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College of Agriculture,
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Cooperative Extension Service

Forage Identification and Use Guide

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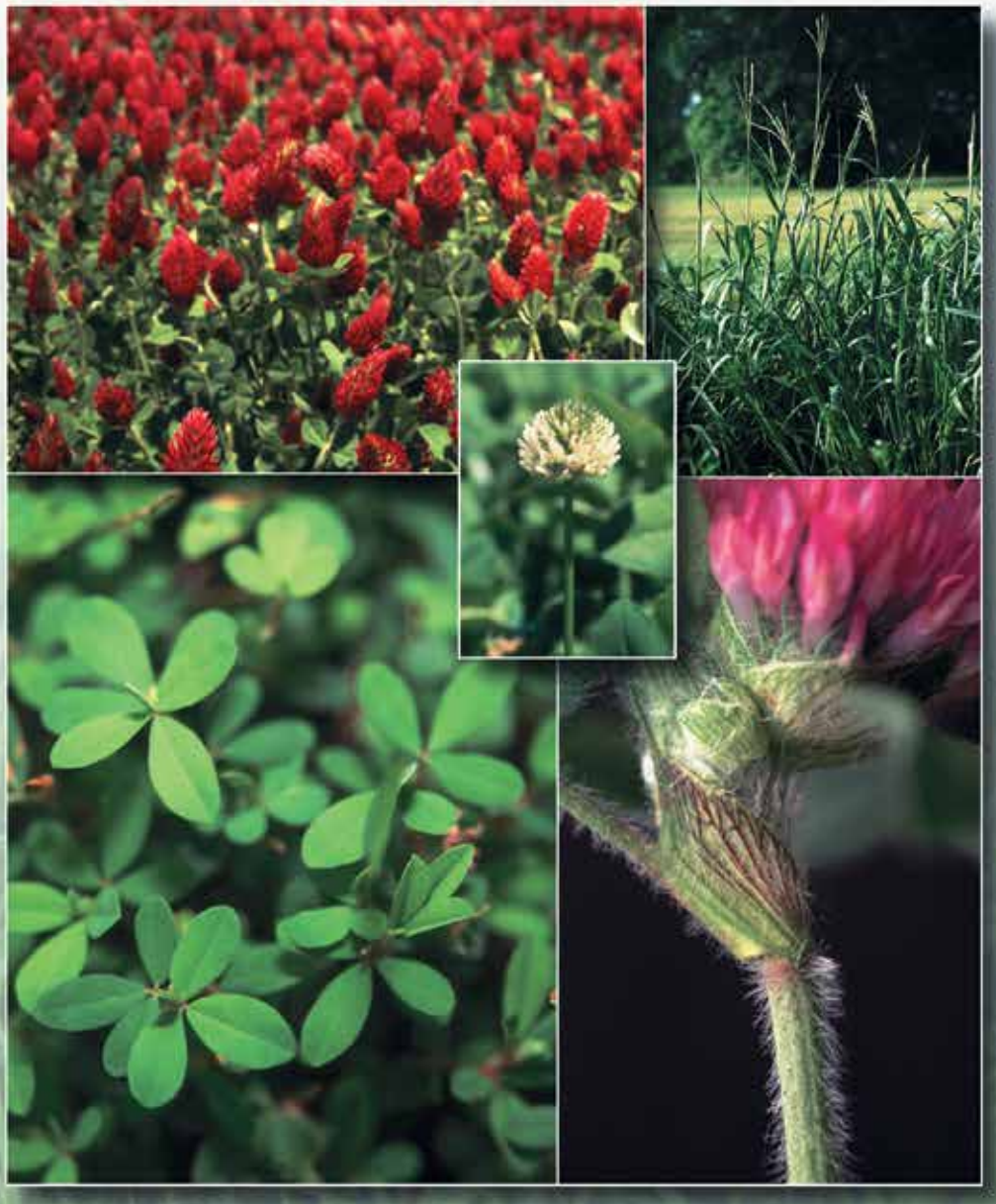

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Contents

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.

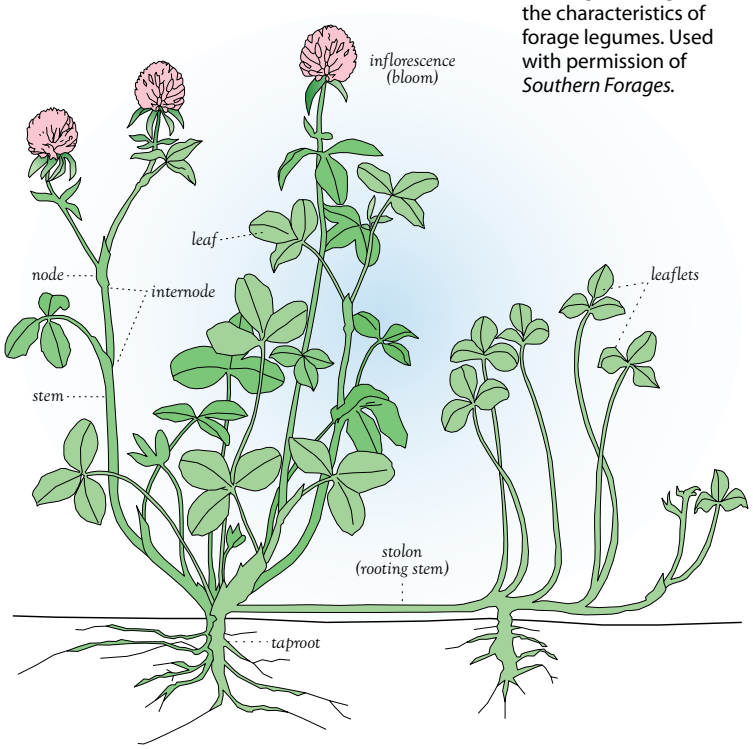


Figure 1.
A generalized drawing showing the characteristics of forage legumes. Used with permission of *Southern Forages.*

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.

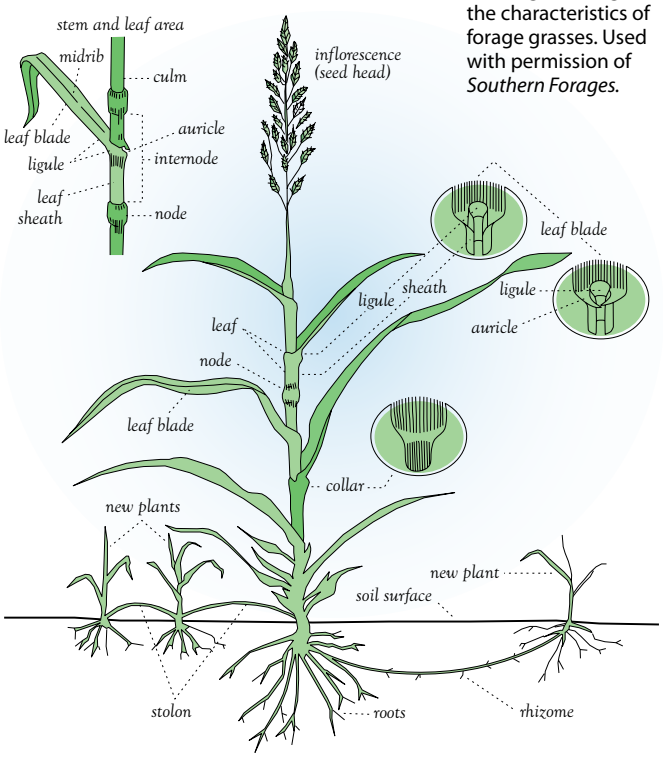


Figure 2.
A generalized drawing showing the characteristics of forage grasses. Used with permission of *Southern Forages.*

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.

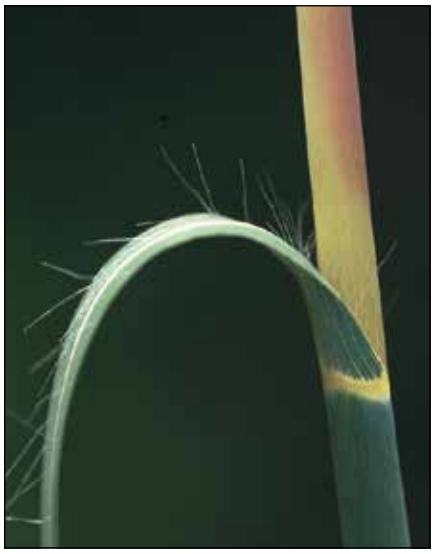
Seeding
Rate: 30-50 bushels of sprigs/a*
Depth: 1-2 in
Date: Apr 15-Jun 15

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: 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: 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 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

*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 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

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.

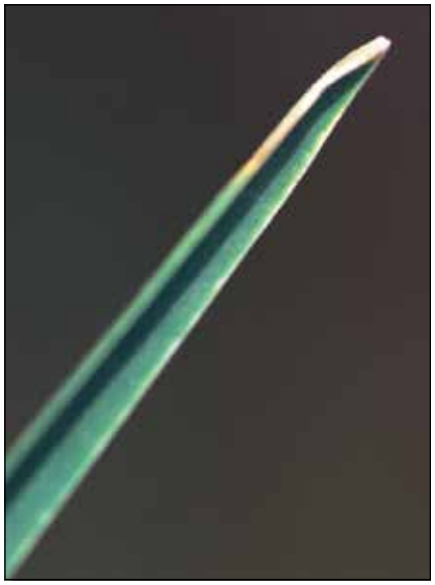
Seeding
Rate: 6-10 lb/a PLS*
Depth: ¼-½ in
Date: Apr 15-Jun 1

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

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

Sericia 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: 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

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

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.

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 alklaloids 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

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. 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

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.

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

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.

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: 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

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

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.

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

Issued: 5