

18. The Gramineae, Grass Family

PLANTS with hollow, round or flat stems (culms). Leaves arranged in two rows on opposite sides of the stem, consisting of three parts: (1) sheath, (2) ligule, (3) blade. The sheath is the basal portion enclosing the stem above the node in tube-like fashion; it is not, however, in most genera, a closed tube but usually possesses free lateral edges which overlap. The ligule is a little collar on the upper side of the leaf at the juncture of the sheath and the blade. The blade is entire, linear, and parallel-veined. The flowers consist of a pistil and three stamens. Each flower is enclosed by a pair of unequal bracts, one on each side. The larger of these bracts is the lemma, the smaller the palea. The unit consisting of the flower, lemma, and the palea is the floret. The florets are arranged in spikelets, each of which consists of a central axis, a pair of bracts (glumes) at the base, and one to several florets above. Fruit, a grain or caryopsis, 1-seeded, the fruit coat permanently adherent about the seed. The grain may be oblong with a longitudinal furrow, boat-shaped, ovoid or planoconvex. The seed contains abundant endosperm and a small embryo at the basal end. The outlines of the embryo are visible externally through the fruit coat.

Grasses are sometimes confused with other grass-like monocotyledonous plants, particularly the sedges or slough grasses (Cyperaceae) and the rushes (Juncaceae). The common sedges found on or about agricultural land have solid, triangular stems with leaves arranged in three rows. The leaf sheath forms a closed tube about the stem. The flowers are in spikes or spikelets but are not enclosed by a pair of bracts; they are usually in the axil of a single bract. In the most common sedges (*Carex* spp.) the 1-seeded fruit is enclosed by a bladderly, beaked, sac-like structure. The common rushes have rounded stems and closed sheaths; the leaves are usually narrow and wiry. The flowers have greenish sepals and petals; the fruit is a small, many-seeded capsule.

The shape and texture of the lemma, palea, and glumes differs widely in various grasses. These structures may be thin and papery, or thick and bone-like. The glumes and lemmas of certain grasses bear long apical bristles, awns.

Grasses differ from one another most conspicuously in the nature and arrangement of their spikelets. Three types of spikelets are most common among weed and crop grasses: (1) Spikelets possessing several

florets, the overlapping lemmas of which give them a shingle-like appearance. At maturity the spikelet breaks up into seedlike units, each consisting of a single floret. Examples: bromegrasses (*Bromus*), quackgrass (*Agropyron*). (2) Spikelets possessing one floret; lemma and palea thin and papery. At maturity the floret usually separates from the glumes. Example: timothy (*Phleum*). (3) Spikelets with one fertile floret, bearing below it a sterile lemma (having no flower) as well as a pair of glumes. Glumes and sterile lemma papery; fertile lemma and palea much hardened and closely adherent about the seed. The whole spikelet breaks off as a seed-like unit at maturity. Examples: barnyard grass (*Echinocloa*), witchgrass *Panicum*.

The spikelets may be borne in open panicles (witch grass, bromegrasses) in condensed-spike-like panicles or racemes, (foxtail grasses; *Setaria*), in solitary terminal spikes, (quackgrass; *Agropyron*), or in digitate clusters of spikes — several spikes originating from the same point in finger-like fashion, (crabgrass; *Digitaria*).

In wheat, rye, hulled oats, or timothy, the structure popularly called the seed is the 1-seeded grain. In other grasses the "seed" is the grain plus certain persistent enveloping floret and spikelet structures. The nature of these structures depends upon the manner in which the spikelet breaks or separates from the parent plant at maturity. In spikelet type (1), as described in the paragraph above, the seed is the matured floret, that is, grain surrounded by lemma and palea plus a short segment of the spikelet axis, the rachilla, which is attached at the base of the seed and upwardly directed on the palea side. In type (2) it consists of the floret alone or of the entire spikelet if the seed is "stripped" before full maturity. In type (3) the seed consists of the entire matured spikelet. Seeds of types (2) and (3), from 1-flowered spikelets, do not possess a rachilla.

Grass "seeds" may assume various guises depending upon the stage when harvested and upon the action of cleaning machinery in stripping off enveloping structures (i.e. lemma, palea, glumes). For example, quackgrass seeds may be observed as: (a) the entire spikelets (usually in small grains), (b) a floret, the grain, surrounded by lemma and palea and bearing a rachilla, (c) a dehulled grain. Yellow foxtail "seeds" may consist of: (a) a dehulled grain, (b) grain plus lemma and palea, (c) grain plus lemma, palea, a sterile lemma, and glumes. Unhulled or virgin redtop consists of entire spikelets, grain surrounded by glumes, lemma and palea. Processed redtop is usually a mixture of unhulled seed (surrounded by lemma and palea) and hulled grains. Commercial timothy seed likewise contains both unhulled seed (possessing lemma and palea) and hulled grains which have been stripped from their enveloping structures.

The grasses contain more species of weeds than any plant family except for the Compositae, and are probably more important because of the overwhelming abundance of many of the kinds. Their relative importance is, furthermore, increasing due to the fact that they are not killed by the most widely used herbicides, 2,4-D and relatives. In many

instances, the destruction of dicotyledonous weeds has only resulted in grassy species taking their place. Farmers tend to think of weeds as consisting of two general kinds, i.e. grassy weeds and broad-leaved kinds.

Although the grasses include many weeds, they are most important of all plants as regards the welfare of man. More than half of the world's cultivated land is devoted to grasses, primarily the cereal crops and corn. The millions of acres of permanent pasture and range are dominated by grasses. Grasses serve directly as human staple foods (wheat and rice most important) and as food for domestic animals (forage and grain) upon which our meat and dairy industries are based. Grasses provide the background, the lawn, for all home and urban ornamental plantings.

In a large family like the grasses, a subordinating classification is a necessity. The group is conventionally divided into a series of tribes which, roughly, are believed to represent natural (i.e. composed of related members) categories. This classification is based upon technical characters of the spikelets which it is beyond the scope of this text to consider. The following arrangement of grasses into groups is, therefore, purely one of convenience. However, it brings together into smaller units those grasses having certain characters in common and should be useful as a learning aid.

SPIKELETS FORMING SPINY BURS

Cenchrus. *Cenchrus pauciflorus*, Sandbur. Annual, prostrate or spreading. Inflorescence a short spike of spiny burs, each bur containing two spikelets and seeds. Burs indehiscent, the grains (yellowish, planoconvex) not often seen. Locally abundant, gardens, roadsides, waste areas. Summer and fall. This annual grass is particularly annoying because of its spiny burs which are difficult to remove from clothing, and which will readily puncture the skin. ^{p216}

INFLORESCENCE A SPIKE OR APPEARING AS SUCH

Inflorescence: (1) a single terminal spike, or (2) a cylindrical condensed panicle which is spike-like in appearance, e.g. foxtails (*Setaria*), or (3) a digitate cluster of spikes at apex of stem, e.g. crabgrass (*Digitaria*). Not included here are grasses in which the parts of a compound inflorescence appear spike-like, or those which have a series of racemes or spike-like branches extending up the stem.

Agropyron, Quackgrass and Wheatgrasses. Plants perennial, erect. Leaves at juncture of sheath and blade with lateral projections, (auricles) which tend to clasp about the stem. Spikelets in narrow terminal spikes, one at each node of spike (compare with *Elymus* and *Hordeum*),

4- to 12-flowered, placed flatwise to main axis of spike (contrast with *Lolium*). Seeds usually the matured florets, these boat-shaped, 7-9 mm. long with or without a short awn.

The auricle, characterized above, is not specific to *Agropyron* alone, but of those grasses in which the inflorescence is a true spike. This group, the tribe Hordeae, includes the following genera: *Elymus*, *Triticum*, *Secale*, *Aegilops*, *Hordeum*, and *Lolium*.

p216 *Agropyron repens*, Quackgrass. Plants spreading by extensively creeping scaly rootstocks. Leaves greenish, tending to bend over at tips, not rolling up when dry. Spikelets 4- to 8-flowered. Seeds frequently confused with those of western wheatgrass (*A. smithii*; compare below), differing as follows: (1) rachilla not enlarged towards apex, (2) a lateral bulge is present on back of lemma at base of seed, (3) callus (tissue surrounding basal attachment scar) glabrous, (4) palea surface usually glabrous.

Primary noxious or prohibited in all northern states. Spring and summer.

Succeeding best in cool, moist climate, quackgrass is of major significance from Minnesota and Iowa, eastward, and from central Iowa, northward. In much of this area it is perhaps the most common primary noxious weed. The plant is of common occurrence elsewhere in the North Central States but its importance as a weed progressively diminishes to the South and West.

Quackgrass is similar to, and not infrequently confused with, western wheatgrass, the ryegrasses (*Lolium* spp.), and wild rye (*Elymus* spp.). Western wheatgrass is described immediately below on a comparative basis. *Lolium* spp. possess spikelets whose narrow edge lies against the rachis and do not have the creeping rhizomes characteristic of quackgrass. The genus *Elymus* is characterized by spikelets which are two or more at each node, whereas those in *Agropyron* are solitary. In vegetative condition, quackgrass may be confounded with rhizomatous forage grasses, e.g. smooth brome (*Bromus inermis*). In such instances the presence of the auricle on the quackgrass leaf will serve to distinguish it from the crop plants.

The seeds of quackgrass are very similar to those of western wheatgrass (*Agropyron smithii*), slender wheatgrass (*A. trachycaulum*), and wild rye (*Elymus virginicus*). Western wheatgrass seeds are described below. Those of slender wheatgrass seeds usually have a silky-hairy rachilla and tend to flare out at the tip (thus appear broader than those of quack). The palea of wild rye seeds usually exceeds the lemma in length. *Agropyron smithii*, Western wheatgrass, Bluestem. Plants with short rootstocks, not spreading aggressively. Stems and leaves blue-green to glaucous-green. Leaves stiff and wiry, tending to roll up when dry. Spikelets 8- to 12-flowered. Seeds differing

from those of quackgrass (compare above) as follows: (1) rachilla slightly enlarged towards apex, (2) a lateral notch or indentation present on back of lemma near base of seed, (3) callus pubescent on lateral margins, (4) palea surface usually finely hairy. Locally common, roadsides, pastures. Early summer. Seeds common in forage grass seed shipped from the West.

Lolium. *Lolium perenne*, Perennial ryegrass. Plants perennial, 3-7 dm. tall, glabrous. Spikelets 10-13 mm. long, several-flowered but with only one glume, in narrow terminal spikes, with the narrow edge of the spikelet lying against the stem axis. "Seed" the matured floret, 5-7 mm. long, awnless. Cultivated, lawns and pastures; sparingly escaped. p217

The seeds are somewhat similar to those of quackgrass but are wider and flatter; the outlines of the dark grain show through the palea; the rachilla is somewhat flattened; the back of the lemma possesses a conspicuous, narrow crease just above the callus.

Annual ryegrass (*Lolium multiflorum*) is similar to the perennial species except that it is awned and usually does not persist over one year.

Elymus, Wild rye. Tall perennial grasses with spikelets paired at each node in dense bristly, spikes; glumes and lemma short- or long-awned. Summer. Common, roadsides, fence rows, and uncultivated areas. p217

Hordeum, Barley. Inflorescence a terminal spike. Spikelets usually 3 at each node of the spike axis, the central one sessile and fertile, 1-flowered; the lateral ones stalked and sterile except in 6-rowed barley. p218

Hordeum jubatum, Squirrel-tail grass. Plants erect, to 6 dm. in height, perennial. Sterile spikelets reduced to a cluster of thread-like awns, 2-5 cm. in length; glumes of fertile spikelets awned; inflorescence having the appearance of a dense silky plume. Each group of three adjoined spikelets separates as a unit at maturity. Abundant, and frequently contributing a silvery cast to pastures, roadsides, and waste places; rarely seen in cultivated fields. Summer.

Hordeum pusillum, Wild barley. Plants annual, usually not more than 2-3 dm. long. Spikes dense, with short stiff awns. Southern. Pastures, hayfields, waste areas. p219

Hordeum vulgare, Barley. Plants annual, erect, to 1 m. or more. Glumes and lemmas drawn out into stiff awns, or awnless (beardless barley). Commercial barley seed consists of the matured floret, the grain enclosed by the close fitting lemma and palea; the awn is usually broken off. Floret yellowish, 10-12 mm. long, narrowly ovoid, irregularly wrinkled. Cultivated, occasionally escaped along roadsides. p219

Secale. *Secale cereale*, Rye. Plants annual, erect. Inflorescence a terminal, bristly, slightly drooping spike. Spikelets two-flowered. Glumes inconspicuous, narrowly lanceolate. Lemmas long-awned, bristly on the p218

back of midrib. Grain 6-9 mm. long, oblong, slightly higher than thick, longitudinally channeled, usually a glazed brown in color. Commercial rye seed consists of the hulled grains.

p220 *Triticum*, Wheat, Erect annuals. Inflorescence a dense terminal spike which is generally somewhat shorter than that of rye and stiffly erect. Spikelets 2- to 4-flowered. Glumes broadly ovate. Lemmas thick, lop-sided, awned or unawned. Grains short-oblong, 7-9 mm. long, longitudinally furrowed, red-brown to straw-brown in color, similar to those of rye but thicker and with embryo flat. Commercial wheat seeds are the hulled grains.

p220 *Aegilops*. *Aegilops cylindrica*, Goatgrass. Winter annual. Spikes slender, with the alternate spikelets fitting into grooves in the thickened, bony axis. Upper spikelets longer-awned than lower ones. Spike rachis segmenting at maturity into sections, each bearing a single spikelet. "Seeds" thus bony fragments comprising the spikelet plus a portion of spike axis. Southern. Winter wheat and waste areas. Spring and early summer.

Setaria, Foxtail grasses. The species described below are rapid-growing summer annuals, erect or basally prostrate. Inflorescence a dense, cylindrical, spike-like bristly panicle. Spikelets planoconvex, 1-flowered, with a sterile lemma, surrounded by a cluster of barbed bristles. Glumes and sterile lemma papery; fertile lemma and palea thick and hard, roughly striate or corrugated. Grain planoconvex, greasy greenish-yellow. "Seed" the entire spikelet or portion of it.

p222 *Setaria lutescens*, Yellow foxtail. Spike tawny-yellow in color, scarcely drooping. Spikelets 3 mm. long, broadly ovate in outline; glumes about half as long as spikelet; lemma brown, coarsely cross-wrinkled. Abundant, cultivated areas, legumes, gardens, waste areas. Summer and fall. The seeds are common in those of legumes, oats, and soybeans.

p221 *Setaria viridis*, Green foxtail. Spike greenish in color, or straw-yellow when dead ripe, often drooping at top. Spikelets about 2 mm. long, ovate to narrowly ovate; second glume as long as the spikelet; fertile lemma straw-brown to dark chocolate, frequently dark-blotched upon a light straw background; surface of lemma granular, longitudinally striate or weakly cross-wrinkled. One of the most widespread and abundant late summer annuals. Cultivated soil, fields, gardens. The seeds are extremely abundant in red clover seed; also occur in small grain and grass seed.

p221 *Setaria faberii*, Tall foxtail, Giant foxtail. Similar to green foxtail, but often taller (sometimes 2 m.). Leaves finely hairy on upper surface. Spikes drooping at tip. Spikelets slightly larger than those of green foxtail; second glume somewhat shorter than fertile lemma. Primarily southern. Roadsides, cultivated land, legumes. Late summer.

p222 *Setaria verticillata*, Bristly foxtail. Spikes often irregular or

lobed. Bristles backwardly barbed so that spikes will tend to cling to anything touching them. Spikelets similar to those of green foxtail. Waste areas, legumes.

Phleum. Phleum pratense, Timothy. Plants erect from a perennial bulbous base. Inflorescence a congested panicle which appears like a dense cylindrical spike but without bristles as in the foxtails. Spikelets 1-flowered; glumes boat-shaped, short-awned, papery; lemma and palea thin; grain about 2 mm. long, plump-ovoid, minutely roughened on the surface, dull yellow in color. Cultivated. Most commercial seed consists of a mixture of grains enclosed in the lemma and palea, and hulled grains. p223

Digitaria, Crabgrasses. Plants annual, ascending or erect, much branched at base, the lower portion of the stem prostrate and rooting. Inflorescence a terminal cluster of digitate spikes. Spikelets plano-convex, with one fertile flower, maturing a single seed. Lemma and palea thick and hard, closely enclosing the grain; lemma finely striate. Sterile lemma and second glume (first glume minute) finely hairy, forming a papery covering about fertile lemma and palea. "Seed" the entire spikelet.

Digitaria ischaemum, Smooth crabgrass. Stems and leaves glabrous. Spikelets (seeds) ovate in outline, 2.5 mm. long. Glume and sterile lemma as long as the spikelet. Fertile lemma black. Abundant, lawns, gardens, cultivated fields. Midsummer to fall. Seeds common in legume and grass seed. p223

Digitaria sanguinalis, Crabgrass, Large crabgrass. Stems and leaves sparsely pubescent. Spikelets (seeds) narrowly ovate in outline, 3 mm. long. Glume about half as long as seed. Lemma olive-green when immature, brownish when mature. Abundant, lawns, gardens, cornfields. Midsummer to fall. Seeds occur in legume and grass seed. p223

Eleusine. Eleusine indica, Goosegrass. Annual, similar in appearance to crabgrass but the digitate spikes considerably broader. Spikelets several-flowered. Grains readily shelling out, reddish-brown, cross-ridged. Primarily southern. Urban areas, waste ground, gardens, roadsides. Summer. p224

Cynodon. Cynodon dactylon, Bermuda grass. Perennial. Stems creeping and rooting at nodes, with short, erect branches. Spikes digitately clustered as in crabgrass. Spikelets 1-flowered, pointed, sideways-compressed. Southern. A lawn and pasture grass mostly south of the north central range. As a weed, primary noxious or prohibited, cultivated and non-cultivated soil. p225

INFLORESCENCE BRANCHED; SPIKELETS SEVERAL-FLOWERED

Inflorescence a branched panicle, the spikelets usually well

separated at branchlet tips, occasionally (e.g. *Dactylis*) crowded together in irregular clusters. Glumes usually much shorter than spikelets, the exerted lemmas overlapping in shingle-like fashion. *Avena*, in which the spikelet includes 2 or 3 florets enclosed by long glumes, comprises an exception to the above statement.

Except for *Eragrostis*, the "seed" in this group comprise a single, usually boat-shaped floret with a rachilla segment at the base. In *Eragrostis*, the seeds readily hull out of the spikelets.

Bromus, Bromegrasses. Plants erect. Leaf sheaths forming a closed tube. Spikelets large, several-flowered, in terminal panicles. Lemma notched at apex; awns, if present, arising from below this notch, not at tip. "Seed" a single floret, boat-shaped or flat.

p224 *Bromus inermis*, Smooth brome. Plants perennial, glabrous. Spikelets 2-2.5 cm. long. Seeds 8-10 mm. long, nearly flat, scarcely awned. Extensively cultivated; escaped along roadsides and in fields. Early summer.

p226 *Bromus japonicus*, Japanese brome. Plants annual, pubescent. Spikelets conspicuously awned. Seeds 7-8 mm. long (the awn of equal length), thin, strongly boat-shaped, the rachilla bowed with an oblique or vertical scar. Abundant, brome and grain fields, along roadsides, and in waste areas. Early summer. The seeds are common in commercial seed of smooth brome and other forage grasses.

p226 *Bromus tectorum*, Downy bromegrass. Plants annual, pubescent. Spikelets about 2 cm. in length, narrow, strongly awned, turning reddish-brown at maturity. Seeds 10-12 mm. long, narrow, bearing an awn of 15 mm. or more in length, finely hairy, flattened or boat-shaped. Abundant, pastures, roadsides, about houses and farm buildings. Late spring. Downy brome is in its "prime" two to three weeks before Japanese brome.

p227 *Bromus secalinus*, Cheat, Chess. Annual or winter annual. Plants and spikelets essentially glabrous. Mature florets thick and heavy, usually short-awned. Southern. Grains, forage grasses, roadsides. Considered a noxious weed in many states.

p227 *Festuca*, Meadow and Alta fescue. Erect perennials, with branching panicles. Spikelets large, essentially unawned. Lemmas not toothed at apex. Mature florets similar to those of ryegrass. Forage grasses, mostly of eastern portion.

p228 *Poa*. *Poa pratensis*, Kentucky bluegrass. Plants perennial from slender creeping rootstocks. Culms clustered, erect, glabrous. Inflorescence an open panicle. Spikelets several-flowered, 4-5 mm. long. "Seed" the matured floret plus rachilla, about 2.5 mm. long, boat-shaped. Cultivated, pastures and lawns.

Avena, Oats. Plants annual, erect, stooling from the base. Inflorescence a terminal panicle. Spikelets large, 2- or 3-flowered; glumes papery, as long as the spikelet. Awns arising from below tip of lemma.

The seed is the grain covered by the somewhat hardened lemma and palea.

Avena sativa, Oats. A cultivated crop. Spikelets mostly 2-flowered. Awns straight or absent. Lemmas essentially glabrous, usually light in color. p228

Avena fatua, Wild oats. Spikelets usually 3-flowered. Awns spirally twisted. Lemmas hairy, especially around basal scar, often dark in color. Northwest. Wheat and flax. p228

Eragrostis, Lovegrass, Stinkgrass. Plants annual, ascending. Spikelets paniced, many-flowered, conspicuously laterally flattened. Grain readily separating from lemma and palea, subspheroid, reddish-orange. Several species differing in size of spikelets. Common, gardens, roadsides, waste ground, around buildings. Late summer. p229

Dactylis. *Dactylis glomerata*, Orchard grass. Erect perennial. Spikelets in irregular, lopsided clusters at ends of panicle branches, about 3-flowered. Lemma and glumes finely hairy on dorsal nerves. A forage grass, mostly eastern portion. p229

INFLORESCENCE BRANCHED OR OF SEVERAL PARTS; SPIKELETS 1-FLOWERED

Inflorescence usually a branching panicle with spreading branches. Sometimes: (1) a series of essentially separate spikes or racemes, or (2) the branches somewhat appressed against main axis so that branching is inevident.

Agrostis, Redtop and Bentgrasses. Plants perennial, erect from rootstocks or prostrate. Spikelets in a diffuse terminal panicle, 1-flowered, small. Glumes papery. Lemma and palea very thin, slightly transparent, glossy. Grains ovoid, reddish-brown, about 1.5 mm. long. Cultivated and somewhat escaped. p231

Aristida. *Aristida oligantha*, Triple-awn grass. Low annuals. Panicles with relatively few spikelets. Spikelets 1-flowered, slender, the lemma with a very conspicuous, 3-branched awn. Southern. Pastures and waste areas.

Muhlenbergia. *Muhlenbergia schreberi*, Nimblewill. A fine-stemmed perennial from slender rootstocks. Leaves short, often diverging from stem at nearly a right angle. Panicles slender, the branches short and appressed against main axis. Spikelets small, narrowly elliptic, one-flowered, with a slender awn. Glumes and lemma papery. Central and southeastern. Shady, moist soil; in lawns under bushes and trees, around buildings, waste areas, not conspicuous but often very abundant. p230

Several other species of *Muhlenbergia*, usually larger, and with knotted, scaly rhizomes flourish in wet soil and sometimes invade cultivated land.

p231 *Andropogon*, Broomsedge, Bluestem. Perennials, often with flattened, erect stems in tufts. Inflorescences various, usually of several racemes or spikes, these clustered in various ways. Spikelets small, 1-seeded, often obscured by numerous filmy hairs which frequently give the entire inflorescence a feathery appearance.

Sorghum. Inflorescence a panicle. Spikelets borne in pairs, one large with a single floret and seed, the other smaller and sterile. Glumes thick. Lemma and palea very thin, difficult to discern. "Seed" the entire spikelet, usually with a pair of stalks (pedicels) appressed against the lower portion, or the hulled grain.

p232 *Sorghum halapense*, Johnson grass. A tall, leafy perennial from rank, creeping rhizomes. Spikelets becoming dark at maturity, narrowly ovoid, about 5 mm. long, the pedicels nearly equal in length, with cup-like tips. One of the major noxious weeds of the southern states, important in our range only in the extreme southern portion.

p232 *Sorghum sudanense*, Sudan grass. Similar to above in appearance but annual. Spikelets somewhat larger, 6 mm. long, usually straw-colored. Pedicels irregular in length, usually with jagged tips. A forage crop.

p233 *Sorghum vulgare*, Sorghum. Annuals. Panicles often dense and congested. Spikelets ovoid, larger than above, the plump grain often exposed at maturity. Pedicels similar to those of Johnson grass. Cultivated. The "seed" in most North Central States kinds is the hulled grain.

p233 *Echinochloa*. *Echinochloa crus-galli*, Barnyard grass. Plants lush, rapid-growing annuals. Stems prostrate to ascending, glabrous. Ligule absent. Spikelets in lopsided clusters (congested panicles), with one fertile flower and one seed, 3-4 mm. long exclusive of awns, broadly ovate, planoconvex. Fertile lemma and palea hard and thick, smooth and shining, yellowish in color. Glumes and sterile lemma papery, bristly on the outside. Awns present or absent. "Seed": (1) the entire spikelet, (2) the fertile lemma and palea enclosing the grain minus outside structures or, (3) the broadly ovate, yellowish grain. Common, fields, gardens, waste areas. Midsummer to fall. The seeds are abundant in agricultural seed.

Panicum, Panic grasses. Spikelets small, in panicles, 1-seeded, planoconvex. Fertile lemma and palea hardened, smooth and shiny, closely enclosing the grain. Glumes and sterile lemma papery. "Seed": (1) the entire spikelet, (2) the fertile floret or, (3) the hulled grain.

p234 *Panicum capillare*, Witchgrass. Plant a rapid-growing, rank annual, erect or spreading. Stems and leaves hairy. Panicle diffuse, becoming nearly as wide as high. Spikelets 2-3 mm. long, planoconvex, pointed, the first glume very short, the second glume and sterile lemma as long as the spikelet. Fertile lemma and palea shiny yellowish with fine longitudinal lines. Hulled grain planoconvex, yellowish. Very abundant,

cultivated land. Late summer and early fall. Seeds common in commercial legume and grass seed.

Panicum dichotomiflorum, Fall panicum. Plants annual, spreading or ascending, rapid-growing. Stems and leaves glabrous. Panicle narrower and less branched than that of witchgrass. Spikelets and seeds similar to those of witchgrass, but slightly longer, and narrowly ovoid in shape. p235



PLATE 130

Cenchrus pauciflorus 1. Inflorescence and leaf x1 1/3.

Agropyron repens 2. Inflorescence x2/3.

Agropyron smithii 3. Inflorescence and leaves. Separate leaf is dried and twisted longitudinally x2/3.



PLATE 131

Elymus canadensis 1. Inflorescence and leaf $\times 2/3$. 3. Spikelet cluster $\times 1\ 1/3$.
Lolium perenne 2. Inflorescence and leaf $\times 2/3$.

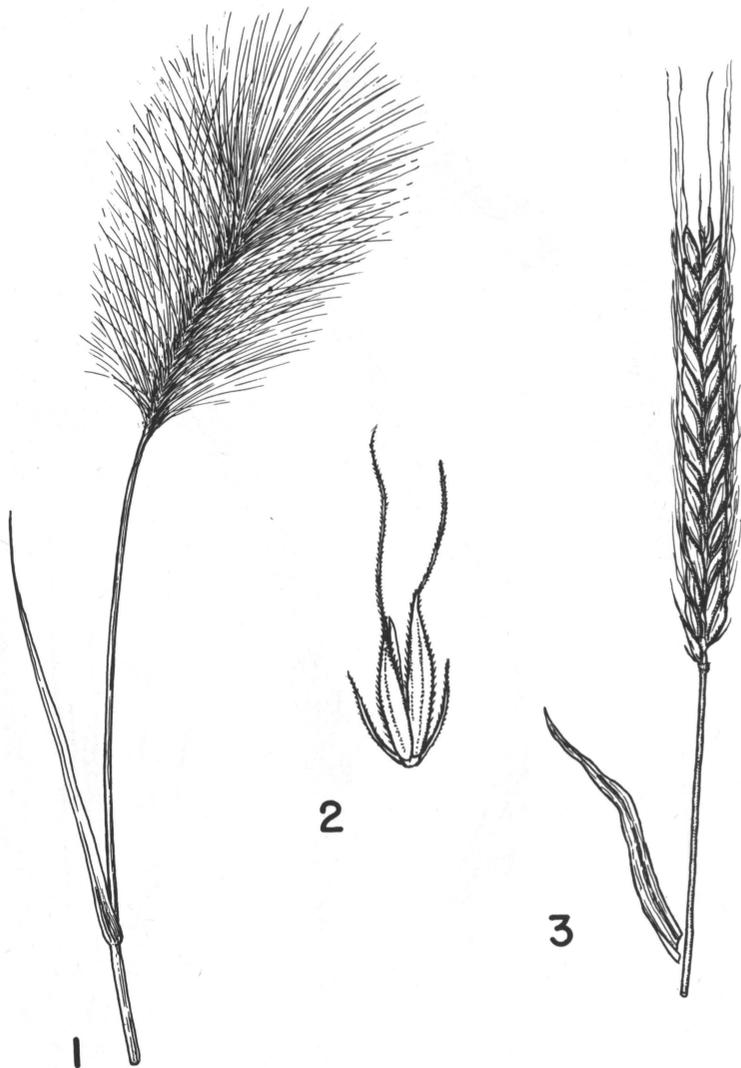


PLATE 132

Hordeum jubatum 1. Inflorescence x2/3.

Secale cereale 2. Spikelet x1 1/3. 3. Inflorescence x2/3.

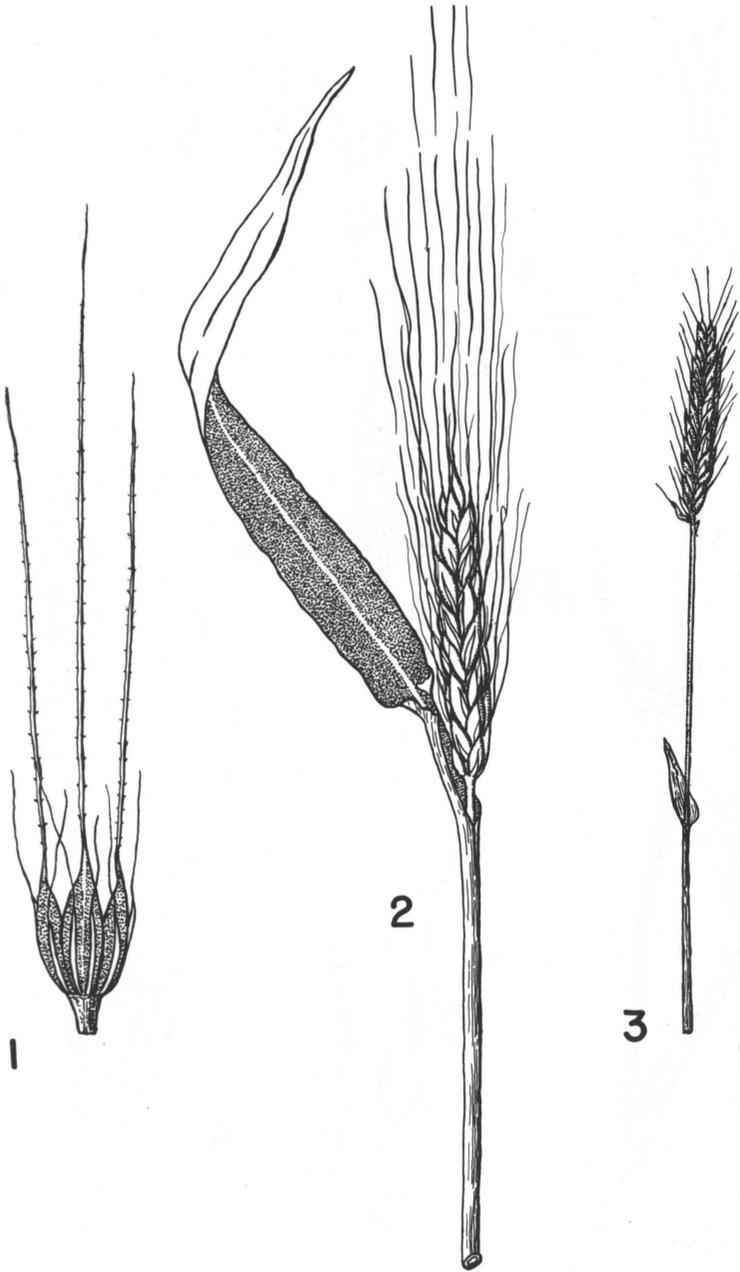


PLATE 133

Hordeum vulgare 1. Spikelet cluster x1 1/2. 2. Inflorescence x2/3.
Hordeum pusillum 3. Inflorescence x2/3.

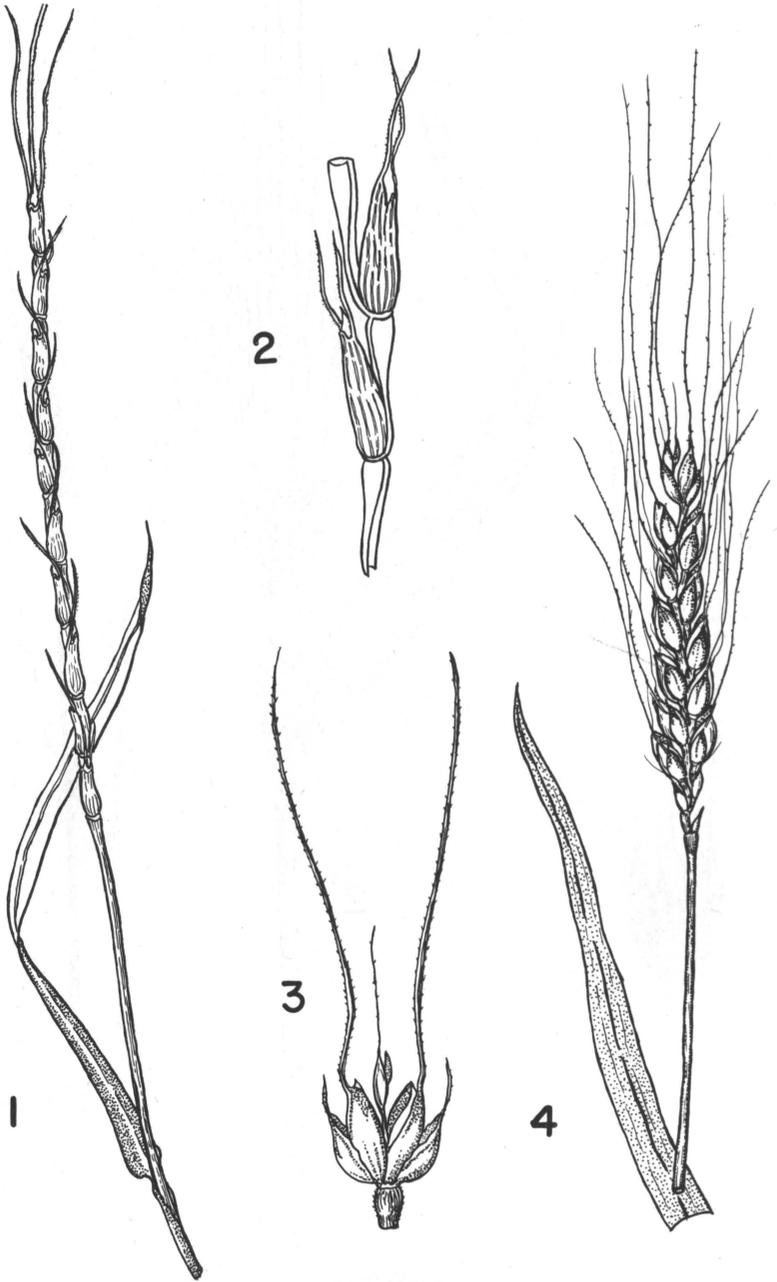


PLATE 134

Aegilops cylindrica 1. Inflorescence and leaf $\times 2/3$. 2. Adjoined spikelets and axis $\times 2$.

Triticum vulgare 3. Spikelet $\times 1\ 1/3$. 4. Inflorescence $\times 2/3$.

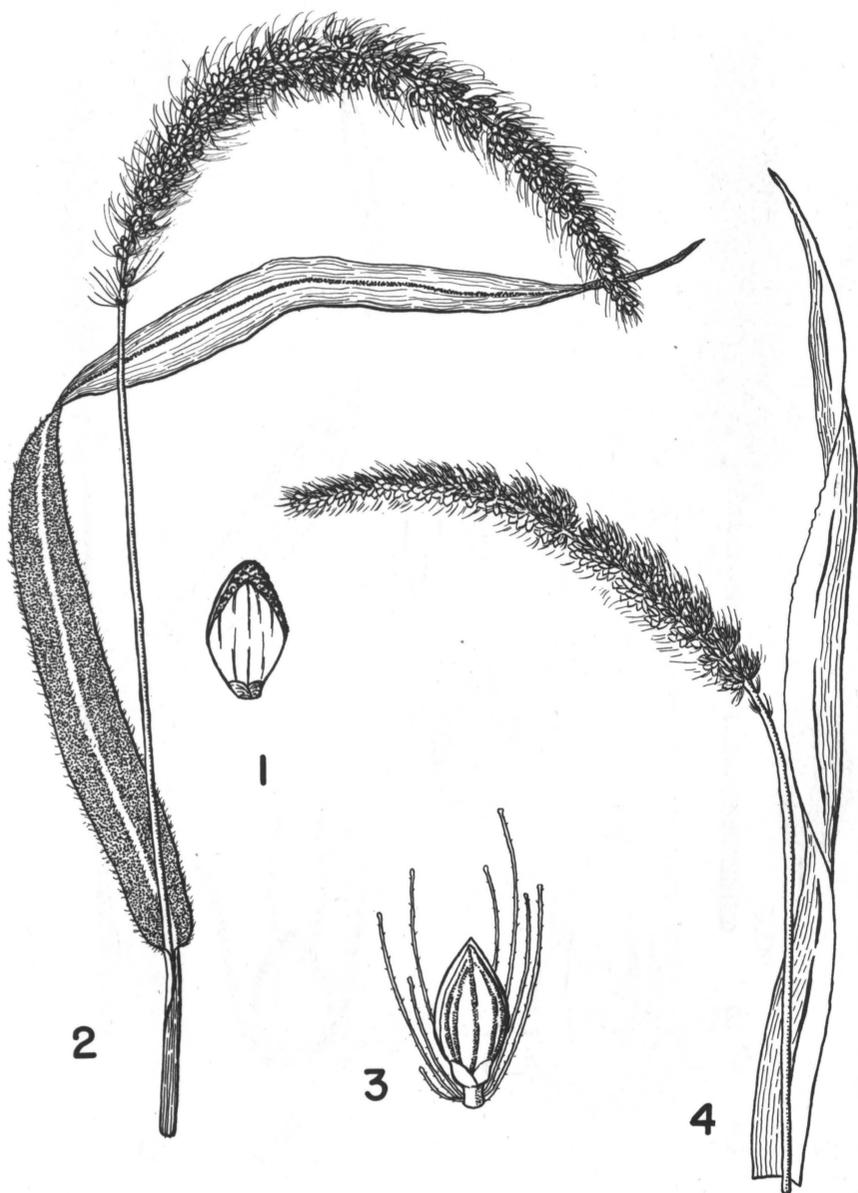


PLATE 135

Setaria faberii 1. Spikelet x4. 2. Inflorescence and leaf x2/3.
Setaria viridis 3. Spikelet x4. 4. Inflorescence and leaf x1.

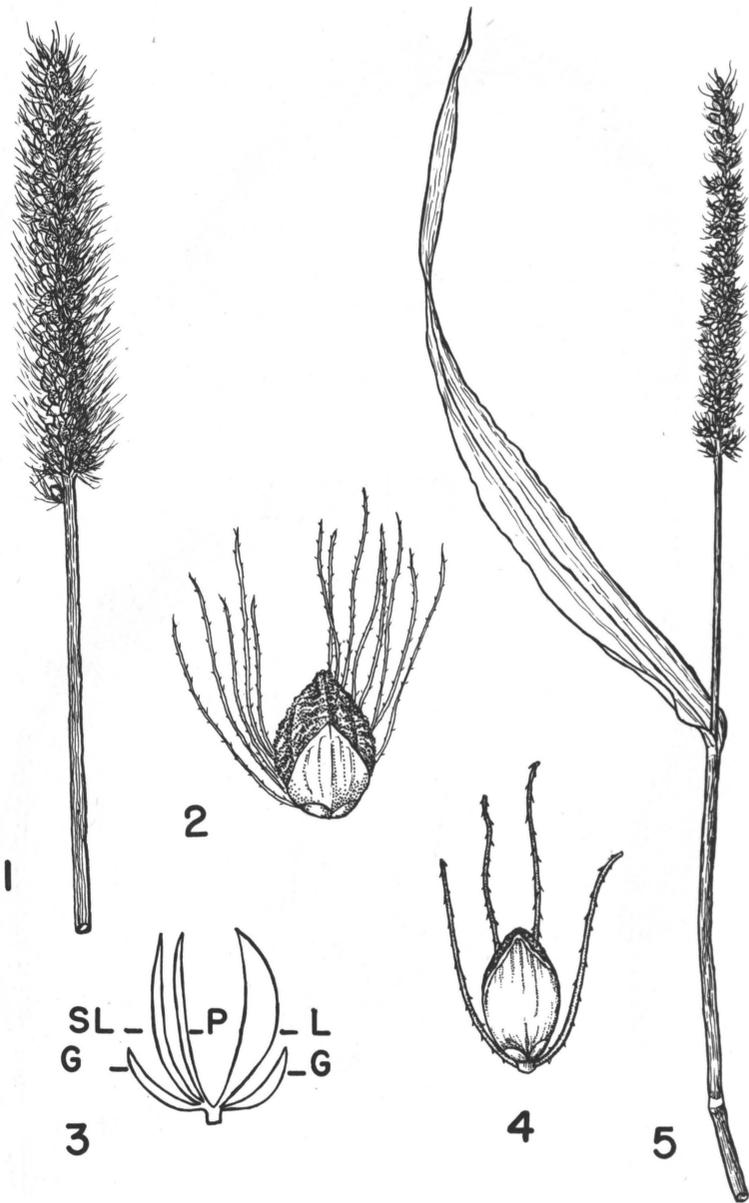


PLATE 136

Setaria lutescens 1. Inflorescence x1. 2. Spikelet x4. 3. Diagram of spikelet
(Parts: G, glume; SL, sterile lemma; P, palea; L, lemma).
Setaria verticillata 4. Spikelet x5. 5. Inflorescence and leaf x2/3.

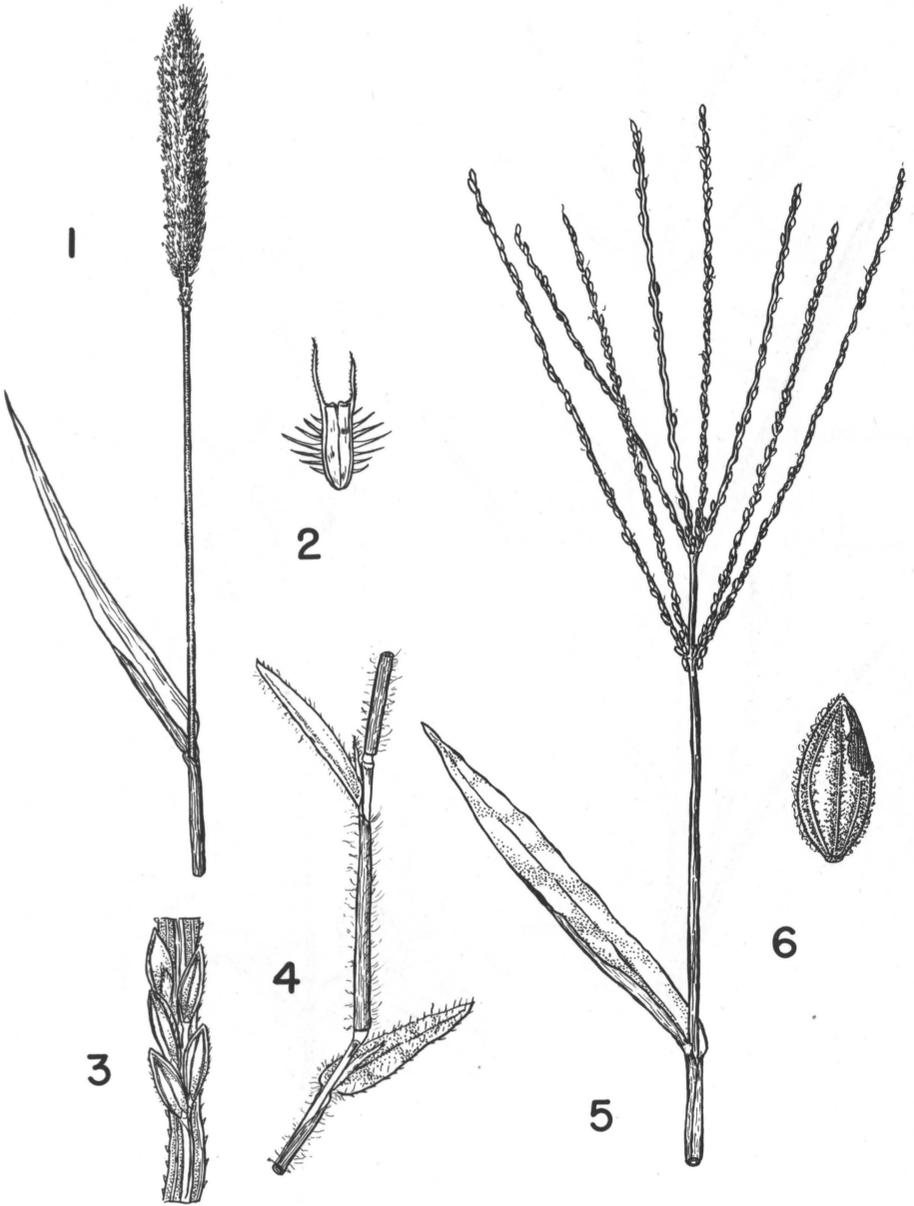


PLATE 137

Phleum pratense 1. Inflorescence and leaf x2/3. 2. Spikelet x3.
Digitaria sanguinalis 3. Spikelets on rachis x4. 4. Portion of leafy stem x2/3.
Digitaria ischaemum 5. Inflorescence and leaf x2/3. 6. Spikelet; glume torn at apex to reveal surface of fertile lemma.

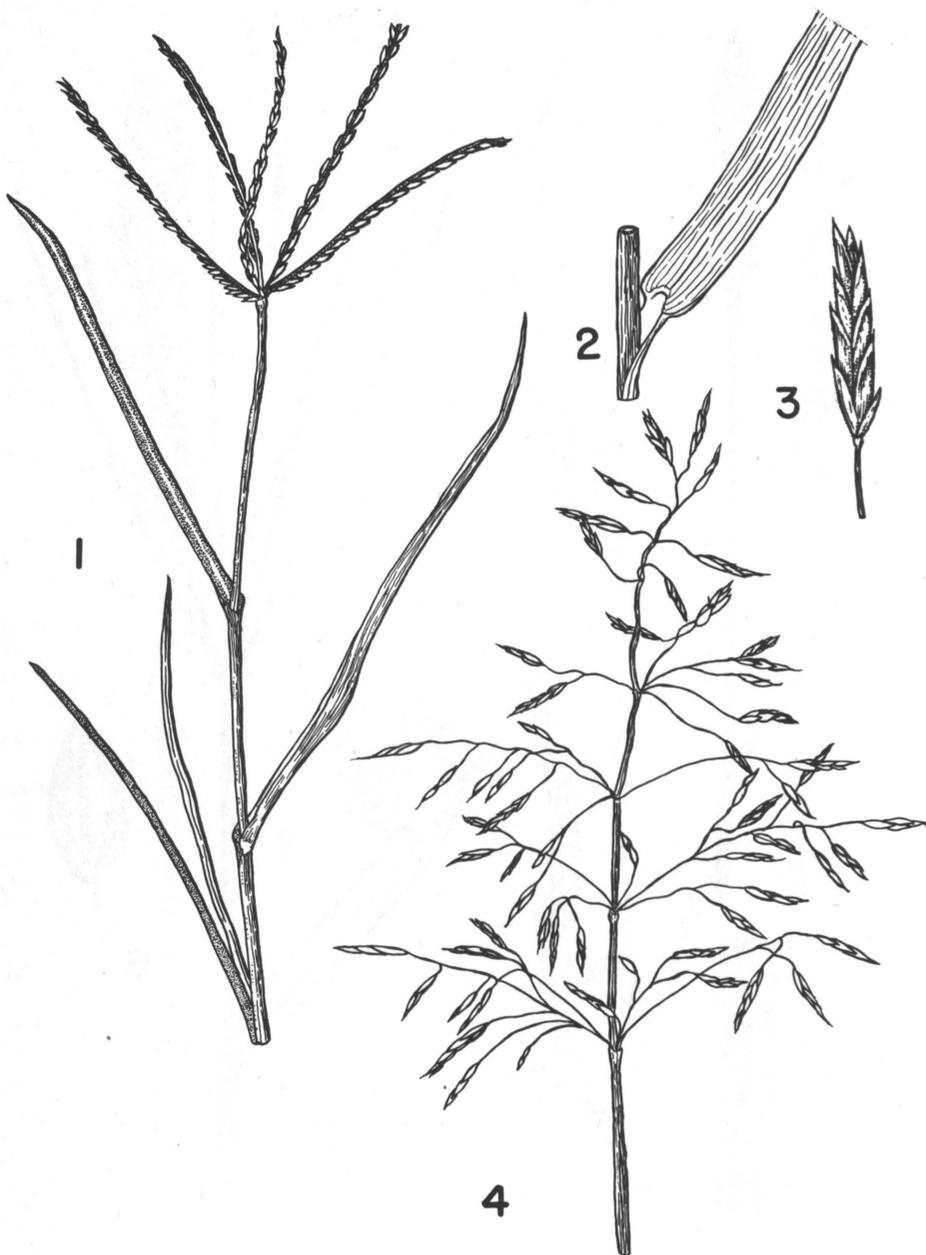


PLATE 138

Eleusine indica 1. Inflorescence and leaves x2/3.

Bromus inermis 2. Lower portion of leaf blade adjoining stem x1/2. 3. Spikelet x1 1/3. 4. Inflorescence x1/3.



PLATE 139
Cynodon dactylon Habit x2/3.



PLATE 140

Bromus japonicus 1. Leaves and stem x2/3. 2. Spikelet x3.

Bromus tectorum 3. Spikelet x3. 4. Inflorescence x2/3. 5. Stem and leaf x2/3.



PLATE 141

Bromus secalinus 1. Floret x2. 2. Inflorescence and leaf x2/3.

Festuca elatior 3. Spikelet x1 1/2. 4. Inflorescence branches and leaf x2/3.



PLATE 142

Avena fatua 1. Spikelet x2. 2. Floret x1 1/3.
Avena sativa 3. Inflorescence branches and leaf x2/3.
Poa pratensis 4. Inflorescence and leaf x2/3.

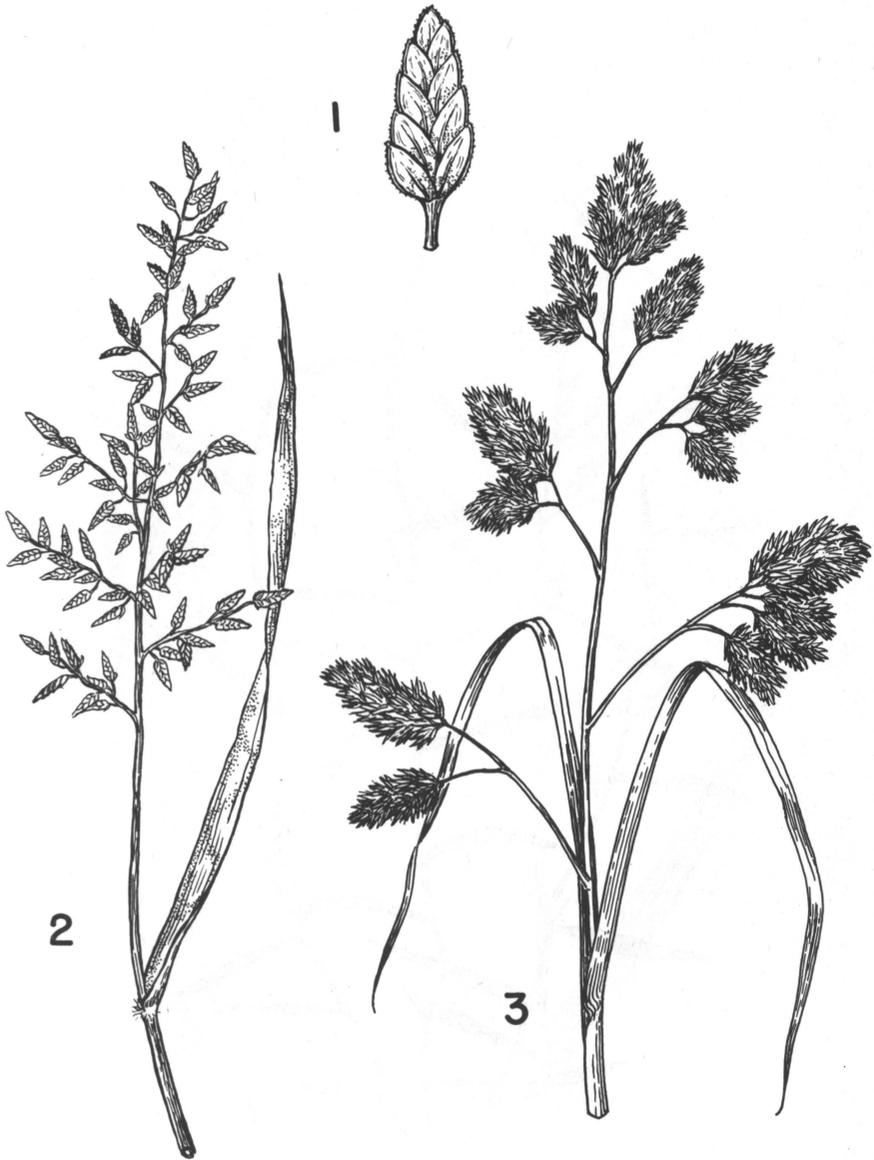


PLATE 143

Eragrostis cilianensis 1. Spikelet x3. 2. Inflorescence x2/3.
Dactylis glomerata 3. Inflorescence and leaves.

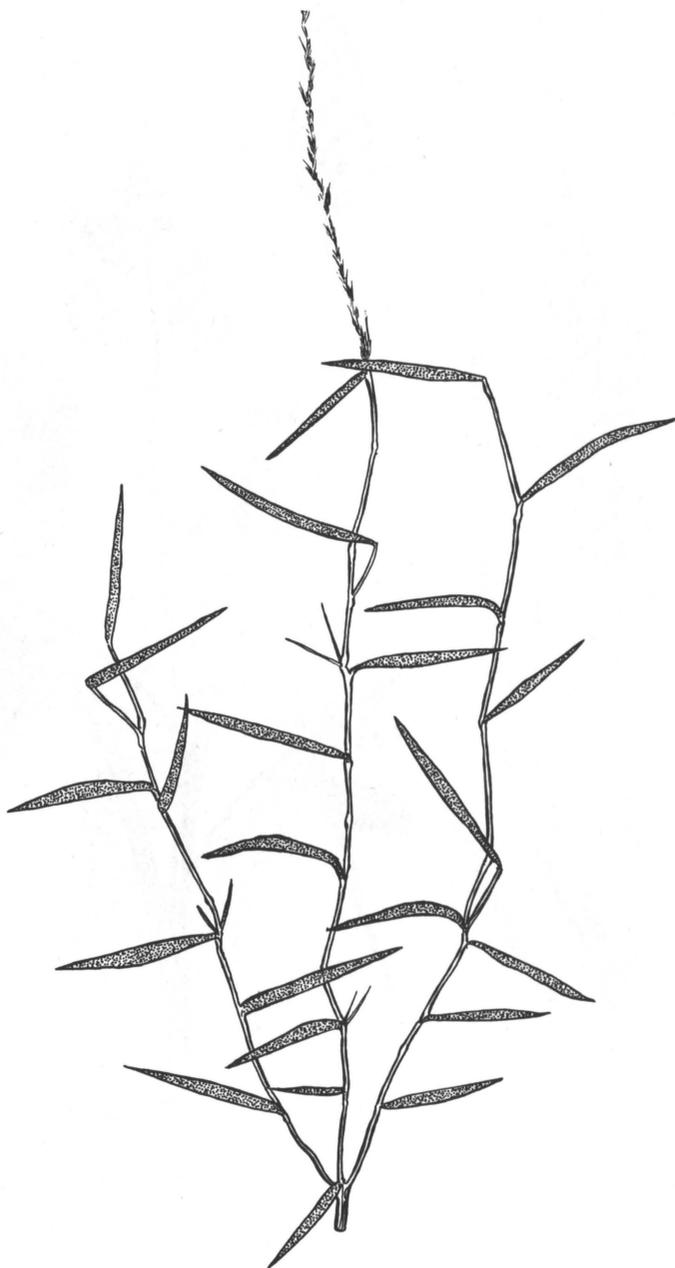


PLATE 144

Muhlenbergia schreberi Habit x2/3.



PLATE 145

Andropogon virginicus 1. Inflorescence x2/3.
Agrostis alba 2. Inflorescence and leaf x2/3.



PLATE 146

Sorghum halapense 1. Spikelet x5. 2. Inflorescence and leaf x1/2. 4. Creeping rootstocks x1/2.
Sorghum sudanense 3. Spikelet x5.

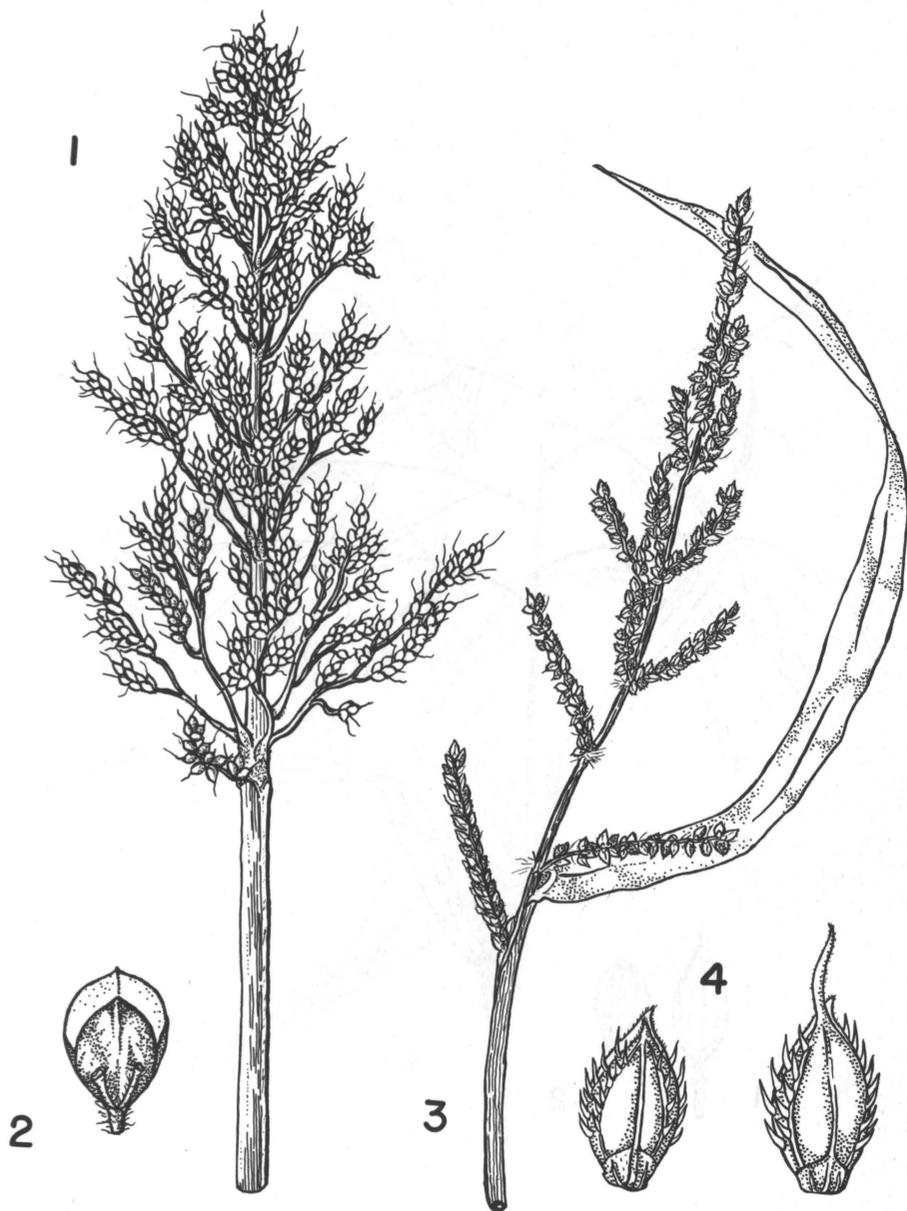


PLATE 147

Sorghum vulgare 1. Inflorescence x1/3. 2. Spikelet x2.
Echinochloa crusgalli 3. Inflorescence x2/3. 4. Spikelets x6.

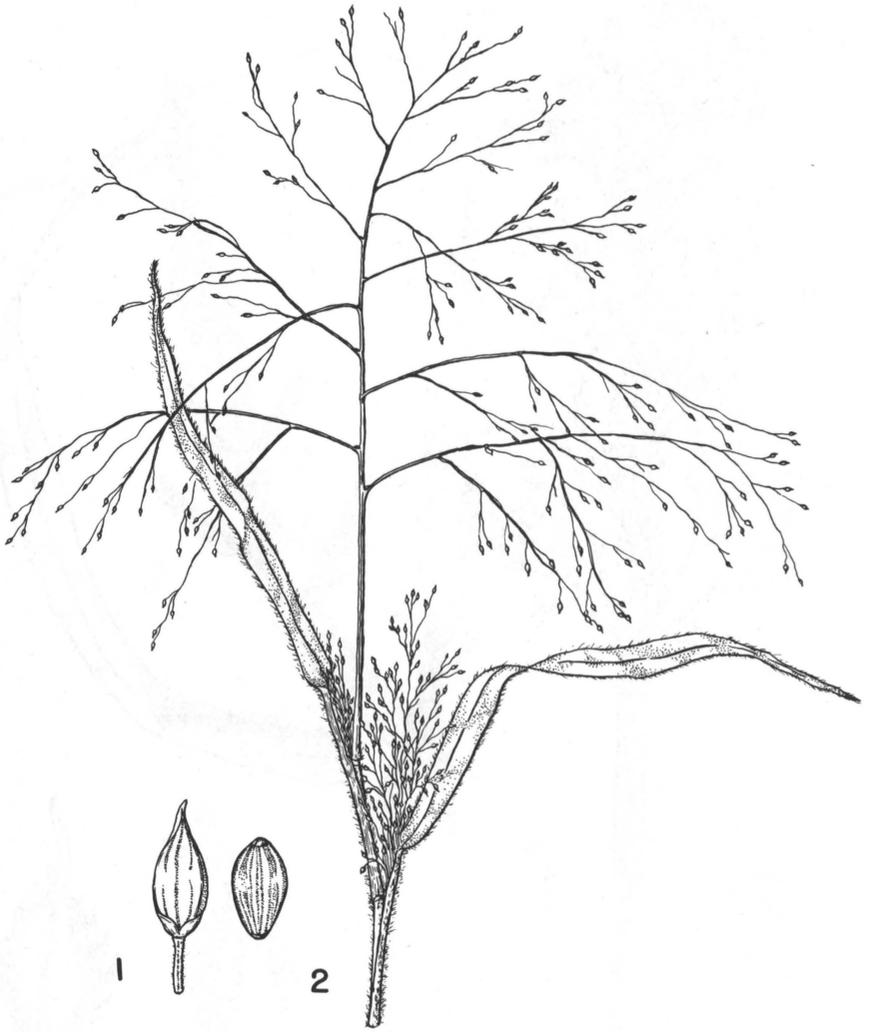


PLATE 148

Panicum capillare 1. Spikelet and floret x6. 2. Inflorescence x1/2.



PLATE 149

Panicum dichotomiflorum Habit x1/3.



PLATE 150

Aristida oligantha 1. Inflorescence x2/3.
Coreopsis tinctoria 2. Flower heads x2/3.

19. The Cyperaceae and Other Monocotyledonous Families

CYPERACEAE, SEDGE FAMILY

STEMS SOLID and 3-angled. Leaves similar to those of grasses, with a linear blade and basal sheath. Leaf sheath forming a closed tube about stem. Flowers without petals, variously arranged, often in spikes, enclosed by a single bract. Fruit a flattened or 3-angled achene with a thick, hard pericarp.

Sedges resemble grasses in general appearance and are often confused with them. They are most easily distinguished by their 3-rowed leaves and triangular stems as compared with the two rows of grass leaves and round or flattened stems. Most sedges have a stiffer, harsher feeling than grasses when handled.

In addition to the above, there are sedges which have round stems and almost no leaves (e.g. bulrushes, spikerushes). These kinds are marsh and aquatic plants and rarely occur on agricultural land.

Carex, Sedge, slough grass. Flowers in spikes, unisexual. Staminate and pistillate flowers separate and different in appearance. Pistillate flowers enclosed within a sac-like structure (perigynium), which is retained as a covering about the fruit. p239

There are more than 100 kinds of sedges in the North Central States, frequently abundant in low meadows and uncultivated fields, along ditches, fence rows, and roadsides. They are evident primarily in the spring and early summer.

Cyperus, *Cyperus esculentus*, Yellow nutgrass. Plants perennial with slender rhizomes which bear small, ovoid tubers. Inflorescence a panicle of brownish-yellow spikelets. Achenes brown, slenderly triangular, each enclosed by a single bract. Sporadic, most common Southeast, poorly drained or sandy soils. p239

JUNCACEAE, RUSH FAMILY

Juncus, Rushes. Plants similar to grasses and sedges in appearance. Stems rounded. Leaf sheaths closed. Blades narrow, often circular in cross section. Flowers in terminal, branched clusters, small, green. p239