm-season grass with fine hairs where the leaf joins the stem.



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: 1/4-1/2 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: 1/4-1/2 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: ½ 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



Bromegrass leaves are broad and generally shorter than those of orchardgrass and fescue. There is usually a W-shaped wrinkle across the leaf about one-third of the way from the tip to the leaf's base. Brome seed heads emerge later than tall fescue and orchardgrass and drape.



Caucasian Bluestem

Bothriochloa caucasica



Caucasian bluestem has finer leaves and is lower growing than the native warm-season grasses. It has a pale green color similar to orchardgrass.



Description

Leafy, warm-season, perennial bunchgrass. 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 indiagrass.

Seeding

Rate: 2-4 lb/a PLS*

Depth: 1/4-1/2 in

Date: Apr 15-Jun 1

Harvest

First harvest: Jun 15-Jul 15

Annual yield: 3-5 tons dry matter/a



*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



Crimson clover is a winter annual legume with long, cylindrical seed heads that are deep red in color. No V-shaped pattern like red clover, very hairy stems.

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 indiagrass. 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



Eastern gamagrass seed heads are segmented and form large seeds when mature, and its leaves extend all the way to the base of the plant, which forms a ring that expands as the plant gets older. Eastern gamagrass plants form a large, circular clump that expands as plants get older.

Indiangrass

Sorghastrum nutans



Indiangrass plants and seed heads take on a golden color in the fall.



Indiangrass leaves have a very characteristic split ligule, often compared to a rifle sight or the feathers of an American Indian headdress.

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: 1/4-1/2 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



Kentucky bluegrass leaves are dark green in color and are more narrow than either tall fescue or orchardgrass. The leaf tips of bluegrass are shaped like a boat's bow. No auricles, low ligule.

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



Korean lespedezas have leaves mainly at the top of the plant. The leaves are short, broad, and lobe shaped and are typically indented at the end.



Kobe lespedezas maintain leaves along the whole length of the stem. Both Kobe and Striate types have leaflets that are long, narrow, and football shaped.

Lespedeza (Sericea), Perennial

Lespedeza cuneata



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



The stem of orchardgrass is nearly flat at the base. It has a tall ligule but no auricles.

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.



Orchardgrass leaves are blue-green in color and emerge along the midrib of the leaf folded in half.

Seeding

Rate: 10-15 lb/a

Depth: 1/4-1/2 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



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.

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



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



Reed canarygrass is a coarse, robust grass with round stems and short, broad leaves. Leaf blades are flat with rough edges. Reed canarygrass has a prominent ligule.

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



Annual ryegrass leaves emerge rolled with auricles that wrap around the stem. Stems are round. (For seed head, see *Ryegrass, Perennial*.)

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. Under-side 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



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.

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.

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

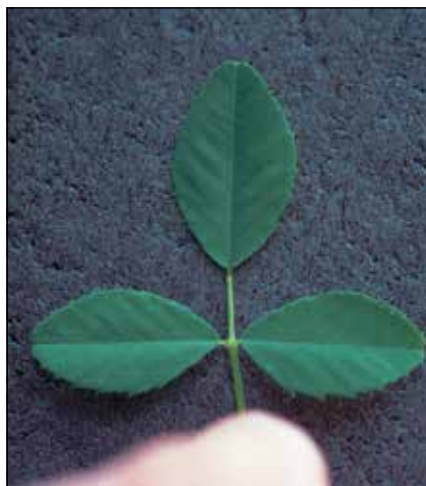
Depth: ¼-½ in

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

Panicum virgatum



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



Switchgrass leaves have a very hairy ligule that often has a dense tuft of hairs where the leaf joins the stem.

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.



Tall fescue has thick, wide leaves with prominent veins, and the emerging leaves are rolled in the bud. There is no obvious ligule.

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

Phleum pratense



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: 1/4-1/2 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.



The leaves are shiny underneath, sometimes watermarked with a V-shaped pattern, and stems are often grooved.

White clover leaves grow from stems (called "stolons") that run horizontally along the top of the ground. Unlike red clover, white clover does not have hairs.

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

