

North Dakota vascular plants: manual to the genera of Gramineae

Alexey Shipunov

October 30, 2015

Contents

Main Key	1
Group A	3
Group B	3
Group C	6
Group D	7
Groups E, F, G	11
Group F	12
Group G	13

Keys are compiled from multiple sources, mainly from the “Flora of North America”, from Ackerfield’s (2015) “Flora of Colorado” and Lesica’s (2012) “Manual of Montana Vascular Plants”.

Main Key

1. “Non-typical” grasses: either spikelets with burs, or inflorescence is a spadix or dense cylinder, or spikelets in capitate clusters, or glumes absent, or bulbs replace flowers, or base of the plant bulbous, or spikelets stalked into caterpillar-like short branches, or plants form “tumbleweeds” 2.
 - “Typical” grasses: no similarity with any statement from the above 15.
Diectomis fastigiata likely absent in North Dakota and therefore omitted in this key.
2. Spikelets enclosed in burs 3.
 - Spikelets not enclosed in burs 4.
3. Burs spiny; plants not strongly stoloniferous, monoecious *Cenchrus*
(*Cenchrus longispinus*)
 - Burs not spiny; plants strongly stoloniferous, dioecious *Buchloë*
- 4 (2). Inflorescence unisexual, the female spike with numerous spikelets in 8–24 rows (ears), with each spike surrounded by several leaf sheaths and husks, the male spikelets in panicles (tassels); blades flat, 2–12 cm wide, 3–9 dm long; corn *Zea*
(*Zea mays*)
 - Inflorescence unlike the above; not cultivated corn 5.

5. Spikelets in capitate clusters and sessile in fascicles of leaves at each branch tip; plants stoloniferous. Lemmas acuminate at the tip, with a tuft of hairs along the margins near the middle, otherwise glabrous, the spikelets not white-woolly *Munroa*
(*Munroa squarrosa*)
- Spikelets not in capitate clusters; plants stoloniferous or not 6.
6. Glumes absent, vestigial, or forming a small cup; riparian or emergent aquatic grasses 7.
- Glumes (at least one) present; plants otherwise various 8.
7. Monoecious annuals; pistillate spikelets positioned above the staminate spikelets; lemmas of pistillate spikelets awned; staminate spikelets with 6 stamens; ligules mostly > 5 mm long ...
..... *Zizania*
- Perennials with bisexual florets; lemmas unawned; stamens 3; ligules < 1 mm long ... *Leersia*
- 8 (6). Florets mostly forming bulblets with shiny, dark purple bases and exerted, linear green tips
..... *Poa*
(*Poa bulbosa*)
- Florets not forming bulblets 9.
9. Plants with bulbous bases (resembling a small onion). Lemmas awnless; spikelets with 2 to several florets. Lower glumes 1–9-veined, 2–16 mm long; distal florets in the spikelets often forming a morphologically distinct rudiment *Melica*
Does not occur but might be found in North Dakota.
- Plants lacking bulbous bases and not similar to the above in other respects 10.
10. Glumes equal, strongly ciliate along the margin, much longer than the lemmas, with horn-like awns; spikelets 1-flowered, flattened, tightly packed in a dense cylindric spike-like inflorescence
..... *Phleum*
(*Phleum pratense*)
- Plants unlike the above in all respects 11.
Alopecurus species (below) are superficially similar to *Phleum* but glumes fused, awnless.
11. Glumes equal in size, broad and laterally compressed; spikelets suborbicular, one-flowered, tightly stacked together, crowded on short branches of a narrow, elongate panicle
..... *Beckmannia*
(*Beckmannia syzigachne*)
- Glumes unlike the above; spikelets various 12.
12. Inflorescence a spike-like panicle composed of 3–13 widely spaced, widely spreading to often curved, spicate unilateral branches; spikelets sessile, 3–5.5 mm long, 1-flowered, embedded and appressed to the slender rachis branches, awnless or with a short awn-tip; at maturity the spike-like panicle breaking off at the base and forming a “tumbleweed” like plants ... *Schedonnardus*
(*Schedonnardus paniculatus*)
- Plants unlike the above in all respects; if spikelets embedded and appressed to the rachis then the spikelets with 2–5 florets and the terminal spikelets with awns 2–8 cm long 13.
13. Spikelets arranged in a dense, cylindrical spike-like panicle, subtended by long bristles ... 14.
- Spikelets unlike the above in all respects 15.
14. Bristles subtending the spikelets in 3 series—outer, inner, and with a central primary bristle 25–35 mm long; cultivated grasses occasionally persisting outside of gardens *Pennisetum*
(*Pennisetum glaucum*)
- Bristles subtending the spikelets in a single series; weedy or native grasses but not cultivated
..... *Setaria*

- 15 (1). Spikelets in pairs with one sessile fertile spikelet and one pediceled staminate or rudimentary spikelet, or sometimes the pediceled spikelet absent with just the pedicel remaining, or spikelets present in threes at the tips of branches; inflorescence usually with long hairs on the rachis and pedicel **Group A**
 – Spikelets unlike the above; rachis and pedicel hairy or not 16.
16. Inflorescence branches bearing spikelets all on one side of the rachis **Group B**
 – Spikelet arrangement not as above 17.
17. Spikelets truly sessile, arranged in 2-sided spikes or spike-like racemes **Group C**
 – Spikelets pedicellate, arranged in panicles or racemes (sometimes the spikelets arranged in very dense spike-like, cylindrical panicles or racemes, but with short pedicels present upon dissection or when bending) 18.
18. Spikelets with one well-developed floret (four, sometimes five or six, visible scales) ... **Group D**
 – Spikelets with two to several well-developed florets (more than six scales visible)
 **Groups E, F, G**

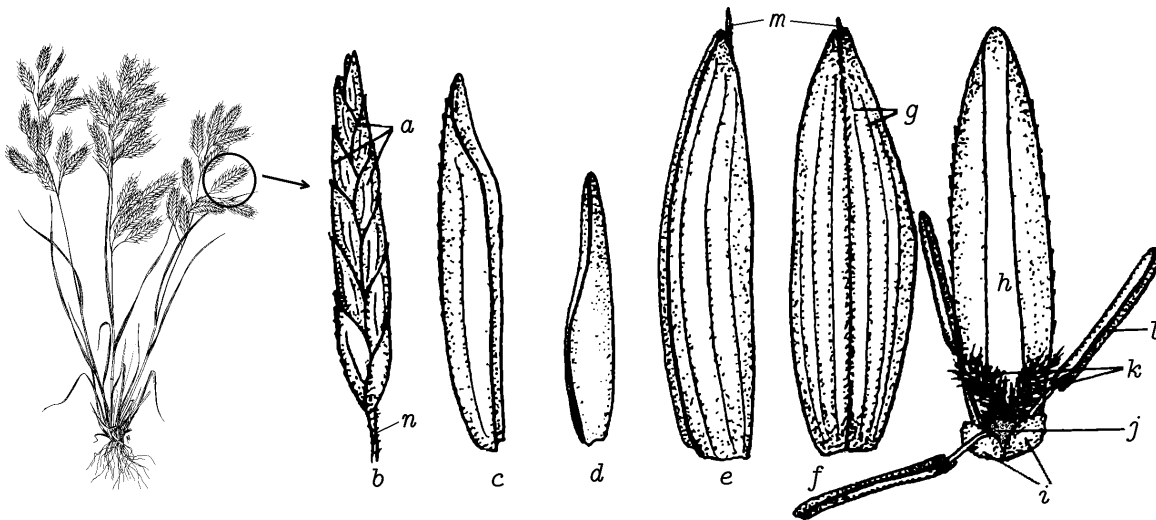


Figure 1. Reproductive organs of grasses. *a, e, f* lemmas (note the small awn); *b* spikelet; *c* upper palea; *d* lower palea; *g* veins; *h* glume; *i* lodicles; *j* ovary; *k* stigmas; *l* stamen; *m* awn; *n* pedicel. (From various sources.)

Group A

Spikelets in pairs.

19. Spikelets arranged in one to several spike-like branches 20.
 – Spikelets not arranged in spike-like branches 21.
20. Spike-like branches solitary at the tips of long, slender peduncles *Schizachyrium*
 (*Schizachyrium scoparium*)
 – Spike-like branches not solitary at the ends of long, slender peduncles; pedicelled spikelets mostly over 5.5 mm long; spike-like branches more or less digitately arranged ... *Andropogon*
- 21 (19). Inflorescence densely hairy with tawny, long hairs; pedicelled spikelet absent, with just the pedicel remaining; leaf blades 1–4 mm wide *Sorghastrum*
 (*Sorghastrum nutans*)
 – Inflorescence not densely hairy with tawny, long hairs; pedicelled spikelet present; leaf blades 5–100 mm wide *Sorghum*

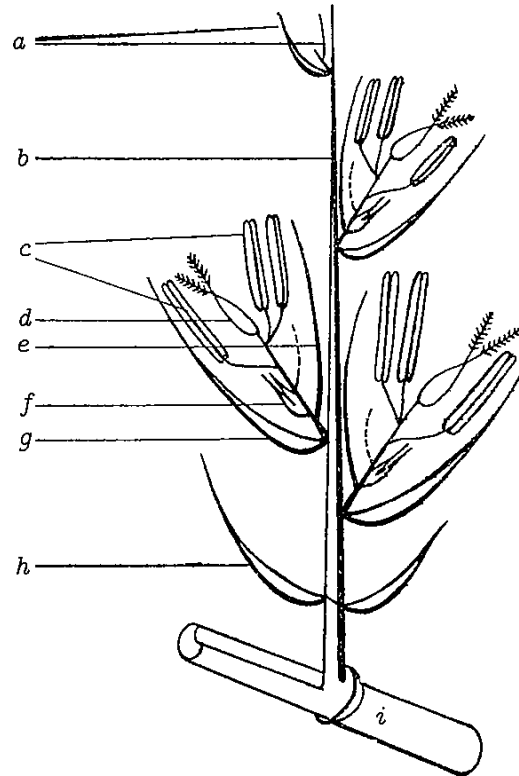


Figure 2. Spikelet. *a* sterile flower; *b* rachilla (axis of the spikelet); *c* stamens; *d* pistil; *e* palea; *f* lodicules; *g* lemma; *h* glume; *i* rachis (axis of the spike). (From various sources.)

Group B

Inflorescence branches bearing spikelets all on one side of the rachis.

22. Inflorescence more or less digitate (in digitate whorls, or of a single terminal whorl of branches) 23.
 – Inflorescence not digitate 25.
23. Lemmas or glumes awned. Glumes unawned; lemma awns 3–10 mm long, straight; lemma keels sparsely to densely hairy; leaf margins glabrous to shortly scabrous at the base *Chloris*
 (*Chloris virgata*)
 – Lemmas or glumes not awned 24.
24. Spikelets 4–8 mm long, with 3-several florets *Eleusine*
 (*Eleusine indica*)
 – Spikelets 2–3.5 mm long, with one fertile floret. Ligules membranous; plants not mat-forming, lacking stolons and rhizomes, annuals *Digitaria*
- 25 (22). Spikelets or spikes pendulous and hanging to one side of the rachis. Spikelets with 1 fertile floret and sometimes with 1 reduced floret above; fertile lemma with 3 awn tips *Bouteloua*
 (*Bouteloua curtipendula*)
 – Spikelets not as above 26.
26. Inflorescence a spike-like panicle composed of 3–13 widely spaced, spreading to curved, spike-like unilateral branches; spikelets sessile, 3–5.5 mm long, embedded and appressed to the slender branches, awnless or with a short awn-tip; at maturity the panicle breaking off at the base and forming a “tumbleweed” like plants *Schedonnardus*
 (*Schedonnardus paniculatus*)

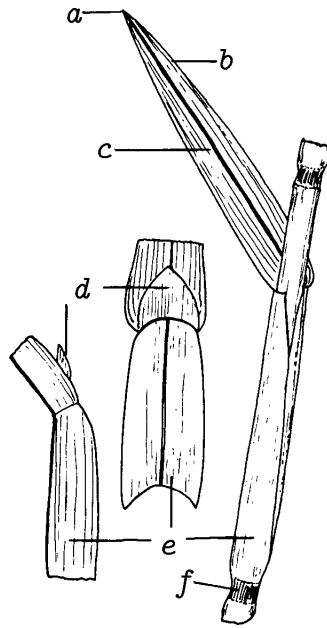


Figure 3. Grass leaves. *a* apex; *b* blade; *c* midrib (midvein); *d* ligule; *e* sheath; *f* node. (From Pohl, 1954.)

- Plants unlike the above 27.
- 27. Plants dioecious, stoloniferous; staminate spikelets 2-flowered, 4–6 mm long, in 2 rows on each branch, disarticulating at the branch and falling as a single unit *Buchloë*
 - Plants monoecious, stoloniferous or not; spikelets unlike the above 28.
- 28. Spikelets arranged in a dense brush-like or eyebrow-like spike or spikes 29.
 - Spikelets not arranged as above 30.
- 29. Spikelets 1–4 per stem, spreading to ascending, with 1 or more reduced florets above the perfect one (these sometimes reduced to awns); rhizomes absent *Bouteloua*
 - Spikelets 4–30 per stem, strongly ascending, without reduced florets above the perfect one; plants strongly rhizomatous *Spartina*
- 30 (28). Spikelets with two or more well-developed florets; lemmas not firm and cartilaginous, awned or not; ligule membranous 31.
 - Spikelets with one well-developed floret; lemmas awnless, firm and cartilaginous; ligule hairy, membranous, or absent 33.
- 31. Spikelets crowded in semi-orbicular to triangular clusters at the ends of stiff, wiry branches; glumes and lemmas coarsely ciliate on the keel, usually with a short awn-tip about 1 mm or less in length *Dactylis*
(*Dactylis glomerata*)
 - Spikelets in linear or oblong panicle branches, not crowded in dense clusters; glumes and lemmas unlike the above 32.
- 32. Lemmas with 5–9 prominent nerves, glabrous, blunt-tipped; plants small, 0.2–1.5 dm tall, usually prostrate or spreading *Sclerochloa*
Sclerochloa dura might be found in North Dakota.
 - Lemmas 3-nerved, the nerves usually hairy at least below, blunt or acute at the tips; plants usually larger, 0.5–15 dm tall, erect. Ligules 2–8 mm long, attenuate and becoming lacerate at maturity; lemmas usually awned or sometimes acute, silvery-hairy on the nerves in the lower half *Leptochloa*
(*Leptochloa fusca*)

- 33 (30). Ligules absent; spikelets with stiff hairs, awned or with a sharp mucronate tip *Echinochloa*

 – Ligules present, hairy or membranous; spikelets glabrous or with soft hairs, awnless. Lower glume absent or inconspicuous; rachis often flattened and broadly winged; plants caespitose to rhizomatous *Paspalum*
Paspalum setaceum might be found in North Dakota.

Group C

Spikelets sessile, arranged in 2-sided spikes or spike-like racemes.

34. Spikelets embedded and appressed into the rachis flush with the nodes (resembling a cylinder); spikelets 9–12 mm long, with 2–5 florets, the terminal spikelet with awns 20–80 mm long, the other spikelets with shorter awns 2–9 mm long *Aegilops*
 (*Aegilops cylindrica*)
 – Spikelets not embedded and appressed into the rachis; plants otherwise unlike the above ... 35.
35. Spikelets arranged edgewise at the nodes of the rachis; first glume absent except in the terminal spikelet *Lolium*
 – Spikelets not arranged edgewise to the rachis; first glume usually present 36.
36. Spikelets widely divergent from the rachis at a wide angle (mostly about 35°–90°) 37.
 – Spikelets ascending, not widely divergent from the rachis at a wide angle 38.
37. Spikes ovate, 0.8–2.5 cm long; annuals *Eremopyrum*
Eremopyrum triticeum was not observed in North Dakota but could be found here.
 – Spikes rectangular to lanceolate, 3–10 cm long; perennials *Agropyron*
 (*Agropyron cristatum*)
- 38 (36). Spikelets 3 per node, one-flowered, the central spikelet fertile and the two lateral spikelets reduced (often to awns) and on short pedicels *Hordeum*
 – Spikelets 1–7 per node, if with 3 spikelets per node then the spikelets all fertile and the lateral spikelets not reduced and pedicellate, or the spikelets with 2-several flowers 39.
39. Annuals; spikelets tightly packed into long, dense spikes 5–20 cm long, usually with long, ascending awns over 6 mm; cultivated crop occasionally escaping along roadsides 40.
 – Perennials; spikelets unlike the above in all respects; not a cultivated crop 42.
40. Spikelets 3 per node, one-flowered; lemmas with long awns mostly over 3 cm long, these tightly appressed and ascending, the lowest awns equal to or longer than the upper awns ... *Hordeum*
 (*Hordeum vulgare*)
 – Spikelets solitary at each node, with 2 to several flowers; lemmas various, if long-awned then unlike the above 41.
41. Glumes linear-subulate, 1-nerved; lemmas strongly ciliate along the upper keel *Secale*
 (*Secale cereale*)
 – Glumes ovate to lanceolate, 5–7-nerved, hard; lemmas sometimes slightly ciliate along the keel *Triticum*
- 42 (39). Glumes and lemmas with conspicuous, long awns mostly over 6 mm long *Elymus*
 – Glumes and lemmas lacking awns or the awns shorter than 6 mm 43.
43. Spikelets 2–7 at most or all nodes 44.
 – Spikelets solitary at all or most nodes 48.

44. Glumes very narrow (about 1 mm wide or less) and gradually tapering to a sharp point, 1-nerved 45.
 – Glumes linear-lanceolate (about 2–4 mm wide), usually at least 3-nerved near the middle ... 46.
45. Spikelets 2 per node (or if 3 or more per node then the leaf blades 8–20 mm wide), 9–25 mm long, 2–7-flowered; base of the plants lacking numerous, old shredded leaf bases *Leymus*
 – Spikelets mostly 3 per node (look at multiple nodes, sometimes a few have 2 per node), 7–9 mm long, 1–2-flowered; leaf blades mostly 1.5–7 mm wide; base of the plants with numerous old, shredded leaf bases that become fibrous *Psathyrostachys*
(Psathyrostachys juncea)
46. Spikelets 3–8 per node, arranged in a dense spike 15–35 cm long; glumes 12–25 mm long; lemmas softly hairy, at least toward the base *Leymus*
 This species (*Leymus racemosus*) could be found in North Dakota.
 – Spikelets 2 per node, arranged in a spike 4–20 cm long; lemmas glabrous to scabrous 47.
47. Rhizomes present; glumes asymmetrical, slightly curving to one side toward the tip, tending to taper from below midlength to a pointed tip; spikelets solitary or sometimes 2 per node; leaf blades usually glaucous, bluish-green *Pascopyrum*
(Pascopyrum smithii)
 – Rhizomes absent, plants caespitose or tufted; glumes symmetrical and straight, not curving to one side, tapering from midlength or higher to a pointed tip; spikelets 2 per node; leaf blades usually green *Elymus*
- 48 (43). Glumes truncate or rounded at the tips, or blunt with a small mucronate tip; one margin of the leaf sheath usual ciliate (at least on the middle or lower sheaths) *Thinopyrum*
 – Glumes gradually tapering to an acute or awned tip; one margin of the leaf sheath usually not ciliate 49.
49. Spikelets not imbricate, the tips of the lower spikelet barely reaching the base of the spikelet above or overlapping it by a small amount; lemma awns strongly divergent to arcuate at maturity 50.
 – Spikelets mostly all imbricate and closely overlapping except sometimes low on the spike, the tips of the lower spikelet reaching the middle of the spikelet above; lemmas awnless or awns various 51.
50. Glumes about $\frac{1}{2}$ the length of the spikelet, acute to obtuse at the tips *Pseudoroegneria*
(Pseudoroegneria spicata)
 – Glumes about $\frac{1}{4}$ – $\frac{1}{3}$ the length of the spikelet, the tips acute or with a short awn 0.5–4 mm long *Elymus*
(Elymus albicans)
- 51 (49). Rachis internodes short, 2.5–3.5 mm long or shorter; glumes lanceolate and 3-nerved, 3–5 mm long, somewhat twisted, with a short awn 1–3 mm long *Agropyron*
 – Rachis internodes more than 5 mm long; glumes various 52.
52. Glumes very narrow (about 1 mm wide or less) and gradually tapering to a sharp point, 1-nerved (subulate); spikelets occasionally paired at some nodes *Leymus*
 – Glumes linear-lanceolate (about 2–4 mm wide), 3–7-nerved near the middle; spikelets all solitary or sometimes 2 per node 53.
53. Glumes asymmetrical, slightly curving to one side toward the tip; leaf blades usually glaucous, bluish-green *Pascopyrum*
(Pascopyrum smithii)

- Glumes symmetrical and straight, not curving to one side; leaf blades usually green *Elymus*
×*Elyhordeum* is the name given to hybrids between *Elymus* and *Hordeum*. These hybrids are fairly common. All appear to be sterile, and their characters are intermediate between parental species.

Group D

Spikelets with one well-developed floret.

54. Glumes equal, strongly ciliate along the margin, much longer than the lemmas, with horn-like awns; spikelets flattened, tightly packed in a dense cylindrical spike-like inflorescence . . . *Phleum*
(*Phleum pratense*)
 - Plants unlike the above in all respects 55.
55. Glumes equal in size, broad and laterally compressed; spikelets suborbicular, tightly stacked together, crowded on short branches of a narrow, elongate panicle *Beckmannia*
(*Beckmannia syzigachne*)
 - Glumes unlike the above; spikelets various 56.
56. Spikelets arranged in a dense, cylindrical spike-like panicle, subtended by long bristles . . . 57.
 - Spikelets unlike the above in all respects 58.
57. Bristles subtending the spikelets in 3 series - with an outer, inner, and central primary bristle 25–35 mm long; cultivated grasses occasionally persisting outside of gardens *Pennisetum*
(*Pennisetum glaucum*)
 - Bristles subtending the spikelets in a single series; weedy or native grasses but not cultivated *Setaria*
- 58 (56). Lemmas 3-awned at the apex. Plants not stoloniferous, monoecious *Aristida*
 - Lemmas awnless or with a single awn 59.
59. Spikelets with one upper fertile terminal floret and one lower sterile floret consisting only of a single lemma (resembling a glume and usually equal to or slightly longer than the upper glume), usually with prominent nerves; lemma of fertile floret smooth and shiny, hard and indurate, with inrolled margins over the palea; disarticulation below the glumes 60.
 - Spikelets unlike the above 62.
60. Ligules absent; spikelets oval, with hispid to bristly hairs (these often pustulate at the base); inflorescence an open panicle with densely flowered branches *Echinochloa*
 - Ligules present (either a membrane or tuft of hairs, sometimes as short as 0.1 mm); spikelets and inflorescence various 61.
61. Spikelets usually hairy, with mostly rounded tips; panicle 3–10 cm long, with relatively few spikelets *Dichanthelium*
 - Spikelets glabrous or merely scabrous on the nerves, with acute, acuminate, or awned tips; panicle 5–50 cm long, with numerous spikelets *Panicum*
- 62 (59). Spikelets with one fertile, central floret with 1–2 bristle-like or narrowly lanceolate sterile florets below (these can be very difficult to see), awnless; glumes equal or nearly so, laterally flattened and keeled, the keel often with a thin, pale wing; leaves flat *Phalaris*
 - Spikelets lacking bristle-like or narrowly lanceolate sterile florets below, awned or not; glumes various, but never winged; leaves flat or involute 63.

63. Lemmas hard and indurate (much more so than the glumes), closely enclosing the palea and grain (usually with overlapping margins), without evident nerves, usually terminally awned (the awn sometimes over 2 cm long) 64.
 – Lemmas not hard and indurate or closely enclosing the palea, usually at least 1-nerved, awned or not (but the awn never over 2 cm long) 69.
64. Awns 9–25 cm long; glumes 15–60 mm long *Hesperostipa*
 – Awns less than 7 cm long (or occasionally fallen or absent); glumes 2.5–25 mm long 65.
65. Lemma bases with a dense ring of hairs at the top of the callus; flowering stems widely spreading or sometimes prostrate, with only 2–3 leaf sheaths and reduced leaf blades *Oryzopsis*
 (*Oryzopsis asperifolia*)
 – Lemmas lacking a dense ring of hairs at the base; flowering stems usually unlike the above ...
 66.
66. Lemmas densely covered with hairs 1.5–6 mm long *Achnatherum*
 – Lemmas glabrous or shortly hairy with hairs less than 1 mm long 67.
67. Glumes 2.5–5 mm long, with acute to rounded tips; lemma oblong to elliptic, often awnless or the awn early-deciduous, 1.8–6 mm long; callus rounded, not sharp; cauline leaf blades 0.5–10 mm wide; florets 1.5–6 mm long *Piptatheropsis*
 – Glumes 6–8 mm long, with acuminate tips; lemma with the awn 10–25 mm, deciduous, slightly twisted, flexuous; callus blunt; cauline leaf blades 8–16 mm wide; florets 4.5–7.5 mm long ...
 *Patis*
 (*Patis racemosa*)
 = Glumes 5.5–15 mm long, the tips acuminate or shortly awned; lemma lanceolate, or rarely oblong-elliptic, awned 2–11 mm long; callus pointed, blunt or often sharp 68.
68. Lemmas tightly closed (unable to pry apart, the margins strongly overlapping their entire length at maturity), glabrous to uniformly hairy, minutely papillate, the tips not lobed, tapering to a crown; palea not evident, $\frac{1}{4}$ – $\frac{1}{2}$ the length of the lemma, glabrous *Nassella*
 (*Nassella viridula*)
 – Lemma margins not strongly overlapping their entire length (able to pry the lemma apart, look for a line on the lemma), sparsely to densely uniformly hairy, not minutely papillate, the tips often 1–2-lobed; palea $\frac{1}{2}$ to subequal to the lemma, usually hairy *Achnatherum*
 \times *Achnella caduca* is a sterile hybrid between *Achnatherum hymenoides* and *Nassella viridula*. It differs from *Achnatherum hymenoides* in its longer glumes and florets; from *Nassella viridula* in its more saccate glumes, longer lemma hairs, and well-developed palea.
- 69 (63). Florets subtended by a tuft of long callus hairs, the hairs at least $\frac{1}{3}$ as long as the lemmas 70.
 – Florets not subtended by a tuft of long callus hairs, or with a tuft of short callus hairs to 0.5 mm 72.
70. Lemmas or glumes awned from the tips *Muhlenbergia*
 (*Muhlenbergia racemosa*)
 – Lemmas awnless or awned from the middle or below; glumes awnless 71.
71. Lemmas awned, usually from the back or near the middle (this sometimes included in the spikelet and difficult to distinguish from callus hairs), or rarely the awn absent; glumes scabrous on the keel; plants rhizomatous or tufted, but the rhizomes lacking leaf-like scales, 1.5–15 dm; ligule membranous *Calamagrostis*
 – Lemmas awnless; glumes not scabrous on the keel; plants rhizomatous, the rhizomes covered with leaf-like scales, to 25 dm; ligule of hairs *Calamovilfa*
 (*Calamovilfa longifolia*)
72. Lemmas and/or glumes awned, the awn 1 mm or longer 73.

- Lemmas and glumes awnless, or the awn less than 1 mm long 80.
- 73. Glumes nearly equal, tipped with awns of nearly equal length 74.
 - Glume unlike the above 75.
- 74. Lemmas 0.5–1.5 mm long, glabrous; disarticulation below the glumes; plants tufted, lacking rhizomes *Polypogon*
(*Polypogon monspeliensis*)
 - Lemmas 1.9–4 mm long, long-hairy on the callus and sometimes also on the midnerve and margins; disarticulation above the glumes; plants rhizomatous with long, creeping scaly rhizomes *Muhlenbergia*
- 75 (73). Lemmas awned from the back, near the middle or below 76.
 - Lemmas awned from the tip or above the middle 78.
- 76. Spikelets arranged in an open to contracted panicle, not dense, cylindric and spike-like; glumes scabrous on the keels but otherwise glabrous *Agrostis*
 - Spikelets arranged in a dense, cylindric spike-like panicle; glumes hairy on the keels and along the nerves, or uniformly hairy over the entire surface 77.
- 77. Lemmas glabrous; glumes equal; hairy on the keels and along the nerves, or occasionally hairy over the entire surface; spikelets with one fertile floret and no reduced florets *Alopecurus*
 - Lemmas with yellowish hairs; glumes conspicuously unequal, hairy throughout; spikelets with the middle floret perfect and two reduced florets on either side (reduced to sterile lemmas) ...
..... *Anthoxanthum*
(*Anthoxanthum monticola*)
- 78. Awns arising from the tip of the lemma 79.
 - Awns arising from below the tip of the lemma. Paleas absent or minute and to 0.5 mm long; rachilla not extended *Agrostis*
- 79. Glumes equal to or longer than the lemma; disarticulation below the glumes; spikelets 2.5–4 mm long, strongly compressed; leaves flat, 4–15 mm wide *Cinna*
 - Glumes shorter than the lemma; disarticulation above the glumes; spikelets terete, not strongly compressed; leaves various *Muhlenbergia*
- 80 (72). Glumes of two distinctly different shapes, the lower glume narrow and 1-nerved with an acute tip, the upper glume broad and obovate, 3–5-nerved, with a rounded or broadly acute tip *Sphenopholis*
 - Glumes more or less similar in shape (equal or not in length) 81.
- 81. Low, mat-forming, prostrate annuals; spikelets 1.5–2.5 mm long, in a dense, cylindric, spike-like panicle 1.5–5 cm long, often purplish-black-tinged *Crypsis*
Was not found in North Dakota but possibly occurs here.
 - Plants unlike the above in all respects 82.
- 82. Ligules composed entirely or mostly of hairs, or shortly membranous and topped with long, ciliate hairs; apex of leaf sheaths with or without a tuft of white hairs *Sporobolus*
 - Ligules a membranous sheath, the top not long-hairy but often lacerate; apex of leaf sheath lacking a tuft of white hairs 83.
- 83. Glumes shorter than the lemma; lemma glabrous or often hairy, at least along the nerves
..... *Muhlenbergia*
 - Glumes equal to or longer than the lemma; lemma glabrous or scabrous on the nerves, or just the callus sparsely hairy with hairs to 0.5 mm long 84.

84. Leaves mostly basal, involute or flat and narrow, mostly 0.5–2 mm wide; plants tufted, lacking rhizomes or stolons; ligule 0.5–3 mm long. Paleas absent or minute and to 0.2 mm long; rachilla not extended *Agrostis*
(*Agrostis scabra*)
- Stem leaves well-developed, flat, 2–10 mm wide; plants usually with rhizomes or stolons, occasionally tufted, sometimes decumbent at the base and rooting at the lower nodes; ligule 1–8 mm long 85.
85. Disarticulation above the glumes; palea absent or to about $\frac{1}{2}$ the length of the lemma; spikelets not strongly compressed *Agrostis*
- Disarticulation below the glumes; palea slightly shorter than the lemma; spikelets strongly compressed to subterete. Spikelets 2.5–4 mm long; plants rhizomatous, 5–20 dm tall *Cinna*

Groups E, F, G

Spikelets with 2-several well-developed florets.

86. Rachillas (axes of spikelets) long-hairy (hairs 6–10 mm long); leaves flat, 15–40 cm long and 2–4 cm wide; inflorescence large, 15–35 cm long; plants 2–6 m tall, “reedlike” with hollow internodes, found along ditches and rivers *Phragmites*
(*Phragmites australis*)
- Rachillas various but not long-hairy; plants otherwise unlike the above in all respects 87.
87. Stems, leaves, and sheaths velvety-hairy; spikelets 2-flowered, the lower floret perfect and the upper floret staminate; glumes longer than the florets *Holcus*
(*Holcus lanatus*)
- Plants unlike the above in all respects 88.
88. Spikelets flattened, 9–20 mm long, with 5–20 florets, usually imperfect with staminate and pistillate flowers in separate inflorescences and often on separate plants; leaves with a tuft of long ciliate hairs on each side of the collar; ligule a short-ciliate membrane; leaf blades distichous; plants strongly rhizomatous, often found in alkaline swales *Distichlis*
(*Distichlis spicata*)
- Plants unlike the above in all respects 89.
89. Ligules composed mostly or entirely of a fringe of ciliate hairs 90.
- Ligules membranous 94.
90. Lemma awns with the lower portion flattened and twisted; glumes about equal, longer than the florets; lemma margins usually hairy *Danthonia*
- Lemmas awnless or if awned then the lower portion of the awn not flattened but sometimes twisted; glumes and lemmas various 91.
91. Lemmas glabrous or scabrous on the keel. Plants caespitose or sometimes stoloniferous; florets perfect, usually less than 1 mm of rachilla showing between florets; inflorescence branches with a small, swollen base *Eragrostis*
- Lemmas hairy on the nerves or at the base 92.
92. Glumes to 2 mm long; lemmas with a short awn to 2 mm long; leaf sheaths present the entire length of the stem and usually swollen at the base, the spikelets often hidden in the upper sheaths; annuals *Triplasis*
(*Triplasis purpurea*)
- Glumes 3–10 mm long; lemmas unawned or awned to 4 mm; leaf sheaths unlike the above; perennials. Panicle open and diffuse with wide-spreading branches; lemmas hairy just at the base 93.

93. Ligules ciliate. Spikelets with (1)2–6 florets. Lemmas acute, entire or with 3 minute teeth, glabrous or shortly pubescent on the distal $\frac{2}{3}$. Grows on sandy soils *Redfieldia*
(*Redfieldia flexuosa*)
- Ligules membranous, sometimes ciliolate, not ciliate. Spikelets with 1(2–3) florets. Lemmas variable. Ecology diverse *Muhlenbergia*
- 94 (89). Spikelets densely crowded in 1-sided semi-orbicular to triangular clusters at the ends of stiff, wiry branches; glumes and lemmas coarsely ciliate on the keel, usually with a short awn-tip about 1 mm or less *Dactylis*
(*Dactylis glomerata*)
- Spikelets not densely crowded in 1-sided semi-orbicular to triangular clusters; glumes and lemmas various 95.
95. Spikelets 1.8–3.5 cm long; glumes longer than the lowest floret and usually longer than the uppermost floret *Avena*
- Spikelets less than 1.8 cm long, or if longer then the glumes shorter than the lowest floret ... 96.
96. Leaf auricles conspicuous and prominent (about 1 mm in length or longer, sometimes shrinking and breaking off when dried); plants to 1.5 (2) m tall *Schedonorus*
(*Schedonorus pratensis*)
- Leaf auricles absent or small and inconspicuous; plants various 97.
97. Lemmas awned, the awn over 0.5 mm long **Group F**
- Lemmas awnless or tipped with a short mucro to 0.5 mm long **Group G**

Group F

Spikelets with 2 or more florets; lemmas awned.

98. At least some lemmas awned from the back (from near the middle or at the base of the lemma); awn usually twisted or bent; at least one glume equal to or longer than the lowest floret ... 99.
- Lemmas awnless or awned from at or near the tip, or awned to $\frac{1}{3}$ the length of the lemma (be careful because sometimes awned from a bifid or toothed apex and appearing awned from the back at first glance); awn straight, twisted, or bent; glumes various 102.
99. Spikelets arranged in a dense, spike-like panicle, the middle perfect and lateral 2 reduced to sterile lemmas, broadly ovate; glumes nearly equal in length, as long as the florets; plants sweet-smelling when dried *Anthoxanthum*
(*Anthoxanthum monticola*)
- Spikelets in an open or narrow panicle, but not dense and spike-like 100.
100. Awns (of lower florets) 10–20 mm long; spikelets 7–15 mm long 101.
- Awns 0.5–8 mm long; spikelets 2–7 mm long. Callus hairs short (about $\frac{1}{5}$ – $\frac{1}{4}$ the length of the lemma) or absent; lemmas awned from near the base; leaves flat to involute, 0.3–4 mm wide *Deschampsia*
101. Spikelets mostly 3–6-flowered; lemmas 10–12 mm long; leaves flat, 2–4 mm wide *Avenula*
(*Avenula hookeri*)
- 102 (98). Leaf sheath closed to the top or nearly so 103.
- Leaf sheath open more than $\frac{1}{2}$ the length 104.
103. Callus long-hairy with hairs 1–2 mm long; leaf sheath glabrous *Schizachne*
(*Schizachne purpurascens*)
- Callus unlike the above; leaf sheath usually hairy or sometimes glabrous *Bromus*

- 104 (102). Lemmas awned from a bifid apex (look closely, this can be minute). Awns bent or twisted, 3–15 mm long; spikelets with 2–4 florets; lemmas 5-nerved, not silvery-hairy along the margins; uppermost floret with the rachilla hairy and prolonged *Trisetum*
 – Lemmas awned from an entire apex 105.
105. Annuals; inflorescence a narrow panicle, the spikelets often more or less situated on one side of the rachis *Vulpia*
 (*Vulpia octoflora*)
 – Perennials; inflorescence various but the spikelets usually not situated on one side of the rachis 106.
106. Lemmas 5–7-nerved; spikelets 2–10-flowered *Festuca*
 – Lemmas 3-nerved; spikelets 2-flowered *Muhlenbergia*

Group G

Spikelets with 2 or more florets; lemmas awnless.

107. Glumes very dissimilar, the upper glume broad and much wider than the lower, obovate and 3–5-nerved, the lower glume narrow, acute, and 1-nerved; spikelets 2–3-flowered; paleas colorless *Sphenopholis*
 – Glumes unlike the above; spikelets and paleas various 108.
108. Inflorescence a dense, spike-like panicle, the rachis densely short-hairy; paleas colorless, often as long as the lemmas; lemmas glabrous or scabrous just along the keel; leaves mostly basal, 1–3 mm wide *Koeleria*
 (*Koeleria macrantha*)
 – Inflorescence not a dense, spike-like panicle, the rachis various; paleas with at least a green central nerve, shorter than to as long as the lemmas; lemmas various; leaves various 109.
109. Uppermost floret with the rachilla hairy and prolonged; upper glume about equal to the lowermost floret; spikelets with 2–3 florets *Trisetum*
 – Uppermost floret without a prolonged rachilla, or the rachilla extended but glabrous; upper glume usually shorter than the lowermost floret; spikelets various 110.
110. Spikelets broadly ovate, golden-brown; glumes nearly equal in length, as long as the florets; plants sweet-smelling when dried *Hierochloë*
 – Spikelets unlike the above 111.
111. Lemmas with 3 conspicuous nerves (with two lateral nerves and one central midnerve) ... 112.
 – Lemmas with 5 or more nerves, or sometimes the lateral nerves inconspicuous and just the central midnerve evident 113.
112. Leaf sheaths closed to the top or nearly so; inflorescence an open panicle with whorled branches; lemmas glabrous; glumes truncate; plants frequently rooting at the lower nodes ... *Catabrosa*
 (*Catabrosa aquatica*)
 – Leaf sheaths open to the base or nearly so; inflorescence branches not whorled; lemmas glabrous or hairy on the nerves; glumes acute; plants not rooting at the lower nodes. Lemma tips acute; spikelets 1.2–4 mm long, 2–3-flowered; inflorescence unlike the above *Muhlenbergia*
113. Leaf sheaths closed to the top or nearly so 114.
 – Leaf sheaths open more than $\frac{1}{2}$ the length 117.
114. Plants with bulbous, swollen bases or the spikelets hanging on one side of the rachis; spikelets less than 2.6 mm wide and not strongly inflated *Melica*
 Does not occur but might be found in North Dakota.

-
- Plants lacking bulbous, swollen bases; if the spikelets hanging on one side of the rachis, then these over 2.6 mm wide in side view and strongly inflated 115.
 - 115. Lemmas 6–35 mm long, the tips usually not scarious, often awned *Bromus*
 - Lemmas 2–7 mm long, the tips usually scarious, awnless 116.
 - 116. Lemmas glabrous, 7-nerved *Glyceria*
 - Lemmas cobwebby at the base or the keel and veins hairy below, 5-nerved *Poa*
 - 117. Lower glume 3–5-nerved and upper glume 5–9-nerved; inflorescence a short panicle 1–4 cm long, the spikelets generally arranged on one side of the rachis, blunt-tipped; plants small, 0.2–1.5 dm tall, often prostrate or spreading *Sclerochloa*
Sclerochloa dura might be found in North Dakota.
 - Lower glume 1–5-nerved and upper glume 3–7-nerved; inflorescences terminal, open panicles; plants 7–20 dm, grow on wetlands *Scolochloa*
(*Scolochloa festucea*)
 - = Lower glume 1–3-nerved and upper glume 3-nerved; plants otherwise unlike the above ... 118.
 - 118. Lemmas with nerves parallel and not converging at the tip; lower glumes 0.4–2.1 mm long and upper glumes 0.8–2.7 mm long 119.
 - Lemmas with nerves converging at the tip; lower glumes 2.5–10 mm long and upper glumes 3–9 mm 120.
 - 119. Lemma nerves faint, not prominently raised; plants caespitose, lacking rhizomes ... *Puccinellia*
 - Lemma nerves conspicuous and prominently raised; plants rhizomatous *Torreyochloa*
Does not occur in North Dakota but might be found here.
 - 120. Lemmas tips scarious, obtuse to broadly acute; lemma nerves usually conspicuously hairy at least below, or with a tuft of cobwebby hairs at the base *Poa*
 - Lemma tips usually not scarious, acute to acuminate; lemma nerves glabrous to scabrous but never hairy, lacking a tuft of cobwebby hairs at the base. Axis of the spikelet scabrous. Plants monoecious, lacking rhizomes or with short rhizomes; inflorescence unlike the above; leaves involute or flat *Festuca*