TURFGRASSES OF ILLINOIS

University of Illinois at Urbana-Champaign/College of Agriculture/Cooperative Extension Service/Circular 1105

THE PROPER SELECTION AND CARE OF TURFGRASSES in Illinois depend upon a knowledge of the environmental adaptation, cultural requirements, and identification features of a number of grass species. Frequently, questions arise as to why a particular turf either failed to establish or deteriorated under certain environmental conditions. Sometimes the answer is that a poorly adapted turfgrass was planted or that the cultural requirements of a particular grass were not met. The first prerequisite to determining the cause of turfgrass problems is an ability to correctly identify different turfgrass species. The thinning and discoloration of rough bluegrass or red fescue on exposed sites in summer, the death of annual bluegrass under conditions of severe drouth and heat stress, the failure of Kentucky bluegrass to persist in the shade, and the tan color of zoysiagrass in spring are all situations requiring an accurate identification of the particular grass present in order to determine the cause of the "diseased" condition of the turf.

This circular is intended as a guide to learning the important vegetative features for identifying various turfgrass species found in Illinois. Refer to circular 1082, "Illinois Lawn Care and Establishment," circular 1076, "Turfgrass Pest Control," and other extension publications for more specific information on the culture of turfgrasses.

TURFGRASS MORPHOLOGY

The mature turfgrass plant is made up of fibrous roots and of shoots composed of elongated and unelongated stems with long, narrow leaves arising from the stem nodes and terminals. Growth habits (Fig. 1) include bunch-type, rhizomatous, and stoloniferous. The bunch-type growth habit is generally found in annual bluegrass, colonial bentgrass, Chewings fescue, tall fescue, and the ryegrasses. Lateral development of grass plants is by tillering, a process by which new shoots arise from vegetative buds in the axils of the leaf sheaths of older shoots. As the enclosing leaf sheath decays, the newly developed shoot (tiller) is revealed. Bunch-type turfgrasses generally have poor recuperative ability after injury; reseed bare spots in these turfs to enhance recovery.

Grasses with a rhizomatous growth habit include Kentucky bluegrass, Canada bluegrass, and creeping red fescue. In addition to tillering, these grasses can spread laterally with the growth of below-ground stems called rhizomes. These develop from the same vegetative buds as do tillers, but the new rhizome breaks through the enclosing leaf sheath and

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Figure 1. Turfgrass growth habits: (a) bunch-type (insert shows tillering), (b) rhizomatous, and (c) stoloniferous.

grows laterally through the soil. This type of growth habit facilitates rapid growth into bare areas that have resulted from diseases, insects, traffic, and other factors.

A stoloniferous growth habit results from the development of stolons. Like rhizomes, stolons are horizontally growing stems that break through an enclosing leaf sheath, but their lateral growth is along the surface of the ground. Stoloniferous grasses include rough bluegrass and creeping bentgrass. When seeded with other grasses, stoloniferous grasses tend to become isolated into distinct patches that disrupt the uniformity of the turf; hence, they are best used in pure stands for specific types of uses and environmental conditions.

Grasses that have both stolons and rhizomes include the two warm-season species, bermudagrass and zoysiagrass. As with the strictly stoloniferous grasses, these are best used in pure stands.

LEAF STRUCTURES

The turfgrass leaf is composed of an upper flattened portion called the *blade* and a lower tubular portion called the *sheath.* At the junction of the leaf blade and sheath are the ligule, the collar, and, in some species, auricles. These are the three principal structural features used in identifying different turfgrass species.

The *ligule* (Fig. 2) is a tongue-like outgrowth that may be a fringe of hairs, as in bermudagrass and zoysiagrass, or a membranous structure

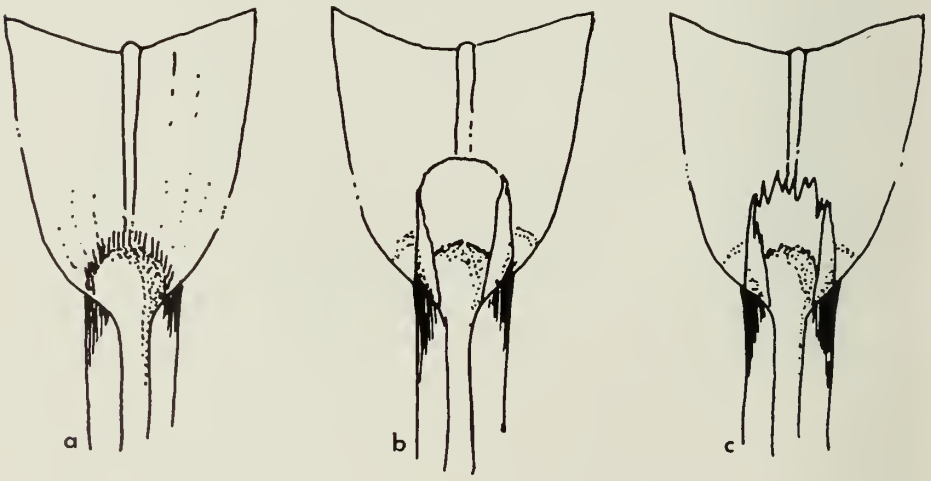


Figure 2. Ligule structures: (a) fringe of hairs, (b) smooth membrane, and (c) jagged membrane.

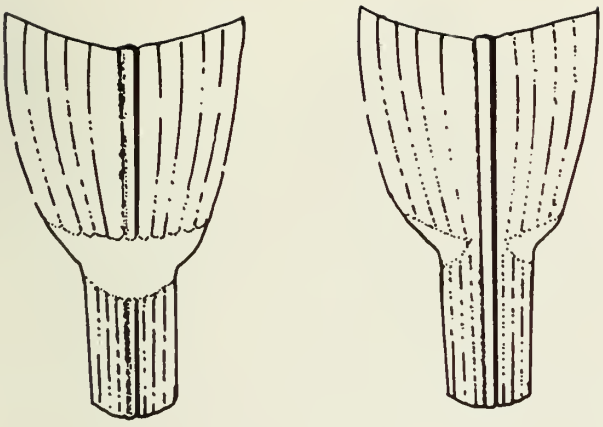


Figure 3. Continuous collar (left) and divided collar (right).

of a particular size and shape. Kentucky bluegrass has a very short, flat, membranous ligule, while creeping bentgrass has a long, pointed, membranous ligule. A membranous ligule may be smooth across the top, as in redtop, or jagged, as in colonial bentgrass.

The *collar* (Fig. 3) is a light green band at the base of the leaf blade; it varies in size and shape according to species. Kentucky bluegrass has a narrow, continuous collar, while tall fescue has a broad, divided collar.

The *auricles* (Fig. 4) are appendages projecting from each side of the collar. They may be long and slender, as in annual ryegrass, short and blunt, as in tall fescue, or absent, as in Kentucky bluegrass.

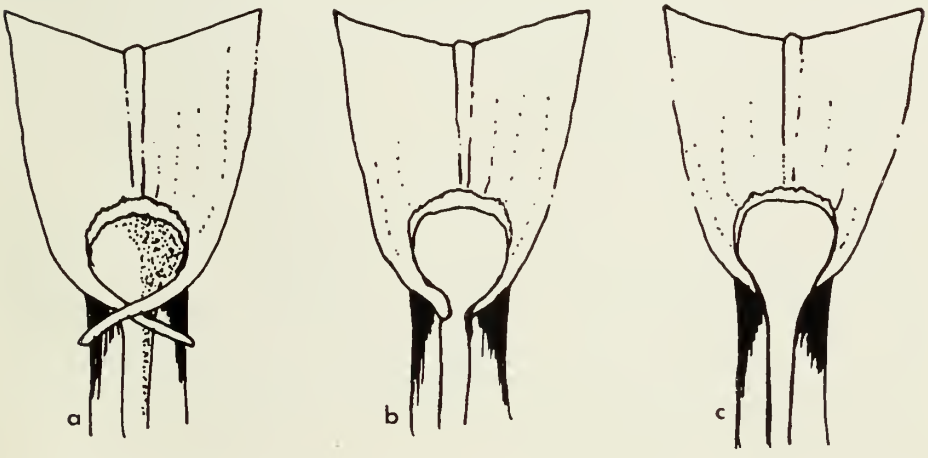


Figure 4. Turfgrass leaves with (a) long and slender auricles, (b) short and blunt auricles, and (c) no auricles.

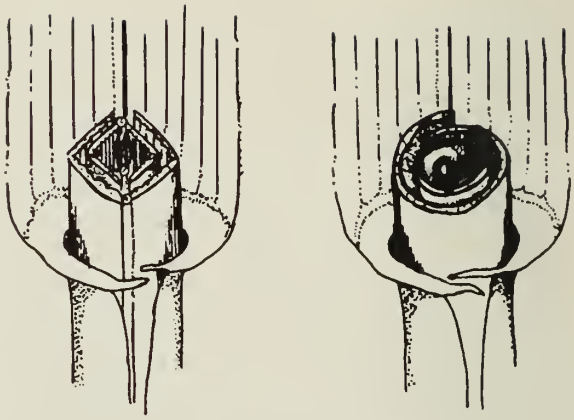


Figure 5. Folded (left) and rolled (right) vernation.

An additional feature helpful in identifying turfgrass species is the *vernation* (Fig. 5), the arrangement of leaves enclosed within the older leaf sheaths. This characteristic is easily demonstrated with the ryegrasses. Perennial ryegrass has a folded vernation, with leaf margins meeting but not overlapping, while annual ryegrass has a rolled vernation, with leaf margins overlapping.

The leaf blades differ considerably among turfgrasses. The bluegrasses have smooth leaf blades (Fig. 6a), while ryegrasses, fescues, and bentgrasses have prominent veins on the upper leaf surface (Fig. 6b).

Under moisture stress, the leaf blades of Kentucky bluegrass (Fig. 6c) and red fescue (Fig. 6d) may fold in response to changes in turgor pressure of the bulliform cells (large, thin-walled epidermal cells located on the upper leaf surface). The two translucent lines observed

Figure 6. Smooth leaf blades of bluegrass (a); ryegrass leaf blades with prominent veins (b); response of leaf blades to moisture stress in Kentucky bluegrass (c) and red fescue (d).

Figure 7. "Boat-shaped" leaf tip of bluegrass.

when a Kentucky bluegrass leaf blade is held up to the light are due to the parallel groups of bulliform cells located on either side of the midrib.

The shape of the leaf tip is an important feature for distinguishing the bluegrasses from other turfgrass species. Bluegrasses have a characteristic "boat-shaped" leaf tip (Fig. 7), while the leaf tips of most other turfgrasses are flat and pointed. The shape of the leaf blade moving toward the tip also helps distinguish Kentucky bluegrass and annual bluegrass, which are parallel sided, from Canada bluegrass and rough bluegrass, which taper toward the leaf tip.

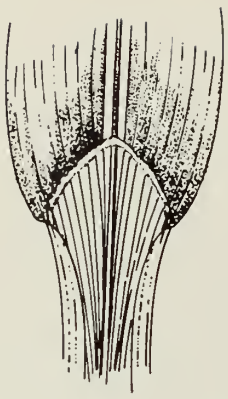
BLUEGRASSES (*Poa* sp.)

Bluegrasses include several species that are important as turfgrasses. These species differ substantially in general appearance, growth habit, environmental adaptation, and cultural requirements; however, they all have certain structural features in common:

- folded vernation (young leaf blades are folded as they emerge from the enclosing sheaths of older leaves)
- boat-shaped leaf tip (the leaf blade gathers toward the tip to form a three-dimensional shape like the prow of a boat)
- smooth leaf blades with parallel translucent lines on either side of the central midrib
- absence of auricles
- membranous ligules

Kentucky bluegrass (*Poa pratensis* L.)

Kentucky bluegrass is the principal turfgrass used in Illinois. It is adapted to a wide range of environmental conditions and provides an attractive turf when maintained under proper cultural conditions. It performs best in open, sunny areas under moderate to high fertilization, moderate mowing heights (1½" to 2"), and supplemental irrigation during drouth periods.

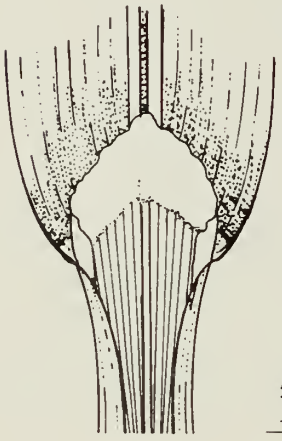


Structural features of Kentucky bluegrass

- very short, flat, membranous ligule
- parallel-sided leaf blades
- rhizomatous growth habit
- medium-coarse to medium-fine leaf texture, depending upon cultivar and cultural intensity
- light to dark green color, depending upon cultivar, time of year, and cultural intensity

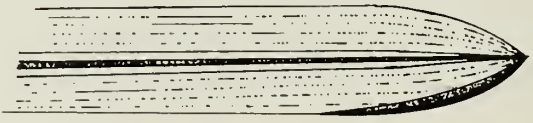
Annual bluegrass (*Poa annua* L.)

When maintained under moderately close mowing and frequent irrigation, annual bluegrass forms a very dense, fine-textured, and vigorous turf during the cooler months of the growing season. It survives reasonably well on compacted soils and is well adapted to moist, shaded conditions. However, its poor tolerance of heat and drouth stress during the summer make it an undesirable weed throughout most of Illinois. Although rarely planted intentionally, it is frequently the major component of such intensively cultured turfs as golf course greens, tees, and fairways.



Structural features of annual bluegrass

- long, pointed, membranous ligule
- parallel-sided to slightly tapering leaf blades
- bunch-type to weakly stoloniferous growth habit
- light green color

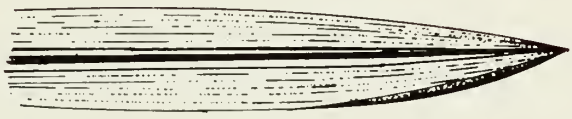


Canada bluegrass (*Poa compressa* L.)

Canada bluegrass forms an open turf of low density and generally poor quality. It is adapted to cool climates and acid, drouthy soils of low fertility. It grows best when clipped at 3 to 4 inches.

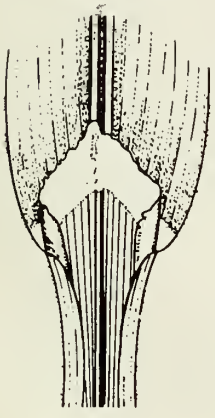
Structural features of Canada bluegrass

- flat, membranous ligule of medium length
- short, tapering leaf blades
- rhizomatous growth habit
- dull, bluish-green leaves of medium texture
- reddish coloration of leaf margins in early spring



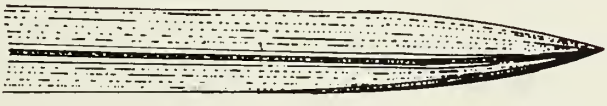
Rough bluegrass (*Poa trivialis* L.)

Rough bluegrass forms a dense, semi-prostrate turf that is adapted to cool, moist, shaded environments. It frequently invades other turfs that are growing on poorly drained, fertile soils during the cooler months of the growing season. During the summer months, however, rough bluegrass is usually thinned and discolored because of its poor heat, drouth, and disease tolerance. As it is not compatible with other turfgrasses, its use is usually limited to wet, shaded areas where other turfgrass species do not persist.



Structural features of rough bluegrass

- long, membranous, slightly toothed ligule
- tapering leaf blades that appear shiny on the undersides
- stoloniferous growth habit
- roughened, "onion-skin" appearance on lower portion of mature leaf sheath
- light green to yellowish-green color



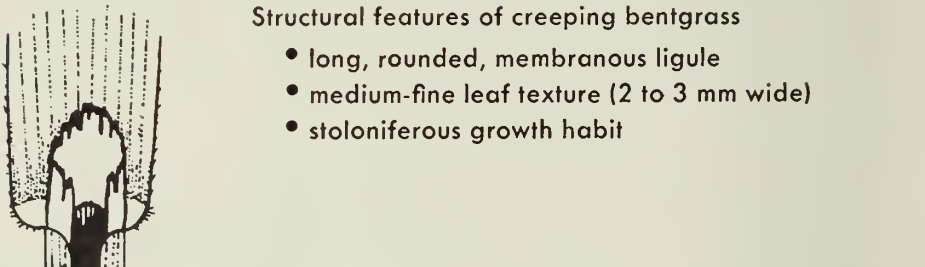
BENTGRASSES (*Agrostis* sp.)

The bentgrasses include four species that are important as turfgrasses in Illinois. Although very limited in their general adaptation and use, bentgrasses provide the dense, closely clipped turfs important for such popular sports as golf. Bentgrasses have these structural features in common:

- rolled vernation
- membranous ligules
- flat, tapering leaf blades with pointed tips
- prominent veins on the upper sides of leaf blades
- absence of auricles

Creeping bentgrass (*Agrostis palustris* Huds.)

Creeping bentgrass forms a smooth, dense turf that, when maintained properly, is suitable for use in golf course putting greens and tees, bowling greens, grass tennis courts, and exotic lawns. Its cultural requirements include close (¼″ or less), frequent mowing; regular applications of fungicides for disease control; frequent irrigation; and some cultivation or topdressing. It is not compatible with other turfgrasses and is frequently found as a serious weed in Kentucky bluegrass lawns.



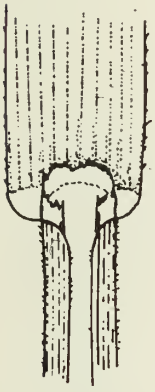
Structural features of creeping bentgrass

- long, rounded, membranous ligule
- medium-fine leaf texture (2 to 3 mm wide)
- stoloniferous growth habit

Colonial bentgrass (*Agrostis tenuis* Sibth.)

Colonial bentgrass is not as well adapted to Illinois as to the milder climates of New England and the Pacific Northwest; however, it is sometimes found in fairway turfs of northern Illinois golf courses. It

does best at slightly higher (½" to ¾") mowing heights than for creeping bentgrass; otherwise, their cultural requirements are similar. Once considered an important component of lawn seed mixtures, the use of colonial bentgrass is now discouraged because of its tendency to become the dominant species in a turf.



Structural features of colonial bentgrass

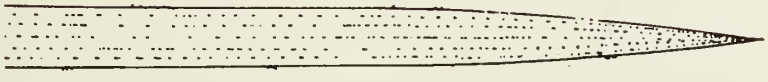
- medium-long, flat, notched, membranous ligule
- medium-fine leaf texture (1 to 3 mm wide)
- bunch-type growth habit, but sometimes with short stolons or rhizomes

VELVET BENTGRASS (*Agrostis canina* L.)

Velvet bentgrass forms a very fine-textured, extremely dense turf when maintained under close mowing and meticulous care. Its high thatching tendency and slow shoot growth limit it primarily to the New England States, where it is especially well adapted. Velvet bentgrass is occasionally observed as small, tight patches in some shaded putting greens on Illinois golf courses.

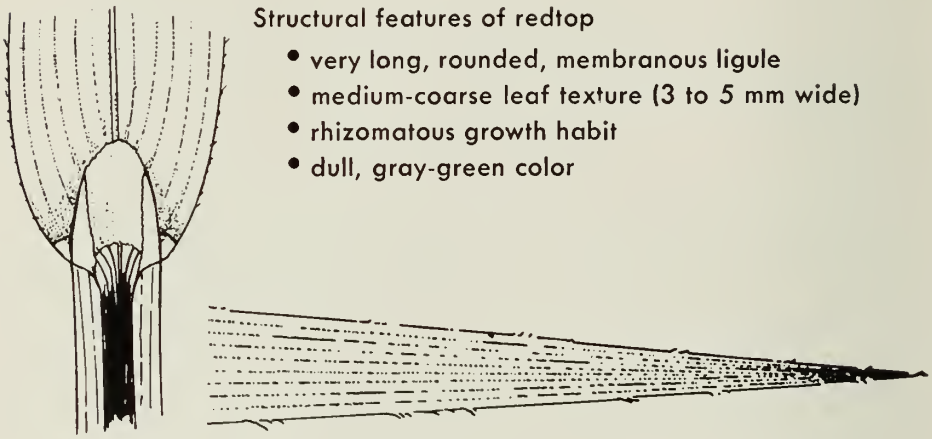
Structural features of velvet bentgrass

- long, pointed, membranous ligule
- very fine leaf texture (less than 1 mm wide)
- stoloniferous growth habit



Redtop (*Agrostis alba* L.)

Redtop forms an open, coarse-textured turf that is adapted to cool, moist (or wet) environments. When planted as a component of seed mixtures, it may persist as unsightly, weedy tufts in the lawn. It is intolerant of temperature extremes, shade, traffic, or close mowing. Redtop is used primarily for low-quality turfs for soil stabilization on roadsides, ditches, and waterways.



Structural features of redtop

- very long, rounded, membranous ligule
- medium-coarse leaf texture (3 to 5 mm wide)
- rhizomatous growth habit
- dull, gray-green color

RYEGRASSES (*Lolium* sp.)

Ryegrasses have been used traditionally as nurse grasses in lawn seed mixtures or for the establishment of temporary lawns. Their quick germination and vigorous seedling growth make them suitable for use where rapid establishment and soil stabilization are desired. Because of their intolerance of temperature extremes, drouth, and certain diseases, ryegrasses sometimes behave like annuals or short-lived perennials. Ryegrasses have the following structural features in common:

- membranous ligules
- presences of auricles
- flat, tapering leaf blades with prominent veins on the upper sides, smooth and glossy on the lower side
- bunch-type growth habit

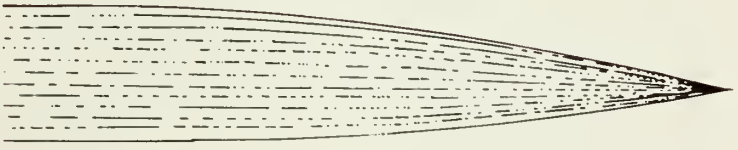
Perennial ryegrass (*Lolium perenne* L.)

Perennial ryegrass is adapted to cool, moist conditions and may persist during the winter and summer seasons, provided severe temperatures do not occur. Because of its rapid germination and vigorous seedling growth, it is frequently used in seed mixtures as a nurse grass for quick

cover. A fairly wear-tolerant grass, perennial ryegrass is sometimes used for overseeding athletic field turfs that have been injured from play. The mowing quality of perennial ryegrasses has generally been poor because of the tough vascular bundles in the leaves; improved varieties, however, such as Manhattan, Pennfine, and NK-200 have better mowing quality and provide turfs that are finer-textured, denser, and darker green than common perennial ryegrass.

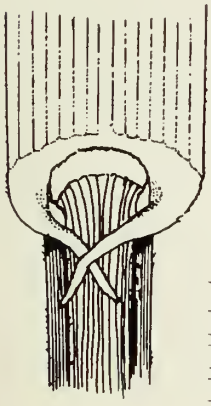
Structural features of perennial ryegrass

- folded vernation
- pointed, membranous ligule
- short, non-clasping auricles



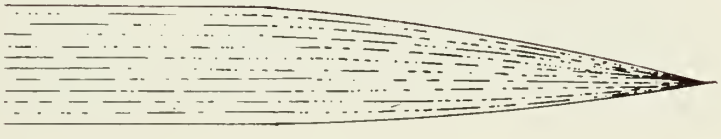
ANNUAL RYEGRASS (*Lolium multiflorum* Lam.)

Annual ryegrass is similar to perennial ryegrass but is less tolerant of cold, heat, and drouth stresses and typically behaves like an annual or short-lived perennial. Its use as a nurse grass is discouraged because of its objectionably coarse texture and its severe competition with more desirable turfgrasses during establishment. It is occasionally recommended as a temporary lawn grass for soil stabilization until there is a more favorable season to establish Kentucky bluegrass.



Structural features of annual ryegrass

- rolled vernation
- short, flat, membranous ligule
- long, slender, clasping auricles



FESCUES (*Festuca* sp.)

The fescues make up a highly variable genus that includes both coarse- and fine-textured species. These species differ substantially in growth habit, environmental adaptation, cultural requirements, and use. As a group the fescues are adapted to drouthy, infertile soils and possess generally good wear tolerance. Fescues have the following structural features in common:

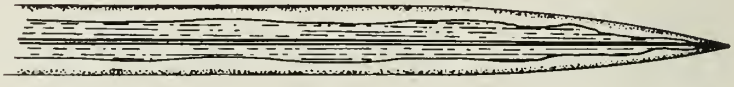
- short, flat, membranous ligule
- prominent veins on upper side of leaf blade

Red fescue (*Festuca rubra* L.)

Red fescue forms a very fine-textured, dense, medium to dark-green turf. It is best adapted to cool, dry, shaded environments and a low to moderate intensity of culture. It is relatively intolerant of high temperatures, poorly drained soils, and saline soils. It is frequently used as a companion grass in mixtures with Kentucky bluegrass for moderately shaded sites. There are two subspecies of red fescue that differ principally in growth habit: creeping red fescue (subspecies *rubra*) is a rhizomatous grass, while Chewings fescue (subspecies *commutata*) is a bunch grass that spreads by tillering only.

Structural features of red fescue

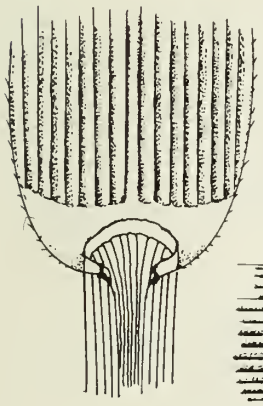
- folded vernation
- very narrow leaves, folded or flat depending upon moisture conditions



Tall fescue (*Festuca arundinacea* Schreb.)

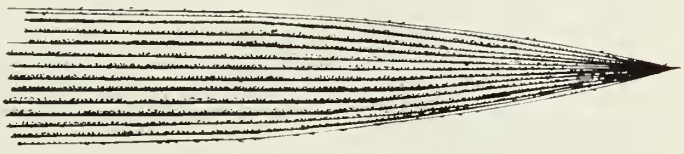
Tall fescue is a very coarse-textured grass that is adapted to a wide range of environmental conditions. It has good heat, drouth, and wear tolerance, and it persists fairly well in moderately shaded environments. It provides a satisfactory turf on sites that receive a low intensity of

culture; however, it responds well to increased fertilization and irrigation if it is mowed at a height of at least 1½ inches. Because tall fescue is not compatible with other turfgrasses, it should be planted alone at high seeding rates (6 to 8 pounds per 1,000 square feet) to ensure the best quality turf.



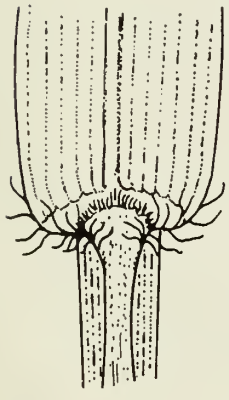
Structural features of tall fescue

- rolled vernation
- wide, stiff leaf blades with prominent veins on the upper side
- bunch-type growth habit, but sometimes with short rhizomes
- short, stubby auricles



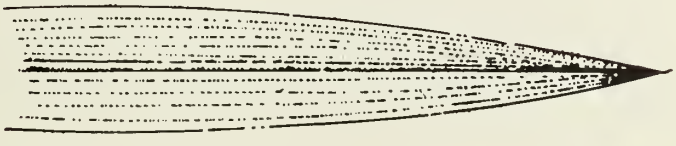
BERMUDAGRASS (*Cynodon dactylon* (L.) Pers.)

Bermudagrass is a warm-season species used occasionally as a turfgrass in southern Illinois. It is also found as weedy patches in bluegrass and bentgrass turfs. It forms a dark-green, dense, vigorous turf of medium-fine texture. Its heat and drouth tolerance are excellent, but poor cold tolerance and winter discoloration severely limit the practical use of bermudagrass in Illinois.



Structural features of bermudagrass

- folded vernation
- ligule is a fringe of hairs
- long hairs extending from the collar
- smooth leaf blade with short hairs
- both stolons and rhizomes present

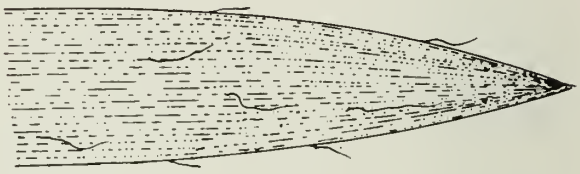


ZOYSIAGRASS (*Zoysia japonica* Steud.)

Zoysiagrass is a warm-season turfgrass frequently seen in lawns and on golf course fairways in southern Illinois. It forms a dense, tough, slow-growing turf and has good heat, drouth, and cold tolerances. Its tan appearance while dormant during the cool months of the year (October to May) may be objectionable, but green dyes may be used to provide artificial color. The invasion by cool-season grasses and broadleaf weeds during winter should be controlled with herbicides in order to maintain a uniform turf. Zoysiagrass is propagated by plugs or shredded sod and is very slow to establish, usually requiring two to three years.

Structural features of zoysiagrass

- **rolled vernation**
- **ligule is a fringe of hairs**
- **long hairs extending from the collar**
- **smooth leaf blade with long, slender hairs extending from the upper side**
- **both stolons and rhizomes present**



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