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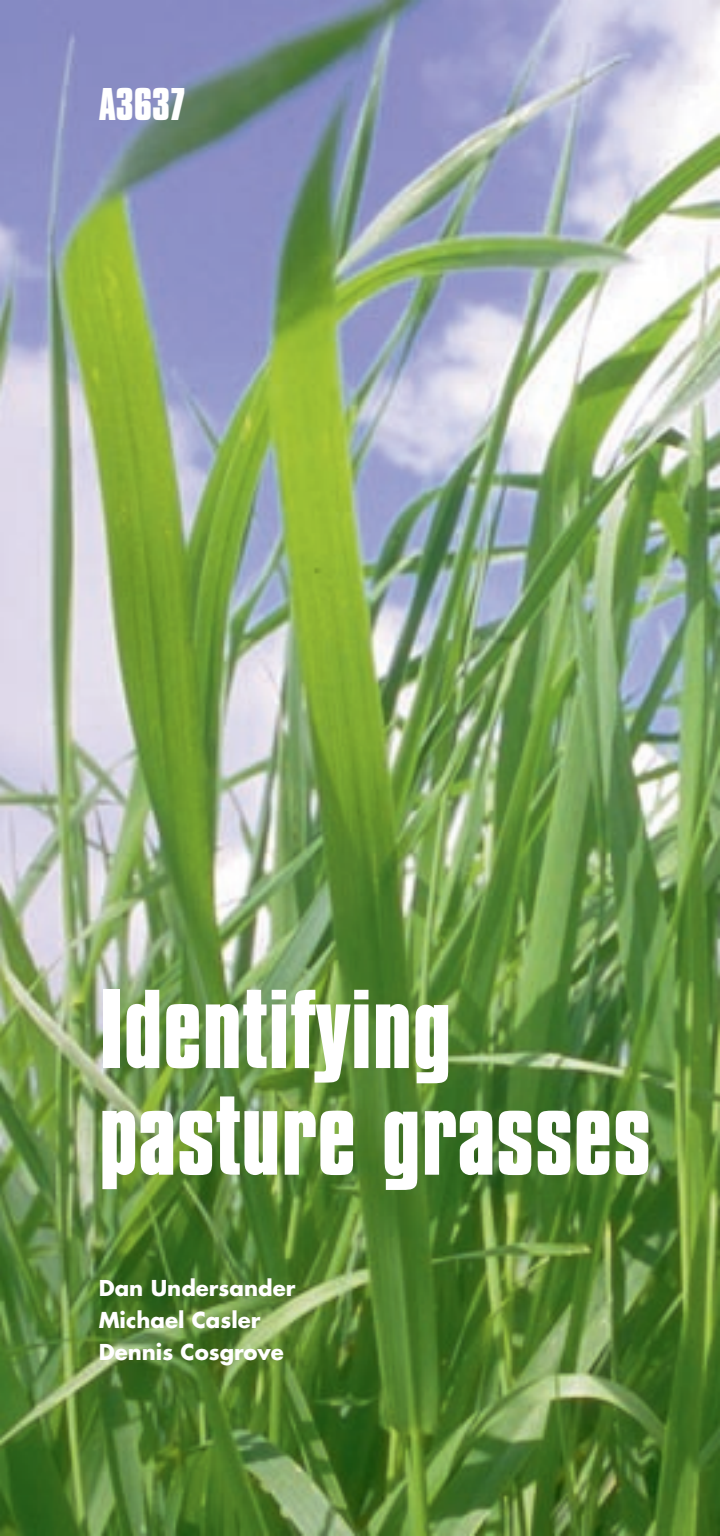


Identifying pasture grasses

Dan Undersander
Michael Casler
Dennis Cosgrove

Contents

Identifying pasture grasses

Dan Undersander, Michael Casler, and Dennis Cosgrove

Grasses are the base of Midwestern pastures. They can supply good yields of quality feed. This booklet identifies the 15 most common annual and perennial grasses in Midwestern pastures: the predominant seeded midwestern grasses, the most common native pasture grasses (quackgrass and Kentucky bluegrass), and a few annual weedy grasses. While many other grasses grow in the Midwest, they do not contribute significantly to the stand or yield.

This guide will help you identify grasses the first year, when you need to know whether a seeding was successful. It will also help you identify grasses in established pastures so you can make informed decisions about pasture management, fencing, and renovation.

This booklet is organized in three parts:

- seed and seedling identification for new plantings,
- vegetative identification (with seed heads) for established plants, and
- information about growth habit and management for each of the seeded grasses.

Using this guide

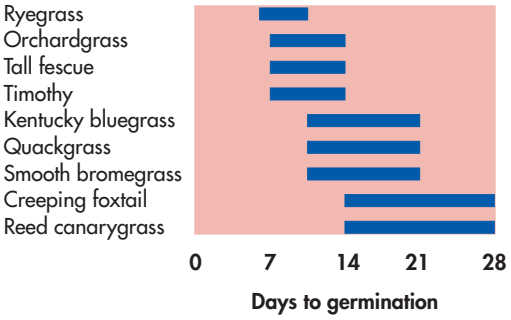
Before you plant

Before purchasing grass seeds, you may want to consult the grass management and descriptions section of this book. It describes the ideal uses for each species and outlines the best techniques for successful establishment, management, and harvest. The species information chart on page 58 summarizes seeding rates and relative tolerance for drought, traffic, and weed suppression.

Identifying seeds and seedlings

The best time to identify seedlings is when plants are at the 2- to 3-leaf stage. Grasses usually reach this stage 1 to 4 weeks after germination, depending on the species. Germination time (shown below) can sometimes help determine grass type.

Germination time



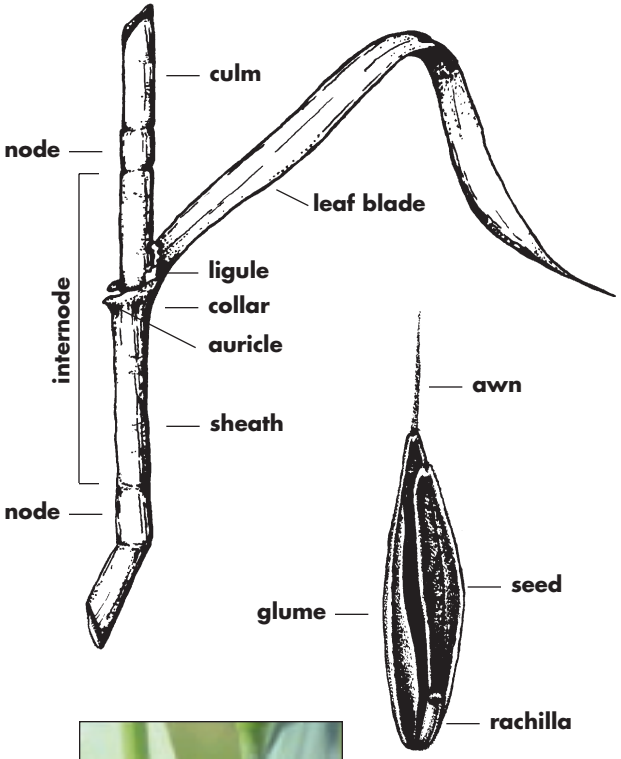
At the 2- to 3-leaf stage, use the "pull test" to determine whether the grass seedling is a perennial or an annual. An annual grass will pull easily and will have many short roots. A perennial grass will be harder to pull and will have at least one long root that may break off when you pull the seedling.

We've organized the grasses in the seed and seedling section by seed size. When you pull the seedling, look for the seed, which will often still be attached. Measure the longest dimension of the seed to determine which category (large, medium, or small) it fits in. Then page through the appropriate category to match the seed and seedling to the photographs and descriptions. The seeds are enlarged to show detail; for actual size, refer to the description at the top of each page.

Identifying vegetative grasses and seed heads

To identify grasses in established pastures, first check to see whether the grass is sod forming (spreading) or bunching (forms clumps). If you're examining a sod-forming grass, the next step is to look at the width of the leaf blades (½-inch wide, ¼-inch wide, or less than ⅛-inch wide). If you're looking at a bunch-type grass, check to see whether the unemerged leaf blade is rolled or folded. Once you've keyed these two items, turn to the appropriate category to identify the grass.

Parts of a grass plant



Overlapping (left) and fused (right) sheaths.

Glossary

Auricle A short extension of the leaf blade that wraps partway around the stem.

Awn A stiff, hair-like extension on some glumes.

Collar A light-colored band of tissue opposite the ligule, on the outer side of the grass leaf.

Culm The jointed stem of grasses.

Glume A tiny leaf-like structure enveloping the seed.

Internode The area of the stem between the nodes.

Leaf blade The flat, expanded portion of the grass leaf.

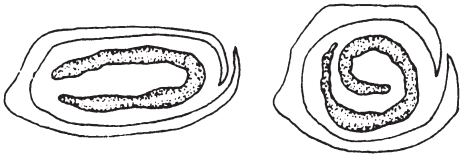
Ligule A membrane or series of hairs on the inner side of the grass leaf where the blade joins the sheath.

Node The place on the stem where a leaf attaches.

Rachilla The point of attachment of a seed to the seed head or to another seed.

Sheath The part of the leaf that wraps around the main stem.

Cross-section of a shoot (showing unemerged leaves)



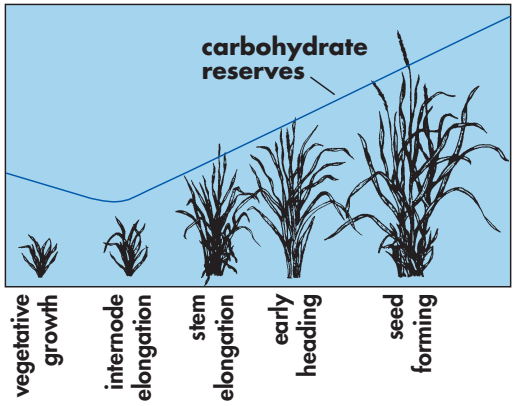
folded **rolled**

How a grass plant grows

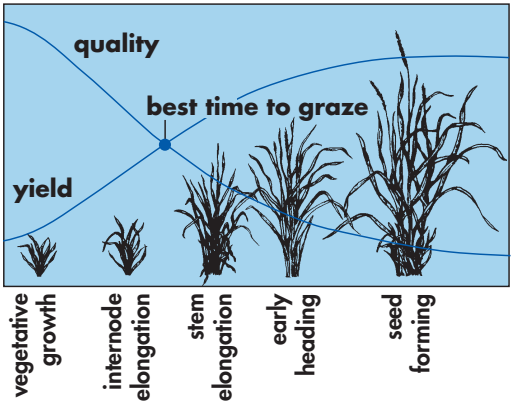
Plants get energy from the sun. Through photosynthesis, plants convert this energy to carbohydrates which can either be used for growth or stored for future use.

Forage growth is slow when plants are small (early spring growth or after grazing). When plants have few green leaves, they must rely heavily on stored carbohydrates for their energy, illustrated below. As leaves get bigger, photosynthesis increases dramatically, allowing for rapid growth. Before flowering, most pasture plants are growing as fast as possible if other factors are not limiting. Once the plant begins to flower, growth slows since most energy is diverted to flower and seed production when forage heads out.

Forage quality decreases as plants age. This occurs because, as plants get larger and more stemmy, a greater percentage of nutrients and dry matter is tied up in non-digestible forms (such as lignin).



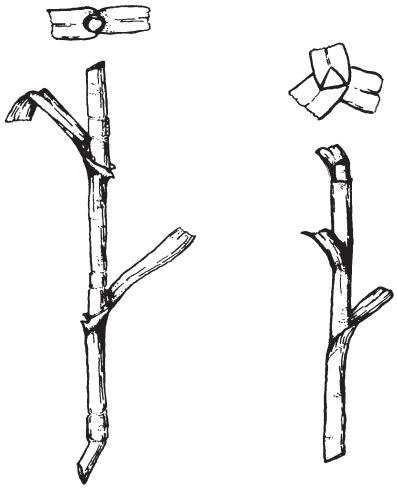
Good managers balance pasture quality against yield. The best time to graze is immediately following the most rapid growth but before flowering and seeding. A good rule of thumb is to wait until grasses are 10 inches tall before grazing. At this stage, sufficient carbohydrate reserves have been built up to allow for rapid regrowth; in addition, both yield and quality are high (see figure below). If grazing occurs before the forage has had time to rebuild its carbohydrate reserves, yield will be low, the next regrowth may be slow and reduced, and winter survival may be decreased. One of the cornerstones of a successful grazing system is having rest periods long enough to allow for rapid forage regrowth.



Is it a grass?

Grasses can sometimes be confused with sedges and rushes. To distinguish them, look for the following characteristics:

- **Sedges** have triangular stems that are filled with pith. The nodes are inconspicuous and leaves grow from the stem in three directions when viewed from top.
- **Rushes** have round or flat stems. Stems are commonly leafy only at the base. Leaves grow from two directions when viewed from the top.
- **Grasses** have round or flat stems. Stems are leafy along the entire length. Leaves grow from two directions when viewed from the top.



grass/rush **sedge**

LARGE SEEDS

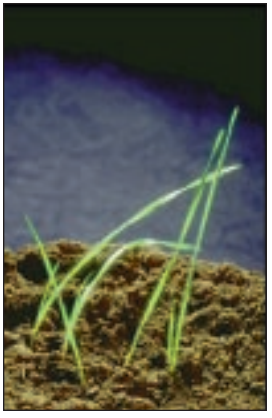
3/8 inch or larger

Smooth bromegrass

Species description, p. 52;
vegetative grasses/seed heads, p. 26.

Seedling characteristics

seed	about 3/8 inch long
shoot	tall, slender; frequently two leaves from same base
leaf blade	medium green; 1/8–1/4 inch wide
sheath	**sides fused at top;** rarely with short hairs
ligule	not prominent; ragged edge
auricles	none, or very short
other	slow emergence



Quackgrass

Vegetative grasses/seed heads, p. 30.

Seedling characteristics

seed	about 3/8 inch long
shoot	frequently reddish at base
leaf blade	dark green, robust; lower surface smooth
sheath	sides overlap at top; short hairs
ligule	short, membranous
auricles	**narrow, pointed, and clasping around the stem**

MEDIUM SEEDS

1/4 inch

Perennial ryegrass

Species description, p. 50;
vegetative grasses/seed heads, p. 40.

Seedling characteristics

seed	about ¼ inch long; rachilla attached
shoot	leaves slightly folded in shoot
leaf blade	**narrow; underside glossy**
sheath	sides overlap at top; smooth
ligule	membranous
auricles	long
other	rapid emergence

Annual (Italian) ryegrass

Species description, p. 50;
vegetative grasses/seed heads, p. 36.

Seedling characteristics

seed	about ¼ inch long; rachilla attached; usually has short awns
shoot	multiple leaves early
leaf blade	**glossy underside**
sheath	sides overlap at top; no hairs
ligule	membranous; medium length
auricles	present
other	rapid emergence

MEDIUM SEEDS

1/4 inch

Orchardgrass

Species description, p. 46;
vegetative grasses/seed heads, p. 41.

Seedling characteristics

seed	¼ inch long; glumes attached; seed often curved to side when viewed with rachilla on top
shoot	**leaves folded in whorl, making a flattened stem**
leaf blade	broad; v-shaped; bluish-green
sheath	flattened; sides overlap at top
ligule	prominent; cuts or splits on whitish margin
auricles	absent

Tall fescue

Species description, p. 54;
vegetative grasses/seed heads, p. 37.

Seedling characteristics

seed	¼ inch long; **club-shaped rachilla**
shoot	rolled in whorl
leaf blade	**base moves rapidly above ground;** dark green
sheath	leaves rolled in sheath; sides overlap at top
ligule	short
auricles	blunt with few hairs

SMALL SEEDS

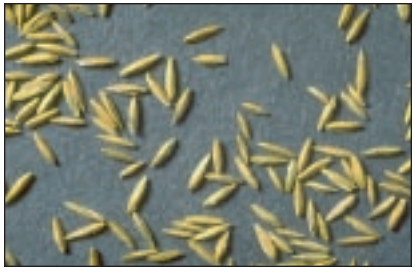
smaller than 1/4 inch

Kentucky bluegrass

Species description, p. 44;
vegetative grasses/seed heads, p. 34.

Seedling characteristics

seed	1/8 inch long; somewhat oval with widest point near middle
shoot	rolled but slightly flattened
leaf blade	**narrow with boat-shaped tip**
sheath	slightly compressed; sides overlap about half the length
ligule	membranous; smooth margin
auricles	absent



Reed canarygrass

Species description, p. 48;
vegetative grasses/seed heads, p. 28.

Seedling characteristics

seed	1/8 inch long; may have some hairs; back side glossy
shoot	rounded; **robust**
leaf blade	medium green; **broad**; flat with rough edges
sheath	sides overlap near top
ligule	prominent
auricles	none
other	slow emergence

SMALL SEEDS

smaller than 1/4 inch

Timothy

Species description, p. 56;
vegetative grasses/seed heads, p. 38.

Seedling characteristics

seed	small, less than 1/16 inch; oval
shoot	rounded
leaf blade	bluish-green; **largest leaf 'twisted' if viewed from above**
sheath	smooth; sides overlap at top
ligule	white; about 1/10 inch long
auricles	absent, occasionally present but small

Creeping foxtail

Vegetative grasses/seed heads, p. 32.

Seedling characteristics

seed	1/10 inch long; **hairy, fluffy, shiny**
shoot	robust
leaf blade	rolled in whorl; flat
sheath	**prominent nodes on stem;** sides fused at top
ligule	1/10 inch long; greenish
auricles	absent
other	seedlings rapidly form sheath so that leaf base is above ground

SMALL SEEDS

smaller than 1/4 inch

Barnyardgrass

Seedling characteristics

seed	1/10 inch long; oval
shoot	robust
leaf blade	broad
sheath	smooth; sides overlap near top
ligule	**absent**
auricles	**absent**

Yellow foxtail

Seedling characteristics

seed	1/8 inch long; oval
shoot	yellow
leaf blade	flat; smooth to slightly rough; usually with long hairs at base
sheath	flattened; sides overlap near top
ligule	**dense fringe of hairs**
auricles	none

SMALL SEEDS

smaller than 1/4 inch

Green foxtail

Seedling characteristics

seed	1/10 inch long; oval
shoot	robust
leaf blade	flat
sheath	rolled; hairs on margin; sides overlap near top
ligule	**fringe of small hairs**
auricles	absent, but small hairs present

Giant foxtail

Seedling characteristics

seed	1/8 inch long; oval
shoot	robust
leaf blade	flat with short hairs
sheath	hairs on margin; sides overlap near top
ligule	**fringe of small hairs**
auricles	absent

VEGETATIVE GRASS & SEED HEAD IDENTIFICATION

SOD—WIDE LEAF BLADE

Smooth bromegrass

Species description, p. 52; seeds/seedlings, p. 10.

Vegetative characteristics

growth habit	sod forming; shallow roots; rhizomes numerous but slender
leaf blade	**'M' constriction midway between base and tip;** about ½ inch wide
sheath	rolled in sheath; sides fused at top; rarely with short hairs
ligule	not prominent; ragged hairs
auricles	absent or very short
height	3–4 feet
seed head	seeds on long side branches; entire head frequently leans to one side

1/2 inch

SOD—WIDE LEAF BLADE

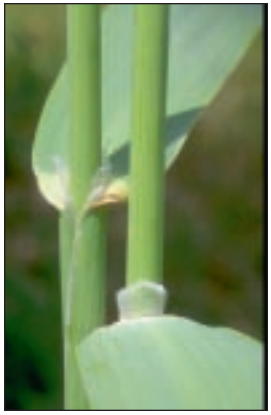
Reed canarygrass

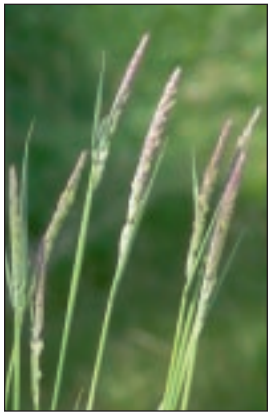
Species description, p. 48; seeds/seedlings, p. 17.

Vegetative characteristics

growth habit	sod forming; large diameter rhizomes
leaf blade	rolled in whorl; **flat, wide (½ inch) with rough margins;** constriction more than 2 inches from tip or collar
sheath	sides overlap near top
ligule	**prominent**
auricles	absent
height	usually 4–6 feet
seed head	slightly green or purple early then turning tan; seeds on short branches, spreading slightly as head matures

1/2 inch





SOD—MEDIUM LEAF BLADE

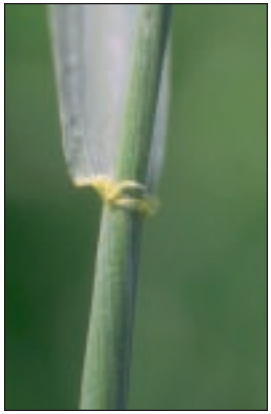
1/4 inch

Quackgrass

Seeds/seedlings, p. 11.

Vegetative characteristics

growth habit	sod forming; rhizomes long, slender, and white
leaf blade	flat; about ¼ inch wide; lower surface smooth; constriction 1–2 inches from leaf tip
sheath	sides overlap at top; short hairs
ligule	membranous; short
auricles	**narrow and clasping**
height	about 3 feet
seed head	no branches; seeds in cluster of 4 to 6; awns less than 1/16 inch



SOD—MEDIUM LEAF BLADE

1/4 inch

Creeping foxtail

Seeds/seedlings, p. 19.

Vegetative characteristics

growth habit	sod forming; rhizomes white and medium length
leaf blade	rolled in whorl; flat
sheath	**prominent nodes on stem**
ligule	1/10 inch long; greenish
auricles	absent
height	2–2½ feet tall
seed head	dense like timothy but shorter and shiny

SOD—NARROW LEAF BLADE

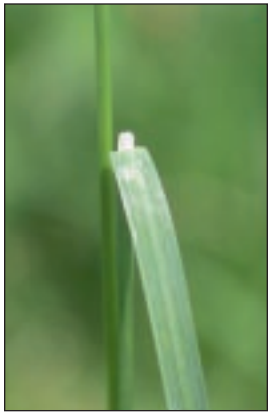
less than 1/8 inch

Kentucky bluegrass

Species description, p. 44; seeds/seedlings, p. 16.

Vegetative characteristics

growth habit	dense sod; slender rhizomes
leaf blade	**narrow with boat-shaped tip**
sheath	oval; sides overlap about half length
ligule	membranous; smooth margin
auricles	absent
height	12–18 inches
seed head	seeds on medium length branches; longer at base of seed head



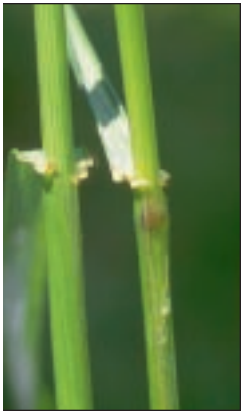
BUNCH—ROLLED LEAF BLADE

Annual (Italian) ryegrass

Species description, p. 50; seeds/seedlings, p. 13.

Vegetative characteristics

growth habit	bunch type
leaf blade	rolled in shoot; **underside of leaves glossy;** leaves flat with edges frequently rolled in
sheath	sides overlap; no hairs on sheath
ligule	membranous
auricles	present
height	up to 3 feet
seed head	seeds in clusters with flat side to stem; at least upper seeds have awns

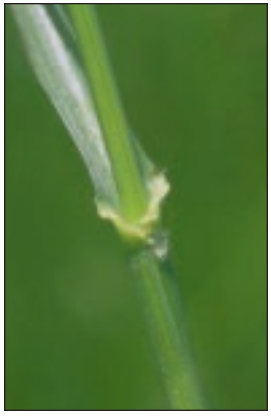


Tall fescue

Species description, p. 54; seeds/seedlings, p. 15.

Vegetative characteristics

growth habit	bunch type
leaf blade	dark green; **prominent veins; sharp edges; dull upper surface with shiny lower surface; coarse texture**
sheath	leaves rolled in sheath; sides overlap at top
ligule	short
auricles	blunt with few hairs
height	2½–3 feet
seed head	seeds on short branches



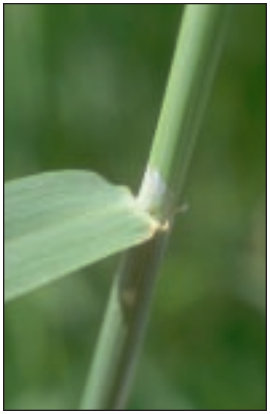
BUNCH—ROLLED LEAF BLADE

Timothy

Species description, p. 56; seeds/seedlings, p. 18.

Vegetative characteristics

growth habit	bunch type; **plants have corms (enlarged base of stem)**
leaf blade	flat; rolled within whorl
sheath	smooth; sides overlap near top
ligule	white; about 1/10 inch tall
auricles	absent, occasionally present but small
height	2–2½ feet
seed head	heads dense cylinder, 2–3 inches long; produces heads on late-season growth



BUNCH—FOLDED LEAF BLADE

Perennial ryegrass

Species description, p. 50; seeds/seedlings, p. 12.

Vegetative characteristics

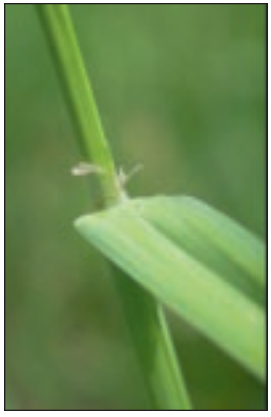
growth habit	bunch type
leaf blade	**leaves folded in shoot;** glossy
sheath	smooth; sides overlap at top
ligule	membranous
auricles	long
height	about 15–24 inches tall
seed head	seeds in clusters with flat side of cluster against the stem

Orchardgrass

Species description, p. 46; seeds/seedlings, p. 14.

Vegetative characteristics

growth habit	bunch type
leaf blade	v-shaped; bluish-green
sheath	**flattened;** sides overlap at top; rough
stem	**prominently flattened**
ligule	prominent with cuts or splits on whitish margin
auricles	absent
height	2–2½ feet
seed head	seeds on short side branches



GRASS MANAGEMENT & DESCRIPTIONS

Kentucky bluegrass

Seeds/seedlings, p. 16;
vegetative grasses/seed heads, p. 34.

Kentucky bluegrass (*Poa pratensis* L.) is a sod-forming grass. It is widely grown as a pasture grass throughout the United States and is the most common species in unimproved pastures in Wisconsin. Kentucky bluegrass is well adapted to less-managed pastures with low animal stocking rates.

Growth habit

New shoots of Kentucky bluegrass develop from rhizomes or from axillary buds in old shoots. Most of these shoots develop during short days in early spring or autumn. Rhizomes develop from buds on aboveground shoots. Carbohydrate storage is in roots in early spring and in roots and rhizomes later in the year. Bluegrass is winterhardy and persistent but has only fair drought and heat tolerance.

Establishment

Kentucky bluegrass is slower to establish than orchardgrass, ryegrass, tall fescue, and timothy. Seed using conventional or no-till into a killed sod. It is not a good candidate for frost seeding or interseeding.

Management

Kentucky bluegrass is the lowest yielding of the cool-season grasses commonly used for pasture. Productivity is greatest during spring and fall. Plants become dormant during the hot, dry months of summer. Kentucky bluegrass may be grazed to 1 to 2 inches. It requires relatively long rest periods to replenish carbohydrate reserves. Overgrazing will reduce forage yield. Grazing may be extended somewhat by including a legume. White clover is a good choice as both species are tolerant of close grazing. Nonetheless, a shortage of pasture will result if Kentucky bluegrass is the only forage source.

Harvesting for hay

Kentucky bluegrass is seldom grown for hay because of its short stature and low yield per cutting.

Varieties

Common seed as well as numerous varieties are available.

Orchardgrass

Seeds/seedlings, p. 14;
vegetative grasses/seed heads, p. 41.

Orchardgrass (*Dactylis glomerata* L.) is a bunch-type grass which produces an open sod. Orchardgrass is best adapted to a wide range of soils with good moisture where management is intense and grazing/haying will be frequent.

Growth habit

Orchardgrass does not produce rhizomes. Instead, it forms bunches by profuse tiller formation at the base of the plant. Carbohydrate storage for regrowth is mainly in the stem bases. Orchardgrass has only fair drought and heat tolerance, winterhardiness, and persistence. Stands tend to thin, leaving large clumps of orchardgrass plants scattered throughout the paddock.

Establishment

Orchardgrass is easier to establish than most of the other cool-season grasses. It is a good choice for interseeding into existing pasture with a no-till drill or by frostseeding, as well as for seeding into a killed sod or a conventionally tilled seedbed.

Management

Orchardgrass is one of the earliest maturing grasses. Unlike smooth bromegrass and timothy, the main stem has less influence on tillering in orchardgrass. Tiller formation begins early and continues throughout the season. Regrowth following grazing comes from the production and elongation of new leaves and the elongation of cut leaves on the stubble. As tiller formation and regrowth is rapid, orchardgrass should be grazed frequently to maintain adequate quality. Grazing timing is important as orchardgrass matures more rapidly than other species and forage quality drops quickly. Following seedhead development or removal, the subsequent forage is nearly all leaves.

Orchardgrass is a very aggressive species, and is not compatible with low-growing legumes. Frequent grazing will help avoid loss of other desirable species. Even though orchardgrass has rapid regrowth following grazing, it is still important to allow a rest period to reestablish carbohydrate levels. For high yields and good quality, allow orchardgrass to regrow to 10 inches before grazing. Despite its vigor, orchardgrass is susceptible to close grazing; leave a stubble height of 3 to 4 inches.

Harvesting for hay

Orchardgrass matures rapidly and consequently has a narrow harvest window. Late-maturing varieties, such as Orion, will better match the maturity of alfalfa or red clover if cutting for hay. Growing more than one variety, with differing maturities may make harvesting quality forage more manageable.

Varieties

Plant high-yielding varieties for grazing. See Extension publication *Perennial Forage Variety Update for Wisconsin* (A1525) for variety performance data. For mixtures with legumes harvested for hay, plant late-maturing varieties (preferred) such as Orion or medium-maturing varieties such as Dawn, Rancho, or Summer Green.

Reed canarygrass

Seeds/seedlings, p. 17;
vegetative grasses/seed heads, p. 28.

Reed canarygrass (*Phalaris arundinacea* L.) is a sod-forming grass. It is the highest yielding cool-season grass when fertilized and an excellent choice in wet areas where it is difficult to grow other species. Reed canarygrass can be used to provide grazing during the "summer slump" of some other forage grasses.

Growth habit

Reed canarygrass reproduces from short, thick rhizomes. Aboveground shoots develop in early spring and late fall. Shoots which develop in spring only live for that year while those that develop in fall overwinter and survive through the following year. Carbohydrate storage occurs in rhizomes. The seed head develops in spring and matures in July. New rhizomes form from buds on old rhizomes during the summer. Reed canarygrass has excellent winterhardiness and persistence. It is tolerant of wet soils but also does well on droughty soils due to a deep root system.

Establishment

Reed canarygrass is more difficult to establish than other cool-season grasses, particularly by interseeding or frost seeding. Seed using conventional tillage or no-till into a killed sod. Seeding in late summer when there is reduced weed competition is often more successful than spring seedings.

Management

Once established, reed canarygrass is a very aggressive species. Like orchardgrass, it forms tillers throughout the growing season. Reed canarygrass must be well managed to avoid overgrowth and subsequent low quality. An early grazing, before tillers form, will not harm plants. Following this period, wait until plants are 14 to 16 inches tall before grazing again. Unlike other grasses, canarygrass will provide good quality forage up to 24 inches in height. Leave 40 to 60% of the dry matter each grazing.

Reed canarygrass may be established with a legume. However, the legume may disappear from the stand as the reed canarygrass develops a thick sod.

Harvesting for hay

Reed canarygrass should be cut at least three times per year, the first time as soon as possible after heads appear, to maximize the production of high quality forage.

Varieties

Reed canarygrass use has been limited by low palatability due to the presence of alkaloids. Recent releases of low alkaloid varieties may increase the use of this species. Three of these varieties are Palaton, Rival, and Venture.

Ryegrass, annual (Italian) and perennial

Annual ryegrass: seeds/seedlings, p. 13; vegetative grasses/seed heads, p. 36.
Perennial ryegrass: seeds/seedlings, p. 12; vegetative grasses/seed heads, p. 40.

Annual ryegrass (*Lolium multiflorum* L.) and perennial ryegrass (*Lolium perenne* L.) are bunch-type grasses. They establish rapidly and have high forage quality. However, poor winterhardiness prevent their use for long-term forage production. Ryegrass is an excellent cover crop or emergency crop. In northern Wisconsin perennial ryegrass is also an excellent choice for short-term hay or pasture production when mixed with red clover.

Growth habit

Ryegrass produces tillers from crown buds at the base of the plant. Carbohydrate storage is in stem bases. It establishes rapidly and yields well under cool, wet conditions. Ryegrass has low drought and heat tolerance. Perennial ryegrass grows less over summer than annual ryegrass. Perennial ryegrass has low winterhardiness, surviving 3 to 4 years in northern Wisconsin with good snow cover but less in the rest of the state.

Establishment

Ryegrass establishes rapidly, providing quick ground cover and a ready supply of forage. Establish by sod seeding, conventional tillage, interseeding, or frost seeding.

Management

Ryegrass may be grazed closely early in the season. A rest period should follow this first grazing to allow tiller development and carbohydrate production. Graze again when plants are 8 inches tall. Leave a stubble height of 3 to 4 inches.

Ryegrass produces high-quality forage in cool, wet weather. Annual and perennial ryegrasses have relatively shallow root systems, so hot, dry weather will reduce yields.

Perennial ryegrass should be included in most pasture seeding mixtures at a low seeding rate (2 lb/a). Do not rely on this short-lived species as the only grass in a pasture mix.

Varieties

Crown rust can severely defoliate plants, reducing forage yield, quality, and persistence. Plant resistant varieties when possible.

Also be sure to obtain seed that is certified to be endophyte-free. This will eliminate animal health problems associated with toxins produced by a fungus that often lives in association with ryegrass plants.

Annual (Italian) ryegrass and perennial ryegrass are available in two forms: diploid and tetraploid. Diploid varieties are more densely tillering. Tetraploid varieties have greater resistance to crown rust, giving them greater summer productivity and quality.

When purchasing annual ryegrass, select late-maturing varieties to reduce head formation and maintain high quality.

For perennial ryegrass, use forage type varieties rather than turf varieties which are extremely low growing and low yielding.

Smooth bromegrass

Seeds/seedlings, p. 10;
vegetative grasses/seed heads, p. 26.

Smooth bromegrass (*Bromus inermis* Leyss.) is a high-yielding grass but requires longer recovery periods than other grasses. It is best adapted to well-drained soils and is an excellent choice for drought-prone areas.

Growth habit

Smooth bromegrass spreads by short rhizomes to form a dense sod. The plant stores most of the food needed for regrowth and overwintering in the rhizomes. Smooth bromegrass is winterhardy, drought and heat tolerant, and is quite persistent.

Establishment

Bromegrass has low seedling vigor and is more difficult to introduce into pastures by frost seeding or interseeding than orchardgrass, timothy, or ryegrass. Successful stands may be established by no-till seeding into killed sods or through conventional tillage methods.

Management

Smooth bromegrass may be grazed before stems elongate, when plants are less than 6 to 8 inches tall. It is more sensitive than most other species to grazing while stems are elongating. For long-lasting stands and high-quality forage, wait until plants are at least 10 inches tall or until new basal tillers are visible before grazing. Graze no closer than 4 inches to avoid removing new shoots from the base of the plant. Smooth bromegrass requires long recovery periods, especially during the summer slump.

Smooth bromegrass is most productive in spring. Subsequent production may be low, especially if nitrogen is limiting. Smooth bromegrass is very responsive to nitrogen; consequently, mid- and/or late summer applications will increase productivity. It can become sodbound in pure stands if not well fertilized.

Harvesting for hay

Harvest legume/bromegrass mixtures before bromegrass stems elongate or after new basal tillers are evident. This may mean harvesting the legume later than normal. Smooth bromegrass is not competitive and has only moderate compatibility with legumes in mixtures.

Varieties

Alpha and Badger have improved resistance to root rot for better establishment and have higher forage quality than other varieties. Alpha and Rebound have improved compatibility with legumes.

Tall fescue

Seeds/seedlings, p. 15;
vegetative grasses/seed heads, p. 37.

Tall fescue (*Festuca arundinacea* Schreb.) is a bunch-type grass which spreads from short rhizomes. Tall fescue has poor palatability and should not be mixed with other pasture species in the Midwest. It is a good choice in areas where animal traffic is high. Tall fescue is also widely used for ditch embankments and grass waterways.

Growth habit

Food storage in tall fescue takes place in stem bases and short rhizomes. Tall fescue is very tolerant of drought and flooding, but somewhat lacking in winterhardiness for Wisconsin. It is also tolerant of low fertility conditions, although it responds well to optimum soil fertility levels. Tall fescue is more shade tolerant than other cool-season grasses.

Establishment

Tall fescue is as easily established as orchardgrass, timothy, and perennial ryegrass. It may be interseeded, established by conventional methods, or no-till seeded in a killed sod.

Management

Tall fescue can be grazed early in the spring but avoid grazing once stem elongation begins. Plants may be grazed or cut for hay after growth is 10 inches tall and plant carbohydrate reserves have been replenished. Leave at least 4 inches of stubble to protect stem bases where carbohydrates are stored. Tall fescue will continue to grow more through the summer than most cool-season grasses.

Harvesting for hay

Tall fescue can provide 2 to 3 hay cuttings per year.

Stockpiling

Poor overwintering and low palatability has precluded widespread use in Wisconsin. However, tall fescue remains erect and maintains quality when stockpiled for use throughout the winter. It can be used to lengthen the grazing season for heifers and dry cows and as a forage source for beef cattle and horses. To maximize stockpiled forage, apply 30 to 50 lb/a of nitrogen on August 1 and defer grazing the rest of the fall.

Varieties

Tall fescue contains internal fungi that produce alkaloids. The alkaloids appear to increase persistence but reduce the average daily gains in grazing beef cattle, sheep, and horses. When planting for grazing, select endophyte-free, low-alkaloid varieties; in ungrazed areas, plant fungus-infected varieties for improved stand life.

Timothy

Seeds/seedlings, p. 18;
vegetative grasses/seed heads, p. 38.

Timothy (*Phleum pratense* L.) is a bunch-type grass which produces an open sod. It is best adapted to cool, moist soils.

Growth habit

In the seeding year, timothy forms a shoot which may or may not produce tillers depending on environmental conditions. In spring of the second year, internodes elongate and the seedhead forms. During this time, lower nodes form an enlarged food storage organ called a corm. Corms supply energy for subsequent tiller formation. As secondary shoots develop, the corms on the primary shoot deteriorate and a secondary corm is formed. Very few corms overwinter, and new spring growth develops from buds at the base of the plant. Unlike other cool-season grasses, timothy produces flowers and seedheads throughout the summer. Timothy has excellent winterhardiness but poor drought and heat tolerance and is not persistent under grazing.

Establishment

Timothy seedlings are more vigorous than smooth bromegrass seedlings but less vigorous than most forage grasses. Timothy can be interseeded, sod seeded, or seeded using conventional methods.

Management

Do not graze timothy during stem elongation. Grazing during this period, when food reserves are low, will slow regrowth and accelerate stand loss. It is more sensitive than most other species to grazing while stems are elongating. Wait until plants are 10 inches tall or until new basal tillers are visible before grazing. Leave at least 4 inches of stubble to keep from removing young tillers and developing corms. Timothy pastures can be stemmy due to constant seedhead production. This reduces palatability to animals, so graze routinely to maintain quality.

Timothy grows best under cool wet conditions. Stand production and persistence will decline severely under heat or drought stress. It is shallow rooted and not a good choice for sandy soils. Timothy responds to nitrogen fertilization, but performs better than most cool-season grasses with low nitrogen.

Harvesting for hay

Timothy is often grown with red clover for harvested forage. Timothy matures relatively late, making red clover, which flowers later than alfalfa, a good match. Later-maturing timothy varieties can be grown in mixture. If planting with alfalfa, select an early-maturing variety. Timothy is not competitive against other grasses, but has good compatibility with legumes in mixtures.

Varieties

Select medium-maturing varieties tested for grazing; select early-maturing varieties to mix with alfalfa for hay. For performance information, see Extension publication *Perennial Forage Variety Update for Wisconsin* (A1525).

Species information

Grass species	Growth habit	Weed suppression	Drought	Traffic	Seed alone (lb/a)	Seed mixture (lb/a)
Creeping foxtail	bunch	P	P	G	10	5
Kentucky bluegrass	sod	G	F	VG	15	4
Orchardgrass	bunch	G	F	G	10	2–4
Quackgrass	sod	G	VG	G	—	—
Reed canarygrass	sod	VG	VG	G	6	5
Ryegrass, annual	bunch	VG	P	G	20–25	2
Ryegrass, perennial	bunch	VG	P	G	20–25	2
Smooth bromegrass	sod	G	VG	G	16	3–6
Tall fescue	bunch	G	VG	VG	10	4
Timothy	bunch	P	P	F	8	2–4

Abbreviations: **VG** = very good, **G** = good, **F** = fair, **P** = poor.

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