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The Identification of the More Important Prairie Hay Grasses of Nebraska by Their Vegetative Characters

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COLLEGE OF AGRICULTURE UNIVERSITY OF NEBRASKA
AGRICULTURAL EXPERIMENT STATION
RESEARCH BULLETIN 65

**The Identification of the More Important
Prairie Hay Grasses of Nebraska by
Their Vegetative Characters**

F. D. KEIM, G. W. BEADLE AND A. L. FROLIK
Department of Agronomy

LINCOLN, NEBRASKA
DECEMBER, 1932

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¹ The species of grasses included are classified as upland, midland, cultivated, and ruderal. The terms "upland" and "midland" are used in the government standards for prairie hay as distinguishing between hay grown on upland virgin meadows and that grown on low, wet ground. The term "ruderal" is applied to introduced, undesirable species.

The Identification of the More Important Prairie Hay Grasses of Nebraska by Their Vegetative Characters ²

F. D. KEIM, G. W. BEADLE³ AND A. L. FROLIK

It is convenient and sometimes necessary to identify the grasses in their vegetative stage of growth. This is especially desirable in a study of the vegetation of native hay meadows and permanent pastures. This key is prepared as a guide in the identification of the more important prairie hay grasses of Nebraska. The meadows are often harvested before the floral parts of many of the grasses appear. If it is desired, therefore, to study the botanical composition of the native meadows, it becomes necessary to rely on identification of many of the grasses by means of vegetative characters.

THE GRAMINEAE (GRASS) FAMILY

The grasses, members of the Gramineae family, form a distinct group of plants as differentiated from other families of flowering plants. They are readily distinguished from other families of plants by their floral parts. Fortunately, they vary sufficiently in their vegetative structures so that most grasses may be identified by their vegetative characters alone.

TABLE 1.—*Distinguishing characters of the Gramineae (grass) and the Cyperaceae (sedge) families*

| Character | Gramineae (grass) | Cyperaceae (sedge) |
|-------------------|--------------------------|--------------------|
| 1. Leaves | Two-ranked ¹ | Three-ranked |
| 2. Leaf sheath | Usually not united | Entire |
| 3. Stem shape | Cylindrical or flattened | Usually triangular |
| 4. Stem structure | Often hollow | Solid |
| 5. Nodes | Distinct | Indistinct |

¹ Refers to number of rows of leaves on the stem.

The families of plants most likely to be confused with the grasses are members of the Cyperaceae (sedge) and Juncaeeae (rush). Several definite differences, however, exist between these two groups of plants and the grasses. These are summarized in Tables 1 and 2.

²These studies were made possible through the co-operation of the Hay, Feed, and Seed Division of the Bureau of Agricultural Economics, United States Department of Agriculture, and the Nebraska College of Agriculture.

³Formerly graduate assistant in the Department of Agronomy, now Teaching Fellow in genetics at the California Institute of Technology at Pasadena, California.

TABLE 2.—*Distinguishing characters of the Gramineae (grass) and the Juncaceae (rush) families*

| Character | Gramineae (grass) | Juncaceae (rush) |
|-------------------|-----------------------------|--------------------------------------|
| 1. Leaves | Rolled or folded in the bud | Neither rolled nor folded in the bud |
| 2. Leaf ligule | Usually present | Absent |
| 3. Leaf sheath | Usually not united | Entire |
| 4. Stem structure | Often hollow | Solid |
| 5. Nodes | Distinct | Indistinct |

USEFUL EQUIPMENT

Certain tools are of considerable value in identifying grasses vegetatively. A trowel or tile spade is useful in uncovering the desired underground parts. A scalpel or sharp knife is essential in obtaining a cross section of the bud shoot. A ruler including the metric system (measurements in millimeters) is of decided value in obtaining the size of the plant parts. Then the most valuable of all is the magnifying glass or hand lens, which is almost essential in identifying and carefully describing plant parts.

VEGETATIVE CHARACTERS USED IN IDENTIFICATION

UNDERGROUND REPRODUCTIVE PARTS

The roots of all grasses are of the fibrous type, but vary considerably with respect to size, abundance, length, and extent of branching. Because of the inconvenience in studying them and their comparatively minor value in work of this nature, the roots are disregarded as a distinguishing character.

The more important vegetative reproductive organs of the grasses are the stolons, rhizomes, and corms. Stolons are above-ground creeping stems, often rooting at the nodes and producing new plants. Rhizomes, commonly called root-stocks, are modified underground stems capable of producing new plants from the nodes. These stems are usually horizontal and coarser than the roots. The presence of rudimentary leaves, buds, nodes, and internodes definitely identifies the rhizomes as stems. A corm is a bulb-shaped swelling at the base of the culm.

None of the grasses included in the study reproduces by stolons. A number reproduce by rhizomes. Only one species

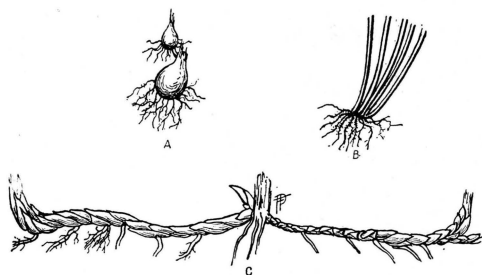


FIG. 1.—Underground reproductive organs of grasses.—A. Corm (*Phleum pratense*). B. Inconspicuous rhizome (*Stipa comata*). C. Prominent rhizome (*Spartina michauxiana*).

bunch habit. In other grasses, the rhizomes are prominent and extensive, and the grass is a typical sod-former. *Stipa comata* (needle grass) and *Spartina michauxiana* (slough grass) respectively, are examples of these types (Fig. 1). The presence or absence of rhizomes and their relative size and length are used as distinguishing characters.

THE BUD SHOOT

The arrangement of the individual leaves in the bud, termed "vernation," may be a useful character. Leaves in the bud are classified as folded (conduplicate) or rolled (convolute) (Fig. 2). In species with folded leaves, the blade is folded at the midvein, the edges not overlapping. Rolled leaves are distinctly rolled into a spiral form.

Folded leaves are usually associated with flattened bud shoots and rolled leaves with round bud shoots, but there are some exceptions. Two illustrations may be given. *Andropogon furcatus* (big bluestem) has a flattened bud shoot but the leaves are distinctly rolled in the bud. *Stipa spartea* (porcupine grass) has round or nearly round bud shoots and yet has folded leaves.

THE LEAF

A grass leaf consists of two principal parts, the sheath and the blade. The sheath, a modified

studied, *Phleum pratense* bears corms (Fig. 1). The presence of corms in species possessing such organs offers a useful character in identification.

Rhizomes vary widely in the degree of development. In some instances these are poorly developed and the grass is characterized largely by a

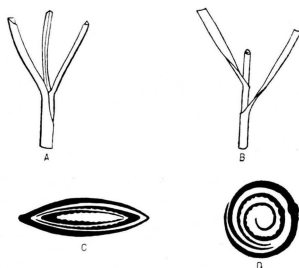


FIG. 2.—Leaf vernation.—

A. Leaves folded in the bud. B. Leaves rolled in the bud. C. Cross-section of a folded bud shoot. D. Cross-section of a rolled bud shoot.

petiole, forms the tubelike structure enveloping the stem. The blade is the linear, more or less flattened structure attached to the sheath. The transition tissue or "joint" between the blade and the sheath is known as the collar. In many grasses clawlike appendages project from the collar or the base of the blade. These are known as auricles. The membranous or hairy structure usually present at the base of the blade on the inner side of the leaf is known as the ligule.

Sheath.—The sheath usually forms a tube-like structure around the stem. It may be entire, or the edges may merely overlap. When observed in cross section, the sheaths may be classified as round or compressed. The shape is dependent upon the shape of the bud shoot and culm. The sheath may be colored, particularly that portion below the surface of the ground. The pigment may be generally distributed through the sheath tissue or may be confined to the veins. The sheath is either glabrous or pubescent, and the latter vary considerably in pubescence. The veins of the sheath are distinct in certain grasses and inconspicuous in others.

Ligule.—The ligule is one of the most useful characters in identifying grasses in the vegetative stage. It may be membranous, it may be a fringe of hairs, or it may be absent (Fig. 3). The membranous types of ligules are classified as truncate, obtuse, or acute (Fig. 4). The margin of each of

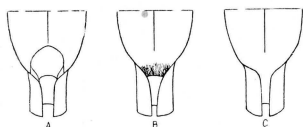


FIG. 3.—Ligule types.—A. Membranous. B. Fringe of hairs. C. Ligule wanting.

these three shapes of ligules may be entire, notched, lacerate, or ciliate (Fig. 4). The ligule may be glabrous or pubescent.

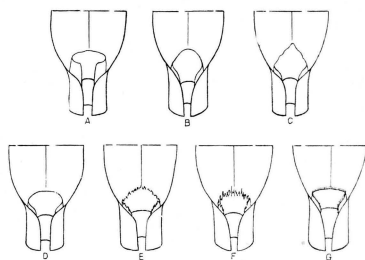


FIG. 4.—Shape of membranous ligules.—A. Truncate. B. Obtuse. C. Acute. Ligule margins—D. Entire. E. Notched. F. Lacerate. G. Ciliate.

Collar.—The collar may be broad or relatively narrow. The differentiations of the collar from the sheath and blade may be due to color or to texture. In some instances the collar is continuous, extending from one margin of the leaf to the other, but in others it is distinctly divided by the mid-vein. It may be glabrous or pubescent. Occasionally one end

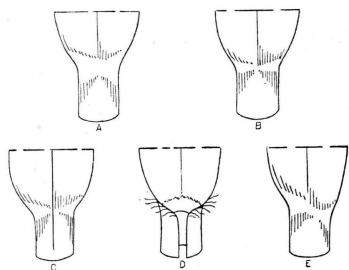


FIG. 5.—Collar types.—A. Broad. B. Narrow. C. Divided by midvein. D. Hairy. E. Spiral.

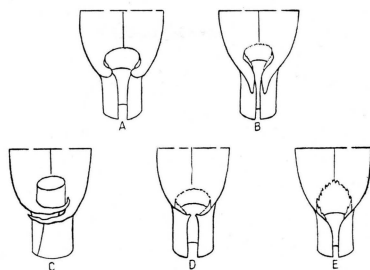


FIG. 6.—Auricle types.—A. Rounded. B. Straight. C. Clawed. D. Reduced. E. Absent.

of the collar is higher than the other and the collar assumes a spiral shape. A number of the various collar types are illustrated in Figure 5.

Auricles.—Auricles are present only in certain species of grasses, and they vary materially in size and shape. They are rounded, straight, clawed, reduced, or absent (Fig. 6). They may be either pubescent or glabrous.

Blade.—Leaf blades are classified as bristle-like or flat, with respect to form. The former never assumes a flattened shape. Bristle-like leaves are classified as solid, folded, or U-shaped. Flat leaves are classified as distinctly flat, V-shaped, folded, U-shaped, edges rolled in, or rolled (Fig. 7). It must be considered in a classification of this type that many leaves may change from their normal shape to a more rolled condition when the plants are subjected to a low soil moisture

or to a hot, dry atmosphere. Flat or V-shaped blades, for example, may assume a U-shaped or rolled shape.

The general outline of the blade varies with the different species of grasses. The base of the blade may be markedly constricted, little constricted, or not at all (Fig. 8). The apex may be gradually or abruptly tapering. If a V-shaped leaf has an abruptly tapering apex, the tip has the appearance of the end of a canoe. The blades may be twisted in varying degrees, or straight.

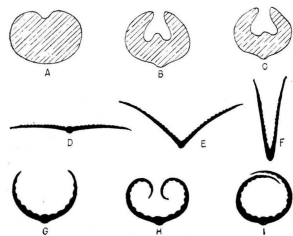


FIG. 7.—Leaf-blade types.—Bristle-like.—A. Solid. B. Folded. C. U-shaped. Flat.—D. Flat. E. V-shaped. F. Folded. G. U-shaped. H. Edges rolled in. I. Rolled.

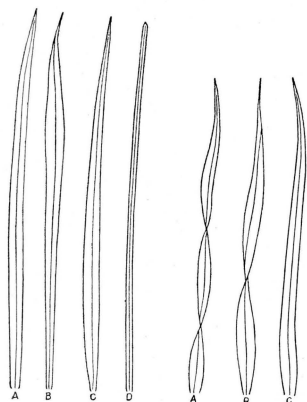


FIG. 8.—Leaf-blade shape.—

A. Little constricted at the base. B. Markedly constricted at the base. C. Gradually tapering toward the apex. D. Abruptly tapering toward the apex of leaf—canoe-shaped.

Leaf-blade twisting.—A. Strongly twisted. B. Somewhat twisted. C. Little twisted.

species, the surface of the blades may be classified with respect to the degree of roughness, depending upon the presence or absence of barbs or hairs. If these projections are absent a leaf is said to be glabrous; if barbs are present, the leaf is rough; and if the projections are hairs, the blade is pubescent. Grasses exhibit a variation in the color of the blades. These variations include a number of shades of bluish-green to yellowish-green. The presence or absence of a waxy bloom on the leaf may modify color.

OTHER FACTORS USEFUL IN IDENTIFICATION

THE HABITAT

The natural habitat of a species may be of considerable value in the identification of it. A species characteristic of a dry, sandy soil would not be likely to appear in a low, wet soil.

The veins in the blade may vary from being very distinct to the other extreme of being inconspicuous. The degrees of prominence are classified as indistinct, distinct, prominent, and very prominent (Fig. 9). Leaves containing prominent ridges are said to be scabrous. The character of venation often determines the nature of light transmitted through the blade. Most of the grass leaves show at least faint white lines when viewed in transmitted light. In prominently veined leaves, these lines are usually distinct. The margin of the leaf may be barbed, ciliate, or smooth. The prominence and abundance of the barbs vary considerably (Fig. 9).

In addition to ridges formed by veins, characteristic of some

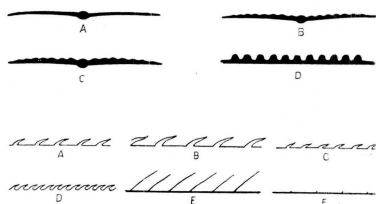


FIG. 9.—Leaf venation.—A. Indistinct. B. Distinct. C. Prominent. D. Very prominent.

Leaf-blade margins.—A. B. C. D. Variations in types of barbing. E. Ciliate. F. Smooth.

ASSOCIATED VEGETATION

Species of a similar water requirement are often found growing together. Finding certain more easily identified species indicates a probability that other species requiring a similar habitat also occur there. If *Andropogon furcatus* (big bluestem) is found growing under favorable conditions in a plant community, then the possibilities of finding *Sorghastrum nutans* (Indian grass) and *Panicum virgatum* (switchgrass) in the same community are greatly enhanced.

BASIS FOR SELECTING SPECIES INCLUDED IN THE KEY

Only species that contribute to an appreciable extent to the prairie-hay crop of Nebraska have been included. Including species of very minor importance would make this key decidedly more cumbersome. *Calamagrostis canadensis* (bluejoint) and *Paspalum stramineum* (bead grass), although of minor importance in the state, have been included because of their importance in near-by prominent prairie-hay producing sections. All species listed in the government standards⁴ for grades of prairie hay have been included except *Fluminea festucacea* (prickly fescue) which is of little importance in the state.

⁴ *Handbook of Official Hay Standards*, Government Printing Office, Washington, D. C., 61 pp., 1933.

ANALYTICAL KEY TO GRASSES—BASED ON VEGETATIVE CHARACTERS

- A. Auricles prominent and claw-like.
 B. Leaves with prominent scabrous ridges on upper surface; plant glaucous, blue-green in color.
Agropyron smithii (14)⁵
- BB. Leaves without prominent scabrous ridges on upper surface; plant not glaucous, medium to dark green in color.
Elymus canadensis (21)
- AA. Auricles absent or reduced, not claw-like.
 B. Ligule a fringe of hairs.
 C. Rhizomes prominent.
 D. Collar pubescent on margins.
 E. Blade pubescent on upper surface.
Panicum virgatum (23)
- EE. Blade glabrous on upper surface.
 F. Short grass; blade 3 mm. or less in width; midvein indistinct.
Bouteloua oligostachya (19)
- FF. Tall grass; blade more than 3 mm. wide; midvein very prominent.
Calamovilfa longifolia (20)
- DD. Collar glabrous.
Spartina michauxiana (34)
- CC. Rhizomes inconspicuous or absent.
 D. Collar densely pubescent with tuft of long, silky hairs; plant perennial.
Sporobolus cryptandrus (27)
- DD. Collar glabrous or nearly so; plant annual.
 E. Blade has long, silky hairs at base on upper surface.
Chaetochloa lutescens (38)
- EE. Blade glabrous.
Chaetochloa viridis (39)
- BB. Ligule membranous
 C. Rhizomes prominent (*Andropogon scoparius* inconspicuous).
 D. Ligule with two pointed projections of the sheath on either margin.
Sorghastrum nutans (25)
- DD. Ligule lacking two pointed projections.
 E. Collar pubescent at least on margins.
 F. Base of leaf markedly constricted.
Andropogon furcatus (16)
- FF. Base of leaf little constricted.
 G. Sheath pubescent.
Bouteloua curtipendula (18)
- GG. Sheath glabrous.
Sporobolus asper (26)
- EE. Collar glabrous.
 F. Rhizomes 3 mm. or more in diameter; young rhizomes red or pink; grows in marshy habitat.
Phalaris arundinacea (33)

⁵ Refers to page on which the species is illustrated and described in detail.

- FF. Rhizomes less than 3 mm. in diameter; young rhizomes not distinctly red or pink; grows in various types of habitat.
- G. Shoot flat; leaves distinctly folded in the bud.
- H. Rhizomes short; ligule long and obtuse; blade light green; bunch forming.
Andropogon scoparius (17)
- HH. Rhizomes long; ligule short and truncate; blade dark green; sod forming.
Poa pratensis (37)
- GG. Shoot round; leaves rolled in the bud.
- H. Ligule truncate.
- I. Blade 1 to 4 mm. wide, distinctly ridged and glaucous on upper surface.
Calamagrostis neglecta (32)
- II. Blade 3 to 10 mm. wide, not so distinctly ridged, not glaucous.
Calamagrostis canadensis (31)
- HH. Ligule obtuse to acute.
Agrostis alba (35)
- CC. Rhizomes inconspicuous or absent.
- D. Leaf blade margins distinctly ciliate.
Paspalum stramineum (24)
- DD. Leaf blade margins not distinctly ciliate.
- E. Collar distinctly pubescent with tuft of long, silky, dense hairs.
Sporobolus heterolepis (28)
- EE. Collar glabrous or covered with few short hairs.
- F. One or two internodes near base of stem swollen.
Phleum pratense (36)
- FF. Internodes near base of stem not swollen.
- G. Ligule 1 mm. or more long; upper surface of leaves very scabrous.
- H. Sheath pubescent, at least along the margins.
Stipa spartea (30)
- HH. Sheath glabrous.
Stipa comata (29)
- GG. Ligule less than 1 mm. long; upper surface of leaf moderately scabrous.
- H. Leaves folded in the bud, shoot round; blades often pubescent.
Koeleria cristata (22)
- HH. Leaves rolled in the bud, blades glabrous.
- I. Lower sheaths pubescent; leaf blade seldom over 12 cm. long.
Hordeum jubatum (40)
- II. Sheaths glabrous; leaf blade often over 12 cm.
Agropyron tenerum (15)

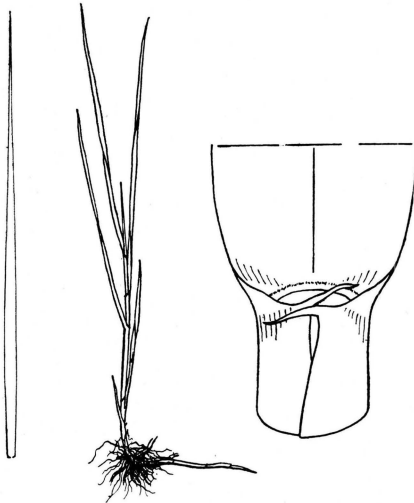


FIG. 10.—*Agropyron smithii* (Western wheat-grass).⁶ Leaf; plant, $\times \frac{1}{2}$; ligule area, $\times 7 \frac{1}{2}$.

An erect perennial with long rhizomes, sod-forming; sandy to clay loam soils of moderate to limited moisture content; usually in pure stand.

Shoot round, leaves rolled in the bud. **Sheath** round, light purple to purplish brown below ground, glabrous, veins prominent, margins hyaline and pubescent. **Ligule** 0.2 to 0.5 mm. long, membranous, truncate, finely toothed. **Collar** medium broad, commonly dark brown or blackish on edges, continuous, glabrous, often spiral. **Auricles** narrow and claw-like, often deciduous, glabrous. **Blade** 2 to 6 mm. wide, 5 to 20 cm. long, flat, little constricted at the base, gradually tapering, tip sharply pointed, often twisted, veins forming prominent ridges on upper surface, midvein indistinct, margins barbed, upper surface distinctly scabrous, lower surface smooth, upper surface often pubescent (hairs soft and less than 1 mm. long), coriaceous, glaucous blue-green in color, erect.

Very important hay and pasture grass in the western part of the state. The United States Department of Agriculture considered it important enough to establish a class of wheat grass hay in the Federal Hay Standards. It is usually not possible to purchase western wheat grass seed on the market. Because of its stoloniferous qualities it has much value in resodding old plow land in the west.

⁶The descriptions of the individual species are presented in the same order in which they are included in the classification on page 4. Measurements are based on numerous specimens examined by the authors and those given by Britton, N. L., *Manual of the flora of the northern states and Canada*, 1112 p., New York, 1905. All descriptions and measurements are based on plants in a young growing condition; hence the size of the various organs will vary within rather wide limits.

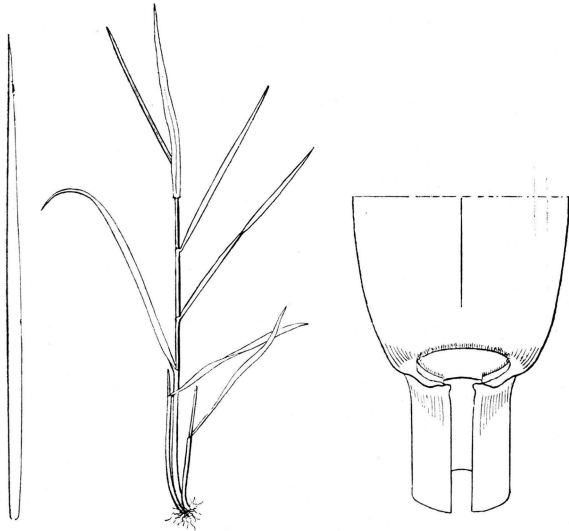


FIG. 11.—*Agropyron tenerum* (Slender wheatgrass). Leaf; plant, x1/6; ligule area; x12.

An erect perennial with very short rhizomes, bunch-forming; sandy to silt loam soil of moderate moisture content; commonly in pure stand.

Shoot round, leaves rolled in the bud. **Sheath** round, white to purple below ground, glabrous, veins distinct, margins hyaline. **Ligule** short, 0.2 to 1.0 mm. long, membranous, truncate, finely ciliate. **Collar** medium broad, distinct yellowish green, continuous, glabrous, sometimes spiral. **Auricles** reduced or absent. **Blade** 2 to 5 mm. wide, 5 to 25 cm. long, flat, little constricted at base, gradually tapering, tip sharply pointed, little twisted, veins distinct on upper surface, midvein distinct on lower surface, margins barbed, rough above and below, glabrous, herbaceous, medium green, erect to nodding.

Seldom an important constituent in prairie hay. More important in western part of the state. Good forage. Produces a good seed crop. Seed available commercially.

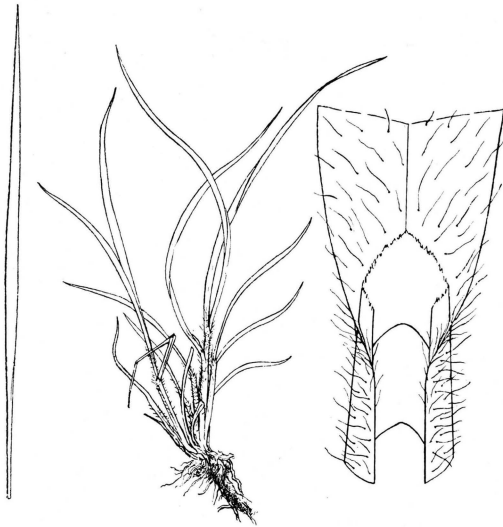


FIG. 12.—*Andropogon furcatus* (Big blue-stem). Leaf; plant, $\times \frac{1}{2}$; ligule area, $\times 8 \frac{1}{2}$.

A tall, erect perennial with short, heavy, scaly rhizomes 1 to 4 mm. in diameter, sod-forming; sandy to silt loam soils of moderate moisture content; associated with *Sorghastrum nutans*, *Elymus canadensis*, and *Panicum virgatum*.

Shoot flattened, leaves rolled in the bud. **Sheath** compressed, white to purple below ground, softly pubescent (hairs 1 to 5 mm. long), sometimes glabrous, veins distinct, margins hyaline. **Ligule** 1 to 3 mm. long, membranous, obtuse, notched and often ciliate. **Collar** medium broad, often indistinct, light green or yellowish green, often divided by midvein, pubescent at least on margins, not spiral. **Auricles** absent. **Blade** 3 to 10 mm. wide, 10 to 45 cm. long, flat, V-shaped, constricted at base, gradually tapering, tip sharply pointed, little twisted, veins distinct, midvein prominent, margins slightly barbed, slightly rough to smooth above and below, long silky hairs on upper surface especially near base, sometimes almost glabrous, herbaceous, light green frequently tinged with red especially toward the tip, nodding.

One of the most important grasses in the upland and upland-midland mixed prairie hay classes. Produces hay of excellent quality if harvested early enough. Seeds freely when plenty of moisture is available but seed is not available commercially.

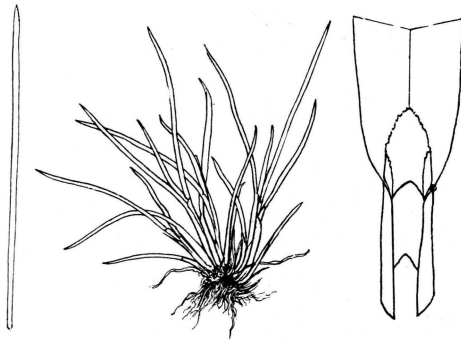


FIG. 13.—*Andropogon scoparius* (Little bluestem). Leaf; plant, $\times\frac{1}{4}$; ligule area, $\times 10$.

An erect perennial with short scaly rhizomes 1 to 2 mm. in diameter, bunch-forming but will form a sod under ample moisture conditions; sandy to silt loam soils of limited moisture content; associated with *Koeleria cristata*, *Stipa spartea*, *Stipa comata*, and *Sporobolus cryptandrus*.

Shoot flattened, leaves folded in the bud. **Sheath** compressed, white to purple below ground, glabrous or rarely sparsely pubescent, veins distinct, margins hyaline. **Ligule** 1 to 2 mm. long, membranous, obtuse to truncate, ciliate. **Collar** very broad, distinct light green to pinkish, continuous, glabrous, not spiral. **Auricles** absent. **Blade** 2 to 5 mm. wide, 5 to 30 cm. long, flat, V-shaped or folded, constricted at base, abruptly tapering near tip, somewhat bluntly pointed, little twisted, veins distinct, midvein very prominent, margins weakly barbed, smooth to rough above and smooth below, glabrous, herbaceous, medium to light green, sometimes glistening, often glaucous, frequently tinged with red, erect to slightly nodding.

Important constituent of prairie hay. Good forage if cut early. It is known as the bunch grass of the sand hills.

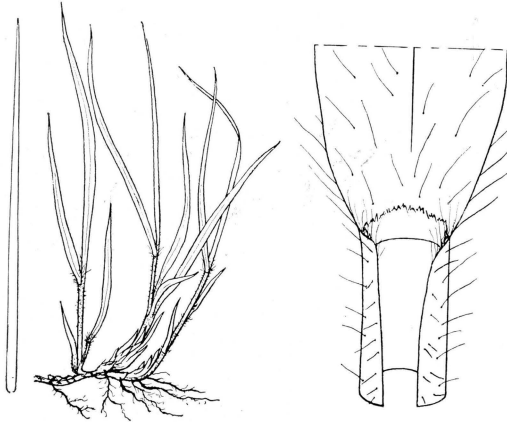


FIG. 14.—*Bouteloua curtipendula* (Side-oats grama). Leaf; plant, $\times \frac{1}{4}$; ligule area, $\times 8\frac{1}{2}$.

An erect perennial with short stout rhizomes 1 to 2 mm. in diameter; sod-forming; usually on heavier soils of moderate moisture content; associated with *Andropogon furcatus*, *Sorghastrum nutans*, and *Sporobolus asper*.

Shoot round, leaves rolled in the bud. **Sheath** round, white to purple below ground, pubescent (hairs soft, 1 to 2 mm. long), veins distinct, margins hyaline. **Ligule** 0.2 to 1.0 mm. long, membranous, truncate, notched, ciliate. **Collar** medium broad, light green or often dark colored, continuous, pubescent, hairs 1 to 2 mm. long, not spiral. **Auricles** absent. **Blade** 2 to 7 mm. wide, 5 to 30 cm. long, flat, constricted at base, gradually tapering, tip sharply pointed, little twisted, veins distinct, midvein distinct on lower surface, margins barbed to ciliate, rough above and below, pubescent on upper surface, sometimes a few hairs on lower surface (hairs usually less than 2 mm. long), herbaceous, medium green, nodding.

Constitutes a small percentage of hay. Good forage if cut early. The many basal leaves render it a rather valuable pasture grass in dry regions.

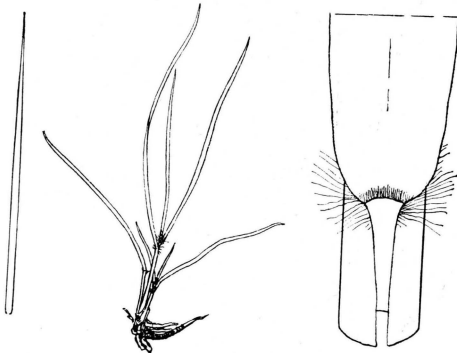


FIG. 15.—*Bouteloua oligostachya* (Blue grama). Leaf; plant, $\times \frac{1}{4}$; ligule area, $\times 10$.

A short, erect perennial with short scaly rhizomes 1 to 2 mm. in diameter, sod-forming; sandy to silt loam soils of limited moisture content; associated with *Stipa spartea*, *Stipa comata*, and *Koeleria cristata*.

Shoot round, leaves rolled in the bud. **Sheath** round, white to purple below ground, glabrous, veins distinct, margins hyaline. **Ligule** 0.1 to 0.5 mm. long, a fringe of hairs. **Collar** medium broad, distinct yellowish green, continuous, pubescent on edges (hairs silky, 1 to 3 mm. long), not spiral. **Auricles** absent. **Blade** 1.0 to 2.5 mm. wide, 2 to 20 cm. long, flat, rounded to V-shaped, not constricted at base, gradually tapering, tip sharply pointed, little twisted, veins forming ridges on upper surface, midvein indistinct, margins weakly barbed, slightly rough above, smooth below, glabrous, sometimes pubescent on lower margins, herbaceous, light to medium green, curled.

One of the most important grasses in western Nebraska, especially for grazing purposes. It is very common throughout the state, but does not constitute a large percentage of hay in eastern Nebraska.

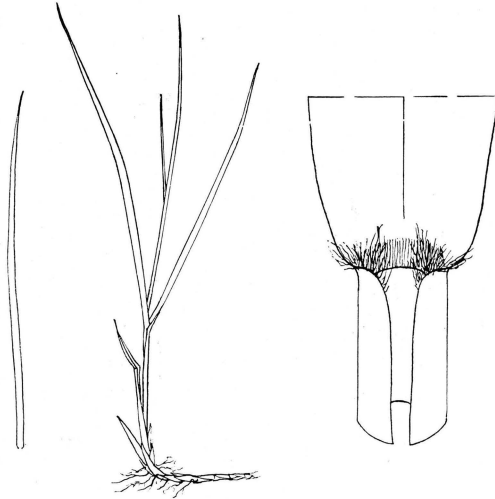


FIG. 16.—*Calamovilfa longifolia* (Sand reed-grass) Leaf, plant, $\times \frac{1}{4}$; ligule area, $3 \frac{1}{2}$.

A stout, erect perennial with long scaly rhizomes 2 to 4 mm. in diameter; sod-forming; sandy soils of low moisture content; associated with *Andropogon scoparius* and *Sporobolus cryptandrus*.

Shoot round, leaves rolled in the bud. **Sheath** round, white to purple tinge below ground, pubescent (hairs long and silky, 1 to 5 mm. long), sometimes glabrous, veins prominent, margins hyaline. **Ligule** 0.5 to 2.0 mm. long, a fringe of hairs. **Collar** medium broad, distinct orange yellow in color, continuous, pubescent on margins, not spiral. **Auricles** absent. **Blade** 4 to 10 mm. wide, 20 to 60 cm. long, flat, rounded to V-shaped, not constricted at base, gradually tapering, tip sharply pointed, little twisted, veins prominent on both surfaces, midvein very prominent on both surfaces, margins weakly barbed and markedly hyaline, smooth above and below, glabrous, coriaceous, medium green, nodding.

Prominent in sandhill area and on other sandy land. A coarse forage, not very palatable.



FIG. 17.—*Elymus canadensis* (Wild rye). Leaf; plant, x1/6; ligule area, x5.

An erect perennial with short rhizomes, bunch-forming; sandy to silt loam soils of moderate moisture content; associated with *Andropogon furcatus*, *Sorghastrum nutans*, and *Panicum virgatum*.

Shoot round, leaves rolled in the bud. **Sheath** round, pinkish below ground with red or dark pink veins, glabrous, sometimes pubescent on margins (hairs 1 to 2 mm. long, soft), veins distinct, margins hyaline. **Ligule** short, 0.1 to 1.0 mm. long, membranous, truncate, notched, and short-ciliate. **Collar** broad, distinct, yellowish green, continuous, glabrous, usually spiral. **Auricles** large, clawed, glabrous. **Blade** 4 to 15 mm. wide, 10 to 25 cm. long, flat, somewhat constricted at the base, gradually tapering, tip sharply pointed, twisted, veins prominent, midvein distinct on lower surface, margins moderately barbed, rough above and below, glabrous, herbaceous, medium to dark green, erect.

Scattered throughout many meadows over the state. Fair forage. Should be cut early for hay. The presence of ergot in the seed stage is quite common and if enough is present may become dangerous to live stock.

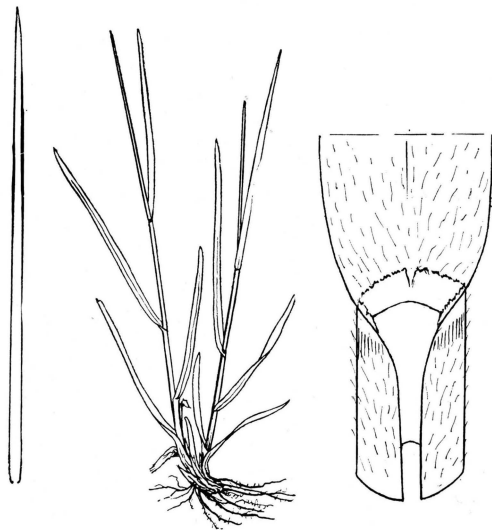


FIG. 18.—*Koeleria cristata* (June grass).
Leaf; plant, $\times \frac{1}{3}$; ligule area, $\times 10$.

A small perennial with inconspicuous rhizomes, bunch-forming; sandy to silt loam soils of limited moisture content; associated with *Andropogon scoparius*, *Stipa spartea*, and *Stipa comata*.

Shoot round, leaves folded in the bud. **Sheath** round to slightly compressed, white below ground, retrorsely pubescent especially the lower sheaths, hairs 0.1 to 0.5 mm. long, sometimes glabrous, veins distinct, margins hyaline. **Ligule** 0.1 to 0.6 mm. long, membranous, truncate, frequently split, often ciliate. **Collar** medium broad, distinct yellowish green, continuous, hairy on edges or glabrous, not spiral. **Auricles** absent. **Blade** 1 to 3 mm. wide, 5 to 25 cm. long, flat, little constricted at base, gradually tapering, tip somewhat bluntly pointed, little twisted, veins forming prominent ridges on upper surface, midvein distinct on lower surface, margins narrowly hyaline and weakly barbed, upper surface rough, lower smooth, pubescent or glabrous above and below, somewhat coriaceous, light green to glaucous, erect.

Common in upland prairie hay over most of the state. Fair quality as a forage, matures too early as compared with majority of grasses.

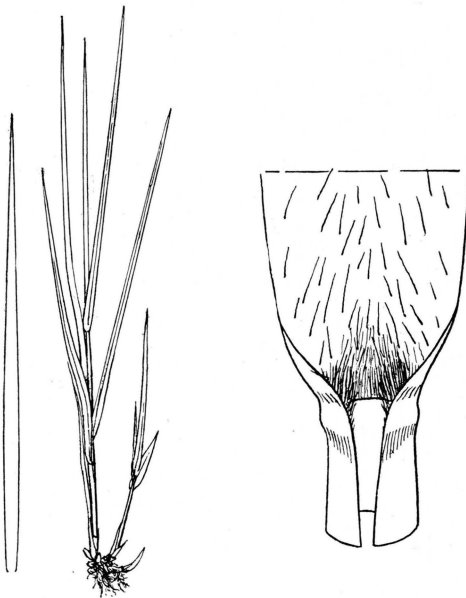


FIG. 19.—*Panicum virgatum* (Switch grass). Leaf; plant, x1/6; ligule area, x8

A stout, erect perennial with large scaly rhizomes 1 to 4 mm. in diameter, sod-forming; sandy to silt loam soils of considerable to limited moisture content; associated with *Andropogon scoparius*, *Andropogon furcatus*, *Sorghastrum nutans*, and *Elymus canadensis*.

Shoot round, leaves rolled in the bud. **Sheath** round, white to purple tinge below ground, pubescent on edges, veins prominent, margins hyaline. **Ligule** 1 to 3 mm. long, a fringe of hairs grown together at base and appearing to be membranous, backed by a tuft of hairs. **Collar** broad, distinct yellowish green, continuous, pubescent on margins, not spiral. **Auricles** absent. **Blade** 4 to 12 mm. wide, 10 to 40 cm. long, flat, constricted at base, gradually tapering, tip sharply pointed, little twisted, veins distinct, midvein prominent, margins weakly barbed, almost smooth on upper and lower surfaces, pubescent on upper surface toward the base, (hairs long and silky), herbaceous, medium green to bluish green, erect to nodding.

Generally distributed over state, of mediocre importance in individual meadows. Good forage if harvested early.

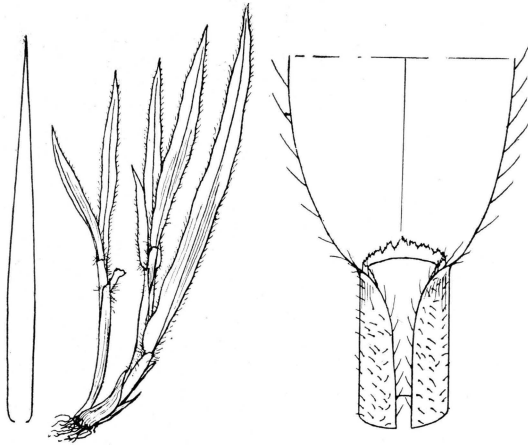


FIG. 20.—*Paspalum stramineum* (Bead grass).
Leaf; pant, $\times \frac{1}{4}$; ligule area, $\times 3 \frac{1}{2}$.

An erect perennial with very inconspicuous rhizomes, bunch-forming; sandy soils of limited moisture content; associated with *Sporobolus cryptandrus*, *Andropogon scoparius*, and *Panicum virgatum*.

Shoot flattened, leaves rolled in the bud. **Sheath** compressed, white to purple below ground, pubescent on margins (hairs long and soft), young sheath minutely pubescent, veins distinct, margins hyaline. **Ligule** 0.5 to 1.0 mm. long, membranous, truncate, notched. **Collar** medium broad, white or somewhat darkened, continuous, pubescent on margins. **Auricles** absent. **Blade** 5 to 15 mm. wide, 5 to 25 cm. long, little constricted at base, gradually tapering, tip somewhat pointed, somewhat twisted, veins distinct, midvein prominent, margins ciliate, smooth above and below, pubescent above and below, herbaceous, light green, erect to nodding.

Of little importance in Nebraska, occurs largely in the sandhills. Fairly good forage.

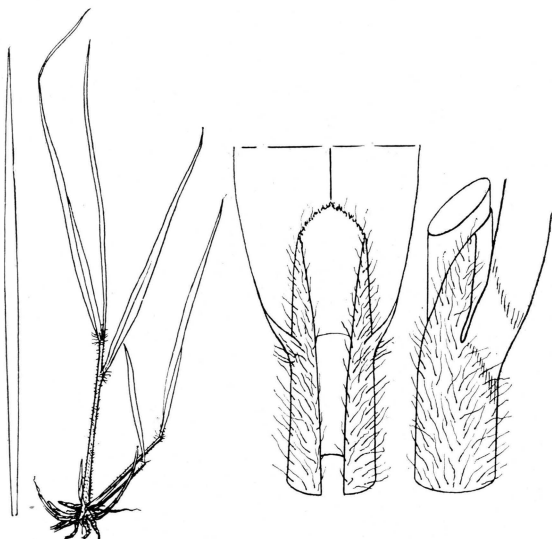


FIG. 21.—*Sorghastrum nutans* (Indian grass).
Leaf; plant, $\times \frac{1}{2}$; ligule area, $\times 5$.

A stout, erect perennial with short scaly rhizomes, sod-forming; sandy to silt loam soils of moderate moisture content; associated with *Andropogon furcatus*, *Panicum virgatum*, and *Elymus canadensis*.

Shoot round to flattened, leaves rolled in the bud. **Sheath** round though often compressed near the top, sometimes purple below ground, pubescent (hairs 1 to 3 mm. long), distinctly veined, margins hyaline. **Ligule** 1 to 5 mm. long, membranous, obtuse to truncate, notched and ciliate, often pubescent and veined on margins which appear to be projections of the sheath. **Collar** medium broad, yellowish green, continuous, glabrous. **Auricles** absent. **Blade** 4 to 8 mm. wide, 10 to 40 cm. long, flat, markedly constricted at the base, gradually tapering, tip sharply pointed, veins prominent, midvein prominent, margins barbed, rough above and below, herbaceous, dull medium green to glaucous, erect to nodding.

Another of the most important grasses in the upland and upland-midland mixed prairie hay classes. Produces excellent forage if harvested sufficiently early.



FIG. 22.—*Sporobolus asper* (Prairie dropseed).
Leaf; plant, $\times 1/6$; ligule area, $\times 8\frac{1}{2}$.

An erect perennial with short rhizomes 1 to 2 mm. in diameter, sod-forming; sandy to silt loam soils of moderate moisture content; associated with *Andropogon furcatus*, *Andropogon scoparius*, and *Sorghastrum nutans*.

Shoot round, leaves rolled in the bud. **Sheath** round, white to purple below ground, glabrous, veins distinct, margins hyaline. **Ligule** 0.1 to 0.3 mm. long, membranous, truncate, ciliate. **Collar** medium broad, distinct yellowish green, continuous, pubescent at least on margins (hairs silky, 1 to 5 mm. long), not spiral. **Auricles** absent. **Blade** 2 to 5 mm. wide, 5 to 35 cm. long, flat, little constricted at base, gradually tapering, tip sharply pointed, little twisted, veins distinct, midvein distinct on lower surface, margins barbed, rough above, slightly rough below, upper surface pubescent near the base (hairs silky, 2 to 5 mm. long), pubescent below (hairs usually less than 1 mm. long), herbaceous, medium green, nodding.

Of mediocre importance in prairie hay. Good forage if cut early.

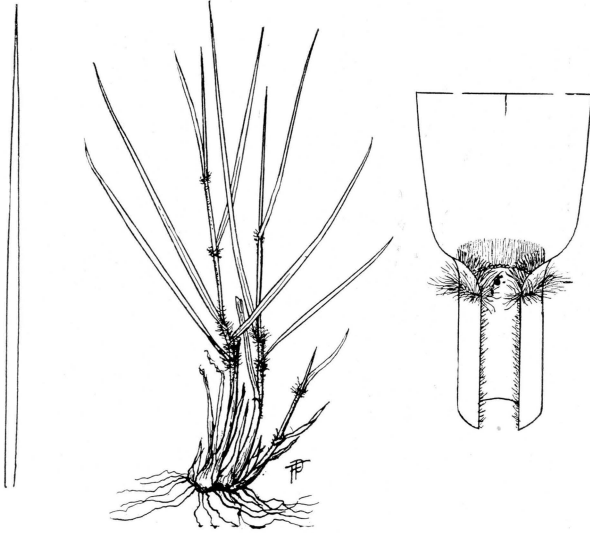


FIG. 23.—*Sporobolus cryptandrus* (Sand dropseed).
Leaf; plant, $\times\frac{1}{2}$; ligule area, $\times 8\frac{1}{2}$.

A semidecumbent perennial with very short rhizomes, 1 to 3.5 mm. in diameter, bunch-forming; sandy to heavy clay soils of moderate to limited moisture content; associated with *Andropogon scoparius*, *Andropogon furcatus*, and *Bouteloua curtipendula*.

Shoot round, leaves rolled in the bud. **Sheath** round, white below ground, green to purple tinge above ground, pubescent on margins (silky hairs 0.5 to 2 mm. long), veins distinct, margins hyaline. **Ligule** 0.1 to 0.4 mm. long, a fringe of hairs. **Collar** medium broad, yellowish to purplish green, divided by the midvein, pubescent (silky hairs 2 to 5 mm. long), not spiral. **Auricles** absent. **Blade** 3 to 10 mm. wide, 7 to 25 cm. long, flat, moderately constricted at base, gradually tapering, tip sharply pointed, little twisted, veins distinct, midvein apparent on lower surface, margins finely barbed, rough above, smooth below, herbaceous, medium green, erect.

Common in the sandhills, less common on heavier soils. Fair forage.

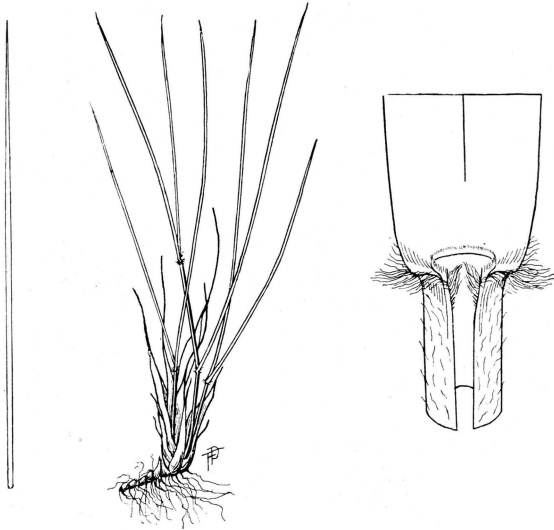


FIG. 24.—*Sporobolus heterolepis* (Northern dropseed). Leaf; plant, $\times\frac{1}{4}$; ligule area, $\times 15$.

An erect perennial with very short rhizomes, 1 to 2 mm. in diameter, bunch-forming; sandy to silt loam soils of moderate to limited moisture content; associated with *Andropogon furcatus*, *Andropogon scoparius*, and *Stipa spartea*.

Shoot flattened, leaves rolled in the bud, characteristically swollen base. **Sheath** flattened, white to purple below ground, glabrous to pubescent, veins distinct, margins hyaline. **Ligule** 0.1 to 0.3 mm. long, membranous, truncate, ciliate. **Collar** medium broad, distinct yellowish green, continuous, pubescent at least on margins (hairs silky, 1 to 3 mm. long), not spiral. **Auricles** absent. **Blade** 1 to 3 mm. wide, 5 to 45 cm. long, flat, little constricted at base, gradually tapering, tip sharply pointed, little twisted, veins distinct, midvein distinct on lower surface, margins barbed, rough above, smooth below, herbaceous, medium green, erect to slightly nodding.

Generally distributed, but constitutes a small percentage of hay. Good forage.

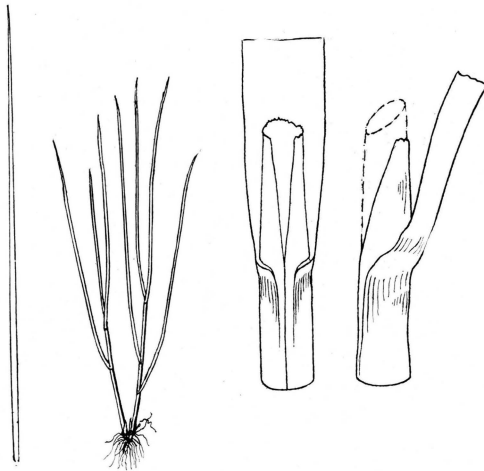


FIG. 25.—*Stipa comata* (Needle grass).
Leaf; plant, $\times \frac{1}{4}$; ligule area, $\times 7 \frac{1}{2}$.

An erect perennial with inconspicuous rhizomes, bunch-forming; generally found in sandy soils of limited moisture content, associated with *Stipa spartea*, *Koeleria cristata*, and *Andropogon scoparius*.

Shoot flattened, leaves folded in the bud. **Sheath** flattened, slightly purple below ground, glabrous, veins distinct, margins hyaline. **Ligule** 1 to 4 mm. long, membranous, obtuse to truncate, often irregular, occasionally finely ciliate, often split. **Collar** medium broad, light green, continuous, glabrous, not usually spiral. **Auricles** absent. **Blade** 1 to 3 mm. wide, 5 to 25 cm. long, flat, often rolled inward, little constricted at base, gradually tapering, tip sharply pointed, usually dead less than 1 cm. back from the tip, sometimes twisted, veins forming prominent ridges on upper surface, midvein indistinct, margins barbed, distinctly rough on upper surface and slightly rough below, glabrous, coriaceous, medium green, erect to nodding.

Generally confined to the sandhill and High Plains areas. Forage of only fair quality as it is usually harvested after full maturity. Seldom present in good prairie hay. The needles are sometimes troublesome to livestock.

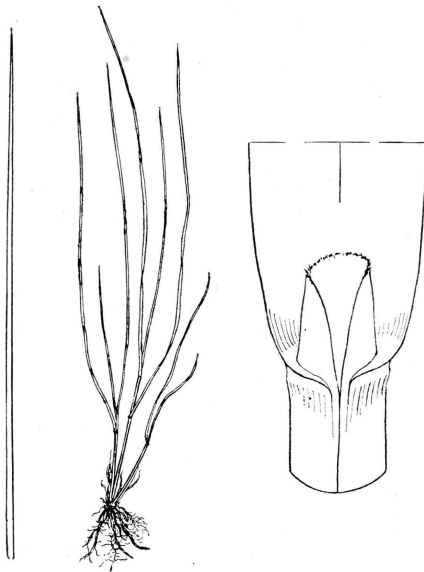


FIG. 26.—*Stipa spartea* (Porcupine grass). Leaf; plant, $\times \frac{1}{5}$; ligule area $\times 7 \frac{1}{2}$.

An erect perennial with inconspicuous rhizomes, bunch-forming; sandy to silt loam soils of limited to moderate moisture content; associated with *Koeleria cristata*, *Andropogon scoparius*, and *Sporobolus heterolepis*.

Shoot round, leaves folded in the bud. **Sheath** round, white to purple below ground, pubescent on margins (hairs short and often retrorse), veins distinct, margins hyaline. **Ligule** 1 to 5 mm. long, membranous, truncate to obtuse, often irregular, finely ciliate, often split. **Collar** medium broad, yellowish green, continuous, glabrous, not usually spiral. **Auricles** absent. **Blade** 1.5 to 4 mm. wide, 10 to 40 cm. long, flat, often rolled, little constricted at base, gradually tapering, tip sharply pointed, usually dead for several centimeters back from tip, little twisted, veins forming prominent ridges on upper surface, mid-vein indistinct, margins barbed, upper surface distinctly scabrous, lower surface smooth, coriaceous, medium green, glistening, nodding.

Generally distributed over the state, growing largely in drier situations. Forage of fair quality, usually harvested after full maturity. A constituent of prairie hay harvested from high ground. Needles usually fall before harvested for hay.

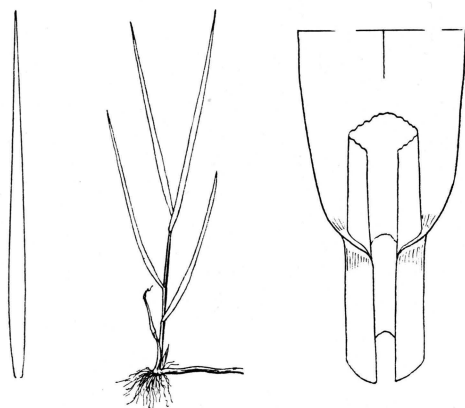


FIG. 27.—*Calamagrostis canadensis* (Blue-joint). Leaf; plant, $\times\frac{1}{4}$; ligule area, $\times 7\frac{1}{2}$.

An erect perennial with long, creeping rhizomes 0.5 to 2 mm. in diameter, sod-forming; silt to usually sandy loams of high moisture content (mucky soils); associated with *Phalaris arundinacea*, *Spartina michauxiana*, and *Calamagrostis neglecta*.

Shoot round, leaves rolled in the bud. **Sheath** round, yellowish green below ground, glabrous, veins distinct, margins hyaline. **Ligule** 1 to 3 mm. long, membranous, truncate, often irregular, notched, often split. **Collar** medium broad, distinct yellowish green, continuous, glabrous, often spiral. **Auricles** absent. **Blade** 3 to 10 mm. wide, 10 to 40 cm. long, flat, little constricted at base, gradually tapering, tip sharply pointed, little twisted, veins prominent forming ridges on upper surface, midvein distinct on lower surface, margins very finely barbed, rough above and below, glabrous, herbaceous, medium green, erect to nodding.

Generally confined to low, sandy areas of central and western Nebraska. Occurs most commonly in the sand-hill area and Platte River Valley. Good to fair forage if cut early.

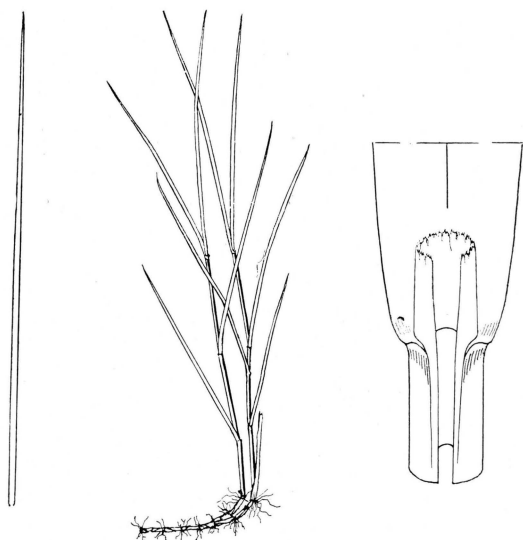


FIG. 28.—*Calamagrostis neglecta* (Pony grass).
Leaf; plant, $\times \frac{1}{4}$; ligule area, $\times 10$.

An erect perennial with long creeping rhizomes 0.5 to 2 mm. in diameter, sod-forming; silt to usually sandy loams of high moisture content (mucky soils); associated with *Phalaris arundinacea*, *Calamagrostis canadensis*, and *Spartina michauxiana*.

Shoot round, leaves rolled in the bud. **Sheath** round, white to purple below ground, glabrous, veins distinct, margins hyaline. **Ligule** 0.5 to 2.0 mm. long, membranous, truncate, notched and ciliate, often split. **Collar** narrow, rather indistinct light green, continuous, glabrous, not spiral. **Auricles** absent. **Blade** 1 to 4 mm. wide, 10 to 30 cm. long, flat, often rolled, little constricted at base, gradually tapering, tip sharply pointed, little twisted, veins forming prominent ridges on upper surface, midvein indistinct, margins barbed, rough above and below, glabrous, somewhat coriaceous, medium green-glaucous on upper surface, erect to nodding.

Generally confined to the western part of the state, not very common. Good to fair forage if cut early.

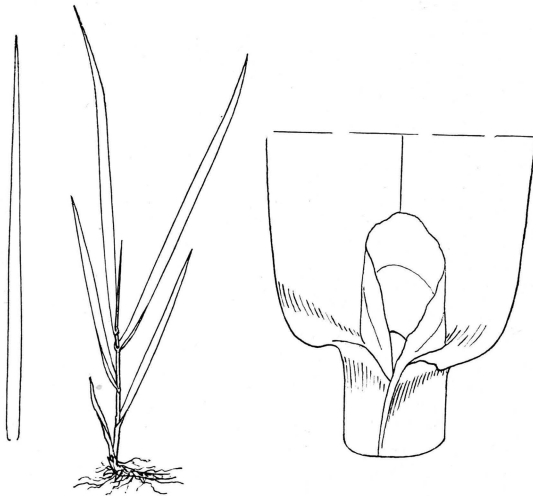


FIG. 29.—*Phalaris arundinacea* (Reed canary-grass). Leaf; plant, $\times \frac{1}{2}$; ligule area, $\times 4 \frac{1}{2}$.

A stout, erect perennial with long rhizomes 3 to 5 mm. in diameter, young rhizomes pinkish to red in color, sod-forming; mucky, sandy to silt loam soils of high moisture content; associated with *Spartina michauxiana*, and *Calamagrostis canadensis*.

Shoot round, leaves rolled in the bud. **Sheath** round, light green to pink-striped below ground, glabrous, veins distinct, margins hyaline. **Ligule** 2 to 4 mm. long, membranous, obtuse, entire or notched, often split, minutely pubescent on back. **Collar** narrow, distinct yellowish green, continuous, glabrous, spiral. **Auricles** absent. **Blade** 6 to 15 mm. wide, 10 to 25 cm. long, flat, little constricted at base, gradually tapering, tip sharply pointed, little twisted, venation distinct, midvein distinct on lower surface, margins nearly smooth, slightly rough on upper and lower surface, glabrous, herbaceous, glaucous, light green, erect.

Occurs in many wet meadows throughout the state. A minor constituent of midland prairie hay class. Forage of good to fair quality. Seed available commercially.

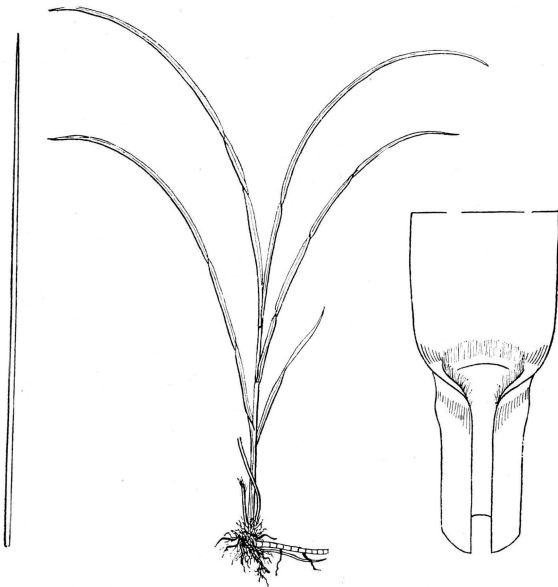


FIG. 30.—*Spartina michauxiana* (Slough grass).
Leaf; plant, $\times 1/7$; ligule area, $\times 4$.

A tall, stout perennial with long prominent rhizomes, sod-forming; sandy to silt loam soils of high moisture content; associated with *Phalaris arundinacea*, lowland sedges and rushes, and often intermingles to a limited extent with *Andropogon furcatus* communities.

Shoot round, leaves rolled in the bud. **Sheath** round, light pink to dark purplish red below ground, glabrous, veins prominent, margins hyaline. **Ligule** 1 to 4 mm. long, a fringe of hairs appearing membranous at the base. **Collar** broad, distinct yellowish green, continuous, glabrous, not spiral. **Auricles** absent. **Blade** 2 to 10 mm. wide, 10 to 60 cm. long, flat, often rolled, somewhat constricted at base, very gradually tapering, tip sharply pointed, little twisted, venation distinct, midvein prominent on lower surface, margins strongly barbed, rough above, smooth below, glabrous, coriaceous, medium to dark green, nodding with glistening surface usually exposed to the wind.

Generally distributed over the state. The most important constituent of the midland hay class. Forage rather coarse, mediocre palatability. Often referred to as whipcord hay by the hay trade.

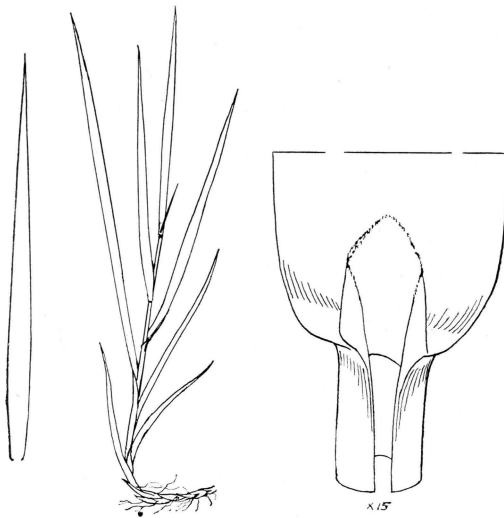


FIG. 31.—*Agrostis alba* (Redtop). Leaf; plant, $\times 1/6$; ligule area, $\times 7\frac{1}{2}$.

An erect perennial with long, slender rhizomes 1 to 2 mm. in diameter, sod-forming; sandy to silt loam soils with a mediocre to rather high moisture content; associated with *Andropogon furcatus*, *Phleum pratense*, and *Spartina michauxiana*.

Shoot round, leaves rolled in the bud. **Sheath** round, white to purple below ground, glabrous, veins distinct, margins hyaline. **Ligule** 1 to 5 mm. long, membranous, obtuse to acute, entire to notched, often split. **Collar** medium broad, distinct light green, continuous, glabrous, spiral. **Auricles** absent. **Blade** 2 to 6 mm. wide, 5 to 15 cm. long, flat, little constricted at base, gradually tapering, little twisted, veins forming distinct ridges on upper surface, midvein distinct on lower surface, margins finely barbed, rough on upper and lower surfaces, herbaceous, light to medium green, erect—appearing rigid.

A cultivated species generally introduced into much of the Elkhorn Valley hay district and sandhill valleys. Of some importance occasionally in lowland prairie hay meadows in other portions of the state. Good forage if harvested early. If allowed to mature, redtop is decidedly unpalatable to livestock. One of the best cultivated grasses adapted to poorly drained soils.

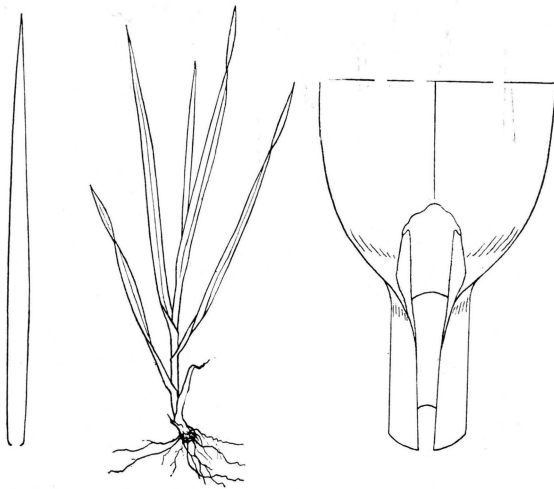


FIG. 32.—*Phleum pratense* (Timothy). Leaf; plant, $\times \frac{1}{2}$; ligule area, $\times 4$.

An erect perennial with inconspicuous rhizomes but with one or frequently two internodes near the base of the stem swollen into a corm, bunch-forming; sandy to silt loam soils of moderate moisture content; associated with *Andropogon furcatus*, *Agrostis alba*, and *Spartina michauxiana*.

Shoot round, leaves rolled in the bud. **Sheath** round to slightly compressed, white to purple below ground, glabrous, veins distinct, margins hyaline. **Ligule** 1.5 to 5.0 mm. long, membranous, obtuse, notched. **Collar** medium broad, distinct light green, continuous, glabrous, often spiral. **Auricles** absent. **Blade** 4 to 10 mm. wide, 5 to 25 cm. long, little constricted at base, gradually tapering, tip sharply pointed, leaves twisted, venation distinct, midvein distinct on lower surface, margins weakly barbed—often retrorsely so at base, slightly rough above and below, herbaceous, light glaucous green, erect.

A cultivated species generally introduced into much of the Elkhorn Valley hay district and the sandhill valleys. Of less importance in prairie hay meadows in other portions of the state. Excellent forage if cut early, and has a wider range of cutting than redtop and Kentucky bluegrass.

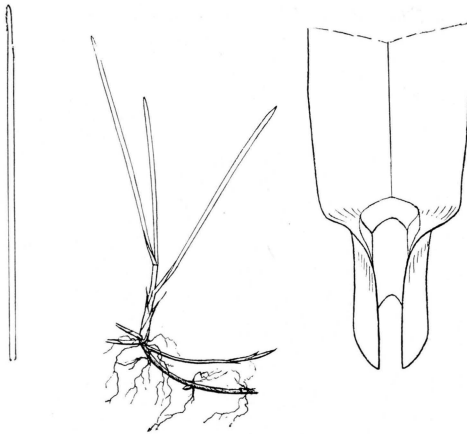


FIG. 33.—*Poa pratensis* (Kentucky bluegrass). Leaf; plant, $\times \frac{1}{2}$; ligule area, $\times 7 \frac{1}{2}$.

A slender, erect perennial with long rhizomes 0.5 to 2 mm. in diameter; sandy to heavy clay soils varying from a limited to a rather high moisture content; associated with *Andropogon furcatus*, *Sorghastrum nutans*, and *Phleum pratense*.

Shoot distinctly flattened, leaves folded in the bud. **Sheath** compressed, white to purple below ground, glabrous, veins distinct, margins hyaline. **Ligule** 0.1 to 0.4 mm. long, membranous, obtuse to truncate, notched to finely ciliate. **Collar** medium broad, distinct yellowish green, continuous, glabrous, not spiral. **Auricles** absent. **Blade** 1 to 4 mm. wide, 5 to 30 cm. long, flat, V-shaped, little constricted at base, little tapering, tip bluntly pointed resembling the bow of a boat, little twisted, veins distinct. White lines lying in close proximity to and on either side of midrib especially prominent if observed by transmitted light, midvein forming a distinct keel, margins finely barbed, upper surface slightly rough, lower surface smooth, glabrous, herbaceous, medium to dark green in color, somewhat shiny, erect to nodding.

A cultivated species invading much prairie hayland, often occupying extensive areas. A detriment to prairie hay industry because of its early maturity and low yields. Late cut bluegrass often depreciates the market quality of prairie hay by lowering the grade.

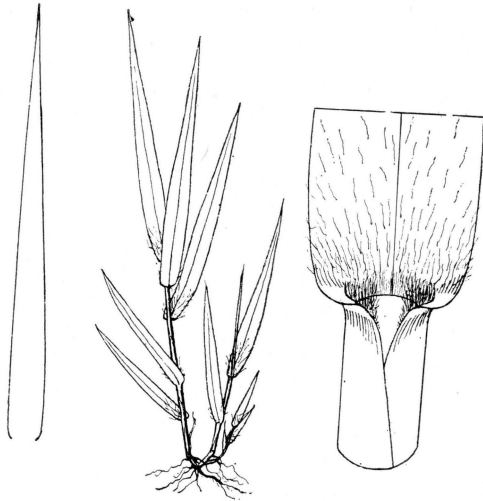


FIG. 34.—*Chaetochloa lutescens*. (Yellow fox-tail). Leaf; plant, $\times \frac{1}{4}$; ligule area $\times 4$.

An erect annual; sandy to clay soils of moderate moisture content; associated with *Chaetochloa viridis* and *Hordeum jubatum*.

Shoot flattened, leaves rolled in the bud. **Sheath** compressed, white to purple below ground, glabrous, veins distinct, margins hyaline. **Ligule** 0.3 to 1.5 mm. long, a fringe of hairs. **Collar** broad, distinct yellowish green, continuous, glabrous, not spiral. **Auricles** absent. **Blade** 5 to 12 mm. wide, 5 to 15 cm. long, flat, little constricted at base, gradually tapering, tip sharply pointed, twisted, veins distinct, mid-vein prominent, margins weakly barbed, slightly rough to smooth above and below, pubescent at base of upper surface (hairs long and silky), herbaceous, medium green, nodding.

Distributed over the state. Generally invades waste places, old stack bottoms, and disturbed areas in prairies. Fair quality if cut early but usually considered a weed.

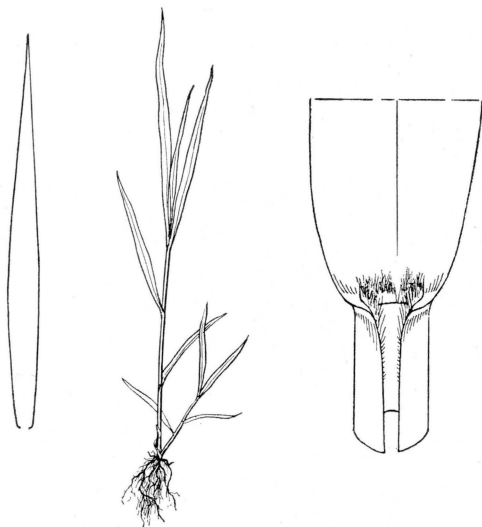


FIG. 35.—*Chaetochloa viridis* (Green foxtail).
 Leaf; plant, $\times \frac{1}{2}$; ligule area, $\times 3 \frac{1}{2}$.

An erect annual; sandy to clay soils of moderate moisture content; associated with *Chaetochloa lutescens* and *Hordeum jubatum*.

Shoot flattened, leaves rolled in the bud. **Sheath** compressed, light green to purple below ground, margins pubescent (hairs soft, usually less than 1 mm. long), margins hyaline. **Ligule** 0.5 to 2.0 mm. long, a fringe of hairs grown together at base. **Collar** medium broad, distinctly yellowish green, continuous, pubescent at least on margins, not spiral. **Auricles** absent. **Blade** 5 to 12 mm. wide, 5 to 20 cm. long, flat, constricted at base, gradually tapering, tip sharply pointed, little twisted, veins distinct, midvein prominent, margins barbed, rough above and below, glabrous, herbaceous, medium to light green, nodding.

Distributed over the state. Generally invades waste places, old stack bottoms, and disturbed areas in prairies. Fair quality if cut early, but usually considered a weed.

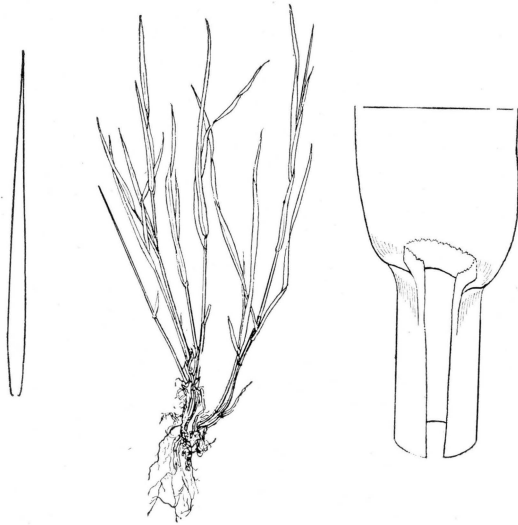


FIG. 36.—*Hordeum jubatum* (Wild barley).
Leaf; plant, $\times \frac{1}{2}$; ligule area, $\times 8$.

An erect perennial with inconspicuous rhizomes; sandy to silt loam soils of moderate to high moisture content; associated with *Chaetochloa viridis*, *Andropogon furcatus*, and *Spartina michauxiana*.

Shoot round, leaves rolled in the bud. **Sheath** round, white to pink or purple below ground, lower sheaths generally pubescent (hairs less than 1 mm. long), veins distinct, margins hyaline. **Ligule** 0.2 to 1.0 mm. long, membranous, truncate, notched and finely ciliate. **Collar** medium broad, distinct yellowish green, sometimes purplish, continuous, glabrous, sometimes spiral. **Auricles** absent or much reduced. **Blade** 2 to 5 mm. wide, 5 to 12 cm. long, flat, little constricted at base, gradually tapering, tip sharply pointed, twisted, veins prominent, forming distinct ridges on upper surface, midvein distinct on lower surface, margins barbed, rough above, slightly rough below, glabrous, herbaceous, medium green, erect.

Distributed over the state. Commonly invades waste places, old stack bottoms, and disturbed areas in prairies. May also grow in midland or upland-midland mixed prairie hay meadows. Undesirable forage, particularly when mature since the beards are injurious to livestock. Considered a weed.