# MONOECIOUS AND DIOECIOUS GRASSES OF THE AMERICAS

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# PREFACE

In this paper there are described 30 genera and 77 species, which include 17 genera and 54 species of monoecious, and 13 genera and 23 species of dioecious grasses of the Western Hemisphere. Special note has been made to include striking characteristics peculiar to each species, especially relative to their flowering habits and inflorescence location in regard to pistillate and staminate spikelets.

This list makes no pretention of being complete since it includes only those grasses, with at least some recognized or economic importance, of which botanists have some knowledge.

The South American species of Poa and Distichlis are not yet well understood. Many species of Pariana and Olyra are also vaguely presented and are of no particular importance. The number of species of a few genera, therefore, is uncertain and there may be a few more which should have been included.

For the sake of convenience this paper has been divided into two parts; the first, a brief consideration of some of the various grasses, the second and more extensive part, includes the description, distribution, location of staminate, and pistillate inflorescence, habitat, and general remarks. These grasses are classed according to tribes, genera, and species. Monoecious and dioecious grasses are listed separately.

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## INDEX OF GRASSES

# INTRODUCTION

All plants have come from simple forms without flowers which existed remote ages ago; these plants all change somewhat as a result of time and environment; this process or the sum of such changes make up what we call evolution. Some of these ancestral plants gradually, through the span of many generations become more complex in structure, these more complex kinds evolved from the simple kinds, from ancestral forms which were much like the simple plants which exist today. The results being that those plants whose new structure was of advantage were more likely to live than those forms whose structure was of no particular advantage.

In order to understand the grass flower better we first consider these processes. The type of flower which we are considering here is one of the simple or modified flower types. By that we mean the simplest flowers have no perianth, and they are composed of essential parts only. The two kinds of essential parts are stamens and pistils. The flowers which have only stamens or only pistils are unisexual or imperfect, those which have both stamens and pistils are called bisexual, perfect, or hermaphrodite. Flowers are not, strictly speaking, sexual; and declinous flowers, while more simple, are not less perfect than are monoclinous ones. The flowers with which the average person is familiar are monoclinous or perfect. Diclinous flowers with stamens are called staminate; those with pistils are called pistillate.

Unisexual flowers are more primitive than perfect ones,[3] that is, flowers which possessed only stamens or only pistils are believed to have preceded those possessing both stamens and pistils.

Plants with imperfect flowers present them in two ways. One type is to bear both staminate and pistillate flowers upon the same individual; the other is to bear the staminate flowers upon some individuals and the pistillate flowers upon others. Plants bearing both kinds of flowers upon the same individual are called monoecious. Plants which bear staminate flowers upon one individual and pistillate flowers upon a different individual are called dioecious.

In considering the distribution of sexes in the grasses, we began with dioecism. The condition which forms the actual anthithesis to this state is cleistogamy in which the lemma and palea do not separate, and the anthers pollinate the adjacent stigmas in the unopened flower.

The more aberrant grass flowers seem to be due, in the main, to a reduction process. This reduction can often be related to the effects of crowding and compression during ontogeny. In its rudimentary stages, the many-flowered inflorescence is squeezed within the leaf-sheaths; the individual spikelets are imprisoned inside the outer empty glumes, and each young flower is entrapped between the lemma and palea.

A manifestation of this same tendency is the suppression of either the androecium or the gynaecium, but not of both, a suppression which produces unisexual flowers.

The grasses show every grade between dioecious species,[1] which have their male and female spikelets on different plants, and are thus wholly dependent upon crossing between different individuals, and species prevailing cleistogamic, in which the flowers as a rule are self-pollinated without opening.

Sexuality in plants is significant in a very important way, namely, in the evolution of organisms, in the derivation of new varieties

and species from those monoecious and dioecious plants we now have. The possibility of thus obtaining new species has been in dispute. Theoretically it might be expected, for a new combination of unit characters in hybrids might stimulate the expression of entirely new qualities.[18] If such hybrids should prove to be stable, and under favorable conditions it is possible, a new species would have resulted without the aid of artifical self-pollination and continued selection to bring it to the constant homozygous condition.

There is no dispute that the fact of sexuality is of tremendous importance to the work of the plant breeder; the problem of the true nature of these diclinous and monoclinous grasses has become of interest because of their possible use in experiments on the nature of sex in higher plants.

An investigation of the nature and causes of neutral states, sterility and imperfect sex expressions must lead to developments of far reaching importance, not only in higher plants but in the biology of the human and animal sex conditions as well. The bees and various other insects have evolved hereditary constitutions through which they instinctively produce males, females, and partial neuters at will. Through these biological processes the sexes of the normal colony are very decidedly controlled. Partial neuter conditions and partial sex-reversals are common in humans, and it is of the greatest importance to the welfare of society that the exact causes of neutrality, sex-reversal, and sterility of both males and females be discovered and proper treatments be developed to overcome barrenness and undesirable neutral and reversed mental reactions. It frequently happens that those who have the highest mental endowment and otherwise a normal physical condition cannot perpetuate their desirable hereditary lines.

The proper study of neutrality in plants may prove as enlightening for the problem of human sterility as the Mendelian study of plant heredity proved to be for the problem of animal heredity.[17]

Any attempt to seek an explanation of sexuality through a balance of genes instead of a balance of physiological and ecological conditions would be in question, since experiments indicate that any sexual condition of an individual is not altogether determined by Mendelian sex genes but also to a large degree by a physiological balance which is produced through the interaction of general heredity potentialities of the cell on the one hand and the environmental conditions on the other, and in all of these processes the balance of genes apparently remains exactly the same. The ordinary vegetative karyokinesis are continuing the original diploid complement of chromosomes and balance of genes just as definitely as we know they do when varieties of fruit trees are propagated indefinitely by means of grafting.

It is probable that the problem of sex can only be solved by the accumulation of data from many sources which when finally put together may give such evidence and understanding as will lead to the ultimate causes and nature of the remarkable sexual dimorphism exhibited by most living things. A thorough understanding of the laws of heredity, physiological reactions, and environment is essential if improvement of plants is to be controlled intelligently.

## A GENERAL DISCUSSION OF SOME OF THE GRASSES

Ordinarily in Zea mays L., the terminal inflorescences are normally male and the lateral female; countless examples have been shown in which the sex segregation does not follow this simple ruling. Hermaphrodite flowers may occur; the tassel may include female flowers;

or the ear may be partly male. The reproductive shoots produced by the basal suckers of the plant are often mixed.[21]

In both monoecious and dioecious species there are various types of general hereditary constitutions which determine the constancy and direction of sex expression in relation to the ecological-physiological conditions. In Zea mays L., the hereditary balance is so conditioned that with the usual favorable environmental conditions of growth, the ecological light gradient causes the sex balance to swing from monoecious expression to pure female expression or toward the opposite but not to pure male expression.

It is a noteworthy fact that the organs that are to be suppressed develop normally up to the point where rapid growth and sexual development begin, and then rapidly decline. This may be brought about by either a variable photoperiod in the earlier stages of growth or by lack of adequate nutrition.[20]

The haploid chromosome number in Euchlaena perennis Hitchc., Mexican teosinte is 20.[14] This species is likely to become more important as it becomes better known. The haploid chromosome number of Euchlaena mexicana Schrad. Annual teosinte is 10. It has been found that a few cases represents a heterotypic anaphase with 11 chromosomes going to each pole; however this is rare. Morphological characteristics indicate that the Annual teosinte and Zoa mays are of more recent origin than Euchlaena perennis and that Tripsacum is the least specialized member of this group of grasses. Chromosome numbers of typical representatives of these three genera indicate that the more primitive and less specialized members have more chromosomes than the more recent and highly specialized species. Of the varieties of Zea mays L., thus far studied all show 10 bivalent chromosomes at mitoses. The chromosome number of

Coix lachryma jobi L., Jobs-tears, is the same as for Zea mays. The haploid chromosome number for all Tripsacums, gama grasses, appears to be 18 and 35. Tripsacum is less closely related to either Zea or Euchlaena than these two genera are to each other. The commonest member of this genera, Tripsacum dactyloides, and among the least corn-like, has been hybridized with corn by a special technique which envolves shortening of the styles or silks of corn and the use of enormous numbers of plants, thus proving a definite relationship, though from the fact that such hybrids are self-sterile it is concluded that the relationship is very remote.[13]

The male and female plants of Buchloe dactyloides Englem., are so unlike that they were originally allotted to two different genera; the staminate form was called Sesleria dactyloides Nutt., and the pistillate form, Anthephora axilliflora Steud. There is some controversy as to the degree of dioecism in this genera. According to some observers,[16] one plant may bear both male and female spikelets. This monoecism is described as occurring at an early stage in the life-history, but when stolons are put forth the sexes become separated to some extent as the branches belong to one or other sex exclusively.

There are two species of Eragrostis Beauv., which were at one time confused, but it has now been shown that one of them Eragrostis hypnoides (Lam.) B. S. P., is always hermaphrodite, while the other, Eragrostis reptans (Michx.) Nees, is dioecious.[6] There is a marked difference between the stamens of the two species. In the hermaphrodite grass, the anthers are very minute, only 0.2 mm. long, while in the species with separate sexes, the anthers are ten times as long and probably two hundred times as great in mass.[1]

The grass constituting the genus Jouvea Fourn., presents certain

unsolved problems of morphology and taxonomy. Weatherwax was guided by the absence of auricles, the branched culm, the staminate inflorescence, and the similarity to Distichlis and Uniola and placed Jouvea in the Festuceae tribe, regarding the pistillate inflorescence as the result of one of those erratic ventures in evolution which have apparently occurred in so many genera of grasses. Hitchcock was sufficiently impressed with the arrangement of the spikelets to place it in Hordeae. However, both genera, Jouvea and Pariana, are of doubtful affinity and are now placed tentatively in the tribe Hordeae.

# TRIBES OF MONOECIOUS GRASSES

## 1. Tripsaceae

1. Coix lacryma-jobi
2. Tripsacum dactyloides
3. Tripsacum floridanum
4. Tripsacum lanceolatum
5. Tripsacum latifolium
6. Tripsacum laxum
7. Tripsacum pilosum
8. Euchlaena mexicana
9. Euchlaena perennis
10. Zea mays

## 2. Paniceae

1. Lithachne pauciflora
2. Lithachne pineti
3. Mniochloa pulchella
4. Mniochloa strephioides
5. Ekmanochloa subaphylla
6. Ekmanochloa aristata
7. Raddia concinna
8. Raddia strictiflora
9. Raddia costaricensis
10. Raddia capillata
11. Raddia sympodica
12. Raddia guianensis
13. Raddia nana
14. Raddia malmeana
15. Olyra latifolia
16. Olyra latifolia var. arundinacea
17. Olyra ciliatifolia
18. Olyra lateralis
19. Olyra caudata
20. Olyra yucatana
21. Olyra standleyi
22. Olyra ecaudata
23. Olyra heliconia
24. Olyra buchtienii
25. Olyra surinamensis
26. Olyra cordifolia
27. Olyra loretensis

## 3. Zizanieae

1. Hydrochloa caroliniensis
2. Luziola peruviana
3. Luziola bahiensis
4. Luziola spruceana
5. Zizaniopsis miliacea
6. Zizania aquatica
7. Zizania aquatica var. angustifolia
8. Zizania texana
9. Pharus parvifolius
10. Pharus glaber
11. Pharus latifolius
12. Pharus cornutus

## 4. Hordeae

1. Pariana zingiberina
2. Pariana lunata
3. Parinan sylvestris

## 5. Chlorideae

1. Cathestecum erectum
2. Cathestecum stoloniferum

## TRIBE TRIPSACEAE

### Genera of Tripsaceae



### Coix L. Jobs-Tears

1. Coix lacryma-jobi L.
Hitchc., Misc. Publ. 243. 423. 1936.
Misc. Publ. 200. 764-765. 1935.

Description: Tall branched grasses, annual; culms usually about 1 m. tall; broad flat blades as much as 4 cm. wide; pistillate spikelets 2 or 3 together, enclosed in a bony beadlike involucre, beads white or bluish-white, globular or ovoid, 6 to 12 mm. long; staminate spikelets approximate in threes on a slender rachis forming a short raceme, the rachis protruding from the orifice of the involucre.

Inflorescence location: Inflorescence borne on the end of long, stout peduncles, these clustered in the axils of the leaves, each inflorescence consisting of an involucre containing the pistillate lower portion of the inflorescence, and the staminate upper portion of the inflorescence.

Distribution: In the Southern United States. Originally from the tropics of the Old World, now cultivated and escaped throughout the American tropics.

Habitat: Moist ground and waste places, ditches, and open ground at low altitudes, especially near dwellings.

Remarks: Cultivated as an ornament and for the ivory or grayish beadlike fruits that are used as beads and rosaries and other ornamental purposes. (A garden form "called by gardeners var. aurea zebrina" has yellow-striped blades.)

### Tripsacum L. Gamagrass

1. Tripsacum dactyloides (L.) L.
U. S. Nat. Herb. 24: part 9. 700. 1930.

Description: Robust perennials in large clumps, with thick knotty rhizomes, 2 to 3 m. tall or sometimes taller; blades usually 1 to 2 cm. wide, flat, scabrous on the margin; spikes 15 to 25 cm. long, the pistillate part one-fourth the entire length or less, pistillate spikelets solitary on opposite sides at each joint of the thick, hard

Inflorescence location: Inflorescence of 1 to several racemes, the pistillate part below; the staminate portion above on the same continuous rachis.

Distribution: Eastern and southern United States, Mexico, and the West Indies to Paraguay and Bolivia.

Habitat: Banks of streams and moist places at low altitudes.

Remarks: This specie is good forage grass, but is not common enough to be of importance. This genus is of interest because it is related to maize. A hybrid between T. dactyloides and maize has recently been made. (Mangelsdorf, P. C., and Reeves, R. G. of Texas.)

2. Tripsacum floridanum Porter. Florida Gamagrass.
U. S. Nat. Herb. 24: part 9. 700. 1930.
U.S.D.A. Misc. Publ. 200. 767. 1935.

Description: Smaller than T. dactyloides in all ways, commonly less than 1 m. tall; blades mostly 1 to 4 mm. wide; terminal and axillary spikes usually solitary.

Inflorescence location: Inflorescence of 1 to several racemes, the pistillate part below, the staminate above on the same rachis.

Distribution: Southern Florida.

Habitat: Low rocky pine lands.

Remarks: Very rare; of no commercial importance.

3. Tripsacum lanceolatum Rupr. Mexican Gamagrass.
U.S.D.A. Misc. Publ. 200. 768. 1935.

Description: Resembling T. dactyloides; sheaths, especially the lower, sometimes hispid; blades often hispidulous on the upper surface; spikes more slender with smaller spikelets than in T. dactyloides, the terminal spides usually 3 to 5; staminates spikelets membranaceous, one of the pair distinctly pediceled.

Inflorescence location: Inflorescence of 1 to several racemes terminal, the pistillate part below, the staminate above on the same rachis.

Distribution: Huachuca Mountains, Ariz.; Mexico to Guatemala.

Habitat: Rocky hills.

4. Tripsacum latifolium Hitchc.
U. S. Nat. Herb. 24: part 9. 700. 1930.

Description: Culms 2 to 4 meters tall, 2 to 3 cm. thick at base; blades as much as 70 cm. long, or the lower as much as 140 cm.

and gradually narrowed at base, 2.5 to 6 cm. wide, glabrous or hispidulous; racemes 1 to 2 more slender than in T. dactyloides.

Inflorescence location: Inflorescence of 1 to several racemes, terminal, the pistillate part below, the staminate above on the same rachis.

Distribution: Guatemala, Honduras, Nicaragua, Hispaniola, and Trinidad; Western Mexico and Central America.

Habitat: Moist rocky slopes, especially in canyons; occasionally in the higher foothills.

Remarks: Cultivated for fodder in Antigua. (The tall stout stems and broad flat blades give the aspect of maize. Sometimes called teosinte which name should be reserved for Euchlaena mexicana.)

5. Tripsacum laxum Nash.
U. S. Nat. Herb. 24: part 9. 700. 1930.

Description: Culms stout, as much as 5 m. tall with fascicled spikes and blades glabrous or more or less hispidulous, as much as 8 or 9 cm. wide, not narrowed at base; racemes slender, few to 10 or 12.

Inflorescence location: Inflorescence terminal, the pistillate portion below, the staminate above on the same continuous rachis.

Distribution: Mexico to Central America.

Habitat: Grassy slopes.

Remarks: Sparingly cultivated for forage under the name Guatemala grass, in Cuba, Puerto Rico, and St. Croix; incorrectly called teosinte or perennial teosinte and maicillo.

6. Tripsacum pilosum Scribn. and Merr.
U. S. Nat. Herb 24: 701. 1930.

Description: Resembles T. laxum but the sheaths papillose-hispid.

Inflorescence location: Inflorescence terminal, the pistillate portion below, the staminate above on the same rachis.

Distribution: Guatemala. Mexico.

Habitat: Grassy slopes.

## EUCHLAENA Schrad. Teosinte

1. Euchlaena mexicana Schrad. Teosinte
U. S. Nat. Herb. 24: part 9. 701. 1930.
Misc. Publ. 200. 768. 1935.

Description: Tall annual, resembling maize, the culms branching at base, 2 to 5 m. tall; blades as much as 8 cm. wide; staminate spikelets 2-flowered, in pairs, on one side of a continuous rachis; pistillate spikelets solitary on opposite sides, sunken in cavities in the hardened joints of an obliquely articulate rachis; spikes infolded in foliaceous spathes or husks, 2 to several of these enclosed in the leaf sheaths.

Inflorescence location: The staminate flowers in spike-like racemes, forming large spreading panicles (tassels) terminating the stems, the pistillate inflorescence in the axils of the leaves.

Distribution: Southern United States and Mexico.

Habitat: Moist grounds at low altitudes.

Remarks: Occasionally cultivated for green forage; this species is of special interest because of its close relationship to corn; it will hybridize with corn, not only through manual manipulation but also when growing naturally in the field.

2. Euchlaena perennis Hitchc. Mexican Teosinte.
U.S.D.A. Misc. Publ. 200. 768. 1935.

Description: A perennial species resembling E. mexicana; it propagates by creeping rhizomes.

Inflorescence location: terminal panicles of staminate spikelets, and axillary spikes of pistillate spikelets.

Distribution: Found only in a very restricted area in the State of Jalisco, Mexico.

Habitat:

Remarks: It will hybridize with corn, but the hybrids are only partially fertile and are perennial in habit.

## ZEA L. Indian Corn

1. Zea mays L. Maize Corn.

Description: Tall robust monoecious annual; staminate spikelets in long spikelike racemes, these 2-flowered, in pairs, on one

side of a continuous rachis, these numerous, forming large spreading terminal panicles; pistillate inflorescence in the axils of the leaves, the spikelets in 8 to 16 or more rows on a thickened, almost woody axis (cob), enclosed in numerous spathes (husks).

Inflorescence location: The staminate flowers in spike-like racemes, forming large spreading panicles (tassels) terminating the stem, the pistillate inflorescence in the axils of the leaves.

Distribution: It is grown in every State of the United States, and from the Canadian border through the Central American tropics to southern Chile.

Habitat: It is the only domesticated plant that can be grown over the entire range of climate, soils, and day lengths from sea level to an altitude of 12,000 feet.

Remarks: It is by far the most valuable single crop produced in the Western Hemisphere and one of the important economic plants of the world, being cultivated for food for man and domestic animals and for forage.

## TRIBE PANICEAE

### Genera of Paniceae



### Lithachne Beauv.

1. Lithachne pauciflora (Swartz) Beauv.
U.S.D.A. Misc. Publ. 243. 368. 1936.

Description: Slender tufted perennial with wiry culms and flat blades; 30 to 50 cm. tall; spikelets in small axillary panicles these with a single pistillate spikelet at the summit and one to several staminate spikelets below; the small axillary panicles produced from the upper sheaths; fruit 4 to 5 mm. long, white; terminal panicle if present wholly staminate.

Inflorescence location: When terminal panicle is present it is wholly staminate, otherwise the staminate and pistillate spikelets are located on small axillary panicles produced from the upper sheaths.

Distribution: Guatemala, Honduras, Costa Rica, Panama. Mexico and the West Indies to Argentina.

Habitat: Moist woods up to 6500 feet altitude.

2. Lithachne pineti (Wright) Chase
U.S.D.A. Misc. Publ. 243. 370. 1936.

Description: Perennial; culms tufted, filiform, spreading, 10 to 20 cm. long; blades ovate to lanceolate, soon reflexed, 10 to 15 mm. long, 3 to 7 mm. wide; staminate spikelets narrow, 3 to 4 mm. long; glumes of pistillate spikelets acuminate, 5 mm. long; fruit about 3 mm.

Inflorescence location: Terminal panicle if present is wholly staminate, otherwise the staminate and pistillate spikelets are in small axillary panicles produced from the upper sheaths.

Distribution: Eastern Cuba.

Habitat: Moist places in pinelands and woods.

## MNIOCHLOA Chase

1. Mniochloa pulchella (Griseb.) Chase.
U.S.D.A. Misc. Publ. 243. 374. 1936.

Description: Culms tufted, filiform, lax and spreading, the sterile culm 5 to 10 cm. long, the flowering culm erect or ascending, 10 to 20 cm. tall, bearing a single sheath about the middle and another near the base; pistillate spikelets subsessile; staminate spikelets smaller, reduced to the lemma and palea; pistillate spikelets about 2.7 mm. long; staminate spikelets about 1.4 mm. long.

Inflorescence location: Inflorescence a pair of slender racemes, one pistillate, the other staminate, at the summit of a naked culm.

Distribution: Eastern Cuba.

Habitat: On shady limestone rocks.

Remarks: Very rare.

2. Mniochloa strephioides (Griseb.) Chase.
U.S.D.A. Misc. Publ. 243. 374. 1936.

Description: Culms lax, erect or more or less spreading, the sterile usually 10 to 15 cm. tall, the fertile culm 4 to 7 cm. tall, bearing a single sheath about the middle; blades ovate-triangular, 5 to 15 mm. long; racemes 1.5 to 2 cm. long; pistillate spikelets about 4.5 mm. long; staminate spikelets 1.5 mm. long.

Inflorescence location: Inflorescence a pair of slender racemes, one pistillate, the other staminate, at the summit of a naked culm.

Distribution: Western Cuba.

Habitat: Shady banks and ravines.

Remarks: Very rare.

## EKMANOCHLOA Hitchc.

1. Ekmanochloa subaphylla Hitchc.
U.S.D.A. Misc. Publ. 243. 375. 1936.

Description: Perennial; culms cespitose, slender, erect, wiry, glabrous, 50 to 100 cm. tall; sheaths shorter than the internodes, blades from minute to well developed, flat, 1 to 3.5 cm. long, narrowly lanceolate, with a puberulent petiole 1 mm. long; racemes conjugate, erect, appressed, the pistillate one 3 to 4 cm. long, spikelets short-pedicled along a slender rachis; staminate about half as long,

spikelets smaller, about half as long, the rachis slender; pistillate spikelets about 6 mm. long excluding the awn; staminate spikelets about 2 mm. apart, appressed, about 2 mm. long.

Inflorescence location: Inflorescence is made up of a pair of slender racemes, one pistillate, the other staminate, at the summit of leafy culms.

Distribution: Only known from province of Oriente, Cuba.

Habitat: Limestone rocks; limestone hills at elevation of 1500 feet.

Remarks: The genus is named for the late Dr. Erik L. Ekman, indefatigable botanical explorer, who collected this species on overhanging limestone rocks of Loma Picote, November 2, 1922.

2. Ekmanochloa aristata Ekman.
U.S.D.A. Misc. Publ. 243. 377. 1936.

Description: Similar to E. subaphylla, about 50 cm. tall; sheaths shorter, with a few long hairs at the summit; inflorescence few-flowered, the staminate and pistillate spikelets each 4 to 5; pistillate spikelets 8 to 9 mm. long excluding the awn, the glume and sterile lemma equaling the body of the fertile floret, 3 to 5 nerved; awn of the fertile floret about 15 mm. long; staminate spikelets 3 to 3.2 mm. long.

Inflorescence location: Inflorescence a pair of slender racemes, one pistillate, the other staminate, at the summit of leafy culms.

Distribution: Cuba; between Taco and Nibujon, prov. Oriente.

Habitat: Rocky limestone hills.

Remarks: Very rare.

RADDIA Bertol.

1. Raddia concinna (Hook. f) Chase.
Proc. Biol. Soc. Wash. 21: 185. 1908.
U. S. Nat. Herb. 24, part 9. 685. 1930. Grasses of Central America.

Description: Erect cespitose perennial, 15 to 30 cm. tall, the conspicuously distichous leafy shoots resembling the pinnately compound leaves of leguminous plant; blade oblong 1.5 to 3 cm. long, 5 to 10 mm. wide; pistillate spikelets 7 to 10 mm. long, the fruit a littler shorter than the glumes and sterile lemma. Slender with flat blades and narrow panicles.

Inflorescence location: Staminate and pistillate spikelets in distinct small panicles, the staminate terminal or from the upper nodes, the pistillate axillary.

Distribution: Nicaragua, (Sandy Bay); Costa Rica, Hamburg Finca, Prov. Limon).

Habitat: Wet forest at low altitudes.

2. Raddia strictiflora (Fourn.) Chase.
Proc. Biol. Soc. Wash. 21: 185. 1908. Hitchc.
U. S. Nat. Herb. 24. part 9. 685. Grasses of Central America.

Description: Culms slender, 25 to 40 cm. tall; nodes puberulent; blades thin, oblong-elliptic, 4 to 7 cm. long, 1 to 2 cm. wide, glabrous, the short petiole puberulent; panicles narrow; staminate spikelets 3 to 4 mm. long; pistillate spikelets about 1 cm. long.

Inflorescence location: Staminate and pistillate spikelets in distinct small panicles, the staminate terminal or form the upper nodes, the pistillate axillary.

Distribution: Honduras, (Puerta Sierra), also Mexico.

Habitat: Moist forest at low altitudes.

3. Raddia costaricensis Hitchc.
Proc. Biol. Soc. Wash. 40: 87. 1927. Hitchc.
U. S. Nat. Herb. 24. part 9. 685. Grasses of Central America.

Description: Erect cespitose perennial; culms stiff, sometimes bent at the nodes, glabrous 20 to 30 cm. tall; sheaths densely hirsute; blades crowded stiffly spreading, 3 to 4 cm. long, 4 to 6 mm. wide; staminate panicles narrow, pale, the spikelets 3 to 4 mm. long; pistillate panicles consisting of a few (apparently 1 to 2), pistillate spikelets and several staminate ones below, the pistillate spikelets glabrous, 7 mm. long, with an apiculation 1.5 mm. long; staminate spikelets glabrous, 3 mm. long.

Inflorescence location: The staminate terminal or from the upper nodes, the pistillate axillary; pistillate panicles consisting of a few pistillate spikelets and several staminate ones below.

Distribution: Costa Rica (Rio Hondo).

Habitat: Forest at low altitudes.

4. Raddia capillata (Trin.) Hitchc.
U. S. Nat. Herb. 24. part 8. 491. 1927. Grasses of Central Andes.

Description: Plants rather slender and low; blades thin, glaucescent, 8 to 10 cm. long, 2 cm. wide; fruit slender, smooth, white, 9 mm. long, 1 mm. wide.

Inflorescence location: The staminate terminal or from the upper nodes, the pistillate axillary.

Distribution: Brazil to Ecuador.

Habitat: Shady banks wet lands.

5. Raddia sympodica (Doell) Hitchc.
U.S.D.A. Misc. Publ. 243. 372. 1936.

Description: Culms tufted, slender, erect, or ascending from strongly geniculate lower nodes, 15 to 30 cm. tall, the sterile culms naked below, bearing 5 to 7 crowded leaves at the summit; blades flat, lanceolate, 3 to 7 cm. long, 6 to 12 mm. wide; staminate inflorescence consisting of small spikelike panicles of 2 to 5 spikelets borne in the upper axils and at the ends of the leafy culms the lateral spikelets staminate, subsessile, about 3 mm. long, 0.8 mm. wide, acuminate; pistillate inflorescence consisting of small spikelike panicles of 2 or 3 fertile spikelets on short thickened pedicels and a few staminate ones borne at the ends and in the upper slightly inflated sheaths of low slender naked culms arising from the base.

Inflorescence location: Staminate and pistillate spikelets in distinct small panicles, the staminate terminal or from the upper nodes, the pistillate axillary.

Distribution: Trinidad and French Guiana.

Habitat: Shady forest floors. "A dwarf grass in sandy soil on slopes under the shade of large forest trees" (Broadway).

Remarks: The fruit becomes lead-colored at maturity and has a glabrous stripe down the back.

6. Raddia guianensis (Brongn.) Hitchc.
U.S.D.A. Misc. Publ. 243. 373. 1936.

Description: Culms tufted, slender, ascending form more or less geniculate lower nodes, 20 to 45 cm. tall, naked below, toward the summit bearing 12 to 24 approximate leaves with overlapping sheaths and distichous spreading blades; blades flat, glabrous, oblong-lanceolate, rounded at both ends, 2 to 3.5 cm. long, 4 to 8 mm. wide; staminate panicles several to many from the axils of the upper sheaths, narrow, few-flowered, the spikelets 5 to 6 mm. long; pistillate panicles 1 or 2 from the middle nodes, bearing 2 to 5 spikelets on short clavate pedicels; fruit 4 mm. long, about 1 mm. wide, bluntly acuminate, whitish, glabrous.

Inflorescence location: Staminate and pistillate spikelets in distinct small panicles, the staminate terminal or from the upper nodes, the pistillate axillary.

Distribution: Tobago to Brazil.

Habitat: Shady banks and moist forest.

7. Raddia nana (Doell) Chase.
Biol. Soc. Wash. Proc. 21: 185. 1908. Hitchc.
U.S.D.A. Misc. Publ. 243: 373. 1936.

Description: Culms tufted, delicate, lax, 10 to 30 cm. long, naked below; blades flat, oblong- to ovate-triangular, spreading, 10 to 12 mm. long, 5 to 7 mm. wide, mucronate at the rounded apex; racemes small and few-flowered, axillary, scarcely exserted from the upper sheaths; pistillate spikelets ovoid, 2 mm. long, the glumes puberulent.

Inflorescence location: Staminate terminal or from the upper nodes, the pistillate axillary; staminate and pistillate spikelets in distinct small panicles.

Distribution: Trinidad to Brazil.

Habitat: Wet sandy savannas.

8. Raddia malmeana (Ekman) Hitchc.
U. S. Nat. Herb. 22: part 6. 505. 1922.

Description: A delicate tufted perennial, slender culms 5 to 10 cm. tall; sheaths mostly shorter than the internodes, pilose at the summit; blades thin, pubescent, elliptic or elliptic-oblong, 10 to 13 mm. long, 3 to 4 mm. wide; pistillate spikelet pubescent, about 1.5 mm. long.

Inflorescence location: Staminate terminal or from the upper nodes, the pistillate axillary; staminate and pistillate spikelets in distinct small panicles.

Distribution: Guiana to Brazil.

Habitat: Savannas.

## OLYRA L.

1. Olyra latifolia L.
U.S.D.A. Misc. Publ. 243. 366-368. 1936. Hitchc.
U.S.D.A. Misc. Publ. 200. 716. 1935. Standl.
U. S. Nat. Herb. 27. 84. Flora of Panama Canal Zone.

Description: Glabrous perennial, somewhat woody, about 5 m. tall, with lanceolate-oblong, abruptly acuminate blades commonly 20 cm. long and 5 cm. wide, and open ovoid panicles of purplish cast, 10 to 15 cm. long, the branches stiffly spreading, each bearing a single large long-acuminate pistillate spikelet at the thickened summit and several small slender-pediceled staminate spikelets along the branches.

Inflorescence location: The pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches; the pistillate spikelets rather large.

Distribution: Said to occur in the region of Tampa Bay, Florida, United States, but the record is doubtful; Mexico and the West Indies to Brazil and Bolivia.

Habitat: Copses and shady banks, at low and medium altitudes.

Remarks: In Cuba this grass is called "tibisi". In Panama it is called "carricillo".

2. Olyra latifolia var. arundinacea Griseb.
U.S.D.A. Misc. Publ. 243. 366-368. 1936.

Description: The form described as Olyra arundinacea, has glabrous sheaths and more loosely flowered green panicles otherwise it is about as Olyra latifolia.

Inflorescence location: Pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches.

Distribution: It is found in the West Indies chiefly from Puerto Rico to Trinidad and extends to Brazil.

Habitat: Copses and shady banks, at low and medium altitudes.

Remarks: The differences mentioned above, which differentiates between the two (latifolia and arundinacea), are best seen in the primary culms and panicles.

3. Olyra ciliatifolia Raddi.
U.S.D.A. Misc. Publ. 243. 368. 1936. Hitchc.
U. S. Nat. Herb. 24. part 8. 490. Grasses of West Indies.

Description: Culms erect, mostly less than 1 m. tall; blades light green, flat, 5 to 15 cm. long, 2 to 4 cm. wide, asymmetric at base,

one side rounded, the ohter side straight for 1.5 to 4 cm. at an angle of 30° to 45°; panicles rather delicate, ovoid, 10 to 15 cm. long, the lower half or two-thirds staminate, the pistillate spikelets in the upper part of the panicle and at the ends of the upper branches; staminate spikelets narrow, about 5 mm. long, short-awned; pistillate spikelets elliptic on thickened pedicels, glabrous, acuminate, about 1 cm. long, the fruit loosely clothed with silky hairs.

Inflorescence location: Pistillate spikelets borne on the ends of the branches of loose terminal panicles, the smaller staminate spikelets pedicellate below the pistillate ones.

Distribution: Brazil to Bolivia.

Habitat: In shade of trees along the rich wood borders.

4. Olyra lateralis (Presl) Chase
Proc. Biol. Soc. Washington 21: 179. 1908. Hitchc. U. S. Nat. Herb. 24: part 9. 683. 1930.

Description: Branching straggling perennial, more delicate than the other species; blades oblong, lanceolate, mostly 3 to 4 cm. long, 5 to 10 mm. wide; glaucous beneath; panicles delicate, about 2 cm. long, and about as wide; staminate spikelets linear, 3 to 4 mm. long; pistillate spikelets ovoid, 2 to 3 mm. long, at the periphery of the panicle.

Inflorescence location: Pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches.

Distribution: Central America to Bolivia.

Habitat: Copses and shady banks at medium altitudes.

5. Olyra caudata Trin. Hitchc.
U. S. Nat. Herb. 24: part 9. 683. 1930.
U. S. Nat. Herb. 24: part 8. 490. 1927.

Description: Blades oblong, 20 cm. long, 8 cm. wide, glabrous; branches of the inflorescence subdigitate, 10 cm. long, the pistillate spikelets solitary at the ends, the glumes extended into a slender point as much as 3 cm. long, the fruit very white and smooth.

Inflorescence location: Pistillate spikelets borne on the ends of the branches of loose terminal panicles, the smaller staminate spikelets pedicellate below the pistillate ones, sometimes the upper branches all pistillate and the lower ones all staminate.

Distribution: British Guiana to Brazil and Peru.

Habitat: Dense forest at about 1000 to 1500 feet altitude.

6. Olyra yucatana Chase.
Proc. Biol. Soc. Washington 21: 178. 1908. Hitchc. U. S. Nat. Herb. 24: part 9. 684. 1930.

Description: Resembling O. latifolia; blades unequally trapezoid-truncate at base; panicles smaller and narrower than in O. latifolia; fruit 7 mm. long, white and shining, silky pubescent at base and margins.

Inflorescence location: Pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches.

Distribution: Guatemala at an altitude of 400 to 2000 feet; British Honduras. Also in southern Mexico.

Habitat: Moist woods at low altitudes.

7. Olyra standleyi Hitchc.
Proc. Biol. Soc. Washington 40: 86. 1927. Hitchc. U. S. Nat. Herb. 24: part 9. 684. 1930.

Description: Erect cespitose perennial; culms slender, 1 to 3 m. tall, the nodes in dry specimens presenting one or two raised dark sharp edges; blades oblong-elliptic, as much as 17 cm. long and 4 cm. wide (the lower not seen), puberulent on the upper surface at base and on the short petiole; panicle of several fastigiate branches spreading at maturity, the axis extending above the whorl and bearing one or two ascending branches, the main branches 8 to 12 cm. long, bearing appressed spikelets, 1 to 4 pistillate spikelets on the upper part, staminate spikelets below, the peduncle and base of the branches more or less puberulent, smaller axillary panicles from the upper sheaths; staminate spikelets about 1 cm. long, the lemma narrow, acuminate-pointed; pistillate spikelets glabrous, the glume and sterile lemma 5-nerved, rather thin, somewhat reticulate with cross veins, gradually accuminate, pointed; fruit narrow, about 8 mm. long, narrowed to an obtuse apex, glabrous, minutely pitted, the pits oblong.

Inflorescence location: Pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches.

Distribution: Costa Rica.

Habitat: Moist woods at 4500 to 5000 feet altitude.

8. Olyra ecaudata Doell. Hitchc.
U. S. Nat. Herb. 24: part 8. 490. 1927.

Description: An erect slender perennial about 60 cm. tall, with oblong blades 10 to 20 cm. long, rough above; branches of the inflorescence fascicled, the staminate spikelets short-pedicoled along the main branches, the pistillate toward the end, acuminate but not caudate.

Inflorescence location: Pistillate spikelets borne on the ends of the branches of loose terminal panicles, the smaller staminate spikelets pedicellate below the pistillate ones, sometimes the upper branches all pistillate and the lower ones all staminate.

Distribution: French Guiana to Bolivia.

Habitat: Copses and shady banks.

9. Olyra heliconia Lindm.
Hitchc., U. S. Nat. Herb. 24: part 8. 490. 1937.

Description: Culms robust but not much branched, about 2 m. tall; blades asymmetrically truncate at base, as much as 30 cm. long and 8 cm. wide; branches of the inflorescence aggregate in about 1 to 2 whorls, slender, as much as 20 cm. long; staminate spikelets often purple, 1 cm. long, pistillate spikelets mostly 3 to 4 toward the end, caudate, the fruit glabrous, delicately pitted.

Inflorescence location: Pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches.

Distribution: Brazil to Bolivia and Peru.

Habitat: Shrubby banks.

10. Olyra buchtienii Hack.
Hitchc., U. S. Nat. Herb. 24: part 8. 490. 1927.

Description: Blades oblong-lanceolate, 25 cm. long, 7 cm. wide, glabrous; branches of the inflorescence about 3, digitate, 10 cm. long; staminate spikelets numerous, about 4 mm. long; pistillate spikelets few at the ends of the branches, the glume and sterile lemma acuminate, about 2 cm. long, puberulent within, the fruit smooth.

Inflorescence location: Pistillate spikelets borne on the ends of the branches of loose terminal panicles, the smaller staminate spikelets pedicellate below the pistillate ones, sometimes the upper branches all pistillate and the lower ones all staminate.

Distribution: Bolivia.

Habitat: Rich woods.

11. Olyra surinamensis Hochst.
Hitchc., U. S. Nat. Herb. 22: part 6. 503-504. 1922.

Description: Differs from O. latifolia in the numerous narrow few-flowered appressed axillary panicles, the narrow pistillate spikelets, and the pubescent fruit.

Inflorescence location: Pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches.

Distribution: British and Dutch Guiana.

Habitat: Wet forest and swamps.

12. Olyra cordifolia H. B. K.
Hitchc., U. S. Nat. Herb. 22: part 6. 504. 1922.

Description: Resembling O. latifolia, but differing in the ovate-oblong blades with a cordate base.

Inflorescence location: Pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches.

Distribution: British Guiana and Colombia to Paraguay.

Habitat: Forests.

13. Olyra loretensis Mez.
Notizbl. Bot. Gart. Berlin 7: 47. 1917.
Hitchc., U. S. Nat. Herb. 24: part 8. 491. 1927.

Description: It is allied to O. ciliatifolia but differs in having much smaller staminate spikelets.

Inflorescence location: Pistillate spikelets borne on the upper branches and on the ends of the lower branches of loose terminal panicles, the smaller staminate spikelets pedicellate along the lower branches.

Distribution: Peru, Colombia, and Brazil.

Habitat: Moist banks and forest.

Remarks: Described from Leticia, in territory in dispute between Peru, Colombia, and Brizil in 1917.

# TRIBE ZIZANIEAE

## Genera of Zizanieae



## Hydrochloa Beauv.

1. Hydrochloa caroliniensis Beauv. Water grass.
U.S.D.A. Misc. Publ. 200. 544-546. 1935.

Description: A slender, branching, aquatic grass, probably perennial, the leaves floating, staminate spikelets about 4 mm. long, in small few-flowered terminal racemes; the pistillate spikelets about 2 mm. long, in few-flowered racemes in axils of the leaves.

Inflorescence location: The staminate and pistillate spikelets in separate panicles on the same plant.

Distribution: South Carolina to Florida and Louisiana.

Habitat: Ponds, marshes, and slow-flowing streams.

Remarks: Spikelets usually inconspicuously and sparsely located in luxuriant foilage of plant. Sometimes this plant, in sufficient abundance, will become troublesome. It is eaten by livestock.

## Luziola Juss.

1. Luziola peruviana Gmel.
U.S.D.A. Misc. Publ. 200. 544. 1935.

Description: Spikelets unisexual, slender culms, 10 to 40 cm. tall; 1 to 4 mm. wide, exceeding the panicles. Staminate panicles terminal, narrow, the spikelets about 7 mm. long; pistillate panicles terminal and axillary, the spikelets about 2 mm. long, ovoid and abruptly pointed at maturity; panicles about as wide as long.

Inflorescence location: The staminate and pistillate spikelets in separate panicles on the same shoot.

Distribution: Florida (Pensacola) and Louisiana (vicinity of New Orleans); Mexico and Cuba, and south to Argentina. (Hitchcock)

Habitat: Muddy ground and wet meadows.

Remarks: This grass is rare in the United States. Will not withstand dry, cold climates.

2. Luziola bahiensis (Steud.) Hitchc.
U.S.D.A. Misc. Publ. 200. 544. 1935.

Description: Spikelets unisexual, extensively stoloniferous, culm not more than 15 cm. tall; staminate panicles few flowered and mostly terminal, the spikelets about 5 mm. long; pistillate panicles 4 to 6 cm. long, the few stiff branches spreading, with a few appressed oblong-lanceolate spikelets 4 to 5 mm. long.

Inflorescence location: The staminate and pistillate panicles on different shoots.

Distribution: Southern Alabama; Cuba. Brazil. (Hitchcock)

Habitat: Lagoons and banks of streams.

Remarks: Very rare in the United States.

3. Luziola spruceana Benth.
U. S. Nat. Herb. 22: part 6. 463. 1922.

Description: Spikelets unisexual, culms thick, soft and spongy, freely branching; sheaths broad, as much as 30 cm. long; blades firm, flat, as much as 50 cm. long and 2 cm. wide, narrowed and folded toward the base; staminate panicles open, 10 to 15 cm. long; spikelets 5 mm. long; stamens 6; pistillate panicles on shorter branches, the branches numerous, approximate on a short axis; spikelets 5 mm. long, acuminate; fruit about 2 mm. long.

Inflorescence location: The staminate and pistillate flowers in separate panicles on the same plant; pistillate panicles on shorter branches.

Distribution: Cuba and Hispaniola; Trinidad to Brazil.

Habitat: Ponds, lagoon, and quaking bogs.

Remarks: Low creeping perennial found in tropical America.

## Zizaniopsis Doell and Aschers.

1. Zizaniopsis miliacea (Michx.) Doell and Aschers.
Water Millet. Zizaniopsis. Southern Wildrice. Marsh Millet.
U.S.D.A. Misc. Publ. 200. 542-544. 1935.

Description: Spikelets unisexual, 1-flowered, culms 4 to 10 feet tall, robust in large clumps, usually in colonies; blades 1 to 5 feet long, those of the base 10 to 40 mm. wide, the margins very scabrous with a razor-like edge; panicle rather narrow, nodding, 30 to 50 cm. long; pistillate spikelet exclusive of the awn 5 to 6 mm. long, the glume with an awn 2 to 6 mm. long; staminate spikelet 7 to 8 mm. long, the glume acute, sometimes with a short awn.

Inflorescence location: The pistillate borne at the end of the branches, and the staminate below or sometimes mixed with the pistillate.

Distribution: Virginia, Ohio, and Oklahoma, south to Florida and Texas.

Habitat: In swamps, in water, and along the margins of streams, ponds, marshes, river banks and lakes.

Remarks: This is a robust perennial marsh grass with stout creeping rhizomes. It is conspicuous for its large purple panicles, at first gracefully drooping but finally erect and spreading. It is of no great economic value except as food or shelter for birds. It is grazed by livestock when the more palatable species are scarce.

## ZIZANIA L. Wildrice

1. Zizania aquatica L. Annual Wildrice
U.S.D.A. Misc. Publ. 200. 540-542. 1935.

Description: Spikelets unisexual, plants annual, culms erect, robust, usually 2 to 3 m. tall; blades elongate, 1 to 4 cm. wide, panicles mostly 30 to 50 cm. long, the branches 15 to 20 cm. long; pistillate spikelets terete, angled at maturity; lemma 3-nerved, tapering into a long slender awn; palea 2-nerved, closely clasped by the lemma; grain cylindric, 1 to 2 cm. long; staminate spikelets soft; lemma 5-nerved, acuminate or awn-pointed; palea about as long as the glume, 3-nerved; stamens 6.

Inflorescence location: Staminate spikelets are borne on the lower spreading branches; pistillate spikelets are borne on the upper ascending branches.

Distribution: This grass is common in the northern Mississippi Valley, along the Atlantic coast from Newfoundland to Pennsylvania and Florida, Arkansas, eastern Texas to Missouri and central Nebraska and Idaho.

Habitat: It is not confined to water but thrives in marshes and on the edges of streams as well.

Remarks: The seeds of wild rice were used by the aborigines for food and are still used to some extent by some of the northern tribes of Indians. Wildrice is important as a food and shelter for water fowl and is sometimes planted for this purpose in marshes on game preserves.

Zizania aquatica var. angustifolia Hitchc. Northern Wildrice.
U.S.D.A. Misc. Publ. 200. 542. 1935.

Description: Culms usually not more than 1.5 m. tall; blades usually not more than 1 cm. wide.

Inflorescence location: Same as above.

Distribution: Quebec and New Brunswick to North Dakota, south to New York and Nebraska.

Habitat: Shallow water on streams and ponds.

2. Zizania texana Hitchc. Texas Wildrice.
U.S.D.A. Misc. Publ. 200. 542. 1935.

Description: Perennial; spikelets unisexual, culms 3 to 10 feet long, rooting at the nodes and floating on or under the water, blades elongate, 3 to 20 mm. wide; panicle 20 to 30 cm. long, narrow; the lower branches ascending, 5 to 10 cm. long; staminate spikelets 7 to 8 mm. long, 1.5 mm. wide; pistillate spikelets about 8 to 12 mm. long, tapering into an awn 1 to 2 cm. long.

Inflorescence location: Staminate and pistillate spikelets are borne in the same inflorescence; the upper branches ascending, bearing the appressed pistillate spikelets; the staminate spikelets being borne on the lower spreading branches.

Distribution: San Marcos, Texas.

Habitat: The grass grows in water 30 to 120 cm. deep, often floating.

Remarks: It furnishes food for water fowl and is still used to some extent by some of the northern tribes of Indians. The grass blossoms most of the year. The growth is so luxuriant it is said to be troublesome in irrigation ditches. (W.A. Silveus)

## PHARUS L.

1. Pharus parvifolius Nash.
U.S.D.A. Misc. Publ. 200. 546. 1935.

Description: Spikelets 1-flowered, unisexual, culms long-decumbent, creeping and rooting at base, the flowering shoot 30 to 50 cm. tall; blades elliptic, abruptly acuminate, 10 to 20 cm. long, about as wide; pistillate spikelets about 1 cm. long, the glumes thin, brown, less than half as long as the lemma; staminate spikelets about 3 mm. long, the slender pedicels appressed to the pistillate spikelets.

Inflorescence location: Spikelets 1-flowered, in pairs along the main branches of the inflorescence, one pistillate and sessile, the other staminate and long-pediceled in the same inflorescence.

Distribution: Florida, rare; West Indies to Brazil. Mexico.

Habitat: Rocky woods; wet forests at low altitudes.

Remarks: Rare in United States; of little value.

2. Pharus glaber H. B. K.
U. S. Nat. Herb. 24: part 8. 420-421. 1927.

Description: Erect glabrous perennial 50 to 75 cm. tall; blades oblanceolate, acuminate, commonly 15 to 25 cm. long and 3 to 5 cm. wide; panicles large, open, fragile, the few branches spreading; spikelets in pairs on the main branches of the inflorescence, one pistillate and sessile, the other staminate and long-pediceled; staminate spikelet laterally compressed on a stiff pedicel as long as the pistillate spikelet. Broad flat blades petioled (the petiole with a single twist reversing the upper and under surfaces of the blade).

Inflorescence location: Both sexes in pairs in the same inflorescence; one pistillate and sessile, the other staminate and long-pediceled.

Distribution: Mexico and the West Indies to Brazil. Found in the Greater Antilles and in the Lesser Antilles as far south as Martinique. (Hitchcock)

Habitat: Rich woods, wet forest at low and medium altitudes.

Remarks: The lemma is peculiar in that it is longer than the glumes and has a minute bent beak and densely clothed with hooked hairs, the panicles readily breaking up, the pieces attaching themselves by the hooked hairs to passing objects.

3. Pharus latifolius L.
U. S. Nat. Herb. 24: part 9. 617. 1930.

Description: Similar to P. glaber, the blades on the average broader, the fruits longer, tapering at the summit, pubescent only near the tip.

Distribution: West Indies and Central America to Brazil.

Habitat: Wet forest at low altitudes.

Remarks: Sometimes called wild oats. (Hitchcock)

4. Pharus cornutus Hack
U. S. Nat. Herb. 24: part 9. 617. 1930.

Description: Culms 30 to 50 cm. tall; blades obovate to oblanceolate, mostly less than 12 cm. long, 3 to 5 cm. wide; panicles 10 to 15 cm. long, the lower pairs of spikelets more or less pediceled on the spreading branches; glumes of fertile spikelet 3 to 5 mm. long, fruit spreading, 2 to 2.5 cm. long, slender, elongate S-shaped from short curves at each end, densely pubescent toward apex.

Inflorescence location: Spikelets 1-flowered, in pairs along the main branch of the same inflorescence, one pistillate and sessile the other staminate and long-pediceled.

Distribution: Costa Rica.

Habitat: Wet forest at medium altitude.

TRIBE HORDEAE

Genera of Hordeae



Pariana Aubl.

1. Pariana zingiberina Doell and Mart.
Hitchc. U. S. Nat. Herb. 24: part 8. 356. 1927.

Description: An erect broad-leaved perennial, with the aspect of ginger, with one vegetative and one fertile culm, the vegetative culm 50 to 80 cm. tall, naked below, bearing several oblong-elliptic blades 12 to 15 cm. long, 3 to 5 cm. wide, the lower ones smaller; fertile culm naked, shorter than sterile one, bearing a single terminal dense spike 5 to 8 cm. long; spikelets in opposite clusters of 3 at each joint of the rachis.

Inflorescence location: Pistillate and staminate borne in same inflorescence at terminal end of culm; spikelets in clusters of three, the center spikelet of the cluster pistillate, the other two staminate.

Distribution: Venezuela to Brazil.

Habitat: Wet forest at low altitudes.

Remarks: The terminal spike somewhat resembles beardless wheat. A genus of doubtful affinity, placed tentatively in Hordeae. Species about 32 in tropical America.

2. Pariana lunata Nees.
Hitchc. U. S. Nat. Herb. 24: part 8. 356. 1927.

Description: Blades oblong-lanceolate, 15 to 20 cm. long, 4 to 5 cm. wide, asymmetrically cuneate at base; sheaths sparsely papillose-roughened, the summit with densely fimbriate auricles, the hairs 1 cm. long; spikelet arrangement as in P. zingiberina.

Inflorescence location: Pistillate and staminate spikelets in same terminal spike in clusters of 3; the center spikelet pistillate, the other two staminate.

Distribution: Guiana to Brazil.

Habitat: Wet forest and shady banks at low altitudes.

Remarks: Sterile shoots frequent on shady banks.

3. Pariana sylvestris Nees.
U.S.D.A. Misc. Publ. 243. 61. 1936.

Remarks: No available material on this species.

## TRIBE CHLORIDEAE

### Genera of Chlorideae



1. Cathestecum erectum Vasey and Hack
U.S.D.A. Misc. Publ. 200. 522. 1935.

Description: Low tufted or stoloniferous perennial with wiry stolons having arched internodes and hairy nodes; culms slender, 10 to 30 cm. tall; blades flat, about 1 mm. wide, mostly basal; spikes 4 to 8 ovoid, 5 mm. long, each consisting of 3 spikelets, the upper or center perfect, the two lateral staminate or rudimentary; glumes unequal, lemma extending into short awns; staminate spikelets about two-thirds as long as the central perfect spikelet; lemmas of all spikelets similar, the sterile ones more deeply lobed; awns from about as long as the lobes to twice as long, hairy at base.

Inflorescence location: Spikes terminal, consisting of 3 spikelets, the upper or central perfect, the 2 lateral staminate or rudimentary.

Distribution: Western Texas, southern Arizona, and northern Mexico.

Habitat: Dry hills.

2. Cathestecum stoloniferum (Fourn.) Griffiths.
U. S. Nat. Herb. 14: 362. 1912.
Hitchc. U. S. Nat. Herb. 24: part 9. 613. 1930.

Description: Low, creeping, stoloniferous perennial, with short blades, and several or many short deciduous spikes, usually 4 to 6, triangular and about 13 mm. long; upper spikelet with densely hairy glumes, the first minute, fan-shaped, the second acuminate, awn-tipped; fertile lemma pubescent and bearing 8 short awns; sterile lemmas usually 3, deeply lobed, glabrous, and with 3 prominent scabrous awns; lower spikelets with densely hairy pointed glumes, the first about half as long as the second; lower lemma as in the perfect spikelet; sterile lemma similar to those of the perfect spikelet, but the awns pilose.

Inflorescence location: Spikes consisting of 3 spikelets, the upper or central perfect, the 2 lateral staminate or rudimentary.

Distribution: El Salvador and Mexico.

Habitat: Open grassy flats.

Remarks: Species four, on the Mexican Plateau.

## TRIBES OF DIOECIOUS GRASSES

### 1. Festuceae

1. Distichlis spicata
2. Distichlis stricta
3. Distichlis dentata
4. Distichlis texana
5. Poa arachnifera
6. Poa macrantha
7. Poa douglasii
8. Poa confinis
9. Poa fendleriana
10. Poa longiligula
11. Cortaderia selloana
12. Cortaderia rudiuscula
13. Gynerium sagittatum
14. Scleropogon brevifolius
15. Eragrostis reptans
16. Festuca kingii
17. Monanthochloe littoralis

### 2. Chlorideae

1. Opizia stolonifera
2. Buchloe dactyloides

### 3. Hordeae

1. Jouvea straminea
2. Jouvea pilosa

### 4. Trageae

1. Fourniera mexicana

### 5. Paniceae

1. Pringleochloa stolonifera

## PLANTS MONOECIOUS SOMETIMES DIOECIOUS

1. Scleropogon brevifolius
2. Buchloe dactyloides
3. Opizia stolonifera
4. Pringleochloa stolonifera
5. Fourniera mexicana

# TRIBE FESTUCEAE

## Genera of Festuceae



## Distichlis Raf. Salt-grass

1. Distichlis spicata (L.) Greene. Seashore salt-grass.
U.S.D.A. Misc. Publ. 200. 175-177. 1935.

Description: Low perennial with culms erect from stout creeping rhizomes mostly 10 to 20 cm. tall, sometimes taller, with numerous conspicuous distichous leaves, the sheaths overlapping, panicles condensed, usually pale or greenish, 1 to 6 cm. long, rarely longer; usually with more than three spikelets, 5 to 9 flowered, mostly 6 to 10 mm. long, compressed; lemmas 3 to 6 mm. long, the pistillate more coriaceous and more closely imbricate than the staminate.

Distribution: Nova Scotia to Florida and Texas; British Columbia to California, Mexico and Cuba; Interior of South America from Peru to Argentina.

Habitat: Moist, especially alkali soil, seacoast of the warmer parts of North and South America.

Remarks: Forms dense colonies; has very little value for forage. It is easily confused with D. stricta.

2. Distichlis stricta (Torr.) Rybd. Desert salt-grass. Marsh-spike-grass. Alkali-grass.
U.S.D.A. Misc. Publ. 200. 177. 1935.

Description: Low perennial resembling D. spicata; panicles less congested, the individual spikelets easily distinguished; spikelets, especially the staminate, with more florets; pistillate and staminate spikelets quite similar in appearance; lemmas of pistillate spikelets 5 or 6 mm. long, those of staminate spikelets 2 to 5 mm. long. Staminate spikelets usually stramineous.

Distribution: Interior Saskatchewan, south to Texas, west to eastern Washington and California.

Habitat: Salty and alkaline soil.

Remarks: In general this plant has very little value for forage but in certain alkali regions it is grazed when better grasses are not available.

3. Distichlis dentata Rybd.
U.S.D.A. Misc. Publ. 200. 177. 1935.

Description: Culms usually low, 10 to 20 cm., much-branched, rather stout; usually the blades are wider than in D. spicata; panicles usually overtopped by the leaves; spikelets many flowered, the florets firm, closely imbricate; palea about as long as the lemma, firm, much broader below, the keels with wide finely dentate wings.

Distribution: Western Colorado to Washington, northern Arizona, and California.

Habitat: Found on alkaline soil in the interior.

Remarks: This and the two preceding species appear to be distinct for the most part but some specimens are intermediate.

4. Distichlis texana (Vasey) Scribn.
U.S.D.A. Misc. Publ. 200. 177 to 179. 1935.

Description: Culms erect from a decumbent base, 20 to 60 cm. tall, producing extensively creeping rhizomes and long stout stolons; blades flat, glabrous beneath, scabrous on the upper surface, mostly 20 to 40 cm. long, 2 to 6 mm. wide; panicle narrow, pale, about 20 cm. long, somewhat interrupted, the branches appressed; spikelets somewhat compressed, 4 to 8 flowered; glumes 5 and 7 mm. long, acute; lemmas of pistillate spikelets closely imbricate and appressed, about 8 mm. long, the margins broad, hyaline; palea of pistillate spikelets shorter than the lemma, strongly bowed out below, convolute around the pistil, the keels with narrow erose or toothed wings; lemmas of staminate spikelets more spreading, about 6 mm. long; lemma not bowed out, not convolute, the keels minutely scabrous, not winged.

Distribution: Presidio, Texas, and northern Mexico.

Habitat: Sand flats.

## POA L. Bluegrass

1. Poa arachnifera Torr. Texas Bluegrass.
U.S.D.A. Misc. Publ. 200. 106. 1935.

Description: Culms tufted, 30 to 50 cm. tall; running rootstocks; sheaths overlapping, hyaline on the margins; blades smooth beneath, scabrous above; panicle narrow and compact, often interrupted; spikelets 4 to 10 flowered; pistillate spikelets lemmas conspicuously cobwebby, 5 to 6 mm. long, acuminate, copiously long webby at base; staminate lemmas glabrous or with a scant web at base.

Distribution: Southward from Kansas to Arkansas and Texas; eastward to South Carolina and Florida; Idaho and New Mexico.

Habitat: Found on the prairies and plains.

Remarks: Sometimes cultivated for winter pasture; it is quite palatable and is grazed closely by livestock. It grows in small patches and is sometimes used on lawns.

2. Poa macrantha Vasey
U.S.D.A. Misc. Publ. 200. 106. 1935.

Description: Culms erect from a decumbent base, with extensively creeping rhizomes, and also long runners creeping over the sand, 15 to 40 cm. tall; sheaths tawny, papery; blades involute; panicle contracted, sometimes dense and spikelike, 5 to 12 cm. long, pale or tawny; spikelets about 12 mm. long, about 5 flowered; lemmas about 8 mm. long, short-webbed at base, pubescent on the keel and marginal nerves below, slightly scabrous on the keel above; pistillate florets with abortive stamens.

Distribution: Washington to northern California.

Habitat: Sand dunes along the coast.

Remarks: A native sandbinder of the sand dunes on the coast of Washington and Oregon. It has very little value as forage and is not cultivated.

3. Poa douglasii Nees.
U.S.D.A. Misc. Publ. 200. 106-107. 1935.

Description: Both plants similar; culms ascending from a decumbent base, usually less than 30 cm. tall; rhizomes slender; sheaths glabrous, tawny and papery; blades involute; panicle ovoid, dense, spikelike, 2 to 5 cm. wide, pale or purplish; spikelets 6 to 10 mm. long, about 5-flowered; lemmas 6 to 7 mm. long, slightly webbed at base, pubescent on the lower part of the keel and marginal nerves, scabrous on the upper part of the keel, usually with 1 to 3 pairs of intermediate nerves.

Distribution: California, Point Arena to Monterey.

4. Poa confinis Vasey
U.S.D.A. Misc. Publ. 200. 107-108. 1935.

Description: Both plants similar; culms often geniculate at base, usually less than 15 cm. tall, sometimes taller; blades involute; panicle narrow, 1 to 3 cm. long, tawny, the short branches ascending or appressed; spikelets 4 to 5 mm. long, mostly 3 or 4-flowered; glumes unequal, the second 3 mm. long; lemmas 3 mm. long, scaberulous, sparsely webbed at base; pistillate florets with minute abortive anthers, the staminate often with rudimentary pistil.

Distribution: British Columbia to Mendocino County, California.

Habitat: Sand dunes and sandy meadows near the coast.

Remarks: This is a native sandbinder of the sand dunes on the north Pacific coast. It is not cultivated.

5. Poa fendleriana (Steud.) Vasey. Mutton-grass.
U.S.D.A. Misc. Publ. 200. 125-126. 1935.

Description: Incompletely dioecious; culms erect, scarbrous below the panicle, 30 to 50 cm. tall; sheaths somewhat scabrous; ligule less than 1 mm. long, blades mostly basal, folded or involute, firm and stiff; panicle long-exserted, oblong, contracted, pale, 2 to 7 cm. long; spikelets 5 or 6-flowered, about 8 mm. long; lemmas 4 mm. long, villous on lower part of keel and marginal nerves; pistillate spikelets with minute stamens, the anthers about 0.2 mm. long.

Distribution: Manitoba to British Columbia, south through western South Dakota (Black Hills) and Idaho to western Texas (Chisos Mountains) and California; northern Mexico.

Habitat: Mesas, open dry woods, and rocky hills at medium altitudes.

Remarks: This grass is partially dioecious; a very small proportion of specimens have been found with well-developed stamens having large anthers, the pistil also developed.

6. Poa longiligula Scribn. and Will. Longtongue Mutton-grass.
U.S.D.A. Misc. Publ. 200. 126. 1935.

Description: Differing from P. fendleriana in the prominent ligule, as much as 5 to 7 mm. long and in the looser, often longer usually greenish panicle.

Distribution: North Dakota to Oregon, south to New Mexico and California.

Habitat: Mesas, open dry woods, and rocky hills in the mountains mostly below timber line.

## CORTADERIA Stapf. Pampasgrass

1. Cortaderia selloana (Schult.) Aschers. and Graebn.
Pampas-grass
U.S.D.A. Misc. Publ. 200. 190-191. 1935.

Description: Perennial reed, in large bunches; culms stout, erect, 2 to 3 or more m. tall; panicle feathery, silvery white to pink, 30 to 100 cm. long; large tussock grass with leaves crowded at the base; spikelets 2 to 3-flowered, the pistillate silky, clothed with long hairs, the staminate naked; glumes white, papery, long, slender; lemmas bearing a long slender awn.

Distribution: In the warmer parts of the United States. Brazil to Argentina and Chile.

Habitat: Plains and open slopes, in South America; cultivated as a lawn ornamental in the warmer parts of the United States; in southern California grown commercially for the plumes.

Remarks: This genus has been described as dioecious, but some of the species have perfect florets, though the anthers are small and the flowers appear to be cleistogamous.

2. Cortaderia rudiuscula Stapf.
Hitchc., U. S. Nat. Herb. 24: part 8. 346-347. 1927.

Description: A large reed differing from C. selloana in the looser yellowish or silvery or purplish panicles 30 to 60 cm. long, dense, but the branches drooping; has a great basal mass of long narrow blades as much as 1.5 long and mostly less than 1 cm. wide, firm and tough, very scabrous on the margins and under side of midribe, the flowering culm stout, 1 to 2 m. tall.

Distribution: Ecuador to Argentina and Chile.

Habitat: Slopes and gullies and along streams; in the mountains.

Remarks: Occasionally cultivated for ornament; Argentina.

## GYNERIUM Humb. and Bonpl.

1. Gynerium sagittatum (Aubl.) Beauv. Uva grass
Hitchc., U. S. Nat. Herb. 24: part 9. 582. U. S. Nat. Herb. 22: part 6. 456-457. 1922. U.S.D.A. Misc. Publ. 200. 190. 1935.

Description: Stout reeds as much as 10 to 12 m. tall, with culms clothed below with old overlapping sheaths, the blades having fallen; blades sharply serrulate, commonly 2 m. long, 4 to 6 cm. wide, forming a great fan-shaped summit to the sterile culms; and pale, plume-like, densely flowered panicles 1 m. or more long, spikelets 2-flowered; pistillate spikelets with long-attenuate second glumes much exceeding the small attenuate long-silky lemmas; staminate spikelets with shorter

glumes and glabrous lemmas; pistillate panicles silky from the villous florets; staminate panicles glabrous.

Distribution: Tropical America, West Indies and southern Mexico to Brazil and Paraguay.

Habitat: River banks and wet ground at low altitudes.

Remarks: Occasionally cultivated for ornament in greenhouses in the United States.

## SCLEROPOGON Philippi

1. Scleropogon brevifolius Phil. Burro grass.
U.S.D.A. Misc. Publ. 200. 227-229. 1935.

Description: Plants monoecious or dioecious. A stoloniferous perennial; culms erect, 10 to 20 cm. tall, tufted, producing wiry stolons; leaves crowded at the base, the blades flat, 1 to 2 mm. wide, sharp-pointed; racemes, excluding awns, 1 to 5 cm. long; staminate spikelets several-flowered, 2 to 3 cm. long; glumes about equal, 1 or 3-nerved; pistillate spikelets several-flowered, the upper florets reduced to awns; body of pistillate spikelets 2.5 to 3 cm. long, the awns 5 to 10 cm. long, loosely twisted.

Distribution: Texas, Colorado, and Arizona, south to central Mexico; Argentina.

Habitat: Semiarid plains and open valley lands.

Remarks: The staminate and pistillate panicles are strikingly different in appearance. Staminate and pistillate panicles may occur on the same plant or rarely the two kinds of spikelets may be found in the same panicle. It may be that the seedlings produce two kinds of branches, each kind then reproducing its own sex. This is quite similar to Buchloe dactyloides upon which extensive investigation has been carried on. On overstocked ranges, it is useful in preventing erosion. It is a good forage when young.

## ERAGROSTIS Beauv. Lovegrass

1. Eragrostis reptans (Michx.) Nees.
Arber, the Gramineae, Cambridge U. Press. 195. 1934.
Hitchc., Rhodora, vol. 28. 113-115. 1925.
Hitchc., Misc. Publ. 200. 148. 1935.

Description: Annual, culms branching, creeping, rooting at the nodes; ascending branches 6 to 10 cm. tall, arising from the rooting nodes; blades flat, usually ovoid, 1 to 3 cm. long; spikelets clustered, 20 to 30 flowers, 6 to 14 mm. long; palea of pistillate floret about half as long as the lemma, of the staminate floret as long as the lemma; anthers before dehising, 1.5 to 2 mm. long.

Distribution: Kentucky to South Dakota, Texas, Oklahoma, Louisiana, and New Mexico extending eastward to the New England states, also found in Trinidad and Buenos Ayres.

Habitat: River banks, sandy land and open ground.

Remarks: This species resembles quite closely E. hypnoides, both in habit and habitat.

## FESTUCA L. Fescue

1. Festuca kingii S. Wats.
U. S. Nat. Herb. 10: part 10. 1906.
Torrey Bot. Club, 39: 106. 1912.
U.S.D.A. Misc. Publ. 200. 69. 1935.

Description: Densely tufted dioecious perennial, occasionally stoloniferous. Inflorescence a narrow panicle, 7 to 20 cm. long. Spikelets mostly 10 to 12 mm. long; 3 to 5-flowered; glumes broadly lanceolate, the lower 1-nerved, the upper 3-nerved. Floral glumes ovate, acuminate, rounded on back, faintly nerved. Styles obsolete; stigmas hispidulous, not plumose; ovary deeply sulcate near the apex; grain beaked and bidentate at the apex.

Distribution: Oregon to southern California, east to Montana and Colorado.

Habitat: Dry mountains and hills, 2000 to 3500 meters altitude.

Remarks: This grass was originally described as a Poa and afterwards transferred to Festuca because the floral glumes are rounded on the back. It has been described as Hesperochloa (Piper) Rydb., which is a subgenus.

## MONANTHOCHLOE Engelm.

1. Monanthochloe littoralis Engelm.
U.S.D.A. Misc. Publ. 200. 175. 1935.
U.S.D.A. Misc. Publ. 243. 45-46. 1936.

Description: Culms tufted, extensively creeping wiry perennial, with clustered short subulate blades, the spikelets inconspicuous at the ends of the short branches, only a little exceeding the leaves; grows in tufts or extensive patches or colonies, often in tangled mass, the long stolons taking root at the numerous nodes and producing new plant; spikelets 1 to few, nearly concealed in the leaves.

Distribution: Southern Florida, especially on the keys; southern Texas along the gulf; southern California; Mexico, Cuba.

Habitat: Muddy seashores and tidal flats.

Remarks: Often a patch of staminate plants is found and near by or at some distance a patch of pistillate. As the inflorescence is inconspicuous it will require close examination to find the stamens or stigmas projecting from the cluster of very short leaves at the apex of the culms.

## TRIBE CHLORIDEAE

### Genera of Chlorideae



### Opizia Presl.

1. Opizia stolonifera Presl.
U.S.D.A. Misc. Publ. 243. 140-142. 1936.

Description: Plants dioecious, sometimes monoecious; pistillate spikelets in a single loose 1-sided spike; fertile lemma subindurate, broad, 3-awned; staminate spikelets awnless, imbricate in short spikes, these racemose. The slender flowering culms 5 to 10 cm. tall; blades flat, 1 to 2 mm. wide; pistillate spikes short-exserted, bristly with awns about 5 mm. long; staminate spikes 1 to 3, long-exserted, 1 to 1.5 cm. long.

Distribution: Southern Mexico and Cuba.

Habitat: Open grounds and pastures; lawns and parks.

Remarks: Low stoloniferous perennial with flat blades and small spikes. Plants dioecious, sometimes monoecious, forming dense mats. Found in lawns and parks.

### Buchloe Engelm.

1. Buchloe dactyloides (Nutt.) Engelm. (Bulbilus dactyloides Raf.)
U.S.D.A. Misc. Publ. 200. 524-526. 1935. Buffalo Grass.

Description: Plants dioecious, rarely monoecious; staminate spikelets 2-flowered, sessile and closely imbricate, in two rows on one side of a slender rachis, forming a short spike 5 to 12 mm. long on slender culms 5 to 20 cm. tall; pistillate spikelets mostly 4 or 5 in a short spike or head 3 to 4 mm. thick; usually two heads to the inflorescence, the common peduncle short and included in the somewhat inflated sheaths of the upper leaves, the thickened indurate rachis and broad outer glumes forming a rigid white obliquely globular structure crowned by the green-toothed summits of the glumes.

Distribution: Minnesota, Montana and Saskatchewan south to Iowa, Arkansas, Oklahoma, Texas, western Louisiana, and northern Mexico.

Habitat: Dry plains.

Remarks: Buchloe dactyloides, a low stoloniferous perennial with short blades, is a close soft grayish-green turf forming grass. It is dominant over large areas of the Great Plains, and is one of the most important grazing grasses of this region. Each plant propagates vegetatively its own kind, rarely both staminate and pistillate.

# TRIBE HORDEAE

## Genera of Hordeae



## Jouvea Fourn.

1. Jouvea straminea Fourn.
Hitchc., U. S. Nat. Herb. 24: part 9. 585-586. 1930.

Description: Slender, cespitose, 30 to 50 cm. tall, with long runners or stolons; blades flat, glabrous, 2 to 5 cm. long, the sheaths a little pilose at the throat; pistillate spikelets single in the axils of the leaves, 2 to 3 cm. long, slender, slightly curved, about 1 mm. thick; staminate spikelets 1 to 1.5 cm. long, smaller than those of J. pilosa; usually have from 5 to 7 florets and seldom more than 15 to 20.

Distribution: El Salvador, Panama and Mexico.

Habitat: Muddy seacoast shores or marshes.

Remarks: This grass, constituting the genus Jouvea, presents certain unsolved problems of morphology and taxonomy. The two species are apparently concise and at the same time sufficiently distinct from each other to conform with any ordinary concept of the species in general; but the correct position of the genus itself is not so well determined.

2. Jouvea pilosa (Presl.) Scribn.
Hitchc., U. S. Nat. Herb. 24: part 9. 585-586. 1930.
Bul. Torrey Club 23: 143. 1896. Bul. Torrey Club 66: 315-325. 1939.

Description: Cespitose, with stout runners or stolons about 2 mm. thick; culms 20 to 40 cm. tall; blades flat becoming involute, glabrous, scabrous on the margins; sheaths pilose at the throat; pistillate spikelets 2 to 4 cm. long, 2 to 3 mm. thick, clustered spikes in axillary fascicles, each of which consist of a short branching system, leafless except for prophylls, with the end of each ultimate branch elongating to form the spike; some staminate spikelets short and oblong, 10 to 15 florets, others are linear, longer and 25 to 50 florets, as much as 5 cm. long.

Distribution: Guatemala, El Salvador, Nicaragua.

Habitat: Sandy sea beaches.

Remarks: The genus, Jouvea, is of doubtful affinity and is placed tentatively in the tribe Hordeae.

## TRIBE TRAGEAE

### Genera of Trageae



### Fourniera Scribn.

1. Fourniera mexicana Scribn.
Hitchc., U. S. Nat. Herb. 24: part 9. 1930. Hitchc., U. S. Nat. Herb. 17: part 3. 1913.

Description: Plants dioecious or monoecious; rather delicate extensively creeping or stoloniferous, apparently annual; staminate spikelet 2-flowered, the first floret sessile, the second on a short naked joint of the rachilla, glumes 3, 2 small and narrow, somewhat toward one side, the third larger; pistillate spikelet 2-flowered, the upper floret reduced to a 3-awned rudiment; glumes 3, about equal, cuneate, broadest above, narrowed below into a short rather densely pubescent pedicel-like base or claw, 2 glumes with one strong and 2 faint nerves, the other with 2 strong and 2 faint nerves; first floret raised on a short joint; lemma 3-nerved, 3-cleft at apex, the middle division longest, sometimes 2-toothed and mucronate between the teeth.

Inflorescence location: Racemes terminal and axillary.

Distribution: Southern Mexico and Central America.

Habitat: Open flat pasture land near the coast, also found growing in loose, gravelly soil.

Remarks: This genus is an anomalous one and its affinities doubtful. The original description states that the plant is dioecious, but the specimen from La Union, Mexico, is monoecious, the sexes on different tufts.

## TRIBE PANICEAE

### Genera of Paniceae



### Pringleochloa (Fourn.)

1. Pringleochloa stolonifera (Fourn.) Scribn. Hitchc., U. S. Nat. Herb. 17: 353. 1913.

Distribution: Around Tehuocan in eastern Puebla, Mexico.

Habitat: Dry plains on calcareous soil.

Remarks: This grass is dioecious sometimes monoecious.

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