

ELYMUS VILLOSUS AND ELYMUS VILLOSUS FORMA
ARKANSANUS

27. SITANION Raf. (sī-tān'yūn)

Spikelets 2-to-few-flowered, the uppermost floret reduced, sessile, usually 2 at each node of a disarticulating rachis, the rachis breaking at the base of each joint, remaining attached as a pointed stipe to the spikelets above; **Glumes** narrow or setaceous, 1-3-nerved, the nerves prominent, extending into one-to-several awns, these (when more than one) irregular in size, sometimes mere lateral appendages of the long central awn, sometimes equal, the glume being bifid; **Lemmas** firm, convex on the back, nearly terete, the apex slightly 2-toothed, 5-nerved, the nerves obscure, the central nerve extending into a long, slender, finally spreading awn, sometimes one or more of the lateral nerves also extending into short awns; **Palea** firm, nearly as long as the body of the lemma, the two keels serrulate.

Low or rather tall caespitose *perennials*, with bristly spikes. Species about six, in the dry regions of western United States, one in Texas.

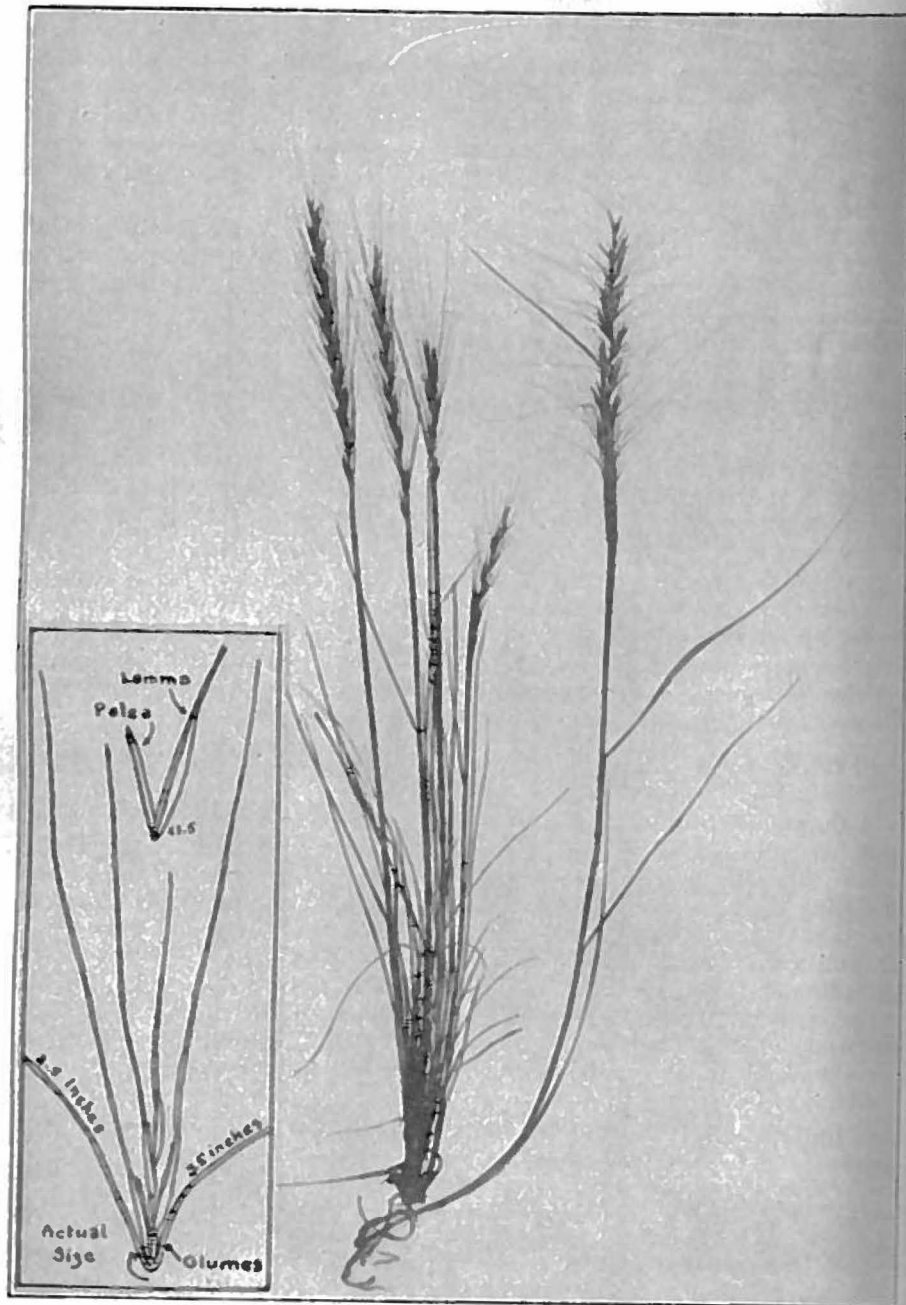
This genus is closely related to *Elymus*, and until recent years has been almost universally included in it. The characters which separate *Sitanion* are the disarticulating rachis together with the slender glumes and long-awned lemmas.

When young all the species furnish forage, but at maturity the disarticulated joints of the spike, with their pointed rachis-joints and long-awned spikelets, are blown about by the wind and often cause injury to stock, penetrating the nose and ears, working in by means of the forwardly roughened awns, and causing inflammation. The species are generally known as squirreltail or foxtail grasses.

S. HYSTRIX (Nutt.) J. G. Smith (hī's'triks); *Elymus elymoides* (Raf.) Swezey; LONG-BRISTLED WILD RYE.

Culms 8-22' tall, tufted, erect; **Blades** 1.5-6' long, 2-7 mm. wide, flat, soon becoming involute, somewhat stiffly ascending, rough above, smooth below; **Sheaths** usually overlapping, the upper one often inflated and enclosing the base of the spike, sometimes rough; **Ligule** membranaceous, less than 1 mm. long; **Spikes** green or tinged with purple, 3-8' long, including awns, usually two spikelets at each node, at maturity the awns spreading and rachis-joint disarticulating; **Spikelets** 2-6-flowered; **Glumes** entire, awl-shaped, with scabrous awns 2-3.5' long; **Lemmas** 8-10 mm. long, scabrous, bearing a long scabrous awn 1.5-3.5' long, at maturity divergent, the apex of lemma sometimes 2-toothed, the upper lemma usually short-awned.

In dry soil, Texas to Missouri, west to Colorado, Wyoming and Arizona. Late spring-summer.



SITANION HYSTRIX, LONG-BRISTLE WILD-RYE

28. HORDEUM L. (hôr'dē-üm)

Spikelets 1-flowered, 3 (sometimes 2) together at each node of the articulate rachis (continuous in *Hordeum vulgare*), the back of the lemma turned from the rachis, the middle one sessile or subsessile, the lateral ones pediceled; **Rachilla** disarticulating above the glumes and, in the central spikelet, prolonged behind the palea as a bristle and sometimes bearing a rudimentary floret; **Lateral Spikelets** usually imperfect, sometimes reduced to bristles; **Glumes** narrow, often subulate and awned, rigid, standing in front of the spikelet; **Lemma** rounded on the back, 5-nerved, usually obscurely so, tapering into a usually long awn.

Annual or **perennial** low or rather tall grasses, with flat blades and dense terminal cylindric spikes. 10 species in the United States, 5 in Texas.

Cultivated barley, an annual, with its many varieties, is the most important species of the genus, and resembles bearded wheat, the awns being as long as 6'. Beardless barley is a variety of *H. vulgare*. When all the spikelets of each cluster are fertile the barley is 2-rowed. In common or 4-rowed barley all the spikelets are fertile, but the lateral spikelets on the opposite sides of the spike being imbricate in a row so that the spike appears to be 4-rowed.

Little barley (*H. pusillum*), a small tufted annual with a narrow pale green spike 1-4' long, has both glumes of the central spikelet and the first glume of both lateral spikelets dilated above the base, the other glumes being bristle-like. *H. pusillum* var. *pubens* has pubescent spikelets.

H. nodosum, resembling little barley, differs in being a perennial, and in having uniformly awn-like glumes. *H. jubatum*, squirreltail, a perennial, has soft brushlike spikes, commonly purplish, with long-awned spikelets, the awns finally spreading, giving the spike a bushy appearance. *H. murinum*, barley-grass, an annual, differs from the other wild barleys in that both glumes of the central spikelet and the first glume of the lateral spikelets are ciliate on the margins with bristly hairs.

LATERAL SPIKELETS SESSILE; CULTIVATED ANNUALS.

Lemma awned.

Lemma awnless.

1. *H. vulgare*

1a. *H. vulgare* var. *trifurcatum*

LATERAL SPIKELETS STALKED; LEMMA AWNED.

LEMMA OF THE middle spikelet sessile.

SPIKES narrow with nearly erect or ascending awns.

Glumes bristle-like; perennials.

2. *H. nodosum*

Four glumes of cluster dilated above the base; annuals.

Spikelets glabrous.

3. *H. pusillum*

Spikelets pubescent, broader.

3a. *H. pusillum* var. *pubens*

SPIKES bushy, with long spreading awns; perennials.

4. *H. jubatum*

LEMMA OF THE middle spikelet stalked; glumes or some of them ciliate; annuals.

5. *H. murinum*

1. *H. VULGARE* L. (vül-gä'rë); *H. sativum* Jessen; CULTIVATED BARLEY.

Culms usually 2-3 feet tall, coarse but weak, erect; **Blades** 5-15' long more or less, about a half inch wide, flat, broad at the base, pointed, the under surface rough, with long glabrous auricles; **Ligule** membranaceous, short, truncate; **Spikes** excluding awns 3-4' long, dense, the rachis not disarticulating at maturity; **Spikelets** in clusters of three, all perfect; **Glumes** narrow, about 8 mm. long, with awns 7-10 mm. long, glabrous to pubescent; **Lemmas** 10-12 mm. long, fusiform, narrowed into a scabrous awn as long as 6 inches, the rachilla extended into a short hairy pedicel; **Palea** about as long as its lemma.

Cultivated lands, waste places, over most of the United States. Spring to summer.

1a. *H. VULGARE* var. *TRIFURCATUM* (Schlecht.) Allfeld (tri-für-kä'tüm); BEARDLESS BARLEY.

Beardless barley is a cultivated variety of *H. vulgare* in which the **Awns** are suppressed and the **Lemmas** have only irregular short teeth or lobes. (See drawings of spike with *H. vulgare*.)

2. *H. NODOSUM* L. (nō-dō'süm); *H. pratense* Huds.; MEADOW BARLEY.

Culms 8-25' tall, tufted, erect or decumbent at the base; **Blades** 1.5-5' long, 2-6 mm. wide, flat, usually rough; **Sheaths** shorter than the internodes; **Ligule** membranaceous, about 6 mm. long, truncate; **Spike** 1-3.5' long, finally exserted; **Spikelets** usually in threes; **Glumes** of all of the spikelets setaceous or awnlike; **Lemma** of the middle spikelet exclusive of the awns 6-8 mm. long, the awn usually 6-12 mm. long, the corresponding lemma in the lateral spikelets much smaller and stalked, awn-pointed.

In meadows and waste places, especially in saline soil, Texas to Tennessee and north. Late spring-summer.

3. *H. PUSILLUM* Nutt. (pū-sil'üm); LITTLE BARLEY.

Culms 4-24' tall, in small tufts, erect or sometimes decumbent at the base; **Blades** 0.5-5' long, 1-6 mm. wide, rough above, flat or involute when dry; **Sheaths** shorter than the internodes; **Ligule** membranaceous, short, truncate; **Spike** finally exserted, 1-4' long, about 5-10 mm. thick, usually erect; **Spikelets** usually in threes, middle sessile and perfect, lateral on short pedicels, imperfect; **Glumes** scabrous, the first glume of each lateral spikelet and both glumes of the middle spikelet dilated above the base, the other two bristle-like, 8-15 mm. long, about equal to the awned lemma of the middle spikelet; **Lemma** of the middle spikelet exclusive of the short awn 6-8 mm. long, the corresponding parts of the lateral spikelets shorter, awnless or awn-pointed, on a short curved stipe; **Palea** of the middle spikelet about as long as its lemma, awn-pointed.

In dry soil, over most of the United States. Spring-summer.

3a. *H. PUSILLUM* var. *PUBENS* Hitchc. (pū'bēns).

This variety differs from the species in that the **Spikelets** are pubescent and broader, and the dilated **Glumes** wider.

4. *H. JUBATUM* L. (jū-bā'tüm); SQUIRRELTAIL-GRASS; FOXTAIL BARLEY.

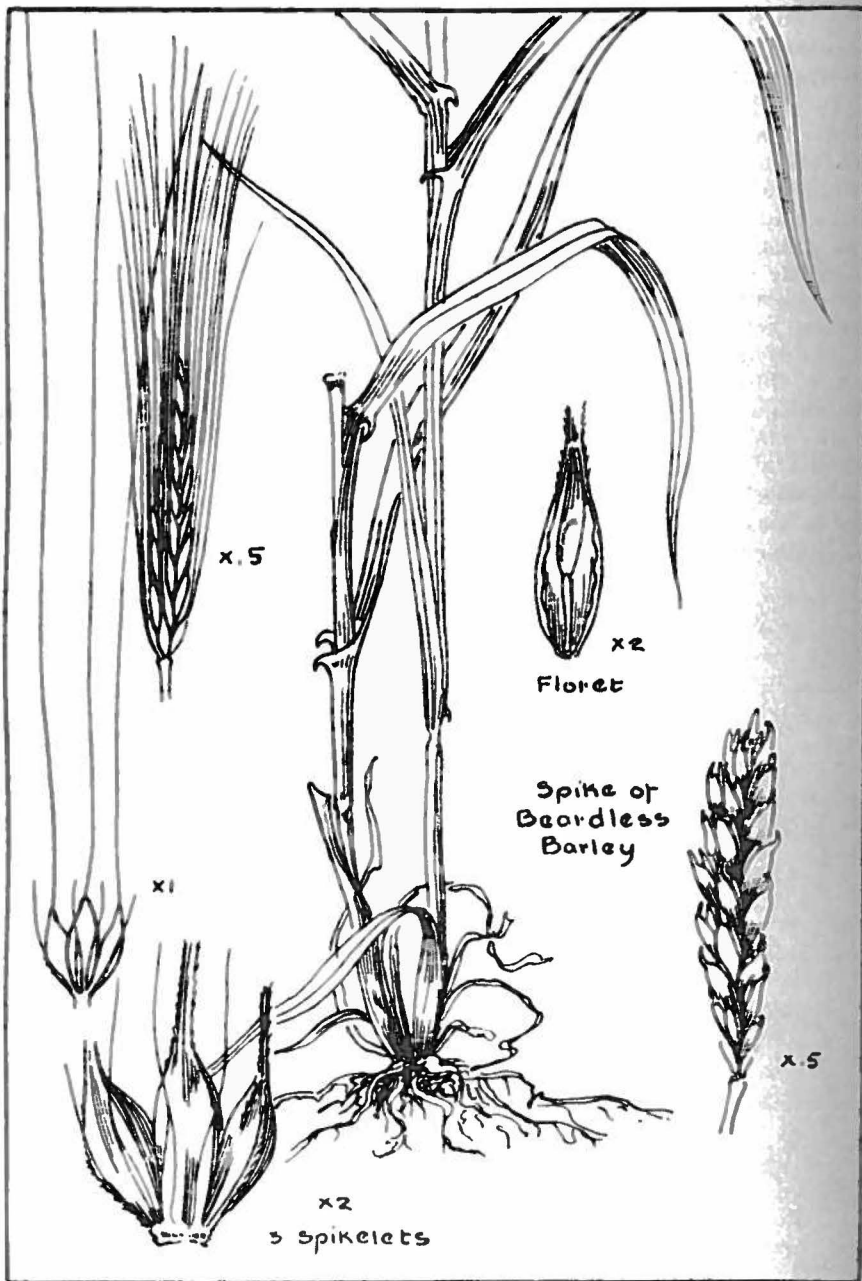
Culms 8-30' tall, tufted, erect, slender; **Blades** 1.5-5' long, 2-5 mm. wide, flat, erect, scabrous; **Sheaths** shorter than the internodes, loose; **Ligule** membranaceous, about 1 mm. long; **Spikes** 2-4.5' long, nodding, green or purplish, turning pale with age, the numerous long awns soon spreading; **Spikelets** three at each node of the articulate rachis, the middle sessile and perfect, the lateral stalked and abortive; **Glumes** setaceous, 1-2.5' long, scabrous, finally spreading; **Lemma** of middle spikelet 6-8 mm. long, lanceolate, scabrous toward the apex, with scabrous awns 1.5-2.5' long, the corresponding parts of the lateral spikelets similar but reduced, the lemma about 6 mm. long including the pedicel, sometimes much reduced, short-awned.

In dry soil, common in the western states, extending into the southern states. Summer.

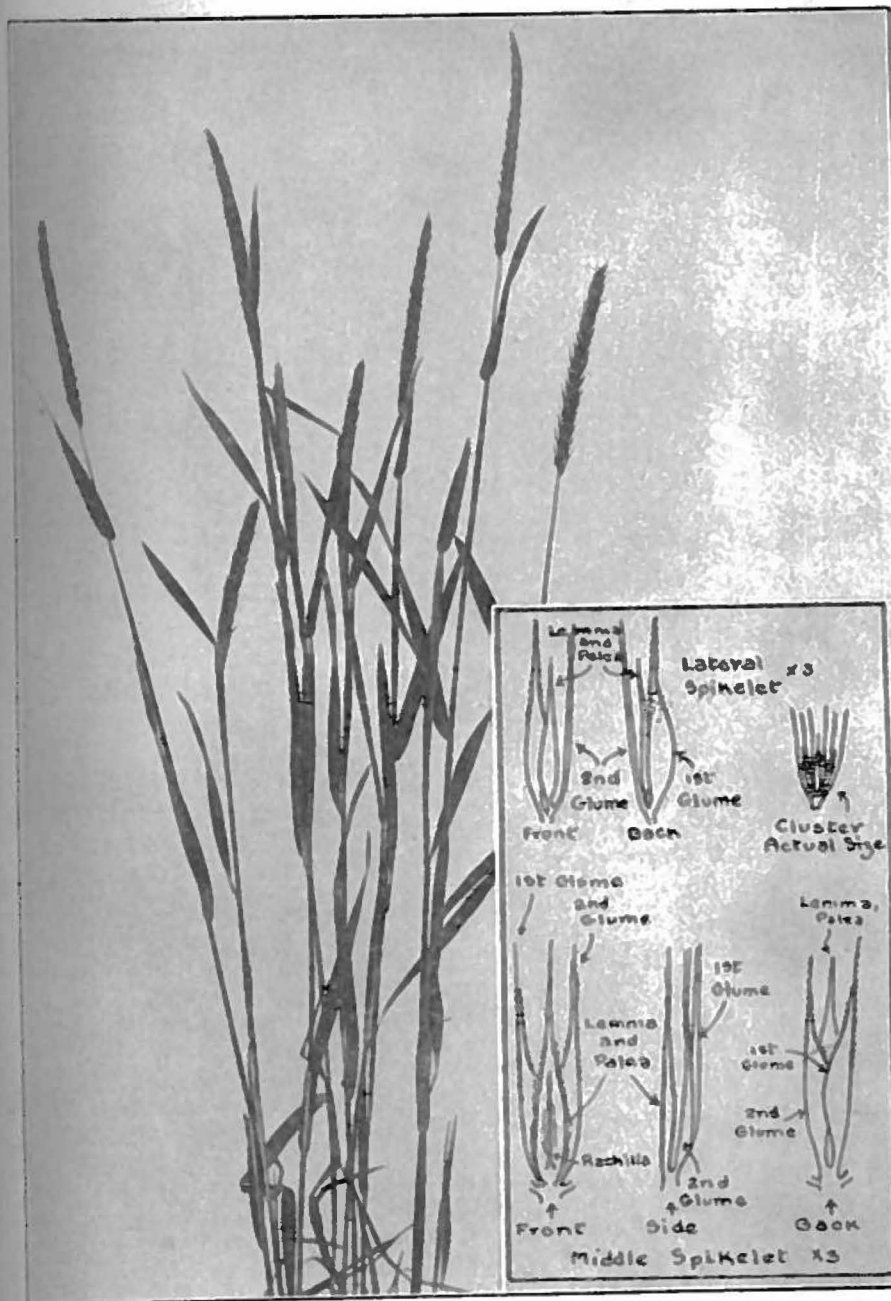
5. *H. MURINUM* L. (mū-rī'nüm); BARLEY-GRASS, WALL-BARLEY, MOUSE-BARLEY, FOXTAIL AND SEA-BARLEY.

Culms 12-30' tall, erect or decumbent at the base; **Blades** 1.5-9' the upper blades 1.5-3' long, 3-7 mm. wide, flat, rough; **Sheaths** mostly shorter than the internodes, on small plants much crowded, loose; **Ligule** membranaceous, truncate, about 1 mm. long; **Spike** 2-3.5' long, exserted or included at the base, spikelets in clusters of threes, the middle spikelets sessile and the lateral on stipes about 1.5 mm. long; **Spikelets**, **Glumes**, both glumes of the middle spikelet and the first glume of the lateral lanceolate and ciliate on the margins, the second glumes of the lateral spikelets awl-shaped, all with awns 18-30 mm. long; **Middle Spikelet**, **Lemma** exclusive of awn 9-12 mm. long, stalked, scabrous toward the apex, the scabrous awns about 25 mm. long; **Palea** about equal to its lemma, narrow, 2-toothed, the two nerves more or less pubescent; **Lateral Spikelets** imperfect, the lemmas and paleas well developed, these and the awns about equal to those of the middle spikelet, the awns sometimes longer; **Rachilla** of the lateral spikelets also extending behind the palea into a bristle shorter than that of the middle spikelet.

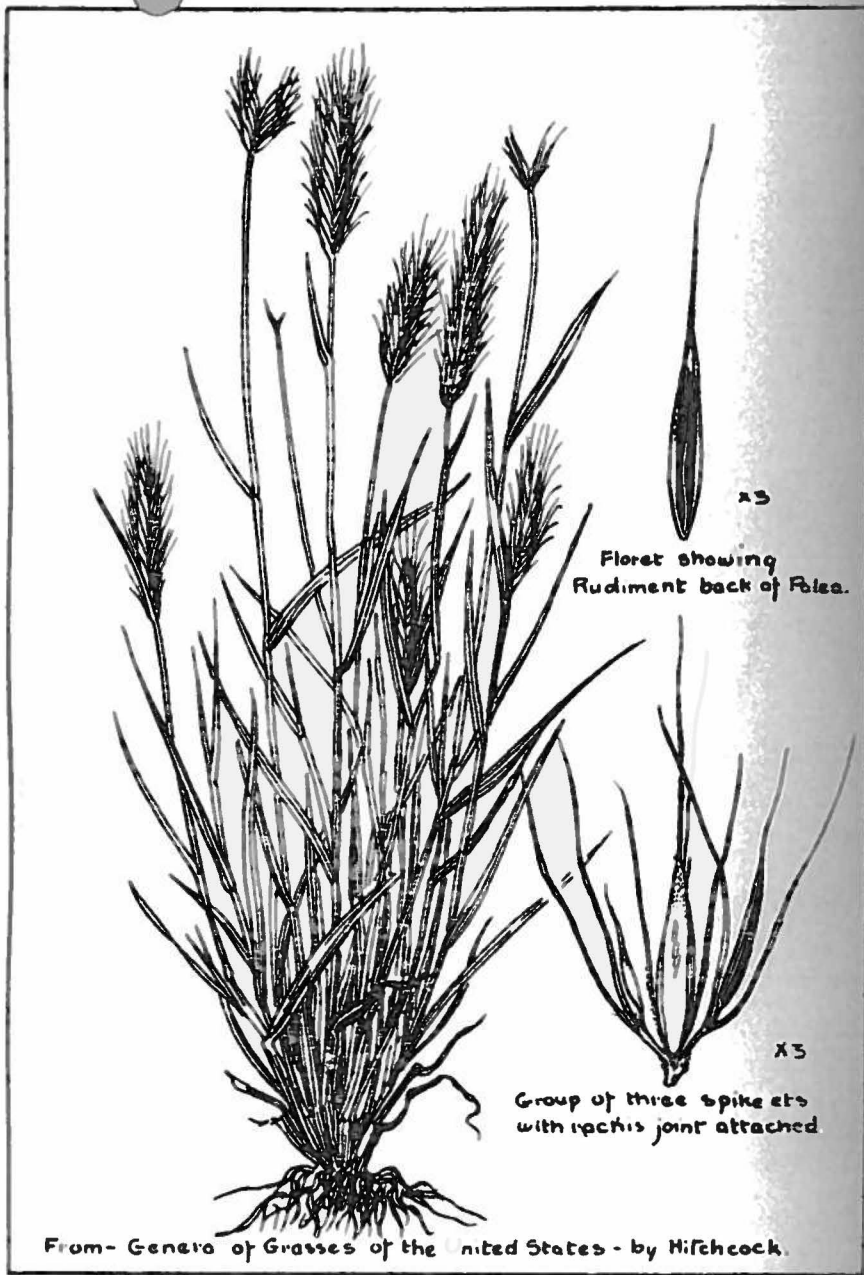
In waste places, sparingly over most of the United States. Spring and summer.



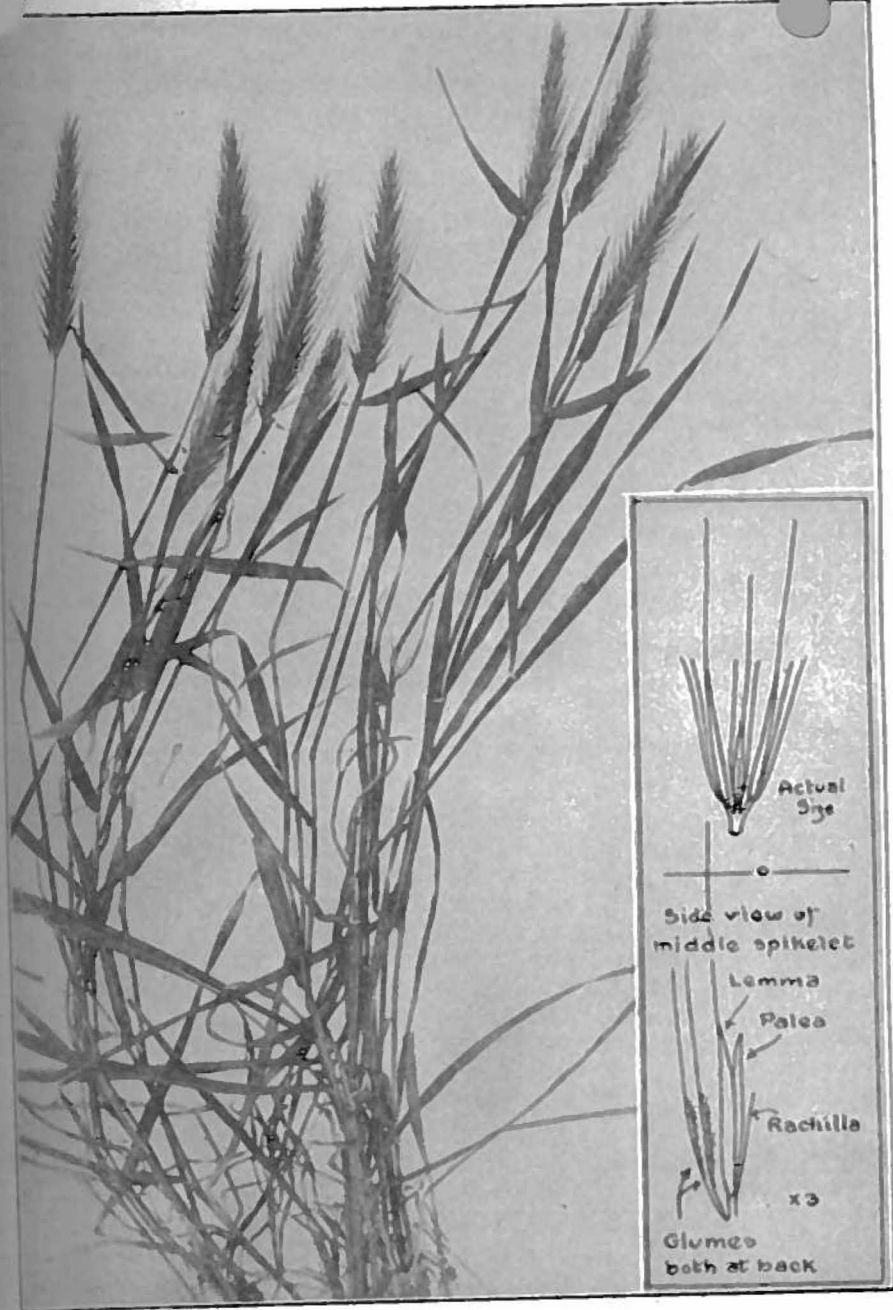
HORDEUM VULGARE, CULTIVATED BARLEY, and to the right a Spike of BEARDLESS BARLEY.



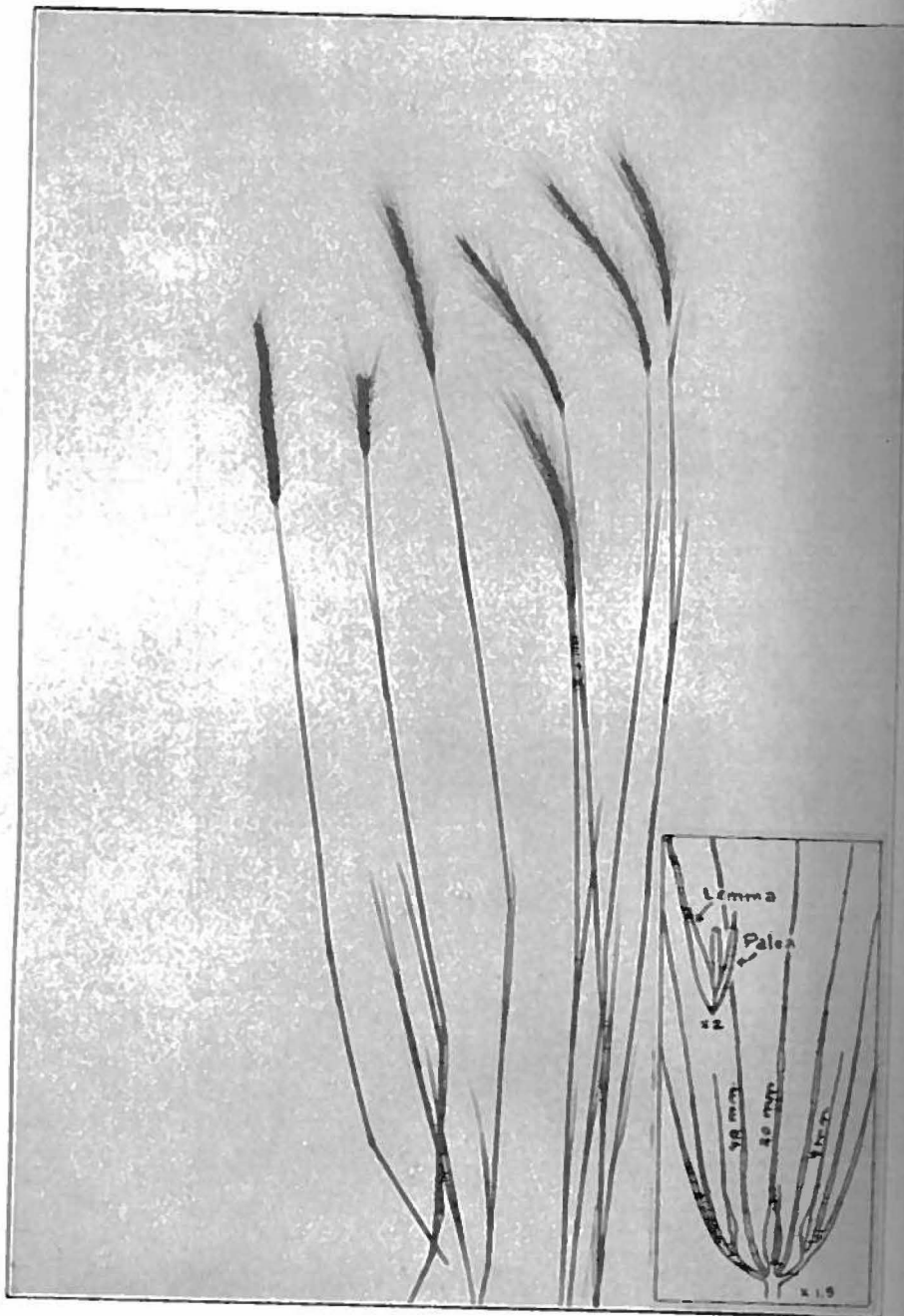
HORDEUM PUSILLUM, LITTLE BARLEY



HORDEUM NODOSUM, MEADOW BARLEY



HORDEUM MURINUM, SEA-BARLEY



HORDEUM JUBATUM, SQUIRREL-TAIL-GRASS

29. LOLIUM L. (lō'li-ūm)

Spikelets several-flowered, solitary and sessile, placed edgewise to the continuous rachis, one edge fitting to the alternate concavities, the rachilla disarticulating above the glumes and between the florets; **First Glume** wanting (except on the terminal spikelet), the second outward, strongly 3-5-nerved, equaling or exceeding the second floret; **Lemmas** rounded on the back, 5-7-nerved, obtuse, acute, or awned.

Annuals or perennials, with flat blades, and simple terminal flat spikes.

This genus is easily distinguished by the position of the spikelets, edgewise to the rachis, and the usual absence of the first glume (the one next to the rachis) except in the terminal spikelet.

The three species in Texas, with a range covering most of the United States, have long narrow spikes.

English rye-grass and Italian rye-grass, closely related perennials, the first with awnless lemmas and the second with awned lemmas, are frequently used for lawns, meadows and pastures. They are of some importance in the south as winter forage. Cross-fertilization often takes place between these two species giving rise to plants with both awned and awnless spikelets. Darnel, the awned form being known as *Lolium temulentum* and the awnless form as *Lolium temulentum* var. *leptochaeton*, is supposed to be the plant referred to in Scripture in the parable of the tares. Because of the presence in the fruit of a narcotic poison, said to be due to a fungus, it is in bad repute.

SECOND GLUME shorter than the spikelet; plants perennial.

Lemmas awnless.

1. *L. perenne*

Lemmas awned.

2. *L. multiflorum*

SECOND GLUME equaling or exceeding the florets; plants annual.

Lemmas awned.

3. *L. temulentum*

Lemmas awnless.

3a. *L. temulentum* var. *leptochaeton*

1. *L. PERENNE* L. (pōr-ēn'nē); ENGLISH OR PERENNIAL RYE-GRASS, RAY-GRASS.

Culms 1-2.5 feet tall, tufted, erect; **Blades** commonly 4-6' long, 2-6 mm. wide, rough above, glossy; **Sheaths** about as long as or longer than the internodes, flattened, auriculate at the base, loose above, rough or smooth; **Ligule** membranaceous, about 1 mm. long; **Spike** slender, commonly 4-10' long; **Spikelets** 6-10-flowered, 10-14 mm. long, flattened; **Glumes**, the first, next to the rachis, wanting except in the terminal spikelet, the second commonly shorter than the florets, 6-12 mm. long, 5-nerved, rigid, obtuse; **Lemmas** 4-6 mm. long, 5-nerved, thin, obtuse, lanceolate; **Palea** about as long as its lemma, elliptic, acute, hyaline, the nerves near the ciliate margins.

In waste places and cultivated grounds, throughout most of the United States, especially the northern portion: Spring-summer.

2. *L. MULTIFLORUM* Lam. (mūl-ti-flō'rūm); *L. italicum* A. Br.; ITALIAN RYE-GRASS.

Culms commonly 2-3 feet tall, sometimes 3.5 feet, stout, tufted, erect, dark-green, with dark swollen nodes, sometimes geniculate at the base, rough above; **Blades** 4-12' long, 6-8 mm. wide, flat, acuminate, the base extended into an auricle on each side, rough, especially the margins and upper surface; **Sheaths** about as long as or shorter than the internodes, flattened, smooth or rough; **Ligule** membranaceous, about 1 mm. long;

Spike commonly 6-10' as much as 18' long; **Spikelets** 10-20-flowered, including awns 12-25 mm. long, linear or lanceolate; **Glumes**, the first, next to the rachis, wanting except in the terminal spikelet, the second shorter than the florets (as long as or longer than the lower florets), rigid, 5-nerved, obtuse, dark-green; **Lemmas** about 6 mm. long, lanceolate, rounded on the back, with five green nerves vanishing in the scarious margin at the apex, except the middle nerve which usually extends into an awn 1-8 mm. long (many plants have most of the lemmas awnless or with just the lower lemma awnless); **Palea** nearly as long as the lemma, acute, lanceolate-elliptic, the two green nerves near the ciliate margins, hyaline.

In fields and waste places, over much of the United States. Spring-summer.

3. *L. TEMULENTUM* L. (tēm-ū-lēn'tūm); DARNEL, POISON-DARNEL.

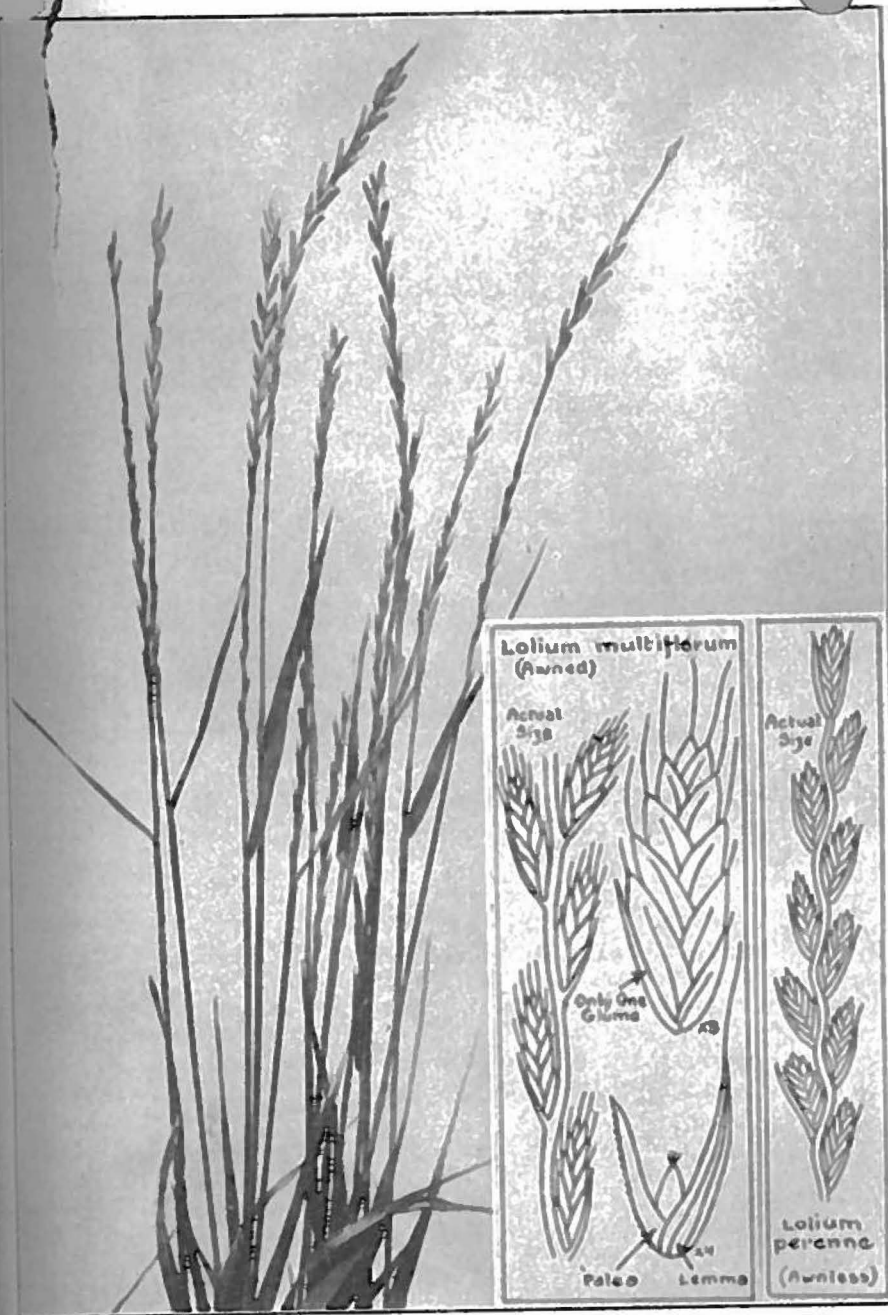
This species is similar to the variety *L. temulentum* var. *leptochaeton* A. Br. except for the awned lemmas. A drawing of the spikelet accompanies the photograph of the variety.

Waste and cultivated ground, introduced from Europe, not so plentiful as Italian rye-grass or English rye-grass. Spring-summer.

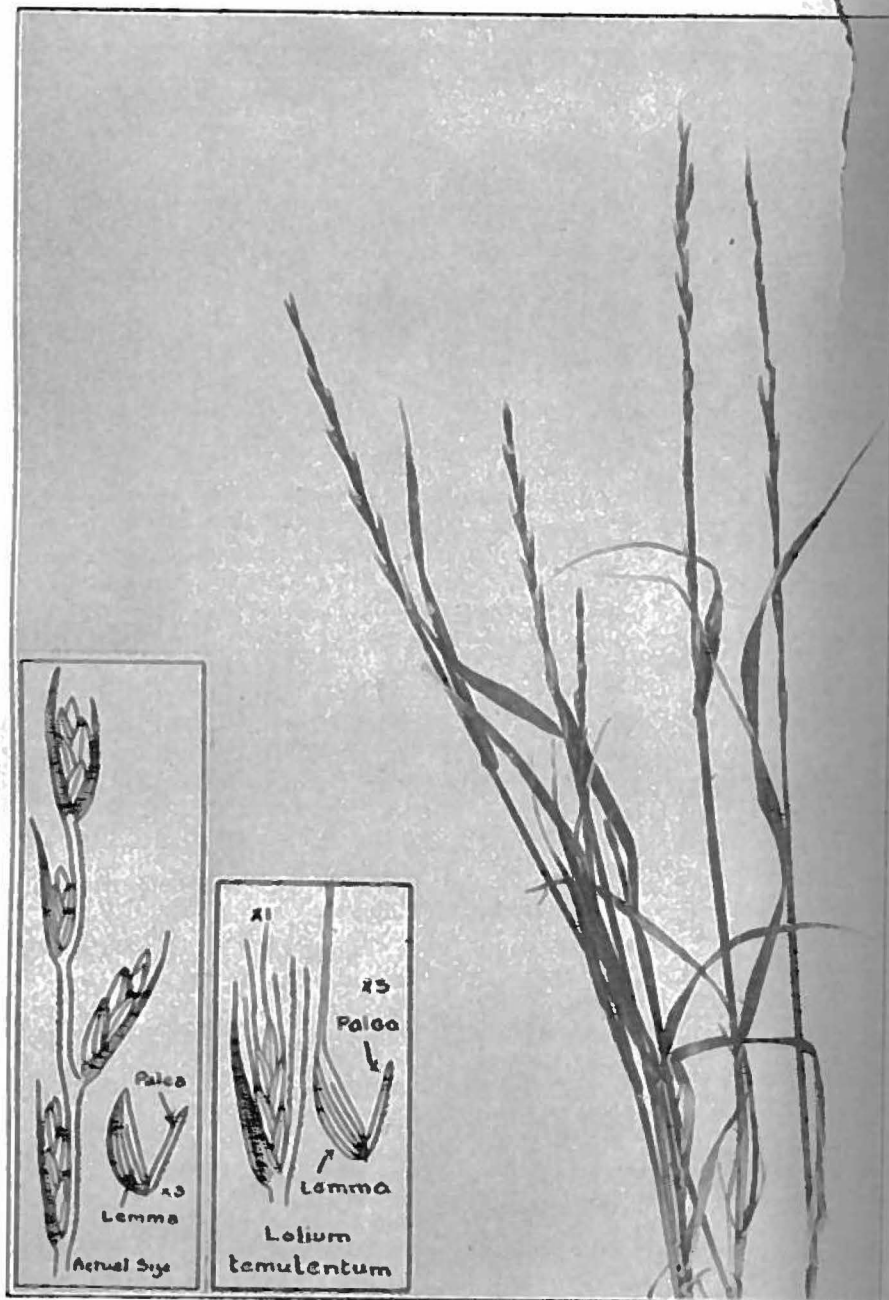
3a. *L. TEMULENTUM* var. *LEPTOCHAETON* A. Br. (lēp-tō-kē'tūn); DARNEL, POISON-DARNEL.

Culms 2-3 feet tall, sometimes taller, erect, simple; **Blades** 4-10' long, 2-7 mm. wide, flat, acuminate, rough on the upper surface; **Sheaths** longer or shorter than the internodes; **Ligule** membranaceous, less than 2 mm. long; **Spike** 4-10' long, spikelets equaling or exceeding the intervals; **Spikelets** 4-7-flowered, 18-20 mm. long (10-20); **Glumes**, the first wanting except in the terminal spikelets, the second equaling or exceeding the florets, rigid, acuminate, green; **Lemmas** about 6 mm. long, broad, rounded on the back, turgid, obscurely 5-7-nerved, awnless; **Palea** about as long as its lemma, obovate.

In waste places and cultivated ground, introduced from Europe, perhaps, with about the same range as the species. Spring-summer.



LOLIUM MULTIFLORUM, ITALIAN RYE-GRASS; also drawing of **LOLIUM PERENNE**, ENGLISH RYE-GRASS, to the right.



LOLIUM TEMULENTUM VAR. **LEPTOCHAETON**. Also drawing of Spikelet of *L. temulentum*, Darnel or Poison Darnel.

IV. AVENEAE, THE OAT TRIBE

30. KOELERIA Pers. (kāl-ē'ri-ā)

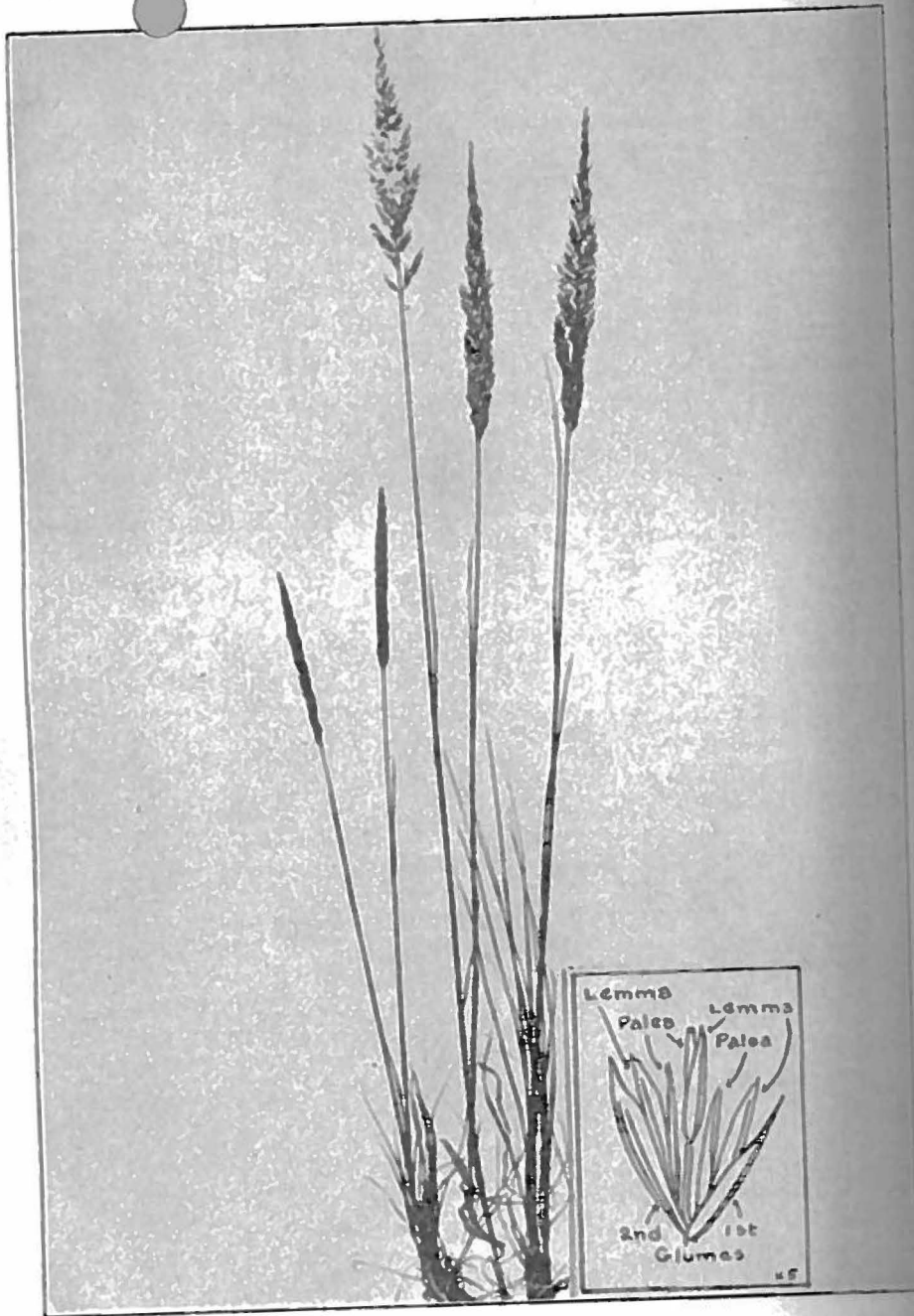
Spikelets 2-4-flowered, compressed, the rachilla disarticulating above the glumes and between the florets, prolonged beyond the perfect florets as a slender bristle or bearing a reduced or sterile floret at the tip; **Glumes** usually about equal in length, but unequal in shape, the lower narrow and sometimes shorter, 1-nerved, the upper somewhat broader above the middle, wider than the lower, 3-5-nerved; **Lemmas** somewhat scarious and shining, the lowermost a little longer than the glume, obscurely 5-nerved, acute or short-awned, the awn, if present, borne just below the apex.

Annual or **perennial**, slender, low or rather tall grasses, with narrow blades and spikelike panicles. Two species in the United States, one in Texas and one in California. Our only grass of this genus is a tufted perennial, a foot or two high, with slender, erect culms, with a pale shining, densely-flowered panicle, 2-5' long, the short branches appressed except when flowering. It thrives on prairies, plains and in open woods from northern Mexico through Texas north to Canada. It is a good forage grass and is a constituent of much of the native pasture throughout the western states.

K. CRISTATA (L.) Pers. (kris-tā'tā); *K. gracilis* Pers.; **KOELER'S GRASS**.

Culms 1-2.5 feet tall, tufted, erect, rigid, simple, densely short-pubescent below the panicle, leafy at the base; **Blades** 2.5-3' long, 1-3 mm. wide, flat or involute, the basal leaves somewhat longer, stiffly ascending or erect, usually more or less rough, and more or less puberulent (or hirsute); **Sheaths** mostly longer than the internodes, smooth to scabrous (or hirsute); **Ligule** membranaceous, fringed, about 1 mm. long; **Panicle** exserted, 2-7' long, pale-green, usually contracted or spikelike, when flowering the branches more or less ascending or spreading, the lower branches 1.5' or less long, gradually shorter above, often interrupted at the base, the main axis and branches minutely pubescent; **Spikelets** 2-4-flowered, 4-6 mm. long, the glumes and lemmas minutely scabrous; **Glumes** nearly as long as the lowest florets; **Lemmas** 3-4 mm. long, the lower a little longer than the glumes, obscurely 5-nerved, shining, acute or short-awned just below the apex, margins scarious. This species seems to be very variable as to pubescence and otherwise.

Prairies and plains, Texas, Colorado, California, south to Mexico. Summer.



KOELERIA CRISTATA, KOELER'S GRASS

31. *TRisetum* Pers. (tri-sé'tüm)

Spikelets usually 2-flowered, sometimes 3-5-flowered, the rachilla prolonged behind the upper floret, usually villous; **Glumes** somewhat unequal, acute, awnless, the second usually longer than the first floret; **Lemmas** usually short-bearded at the base, 2-toothed at the apex, the teeth often awned, bearing from the back below the cleft apex a straight and included or usually bent and exerted awn.

Tufted *perennials* with flat blades and open or usually contracted or spike-like panicles. Eight species in the United States, mostly in the mountains, one in Texas.

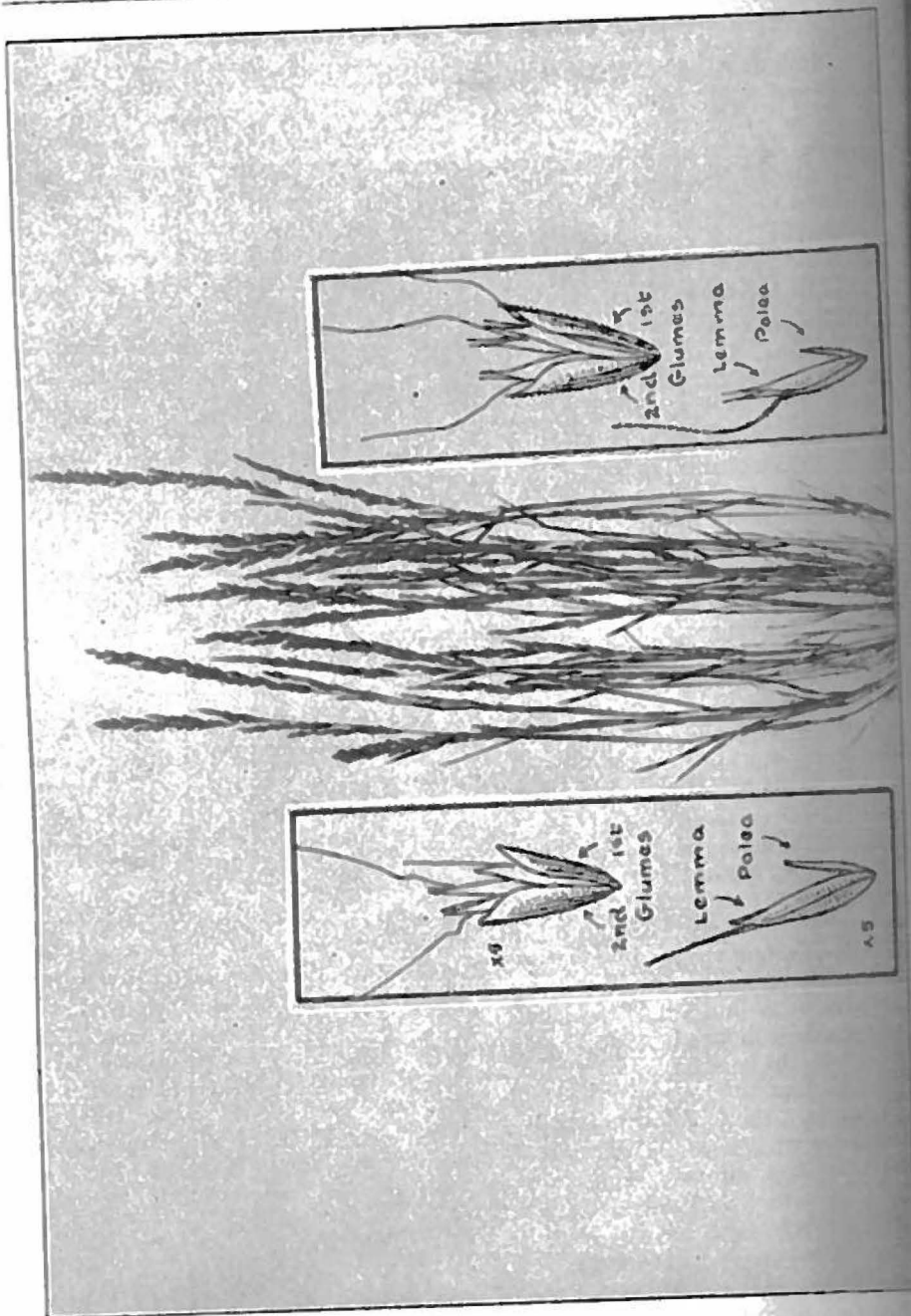
The name *Trisetum* refers to the three awns of the lemma of many of the species, one from the back and one from each of the teeth. Our only species, *T. interruptum*, has glabrous lemmas, the articulation being below the spikelets. This species is closely related to *Sphenopholis*.

Formerly our plants were divided into two species—*T. interruptum*, a freely branching plant with the awn of the lower lemma long and bent like those of the upper lemmas, the teeth extended into short scabrous awns, and *T. hallii*, usually simple, with the awn of the lower lemma short and straight (not long and bent like those of the upper lemma), the teeth wedge-shaped. But Dr. Hitchcock on examination of a great deal of material found that these two intergrade, the characters used to distinguish them being inconstant, and therefore reduced *T. hallii* to *T. interruptum*.

T. INTERRUPTUM Buckl. (in-tēr-üp'tüm); including *T. hallii* Scribn.

Calms 6-18' tall, tufted, erect or ascending from a geniculate base, slender, glabrous or puberulent, especially the lower internodes, and below the nodes simple or branching; **Blades** 1-5' mostly 2-3' long, 1.5-3 mm. wide, flat or involute toward the tip, rough, or the under surface smooth, the basal leaf-blades short and often numerous; **Sheaths** about as long as the internodes, rough, the lower sometimes puberulent; **Ligule** membranaceous, about 2 mm. long; **Panicle** 1.5-5' long, slender, finally exerted, somewhat interrupted, erect or slightly nodding, the branches mostly in twos or threes, 0.5-1.5' long, usually appressed, the sessile or short-pedicelled spikelets crowded along their entire length; **Spikelets** 3-4-flowered, exclusive of the awns 4-5 mm. long, the uppermost floret abortive or reduced to a small rudiment; **Glumes** subequal, 3-4 mm. long, oblanceolate, acute or short awn-pointed, hispid on the keel, the first 3-nerved, the second broader, 5-7-nerved; **Lemmas**, the lower including the awn-like teeth 4-4.5 mm. long, 3-nerved, scabrous on the midnerve, various on the margins toward the apex, finely tuberculate, *glabrous*, the teeth wedge-shaped or extended into short scabrous awns, bearing from the back an awn from one-fourth to one-third the distance from the apex, 2-6 mm. long, that of the lower lemma often straight and short, all of the other awns longer and more or less twisted and bent about one-third the distance above the insertion.

Dry or moist soil, prairies and hills, central Texas to southern New Mexico. Spring.



TRISETUM INTERRUPTUM, the drawings showing the two forms

32. SPHENOPHOLIS Scribn. (sfē-nōf'ō-līs)

(Eatonia of Authors, not Raf.)

Spikelets 2-3-flowered, the pedicel disarticulating below the glumes, the rachilla produced beyond the upper floret as a slender bristle; **Glumes** unlike in shape, the first narrow, acute, 1-nerved, the second broadly obovate, 3-5-nerved, somewhat coriaceous; **Lemmas** firm, scarcely nerved, awnless, the first a little shorter or a little longer than the second glume.

Perennial grasses with usually flat blades and shining pale-green or pale-purplish narrow panicles.

S. obtusata, with rather dense panicle, the second glume obovate and subcucullate is found at random over much of the United States.

Our other species have rather loose, lax and nodding panicles; *S. longiflora* and *S. intermedia* with oblanceolate acute or acutish second glume not much wider than the lemmas; *S. nitida* and *S. filiformis* with an obovate second glume broadly rounded at the summit.

PANICLES DENSE. USUALLY SPIKELIKE, ERECT OR NEARLY SO; the first glume shorter and not more than one-fifth as wide as the obovate-subcucullate second.

PANICLES NOT DENSE, LAX, NODDING, contracted but loose, often slender, but not spikelike.

SECOND GLUME oblanceolate, acute or subacute, not much wider than the lemmas; panicles many-flowered.

Second glume about 2.5 mm. long; first glume subulate, about 2 mm. long; lemma 2.5 mm. long.

Second glume about 3.5 mm. long; first glume linear; lemma 3.5 mm. long.

SECOND GLUME obovate, broadly rounded at the summit.

Blades rarely more than 4' long, flat, 2-5 mm. wide.

Blades elongate, flat to subinvolute, mostly less than 2 mm. wide; first glume linear.

1. *S. obtusata*

2. *S. intermedia*

3. *S. longiflora*

4. *S. nitida*

5. *S. filiformis*

1. *S. OBTUSATA* (Michx.) Scribn. (ōb-tū-sā'tā); *S. obtusata* var. *lobata* (Trin.) Scribn.; *S. pubescens* (Scribn.) Heller.

Culms 10-30' tall, solitary or a few culms to a tuft, simple, erect or decumbent at the base, often scabrous just below the panicle; **Blades** 1.5-7' long, 2-9 mm. wide, flat, somewhat narrowed toward the base, rough, glabrous or pubescent; **Sheaths** shorter than the internodes, rather loose, smooth or rough, glabrous or pubescent; **Ligule** membranaceous, 1.5-3 mm. long, erose; **Panicles** light-green or purplish, finally exserted, 2-7' long, contracted, usually erect, densely-flowered, the branches 1.5' long or less, erect or appressed, the spikelets crowded, the scabrous pedicels about 1 mm. long; **Spikelets** 2.5-3 mm. long; **Glumes** scabrous on the keels, the first about one-fifth as wide as and somewhat shorter than the second, the second about one-third shorter than the lower lemma, broad, obovate, obtuse or truncate, subcucullate, minutely scabrous; **Lemmas** 2-2.3 mm. long, obtuse, extending beyond the glumes, smooth or minutely scabrous, or much so on the keel toward the apex; **Palea** slightly shorter than the lemma, narrow.

In dry or moist soil, Texas west to Arizona and east to Florida, north to Maine. Spring-summer.

2. *S. INTERMEDIA* (Rydb.) Hitchc. (in-tēr-mē'di-ā); formerly erroneously determined as *S. pallens* (Spreng.) Scribn.

Culms 2-2.5 feet tall, slender, erect; **Blades** 2.5-7' long, 2-6 mm. wide, flat; **Panicles** 3-6' long, contracted, not dense or spikelike, lax,

nodding; **Spikelets** 3-3.5 mm. long; **Glumes**, the first 2 mm. long, subulate, scabrous on the keel, the second about 2.5 mm. long, oblanceolate, acute or subacute; **Lemmas** about 2.5 mm. long.

Meadows and damp woods, Texas, Georgia, Maine to Wisconsin (Palestine, Texas.) Spring-summer.

3. *S. LONGIFLORA* (Vasey) Hitchc. (lōn-jī-flō'ra); *S. pallens* var. *longiflora* (Vasey) Scribn.

Culms 2-3.5 feet tall, in small tufts, erect or ascending; **Blades** 2.5-7' long, 4-8 mm. wide, flat, thin and lax, rough; **Sheaths** shorter than the internodes, smooth or slightly rough; **Ligule** membranaceous, about 2 mm. long; **Panicles** linear-lanceolate, exserted, 4-9' long, nodding, loose, shining, the branches 1-2' distant, in half whorls, 3.5' long or less, usually appressed; **Spikelets** 1-2-flowered, 3.5-4.5 mm. long; **Glumes** more or less scabrous, especially on the keels, subequal, the first narrow, about 3.1 mm. long, acute, the second about 3.5 mm. long, broader, oblanceolate, acute when spread; **Lemmas** about 3.5 mm. long, acute, scabrous on the keel toward the apex, margins scarious, **Palea** about three-fourths as long as its lemma, 2-toothed.

Along the banks of streams, in open woods, Texas and Louisiana (Chico Bayou, near Alvin, Texas.) Spring.

4. *S. NITIDA* (Spreng.) Scribn. (nīt'ī-dā); *Eatonia nitida* (Spreng.) Nash; *E. dudleyi* Vasey; *S. glabra* (Nash) Heller; **SLENDER SPHENOPHOLIS.**

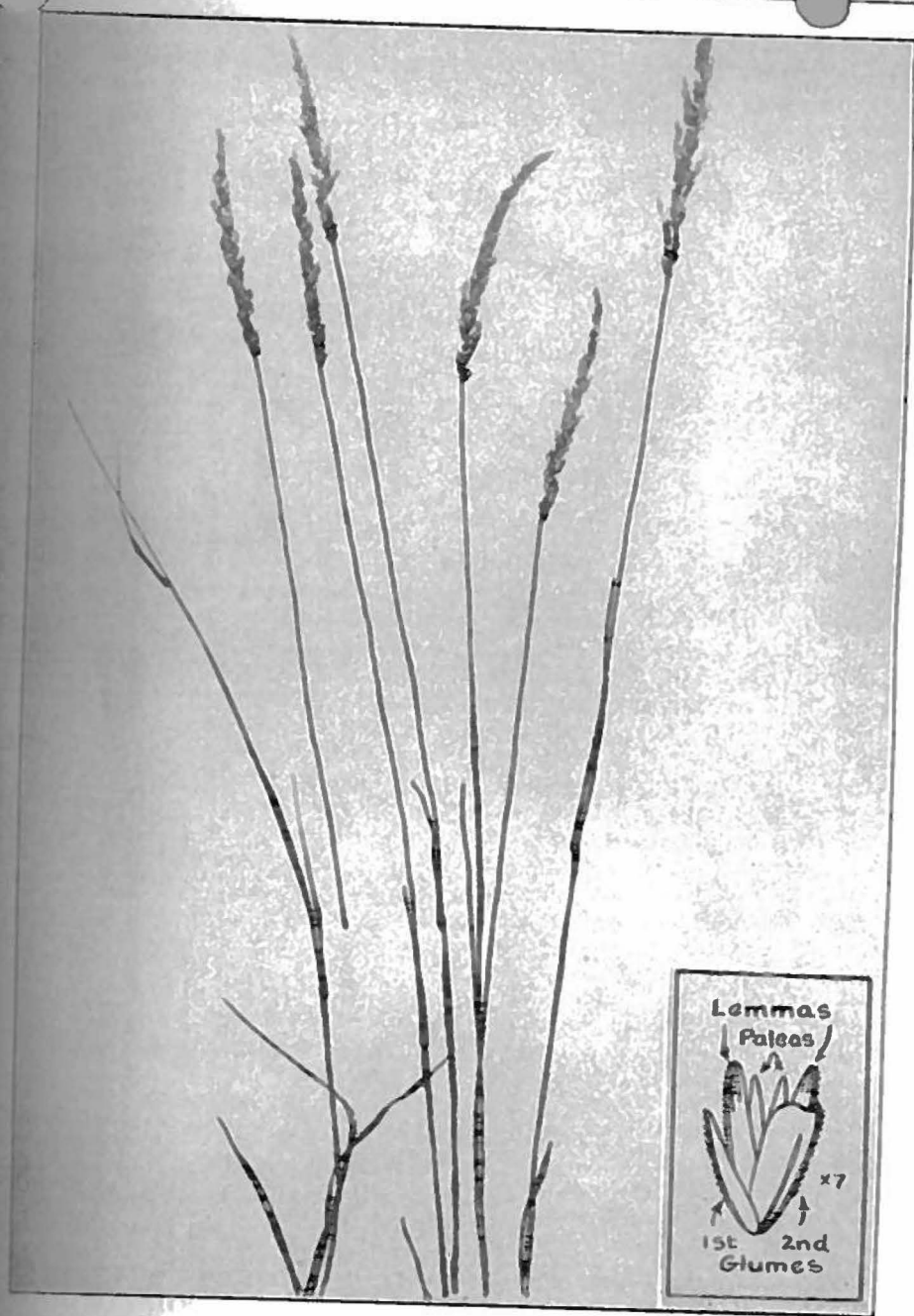
Culms 1-2 feet tall, very slender, erect, tufted; **Blades** 0.5-3' long (or those of the sterile shoots 3-6' long and 2-4 mm. wide), 2 mm. wide or less, the upper short, abruptly acute, often pubescent; **Sheaths** shorter than the internodes, glabrous to softly pubescent; **Ligule** membranaceous, about 0.5 mm. long; **Panicle** exserted, pale-green, 2-6' long, loosely-flowered, its branches 1-2.5' long, spreading at flowering time, finally erect; **Spikelets** 2-3-flowered, about 3 mm. long, on short pedicels; **Glumes** smooth or nearly so, equal or subequal, about 2 mm. long, the first not less than one-third as wide as the second, the second rounded or abruptly apiculate at the summit; **Lemmas** narrow, 2-2.5 mm. long, oblong, obtuse or acutish, the lower smooth or nearly so, the upper scabrous especially near the tip and on the keel; **Palea** slightly shorter than its lemma.

In dry soil, east Texas, Georgia, Mississippi, Vermont to Michigan (Kuntz, Texas.) Spring-fall.

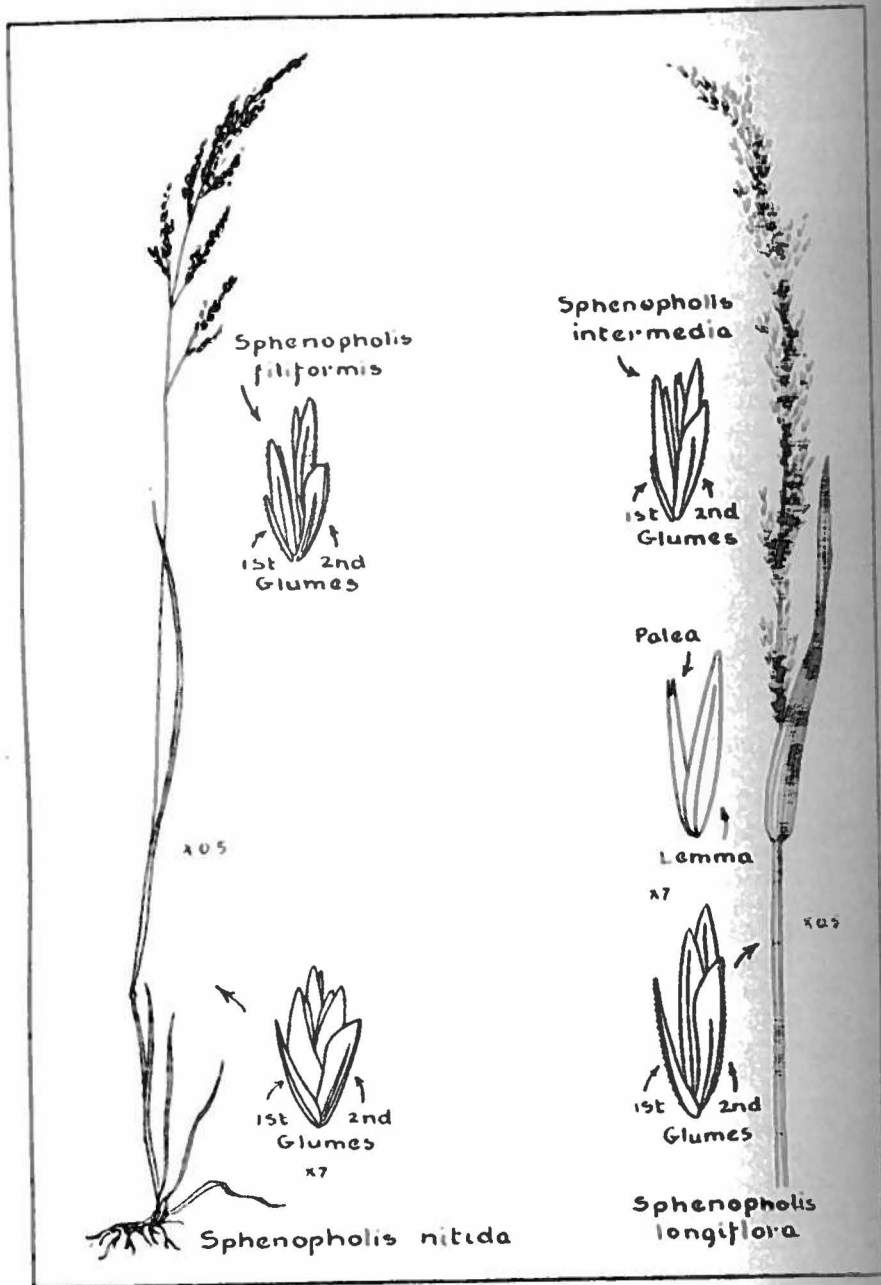
5. *S. FILIFORMIS* (Chapm.) Scribn. (fil-ī-fōr'mis); *Eatonia pennsylvanica* var. *filiformis* Chapm.; *E. filiformis* (Chapm.) Vasey.

Culms 1-2 feet tall, densely-tufted, erect, very slender; **Blades** of the culm 1.5-2' long, of the sterile shoots as much as 20' long, mostly less than 2 mm. wide, flat or subinvolute; **Panicle** 2-6' long, slender, often nodding, the slender branches rather distant, erect or ascending; **Spikelets** 3-4 mm. long, the two florets rather distant; **Glumes** about 2 mm. long, the second broadly rounded at the summit; **Lemmas** about 2.8 mm. long, obtuse or subobtuse, rarely with a short spreading awn, the lower smooth, the upper minutely roughened.

Dry plains, North Carolina to Florida, Tennessee, and eastern Texas (Colmesneil, Tyler County, Texas.) Spring.



SPHENOPHOLIS OBTUSATA



SPHENOPHOLIS NITIDA, SPHENOPHOLIS FILIFORMIS,
SPHENOPHOLIS INTERMEDIA, SPHENOPHOLIS LONGIFLORA.

33. AVENA L. (á-vě'ná)

Spikelets 2-several-flowered, the rachilla bearded, disarticulating above the glumes and between the florets; **Glumes** about equal, membranaceous or papery, several-nerved, longer than the lower floret, usually exceeding the upper floret; **Lemmas** indurate, except toward the summit, 5-9-nerved, bidentate at the apex, bearing a dorsal bent and twisted awn (this straight and reduced in *Avena sativa*).

Annual or *perennial*, low or moderately tall grasses, with narrow or open usually rather few-flowered panicles of usually large spikelets. Our one species, cultivated oat, is an annual.

In the several varieties of cultivated oat the florets do not disarticulate readily, and the lemmas are usually glabrous with awns straight or wanting, while in *Avena sativa* L., wild oat, from which most of the varieties of cultivated oat are supposed to be derived, the florets disarticulate easily, the awns are bent and twisted, and the lemmas are beset with brown hairs.

A. SATIVA L. (sá-tí'vá); CULTIVATED OAT.

Stems 2-4 feet high, erect, tufted, thick but weak stems; **Blades** flat, as much as 19' long and 20 mm. wide, more or less scabrous, especially above and along the margins; **Ligule** membranaceous, almost truncate, less than 5 mm. long, toothed; **Panicle** somewhat narrow and one-sided, erect or nodding, as much as 10' long, its branches ascending, spikelets drooping; **Spikelets** 2-flowered, excluding the awns usually 16-25 mm. long, pedicels thickened just below the spikelet, rachilla of lower floret bearded; **Glumes** broad, acute, about equal, membranaceous, prominently many-nerved (usually 9-11-nerved), commonly 20-25 mm. long and longer than florets; **Lemmas** glabrous, smooth, 2-toothed, awnless, or one or both with a straight dorsal awn as much as 30 mm. long, lower lemma 15-23 mm. long, upper shorter, 5-9-nerved, the awn leaving the midvein from near the middle of the back of lemma; **Palea** nearly as long as its lemma, 2-keeled, ciliate, 2-toothed.

In cultivation over most of the United States. Spring-summer.

34. AIRA L. (í'rá)
(Aspris Adans.)

Spikelets 2-flowered, the rachilla disarticulating above the glumes, not prolonged; **Glumes** about equal, acute, membranaceous or subscarios; **Lemmas** firm, rounded on the back, tapering into two slender teeth, the callus with a very short tuft of hairs, bearing on the back below the middle a slender, geniculate, twisted, usually exerted awn, this reduced or wanting in the lower floret in one species.

Low, delicate *annuals* with small open or contracted panicles. Species about nine, in southern Europe, three being introduced in the United States, one in Texas.

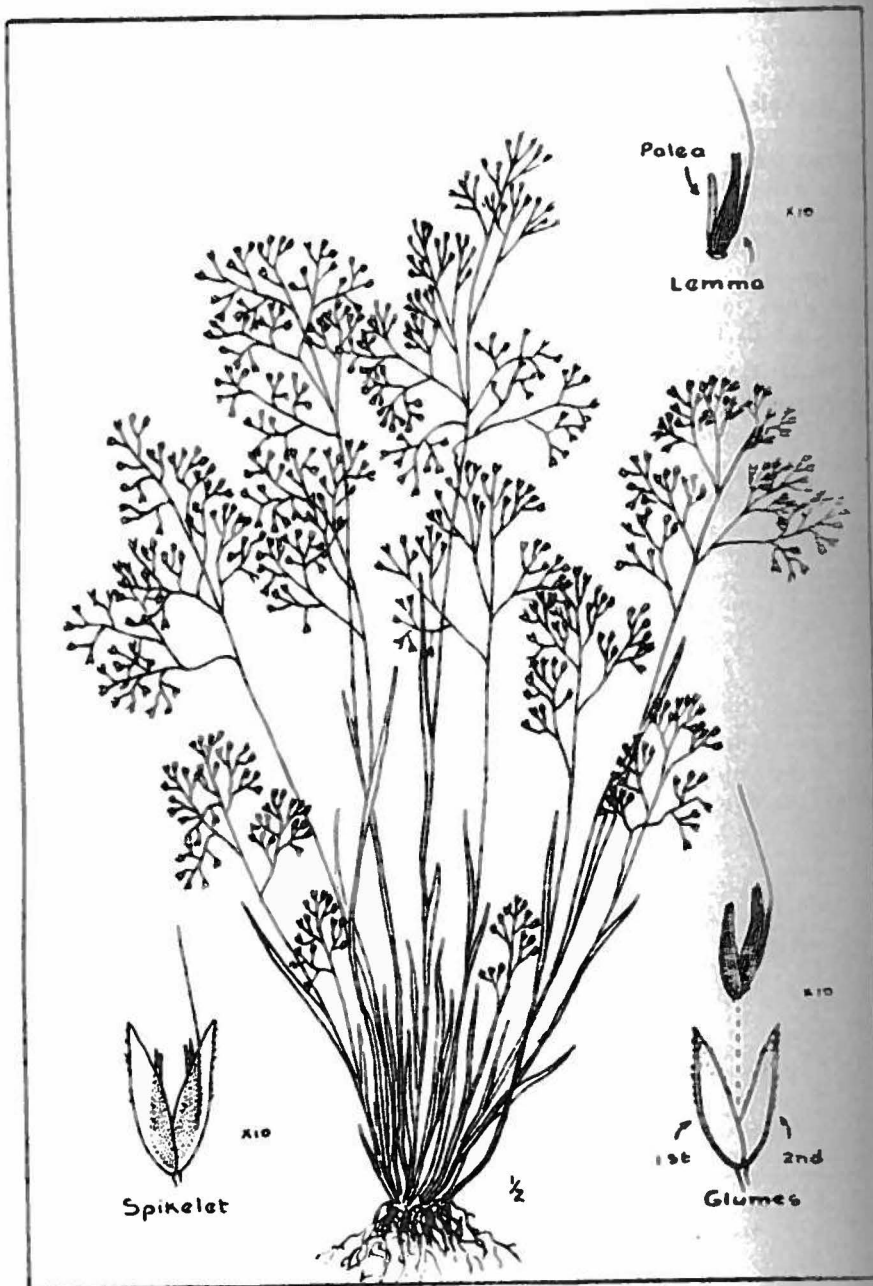
A. **CAPILLARIS** Host (káp-í-lár'is); *Aspris capillaris* (Host) Hitchc.

Calms 5-12' tall, rarely taller, tufted, slender; **Blades** 0.5-2' long, 0.5-1.5 mm. wide, flat; **Sheaths** shorter than the internodes, ciliate; **Ligule** a ring of very short hairs; **Panicles** silvery-shining, 1.5-3' long, open, the branches commonly less than 1.5' long, ascending or spreading, the spikelets scattered toward the ends of the capillary branches on scabrous pedicels 3-5 mm. long; **Spikelets** exclusive of the awn 1.5-2.3 mm. long; **Glumes** about equal, exceeding the florets, acute, often abruptly so, sometimes awn-pointed, more or less minutely scabrous; **Lemmas** rather brown, about 1.3 mm. long, lanceolate, scabrous, narrowed above into two pale slender staccous teeth, a tuft of hairs on the callus; the *lower* with shorter teeth, awnless or rarely awned; the *upper* bearing a geniculate awn from below the middle exceeding the glumes about 1.5-2.5 mm., the awn stouter and brown below the bend; **Palea** slightly shorter than the lemma.

Sandy land, east Texas, Virginia and southward, and on the Pacific coast. (Common from Texarkana to Marshall, Texas.) Spring-summer.



AVENA SATIVA, CULTIVATED OAT



AIRA CAPILLARIS

35. *HOLCUS* L. (höl'küs) (*Notholcus* Nash)

Spikelets 2-flowered, the pedicel disarticulating below the glumes, the rachilla curved and somewhat elongate below the first floret, not prolonged above the second floret; **Glumes** about equal, longer than the two florets; **First Floret** perfect, its lemma awnless; **Second Floret** staminate, its lemma awned on the back.

Perennial grasses, with flat blades and contracted panicles. Two species in the United States, one in Texas.

Velvet-grass has been introduced in various places in the eastern states and also on the Pacific coast where it is abundant. It is sometimes recommended as a meadow grass, but for this purpose it has little value except on moist sandy or sterile soil where other grasses will not thrive. It is an erect, grayish, velvety-pubescent grass 2-3 feet tall, with a contracted pale or purplish panicle 2-6' long, the branches spreading in anthesis.

H. LANATUS L. (lá-ná'tüs); *Notholcus lanatus* (L.) Nash; **VELVET-GRASS.**

Culms 1.5-3 feet tall, tufted, erect or decumbent at the base, simple, softly and densely-grayish pubescent, or glabrous to puberulent below the panicle; **Blades** 1-6' long, 4-12 mm. wide, flat, velvety grayish-green; **Sheaths** shorter or the lower longer than the internodes, velvety grayish-green; **Ligule** 1-2 mm. long, toothed, pubescent; **Panicle** pale or purplish, 2-6' long, oblong to oblong-pyramidal, contracted or open in flower, densely-flowered, the branches mostly in whorls of 1-3, the longer naked at the base, mostly 0.5-1.5' long, erect or appressed, or spreading in flower; **Spikelets** 4-5 mm long; **Glumes** longer than the florets, pubescent, the hairs longer and stiff on the nerves, the first 1-nerved, acute or obtuse, the second broader pointed, 3-nerved; **Lemmas** 2 mm. long, shining, the lower perfect, sparsely ciliate on the keel, somewhat obtuse, the upper 2-toothed, and bearing a hooked awn often over 1 mm. long just below the apex. (Drawings with *Danthonia spicata*.)

In moist or dry soil, meadows, fields and waste places, Texas, along the Pacific coast, Illinois to Massachusetts, North Carolina. Here and there over most of the United States, extending into Canada. (Beaumont, Texas.) Spring-summer.

6. **DANTHONIA** Lam. & DC. (dān-thō'ni-á)

Spikelets several-flowered, the rachilla readily disarticulating above the glumes and between the florets; **Glumes** about equal, broad and papery, acute, mostly exceeding the uppermost floret; **Lemmas** rounded on the back, obscurely several-nerved, the base with a strong callus, the apex bifid, the lobes acute, usually extending into slender awns, a stout awn arising from between the lobes; **Awn** flat, tightly twisted below, geniculate, exerted, including three nerves of the lemma.

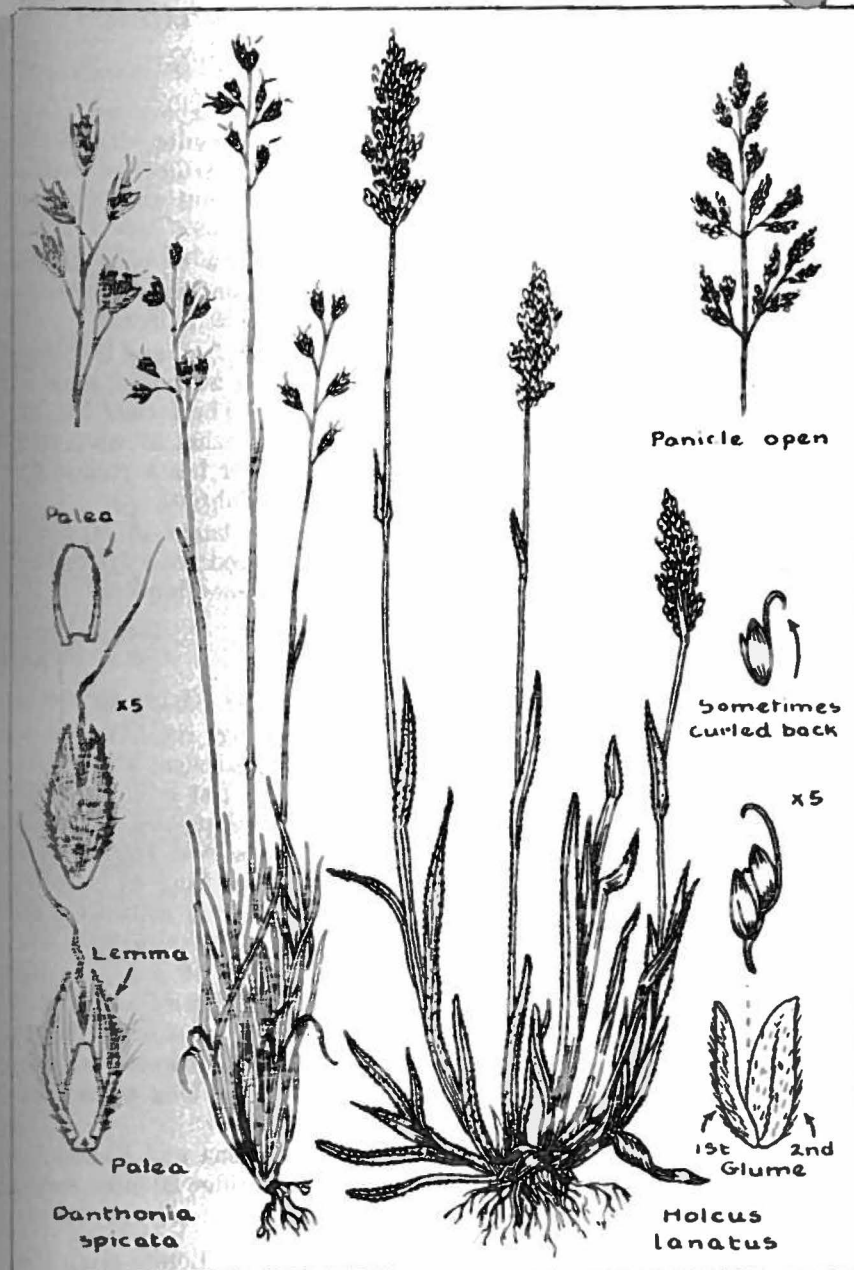
Tufted, low or moderately tall *perennials*, with few-flowered open or spikelike panicles of rather large spikelets.

D. SPICATA (L.) Beauv. (spī-kā'tā).

Culms 1-2 feet tall, tufted, simple, erect, slender, terete, the early leaves below numerous; **Blades** 1-6' long, the upper short, mostly 1-2 mm. wide, usually involute, often rough toward the apex, pubescent on the upper surface near the base, the lower sparsely-pubescent on both surfaces, especially above; **Sheaths** shorter than the internodes, often pilose at the throat, sometimes sparsely-pubescent below; **Ligule** a ring of short hairs; **Panicle** 1-2' in length, the branches short commonly with 1 or 2 spikelets, the pedicels and branches erect or ascending; **Spikelets** 5-7-flowered, 8-10 mm. long; **Glumes** 8-10 mm. long, the second sometimes slightly shorter, acuminate, 3-5-nerved, sometimes one or two obscure or wanting; **Lemmas** about 4 mm. long, including the triangular teeth about 1 mm. long, broadly oblong, sparsely pilose over the back and margins, 7-nerved, a flat 3-nerved awn extending from the sinus, about 6 mm. long, closely twisted at the base, loosely so above; **Palea** about three-fourths as long as its lemma, obovate, abruptly narrowed into an obtuse apex, the margins ciliate; **Grain** oblong, slightly over 1 mm. long, brown, channeled on one side.

It is said that all the species of this genus in the United States produce *cleistogenes* in the lower sheaths.

In dry soil, eastern Texas to Colorado, South Dakota to Newfoundland, south to North Carolina. (Texarkana, Texas.) Summer-fall.



DANTHONIA SPICATA; HOLCUS LANATUS, VELVET-GRASS

V. AGROSTIDEAE, THE TIMOTHY TRIBE

37. CALAMOVILFA Heck. (käl-ä-mō-vil'fá)

Spikelets 1-flowered, the rachilla disarticulating above the glumes, not prolonged behind the palea; **Glumes** unequal, acute, chartaceous; **Lemma** a little longer than the second glume, chartaceous, awnless, glabrous or pubescent, the callus bearded; **Palea** about as long as the lemma.

Perennial, rigid, usually tall grasses, with narrow or open panicles, some species with creeping rhizomes. Species four, confined to the United States and southern Canada, one and perhaps two species in Texas.

Giant reed-grass, often growing to a height of 6-8 feet, and long-leaved reed-grass commonly 2-4 feet tall, both with creeping horizontal rootstocks and pale open panicles, thrive in very sandy land. The former has large panicles, sometimes 2.5 feet long, the spreading branches as much as 16' long, the lemma and palea pubescent, while the latter has a panicle 4-15' long, the branches ascending, the lemma and palea glabrous.

Giant reed-grass is plentiful along the sandy banks of streams of northwestern Texas, and it is likely that long-leaved reed-grass will be found in the vicinity of Texline, Texas. Both are excellent sand binders.

LEMMA and palea pubescent; spikelets 7-9 mm. long.

LEMMA and palea glabrous; spikelets 5-6 mm. long.

1. *C. gigantea*

2. *C. longifolia*

1. *C. GIGANTEA* (Nutt.) Scribn. & Merr. (ji-gän-tě'á); GIANT REED-GRASS.

Culms 3-8 feet tall, erect or slightly ascending, rigid, robust and rather woody, with long creeping rootstocks, making excellent sand binders; **Blades** as much as 32' long, 5-18 mm. wide at base, flat or involute near the apex, rigid, long-attenuate; **Sheaths** longer than the internodes; **Ligule** a ring of hairs 1-2 mm. long; **Panicle** long-exserted, 1-2.5 feet long, the lower branches as much as 16' long, the spreading or ascending branches naked at the base, usually in ones along the main axis, each branch with 1-6 branchlets up to 6' long, the spikelets toward the apex, the axils of branches and branchlets pilose; **Spikelets** 7-9 mm. long, light in color; **Glumes** 1-nerved, acute, the first about 6-7 mm. long and the second about 7-8 mm. long; **Lemma** a little longer or shorter than the second glume, *pubescent on the lower half*, the callus copious with long hairs about half as long as the lemma; **Palea** about as long as its lemma, strongly two-keeled, *pubescent*.

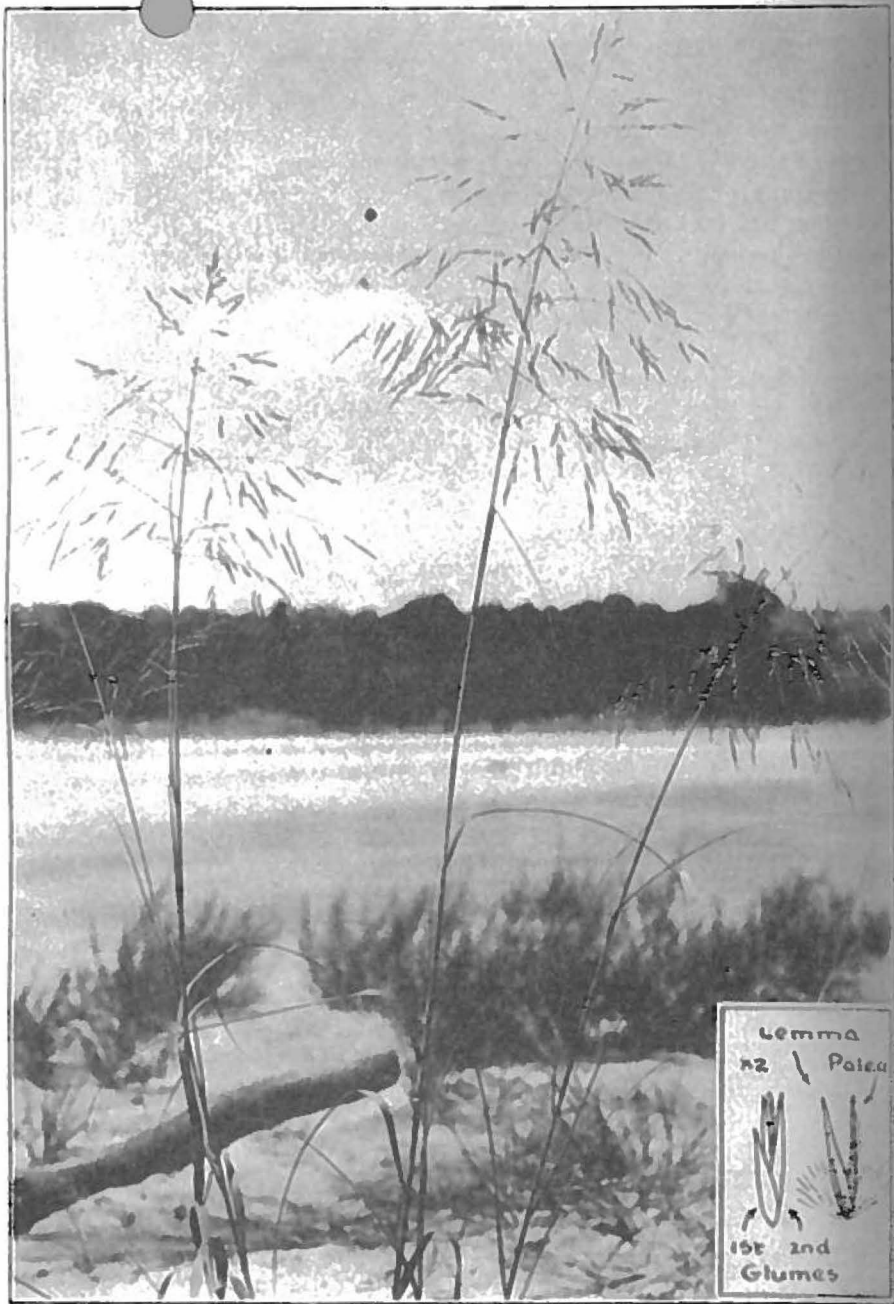
In very sandy places, Texas, New Mexico, Arizona and Kansas; also probably in Oklahoma. (Along Canadian River at bridge 20 miles north of Amarillo, Texas.) Summer.

2. *C. LONGIFOLIA* (Hook.) Scribn. (lön-jí-fó'li-á); LONG-LEAVED REED-GRASS. (*Not yet collected in Texas.*)

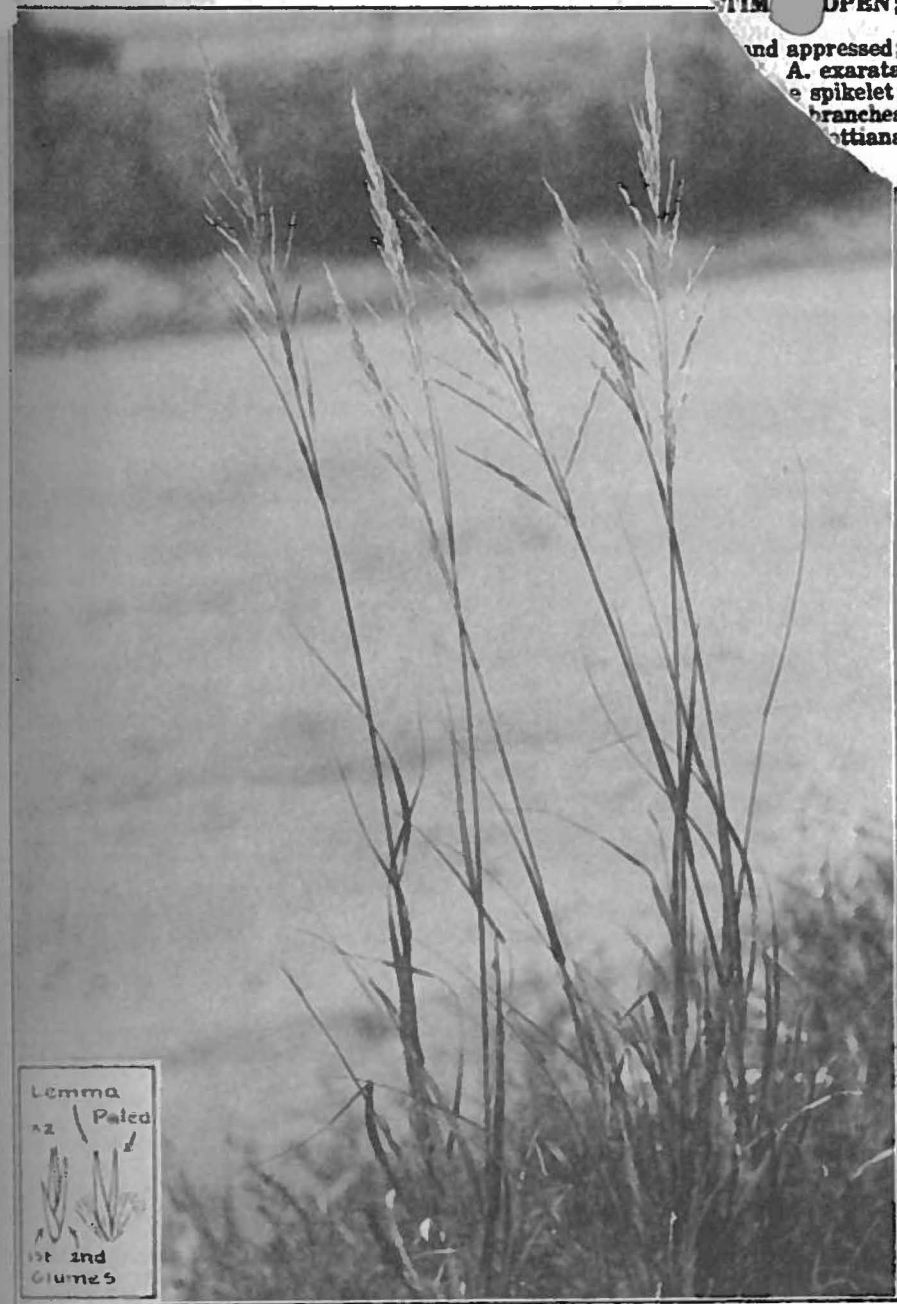
Culms 1-4 feet tall, erect, simple, usually stout, firm, from long horizontal rootstocks; **Blades** 4-15' long, 5-9 mm. wide, the upper shorter, flat or involute toward the tip, tough, slightly rough above; **Sheaths** crowded and overlapping, distant above, slightly scabrous, glabrous or pubescent at the throat and margins; **Ligule** a dense ring of hairs 1-2 mm. long; **Panicle** open but comparatively narrow, 4-12' long, pale, the

branches usually ascending, rarely spreading, mostly solitary, the lower commonly 4-5' long; **Spikelets** 5-6 mm. long, rarely 8 mm. long, pale; **Glumes** acuminate, the first about two-thirds as long as the lemma, the second slightly longer or as long as the lemma; **Lemma** acuminate, *glabrous*, the callus hairs copious, about half to two-thirds as long as the lemma; **Palea** about as long as the lemma, *glabrous*.

In sandy places, Colorado to Kansas and Indiana, north to Canada. (As this grass has been collected near Texline, New Mexico, it is likely to be found in the sandy district in Texas south and east of Texline.) Summer.



CALAMOVILFA GIGANTEA, GIANT REED-GRASS



CALAMOVILFA LONGIFOLIA, LONG-LEAVED REED-GRASS

STEM OPEN;

and appressed;
A. exarata
 spikelet;
 branches
ottiana

38. AGROSTIS L. (á-grös'tis)

The Bent-grasses

Spikelets 1-flowered, disarticulating above the glumes, the rachilla not prolonged; **Glumes** equal or nearly so, acute, acuminate or sometimes awn-pointed, carinate, usually scabrous on the keel and sometimes on the back; **Lemma** obtuse, usually shorter and thinner in texture than the glumes, awnless or dorsally awned, often hairy on the callus; **Palea** usually shorter than the lemma, 2-nerved in only a few species, usually small and nerveless or obsolete.

Annual or usually **perennial**, delicate or moderately tall grasses, with glabrous culms, flat or sometimes involute, scabrous blades, and open or contracted panicles of small spikelets. About 25 species in the United States, 8 in Texas.

All the species of Texas are **perennials** except *A. elliotiana*, an annual and *A. exarata*, perennial and annual. The panicles of many of the species are purplish or reddish-purple or tinged with purple.

Redtop (*A. alba*), commonly 2-4 feet tall, with its green to reddish and purple panicle gives varying tones of green to purple to midsummer fields, especially from New England to the Rocky Mountains. It extends to or within the northernmost borders of Texas. *A. palustris*, with long stolons, has a somewhat open narrow panicle. It is confined to marshes or ditches along or near the coast. Fly-away grass (*A. hiemalis*) is a slender, erect plant, the beautiful nodding purplish panicles being broken off at maturity by the wind and blown over the fields as tumble weeds. *A. verticillata*, 1-2 feet tall, also has beautiful purplish-tinged panicles, but in Texas is confined mostly to wet meadows and along the margins of streams, sometimes forming dense colonies. Thin grass, a slender lax plant, sometimes prostrate, is found in low rather moist places in woodlands in east Texas. *A. elliotiana*, an annual with a rather narrow open panicle, the branches usually ascending, and *A. retrofracta*, a perennial, with the habit of *A. hiemalis*, though coarser, and an open panicle about as wide as long, both commonly less than 2' tall, have awned lemmas. *A. exarata*, with a perennial or annual base, commonly 1-2 feet tall, sometimes much taller, has a narrow and rather dense panicle 2.5-8' long. It is a very variable plant as to height and aspect.

PALEA AT LEAST HALF AS LONG AS THE LEMMA; PERENNIALS.

PANICLE OPEN or sometimes contracted after flowering; culms erect or decumbent at the base.

PANICLE 2-9' long, its branches long and sometimes naked at the base; glumes scabrous on the keel only; rhizomes present. 1. *A. alba*

PANICLE 6-8' long, widely spreading, about as wide as long; spikelets 2.5-3 mm. long, the rachilla prolonged; awn of the lemma 3-3.5 mm. long. 2. *A. retrofracta*

PANICLE CONTRACTED, dense, the branches short; culms decumbent at the base; (*A. palustris* is *stoloniferous*).

PANICLE 2-5' long, branches erect or spreading in anthesis; glumes strongly scabrous all over. 3. *A. verticillata*

PANICLE long, spikeletlike, its branches short, appressed or ascending; blades short and stiff; glumes acute, scabrous on the upper part of the keel. 4. *A. palustris*

PALEA WANTING; PANICLE DIFFUSELY SPREADING; PERENNIALS.

CULMS WEAK, usually spreading or prostrate; spikelets 2-2.5 mm. long, woodland species. 5. *A. perennans*

CULMS AND blades erect; panicle loose, the capillary branches long, spikelet-bearing toward their ends; spikelets 1.5-2 mm. long; glumes scabrous on the keel. 6. *A. hiemalis*

PALEA MINUTE; PANICLE USUALLY NARROW, SOMETIMES OPEN; ANNUALS.

LEMMA AWNLESS or awned; panicle dense, the branches short and appressed; glumes mostly scabrous over the back. 7. *A. exarata*

LEMMA AWNED, the awn flexuous, more than twice as long as the spikelet; spikelet 1.5 mm. long; panicle about half as long as the culm, the branches slender and naked below; annual. 8. *A. elliotiana*

1. *A. ALBA* L. (ál'bá); this has been referred to as *A. palustris* Huds., but that is found to be a distinct coastal species; **Redtop**.

Culms usually 2-3 sometimes 4 feet tall, erect or erect from a more or less decumbent base, bearing rhizomes; **Blades** 3-7' long sometimes longer, 2-6 mm. wide, flat, rough, slightly stiff or lax, erect or drooping; **Sheaths** shorter than the internodes; **Ligule** membranaceous, 3-5 mm. long, lacerate, **Panicle** 3-11' long, exserted, ovate to pyramidal, green, brown or purplish, branches in whorls, the lower 1-4' long, the longer naked below and the short ones spikelet-bearing to the base, ascending or erect, open in flowering, contracted in fruit; **Spikelets** 2-2.5 mm. long, lanceolate, acute, green or reddish, on scabrous pedicels shorter or longer than the spikelet; **Glumes** about equal, scabrous on the keel; **Lemma** nearly as long as the glumes, obtuse, hyaline, rarely awned near the base; **Palea** more than one-half as long as its lemma, hyaline.

In fields, meadows and along streams throughout most of the United States. **Summer**.

2. *A. RETROFRACTA* Willd. (rê-trô-frák'tá).

Culms 12-20' tall, erect, with much the habit of *A. hiemalis* but coarser; **Blades** 1.5-2 mm. wide, flat, rough; **Sheaths** smooth; **Ligule** 3-5 mm. long; **Panicles** exserted, 6-8' long and about as wide, very open, the capillary branches in distant whorls, spreading, *naked at the base*; **Spikelets** 2.5-4 mm. long; **Glumes** subequal, the lower slightly longer, acuminate, scabrous on the keel; **Lemma** slightly over half the length of the glumes, pubescent, the hairs appressed, the callus villous, the dorsal awn attached about one-third the distance below the apex of the lemma, 3-3.5 mm. long, with a bend about 1 mm. from the base of the awn; **Palea** slightly shorter than the lemma, narrow, 2-nerved, rachilla prolonged as a minute bristle. ♀

The above description and the drawings were made from a portion of a branch and information furnished by the Grass Herbarium. This plant has been collected only at Kent, Texas. **Spring**.

3. *A. VERTICILLATA* Vill. (vêr-tis-i-lá'tá).

Culms usually 1-2 sometimes 2.5 feet high, erect, but usually decumbent and rooting at the lower nodes, often in dense mats; **Blades** 3-5.5' long, 3-10 mm. wide, slightly narrowed at base, acuminate, flat, rough above and on margins, sometimes rough below; **Sheaths** shorter than the internodes, loose, sometimes rough; **Ligule** membranaceous, 3-4 mm. long; **Panicles** 2-4.5' long, 1-2' wide when open, dense, oblong or slightly pyramidal, branches about 1-5 in half whorls, erect, ascending or spreading, *usually flowering to the base*, 1' or less long, often interrupted below; **Spikelets** about 1.5 mm. long, usually green but sometimes purple; **Glumes** about equal, hispidulous all over, about 1.5 mm. long, acute, 1-nerved; **Lemma** about 1 mm. long or two-thirds as long as the glumes, 5-nerved, about 5-toothed, oval, truncate, broad, obtuse, hyaline; **Palea** about as long as its lemma, hyaline, obtuse.

Wet meadows and wet places along streams, western Texas to Colorado and California, Mexico. Spring-fall.

4. *A. PALUSTRIS* Huds. (pà-lūs'trīs); *A. maritima* Lam.; **CREeping BENT.** (*Erroneously referred to Texas.*)

Culms 12-20' tall, tufted, erect or decumbent at the base, finally branching, with long stolons; **Blades** mostly short and appressed (1.5-3.5' long, 3 mm. wide or less) stiff; **Panicle** somewhat open but condensed, 1.5-4' long; **Spikelets** 2-2.5 mm. long, on short hispidulous pedicels enlarged at the apex; **Glumes** acute, scabrous on the upper part of the keel, especially on the first glume; **Lemmas** about three-fourths as long as the glumes, hyaline, denticulate at the truncate or rounded apex, scabrous on the upper part of the keel; **Palea** about half as long as the lemma. (No drawings.)

Marshes along the coast from Newfoundland to Maryland; British Columbia to northern California, occasionally as far south as New Mexico; found especially along ditches. Summer.

5. *A. PERENNANS* (Walt.) Tuckerm. (për-ën'āns); **THIN-GRASS.**

Culms 1-2.5 feet tall, simple or branching, slender, weak, lax, erect or decumbent at the base, sometimes prostrate; **Blades** 4-10' long, 2-6 mm. wide, flat, thin, rough; **Sheaths** mostly shorter than the internodes; **Ligule** 3-6 mm. long, membranaceous; **Panicles** often included at the base, pale-green, diffuse, 4-10' long, oblong-pyramidal, the axis scabrous, the slender scabrous branches ascending, the lower as much as 3' long, 2-10 at each node, distant as much as 2', dividing and *spikelet-bearing at or about the middle*, the branchlets and scabrous pedicels appressed or divergent, the pedicels commonly 1-6 mm. long; **Spikelets** about 2.5 mm. (2-3) long, acuminate; **Glumes** subequal, or the first slightly longer, acuminate, 1-nerved, usually very scabrous on the keel; **Lemmas** about three-fourths as long as the first glume, a minute tuft of hairs on each side at base; **Palea** wanting; **Grain** about 1.5 mm. long, 0.5 mm. wide, spindle-shaped.

Along streams in woods, eastern Texas, North Carolina, Kentucky, Ohio to Massachusetts. (Tyler, Texas.) Fall.

6. *A. HIEMALIS* (Walt.) B. S. P. (hī-è-mā'līs); *A. scabra* Willd.; **FLY-AWAY-GRASS, ROUGH HAIR-GRASS, TICKLE-GRASS.**

Culms 1-2 feet tall, erect, simple or tufted, slender; **Blades** 2-5' long, 1-3 mm. wide, rough, flat or involute; **Sheaths** usually longer than the nodes; **Ligule** membranaceous, 2-4 mm. long; **Panicle** 4-12' long, usually purplish, exserted when mature, becoming pyramidal, the rough capillary branches in a half whorl which are distant about 1-2.5', ascending or widely spreading or drooping, the lower 4-6' long, divided near or above the middle, *flowering only towards the extremities*; **Spikelets** 1.5-2 mm. long; **Glumes** 1-nerved, pointed, the first usually longer; **Lemmas** about two-thirds as long as the first glume or equaling it, obtuse, 5-nerved, awnless or rarely awned, **Palea** wanting.

In dry or moist soil throughout nearly the whole of North America. Spring-summer.

7. *A. EXARATA* Trin. (èks-à-rā'tá); *A. grandis* Trin.; *A. asperifolia* Trin.

Culms 1-2 or sometimes 3-4 feet tall, varying much as to size and aspect, erect or geniculate at the base, from perennial or annual roots; **Blades**, those of the culm 2.4-6' long, of the sterile shoots shorter, 3-7 mm.

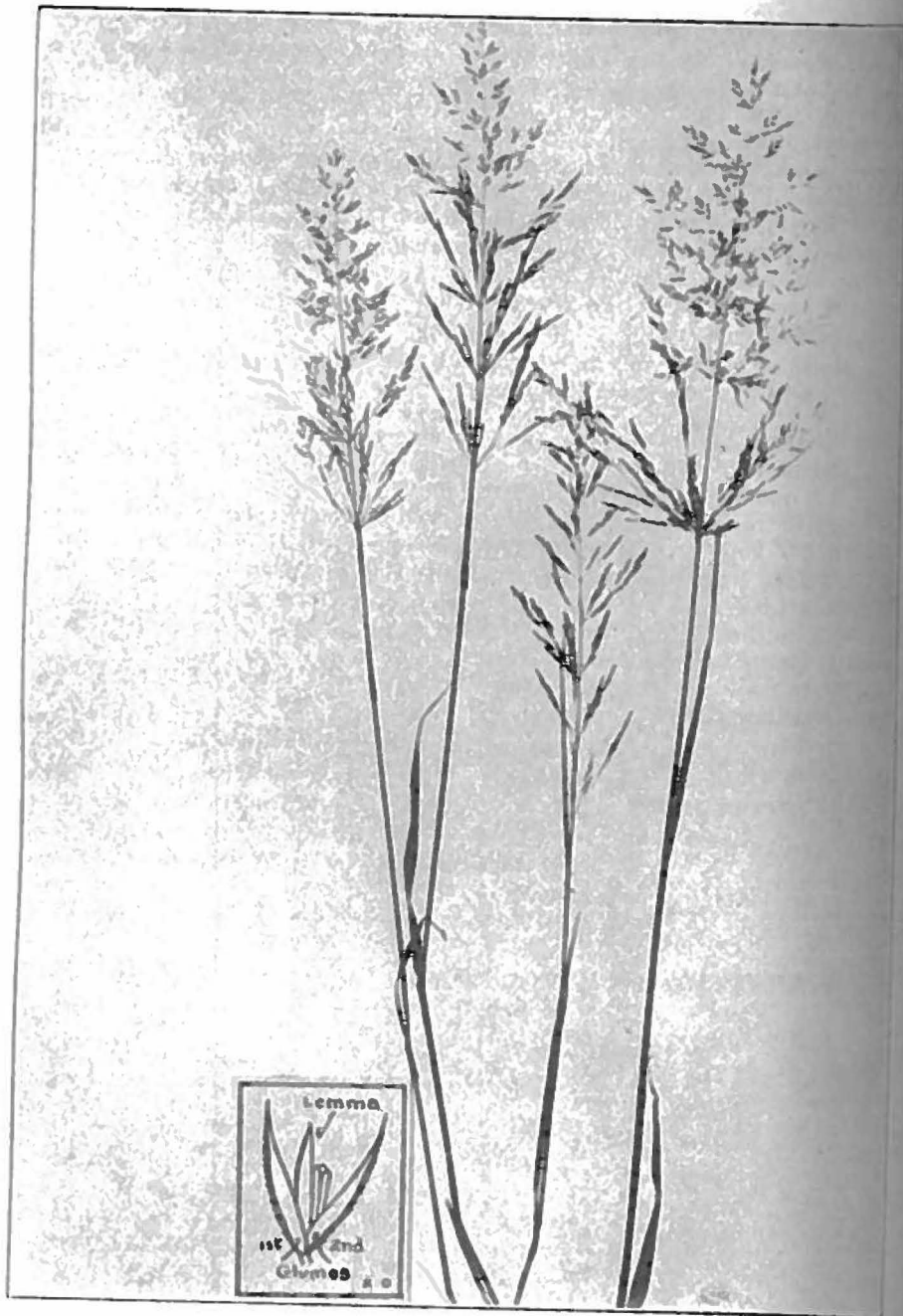
erect, flat, rough; **Sheaths** shorter than the internodes, or the lower longer, smooth to rough; **Ligule** decurrent, membranaceous, 2-5 mm. long; **Panicle** exserted, pale-green or tinged with purple, erect or slightly nodding, 2.5-8' long, 10-15 mm. (6-30) thick, often lobed and somewhat interrupted below, dense, the branches commonly 0.5-2' long, several to a whorl, commonly *spikelet-bearing to the base*, erect; **Spikelets** 2-3.5 mm. long, acute, on scabrous pedicels 1-2 mm. long; **Glumes** nearly equal, or the lower longer, scabrous or short-hispid on the keel, scabrous along the margins; **Lemmas** about two-thirds as long as the glumes, acute or sub-obtuse, awnless, or bearing from about the middle of the back a straight or bent exserted awn, thin, toothed, with a very short sparingly-pilose callus; **Palea** wanting or minute (less than 0.5 mm. long).

Moist or rather dry open ground, west Texas, New Mexico, California, and Colorado north. Summer-fall.

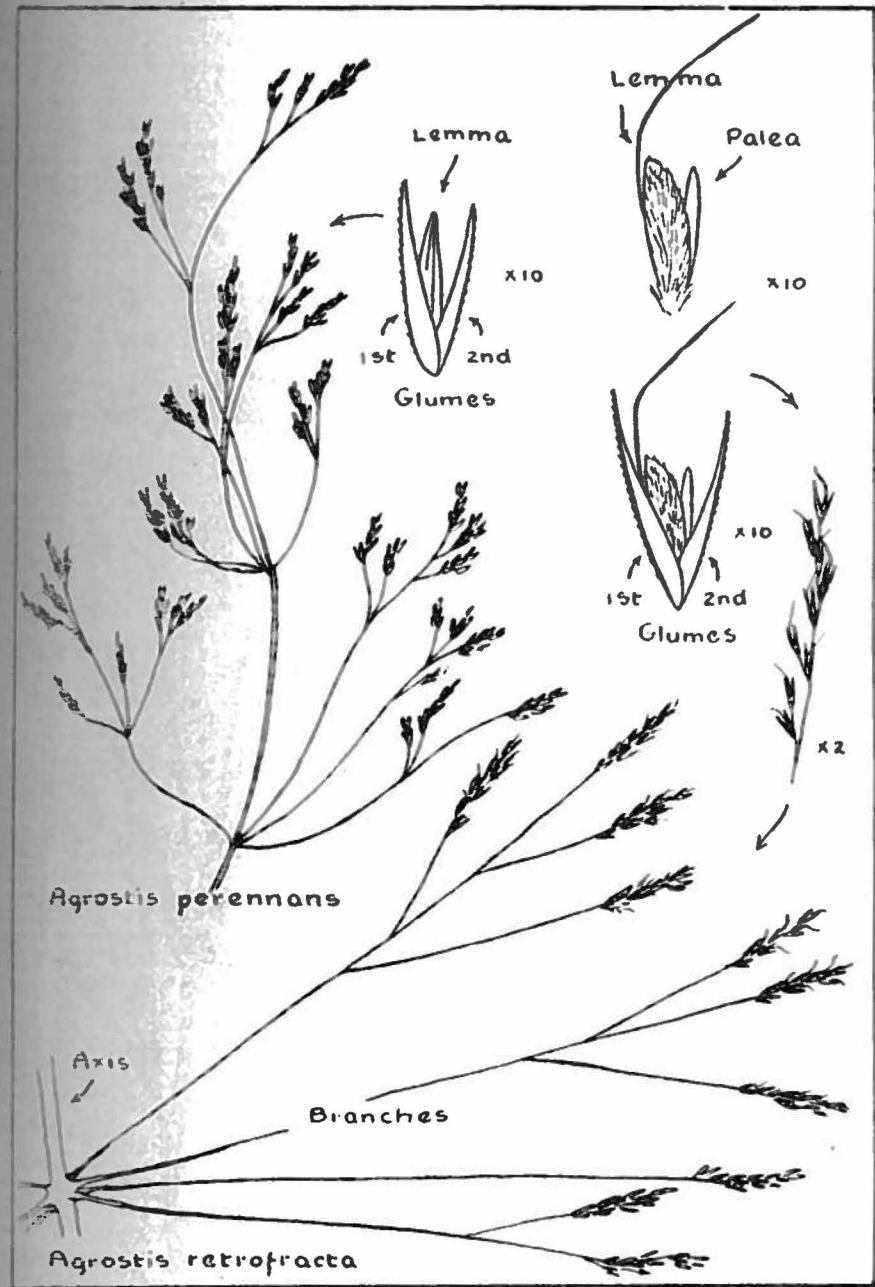
8. *A. ELLIOTTIANA* Schult. (èl-i-üt-i-ā'nā); *A. arachnoides* Ell.

Culms 5-20' tall, tufted, erect, slender, weak, simple; **Blades** 0.5-2' long, 1-2 mm. wide, rough; **Sheaths** shorter than the internodes, smooth or slightly rough, striate; **Ligule** membranaceous, about 2 mm. long; **Panicle** 2-5' long, usually narrow, finally open, lax, the *capillary branches naked below*, erect or ascending or finally drooping, the lower 1-1.5' long; **Spikelets** 1.5-2 mm. long, linear-lanceolate; **Glumes** about equal, acute, scabrous on the keel and margins; **Lemmas** about four-fifths as long as the glumes, acute or 2-toothed, bearing a very finely filiform flexuous barbellate awn 2-4 times its length inserted just below the apex, sometimes wanting; **Palea** wanting.

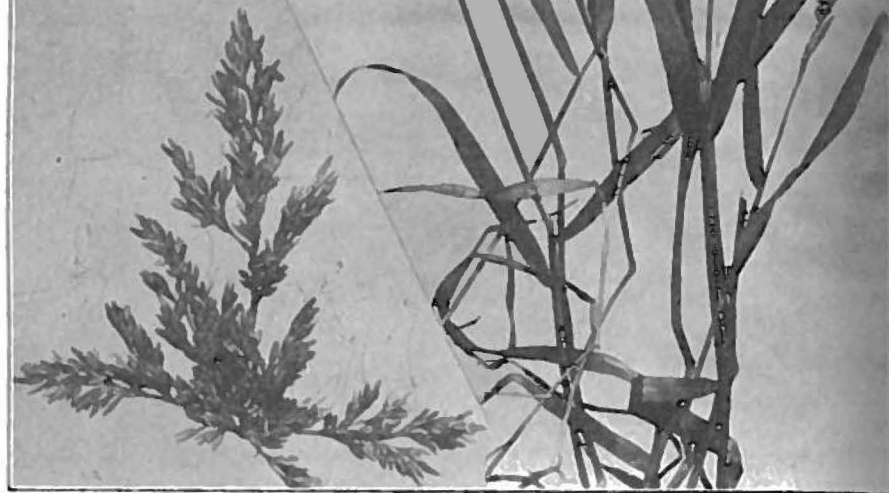
Dry or wet land; Texas to Florida, South Carolina, Tennessee, Kansas to Illinois, and Kentucky. (Granite Mountains, Marble Falls, Texas. Spring-summer.



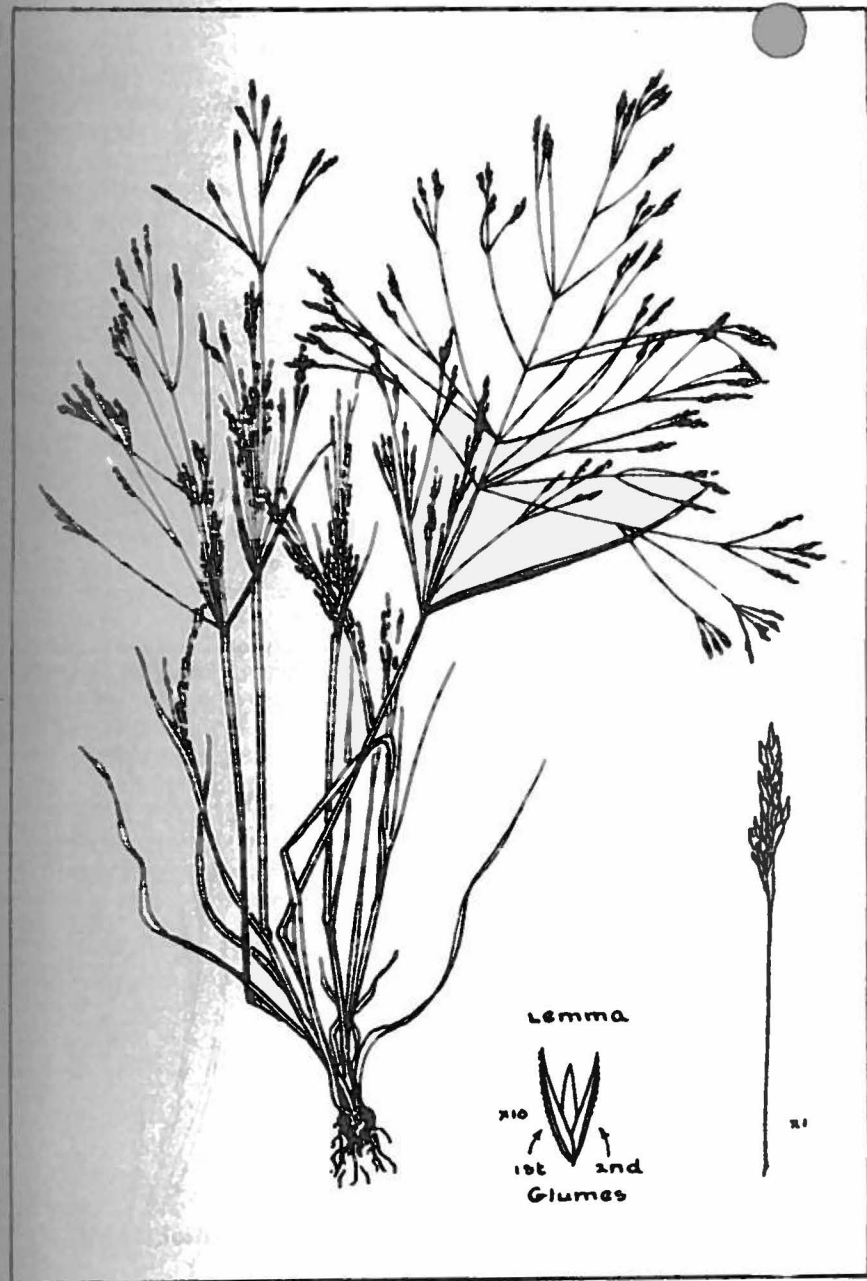
AGROSTIS ALBA, REDTOP



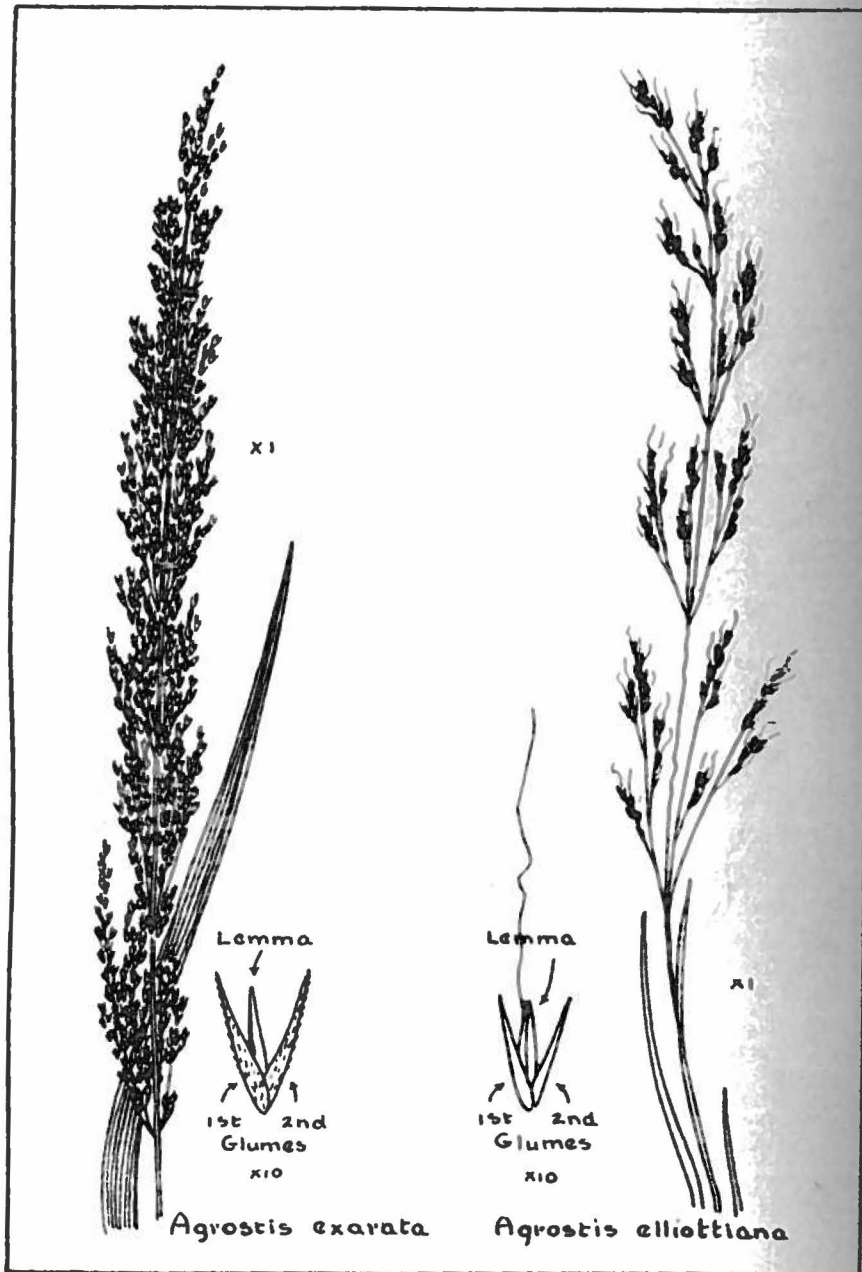
AGROSTIS PERENNANS AND AGROSTIS RETROFRACTA



AGROSTIS VERTICILLATA



AGROSTIS HIEMALIS; FLY-AWAY GRASS



AGROSTIS EXARATA AND AGROSTIS ELLIOTTIANA

39. CINNA L. (sin'á)

Spikelets 1-flowered, disarticulating below the glumes, the rachilla forming a stipe below the floret and produced behind the palea as a minute bristle; **Glumes** equal, 1-nerved; **Lemma** similar to the glumes, nearly as long, 3-nerved, bearing minute, short, straight awn just below the apex; **Palea** apparently 1-nerved, 1-keeled.

Tall *perennial* grasses, with flat blades and paniculate inflorescence. Species three, North America and northern Eurasia, two in the United States, one in Texas.

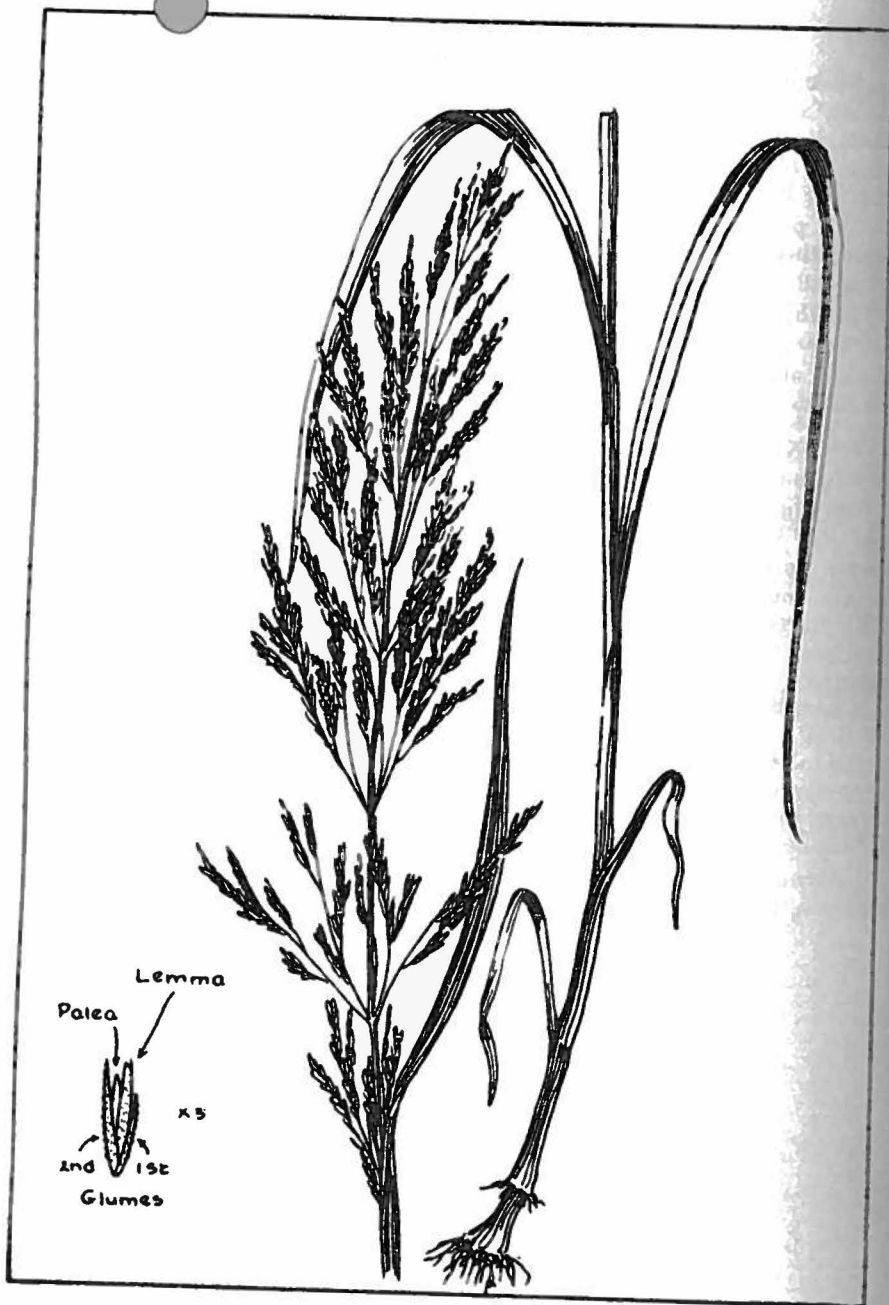
In this genus the palea is apparently 1-nerved, especially so in *C. arundinacea*. This is an exception to the rule that the palea is 2-nerved.

The origin of this apparent single nerve is demonstrated by the fact that in one of the species the nerve may be easily split into two.

C. ARUNDINACEA L. (á-rún-dí-ná'sé-á); WOOD REED-GRASS, SWEET WOOD-GRASS.

Culms 2-5 feet tall, erect, simple, leafy; **Blades** 6-15' long, 6-14 mm. wide, flat, rather long acuminate, rough or slightly rough; **Sheaths**, upper shorter than the internodes, smooth or rough; **Ligule** membranaceous, 2-5 mm. long; **Panicle** finally exserted, pale green to purple, 6-15' long, rather narrow, somewhat open, or contracted after flowering, the filiform branches erect or drooping, the lower 1.5-4.5' long, the scabrous pedicels enlarged at the apex, about as long as the spikelets; **Spikelets** about 5 mm. long, narrow, **Glumes** unequal, acuminate, scabrous especially on the keel, the first 1-nerved, usually about 1 mm. shorter than the 1 or 3-nerved second; **Lemma** slightly exceeded or equaled by the second glume, minutely scabrous, especially on the keel, usually bearing an awn about 0.5 mm. long from the 2-toothed apex, sometimes awnless; **Palea** nearly as long as its lemma, similar in shape but 1-nerved, scabrous on the keel.

Along shady streams and in wooded swamps, northeast Texas to Alabama, north to Newfoundland and the Northwest. Summer-fall.



CINNA ARUNDINACEA, WOOD REED-GRASS

40. LIMNODEA L. H. Dewey (lim-nō'dē-à)

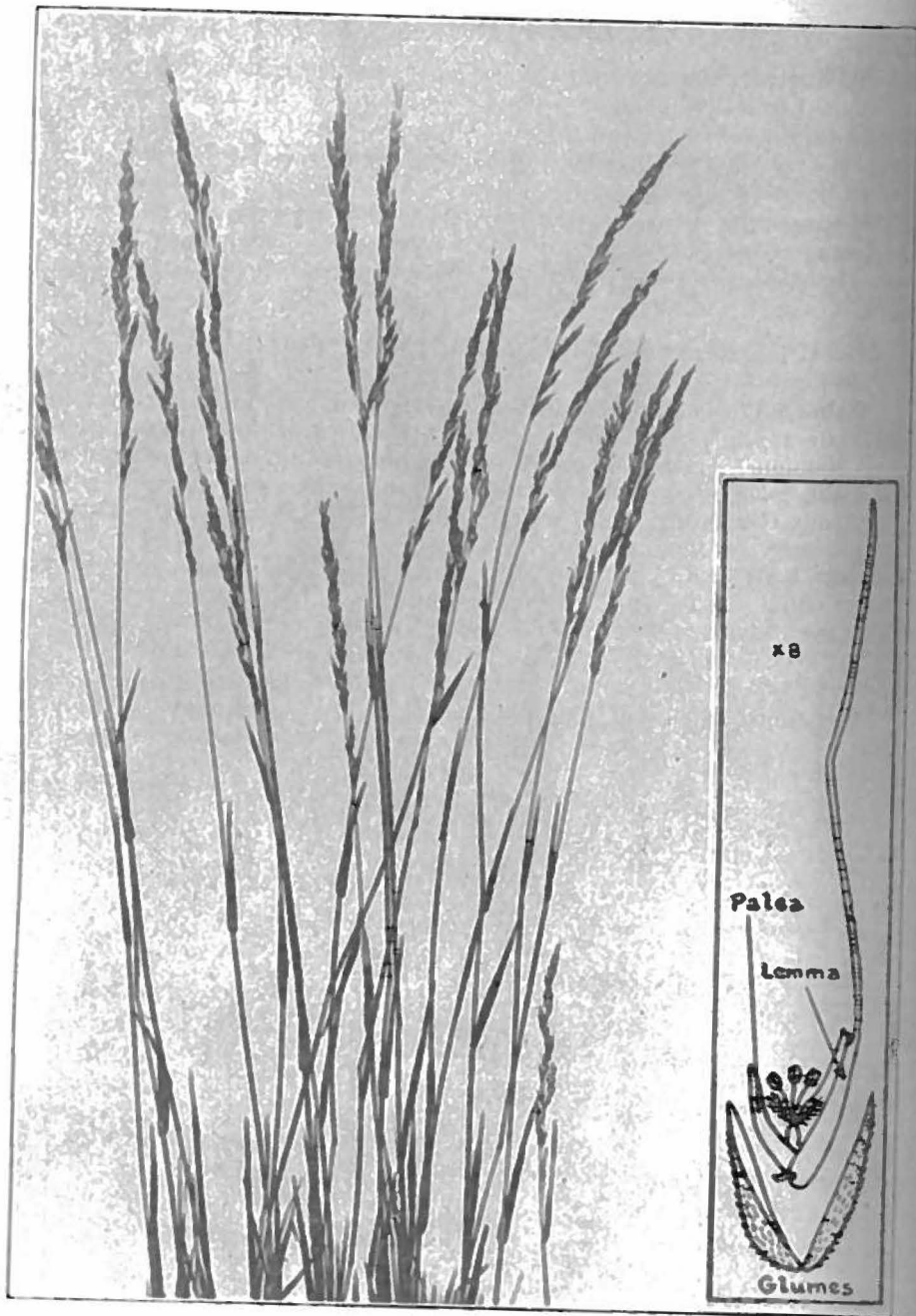
Spikelets 1-flowered, disarticulating below the glumes, the rachilla prolonged behind the palea as a short, slender bristle; **Glumes** equal, firm; **Lemmas** membranaceous, smooth, nerveless, 2-toothed at the apex, bearing from between the teeth a slender bent awn, twisted at base; **Palea** a little shorter than the lemma.

Species one, a slender *annual* with flat blades and a narrow panicle. It has a range from Texas to Florida. A form with pilose glumes has been named *L. arkansana* var. *pilosa* (Trin.) Scribn. but is included in the species below.

L. ARKANSANA (Nutt.) L. H. Dewey (är-kän-sā'nà); *Thurberia arkansana* Benth.

Stems 1-1.5, sometimes 3 feet tall, solitary or tufted, slender, erect or geniculate at the base; **Blades** 1-6' long, 3-5 mm. wide, lance-linear, somewhat flexuous, rough; **Sheaths** mostly shorter than the internodes, pubescent, margins and throat villous, more or less rough; **Ligule** membranaceous, 1-2 mm. long, fringed; **Panicle** 3-6' long, finally exserted, narrow, erect or nodding, branches erect or appressed, 0.5-2.5' long; **Spikelets** 3.5-4 mm. long, on pedicels 1-3 mm. long, narrow, oblong; **Glumes** equal, acute, scaberulous or pubescent, with three nerves which can be seen from the inside; **Lemmas** about as long as the glumes, the awn two to three times as long as the body of the lemma, the three nerves obscure; **Palea** nearly as long as its lemma, narrow, hyaline.

Dry fields and waste places, Texas to Florida. Spring.



LIMNODEA ARKANSANA

41. ALOPECURUS L. (äl-ö-pë-kü'rüs)

Spikelets 1-flowered, disarticulating below the glumes, strongly compressed laterally; **Glumes** equal, awnless, usually united at base, ciliate on the keel; **Lemma** about as long as the glume, 5-nerved, obtuse, the margins united at base, bearing from below the middle a slender dorsal awn, this included or exerted two or three times the length of the spikelet; **Palea** wanting.

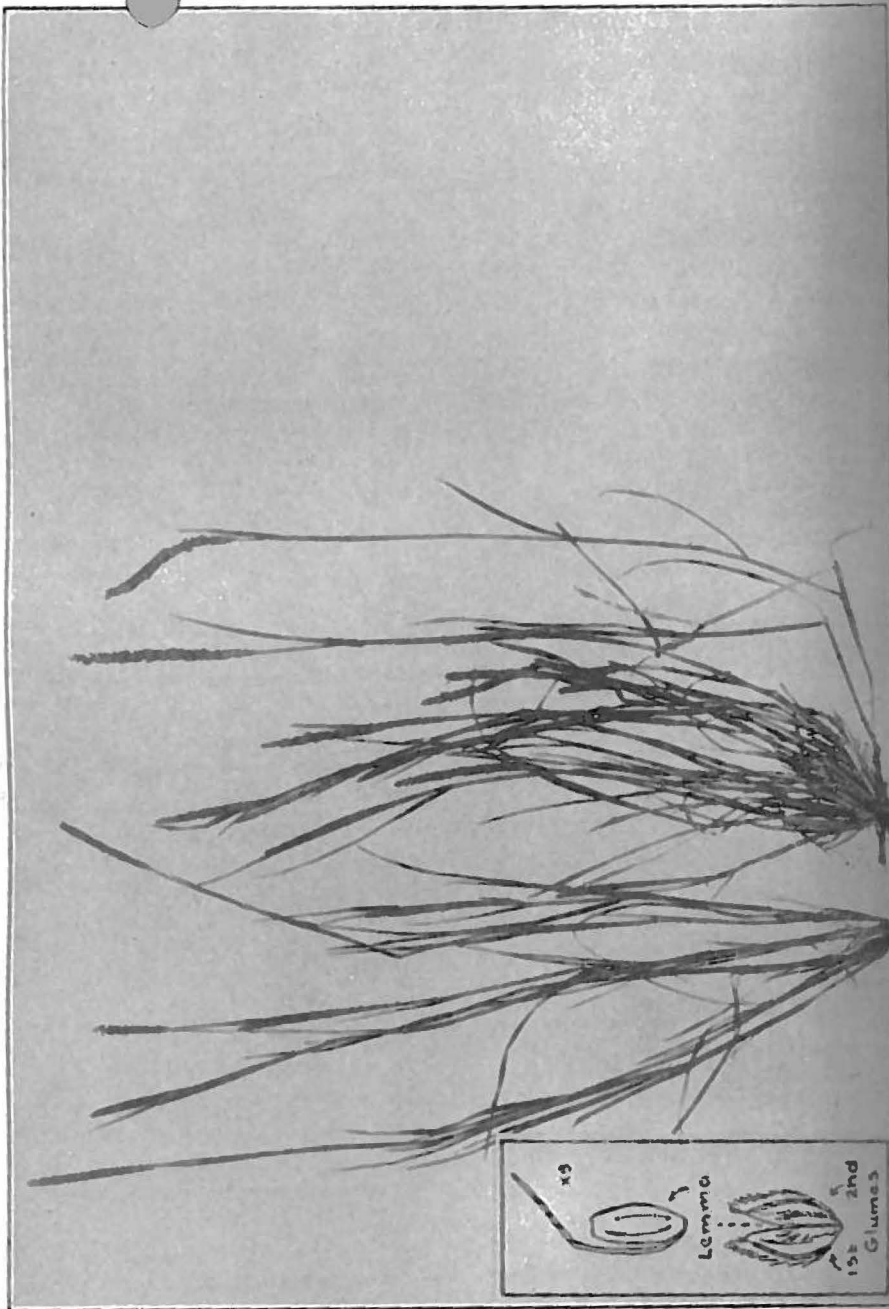
Low or moderately tall *annual* or *perennial* grasses with flat blades and soft, dense spikelike panicles; one species in Texas.

This grass is a low tufted *annual*, and very much resembles *A. geniculatus* L., a *perennial*.

A. CAROLINIANUS Walt. (kär-ö-li-ni-ä'nüs); *A. ramosus* Poir.

Stems 6-18' tall, erect or sometimes geniculate at or near the base, tufted, simple or branching, rather slender; **Blades** 2-4.5' long, mostly 2-3', 1-4 mm. wide, flat, rough above; **Sheaths** shorter than the internodes, loose or somewhat inflated, especially the upper; **Ligule** membranaceous, 3-5 mm. long, decurrent; **Panicles** finally exerted, the axillary often included at the base, narrow, spikelike, about 2' long, 3-5 mm. thick, cylindric, dense, the pedicels enlarged at the apex and turned inward, the main axis, branches and pedicels sparsely pubescent, the branches very short, the spikelets crowded; **Spikelets** 2-2.5 mm. long, flattened, falling from the pedicels entire; **Glumes** equal, slightly united at the base, much flattened, subacute, the keels strongly ciliate, otherwise sparsely hirsute or nearly glabrous; **Lemmas** with a bent awn attached near the base about twice as long as its body.

In low moist ground, eastern and southern Texas. (Texarkana, Goliad and Floresville, Texas.) Early spring.



ALOPECURUS CAROLINIANUS

42. POLYPOGON Desf. (pöl-i-pō'gön)

Spikelets 1-flowered, the pedicel disarticulating a short distance below the glumes leaving a short-pointed callus attached; **Glumes** equal, entire or 2-lobed, awned from the tip or from between the lobes, the awn slender, straight; **Lemma** much shorter than the glumes, hyaline, usually bearing a slender straight awn shorter than the awns of the glumes.

Annual or **perennial** usually decumbent grasses, with flat blades and dense, bristly, spikelike panicles. Species about 10, in the temperate regions of the world, chiefly in the Eastern Hemisphere, three species being introduced into the United States, two in Texas.

Our two species have dense spikelike panicles 1-6' long, the crowded spikelets with long-awned glumes. Annual beard-grass with a soft, bristly, pale-green or yellowish panicle, has numerous long awns concealing the spikelets, and *P. lutosus*, a perennial, with a dull panicle, has shorter awns not concealing the spikelets. Both are plentiful in California, the former being found here and there over much of the United States, sometimes important in low meadows, and the latter has been collected in a few of the southern states including Texas.

PLANTS annual; panicles silky, the awns 2-4 times as long as the glumes, concealing the spikelets. 1. *P. monspeliensis*

PLANTS perennial; panicle dull, often lobed, the awns about as long as the glumes, not concealing the spikelets. 2. *P. lutosus*

1. *P. MONSPELIENSIS* (L.) Desf. (mön'speli-én'sis); ANNUAL BEARD-GRASS.

Stems usually 8-24' sometimes as much as 35' tall, erect from a decumbent base, sparingly branched, tufted; **Blades** 2-9' commonly 3-5' long, 3-10 mm. wide, some narrowed at the base, acuminate, flat, scabrous especially above, **Sheaths** nearly as long as the internodes, upper slightly inflated, loose, sometimes slightly scabrous; **Ligule** 4-6 mm. long, membranaceous **Panicle** 1-6' long, sometimes interrupted below, dense and spikelike, oval or cylindric, mostly exserted, soft silky, often of a yellowish shining pale green, the branches short; **Spikelets** about 2 mm. long with awns 2-6 times as long, nearly sessile, crowded, very numerous and nearly concealed by the numerous awns; **Glumes** subequal, about 2 mm. long, hispid, both with awns 4-7 mm. long, from an obtuse, slightly bifid, or entire apex; **Lemmas** much shorter, truncate, erose, hyaline, broad, bearing a delicate awn about 0.5-1 mm. long, inserted just below the apex, or sometimes wanting; **Palea** about two-thirds as long as the lemma, 2-toothed, truncate.

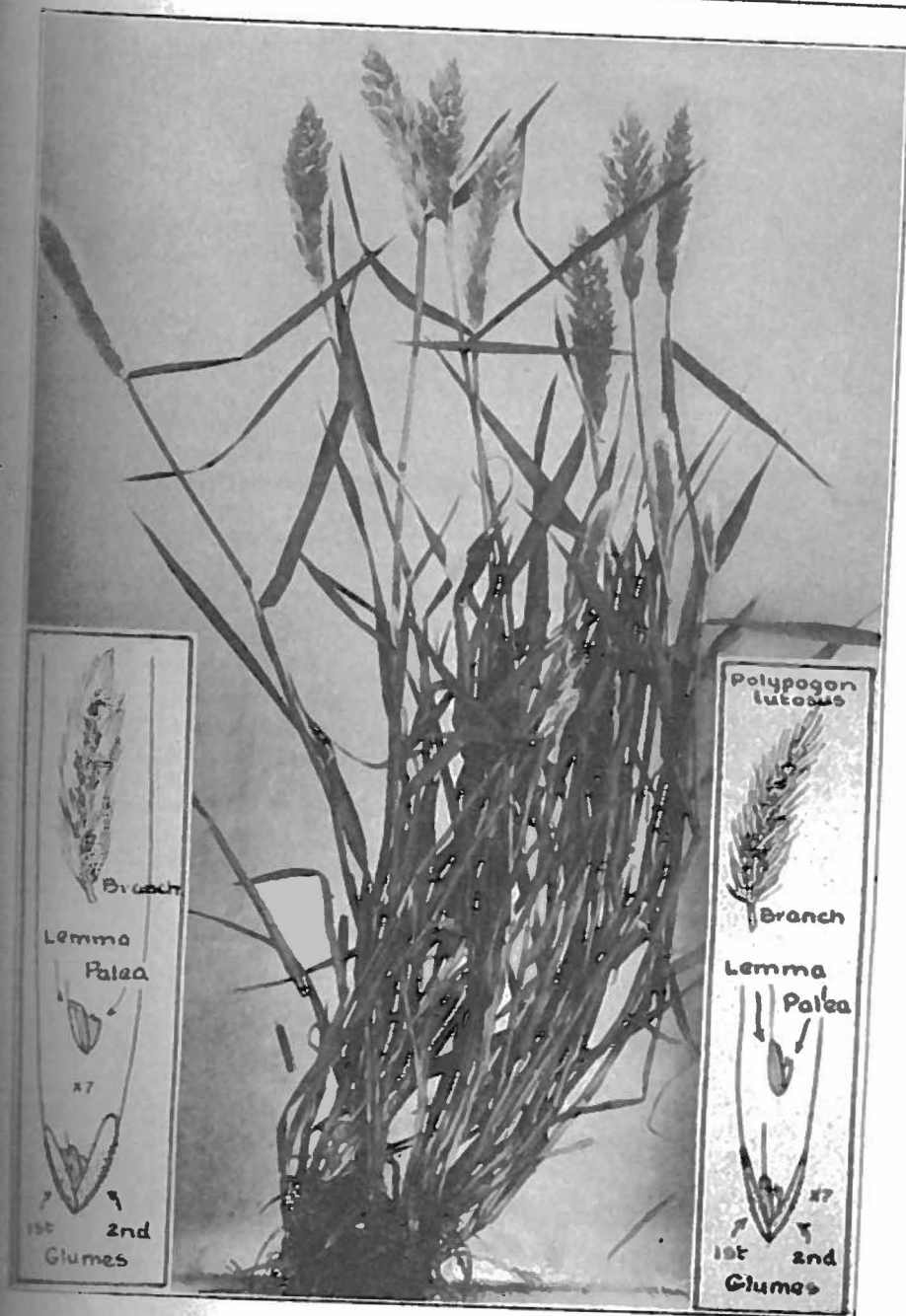
In waste places, especially in low meadows along streams here and there over the United States. Spring to fall.

2. *P. LUTOSUS* (Poir.) Hitchc. (lü-tō'sūs); *P. littoralis* (With.) J. E. Smith, *Agrostis lutosus* Poir.

Stems 6-32' tall, sometimes taller, erect or decumbent at the base, taking root at the lower nodes; **Blades** 1-6' mostly 2-3.5' long, erect, 3-8 mm. wide, flat; **Sheaths** mostly shorter than the internodes, the upper slightly inflated; **Ligule** membranaceous, strongly-nerved, minutely scabrous, about 2.5 mm. long.

long, dense, spikelike, more or less lobed or interrupted below; **Spikelets** exclusive of the awns about 2 mm. long, numerous, crowded, narrow; **Glumes** about equal, 2-3 mm. long, folded and involute at the tip, more or less scabrous, especially on the midnerve and margins, also puberulent, with a straight awn commonly about as long as the glumes, or sometimes nearly twice as long, from the sinus of a bifid apex, or below, or when entire terminal; **Lemma** about three-fourths as long as the glumes, broadly truncate, often erose, thin and hyaline, awnless or with an awn 1-2 mm. long; **Palea** nearly as long as its lemma, 2-toothed, hyaline. (For illustration see photograph of *Polygogon monspeliensis*.)

In wet places, Texas to Louisiana and Alabama, California. (Alpine, Texas.) Spring-summer.



POLYPOGON MONSPELIENSIS; ANNUAL BEARD-GRASS; drawings of
POLYPOGON LUTOSUS.

43. LYCURUS H. B. K. (li-kū'rūs)

Spikelets 1-flowered, the rachilla articulate above the glumes; **Glumes** awned, the first usually 2-awned; **Lemma** narrow, firm, longer than the glume, terminating in a slender awn.

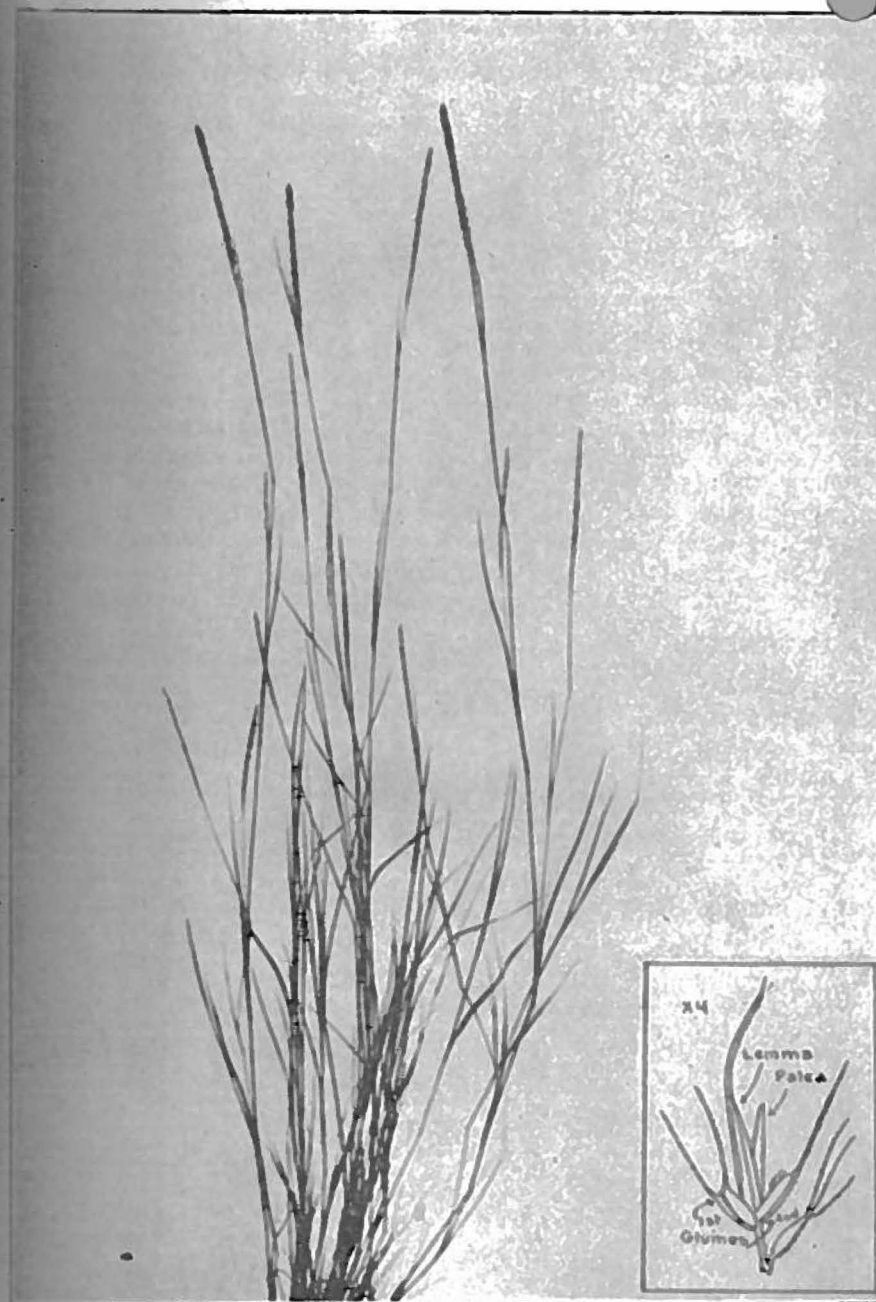
Low *perennial* grasses, with dense spikelike panicle, the spikelets borne in pairs, the lower of the pair sterile, the short branchlets deciduous. One species in the United States.

L. PHLEOIDES H. B. K. (flē-oi'dēz); TEXAS TIMOTHY, WOLFTAIL

Our only species, Texas timothy, is a tufted, slender grass usually 12-18' tall, with a dense, narrow, lead-colored, cylindric panicle. At a distance it somewhat resembles timothy, but the spikelike panicles are smaller and bristly with awns.

Culms 12-27' tall, usually 12-18', tufted, erect or ascending, sometimes decumbent at the base with a slightly thickened or bulbous base, freely branching, rather weak; **Blades** 1-3' long, about 1-3 mm. wide, upper shorter, radical leaves numerous and shorter, flat or folded, rough on the margins and on upper surface toward the apex, the margins and midrib white; **Sheaths** much shorter than the internodes, loose; **Ligule** membranaceous, 3-4 mm. long; **Panicles** commonly 2-4' long, 3-8 mm. wide, exserted, often an axillary panicle at each node, with peduncles sometimes as long as that of the terminal panicle, dense, spikelike, cylindric, with many very short branchlets; **Spikelets** exclusive of the awns 3.5-5 mm. long, with awns 7-9 mm. long, usually in pairs, sometimes three, on very short branches, the upper perfect and the lower staminate or neuter, falling with the branchlets; **Glumes** about half as long as the lemma, awns unequal, more or less ciliate on the margins, the first oblong, thin, 2-nerved, about 1.5 mm. long, with two or rarely three unequal scabrous awns 2-5 mm. long, the second 1-nerved, 1.5-2 mm. long, terminating in an awn 3-6 mm. long; **Lemma** 3.5-4 mm. long, lanceolate, acuminate, thicker than the glumes, 3-nerved, more or less pubescent, terminating in a scabrous awn 3-4 mm. long; **Palea** lanceolate, 2-toothed, nearly as long as its lemma, thinly pubescent.

Plains and rocky hills, from Mexico through western Texas to Arizona and Colorado. August to October.



LYCURUS PHLEOIDES; TEXAS TIMOTHY, WOLFTAIL

44. PHLEUM L. (flě ům)

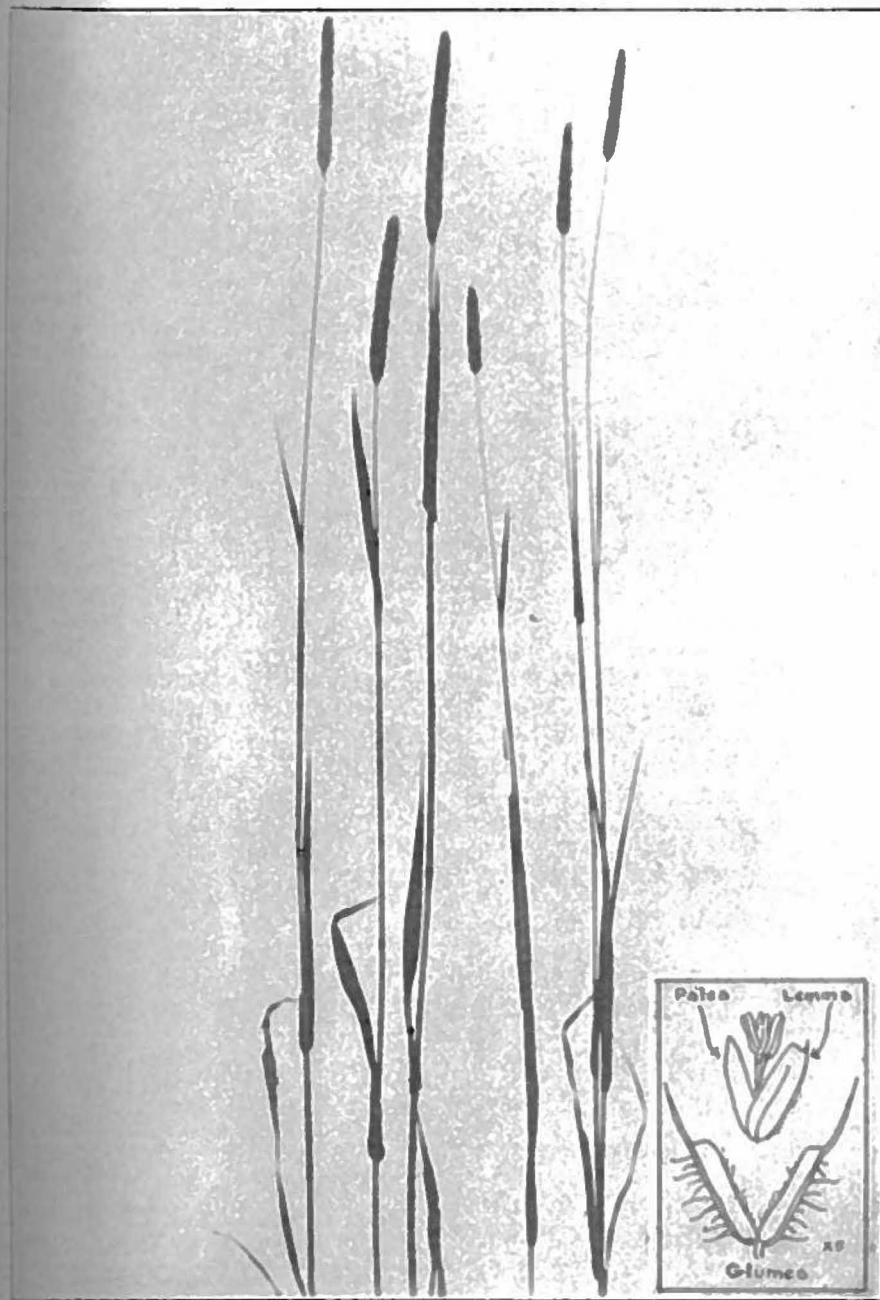
Spikelets 1-flowered, laterally compressed, disarticulating above the glumes; **Glumes** equal, membranaceous, keeled, abruptly mucronate or awned; **Lemma** shorter than the glumes, hyaline, broadly truncate, 3-5-nerved; **Palea** narrow, nearly as long as the lemma.

Annuals or **perennials**, with erect culms, flat blades, and dense cylindrical panicles. Our only species in Texas is timothy, an erect **perennial** 2-4 feet tall, with a long cylindrical spikelike panicle usually 3-5' long, long-exserted on a slender peduncle, the culms swollen at the base. It is the most important meadow grass in America, and thrives best in the cool humid regions.

P. PRATENSE L. (prā-těn'sē).

Culms 16-40' tall, tufted, erect, simple, somewhat swollen at the base; **Blades** 3-13' long, 5-9 mm. wide, flat, scabrous; **Sheaths** often exceeding the internodes; **Ligule** membranaceous, 2-3 mm. long; **Panicle** 1-6' long, spikelike, 5-8 mm. thick, cylindrical, obtuse, densely flowered; **Spikelets** excluding the awns 2.5-3 mm. long; **Glumes** ciliate on the keel, the awns less than half their length, usually about 1 mm. long; **Lemma** and **Palea** about equal, thin, half as long as the glumes.

Meadows and waste places, nearly throughout North America. Summer.



PHLEUM PRATENSE, TIMOTHY

45. GASTRIDIDIUM Beauv. (gäs-tríd'i-üm)

Spikelets 1-flowered, the rachilla disarticulating above the glumes, prolonged behind the palea as a minute bristle; **Glumes** unequal, somewhat enlarged or swollen at the base; **Lemma** much shorter than the glumes, hyaline, broad, truncate, awned or awnless; **Palea** about as long as the lemma.

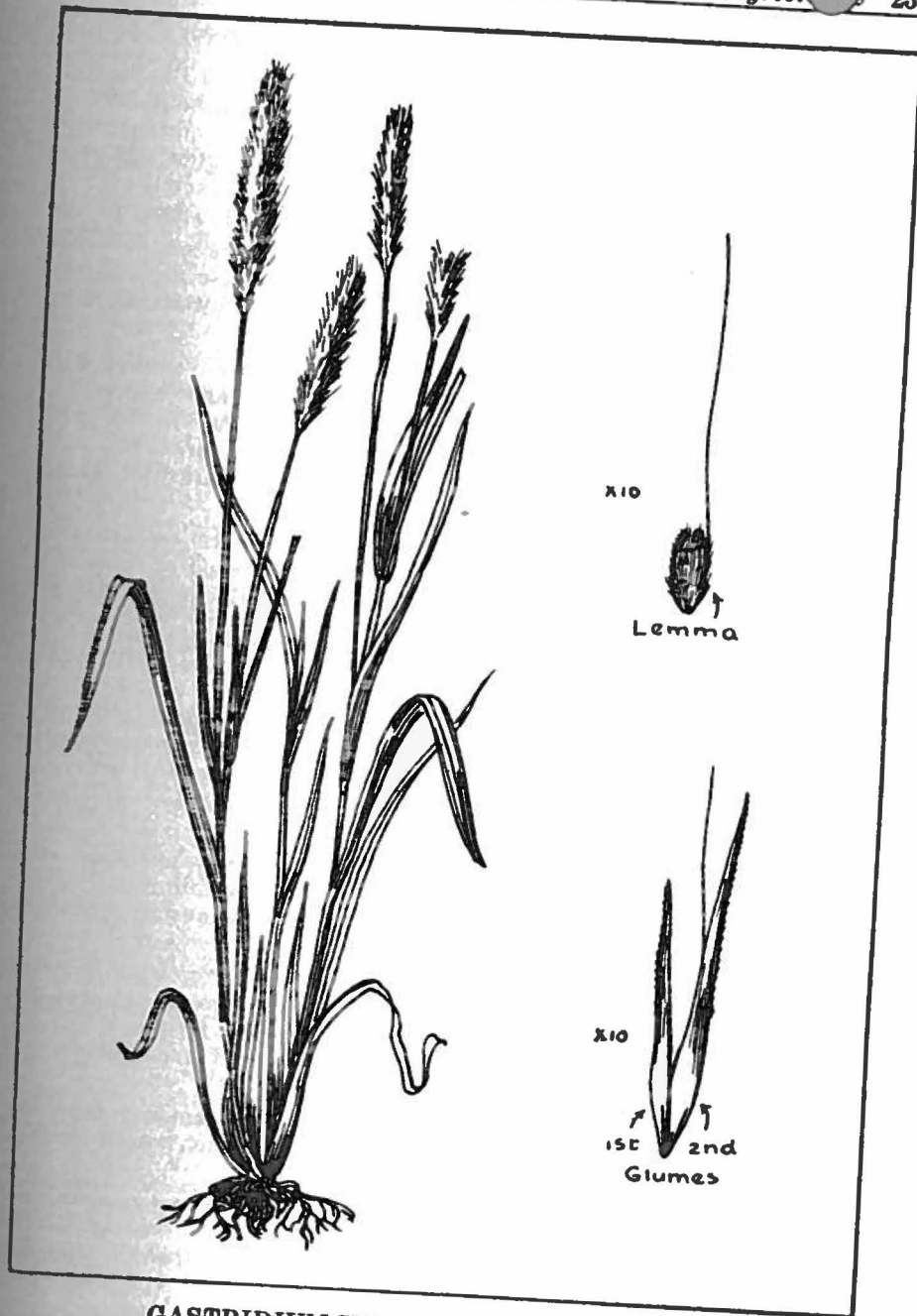
Annual grasses, with flat blades and pale, shining, spikelike panicles. Species two, in the Mediterranean region; one introduced into the United States.

Our species is distinguished by the long-acuminate glumes and the short hairy lemma with an awn exceeding the glumes. It is a common weed on the Pacific Coast but is rather rare in Texas. It appears to have no economic value.

G. VENTRICOSUM (Gouan) Schinz & Thell. (vën-tri-kō'süm); *G. lendigerum* (L.) Gaud.; *G. australe* Beauv.; NIT-GRASS.

Culms 8-24' tall, erect or decumbent at the base, branching, leafy below, naked above; **Blades** 1.5-5' long, 2-4 mm. wide, mostly flat; **Sheaths** shorter than the internodes; **Ligule** 2-5 mm. long, thin-membranaceous; **Panicles** exserted or those of the branches included at the base, 1.5-4' long, rarely 6', 5-11 mm. thick, spikelike, densely-flowered, the spikelets on scabrous pedicels 1.5 mm. long or less; **Spikelets** exclusive of the awn 4-6 mm. long, lanceolate; **Glumes** long acuminate, scabrous on the keel, the first 3-3.5 mm. long, the second 4-6 mm. long; **Lemma** about 1.1 mm. long, about one-fourth as long as the second glume, 0.5 mm. wide, truncate, toothed, sparsely hairy, a tuft of short hairs on the callus, the awn exceeding the second glume.

In dry places, Texas, common on the Pacific coast, introduced from Europe. (Alpine, Texas.) Summer.



GASTRIDIDIUM VENTRICOSUM, NIT-GRASS

46. MUHLENBERGIA Schreb. (mū-lĕn-bĕr'jĭ-à)

Spikelets 1-flowered, the rachilla disarticulating above the glumes; **Glumes** usually shorter than the lemma, obtuse to acuminate or awned, the first sometimes small or rarely obsolete; **Lemma** firm-membranaceous, 3-to-5-nerved, with a very short, usually minutely pilose callus, the apex acute, sometimes bidentate, extending into a straight or flexuous awn, or sometimes only mucronate or bearing a slender awn just below the tip.

Perennial or rarely **annual** low or moderately tall grasses, tufted or rhizomatous, the culms simple or much branched, the inflorescence a narrow or open panicle. Species about 80, mostly Mexico and southwestern United States, about 34 in Texas.

Most of our species are found in the western and southwestern states, where a few are rather common, being less than a dozen in our eastern states. They are mostly fall grasses. As a rule in this genus the diffuse open panicles are purple, usually green in *M. arenicola*, while the contracted ones range from grayish-green to light or dark lead-colored, rarely purple.

Muhlenbergia agrees with *Stipa* and its allies in the firm texture of the lemma; and differs from *Sporobolus* in the 3-nerved awned or mucronate lemma; and from *Agrostis* in the firmer lemma, usually longer than the glumes.

M. texana, the only annual in Texas, usually not over 15' tall, with a nearly oblong panicle, has ciliate glumes.

M. porteri, known as mesquite grass, is a straggling plant, often in a tangled mass, commonly about 1.5 feet tall, with short internodes, sheaths and blades, the blades soon deciduous. As stock are fond of this grass it is usually found only under the protection of thorny shrubs. It thrives mostly west of a line from Laredo to San Angelo.

M. pungens, known as blow-out grass, is a densely-tufted plant 1.5-2 feet tall, with rigid spiny-pointed blades, the secondary branches of the panicle fasciated. It is confined to very sandy land in west or northwest Texas.

M. torreyi, known as ring grass, as it is often found growing in a ring (the central plants having died out), somewhat resembles *M. pungens*, but is lower and less rigid, with the basal leaves usually recurved, and the secondary branches of the panicle commonly single. It thrives on the dry hillsides of high plains in west Texas.

M. arenicola somewhat resembles ring-grass except that it is taller and usually has a green and longer panicle, the blades much longer and not recurved at the base.

M. arenacea, a low plant, usually less than 10' tall, and panicles commonly less than 4' long, the ligules with acute auricles, thrives on the dry sterile mesas or plains of west Texas, while *M. asperifolia*, a somewhat taller plant, with panicles usually more than 4' long, and without auricled ligules, thrives only in damp places in the valleys of west Texas.

M. involuta, commonly 3-5 feet tall, *M. reverchonii* and *M. rigida* usually about 2.5-3 feet tall, are similar in general appearance. *M. involuta* and *M. reverchonii* have short-awned lemmas while *M. rigida* has long-awned lemmas, the panicle being a darker purple than those of the first two species. *M. rigida* is a rather rare plant on the high mountains of west Texas. *M. involuta*, a new species first collected by the author, has about the same

range as *M. reverchonii*. These are found here and there in the hills for about 100 miles north and northwest of San Antonio.

M. expansa and *M. capillaris*, commonly 2.5-3 feet tall, have large open panicles, the former with a short-awned lemma, the latter with a long-awned lemma and glumes often short-awned. Both of these plants are found in eastern Texas.

M. montana may be distinguished by its 3-toothed second glume, the teeth awned. *M. setifolia*, a somewhat taller plant, with involute blades as much as 12" long, has the branches verticillate. Both are west Texas plants.

Our remaining *Muhlenbergias* have mostly contracted panicles, the branches often narrowly ascending in anthesis.

M. schreberi, known as Nimble Will, and *M. repens*, are straggling plants, the former with a panicle 2-6' long, the glumes very minute and lemma with an awn 1-4 mm. long, and the latter with the panicle usually less than an inch long, mostly included at the base, the lemma pointed or with an awn usually less than 0.5 mm. long. *M. schreberi* has a wide range extending into the eastern states where it is a common weed. In Texas it is usually confined to open woods. *M. utilis* and *M. repens* are similar in aspect, both west Texas plants, the former mostly in rather damp soil, the latter forming a dense sod on the Davis Mountains, west Texas.

M. parviglumis, *M. monticola*, *M. pauciflora* and *M. metcalfei* are west Texas plants, the first three with long awns and the last with a short awn. *M. metcalfei* was collected in the Guadalupe Mountains by the author, being the first specimen of this species collected in Texas.

M. rigens, known as deer-grass, has a long narrow, densely-flowered pale panicle, the branches short. It is found from western Texas to California. *M. fourieriana* and *M. emersleyi* have nearly oblong purplish panicles, the branches of the former usually less than 2.5' long, of the latter usually less than 4' long. *M. fourieriana* is found in the hills north of San Antonio, extending into western Texas, and *M. emersleyi* in the mountains of west Texas and New Mexico. These three species were formerly placed in the genus *Epicampes*. They are rather tall plants with long narrow blades; the spikelets are very variable. The lemma often bears an awn from just below the tip or from between a bifid apex.

PANICLES OPEN, USUALLY PURPLISH.

PLANT ANNUAL—Glumes ciliate; plants commonly not over 15' tall; panicles nearly oblong, half to two-thirds as long as the plant. 1. *M. texana*

PLANTS PERENNIAL. Panicles mostly pyramidal.

PLANTS weakly ascending from a decumbent base or prostrate, diffusely branching throughout. 2. *M. porteri*

PLANTS erect, or sometimes spreading; blades mostly less than 2' long (1-4' in *M. asperifolia*).

Plants from creeping rootstocks. Awn commonly shorter than the lemma or rarely awnless.

Secondary branches of the panicle clustered; blades stiff and spiny-pointed. 3. *M. pungens*

Secondary branches of the panicle usually single, blades neither stiff nor spiny.

Basal blades recurved; plants usually less than 12' tall. 4. *M. torreyi*

Basal blades not recurved; lemma with very short awn or awnless.

Ligule with acute auricles; plants commonly less than 10' tall.

Ligule not auricled; plants commonly 10-16' tall; blades 1-4' long. 5. *M. arenacea*

Ligule not auricled; plants commonly 10-16' tall; blades 1-4' long. 6. *M. asperifolia*

Plants without creeping rootstocks.

Awn 1-4 mm. long; glumes one-third to three-fourths as long as the lemma; pedicels long.

- Blades 2-5' long, involute; plants 1-2 feet tall; panicle green, rarely somewhat purplish; spikelets 3 mm. long. 7. *M. arenicola*
- Blades much longer, mostly involute; plants taller; panicles purplish; spikelets 3.5-4.5 mm. long.
- Plants 2.5-4 feet tall; glumes about three-fourths as long as the lemma, subacute or erose; panicle nearly oblong. 8. *M. involuta*
- Plants 2.5-3 feet tall; panicles narrowly pyramidal. Glumes about one-third as long as the lemma. 9. *M. reverchonii*
- Glumes about half as long as the lemma; awn usually less than 1 mm. long. 10. *M. expansa*
- Awn 2-6 times as long as the lemma.
- Spikelets 4-4.5 mm. long; blades long and mostly involute, 1-3 mm. wide; awn 6-20 mm. long.
- Glumes about one-fourth as long as the lemma, acute or obtuse; panicle reddish-purple, the branches erect or narrowly spreading. 11. *M. rigida*
- Glumes about half as long as the lemma, often short awned. 12. *M. capillaris*
- Spikelets 3-4 mm. long; panicle branches 2-3' long, usually loosely appressed, ascending in anthesis.
- Second glume 3-toothed, the teeth awned; plant commonly about 2' tall; blades 2-3' long. 13. *M. montana*
- Second glume not 3-toothed; glumes one-third to half as long as the lemma; branches of the panicles mostly verticillate; blades 3-17' long, setiform. 14. *M. setifolia*
- PANICLES MORE OR LESS CONTRACTED, NOT DIFFUSE.** Blades usually flat; culms branching. Perennials.
- PLANTS FROM creeping rootstocks.**
- GLUMES** not more than one-fourth as long as the lemma, the first very minute or wanting; culms long and straggling. 15. *M. schrebleri*
- GLUMES** at least half as long as the lemma.
- Glumes half to two-thirds as long as the lemma, usually unequal in *M. brachyphylla*.
- Plants usually erect; glumes broadly ovate.
- Spikelets 1.5-2 mm. long; lemma awnless. 16. *M. sobolifera*
- Spikelets 2-2.5 mm. long (3-4); lemma awned. 16a. *M. sobolifera* var. *setigera*
- Spikelets 3-3.5 mm. long; lemma awned; glumes unequal. 17. *M. brachyphylla*
- Plants often straggling or prostrate, slender; panicle slender, reduced, usually included at the base; glumes lanceolate; lemma mucronate, short-awned or awnless.
- Spikelets 2.8-3 mm. long; glumes about two-thirds as long as the lemma. 18. *M. repens*
- Spikelets 1.5-2 mm. long; glumes about half as long as the lemma. 19. *M. utilis*
- Glumes about as long as the lemma, rarely exceeding it; spikelets 2.5-3.5 mm. long.
- Lemma pubescent at the base.
- Glumes acute or aristate-pointed.
- Lemma awnless. 20. *M. mexicana*
- Lemma with an awn 5-12 mm. long. 21. *M. umbrosa*
- Glumes awned; lemma awned. 22. *M. leucomeni*
- Lemma and callus glabrous, awnless; panicles somewhat glomerate. 23. *M. glabriflora*
- Glumes much exceeding the awnless lemma. Glumes awned; panicle dense and interrupted. 24. *M. racemosa*
- PLANTS NOT from creeping rootstocks.**
- BLADES** short, usually not over 4' long; glumes shorter than the lemma.
- Awn much longer than the lemma. Awn 6-25 mm. long.
- Lemma conspicuously pubescent; glumes nearly as long as the lemma, awned. 25. *M. polycaulis*
- Lemma pubescent at the base.
- Glumes less than one-third as long as the lemma, obtuse, usually erose; spikelets 2.3-3 mm. long. 26. *M. nana*

Glumes half to two-thirds as long as the lemma, acute; spikelets 3-4 mm. long on short stout pedicels; internodes short.

27. *M. monticola*
- Lemma glabrous, callus prominent and glabrous; glumes half to two-thirds as long as the lemma, acute; spikelets 3-3.5 mm. long.
28. *M. pauciflora*
- Awn shorter than the lemma, usually less than 1 mm. long; glumes awned, two-thirds as long as the lemma; panicle usually dense, cylindrical, obtuse; spikelets 3 mm. long. 29. *M. wrightii*
- BLADES** much, exceeding 4' long, mostly very long, usually involute or conduplicate.
- Glumes two-fifths to half as long as the lemma, awn of lemma 1-5 mm. long; panicles long, loose, the branches erect or narrowly ascending.
- Panicle green; spikelets 4-5 mm. long. 30. *M. acuminata*
- Panicle greenish-purple; spikelets 3.5-4 mm. long. 31. *M. metcalfei*
- Glumes as long or nearly as long as the lemma (Nos. 32, 33 and 34 formerly placed in genus *Epicampes*).
- Panicle spikelike, narrow, dense, the short branches floriferous from the base or nearly so; lemma acuminate, mucronate or short-awned. 32. *M. rigens*
- Panicle not spikelike, in anthesis oblong or nearly so; lower sheaths compressed-keeled.
- Panicle branches rarely more than 2.5' long; lemma glabrous or obscurely-pubescent, awnless or with a short awn. 33. *M. fourrieriana*
- Panicle branches rarely over 4' long; lemma villous below, awnless or with an awn 5-15 mm. long. 34. *M. emersleyi*

1. *M. TEXANA* Buckl. (tĕks-ā'nā); *M. buckleyana* Scribn.

Culms 8-17' tall, tufted, slender, spreading, branching below, the internodes glabrous or the lower puberulent; Blades 1-2' long, commonly less than 2 mm. wide, flat or involute, rough; Sheaths longer than the internodes, loose, slightly scabrous; Panicles 4-8' long, or those of the branches shorter, half to two-thirds as long as the culms, open, loose, oblong or narrowly pyramidal, purplish or finally pale; the branches 1-2.5' long, capillary, ascending or spreading, usually solitary and sparingly branching, and spikelet-bearing towards the ends; Spikelets mostly 1.8-2 mm. long, narrowly lanceolate; Glumes acute or awn-pointed, hyaline, 1-nerved; sparingly pubescent or scabrous on the back, ciliate, about half as long as the spikelet, the second slightly longer; Lemma 1.8-2 mm. long, 2-toothed, glabrous or slightly pubescent on the three nerves, midnerve excurrent into a scabrous awn 1.5-2 mm. long; Palea nearly as long as the lemma, thin, acute.

Rocky hills, gravelly bars and river banks, western Texas, New Mexico and Mexico. Fall.

2. *M. PORTERI* Scribn. (pōr'tēr-i); *M. texana* Thurb. not Buckley; MESQUITE GRASS, BUSH-GRASS.

Culms 5-25' tall, sometimes as much as 36' long, often forming large bunches of tangled culms and leaves, diffusely branching, ascending from a prostrate or geniculate-decumbent base, usually growing among isolated thorny shrubs or bushes; Blades 0.8-2.5' long, about 1.5 mm. wide, flat or involute toward the tip, bristly pointed, slightly rough above, soon deciduous; Sheaths shorter than the short internodes, soon spreading; Ligule membranaceous, about 2 mm. long, lacerate-ciliate; Panicles purplish, mostly 2-4' long, terminating the numerous branches, commonly included at the base, the scabrous branches mostly 1-2' long, stiffly ascending or spreading, loosely-flowered, the scabrous pedicels commonly 5-8 mm. long; Spikelets purplish, narrow, exclusive of

the awns 2.5-3.5 mm. long; **Glumes** subequal, linear-lanceolate, half to two-thirds as long as the lemma, 1-nerved, slightly scabrous on the keel, acuminate, acute or more or less erose; **Lemma** 2.5-3.5 mm. long, usually minutely two-toothed, slightly scabrous on the three nerves, sparsely short-pubescent, the scabrous awn 4-10 mm. commonly 4-6 mm. long; **Palea** about equal to its lemma and similar in shape, very sparsely short-pubescent.

Hills, mesas, plains, central Texas west to Arizona and north to Colorado. (Near Dryden, Texas.) July-August.

3. *M. PUNGENS* Thurb. (pūn'jēns); BLOW-OUT GRASS, PURPLE HAIR-GRASS.

Culms 10-24' tall, densely tufted, often in large clumps, erect from a decumbent branching base, rigid, the nodes and internodes from softly to harshly puberulent or more or less woolly at the base, from strong creeping rootstocks; **Blades** mostly 1-2' long, about 1.5 mm. wide or less, involute-setaceous or nearly flat at the base, rigidly ascending, not recurved; **Sheaths** longer than the internodes, the lower very short and the upper very long, crowded at the base, puberulent to glabrous, or the lower covered sheaths softly woolly; **Ligule** a very short membrane, densely ciliate with very fine soft hairs, all less than 1 mm. long; **Panicle** purplish, long-exserted, 3-6', rarely longer, narrowly pyramidal, the slender primary branches mostly 2-2.5' long, ascending or spreading, usually solitary, rather rigid, naked at the base, branched near the base, the branchlets apparently fascicled or numerous branchlets approximate, spreading, the axis, branches and branchlets harshly puberulent, the scabrous capillary pedicels often 10-20 mm. long, enlarged at the apex; **Spikelets** 3-4.5 mm. long; **Glumes** half to two-thirds as long as the lemma, acuminate, often 2-toothed or awn-pointed, scabrous especially on the keel; **Lemma** scabrous, bristle-pointed or with an awn shorter than the body, usually 1-2 mm. long; **Palea** about as long as the lemma, with two bristle-pointed teeth or short awns.

Sand hills and bad lands, Texas to Utah, and to Colorado and Nebraska. Summer-fall.

4. *M. TORREYI* (Kunth) Hitchc. (tōr'i-i); *M. gracillima* Torr.; BANG GRASS.

Culms 4-12 rarely 20' tall, densely tufted, erect or decumbent at the base, simple, slender but rigid; **Blades** mostly crowded at the base, recurved, only 2-3 to the culm, erect, mostly 2-36 mm. long, rarely longer, involute-filiform, setaceous, smooth or slightly rough; **Sheaths** longer than the internodes; **Ligule** membranaceous, 4-6 mm. long; **Panicles** 2-9' commonly 3-6' long, exserted, finally open, purplish, the slender branches mostly single, usually 1-2.5' long rarely 3.5' long, ascending or finally widely spreading, naked below, the branchlets short, solitary and few, commonly 1-3 spikelets to a branchlet, the scabrous capillary pedicels 3-6 mm. long or the terminal longer, enlarged at the apex; **Spikelets** exclusive of the awn 2-3.5 mm. long; **Glumes** unequal, the second slightly longer, half to two-thirds as long as the lemma, acute or awn-pointed, slightly scabrous; **Lemma** scabrous especially toward the apex, a scabrous awn commonly 2-4 mm. long from between the minutely bifid apex; **Palea** about as long as the lemma, usually minutely 2-toothed. (Two photographs.)

On prairies, mesas, rocky hills and mountains, Texas to Arizona, Colorado and Kansas. (High plains and mountains about 35 miles east of El Paso on the Carlsbad Road.) September-October.

5. *M. ARENACEA* (Buckl.) Hitchc. (ār-ē-nā'sē-ā); *Sporobolus arenaceus* Buckl.; *Sporobolus auriculatus* Vasey.

Culms 5-12' commonly about 8' tall, slender but rather rigidly erect or ascending, often scabrous, freely branching below, from long scaly rootstocks; **Blades** 10-30 mm. long, those of the culm sometimes longer, 2 mm. wide or less, flat, soon involute when dry, the cartilaginous margins and both surfaces rough; **Sheaths** longer than the short internodes, or the second one from above shorter, smooth to rough; **Ligule** membranaceous, fimbriate, less than 0.5 mm. long, the acute auricles two or three times as long as the ligule proper; **Panicles** purplish, diffuse, commonly included at the base or finally exserted, 2-4' mostly less than 3' long, open, ovate to pyramidal, thin, the scabrous capillary branches mostly single or in pairs, 1-2.5' long, ascending or spreading or sometimes reflexed, naked at the base, bearing 1-3 spikelets at the end of the branches or short branchlets, the scabrous pedicels ascending or spreading, commonly 1-4 times as long as the spikelets; **Spikelets** rarely 2-flowered, commonly 2-2.3 mm. long rarely 3 mm. long, lanceolate; **Glumes** 1-nerved, more or less scabrous on the nerve, subequal, about 1 mm. long or scarcely one-half as long as the spikelet, acute or sometimes erose; **Lemma** obtuse, 3-nerved, 2-toothed, the midnerve often extending into a straight awn usually less than 1 mm. long, glabrous, or a few hairs at the base; **Palea** about as long as its lemma.

Plains among the hills and mountains of West Texas to Arizona and south into Mexico. (Mostly west of Del Rio, Sonora, Big Spring.) Summer-fall.

6. *M. ASPERIFOLIA* (Nees & Meyen) Parodi (ās-pēr-i-fō'li-ā); *Sporobolus asperifolius* (Nees & Meyen) Nees; ROUGH-LEAVED DROP-GRASS.

Culms 4-24' tall, tufted or in large patches or colonies, erect or ascending from a decumbent base, slender, rather weak, flattened, branching below, from slender creeping rootstocks; **Blades** 0.5-4' long, the upper usually longer, 1-2.5 mm. wide, flat or involute toward the tip, erect or ascending, very rough on the margins and upper surface; **Sheaths**, the upper shorter or about as long as the internodes, the lower short and crowded, flattened; **Ligule** firm, truncate, 0.5-1 mm. long; **Panicles** purplish, 2.5-9' long, usually more than half as wide, often included at the base, ovate to pyramidal, the branches, branchlets and pedicels scabrous, the capillary branches rather stiffly ascending or spreading, solitary or in twos or threes, the lower 2 to 4.5' long, naked at the base, branching nearly to the base, the branchlets mostly 1-2' long, with a few scattered spikelets at the end of the branchlets, the pedicels mostly 10-20 mm. long; **Spikelets** 1.5-2 mm. rarely 2.3 mm. long (sometimes 2-3-flowered; the glumes and lemma vary much as to length); **Glumes** subequal, from one-third to nearly as long as the lemma, acute, often bristly-pointed, thin, scabrous on the keel; **Lemma** acute or subacute, sometimes with a mucro or short-awn, minutely scabrous; **Palea** nearly as long as the lemma, 2-toothed.

In damp soil, west Texas to Mexico, north to Colorado and Missouri (Guiz Canyon, Ft. Davis-Alpine Road.) Summer-fall.

7. *M. ARENICOLA* Buckl. (är-ën-i-kō'lá).

Culms 1-2.5 feet tall, tufted, erect or ascending, branching, slender, rough, glabrous or puberulent at and near the nodes; **Blades** 2-5' long, those of the culm shorter than those of the sterile shoots, 1 mm. wide or less, involute, not curved, erect, scabrous; **Sheaths** shorter than the internodes, rough to smooth; **Ligule** membranaceous, 4-6 mm. long, decurrent; **Panicle** 6-15' long, short-exserted or sometimes included at the base, pale-green or sometimes purplish, 6-15' long, often half as long as the culm, usually narrowly open, sometimes pyramidal, usually somewhat nodding, the axis and branches scabrous, the branches mostly solitary, sometimes subverticillate, naked at the base, slender, rather distant, 2-4' rarely 6' long, the branches usually ascending, rarely widely spreading, the branchlets loosely appressed; **Spikelets** exclusive of the awn 3 mm. long, on slender scabrous pedicels usually about as long as the spikelet or the terminal much longer; **Glumes** subequal, half to two-thirds as long as the lemma, acuminate, awn-pointed, scabrous on the nerve, otherwise smooth or scabrous; **Lemma** sparsely scabrous, sparsely ciliate and a few hairs at the base or glabrous, the awn 1-3 mm. long; **Palea** about as long as the lemma.

Plains, mesas and foothills, central Texas west to Arizona. (Abilene and Van Horn, Texas.) Late summer-fall.

8. *M. INVOLUTA* Swallen (in-vō-lū'tá).

Culms 2-5 feet tall, tufted, often densely so, simple, comparatively slender but rigid, minutely strigose below the panicles, growing mostly in isolated tufts; **Blades** 1-14' long, the upper short, the lower long, about 1 mm. wide when folded, mostly involute, wiry, with a long narrow point, rough; **Sheaths** longer than the internodes, compressed-keeled, the junction of the blades and sheaths obscure, rough; **Ligule** membranaceous, fragile, about 12 mm. long; **Panicle** exserted or slightly included at the base, purple, erect or nodding, 8-18' long, oblong, when open 2-3' wide, the axis, branches and pedicels scabrous, the slender branches 2-3.5' mostly 2' long, narrowly ascending to narrowly spreading, 1-5 at a node, naked at the base, somewhat distant, the short and almost appressed branchlets with a few spikelets, the pedicels enlarged at the apex, shorter than to as long as the spikelet, terminal as much as 10 mm. long; **Spikelets** exclusive of the awn 3-4.5 mm. long, narrow, lanceolate; **Glumes** three-fourths to nearly as long as the lemma, the second slightly longer than the first, minutely scabrous, entire, erose or toothed at the obtuse apex; **Lemma** 3-nerved, minutely scabrous, acuminate, more or less pubescent at the base at or near the margins, the minutely toothed apex awned from just below the teeth, the awn slender, 1.5-2 mm. long, sometimes longer; **Palea** about as long as the lemma, minutely scabrous toward the apex. (A new species first collected by the author.)

Rocky hillsides and draws, in the hills northeast, north and northwest of San Antonio, Texas. (Bandera, Boerne, Johnson City and north of New Braunfels, Texas.) Fall.

9. *M. REVERCHONI* Vasey & Scribn. (rěv-ěr-shō'nī).

Culms 1-3 feet tall, densely tufted, erect or spreading, slender, scabrous below the panicle; **Blades** 2-10' long, the upper short, mostly involute, 1-1.5 mm. wide when folded, acuminate into long slender points, slightly scabrous; **Sheaths** longer than the internodes, close; **Ligule** membranaceous, 4-6 mm. long, fragile; **Panicle** 6-14' mostly about 10' long,

oblong-pyramidal, exserted or included at the base, axis scabrous, branches ascending or spreading, 5' or less long, naked at the base, mostly single, the scabrous capillary branchlets 1-2' long, divaricate, with 1-8 spikelets, on capillary divergent pedicels, enlarged at apex, scabrous, 1-3 times as long as the spikelets; **Spikelets** exclusive of awn 3-5 mm. long, narrow, acuminate; **Glumes** commonly half to two-thirds as long as the spikelet, the second slightly longer, 1-nerved, obtuse, erose or toothed, pale; **Lemma** acuminate, pubescent at the base, scabrous, especially toward the apex, straw-colored, with a scabrous awn, straight, 0.5-4.5 mm. long, commonly 2-4 mm. long or awnless; **Palea** about as long as its lemma, scabrous, narrow.

Rocky hillsides western Texas, more common and with a wider range than *M. involuta*. Fall.

10. *M. EXPANSA* (Poir.) Trin. (ěks-păn'sá); *M. trichopodes* (Ell.) Chapm.

Culms 2-3.5 feet tall, erect or spreading, often in large dense clumps with a fibrous mass at the base (old shredded sheaths, the tough nerves persisting in this fibrous mass after the balance of the sheath has rotted away); **Blades** 1.5-17' long, the upper short, the lower and basal blades long, 1-2.5 mm. wide, mostly flat or folded somewhat at the base, rather wiry and stiff, erect or the lower spreading, commonly rough near the base; **Sheaths** longer than the internodes, loose, smooth or slightly rough; **Ligule** 2-3 mm. long, firm, wider than the blade; **Panicles** purplish, 4-18' long, finally open and exserted, narrowly pyramidal, nodding, the axis, capillary branches, branchlets and pedicels scabrous, the branches as long as 3.5', ascending or spreading, usually solitary, branching to or near the naked base, the branchlets as much as 2' long, with a few scattered spikelets on pedicels 5-12 mm. long, rarely longer, the pedicels enlarged at the apex; **Spikelets** 3.5-4.5 mm. long, lanceolate, purplish, the glumes soon turning pale; **Glumes** subequal, the first about half as long as the lemma, the second slightly longer, acute or awn-pointed, scabrous on the keel toward the apex; **Lemma** lanceolate, acuminate, with a scabrous awn 0.5-1 mm. rarely 2 mm. long, 3-nerved, the nerves prominent, scabrous especially toward the apex, pubescent at or near the base; **Palea** often slightly longer than the lemma, pointed, scabrous, with appressed hairs between the nerves.

In sandy open pine lands, Texas to Florida, north to North Carolina. (About 4 miles south of Buna, Texas.) Summer-fall.

11. *M. RIGIDA* (H. B. K.) Kunth (rij'i-dá); *M. berlandieri* Trin.

Culms 1.5-3 feet tall, densely tufted, erect, somewhat rigid, simple or branching at the base; **Blades** 1.5-10' long, the upper short, 1.5-3 mm. wide, mostly involute, erect, rather rigid, margins and upper surface rough, nerves prominent; **Sheaths** longer than the internodes with auricles 2-5 mm. long; **Ligule** membranaceous, firm, 3-5 mm. long, wider than the blade, decurrent; **Panicles** dark-purple, narrowly pyramidal, finally exserted, 4-13' long, nearly half as wide, erect or sometimes nodding, the axis scabrous, the capillary branches as much as 5' long, solitary or several to a node, ascending or narrowly spreading, the lower as much as 2' distant, naked below, the few branchlets on the upper half bearing a few spikelets, the pedicels 2-9 mm. long; **Spikelets** exclusive of the awn, 4-4.5 mm. long, lanceolate, purple; **Glumes** about one-fourth as long as the spikelet, 1-nerved or nerveless, acute or obtuse, often erose; **Lemma** scabrous, 2-toothed, a pencil tuft of hairs on each side of the callus, the

hairs about 0.5 mm. long, the three nerves prominent, the midnerve produced into a purplish flexuous awn 10-20 mm. long; **Palea** about as long as the lemma, scabrous.

Rocky mountains, western Texas and New Mexico, extending south into Mexico. (On Scenic Drive about 16 miles west of Fort Davis, altitude about 7,000 feet.) Fall.

12. *M. CAPILLARIS* (Lam.) Trin. (kăp-i-lăr'is); LONG-AWNED HAIR-GRASS.

Culms 2-4 feet commonly 2-3 feet tall, in small or very large tufts, simple above the base, erect, wiry, smooth or nearly so; **Blades** 4-16' long, involute and subcylindric, about 1 mm. in diameter, 2-3 mm. when spread out, rigid, pungent pointed; **Sheaths**, the upper long and often sheathing the base of the panicle, the lower short, overlapping; **Ligule** membranaceous, about 4 mm. long; **Panicle** purple, 6-20' long, exserted or included at the base, ovate-oblong to widely pyramidal, finally diffuse, the axis slightly rough, the lower capillary branches 4-7' long, mostly in ones or twos, naked at the base, ascending or spreading, the capillary pedicels clavate-thickened at the apex, mostly 15-30 mm. long; **Spikelets** exclusive of the awns about 4 mm. long, lanceolate, acute, purple; **Glumes** unequal, commonly one-half as long as the spikelet, slightly scabrous, the first acute or short-awned, the second awned, the awn sometimes as much as 2 mm. long; **Lemma** exclusive of awn about 4 mm. long, linear-lanceolate, 3-nerved, somewhat scabrous, glabrous except for a tuft of hairs below, scabrous awn 6-18 mm. long; **Palea** about as long as its lemma, acute, narrow.

In dry sandy soil or pine lands, Texas to Oklahoma, east to Florida, north to Missouri and Massachusetts. Fall.

13. *M. MONTANA* (Nutt.) Hitchc. (mön-tăn'ä); *M. gracilis* of authors, not Kunth; *M. trifida* Hack.

Culms commonly 12-24' rarely 32' tall, tufted, rather rigidly erect, unbranched above, from a very short rootstock; **Blades** 2-6' long, rarely longer, 1-2.5 mm. wide, flat or usually involute above, commonly rough, erect; **Sheaths** longer than the internodes, crowded below, loose; **Ligule** membranaceous, broader than the blades at the base, decurrent, 7-10 mm. long or more, fragile; **Panicles** long-exserted or sheathed below, 2-7' long, erect or nearly so, the branches usually solitary and rather distant, erect or nearly so, or at anthesis ascending, commonly 2' long or less, rarely 3.5', the scabrous branchlets crowded with spikelets on scabrous short pedicels; **Spikelets** exclusive of the awns 3.5-4 mm. long, lanceolate; **Glumes** half to two-thirds as long as the lemma more or less scabrous, the first lanceolate, acuminate, aristate, 1-nerved, the second slightly longer, the three nerves produced into aristate-points or short awns; **Lemma** 3-nerved, the lateral nerves marginal and obscure, more or less pubescent below and ciliate on the margins, tapering into a scabrous flexuous awn (not twisted) 4-13 mm. long; **Palea** slightly shorter than the lemma, pubescent below.

Canyons, mesas and rocky hills 6,500-10,000 feet; west Texas to Mexico and north to Colorado and Montana, Utah, and California. Late summer-fall.

14. *M. SETIFOLIA* Vasey (sēt-i-fō'li-ä).

Culms 20-30' tall, erect, rather rigid, simple, somewhat scabrous below the nodes; **Blades** 2.5-12' long, strongly rooted tufts, rather pale; **Blades** 2.5-12' long,

1.5 mm. wide or less, involute or conduplicate at the base, very narrow, with filiform tip, setiform, slightly scabrous, often curved, the basal numerous, longer than the upper; **Sheaths** mostly longer than or about as long as the internodes; **Ligule** membranaceous, 4-8 mm. long, decurrent; **Panicles** 4-8' long, usually exserted, erect or somewhat flexuous and nodding, loose, interrupted, somewhat open, nearly oblong, the branches solitary or a few approximate, appressed or ascending, often branched and naked at the base, 2.5-3' long or less; **Spikelets** 4-6 mm. long on rather long, scabrous, capillary pedicels, about twice as long as the spikelet, enlarged at the hispidulous summit; **Glumes** 1-nerved, or the second 3-nerved, one-third to half as long as the lemma, the second usually slightly longer, broad, often mucronate at the acute or erose apex, more or less scabrous, **Lemma** 3-nerved, scabrous toward the apex, the callus glabrous or sparsely pubescent, with a fine flexuous, scabrous awn produced from between two minute teeth, the awn 10-25 mm. long; **Palea** about as long as its lemma, scabrous toward the apex.

Rocky banks and foothills, mountains of western Texas. (Hueco Mountains 15 miles north of Van Horn, Sanderson, Sheffield, Texas.) Fall.

15. *M. SCHREBERI* Gmel. (shrë'bër-i); *M. diffusa* Willd.; NIMBLE WILL, SATIN-GRASS.

Culms 12-36' sometimes taller, creeping erect or ascending from a decumbent or prostrate base, often rooting at the nodes, very delicate, slender, diffusely branching; **Blades** 1.5-3.5' long, 1-4 mm. wide, flat, thin, slightly narrowed toward the base, spreading or ascending, rough; **Sheaths** shorter than the internodes, loose; **Ligule** membranaceous, fringed, very short; **Panicle** 2-6' long, finally exserted, slender, somewhat lax, its erect or appressed branches commonly 1-2' long, slender, interrupted, the axillary panicles usually included at the base; **Spikelets** exclusive of the awns about 2 mm. long, narrow, appressed, on short scabrous pedicels commonly 1-2 mm. long; **Glumes** minute, pale, the lower often almost obsolete, the second minute, truncate, less than one-fourth as long as the lemma, **Lemma** exclusive of the awn about 1.9 mm. long, lanceolate, 3-nerved, sparsely hairy below, very scabrous, especially on the nerves and margins, tapering into a slender scabrous straight awn 1-4 mm. long; **Palea** nearly as long as its lemma, acute, lanceolate.

Damp shady places in woods and waste places, Maine to Minnesota and south to Florida and Texas. (Open woods, San Antonio and Angleton, Texas.) Summer-fall.

16. *M. SOBOLIFERA* (Muhl.) Trin. (sō-bō-lif'ër-ä); ROCK MUHLENBERGIA, ROCK DROPSIDE.

Culms 2-3 feet tall, erect or ascending, slender, commonly branching, scabrous below the glabrous nodes, leafy towards the summit, from scaly rootstocks; **Blades** of the culm 4-6' long, 3-6 mm. wide, of the branches 1-3' long 1-4 mm. wide, narrowed toward the base, flat, rough; **Sheaths** shorter than the internodes or those of the branches crowded and overlapping; **Ligule** a short membrane, truncate; **Panicles** 3-8' long, very slender, finally exserted, those of the branches usually shorter, the slender branches distant their own length below, overlapping above, 0.5-2' long, solitary or an extra shorter branch flowering to the base, appressed or narrowly ascending, the spikelets on short scabrous pedicels; **Spikelets** 2-2.5 mm. commonly about 2 mm. long, narrowly lanceolate; **Glumes** subequal, 1-1.7 mm. long, half to three-fourths as long as the lemma, the

second usually slightly longer, acute or abruptly cuspidate, scabrous especially on the keel; **Lemma** 3-nerved, obtuse, the midnerve produced into a short point, thinly pubescent on the lower half, scabrous above.

Rocky woods, Texas, Oklahoma, Iowa, Arkansas, Tennessee, Virginia, New Hampshire to Minnesota. Fall.

16a. *M. SOBOLIFERA* var. *SETIGERA* Scribn. (sê-tij'ër-à); **SLENDER SATIN-GRASS.**

Culms 2-3 feet tall, slender, simple or branching, erect, leafy throughout (branching more freely in the later stages); **Blades** 2-5' (2-7') long, 2-7 mm. wide, flat, narrowed toward the base, acuminate, rough; **Sheaths** mostly shorter than the internodes; **Ligule** short and truncate; **Panicle** 2.5-8' (2.5-16') long, very slender, loosely-flowered, the slender branches appressed, solitary or in pairs, one of the pair shorter, 1-3.5' long; **Spikelets** 2-2.5 mm. (3-4) long on scabrous pedicels 1-2 mm. long; **Glumes** 1-2 mm. long, subequal, two-thirds to as long as the lemma, abruptly acuminate, scabrous, the first very broad; **Lemma** 1.5-2.3 mm. (2.5-3.5 mm.) long, pubescent below, tapering into an awn 2-6 mm. long (2-4 times its length).

In dry rocky woods, Texas and Alabama, Massachusetts to Minnesota. (Dallas, Texas.) Summer-fall.

17. *M. BRACHYPHYLLA* Bush (bräk-i-fil'ä).

Culms 20' tall more or less, erect or ascending from a decumbent base, leafy, freely branching at the middle nodes, mostly glabrous below the nodes, from scaly rootstocks; **Blades** mostly 1.5-4' long, 2-7 mm. wide, the lower shorter than the upper, flat, rough; **Sheaths** mostly shorter than the internodes; **Ligule** membranaceous, about 1 mm. long; **Panicles** numerous on main culm and branches, 2-4' long more or less, often included at the base, slender, more loosely-flowered than *M. umbrosa*, the slender branches mostly appressed; **Spikelets** exclusive of the awn 3-3.5 mm. long, narrowly lanceolate; **Glumes** subequal, the second about two-thirds as long as the lemma, the first usually slightly shorter, acute, scabrous on the keel; **Lemma** hairy for about one-third the distance from the base, the hairs less than 1 mm. long, glabrous to minutely hispidulous above, 3-nerved; **Awn** 1.5-8 mm. long; **Palea** somewhat shorter than the lemma.

This plant somewhat resembles *M. sobolifera* or a loosely-flowered *M. umbrosa*. It is shown with *M. umbrosa*.

Low woods, Indiana to Nebraska, south to central Texas. (Near Fort Worth.) Late summer-fall.

18. *M. REPENS* (Presl) Hitchc. (rê'pëns).

Culms 2-20' tall or long, erect or commonly prostrate or straggling, with erect or ascending branches, freely branching, slender, in dense patches or forming a continuous turf, from long rootstocks; **Blades** 6-50 mm. long, those of the main culm as much as 2' long and 2 mm. wide or less, flat toward the base, those of the branches usually shorter, mostly involute and about 0.5 mm. thick, sharp-pointed, often recurved, smooth or minutely scabrous; **Sheaths** commonly longer than the internodes, sometimes shorter, crowded, loose; **Ligule** membranaceous, about 1 mm. long; **Panicles** narrow, erect, 5-50 mm. long, the terminal usually longer than the numerous panicles of the branches, commonly less than 1' long, included at the base, light lead-color, the very short branches appressed or narrowly ascending, the scabrous pedicels 1-3 mm. long; **Spikelets** 2.8-3 mm. long, lanceolate; **Glumes** about two-thirds as long as the lemma, the first

pointed, rarely obtuse, scabrous toward the tip, 1-nerved, or the first with an extra nerve on each side, pale; **Lemma** slightly longer than the acute palea, sharp-pointed to short-awned, the awn usually less than 0.5 mm. long, 3-nerved, the lateral nerves obscure, scabrous toward the apex.

Dry or moist soil; western Texas to Arizona. (Ft. Davis, Texas.) Fall.

19. *M. UTILIS* (Torr.) Hitchc. (ü'til-is); *Vilfa utilis* Torr.; *Sporobolus utilis* (Torr.) Scribn.; **APAREJO GRASS.**

Culms commonly 6-12' sometimes as much as 36' tall, the short and isolated plants usually somewhat tufted and erect, those of dense colonies or patches usually more or less prostrate, or the taller plants straggling, slender, freely branching from slender rootstocks; **Blades** numerous, stiffly ascending to recurved, 10-40 mm. commonly 10-20 mm. long, mostly involute, when folded about 0.3 mm. thick; **Sheaths** of the culm mostly shorter than the internodes, of the branches mostly longer, smooth or slightly scabrous, the collar white; **Ligule** membranaceous, about 1 mm. long; **Panicle** spike-like, terminal and axillary, 10-30 mm. commonly 10-15 mm. long, interrupted below, included at the base, slender, the short branches appressed, usually with 2-3 spikelets, the spikelets on short pedicels about 1.5 mm. long; **Spikelets** 1.5-2 mm. long, pale; **Glumes** subequal, about half as long as the lemma, acute or subacute, sometimes erose, the first slightly and minutely scabrous toward the apex; **Lemma** lanceolate, acute, with three green nerves or the lateral obsolete, entire or mucronate; **Palea** slightly shorter than the lemma, minutely scabrous on the keels.

In rather moist soil Texas to southern California, south into Mexico. (Comfort, Texas.) Spring.

20. *M. MEXICANA* (L.) Trin. (mëks-i-kä'nä).

Culms 6-25' (6-40') tall, slender, erect or decumbent, sometimes prostrate, plants top-heavy, rooting at the lower nodes, from long scaly rootstocks, glabrous below the nodes; **Blades** 2-6' long, 2-6 mm. wide, those of the branches smaller, flat, rough; **Sheaths**, the uppermost of the branches crowded and overlapping, the lower usually shorter than the internodes, smooth or slightly rough; **Ligule** a short membrane; **Panicles** numerous, 2-6' long, contracted, those of the culm and especially those of the branches often included at the base, its branches 1-2' long, rather spikelike, erect or appressed, rarely ascending, the spikelets appressed, crowded, on short scabrous pedicels; **Spikelets** 2.5-3 mm. or including the short awn sometimes 4 mm. long; **Glumes** subequal, about as long as the lemma, subulate, acuminate or short-awned, scabrous, especially on the keel; **Lemma** acuminate, awnless or short-awned, 3-nerved, scabrous, especially toward the apex, sparsely pilose at the base and very sparsely so a short distance above the base. The glumes and lemma vary much relatively as to length and as to being awnless or short-awned.

In swamps, thickets and borders of fields; Texas to Oklahoma and Colorado, Montana, Nebraska, Tennessee, Canada. Summer-fall.

21. *M. UMBROSA* Scribn. (üm-brö'sä); *M. sylvatica* Torr.; **WOODLAND DROPS-EED.**

Culms 1-3 feet tall, erect or ascending, freely branching, leafy, minutely strigose below the nodes, from scaly rootstocks resembling *M. mexicana* in habit; **Blades** 2-7' long, 2-6 mm. wide, flat, rough; **Sheaths** mostly shorter than the internodes, or those of the branches overlapping,

Panicle green, not compactly flowered; exerted or commonly included at the base, linear, numerous, from main culm and branches, 2.5-7' long, rather lax, the slender branches erect or narrowly ascending, 1-2' rarely 3' long; **Spikelets** 2.5-3 mm. long, narrowly lanceolate, **Glumes** equal or the lower slightly shorter, 2-2.5 mm. long, about equal to the scabrous lemma, acuminate, often aristate, or awn-pointed, scabrous; **Lemma** rough, acuminate, the hairs at base about 1 mm. long, appressed, awn slender, 5-12 mm. long; **Palea** about as long as the lemma, acuminate, scabrous on the nerves.

In moist woods and along streams. Texas, Arizona, Oklahoma, North Carolina, north to South Dakota and New Brunswick. Summer-fall.

22. *M. LEMMONI* Scribn. (lēm'ō-nī).

Culms 1-2 feet tall, usually low, often decumbent, freely branching, leafy throughout, from creeping rootstocks; **Blades** commonly 1.5-4' long, 1.5-2.5 mm. wide, flat, soon involute, erect, numerous; **Sheaths** longer than the internodes; **Ligule** membranaceous, about 1 mm. long, fringed; **Panicles** 2-6' long, exerted or included at the base, narrow, interrupted, the branches appressed or narrowly ascending, in ones to threes, unequal, commonly about 1-2' long, the spikelets crowded on pubescent pedicels about 1 mm. long; **Spikelets** exclusive of the awns 3-3.5 mm. long; **Glumes** equal, acute, prominently keeled, scabrous on the keel, 2.5-3.5 mm. or including the awn sometimes 5 mm. long; **Lemma** excluding the awn 2.5-3 mm. long, strongly 3-nerved, 2-toothed, linear, scabrous toward the apex, pubescent on the lower half, the callus hairs conspicuous, the awn 1-3 mm. long, rarely longer; **Palea** about equal to its lemma, pubescent below the middle.

Mountains, western Texas to Arizona and Mexico. (Fowlkes Ranch, Black Mountains, Texas.) Summer-fall.

23. *M. GLABRIFLORA* Scribn. (glā-brī-flō'rā).

Culms 12-25' tall, slender, erect or decumbent and spreading, freely branching, minutely strigose below the nodes, in habit resembling *M. mexicana*; **Blades** 0.5-3.5' long, 1-4 mm. wide, flat, rough; **Sheaths** shorter than the internodes; **Ligule** very short; **Panicles** commonly purple, shorter and narrower than in *M. mexicana*, terminal and those of the several branches often included at the base, more or less glomerate, the branches racemose like, 1-2' long, appressed or ascending; **Spikelets** 2.5-3.5 mm. long, somewhat crowded, on short scabrous pedicels; **Glumes** usually purple, 2-3.5 mm. long, subequal, the second usually slightly longer, acuminate, often awn-pointed, scabrous toward the tip, the length of the glume varying much on the same panicle; **Lemma** awnless, 2.5-3 mm. long, 3-nerved, strongly nerved, scabrous toward the apex, callus and base glabrous; **Palea** about equal to the lemma.

Rich woods, Dallas, Texas. Fall.

24. *M. RACEMOSA* (Michx.) B. S. P. (rā-sē-mō'sā); *M. glomerata* Trin.; SATIN-GRASS.

Culms 1-3 feet tall, erect, simple or branching, smooth or rough below the panicles and the nodes, from stout, scaly rootstocks; **Blades** 2-5' long, 2-6 mm. wide, rough; **Sheaths** shorter than the internodes, or those of the branches crowded and overlapping; **Ligule** 1 mm. long, erose-truncate; **Panicle** 2-5' long, usually exerted, dense and interrupted, erect or slightly nodding, the branches rather distant, overlapping, the spikelets crowded on short branchlets at the base (appearing to be branches),

short extra branches, appressed or narrowly ascending, commonly 12-25 mm. long, the spikelets densely crowded, subsessile; **Spikelets** 4-6 mm. long; **Glumes** including the awns 4-6 mm. long, acuminate, scabrous on the keel, otherwise smooth to scabrous; **Lemma** half to two-thirds as long as the glumes, acuminate, the three nerves prominent, the midnerve produced into a short point, pubescent toward the base, scabrous above; **Palea** nearly equal to the lemma.

This plant has not been found in Texas, but it has been collected in New Mexico and may appear in western Texas.

In wet places (often in open woods), New Mexico, Oklahoma, Maryland and north. Summer-fall.

25. *M. POLYCAULIS* Scribn. (pōl-i-kō'līs).

Culms 12-20' tall, numerous, wiry, decumbent and scaly at the base, from a firm crown; **Blades** mostly less than 2' long, about 1 mm. wide, mostly flat; **Panicle** narrow, contracted, 1-3' long, interrupted; **Spikelets** excluding the awn 2.5-3 mm. long; **Glumes** a little shorter than the lemma, tapering into a short slender awn, more or less ciliate on the keel, or scabrous toward the apex; **Lemma** tapering into a delicate awn 5-20 mm. long, conspicuously pilose, especially below. (Drawings on photograph of *M. monticola*.) Shaded ledge and grassy slopes; western Texas to southern Arizona and central Mexico. Fall.

26. *M. PARVIGLUMIS* Vasey (pär-vī-glū'mīs).

Culms 12-28' tall, tufted, erect, slender, freely branching throughout with the habit of *M. monticola*; **Blades** 1.5-4' long, 2 mm. wide or less, erect, flat or closely involute, smooth or slightly rough; **Sheaths** usually shorter than the internodes, or the lower longer, loose, the branches pushing them from the culm, smooth to slightly rough; **Ligule** about 2.5 mm. long, membranaceous, fragile; **Panicles** partly enclosed at the base, erect or slightly nodding, flexuous, greenish-gray, 4-7' long, the capillary branches solitary or the lower in twos, erect or appressed, subdivided and flowering to the base, the appressed spikelets on short branchlets, the scabrous pedicels 1-3 mm. long; **Spikelets** 2.3-3 mm. long; **Glumes** about equal, 0.5-0.8 mm. long or about one-fourth as long as the spikelet, obtuse or subacute, erose; **Lemma** 2.2-2.9 mm. long, linear-lanceolate, 3-nerved, scabrous on the nerves and toward the apex, 2-toothed, appressed-pubescent on the margin below, the straight slightly scabrous awn 20-25 mm. (20-40) long, from just below the acute bifid apex; **Palea** nearly as long as the lemma, scabrous on the keels.

Rocky hills or mountains, western Texas to Mexico. (Guadalupe Mountains. Fall.

27. *M. MONTICOLA* Buckl. (mōn-tī-kō'lā).

Culms 6-30' commonly about 20' tall, tufted, erect or ascending from a decumbent base, wiry, internodes short, freely branching, rather slender and weak; **Blades** 1-4' long, the upper longer than the lower, 2 mm. wide or less, flat or involute especially toward the tip, erect, smooth or rough on the upper surface; **Sheaths** shorter than the internodes, the lower spread open by the branches, smooth or slightly rough; **Ligule** usually membranaceous, 2-3 mm. long, lacerate; **Panicles** numerous, 1.5-8' long, usually exerted or the axillary shorter and included at the base, erect or slightly nodding, rather loose, the branches mostly single, 10-40 mm. long, with short branchlets at the base (appearing to be branches),

spikelet-bearing to the base, erect or ascending, the crowded spikelets subsessile or on stout scabrous pedicels 1-4 mm. long; **Spikelets** excluding the awns 3-4 mm. long; **Glumes** subequal or unequal, half to two-thirds the length of the lemma, the second often slightly longer, acute, often minutely toothed, or erose, thin, scabrous on the body and prominent nerve toward the apex; **Lemma** lanceolate, acuminate, the three green nerves prominent, pubescent at the base, scabrous especially toward the base, the scabrous flexuous awn 8-15 mm. rarely 20 mm. long; **Palea** about as long as the lemma, somewhat pubescent toward the base.

Mesas and foothills, western Texas to Arizona. (Marfa road 12 miles west of Alpine, Texas.) Fall.

28. *M. PAUCIFLORA* Buckl. (pô-sî-flô'ra).

Culms 12-20' tall, tufted, erect or spreading, wiry, scabrous, branching, especially toward the base; **Blades** 1.5-5' long, 1 mm. wide or less, the lower short, involute, setaceous; **Sheaths** mostly shorter than the internodes, some of them crowded off by the branches, rough; **Ligule** membranaceous, about 1 mm. long, lacerate, fragile; **Panicles** narrow, 1.5-4.5' long, included at the base or exserted, interrupted below, flexuous, the branches usually solitary, erect or appressed, the longest about 25 mm. long, closely-flowered to the base, the spikelets on scabrous and rather stout pedicels 0.5-1.5 mm. long; **Spikelets** exclusive of the awn 3-3.5 mm. (3-4) long; **Glumes** often awn-pointed, scabrous on the keel, the first 1.1-2 mm. long, the second 2-2.5 mm. long; **Lemma** 3-3.5 mm. long, lanceolate, acuminate, purplish, scabrous on the three nerves, the callus glabrous and prominent, the midnerve produced into a scabrous straight awn 6-13 mm. long; **Palea** about as long as its lemma, scabrous on the keels.

Mountains and rocky hills, western Texas to Arizona and south to Mexico, also north to Colorado. (Guadalupe Mountains.) Fall

29. *M. WRIGHTII* Vasey (rit'i-i). Not yet collected in Texas.

Culms 1-2.5 commonly about 1.5 feet tall, erect or decumbent at the base, often densely tufted, firm, somewhat flattened, more or less rough, from short rootstocks; **Blades** 3-5' long, 2 mm. wide or less, flat at the base, with filiform involute tips, rigid, rough above; **Sheaths** shorter than the internodes, or the lower overlapping, keeled; **Ligule** 0.5-1.5 mm. long, membranaceous, almost truncate; **Panicles** erect, 2-5' rarely 7' long, obtuse, usually dense and spikelike, cylindric, 2-8 mm. thick, usually dense, or sometimes the branches distant and slender and more or less interrupted, the axis scabrous; the branches mostly 10-20 mm. rarely 35 mm. long, usually appressed or narrowly ascending, spikelike, densely flowered, the spikelets on short scabrous pedicels; **Spikelets** sometimes 2-flowered, 3 mm. long; **Glumes** subequal, ovate but awn-pointed or short awned, two-thirds to as long as the lemma, 1-nerved, scabrous on the nerve toward the apex; **Lemma** awn-pointed or with an awn about 0.5 mm. long, or sometimes 1 mm. long, scabrous toward the apex, sparsely short-pubescent below; **Palea** about as long as the lemma.

This species has not been collected in Texas, but has been collected in Mexico and New Mexico. Mountains, Mexico through New Mexico to Colorado. Summer-fall.

30. *M. ACUMINATA* Vasey (â-kû-mî-nâ'tâ).

Culms 2-3 feet tall, erect, tufted, rather stout, internodes long, hard and wiry at the base; **Blades** 5-16' long, scarcely 1 mm. wide, folded, 1-1.5

mm. wide, open, very rough; **Sheaths** shorter than the internodes or overlapping below, not broad and papery, closely enclosing the culms, rough, with erect, firm auricles 4-10 mm. long, rarely longer; **Ligule** about 6 mm. long, hardened at the base; **Panicle** contracted, narrow, green, 6-12' long, about 10 mm. wide, erect or slightly nodding, axis and branches scabrous, the longer branches mostly less than 2' long, several at each node, the shorter spikelet-bearing branches at the base, appressed or erect or narrowly ascending, spikelets sessile or on short stout pedicels about 1 mm. long, scabrous, enlarged at the apex; **Spikelets** 4-5 mm. long, narrowly lanceolate; **Glumes** broad, subequal, about half as long as the lemma, acute or erose-truncate at the apex, scabrous toward the apex; **Lemma** scabrous toward the tip, 2-toothed, acuminate or with a scabrous awn 2-5 mm. long, a few appressed hairs on the callus; **Palea** about equal to the lemma, scabrous toward the tip.

Rich moist soil, cool slopes, rocky mountains or hills; western Texas, New Mexico, and south into Mexico. Summer-fall.

31. *M. METCALFEI* Jones (mêt-kâf'ê-i).

Culms 2-4 feet tall, rather rigidly erect, simple, tufted, rough below the panicle; **Blades** 3-20' long, the upper short, the lower and those of the sterile shoots long, about 1 mm. wide when folded, involute, rigidly erect, smooth or slightly rough; **Sheaths** longer than the internodes, loose; **Ligule** membranaceous, 2-5 mm. (3-10) long, truncate, firm, fimbriate; **Panicles** greenish-purple, narrow but usually loose, short-exserted or included at the base, 4-12' long, erect or slightly nodding, the axis scabrous, the branches appressed or narrowly ascending, several at a node, commonly about 1.5' long, sometimes as much as 3' long, the scabrous capillary pedicels enlarged at the apex, mostly 2-5 mm. long, the spikelets more or less appressed to the short branchlets; **Spikelets** purple, exclusive of the awn 3.5-4 mm. long; **Glumes** subequal, two-fifths to half as long as the lemma, 1-nerved or nerveless, acute to obtuse, often erose, minutely scabrous toward the apex; **Lemma** lanceolate, scabrous-hispidulous, the callus glabrous or with a few short hairs, a straight or flexuous awn mostly 1-5 mm. (5-10) long, from the minutely bifid apex; **Palea** nearly as long as the lemma, scabrous toward the apex.

Southern New Mexico, Arizona, south through Texas to Mexico. (Rocky ravine, high point in the Guadalupe Mountains on the Carlsbad-El Paso Road.) Fall.

32. *M. RIGENS* (Benth.) Hitchc. (ri'jêns); *Epicampes rigens* Bentham;
DENSE-GRASS.

Culms 2-6 feet tall, usually growing in large, dense clumps, rather coarse, erect or spreading, simple, rigid; **Blades** 4-30' mostly 5-15' long, 2-5 mm. wide usually involute, sometimes flat, rigidly erect or ascending, rough, **Sheaths** longer than the internodes, the upper very long and the lower short, loose, smooth or rough; **Ligule** firm, almost truncate, 1-2 mm. long, wider than the blade; **Panicles** spikelike, exserted or sheathed at the base, 6-24' long, 3-8 mm. in diameter, interrupted below, erect or slightly nodding, densely-flowered, pale, the branches appressed to the scabrous axis, commonly less than an inch long, the branches and pedicels scabrous, the pedicels 1-3 mm. long usually about 1 mm.; **Spikelets** 2.5-4 mm. long, lanceolate, acute, terete; **Glumes** subequal, two-thirds to about as long as the spikelet, obscurely 1-nerved, commonly scabrous over the back and on the nerve toward the apex, pale, obtuse or acute, sometimes erose, or

sometimes a mucro from between the lobes of a bifid apex; **Lemma** usually slightly exceeding the glumes, 3-nerved, acute, minutely scabrous, the callus short-pubescent, without an awn or mucro or with a scabrous mucro or short-awn (usually less than 1 mm. long) from between or below the lobes of a bifid apex; **Palea** more than half to nearly as long as the lemma, subacute, minutely scabrous.

Damp rocky canyons and damp meadows, western Texas to California and south to Mexico. (In mountains along Alpine-Ft. Davis road.) Fall.

33. *M. FOURNIERIANA* Hitchc. (fōr-nī-ēr-ī-ā'nā); *Epicampes berlandieri* Fourn., not *M. berlandieri* Trin.

Culms 2-6 feet tall, usually in rather large dense tufts, simple, erect, rigid, somewhat flattened, with many sterile branches at the base; **Blades** 2-48' commonly 6-24' long, the upper short, the lower and those of the sterile shoots long, conduplicate toward the base, flat above, when folded 1-2 mm. wide, when flattened 2-5 mm. wide, scabrous to smooth, the margins not rough; **Sheaths** longer than the internodes, junction of sheath and blade obscure, flattened, smooth to rough; **Ligule** membranaceous, firm below, fragile above, decurrent, 10-20 mm. long; **Panicle** pale to purplish, usually exserted, 8-28' long, linear-oblong, when flowering 1-3' wide, interrupted below, the numerous branches usually less than 2.5' long, erect to spreading, usually ascending when in flower, one to several to a node, naked at the very base, the numerous short branchlets crowded with spikelets, the scabrous pedicels usually less than 1 mm. long; **Spikelets** (rarely 2-flowered) 2.5-3 mm. long, pale, often tinged with purple; **Glumes** subequal, the second sometimes slightly longer, and as long as or longer than the lemma, acute or obtuse, entire, erose or mucronate, scabrous on the nerves and body; **Lemma** obtuse, awnless or with a short awn from below a bifid apex, the awn 0.5-1 mm. rarely 3 mm. long, sparsely pubescent below, minutely scabrous, especially on the mid-nerve and toward the apex; **Palea** shorter to longer than the lemma, acute or obtuse, entire or erose, only slightly scabrous.

There are considerable variations in the comparative length of glumes, lemma and palea.

Along streams, draws, and banks, southern Texas to western Texas. (Hills north of San Antonio, Texas.) Summer.

34. *M. EMERSLEYI* Vasey (ē-mērs'lē-ī); *M. vaseyana* Scribn.; *Epicampes emersleyi* (Vasey) Hitchc. (includes *Epicampes subpatens* Hitchc.).

Culms 2-4 rarely 6 feet tall, simple, usually in rather large tufts, erect, rigid, scabrous especially below the panicle, or smooth, leafy at the base; **Blades** 3-15' or sometimes 25' long, the upper short, 1-4 mm. wide, conduplicate or flat, harsh, scabrous, especially on the margins and mid-rib; **Sheaths** longer than the internodes, flattened, usually scabrous, crowded at the base; **Ligule** membranaceous, narrow, as much as 20 mm. long, decurrent, fragile; **Panicle** 8-15' rarely 24' long, usually exserted, contracted, erect or the longer ones nodding, the axis and branches scabrous, the branches in ones to fours, distant, ascending or slightly spreading or appressed, 1-5' rarely 7' long, naked for one-fourth to one-third the distance from the base, the spikelets on scabrous pedicels about half the length of the spikelets; **Spikelets** 2-3.5 mm. mostly 2.5-3 mm. long; **Glumes** equal or the second slightly longer, shorter or longer than the lemma, 1-nerved or an extra one or two dim nerves, acute or obtuse,

often erose, scabrous, usually pale; **Lemma** 3-nerved, the lateral often obscure, short-pubescent below, especially along the margins, awnless or the mid-nerve produced from below the apex into a slender scabrous awn commonly 5-15 mm. rarely only 1-3 mm. or 27 mm. long, or sometimes a part of the spikelets on the same panicle awnless and awned; **Palea** slightly longer or shorter than the lemma, sparsely hairy below.

This plant varies much as to height, length of spikelets, and awns. The plant photographed was much larger than usual.

Hills and mountains, western Texas and New Mexico. (Mosquiz Canyon and Limpia Canyon, near Ft. Davis, and also about 30 miles southeast of San Antonio, Texas.) Summer-fall.

sometimes mucro from between the lobes of a bifid apex; **Lemma** usually slightly exceeding the glumes, 3-nerved, acute, minutely scabrous, the callus short-pubescent, without an awn or mucro or with a scabrous mucro or short-awn (usually less than 1 mm. long) from between or below the lobes of a bifid apex; **Palea** more than half to nearly as long as the lemma, subacute, minutely scabrous.

Damp rocky canyons and damp meadows, western Texas to California and south to Mexico. (In mountains along Alpine-Ft. Davis road.) Fall.

33. *M. FOURNIERIANA* Hitchc. (fōōr-nī-ēr-ī-ā'nā); *Epicampes berlandieri* Fourn., not *M. berlandieri* Trin.

Culms 2-6 feet tall, usually in rather large dense tufts, simple, erect, rigid, somewhat flattened, with many sterile branches at the base; **Blades** 2-48' commonly 6-24' long, the upper short, the lower and those of the sterile shoots long, conduplicate toward the base, flat above, when folded 1-2 mm. wide, when flattened 2-5 mm. wide, scabrous to smooth, the margins not rough; **Sheaths** longer than the internodes, junction of sheath and blade obscure, flattened, smooth to rough; **Ligule** membranaceous, firm below, fragile above, decurrent, 10-20 mm. long; **Panicle** pale to purplish, usually exserted, 8-28' long, linear-oblong, when flowering 1-3' wide, interrupted below, the numerous branches usually less than 2.5' long, erect to spreading, usually ascending when in flower, one to several to a node, naked at the very base, the numerous short branchlets crowded with spikelets, the scabrous pedicels usually less than 1 mm. long; **Spikelets** (rarely 2-flowered) 2.5-3 mm. long, pale, often tinged with purple; **Glumes** subequal, the second sometimes slightly longer, and as long as or longer than the lemma, acute or obtuse, entire, erose or mucronate, scabrous on the nerves and body; **Lemma** obtuse, awnless or with a short awn from below a bifid apex, the awn 0.5-1 mm. rarely 3 mm. long, sparsely pubescent below, minutely scabrous, especially on the mid-nerve and toward the apex; **Palea** shorter to longer than the lemma, acute or obtuse, entire or erose, only slightly scabrous.

There are considerable variations in the comparative length of glumes, lemma and palea.

Along streams, draws, and banks, southern Texas to western Texas. (Hills north of San Antonio, Texas.) Summer.

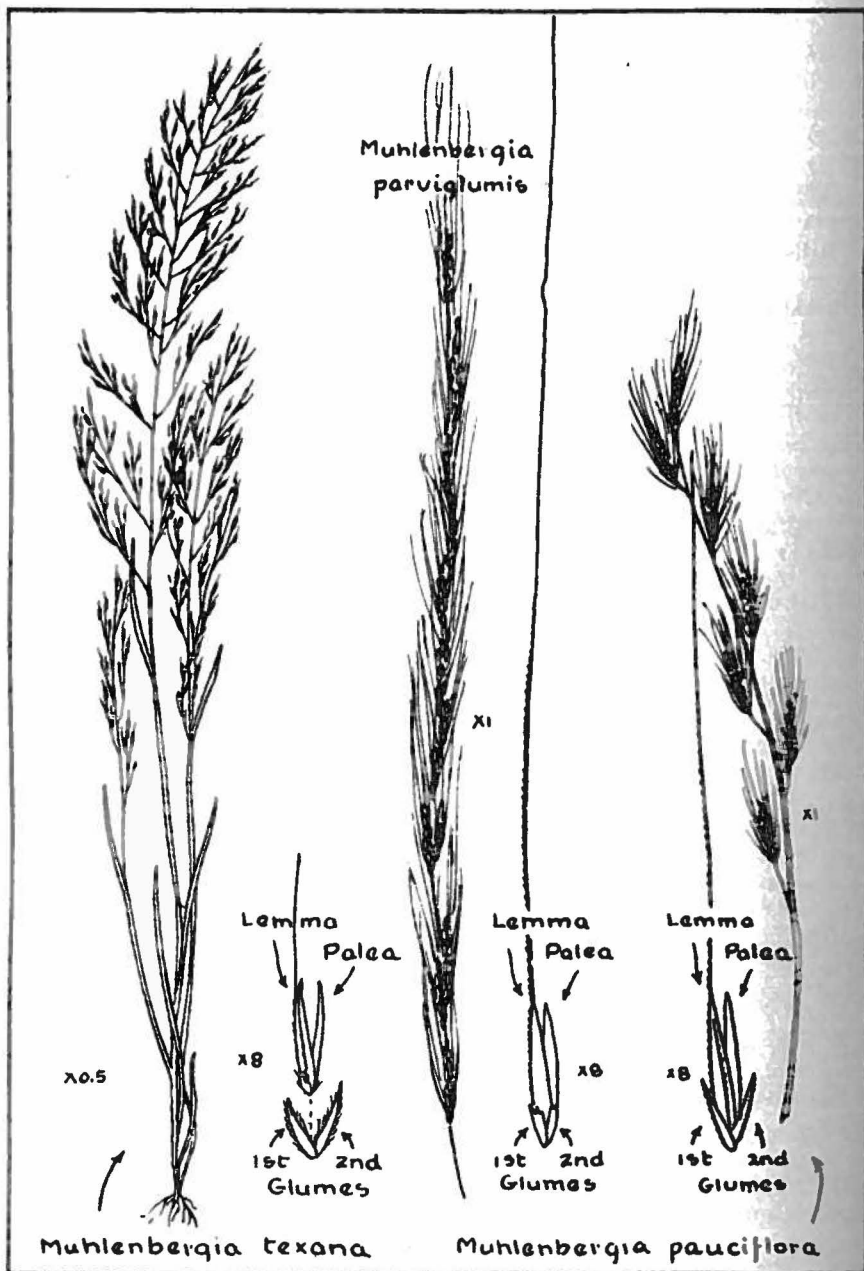
34. *M. EMERSLEYI* Vasey (ē-mērs'lē-ī); *M. vaseyana* Scribn.; *Epicampes emersleyi* (Vasey) Hitchc. (includes *Epicampes subpyralis* Hitchc.)

Culms 2-4 rarely 6 feet tall, simple, usually in rather large tufts, erect, rigid, scabrous especially below the panicle, or smooth, leafy at the base; **Blades** 3-15' or sometimes 25' long, the upper short, 1-4 mm. wide, conduplicate or flat, harsh, scabrous, especially on the margins and mid-rib; **Sheaths** longer than the internodes, flattened, usually scabrous, crowded at the base; **Ligule** membranaceous, narrow, as much as 2) mm. long, decurrent, fragile; **Panicle** 8-15' rarely 24' long, usually exserted, contracted, erect or the longer ones nodding, the axis and branches scabrous, the branches in ones to fours, distant, ascending or slightly spreading or appressed, 1-5' rarely 7' long, naked for one-fourth to one-third the distance from the base, the spikelets on scabrous pedicels about half the length of the spikelets; **Spikelets** 2-3.5 mm. mostly 2.5-3 mm. long; **Glumes** equal or the second slightly longer, shorter or longer than the lemma, 1-nerved or an extra one or two dim nerves, acute or obtuse,

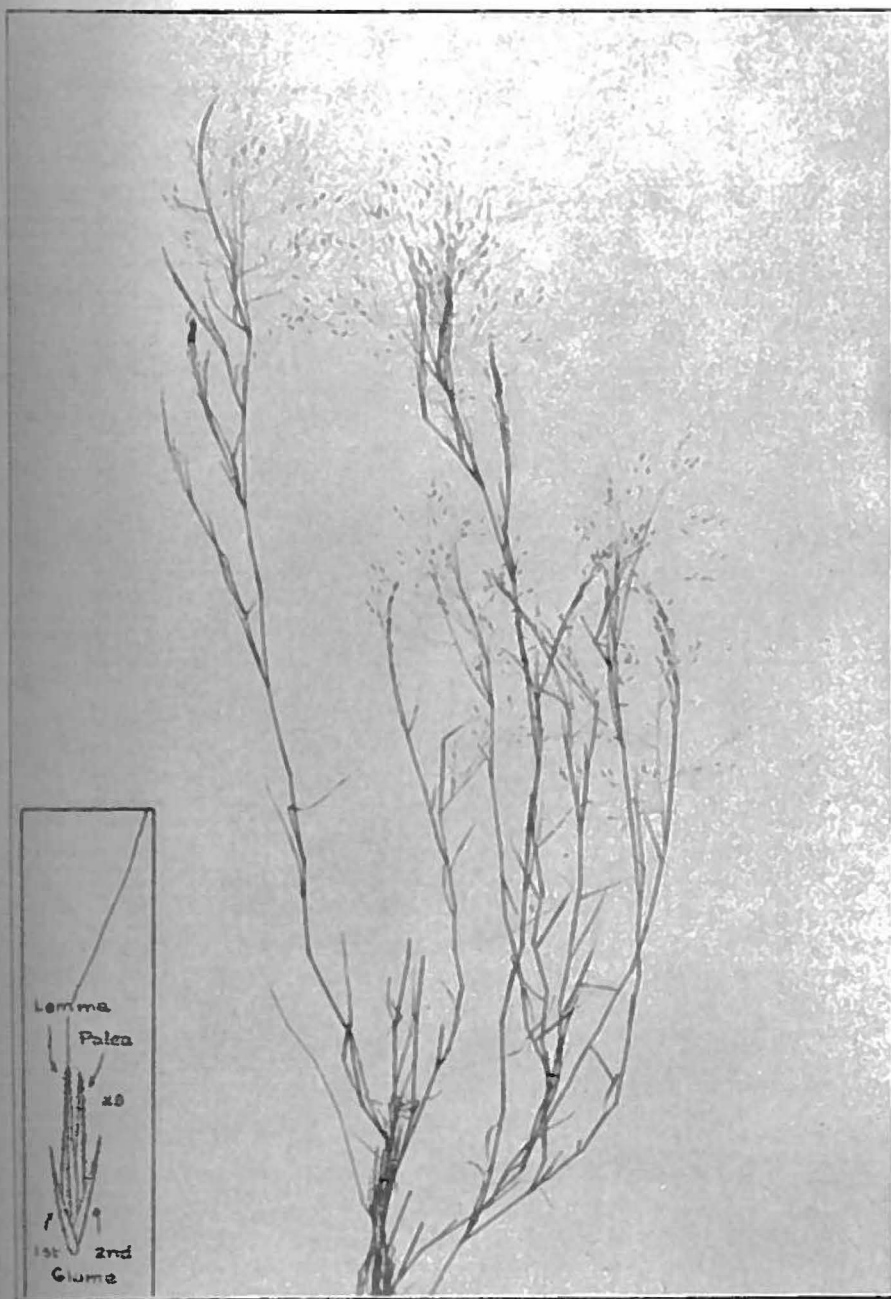
when erose, scabrous, usually pale; **Lemma** 3-nerved, the lateral often obscure, short-pubescent below, especially along the margins, awnless or the midnerve produced from below the apex into a slender scabrous awn commonly 5-15 mm. rarely only 1-3 mm. or 27 mm. long, or sometimes a part of the spikelets on the same panicle awnless and awned; **Palea** slightly longer or shorter than the lemma, sparsely hairy below.

This plant varies much as to height, length of spikelets, and awns. The plant photographed was much larger than usual.

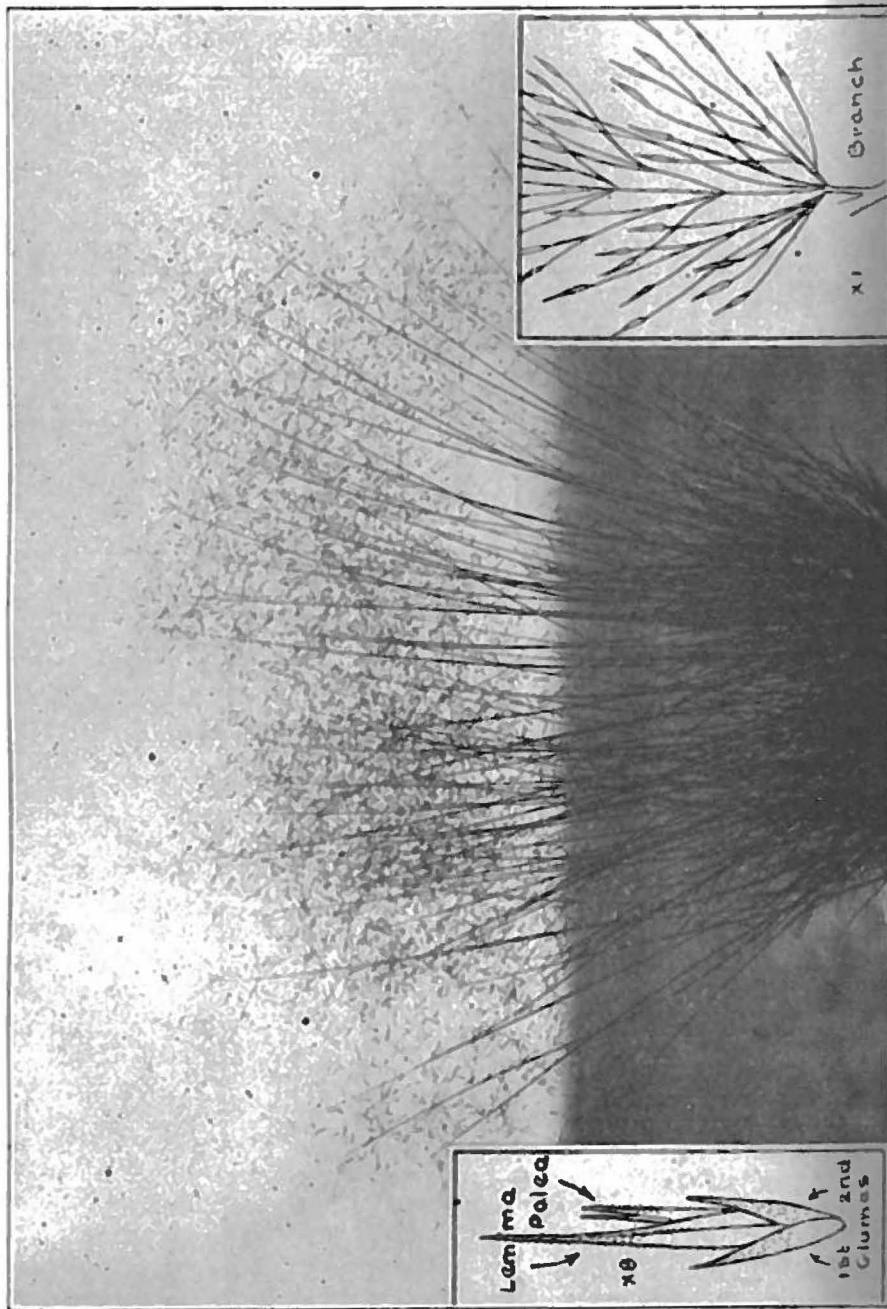
Hills and mountains, western Texas and New Mexico. (Mosquiz Canyon and Limpia Canyon, near Ft. Davis, and also about 30 miles northeast of San Antonio, Texas.) Summer-fall.



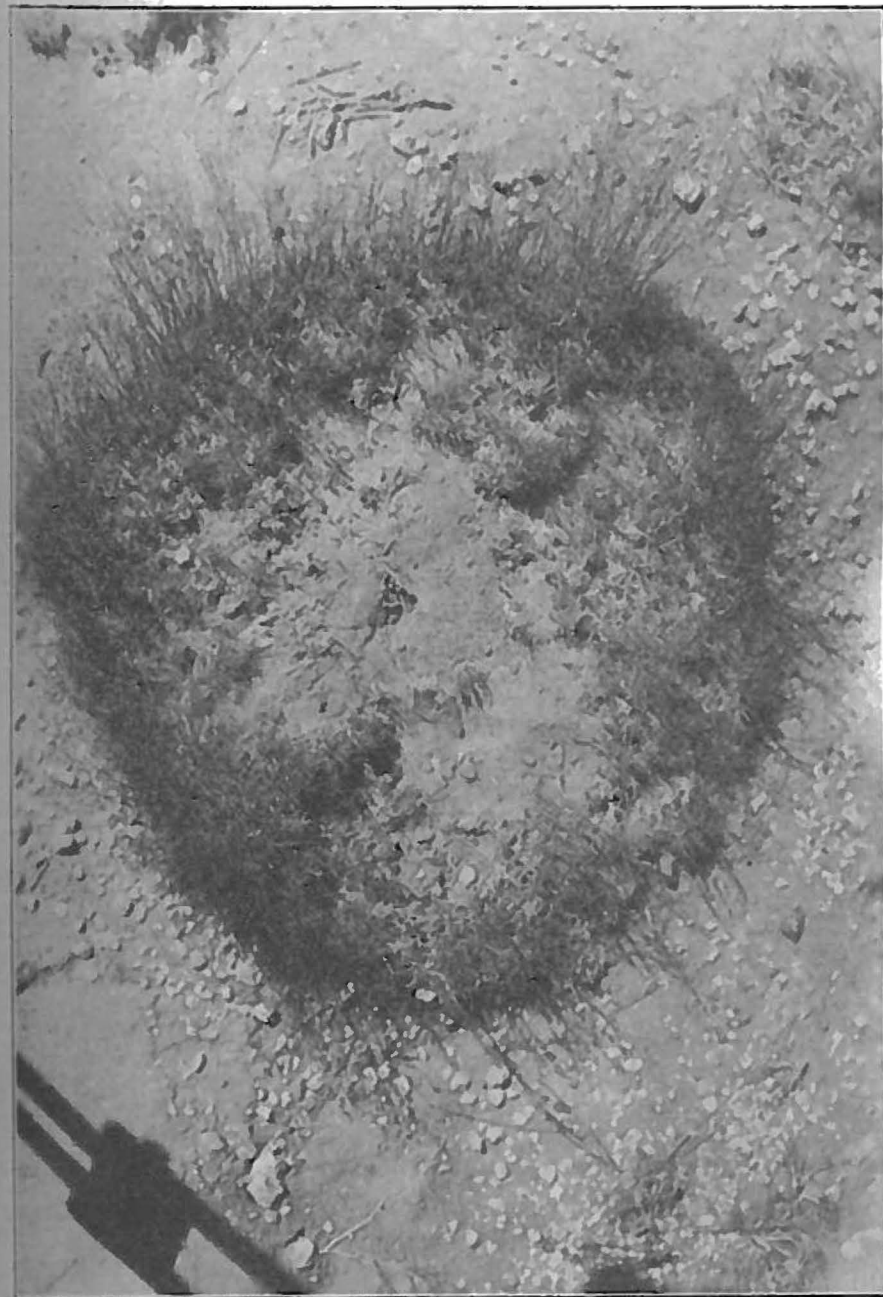
MUHLENBERGIA TEXANA, MUHLENBERGIA PARVIGLUMIS AND MUHLENBERGIA PAUCIFLORA.



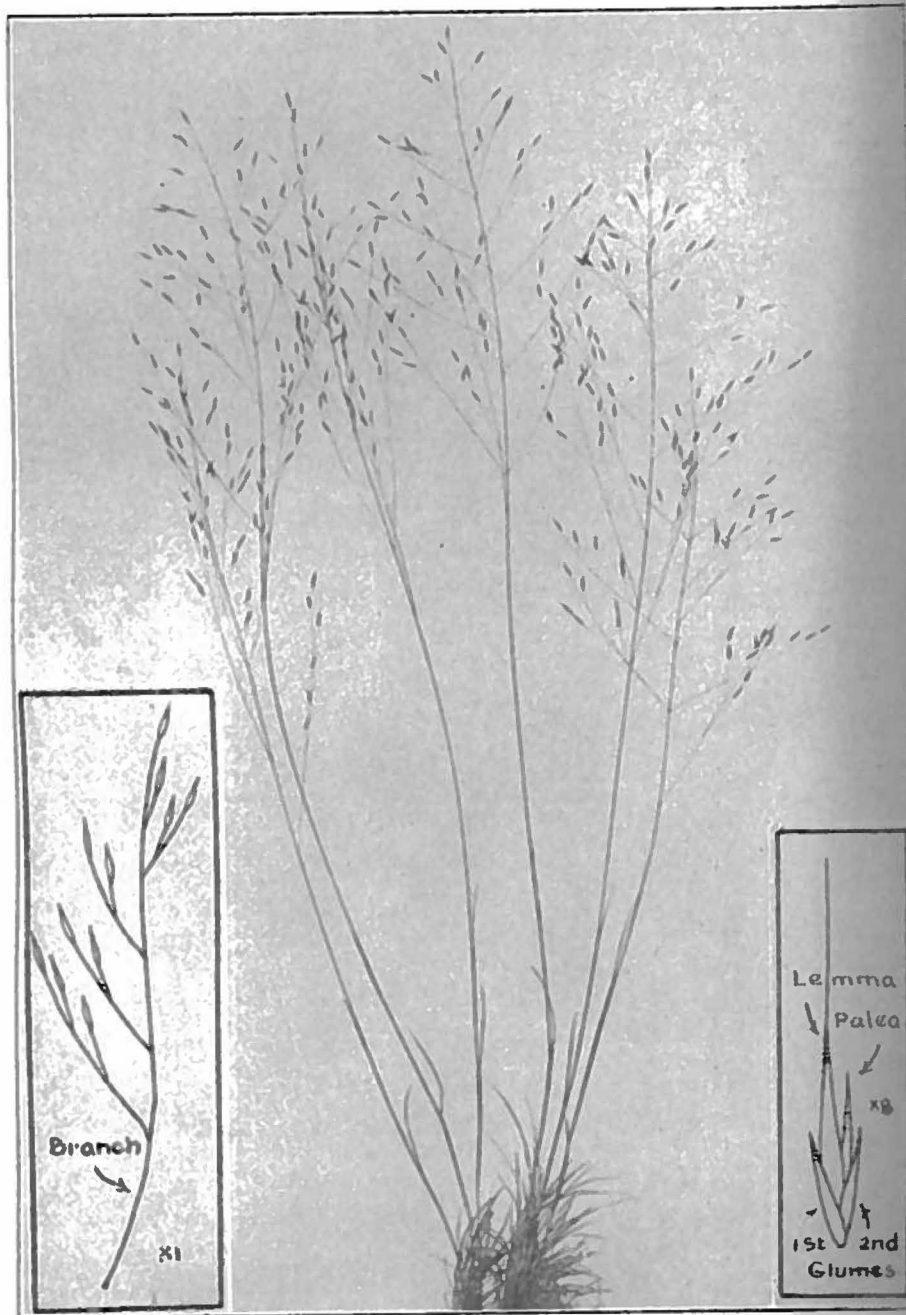
MUHLENBERGIA PORTERI; LARGE MESQUITE-GRASS



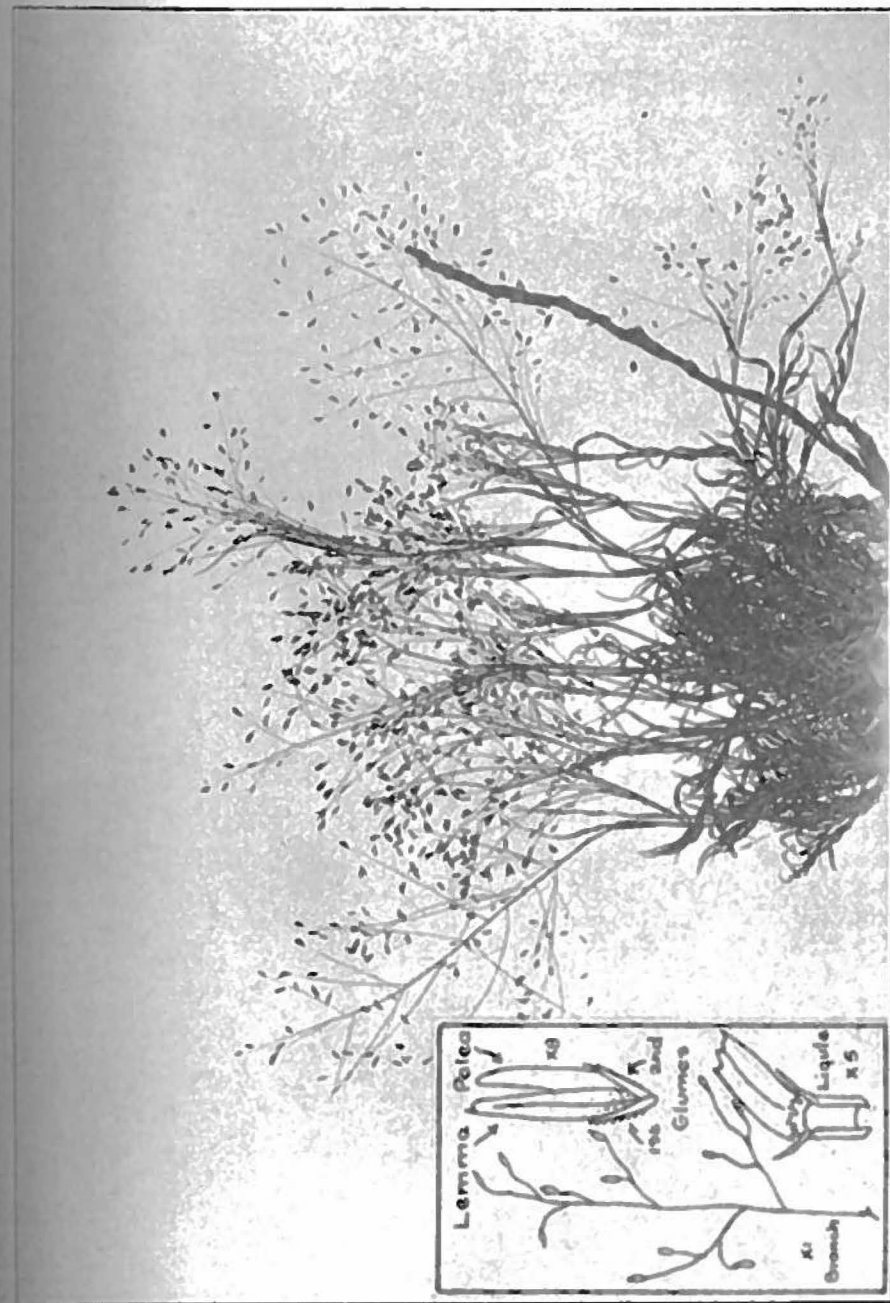
MUHLENBERGIA PUNGENS; BLOW-OUT GRASS



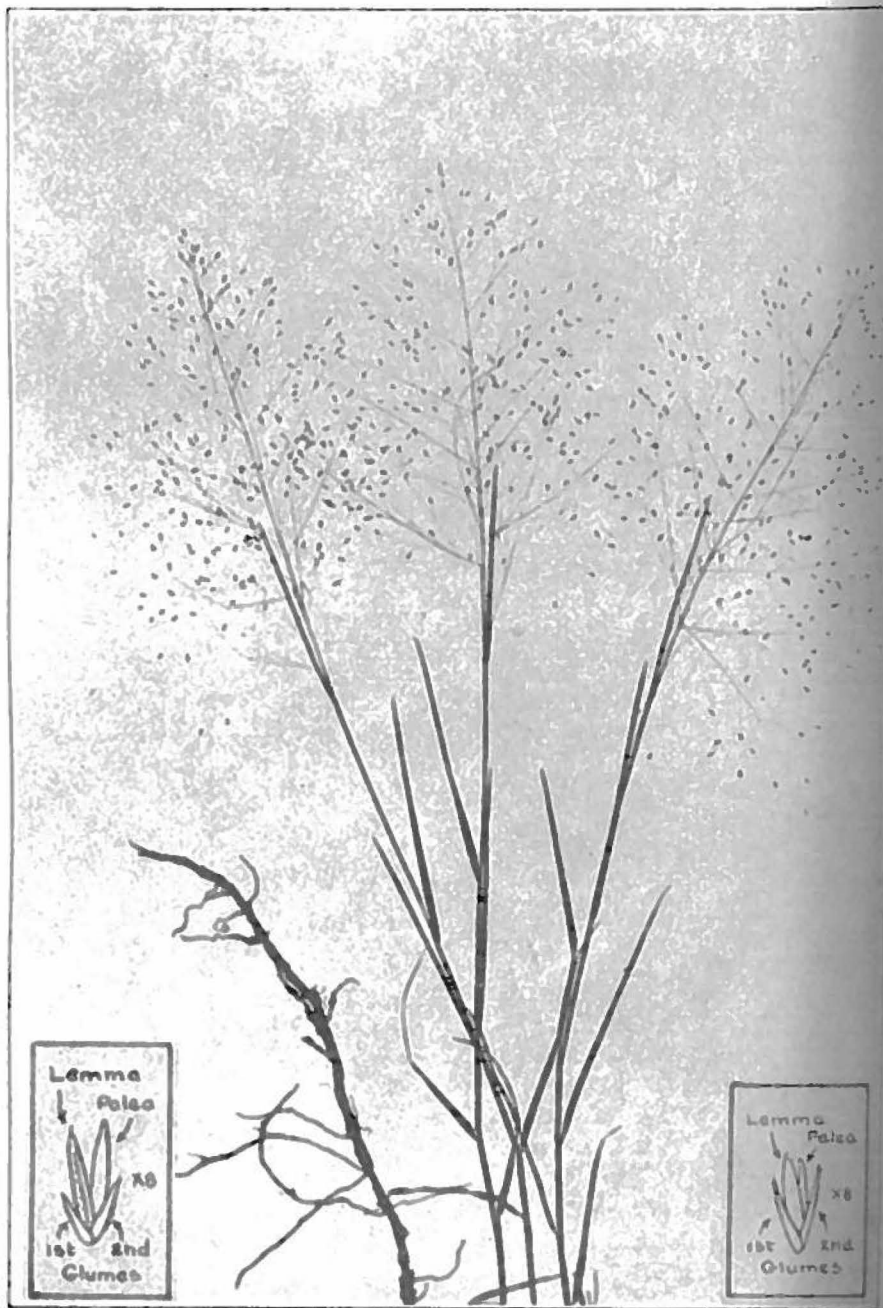
MUHLENBERGIA TORREYI; RING-GRASS



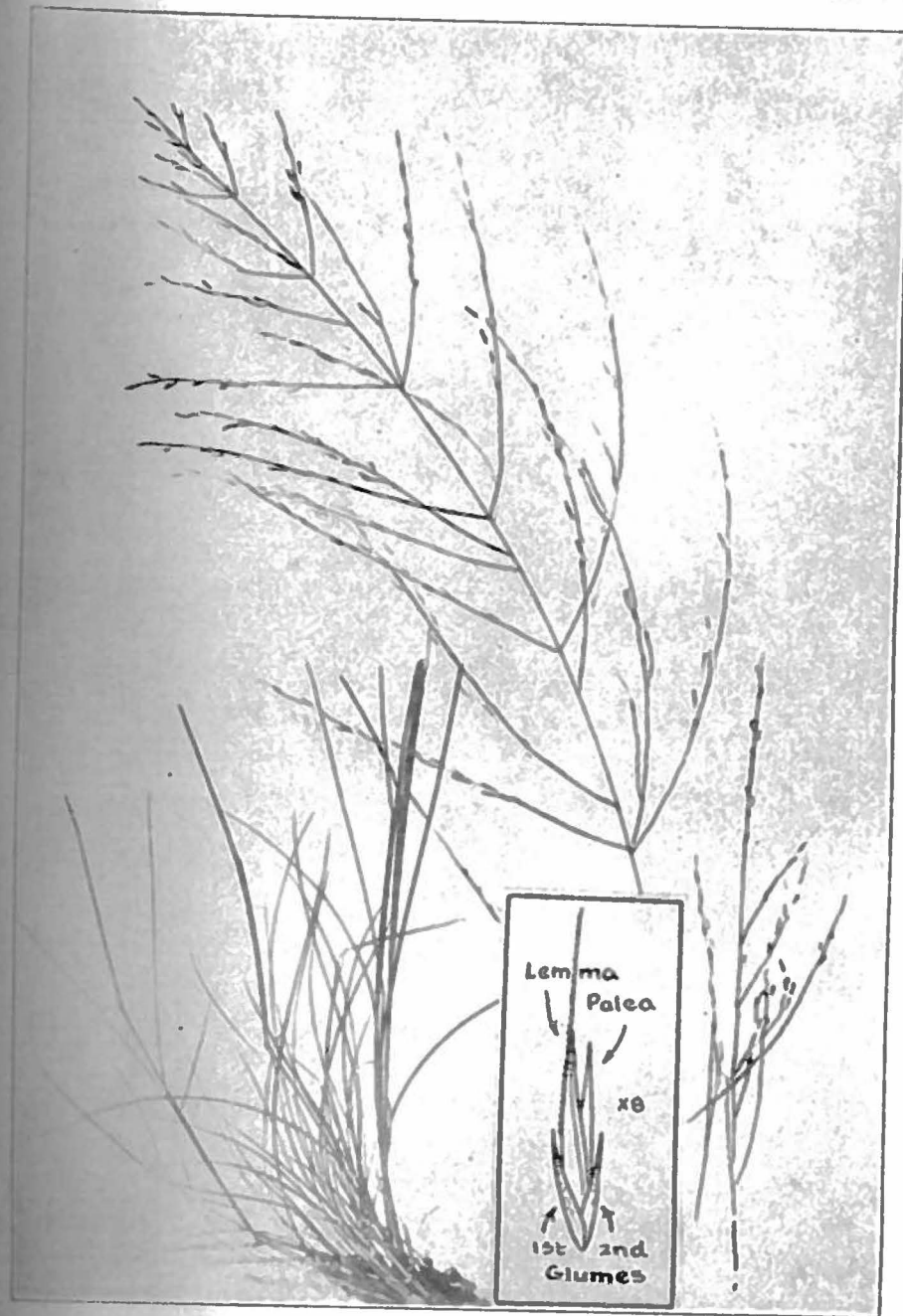
MUHLENBERGIA TORREYI; RING-GRASS



MUHLENBERGIA ARENACEA



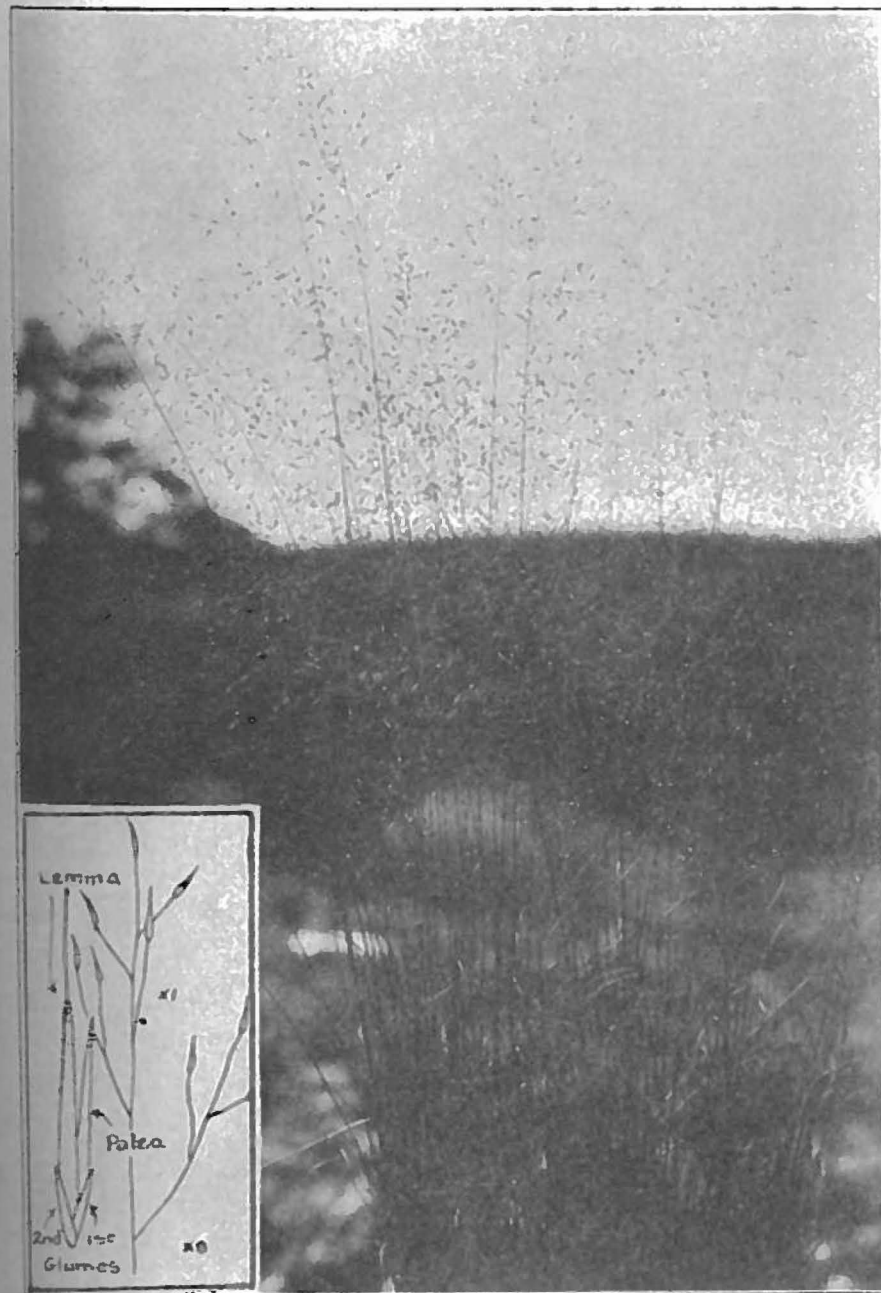
MUHLENBERGIA ASPERIFOLIA



MUHLENBERGIA ARENICOLA



MUHLENBERGIA INVOLUTA



MUHLENBERGIA REVERCHONI