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West Virginia Grasses

Earl Lemley Core

E. E. Berkley

H. A. Davis

Nelle Ammons

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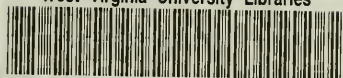
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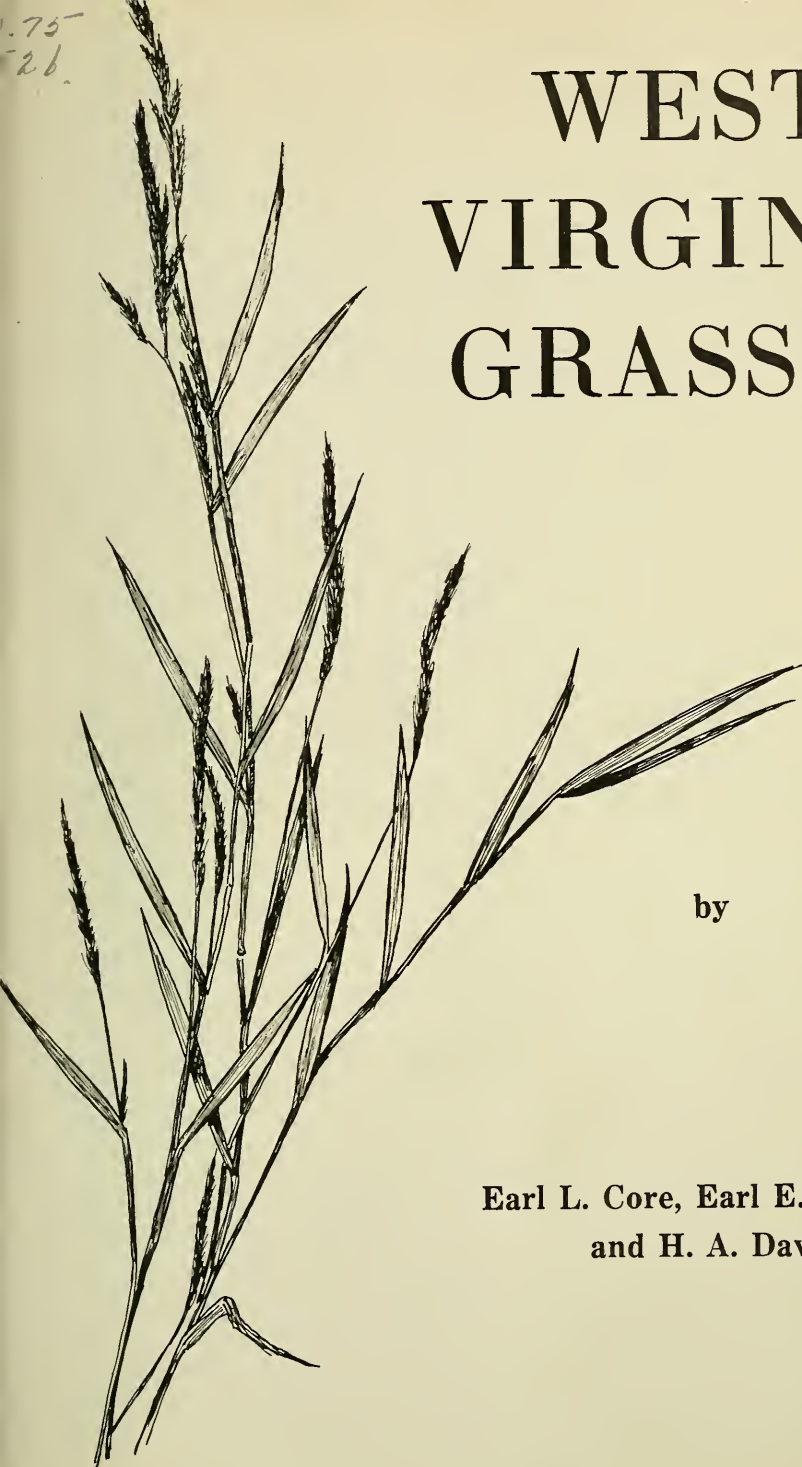
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WEST VIRGINIA GRASSES



by

Earl L. Core, Earl E. Berkley,
and H. A. Davis



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WEST VIRGINIA GRASSES

by

EARL L. CORE, EARL E. BERKLEY, AND H. A. DAVIS

Illustrations

by

NELLE AMMONS

Assisted by

WILLIAM F. STRUNK AND DOROTHY MEGOWEN

Agricultural Experiment Station
College of Agriculture, Forestry, and Home Economics
WEST VIRGINIA UNIVERSITY

C. R. ORTON, *Director*
Morgantown

Contribution No. 29 from the Herbarium of
West Virginia University

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INTRODUCTION

OF ALL PLANTS, the grass family includes those most valuable to man. To this belong the cereals such as wheat, corn, rice, barley, oats, and rye that provide so large a portion of man's food supply; the majority of the pasture and meadow plants that furnish forage and hay; and many large grasses such as sugar cane, sorghum, and bamboo, also important for their contributions to our food supply as well as to science and the arts.

In addition to the economically important grasses that are mainly cultivated, thousands of species occur wild in vast grasslands which cover enormous areas on all the continents. Certain of the native species are of great value as a source of food for grazing animals, particularly those species with growth habits permitting continuous cropping without destroying the plants. The sod-forming grasses and those that spread by runners or rootstocks are especially valuable.

This bulletin is concerned only with those species which occur wild in West Virginia. Some of these are also cultivated at times, but the grasses normally found only in cultivation are not included, since these are generally well known and need not form a part of this treatise.

The present treatment is designed to provide information for all those interested in the wild grasses of West Virginia. Keys, descriptions, and illustrations are supplied to facilitate the identification of species; distribution records and ecologic notes are given, so that the student may know where to seek certain species; and economic notes provide information concerning the importance of the grasses as forage, hay, or soil-binding plants; or as troublesome, noxious weeds to be eliminated wherever possible.

ACKNOWLEDGMENT

It is quite apparent that the authors of this treatise are deeply indebted to the work of the many students, from Millspaugh down to the present, who have left their notes and specimens available for reference in the University Herbarium. Special mention should also be made of the efficient work of Elizabeth Ann Bartholomew, herbarium assistant, in caring for the specimens and making them available for study. The authors also wish to acknowledge the valuable assistance of Mrs. Agnes Chase, Dr. Jason R. Swallen, and the late Dr. A. S. Hitchcock in checking the identifications of hundreds of specimens. Dr. Swallen has also read the entire manuscript critically and has made numerous helpful suggestions.

Finally, acknowledgment must be made of the help received from Dr. C. R. Orton, whose unceasing interest has stimulated work on the project and made possible its publication.

HISTORICAL

The first systematic study of the grasses of West Virginia was made by Dr. Charles Frederick Millspaugh, botanist on the staff of the West Virginia Agricultural Experiment Station from 1889 to 1892.¹ The results of his work were published in a preliminary catalogue of the state flora and included 99 species, varieties, and forms of grasses.² During the next few years the investigations of Lawrence William Nuttall, a mine operator of Nuttallburg, Fay-

ette County, West Virginia, resulted in the addition of numerous species, which were included in a joint publication by Millspaugh and Nuttall in 1896. This listed 98 species, varieties, and forms of grasses.³ In 1903 Dr. John L. Sheldon became head of the new department of botany at West Virginia University and thoroughly explored most regions of the State, adding many more species hitherto unknown to the state's flora. These new finds were reported in Millspaugh's third and last flora,⁴ in which 135 species, varieties and forms of grasses were listed. Most of the specimens collected by Millspaugh, Nuttall, and Sheldon are now preserved in the Herbarium of West Virginia University. Thousands of other specimens have been added through the work of Dr. P. D. Strausbaugh, who directed expeditions of botanical students over the State each summer from 1926 to 1941. In 1928 Dr. Earl E. Berkley, now of the Bureau of Plant Industry Station, Beltsville, Maryland, one of the present authors, began an intensive field study of the grasses of West Virginia, a project which resulted in the collection of several thousand specimens representing all counties of the State. This work was financed in part by a grant from the West Virginia Agricultural Experiment Station. Dr. Berkley's entire collection has been presented to the University Herbarium, where it has formed the basis for all succeeding studies. Studies of county or local floras by botanists too numerous to mention here have also resulted in important contributions to our knowledge of the subject.

¹ See Core, "Contributions of Charles Frederick Millspaugh to the Botany of West Virginia". Proc. W. Va. Acad. Sci. 8: 82-93. 1935.

² "Preliminary Catalogue of the Flora of West Virginia". W. Va. Agri. Exper. Sta. Bul. 24. 1892.

³ C. F. Millspaugh and L. W. Nuttall, "Flora of West Virginia". Field Mus. Bul. 1896.

⁴ "The Living Flora of West Virginia", W. Va. Geol. Surv. vol. 5(A). 1913.

USES OF GRASSES

Pasture grasses—Fenced pastures in West Virginia include many areas of grassland (mostly land from which forests were removed); or areas that are covered with open woods; or rocky, sterile, or wet areas not suitable for cultivated crops. Two types of pastures are recognized—wild pastures, in which the principal species are native grasses, and tame pastures, where introduced species are sown and cultivated. Kentucky bluegrass is our standard pasture grass. It thrives especially well on limestone soils and is not adapted to acid soils. Redtop is another well known and widely distributed grass, deriving its chief importance from the fact that it thrives on acid soil where bluegrass fails. Orchard grass is a third excellent species for this region, especially in combination with other grasses. Its chief fault is that it grows in large tussocks. Other important pasture grasses are English and Italian rye grasses, tall oat grass, and fescue grass.

Meadow grasses—Meadows are areas producing grasses (or other plants) to be cut for hay. Meadows also may be classed as wild and tame, although in West Virginia very little wild hay is harvested. Timothy is the standard meadow grass of West Virginia. It is less nutritious than some other grasses, but it com-

bines as does no other grass the requisite qualities, being palatable, fairly nutritious, and easily grown. The seed is cheap and of good quality. On the best soils there is no competing meadow grass; on soils too moist or too acid for timothy, redbtop may be more satisfactory. Other meadow grasses for West Virginia include orchard grass, meadow fescue, tall oat grass, rye grass, and smooth brome.

Lawns—A lawn is an area covered with grass kept closely mown. The term is generally applied to tracts near dwellings but may be used for other areas such as parks or golf courses. With rare exceptions, conditions desirable in lawns are supplied only by grasses. The most popular lawn grass is Kentucky bluegrass. The only other lawn grasses normally grown in West Virginia are Rhode Island bent, creeping bent, rye grass, and *Poa annua*. Other grasses sometimes used in lawn-grass mixtures include Canada bluegrass and the fescue grasses.

Soil-binding grasses—Grasses are among the best of plants for use in saving soil by preventing erosion. In a good sod the rootstocks, the masses of fibrous roots, and the accumulation of partly decayed plants offer almost complete protection against loss of soil. Moreover, land put in grass not only checks erosion but, when used in meadows and pastures, is an income-producer as well. Kentucky bluegrass is recommended for soils with plenty of lime, while poverty grass is of value on dry, sterile soil. Reed canary grass is suitable for protection of stream banks. Other grasses that may be used in soil conservation in West Virginia include smooth brome grass and other brome grasses, quackgrass, rye grass, three-awn grass, and timothy. Many other species, of course, may also be of value.

“Old Fields”—While West Virginia is generally thought to have been densely forested at the time of its first penetration by white men, it is known that certain small areas were grasslands even then. These areas, known to the early settlers as “old fields”, were supposed to have been cultivated by the Indians, but this is by no means a satisfactory explanation of their treeless condition. More study is needed of these interesting spots, several dozen of which have been located.

Weeds—Grasses may be of all degrees of weediness. Some species are of no value for forage but are still harmless, since they are generally found only in waste places, as is old-witch grass. Others, such as foxtail, become troublesome because they occur in cultivated fields. Weeds may be classed as annual—those which grow from seeds each year, as crab grass; or perennial—those which spread by creeping roots or rootstocks, as quackgrass. Annuals can be controlled by preventing the formation of seeds, but perennials are difficult to eradicate, since even a small piece of a rootstock left in the soil may give rise to a new plant. They may, however, be reduced by cultivation or smothered with a vigorous crop such as alfalfa.

THE NAMES OF GRASSES

The Latin names of the grasses have been taken in virtually every case from Hitchcock's "Manual of the Grasses of the United States". Where this name differs from the name used in Gray's Manual (7th edition), the latter name appears in italics. In so far as possible, the common names used for grasses in this region have been given. Many West Virginia grasses have never received names in common speech, so they can be referred to only by their scientific names.

THE ANATOMY OF GRASSES

Roots—The roots of grasses are fibrous, originating at the base of the stem; or, in the case of some grasses whose stems lie flat on the ground, roots may be found arising at many of the nodes (pl. 1, Fig. 1). Roots do not bear scales (reduced leaves).

Stems—The stem of grasses, known technically as a *culm*, is composed of *nodes* (joints) and *internodes* (pl. 1, Fig. 1). The nodes are solid, forming partitions between the usually hollow internodes. Grasses whose stems grow erect, dying back to the ground in autumn and growing up from the base the following spring, form bunches called *tussocks*, while grasses whose stems are horizontal take root at the nodes and send up new shoots some distance away from the original plant, forming a *sod*. Stems which creep along beneath the ground, sending up shoots at various places, are called *rhizomes*, or *rootstocks*, while if the creeping stem runs on top of the ground it is called a *stolon*, or *runner*. In some grasses the base of the culm is enlarged and solid, forming a *corn*.

Leaves—A leaf arises at each node and consists of two parts, the *sheath*, or lower part, which encloses the stem, and the *blade*, the upper, narrow portion which is ordinarily called the leaf (pl. 1, Fig. 1). A thin structure on the inside of the leaf at the junction of the sheath and blade is called the *ligule*. The area on the outside of the leaf at that point is known as the *collar* (pl. 1, Fig. 4). In some grasses the blade extends downward on each side of the stem forming earlike lobes or *auricles* (pl. 1, Fig. 3).

Inflorescence—The flowers of grasses are borne at the end of the culm or of its branches. The flowers occur in small, compact groups called *spikelets*, which are joined to the main stem or its branches by a stalk or *pedicel*. The spikelets are grouped in a cluster, or inflorescence, known as a *panicle*, in which the cluster is more or less branched. Where the inflorescence is not branched, but the spikelets are attached directly to the main axis, the cluster is known as a *raceme*; in cases where the spikelets have no pedicel, but are sessile on the main axis, the cluster is known as a *spike*. Deviations from these types include spike-like racemes and spike-like panicles.

The spikelet—The units of the flower cluster of grasses are called spikelets (pl. 1, Figs. 5 & 6). A spikelet consists of a short

stalk with one or more flowers in the axils of bracts. The lower pair of bracts are empty and are called *glumes*. The lower bract is the first glume, the upper one the second glume. The bracts above the glumes are regularly arranged alternately in two rows on a slender axis called the *rachilla*. Each of these bracts is known as a *lemma* and encloses the grass flower. The lemma contains nerves or *veins*; the middle one is usually larger and is called the *keel*. The mid-nerve of the lemma (and of the glumes, too) often extends beyond the tip as a sort of bristle or *awn*. A tough swelling at the base of the lemma is called the *callus*. Between the flower and the rachilla lies a 2-nerved bract, the *palea*, which, with the lemma on the opposite side encloses the flower. The lemma, palea, and the enclosed flower are spoken of collectively as the *floret*.

The flower—The flowers of grasses are quite small. They are generally *perfect*; that is, they contain both *stamens* and *pistils*. At the base of the flower, outside the stamens are two (rarely three) tiny scales called *lodicules* (pl. 1, Fig. 12), thought by some people to represent the petals. These lodicules swell at *anthesis*, or flowering time, and cause the floret to open. In most grasses there are three stamens and one pistil with two plumose stigmas (pl. 1, Fig. 12). The pollen is carried by the wind. The fruit of grasses contains one seed and has the seed coat and the ovary wall grown together. This type of fruit is known as a *caryopsis*, or grain (pl. 1, Fig. 8).

In some grasses the spikelets are *unisexual*; that is, they contain only stamens or only pistils. If these spikelets occur on different plants, the grass is *dioecious*, while if they are at different places on the same plant, the grass is *monoecious* (pl. 14). In some grasses both unisexual and perfect spikelets may occur on the same plant.

USE OF THE KEYS

In identifying a grass by use of this bulletin, the student should begin with the Key to the Tribes (p. 8). Having found the tribe to which the plant belongs, reference should next be made to the key to the genera included in that tribe. The third step is to turn to the page on which that genus is described and to continue by using the key to the species in the genus. The accompanying illustrations are for the most part from original drawings and for convenience in reference are grouped in plates facing the descriptions of the species. The sketches are designed to show the most typical structure or structures of each grass, in order that its identification may be made as easy as possible.

There are included in this publication 187 species and varieties of grasses known to occur wild in West Virginia. The herbarium of West Virginia University contains specimens of practically all the grasses listed, and the distribution of the species in the State has been recorded from the mounted herbarium specimens. The distribution is, of course, very incomplete because of the fact that some regions of the state have been studied more thoroughly than others, but collections have been made in every one of the 55 counties.

KEY TO THE TRIBES

1. Spikelets imbedded in the joints of the rachis 1. MAYDEAE
1. Spikelets not imbedded in the rachis 2.
 2. Plants woody, culms perennial, the broad flat leaves with a short petiole 11. BAMBUSEAE
 2. Plants herbaceous, culms annual 3.
 3. Spikelets 1-flowered (technically 2-flowered, the lower flower in each spikelet imperfect): spikelets flattened from the back; pedicels jointed just below the spikelets 4.
 4. Spikelets in pairs, one sessile and perfect, the other stalked and staminate, or empty, or reduced to a mere stalk 2. ANDROPOGONEAE
 4. Spikelets single 3. PANICEAE
 3. Spikelets 1- to many-flowered, more or less flattened from the side; pedicels jointed just above the glumes (except in a few genera, which have spikelets flattened from the side) 5.
 5. Glumes none; plants of wet places 4. ORYZEAE
 5. Glumes present 6.
 6. Spikelets 3-flowered, uppermost floret in each spikelet perfect, the two lower staminate or sterile 5. PHALARIDEAE
 6. Spikelets 1- to many-flowered, no imperfect flowers below the perfect ones 7.
 7. Spikelets in 1-sided spikes or sessile on opposite sides of a zigzag rachis 8.
 8. Spikelets 1- to several-flowered, in 1-sided spikes 8. CHLORIDEAE
 8. Spikelets 1- to several-flowered, sessile on opposite sides of a zigzag axis 10. HORDEAE
 7. Spikelets in an open or contracted panicle 9.
 9. Spikelets 1-flowered 6. AGROSTIDEAE
 9. Spikelets 2-many flowered 10.
 10. Glumes shorter than the lowermost floret; awn, if present, straight and arising from or near the apex of the lemma 9. FESTUCEAE
 10. Glumes as long as the lowermost floret; awn, if present, attached to the back of the lemma 7. AVENEAE

TRIBE I. MAYDEAE

- A single genus 1. TRIPSACUM, pl. 2

TRIBE II. ANDROPOGONEAE

- 1. Spikelets all alike, surrounded by soft hairs 2.
- 2. Racemes continuous, the spikelets of each pair with unequal pedicels. MISCANTHUS
- 2. Racemes breaking into joints at maturity, one spikelet in each pair sessile, the other stalked. 2. ERIANTHUS
- 1. Spikelets of 2 kinds, one sessile and perfect, the other stalked and imperfect 3.
- 3. Racemes terminal and axillary. 5. ANDROPOGON, pl. 3
- 3. Racemes terminal only 4.
- 4. Stalked spikelets staminate. 3. SORGHUM, pl. 2
- 4. Stalked spikelets absent, only the stalk present. 4. SORGHASTRUM, pl. 2

TRIBE III. PANICEAE

- 1. Spikelets enclosed in round, spiny burs. 10. CENCHRUS, pl. 12
- 1. Spikelets not enclosed in burs 2.
- 2. Spikelets surrounded by one or more rough bristles; inflorescence a spike-like panicle. 11. SETARIA, pl. 13
- 2. Spikelets not surrounded by bristles 3.
- 3. Sterile lemma awned or sharp-pointed. 9. ECHINOCHLOA, pl. 12
- 3. Sterile lemma not awned 4.
- 4. Spikelets stalked in open panicles. 8. PANICUM, pls. 6-11
- 4. Spikelets nearly sessile in slender 1-sided racemes 5.
- 5. Spikelets obovate or nearly orbicular 7. PASPALUM, pl. 5
- 5. Spikelets lanceolate or elliptic. 6. DIGITARIA, pl. 4

TRIBE IV. ORYZEAE

- 1. Upper spikelets pistillate, some of them long-awned; lower spikelets staminate, without awns. 12. ZIZANIA, pl. 14
- 1. Spikelets all perfect and without awns. 13. LEERSIA, pl. 14

TRIBE V. PHALARIDEAE

- 1. Lemma not awned; glumes equal. 14. PHALARIS, pl. 15
- 1. Lemma awned on the back; glumes unequal. 15. ANTHOXANTHUM, pl. 15

TRIBE VI. AGROSTIDEAE

- 1. Lemma thick, hardened 2.
- 2. Spikelets awnless. 16. MILIUM, pl. 16
- 2. Spikelets awned 3.
- 3. Awn 3-parted. 19. ARISTIDA, pl. 17
- 3. Awn simple 4.
- 4. Lemma broad, the awn falling soon after flowering. 17. ORYZOPSIS, pl. 16
- 4. Lemma narrow, with a long, twisted, persistent awn. 18. STIPA, pl. 16
- 1. Lemma thin, not hardened 5.
- 5. Lemma short-pointed or awned from the tip 6.

- 6. Rachilla not prolonged behind the palea . . . 20. MUHLENBERGIA, pl. 18
- 6. Rachilla prolonged in a bristle behind the palea 21. BRACHYELYTRUM, pl. 19
- 5. Lemma awnless or awned on the back 7.
- 7. Spikelets in dense, spike-like panicles 8.
 - 8. Glumes sharp-pointed; lemma awnless . . . 22. PHLEUM, pl. 19
 - 8. Glumes not sharp-pointed; lemma awned on the back 23. ALOPECURUS, pl. 19
- 7. Spikelets in open panicles 9.
 - 9. Lemma 1-nerved 24. SPOROBOLUS, pl. 19
 - 9. Lemma 3- to 5-nerved 10.
 - 10. Floret stipitate 27. CINNA, pl. 22
 - 10. Floret not stipitate 11.
 - 11. Rachilla not prolonged behind the palea 25. AGROSTIS, pls. 20, 21
 - 11. Rachilla prolonged in a bristle behind the palea 26. CALAMAGROSTIS, pl. 22

TRIBE VII. AVENEAE

- 1. Florets 2, one perfect, the other staminate 2.
 - 2. Lower floret staminate, bearing a long bent and twisted awn 32. ARRHENATHERUM, pl. 24
 - 2. Lower floret perfect, awnless, the upper staminate, with a hooked awn 28. HOLCUS, pl. 23
- 1. Florets 2 or more, all alike (except the reduced upper ones) 3.
 - 3. Articulation below the glumes, the spikelets falling entire 4.
 - 4. Lemmas with a conspicuous bent awn . . . 30. TRISSETUM, pl. 23
 - 4. Lemmas awnless or with very short awns. 29. SPHENOPHOLIS, pl. 23
 - 3. Articulation above the glumes, the glumes remaining after the fall of the spikelets 5.
 - 5. Spikelets several-flowered 33. DANTHONIA, pl. 24
 - 5. Spikelets 2-flowered 6.
 - 6. Lemmas keeled, the awn arising from above the middle 30. TRISSETUM, pl. 23
 - 6. Lemmas convex, the awn from below the middle 31. DESCHAMPSIA, pl. 24

TRIBE VIII. CHLORIDEAE

- 1. Spikelets 1-flowered 2.
 - 2. Culms tall, over 1 m. high 34. SPARTINA, pl. 25
 - 2. Culms low, much branched and spreading . . . 35. CYNODON, pl. 25
- 1. Spikelets with more than 1 flower 3.
 - 3. Culms erect, lemmas 3-awned; spikes numerous, racemose 36. BOUTELOUA, pl. 25
 - 3. Culms spreading, spikelets awnless; spikes few, digitate 37. ELEUSINE, pl. 25

TRIBE IX. FESTUCEAE

1. Spikelets of 2 forms, sterile and fertile intermixed, panicle dense, 1-sided. 44. *CYNOSURUS*, pl. 29
1. Spikelets all alike in the same inflorescence 2.
 2. Lemmas bearing 3 prominent nerves 3.
 3. Lemmas hairy on the nerves and callus, the midnerve extended as an awn. 38. *TRIODIA*, pl. 26
 3. Lemmas usually not hairy on the nerves and callus, awnless 4.
 4. Lemmas thick, broad, smooth, and shining. 39. *DIARRHENA*, pl. 26
 4. Lemmas thin. 42. *ERAGROSTIS*, pls. 28, 29
 2. Lemmas with 5 to many nerves, the nerves often very faint 5.
 5. Spikelets bearing 1 to 4 empty lemmas below the fertile florets; nerves faint. 40. *UNIOLA*, pl. 26
 5. Spikelets with no empty lemmas below the fertile florets; nerves usually prominent 6.
 6. Callus of florets bearded. 42. *SCHIZACHNE*, pl. 27
 6. Callus not bearded (lemmas cobwebby at base in *Poa*) 7.
 7. Lemmas keeled on the back 8.
 8. Spikelets much flattened, nearly sessile in dense 1-sided clusters at the ends of the stiff panicle branches. 44. *DACTYLIS*, pl. 29
 8. Spikelets not much flattened, not crowded in 1-sided clusters 9.
 9. Lemmas awned; spikelets large. 49. *BROMUS*, pls. 35, 36
 9. Lemmas awnless; spikelets small 46. *POA*, pls. 30-32
 7. Lemmas rounded on the back 10.
 10. Glumes papery; upper florets sterile; spikelets brown or purplish. 41. *MELICA*, pl. 27
 10. Glumes not papery; upper florets not unlike the others; spikelets usually green 11.
 11. Nerves of lemma prominent, parallel. 47. *GLYCERIA*, pl. 33
 11. Nerves of lemma faint, converging towards the apex 12.
 12. Lemmas bearing 2 small teeth at the apex, with an awn between them. . . 49. *BROMUS*, pls. 35, 36
 12. Lemmas pointed, awnless, or awned from the tip 13.
 13. Spikelets awned. . . . 48. *FESTUCA*, pl. 34
 13. Spikelets awnless. . . . 46. *POA*, pls. 30-32

TRIBE X. HORDEAE

1. Only one spikelet at each joint of the rachis 2.
 2. Spikelets placed with one edge to the rachis..... 50. *LOLIUM*, pl. 37
 2. Spikelets placed with the side to the rachis..... 51. *AGROPYRON*, pl. 38
1. Two or three spikelets at each joint of the rachis 3.
 3. Spikelets usually 1-flowered, 3 at each joint, the two on the sides with short stalks and usually poorly developed..... 52. *HORDEUM*, pl. 38
 3. Spikelets bearing 2 to 6 flowers, all alike 4.
 4. Glumes as long as the florets; spikes dense..... 53. *ELYMUS*, pl. 39
 4. Glumes only short bristles, sometimes absent; spikes loose..... 54. *HYSTRIX*, pl. 40

TRIBE XI. BAMBUSEAE

- A single genus..... 55. *ARUNDINARIA*, pl. 40

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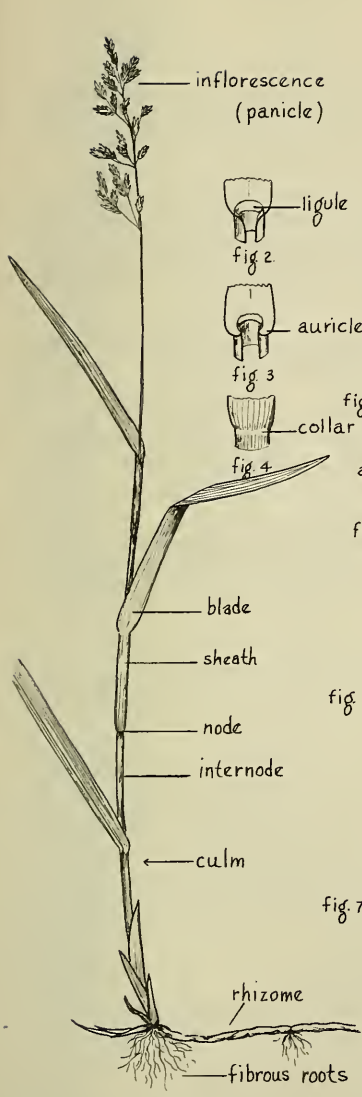


fig. 1 Complete plant

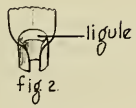


fig. 2

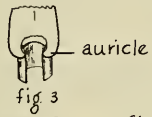


fig. 3

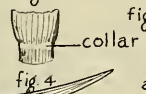


fig. 4

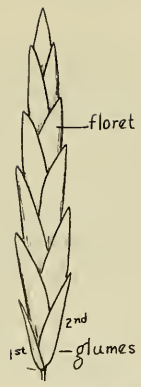


fig. 5 many-flowered spikelet

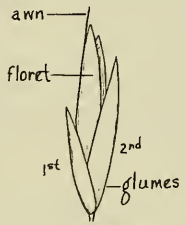


fig. 6 one-flowered spikelet

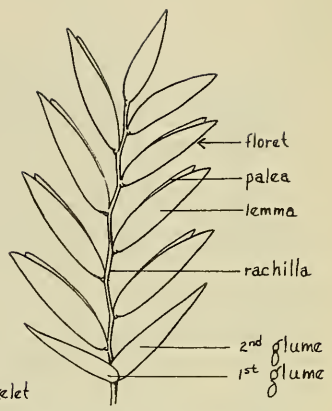


fig. 9 generalized spikelet

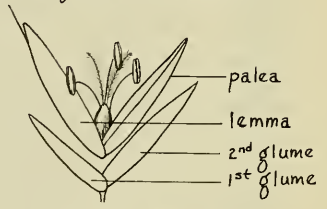


fig. 10 spikelet at flowering



fig. 7 floret in fruit



fig. 8 a fruit

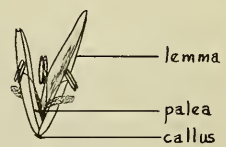


fig. 11 floret in flower

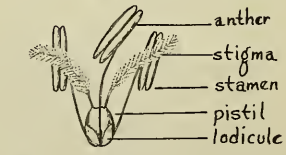


fig. 12 a flower

DESCRIPTION OF SPECIES

1. TRIPSACUM L.

Tall perennials from creeping rootstocks; leaves broad and flat; spikes terminal and axillary, breaking into joints at maturity. Spikelets unisexual, the staminate in pairs at each joint of the rachis in the upper part of the spikes, the pistillate imbedded one in each joint in the lower part of the spikes.

1. *T. dactyloides* L. GAMA GRASS. Culms glabrous, 1 to 2.5 m. high; leaves 1.5 to 3.5 cm. wide; spikes 1, 2, or 3 together at the top, 15 to 25 cm. long; axillary spikes solitary. In moist soil along the New River and the Potomac and its tributaries (Grant, Hampshire, and Fayette Counties). A good forage grass, especially liked by stock when young, but not common enough to be of importance. July-Aug.

Miscanthus sinensis Anderss. EULALIA, a grass 1 to 3 m. high, introduced from Asia, is often planted as an ornamental and occasionally escapes.

2. ERIANTHUS Michx.

Perennial, reed-like grasses, with long, flat leaf-blades and terminal, dense, silky panicles. Spikelets in pairs along a slender axis, 1 sessile, the other stalked. Glumes equal, covered with long, silky hairs.

1. *E. alopecuroides* (L.) Ell. *E. divaricatus* (L.) Hitchc. PLUME GRASS. Culms 1.5 to 3 m. tall; sheaths pilose at the summit; blades 1.5 to 2.5 cm. wide; panicle silvery to tawny; midnerve of lemma extending into a twisted awn about 1.2 cm. long. Moist soil in borders of woods in the southern counties (Wayne). A southeastern species. Sept.

3. SORGHUM Moench.

Tall annuals or perennials with flat blades and terminal panicles. Spikelets in pairs, one sessile and bearing a grain, the other stalked, but sterile, the terminal sessile spikelet with two stalked ones.

1. *Sorghum halepense* (L.) Pers. JOHNSON GRASS. Culms 5 to 15 dm. tall, erect from creeping, scaly rootstocks; leaves 2 cm. wide or less, often purple-spotted from a bacterial disease; panicle open, 1.5 to 5 dm. long; sessile spikelet 4.5 to 5.5 mm. long, bearing silky hairs; awn 1 to 1.5 cm. long, bent, twisted below; stalked spikelet 5 to 7 mm. long. Introduced from Europe by W. Johnson, of Alabama, about 1840; sometimes cultivated for forage, but on account of the difficulty of eradication it may become a bad weed. Specimens in the Herbarium represent Hampshire, Hardy, Grant, Kanawha, Summers, and McDowell Counties. July-Sept.

4. SORGHASTRUM Nash

Perennials with tall culms and flat leaves; racemes composed of only 2 or 3 joints; sterile spikelets only hairy pedicels, with no flowers developed.

1. *Sorghastrum nutans* (L.) Nash. INDIAN GRASS. Culms 1 to 2 m. high, not branched; sheaths smooth; leaves 6 to 10 mm. wide, rough; panicles 15 to 30 cm. long, at first open, then closing after flowering, spikelets 6 to 8 mm. long, yellowish or reddish brown, covered at the base with tawny hairs; glumes equal; lemma small, ending in a bent and twisted awn. A common constituent of wild hay in the prairie region, found in West Virginia in open woods and moist or dry soil throughout the State. The root leaves are important for forage. It is one of our most beautiful grasses. Aug.-Sept.



Plate 2

5. ANDROPOGON L.

Coarse, weedy perennials with solid stems; spikelets in racemes, in pairs at each joint of the rachis, one sessile and perfect, the other stalked and staminate or rudimentary; glumes nearly equal; lemma of the perfect flower with a bent or twisted awn; rachis and pedicels bearing long, silky hairs. Racemes enclosed, at least at the base, by a sheath or *spathe*.

1. Racemes 1 on each peduncle..... 2. *A. scoparius*
1. Racemes in groups of 2 to 7, on each peduncle 2.
2. Racemes on each branch usually 3 to 7, clustered at the end..... 5. *A. furcatus*
2. Racemes on each branch usually 2 3.
3. Racemes longer than the spathes..... 1. *A. Elliottii*
3. Spathes as long as the racemes 4.
4. Spathes very rough, racemes clustered in a dense mass near the summit of the culm..... 3. *A. glomeratus*
4. Spathes smooth; racemes scattered along the culm.. 4. *A. virginicus*

1. *A. Elliottii* Chapm. ELLIOTT BEARDGRASS. Culms 5 to 10 dm. tall, branching near the summit; lower sheaths pilose; upper sheaths numerous, broad and flattened, purplish or brown, and very conspicuous; internodes very short, densely bearded; blades flat, 3 to 4 mm. wide; racemes loosely soft-silky, mostly in pairs, on long, slender stalks; spikelets 4 mm. long. Dry soil in open ground, found only in the southern counties (Cabell). Sept.-Oct.

2. *A. scoparius* Michx. LITTLE BLUESTEM. Culms 4 to 12 dm. tall, the upper half freely branching; sheaths and blades usually nearly glabrous, the blades 3 to 6 mm. wide; racemes one on each stalk, mostly curved, the rachis pilose; sessile spikelets 6 to 8 mm. long; lemma awn twisted, 8 to 15 mm. long. Dry fields and open woods, throughout the State. It is a valuable forage plant when young but is avoided by stock as it becomes older. It is usually regarded as a weed, and its presence is an indicator of poor soil. July-Sept.

3. *A. glomeratus* (Walt.) BSP. BUSHY BEARDGRASS. Culms 5 to 15 dm. tall, flattened, with broad overlapping lower sheaths; culms bushy-branching at the summit; blades 3 to 8 mm. wide; inflorescence dense, feathery, about the length of the flattened spathes; peduncle and branchlets long-villous; sessile spikelets 3 to 4 mm. long. Low, moist ground, a southern species. Has been found in West Virginia only in Raleigh County. Sept.-Oct.

4. *A. virginicus* L. BROOMEDGE. Culms 5 to 12 dm. high, usually in clumps, freely branching; blades 2 to 5 mm. wide, hairy on the upper surface, inflorescence partly included in the enlarged bronze spathes; rachis very slender, long-villous; sessile spikelet 3 mm. long; lemma awn straight, 1 to 2 cm. long. The rich brown of the dead foliage is very conspicuous in the winter landscape. One of the most widespread and pernicious weeds in West Virginia, occurring in every county in open ground of abandoned fields, pastures, and meadows. It has some value for forage while young, but is rejected when older. It has no value for hay. Probably no native grass is better known to our farmers. Bundles of stems tied together have been used for brooms. Blooms late in the season. Dustman and Shriver found that the early growth of this grass showed high protein and low fiber content compared with the later growth stages and recommended reasonably early, close, and continuous grazing during the spring.

5. *A. furcatus* Muhl. BIG BLUESTEM. TURKEYFOOT. Culms often in large clumps, 1 to 1.5 m. tall, usually branched near the top; blades 4 to 8 mm. wide, the margins very rough; racemes on the long-extended terminal stalk mostly 3 to 6, fewer on the branches, usually purplish or yellowish; sessile spikelet 7 to 10 mm. long. Dry soil in fields and open woods throughout the State. This is an extremely important forage grass in the prairie states, but, while it is found probably in every county in the State, it is generally too uncommon in West Virginia to be of great value. Blooms late in the season.



A. virginicus



A. scoparius



A. Elliottii



A. glomeratus



A. furcatus

ANDROPOGON

6. DIGITARIA Scop.

Annual weedy grasses with branched culms and a digitate inflorescence. Spikelets with 1 perfect flower, lanceolate-elliptic, sessile or nearly so, in two rows on one side of a narrow or winged rachis, forming slender racemes which are clustered at the summit of the culm.

1. Lower leaf-blades more or less hairy 3. *D. sanguinalis*
1. Leaf-blades glabrous 2.

2. Lower sheaths with hairs; rachis narrow, wingless 1. *D. filiformis*
2. Lower sheaths glabrous; rachis winged 2. *D. Ischaemum*

1. *D. filiformis* (L.) Koeler. FINGER GRASS. Usually growing in clumps, branched and leafy at the base; culms very slender, 1 to 7 dm. high; lower sheaths with stiff straight hairs; leaves 1 to 4 mm. wide; racemes 1 to 5, unequal in length, 3 to 10 cm. long, the rachis narrow, wingless; spikelets 1.7 mm. long, lying flat against the rachis; first glume absent; the second covered with soft, white, gland-tipped hairs. Sterile or sandy soil, rare in West Virginia (has been found in Monongalia and Hampshire Counties). July-Sept.

2. *D. Ischaemum* (Schreb.) Muhl. *D. humifusa* Pers. SMOOTH CRAB GRASS. Culms glabrous, 1.5 to 4 dm. long, much branched near the base, ascending or nearly prostrate on the ground; leaves 3 to 6 mm. wide; racemes 2 to 6, divergent, 3 to 10 cm. long, the rachis winged; spikelets about 2 mm. long, glume and sterile lemma equal in length, densely hairy; fertile lemma dark brown. Cultivated and waste ground, introduced from Europe. Not so common in West Virginia as the next species (has been found in Wetzel, Monongalia, Preston, Hampshire, and Wayne counties). Aug.-Oct.

3. *D. sanguinalis* (L.) Scop. CRAB GRASS. Culms 3 to 12 dm. long, erect or ascending from a decumbent base, or creeping and rooting at the nodes; sheaths with soft hairs; leaves 4 to 10 mm. wide, rough, often hairy; racemes 3 to 12, 5 to 18 cm. long; spikelets about 3 mm. long; first glume present but small; second glume half as long as the fertile lemma. Widespread in cultivated and waste grounds throughout the State, one of the most common and troublesome weeds of lawns. It is a hot weather grass, drought resistant, rooting at the joints of the prostrate stems. Since it is an annual it may be controlled by preventing it from seeding. Aug.-Oct.



DIGITARIA

7. PASPALUM L.

Perennial grasses with an inflorescence of one or more racemes borne at the summit of the culm or in the axils of the uppermost leaves; spikelets 1-flowered, plano-convex, with a very short stalk, in two rows on one side of the elongated rachis; spikelets with the back of the fertile lemma against the rachis; first glumes usually absent; lemma and palea hardened. The species of this genus furnish a limited amount of forage.

1. Plants bearing terminal inflorescences and 1 or more axillary racemes from the uppermost sheath 2.
2. Leaves glabrous on both surfaces, ciliate on the margin. 1. *P. ciliatifolium*
2. Leaves hairy on one or both surfaces..... 2. *P. pubescens*
1. Plants bearing only terminal inflorescences; axillary racemes none 3.
3. Spikelets 3 mm. long..... 5. *P. circulare*
3. Spikelets 2.5 mm. long 4.
4. Plants glabrous or with only scattered hairs..... 3. *P. laeve*
4. Plants with hairy sheaths and blades..... 4. *P. longipilum*

1. *P. ciliatifolium* Michx. Culms erect, 4 to 9 dm. high; leaves 6 to 20 mm. wide, ciliate on the margin, otherwise glabrous; inflorescences 5 to 10 cm. long, one terminal, and one or more others coming from the uppermost sheath; spikelets 2 mm. long, broadly oval. Exceedingly variable. Sandy soil. A southeastern species, rare in West Virginia. Reported from Wyoming and Hardy Counties. July-Sept.

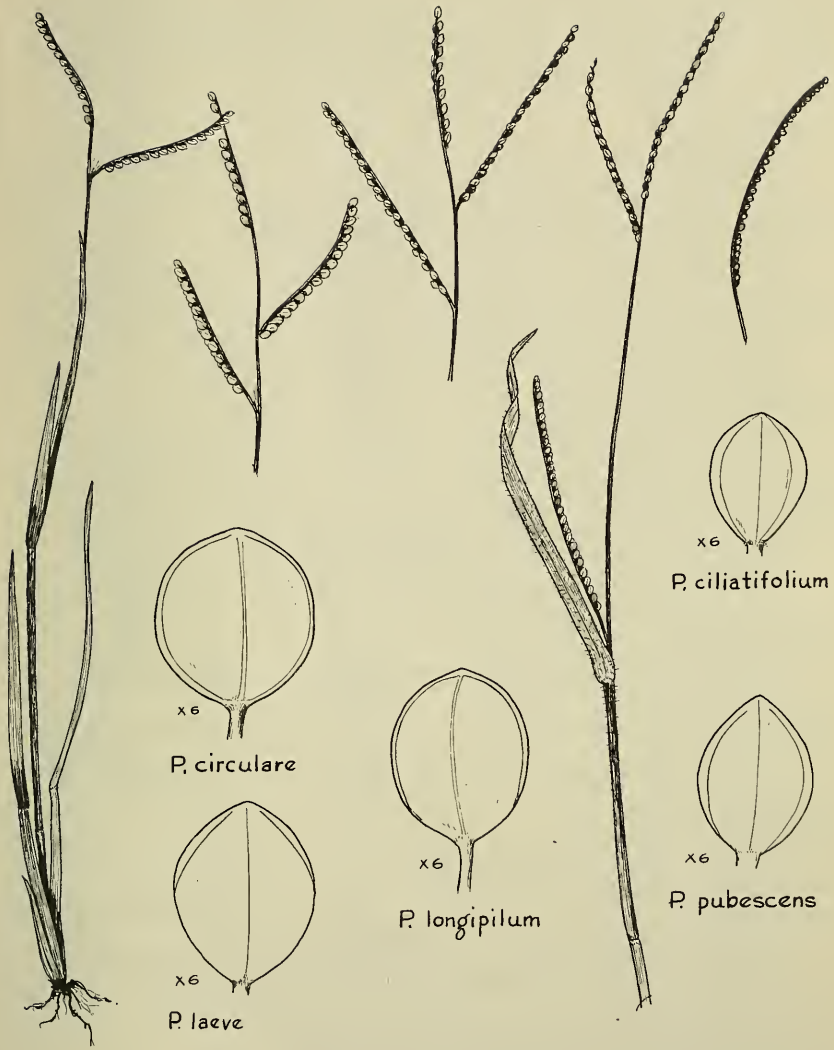
P. setaceum Michx., which somewhat resembles *P. ciliatifolium* but has spikelets only 1.5 mm. long, has been found in Pendleton County.

2. *P. pubescens* Muhl. HAIRY PASPALUM. Culms slender, erect, 4 to 9 dm. tall, often hairy at the summit; leaves 2 to 10 mm. wide, with long soft hairs on both surfaces; inflorescences 1 to 3, one terminal and one or more from the uppermost sheath, 4 to 17 cm. long; spikelets 2 mm. long, glabrous. Sandy soil in old fields, pastures, and dry woods. Apparently the commonest *Paspalum* in West Virginia. Aug.-Sept.

3. *P. laeve* Michx. SMOOTH PASPALUM. Culms spreading or prostrate on the ground, 3 to 6 dm. long; leaves 3 to 10 mm. wide, glabrous, or with a few hairs on the upper surface; inflorescence terminal, consisting of usually 3 or 4 racemes, each 3 to 10 cm. long; spikelets glabrous, about 2.5 mm. long. Sandy soil in meadows, open woods, and old fields, frequent throughout the State. A late summer grass, well liked by stock. July-Oct.

4. *P. longipilum* Nash. *P. plenipilum* Nash. LONG-HAIRED PASPALUM. Culms erect or spreading, 5 to 10 dm. tall; sheaths with soft hairs; leaves 3 to 10 mm. wide, usually bearing soft hairs; inflorescence terminal, of 2 to 4 racemes 4 to 8 cm. long; spikelets glabrous, about 2.5 mm. long. Resembles *P. laeve*. Fields and open ground, generally in moist soil. A southeastern species, found in West Virginia only in the southern counties (reported from Fayette and Wyoming). Aug.-Sept.

5. *P. circulare* Nash. Culms 5 to 10 dm. long; sheaths usually with stiff hairs; leaves 5 to 8 mm. wide, hairy on the upper surface, usually glabrous underneath; inflorescence terminal, of 2 to 4 racemes 6 to 10 cm. long; spikelets orbicular, about 3 mm. long. Open moist ground, throughout the State but apparently infrequent (specimens from Monongalia, Barbour, Wirt, Randolph, and Kanawha Counties). June-Sept.



x6

P. circulare

x6

P. laeve

x6

P. longipilum

x6

P. ciliatifolium

x6

P. pubescens

PASPALUM

8. PANICUM L.

Annual or perennial grasses, mostly weedy in habit; spikelets with 1 perfect flower and 1 imperfect one below it; glumes unequal, the first very small, the second about equal to the sterile lemma; fertile lemma hardened, the edges in-rolled; grain firmly enclosed by the lemma and palea. Many species produce an unbranched culm in the spring, called the *vernal phase* which later in the year branches and becomes more or less bushy. This stage, the *autumnal phase*, (see plate 9) is often quite different in appearance from the earlier form. Some species produce *winter rosettes* of basal leaves which remain during the spring and are usually different in shape from the culm leaves (plate 9). Our species have only a limited value for forage.

1. Annuals 2.
1. Perennials 6.
 2. Plants glabrous..... 5. *P. dichotomiflorum*, pl. 6
 2. Plants bearing stiff hairs 3.
3. Panicle more than half the length of the entire plant 4.
3. Panicle not over one third the length of the entire plant 5.
 4. Panicle with widely spreading branches; spikelets 2 to 2.5 mm. long..... 1. *P. capillare*, pl. 6
 4. Panicle narrow; spikelets 3 to 3.5 mm. long..... 3. *P. flexile*, pl. 6
5. Culms thick; leaves about 10 mm. wide..... 2. *P. Gattingeri*, pl. 6
5. Culms slender; leaves 6 mm. wide or less..... 4. *P. philadelphicum*, pl. 6
 6. Basal leaves similar to culm leaves, not forming a rosette 7.
 6. Basal leaves distinctly different from culm leaves, forming a rosette 11.
7. Spikelets on long pedicels 8.
7. Spikelets on short pedicels along the main branches 9.
 8. Branches of panicle spreading..... 7. *P. virgatum*, pl. 6
 8. Branches of panicle ascending..... 6. *P. amarulum*, pl. 6
9. Rootstocks present; culms not flattened; spikelets 3.5 mm. long..... 10. *P. anceps*, pl. 7
9. Rootstocks absent; culms much flattened; spikelets smaller 10.
 10. Fruit stalked in the spikelet; spikelets 2.5 to 2.8 mm. long..... 9. *P. stipitatum*, pl. 7
 10. Fruit not stalked in the spikelet; spikelets 1.8 to 2 mm. long..... 8. *P. agrostoides*, pl. 7
11. Spikelets 3 mm. or more long 12.
11. Spikelets less than 3 mm. long 15.
 12. Leaves linear-elongated, not over 5 mm. wide 11. *P. depauperatum*, pl. 7
 12. Leaves lanceolate, more than 15 mm. wide 13.
13. Spikelets 3 mm. long..... 14. *P. clandestinum*, pl. 8
13. Spikelets 3.5 to 4 mm. long 14.
 14. Nodes bearded with hairs pointed downwards..... 15. *P. Boscii*, pl. 8
 14. Nodes not bearded..... 16. *P. latifolium*, pl. 8
15. Spikelets glabrous 16.
15. Spikelets hairy 19.
 16. Spikelets less than 1.5 mm. long..... 20. *P. microcarpon*, pl. 8
 16. Spikelets 2 to 2.5 mm. long 17.
17. Spikelets 2 mm. long 18.
17. Spikelets 2.5 mm. long..... 19. *P. yadkinense*, pl. 8
 18. Lower nodes usually bearded; second glume as long as the mature fruit..... 18. *P. barbulatorum*, pl. 8
 18. Nodes not bearded; second glume shorter than the mature fruit..... 17. *P. dichotomum*, pl. 8
19. Leaves conspicuously elongated, less than 5 mm. wide 20.
19. Leaves not conspicuously elongated, the principal leaves in nearly every case more than 5 mm. wide 21.
 20. Sheaths glabrous..... 13. *P. Wernerii*, pl. 7
 20. Sheaths pilose..... 12. *P. linearifolium*, pl. 7
21. Sheaths with conspicuous, long, soft hairs pointed downwards..... 21. *P. xalapense*, pl. 9
21. Not as above 22



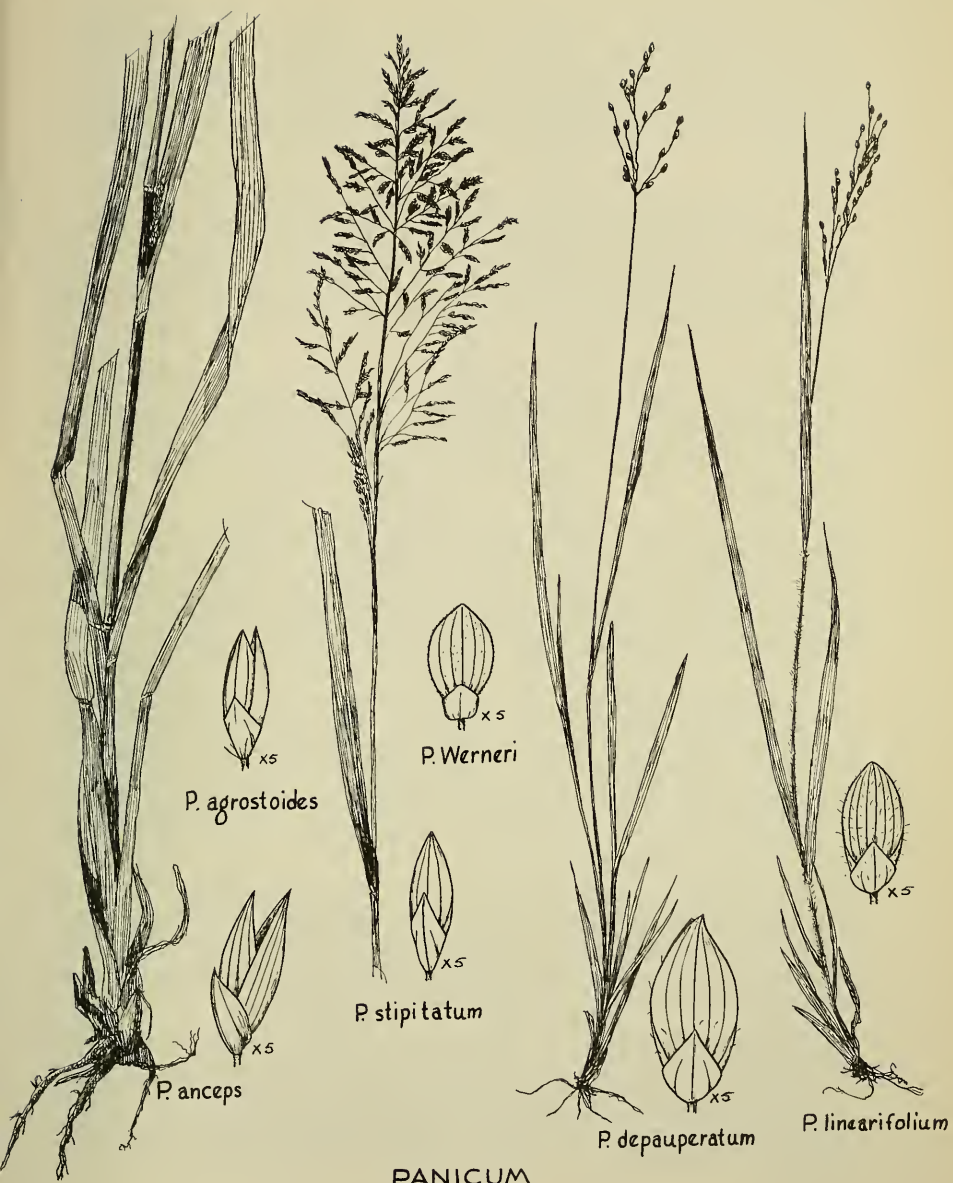
PANICUM

22. Sheaths mostly glabrous 23.
 22. Sheaths hairy 23.
23. Ligule 4 to 5 mm. long 23. *P. Lindheimeri*, pl. 9
 23. Ligule less than 1 mm. long 24.
 24. Culms bearing short hairs 30. *P. Ashei*, pl. 10
 24. Culms glabrous 25.
25. Spikelets 1.5 to 1.8 mm. long 26.
 25. Spikelets 2.2 to 2.8 mm. long 27.
 26. Nodes hairy; leaves 6 to 10 cm. long, 7 to 14
 mm. wide 25. *P. sphaerocarpon*, pl. 9
 26. Nodes not hairy, leaves 12 to 23 cm. long, 15 to
 24 mm. wide 24. *P. polyanthes*, pl. 9
27. Leaves 12 to 20 mm. wide 29. *P. commutatum*, pl. 10
 27. Leaves 6 to 12 mm. wide 22. *P. Clutei*, pl. 9
 28. Sheaths with fine, short hairs 30. *P. Ashei*, pl. 10
 28. Sheaths with long, soft hairs or velvety 29.
29. Plants grayish-velvety 27. *P. auburne*, pl. 10
 29. Plants not velvety; sheaths with long, soft hairs 30.
 30. Hairs on the sheaths spreading 31.
 30. Hairs lying close and flat against the sheaths 36.
31. Spikelets 2.2 to 2.5 mm. long 28. *P. villosissimum*, pl. 10
 31. Spikelets 1.3 to 1.9 mm. long 32.
 32. Upper surface of leaves usually glabrous 26. *P. tennesseense*, pl. 10
 32. Upper surface of leaves usually pubescent 33.
33. Upper surface of leaves with long erect hairs 34.
 33. Upper surface of leaves with short hairs or the hairs
 lying close and flat against the leaf 34. *P. huachucae*, pl. 11
 34. Axis of panicle with long, soft hairs 31. *P. implicatum*, pl. 11
 34. Axis of panicle nearly glabrous 35.
35. Upper surface of leaves with fine, short hairs in
 addition to the long hairs 33. *P. albemarlense*, pl. 11
 35. Upper surface of leaves not as above 32. *P. meridionale*, pl. 11
 36. Ligule very short, usually about 0.5 mm. long 37.
 36. Ligule of conspicuous hairs, usually 3 to 5 mm. long 38.
37. Spikelets 1.8 to 1.9 mm. long; leaves 4 to 7 cm. long 35. *P. tsugetorum*, pl. 11
 37. Spikelets 1.5 to 1.7 mm. long; leaves 4 to 5 cm.
 long 36. *P. columbianum*, pl. 11
 38. Plants decumbent, forming a mat; olive-green 33. *P. albemarlense*, pl. 11
 38. Plants erect, not forming a mat; yellowish
 green 32. *P. meridionale*, pl. 11

1. *P. capillare* L. OLD WITCH GRASS. Annual; culms thick, somewhat branched, ascending, 2 to 8 dm. tall; sheaths and usually the leaves bearing long, stiff hairs; leaves 5 to 15 mm. wide; panicle very large and spreading, about half the length of the entire plant; spikelets 2 to 2.5 mm. long; second glume and sterile lemma taper-pointed. At maturity the panicles break away and are blown around like tumble weeds. Sandy soil, a very common weed in fields throughout the State. Aug.-Oct.

2. *P. Gattingeri* Nash. TICKLEGRASS. Annual grass bearing stiff hairs all over; culms widely spreading, up to 1 m. high, branching at each node and the branches again branching; leaves 6 to 10 mm. wide; panicles oval, widely spreading; spikelets 2 mm. long. Moist, open ground and waste places, infrequent. We have specimens from Preston, Monongalia, Wetzel, Marshall, and Wayne Counties. Aug.-Oct.

3. *P. flexile* (Gattinger) Scribn. WIRY WITCH GRASS. Annual; culms slender, erect, 3 to 6 dm. high, branched at the base; leaves erect, 2 to 6 mm. wide, usually bearing stiff hairs; panicle about half the length of the entire plant; spikelets glabrous, 3 to 3.5 mm. long, solitary at the ends of the branches; second glume and sterile lemma taper-pointed, much longer than the fruit. Sandy, often damp soil of meadows and open woods. Apparently rare in West Virginia,



PANICUM

Plate 7

although it may be often mistaken for *P. capillare*, which it closely resembles. Reported from Monroe County. July-Oct.

4. *P. philadelphicum* Bernh. WOOD WITCH GRASS. Annual, the entire plant bearing stiff hairs; culms slender, erect or somewhat decumbent at the base, much branched, zigzag, 1.5 to 4 dm. high; leaves 2 to 6 mm. wide; panicle about one third the height of the entire plant, few-flowered; spikelets 1.7 to 1.8 mm. long; second glume and sterile lemma sharp-pointed, about the length of the fruit. Dry woods, clearings, and sandy shores, uncommon; has been found in Jefferson, Berkeley, Hampshire, Preston, Monongalia, and Wirt Counties. Aug.-Sept.

5. *P. dichotomiflorum* Michx. SPREADING WITCH GRASS. Annual; culms thick, flattened, branched, glabrous, spreading from a leaning base, 3 to 18 dm. long; ligule a dense ring of white hairs; leaves 8 to 15 mm. wide; panicles 1.2 to 4 dm. long, very widely spreading; spikelets 3 mm. long, sharp-pointed; second glume and sterile lemma pointed beyond the fruit. Low waste ground and cultivated fields, abundant in the autumn after cultivation has ceased. Common throughout the State. July-Oct.

6. *P. amarulum* Hitchc. & Chase. Culms thick, 1 to 2 m. tall, in large bunches; leaves 5 to 12 mm. wide, somewhat inrolled, hairy on the upper surface near the base; panicle large, 5 to 10 cm. wide, slightly nodding, densely flowered; spikelets 4 to 5.5 mm. long, taper-pointed. Sandy seashores and coastal dunes; the only West Virginia record is from Raleigh County, where it may have been introduced.

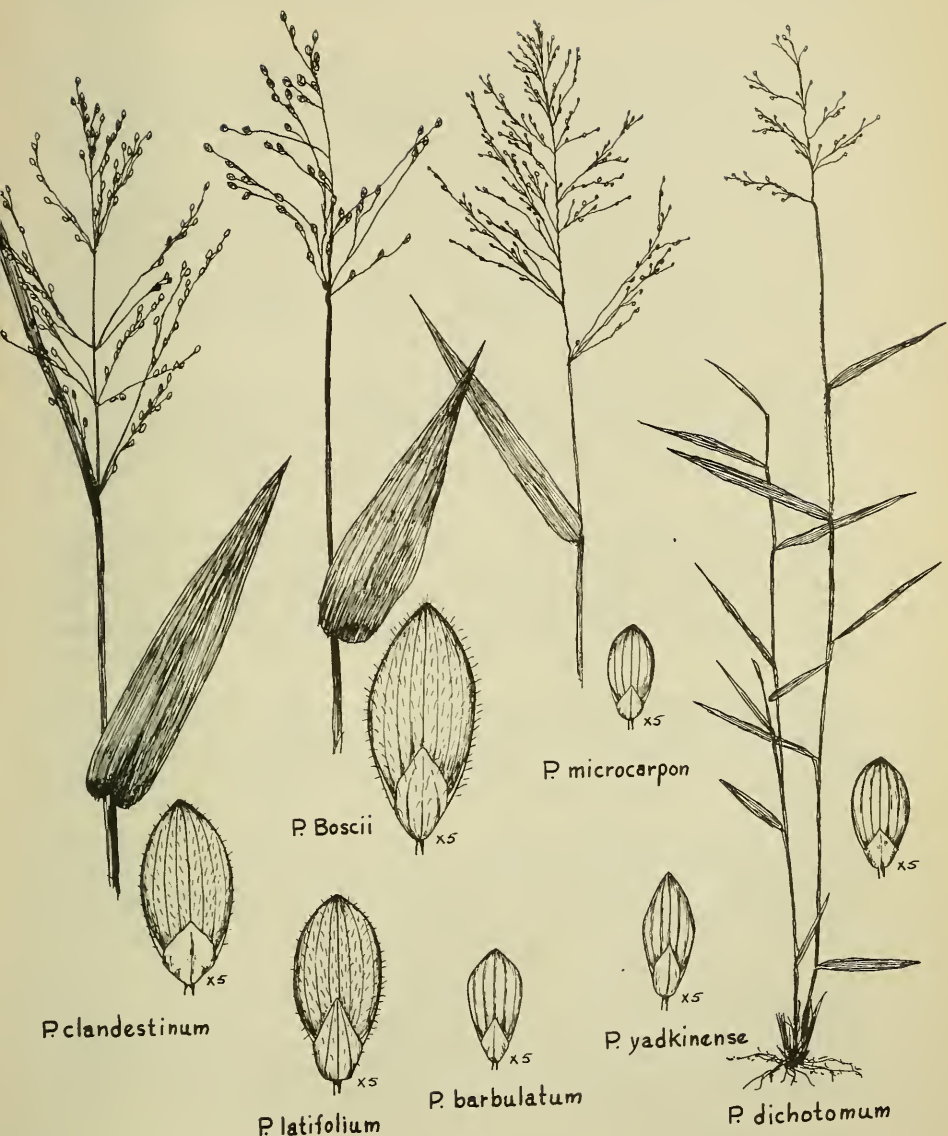
7. *P. virgatum* L. SWITCH GRASS. Culms thick, glabrous, 1 to 2 m. tall, in clumps from thick horizontal rootstocks; leaves flat, 3 to 15 mm. wide, almost completely glabrous; panicles 1.5 to 5 dm. long, open, and widely spreading; spikelets 3.5 to 5 mm. long; second glume and sterile lemma spreading and pointed, longer than the fruit. Very variable. Low, open ground. Common throughout the State. It is good for grazing when young and because of its tough rootstocks is acceptable for control of water erosion. Aug.-Sept.

8. *P. agrostoides* Spreng. RED-TOP PANIC GRASS. Culms thick, 4 to 10 dm. high; sheaths loose; leaves 6 to 10 mm. wide; panicle usually purplish, 1 to 3 dm. long, the branches stiff and ascending, densely flowered, mostly on the under side; spikelets 2 mm. long. The inflorescence somewhat resembles red-top. Wet meadows and shores; a good forage plant, but not sufficiently common or easily available to be of importance. Reported from Morgan, Hampshire, Hardy, Monongalia, and Pocahontas Counties; doubtless occurs in most counties of the State. Aug.-Sept.

9. *P. stipitatum* Nash. TALL FLAT PANIC GRASS. Culms rather thick, 4 to 10 dm. high; leaves 6 to 10 mm. wide, purplish; panicle dark purple, 1 to 2 dm. long; spikelets lanceolate, 2.5 mm. long, arranged along one side of the branchlets; second glume longer than the sterile lemma, fruit stalked ("stipitate"); no hairs at base of spikelet. Moist soil, apparently uncommon; specimens from Monongalia, Summers, and Nicholas Counties. July-Sept.

10. *P. anceps* Michx. FLAT-STEMMED PANIC GRASS. Culms erect, 6 to 12 dm. high, with scaly rootstocks; sheaths somewhat flattened; leaves 6 to 10 mm. wide, flat; panicles 2 to 5 dm. long, very loose and open; branches spreading; spikelets in somewhat one-sided arrangements, 3.5 mm. long; second glume and sterile lemma curved at the apex, one-third longer than the fruit. Moist, sandy soil, in the central and southern counties (Nicholas, Braxton, Raleigh). July-Sept.

11. *P. depauperatum* Muhl. STARVED PANIC GRASS. Culms erect, 2 to 4 dm. high, in small clumps, branched at the base; leaves about as long as the culm, 2 to 5 mm. wide; panicles 4 to 8 cm. long, few-flowered; spikelets 3.2 to



PANICUM

3.8 mm. long, elliptic, strongly nerved; second glume and sterile lemma extending in a point beyond the fruit. Sterile woods; has been found in Berkeley, Morgan, Hardy, Monongalia, and Summers Counties. Characteristic of very barren acid land. May-June.

12. *P. linearifolium* Scribn. LOW PANIC GRASS. Culms 2 to 4.5 dm. high, in dense clumps, very slender, erect; sheaths hairy; leaves erect, 2 to 4 mm. wide, often hairy, usually overtopping the panicles; panicle 5 to 10 cm. long, few-flowered, the branches spreading; spikelets 2.4 to 2.7 mm. long, blunt, somewhat hairy; second glume and sterile lemma as long as the fruit. Dry acid woods, common throughout the State. May-July.

13. *P. Wernerii* Scribn. WERNER'S PANIC GRASS. Culms in small clumps, erect, nearly glabrous, 2 to 4.5 dm. high; sheaths glabrous, nodes bearing a few long hairs; leaves conspicuously elongated, erect, 3 to 6 mm. wide; spikelets 2.2 to 2.3 mm. long, nearly glabrous. Closely resembles *P. linearifolium*, of which it is sometimes regarded as a variety. Sterile woods and knolls, frequent (has been found in Berkeley, Morgan, Hampshire, Mineral, Upshur, Wetzel, and Mercer Counties). June-July.

14. *P. clandestinum* L. DEERTONGUE GRASS. Culms 5 to 12 dm. high, erect, thick, usually in very large clumps, bearing stiff hairs; sheaths hairy; leaves 1.5 to 3 cm. wide, strongly nerved; panicle open, 1 to 1.5 dm. long, densely flowered; spikelets 3 mm. long, elliptic, hairy. Autumnal phase with short branches and crowded leaves. Common in moist, usually sandy, ground in all parts of the State. Our commonest moist-soil panic grass. June-Sept.

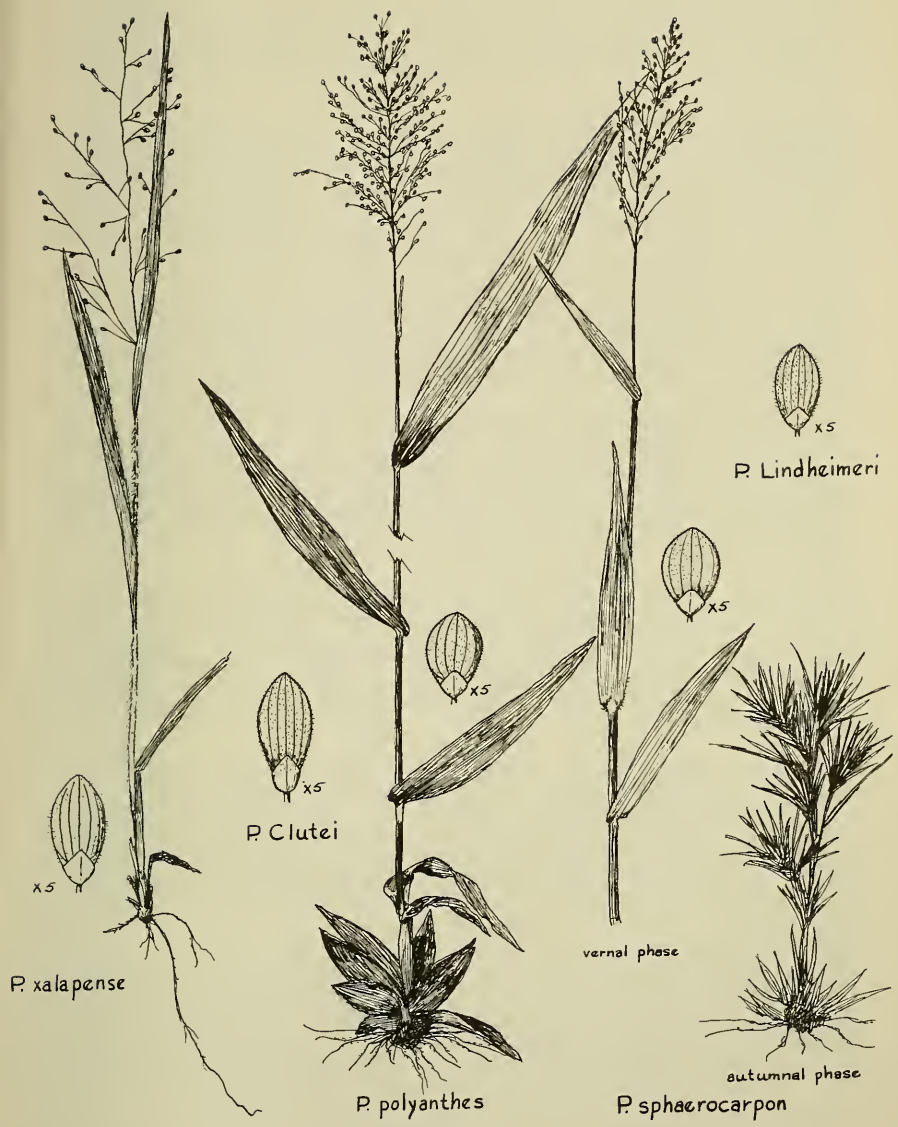
15. *P. Boscii* Poir. Culms 3 to 7 dm. high, pubescent or glabrous; lower nodes bearded; sheaths fine-hairy, with a dense ring of hairs at the summit; blades 2.5 to 3 cm. wide, hairy; panicle 6 to 10 cm. long; spikelets 4 to 4.5 mm. long, obovate; second glume and sterile lemma hardly as long as the fruit. Autumnal phase more or less branching. Common in woods throughout the State. In the var. *molle* (Vasey) Hitchc. & Chase the plant is very downy-hairy. June-Aug.

16. *P. latifolium* L. Culms glabrous, or sometimes hairy near the base, 4.5 to 10 dm. high; leaves 1.5 to 4 cm. wide, fringed with hairs near the base, otherwise glabrous; panicle 8 to 15 cm. long, few-flowered; spikelets 3.5 to 3.8 mm. long, obovate-elliptic. Autumnal phase branching from the middle nodes. Rocky woods, common, especially in the mountain counties. June-Aug.

17. *P. dichotomum* L. BUSHY PANIC GRASS. Culms glabrous, often purpletinged, 3 to 5 dm. high, erect; leaves spreading, 4 to 8 mm. wide, the basal ones short, forming flat rosettes in autumn; panicle 4 to 9 cm. long, spreading; spikelets elliptical-oblong, 2 mm. long; second glume shorter than the fruit. Autumnal phase erect, "branched at the top like a little tree." Common in all parts of the State in dry, open, acid woods. May-Aug.

18. *P. barbdatum* Michx. Culms 5 to 8 dm. high, in large clumps; lower nodes usually bearded; leaves 6 to 10 mm. wide, glabrous; panicle 6-11 cm. long, lower branches drooping at maturity; spikelets 2 mm. long, glabrous; second glume and sterile lemma equal. Autumnal phase much branched, forming large, top-heavy bunches reclining on the ground. Similar to *P. dichotomum*. Dry, rocky woods and hillsides, common throughout the State. May-June.

19. *P. yadkinense* Ashe. Culms 3 to 10 dm. tall; sheaths usually bearing pale spots; leaves 8 to 11 mm. wide; panicle 10 to 12 cm. long, with slender branches; spikelets 2.5 mm. long, pointed, glabrous; second glume and sterile lemma longer than the fruit. Autumnal phase leaning, not much branched. Moist woods and thickets. A southeastern species; rare in West Virginia (Fayette and Lincoln Counties). Named from Yadkin River, North Carolina.



PANICUM

Plate 9

20. *P. microcarpon* Muhl. SMALL-FRUITED PANIC GRASS. Culms erect, in large clumps, 6 to 10 dm. tall; nodes swollen, densely bearded, with hairs bent downwards; leaves 8 to 15 mm. wide, thin, fringed with hairs at the base, otherwise glabrous; panicles 8 to 12 cm. long; spikelets 1.6 mm. long, glabrous; second glume slightly longer than the fruit. Autumnal phase much branched, reclining or flat on the ground, with densely crowded small leaves and panicles. The common panic grass of wet woods and swampy places throughout the State. June-July.

21. *P. xalapense* HBK. Culms in soft clumps, 1 to 4 dm. high, glabrous; nodes bearded; sheaths hairy; leaves 6 to 11 mm. wide, nearly glabrous except for a fringe of hairs on the margins; panicles 6 to 10 cm. long, the branches long and slender, spreading, few-flowered; spikelets 2 mm. long; second glume and sterile lemma with long soft hairs. Low woods, frequent (Preston, Marion, Fayette, Wyoming, Boone, and Lincoln Counties); a southern species reaching its northern limit in West Virginia. Named for Xalapa, Mexico.

22. *P. Clutei* Nash. Vernal phase olive-green, often purple-tinged; culms erect, often 1 m. tall; lower nodes velvety; lower sheaths velvety-hairy; leaves 8 to 12 mm. wide, the lower ones velvety-hairy; panicle 8 to 10 cm. long, many-flowered; spikelets 2.2 to 2.3 mm. long. Low moist ground, mainly on the coastal plain; in West Virginia reported only from Webster and Wyoming Counties.

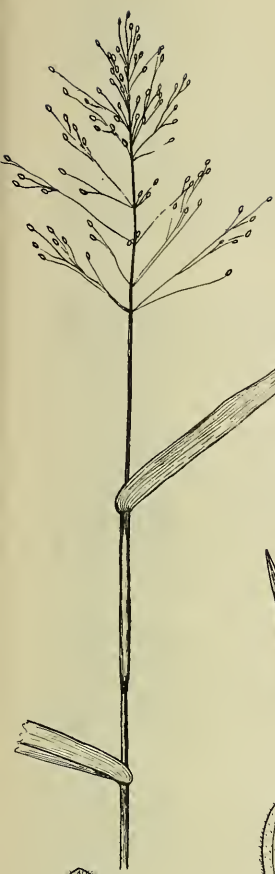
23. *P. Lindheimeri* Nash. LINDHEIMER'S PANIC GRASS. Culms stiff, ascending or spreading, 5 to 10 dm. long, glabrous, or hairy near the base; sheaths nearly glabrous; ligule 4 to 5 mm. long; leaves 6 to 8 mm. wide, nearly glabrous; panicle 4 to 7 cm. long, loosely flowered; spikelets 1.5 mm. long, obovate, blunt, hairy; second glume shorter than the fruit. Autumnal phase elongated, usually radiating flat on the ground from the base. Common in sandy woods and open ground throughout the State. June-Aug.

24. *P. polyanthes* Schultes. MANY-FLOWERED PANIC GRASS. Culms erect, light green, 3 to 9 dm. high; nodes glabrous; sheaths usually overlapping; leaves 1.5 to 2.5 cm. wide, strongly nerved, fringed with hairs near the base; panicle 8 to 25 cm. long, densely flowered, the lower branches nearly erect; spikelets nearly spherical, 1.5 to 1.6 mm. long; fruit straw-colored. Autumnal phase only a little branched. Damp ground, woods, and openings. Common throughout the State. July-Sept.

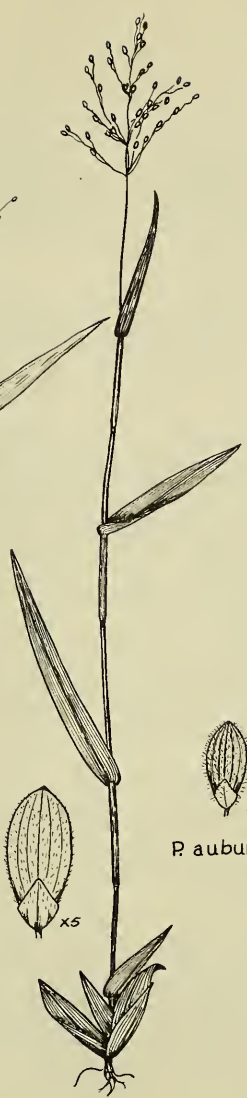
25. *P. sphaerocarpon* Ell. ROUND-FRUITED PANIC GRASS. Culms rather thick, glabrous, dull green, 2 to 5.5 dm. high, widely spreading; nodes hairy; leaves 7 to 14 mm. wide, fringed with stiff hairs at the base; panicle 5 to 10 cm. long, loosely flowered, with sticky spots on the axis; spikelets usually purple, 1.6 to 1.8 mm. long; fruit white; autumnal phase prostrate-spreading, with a few short branches. Open places especially in sandy ground, in southern West Virginia; has been found in Raleigh, McDowell, and Greenbrier Counties. May-June.

26. *P. tennesseeense* Ashe. Culms often purplish, 2.5 to 6 dm. high, stiffly spreading, hairy; sheaths hairy; leaves 5 to 8 mm. wide, with a thin white margin, upper surface nearly glabrous, lower surface usually hairy; ligule a dense ring of hairs, 4 to 5 mm. long; panicle purplish, 4 to 7 cm. long, densely flowered; spikelets 1.6 to 1.7 mm. long, blunt; second glume shorter than the mature fruit. Autumnal phase widely spreading with numerous clustered branches. Open, moist ground and borders of woods, common throughout the State. July-Aug.

27. *P. auburne* Ashe. Vernal phase grayish-hairy and velvety all over; culms 2 to 5 dm. tall, wide-spreading, soon branching and falling over at the base; leaves 3 to 5 mm. wide; panicle 3 to 5 cm. long; spikelets 1.3 to 1.4 mm. long, obovate, densely hairy. Autumnal phase much branched, spreading flat on the ground and forming large mats. Sandy pine and oak woods mainly on the coastal plain; in West Virginia reported only from Monongalia County.



P. commutatum

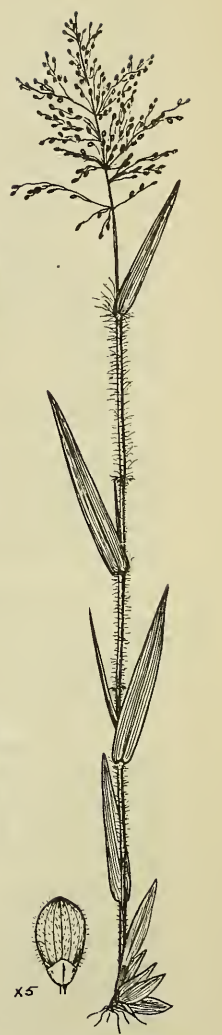


P. Ashei

P. auburne



P. villosissimum



P. tennesseense

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28. *P. villosissimum* Nash. WHITE-HAIRED PANIC GRASS. Culms olive-green, 2.5 to 4.5 dm. high, erect, slender, clothed with long, spreading hairs; sheaths also hairy; ligule densely hairy, 4 to 5 mm. long; leaves 5 to 10 mm. wide, bearing soft hairs on both surfaces; panicles 4 to 8 cm. long, loosely flowered; spikelets 2.2 to 2.5 mm. long, blunt, hairy. Autumnal phase spreading, later becoming flat on the ground, the clump having a "combed-out appearance", a conspicuous feature in the field. Sandy or sterile soil, open woods and hillsides, local (specimens from Hardy, Greenbrier, and Wyoming Counties).

29. *P. commutatum* Schultes. VARIABLE PANIC GRASS. Culms thick, erect, glabrous, 4 to 7.5 dm. high, in clumps; sheaths glabrous or nearly so, except for a ring of hairs at the summit; leaves 1.2 to 2 cm. wide, nearly glabrous; panicle 6 to 11 cm. long; spikelets 2.6 to 2.8 mm. long, oblong-elliptic, blunt. Autumnal phase with spreading branches from the middle nodes. Dry woods and thickets, common throughout the State. June-July.

30. *P. Ashei* Pearson. Culms purplish, thick, erect, wiry, 2.5 to 5 dm. high, in loose clumps, densely covered with short, crisp hairs; leaves 5 to 12 mm. wide, rigid, nearly glabrous; panicle 5 to 10 cm. long; spikelets oblong; obtuse, 2.6 mm. long. Autumnal phase much branched, with crowded leaves, often top-heavy and reclining on the ground. Dry, rocky woods, common throughout the State. May-Aug.

31. *P. implicatum* Scribn. Culms slender, erect, 2 to 5.5 dm. high, soft-hairy; leaves 3 to 6 mm. wide, upper surface bearing erect, soft hairs, the lower surface with short, appressed hairs; ligule 4 to 5 mm. long; panicle 3 to 5 cm. long, the axis bearing long, soft hairs, the branches very slender, often tangled ("implicate"); spikelets 1.5 mm. long, obovate, blunt, hairy. Autumnal phase with numerous branches from the lower nodes. Wet meadows, bogs, and wooded swamps. A northern species, at the southern limit of its range in West Virginia. We have specimens from Hancock and Mercer Counties. June-Aug.

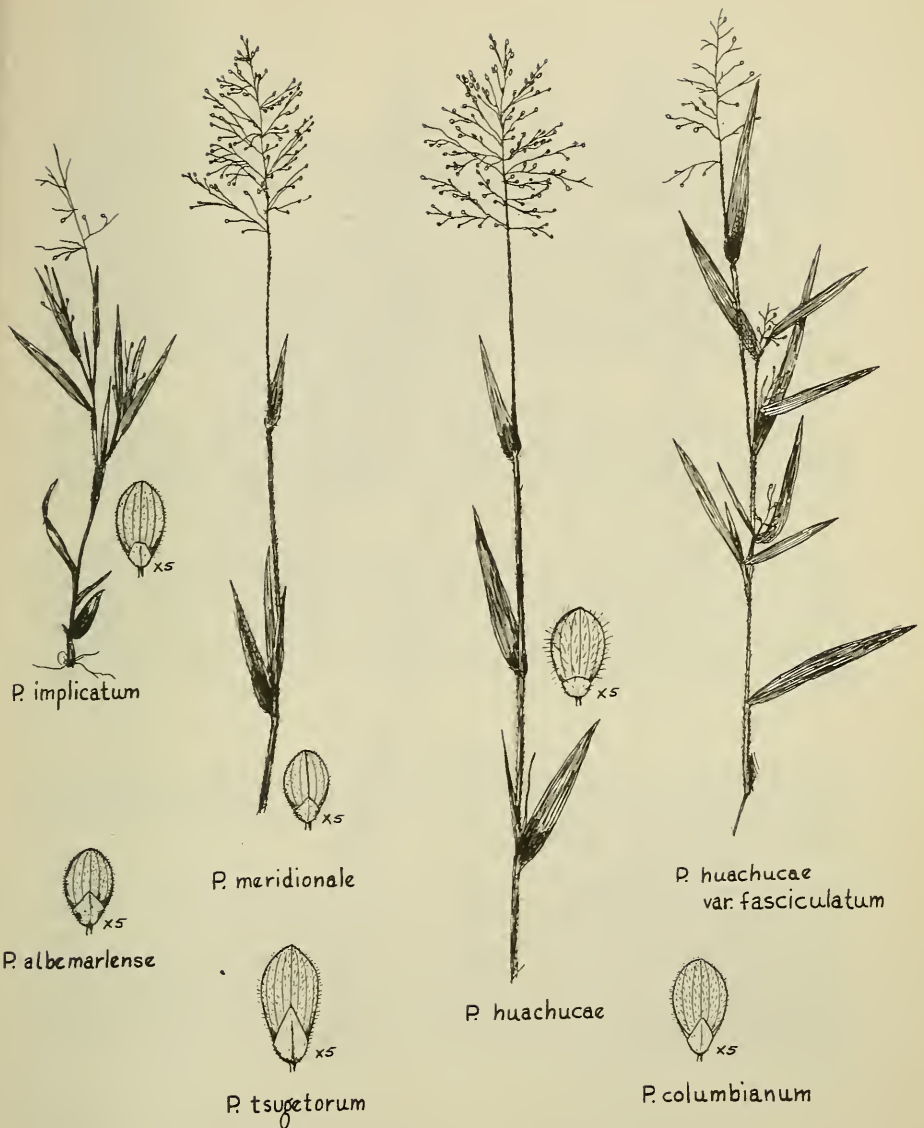
32. *P. meridionale* Ashe. Culms 1.5 to 4 dm. tall, soft-hairy; sheaths hairy; ligule densely hairy, 3 to 4 mm. long; leaves 2 to 4 mm. wide, bearing long, erect hairs on the upper surface; panicle 1.5 to 4 cm. long; spikelets 1.3 to 1.4 mm. long, hairy. Autumnal phase with clusters of branches from each node. Sandy or sterile woods and clearings, infrequent (Mineral, Nicholas, Mercer, and Wyoming Counties). June-Sept.

33. *P. albemarlense* Ashe. Vernal phase covered with long, gray hairs; culms 2.5 to 4.5 dm. tall, at first erect, then more or less decumbent and spreading; leaves 3 to 6 mm. wide, bearing long, soft hairs; panicle 3 to 5 cm. long; spikelets 1.4 mm. long, hairy. Autumnal phase much branched. Low, sandy woods or open ground, mainly a coastal-plain species; in West Virginia reported only for Hampshire County. Aug-Sept.

34. *P. huachucae* Ashe. HAIRY PANIC GRASS. Culms stiff, densely hairy, olive-green, often purplish, 2 to 6 dm. high, erect; nodes bearded; leaves 6 to 10 mm. wide, densely hairy; ligule 3 to 4 mm. long; panicle 4 to 5 cm. long, densely flowered; spikelets 1.5 to 1.8 mm. long, hairy, obovate, blunt; second glume and sterile lemma a little shorter than the fruit. A variable species. Common in open grasslands and clearings throughout the State. June-Sept. Named from Huachuca Mountains, Arizona.

The var. *fasciculatum* (Torr.) F. T. Hubb., with more lax, spreading leaves often nearly glabrous on the upper surface, is found in open woods throughout the State and is more common than the species. It is often difficult to distinguish between them.

35. *P. tsugetorum* Nash. Culms sometimes purplish, slender, 2.5 to 5 dm. tall, ascending or spreading, often bent at the lower nodes, clothed with short hairs; leaves 4 to 7 mm. wide, bearing short hairs on the lower surface, nearly



PANICUM

glabrous above; panicle 3 to 5 cm. long, loosely flowered; spikelets 1.9 mm. long. Autumnal phase much branched and spreading. Sandy woods. Our only record is from Jefferson County. June-Sept.

36. *P. columbianum* Scribn. AMERICAN PANIC GRASS. Culms rather slender, stiff, erect or ascending, 1.5 to 4 dm. high, densely hairy; sheaths hairy; leaves 4 to 5 mm. wide, hairy on the lower surface, usually glabrous above, panicle 3 to 5 cm. long; spikelets 1.5 mm. long. Autumnal phase widely-spreading, much branched from the middle nodes, the branches erect. Dry sandy soil, mostly near the coast; has been collected in Marion and Pocahontas Counties. June-Sept.

9. ECHINOCHLOA Beauv.

Coarse, weedy, annual grasses with long leaves and terminal, thick panicles. Spikelets with one perfect flower, nearly sessile in 1-sided racemes grouped in panicles; glumes unequal, bearing stiff hairs; sterile lemma with an awn from the apex; fertile lemma and palea papery, long-pointed.

1. *E. crusgalli* (L.) Beauv. BARNYARD GRASS. Culms thick, fleshy, branching from the base, 3 to 18 dm. high; sheaths glabrous; leaves glabrous, 5 to 15 mm. wide; panicle dense, 1 to 3 dm. long, very variable, deep purple to pale green, erect or drooping; spikelets 3 mm. long, long-awned or nearly awnless. Moist, rich soil, ditches, cultivated fields and open ground, common throughout the State. Grazed by stock and occasionally cut for wild hay, but usually grows in small stands or in moist situations where it cannot well be used. Aug.-Oct.

10. CENCHRUS L.

Annual grasses, with unbranched racemes of spiny burs; spikelets 1-flowered, 2 to 6 together and surrounded by a ring ("involucre") of rigid spines fused together at the base and which drops off with them when the fruit is ripe. The seeds germinate within the old involucre.

1. *C. pauciflorus* Benth. *C. carolinianus* Walt. SANDBUR. Culms flattened, much branched, ascending or spreading, 3 to 8 dm. long; leaves flat, 2 to 7 mm. wide; racemes 3 to 8 cm. long, the burs crowded; burs (excluding spines) about 4 to 6 mm. wide, hairy; spines numerous, spreading, flat, hairy at the base; spikelets usually 2 in each bur. Sandy soil, on river banks; has been found in Hampshire, Grant, Jackson, and Kanawha Counties. A good forage grass before the burs are formed, but a pernicious weed after they mature. The burs become hard at maturity and readily fall off. July-Aug.



Echinochloa crusgalli

Cenchrus pauciflorus

11. SETARIA Beauv.

Annual or perennial, weedy grasses, with narrow, flat leaves and cylindrical, spike-like panicles. Spikelets with one perfect flower, surrounded by few or many bristles which are attached to the rachis below the spikelets.

1. Bristles below each spikelet 5 or more 2.
 2. Perennial by creeping rootstocks..... 1. *S. geniculata*
 2. Annual; no rootstocks..... 2. *S. lutescens*
1. Bristles below each spikelet only 1 to 3 3.
 3. Bristles downwardly barbed..... 3. *S. verticillata*
 3. Bristles upwardly barbed 4.
 4. Spikelets about 2 mm. long; panicle green, erect, usually less than 7 cm. long..... 4. *S. viridis*
 4. Spikelets about 3 mm. long; panicle yellow or purple, nodding, more than 7 cm. long, sometimes as much as 30 cm. long..... 5. *S. italica*

1. *S. geniculata* (Lam.) Beauv. *S. imberbis* R. & S. Perennial; culms in clumps, 3 to 7 dm. high, slender, flattened, erect; sheaths overlapping, glabrous; blades 3 to 7 mm. wide, straight; panicle 2 to 5 cm. long, about 1 cm. thick; bristles 8 to 12 at each spikelet, 5 to 10 mm. long, usually pale yellowish; spikelets 2 mm. long; fertile lemma wrinkled crosswise. Open ground, pastures, and cultivated soil; a southern species, in West Virginia known only from the southern counties (Wyoming, Summers, Mercer).

2. *S. lutescens* (Weigel) F. T. Hubb. *S. glauca* (L.) Beauv. YELLOW FOXTAIL. Annual; culms branching at the base, flattened, 3 to 12 dm. high; leaves flat, glaucous, 10 mm. wide or less, twisted in a spiral; panicle 2 to 10 cm. long, about 1 cm. thick; bristles 5, upwardly barbed, yellowish, 3 to 8 mm. long; spikelets 3 mm. long; fertile lemma wrinkled crosswise. Cultivated ground and waste places, common in all parts of the State. Introduced from Europe. It is one of the worst weeds of cornfields, coming up after cultivation has been finished. June-Oct.

3. *S. verticillata* (L.) Beauv. BRISTLY FOXTAIL. Annual; culms in clumps, 3 to 6 dm. tall; leaves rough, 5 to 10 mm. wide; panicles green, 5 to 10 cm. long, somewhat compound; bristles usually one below each spikelet, downwardly barbed, 3 to 6 mm. long; spikelets 2 to 2.5 mm. long; fertile lemma wrinkled crosswise. Near dwellings; uncommon in West Virginia (Monongalia, Jefferson, and Hampshire Counties). Naturalized from Europe. The heads often become entangled because of downwardly barbed bristles. July-Sept.

4. *S. viridis* (L.) Beauv. GREEN FOXTAIL. Annual; culms in clumps, 2 to 9 dm. high; leaves 4 to 10 mm. wide, rough on the edges; panicles rather thick, the rachis hairy; bristles 1 to 3 below each spikelet, upwardly barbed, green, usually 7 to 12 mm. long; spikelets 2 mm. long; fertile lemma faintly wrinkled. Cultivated grounds and waste places, common in all parts of the State. Like the yellow foxtail, it is a bad weed in cornfields. Introduced from Europe. May-Sept.

5. *S. italica* (L.) Beauv. FOXTAIL MILLET. Annual; cultivated form of *S. viridis*, the culm thicker and taller, the blades broader; panicle thick, nodding, 8 to 30 cm. long, divided into lobes, yellowish or purplish; bristles two or three in a cluster. Cultivated under the name of Millet, German Millet, or Hungarian grass and occasionally an escape. Sometimes grown for hay.



SETARIA

12. ZIZANIA L.

Tall, aquatic grasses with long leaves and large, terminal panicles. Spikelets unisexual, the pistillate on the appressed upper branches, the staminate on the expanded lower branches of the same panicle.

1. *Z. aquatica* L. *Z. palustris* L. INDIAN RICE. WILD RICE. Culms 2 to 3 m. high; leaves flat, 1.5 - 4 cm. wide; lemma with a long, hispid awn from the summit. Seeds of wild rice were collected by the American Indians for food and are still used by some of the northern tribes. It is important as food and shelter for water fowl and is sometimes planted for this purpose in marshes of wildlife refuges. The only record of this plant for West Virginia is in shallow water in Lake Terra Alta, Preston County. June-Aug.

13. LEERSIA Sw.

Perennial grasses, growing in moist ground; spikelets in short racemes arranged in panicles; glumes none; lemma boat-shaped, awnless.

1. Spikelets 2.5 to 3 mm. long..... 1. *L. virginica*
1. Spikelets 4 to 5 mm. long..... 2. *L. oryzoides*

1. *L. virginica* Willd. WHITE GRASS. Culms weak, straggling, branched, 5 to 12 dm. long, ascending from thick clustered rootstocks; leaves 2 to 12 mm. wide; panicle simple, 1 to 2 dm. long, with slender, stiff branches; spikelets 2.5 to 3 mm. long, appressed; lemma hispid. Common in wet woods and along streams throughout the State. July-Sept.

2. *L. oryzoides* (L.) Swartz. RICE CUTGRASS. Culms slender, branched, ascending from slender rootstocks, 1 to 1.5 m. tall; leaves 4 to 10 mm. wide, the edges very rough, cutting the flesh like a knife; panicle much branched, 1 to 2 dm. long; spikelets 4 to 5 mm. long; lemma hispid. Swamps, stream or lake borders, ditches, etc., often forming a definite zone of vegetation. Common in all parts of the State. Aug.-Sept.



Zizania aquatica



Leersia oryzoides



x3



Leersia virginica



x3

Plate 14

14. PHALARIS L.

Annuals or perennials with flat leaves and dense panicles; spikelets 3-flowered, one perfect, the lower two sterile, greatly reduced.

1. Glumes wing-keeled on the back; panicles short-ovoid. . . . 1. *P. canariensis*
1. Glumes not winged on the back; panicles elongated-oblong 2. *P. arundinacea*

1. ***P. canariensis*** L. CANARY GRASS. Annual, 3-8 dm. high; panicle spike-like, oval, very dense, 2-4 cm. long; spikelets broad; glumes 7 to 8 mm. long, pale with green veins, broadly winged; fertile lemma 5 to 6 mm. long, hairy. Waste places, infrequent in West Virginia (Monongalia County). The species furnishes the canary seed of commerce. July-Aug.

2. ***P. arundinacea*** L. REED CANARY GRASS. Perennial, 6-15 dm. high; leaves 6-10 mm. wide; panicle spreading during flowering, narrowed afterwards, 6-15 cm. long; spikelets lanceolate, pale; glumes 5 mm. long. Common in all parts of the State in wet meadows, swamps, and along streams, where it is a good forage plant. An important constituent of lowland hay in the northern prairie states. Suitable for protection of stream banks, seepy situations, etc. June-July.

15. ANTHOXANTHUM L.

Sweet-smelling plants with flat leaves and narrow panicles; spikelets 3-flowered (one perfect); glumes very unequal; sterile lemmas 2-lobed, awned on the back, fertile lemma awnless.

1. ***A. odoratum*** L. SWEET VERNAL GRASS. Perennial; culms erect, 2 to 6 dm. tall; leaves rough above, 2 to 5 mm. wide; collar hairy; panicles 3 to 8 cm. long; spikelets 8 to 10 mm. long, yellowish-green, spreading at flowering time. Sweet-scented due to the presence of coumarin. Meadows, pastures, and waste places throughout the State. Sometimes included in meadow mixtures to give fragrance to the hay, but of little forage value. May-July.

Another species, ***A. aristatum*** Boiss. (*A. Puelii* Lecoq & Lamotte), a low annual, has been found introduced on the State Dairy Farm at Morgantown.



Anthoxanthum odoratum



Phalaris canariensis



Phalaris arundinocea

16. MILIUM (Tourn.) L.

A perennial grass with flat leaves and open panicles; spikelets 1-flowered; glumes equal, slightly longer than the lemma.

1. *M. effusum* L. MILLET GRASS. Culms slender, glabrous, unbranched, 1 to 1.5 m. high; leaves 8 to 15 mm. wide; panicle open, the branches in widely separated pairs or clusters, wide-spreading or drooping, bearing spikelets from about the middle to the end; spikelets 3 to 3.5 mm. long. Cold, damp woods and mountain meadows, at relatively high elevations in the mountain counties (specimens from Preston, Grant, Tucker, and Pocahontas Counties). A northern grass, reaching its southern limits in West Virginia. June-Aug.

17. ORYZOPSIS Michx.

Perennial grasses growing in clumps; spikelets 1-flowered, in few-flowered panicles; glumes broad; lemma ending in a slender awn.

1. *O. racemosa* (J. E. Smith) Ricker. MOUNTAIN RICE. Culms erect, 3 to 12 dm. high, leafy to the top; leaves 4 to 15 mm. wide, taper-pointed, rough below, hairy above; branches of the panicle nearly simple, ascending; spikelets 7 to 9 mm. long; lemma becoming black in fruit, awn about 2 cm. long. Rocky woods, mostly in the mountains (Pendleton and Grant Counties). Highly palatable to livestock but not abundant enough to be important. A northern species, attaining its southern limit in West Virginia and Kentucky. June-Oct.

18. STIPA L.

Rather large perennials, growing in clumps, with rolled leaves; spikelets 1-flowered, in terminal panicles; floret with a bearded, sharp-pointed callus; glumes narrow; lemma ending in a strong bent and twisted awn.

1. *S. avenacea* L. BLACK OAT GRASS. Culms slender, 3 to 10 dm. high, leafy at the base; leaves 1 to 1.5 mm. wide, usually rolled; panicle loose, the slender branches in pairs, spreading; glumes often purplish; base of floret covered with brown hairs; lemma dark-brown, with a fringe of short hairs at the top; awn 4 to 7.5 cm. long, twice bent. Dry woods, mostly on the coastal plain. In West Virginia known only from Hardy County. The awns alternately twist and untwist with changes in moisture and help to bury the grain. May-June.



Miliun effusum

Oryzopsis racemosa

Stipa avenacea

Plate 16

19. ARISTIDA L.

Annual or perennial grasses growing in clumps; spikelets 1-flowered, in narrow panicles; glumes unequal; lemma hardened, ending in three awns. The species are of minor importance for forage in West Virginia but of greater value in arid regions. The fruit with its three awns breaks off and is blown around by the wind, getting into the wool of sheep and the nostrils and eyes of stock and so becoming troublesome.

1. Middle awn spirally coiled at base, side awns straight 2.
 2. Glumes nearly equal, 6 to 8 mm. long, lemma 5 to 6 mm. long..... 1. *A. dichotoma*
 2. Glumes unequal, the second longer, about 1 cm. long; lemma about 1 cm. long..... 2. *A. Curtissii*
1. Middle awn not spirally coiled at the base 3.
 3. Plants perennial..... 5. *A. lanosa*
 3. Plants annual 4.
 4. Awns 4 to 7 cm. long, about equal..... 4. *A. oligantha*
 4. Awns usually less than 2 cm. long, often unequal..... 3. *A. longespica*

1. *A. dichotoma* Michx. TRIPLE-AWN GRASS. Annual; culms in clumps, wiry, branched at the base and usually forked at each node, 1 to 6 dm. high; leaves mostly rolled, about 1 mm. wide; panicles few-flowered, narrow; glumes about equal, 6 to 8 mm. long, sharp-pointed; lemmas 6 mm. long; side awns only little erect teeth, middle awn 3 to 6 mm. long, coiled at the base. Sterile sandy or gravelly soil, frequent (specimens from Jefferson, Berkeley, Hardy, Grant, Preston, Monongalia, and Fayette Counties). Aug.-Oct.

2. *A. Curtissii* (A. Gray) Nash. Annual; culms 1 to 6 dm. tall; leaves about 1 mm. wide; panicles loose; glumes unequal, second glume about 1 cm. long; lemma about 1 cm. long; central awn about 1 cm. long, side awns 2 to 4 mm. long. Similar in general appearance to *A. dichotoma*. Open dry ground, in West Virginia known only from Grant and Mineral Counties. Aug.-Oct.

3. *A. longespica* Poir. *A. gracilis* Ell. Annual; culms branched, 2 to 4 dm. high; leaves flat or rolled, about 1 mm. wide; panicles narrow, 1 to 2 dm. long; glumes about equal, 5 mm. long; lemma 4 to 5 mm. long; central awn curved at base, 5 to 15 mm. long, side awns erect, 2 to 6 mm. long. Sterile or sandy soil, Hampshire and Raleigh Counties. Mainly a coastal-plain species. Sept.-Oct.

4. *A. oligantha* Michx. PRAIRIE THREE-AWN GRASS. Annual; culms wiry, much branched, 3 to 5 dm. tall; leaves flat or rolled, about 1 mm. wide; panicle narrow, loosely flowered; glumes about equal, 2 to 3 cm. long, tapering into an awn 3 to 5 mm. long; lemma 2 cm. long; awns nearly equal, 4 to 7 cm. long. Open sterile soil, mainly in the prairies. Our specimens are from Hardy, Monongalia, Ohio, and Cabell Counties. Aug.-Oct.

5. *A. lanosa* Muhl. WOOLLY TRIPLE-AWN GRASS. Perennial; culms erect, unbranched, 6 to 12 dm. high; lower sheaths woolly ("lanate"); leaves flat, 3 to 6 mm. wide; panicle nearly half the length of the entire plant, narrow, nodding; first glume 12 to 14 mm. long, the second about 1 cm. long; lemma spotted, about 1 cm. long; side awns 1 cm. long, middle awn 1.5 to 2 cm. long. Dry sandy soil, in West Virginia known only from Fayette County. A coastal-plain species. Sept.-Oct.



A. oligantha



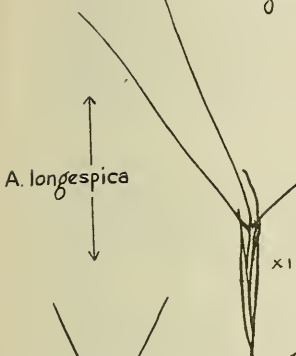
A. Curtissii



A. lanosa



A. dichotoma

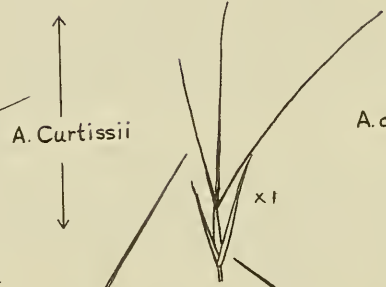


A. longespica

x1



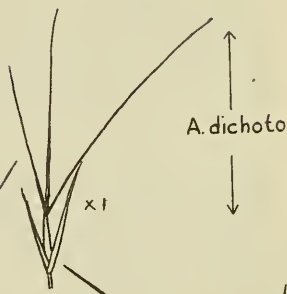
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x1



x3



x1



x3

ARISTIDA

20. MUHLENBERGIA Schreb.

Perennial grasses with slender rootstocks and flat or rolled leaves; panicles usually narrow but dense; spikelets small, 1-flowered; glumes thin, often awn-tipped; lemma narrow, awned, or awnless. The western species are important range grasses, but the eastern ones are of limited value.

1. Glumes not more than one-fourth as long as the floret 6. *M. Schreberi*
1. Glumes at least half as long as the floret 2.
 2. Glumes broadly ovate 3.
 3. Spikelets 1.5 to 2 mm. long; lemma awnless 1. *M. sobolifera*
 3. Spikelets 3 to 4 mm. long; lemma awned 2. *M. tenuiflora*
 2. Glumes lanceolate 4.
 4. Culms glabrous below the nodes 5. *M. mexicana*
 4. Culms with stiff hairs below the nodes 5.
 5. Panicles very narrow; lemma usually long-awned 3. *M. sylvatica*
 5. Panicles oblong, compactly flowered; lemma awnless or with only a short awn 4. *M. foliosa*

1. *M. sobolifera* (Muhl.) Trin. BRANCHED MUHLY. Perennial, with numerous scaly rootstocks; culms erect, sparingly branched, 4 to 8 dm. high, rough below the nodes; leaves 4 to 6 mm. wide; panicles very slender, loosely-flowered; spikelets 2 to 2.5 mm. long; glumes broadly ovate, more than half as long as the floret. Dry, rocky woods and cliffs, frequent (Pendleton, Grant, Monongalia, Wetzell, and Fayette Counties). Sept.-Oct.

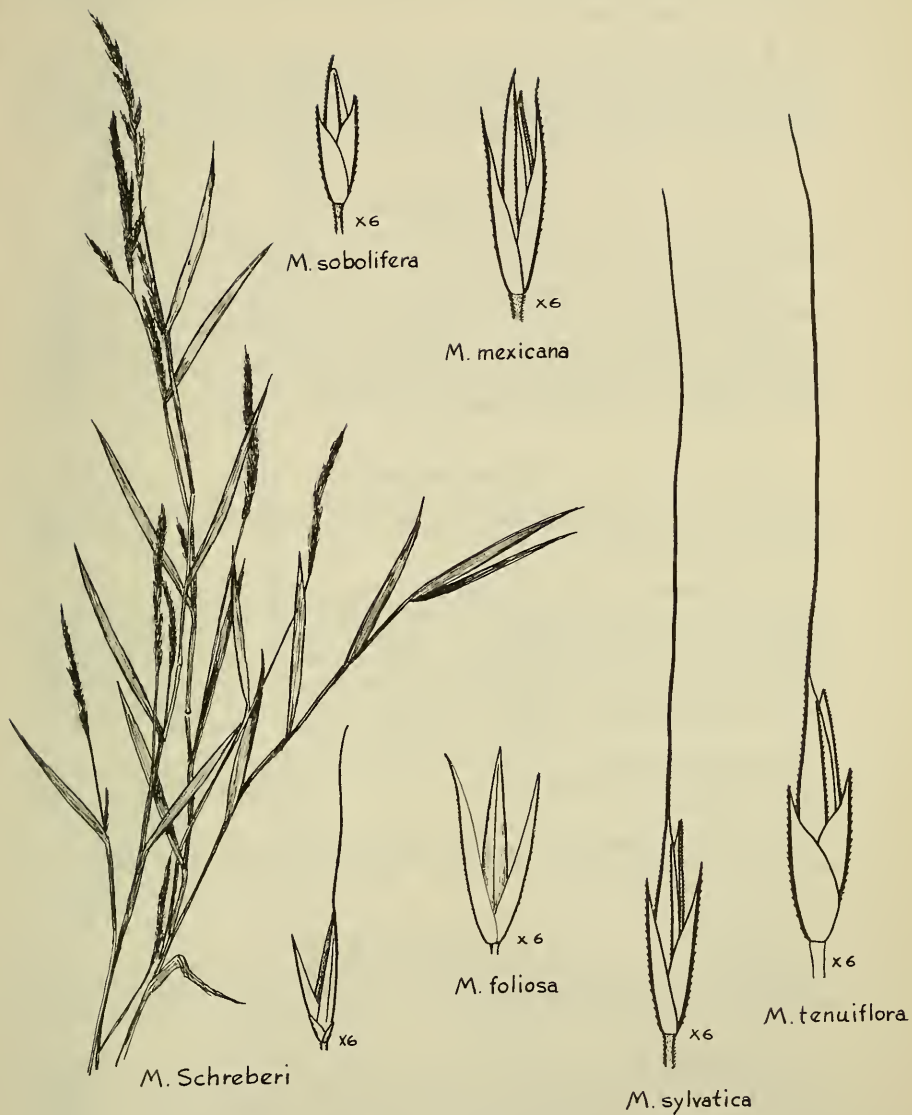
2. *M. tenuiflora* (Willd.) BSP. SLENDER-FLOWERED MUHLY. Culms erect, 6 to 10 dm. high; nodes pubescent; leaves 4 to 10 mm. wide; panicle loosely flowered; spikelets 3 to 4 mm. long; glumes broadly ovate, more than half as long as the lemma; lemma tapering to a slender awn 5 to 10 mm. long. Rocky woods and ravines, frequent (Pendleton, Tucker, Preston, Monongalia, Randolph, Nicholas, Greenbrier, Fayette, and Wyoming Counties). Of no recognized agricultural value. Aug.-Sept.

3. *M. sylvatica* Torr. WOODLAND MUHLY. Culms erect, 6 to 9 dm. high, much branched, leafy; leaves 2 to 6 mm. wide; panicles usually short-exserted, slender; spikelets not crowded, on long, erect branches, 2.5 to 3 mm. long; glumes short-pointed, more than half as long as the floret; lemma short-pointed or with an awn 6 to 12 mm. long. Moist, rocky woods and banks throughout the State (Morgan, Hampshire, Grant, Pocahontas, Greenbrier, Summers, and Wyoming Counties). Aug.-Oct.

4. *M. foliosa* Trin. Culms erect, 6 to 9 dm. high, much branched, leafy; leaves 2 to 6 mm. wide; panicles long-exserted, cylindrical, densely flowered; spikelets 2 to 3 mm. long, often purplish; glumes with a short point, about as long as the lemma; lemma awnless or with a short awn. Moist ground, in the mountains; rare (Preston County). Sept.

5. *M. mexicana* (L.) Trin. WIRESTEM MUHLY. Culms ascending, decumbent, and rooting at the lower nodes, 6 to 9 dm. high, branching at the base; leaves 2 to 6 mm. wide; panicles ovoid, borne at the tips of the culm and of its many short branches, often partly enclosed within the upper sheath; glumes sharp-pointed, about as long as the lemma; lemma awned or awnless. Sandy and gravelly stream banks and waste ground. Forage fair when young but later becomes tough. Of some value for binding stream banks. This species and *M. Schreberi* are common in most parts of West Virginia and may become troublesome weeds in cultivated fields. The species is not a native of Mexico, as the scientific name appears to indicate. Aug.-Sept.

6. *M. Schreberi* J. F. Gmel. NIMBLEWILL. Culms 3 to 8 dm. long, often decumbent at the base and rooting at the lower nodes, much branched and straggling; leaves 2 to 4 mm. wide; panicles numerous, slender, rather densely flowered; spikelets 2 mm. long; glumes very small or the first one often entirely absent; lemma as long as the spikelet, awned. Dry woods, hillsides, and waste places. A common weed in all parts of the State. Aug.-Sept.



MUHLENBERGIA

21. BRACHYELYTRUM Beauv.

Perennials with unbranched culms and short, knotty rootstocks; spikelets 1-flowered; panicle few-flowered, narrow; glumes very small, unequal; lemma ending in a long straight awn.

1. **B. erectum** (Schreb.) Beauv. Culms erect, 5 to 10 dm. high; sheaths usually with a few stiff hairs; leaves 1 to 1.5 cm. wide, rough, with long hairs on the nerves beneath; panicle narrow, 5 to 15 cm. long; spikelets 1 cm. long, with an awn 1 to 3 cm. long. Rocky, open woods, found in all parts of the State but not common enough to be of value. July-Aug.

22. PHLEUM L.

Erect unbranched perennials with flat leaves and dense, terminal, spike-like panicles; glumes equal, with a short awn; lemma broad, blunt.

1. **P. pratense** L. TIMOTHY. Culms 4 to 10 dm. high, swollen at the base, forming large clumps; leaves 5 to 8 mm. wide; panicle long-cylindrical, usually 5 to 10 cm. long; awn of glumes 1 mm. long. Meadows, commonly cultivated for hay and widely escaped in all parts of the State; our most important hay species. Named for Timothy Hanson, who brought the grass from New England to Maryland about 1720. Naturalized from Europe. June.

23. ALOPECURUS L.

Branching perennials (rarely annuals) with flat leaves and soft, densely flowered, spike-like panicles; spikelets 1-flowered; glumes equal, awnless; lemma broad, blunt, with a slender awn on the back.

1. **A. pratensis** L. MEADOW FOXTAIL. Culms erect, glabrous, 3 to 9 dm. high, with short, creeping rootstocks; sheaths loose, the upper inflated; leaves rough, 2 to 6 mm. wide; panicle soft, dense, spike-like; spikelets 5 mm. long; glumes sharp-pointed, fringed with long hairs; lemma blunt, about the length of the glumes; awn about 5 mm. long. Shade-tolerant. Meadows and pastures, introduced from Europe. Sometimes cultivated for hay, and sparingly escaped. Rare in West Virginia (Monongalia and Ohio Counties). Apr.-May.

A. myosuroides Huds. (*A. agrestis* L.) with spikelets 6 to 7 mm. long, the glumes not bearing long hairs; has been found in waste places in Ohio and Monongalia Counties.

A. carolinianus Walt., an annual, with spikelets 2 to 2.5 mm. long, has been found in cultivated ground in Ohio County.

24. SPOROBOLUS R. Br.

Annual or perennial grasses with rolled or flat leaves; panicles narrow and spike-like or loose and spreading; spikelets 1-flowered, awnless; glumes unequal; lemma as long as the glumes or longer.

1. **S. vaginiflorus** (Torr.) Wood. DROPSEED. Annual; culms in clumps, 2 to 6 dm. high; leaves about 2 mm. wide, rolled near the end; panicles numerous, partly included in the sheaths, or the terminal panicle exerted; spikelets 4 mm. long; glumes usually unequal; lemma hairy. Sterile fields and waste places, frequent (Hampshire, Pendleton, Mineral, Monongalia, Randolph, and Fayette Counties). A palatable forage grass, but not abundant enough to be of importance. Sept.

S. cryptandrus (Torr.) A. Gray, SAND DROPSEED, a perennial species usually occurring on sandy coasts; has been found as a weed in Monongalia County.

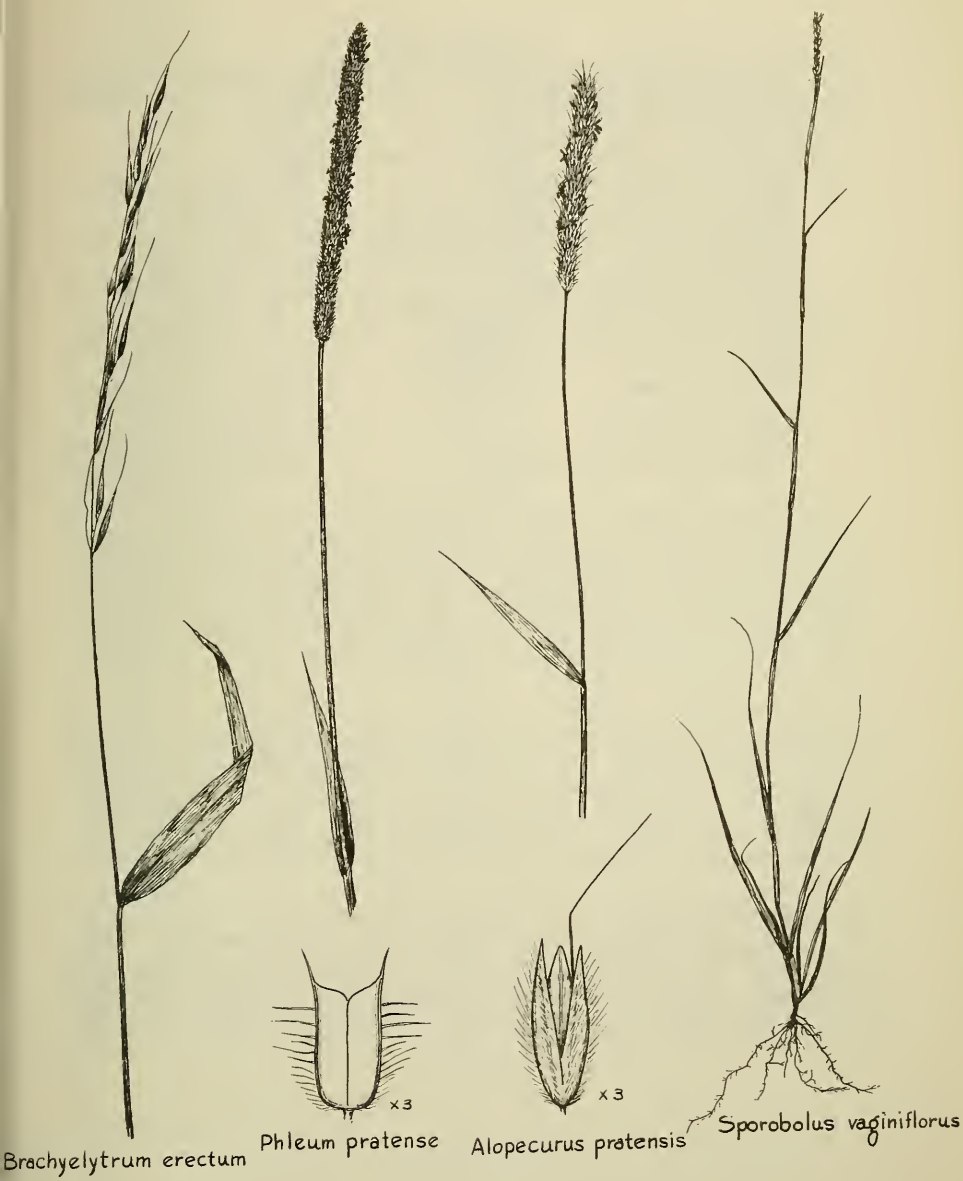


Plate 19

25. AGROSTIS L.

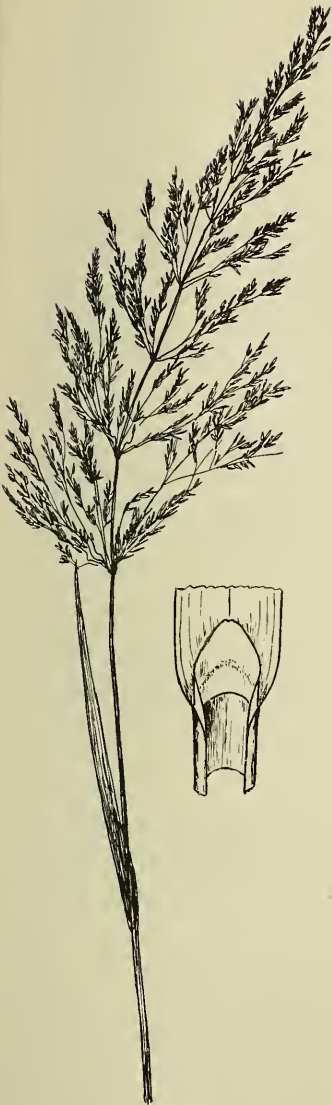
Annual or perennial grasses with flat leaves and thin ligules; panicles open or contracted; spikelets 1-flowered; glumes nearly equal, acutely pointed; lemma broad, shorter than the glumes.

1. Palea at least half as long as the lemma, 2-nerved 2.
 2. Ligule short, usually less than 1 mm. long 2. *A. tenuis*, pl. 20
 2. Ligule about 4 to 6 mm. long 3.
 3. Panicle open, no long stolons; culms erect 1. *A. alba*, pl. 20
 3. Panicle narrow; long stolons usually present; culms decumbent at base 3. *A. palustris*, pl. 20
1. Palea very small and nerveless or entirely absent 4.
 4. Panicle widely and loosely spreading 4. *A. hiemalis*, pl. 21
 4. Panicle open, but not widely spreading 5.
 5. Lemmas awnless 5. *A. perennans*, pl. 21
 5. Lemmas awned 6.
 6. Spikelets about 2 mm. long 6. *A. canina*, pl. 21
 6. Spikelets about 3 mm. long 7. *A. borealis*, pl. 21

1. *A. alba* L. REDTOP. Rootstocks creeping; culms 3 to 10 dm. high; leaves flat, stiff, 5 to 10 mm. wide, the ligule 4 to 5 mm. long, rounded or pointed at apex; panicle reddish, pyramidal during flowering, often contracted later; glumes nearly equal; lemma blunt, about the length of the glumes, sometimes awned. Redtop is common in fields throughout the State. Extensively cultivated for meadows, pastures, and lawns. It is the second most important pasture grass in West Virginia, being grown especially upon soils lacking sufficient lime for bluegrass, and those too wet for timothy. June-Sept.

2. *A. tenuis* Sibth. *A. alba* var. *vulgaris* (With.) Thurb. COLONIAL BENT GRASS. Culms in clumps, erect, 2 to 4 dm. tall; ligule usually less than 1 mm. long, blades 1 to 3 mm. wide; panicle open, delicate; spikelets not crowded; lemma awnless. Closely resembles *A. alba*. Cultivated for lawns and pastures, escaped, and well established in places (our specimens are from Monongalia and Pocahontas Counties). A form with the lemma awned, *A. tenuis* var. *aristata* (Parn.) Druce, (*A. alba* var. *aristata* Gray), has been found in Monogalia, Pocahontas, and Raleigh Counties. July-Aug.

3. *A. palustris* Huds. *A. alba* var. *maritima* (Lam.) G. F. W. Mey. CREEPING BENT. Culms in dense clumps, prostrate, rooting at the nodes; leaves rather short, stiff, erect, appressed against the culm; panicle narrow, dense; glumes nearly equal. Native to marshes along the coast and occasionally introduced in the interior. Our specimens are from Pendleton, Webster, Raleigh, and Summers Counties. Various forms of this species are extensively used for lawns and golf greens. July-Aug.



A. alba



A. tenuis



A. palustris

AGROSTIS

4. *A. hiemalis* (Walt.) BSP. HAIRGRASS. Culms very slender, erect, 3 to 6 dm. high; leaves short and narrow, less than 2 mm. wide; panicle purplish, very widely spreading, as much as 30 cm. long, the branches few, stiff, very slender, bearing spikelets only near the ends; spikelets 1.5 to 2 mm. long; glumes very sharp-pointed, somewhat unequal; lemma usually awnless. Meadows and moist open ground, common in all parts of the State. At maturity the panicle branches spread widely and the entire panicle breaks away and rolls before the wind, scattering the seeds; hence the name fly-away grass, used in the West. June-Aug.

5. *A. perennans* (Walt.) Tuckerm. THIN GRASS. Culms erect, 3 to 10 dm. high; leaves numerous, 1 to 6 mm. wide; panicle ovoid-cylindric, the branches dividing again about the middle; spikelets 2 to 3 mm. long; glumes long-pointed, unequal; lemma awnless. Variable; in deep shade the culms are weak and decumbent and the panicles more open. Flowers later than any of our other species of *Agrostis*. Low, open ground or damp, shaded places, common in all parts of West Virginia. Aug.-Oct.

6. *A. canina* L. VELVET BENT GRASS. Culms erect, 2 to 6 dm. high; basal leaves narrow, rolled, those of the culm broader and flat, about 2 mm. wide; ligule usually long and pointed; panicle at first loose, later contracted; spikelets 2 mm. long; glumes about equal, sharp-pointed; lemma with an awn attached on the back at the middle, the awn exserted and bent. Meadows and open ground, sparingly introduced from Europe. In West Virginia known only from Grant County. Regarded by some as the finest of all grass turfs. Also known as brown bent grass. Aug.-Sept.

7. *A. borealis* Hartm. Culms in clumps, 1 to 4 dm. high; leaves tufted at the base, few on the culm, 1 to 3 mm. wide; panicle pyramidal, open, lower branches whorled and spreading; spikelets 2.5 to 3 mm. long; glumes sharp-pointed; lemma awn 1 to 3 mm. long, bent. A northern species, found as far north as Greenland and Alaska. In West Virginia known only from high elevations in Pocahontas County. July-Aug.



A. canina

A. hiemalis

A. perennans

A. borealis

AGROSTIS

26. CALAMAGROSTIS Adans.

Tall, perennial grasses with running rootstocks and unbranched culms; panicles many-flowered; spikelets 1-flowered; rachilla extended behind the palea as a hairy bristle; glumes nearly equal; lemma awned on the back, surrounded at the base with many long hairs attached to the callus.

1. Spikelets 3 to 3.5 mm. long 2. *C. canadensis*
1. Spikelets 4 to 5 mm. long 1. *C. Porteri*
1. Spikelets 6 to 7 mm. long 3. *C. cinnoides*

1. *C. Porteri* A. Gray. Culms slender, 6 to 12 dm. tall, with slender rootstocks; sheaths hairy on the collar; leaves 4 to 8 mm. wide; panicle narrow but loose, 10 to 15 cm. long; spikelets 4 to 5 mm. long; awn of the lemma bent and protruding from the side of the glumes; callus hairs few, about half as long as the lemma. Dry, rocky soil; in West Virginia known only from the shale barrens of Greenbrier County. Aug.-Sept.

2. *C. canadensis* (Michx.) Beauv. BLUEJOINT GRASS. Culms 6 to 15 dm. high, clustered; leaves flat, 4 to 8 mm. wide; panicle 1 to 3 dm. long, loose and open; spikelets 3 to 3.5 mm. long; glumes mostly purple-tinged, about equal, sharp-pointed; callus-hairs about as long as the lemma; awn small. Wet places, open woods, meadows, in the mountain counties (specimens from Hardy, Preston, Tucker, and Pocahontas). A good grass for low, wet, mountain meadows. A source of much of the wild hay of the northern prairie states. June-Aug.

3. *C. cinnoides* (Muhl.) Barton. Culms thick, 1 to 1.8 m. high, erect or leaning; leaves very rough, 5 to 10 mm. wide; panicles 8 to 17 cm. long, contracted, strict, the short branches erect after flowering; spikelets 6 to 7 mm. long; glumes long-pointed, the tips curved outward; lemma awned about the middle; callus-hairs about half the length of the floret. Bogs and moist ground, in the mountain counties (specimens from Hampshire, Mineral, Preston, Monongalia, Pocahontas, Fayette, Raleigh, Mercer). July-Aug.

27. CINNA L.

Tall perennials with flat leaves and conspicuous transparent ligules; panicles many-flowered, nodding; spikelets 1-flowered; rachilla extended beyond the palea into a tiny bristle; glumes narrow, with short, stiff hairs on the keel; lemma with a short awn from between the two small teeth at the tip; palea with only 1 keel, the two nerves being so close together as to appear to be one. Our two species are highly palatable but not abundant enough to be of importance as forage grasses.

1. Leaves 1 cm. or less wide; spikelets 5 mm. long 1. *C. arundinacea*
1. Leaves 1 to 1.5 cm. wide; spikelets 4 mm. long 2. *C. latifolia*

1. *C. arundinacea* L. WOODREED GRASS. Culms 5 to 15 dm. high, erect; ligule prominent; leaves 1 cm. or less wide, slightly rough; panicle grayish-green, 1.5 to 3 dm. long, the slender branches ascending; spikelets 5 mm. long; glumes unequal, the second as long as the lemma; awn very small. Shaded swamps and moist woods throughout the State. Aug.-Sept.

2. *C. latifolia* (Trev.) Griseb. DROOPING WOODREED GRASS. Culms erect, 5 to 15 dm. high; leaves 1 to 1.5 cm. wide; panicle 1.5 to 3.5 dm. long, the hair-like branches spreading or drooping; spikelets 4 mm. long; glumes about equal; lemma as long as the glumes. Cold, damp mountain woods (Pendleton, Tucker, Randolph, and Pocahontas Counties). July-Aug.



Calamagrostis canadensis

Calamagrostis cinnoides

Calamagrostis Porteri

Cinna arundinacea

Cinna latifolia

28. HOLCUS L.

Perennial grasses with flat leaves and densely flowered panicles; spikelets 2-flowered, the joint below the glumes; lower floret perfect, awnless, upper floret usually staminate; lemma bearing an awn on the back; glumes about equal in length, boat-shaped, longer than the florets.

1. *H. lanatus* L. VELVET GRASS. Entire plant grayish, velvety-hairy; culms erect, 3 to 6 dm. high; leaves 5 to 10 mm. wide; panicle purplish, 5 to 15 cm. long; spikelets 4 mm. long; glumes soft-hairy; awn of the second floret like a little hook. Striking in appearance and easily recognized because of its light color. Moist meadows, introduced from Europe. Occasionally cultivated as a meadow grass. Common throughout the State but not well liked by stock. June-July.

29. SPHENOPHOLIS Scribn.

Slender perennial grasses with flat leaves and narrow panicles; spikelets 2- or 3-flowered, the joint just below the glumes; rachilla extended behind the upper floret as a slender stalk; glumes nearly equal, exceeded by the uppermost floret; lemma papery, awnless or nearly so. The species are forage grasses but are not abundant enough to be important.

1. Panicle dense, usually spike-like, erect..... 1. *S. obtusata*
1. Panicle not dense or spike-like, nodding 2.
 2. Glumes unequal in length, the second glume sharp-pointed; florets glabrous..... 3. *S. intermedia*
 2. Glumes nearly equal in length, the second one with the apex blunt; second floret very rough..... 2. *S. nitida*

1. *S. obtusata* (Michx.) Scribn. PRAIRIE WEDGEGRASS. Culms in clumps, 3 to 10 dm. tall; leaves flat, 2 to 5 mm. wide; panicle erect or nearly so, dense, spike-like, 5 to 20 cm. long; spikelets 2.5 to 3.5 mm. long; second glume very broad, hood-like. Open woods and old fields (Jefferson, Berkeley, Morgan, and Hampshire Counties). June-Aug.

2. *S. nitida* (Spreng.) Scribn. Culms slender, 3 to 6 dm. high; sheaths usually hairy; leaves 2 to 5 mm. wide, usually hairy; panicle 5 to 20 cm. long, loosely flowered; spikelets 3 mm. long, wedge-shaped; glumes nearly equal in length, the second one broad and rounded at the top; lemmas rather blunt. Woods, frequent (specimens from Morgan, Mineral, Preston, Monongalia, Wirt, Kanawha, Raleigh, and Wyoming Counties). May-June.

3. *S. intermedia* (Rydb.) Rydb. *S. pallens* (Spreng.) Scribn. SLENDER WEDGEGRASS. Culms slender, 3 to 10 dm. high; sheaths glabrous or hairy; leaves 2 to 6 mm. wide, rough on the nerves; panicles nodding, 8 to 20 cm. long; spikelets 3 to 4 mm. long, oblong-lanceolate; glumes unequal, rough on the keels, the second one thin, sharp-pointed; lemmas sharp-pointed. Damp woods, slopes, and moist places, frequent throughout the State (specimens from Jefferson, Berkeley, Morgan, Mineral, Monongalia, Ohio, Wetzell, Marion, Harrison, Webster, Pocahontas, and Kanawha Counties). May-June.

30. TRISETUM Pers.

Perennials with flat leaves and more or less open, shining panicles; spikelets usually 2-flowered, the rachilla extending behind the upper floret; glumes unequal, sharp-pointed; lemmas hairy at base, 2-toothed at the apex, bearing a bent awn from the back.

1. *T. pennsylvanicum* (L.) Beauv. *Sphenopholis palustris* (Michx.) Scribn. Culms slender, weak, usually leaning at the base, 5 to 10 dm. tall; sheaths usually glabrous; leaves flat, rough, 2 to 5 mm. wide; panicle narrow, loose, nodding, 1 to 2 dm. long; spikelets 5 to 7 mm. long; glumes sharp-pointed; lemmas tapering, the first usually awnless, the second with a spreading awn 4 to 5 mm. long. Swamps and wet places, local (Upshur, Webster, Randolph, and McDowell Counties). A paler green than most grasses. June-July.



Sphenopholis obtusata



Sphenopholis nitida



Sphenopholis intermedia



Trisetum pennsylvanicum



Holcus lanatus

31. DESCHAMPسيا Beauv.

Perennials with flat or rolled leaves and loose panicles; spikelets usually 2-flowered; rachilla extended behind the upper floret as a bristle; glumes thin, nearly equal; lemmas thin, bearing slender awns from near the base.

1. Basal leaves rolled, filiform; panicle 5 to 12 cm. long; awn elongated, abruptly bent. 1. *D. flexuosa*
1. Basal leaves not filiform; panicle 10 to 25 cm. long; awns short, nearly straight. 2. *D. caespitosa*

1. *D. flexuosa* (L.) Trin. HAIRGRASS. Culms slender, 3 to 8 dm. high; basal leaves rolled, filiform; upper part of the culm nearly leafless; culm leaves filiform; panicle very loose, few-flowered, the branches flexuous, bearing spikelets near the ends; spikelets 4 to 5 mm. long; lemmas rough, the awn 5 to 7 mm. long, bent, and twisted. Dry ground, woods, or open ground in the mountains (Berkeley, Morgan, Hampshire, Grant, Mineral, and Tucker Counties). June-July.

2. *D. caespitosa* (L.) Beauv. TUFTED HAIRGRASS. Culms slender, 6 to 12 dm. high, leafy at the base; leaves flat or rolled, 1.5 to 4 mm. wide; spikelets 4 mm. long; lemmas smooth, the awn hardly longer than the lemma, nearly straight. Bogs and other wet places, in the mountains (Monongalia, Preston, Tucker, and Pocahontas Counties). A northern and Rocky Mountain species, reaching its southeastern limit in West Virginia. Sometimes a dominant grass in mountain meadows, furnishing excellent forage. June-July.

32. ARRHENATHERUM Beauv.

Tall perennials with flat leaves and narrow panicles; spikelets 2-flowered, the lower staminate, its lemma bearing a bent and twisted awn on the back, the upper perfect, its lemma nearly awnless; rachilla extended behind the upper floret as a bristle; glumes unequal, thin.

1. *A. elatius* (L.) Beauv. TALL OAT GRASS. Culms erect, 1 m. or more high; leaves 5 to 10 mm. wide, rough on both surfaces; panicle pale or purplish, shiny, 15 to 30 cm. long; spikelets 7 to 8 mm. long; lemmas rough, the awn of the staminate floret about twice as long as the lemma. Meadows and waste places, common throughout the State. Introduced from Europe and escaped from cultivation. Regarded as valuable for winter grazing, as is indicated by the common name Evergreen Grass, sometimes used. Garber and Odland (see bibliography) reported an annual yield of over 2 tons per acre when it was grown as hay in pure seeding. June-July. The variety *bulbosum* (Willd.) Spenner, in which the base of the culm consists of a series of closely packed bulb-like corms, has been found in Nicholas County.

33. DANTHONIA DC.

Erect perennials growing in clumps, leaves narrow, panicles small; spikelets several-flowered; glumes nearly equal, much longer than the lemmas; lemma with 2 teeth at the apex and a twisted awn between the teeth.

1. Teeth of the lemma triangular. 1. *D. spicata*
1. Teeth of the lemma tapering into long bristles. 2. *D. compressa*

1. *D. spicata* (L.) Beauv. POVERTY GRASS. Culms round, 2 to 7 dm. high; the numerous basal leaves curly, especially in winter, those of the culms erect, 2 mm. or less wide; panicle 2 to 5 cm. long, few-flowered, the few short branches erect; glumes 10 to 12 mm. long; lemmas bearing stiff hairs, teeth triangular, the awn longer than the lemma. Common in dry, sterile soil throughout the State. Its presence usually indicates poor land. Dustman and Shriver (see bibliography) found that the early growth of this grass showed high protein and low fiber content as compared with the later growth stages and recommended reasonably early and close grazing. June-Aug.



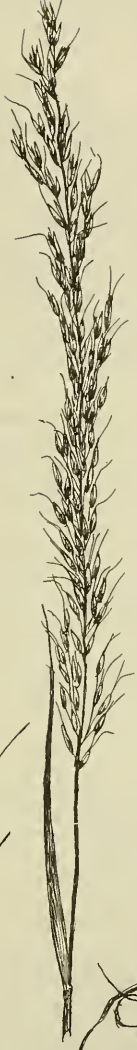
Deschampsia caespitosa



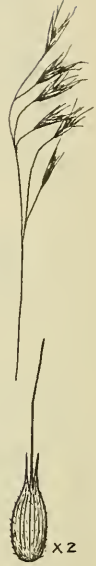
Deschampsia flexuosa



Arrhenatherum elatius



Danthonia spicata



Danthonia compressa



2. *D. compressa* Aust. Culms flattened, 4 to 8 dm. tall; leaves flat, 2 to 3 mm. wide; panicle 5 to 8 cm. long, the branches spreading; glumes 10 to 14 mm. long; teeth of the lemma tapering into bristles at least 2 mm. long, with a twisted awn attached between them. Dry woods, mostly in the mountains (specimens from Berkeley, Hampshire, Mineral, Preston, Monongalia, Tucker, Grant, Randolph, Pocahontas, Fayette, Raleigh, and Wyoming Counties). An important forage grass in the mountains of North Carolina and Tennessee, but hardly common enough here.

34. SPARTINA Schreb.

Coarse perennials with strong, thick rootstocks, stiff, unbranched culms, and long, tough leaves; spikelets 1-flowered, arranged in two rows along one side of the rachis, forming one-sided spikes, which are scattered along a common axis; glumes unequal, sharp-pointed; lemma blunt, 1-nerved.

1. *S. pectinata* Link. *S. Michauxiana* Hitchc. CORDGRASS. Culms thick, 1 to 2 m. high; leaves 6 to 12 dm. long, 15 mm. wide or less, tapering to a very slender point, very sharp on the edges; spikes 5 to 20, scattered; glumes with stiff hairs on the keel, the second glume tapering into an awn, 7 mm. long; lemma 7 to 9 mm. long, glabrous except for the midnerve, apex 2-toothed. Banks of rivers and lakes, or in swamps, mostly in the mountains (Hampshire, Hardy, Monongalia, Pocahontas, Fayette, and Summers Counties). Said to make good hay for horses when cut early. Aug.-Oct.

35. CYNODON Richard

Low, much-branched, creeping perennials with flat leaves and slender spikes in a digitate arrangement at end of branches; spikelets 1-flowered, awnless, sessile in 2 rows along one side of a slender axis, forming 1-sided spikes; glumes unequal, narrow, boat-shaped; lemma obtuse, boat-shaped, fringed with hairs on the keel.

1. *C. Dactylon* (L.) Pers. BERMUDA GRASS. Culms glabrous, flattened, wiry, much creeping by stolons, the old sheaths of the stolons and the lowest one of the branches forming conspicuous "dog's teeth", flowering branches usually erect, 1 to 4 dm. high; ligule a conspicuous ring of white hairs; spikes 4 or 5, 2 to 5 cm. long, purple; spikelets 2 mm. long; lemma longer than the glumes. Fields and waste places, rarely found in West Virginia (specimens from Harrison and Mingo Counties). The most important pasture grass of the southern states; spreads readily by rootstocks and may become a troublesome weed in cultivated fields. Introduced from Europe. July-Sept.

36. BOUTELOUA Lag.

Perennial grasses with narrow leaves and 1-sided spikes nearly sessile on a main axis; spikelets 1- or 2-flowered, in 2 rows along one side of a flattened rachis, the rachilla projecting beyond the fertile floret and bearing a sterile floret; lemma bearing 3 to 5 teeth at the apex, 3 of them awn-pointed. Important grazing grasses in the southwestern states.

1. *B. curtipendula* (Michx.) Torr. GRAMA GRASS. Culms erect, 3 to 10 dm. high; sheaths hairy; leaves 3 to 5 mm. wide, flat or rolled, especially at the ends, rough above, often hairy underneath; spikes 15 or more, each composed of 12 or less spikelets; spikelets 7 to 10 mm. long; first glume less than half as long as the second; lemma rough, ending in 3 short awns. Dry hills and fields; in West Virginia known only from the shale barrens of Grant and Hardy Counties. Much used for forage and for hay, especially in the prairie states, but too rare in West Virginia to be of importance. A handsome species. July-Sept.

37. ELEUSINE Gaertn.

Coarse annuals, in clumps, with thick 1-sided spikes in a digitate arrangement at the apex of the culms; spikelets several-flowered, awnless, the florets sessile and closely packed in 2 rows along one side of the rachis; glumes unequal, shorter than the floret; lemmas 5-ribbed.



Spartina pectinata



Eleusine indica



Bouteloua curtipendula



Cynodon Dactylon



x3



x3

1. *E. indica* Gaertn. YARD GRASS. Culms glabrous, flattened, bent over at the base, usually less than 5 dm. long; sheaths loose; leaves 3 to 8 mm. wide; spikes 2 to 10, 2.5 to 8 cm. long; spikelets about 5 mm. long, bearing 3 to 5 florets. Yards and waste ground, a common weed in all parts of the State. Introduced from tropical regions. Very resistant to trampling and drying. June-Oct.

38. TRIODIA R. Br.

Perennials with long, narrow leaves and open, terminal panicles; spikelets 3- to 12-flowered; florets perfect or the upper staminate; glumes unequal, shorter than the spikelets; lemma thick, 2-toothed, the nerves silky-hairy; nerves of the lemma extending beyond the apex as small awns.

1. *T. flava* (L.) Smyth. *Tridens flavus* (L.) Hitchc. TALL REDTOP. Culms erect, usually in small clumps, 1 to 2 m. tall, blades very smooth, 3 to 10 mm. wide; panicle open, 2 to 4.5 dm. long, usually purple or becoming nearly black, covered with a sticky, oily substance which discolors the hands when it is rubbed; spikelets 5 to 8 mm. long; glumes and lemmas with short tips. Open places and waste ground. Common in all parts of the State. A showy grass, but apparently of no agricultural value. Very conspicuous in late summer and fall. Aug.-Oct.

39. DIARRHENA Beauv.

Perennials with unbranched culms from creeping rootstocks, flat leaves, and few-flowered panicles; spikelets bearing 3 to 5 florets, the uppermost sterile; glumes unequal, much shorter than the florets; lemmas broad, thick, rigid, smooth, and shining, sharp-pointed; grain large, usually longer than the lemma and palea.

1. *D. americana* Beauv. TWIN GRASS. Culms slender from a creeping rootstock, 6 to 9 dm. tall; leaves few, all below the middle of the culm, elongate, 1 to 2 cm. wide, scabrous or pubescent beneath; panicle 1 to 2.5 dm. long, simple or with few appressed branches; spikelets 10 to 16 mm. long; lemmas 6 to 10 mm. long. Wooded river banks, etc., uncommon (Jefferson, Fayette, and Wayne Counties). A grass of the prairie states, reaching its eastern limit in West Virginia. Too rare here to be of importance as a forage grass. July-Aug.

40. UNIOLA L.

Erect perennials, with unbranched culms and terminal panicles; spikelets flattened, several-flowered, the lower 1 to 4 lemmas empty; glumes keeled, pointed; lemmas firm, keeled; palea with a broadly-winged keel.

1. *U. latifolia* Michx. BROADLEAF UNIOLA. Culms 6 to 15 dm. tall, with short thick rhizomes; blades flat, 10 to 22 cm. long, 5 to 20 mm. wide, rough on the margins; panicle open, drooping, 1 to 2.5 dm. long; spikelets 1.5 to 3 cm. long, 10 to 15-flowered, wide, very flat, hanging on capillary pedicels. Moist woods, usually in river bottoms, mainly in the Potomac and New-Kanawha drainage systems (specimens from Jefferson, Hampshire, Grant, Summers, Raleigh, Fayette, Wyoming, and Wayne Counties). Too uncommon to be of economic importance in West Virginia. Worthy of cultivation as an ornamental. Aug.-Sept.



Triodia flava

Uniola latifolia

Diarrhena americana

41. MELICA L.

Tall perennials, the base of the culm often swollen into a corm; sheaths closed; blades flat; panicles usually narrow, not much branched; spikelets rather large, 2- to several-flowered; glumes somewhat unequal in length, thin, papery, colorless on the margin; lemmas convex, colorless on the margin, the callus not bearded. The species are palatable grasses but not abundant in West Virginia.

1. Glumes about equal; spikelets 2-flowered..... 1. *M. mutica*
1. Glumes unequal; spikelets 3- to 5-flowered..... 2. *M. nitens*

1. *M. mutica* Walt. TWO-FLOWER MELIC GRASS. Culms erect from knotted rootstocks, wiry, 6 to 9 dm. high; sheaths usually overlapping, rough; leaves 2 to 10 mm. wide; panicles 0.8 to 2.5 dm. long with threadlike, upright branches; spikelets 2-flowered, 7 to 10 mm. long, hanging on short stalks; glumes about equal in length, broad and papery; lemmas rough, blunt, awnless. Dry, rocky, open woods and thickets, never in any abundance, but only a few clumps here and there (specimens from Raleigh County). Apr.-May.

2. *M. nitens* Nutt. THREE-FLOWER MELIC GRASS. Culms 8 to 12 dm. tall, erect from a short rootstock; sheaths overlapping, glabrous; leaves 4 to 8 mm. wide; panicle 1.5 to 2.5 dm. long, the branches slender, spreading; spikelets numerous, 10 to 12 mm. long, usually 3-flowered, hanging on short stalks; glumes unequal in length, broad and papery; lemmas 7 to 9 mm. long, rough, sharp-pointed. Rocky woods, rare (Hampshire County). May-June.

42. SCHIZACHNE Hack.

Tall perennials with unbranched culms and open, few-flowered panicles; spikelets several-flowered; glumes narrow, unequal; lemmas lance-shaped, bearing long hairs on the callus, awned from just below the 2-toothed apex.

1. *S. purpurascens* (Torr.) Swallen. *Melica striata* (Michx.) Hitchc. FALSE MELIC. Culms erect, 5 to 10 dm. tall; sheaths closed; blades flat, narrowed at the base, 1 to 5 mm. wide; panicle about 10 cm. long, the branches single or in pairs, more or less drooping, bearing 1 or 2 spikelets; spikelets 2 to 2.5 cm. long; glumes purplish, less than half as long as the spikelets; lemmas about 1 cm. long, the awn as long as the lemma or longer. Rocky woods in the mountains (Randolph and Pocahontas Counties); a far-northern species, reaching its southeastern limit in West Virginia. May-June.



x2



Melica mutica



x2



Melica nitens



x3

x2

Schizachne purpurascens

43. ERAGROSTIS Beauv.

Annuals or perennials with terminal panicles; spikelets much flattened, several-flowered, the uppermost floret sterile; glumes keeled, much shorter than the spikelets; lemmas broad, keeled. The species are numerous, but of little value as forage grasses.

1. Plants annual 2.
 2. Plants creeping; rooting at the nodes, forming mats 7. *E. hypnoides*, pl. 29
 2. Plants not creeping or forming mats 3.
 3. Spikelets mostly bearing less than 5 florets 4.
 4. Panicles two-thirds the length of the entire plant or more; pedicels more than 5 mm. long 1. *E. capillaris*, pl. 28
 4. Panicles less than half the length of the entire plant; pedicels mostly less than 5 mm. long.... 2. *E. Frankii*, pl. 28
 3. Spikelets mostly bearing more than 5 florets 5.
 5. Plants with small glandular depressions on the branches and sometimes on the keels of the lemmas 6.
 6. Spikelets 2.5 to 3 mm. wide; panicle dense..... 5. *E. cilianensis*, pl. 28
 6. Spikelets about 1.5 mm. wide; panicle open 6. *E. poaeoides*, pl. 28
 5. Plants not glandular on the branches nor lemmas 7.
 7. Spikelets about 1 mm. wide..... 3. *E. pilosa*, pl. 28
 7. Spikelets 1.5 mm. wide or wider..... 4. *E. pectinacea*, pl. 28
1. Plants perennial 8.
 8. Culms 2 to 6 dm. tall; spikelets 2- to 6-flowered... 8. *E. spectabilis*, pl. 29
 8. Culms 5 to 12 dm. tall, spikelets 6- to 12-flowered... 9. *E. hirsuta*, pl. 29

1. *E. capillaris* (L.) Nees. LACEGRASS. Culms much branched at base, 2 to 5 dm. high; blades 1 to 3 mm. wide; sheaths pilose; panicle usually two-thirds the entire height of the plant, diffusely branched; spikelets 2- to 4- flowered, 2 to 3 mm. long, on long, capillary, divergent pedicels. In autumn the mature panicles break off and are blown about by the wind. Dry, open ground and open woods, frequent throughout the State. Aug.-Sept.

2. *E. Frankii* C. A. Meyer. FRANK'S LOVEGRASS. Culms 2 to 5 dm. high, diffusely branched; sheaths glabrous, blades 1 to 3 mm. wide; panicle less than half the length of the plant; spikelets 3- to 5-flowered, 2 to 3 mm. long. Very similar to *E. capillaris*, from which it differs chiefly in its shorter panicle and appressed pedicels. Moist or sandy open places, often along roadside ditches throughout the State (specimens from Hampshire, Mineral, Monongalia, Fayette, and Summers Counties). Has a strong, disagreeable odor when fresh. Aug.-Oct.

3. *E. pilosa* (L.) Beauv. INDIA LOVEGRASS. Culms slender, 1 to 5 dm. tall; leaves flat, 1 to 3 mm. wide; panicle open, 5 to 20 cm. long, the branches very slender, with a few long hairs in the axils; spikelets linear, 3- to 9-flowered, 3 to 5 mm. long. Moist, open ground and waste places, especially along gravelly roads and in railroad ballast, common throughout the State. July-Aug.

4. *E. pectinacea* (Michx.) Nees. *E. Purshii* Schrad. Culms slender, 1 to 5 dm. tall; leaves flat, 1 to 3 mm. wide; panicle delicate, the axils glabrous or only slightly hairy; spikelets linear, 3- to 9-flowered, 5 to 8 mm. long. Fields, waste places, and open ground throughout the State (specimens from Jefferson, Grant, Monongalia, Wetzel, Randolph, Raleigh, and Cabell Counties). Resembles *E. pilosa*, but this species has the lateral nerves of the lemmas plainly visible, whereas in *E. pilosa* they are not plainly visible. July-Aug.

5. *E. cilianensis* (All.) Link. *E. megastachya* (Koeler) Link. STINKGRASS. Culms 1 to 5 dm. tall, much branched at base and at the nodes, bearing a ring of glands below each node; leaves 2 to 7 mm. wide; panicle erect, rather condensed, 5 to 20 cm. long; spikelets 10- to 40-flowered, 5 to 15 mm. long, 2.5 to 3 mm. wide; keel of the lemmas glandular. Cultivated ground and waste places, common in all parts of the State. Introduced from Europe. Strong-scented. June-Sept.

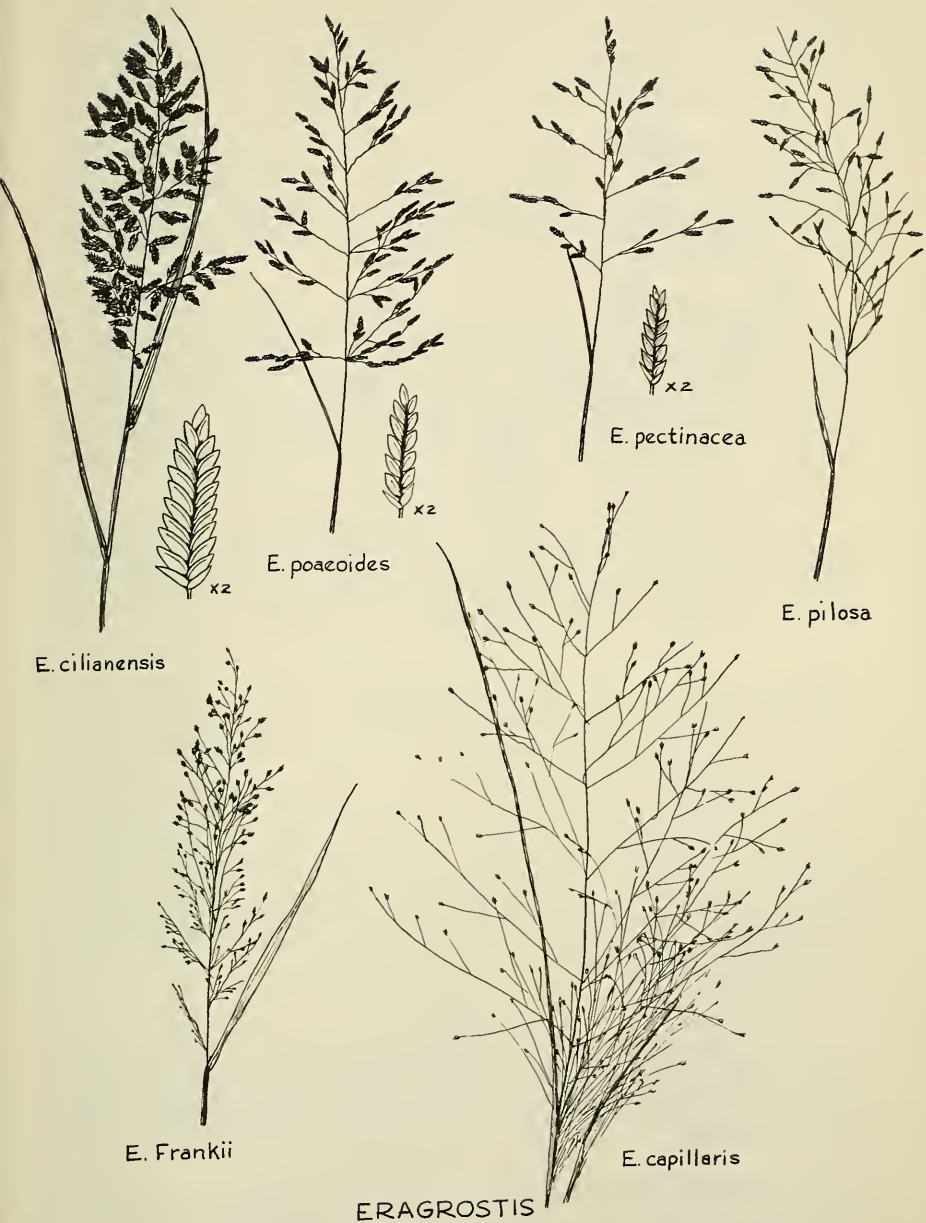


Plate 28

6. *E. poaeoides* Beauv. *E. minor* Host. LOW LOVEGRASS. Similar to *E. cilianensis*; culms more slender, panicle more open, spikelets smaller, 5 to 10 mm. long, 1.5 to 2 mm. wide, 8- to 20-flowered; leaves bearing glands on the margins of the blades and on the keel of the sheaths. Waste ground, especially cinders along railroads; not common. Has been found in Jefferson, Grant, and Monongalia Counties. Introduced from Europe. June-July.

7. *E. hypnoides* (Lam.) BSP. CREEPING LOVEGRASS. Annual; extensively creeping and rooting at the nodes, forming mats; the panicle-bearing branches erect or ascending, 5 to 12 cm. high; panicle 1 to 5 cm. long, nearly simple; spikelets 10- to 35-flowered, 5 to 10 mm. long. Moist or sandy places, usually along rivers, frequent throughout the State (Berkeley, Hampshire, Grant, Mineral, Summers, Fayette, and Cabell Counties). Aug.-Sept.

8. *E. spectabilis* (Pursh.) Steud. *E. pectinacea* (Michx.) Steud. PURPLE LOVEGRASS. Perennial; culms tufted, 3 to 6 dm. tall; sheaths glabrous or pilose, hairy at the throat; blades flat or folded, 4 to 8 mm. wide, tapering to a fine point; panicle about two-thirds the entire length of plant, usually decidedly purplish, the branches spreading at maturity, with tufts of hairs in the axils; spikelets 4- to 12-flowered, 3 to 8 mm. long, about 2 mm. wide. Open, sandy soil, frequent throughout the State (specimens from Hampshire, Hardy, Monongalia, Mineral, Wirt, and Summers Counties). The commonest perennial *Eragrostis* in West Virginia. July-Oct.

9. *E. hirsuta* (Michx.) Nees. Perennial; culms erect, 5 to 12 dm. tall; sheaths pilose at the throat; leaves flat, 5 to 10 mm. wide; panicle diffuse, more than half the entire height of the plant, pilose in the axils; spikelets on long pedicels, 2- to 6-flowered, 3 to 4 mm. long. Dry soil; a coastal plain species rare in West Virginia (specimens from Pendleton and Raleigh Counties). Aug.

44. DACTYLIS L.

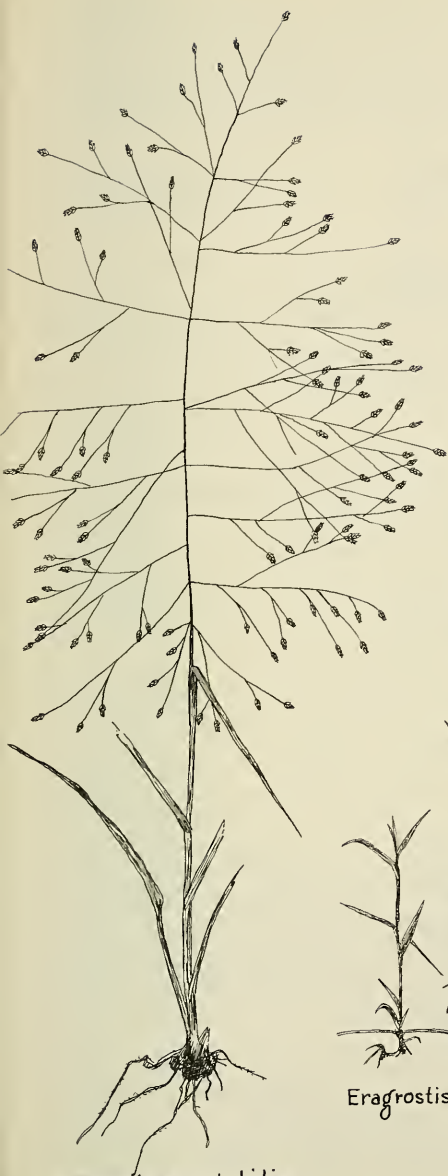
Perennials with flat leaves; spikelets bearing 2 to 5 florets, flattened, nearly sessile in dense clusters arranged in a panicle; glumes unequal, with stiff hairs on the keel, sharp-pointed; lemmas also bearing hairs on the keel, awned.

1. *D. glomerata* L. ORCHARD GRASS. Perennial; culms in large clumps, 9 to 12 dm. tall; blades scabrous, elongate, 2 to 8 mm. wide; panicle 8 to 15 cm. long, its branches few, distant, solitary, stiff, ascending or at length spreading, the lowermost often 10 cm. long; spikelets crowded in dense, one-sided clusters terminating the branches of the panicle. Fields, roadsides, and waste places, common in all parts of West Virginia. Introduced from Europe. Cultivated to some extent as a meadow and pasture grass, but less so than formerly. Grows well in the shade of orchards. It is very nutritious and is said to yield a higher proportion of aftermath than any other common grass. June.

45. CYNOSURUS L.

Perennials with narrow flat leaves and dense, spike-like panicles; spikelets of 2 kinds, sterile and fertile together, the fertile sessile, nearly covered by the short-stalked sterile one; sterile spikelets consisting of 2 glumes and several lemmas; fertile spikelets bearing 2 or 3 florets, the glumes narrow, the lemmas broader, awn-tipped.

1. *C. cristatus* L. CRESTED DOGTAIL. Perennial; culms tufted, slender, 3 to 6 dm. high; blades narrow, rather short; panicle spike-like, 3 to 8 cm. long. Grassy places, sparingly introduced from Europe. Has been found in Monongalia County. Occasionally included in meadow mixtures, but of little value.



Eragrostis spectabilis



Eragrostis hypnoides



Dactylis glomerata



Cynosurus cristatus

46. POA L.

Annuals or perennials with unbranched culms, narrow leaves ending in a boat-shaped tip, and terminal panicles; spikelets 2- to 6-flowered, the uppermost floret imperfect; glumes keeled; lemmas thin, mostly colorless at the tip, keeled, awnless, 5-nerved, often with a tuft of long, cobwebby hairs at the base. The species of this genus are of great value as forage plants. Some are cultivated for hay; others form a large part of pasture grasses. They are quite palatable and are often the most important grasses in many parts of the country.

1. Plants annual 2.
 2. Florets with webby hairs at the base..... 2. *P. Chapmaniana*, pl. 30
 2. Florets not webbed at the base..... 1. *P. annua*, pl. 30
1. Plants perennial 3.
 3. Creeping rootstocks present 4.
 4. Culms much flattened..... 4. *P. compressa*, pl. 31
 4. Culms rounded or only slightly flattened 5.
 5. Lower panicle branches in a whorl of usually 5; leaves mostly shorter than the culm; lemmas 2.5 to 3 mm. long..... 5. *P. pratensis*, pl. 31
 5. Lower panicle branches usually in twos; leaves about as long as the culm; lemmas 4 to 4.5 mm. long..... 7. *P. cuspidata*, pl. 31
 3. Creeping rootstocks not present 6.
 6. Marginal nerves of the lemmas glabrous 7.
 7. Sheaths roughened; panicle usually not included in the sheath at its base..... 6. *P. trivialis*, pl. 31
 7. Sheaths smooth; panicle base usually included in the sheath 8.
 8. Lemmas hairy on the keel; panicle branches mostly in fours or fives..... 8. *P. alsodes*, pl. 32
 8. Lemmas smooth on the keel; panicle branches mostly in twos or threes..... 11. *P. saltuensis*, pl. 32
 6. Marginal nerves of the lemmas hairy 9.
 9. Lower panicle branches bent downwards at maturity..... 10. *P. sylvestris*, pl. 32
 9. Lower panicle branches not bent downwards at maturity 10.
 10. Florets usually converted into bulblets; culms bulb-like at base..... 9. *P. bulbosa*, pl. 32
 10. Florets normal; culms not bulb-like at base..... 3. *P. palustris*, pl. 30

1. *P. annua* L. ANNUAL BLUEGRASS. Bright green, tufted, winter annual; culms erect or spreading, sometimes rooting at lower nodes, 5 to 20 cm. tall, blades soft and lax, 1 to 3 mm. wide; panicle pyramidal, open, 3 to 8 cm. long; spikelets crowded, about 4 mm. long; lemma not webbed at base, plainly 5-nerved. Very common in cultivated and waste ground throughout the State. Common in lawns, making a dense sod in spring, seeding on culms too short to be cut by the lawn mower, then dying out, leaving bare patches during extreme hot weather. Flowers in April and May, and in wet seasons all summer and fall.

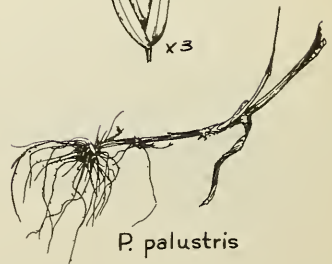
2. *P. Chapmaniana* Scribn. Annual, rarely over 2.5 dm. high, in clumps; culms rounded, erect; sheaths close; leaves mostly 1 to 2 mm. wide or narrower; panicle 2 to 9 cm. long; florets webbed at the base; spikelets 3 to 4 mm. long; lemma with 3 prominent nerves and 2 intermediate very faint ones. Dry soil, open ground, and cultivated fields, uncommon in West Virginia (specimens from Kanawha County). Resembles *P. annua*, but differs in having the florets webbed. Apr.-May.



P. annua



P. Chapmaniana



P. palustris

POA

3. *P. palustris* L. *P. triflora* Gilib. FOWL BLUEGRASS. Culms loosely tufted, decumbent at the flattened purplish base, 3 to 15 dm. tall; leaves 1 to 2 mm. wide, rough; ligule 3 to 5 mm. long; panicle yellowish-green or purplish, 1 to 3 dm. long, the branches in rather distant fascicles, naked below. Meadows, moist open places, and along streams, principally in the mountains (Ohio, Tucker, Pendleton, Pocahontas, Nicholas, Raleigh, and Mercer Counties). Useful in meadow mixtures for bottom lands. A northern species, reaching its southeastern limit in West Virginia. June-July.

4. *P. compressa* L. CANADA BLUEGRASS. Culms bluish green, flattened, 2 to 6 dm. tall, wiry; blades short; panicle narrow, 2 to 8 cm. long, the short branches in pairs, spikelet-bearing to the base; spikelets 3- to 6-flowered, 4 to 6 mm. long; web of lemma scant or lacking. Strongly stoloniferous and forming dense patches on dry, sterile soil. Very common in all parts of West Virginia. Introduced from Europe. Cultivated as a pasture grass in the northeastern states and Canada, especially on dry, poor soils. Also useful as a soil binder on poor, dry banks. Inferior to Kentucky bluegrass, but recommended for seeding with redbtop on poor soils. May-Sept.

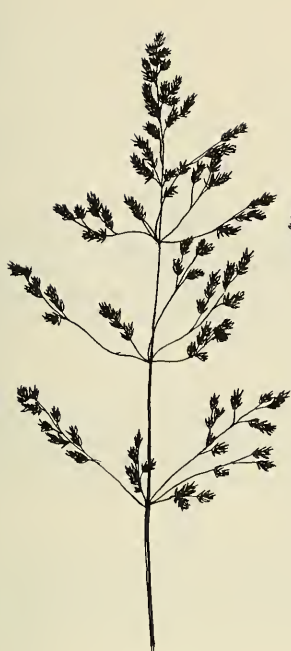
5. *P. pratensis* L. KENTUCKY BLUEGRASS. Culms 3 to 12 dm. tall, stoloniferous at base; blades 1 to 6 mm. wide, those of the culm 5 to 15 cm. long, basal ones much longer; panicle pyramidal, the slender branches in whorls of 3 to 5, naked at base; spikelets crowded, 4 to 5 mm. long; lemmas copiously webbed at base. Very common in cultivated and open ground throughout the State. *The most important pasture grass in West Virginia.* The standard grass where the soil contains plenty of lime. Also our most common lawn grass. Native to Eurasia and the northern part of North America, just how far south is not known. Doubtless introduced in West Virginia. May-July.

6. *P. trivialis* L. ROUGH BLUEGRASS. Culms erect, more or less roughened below the panicle, 3 to 9 dm. high; sheaths and blades somewhat roughened; ligule 4 to 6 mm. long; blades 2 to 4 mm. wide; panicle 6 to 15 cm. long; the lower branches about 5 in a whorl; spikelets about 3 mm. long; nerves of lemma prominent. This species closely resembles *P. pratensis*, from which it differs by its lack of stolons and somewhat scabrous herbage. Moist places, often in shade, common in all parts of the State. Introduced from Europe. Sometimes included in meadow mixtures, but of little importance as such. A good lawn grass for moist, shady places.

7. *P. cuspidata* Nutt. *P. brachyphylla* Schultes. SHORT-LEAVED BLUEGRASS. Culms in loose tufts, 3 to 5 dm. tall, stoloniferous; basal blades about equaling the culms, cuspidate; upper blades short, 2 to 4 mm. wide; panicle 7 to 12 cm. long, sometimes purplish; the branches mostly in pairs, distant, spreading, spikelet-bearing near the ends; spikelets 3- to 4-flowered, often purplish; lemmas webbed at base. Rocky woods, blooming in spring before the leaves are out on the trees. Our earliest flowering native grass. Common in all parts of the State. Apr.-May.



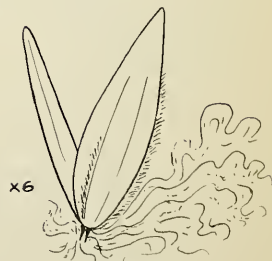
P. compressa



P. trivialis



P. cuspidata



P. pratensis

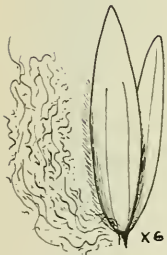
POA

8. *P. alsodes* A. Gray. Culms in loose tufts, 2 to 6 dm. tall; blades thin, loose, 2 to 5 mm. wide; panicle 1 to 2 dm. long, the filiform branches in distant whorls of 3's to 5's; spikelets 2- to 3-flowered, about 5 mm. long; lemmas hairy on the keel, webbed at the base. Rich woods, usually in moist places, in the mountains (specimens from Grant, Pendleton, Mineral, Preston, Monongalia, Randolph, and Pocahontas Counties). May-June.

9. *P. bulbosa* L. BULBOUS BLUEGRASS. Culms densely tufted, bulbous at base, 3 to 6 dm. tall; blades 1 to 2 mm. wide; panicle 5 to 8 cm. long; the florets mostly converted into bulblets about 2 mm. long with a dark purple base; bracts with slender green tips, 5 to 15 mm. long; unchanged spikelets about 5-flowered; lemmas webbed at base. Fields, sparingly introduced from Europe. In West Virginia known only from Gilmer County.

10. *P. sylvestris* A. Gray. SYLVAN BLUEGRASS. Culms tufted, erect, 3 to 12 dm. tall; blades loose, 2 to 6 mm. wide; panicle erect, 1 to 2 dm. long, the slender flexuous branches spreading, usually 3 to 6 in a whorl; spikelets 2.5 to 4 mm. long; lemmas about 2.5 mm. long, webbed at base. Rich moist or rocky woods throughout the State. Apr.-July.

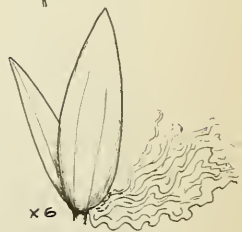
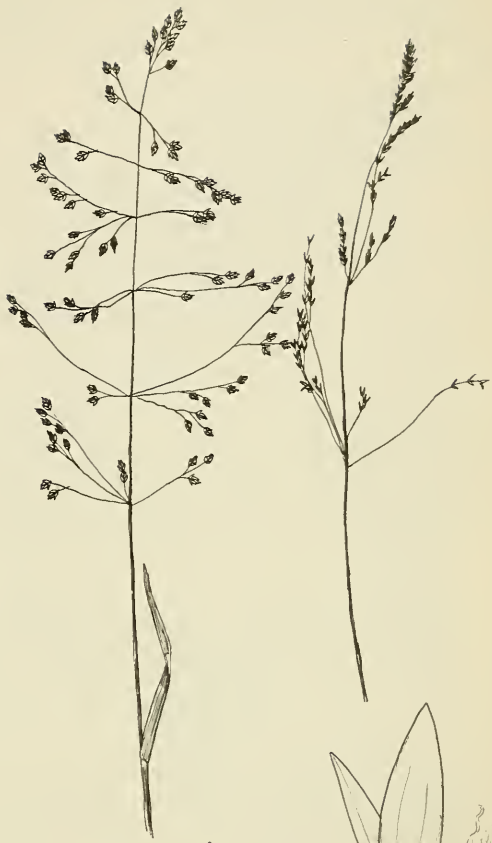
11. *P. saltuensis* Fern. & Weig. Culms tufted, mostly 3 to 6 dm. tall; blades loose, 2 to 4 mm. wide; panicle nodding, 5 to 10 cm. long, the branches slender, bearing spikelets toward the ends; spikelets 3 to 4 mm. long; lemmas 3 mm. or more long, acute, webbed at base. Woods, in the mountains (Mineral and Webster Counties). A northern species, reaching its southern limit in this State. Too uncommon in West Virginia to be of economic importance. June.



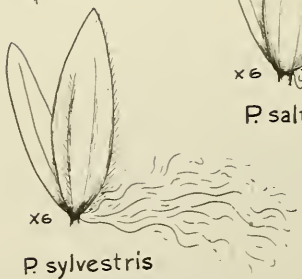
P. alsodes



P. bulbosa



P. saltuensis



P. sylvestris

POA

47. GLYCERIA R. Br.

Usually tall, aquatic perennials, with unbranched culms, flat leaves, and terminal panicles; spikelets several-flowered; glumes unequal, shorter than the florets; lemmas convex, firm, with a colorless margin, and 5 to 9 strong, parallel nerves. The species are all palatable grasses and are often grazed, but most of them are confined to wet lands, where their use is limited.

- | | |
|--|------------------------------|
| 1. Spikelets 1 to 4 cm. long. | 7. <i>G. septentrionalis</i> |
| 1. Spikelets 2 to 7 mm. long 2. | |
| 2. Panicle narrow. | 1. <i>G. melicaria</i> |
| 2. Panicle open, loose 3. | |
| 3. Spikelets 3 to 4 mm. wide; lemmas faintly nerved 4. | |
| 4. Spikelets 5- to 10-flowered. | 2. <i>G. canadensis</i> |
| 4. Spikelets 3- to 5-flowered. | 3. <i>G. laxa</i> |
| 3. Spikelets not over 2.5 mm. wide; lemmas strongly nerved 5. | |
| 5. Second glume 1 mm. long. | 4. <i>G. striata</i> |
| 5. Second glume 2 to 2.5 mm. long 6. | |
| 6. Panicle many-flowered, 2 dm. or more long; lemmas
1.4 to 2.5 mm. long. | 5. <i>G. grandis</i> |
| 6. Panicle few-flowered, rarely 1.5 dm. long; lemmas 3
to 3.5 mm. long. | 6. <i>G. pallida</i> |

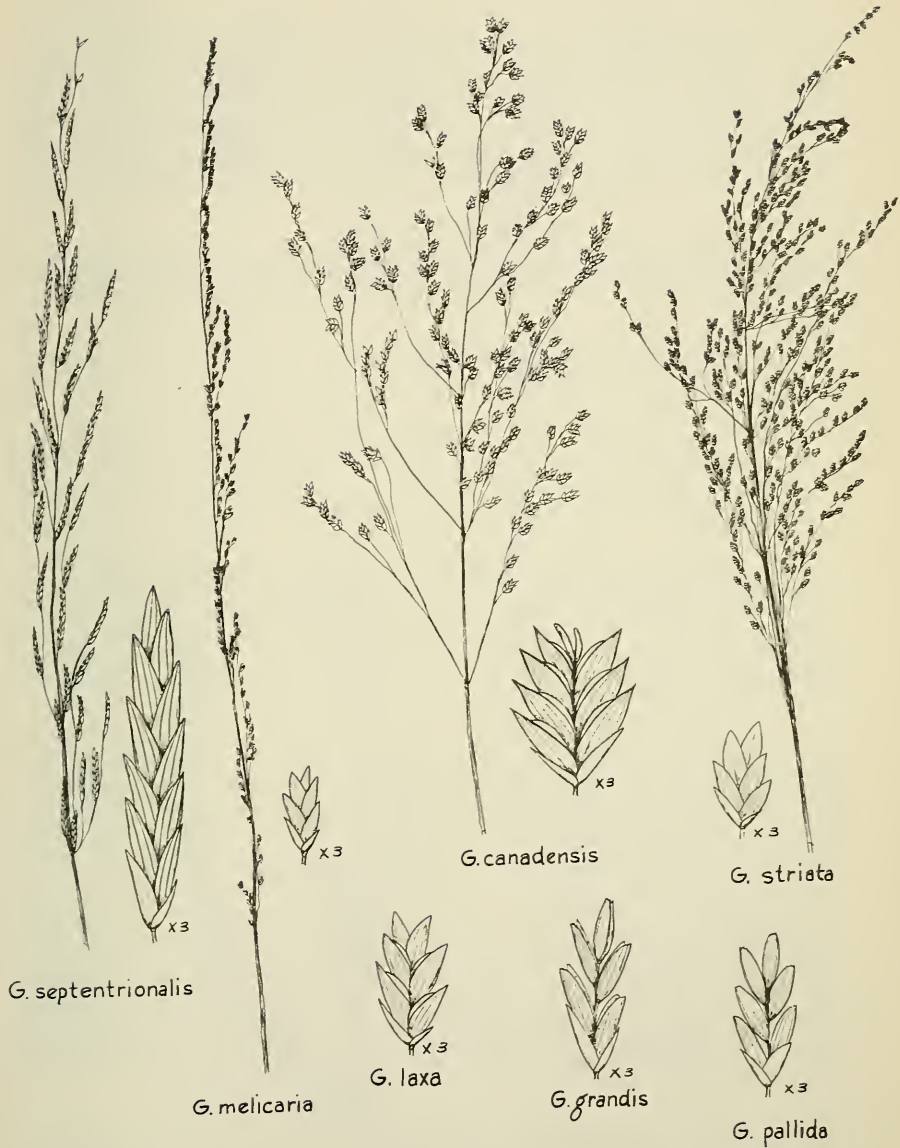
1. *G. melicaria* (Michx.) F. T. Hubb. *G. Torreyana* (Spreng.) Hitchc. Culms slender, solitary or few, from a running rootstock, 6 to 9 dm. tall; sheaths smooth, blades slightly roughened, 3 to 6 mm. wide; panicle 1.5 to 3 dm. long, very narrow, the branches erect; spikelets 3- to 4-flowered, about 4 mm. long. Wet woods and swamps, in the mountains (Mineral, Preston, Upshur, Randolph, Webster, and Pocahontas Counties). July-Aug.

2. *G. canadensis* (Michx.) Trin. RATTLESNAKE MANNAGRASS. Culms erect, solitary or few in a tuft, 6 to 15 dm. tall; blades rough on both sides, 4 to 8 mm. wide; panicle open, 1.5 to 3 dm. long, nearly as wide when fully expanded, the branches at length drooping; spikelets 5 to 7 mm. long, 5- to 10-flowered. Bogs and wet places, at rather high elevations (specimens from Hampshire, Hardy, Preston, Tucker, Pocahontas, and Mercer Counties). This species reaches its southern limit in the mountain swamps of West Virginia. July-Aug.

3. *G. laxa* Scribn. Culms 1 to 1.5 m. high; leaves 6 dm. or more long, 3 to 7 mm. wide; panicle loose, much branched, 3 to 4 dm. long, nearly as wide; spikelets 3- to 5-flowered, 4 to 5 mm. long, 3 mm. wide. Similar to *G. canadensis*, of which it is sometimes regarded as only a variety. Mountain swamps, Preston County. A northern grass reaching its southern limit in West Virginia. July-Sept.

4. *G. striata* (Lam.) Hitchc. *G. nervata* (Willd.) Trin. FOWL MANNAGRASS. Culms slender, 3 to 10 dm. tall; sheaths and upper surface of blades scabrous; blades 1.5 to 3 dm. long, 4 to 10 mm. wide; panicle 1 to 2 dm. long, nodding, the branches drooping at maturity; spikelets crowded toward the ends of the branches, often purplish, 3 to 4 mm. long, 3- to 7-flowered; lemmas with 7 prominent nerves. Wet places, growing in large, pale green tussocks, common in all parts of West Virginia. The most important species of this genus in the United States. It furnishes food for waterfowl during fall migration and has some value as forage in wet fields. June-Sept.

5. *G. grandis* Wats. AMERICAN MANNAGRASS. Culms clustered, thick, erect, 1 to 1.5 m. tall; sheaths loose, rough; leaves 1.8 to 3 dm. long, 6 to 15 mm. wide; panicle large, 2 to 4 dm. long, much branched, loose and open, nodding; spikelets numerous, with purple florets and white glumes, 4- to 7-flowered, 5 to 6 mm. long. Banks of streams, wet meadows, and ditches. Pocahontas and Tucker Counties. July.



GLYCERIA

6. *G. pallida* (Torr.) Trin. Culms slender, from a creeping base, 3 to 10 dm. tall; blades 2 to 8 mm. wide; panicle pale green, 7 to 15 cm. long, ascending, flexuous; spikelets 4- to 7-flowered, 6 to 7 mm. long; glumes blunt; lemmas blunt. Shallow, cold water, in the mountains (Preston and Tucker Counties). May-June.

7. *G. septentrionalis* Hitchc. EASTERN MANNAGRASS. Culms thick, 1 to 1.5 m. high; blades 1.2 to 2.5 dm. long, 6 to 8 mm. wide; panicle 2 to 2.5 dm. long, the long, slender branches rather few; spikelets 8 to 20 mm. long, scattered, sessile or short-pedicel, 6- to 12-flowered, a nearly sessile one in each axil; glumes and lemmas blunt. In swamps, usually in shallow water, often forming dense stands, more or less local throughout the State (Hampshire, Mineral, Randolph, Pocahontas, Raleigh, and Mason Counties). Lower leaves often floating. An excellent pasture grass for swampy meadows. Late spring and fall.

48. FESTUCA L.

Annuals or perennials with terminal panicles; spikelets 2- to several-flowered; glumes unequal, narrow, sharp-pointed; lemmas firm, narrow, sharp-pointed or tapering into a straight awn. Many species of fescue are important forage grasses.

1. Annuals 2.
 2. Awn more than twice as long as the lemma 1. *F. myuros*
 2. Awn not longer than the lemma 2. *F. octoflora*
1. Perennials 3.
 3. Leaves rolled 4.
 4. Culms decumbent; base red, fibrillose 3. *F. rubra*
 4. Culms erect 4. *F. ovina*
 3. Leaves flat 5.
 5. Spikelets 8 to 15 mm. long, 6- to 11-flowered 5. *F. elatior*
 5. Spikelets 4 to 6 mm. long, 1- to 4-flowered 6. *F. obtusa*

1. *F. myuros* L. Culms erect or bent at the base, usually in small clumps, 2 to 6 dm. high; leaves smooth, rolled, 1 mm. wide or less; panicle 7 to 20 cm. long, narrow, the branches ascending; spikelets 4- to 5-flowered, 8 to 11 mm. long; first glume about 1 mm. long, the second about 4 mm. long; lemma narrow, tapering into an awn about twice its length. Dry fields, mostly on the coastal plain. In West Virginia known only from Jefferson and Hampshire Counties. Introduced from Europe. June-July.

2. *F. octoflora* Walt. SIX-WEEK'S FESCUE. Culms slender, erect, 0.5 to 4 dm. high; sheaths shorter than the internodes; blades very narrow, rolled or sometimes flat, soft; panicle narrow, erect, 3 to 12 cm. long, often reduced to a somewhat one-sided raceme; spikelets 6 to 8 mm. long, 3- to 13-flowered; lemma lance-shaped, tapering into a rough, straight awn usually 2 to 5 mm. long. Dry, sterile soil, in open places. It is found in most parts of the State but never occupies large areas and is of little economic value. May-June.

3. *F. rubra* L. RED FESCUE. Culms from creeping rootstocks, bent at the reddish base, 4 to 9 dm. high; sheaths and blades smooth; panicle 5 to 20 cm. long, usually narrow, the branches upright; spikelets 7 to 8 mm. long, bearing usually 4 to 6 florets; lemma 5 to 7 mm. long, tapering to a rough awn about half as long. Low, sandy soil throughout the State (specimens from Jefferson, Mineral, Monongalia, Summers, Raleigh, and Mason Counties). A valuable forage grass, cultivated to a limited extent in lawns or pastures, usually in mixtures. Withstands trampling. Since it is drought-resistant and an excellent soil-binder, it is useful for holding hillsides and highway slopes. Apr.-June.

F. rubra var. *heterophylla* (Lam.) Nutt. SHADE FESCUE, which differs from the species in having flat culm blades, has been found in Monongalia County.

4. *F. ovina* L. SHEEP FESCUE. Culms erect, 1.5 to 6 dm. high, in dense clumps; leaves pale green, thread-like, much rolled, firm, usually scabrous, those



F. octoflora

F. rubra

F. ovina

F. elatior

F. obtusa

FESTUCA

of the culm very short; panicle narrow, 5 to 10 cm. long, the branches upright; spikelets 5 to 8 mm. long, usually bearing 3 to 6 flowers; lemma smooth, 4 to 5 mm. long, tapering into an awn about 1 mm. long. Open woods and stony slopes, apparently uncommon in this State (specimens from Monongalia and Preston Counties). A good grazing grass, but not abundant; introduced in West Virginia but native farther north and in Europe. Regarded as valuable for sheep pastures. Drought resistant and capable of growth on poor, dry soils. May-June.

5. *F. elatior* L. MEADOW FESCUE. Culms 5 to 12 dm. tall, growing in loose tufts; blades 4 to 8 mm. wide, scabrous above, bearing sharp, projecting points at the top of the sheaths; panicle 1 to 2 dm. long, erect, contracted, branches spikelet-bearing nearly to the base; spikelets 8 to 12 mm. long, 6- to 8-flowered; lemmas 6 to 7 mm. long. Meadows, roadsides, and waste places, common in all parts of the State. Grown for meadow and pasture. Introduced from Europe. The most important cultivated species of the genus. June-Aug.

6. *F. obtusa* Spreng. *F. nutans* Spreng. NODDING FESCUE. Culms 4 to 12 dm. tall; blades 4 to 7 mm. wide, scabrous; panicle loose and open, 1 to 2 dm. long, the spikelets near the ends of the spreading branches, spikelets 3- to 5-flowered, 4 to 6 mm. long; lemmas 3 to 4.5 mm. long. Rocky woods and banks, usually growing in small tufts, common in all parts of West Virginia. June-July.

49. BROMUS L.

Annuals, biennials, or perennials with flat leaves and terminal panicles of large spikelets; spikelets few- to many-flowered; glumes unequal, sharp-pointed; lemmas longer than the glumes, usually bearing 2 teeth at the apex, awnless or awned; grain furrowed. The perennials include several important forage plants, but the annuals are mostly weedy species introduced from the Old World. *B. secalinus*, *B. commutatus*, and *B. japonicus* are closely related annuals, regarded by some botanists as only varieties of *B. arvensis*.

1. Perennials 2.
 2. Creeping rhizomes present. 9. *B. inermis*, pl. 36
 2. Creeping rhizomes absent 3.
 3. Panicle narrow, the branches erect. 8. *B. erectus*, pl. 36
 3. Panicle open, the branches spreading or drooping 4.
 4. Lemmas glabrous. 5. *B. purgans*
var. *laeviglumis*
 4. Lemmas hairy 5.
 5. Lemmas hairy along the margins and on the lower part of the back, otherwise glabrous. 5. *B. ciliatus*, pl. 36
 5. Lemmas hairy rather evenly all over the back 6.
 6. Sheaths shorter than the internodes; nodes 4 to 6. 6. *B. purgans*, pl. 36
 6. Sheaths longer than the internodes; nodes 10 to 20. 7. *B. latiglumis*, pl. 36
1. Annuals 7.
 7. Lemmas narrow, tapering to a sharp point, the teeth 2 to 5 mm. long; awns usually more than 1.5 cm. long 4. *B. tectorum*, pl. 35
 7. Lemmas broad, rounded at the tip, the teeth less than 1 mm. long 8.
 8. Sheaths smooth. 1. *B. secalinus*, pl. 35
 8. Sheaths hairy 9.
 9. Branches of the panicle stiffly spreading. . . 2. *B. commutatus*, pl. 35
 9. Branches of the panicle slender, lax, or flexuous. 3. *B. japonicus*, pl. 35

1. *B. secalinus* L. CHESS. CHEAT. Culms 4 to 9 dm. high; sheaths smooth and strongly nerved; blades bearing a few long hairs above; panicle open, the branches somewhat drooping; spikelets glabrous, bearing 5 to 15 florets; glumes 5 to 7 mm. long; lemmas 8 to 11 mm. long; awns short and rather weak. Openings in the spikelet are visible at the base of the florets. Fields and waste places,



B. secalinus



B. commutatus



B. japonicus



B. tectorum

BROMUS

a common and troublesome weed in most parts of West Virginia. Introduced from Europe. Early American farmers believed that wheat would turn to this species, hence the name Cheat. July-Aug.

2. **B. commutatus** Schrad. HAIRY CHESS. Culms 3 to 6 dm. tall; sheaths hairy; panicle open, drooping, 1.5 dm. long or less; spikelets glabrous, bearing 5 to 8 florets; glumes 6 to 8 mm. long; lemmas 7 mm. long, with an awn as long or longer. Similar to *B. secalinus*, but the florets are more closely packed in the spikelets. A weed in fields and waste places, very common in all parts of the State. Introduced from Europe. June-July.

3. **B. japonicus** Thunb. JAPANESE CHESS. Culms 1.5 to 6 dm. high, sheaths and leaves bearing long hairs; blades about 1.5 mm. wide; panicles open and drooping, one-sided, 1 to 2 cm. long; spikelets very narrow, 2.5 cm. long, bearing 6 to 12 florets; lemmas glabrous, 9 mm. long, with a twisted awn about 12 mm. long. A weed in waste places throughout the State. Introduced from the Old World. June-July.

4. **B. tectorum** L. DOWNY CHESS. Culms 3 to 6 dm. high, slender, in clumps; sheaths and blades hairy; panicle broad, dense, one-sided, drooping, 6 to 15 cm. long; spikelets 13 to 20 mm. long, nodding; lemmas hairy; awn 13 to 15 mm. long. Waste places, a common weed in most parts of the State. Introduced from Europe. May-July.

B. sterilis L., which somewhat resembles *B. tectorum* but has awns 2 to 3 cm. long, has been found in Hampshire County. Introduced from Europe.

5. **B. ciliatus** L. FRINGED BROME. Culms rather slender, 7 to 12 dm. tall; sheaths hairy or sometimes nearly smooth; leaves 1 cm. wide, usually bearing long hairs on both surfaces; panicle broad and drooping, about 1.5 to 2.5 dm. long, the branches bearing spikelets near the ends; spikelets 1.5 to 2.2 cm. long, bearing 5 to 9 florets; glumes narrow; lemmas 10 to 12 mm. long, fringed with hairs on the edges; awn straight, 3 to 5 mm. long. Moist woods and banks, common throughout the State. July-Aug.

6. **B. purgans** L. CANADA BROME. Culms slender, 7 to 12 dm. tall, with usually 4 to 6 nodes; sheaths shorter than the internodes, more or less hairy; blades narrowed at base, without flanges; panicle 1.5 to 4 dm. long, nodding at maturity; spikelets 1.8 to 2.5 cm. long, 4- to 7-flowered. Moist or dry woods and rocky slopes; strictly a woodland species, common in all parts of the State. June-July.

A form of this species with glabrous lemmas, known as *B. purgans* var. *laeviglumis* (Scribn.) Swallen is also common in West Virginia.

7. **B. latiglumis** (Shear.) Hitchc. *B. atissimus* Pursh. Culms slender, 7 to 12 dm. tall, with usually 10 to 20 nodes; sheaths overlapping, longer than the internodes, more or less hairy, especially about the throat and collar; base of blades with prominent flanges on each side. Closely resembles *B. purgans*, differing through having much overlapping sheaths and a later blooming date. Alluvial banks of streams, local (specimens from Hampshire, Monongalia, and Summers Counties). Aug.-Sept.

8. **B. erectus** Huds. Culms erect, 6 to 9 dm. high, glabrous; sheaths nearly glabrous; leaves narrow, bearing a few long hairs; panicle 1 to 2 dm. long, the branches few, upright; spikelets narrow, 5- to 10-flowered; lemmas 10 to 12 mm. long, tapering, rough-hairy on the back; awn 5 to 6 mm. long. Fields, local. Monongalia County. Introduced from Europe.

9. **B. inermis** Leyss. SMOOTH BROME. Culms erect, 5 to 10 dm. tall; ligule 1.5 to 2 mm. long; blades smooth or nearly so, 5 to 10 mm. wide; panicle 10 to 20 cm. long, erect, the branches whorled; spikelets 2 to 2.5 cm. long; lemmas 9 to 12 mm. long, glabrous or nearly so, blunt at the tip or with an awn only 1



BROMUS

to 2 mm. long. Cultivated as hay and pasture grass in the prairie states; established along roads and in waste places (Hancock, Ohio, Monongalia, and Hampshire Counties). Introduced from Europe. The most important species of the genus. Important for holding banks along streams and ditches.

50. LOLIUM L.

Perennial grasses with erect, unbranched culms, flat leaves, and terminal spikes; spikelets several-flowered, one in a place in alternate notches of a zigzag rachis, one edge of each spikelet lying next to the rachis, and the glume on that side (the lower one) absent, the glume on the other side stiff, exceeding the lowest floret; lemmas convex, with or without awns. *L. perenne* and *L. multiflorum* are among the most important of the European forage grasses and are used in this country to a limited extent for hay, pasture, and lawn.

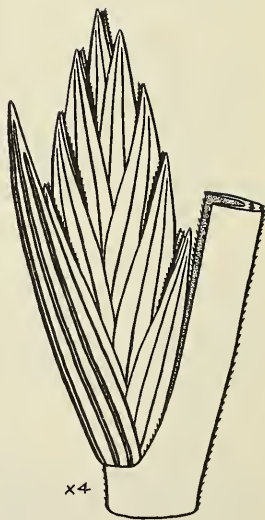
1. Spikelet 8- to 10-flowered; lemmas awnless..... 1. *L. perenne*
1. Spikelet 10- to 20-flowered; some of the lemmas awned.... 2. *L. multiflorum*

1. ***L. perenne* L.** COMMON DARNEL. PERENNIAL RYE GRASS. Perennial; culms 3 to 6 dm. tall, glabrous; leaves usually not over 4 mm. wide, collar with a flange-like projection on each side; spikelet 8- to 10-flowered; glume shorter than the spikelet; lemma about 5 to 6 mm. long, awnless. Fields and roadsides, common throughout the State. Sometimes cultivated as a meadow grass. Important in erosion control because of rapidity of establishment, large root system, and reseeding ability. Perhaps the grass longest under cultivation for forage in the world. June.

2. ***L. multiflorum* Lam.** ITALIAN RYE GRASS. Perennial; culms 3 to 6 dm. tall, glabrous, but the upper portion roughened; leaves 4 mm. wide or less, bearing little projections on each side of collar; spikelets 10- to 20-flowered; lemmas 7 to 8 mm. long, usually at least the upper ones awned. Fields and roadsides, occasionally established (specimens from Mineral, Marshall, Ohio, Nicholas, and Mercer Counties). Introduced from Europe. Sometimes cultivated as a meadow grass. It is a good forage plant but does not persist very long. June.



L. multiflorum



L. perenne

LOLIUM

51. AGROPYRON Gaertn.

Perennials with unbranched culms and terminal spikes; spikelets several-flowered, one in a place in alternate notches of a zigzag rachis, the side of the spikelet placed against the rachis; glumes equal in length, usually stiff and shorter than the spikelet, sharp-pointed or awned; lemmas convex; sharp-pointed or awned. Most of the species are good forage grasses, but some of them become troublesome weeds because of their creeping rootstocks.

1. Awn of the lemma shorter than the body of the lemma 2.
1. Awn longer, usually fully twice the length of the lemma. . . 3. *A. subsecundum*
2. Leaves mostly 6 to 10 mm. wide; strong rhizomes present. . . 1. *A. repens*
2. Leaves mostly 2 to 4 mm. wide; rhizomes lacking. . . . 2. *A. trachycaulum*

1. *A. repens* (L.) Beauv. QUACKGRASS. Culms bright green or glaucous, 3 to 12 dm. high; sheaths mostly glabrous; leaves flat or rolled, often bearing scattered soft hairs on the upper surface; spikelets about 5-flowered, 1 to 1.5 cm. long; glumes 8 to 10 mm. long, sharp-pointed or with a short awn; lemmas about 1 cm. long, strongly nerved, pointed or bearing an awn as much as 5 mm. long. Fields, roadsides and waste places, common in all parts of West Virginia. The internodes of the long, creeping rootstocks are a bright yellowish-green. A good forage plant, but usually regarded as a troublesome weed because of the creeping rootstocks.

2. *A. trachycaulum* (Link.) Malte. *A. tenerum* Vasey. SLENDER WHEATGRASS. Culms stiff, erect, 5 to 10 dm. high; leaves narrow; flat or rolled 2 to 4 mm. wide; spikelets rather distant from each other; glumes firm, nearly as long as the spikelet, the margin thin and colorless, the tip awned or pointed; lemmas usually short-awned. Resembles quackgrass but without creeping rootstocks. A northern species, reaching its southern limit in the Appalachians in West Virginia but also common in the far West. Cultivated extensively in the northwestern states. It is one of the few native North American grasses in cultivation. July-Aug.

3. *A. subsecundum* (Link.) Hitchc. *A. caninum* (L.) Beauv. BEARDED WHEATGRASS. Culms green or glaucous, 3 to 10 dm. high, without creeping rootstocks; leaves flat, 2 to 6 mm. wide, rough; spike more or less nodding, rather dense, 7 to 15 cm. long; spikelets 1.2 to 1.5 cm. long, excluding the awns; glumes pointed or awned; lemma awns straight, fully twice the length of the lemma. Cultivated grounds and meadows, in West Virginia known only from Ohio and Pocahontas Counties. July-Sept.

52. HORDEUM [Tourn.] L.

Biennials with terminal spikes which break apart at the joints when mature; spikelets usually 1-flowered, 3 together at each joint of the flattened rachis, the middle one sessile, the other two stalked and usually reduced to spreading awns; glumes equal in length, stiff, narrow, or bristle-like; lemma tapering into an awn.

1. *H. jubatum* L. SQUIRREL TAIL GRASS. Culms erect, or bent at the base, 3 to 7 dm. high; leaves 5 mm. wide or less, rough; spike very bushy, nodding, 5 to 12 cm. long and about the same width; lateral pair of spikelets each reduced to 1, 2, or 3 awns; glumes of the perfect spikelet awn-like, 3 to 6 cm. long; lemma 6 to 8 mm. long, with an awn as long as the glumes. Open ground, meadows, and waste places. A troublesome weed in the northern and western states, but fortunately not common in West Virginia where it is at the limit of its range (specimens from Monongalia, Lewis, Pendleton, Pocahontas, Webster, and McDowell Counties). June-Aug.

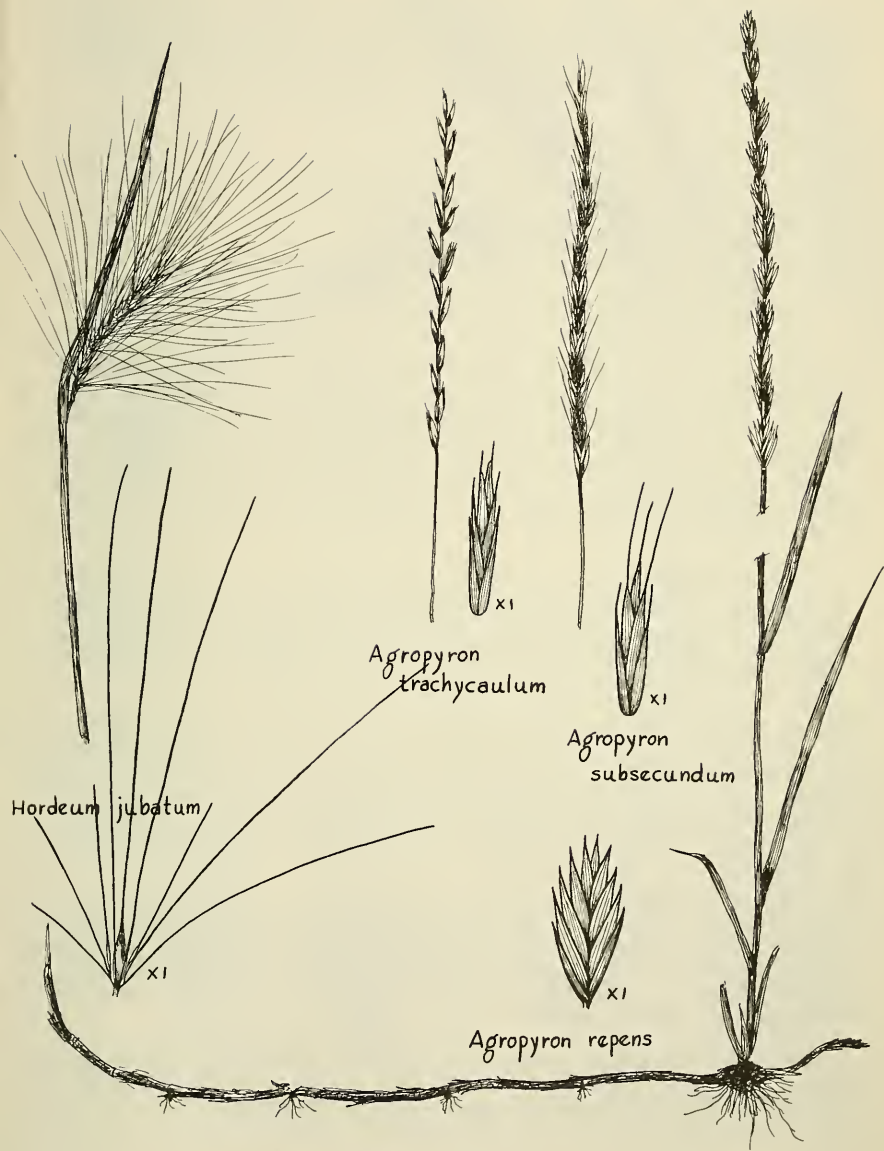


Plate 38

53. ELYMUS L.

Erect perennials in clumps, with flat leaves and densely flowered terminal spikes; spikelets 2- to 6-flowered, sessile and in pairs (or more) at the alternate notches of the zigzag rachis; glumes equal in length, stiff, narrow, sharp-pointed, or awned, placed side by side in front of the florets; lemmas convex, sharp-pointed, or awned. For the most part good forage grasses.

1. Glumes very narrow and bristle-like 2.
2. Glumes and lemmas hairy..... 4. *E. villosus*
2. Glumes and lemmas glabrous or slightly roughened..... 5. *E. arkansanus*
1. Glumes broader near the base 3.
3. Glumes and lemmas bearing coarse hairs..... 2. *E. canadensis*
3. Glumes and lemmas glabrous or nearly so 4.
4. Glumes about 1 mm. wide at the middle, the bases not bowed out..... 3. *E. riparius*
4. Glumes about 1.5 to 2 mm. wide at the middle, the bases bowed out..... 1. *E. virginicus*

1. *E. virginicus* L. VIRGINIA WILD RYE. Culms in clumps, erect, 6 to 12 dm. tall; sheaths glabrous; leaves flat, rough, mostly 5 to 15 mm. wide; spike 5 to 15 cm. long, usually erect, often partly included in the upper sheath; glumes firm, hardened, yellowish, bowed out at the base, about 1.5 to 2 mm. wide at the middle, rough, tapering into a straight awn often as long as the body of the glume; lemmas glabrous below, rough above, with an awn usually about 1 cm. long. Moist ground, low woods, and along streams, common in all parts of West Virginia. July-Sept.

2. *E. canadensis* L. CANADA WILD RYE. Culms thick, green or glaucous, 6 to 15 dm. high; leaves mostly 1 to 2 cm. broad; spike 1 to 2 dm. long, nodding, loosely flowered in the lower portion; spikelets usually three or four together; glumes and lemmas bearing coarse hairs and long, spreading awns. River banks, open ground, and sandy soil throughout the State. Probably has considerable value for pasture but has received little attention. July-Aug.

3. *E. riparius* Wiegand. Culms slender, erect, 1 to 1.5 m. high; sheaths glabrous; leaves flat, 5 to 15 mm. wide, rough; spike nodding, 7 to 20 cm. long; glumes narrow, about 1 mm. wide at the middle, not bowed out at the base; lemmas smooth or slightly roughened, awn straight, usually 2 to 3 cm. long. River banks and low ground, common throughout the State. Resembles *E. canadensis* but can be distinguished by having glabrous or only slight roughened lemmas. July-Sept.

4. *E. villosus* Muhl. *E. striatus* Willd. Culms slender, in clumps, 6 to 10 dm. tall; sheaths nearly glabrous; leaves flat, hairy on the upper surface; spike 7 to 10 cm. long, 2.5 cm. thick, dense, drooping; spikelets 1- or 2-flowered; glumes bristle-like, 2 or 3 times the length of the floret, hairy; floret 6 mm. long, hairy, with a slender awn 2 to 3 cm. in length. Rocky woods and banks, common throughout the State. July-Aug.

5. *E. arkansanus* Scribn. & Ball. *E. striatus* var. *arkansanus* Hitchc. This species is regarded by Hitchcock (see Manual, p. 256) as merely a form of *E. villosus* with glabrous or slightly roughened glumes and lemmas. Our only specimen is from Mercer County.



E. canadensis

E. riparius

E. villosus

E. virginicus

ELYMUS

54. HYSTRIX Moench.

Perennials with unbranched culms, flat leaves, and loosely flowered spikes; spikelets 2- to 4-flowered, 1 to 3 together at each joint of the flattened rachis; glumes bristle-like, one or both often absent; lemmas rigid, tapering into a long awn.

1. *H. patula* Moench. BOTTLE-BRUSH GRASS. Culms 6 to 12 dm. high; leaves 8 to 15 mm. wide, rough; spike sometimes partly included in the upper sheath; spikelets usually distant from each other, at first erect, soon widely spreading, 1 to 1.5 cm. long, excluding the awns; lemmas nearly glabrous, often pubescent at the tip; awns 1.5 to 4 cm. long. Moist woods, throughout the State, but of little forage value because of its scarcity. The spreading awns give it the appearance suggested by the common name. June-Aug.

55. ARUNDINARIA Michx.

Woody grasses with panicles of large spikelets at the summit of the plant and in the axils of the leaves; spikelets several-flowered; glumes unequal, shorter than the lemmas, the first glume sometimes absent; lemmas boat-shaped, sharp-pointed.

1. *A. gigantea* (Walt.) Chapm. CANE. Culms 3 to 10 m. high, branching; leaves 1.5 to 3 cm. wide, tapering at each end; panicles on leafy branches bearing loose sheaths and small blades; spikelets 8- to 12-flowered, 3 to 7 cm. long. River banks, growing in colonies over large areas called canebreaks. In West Virginia at the limit of its range, being known only from Wayne County. Our tallest grass. A very interesting grass and quite important farther south.

Phyllostachys nigra (Lodd.) Munro var. *Henonis* (Mitf.) Stapf., a hardy bamboo, 3 to 5 m. high, introduced from Japan, has become established along the bank of the Little Kanawha River in Wood County.

GLOSSARY

- Acute.** Sharp-pointed.
Appressed. Lying close against an organ.
Auricle. An ear-like lobe.
Awn. A slender bristle arising from the end or back of a glume or lemma.
Axil. The angle between an organ and the axis to which it is attached.
Axis. The main stem of an inflorescence.
Blade. The part of a leaf above the sheath.
Bract. Reduced, modified leaf.
Bulb. An underground stem with fleshy scales like an onion.
Callus. The hardened base of a mature lemma in some grasses.
Capillary. Very slender, hairlike.
Caryopsis. The grain or fruit of grasses.
Ciliate. Fringed with hairs on the margin, like an eyelash.
Collar. The area on the under side of a leaf at the junction of sheath and blade.
Corm. The hard swollen base of a stem.
Culm. The jointed stem of a grass.
Depauperate. Impoverished or dwarfed.
Diffuse. Open and much-branched.
Dioecious. Unisexual, the two kinds of flowers on separate plants.
Digitate. Several racemes or spikes arising from the summit of a peduncle.
Ellipsoid. Shaped nearly like a football.
Exserted. Protruding.
Fascicle. A little bundle or cluster.
Fertile. Capable of producing fruit.
Filiform. Threadlike.
Fimbriate. Fringed.
Flexuous. Bent alternately in opposite directions.
Floret. The lemma and palea with the included flower.



Hystrix patula

Arundinaria gigantea

- Fusiform.** Broadest in the middle, tapering to each end; cigar-shaped.
- Glabrous.** Without hairs.
- Gland.** A structure that secretes a fluid.
- Glaucous.** Covered with a bluish waxy coating, as the stem of a raspberry.
- Glumes.** The two bracts at the base of a spikelet.
- Hirsute.** Bearing straight, stiff hairs.
- Hispid.** Bearing stiff hairs.
- Imbricate.** Overlapping.
- Inflorescence.** The flowering part of a plant.
- Internode.** The part of a stem between two nodes.
- Joint.** The node of a culm.
- Keel.** The sharp fold at the back of a sheath, blade, or lemma, like the keel of a boat.
- Lanate.** Woolly.
- Lanceolate.** Narrow, tapering to both ends, but the broadest part below the middle.
- Lax.** Loose.
- Lemma.** The lower of the two bracts inclosing the grass flower.
- Ligule.** A thin appendage on the upper side of a leaf at the junction of the sheath and blade.
- Linear.** Long and narrow.
- Monoecious.** Unisexual, with both kinds of flowers on the same plant.
- Nerve.** A vein of blades, glumes, and lemmas.
- Neuter.** Without stamens or pistil.
- Node.** The joint of a culm.
- Ovate.** Egg-shaped in outline, the broadest part below the middle.
- Palea.** The inner bract of a floret.
- Panicle.** An inflorescence with a main axis and branches.
- Pectinate.** Comb-like, referring to grasses where the spikelets are close together, parallel, and branching from the rachis like the teeth of a comb.
- Pedicel.** The stalk of a spikelet.
- Perfect.** Flowers that have both stamens and pistils.
- Pilose.** Bearing soft, straight hairs.
- Pubescent.** Covered with hairs.
- Raceme.** An unbranched flower cluster bearing pediceled flowers on an elongated axis.
- Rachilla.** The axis of a spikelet.
- Rachis.** The axis of a spike or raceme.
- Rhizome.** A creeping, underground stem.
- Rosette.** A cluster of radiating basal leaves.
- Scabrous.** Rough.
- Sessile.** Without a pedicel.
- Sheath.** The lower part of a leaf, enclosing the stem.
- Spathe.** A sheathing bract of the inflorescence.
- Spike.** An unbranched flower cluster with the flowers sessile on an elongated axis.
- Spikelet.** The unit of the inflorescence, composed of two glumes and one or more florets.
- Sterile.** Without pistils.
- Stipe.** A tiny stalk to an organ.
- Stolon.** A horizontal stem creeping on the surface of the ground.
- Terete.** Cylindrical.
- Truncate.** Ending abruptly, as if cut off.
- Unisexual.** Having only stamens or only pistils.
- Villous.** Bearing long, soft hairs.
- Web.** A cluster of slender, soft hairs.
- Whorl.** An arrangement of leaves or flowers in a circle around the stem.

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