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Distinguishing Johnsongrass and Young Summer Grass Weeds

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One of the most difficult tasks associated with the management of weedy grasses is accurately identifying the species of an immature plant. Since many grasses look similar when very young, identification to species is key to correctly implementing a weed management program, especially one using herbicides. For example, some grasses are annuals, which must be killed before they set seed, and others are perennials, which can regrow year after year, even after the vegetative portion has been killed. Or, one species may respond to a given herbicide differently than another species, and many species have developed tolerance or resistance to certain herbicides.

Johnsongrass (*Sorghum halepense* (L.) Pers.), a summer perennial grass, is one of the world's most noxious and economically important weeds. It is especially troublesome in orchards, vineyards, annual cropping systems, ditches, canals, and roadsides. It reproduces via seed and creeping underground stems (rhizomes) and can spread rapidly over time.

This guide aids in identifying and distinguishing johnsongrass and other grass species that appear similar when immature, using distribution maps of United States counties where each species has been reported, photographs, and diagnostic characteristics for each species. A glossary and a dichotomous key are included at the end of the guide to aid in identification. Photos and characteristics are generalizations, as many species vary in form and growth habit. This guide contains identification keys for the following species:

Johnsongrass (*Sorghum halepense* (L.) Pers.)
Shattercane (*Sorghum bicolor* (L.) Moench)
Barnyardgrass (*Echinochloa crus-galli* (L.) P. Beauv.)
Fall panicum (P*anicum dichotomiflorum* Michx.)
Giant reed (*Arundo donax* L.)
Orchardgrass (*Dactylis glomerata* L.)
Perennial ryegrass (*Lolium perenne* L.)
Tall fescue (*Festuca arundinacea* Schreb.)

Johnsongrass florets. *Photo:* J. K. Clark.

Johnsongrass collar. *Photo:* A. R. Ceseski.

Johnsongrass ligule. *Photo:* J. M. DiTomaso.

Johnsongrass plant. *Photo:* A. R. Ceseski.

Johnsongrass midvein. *Photo:* A. R. Ceseski.

Johnsongrass panicle. *Photo:* A. R. Ceseski.

Johnsongrass (*Sorghum halepense*)

Seeds

- Florets average 1/16 in. wide by 3/16 in. (1.5 to 5 mm) long; florets are dark red to black when mature.
- Spikelets usually consist of one fertile floret and two sterile florets with awns up to 9/16 in. (14 mm) long.
- Seeds are football shaped.

Ligule and Collar

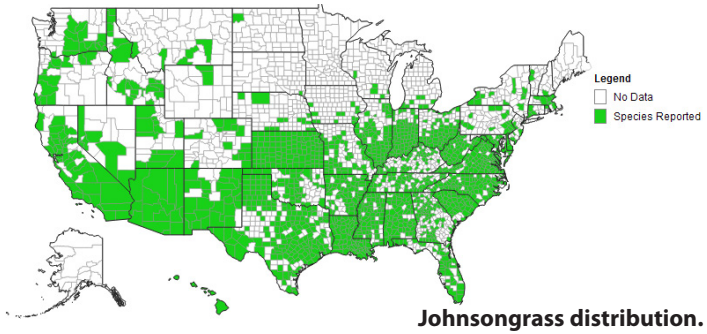
- Ligules are membranous and fringed, to 1/4 in. (6 mm) long, and may be prominent or hidden.
- Collars are hairless to sparsely hairy and may be clasping or sessile.
- Auricles are absent.
- Sheaths are open and may overlap or join flush.

Stem and Leaf

- Stems are hairless with solid internodes and may have hairless to sparsely hairy nodes that may be reddish.
- Aerial (prop) roots may develop near the stem base.
- Leaves emerge rolled in the bud, grow up to 24 in. (60 cm) long, and are smooth with smooth or very slightly rough margins.
- Leaves have a prominent midrib and a white midvein.

Inflorescence

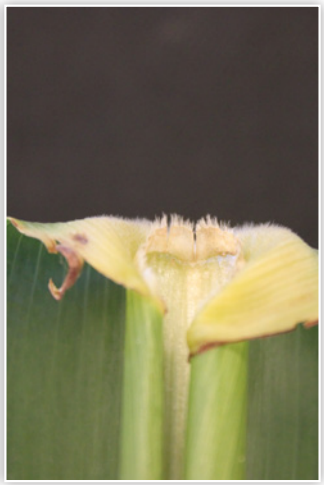
- Panicles are wide open, 4 to 20 in. (10 to 50 cm) long, and pyramidal.
- Inflorescences may be golden to dark purple.
- Inflorescences may be infested with smut, making them appear dark and condensed.



Johnsongrass distribution.

Shattercane seeds. *Photo:* J. K. Clark.

Shattercane ligule and collar. *Photo:* A. R. Ceseski



Shattercane ligule and collar. *Photo:* A. R. Ceseski.

Shattercane stem and leaf. *Photo:* A. R. Ceseski.

Shattercane plant. *Photo:* University of Illinois Crop Services Extension.

Shattercane inflorescence. *Photo:* A. R. Ceseski.

Shattercane (*Sorghum bicolor*)

Seeds

- Florets are waxy, average 1/8 in. wide by 5/32 in. long (3 by 4 mm), and are usually black when mature.
- Spikelets usually consist of one fertile floret and one sterile floret, with an awn up to 7/16 in. (11 mm) long.
- Seeds are ovoid.

Ligule and Collar

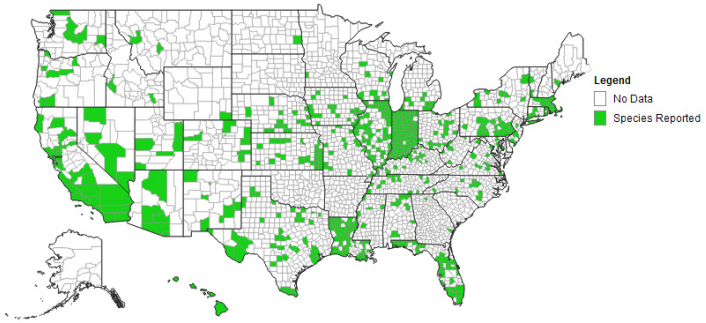
- Ligules are membranous, fringed, and less than 3/16 in. (5 mm) long.
- Collars are hairless to sparsely hairy. Sheaths are open and may overlap or join flush.
- Auricles are absent.
- Sheaths are open and may be reddish near collars.

Stem and Leaf

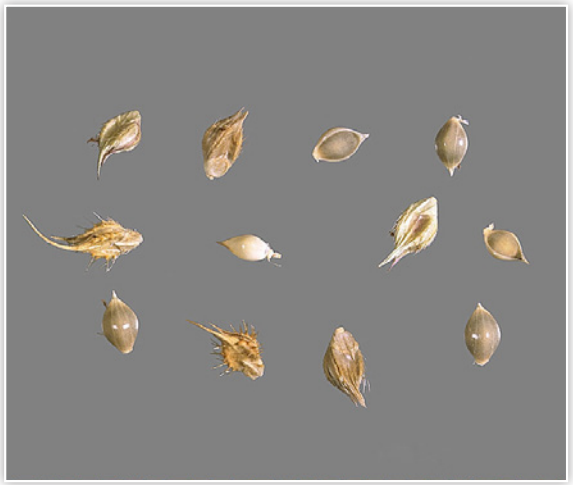
- Stems and leaves are waxy.
- Stems are hairless, with solid internodes and may have red or purple spots; aerial roots may develop near stem base.
- Leaves emerge rolled in the bud, are wavy and smooth, up to 4 in. (10 cm) wide and 40 in. (1 m) long, and have rough edges.
- Leaves have a small v-shaped midrib and a narrow, white midvein.

Inflorescence

- Panicles are erect and partially open, 4 to 20 in. (10 to 50 cm) long, and fountain shaped, with a wavy axis (rachis) and branches (rachillae).
- Inflorescences may be cream to purple with black spikelets.



Shattercane distribution.



Barnyardgrass seeds. *Photo:* J. O'Brien.

Barnyardgrass collar without ligule. *Photo:* J. K. Clark.

Barnyardgrass collar. *Photo:* J. M. DiTomaso.

Barnyardgrass collar. *Photo:* J. M. DiTomaso.

Barnyardgrass plant. *Photo:* J. K. Clark.

Barnyardgrass awns and panicle. *Photo:* J. M. DiTomaso.

Barnyardgrass awns. *Photo:* J. K. Clark.

Barnyardgrass (*Echinochloa crus-galli*)

Seeds

- Spikelets are leathery, 3/32 wide by 5/32 in. (2 by 4 mm) long, and shatter easily.
- Lemma awns are variable and may be absent or up to 2 in. (5 cm) long.
- Lemmas are pointed and usually hairy; seeds are also pointed.

Ligule and Collar

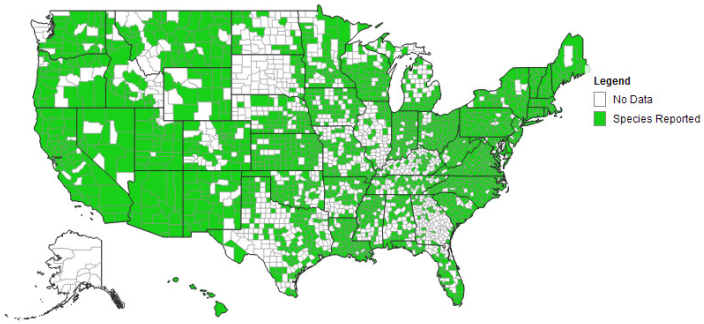
- Ligules are absent.
- Collars are hairless to very sparsely hairy on margins and are semiclasping to clasping.
- Auricles are absent.
- Sheaths are open.

Stem and Leaf

- Early growth may start prone then turn upward or be entirely erect.
- Stems are hollow and may be ribbed, and sheaths are often purple near the base.
- Leaves emerge rolled in the bud, are up to 1½ in. (4 cm) wide and 20 in. (50 cm) long, and are rough when rubbed toward collar. Sheaths are open.

Inflorescence

- Panicles are highly variable, can be awnless or have long awns, and may be erect or drooping.
- Panicles may be open or dense, but branches (rachillae) are densely clustered with florets.
- Inflorescences are usually pale green to purple.



Barnyardgrass distribution.

Fall panicum seeds. *Photo:* J. K. Clark.

Fall panicum ligule. *Photo:* R. B. Ackley.

Fall panicum ligule. *Photo:* R. B. Ackley.

Fall panicum collar. *Photo:* J. M. DiTomaso.

Fall panicum plant. *Photo:* J. M. DiTomaso.

Fall panicum head. *Photo:* J. M. DiTomaso.

Fall Panicum (*Panicum dichotomiflorum*)

Seeds

- Lemmas are leathery, 1/16 in. wide by 1/8 in. long (1.5 by 3 mm), green to purple, with no awns.
- Seeds are elliptical (football shaped), shiny, and green.

Ligule and Collar

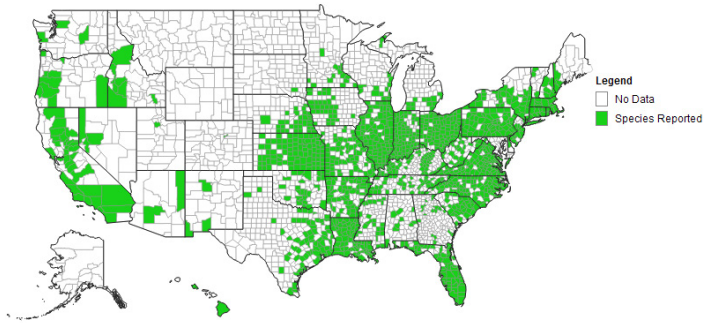
- Ligules are white, entirely fringed, and less than 3/16 in. (5 mm) long.
- Collars do not clasp stems; auricles are absent.

Stem and Leaf

- Early growth may start prone then turn upward or be entirely vertical.
- Nodes can be knobby and angled.
- Leaves emerge rolled in the bud and are usually hairless, but seedling leaf blades are usually sparsely hairy on the underside.
- Leaves grow up to 5/8 in. (16 mm) wide by 20 in. (50 cm) long, have rough margins and a white midvein, and a pronounced midrib.

Inflorescence

- Panicles are erect and very open, with tiny spikelets that do not open away from their stalks (rachillae).



Fall panicum distribution.

Giant reed seeds. *Photo:* J. A. O'Brien.

Giant reed collar and ligule. *Photo:* M. A. Garland.

Giant reed collar and ligule. *Photo:* Z. Akulova.

Giant reed sheath. *Photo:* J. M. DiTomaso.

Giant reed flowering head. *Photo:* J. M. DiTomaso.

Giant reed young plant. *Photo:* D. Moorhead.

Giant Reed (*Arundo donax*)

Seeds

- Florets are up to 9/16 in. (14 mm) long, hairy, shiny, and usually without awns.
- Seeds are usually sterile, so young plants are likely the products of rhizome fragments or stem nodes.

Ligule and Collar

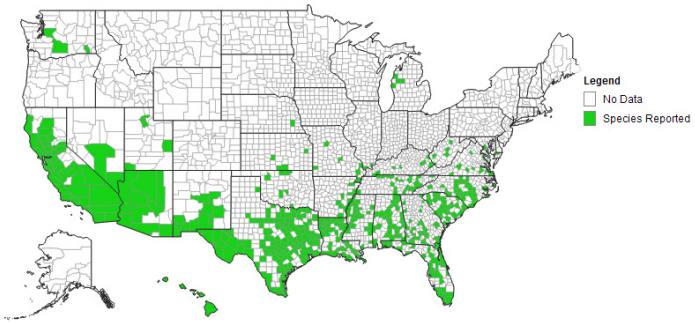
- Ligules are membranous, fringed, and up to 1/16 in. (1.5 mm) long.
- Collars are yellow to light green, clasp the stem to form small auricles, and are hairy at the margin.

Stem and Leaf

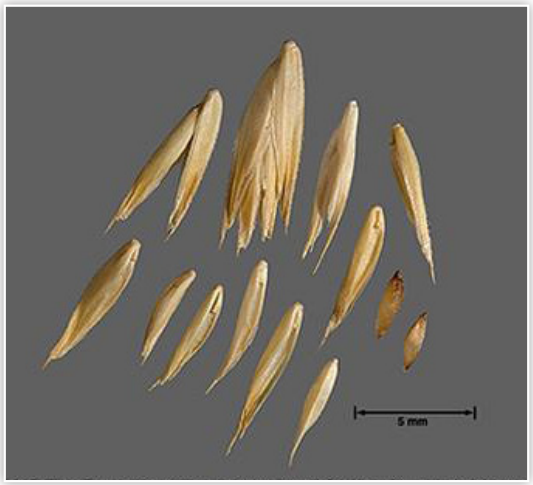
- Internodes are up to 1½ in. (4 cm) thick, rigid and woody at maturity, hollow, and usually hairless.
- Leaves are up to 2⅜ in. (6 cm) wide and 36 in. (90 cm) long and alternate on the stem.
- Leaves are hairless, with very rough edges.
- Leaves and stems may be striped yellow-green.

Inflorescence

- Panicles are plumelike and dense and can be densely packed to wide open.



Giant reed distribution.



Orchardgrass seeds. *Photo:* J. A. O'Brien.

Orchardgrass ligule. *Photo:* North Carolina State University Center for Turfgrass Environmental Research and Education.

Orchardgrass collar. *Photo:* B. B. Fischer.

Orchardgrass stem. *Photo:* J. M. DiTomaso.

Orchardgrass panicle. *Photo:* J. M. DiTomaso.

Orchardgrass open panicles. *Photo:* J. M. DiTomaso.

Orchardgrass plants. *Photo:* J. M. DiTomaso.

Orchardgrass (*Dactylis glomerata*)

Seeds

- Florets are narrow, up to ¼ in. (6 mm) long, with very short hairs on one side and short awns, to 1/32 in. (1 mm).

Ligule and Collar

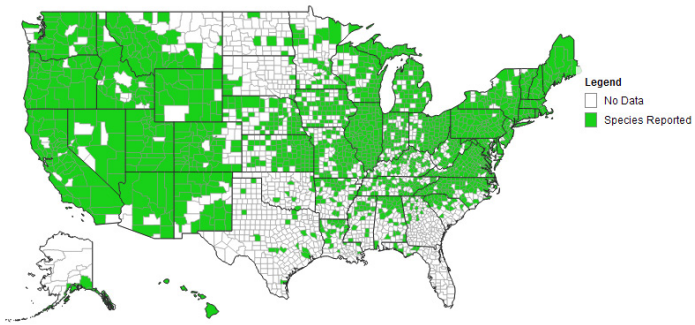
- Ligules are papery or membranous, up to 7/16 in. (11 mm) long, have a rounded top, and may be with or without a fringe.
- Collars are partially clasping and are usually cream to yellow.
- Auricles are absent.

Stem and Leaf

- Stems and leaves may have a bluish cast.
- Stems are ovoid and may grow fully erect or begin prostrate.
- Leaves are V-shaped, emerge folded in the bud, to ¼ in. (6 mm) wide, and slightly rough.
- Sheaths are closed about 1½ in. (4 mm) below the collar and have a prominent ridge (keel) on the backside.

Inflorescence

- Panicles are open, with clusters of ovoid spikelets branching from the rachis.
- Spikes tend to face the same direction.



Orchardgrass distribution.

Perennial ryegrass seeds. *Photo:* J. A. O'Brien.

Perennial ryegrass collar. *Photo:* Z. Akulova.

Perennial ryegrass collar. *Photo:* R. Norris.

Perennial ryegrass stem and leaf. *Photo:* J. M. DiTomaso.

Perennial ryegrass inflorescence. *Photo:* J. M. DiTomaso.

Perennial ryegrass plant. *Photo:* L. J. Bakker.

Perennial Ryegrass (*Lolium perenne*)

Seeds

- Florets usually remain within a tan to brown palea/lemma.
- Florets are rigid and narrow, more than 3/16 in. (5 mm) long.

Ligule and Collar

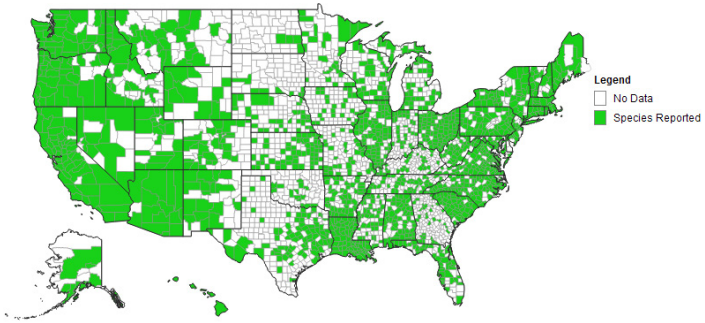
- Ligules are membranous, up to 1/8 in. (3 mm) long, with no hairy margin.
- Collars are clasping and may be light green to yellow.
- Clasping auricles are usually present and at least 3/16 (5 mm) in. long but may be absent in hybrid plants.

Stem and Leaf

- Stems can be round or oval, are hairless, and are usually ridged.
- Leaves are typically folded in the bud, but in hybrids they may be rolled. Seedling leaves are glossy.
- Leaves are ridged, hairless, and narrow, up to 1/4 (6 mm) in. wide and 12 in. (30 cm) long, with a sharp midrib.

Inflorescence

- Spikes have very short or no stalks, with spikelets alternating in the same plane.
- Spikelets have only a single glume.
- Individual spikelets have up to 10 waxy florets, with variable awns to 5/16 in. (8 mm) long.



Perennial ryegrass distribution.

Tall fescue seeds. *Photo:* J. A. O'Brien.

Tall fescue stem and collar. *Photo:* J. M. DiTomaso.

Tall fescue collar. *Photo:* Ohio State University Weed Lab.

Tall fescue stem and leaf. *Photo:* J. H. Miller and T. Bodner.

Tall fescue panicle. *Photo:* J. M. DiTomaso.

Tall fescue young plant. *Photo:* Ohio State University Weed Lab.

Tall Fescue (*Festuca arundinacea*)

Seeds

- Florets are narrow, up to 5/16 in. (8 mm) long, with awns up to 1/16 in. (2 mm) long.

Ligule and Collar

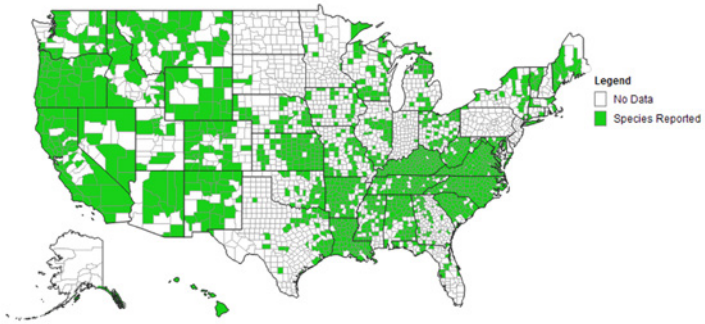
- Ligules are membranous and very short, less than 1/16 in. (1.5 mm) long.
- Collars may be yellow to light green and usually have well-developed, hairy, clasping auricles.

Stem and Leaf

- Stems are ridged and solid, with knobby, lightened nodes.
- Leaves reach 3/8 in. (10 mm) wide and up to 28 in. (70 cm) long, with obvious ridges on top.
- Leaves emerge flat or loosely rolled in the bud and are hairless until maturity.

Inflorescence

- Panicles are open and somewhat conical.
- Florets can be red to purple.



Tall fescue distribution.

Glossary

Inflorescence Anatomy

Awn. Bristlelike protrusions of the lemma that may be of variable length, even on the same plant or the same inflorescence.

Floret. Sterile or fertile flowers of a grass plant.

Inflorescense. The flowering structure of grasses.

Lemma and palea. The outer coverings of an individual floret that cover the flower and later, the seeds; the lemma is usually longer than the palea.

Panicle. Stalked, branching spikelets.

Raceme. Stalked, unbranching spikelets.

Rachis. The main axis of a grass plant.

Spike. A stalkless spikelet.

Spikelet. The basic repeating units of a grass inflorescence, which may contain one or many florets. They may project from the rachis in a variety of forms, the most common of which are spikes, racemes, and panicles.

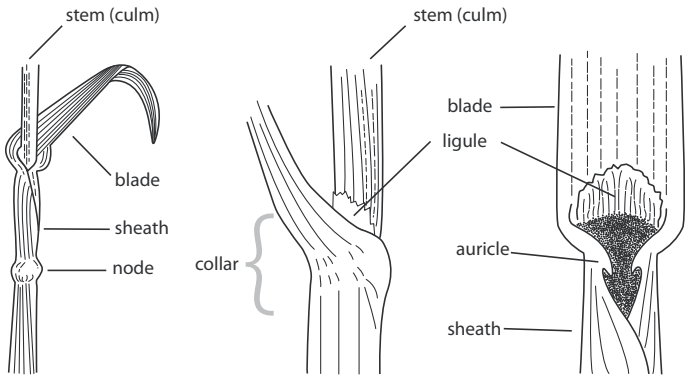
Collar Region Anatomy

Auricle. Extensions of a leaf collar that may grow to overlap (clasp) with each other or be entirely absent; may be hairless or hairy.

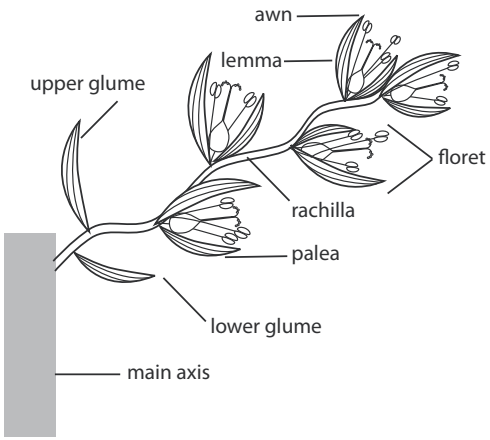
Collar. The transition region of a leaf between the blade and the sheath. Collars may be wide or narrow and may wrap completely around a stem (clasp) or not at all. They may be hairless or hairy.

Ligule. Extensions of a leaf sheath's inner surface, which clasp the stem at the collar. They may be entirely membranous to entirely fringed, or membranous with a fringed top, and may be absent or up to ½ in. (13 mm) long or more.

Sheath. The basal structures of leaves, which wrap around the stems. They can be split or overlapping, closed (fused), or split near the collar and fused further toward the base.

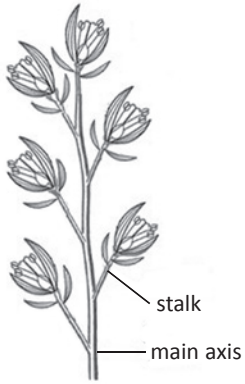


Generic grass collar. *Illustration: E.* A. Healy.

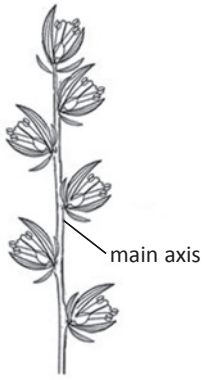


Generic grass floret. *Illustration: E.* A. Healy.

Grass panicle. *Illustration: E.* A. Healy.



Grass raceme. *Illustration: E.* A. Healy.



Grass spike. *Illustration: E.* A. Healy.

Dichotomous Key

This key may be used to distinguish between immature forms of the grasses included in this guide. Based on observed characteristics of stems, leaves, and collar regions, you may be able to determine the species of one of these plants prior to the formation of inflorescence. Choose the option that matches the plant in question and move to the next set of characteristics until the correct species is identified.

1. Ligules are absent.

Barnyardgrass (*Echinochloa crus-galli*)

1. Ligules are present.

    2. Auricles are present.

        3. Leaves are smooth and wider than ½ in. (13 mm).

Giant reed (*Arundo donax*)

        3. Leaves are ridged and are narrower than ½ in. (13 mm).

            4. Auricles and leaves are hairless, ligule is up to ⅛ in. (3 mm) long.

Perennial ryegrass (*Lolium perenne*)

            4. Auricles and leaves are hairy, ligule is less than 1/16 in. (2 mm) long.

Tall fescue (*Festuca arundinacea*)

    2. Auricles are absent.

        5. White midvein is absent, ligule is long and membranous, leaves are v-shaped.

Orchardgrass (*Dactylis glomerata*)

        5. White midvein is present.

            6. Collar is hairy, ligule is short and entirely fringed.

Fall panicum (*Panicum dichotomiflorum*)

            6. Collar is hairless, ligule is fringed-membranous.

                7. Leaves are wavy and waxy, midrib is narrow and v-shaped.

Shattercane (*Sorghum bicolor*)

                7. Leaves are smooth and straight, midrib is prominent and rounded.

Johnsongrass (*Sorghum halepense*)

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