THE GRASSES OF NOVA SCOTIA

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ABSTRACT

This is a systematic treatment of Gramineae, with keys for identification and notes on characteristics, nomenclature, and distribution of the 121 species of the province. Diagrams illustrating the essential parts of the inflorescence and ligule region, and maps of distribution, are included for most species.

The Grass Family includes a large number of important agricultural and economic plants. In addition to the cultivated cereals, wheat, corn, oats, barley, rye, etc., there are the many valuable forage species making up the herbage of our pastures and the hay of seeded or natural meadowlands. Grasses also form the turf of lawns, greens, and landing fields, surviving where most other types of plants would soon be eliminated by the repeated cutting and treading. Certain firmly-rooted and sod-forming species are useful in preventing the erosion of soil and the drifting of sand; others aid in causing the deposition of water-borne and tidal silts and in building up and holding the extensive marshes for which the province is noted. A few have become serious weeds in fields, waste-places and gardens. Many species of woodlands, swamps, and waysides offer food for wild life.

Botanically, the grasses are among the most difficult of all the flowering plants to classify. This is due, in large part, to their great variety and the relatively small size of the reproductive parts. Although much study has been given to

the grasses of this continent, particularly during the past thirty years, considerable confusion still exists in the literature as to their classification. The following account is an attempt to bring together and summarize the known information on the various species to be found within the borders of Nova Scotia, and to present keys, descriptions, and diagrams of the essential parts that may aid in their identification. The notes and maps of the distribution within the province are based on specimens in herbaria, published records, and field observations of the authors.

The first list that we have for the province is contained in Titus Smith's manuscript, dated 1801-02, in the Provincial Archives. Twelve species are listed, some of which are not recognizable from the names given. Dr. George Lawson and Dr. A. W. H. Lindsay of Halifax collected many grasses among other plants and their records are embodied in Lindsay's list, sometimes referred to as Sommer's Catalogue, which appeared in the Proceedings of this Institute in 1876. This list gave 23 species of grasses, a few of which have since been revised or deleted.

Since the publication of Lindsay's catalogue, many more sections of the province have been visited by professional botanists, and the whole group of grasses is better understood from a systematic standpoint. A number of species have been introduced in the intervening years and have become naturalized to our flora. The present list, including all the forms that have been available to the authors as preserved specimens or recorded in the literature up to 1942, includes 121 species, 32 additional varieties, and 18 forms. The increase in the knowledge of our grass flora has been due to a large extent to the exploration of John Macoun in various parts of the province in 1883, in Cape Breton in 1898, on Sable Island in 1890, and again on the mainland in 1910. The Gray Herbarium Expedition of Harvard University in the summers of 1920 and 1921, under the direction of Professor M. L. Fernald, covered most of the southern and western portions of the province.

Fernald's reports (1921, 1922) have been most valuable in contributing to the records of new species and distribution of grasses. The survey of Sable Island by Harold St. John in 1913 and of St. Paul Island by L. M. Perry and M. V. Roscoe in 1929 have contributed lists of plants, including grasses, from these outlying points. In later years, smaller collections have been made by H. Groh, A. R. Prince, C. E. Atwood, M. O. Malte, H. T. Güssow, J. Adams, J. W. McLellan, J. Rousseau, and others. The authors have done most of their collecting since 1936. During the past two years, M. S. Brown and L. Brown of Halifax have contributed many specimens.

Specimens preserved in the following herbaria have been examined: National Museum of Canada, Ottawa; Division of Botany, Department of Agriculture, Ottawa; Dalhousie University, Halifax; Nova Scotia Agricultural College, Truro; Acadia University, Wolfville; Provincial Museum, Halifax; and the Dominion Experimental Station, Kentville. In all, about 1800 specimens have been seen. Collections of the authors, constituting about half this number, are deposited in the Herbarium of the Division of Botany at Ottawa, and the Herbarium of the Nova Scotia Agricultural College at Truro. Duplicates have been distributed to various other institutions.

In the subdivision of Gramineae into the various tribes and genera, and in the sequence of these, Hitchcock's Manual (1935) has been followed. Characters used in the descriptions and keys, however, apply only to material as represented in Nova Scotia. Measurements of lemmas, when not otherwise stated, refer to the lowest floret of the spikelet. The lemmas of the upper florets are generally shorter. Leaves from the vegetative shoots or from the base of the culm were selected for ligule characters. These leaves are often the only parts of the plants left in grazed or mown areas and, moreover, appear to be quite constant within limits. Ligules of the upper culm leaves are much greater in length.

The drawings have been made to scale from dried or fresh material from the province. On the maps showing distribution,

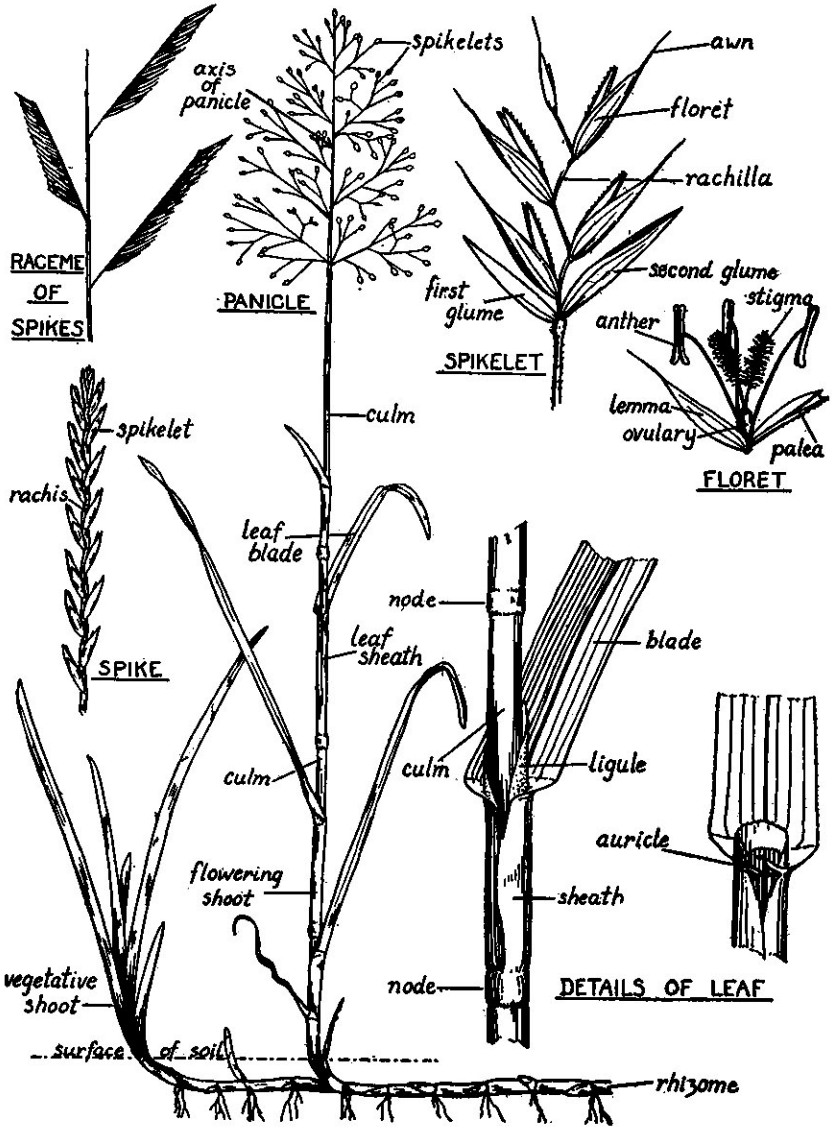
dots indicate the approximate sites of collection of specimens, the circles field records and published records that are considered reliable but for which there are no preserved specimens. The incidence of records cannot be taken as a measure of abundance of the species in any part, since some areas have been more intensively explored than others.

The authors wish to acknowledge the kindness of the following persons for examining specimens or commenting on the manuscript: H. Senn, M. L. Fernald, A. E. Porsild, G. L. Church, J. W. Swallen, R. M. Lewis. Permission of the Department of Agriculture of Nova Scotia for much of the time and facilities necessary to carry out this work is greatly appreciated.

GRAMINEAE The Grass Family

Annual or perennial herbaceous plants with fibrous roots and slender, jointed stems called culms. The culms are usually hollow between the nodes due to the early break-down of the pith, and growth in length takes place in the meristem immediately above each node. They are generally circular or oval in cross-section, but may be quite flattened as in *Poa compressa*. The culms of the grasses are thus quite different from the generally solid and three-sided stems of the Cyperaceae, a grass-like family including the sedges and bulrushes. Underground stems with scale-leaves (rhizomes) and prostrate surface runners (stolons) are often formed.

Leaves alternating in two ranks up the culm have long sheaths which envelop the culm for some distance above the nodes with the margins over-lapping along the sides opposite the blades. Closed sheaths, which frequently become ruptured with growth, are characteristic of many species of the Tribe Festuceae. The blade is linear with a prominent mid-vein and parallel secondary veins. The blades may be folded along the mid-rib (conduplicate) as in *Poa*, *Glyceria*, *Dactylis*, or they may roll in from the margins (convolute) in counter-directions in alternate leaves.


RACEME OF SPIKES
axis of panicle
spikelets
PANICLE
awn
floret
rachilla
second glume
first glume
anther
stigma
SPIKELET
lemma
ovulary
palea
FLORET
spikelet
rachis
SPIKE
culm
leaf blade
node
leaf sheath
blade
culm
culm
ligule
auricle
flowering shoot
sheath
vegetative shoot
node
DETAILS OF LEAF
surface of soil
rhizome

At the junction of the sheath and blade is a small appendage, the ligule, which projects upward around the culm and may be scale-like and membranous or represented by a row of hairs. The ligule is absent in *Echinochloa.*

The inflorescence is composed of spikelets which may be arranged in a panicle, a spike, or a raceme of spikes on the axis of the inflorescence, the rachis. Each spikelet consists of two lower scale-like bracts called glumes, and enclosed within these one or more florets arranged in alternating manner on opposite sides of the axis of the spikelet, the rachilla. Each floret has a membranous or indurated scale on the outside called the lemma, in the axil of which is a generally membranous, two-nerved scale, the palea, which is greatly reduced in size in some species of *Agrostis* or lacking in *Alopecurus.* The lemma and palea enclose the three stamens and the one-celled ovulary with its two plumose stigmas. The ovulary matures to form a grain, or caryopsis. In some florets either the stamens, the ovulary, or both, may be lacking, or the stamens reduced in number. (Poaceae)

KEY TO TRIBES

a. Spikelets 1- to several-flowered; spikelet generally breaks apart just above the glumes and between the florets at maturity; spikelets usually flattened from the sides. (SUB-FAMILY Festucoideae)

b. Spikelets arranged in true spikes, that is, sessile on the axis of the inflorescence.

c. Spike solitary and terminal on the culm; spikelets single, or in groups of 2 or 3, alternating along opposite sides of the axis.

TRIBE II. *Hordeae* (p. 217)

c. Spikes several; spikelets attached singly, flattened and closely overlapping along one side of the axis of the spike.

TRIBE V. *Chlorideae* (p. 260)

b. Spikelets in open, contracted, or occasionally spike-like panicles but not in true spikes, the individual spikelets having a short or long stalk.

d. Spikelets unisexual in different portions of the same paniele, the staminate pendent on the lower spreading branches, the pistillate on the upper erect branches and long awned; tall aquatic grasses.

TRIBE VIII. *Zizanieae* (p. 269)

d. Spikelets bisexual, although some florets in the spikelet may lack stamens, pistils or both (if spikelets unisexual their appearance not greatly different).

e. Spikelets with 2 or more florets which produce fruit.

f. Glumes shorter than the body of the first lemma; lemmas, if awned, with the awn arising from the tip or from between the two terminal teeth.

TRIBE I. *Festuceae* (p. 184)

f. Glumes as long as the body of the lemma or longer, frequently enclosing all the florets; the awn of the lemma, if present, arising from the back below the tip.

TRIBE III. *Aveneae* (p. 228)

e. Spikelets with only 1 fruit-producing floret; sterile or staminate florets, if present, being below the pistillate floret.

g. Glumes present, one may be greatly reduced in size.

h. Spikelets with only one floret, this perfect; glumes longer or shorter than the spikelet.

TRIBE IV. *Agrostideae* (p. 238)

h. Spikelets with 1 fruit-producing floret, the 2 florets below it being staminate or represented by lemmas only; glumes longer than the spikelet.

TRIBE VI. *Phalarideae* (p. 264)

g. Glumes absent; lemmas broad and flattened; plant very rough, retrorse-scabrous.

TRIBE VII. *Oryzeae* (p. 268)

a. Spikelets with 1 fruit-producing floret, the lemma of the sterile floret beneath it similar to the second glume in size and texture, the lemma and palea of the fertile floret being smooth and hard, encasing the fruit at maturity, the spikelets fall away entire, sometimes with a cluster of bristles attached; spikelets usually flattened from the back (SUB-FAMILY Panicoideae).

TRIBE IX. *Paniceae* (p. 270)

TRIBE I. FESTUCEAE

a. Plants slender, generally less than 5 feet tall; inflorescence not plume-like; spikelets without conspicuous silky hairs at maturity.

b. Panicle open or contracted, but not spike-like.

c. Ligule membranous; top of sheath free from pilose hairs.

d. Sheath closed in the throat to near the top, round in cross-section; awns generally present and arising between the two teeth terminating the lemma, or just below the tip; spikelets 2 cm. long, or longer.

e. Callus of lemma not fringed with hairs; ligule not sheathing the culm; sheaths and blades generally short-pubescent; grain pubescent at summit.

1. *Bromus* (p. 186)

e. Callus of lemma with a ring of short stiff hairs; ligule encircling the culm and continuous with the membranous front of the sheath; sheaths and blades glabrous; grain glabrous,

13. *Schizachne* (p. 216)

d. Sheaths open in the throat or splitting readily down the front, on young vegetative shoots flattened and elliptical in cross-section; awns generally absent, if present merely continuations of the tip of the lemmas; blades and sheaths glabrous or, at least, not conspicuously hairy.

f. Spikelets diffuse in the inflorescence, not crowded in dense one-sided clusters.

g. Lemmas rounded on the back, at least below, lacking pubescence.

h. Lemmas acute, awned from the tapering tip in most species; nerves converging towards the tip of the lemma.

2. *Festuca* (p. 190)

h. Lemmas obtuse, rounded or acutish at the apex, never awned; nerves not as strongly convergent towards the tip of the lemma.

i. Lemma not as broad as long, the margins extending little, if at all, beyond the margins of the palea; florets ascending to spreading in the spikelet; common.

j. Nerves of lemma faint, generally 5; plants of saline or brackish soils only.

3. *Puccinellia* (p. 195)

j. Nerves of lemma prominent and sometimes raised, generally 7; plants of moist or wet, but not of saline soils.

4. *Glyceria* (p. 197)

i. Lemma as broad as long, the margins produced far beyond the palea; florets spreading horizontally in the spikelet; rare, introduced grasses.

6. *Briza* (p.211)

g. Lemmas keeled on the back, i.e. sharp along the mid-rib; awns always absent.

k. Spikelets 4 to 6 mm., rarely to 8 mm. long, on slender pedicels in erect or spreading panicles; lemma with a cottony pubescence generally present at the base and frequently also on the keel and other nerves; ligule membranous, mostly entire-margined, with no hairs at the top of the leaf-sheath.

5. *Poa* (p. 204)

k. Spikelets 6 to 10 mm. long in erect clusters; lemmas entirely free of hairs; ligule less than 1 mm. long, with a few hairs present at the top of the sheath; plants of salt or brackish places, with firm narrow blades, and scaly rhizomes.

9. *Distichlis* (p. 212)

f. Spikelets on very short pedicels, crowded in dense one-sided clusters at the ends of stiff naked panicle-branches.

10. *Dactylis* (p. 213)

e. Ligule a row of hairs less than 1 mm. long; tufts of hairs present at the top of the sheath.

l. Annual grass with lead-colored spikelets of more than 10 florets; lemmas strongly 3-nerved; minute glands present in a ring at the nodes, on keels of the glumes and lemmas.

7. *Eragrostis* (p. 211)

l. Perennial grasses; spikelets with less than 10 florets; lemmas faintly nerved; glands absent.

m. Spikelets with 2 to 4 florets; lemmas 3-nerved; florets bisexual; plants with tough fibrous roots, growing in tussocks in peaty-acid soils.

8. *Molinia* (p. 212)

m. Spikelets with 5 to 9 florets; lemmas with 5 or more faint nerves; florets unisexual, staminate and pistillate inflorescences on separate plants; plants with scaly rhizomes, forming zones in salt or brackish areas.

9. *Distichlis* (p. 212)

b. Spikelets in pairs in a slender one-sided spike-like panicle, a sterile and a fertile spikelet together, the sterile spikelet short-stalked, the fertile one sessile.

11. *Cynosurus* (p. 214)

a. Plants stout and reed-like, 6 or more feet tall; inflorescence large and plume-like; silky hairs from the rachilla of the spikelet long and conspicuous at maturity; leaves broad.

12. *Phragmites* (p. 215)

1. BROMUS L.

Inflorescence a panicle; spikelets large, 5- to 10-flowered; lemmas rounded on the back or slightly keeled in some, 5- to 7-nerved, glabrous or pubescent with straight hairs, generally toothed at apex and awned from just below the tip; stigmas attached in a groove below the apex of the ovulary; sheaths closed to near the top; ligule membranous.

a. Annuals; first glume 3- to 5-nerved.

b. Panicle contracted with erect or ascending branches with spikelets generally borne singly.

c. Lemmas glabrous.

1. *B. racemosus*

c. Lemmas pubescent.

2. *B. mollis*

b. Panicle open, with branches (the lower at least) spreading widely.

d. Sheaths glabrous, or the lowest slightly pubescent.

3. *B. secalinus*

d. Sheaths pubescent.

4. *B. commutatus*

a. Perennials; first glume 1-nerved.

e. Rhizomes present, the plant growing in dense leafy masses; lemmas not awned or with rudiments of awns less than 2 mm. long, appressed hispid across the back especially towards the base.

5. *B. inermis*

e. Rhizomes absent, the plants growing singly or spaced; lemmas awned, densely villous along the margins but glabrous up the middle of the back.

f. Spikelets generally greenish; glumes keeled; palea with the nerves appearing marginal due to infolding of the membranous edges.

6. *B. ciliatus*

f. Spikelets generally purplish or bronze-tinged; glumes flat or rounded on the back; palea with the membranous margins showing well beyond the nerves at least for more than half of its length.

7. *B. Dudleyi*

1. *Bromus racemosus* L.

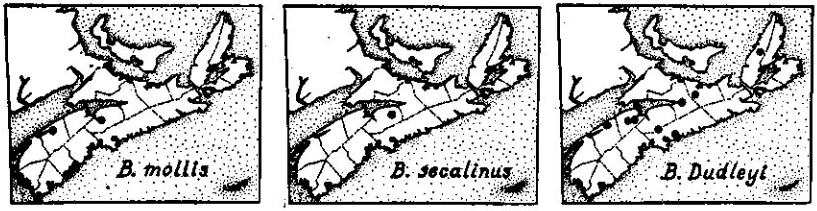
In 1922 Wiegand wrote, "Rare in America. The only American specimen seen by the writer was from a railway embankment, Grand Pré, Nova Scotia, 1901, Howe and Lang, No. 375" (*Rhodora* **24**: 90, 1922). Only in recent years have other specimens been collected: at Brooklyn, Woodville, and Cape George. Specimens collected by Macoun at Bridgewater and by Groh at Kentville and Yarmouth have been referred to *B. commutatus*, since depauperate plants of this species greatly resemble *B. racemosus*.

Introduced from Europe, growing as a weed in waste places.

2. *Bromus mollis* L. SOFT CHESS

Found in open soil, gardens, along roadways and railroad embankments mainly in the southern and western counties. This species used to be confused with *B. hordaceus*, a rare

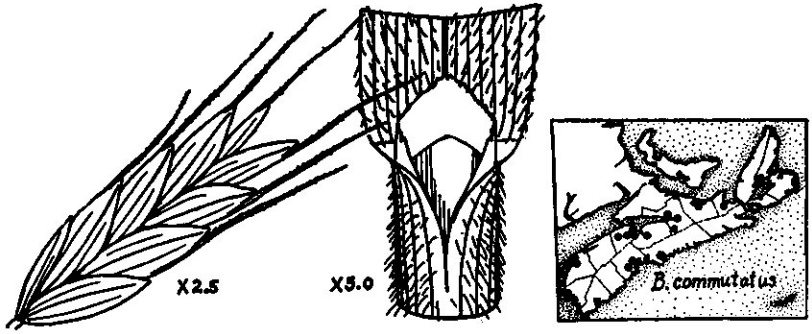
species in Europe (*Amer. Jour. Bot.* **21**: 128, 1934). No plants that could be definitely placed with the form *leiostachys* (Hartm.)Fern. (*Rhodora* **35**: 316, 1933), which has smooth spikelets, have been seen from the province.



3. *Bromus secalinus* L. CHESS

Has been found only on "Railroad gravel along Five-Mile River (Hants)" (Fernald 1921), and in meadow grass at Sable Island in 1899 by Macoun. It has not been collected in recent years. A weed introduced from Europe and very troublesome in some parts of North America.

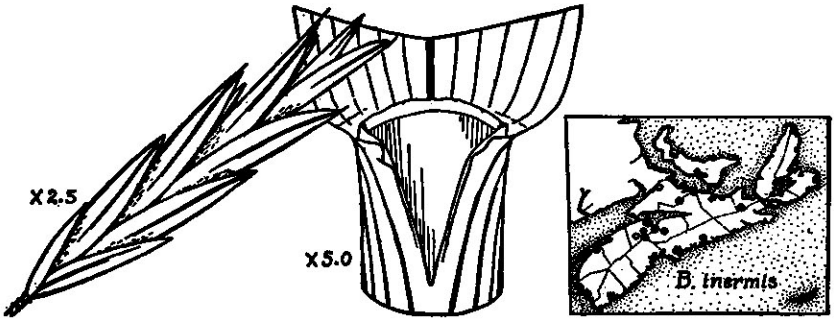
4. *Bromus commutatus* Schrad. HAIRY CHESS



A common weed in vacant lots in towns, along roadsides and in waste places in all sections of the province.

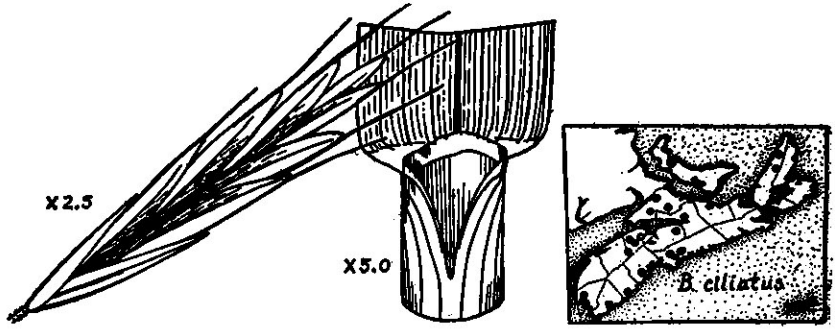
5. ***Bromus inermis*** Leyss.

SMOOTH BROME-GRASS, AWNLESS BROME-GRASS



A valuable forage grass extensively cultivated in drier parts of Canada. In Nova Scotia the plant has been noticed to persist and spread into large colonies at a few widely separated points in the province. Found in waste ground or along roadsides; not cultivated to any extent. All our plants appear to be the form ***villosus*** (Mert. & Koch)Fern. (*Rhodora* **35**: 316, 1933).

6. ***Bromus ciliatus*** L. FRINGED BROME-GRASS.



A tall native species found in all parts of the province. It is a common grass of open roadsides, stream banks and old

meadowlands, but never cultivated. Its value as a hay grass is not known.

Two varieties have been described (*Rhodora* 32: 70, 1930). Most of our plants are var. ***genuinus*** Fern. (var. *denudatus* (Wieg.)Fern., *Rhodora* 28: 20, 1926) with glabrous sheaths. A specimen of Macoun's from Bridgewater, 1910, having strongly pubescent sheaths, is var. ***intonsus*** Fern.

7. *Bromus Dudleyi* Fern. DUDLEY'S BROME-GRASS

Very similar to the preceding and often included with it (*Rhodora* 32: 63, 1930). Found in open woods, clearings, roadsides and thickets in various parts of the province.

2. FESTUCA L.

Perennials with several-flowered spikelets in panicles, glabrous, or with a minute pubescence on lemmas or lower sheaths only; lemma firm, rounded on the back, obscurely nerved, tapering to a sharp or awn-tipped point; ligules less than 1 mm. long and sometimes almost obsolete.

a. Blades flat, 3 mm. or more wide; claw-like auricles present at the top of the sheath; lemmas awnless.

b. Spikelets 6- to 10-flowered, about 10 mm. long, borne throughout the panicle; lemmas 5 to 7 mm. long, thin with membranous margins. Rich meadows and pastures.

1. *F. elàtior*

b. Spikelets 3- to 5-flowered, about 6 mm. long, borne on the panicle-branches only above the middle; lemmas 4 mm. long, coriaceous. Woodlands.

2. *F. obtusa*

a. Blades narrow and permanently folded; claw-like auricles absent; lemmas usually awned.

c. Lemmas 2.5 to 3.5 mm. long, awnless or with sharp tips less than 0.5 mm. long; leaves very slender, hair-like and flexuous.

3. *F. capillata*

c. Lemmas more than 3.0 mm. long, awned or mucronate-tipped; leaves coarser and stiffer.

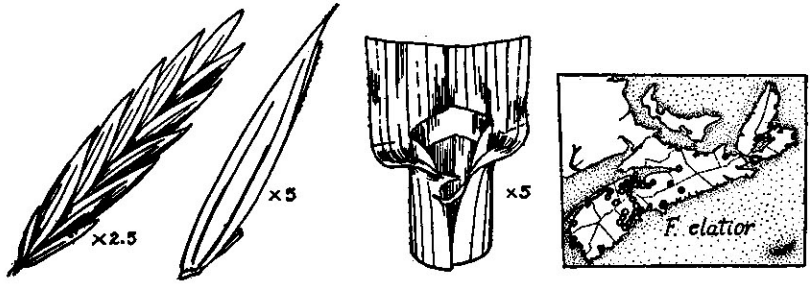
d. Basal sheaths closed to near the top, often purplish, generally minutely reflex-hirsute; dead sheaths at base of plant dark brown or red-brown, becoming fibrillose due to splitting of tissue between the tough veins. Plant generally forms a dense uniform sod by growth from short spreading basal off-shoots in the surface soil.

4. *F. rubra*

d. Basal sheaths split to near the base, whitish and cartilaginous, glabrous; dead sheaths whitish or light brown, not readily breaking up into fibrillose material. Plants densely tufted, without spreading off-shoots, consequently not forming smooth mats.

5. *F. ovina*

1. *Festuca elatior* L. MEADOW FESCUE



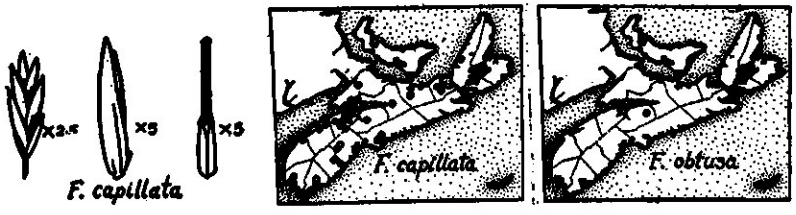
A tall leafy species easily recognized in the field by its bright green, glossy-backed blades, by the presence of auricles, and by the bright red or purple colour of the base of the fresh inner sheaths. An important forage grass frequently included in meadow and pasture seedings. It readily becomes established in Nova Scotia and persists in rich soils in fields, along roadsides and in waste places in most parts. (*F. pratensis* Huds.)

Var. ***arundinacea*** (Schreb.) Wimm. is a much taller and stouter plant with tough, strongly-ridged blades, coriaceous sheaths. spikelets fewer-flowered and lemmas awn-tipped. A single specimen has been seen from the province, collected by Macoun at Baddeck in 1898.

2. ***Festuca obtusa*** Spreng. NODDING FESCUE

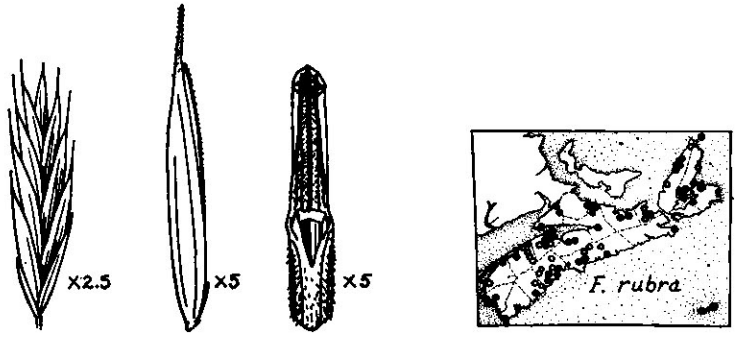
A very rare woodland species reported only from Five Mile River, Hants County (Fernald, 1921). There is some doubt as to whether the old record from Halifax, published in Macoun's Catalogue has been based on authentic material, since no subsequent collection has been made in this section of the province. More abundant in the open deciduous woods on non-acid soils towards the interior of the continent. (*F. nutans* Spreng.)

3. ***Festuca capillata*** Lam. HAIR FESCUE



This grass, generally confused with *F. ovina* in the past, is readily recognized by its extremely fine, slender and hair-like, but very tough blades. It has no forage value and is undesirable in lawns. Found growing in tufts in dry sterile soils of pastures, lawns, and along roadsides, often occupying large areas as in Kings County and the interior of Lunenburg County. Probably introduced in agricultural seed from Europe. (*F. ovina*, var. *capillata* (Lam.)Hack.)

4. *Festuca rubra* L. RED FESCUE



A rather common grass throughout the province growing along roadsides, in pastures (particularly those in exposed situations and close to the coast), in sand and gravel along sea beaches, in the *Spartina patens* zone of the salt marshes, and sometimes even in boggy soils. Although a rather palatable grass and one well able to withstand close grazing conditions, it never becomes as abundant in our old pastures as it does in regions more inland on the continent. In lawns, some strains produce a very fine dark green uniform turf and dense sod resistant to wear.

The plant shows as great variability in its morphological characters as in the habitats in which it grows. Many subspecific types have been described by various authors, the following, with their distinctive characteristics as given in Fernald's key (*Rhodora* **35**: 132, 1933), are represented in the province.

Typical variety, spikelets 7 to 10 mm. long, 3- to 7-flowered; second glume 3.0 to 4.5 mm. long; body of first lemma 4.0 to 6.0 mm. long, glabrous; foliage green. Common throughout the province. Forma ***glaucescens*** (Hartm.)Holmb. is similar but the leaves are whitish. Found mainly on dry soil, sandy or gravelly areas by sea beaches. Forma ***megastachys*** (Gaud.) Holmb. differs from the typical form in having spikelets over

10 mm. long; 6- to 10- flowered; second glume 4.0 to 6.0 mm. long; lemma 6.0 to 8.0 mm. long. Found especially in the tidal marshes. Forma ***squarrosa*** (Fries)Holmb. has pubescent lemmas. Located in many places in the province and reported from St. Paul Island (Perry, 1931) under var. ***arenaria*** (Osbeck) Fries.

Var. ***multiflora*** (Hoffm.)Asch. & Graebn., blades flat; spikelets 10 to 17 mm. long, 6- to 10-flowered; body of lowest lemma 5.5 to 7.0 mm. long. Reported from Dartmouth (Fernald, 1922).

Var. ***juncea*** (Hack.)Richter, leaves stiff and strongly whitened; spikelets 9.0 to 20.0 mm. long, 6- to 10-flowered; body of first lemma 5.0 to 7.5 mm. long. Found along the sea coast, mainly on dry beach and dune sand.

5. ***Festuca ovina*** L. SHEEP FESCUE

This species is now found to be quite scarce in the province, the many earlier records being due to confusion with either *F. rubra* or *F. capillata*. As a lawn and pasture grass, for which it is frequently recommended, it is almost useless because of its coarse tufted and straggly type of growth. It does, however, grow well on sterile sandy and poor dry soils, and it is in such situations that it is found in the province.

Found at Kentville, Wolfville, Truro, Antigonish and undoubtedly elsewhere. The statement from Macoun's Catalogue of "Rather common on Atlantic Coast and apparently indigenous," probably applies to some variety of *F. rubra*. Macoun's specimens named *F. ovina*, var. *duriuscula* are this species. Ganong's report (1903, p. 363) from the salt marshes relates to *F. rubra* also. An examination of Lindsay's specimen from Bedford shows it to be *Poa compressa*.

Forma ***hispidula*** (Hack.)Holmb. with hispid lemmas has been found at Kentville, Wolfville and Antigonish Harbour growing with typical plants and with plants with pubescence of an intermediate type. A key to *F. ovina* and its allies in

eastern North America is given by Fernald in *Rhodora* **37**: 250-251, 1935.

3. PUCCINELLIA Parl.

Glabrous perennials or biennials of wet saline or brackish soils, with narrow often inrolled leaves; spikelets 2- to many-flowered; lemmas rounded on the back, awnless, obscurely-nerved and sometimes minutely pubescent towards the base; ligule membranous. This is a difficult genus which is as yet incompletely understood. Fernald, M. L. and C. A. Weatherby, The genus *Puccinellia* in eastern North America. *Rhodora* **18**: 1-23, 1916.

a. Anthers 1.5 to 2.8 mm. long; second glume 3.0 to 4.5 mm. long; lemmas 3.5 to 5.0 mm. long, pubescent towards the base.

1. *P. maritima*

a. Anthers less than 1 mm. long; second glume up to 2.5 mm. long; lemmas 1.8 to 3.5 mm. long, glabrous or nearly so.

b. First glume 1.5 to 2.0 mm. long; second glume 2.0 to 2.6 mm. long; lemmas 2.6 to 3.5 mm. long, not ciliolate.

2. *P. pumila*

b. First glume 1 mm. long; second glume 1.3 to 2.0 mm. long; lemmas 2.0 to 2.5 mm. long.

c. Panicle stouter, dense, the branches ascending, with spikelets nearly to the base; glumes and lemmas minutely serrulate towards the tip, but not ciliolate.

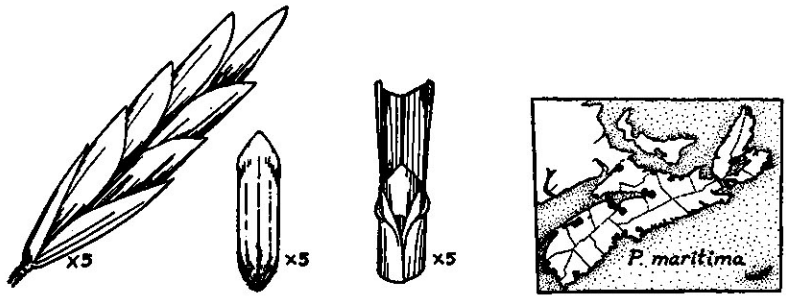
3. *P. fasciculata*

c. Panicle slender, the spreading or reflexed branches with spikelets mostly above the middle; glumes and lemmas erose-ciliolate.

4. *P. distans*

1. ***Puccinellia maritima*** (Huds.) Parl.

SEA-SIDE PUCCINELLIA



Found commonly, but only on saline or brackish marshes from Shelburne County all along the shores of the Bay of Fundy. There is also a record from Louisburg (Macoun, 1888). Nova Scotia to Rhode Island.

2. ***Puccinellia pumila*** (Vasey) Hitchc. DWARF PUCCINELLIA

Widespread along the seashores of the province; but also found at inland points around salt springs, as at Oxford. (*P. paupercula* (Holm.) Fern., var. *alaskana* (Scribn. & Fern.) Fern. & Weath.); (*P. angustata* in Britton & Brown). Labrador, south to Connecticut.

3. ***Puccinellia fasciculata*** (Torr.) Bicknell

A smaller, more densely flowered species than the preceding two; found rarely at the heads of salt marshes or on dykelands on the Fundy side of the Province. Collected at Kentville and Grand Pré. Mentioned in Britton and Brown under the name *P. Borreri*, as ranging to Nova Scotia. Nova Scotia to Delaware; Europe.

4. ***Puccinellia distans*** (L.) Parl. SPREADING PUCCINELLIA

Occurs in waste places along roadsides as well as on salt or brackish mud around the towns of Sydney, Pictou, and

Windsor; appearing as if introduced from the Old World in ballast. Widely spread in eastern North America.

4. GLYCERIA R. Br.

Plants of moist or aquatic habitats, lacking hairs throughout; inflorescence an open or contracted panicle; spikelets 2- to 12-flowered; lemmas awnless, rounded on the back, generally with 7 distinct and often raised nerves, smooth to scabrous; leaf-blades (except in *G. Fernaldii* and *G. pallida*) without ridges on the upper surface and folded along a conspicuous mid-rib; sheaths closed, at least during early stages; ligule membranous. (Panicularia)

One or more of the following characteristics will distinguish these grasses from related genera: the several-flowered spikelets with glumes shorter than lemmas; the 7, often prominently raised, nerves of the round-backed lemmas; and the moist, but never brackish, habitat.

a. Spikelets elongate, 10 mm. long or longer, lying closely along the branches of the panicle on short pedicels.

b. Leaves 2 to 4 mm. wide, rarely to 6 mm.; lemmas 3 to 4 mm. long, smooth or nearly so between the slightly roughened nerves.

1. *G. borealis*

b. Leaves 4 to 8 mm. wide; plant coarser; lemmas 5.0 to 6.5 mm. long, minutely roughened between the nerves.

2. *G. fluitans*

a. Spikelets ovate or oblong, less than 7 mm. long, on more diffuse branchlets.

c. Panicle contracted with closely ascending branches.

d. Panicle oblong and dense, erect, 12 cm. long or less; lemmas 3 to 4 mm. long.

3. *G. obtusa*

d. Panicle linear, rather open and often nodding, 15 to 25 cm. long; lemmas 2.0 to 2.3 mm. long.

4. *G. melicaria*

c. Panicle loose with more or less spreading or drooping branches.

e. Nerves of the lemmas not prominently raised; edges of the bowed-out palea visible beyond the edges of the lemma.

f. Spikelets with 5 to 10 florets; lemma 3 to 4 mm. long.

5. *G. canadensis.*

f. Spikelets with 3 to 6 florets; lemma 2.0 to 2.5 mm. long.

5a. *G. canadensis*, var. *laxa*

e. Nerves of the lemmas prominent; palea not bow-shaped.

g. Stems usually stout, erect.

h. Panicle mostly less than 20 cm. long; spikelets 3 to 4 mm. long, with the first glume 1 mm. long or shorter.

i. Leaves flat, to 7 mm. wide; panicle 10 to 30 cm. long; spikelets mostly greenish, with the smaller lemmas (mainly 1.5 to 1.8 mm. long) merely scarious-tipped.

6. *G. striata*

i. Leaves mostly folded, to 4 mm. wide; panicle 5 to 15 cm. long; spikelets mostly purplish with the larger lemmas (2.0 to 2.2 mm. long) rounded with broad rounded tips.

6a. *G. striata*, var. *stricta*

h. Panicle large and ample, 15 to 40 cm. long; leaves 7 to 12 mm wide; spikelets 5 to 6 mm. long, with the first glume 1.2 to 1.5 mm. long.

7. *G. grandis*

g. Stems soft and weak, lying partly on the ground; spikelets pale green, scabrous.

j. Plant 3 to 10 dm. high; leaves mostly 4 to 8 mm. wide; spikelet 4- to 7-flowered, 6 to 7 mm. long; anthers 1 mm. long.

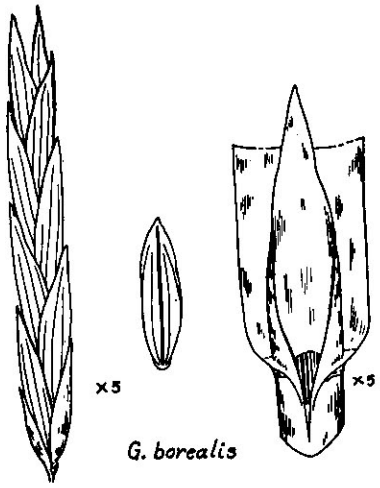
8. *G. pallida*

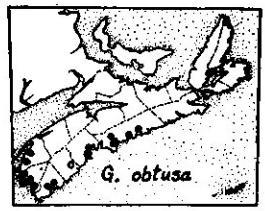
j. Plant 2 to 4 dm. high; leaves 1 to 3 mm. wide; spikelet 3- to 5-flowered, 4 to 5 mm. long; anthers 0.4 to 0.6 mm. long or less.

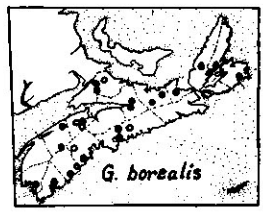
9. *G. Fernaldii*

1. ***Glyceria borealis*** (Nash) Batchelder

NORTHERN MANNA-GRASS







Growing in quiet shallow waters in pools and streams, around the margins of lakes, in ditches, the long narrow leaves often floating on the surface of the water; also in very wet soil. Common throughout the province. Distributed across the continent.

A plant with larger stalks and broader spikelets collected in a shallow ditch at Meteghan, Digby County (Dore, no. 745, August 9, 1940), has been found by G. L. Church of Brown University to have 40 chromosomes, twice the number of *G. borealis*, but the same as in *G. septentrionalis* Hitchc. The specimen, however, lacks the distinct scabridity of the lemmas, which typifies *G. septentrionalis*.

2. ***Glyceria fluitans*** (L.) R. Br. FLOATING MANNA-GRASS

Similar to the preceding, but distinguished by its larger, stouter spikelets, longer lemmas and stouter growth. Abundant in swales, ditches and wet meadows around the marshes near

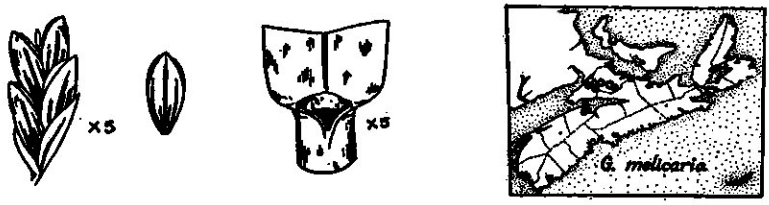
Truro (Roland, 1941); unknown elsewhere in the province. Introduced from Eurasia to eastern North America.

3. *Glyceria obtusa* (Muhl.) Trin. BLUNT MANNA-GRASS

The stiff upright growth of the stems and leaves with the compact dense panicles of large spikelets, and the short ligule about 1 mm. long, are good field characteristics. Common in Yarmouth and southern Digby Counties, eastward at least to Lunenburg County, and scattered to Musquodoboit Harbour in Halifax County. In some places it makes dense stands 3 to 4 feet high with panicles 17 to 20 cm. long (Fernald, 1922, p. 161). Swales, wet muck soils and boggy margins of streams and lakes. Found only near the Atlantic coast from N. S. to North Carolina. (Map p. 199).

4. *Glyceria melicaria* (Michx.) F. T. Hubb.

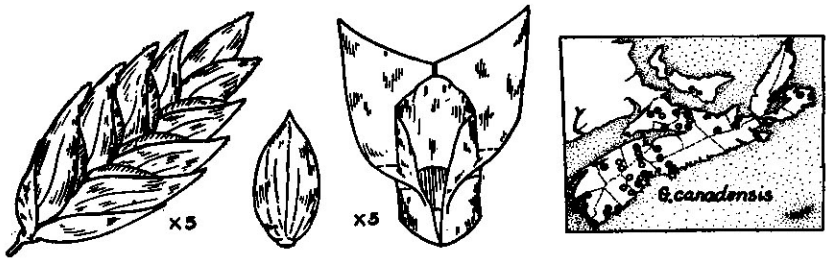
LONG MANNA-GRASS



Identified best, when growing, by the long erect or nodding, narrow panicle; or, if confused with species of *Poa*, by the closed sheath. Abundant in rich, wet woods, damp thickets and along shady brooksides, often becoming the dominant grass over small areas; from Cape Blomidon northward through Cumberland County, eastward at least to Folleigh Lake and probably beyond. There is a specimen collected by M. S. Brown from a doubtful station in Halifax County. Extending eastward and southward from N. S. (*G. elongata* Trin.; *G. Torreyana* (Spreng.)Hitchc.)

5. ***Glyceria canadensis*** (Michx.) Trin.

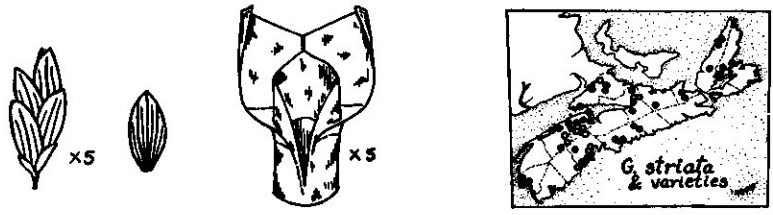
RATTLE-SNAKE MANNA-GRASS



One of the handsomest of our native grasses with its large turgid yellowish-green spikelets pendent from long slender branches of an ample panicle. When young the spikelets are almost terete, but soon after flowering the lemmas spread widely and expose the bowed out keels of the paleas. Common throughout the whole province, in well-drained swamps, boggy land, springy woods and ditches, wet meadows and grassy borders of streams and ponds, sometimes even in sphagnous bogs. General in distribution in eastern Canada and north-eastern U. S. A.

5a. Var. ***laxa*** (Scribn.)Hitchc. Much taller than the preceding, often growing in large pure colonies. Scattered in occurrence from Digby and Yarmouth Counties to Hants and Halifax Counties; also in Cape Breton Island. Restricted in Canada and the U. S., unlike the species, to eastern regions. P. E. I. to West Virginia, but also in Michigan.

6. ***Glyceria striata*** (Lam.) Hitchc. FOWL MANNA-GRASS



Common throughout the province in moist rich soils in meadows, ditches, along streams and wet open woods. The

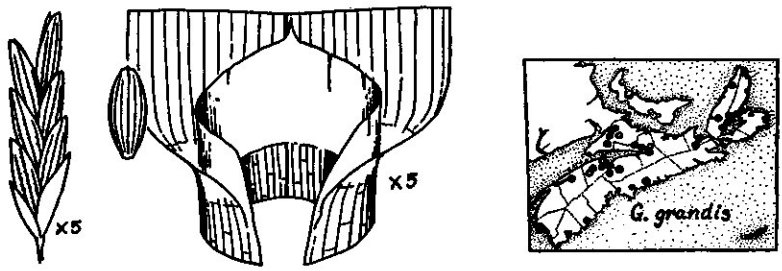
spikelets vary somewhat in length and in the number of florets. Ranges throughout the temperate parts of the continent. (*G. nervata* (Willd.)Trin.)

The tall, slender woodland form with sparse open panicle of widely-spreading branches and smaller green spikelets 2 to 3 mm. long, 3- to 4-flowered, with lemmas 1.2 to 1.8 mm. long, has been named *G. nervata*, var. *parviglumis* Scribn. & Merr. This is found in Kings, Annapolis and Yarmouth Counties. As a variety it is scarcely distinct since all intergrades with the species can be found; and it is better considered merely as an ecological form.

6a. Var. ***stricta*** (Scribn.)Fern. (*Rhodora* 31: 48, 1929) is a smaller and stricter form with a purplish tinge to sheaths and panicle. Found in similar or more open and drier situations than the species; probably more common in the province. In moist meadows and pastures it may provide considerable fodder. A more northern variety ranging from Labrador to Alaska south to N. S., Maine, and along the Rocky Mountains.

7. *Glyceria grandis* S. Wats.

REED MANNA-GRASS, AMERICAN MANNA-GRASS



Culms stout, 10 to 15 dm. high, with wide flat leaves and ample erect panicle of numerous small purplish spikelets with pale glumes. The minute cross-veins stand out in the sheaths and blades. Found throughout the province in wet meadows, banks of streams, marshes; often conspicuous in

swales and ditches particularly in the northern and western tier of counties. Readily eaten by cattle. P. E. I. to Alaska southward.

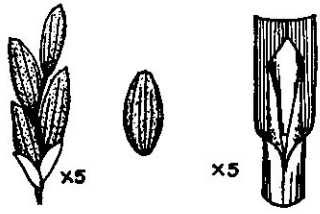
Forma ***pallescens*** Fern., with yellowish spikelets, has been reported from Yarmouth (Fernald, 1921) and since found in Kings County at numerous places from Grand Pré to Coldbrook growing in patches and often admixed with the typically purple-panicled plants. Also known from Maine.

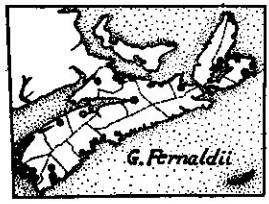
8. ***Glyceria pallida*** (Torr.) Trin. PALE MANNA-GRASS

A pale green, lax, medium-sized grass known at the present time only from collections from "boggy swales and savannahs of the Tusket River, Yarmouth Co." (Fernald, 1921). The earlier records from Cape Breton Island and Lunenburg County are to be referred to *G. Fernaldii*. A collection from near Amherst is intermediate in some respects. This and the next are probably not specifically distinct. N. S. to Wisconsin, south to North Carolina.

9. ***Glyceria Fernaldii*** (Hitchc.) St. John

SMALL MANNA-GRASS





Resembling the last, but smaller throughout, often reclined in the bottom of cat-tail marshes, swales, margins of ponds, ditch bottoms; abundant in its proper habitat throughout the province. This grass has often passed under the names of *G. pallida*, var. *Fernaldii* Hitchc. (*Rhodora* **8**: 211, 1906) or *G. neogaea* Steud. (Kelso, L. *Rhodora* **35**: 225-226, 1933). Range is more northern than *G. pallida*: Nfld. to Minnesota, south to Connecticut.

5. POA L.

Plants without pubescence on the leaves and stems; leaves with narrow blades which are folded along the mid-vein in the young shoot; ligules membranous; inflorescence an open or only loosely contracted panicle; spikelets 2- to 5-flowered, flattened so that the glumes and lemmas become a keel along the mid-nerve; lemmas always awnless, with 5 nerves, the two intermediate ones often obscure, generally with a coiled tuft of long, webby hairs arising from the callus and frequently with soft pubescence on the mid-nerve and other nerves. The great variation of several members of this genus makes this an extremely difficult group to classify adequately.

a. Low annual or winter-annual, less than 25 cm. high, with light-green leaves; webby hairs at base of lemma lacking or, rarely, short and scant; panicle-branches arising singly or in pairs; keel and marginal nerves of lemma pubescent.

1. *P. annua*

a. Perennial, usually much taller; webby hairs present at base of lemma.

b. Plants with long rhizomes; keel and marginal nerves of the lemma pubescent.

c. Culm flattened, 2-edged; leaf-blades short and tapering to the tip, generally a bluish- or glaucous-green color, glabrous; webby hairs at the base of the lemma scant; panicle branches usually in pairs.

2. *P. compressa*

c. Culm round in cross-section; leaf-blades often long and narrow with parallel sides and abruptly-pointed tip, generally dark green, sometimes minutely pubescent on upper surface.

d. Panicle with many spikelets on slender branches borne mostly five at each node of the panicle; spikelets 3.0 to 5.0 mm long; common.

3. *P. pratensis*

d. Panicle with a few spikelets on short, stiff branches arising singly or in pairs from each node; spikelets 5.5 to 7.0 mm. long; rare, in mossy woods

4. *P. costata*

b. Plants tufted and lacking rhizomes, often decumbent at the base or somewhat sprawling.

e. Marginal nerves of the lemma not pubescent, the keel glabrous or pubescent.

f. Ligule of lower leaves 2 to 6 mm. long; spikelets numerous; panicle-branches several at each node.

5. *P. trivialis*

f. Ligule 1 mm. long or less; spikelets few at the ends of slender nodding branches of the panicle.

g. Keel of the lemma pubescent; panicle-branches more than 2 at each node.

6. *P. alsodes*

g. Keel of the lemma glabrous; panicle-branches in pairs or solitary.

7. *P. saltuensis*

e. Marginal nerves, as well as the keel, pubescent.

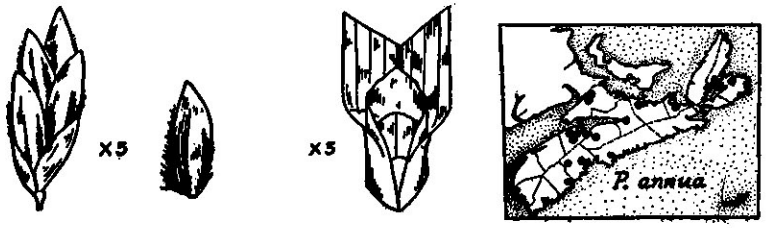
h. Ligule on lower leaves less than 1 mm. long.

8. *P. nemoralis*

h. Ligule on lower leaves 1 to 4 mm. long.

9. *P. palustris*

1. *Poa annua* L. ANNUAL BLUE-GRASS



This species, easily recognized by its light green foliage, low-growing habit and abundant panicles, is a common weed in gardens, lawns, dooryards, along paths, and in pastures around the gateway and drinking troughs where heavy trampling keeps down taller-growing species. Flowering starts early in the spring and continues until frost, with sometimes a dormant period in the dry mid-summer. New plants arise from seed or from the old stalks that winter over.

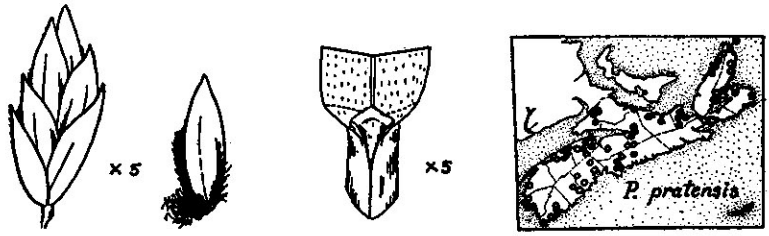
A common weed throughout the province. Introduced from Europe and widely distributed.

2. ***Poa compressa*** L. CANADA BLUE-GRASS

This rhizomatous species sends up spaced tough stalks somewhat geniculate at the base but lacking the abundance of vegetative shoots and basal leaves, and turf-forming properties of *P. pratensis.* The sheaths soon turn whitish and become conspicuous against the green blades and culms. This feature, together with the distinctly flattened culms, longer and whiter ligule and later flowering, readily distinguishes this plant from *P. pratensis,* with which it is frequently confused.

In Nova Scotia *P. compressa* seems to be restricted to the highly aerated soil such as can be found in the sod overhanging a ditch or road-cut, in pockets on flat rocks, where frost-heave has loosened up the ground, or in beach gravels and sands. Found in most regions of the province, but not nearly as common as the next. A good forage species, but established only in favoured situations. Not suitable for lawns. Introduced from Europe; throughout North America, and well adapted to conditions in the Great Lakes region.

3. ***Poa pratensis*** L. KENTUCKY BLUE-GRASS



One of the commonest species in pastures, meadows, lawns and roadsides in all parts of the province. Due to its long rhizomes which spread under the surface, the plant is able to survive under conditions of continual grazing, close clipping and trampling, forming a tough sod with an abundance of narrow leaves.

The great variation found in the habit and morphology of this species has given rise to some confusion in the classification of its sub-specific states. Development of the seed is known to take place asexually by nucellar budding allowing the same combination of genetic characters to be preserved unchanged from generation to generation. A great variety of habit types are therefore to be found in nature, their appearance showing some correspondence with ecological conditions. In old pastures and in exposed uplands, low-growing, broad-leaved forms occur. Many types have narrow blades (var. *angustifolia* (L.) Sm.). Large coarse plants in bogs and humid uplands are related to the northern variety ***alpigena*** Fries. Certain abnormal spikelets are formed when the florets become infected by nematodes, similar to the case of *Agrostis tenuis*, and such plants may be confused with the next species.

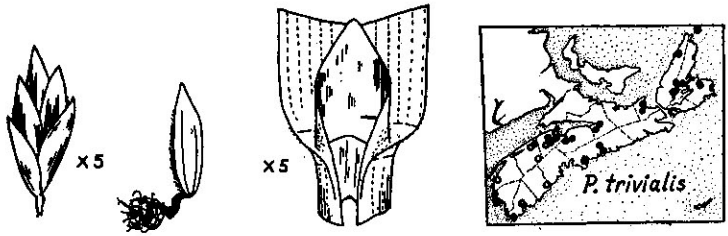
Introduced from Europe. One of the most valuable forage and turf-forming grasses in moist temperate regions. In areas subject to mid-summer drought, the plant exhibits a striking dormancy.

4. ***Poa costata*** Schum.

A delicate and rare grass found in damp, mossy woods and glades or thickets at Middleton, Port Bevis and Truro. Also found in P. E. I. and Nfld. and thought to be the same as the plant of northern Europe (Fernald, M. L. *Rhodora* **23**: 133, 231, 1921).

Examination of the Nova Scotian specimens shows all to be highly parasitized by nematode worms (Dore, W. G. *Rhodora* **44**: 246-247, 1942). Similar infection in *P. pratensis* causes abnormal changes of the flowering parts so that the plants become very similar in their dimensions and structure to *P. costata.* It may be suspected, therefore, that the North American plants that have been called *P. costata* in the past may be nothing more than *P. pratensis* or some other local species with all spikelets infected. The vegetative characteristics are similar to those of *P. pratensis.*

5. ***Poa trivialis*** L. ROUGH-STALKED BLUE-GRASS



Plants without rhizomes, upright from a decumbent base, pale green or with the sheaths tinged with purple; culms and sheaths more or less scabrous; ligule 2 to 6 mm. long, pointed; flowering until frost. Individuals in shaded or excessively moist situations are weak and sprawling with 1- or 2-flowered spikelets and narrow glumes, appearing very different from the typical plant.

An abundant species in good land throughout the province. A valuable forage grass growing well both in hay and as a bottom grass in pastures. The plant persists and spreads on its own accord, being more successful here than in the interior of the continent. Introduced from Europe to many places of North America, often appearing as if native to this province.

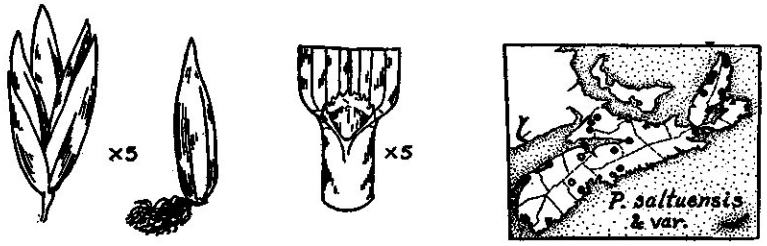
6. ***Poa alsodes*** A. Gray

Recorded in Lindsay's Catalogue from Dartmouth. There is no specimen, however, to substantiate this in his collection in the Provincial Museum. The plant was collected in 1940 on a stream bank in deep woods at Cheticamp and is evidently very rare in N. S. Found in rich woods, westward to Minnesota and south to Tennessee.

7. ***Poa saltuensis*** Fern. & Wieg. FOREST MEADOW-GRASS

A woodland species with tall, slender, culms, sheaths closed to near the top, and drooping panicles with few spikelets. Plants typical of the species have panicles 10 to 20 cm. long,

spikelets 3-flowered, 4.5 to 5.0 mm. long, and lemmas 3.5 to 4.0 mm. long. Plants with smaller panicles 6 to 10 cm. long, spikelets 2-flowered, 3.5 to 4.0 mm. long, and lemmas about 3.0 mm. long have been segregated as var. ***microlepis*** Fern.



& Wieg. (*Rhodora* 20: 124, 1918). Much of the Nova Scotian material appears to be this variety but the separation is not clear-cut. (*P. debilis* Torr. and *P. debilis*, var. *acutiflora* Vasey in Macoun's Catalogue, 1888)

Found in rich and mossy hardwoods, in brookside thickets, and on the rocky shaded banks. Nfld. to Minnesota, south to Delaware.

8. *Poa nemoralis* L. WOOD BLUE-GRASS

Similar to the next, but with the glumes narrower and more slender-pointed and the ligule of the lower leaves less than 0.5 mm. long.

The only specimens seen from the province are from a shady lawn at Antigonish and dry wooded bank at Kentville.

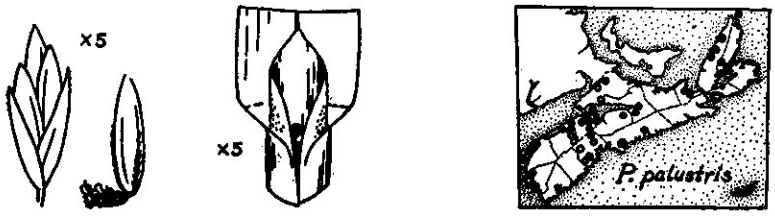
Introduced from Europe and occasional from Nfld. to Delaware and Michigan.

9. *Poa palustris* L.

FOWL BLUE-GRASS, SWAMP MEADOW-GRASS

A tall grass with ample panicle common in moist situations throughout the province. The spikelets are frequently 3-flowered with the tips of the lemmas bronze-tinged. The

taper-pointed blades frequently stand erect on the culm, giving a characteristic field appearance. Ligules are long, those of the lower culm leaves 1 to 4 mm. long. In the absence



of other parts *P. palustris* may be distinguished from *P. pratensis* by this point, the ligules in the latter being less than 1 mm. long.

The extreme variations that occur in this species due to habitat and stage of growth have led to much taxonomic confusion. The plant is best developed in moist meadows and along stream banks. In drier sites and pastures it has a stricter growth with sparser panicles; in deep shade the plant is weak and the panicle reduced to a few small spikelets; autumnal forms are decumbent, sending up numerous flowering tillers. (*P. triflora* Gilib., *P. serotina* Ehrh.)

Common in all parts of the province. Found from Nfld. southward, also on the West Coast and in Eurasia.

Poa alpina L.

Mentioned by Fernald as occurring in Cape Breton (Mem. Gray Herb. II: 314, 1925) and ranging into N. S. according to Gray's *Manual.* No specimen from Nova Scotia has been seen by the authors.

Poa caesia Sm.

The record for Windsor in Macoun's Catalogue, 1888, has not been substantiated. (*P. glauca* Vahl)

6. BRIZA L.

Small perennial with open panicle, and large spikelets pendulous from the ends of flexuous capillary branches; spikelets about 10-flowered, orbicular in shape; lemmas broad and cordate at the base, smooth and faintly nerved, spreading at right-angles from the axis of the spikelet.

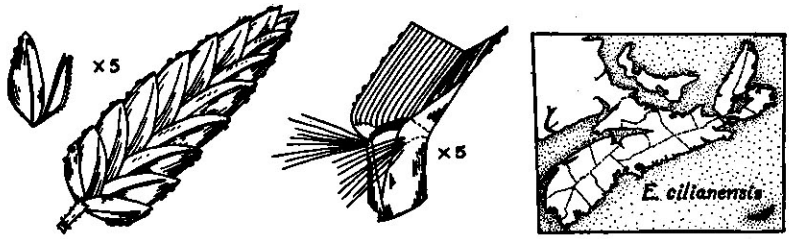
1. ***Briza media*** L. QUAKING-GRASS

The only record of this grass in the province is based on Macoun's collection made in ditches at Digby in 1910. The plant is sparingly introduced from Europe, where it grows in fields and meadows. It does not, however, grow well on this continent.

7. ERAGROSTIS Beauv.

A weedy annual, with numerous small glands giving off a disagreeable odor; panicle large, with numerous many-flowered spikelets; lemmas soon fall away leaving the paleas on the rachilla and allowing the grains to shed readily. Our species is readily recognised by the 10- to 40-flowered spikelet, by the glands on the foliage, on flowering parts and in a ring just below the nodes, by the tuft of fine hairs at the top of the sheath and by the ciliate ligule.

1. ***Eragrostis cilianensis*** (All.) Link STINK-GRASS



The plant was collected in 1938 in waste land about Halifax Harbour, but undoubtedly occurs in ballast and in

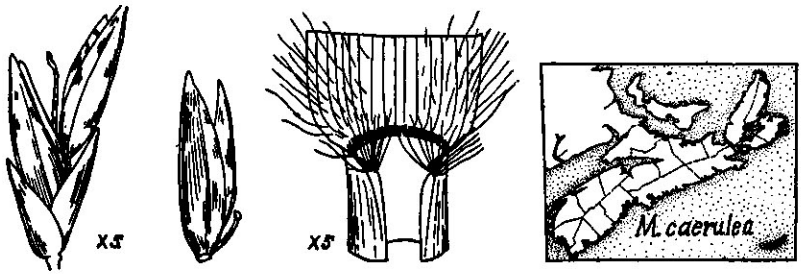
similar places elsewhere in the province. Introduced from Europe and becoming a common weed in America. (*E. major* Host)

8. MOLINIA Schrank

Coarse grass 5 to 10 dm. high, with long tapering leaves 2 to 8 mm. wide; panicle large and elongated with 2- to 3-flowered spikelets; glumes and lemmas smooth and purple-tinged; ligule ciliate; hairs present at the top of the sheath and towards the base of the blade.

1. *Molinia caerulea* (L.) Moench

FLYING BENT, PURPLE HEATH-GRASS



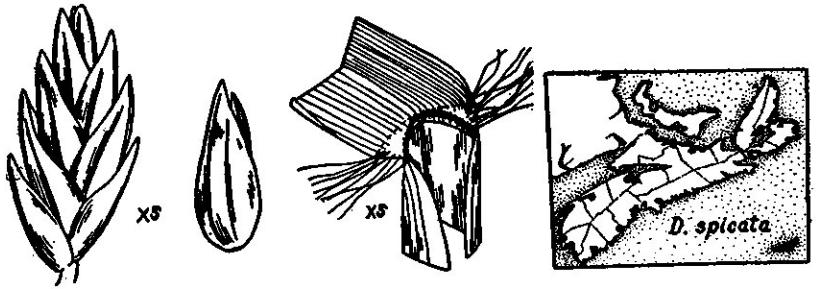
A common grass of upland moors of northern Europe; introduced into America in only a very few localities in the eastern United States and Newfoundland. Collected for the first time in Canada in 1940 around the town of Louisburg where the extensive stands indicate its establishment there for a long time (Roland and Dore, 1942). The leaves are coarse, tough and break off at the ligule region at maturity leaving large tussocks of sheaths and culms anchored firmly in place by extremely tough and persistent fibrous roots. Sheep can graze it only when the leaves are young in the spring.

9. DISTICHLIS Raf.

Small grasses 1 to 4 dm. high with numerous rigid sharp-pointed leaves; staminate and pistillate spikelets in separate

plants, 5- to 9-flowered, compressed so that the lemmas and glumes are sharply keeled; panicle dense and stiffly erect.

1. ***Distichlis spicata*** (L.) Greene SEASHORE SALT-GRASS



Found only along the coast where the soil is affected by the salt or brackish water, generally forming extensive colonies in the upper parts of the marshes or just above high tide on the sandy shores. Not common, but scattered along the Bay of Fundy and up the Atlantic Coast. Around much of the coast of North and South America, and inland around salt springs or in saline soil.

10. DACTYLIS L.

Tall, tufted perennial grass with broad, smooth blades keeled along the prominent mid-rib; spikelets 3- to 8-flowered, much compressed, almost sessile and crowded in clusters along or at the ends of the stiff panicle-branches; keels of the glumes and lemmas conspicuously ciliate; ligule long and membranous.

1. ***Dactylis glomerata*** L. ORCHARD-GRASS, COCKSFOOT

A valuable forage grass used extensively in pastures and hay fields in Britain and other parts of Europe. It is essentially a hay type with upright shoots and leaves, but low-growing, leafy strains have been developed especially for grazing purposes. In Nova Scotia it is not sown to any extent, although

the grass may be found in most parts of the province growing wild in fields around towns, along roadsides and in orchards.

Numerous varieties have been proposed by European workers. In Nova Scotia the ***typical*** variety, with the backs

of the glumes and lemmas essentially glabrous, is the most common. Var. ***ciliata*** Peterm., with pubescent glumes, lemmas and sheaths, and var. ***detonsa*** Fries, with the keels of the glumes and lemmas merely scabrous rather than long-ciliate, are also found. Widely introduced from Eurasia.

11. CYNOSURUS L.

Low grasses, with slender spike-like panicles and the spikelets sessile or on very short pedicels arranged along one side of the axis; spikelets of two kinds in the same inflorescence, the sterile ones with scale-like parts and short pedicels, the fertile ones situated at the base of the sterile and with 2 or 3 florets; ligule membranous.

1. *Cynosurus cristatus* L. CRESTED DOG-TAIL

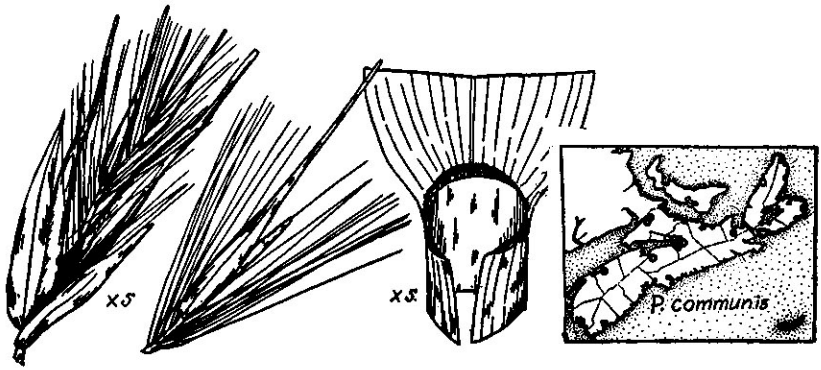
A common species of meadows and pastures in northern Europe, and known in Newfoundland. Collected but once in Nova Scotia, on a roadside at Baddeck in 1936, by Groh.* Introduced in scattered places from Nfld. to Virginia, and on the West Coast. Considered to have only slight forage value.

* Found growing abundantly in old pasture fields west of Kentville, late Aug. 1942.

12. PHRAGMITES Trin.

Tall, perennial, broad-leaved reed-like grasses growing in dense thicket-like stands from stout rhizomes, and producing late in the season large silky panicles at the top of the stalks; spikelets several-flowered, the flowers successively smaller, and with long silky hairs growing from the rachilla; ligule brownish, of matted hairs.

1. ***Phragmites communis*** Trin. COMMON REED



This is the largest grass in the province with an average height of 6 to 7 feet, sometimes attaining as much as 10 feet. The culms are large, smooth, tough and shaft-like, with leaf-blades an inch or more in width. The American plants, including all those found in Nova Scotia, with their greater stature, longer spikelets and glumes, have been separated from the European plant as var. ***Berlandieri*** (Fourn.)Fern. (*Rhodora* **34**: 211, 1932).

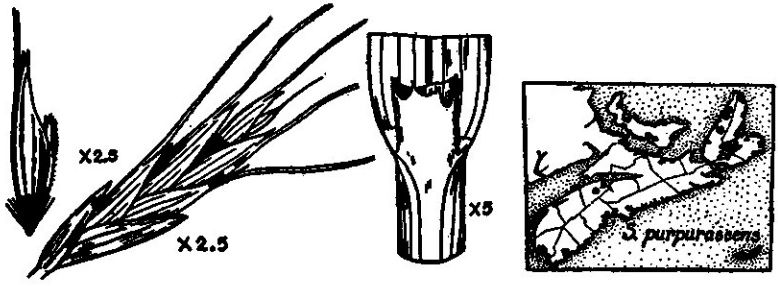
Found along the upper borders of salt marshes, or just behind them, in wet partly-brackish situations. About Amherst this grass is found around the heads of the marshes, along ditches or in boggy situations (Ganong, 1903, pp. 439, 441); also rather commonly in similar situations along Cobequid Bay. One station, a few miles inland in the vicinity of Heatherton, Antigonish County, is found in a swampy spot

marked on the geological map as a salt spring. An extensive stand of the grass just west of Annapolis Royal has been known for a long time (Fernald, 1922, p. 161). Although of no great economic value, the plant is sometimes used for a variety of purposes such as thatching and wicker or basket work. The mature panicles are highly decorative. Known around the world on all continents.

13. SCHIZACHNE Hack.

Rather tall perennial with a few-flowered, open to contracted panicle; spikelets large, several-flowered, only the lower ones producing grains; lemmas rounded on the back, distinctly-nerved, and long-awned from between the two terminal membranous teeth; callus with a ring of short hairs.

1. ***Schizachne purpurascens*** (Torr.) Swallen FALSE MELIC



One of the rarest native grasses of the province, found only in the extreme northern part of Cape Breton Island and at Moore's Falls near Kentville. It is tall and slender, with weak culm and soft glabrous leaves; generally found in open rocky woods or along stream banks. Of all our native grasses, this one alone is characterized by the closed sheath and sheathing ligule. The generally purplish glumes, the fringed lemma with its long straight awn and bifid tip, and the few long-pedicelled spikelets of the inflorescence, are other good features for the

recognition of this species. (*Melica striata* Hitchc.) Nfld. to Alaska southward.

Tribe II. HORDEAE

a. Leaves not tough and bristle-like; spikelets two-ranked forming a two-sided to cylindrical spike.

b. Spikelets occurring singly at each node of the axis, sometimes in pairs at the lower nodes.

c. Perennials; spikes slender. with spikelets 4- to 12-flowered.

d. Spikelets placed with the edges of the florets towards the axis of the spike; both glumes present.

14. *Agropyron* (p. 218)

d. Spikelets with the back of one row of florets towards the axis of the spike; lower glume in each spikelet absent, except in the terminal spikelet.

20. *Lolium* (p. 226)

c. Annual or winter-annual cultivated cereals; spikes denser and stouter, with the spikelets 2- to 5-flowered.

e. Glumes broad, 3-nerved; lemmas awnless or long-awned; spikelets generally 3- to 5-flowered.

15. *Triticum* (p. 221)

e Glumes narrow, bristle-like, 1-nerved; lemmas long-awned; spikelets generally 2-flowered.

16. *Secale* (p. 222)

b. Spikelets more than one at each node.

f. Spikelets two at each node of the axis, both alike.

g. Glumes well-developed; spike dense with appressed or ascending spikelets.

17. *Elymus* (p. 222)

g. Glumes obsolete, or present as slender bristles; spike very open, with spikelets spreading horizontally at maturity.

18. *Hystrix* (p. 224)

f. Spikelets 3 at a node, the lateral pair short-stalked and sometimes reduced to awns.

19. *Hordeum* (p. 225)

a. Leaves involute, tough, slender and bristle-like, arising from a tuft of whitened, hard sheaths; spikelets turned to one side forming a slender one-sided spike; glumes absent or obsolete.

21. *Nardus* (p. 227)

14. AGROPYRON Gaertn.

Tufted or rhizomatous perennials with spikelets arranged singly at each node and with the edges of the florets adjacent to the rachis; spikelets several-flowered; glumes and lemmas firm, rounded on the back and tapering into a point or awn; ligule short, tough-membranous; hooked auricles often present at top of sheath.

a. Spikelets breaking up readily at maturity, leaving the glumes attached to the rachis; rachilla pilose; anthers 1 to 2 mm. long; rhizomes absent.

1. *A. trachycaulum*

a. Spikelets not separating readily between the florets at maturity but dropping from the rachis intact with the glumes; rachilla not pilose; anthers 3 to 7 mm. long; long creeping rhizomes present.

b. Blades firm, stiff, glabrous and glaucous, with a few broad ribs; culms completely or almost filled with pith towards the top; spike nearly square in cross-section; internodes of rachis thick and usually 4-angled.

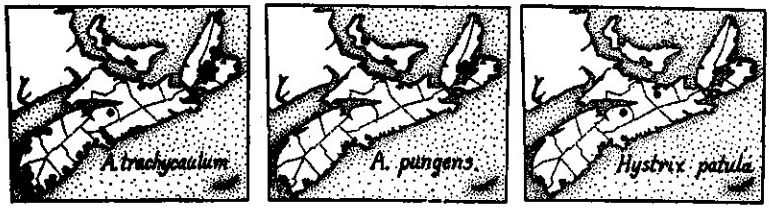
2. *A. pungens*

b. Blades softer, flat, generally sparsely pilose on the upper surface, green or sometimes somewhat glaucous, with many narrow ribs; culms hollow at the top; spike not conspicuously 4-angled; internodes of rachis thin and rounded on the back.

3. *A. repens*

1. *Agropyron trachycaulum* (Link) Steud.

SLENDER WHEAT-GRASS



This is a very variable species and has been studied by several different workers. The following papers may be referred to: Pease, A. S. and A. H. Moore, *Agropyron caninum* and its

Northern American allies. *Rhodora* **12**: 61-77, 1910. Malte, M. O., The so-called *Agropyron caninum* (L.) Beauv. of North America. Nat. Mus. Can., *Ann. Rpt.* 1930: 27-48, 1932. Fernald, M. L., *Agropyron*, § *Goularda* in eastern North America. *Rhodora* **35**: 161-182, 1933. Hitchcock, A. S., New species, and changes in nomenclature, of grasses of the U. S. *Amer. Jour. Bot.* **21**: 127-139, 1934. Fernald, M. L., *Agropyron trachycaulum* versus *A. pauciflorum*. *Rhodora* **36**: 417-420, 1934.

In Nova Scotia this species is represented by the following varieties, with distinguishing characteristics according to Fernald's treatment (l. c. 1933):

a. Awns wanting or very short.

b. Glumes (excluding awns) 10 to 16 mm. averaging 12.5 mm. long; fruiting spikes narrow, 5 to 12 mm. thick.

var. *majus*

b. Glumes (excluding awns) 7 to 10 mm., averaging 8 mm. long; fruiting spike narrower, 3 to 6 mm. thick.

var. *novae-angliae*

a. Awns nearly equaling to much longer than the body of the lemma.

var. *glaucum*

Var. ***majus*** (Vasey)Fern. Found on gravelly beaches of lakes or bordering marshes in Shelburne, Yarmouth and Digby Counties, around the Bras d'Or Lakes, and on St. Paul Island. Labrador to British Columbia, south to Maine, etc. (*A. pauciflorum* (Schwein.)Hitchc. in part, of Hitchcock's Manual)

Var. ***novae-angliae*** (Scribn.)Fern. Found in a variety of habitats, along dry or gravelly beaches of brackish lakes or sea shores, gypsum talus, rocky flood plains, or turfy mats on sea cliffs. Queens, Halifax and Hants Counties and around the Bras d'Or Lakes. Labrador to British Columbia, south to Connecticut, Wisconsin, etc. (*A. pauciflorum* (Schwein.) Hitchc. in part, of Hitchcock's Manual)

Var. ***glaucum*** (Pease & Moore)Malte. Found in thickets, along gravelly beaches of brackish or salt shores, or dry roadsides. Shelburne, Digby, Lunenburg, Halifax Counties and around Bras d'Or Lakes. Nfld. to British Columbia, south to New England, Pennsylvania and California. (*A. subsecundum* (Link)Hitchc. in Hitchcock's Manual)

2. ***Agropyron pungens*** (Pers.) R. & S.

Closely related to *A. repens* as shown in its similar growth and chromosome number and sometimes growing associated with it. Found in the province only along the brackish shores of the Bras d'Or Lakes, Cape Breton Island, with specimens collected at Iona, Grand Narrows, Baddeck and George River.

Some of the plants of this species with fewer florets (3 to 5) in the spikelets, shorter and more involute leaves, and more open inflorescence, were originally described as a separate species, *A. acadiense* by Hubbard (*Rhodora* **19**: 15-17, 1917). These characteristics, as well as others cited by Hubbard, have been found to grade into those typical of the species; and the plants have been reduced to varietal status as *A. pungens*, var. ***acadiense*** (F. T. Hubb.)Fern. (*Rhodora* **23**: 232, 1921). Found growing with the species. (Map p. 218)

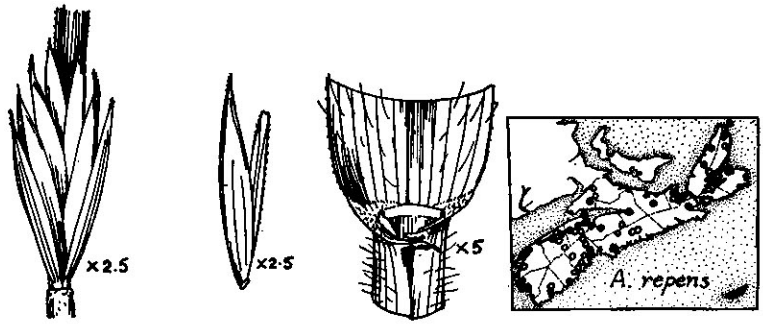
3. ***Agropyron repens*** (L.) Beauv.

COUCH-GRASS, QUACK-GRASS

This is thought to be a native grass of coastal areas from Newfoundland and the lower St. Lawrence to New England, which has invaded fields and waste places to become a noxious weed. In cultivated land it spreads rapidly by its long, tough, underground stems and is very difficult to eradicate. In hay fields and pastures, however, the grass provides good fodder. It is also common along sand beaches, roadsides, reclaimed and brackish marshes.

The species exhibits great variability and many varieties and forms have been described. The following segregations

based on characters of the flowering parts have been given by Fernald, and may be found throughout the province. Each of the eight is represented by numerous specimens collected at various sites, which show no correlation with



habitat or geographical regions. Fernald, M. L., The American variations of *Agropyron repens*. *Rhodora* 35: 182-185, 1933.

Typical variety has the glumes oblong, rounded or abruptly narrowed at the tip, with broad scarious margins; rachis glabrous except for the ciliate edges; glumes and lemmas not definitely awned. Forma ***aristatum*** (Schum.)Holmb. differs in having the glumes and lemmas awned. Forma ***trichorrachis*** Rohlena differs in having the rachis pilose. Forma ***pilosum*** (Scribn.)Fern. has both the glumes and lemmas awned, and also the rachis pilose.

Var. ***subulatum*** (Schreb.)Reichenb. in its typical form has the glumes lanceolate, tapering gradually from near the middle to near the apex; margin narrow or inrolled; rachis glabrous except for the ciliate margins; glumes and lemmas not awned. Its forma ***Vaillantianum*** (Wulf. & Schreb.)Fern. differs in having glumes and lemmas awned. Forma ***heberhachis*** Fern. has the rachis pilose. Forma ***setiferum*** Fern. has awned glumes and lemmas, and pilose rachis.

15. TRITICUM L.

Annual or winter-annual cereal grasses with 2- to 5-flowered spikelets occurring singly at the nodes of the thick

stiff spike; glumes broad, 3-nerved with the mid-nerve placed towards one side; lemmas broad, firm, smooth, awnless or long-awned; hooked auricles present at top of sheath.

1. ***Triticum aestivum*** L. COMMON WHEAT

Cultivated to some extent in the province; also found growing as an escape in farm yards, city dumps, around grain elevators, railroad stations, wharves, etc. (*T. vulgare* Vill., *T. sativum* Lam.)

16. SECALE L.

Annual or winter-annual cereal grasses with 2-flowered spikelets arranged singly at the nodes of the slender somewhat nodding spike; glumes narrow and bristle-like; lemmas broad and ciliate on the keel, long-awned; hook-like auricles sometimes present at top of sheath.

1. ***Secale cereale*** L. COMMON RYE, WINTER RYE

Cultivated, but volunteering in waste places, or in fields the year following cropping.

17. ELYMUS L.

Perennial native grasses with spikelets occurring in pairs at each node of the rachis of the spike; spikelets 2- to 6-flowered; glumes broad, or narrow and awn-like; lemmas pointed or long-awned; hook-like auricles sometimes present at the top of the sheath; ligule short and tough-membranous.

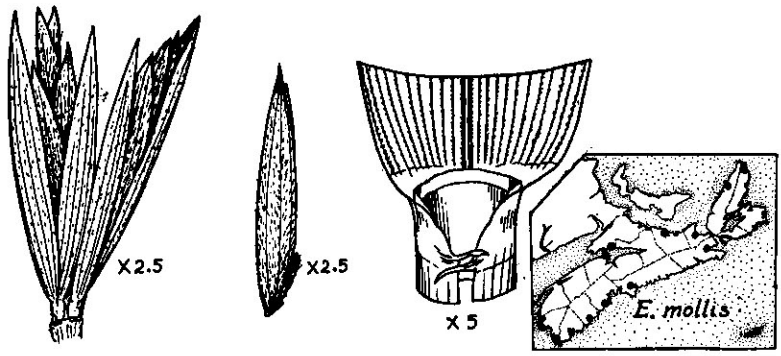
a. Glumes broad, 2 to 4 mm. wide, lanceolate, not thickened or bowed-out at the base; blades broad, coarse and glaucous; culms densely short-pubescent towards the top. Stout plants with tough rhizomes, growing only on sandy or gravelly sea beaches.

1. *E. mollis.*

a. Glumes less than 2 mm. broad, slender, stiff and long-awned, thickened and bowed-out at the base; blades thin and green, well-distributed along the culm; culms glabrous. Slender plants without underground rhizomes.

2. *E. virginicus*

1. ***Elymus mollis*** Trin. AMERICAN DUNE-GRASS



A coarse, broad-leaved grass found on sandy beaches all along the coast. In North America the plant was first called *E. arenarius*, var. *villosus* E. Mey. on account of its close resemblance to the European *E. arenarius* L. The plants are now considered to be specifically distinct, the European plants being glabrous on the culm and glumes, the North American plants soft pubescent (*Rhodora* **17**: 98-103, 1915). The habit of growth and general appearance of *E. mollis* is very similar to American Beach-grass, *Ammophila breviligulata*, which grows in similar situations.

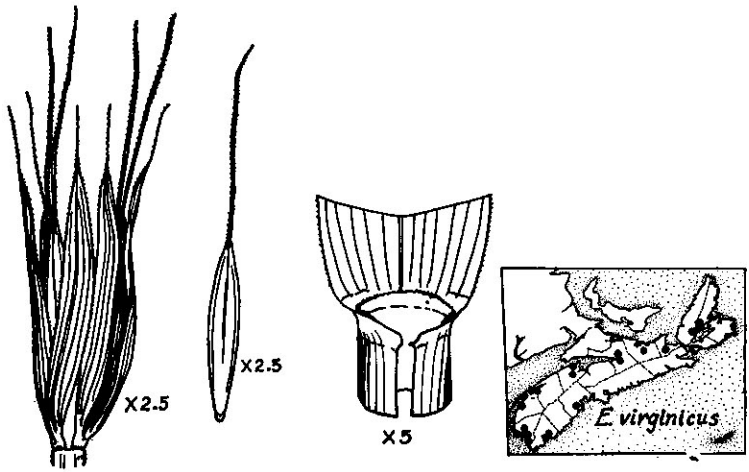
2. ***Elymus virginicus*** L. VIRGINIA WILD RYE, TERRELL-GRASS

A common species showing great variability in the size, of the spikes, their exsertion above the uppermost sheath, the length of the awns and pilosity of the lemmas. Varieties and forms based on such characteristics have been classified differently by Wiegand (*Rhodora* **20**: 82-84, 1918), Fernald (*Rhodora* **35**: 196-198, 1933), and Hitchcock (1935). The sub-specific types likely to be found in the province are as follows:

Var. ***typicus***, with its broad green blades, coarse spikes about 10 cm. long, and glabrous spikelets is found in moist or shaded places in various parts.

Var. ***halophilus*** (Bickn.)Wieg., with slender and generally inrolled blades, culms and spikes more slender, and glabrous lemmas, is known from around estuaries in Yarmouth County.

Var. ***intermedius*** (Vasey)Bush, with spikes and stems much as in var. *typicus* but with the lemmas, glumes and rachis



hirsute: found along Sand Beach, Yarmouth; on the railroad embankment near the shore at Smith's Cove, Digby County; and at Digby. Var. *typicus*, f. *hirsutiglumis* (Scribn.)Fern. and var. *halophilus*, f. *lasiolepis* Fern. (*Rhodora* **35**: 198, 1933) are included here.

Elymus canadensis L.

The occurrence of this species, noted from Pictou (Macoun, 1888), has not been substantiated by specimens nor reported again in the province.

18. HYSTRIX Moench

Spikelets in pairs or rarely in threes at the nodes of the rachis, at maturity spreading horizontally and readily shattering; spikelets 2- to 4-flowered; glumes reduced to short bristles

or obsolete; lemmas tapering into long awns generally 2 to 3 cm. long.

1. ***Hystrix patula*** Moench BOTTLE-BRUSH GRASS

A rare grass of wooded bottomlands. Collections along Five Mile River, Hants County by members of the Gray Herbarium Expedition, and in the valley of the East River at Charcoal, by St. John, are the only specimens taken to date from the province (map, p.218). They belong to var. ***Bigeloviana*** (Fern.)Deam with pilose lemmas (Fernald, M. L. The northern variety of *Asperella Hystrix*, *Rhodora* **24**: 229-231, 1922). (*Asperella Hystrix* (L.)Humb.)

19. HORDEUM L.

Spikelets arranged three at a node, sometimes only the middle spikelet develops, the two lateral and stalked spikelets remaining reduced and abortive; spikelets 1-flowered (central spikelet sometimes 2-flowered in *H. montanense*), with long-awned glumes and lemma; at maturity the rachis breaks up readily into sections, except in the cultivated barley; hook-like auricles present in some species.

a. Body of lemma about 10 mm. long; rachis not breaking up at the joints. Annual cultivated cereal.

1. *H. vulgare*

a. Body of lemma less than 8 mm. long; rachis disarticulating readily at maturity. Slender biennial or perennial grasses.

b. Lateral spikelets abortive and represented by three awns; central spikelet 1-flowered without a prolongation of the rachilla; awns 4 to 8 cm. long.

2. *H. jubatum*

b. Lateral spikelets well-developed; central spikelet 2-flowered, or with a reduced second floret at the tip of the rachilla; awns 1 to 4 cm. long.

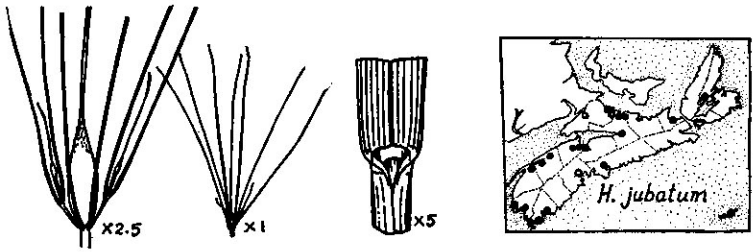
3. *H. montanense*

1. ***Hordeum vulgare*** L. CULTIVATED BARLEY

This common cereal, extensively cultivated in the province, is generally of the 6-rowed type (*H. hexastichon* L.). Two-

rowed barley (*H. distichon* L.) is cultivated sometimes. Found as an annual weed in dumps, waste places, farm yards, etc.

2. ***Hordeum jubatum*** L. FOX-TAIL BARLEY



A well-known weedy grass, easily recognized by its tassel-like spikes of pale green or purplish awns. Common throughout the province in pastures and around farm-yards, but especially abundant along the salt marshes and on the dykes.

3. ***Hordeum montanense*** Beal

A single large colony was located in 1941 by Roland on a dyke by a brookside, Onslow, Colchester County. The plant has probably been introduced here, since its native range is in the prairies.

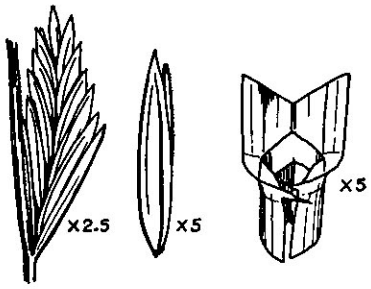
20. LOLIUM L.

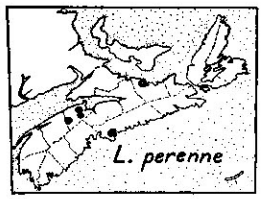
Spikelets arranged singly in a slender spike with the backs of one rank of lemmas next to the rachis, several-flowered; first glume (the one that would be adjacent to the rachis) absent; second glume generally long and exceeding the lower lemma in length; both glumes present in the terminal spikelet of the spike; auricles present; ligule thin-membranous.

1. ***Lolium perenne*** L. PERENNIAL RYE-GRASS

A choice pasture grass in northern Europe, but not as persistent or strongly perennial in America on account of its

susceptibility to winter-killing. It gives rapid growth in the first year and is sometimes used in seeding down pastures to be grazed the same season. It is also used in lawn mixtures





to give a green cover soon after sowing. Found at several places in the province, particularly in new lawns sown to English seed mixtures.

Lolium temulentum L.

Recorded by Ganong (1903, p. 431) as a secondary species in the *Phleum-Agropyron* Association of the dyked marshes. No specimen of this plant has been seen from Nova Scotia.

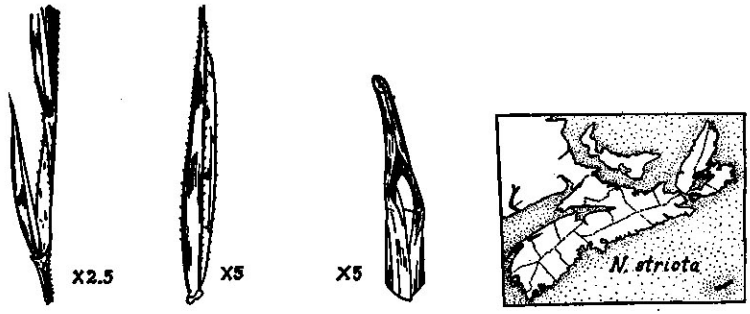
21. NARDUS L.

Coarse tufted perennial with slender involute wire-like leaves; spikelets one-flowered and occurring singly on the axis, twisted sideways to form a slender one-sided spike; glumes wanting, or the upper one merely a reduced scale bordering the niche in which the floret is sessile to the axis.

1. *Nardus stricta* L. MOOR MAT-GRASS

This grass is so coarse that it is unpalatable to animals except in the very early part of the season; and in northern Europe it has become a very extensive pest in sheep-grazing land. In North America the plant is known from a few isolated

stations in Nfld., New Hampshire, New York, Massachusetts and Michigan, where it has undoubtedly been introduced. No published records are available from Canada to date although its presence in southern Quebec (Weedon, Wolfe



Co., J. H. Whyte) has been known since 1936. In Nova Scotia the plant grows in an old pasture at Clyde River, Shelburne County, and probably also at Tusket, Yarmouth County.

Tribe III. AVENEAE

a. Ligule membranous; no tuft of hairs at the top of the sheath

b. Perennial grasses with spikelets less than 12 mm. long.

c. Awns absent; glumes very unequal in width, the second much broader than the first

22. *Sphenopholis* (p. 229)

c. Awns present; glumes essentially of equal width.

d. Panicle contracted, or with the branches ascending; lemmas flattened, with sharply-keeled backs; blades and sheaths finely pubescent.

e. Spikelets generally more than 2-flowered; each lemma with a slender awn.

23. *Trisetum* (p. 230)

e. Spikelets 2-flowered; only the upper lemma awned, with a short, hooked awn.

27. *Holcus* (p. 234)

d. Panicle loosely open, the spikelets on slender branches; blades and sheaths glabrous; spikelets 2-flowered.

f. Florets both perfect, and with awned lemmas; glumes equal in length; spikelets 3.0 to 5.5 mm. long; blades less than 3 mm. wide.

24. *Deschampsia* (p. 231)

f. Florets not alike, the lower staminate and long-awned, the upper perfect and not awned; second glume longer than the first; spikelets 7 to 9 mm. long; blades 5 to 10 mm. wide.

26. *Arrhenatherum* (p. 234)

b. Annual cultivated grasses with large spikelets more than 12 mm. long; lemmas awned or awnless.

25. *Avena* (p. 233)

a. Ligule a row of fine hairs; tufts of hairs present at the top of the sheath.

g. Lemma with a twisted awn arising from between the two sharp teeth.

28. *Danthonia* (p. 235)

g. Lemma awnless, with three small teeth at the apex.

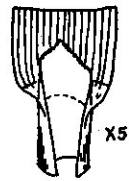
29. *Sieglingia* (p. 237)

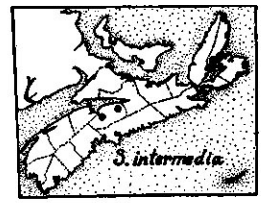
22. SPHENOPHOLIS Scribn.

Slender grasses with nodding, more or less contracted panicles of small shining spikelets; panicle branches spikelet-bearing from the base; spikelets generally 2-flowered, falling away entire due to the articulation below the glumes; leaf-blades flat, 2 to 6 mm. wide, mostly glabrous.

1. ***Sphenopholis intermedia*** (Rydb.) Rydb.

SLENDER WEDGE-GRASS





First reported by Fernald in 1921 as *S. pallens* (Spreng.) Scribn., the name then erroneously ascribed to this grass.

True *S. pallens* is now known to be an awned form restricted to rare occurrences in South Carolina and Virginia; while all the Nova Scotian plants belong to the transcontinental *S. intermedia.* This has been collected at but five separate sites in the province, in every case growing on cliff-faces or in gravel situations where its roots were in contact with limestone or gypsum. Nfld. to British Columbia, south to Florida.

23. TRISETUM Pers.

Tufted perennial grasses with the spikelets 2- to 5-flowered in dense to merely contracted panicles; glumes about equal in width, the upper one nearly as long as the first lemma, longer than any floret; lemmas awned from the back, sharply keeled, with two slender teeth at the apex; rachilla and generally the callus of the lemma with short hairs; sheaths rather hairy.

a. Panicle dense and spike-like; spikelets generally greenish; awns nearly straight, not twisted.

b. Glumes glabrous except for the ciliolate keels.

1. *T. spicatum*, var. *molle*

b. Glumes pubescent.

1a. *T. spicatum*, var. *pilosiglume*

a. Panicle looser and somewhat open; spikelets tinged with brown or purple; awns long and strongly twisted.

2. *T. flavescens*

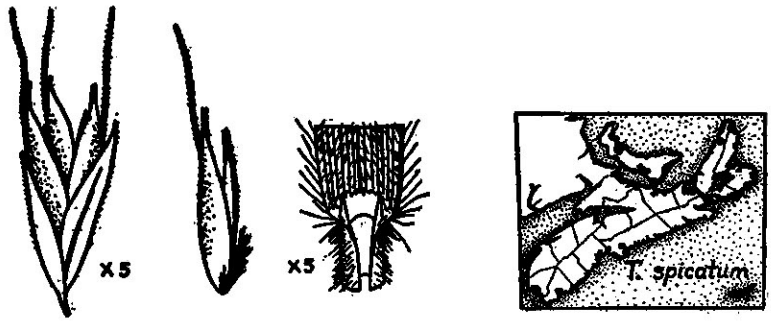
1. ***Trisetum spicatum*** (L.) Richter SPIKE TRISETUM

Two varieties of this species have been found in the province only at the northern tip of Cape Breton Island.

Var. ***molle*** (Michx.) Beal, which is generally distributed across Arctic and temperate North America, is found along the Cheticamp River.

Var. ***pilosiglume*** Fern. (*Rhodora* **18**: 195-198, 1916) has affinities with the flora of regions to the north of N. S., of

Newfoundland, Gaspé, and certain high mountains of Maine and New Hampshire. Found along the Cheticamp River



and scattered on rocky outcrops along some of the streams of Bay St. Lawrence.

2. ***Trisetum flavescens*** (L.) Beauv. GOLDEN OAT-GRASS

An introduced forage grass found persisting in old pastures in the town of Meteghan, Digby County.

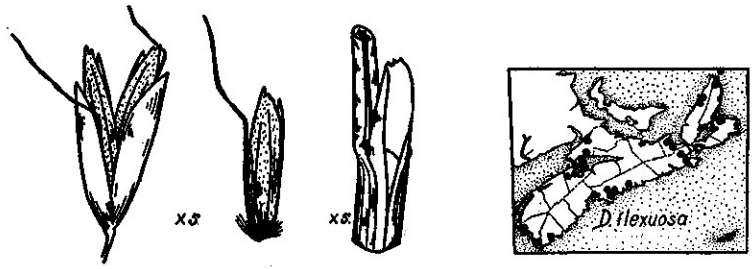
24. DESCHAMPSIA Beauv.

Narrow-leaved perennials, with open panicle of widely-spreading delicate branches; spikelets 2-flowered; glumes broad, acute and about equal in size; lemmas toothed at the apex, with a slender awn arising from near the base; callus of the lemma, and the rachilla with straight hairs; ligule membranous; foliage glabrous.

a. Leaves filiform, involute, less than 1 mm. in diameter; awns twisted, extending well beyond the glumes; lemmas and sheaths scabrous.
1. *D. flexuosa*

a. Leaves flat or folded, 1 to 3 mm. broad; awns straight, not much longer than the lemmas, not conspicuously exserted; lemmas and sheaths glabrous.
2. *D. caespitosa*

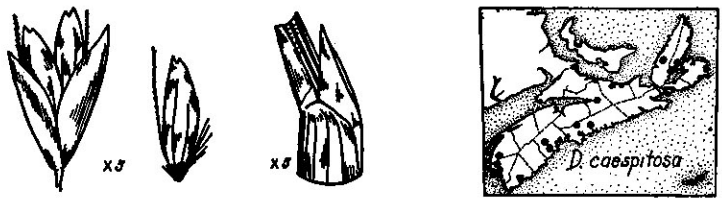
1. ***Deschampsia flexuosa*** (L.) Trin. CRINKLED HAIR-GRASS



Common throughout the province, in dry barren soils, such as on the tops of exposed granitic hills, on sandy plains in Kings and Annapolis Counties, sea-cliffs, and barren headlands. It is readily recognized in the field by its basal tuft of very fine leaves, and the shining silver and purplish spikelets at the tips of the very fine, spreading panicle-branches.

A northern variation of this plant (var. *montana*) with slightly larger spikelets has been reported (Perry, 1931) from St. Paul Island off the tip of Cape Breton. This variation, however, does not seem to be distinct. Both our species of *Deschampsia* exhibit great variation in their stature, size and shape of leaves, panicles, spikelets, etc., and are decidedly polymorphous. Greenland to Alaska southward; Eurasia.

2. ***Deschampsia caespitosa*** (L.) Beauv. TUFTED HAIR-GRASS



A taller species than the preceding, up to 7.5 dm. high, with the slender branches of the large open panicle tipped with purplish, silvery, shining spikelets, 3.5 to 5.0 mm. long.

The common variety in Nova Scotia is var. ***glauca*** (Hartm.) Lindm. (*Rhodora* **28**: 152, 1926), smaller in height and in size of spikelets, leaves, ligules, etc., than the typical European plants on which the species description was based.

Rather rare in the province, growing on riverbanks in moist rocky soil, on lake shores, and in damp soil in various places from Yarmouth to Cape Breton. Greenland to Alaska southward.

25. AVENA L.

Annual grasses with broad leaves and large spreading panicle; spikelets large, 2- or 3-flowered, usually pendulous; lemmas awnless or with a large twisted and geniculate awn inserted about the middle of the back, hard and tough and enclosing the grain; rachilla, and sometimes the back of the lemma, hairy; auricles absent; ligule membranous, long and whitish.

a. Lemmas glabrous; awns entirely absent, or, if present, not twisted or twisted but a few times at the base; florets not readily separating from the spikelet nor from each other.

1. *A. sativa*

a. Lemmas with long, slender and twisted hairs on the back, and a ring of stiff, brown, bristle-like hairs from around the callus; awns strong and stiff, the lower part twisted and extending beyond the tip of the lemma, upper part about twice as long as the lower part; florets readily separating from the spikelet.

2. *A. fatua*

1. *Avena sativa* L. CULTIVATED OAT

A common cereal plant grown extensively in the province for grain or for green fodder; frequently found as an escape.

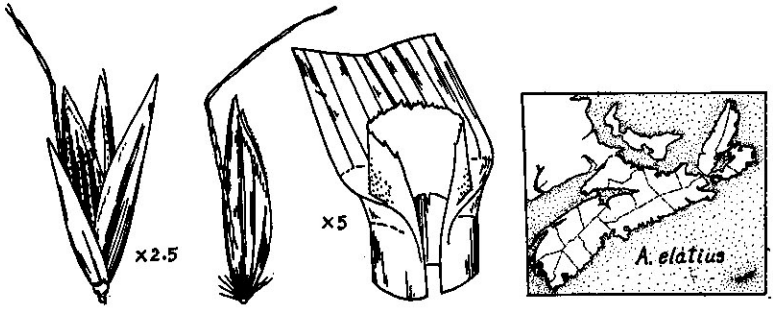
2. *Avena fatua* L. WILD OAT

Very similar to the cultivated oat in appearance. Sometimes found as a weed in fields of cultivated oats, arising from impurities in seed, or in waste places around farms or towns.

26. ARRHENATHERUM Beauv.

Tall perennial grass with slender open panicle; spikelets 2-flowered, the lower floret with stamens only and bearing a long twisted and geniculate awn from the back of the lemma near its base, the upper being perfect and producing a grain, almost awnless; upper glume longer than the lower and equalling the spikelet in length; lemma with stiff hairs on the callus; ligule long and membranous.

1. ***Arrhenatherum elatius*** (L.) Presl. TALL OAT-GRASS

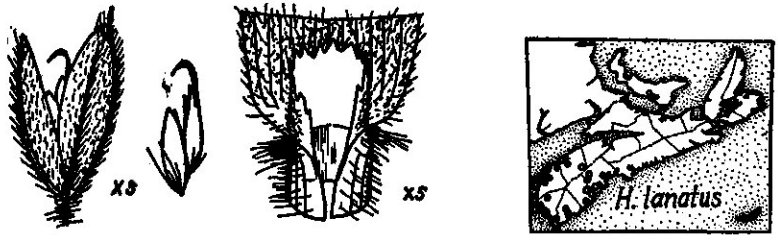


A valuable forage grass for hay crops on heavy land, but not commonly used for this purpose in the province. It was found in 1940 well established around the edges of a field at an Illustration Farm in Yarmouth County. Introduced from Europe, and escaped from cultivation.

27. HOLCUS L.

Velvety pubescent, perennial grass with contracted dense panicles of whitish, pink or purplish spikelets; spikelets falling away entire at maturity, 2-flowered, the lower floret with both stamens and ovulary, the upper with stamens only; glumes broad and enclosing the whole spikelet; lemmas firm and smooth, the lower awnless, the upper with a short, sharp, hooked awn. (*Nothoholcus* Nash)

1. ***Holcus lanatus*** L. VELVET-GRASS, YORKSHIRE FOG



A conspicuous and readily recognized grass on account of its striking pale or purplish appearance and soft felted pubescence. The production of inflorescences shows no marked periodicity; and in mid-season, panicles in all stages of development may be found on the same plant.

One of the most abundant grasses throughout Shelburne, Yarmouth and Digby Counties in meadows, pastures, roadsides and waste places. On some farms this is considered to be a valuable forage species, and passes under various erroneous names, of which Orchard Grass is the commonest. In Europe the grass is not classed as a highly palatable species on account of its fuzziness. Although the grass has been thoroughly established and has grown throughout south-western Nova Scotia for a long time, it has not spread to the eastern parts of the province.

Numerous varieties have been proposed by European workers based on the colour and pubescence of the various parts, but these do not seem important enough in our material to warrant separate recognition. Introduced from Europe; also abundant in southern coastal British Columbia, but not well established elsewhere in Canada.

28. DANTHONIA Lam. & DC.

Tufted perennial grasses with compact or spreading panicles composed of few spikelets on stiff branches; spikelets 3- to 8-flowered, enclosed by the glumes which persist on

the branches after the shedding of the florets; lemmas firm, rounded on the back, sharply 2-toothed at the apex and bearing a long twisted awn from the back between the teeth, sparsely pilose on the back and with short straight hairs from the callus.

a. Basal leaf-blades usually less than 15 cm. long, curled when dead and dry; ligule a row of short hairs less than 1 mm. long at the center, but 2 to 3 mm. long at the edges; sheaths, at least the lower ones, spreading-pilose; blades with sparse pilose hairs, rarely glabrous on both sides; teeth of the lemma sharply acute but without long slender points, generally less than 2 mm. long; branches of the panicle ascending, excepting during anthesis, giving a spike-like appearance.

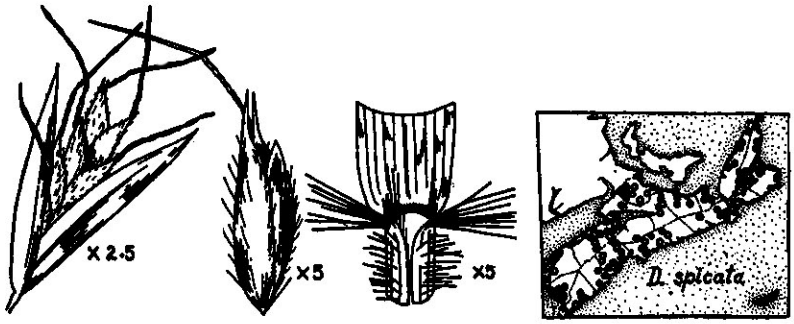
1. *D. spicata*

a. Basal leaf-blades 15 to 50 cm., averaging 30 cm. long, not curling greatly when dead and dry; ligule of long silky hairs, 3 to 6 mm. long; sheaths, except for the tuft of hairs at the throat, and blades glabrous; teeth of the lemma slender and awn-like, membranous, sometimes slightly twisted, 2 mm. or longer; lower branches of the panicle spreading, and generally reflexed during and after anthesis.

2. *D. compressa*

1. ***Danthonia spicata*** (L.) Beauv.

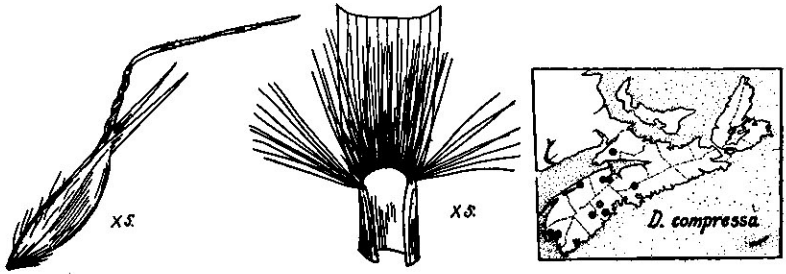
POVERTY-GRASS, WIRE-GRASS, WILD OAT-GRASS



One of our most abundant grasses, found everywhere on poor or sterile soil. Depleted pastures have a matted covering of this species, worthless for grazing. The curled basal leaves persist from year to year, and make a tuft of coarse dry material that pulls up readily by the roots and is decidedly unpalat-

able to stock. The plant is readily replaced by better grasses when pasture improvement is carried out; but it quickly becomes dominant again as soon as the land is neglected. It shows considerable variation in stature, pubescence of leaves, and other characters; and is probably reproduced mainly by the closed-fertilized grains that are borne inside the sheaths, especially at the base of the culms. Nfld. to British Columbia, south to Florida.

2. ***Danthonia compressa*** Austin FLATTENED WILD OAT-GRASS



Rather rare in the province, found in thickets, borders of woods, along woodland paths, generally in moister soils than the preceding, and often difficult to distinguish from luxuriant specimens of it. N. S. to Quebec, south to North Carolina.

A stout erect plant, with a narrow spike-like panicle, possibly an autumnal phase of *D. compressa*, has been named *Danthonia Faxoni* Austin. Its status is still debatable. Common in southeastern Canada and the eastern States; collected on a Bay of Fundy headland, Central Grove, Digby County.

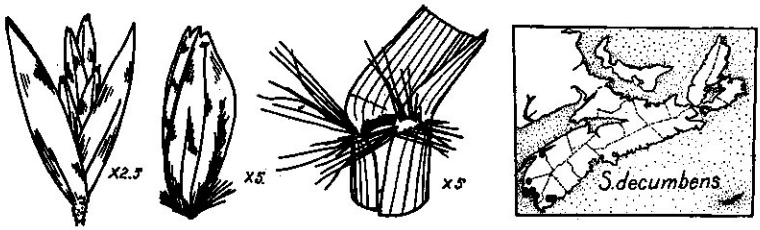
29. SIEGLINGIA Bernh.

Low, perennial, tufted grass with contracted panicles and few spikelets; culms often spreading; leaf-blades 2 to 3 mm. wide, gradually tapering to the tip; spikelets 3- to 5-flowered, enclosed by the glumes; lemmas awnless, rounded

on the back, 3-toothed at the summit, with marginal and callus hairs.

1. ***Sieglingia decumbens*** (L.) Bernh.

MOUNTAIN HEATH-GRASS HEATHER-GRASS



Rather common in old pastures, peaty swales, and moist soils in Yarmouth and Shelburne Counties; found also at Digby. A common species of the upland heaths in Europe. Has been considered native, but is undoubtedly introduced from Europe. Nfld. and N. S. (*Triodia decumbens* Beauv.)

Closely related to *Danthonia* which it resembles in many vegetative and reproductive characters. It bears basal cleistogamous flowers in the same way, and crosses with some species of that genus (Beddows, A. R., *Ann. Bot.* **XLV**: 443-451, 1931).

Tribe IV. **AGROSTIDEAE**

a. Lemma as thin or thinner than the glumes; spikelets laterally compressed or subterete.

b. Spikelets, exclusive of the awns, 1 to 7 mm. long.

c. Inflorescence an open or contracted panicle, if very contracted and spike-like, more or less interrupted.

d. Spikelet disarticulating above the glumes, the empty glumes remaining on the branches after maturity; floret (not spikelet) not stalked; palea 2-nerved; stamens 3.

e. Callus of floret with a tuft of fine hairs at least one-fourth as long as the lemma; rachilla hairy, prolonged behind the palea; second glume 3-nerved.

30. *Calamagrostis* (p. 240)

e. Callus of floret glabrous or with very short hairs; rachilla not prolonged; second glume 1-nerved.

f. Perennials; blades glabrous; ligule membranous.

g. Rhizomes not short and scaly (underground rhizomes, or long leafy stolons may be present); glumes equal or longer than the lemma, not awn-tipped; lemma awnless or awned from the back.

32. *Agrostis* (p. 243)

g. Rhizomes short, shallow, branching, scaly and knotty (absent in *M. uniflora*); body of glumes shorter than the lemma, the long-awned tip, if present, surpassing the lemma.

36. *Muhlenbergia* (p. 254)

f. Annuals; margin of blade long-ciliate; ligule a row of short hairs.

37. *Sporobolus* (p. 256)

d. Spikelet disarticulating below the glumes, falling away entire; floret short-stalked; palea appearing 1-nerved; stamen 1.

33. *Cinna* (p. 250)

c. Inflorescence a dense, cylindrical spike-like panicle with the spikelets on very short stalks.

h. Inflorescence soft to the touch; glumes not long-pointed; lemmas awned from the back, the awns often conspicuous.

34. *Alopecurus* (p. 251)

h. Inflorescence harsh to the touch; glumes long-pointed; lemmas awnless.

35. *Phleum* (p. 254)

b. Spikelets, exclusive of the awns, 8 mm. or more long.

i. Lemma awnless or very short-awned; glumes as long as the lemma; panicle densely-flowered and spike-like; sandy sea-shores and dunes.

31. *Ammophila* (p. 242)

i. Lemma tapering into a long awn; glumes minute or wanting; panicle lax with a few early-deciduous spikelets; damp woodlands.

38. *Brachyleytrum* (p. 257)

a. Lemmas thicker and firmer than the glumes, hard and shining, firmly enclosing the palea and grain; spikelets dorsally compressed or terete.

j. Lemma awnless, glabrous, smooth; spikelets dorsally compressed; culms tall, in patches from spreading rhizomes.

39. *Milium* (p. 258)

j. Lemma awned but the awn deciduous, pubescent at the base and generally over much of the back; spikelet almost terete; culms tufted, with fibrous roots.

40. *Oryzopsis* (p. 258)

30. CALAMAGROSTIS Adans.

Tall perennial grasses with many spikelets in the panicle; spikelets 1-flowered; rachilla prolonged above the floret and bearing hairs; lemma with an awn arising from the mid-rib well below the apex; callus of lemma with a tuft of hairs; ligule long and membranous.

a. Awn straight; callus hairs abundant and about as long as the lemma; lemma thin and transparent.

b. Panicle loose and open, particularly at flowering time.

1. *C. canadensis*

b. Panicle more or less contracted.

c. Blades flat, rather lax; spikelets 6 to 7 mm. long; hairs on the rachilla at the top only.

2. *C. cinnoides*

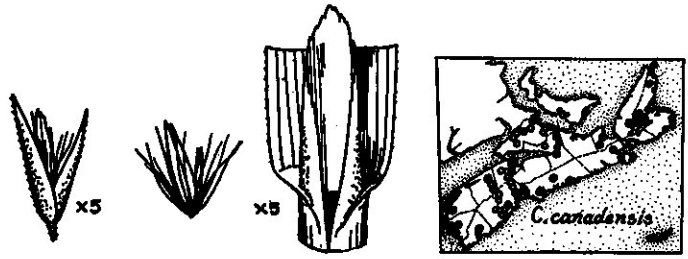
c. Blades involute, or, if flat, rigid and becoming involute; spikelets 3 to 4 mm. long; rachilla with hairs all along its length.

3. *C. neglecta*

a. Awn slightly twisted, curved so that the tip sticks out from between the glumes; callus hairs scant and short; lemma firm and scabrous.

4. *C. Pickeringii*

1. *Calamagrostis canadensis* (Michx.) Nutt. BLUE-JOINT



A common grass of ditches, swales and fresh-water marshes throughout the province. The size of the spikelets has been taken as the basis for the segregation of several varieties but this variation does not seem to be discontinuous and is not correlated with other morphological characteristics. There is, moreover, some disagreement as to the limits of each variety among the authors of the following papers: Inman, O. L., *Calamagrostis candensis* and related species. *Rhodora* **24**: 142-144, 1922. Stebbins, G. L., A revision of some North American species of *Calamagrostis*. *Rhodora* **32**: 35-57, 1930. Muenscher, W. C. and R. T. Clausen, in Notes on the Flora of Northern New York. *Rhodora* **36**: 406, 1934. It seems best to consider the varieties as intergrading components of a highly polymorphous species.

Var. ***typica*** spikelets 2.8 to 3.8 mm. long. Common in the province, many of the plants having spikelets ranging from 3.5 to 4.0 mm. long within the same panicle and grading into the next.

Var. ***robusta*** Vasey: spikelets 3.5 to 4.5 mm. long. Common throughout. Specimens named var. *Langsdorfii* Trin., collected at Whycocomagh by Macoun in 1883 and at Boylston by Hamilton in 1890 are found to fall under var. *robusta*. True C. *Langsdorfii*, as now understood, is confined to sub-arctic regions and is not found in N. S. Specimens which might be classed definitely as var. *scabra* (Presl)Hitchc. (*Amer. Jour. Bot.* **21**: 135, 1934), with spikelets 4.5 to 6.0 mm. long and scabrous glumes, have not been found in the province.

2. ***Calamagrostis cinnoides*** (Muhl.) Barton

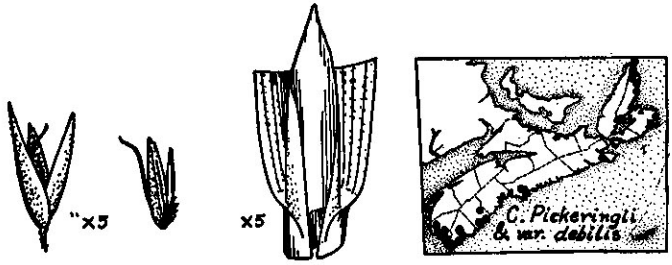
There is but one report in the literature (Stebbins, l. c.) of a collection of this species: at Halifax, by Lunt, 1912. (*C. coarctata* Torr.). N. S. and Maine, southward.

3. ***Calamagrostis neglecta*** (Ehrh.) Gaertn., Meyer & Scherb.

Collected only in the vicinity of Amherst in bogs, but reported as becoming common northward into eastern New

Brunswick, P. E. I. and Magdalen Islands (Fernald, 1921, p. 230).

4. ***Calamagrostis Pickeringii*** Gray



Since the publication in Macoun's Catalogue (1888) of, "the only known station for the species in Canada is in the wet meadows surrounding Louisburg, C. B., 1883," the plant has been found at numerous additional stations at widely separated points in the province, mainly along the Atlantic sea-coast regions. Found in bogs, boggy barrens, swales, and heathy meadows in the highlands.

Var. ***debilis*** (Kearney)Fern. & Wieg. has shorter spikelets (2.8 to 3.6 mm. long) than has the typical species (4.0 to 5.0 mm.); much more common in similar habitats in the Atlantic tier of counties from Yarmouth to Cape North.

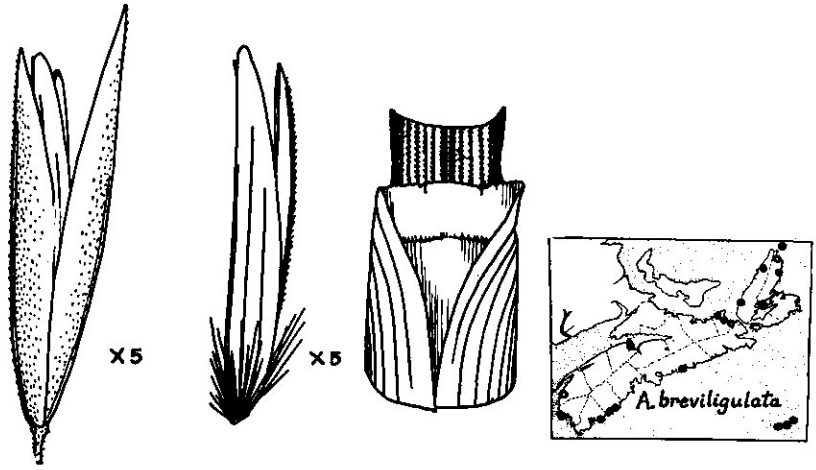
31. AMMOPHILA Host

Coarse perennials with scaly rhizomes and dense spike-like, pale-colored panicles 20 to 40 cm. long; spikelets one-flowered, compressed, about 1 cm. long; lemmas glabrous except for the dense tuft of short straight hairs from the callus.

1. ***Ammophila breviligulata*** Fern. AMERICAN BEACH-GRASS

A coarse grass 2 to 5 feet high, with the blades tough, tapering to a long point, and readily becoming involute. Common around the shores of the province wherever sandy beaches or

low dunes occur; frequently growing with the two other similar rhizomatous grasses, *Elymus mollis* and *Agropyron repens*.



It is said that the wild ponies on Sable Island subsist throughout the year mainly on this grass (St. John, 1921).

This grass is considered to be distinct from the European *A. arenaria* (L.) Link because of its shorter ligule and shorter callus hairs (Fernald, M. L. *Rhodora* **22**: 71, 1920). Along the coast from Nfld. to North Carolina, and around the Great Lakes.

32. AGROSTIS L.

Perennial grasses spreading extensively by rhizomes or stolons, but sometimes tufted; spikelets one-flowered; glumes almost equal, keeled, longer than the floret; lemmas thin-membranous, glabrous or sometimes minutely scabrous, or with minute hairs arising at the sides of the callus; palea membranous, 2-nerved, half the length of the lemma, or shorter, or absent. Malte, M. O., The commercial bent grasses (*Agrostis*) in Canada. *Nat. Mus. Can. Bull.* 50, *Ann. Rpt.* 1926: 105-126, 1928. Philipson, W. R., A revision of the

British species of the genus *Agrostis* Linn. *Linn. Soc. Journ. Bot.* **LI**: 73-151, 1937.

a. Palea obsolete or absent; panicle-branches slender or capillary; rhizomes absent.

b. Panicle diffuse, the capillary branches re-branching at or above the middle.

1. *A. scabra*

b. Panicle not diffuse, or the branches re-branching below the middle.

c. Panicle somewhat lax; several culm-leaves present; lemmas awnless, or rarely with a straight short awn; culms upright from the base; stolons absent.

2. *A. perennans*

c. Panicle branches more rigidly spreading; leaves mainly in a basal tuft; lemmas with a twisted geniculate, but sometimes straight and short, awn; stolons and basal decumbent part of the culm rooting at the nodes.

3. *A. canina*

a. Palea at least one-third as long as the lemma; panicle-branches more rigid; rhizomes or stolons present.

d. Ligule longer than broad, generally 2 to 4 mm. long on the lower leaves, frequently whitish and translucent, membranous, rounded or pointed at the apex; spikelets on short branchlets, numerous towards the axis of the panicle, the branchlets appressed or ascending after anthesis.

4. *A. stolonifera*

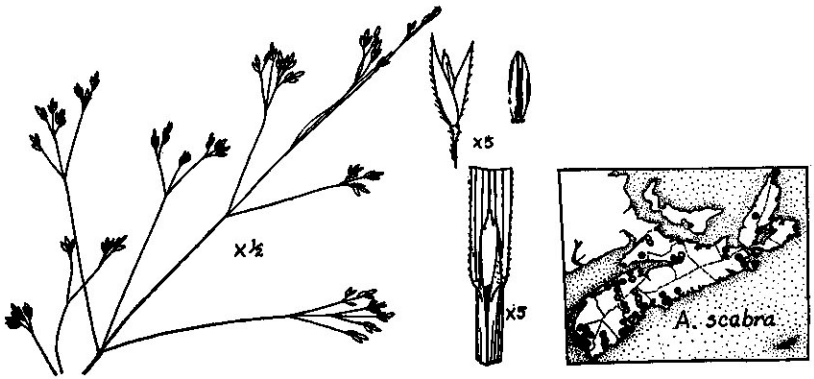
d. Ligule broader than long, generally 0.5 to 1.0 mm. long on the lower leaves, transparent, brownish or somewhat hyaline, truncate; spikelets not more crowded at the base of the branches, the branches divaricate-spreading after anthesis.

5. *A. tenuis*

1. *Agrostis scabra* Willd. TICKLE-GRASS, HAIR-GRASS

The uncertain distinctness of this grass and its relationship to other species has resulted in great confusion in the past records. The species was shown by Fernald (*Rhodora* **35**: 208, 1933) to be distinct from *A. hiemalis* (Walt.) B.S.P., which

does not range as far north as Nova Scotia, but with which our plants were classified for a long time. The following varieties



and forms are common, or may be expected to occur in the province.

The ***typical*** variety has spikelets 2.0 to 3.0 mm. and lemmas 1.3 to 2.0 mm. long. This is a weedy plant common throughout the province in a variety of soils, but particularly in places that have been laid bare by cultivation, burning, flooding, etc. Forma ***Tuckermani*** Fern., with awned lemmas, is said to occur rarely throughout the range of the typical awnless plants from Nfld to New England, but most of the Nova Scotian specimens at hand show the lemmas awnless.

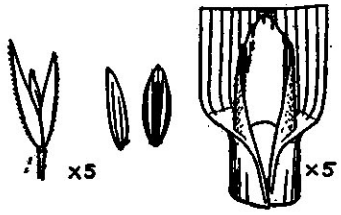
Var. ***septentrionalis*** Fern. has spikelets 3.2 to 4.3 mm. long with the lemmas 2.0 to 2.5 mm. long. Found at many places in the province, especially in the southern and southwestern areas. This has been confused with the southern coastal-plain *A. elata* and reported under the name *A. hiemalis* var. *elata* (Fernald, 1921). Forma ***setigera*** Fern., with awned lemmas, is reported from St. Paul Island, Canso and Markland (*Rhodora* **35**: 210, 1933).

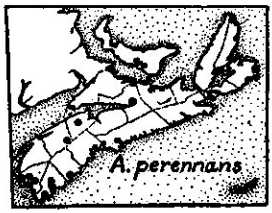
Var. ***geminata*** (Trin.) Swallen (*Proc. Biol. Soc. Wash.* **54**: 45, 1941) has the mature panicles much smaller and more regularly ovoid than has typical *A. scabra*, forming one-sixth to rarely one-half the length of the plant, their branches

stiffer and shorter and scarcely swollen at the base. This variety, which is typically awned, is also found with awnless lemmas (*A. geminata*, f. *exaristata* Fern. *Rhodora* **35**: 211, 1933). It may range into Nova Scotia, but is not definitely known.

2. ***Agrostis perennans*** (Walt.) Tuckerm.

AUTUMN BENT-GRASS, THIN-GRASS



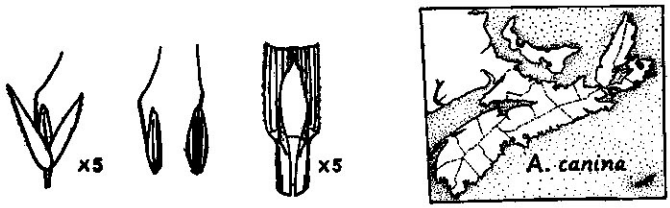


Not as abundant as the preceding species, but probably common throughout in woodlands, thickets, moist roadsides, lake margins and along the banks of streams. Considerable variation occurs, the typical plant having smaller panicles with appressed-ascending branches and spikelets on short pedicels, many shorter than the spikelets. Our plants seem to resemble more closely the woodland variety with a more diffuse panicle and spikelets on longer, more divergent pedicels, which has been named var. ***aestivalis*** Vasey (*A. Schweinitzii* Trin.). Awned plants of both varieties have been given formal names (*Rhodora* **35**: 317, 1933), but these have not been seen from the province. N. S. to Minnesota, south to Florida.

3. ***Agrostis canina*** L. VELVET BENT-GRASS

Rare in the wild state and known only from Sydney, Louisburg and Forchu in Cape Breton, where it is well established and undoubtedly introduced from Europe. Some consider it indigenous in Newfoundland (*Rhodora* **28**: 161, 1926). On account of its dense growth of fine, bright-green

basal leaves, it has excellent turf-making qualities. Certain strains are used extensively for golf greens and may be found throughout the province in these special situations. Such



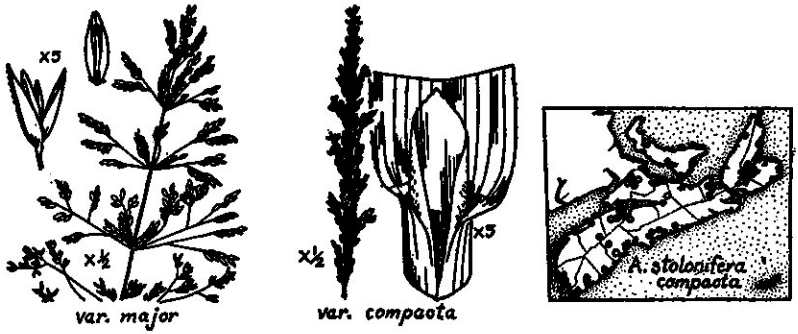
strains, selected for active vegetative growth, are poor seed-setters and are propagated by stolons which root readily at the nodes.

All of our plants are probably the variety *fascicularis* (Curtis) Sinclair according to the treatment of Philipson. The plants with clusters of short leaves arising from the nodes of the stolons have been described by Rousseau (*Contrib. Univ. Montr.* 32: 17, 56, 1938) as forma *fasciculata* of the species based on plants from Forchu. This is undoubtedly an autumnal phase of the above variety. Plants that have the lemmas awnless, or occasionally with a short awn in some of the spikelets, have been collected at Louisburg, growing with the typically long-awned plants. This is probably the same as var. *mutica* Gaud., referred to by Malte as collected by Fernald and Wiegand in Newfoundland. At best it should be another form of var. *fascicularis*. Philipson places var. *mutica* among his "minor variations" which have something less than varietal rank.

4. *Agrostis stolonifera* L.

The plants typical of this species are rather obscure and of uncertain definition. It is best known by two markedly different varieties which represent the extremes in variation in a large series of intergrading types, and which are treated

by some workers as distinct species. The excellent study made by Dr. M. O. Malte is followed here.



Var. ***major*** (Gaud.) Farw. RED-TOP

In this the panicles are open during and after anthesis; rhizomes present. Not nearly as common as var. *compacta*, but found along roadsides and in waste lots, or persisting for a short while after sowing in well-drained soil, particularly in the Annapolis Valley. It does not grow abundantly, however, as it does in Quebec and Ontario and in the northeastern States. A valuable hay and pasture species. (*A. alba* L. in Hitchcock's Manual, *A. gigantea* Roth according to Philipson)

Var. ***compacta*** Hartm. CREEPING BENT-GRASS

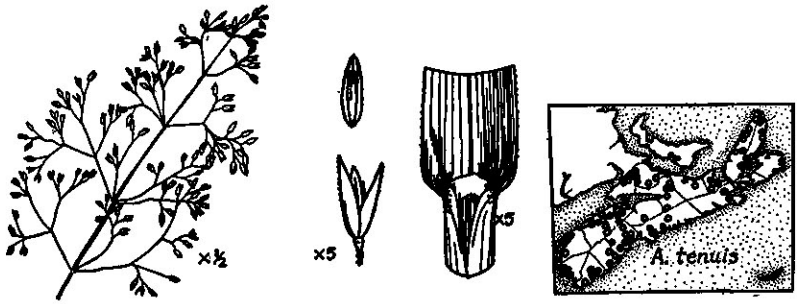
Panicles open only during anthesis, the shorter branches becoming erect and appressed into a compact panicle at maturity; stolons, spreading extensively on the surface, present.

Common in moist fields and pastures, in ditches, on the upper part of salt and brackish marshes, as well as in freshwater marshes and swales; also found along the margins of pools and streams, the stolons sometimes growing out into the water. The plant provides some forage for stock. It may become a valuable component of lawns and perhaps greens.

(*A. palustris* Huds. in part; *A. stolonifera* L., vars. *stolonifera* (L.)Koch and *palustris* (Huds.)Farw.)

This plant shows great variation in its habit of growth, length of stolons, form of panicle, colour of the spikelets, and other characteristics. On exposed sand and gravel-flats along the sea-shore somewhat dwarfed plants with broad and short (about 1.8 mm. long) glumes and short leaves with purplish sheaths, classed by Philipson as "ecas" *arenaria* (Jenson & Wachter)Philipson, have been found at Clam Harbour, Port Mouton, Iona, Cheticamp, and Yarmouth. (*A. maritima* Lam., *A. coarctata* Ehrh).

5. ***Agrostis tenuis*** Sibth. BROWN-TOP, COLONIAL BENT-GRASS, P.E.I. BENT-GRASS, RHODE ISLAND BENT-GRASS



The most abundant and important grass species in the province, making up the majority of the cover in pastures, meadows and lawns. It is a plant naturally suited to maritime and cool humid climates and found in such regions in various parts of the world: in the upland pastures and fields in Britain and northern Europe, in New Zealand, in the north-eastern States and the Maritime Provinces. Going westward in Canada it tends to run out in Quebec in the lowlands about Quebec city and in the uplands about the Champlain valley; in Ontario it does not persist well, even after seeding, but on south-eastern Vancouver Island it again becomes abundant.

All our plants are var. *hispida* (Willd.)Philipson, according to a recent treatment (Philipson, p. 86).

Forma ***aristata*** (Parnell)Wieg., with most of the lemmas awned, has been found at Purcell's Cove, Halifax (Howe & Lang) and at Lawrencetown, Halifax County by M. S. Brown. This is var. *aristata* (Hartm.)Holmb. in Malte's treatment.

Plants with enlarged floral parts due to infection with the nematode *Anguillina agrostis* are abundantly found in Yarmouth, Annapolis and Kings Counties. In the past, these diseased plants have been given a separate varietal name, var. *sylvatica* (Huds.)With. (Philipson, W. R., *Jour. Bot.* **LXXIII**: 65-74, 1935).

The distinctions between Brown-top (*A. tenuis*) and Red-top (*A. stolonifera*, var. *major*) have not always been clear to field workers. Although the spikelets and some general features are similar in the two plants, there are several very striking differences. The panicle of Brown-top is smaller, looser and more open, with the fewer spikelets placed nearer the ends of the widely divergent branchlets. The shape and length of the ligules, as given in the key, are the best characteristics to separate plants in the vegetative condition; but the narrower, brighter-green and somewhat shiney-backed blades of Brown-top are also distinctive. The rhizomes of Brown-top lack the extensive underground creeping habit, and consequently the sod formed is denser and firmer than that of Red-top. The difference in colour of flowering panicles is not as striking as the names of the plants would suggest, but the general flowering periods are quite separate, Red-top coming into bloom much earlier.

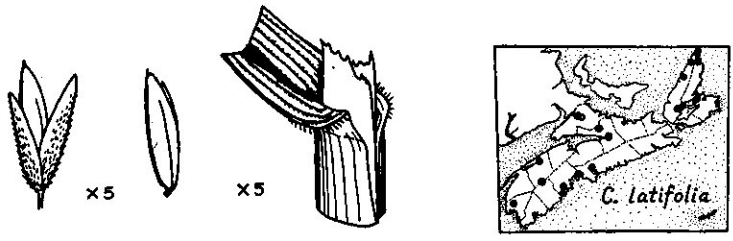
A hybrid between a variety of *A. stolonifera* and *A. tenuis*, testified by Malte, has been collected at St. Paul Island by Perry and Roscoe, 1929.

33. CINNA L.

Perennials up to 5 feet high, growing singly or few in a tuft, with wide leaves and large, generally nodding, panicles;

spikelets one-flowered with sharply keeled scabrous glumes; lemma stipitate, with a very short awn from just below the apex; nerves of the palea appearing as one; stamen one.

1. ***Cinna latifolia*** (Trev.) Griseb. DROOPING WOOD-REED



Scattered to common in wet woods, well-drained swamps, and along alluvial ground throughout. Nfld. to Alaska, south to Connecticut.

Cinna arundinacea L. reported from near Bedford, Halifax Co., in Lindsay's Catalogue and repeated by Macoun, is not represented in any of the herbaria visited. A sheet labelled "*Cinna*, Lily Lake, Bedford, June 29, '72" in Lindsay's collection at the Provincial Museum is *Dulichium arundinaceum.*

34. ALOPECURUS L.

Perennials with densely-flowered spike-like panicles very similar to *Phleum*, but differing in being softer and by having conspicuous awns. Spikelets broad and flat; glumes long-pubescent, particularly on the keel, and generally joined together towards the base; lemma shorter or about the same length as the glumes and awned on the back; palea wanting; leaves with membranous ligules and inflated upper sheaths.

a. Panicle large, 7 to 10 mm. thick; spikelets about 5 mm. long; awns long and conspicuous

1. *A. pratensis*

a. Panicle smaller, 2 to 6 mm. thick; spikelets 2 to 3.5 mm. long.

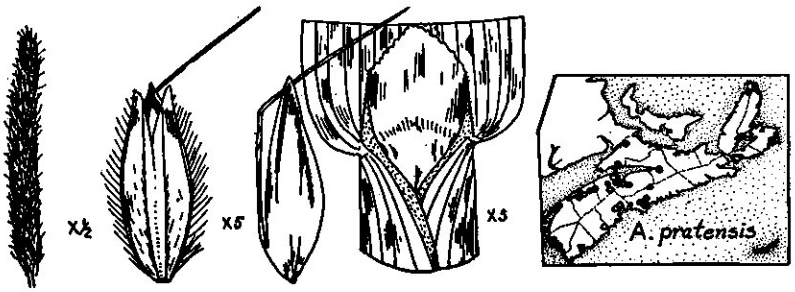
b. Awns arising from near the middle of the lemma, barely extending beyond the glumes.

2. *A. aequalis*

b. Awns arising from near the base of the lemmas, extending 2 to 3 mm. beyond the glumes.

3. *A. geniculatus*

1. *Alopecurus pratensis* L. MEADOW FOX-TAIL



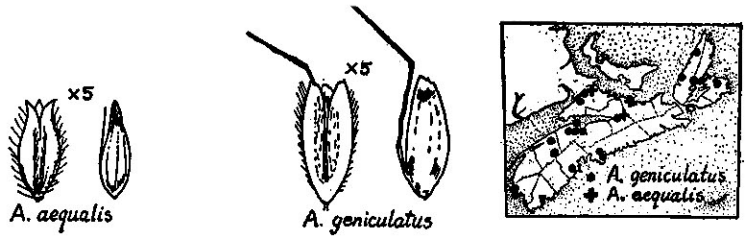
A tall leafy perennial with the inflorescence resembling that of the Timothy, but much softer and flowering earlier in the season. It is a valuable forage grass and has been used in Europe and America when an early growth is desired. However, in some respects, it does not seem as desirable a grass as Timothy and other cultivated grasses since it soon becomes tough and unpalatable. Extensively naturalized and common in rich meadow lands and along roadsides in many parts of the province, often making up a considerable proportion of the grasses in such places. Nfld. to Alaska, south to Delaware; Eurasia; occasionally cultivated.

2. *Alopecurus aequalis* Sobol. SHORT-AWN FOX-TAIL

An erect or spreading semi-aquatic species usually not rooting at the nodes. Localized in distribution; in water and wet places, Pictou (coll. MacKay, 1880), in shallow pools along the Salmon River above Truro, and common in spring

pools and ditches south of Amherst. N. S. to Alaska, south to Pennsylvania; native. (*A. aristulatus* Michx., *A. geniculatus*, var. *aristulatus* Torr).

3. ***Alopecurus geniculatus*** L. WATER FOX-TAIL



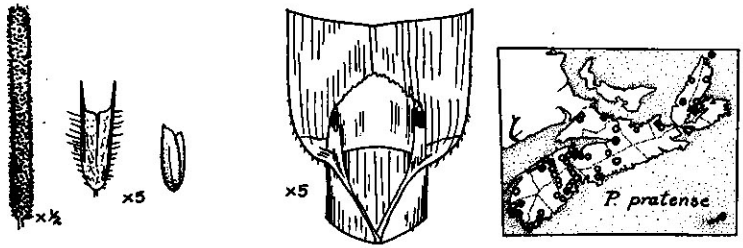
Similar to the above, decumbent at the base and usually rooting at the nodes; inflorescence with the awns conspicuous. Common throughout in wet pastures and fields, in ditches or around the edges of ponds, sometimes growing into shallow water. It is often one of the first grasses to occupy the bare muddy areas along ditches and dyke roads, where the soil is sticky, and drainage and soil aeration poor. Nfld. to Saskatchewan, south to Virginia; introduced.

The spikelike panicles of this species mature over a prolonged period during the season, as in some other introduced species (*Poa trivialis*, *Holcus lanatus*). The great variation also shown in their length and breadth, even on stems originating from the same plant, must be due to seasonal moisture conditions. A variety *microstachyus* Uechtr. with small panicles (mostly 1 to 2 cm. long) is reported as "abundant in some roadside ditches at Yarmouth" (Fernald, 1921, p. 229). Examination of some of the material on which this record is probably based, show it to be merely a depauperate plant collected in mid-summer from "exsiccated roadsides" (Fernald et al., no. 19878) with panicles mainly 2 to 3 cm. long. Plants from Cheticamp with spikelets 1.2 to 3.0 cm. long, and from elsewhere, approach the small extreme in size.

35. PHLEUM L.

Tall perennial grass with culms arising in a tuft, with bulbous basal internodes; terminal panicles dense, cylindrical and spike-like, firmer and rougher than in *Alopecurus* which it resembles; spikelets 1-flowered; glumes equal, compressed, ciliate on the keels, and awn-pointed; lemma much shorter, membranous and falling away with the grain leaving the glumes on the stalk for some time afterwards; ligule white membranous, notched on either side; blades broad, glabrous, except for minute cilia at the very base.

1. ***Phleum pratense*** L. TIMOTHY



The most abundant and most valuable hay grass grown in the province. Grown extensively in meadows, and found equally abundant along roadsides and in waste places. The species appears to be one of the most palatable of forage grasses and is adapted to a wide range of well-drained soils.

36. MUHLENBERGIA Schreb.

Low to tall perennial, tufted grasses; spikelets 1-flowered in open or contracted panicles, with the glumes usually shorter than the lemmas and obtuse to awned; lemma 3-nerved, acute or awned from the tip, sometimes with a few pilose hairs towards the base.

a. Rhizomes lacking; culms slender, often decumbent at the base and rooting at the nodes; panicles loose and open, the spikelets on capillary pedicels; glumes less than half the length of the lemmas.

1. *M. uniflora*

a. Rhizomes short, scaly and knotted; culms erect at the base, and stouter; panicles contracted and densely-flowered, the spikelets on short pedicels; glumes about the length of the lemmas.

b. Glumes with stiff awn-like tips, much exceeding the awnless lemmas; panicle interrupted towards the base, with the branches short and appressed.

2. *M. racemosa*

b. Glumes acuminate, about the length of the lemmas or shorter; panicle with the lower branches 1 to 3 cm. long and somewhat spreading.

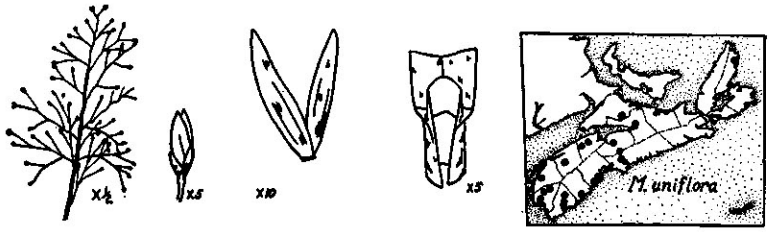
c. Lemma not long-awned.

3. *M. foliosa*

c. Lemma with an awn 4 to 10 mm. long.

3a. *M. foliosa*, var. *setiglumis*

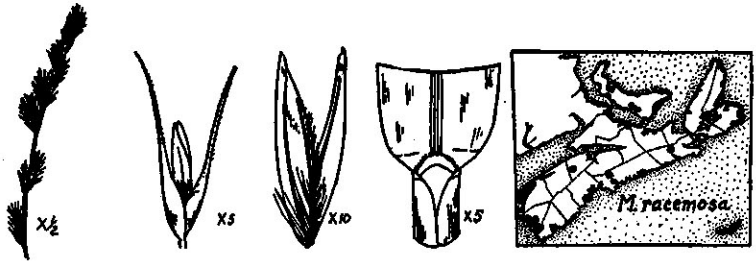
1. *Muhlenbergia uniflora* (Muhl.) Fern.



A delicate and neat perennial, 2 to 4 dm. high, with open panicle of small dark-purple spikelets. Common in peat swales, bogs, and sandy sterile soils in the southern and western section of the province, east to Halifax County with isolated stations in Cumberland, Colchester and Victoria Counties. To be expected in any part of the province. (*Sporobolus uniflorus* (Muhl.) Scribn.).

In some plants a few spikelets towards the tips of the branches may be 2-flowered. These show a transition to var. *terrae-novae* Fern. (*Rhodora* **29**: 10-14, 1927), the common variety of Newfoundland. This has most of the spikelets 2-flowered, the upper floret staminate and the lower perfect, on shorter pedicels in a somewhat contracted panicle.

2. ***Muhlenbergia racemosa*** (Michx.) B.S.P. MARSH MUHLY



Perennials with culms 5 to 10 dm. high; leaves flat, 2 to 5 mm. wide; panicle narrow and rather bristly, 3 to 10 cm. long, usually purplish. Common in peaty swales, cobbly shores and brook margins throughout the province. Nfld. to British Columbia, south to Maryland.

3. ***Muhlenbergia foliosa*** (Roem. & Schult.) Trin.

Resembling the preceding but with the panicle greener, more branched, the spikelets only 2 to 3 mm. long instead of 4 to 6 mm., and with the base of the lemmas long-pilose. Found, so far, only by the wet rocky shore at the headwaters of the Halfway River, Kings County. Maine to Montana, south to North Carolina.

3a. Var. ***setiglumis*** (S.Wats.)Scribn. is likewise known from only one station; rocky margin of the Ste. Croix River, Hants County.

37. SPOROBOLUS R. Br.

Spikelets one-flowered; lemma with the mid-nerve only, not awned; grain falling away readily and the pericarp slipping off when the grain is mature and moist; ligule a fringe of hairs.

1. ***Sporobolus vaginaeflorus*** (Torr.)Wood

SHEATHED DROP-SEED

A bright-green annual, with the panicle enclosed in the upper sheath until after maturity; lemmas about 4 mm. long,

sparsely appressed-pubescent; leaf-blades with a few stiff hairs arising from papillae on the margin at the base.

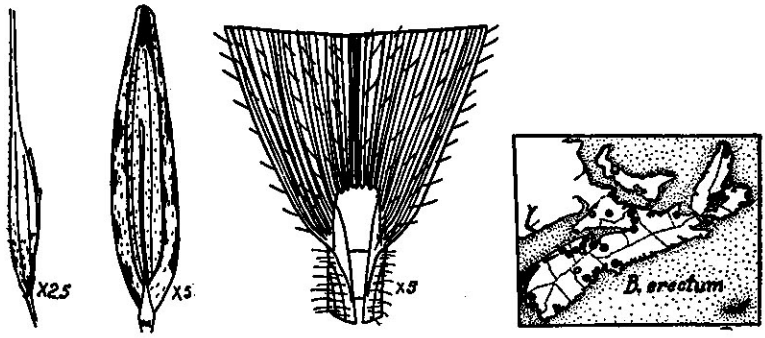
Only one occurrence of the plant is known in the province: in a dry, sandy pasture at Nictaux, Annapolis County. Although identification has been based on immature material, it is probable that the specimen is variety *inaequalis* Fern. (*Rhodora* **35**: 108-110, 1933) which has a slightly more northern range than has the typical species. Known from Maine, southward and westward.

38. BRACHYELYTRUM Beauv.

Erect, slender, brittle-culmed perennials 2 to 4 feet high, generally growing in patches from short knotty rhizomes; leaves somewhat pilose, up to 1 cm. wide and 10 cm. long, mostly on the basal half of the culm; panicles contracted with a few spikelets; spikelets one-flowered, very readily breaking away while still green and leaving the two very small, unequal glumes attached to the rachis; rachilla prolonged above the lemma into a long slender bristle. (*Dilepyrum*)

1. ***Brachyelytrum erectum*** (Schreb.)Beauv.

BEARDED SHORT-HUSK



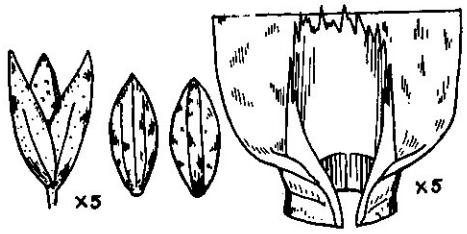
A scattered but never abundant grass, usually growing in wet rocky areas, along shaded streams, in rich moist woods,

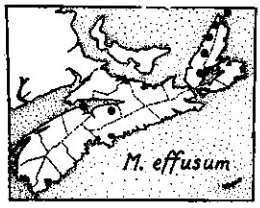
or occasionally even in open places after the trees or shrubs have been cut off. In all parts of the province. Nfld. to Minnesota, south to Georgia.

39. MILIUM L.

Smooth perennial grass, 3 to 6 feet high, with broad blades; spikelets one-flowered, in an open panicle with branches widely spreading to reflexed; glumes pale green and rounded on the back; lemma smooth and shining, becoming firm and hard, the edges overlapping the palea and grain; ligule long and membranous.

1. ***Milium effusum*** L. TALL MILLET-GRASS





One of the rarer grasses of the province, confined mainly to rich soils in calcareous regions, either on alluvial soil or on rich hardwood slopes. First collected by Macoun at Whycocomagh in 1883 and at Big Intervale in 1898; reported also from the alluvium of Five-Mile River, Hants County (Fernald, 1921) and from a slope on St. Paul Island (Perry, 1931). It has since been found growing in scattered areas in rich hardwoods on the top of Cape Blomidon (Roland, 1941), in woods north of Cheticamp and at Pleasant Bay. Temperate parts of North America.

40. ORYZOPSIS Michx.

Native perennial grasses, scattered or in small tufts, with the few one-flowered spikelets in narrow or open panicles;

lemma awned from the tip, hard and shiny, appressed-pubescent, closely enveloping the palea and grain.

a. Spikelets, excluding awns, 6 to 8 mm. long, in a narrow contracted panicle; blades mostly basal, flat when fresh, 4 to 8 mm. wide.

1. *O. asperifolia*

a. Spikelets, excluding awns, 3 to 5 mm. long, in small diffuse panicles; blades mainly on the stem, mostly involute, less than 3 mm. wide.

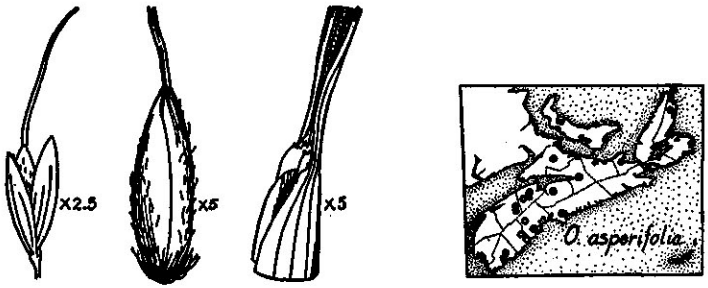
b. Awn less than 3 mm. long, almost straight; panicle smaller, 3 to 6 cm.

2. *O. pungens*

b. Awn 8 to 15 mm. long, twisted in two places; panicle larger, 5 to 10.

3. *O. canadensis*

1. *Oryzopsis asperifolia* Michx. RICE-GRASS



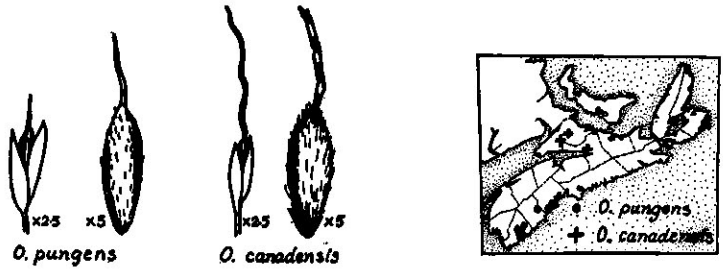
The tufts of rigid long broad leaves, dark-green on the back and pale-green above, are characteristic of the dry woods or sterile bushy barrens throughout the province. Scattered to common, but never abundant; flowering from late May to early June. Nfld. to British Columbia, south to Connecticut.

2. *Oryzopsis pungens* (Torr.) Hitchc.

Characteristic of dry barrens of Shelburne and south-western Lunenburg Counties, occasional in Queens County; also at Mira Bay, Cape Breton County. Smaller than, but very

similar to the next. Labrador to British Columbia, south to Connecticut.

3. ***Oryzopsis canadensis*** (Poir.) Torr.



A more northern species than the preceding, extending into the province on the dry and barren soils in Cumberland and central Colchester Counties; found also in dry pine woods, near Jordan Falls, Shelburne County. Nfld. to Alberta, south to Nova Scotia, New York, and northern Michigan. (*Stipa canadensis* Poir.)

Tribe V. **CHLORIDEAE**

41. SPARTINA Schreb.

Perennial grasses with extensively creeping, scaly rhizomes; inflorescence of two to many spikes arranged along a central stalk; spikelets one-flowered, much compressed laterally, sessile and closely overlapping along one side of the axis of the spike; glumes of unequal length, the lower shorter, the upper longer than the lemma; lemma with only the mid-nerve prominent; palea slightly longer than the lemma, two-nerved; ligule a row of short hairs.

a. Blades more than 5 mm. wide, flat towards the base and inrolled towards the tip when fresh; plants with stout upright culms 3 or more mm. in diam., 10 to 20 dm. high.

b. First glume as long as the lemma, very rough-ciliate on the keel; second glume tapering to an awn-like tip as long again as the lemma; inflorescence open, purplish and slender-waving; brackish to fresh water.

1. *S. pectinata*

b. First glume about half as long as the lemma, rarely smooth; second glume without the long awn-like tip, barely exceeding the lemma; inflorescence erect, crowded, yellowish; growing only next to salt water or in very brackish soil.

c. Lemmas glabrous.

2. *S. alterniflora*

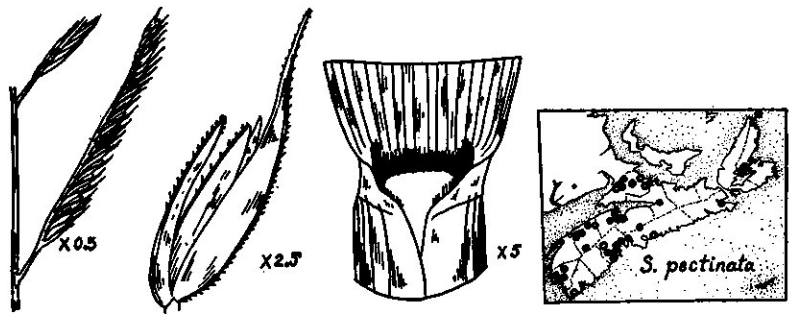
c. Lemmas sparsely pilose.

2a. *S. alterniflora*, var. *pilosa*

a. Blades less than 3 mm. wide, and involute even when fresh; plants with slender decumbent culms less than 2 mm. in diam., growing in dense leafy mats, mostly 3 to 6 dm. high.

3. *S. patens*

1. *Spartina pectinata* Link TALL CORD-GRASS, BROAD-LEAF



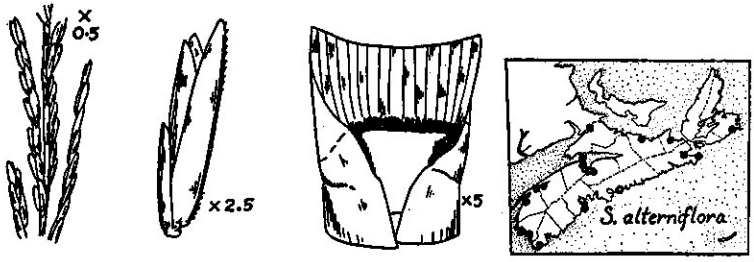
This is the tallest of our cord-grasses and is not restricted to saline soils as are the other two species. It is common bordering salt marshes or along the ditches and drains where free water has carried away most of the salts, and elsewhere in the province wherever open ditches, streams and sloughs occur. Across the continent; along salt marshes from Nfld.

southward. (*S. cynosuroides* of older records, *S. Michauxiana* Hitchc.)

The extreme variation with narrow, slender,spreading spikes and appressed awns, var. *Suttiei* (Farw.) Fern. (*Rhodora* **35**: 258-260, 1933) is reported as ranging from P. E. I. and N. S. southward and westward. Most of the N. S. collections appear intermediate between this variety and the typical species. Cytological evidence, moreover, does not show any difference between the two segregations (Church, G. L., *Amer. Jour. Bot.* **27**: 269, 1940).

2. ***Spartina alterniflora*** Lois.

SMOOTH CORD-GRASS, SALT MARSH-GRASS

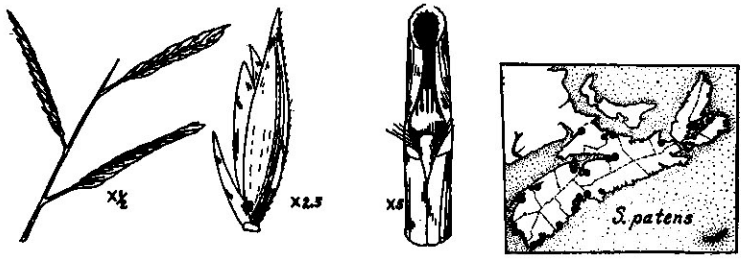


This is the characteristic grass of our salt marshes and is frequently the single seed-plant colonizing the inter-tidal zone. The success of this species in growing under the rigorous conditions of complete or partial submergence with salt water at every tide has been attributed (Church,l c.) to a high degree of polyploidy which allows the throwing off of numerous ecotypes varying in their environmental requirements.

The dense leafy upright growth is important, both in protecting the shores from erosion, and in causing the deposition of fine tidal silts on the extensive marshes particularly in the region surrounding the Bay of Fundy. Quebec to Nfld. along the tidal marshes to Texas; Europe. (*S. stricta*, var. *glabra* of earlier records)

2a. Var. ***pilosa*** (Merr.) Fern. has been reported (Fernald, 1922) to occur "apparently frequently on salt marshes from Yarmouth County to Annapolis County and presumably beyond." Although this pilose variety is undoubtedlydistinct, since it is different from non-pilose plants also in certain cytological characteristics, the lemmas show all degrees of pubescence from a sparse pilosity to a scabrous or glabrous condition even in the same inflorescence. Var. *pilosa* is a taller, more robust plant with more spikes composing the inflorescence and flowering later than the typical form. It is to be considered an ecotype confined to brackish flats rather than to saline tidal marshes.

3. ***Spartina patens*** (Ait.) Muhl. SALT MEADOW CORD-GRASS



A low grass forming dense matted dark-green patches on parts of the salt marshes above the *S. alterniflora* zone. Found around the coast wherever suitably protected shores are present. If this grass is repeatedly cut for hay, it gradually dies out and is replaced by *Puccinelia* and other salt-marsh plants (Chapman, V. J., *Rhodora* **39**: 53-57, 1937). Frequently the only areas on the marsh where this grass persists are around the staddles or corners of the dykes where mowing-machines cannot reach it. Along the coast from Quebec to Texas, and in saline marshes inland. (*S. juncea* of earlier records)

TRIBE VI. PHALARIDEAE

a. Lemmas of the sterile florets larger than the fertile floret; plants bitter-tasting and sweet-scented when dry; inflorescence brownish; flowering early in summer.

b. Glumes equal in size and shape; lower florets staminate, their lemmas awnless, broad and acute; inflorescence an open panicle; long tough basal leaves appear much after flowering.

42. *Hierochloë*

b. Glumes very unequal, the second much longer and broader, generally enclosing the floret; lower florets neuter, their lemmas awned, slender and 2-lobed at the apex; inflorescence spike-like, borne on leafy culms.

43. *Anthoxanthum*

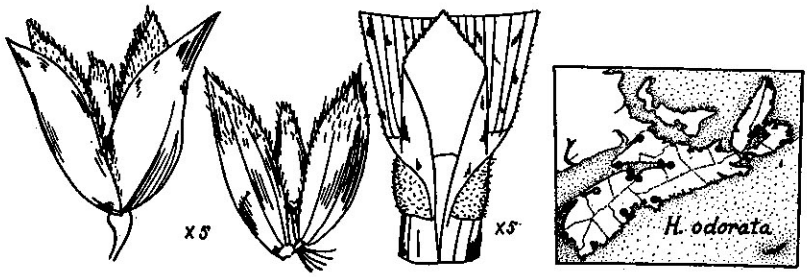
a. Lemmas of the sterile florets much shorter than the fertile floret, or reduced to hairy scales; plants not bitter or scented; inflorescence greenish, appearing in middle or late summer.

44. *Phalaris*

42. HIEROCHLOË R.Br.

Perennial grass with underground rhizomes and small open panicles with rather few brownish, shining spikelets; spikelets with two broad boat-shaped glabrous glumes, with a single fertile floret between two larger staminate ones; leaves 2 to 5 mm. wide; ligule firm and membranous.

1. ***Hierochloë odorata*** (L.) Wahl. SWEET-GRASS, HOLY-GRASS



This is one of our earliest flowering grasses, with the panicles becoming conspicuous in early May and flowering before June. The long green leaves, which are tough and roll in readily on drying, arise from separate basal offshoots and do not appear until later. They have the bitter taste of coumarin which on drying gives the persistent pleasant fragrance for which the plant is noted; and on this account are often gathered extensively by the Indians and used in making fancy baskets. The leaves of *Anthoxanthum odoratum*, also coumarin-scented, are not suitable for this purpose. The grass is found in many places around the province, growing on low-lying, moist, heavy soil, generally in the proximity of, or on the upper areas of the tidal marshes.

All the plants found in eastern Canada have been put in the variety *fragrans* (Willd.) Richter, which is somewhat different from the typical plant as found in Europe and in the western parts of the continent (*Rhodora* **19**: 152, 1917). It is doubtful, however, whether this distinction should be maintained.

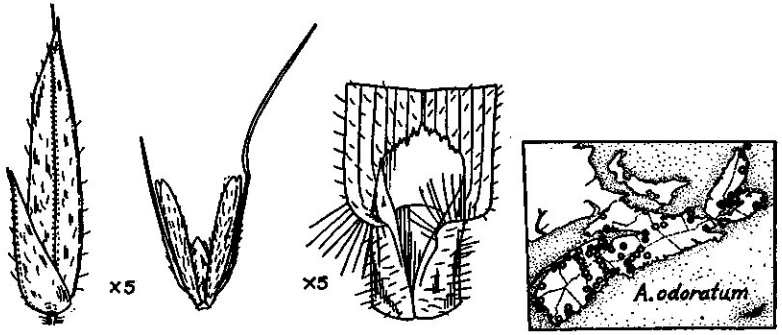
43. ANTHOXANTHUM L.

Low, tufted perennial grasses with dense spike-like brownish-yellow panicles; spikelets with unequal glumes and one fertile floret between two sterile ones; sterile florets each reduced to a hairy long-awned scale-like lemma; blades with conspicuous marginal hairs at the base; ligule membranous.

1. *Anthoxanthum odoratum* L. SWEET VERNAL-GRASS

An early-maturing grass common in old hayfields, roadsides and waste fields throughout the Maritime Provinces. This species used to be seeded in the hay mixture to give a scent to the hay, but now is considered undesirable since cattle do not relish it. It flowers much earlier than the more valuable hay species and by the time the hay is cut, it consists

of nothing but slender dry culms inconspicuous in the stand and of no value for forage. Widely introduced from Eurasia.



44. PHALARIS L.

Perennial or annual grasses with upright culms bearing terminal spike-like panicles of flattened spikelets; spikelets with broad equal glumes, and one fertile floret between two greatly-reduced sterile ones; lemma of the fertile floret smooth and readily falling away from the glumes at maturity; ligule long, whitish and membranous; awns absent; plant glabrous.

a. Plants annual; panicle oval, dense and spike-like; lemmas broad-winged, white with green stripes.

1. *P. canariensis*

a. Plants perennial; panicle elongated, branched, contracted after flowering; lemmas pale, not broad-winged.

b. Leaves green.

2. *P. arundinacea*

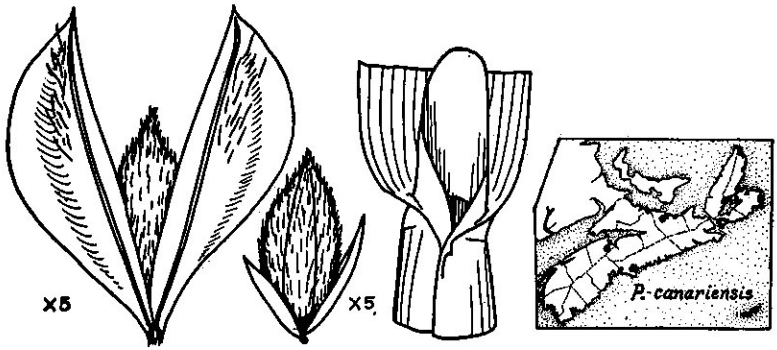
b. Leaves striped with white.

2a. *P. arundinacea*, var. *picta*

1. *Phalaris canariensis* L. CANARY-GRASS

Introduced in the form of canary and bird seed, this attractive species is sometimes encountered along roadways,

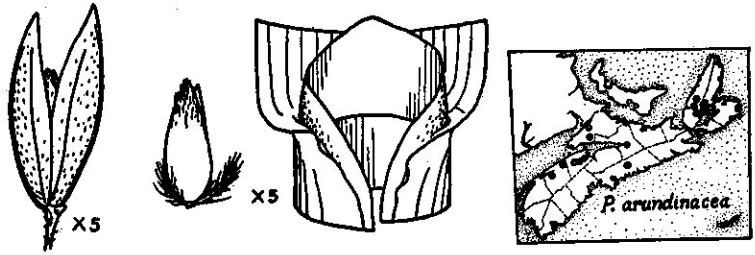
on ballast, or in city dumps. Only three specimens have been seen from the province. Pictou (coll. McKay, 1883), Wolfville



(coll. Perry, 1912), Halifax (coll. Brown, 1940). Being an annual, it does not persist or become weedy.

2. *Phalaris arundinacea* L. REED CANARY-GRASS

This tall broad-leaved species of mucky soils, wet meadows and along streams, is not of common occurrence, although it has been found at widely-separated points throughout the province; and in the proper habitat, as along the rivers above Kentville or Parrsboro, it may form a considerable part of the grass in the wetter areas. Its leafy nature and



vigorous growth makes it an excellent hay grass for wet land. The lemma of the fertile floret is smooth and shiny and slips

out of the heads readily very soon after flowering, thus making the harvesting of seed difficult. N. S. to Alaska, southward.

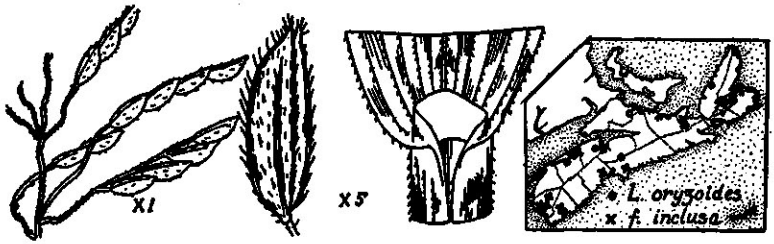
2a. Var. ***picta*** L. is the Ribbon Grass of gardens where it is frequently planted for its ornamental leaves. It is persistent, easy to grow, and spreads by rhizomes as does the typical species. It may be found in any of the towns and cities in the province.

Tribe VII. **ORYZEAE**

45. LEERSIA Swartz

Bright-green broad-leaved grasses with very rough sheaths and blades, growing in wet soil or in shallow water; panicle with many spikelets on slender branches, emerging in the latter part of the summer or completely enclosed in the sheaths with the flowers remaining cleistogamous; spikelet one-flowered, strongly flattened laterally and without glumes; lemma broad, firm, coarsely hispid, and almost oval in shape, awnless, 4.5 to 6.0 mm. long.

1. ***Leersia oryzoides*** (L.) Swartz RICE CUT-GRASS



Sometimes forming dense, tangled, clinging masses of foliage in ditches, swamps and wet waste lands. The leaves are a bright yellowish-green; culms frequently a meter or more long with the panicle exserted 10 cm. or more from the upper sheath when in flower. Not nearly so common in the province

as the following form, being found in Annapolis, Halifax, Antigonish, and Inverness Counties. More abundant eastward and southward across the continent.

Forma ***inclusa*** (Wiesb.)Dörfl. has the inflorescence enclosed in the inflated sheaths or breaking out the sides, never exserted far beyond the top of the sheath. The leaves are darker green and the sheaths often purplish, the whole plant tending to be shorter than the typical species. Found in many parts of the province, frequently in the shallow water or in the wet soil along the margin of lakes. Due to the hidden or late emerging panicles this grass is difficult to recognize by its flowering parts; but it is readily identified by its sharp scabridity and the dense fringe of reflexed white hairs at the culm-nodes. (*f. clandestina* Eames)

Forma ***glabra*** Eaton occurs when the leaves are submerged in the water and become smooth. However, if any of the leaves of a plant happen to be borne permanently above the surface, they have the typical scabridity. Fernald (1921, p. 229) reports this essentially smooth variation completely submerged in Trefry's Lake, Arcadia. Plants from the Roseway River above Shelburne, submerged for the greater part of their length, have the submerged leaves smooth but the leaves above the water-line rough.

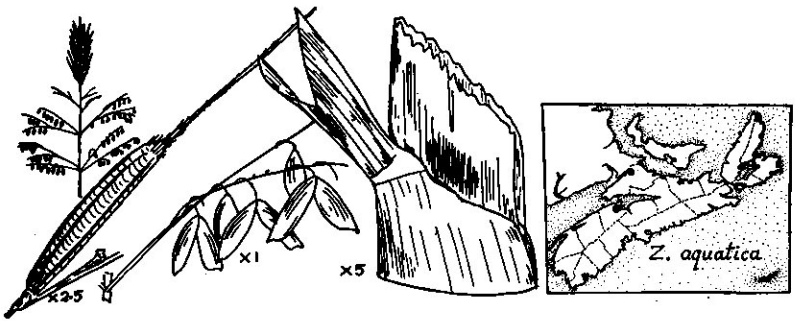
Tribe VIII. **ZIZANIEAE**

46. ZIZANIA L.

Tall, broad-leaved aquatic grasses with monoecious inflorescences of 1-flowered spikelets; staminate spikelets pendent from the widely-spreading lower branches of the panicle; glumes absent; lemma and palea membranous; stamens six; the whole spikelet falling away soon after anthesis: pistillate spikelets on the erect stiff branches of the upper part of the panicle; glumes obsolete; lemma hard, bristly-scabrous, long awned, enclosing the long, black grain; leaves glabrous:

ligule long and membranous. Fassett, N. C., A study of the genius *Zizania*. *Rhodora* 26: 153-160, 1924.

1. ***Zizania aquatica*** L. NORTHERN WILD RICE



A grass native to North America and growing abundantly in the shallow water of lakes, streams and sloughs in the interior of the continent and providing food and shelter for wild water fowl. Also harvested by certain tribes of Indians for food. Now sown to some extent in bird sanctuaries to attract wild ducks and geese. The viability of the seed is rapidly lost on drying. The only records of the plant from Nova Scotia are from Long Lake, near Amherst (coll. Groh, 1935), and Canard River, Upper Canard (coll. Roland, 1939). All of our plants are var. ***angustifolia*** Hitchc.

Tribe IX. **PANICEAE**

a. Spikelets not surrounded by bristles from below the base; inflorescence a diffuse panicle, or of several racemes.

b. Spikelets not crowded, longer pedicelled; glumes and sterile lemma not awned, often pubescent but never stiffly hispid.

c. Spikelets in pairs in two rows along one side of an axis; inflorescence of several racemes, digitate at the top of the culm.

47. *Digitaria* (p. 271)

c. Spikelets in diffuse panicles.

48. *Panicum* (p. 272)

b. Spikelets crowded along one side of the panicle branches, almost sessile, with the glumes or sterile lemma awned and stiffly hispid.
49. *Echinochloa* (p. 282)

a. Spikelets with 1 to many long bristles from below the base; inflorescence a dense spike-like panicle.
50. *Setaria* (p. 283)

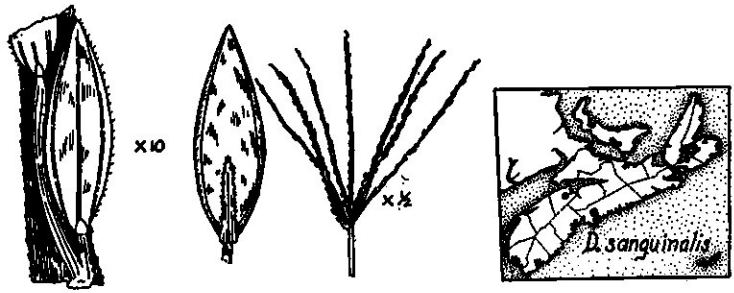
47. DIGITARIA Heister

Low, introduced, weedy grasses with the panicle consisting of a number of radiating branches bearing spikelets in pairs closely appressed along them in a zig-zag double line. Spikelets with a minute first glume, a second glume as long as the spikelet or half as long, one sterile lemma, and a fertile floret in the center.

a. Lower blades and sheaths pilose; plants erect; panicle-branches 4 to 6, joined at nearly the same point to the main axis; second glume only half the length of the spikelet
1. *D. sanguinalis*

a. Lower blades and sheaths glabrous; plants usually widely spreading; panicle-branches 2 to 4, more or less separated; second glume nearly as long as the spikelet.
2. *D. Ischaemum*

1. *Digitaria sanguinalis* (L.) Scop. CRAB-GRASS

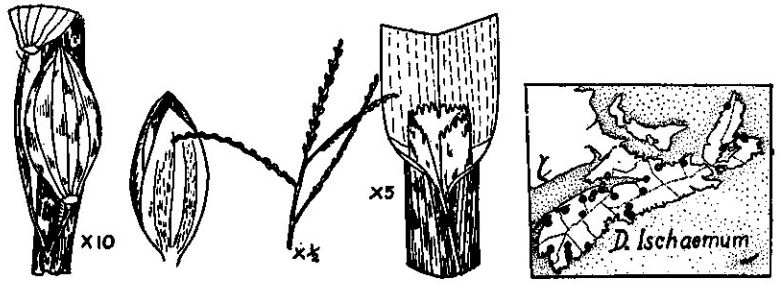


A branching, generally purplish plant, spreading from the decumbent base. Both this and the following species are

best recognized by the digitate-branching type of inflorescence. But recently introduced into the province; common in gardens and waste places around Halifax, Bedford, Kentville, and probably elsewhere. Native of Europe; throughout the U. S. and southern Canada.

2. ***Digitaria Ischaemum*** (Schreb.) Muhl.

SMOOTH CRAB-GRASS



Smaller and smoother than the preceding, at first erect, but soon decumbent and widely spreading, purplish. Much commoner, and becoming a weed around towns, in waste places, and especially on the sandy soil of the Annapolis Valley. Introduced from Eurasia, and widely spread. (*D. humifusa* Pers.)

48. PANICUM L.

Annual or perennial grasses of diverse appearance, with rather characteristic oval, plump spikelets in open or compact panicles; ligule a fringe of hairs; glumes 2, very unequal, the first often minute, the second large and similar to the sterile lemma; sterile lemma bearing a minute palea; the fertile lemma slightly smaller, blunt and hardened, the margins enclosed around a palea of the same texture. The cultivated millet is the type species. *Panicum* species are common in the southern part of the province and in light sandy soils, becoming progressively rarer northeastward.

a. Basal leaves different from those of the stem, shorter and stouter, forming a winter rosette.

b. Leaves narrow, often 20 times as long as wide, exceeding the panicles; nodes bearded; ligule less than 1 mm. long.

c. Spikelet about 3.5 mm. long, sharp-pointed or beaked.

1. *P. depauperatum*

c. Spikelet 2.2 to 2.4 mm. long, blunt and not beaked.

2. *P. linearifolium*

b. Leaves not nearly so elongate.

d. Leaf-blades not heart-shaped at the base, less than 1 cm. wide.

e. Ligule less than 1 mm. long; spikelets 2.2 to 2.4 mm. long; sheath glabrous.

3. *P. boreale*

e. Ligule of conspicuous hairs 3 to 5 mm. long; spikelets less than 2.1 mm. long.

f. Sheaths glabrous; plants 3 to 9 dm. high; spikelets about 1.5 mm. long.

4. *P. spretum*

f. Sheaths more or less pubescent; small plants, rarely over 4 dm. high.

g. Spikelets 1.3 to 1.5 mm. long.

h. Sheaths and lower surface of the leaves with shorter appressed pubescence between the longer hairs; axis of panicle finely pubescent; lower panicle branches ascending and not tangled.

5. *P. meridionale*

h. Sheaths and both surfaces of the leaf-blades without any pubescence between the long hairs; axis of the panicle usually pilose; lower branches of the panicle spreading and tangled.

6. *P. lanuginosum*, var. *implicatum*

g. Spikelets 1.6 to 2.1 mm. long.

i. First glume less than one-third the length of the spikelet, acute or obtuse; panicle-branches slender, spreading, the lower often reflexed; sheaths glabrous or with spreading hairs.

j. Axis of panicle spreading-pilose, at least on the lower internodes; blades mostly pilose above and pubescent below.

6a. *P. lanuginosum*, var. *fasciculatum*

j. Axis of panicle smooth or with at most a few appressed hairs; blades glabrous to sparsely pilose above and minutely pubescent below.

6b. *P. lanuginosum*, var. *septentrionale*

i. First glume nearly one-half the length of the spikelet, acute; panicle-branches stout, ascending; sheaths with appressed or ascending hairs; blades long-pilose on both sides.

7. *P. subvillosum*

d. Leaf-blades heart-shaped at the base, 1 to 3 cm. wide.

8. *P. clandestinum*

a. Basal leave similar to the stem leaves, not forming a winter rosette: spikelets mostly longer than 2.0 mm.; plants large, 2 to 20 dm. high.

k. Plants annual, without rootstocks; sheaths pilose or glabrous.

l. Sheaths glabrous; panicle diffusely branched; spikelets 2.5 mm. long; first glume blunt, one-quarter the length of the spikelet.

9. *P. dichotomiflorum*

l. Sheaths densely pilose.

m. Spikelets 3 mm. or less in length, not smooth and shining.

n. Panicle generally less than one-third the length of the plant; spikelets 1.8 to 2.0 mm. long.

10. *P. philadelphicum*

n. Panicle about half the length of the plant; spikelets 2.3 to 3.0 mm. long.

o. Panicle-branches erect and crowded, only at length spreading; leaves scattered on the stem; spikelets up to 2.5 mm. long.

11. *P. capillare*

o. Panicle branches more exserted, the lower reflexed; leaves mostly near the base of the plant; spikelets pointed, about 3 mm. long.

11a. *P. capillare*, var. *occidentale*

m. Spikelets 4 to 5 mm. long, smooth and shining; panicle drooping, one-third or less the length of the plant.

12. *P. miliaceum*

k. Plants perennial, growing in tufts from short rootstocks; sheaths glabrous. Southwestern Nova Scotia only.

p. Plant stout, 10 to 20 dm. high; spikelets 3.2 to 4.0 mm. long, long-pedicelled in diffuse panicles.

13. *P. virgatum*

p. Plant more slender, 2 to 8 dm. high; spikelets short-pedicelled along one side of the nearly unbranched panicle-branches.

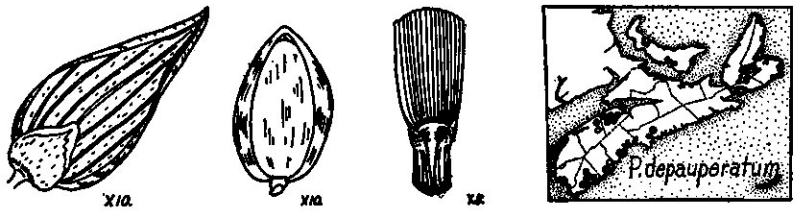
q. Panicle 1.0 to 2.5 dm. long; spikelets 2.4 to 2.7 mm. long, with the upper glume equalling or longer than the sterile lemma.

14. *P. longifolium*

q. Panicle 0.3 to 1.5 dm. long; spikelets 2.7 to 3.4 mm. long, with the upper glume shorter than the sterile lemma.

14a. *P. longifolium*, var. *tusketense*

1. ***Panicum depauperatum*** Muhl. STARVED PANIC-GRASS



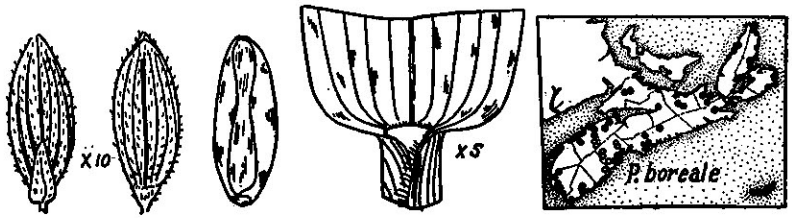
Plants densely tufted, rather low, with slender erect culms. It is readily distinguished by the narrow, very long leaves which reach to the middle of the panicle or above, and by the large spikelets, slightly beaked at the end and very minutely pubescent. The autumnal phase is similar with the basal leaves over-topping the panicles. Very common on the sandy soils of the Annapolis Valley, and scattered on sandy, gravelly or sterile soils elsewhere, from Shelburne to Halifax County. N. S. to Minnesota, southward.

All of our plants belong to the northern extreme, var. ***psilophyllum*** Fern. (*Rhodora* **23**: 193, 1921), characterized by glabrous sheaths. Its form ***cryptostachys*** Fern. is a dwarfed form growing in very sterile soil, and bearing only reduced basal panicles of 1 to 4 spikelets. Scattered in the province throughout the range of the variety (*Rhodora* **23**: 194, 1921).

2. ***Panicum linearifolium*** Scribn.

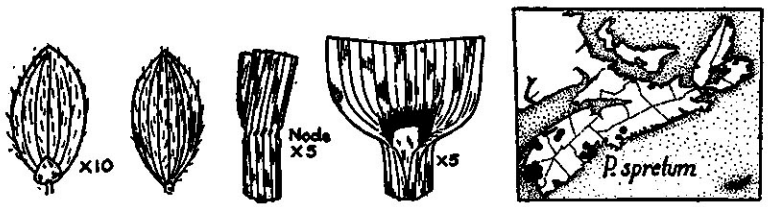
The northern extreme of this species with glabrous sheaths, var. ***Werneri*** (Scribn.) Fern. (*Rhodora* **23**: 194, 1921), is represented by collections from Kings County, from sandy soils in the vicinity of Coldbrook by Roland. Formerly known from Maine, westward and southward.

3. ***Panicum boreale*** Nash NORTHERN PANIC-GRASS



Plants usually erect and glabrous, 3 to 5 dm. high, with leaves 8 to 12 mm. wide. Common in damp or moist situations throughout the province. Nfld. to Minnesota, south to New Jersey and Indiana.

4. ***Panicum spretum*** Schult.



Vernal phase tall and erect, 3 to 9 dm. high; autumnal phase usually reclining, much branched, often with many short branches at the nodes; nodes and upper sheaths glabrous. Wet or peaty swales, gravelly or sandy upper borders of lake beaches, or wet margins of pools and ditches; scattered from

Yarmouth County, eastward to Halifax County. A coastal-plain plant; from N. S. to Texas; also found in Indiana.

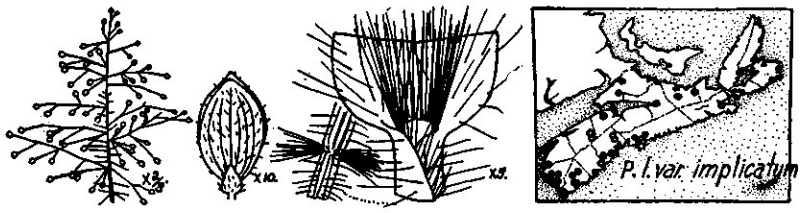
5. ***Panicum meridionale*** Ashe

Known at but one station east of Massachusetts. Collected by the Gray Herbarium Expedition on the cobbly beach of Gavelton (Butler's) Lake, Gavelton, Yarmouth County (*Rhodora* **24**: 161, 1922).

6. ***Panicum lanuginosum*** Ell.

This is an extremely variable and difficult species in a section of the genus where specific lines are very indistinct. Numerous species have been proposed that appear to be but ecological forms or minor variations. Recently a number of these have been combined under a single species, of which three better-marked varieties are found in the province. Fernald, M. L., *Panicum Lindheimeri*. *Rhodora* **23**: 223-228, 1921. Fernald, M. L., Realignments in the genus *Panicum*. *Rhodora* **36**: 77-78, 1934.

6a. Var. ***implicatum*** (Scribn.) Fern. A small plant 2 to 5 dm. high, generally erect, but with a spreading or reclining autumnal form; loosely branched from the middle or lower

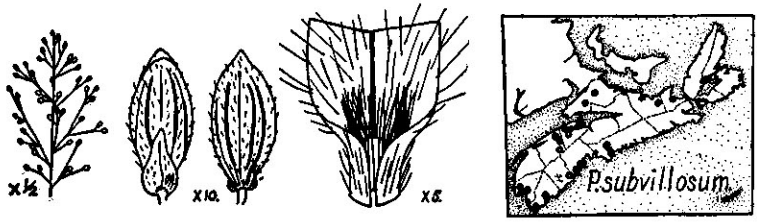


nodes. This is one of the commoner forms of the province; abundant in the southwestern counties and becoming rarer eastward to Cape Breton. Meadows, bogs, heavy soils but occasionally even in sandy places. (*P. implicatum* Scribn.).

6b. Var. ***fasciculatum*** (Torr.) Fern. Taller than the preceding, with larger spikelets, and often grading into it. Growing in similar situations from Yarmouth County to Cape Breton, but not nearly so abundant (*P. huachucae* Ashe, var. *fasciculatum* (Torr.) F. T. Hubb.). *P. huachucae* is a trivial form of more open habitats, with stiffer, more ascending leaves. *P. tennesseense* Ashe is likewise considered to be merely a variation. Across the continent.

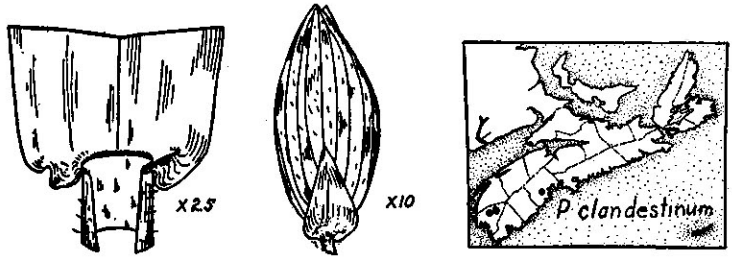
6c. Var. ***septentrionale*** (Fern.) Fern. (*Rhodora* **23**: 227, 1921). Rare in Nova Scotia. Known only from a wet sphagnous swale at border of Beaver Lake, Yarmouth County (Fernald, 1921); and dry pine and oak woods on steep slopes along the Lahave River, Bridgewater (Fernald, 1922, p. 161).

7. ***Panicum subvillosum*** Ashe PANIC-GRASS



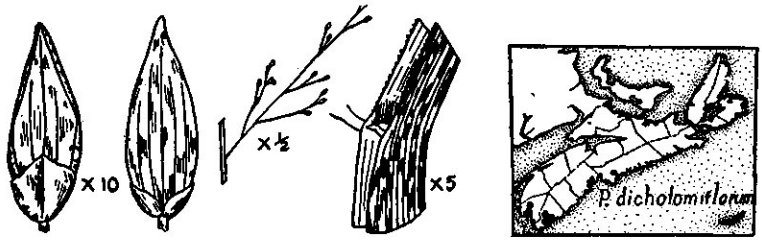
Probably the commonest species of *Panicum* in the province. Common throughout in dry sandy or rocky open soil, fields, pastures, roadsides and barrens.

8. ***Panicum clandestinum*** L.



Plants coarse, often in large clumps, 7 to 12 dm. high, with broad leaves up to 3 cm. wide. Occasional in the Tusket Valley, Yarmouth County, in damp, rocky or gravelly thickets (Fernald, 1921); found on the upper border of cobble beach, Wentzell Lake, Lunenburg County (Fernald, 1922). Widely distributed westward and southward.

9. ***Panicum dichotomiflorum*** Michx.



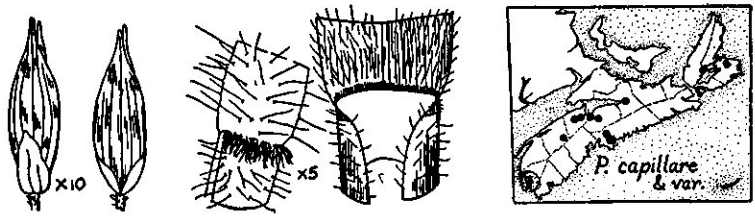
Scattered and rather rare, in the Tusket Valley, Yarmouth County, on sandy and gravelly shores of lakes, and borders of savannahs (Fernald, 1921); found in similar places beside Harper and Welshtown Lakes, Shelburne County (Fernald, 1922). All of our specimens apparently belong to var. ***geniculatum*** (Wood) Fern. (*Rhodora* **38**: 387-390, 1936), the coastwise extreme with coarse geniculate stems, enlarged lower nodes, and inflated sheaths. N. S., southward to the Gulf of Mexico.

10. ***Panicum philadelphicum*** Bernh.

A pilose annual grass with blades 3 to 8 mm. wide; panicle large, very diffuse, nearly as wide as long, with few spikelets on capillary branchlets and pedicels. Plants often prostrate and much branched at the base. Our plants belong to var. ***Tuckermani*** (Fern.) Steyermark & Schmoll, a more northern variation with the swollen bases, pulvini, of the panicle-branches nearly glabrous (*Rhodora* **41**: 86-90, 1939). Known by only one collection from the province; cranberry bog, Bridgewater

(McLellan, Sept. 11, 1939). Maine to New York, and scattered westward.

11. *Panicum capillare* L. WITCH-GRASS



Large coarse annual plant, with a very large diffuse panicle. Scattered in sandy fields, roadsides, and waste places, sometimes becoming a weed in gardens. Maine, southward and westward, probably introduced into Nova Scotia.

11a. Var. ***occidentale*** Rydb. is a smaller plant with more exserted panicles and larger spikelets. Occasionally seen about railroad yards, as at Windsor Junction, Halifax, and Sydney; obviously introduced. Widely distributed, and commoner westward. (*P. barbipulvinatum* Nash)

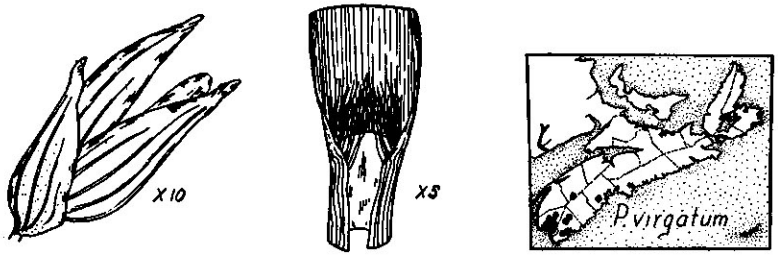
12. *Panicum miliaceum* L. BROOM-CORN MILLET

Plants large, 2 to 10 dm. high, with large, usually drooping panicles. Occasionally planted in the province, and sometimes found along roadsides and waste places; not persisting. Cultivated strains and varieties of diverse appearance may be found. Eurasia.

13. *Panicum virgatum* L. SWITCH-GRASS

A large coarse species found on sandy, gravelly or cobbly beaches, in thickets, bogs and on peaty borders of lakes; scattered throughout the southwestern part of Nova Scotia. Widely distributed in North America.

Our plants all belong to var. ***spissum*** Linder, a variety with short, ascending, rather than long, creeping rootstocks. This variety reaches its best development in Nova Scotia and

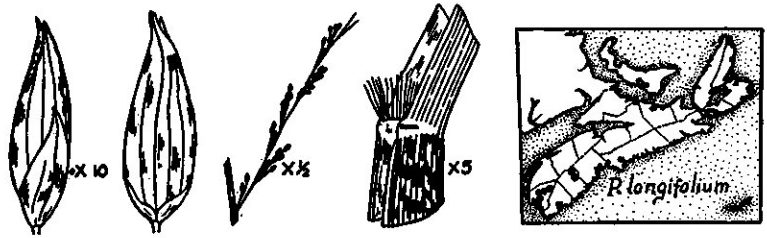


eastern Massachusetts (*Rhodora* **24**: 11-16, 1922). First reported from the province as var. *cubense* (Fernald, 1921, p. 192).

14. ***Panicum longifolium*** Torr.

Rather similar to *P. dichotomiflorum* in the appearance of the plant, and shape and size of the spikelets; distinguished by its longer first glume and more compact panicle. Found in two places in the interior of Queens County by Weatherby, and along the Tusket River in Yarmouth County.

The plants occurring on the sandy or gravelly beaches, and peaty margins of lakes in the Tusket River valley have been



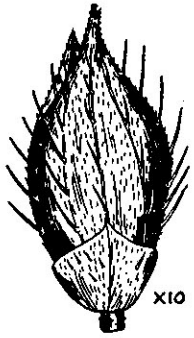
referred to a separate indigenous variety, var. ***tusketense*** Fern. The distinctions given between the typical species and this variety (*Rhodora* **23**: 192-193, 1921) are included in the

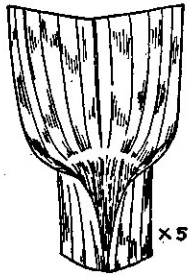
key. However, later collections from Queens County, and even from the Tusket valley seem to be more typical of the species than of the variety. The species is a coastal-plain plant ranging from N. S. to Florida and Texas.

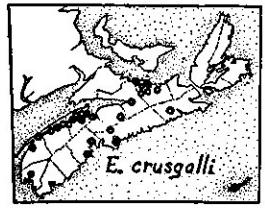
49. ECHINOCHLOA Beauv.

Coarse succulent annual grasses with flattened sheaths, flat blades, and hairy spikelets crowded along the branches of the branched panicle; ligule absent. Spikelets flattened on one side, pubescent, with hispid hairs along the nerves; first glume short; second glume and sterile lemma equal, both very variable as to the length of the awned tips.

1. ***Echinochloa crusgalli*** (L.) Beauv. BARNYARD-GRASS







Culms erect, up to 3 feet high, often branching at the base; panicle purplish tinged, large, with numerous spreading branches. A common weed in waste ground, along ditches, in gardens and around dwellings, generally growing in rich or moist soil; not becoming a bad weed in field or hay crops. Introduced from the old world, and common throughout.

This grass is very variable in all its characters. The plants may be large or small, the panicle greenish to purplish, the spikelets very hispid, or almost smooth, and the awns very long or nearly absent.

The ***typical*** plant has most of the spikelets with awns between 3 and 10 mm. long, with some of the spikelets awnless. Besides this form, the following two extremes may be expected to occur throughout.

Var. ***mitis*** (Pursh) Peterm. has the spikelets awnless or nearly so, any awns being less than 3 mm. long. Found at Grand Pré, and Halifax by M. S. Brown.

Var. ***longiseta*** (Trin.) Farwell is not so well marked, but has many of the spikelets with awns 2 to 3 cm. long. Grand Pré (coll. Brown).

Var. ***frumentacea*** (Roxb.) Wight has been occasionally cultivated in the province under the name Japanese Millet, but has not been observed as an escape. The racemes are thick with incurved, appressed branches; the spikelets are awnless and purplish.

50. SETARIA Beauv.

Introduced annual plants, with the inflorescence a terminal bristly spike-like panicle; spikelets awnless, but surrounded by one to many long bristles which arise below the spikelet and represent sterile branchlets; first glume about half the length of the spikelet, the second equalling the sterile lemma; ligule a row of hairs.

a. Bristles below each spikelet numerous; spikelets 3 mm. long, the sterile lemma transversely rugose; base of blade with a few flexuous hairs; margin of sheath glabrous

1. *S. lutescens*

a. Bristles below each spikelet 1 to 3; spikelets 2.0 to 2.5 mm. long, the sterile lemma smooth, or nearly so; blade glabrous; margin of sheath ciliate.

b. Spikelets articulated below the glumes, falling away entire; panicle cylindrical, not interrupted.

c. Panicle green, densely-flowered, about 6 mm. long; bristles 1.0 to 1.5 mm. long.

2. *S. viridis*

c. Panicle purplish, irregularly-flowered, generally 2 to 3 cm. long; bristles shorter, less than 1 cm. long.

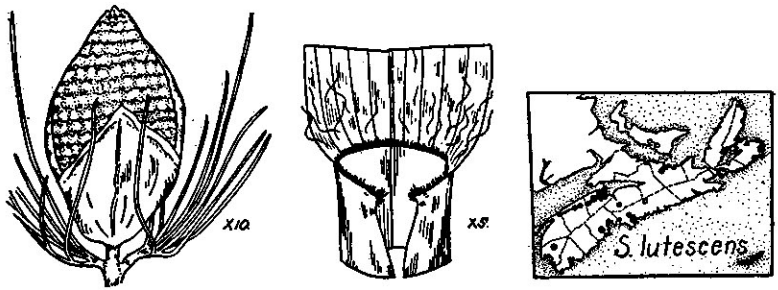
2a. *S. viridis*, var. *Weinmanni*

b. Spikelets articulated above the glumes, the fruit shelling out and leaving the glumes and sterile lemma behind; panicle large, usually much interrupted, green, yellow, or purplish.

3. *S. italica*

1. ***Setaria lutescens*** (Weigel) F. T. Hubb.

YELLOW BRISTLE-GRASS, YELLOW FOX-TAIL



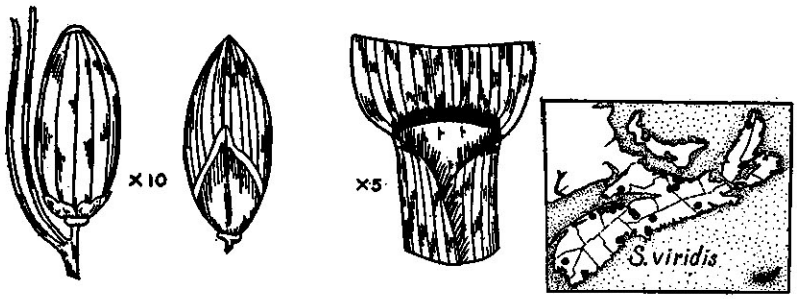
A weedy annual, distinguished by its rather narrow yellow panicles with relatively few large spikelets. Common in the Annapolis Valley on the light or sandy soils, in gardens, orchards and along roadsides; rarer throughout the rest of the province. Introduced from Europe, and widely distributed. (Formerly referred to *S. glauca* (L.) Beauv. *Rhodora* 18: 232, 1916).

2. ***Setaria viridis*** (L.) Beauv.

GREEN BRISTLE-GRASS, YELLOW FOX-TAIL

A weed with the numerous small spikelets forming a dense green panicle, growing in light to heavy soils, in gardens, waste places, orchards and roadsides. Common throughout the Annapolis Valley, and scattered in the rest of the province. Introduced from Europe, throughout North America.

2a. Var. ***Weinmanni*** (R. & S.) Brand is a smaller plant with a purplish color, and culms more or less geniculate at the



base. Scattered on light soils in the Annapolis Valley, and occasionally around railroad yards elsewhere. Introduced.

3. ***Setaria italica*** (L.) Beauv. FOX-TAIL MILLET

A cultivated form of *S. viridis* with more robust culms, broader blades and larger, often lobed panicles. Many different varieties and strains have been used or developed, so that plants of very diverse appearance may be found. Frequently cultivated for summer forage; occasionally found as an escape in waste places. Eurasia; widely introduced.

Setaria verticillata (L.)Beauv.

Recorded, from "Pictou County, N. S. (Sommer's Catalogue)" in Macoun's Catalogue; and in Sommer's Catalogue listed as "*Setaria verticillata.* W. River (Pictou County) Ly." The specimen in Lindsay's collection in the Provincial Museum, on which this record is presumably based, is a plant with large inflorescence which should probably be placed in *S. italica.*

TRIBE X. TRIPSACEAE

51. ZEA L.

Tall, stout, cultivated annual grass with pith-filled culms and broad coarse blades; spikelets unisexual; staminate spikelets 2-flowered and borne in racemes in a large terminal panicle, the tassel; pistillate spikelets with generally one fertile flower, borne in a dense and thickened spike, the ear, surrounded by numerous leaves, the husk, on short lateral branches. This tribe is so distinct and so readily recognised from all our other grasses that it has not been included in the keys. On account of the great modification of the flowering parts, it is believed to be among the most highly evolved of the grasses.

1. *Zea Mays* L. INDIAN CORN, MAIZE

Frequently cultivated in well-drained soils and in the warmer sections of the province. Grown for table use (Sweet Corn), or for ensilage, the whole plant being cut up while green. The crop is not grown profitably for feed grain in this region.

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