

1967

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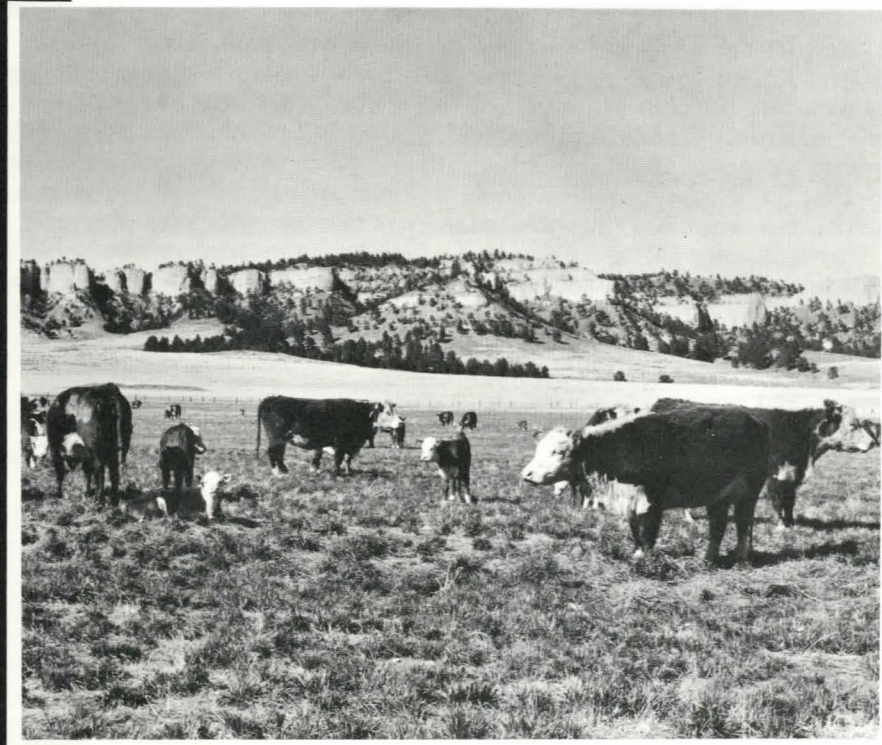
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NEBRASKA RANGE AND PASTURE GRASSES



Extension work in "Agriculture, Home Economics and subjects relating thereto," The Cooperative Extension Service, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln, Cooperating with the Counties and the U.S. Department of Agriculture
Leo E. Lucas, Director

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Issued February, 1967, 4,000
Reprinted August, 1967, 7,500
Reprinted November, 1973, 3,000
Reprinted December, 1976, 2,000

ACKNOWLEDGMENTS

The author wishes to acknowledge assistance received from the following staff members of the University of Nebraska College of Agriculture and Home Economics in organizing, reviewing and evaluating the materials included in this publication: Dr. Donald F. Burzlaff, Dr. Donald C. Clanton and Dr. Elverne C. Conard. Credit for preparing the collar inset drawings and many other individual grass drawings goes to Mrs. Ida Alberta Smith of Logan, Utah. Credit for a number of additional drawings goes to the U.S. National Museum and the U.S. Forest Service.

Nebraska Range and Pasture Grasses

By John F. Vallentine
Range Management Specialist

PREFACE

Grassland comprises more than 50 percent of the land area of Nebraska. The primary use of this grassland is grazing by livestock. Grass is the backbone of Nebraska's beef cattle industry, with sales of live cattle amounting to \$600 million or more annually. Grass has been important to Nebraskans from early pioneer days.

This manual discusses in detail the identification, distribution, uses and values of 59 grasses selected as the most important on range and pasture in Nebraska (additional grasses are discussed in special notes). Some are highly desirable forage grasses; others are worthless weeds. All have been evaluated as to their desirability and grazing use in perennial grassland, including irrigated pasture. Annual grasses adapted for use as temporary pasture have not been considered.

A single, common name has been suggested for each grass in this manual. Each grass is referred to by this standardized name. However, less acceptable common names have been listed in parentheses to aid in identification. Standardized names follow usage in EC 64-161, "Common Range Plants in Nebraska." Authorities for scientific names used in this manual are those given in the following references: for grasses, Hitchcock's *Manual of the Grasses of the U.S.*; for broadleaf plants, Harrington's *Manual of the Plants of Colorado*.

Named varieties have been developed for many forage grasses. Some are listed in the appropriate individual grass sections. However, since new varieties are continually being developed and varietal recommendations frequently change, recommendations on grass varieties have been omitted. Current varietal recommendations can be obtained from the University of Nebraska College of Agriculture.

Both native and introduced grasses are included. Many grasses native to Nebraska are undesirable and not recommended for reseeding. Also, many introduced grasses, both desirable and undesirable, have become naturalized in Nebraska grasslands, and others are well adapted for range and pasture seeding. The origin of grass species has been included primarily to explain current distribution in Nebraska rather than to imply adaptation, forage value, and general utility on Nebraska grasslands *per se*.

Present distribution, management suggestions and seeding recommendations of the various grasses have been related to range sites as much as possible. A discussion of the 12 range sites recognized in this manual precedes the main section. Each range site has its own vegetation and soil characteristics, grazing potential and unique habitat for livestock.

A wide range of source material was used in com-

piling information in this manual. Sources included textbooks, scientific journals, research reports, floras and grass manuals, live plant specimens and herbarium materials, field notes, USDA and Experiment Station publications, government agency publications, and personal correspondence. There was no attempt to document sources of information for readers. Published materials most frequently referred to are included under "References on Nebraska Grasses."

NEBRASKA RANGE SITES

Wetland Site

High water tables are common along Nebraska rivers and in the valleys of the Sandhills. These water tables fluctuate considerably from a normal high in March-May to a low in September-November. On the wetland site, the high spring water table is usually within 10 inches of the soil surface or may rise above the surface for short periods during the growing season. This site is too wet for cultivated crops but is too dry for common reedgrass (*Phragmites communis*) and cattails (*Typha* spp.). The soils vary from sands to silty clays. The topsoil is very dark and high in organic matter; the subsoils are dull and gray. Marshy lands where water covers the soil surface most of the growing season is classified as *marsh* (non-range).

Principal forage plants on the wetland site are prairie cordgrass (*Spartina pectinata*), sedges (*Carex* spp.), rushes (*Juncus* spp.), reed canarygrass (*Phalaris arundinacea*), reedgrasses (*Calamagrostis* spp), alkali-grass (*Puccinellia airoides*), and prairie wedgescale (*Sphenopholis obtusata*). Shrubs, except willows (*Salix* spp.), are generally uncommon. Native broadleaf plants are generally less than 10-15 percent of the composition. Undesirable invaders include foxtail barley (*Hor-*



Wetland range site near North Platte.

deum jubatum), Canada thistle (*Cirsium arvense*), and dandelion (*Taraxacum officinale*). Water hemlock (*Cicuta maculata*), a poisonous plant, is sometimes common.

Herbage production is about three times that from the average range sites. Hay production is the most common use of this site, but the plants naturally present usually produce rather coarse hay. Haying operations often must be delayed until the water table drops and the soil becomes firm enough to support equipment. Delaying cutting until after plants begin to mature further reduces hay quality.

Interseeding of adapted, early maturing, cool-season grasses such as reed canarygrass and redtop (*Agrostis alba*) will improve hay quality where soil conditions allow early cutting. Timothy (*Phleum pratense*) and alsike clover (*Trifolium hybridum*) are also adapted to portions of the wetland site where water does not stand. Wetland sites are not normally grazed during the growing season but are used for aftermath grazing and hay feeding during the winter.

Subirrigated Site

This site has a water table within 10 to 60 inches of the ground surface during most of the growing season. The water table rarely rises above the ground surface but remains within effective reach of deep-rooted grasses. The somewhat lower water table favors a much greater variety of forage plants than does the wetland site. Soils vary from fine sand to silty clay loam. The surface soil is high in organic matter. This site is common in bottmlands along rivers and in Sandhills valleys.

Principal forage plants on the subirrigated site are big bluestem (*Andropogon gerardi*), switchgrass (*Panicum obtusum*), prairie cordgrass, and indiagrass (*Sorghastrum nutans*). Other forage plants common on the site are sedges, Kentucky bluegrass (*Poa pratensis*), slender wheatgrass (*Agropyron trachycaulum*), Canada wildrye (*Elymus canadensis*), little bluestem (*Andropogon scoparius*), prairie sandreed (*Calamovilfa longi-*



Subirrigated (left center) and shallow range sites near Halsey.

folia), reedgrasses, sand dropseed (*Sporobolus cryptandrus*), western wheatgrass (*Agropyron smithii*), and blue and hairy grama (*Bouteloua gracilis* and *hirsuta*). Foxtail barley (*Hordeum jubatum*) is a troublesome invader. Undesirable broadleaf plants that tend to invade or increase are lambsquarter (*Chenopodium album*), docks (*Rumex* spp.), American licorice (*Glycyrrhiza lepidota*), western ragweed (*Ambrosia psilostachya*), and thistles (*Cirsium* spp.).

The subirrigated site is noted for its high quality bluestem hay. Timothy is commonly interseeded along with red and alsike clover or alfalfa. Phosphorus fertilization of grass-legume mixtures greatly increases the production and protein content of the hay. This site is commonly summer-grazed every second or third year with satisfactory livestock gains and without damage to the plants or soil. Carrying capacity is normally two to three times that on adjacent upland sites.

Saline Subirrigated Site

This site has a water table within 10 to 60 inches of the ground surface during most of the growing season. The soil has a high salt or alkali content, which often shows as a whitish-gray cover on the ground. This site is common along the North Platte and Niobrara Rivers and around Sandhill lakes.

Ground cover varies from almost none to a variety of forage plants. The kinds of plants found on this site depend on the amount of salt in the soil. Where salt content of the soil is lower, many of the same species found on a subirrigated site will grow. On soils of high salt content, only salt-tolerant plants such as saltgrass (*Distichlis stricta*), alkali sacaton (*Sporobolus airoides*) sedges and rushes, switchgrass, nuttall alkali-grass (*Puccinellia airoides*), alkali cordgrass (*Spartina gracilis*), and western wheatgrass can survive. Foxtail barley is a troublesome invader. Salt-tolerant weeds such as Russian thistle (*Salsola pestifer*), lambsquarter, and kochia (*Kochia scoparia*) may be common.

Although the carrying capacity may be similar to that on subirrigated range, the forage species on a



Saline subirrigated range site along North Platte River near Minatare.

saline subirrigated range site are often low in palatability. These lands are usually grazed rather than hayed. Some death losses result from animals eating arrowgrass (*Triglochin maritima*), a poisonous plant common on this site. Tall wheatgrass (*Agropyron elongatum*) and tall fescue (*Festuca arundinacea*) are salt-tolerant grasses commonly seeded on saline sub-irrigated sites for cool-season grazing.

Overflow Site

This site regularly receives additional water from occasional stream overflow, run-in from adjacent slopes, or from snowdrift. However, the water table is more than 60 inches under the soil surface. This lowland site is found on flat bottom ravines, foot slopes, terraces, and depressions throughout the state. The soils vary from fine sand to clays and are usually fertile and productive.



Overflow (bottom), this loess (steep hillsides), and limy upland (tops) range sites on the North Platte Station.

Principal forage plants on an overflow site are western wheatgrass, big bluestem, switchgrass, and side-oats grama (*Bouteloua curtipendula*). Other forage plants include Kentucky bluegrass, Canada wild-rye, indiagrass, green needlegrass, green muhly (*Muhlenbergia racemosa*), prairie sandreed, needle-and-thread (*Stipa comata*), blue grama, and buffalograss (*Buchloe dactyloides*). Low value plants, often associated with range deterioration, are skunkbush (*Rhus trilobata*), buckbrush (*Symphoricarpos* spp.), western ragweed, buffalobur (*Solanum rostratum*), annual bromes (*Bromus* spp.), falseboneset (*Kuhnia glutinosa*), ironweed (*Vernonia* spp.), heath aster (*Aster ericoides*), thistles, little barley (*Hordeum pusillum*), verbenas (*Verbena* spp.), and various other annuals.

Because of extra moisture available for plant growth on an overflow site, herbage production for grazing or hay is above average. Grass hay is commonly cut on overflow pockets. Cattle greatly prefer overflow sites because of the succulence of the forage plants and easy access to the areas. Heavy grazing has lowered the condition on many overflow sites. Weed control is often required.

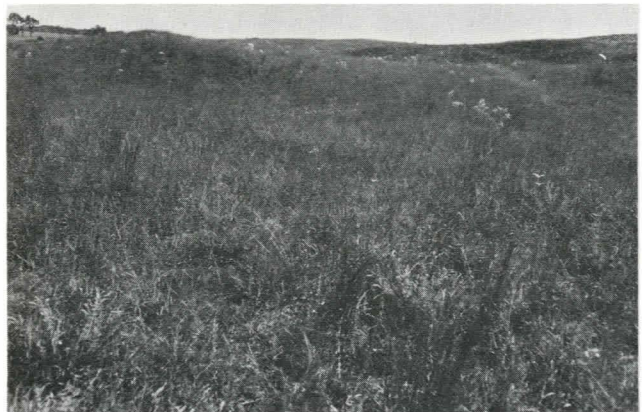
Sands Site

Soils are deep, loose sands and loamy sands with poorly developed horizons in the soil profile and adequate to unrestricted drainage. Slopes are gentle to rolling. The undulating, wave-like hills of the Sandhills are typical of this site. It is the largest and most widespread range site in the Sandhills. The depth of surface soil showing darker color because of organic matter is usually less than 6 inches.

Principal forage plants on a sands site are sand bluestem (*Andropogon hallii*), prairie sandreed, little bluestem, switchgrass, sand lovegrass (*Eragrostis trichodes*), and needle-and-thread. Other common forage plants are porcupinegrass (*Stipa spartina*), prairie junegrass (*Koeleria cristata*), sand dropseed, scribner panicum (*Panicum scribnerianum*), blowout grass (*Redfieldia flexuosa*), blue and hairy grama, indiagrass, Indian ricegrass (*Oryzopsis hymenoides*), sedges (*Carex* spp. and *Cyperus* spp.), leadplant (*Amorpha canescens*), sand paspalum (*Paspalum stramineum*), purple lovegrass (*Eragrostis spectabilis*), and Canada wildrye.

Undesirable grasses and broadleaf plants are sandbur (*Cenchrus pauciflorus*), perennial threeawns (*Aristida* spp.), sandhill muhly (*Muhlenbergia pungens*), sixweeks fescue (*Festuca octoflora*), lemon scurfpea (*Psoralea lanceolata*), green sagewort (*Artemisia* spp.), cudweed sagewort (*Artemisia gnaphalodes*), woolly indianwheat (*Plantago purshii*), wildrose (*Rosa arkan-sana*), and yucca (*Yucca glauca*). Sand sagebrush (*Artemisia filifolia*) occupies large acreages of this site in the western Sandhills and south of the North Platte River.

Sands sites are used primarily for grazing although some hay is cut on ranches having no meadows. Forage production is moderately stable since moisture penetrates the soil rapidly and is available for longer periods of time than on sandy or silty sites. Soil is subject to severe wind erosion when the vegetative cover is removed. Weed control is often required on western ragweed, sand sagebrush, green sagewort, and sometimes on yucca, wildrose, and leafy spurge (*Euphorbia escula*). Two poisonous plants, threadleaf groundsel (*Senecio riddellii*) and lambert crazyweed or locoweed (*Oxytropis lambertii*) are fairly common.



Sands range site near North Platte.



Sandy range site (center) near Stapleton.

Sandy Site

Soils are principally loamy fine sands but vary from fine sandy loams to loamy sands. There is often less than one percent slope and little change in relief. This site is typically a dry, flat valley between choppy or rolling sandhills. These valleys vary from 5 acres or less in size to a half section. Drainage is adequate and the water table is not within reach of plant roots. The soil contains more fine soil particles and organic matter than on sands or choppy sands sites. Moderate accumulation of humus in the surface soil to depths over 6 inches (often to 8–12 inches) causes darker color.

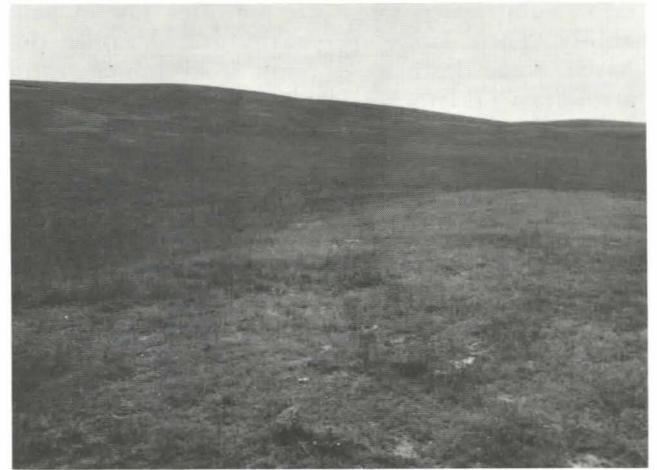
Principal forage plants on a sandy site are prairie sandreed, blue grama, sedges, needle-and-thread, switchgrass, sand dropseed, and sand bluestem. Other common forage plants are western wheatgrass, Kentucky bluegrass, little bluestem, big bluestem, hairy grama, Indian ricegrass, porcupinegrass, prairie junegrass, scribner panicum, purple and sand lovegrass, and leadplant.

Undesirable plants that often become common are western ragweed, green and cudweed sageworts, six-weeks fescue, cheatgrass brome, woolly indianwheat, and wildrose.

Sandy sites are normally grazed in winter. Although sometimes cut for hay, hay yields from native stands are seldom over a half ton per acre. Because of easy access, livestock tend to concentrate on sandy sites; thus many such areas are in low condition. Also, a considerable amount of formerly cultivated "go-back" land is found on sandy sites. Sandy sites are adapted to seeding western or intermediate wheatgrass with or without alfalfa but not red clover. These two cool-season grasses provide valuable spring grazing or hay production or a combination use, but must be fenced from adjacent upland areas and managed separately.

Silty Site

Soils are very fine sandy loams, loams, silt loams, and silts on nearly level to gently rolling slopes. This is the most common range site outside of the Sandhills



Silty range site in Keith County.

region and includes the loess plains and hills south and east of the Sandhills, along the Republican River, and on the upland plains and gentle slopes of southwestern Nebraska and the Panhandle. Since moisture penetration into the soil is lower and the wilting coefficient is higher, deep rooted grasses on a silty site are somewhat more susceptible to drought than on coarser soils.

Principal forage plants on a silty site are blue grama, side-oats grama, needle-and-thread, threadleaf sedge (*Carex filifolia*), and western wheatgrass. Big and little bluestem are very important in the 20–24 inch and higher precipitation zones, but are less important in the Nebraska Panhandle and southwestern sections. Shortgrass tends to dominate on hilltops and areas receiving less than 20 inches of annual precipitation. Other common forage plants are switchgrass, plains muhly (*Muhlenbergia cuspidata*), prairie junegrass, sandberg bluegrass (*Poa secunda*), sand dropseed, squirreltail (*Sitanion hystrix*), Canada wildrye, Kentucky bluegrass, scribner panicum, buffalograss, and hairy grama.

Undesirable grasses include cheatgrass brome, Japanese brome (*Bromus japonicus*), prairie threeawn (*Aristida oligantha*), and red threeawn (*Aristida longiseta*). Common forbs are gayfeathers (*Liatris* spp.), scarlet globemallow (*Sphaeralcea coccinea*), goldenrods (*Solidago* spp.), and a large number of other species. Prickly pear sometimes becomes troublesome.

Most silty sites ideally suited to cultivation have been converted to crop production. However, many smaller units in the south and east and larger units in the west are still in native grass cover. Many unproductive croplands on this site have been seeded back to grass; this trend continues. Grasses such as intermediate and crested wheatgrass and Russian wildrye in the western portion and smooth brome and intermediate wheatgrass in the eastern sections have been seeded on silty soils for spring grazing. Improved varieties of warm-season grasses such as big bluestem, switchgrass, side-oats grama, and indiagrass have been seeded for midsummer grazing.

Clayey Site

Soils are sandy clay loams, clay loams, silty clay loams, and clays. Soils are deep but moisture penetration and movement in the soil is restricted. Soils are sticky when wet but become very hard when dry. Clayey sites are found in Nebraska chiefly along the White and Niobrara Rivers in Dawes, Sioux, Sheridan, Boyd and Keya Paha Counties and in eastern Nebraska.

Principal forage grasses on a clayey site are blue grama, western wheatgrass, needle-and-thread, and threadleaf sedge. On the more moist situations, little bluestem, big bluestem, switchgrass, and indiangrass may produce considerable forage. Other common forage plants include green needlegrass, Canada wildrye, prairie junegrass, buffalograss, and side-oats grama. Annual bromegrasses are troublesome invaders, and prickly pear often becomes a problem.



Clayey range site in northern Sioux County.

Carrying capacity of the clayey site varies considerably depending upon the slope and texture of the soils. Limited ground-water supplies place special emphasis on reservoirs and dugouts for stockwater. Soils on some clayey sites are high in selenium, a mineral highly toxic to livestock and that can be taken up by plants. Several other poisonous plants having toxic properties also are rather common.

Choppy Sands Site

Soils are deep, loose sands on steep, irregular slopes over 20 percent and are slightly acid. Drainage is unrestricted. Narrow ridges and broken surfaces (catsteps) are characteristic of the site. Ground cover is less than on a sands site, and even less profile development is found. Dark coloring from organic matter in the surface soil is at a minimum and seldom over 2 to 3 inches deep. The site is highly susceptible to wind erosion, and blowouts in various stages of activity and stabilization are common. This site is found in the Sandhills region.

Vegetation on a choppy sands site is similar to that found on the sands site. However, there is often an increased amount of rhizomatous grasses such as blow-



Choppy sands range site in Thomas County showing grasses stabilizing a blowout.

outgrass and sandhill muhly and shrubs such as wild-rose and yucca. Grasses such as blue grama, needle-and-thread, and sand dropseed are less common than on sands site.

Because of excessive moisture drainage, the choppy sands site is much less productive than a sands site and thus less valuable. Preventing blowouts from livestock concentration and maintaining good distribution of grazing animals is difficult. Because of tall grasses and winter protection for livestock, choppy sands are best suited to winter use. Yucca may grow in dense stands but can be controlled by winter grazing when it is palatable to livestock, or by spraying with silvex.

Limy Upland Site

This upland site is commonly found on smooth, rolling slopes up to 15 to 25 percent slope but occasionally on nearly level ground. Soils are deep and well-drained and vary from fine sandy loam to clay loam. Profile development is minimum and both surface soil and subsoil are limy. Limy upland sites in cultivated fields show up as light colored knobs and slopes. Distribution of this site in Nebraska is throughout the state.



Limy upland range site and barren (non-range) near Scottsbluff.

Vegetation on limy upland sites includes most of the same species found on silty and clayey sites. However, limy upland sites tend toward more little bluestem and side-oats grama and less switchgrass and big bluestem than do silty sites. Principal forage plants are little bluestem, side-oats grama, blue grama, western wheatgrass, and needle-and-thread.

Because of lower organic matter and increased runoff, limy upland sites are often less productive than silty and clayey sites. Cultivated fields including considerable amounts of eroded limy upland sites should be reseeded to adapted grasses.

Shallow Site

Soils in which the effective root zone of plants is restricted to 20 inches or less are shallow sites. Impervious layers are found variously as bedrock, shale, gravel or coarse sand. Outcroppings of these layers are common. Soil texture varies depending upon the nature of the parent material. The shallow site is most common north and west of the Sandhills and along the North Platte River.

Vegetation varies on shallow sites depending upon soil depth and texture and upon topographical features. Plant species are usually similar to those found on adjacent sites with deep soil. Forage plants found most commonly on shallow sites are little bluestem, blue and hairy grama, needle-and-thread, side-oats grama, and western wheatgrass. A scattered stand of cedar (*Juniperous virginiana*) or ponderosa pine (*Pinus ponderosa*) is not uncommon.

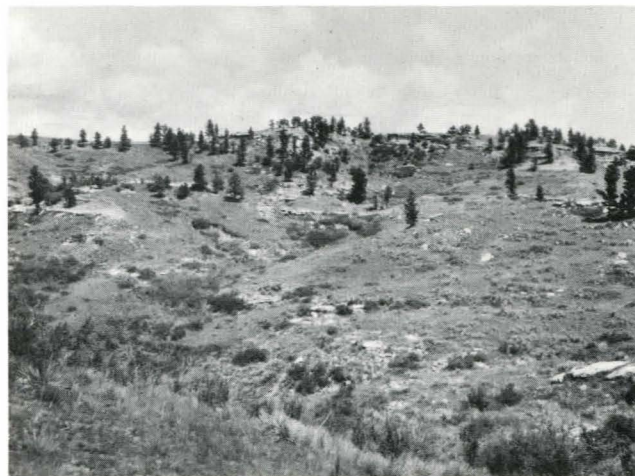


Shallow range site in Sioux County.

Because of the limited amount of soil available to promote plant growth, carrying capacity of shallow sites is typically low. Soils are not adapted to cultivation. Reseeding of native stands should be attempted only with caution. Difficult livestock access, steep terrain, and shortage of ground water for stock water are common.

Thin Loess Site

Soils are deep silt loams on steep to very steep, rough, broken slopes of over 25 percent. Catsteps or



Shallow range site in Morrill County.

land slips are common. Soils are limy. Thin loess sites are typically the canyon sides along the rivers and streams south and east of the Sandhills but not limited to these areas.

The thin loess site normally occurs in combination with limy upland, silty and overflow sites and has most of the same plant species present. However, because of indirect sunlight, snowdrift, and runoff and seepage from higher areas, thin loess sites usually support more mid and tall grasses.

Principal forage species are little bluestem, needle-and-thread, western wheatgrass, blue grama, and side-oats grama. Other important forage plants are big bluestem, green needlegrass, Indian ricegrass, plains muhly, prairie junegrass, prairie sandreed, threadleaf sedge, Canada wildrye, and switchgrass.

Since thin loess sites are not adapted to cultivation, such areas comprise much of the native grassland in areas where farming predominates over ranching. This is evident in counties along the Republican and lower Loup Rivers and their tributaries where the more level uplands and lowlands are farmed and the rougher areas appear as islands of grassland.

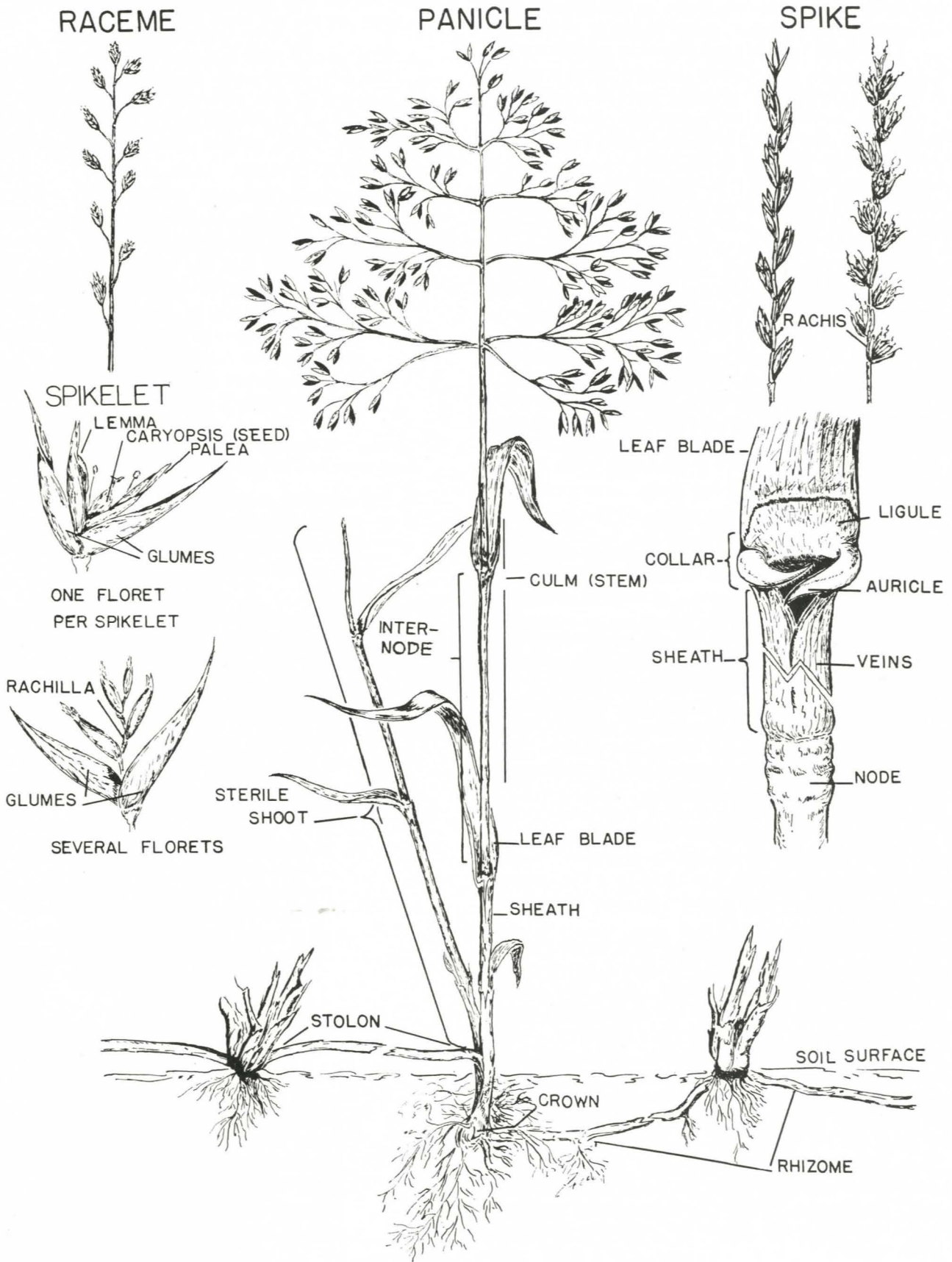
Since such grasslands are rough and often irregular in shape, providing adequate amounts and distribution of stockwater is difficult. Obtaining adequate grazing use of thin loess sites without injuring associated sites is always a problem. However, since thin loess sites are subject to severe water erosion, care should be taken that they are not overgrazed.

PARTS OF A GRASS PLANT

Vegetative parts of a grass plant include the stem, the leaves and the roots. The stem or *culm* is made up of *nodes* (joints) and *internodes* (between the joints). The internodes are usually hollow, but the joints are always solid. Grass culms are erect, *prostrate* (lying on the surface of the ground), or *decumbent* (lying on the ground or horizontal at the base but curving upwards at the end).

A grass leaf has two parts: the *sheath* is the lower, tubular part which encloses the stem, and the *blade*

THE GRASS PLANT



is the expanded upper portion that extends away from the stem. The region where the sheath and blade join is called the *collar*. On the inside of the collar, and projecting above the sheath, is a thin lining called the *ligule*. The ligule may appear as a thin membrane, a ring of hairs, or be entirely absent. Two earlike appendages sometimes projecting from the collar, one on each side, are the *auricles*. Auricles are found on grasses of the *Hordeae* tribe, on meadow and tall fescue, and sometimes on other species.

The arrangement of leaves in the bud (referred to as *vernation*) is helpful in grass identification. Leaves still in the bud may be folded (margins meet but do not overlap) or rolled lengthwise (margins overlap). This is best determined by cutting the shoot crosswise immediately below the collar of the last fully developed leaf and examining under a magnifying glass.

The roots are also helpful in identifying grasses. Some grasses have only fibrous roots below ground. Others may also have *rhizomes* or *stolons*. Rhizomes are jointed, scaly, underground stems which spread horizontally and take root and produce shoots at the joints and tips. Stolons (also called runners) are similar to rhizomes except that they grow horizontally above the ground surface and are not scaly.

Reproductive Parts

Reproductive or flowering parts of the grass plants comprise the *inflorescence*. It is composed of an axis or "backbone" called the *rachis* (seedstalk) and specialized structures called *spikelets*.

The two most common kinds of inflorescence are the *spike* and the *panicle*. A third but less common kind is the *raceme*. The spikelets of a spike are attached directly (*sessile*) to the rachis. The spikelets of a raceme are attached to the ends of *pedicels* (short stalks or branches) arranged along the rachis. The panicle is a compound inflorescence with at least some of the panicle branches rebranched.

A normal spikelet is composed of two *glumes*, the *rachilla*, and one to several *florets*. The glumes, normally two in number, are the chaffy or "empty" bracts at the base of the spikelet. The rachilla is the central axis of a spikelet having more than one floret and supports the florets.

A floret consists of two opposite, chaffy bracts known as the *lemma* and *palea* and the flower which they enclose. The lemma is the outer bract and often encloses the seed on three sides. The palea is the inner bract. Each perfect flower usually consists of three stamens and a single pistil containing one ovary. Only one seed is produced from each grass flower. In some grasses the lemma and palea remain attached to the seed after they ripen and fall. In other grasses, the seeds shell out.

Awns (beards) are found on the glumes and/or lemmas of many grass species. Certain plant parts, particularly the lemma and leaves, are *pubescent* (covered with fine hair) in some species but *glabrous* (hairless) in other species.

KEY TO GRASS TRIBES IN NEBRASKA

- I. Two florets per spikelet, the lower staminate or sterile; glumes fall with the ripe seed.
 - A. Male and female spikelets on separate parts of the inflorescence or plant, the male spikelets forming tassels and the female spikelets arranged on a cob (like corn) or thickened rachis section (like eastern gamagrass)—Corn tribe (*Tripsaceae*).
 - B. Spikelets not arranged as above.
 1. Glumes thicker and firmer than the fertile lemma; spikelets paired, usually one sessile and perfect and the other on a short stalk and staminate or sterile—Bluestem tribe (*Andropogoneae*), p.
 2. Glumes thinner and less firm than the fertile lemma, sterile lemma appearing as a third glume; spikelets not paired as above—Millet tribe (*Panicaceae*), p.
- II. Florets not arranged as above; glumes usually remain attached to the rachis when ripe seeds fall.
 - A. Inflorescence a spike.
 1. Inflorescence usually of two or more spikes per culm; spikelets arranged on one side of the rachis only—Grama tribe (*Chlorideae*), p.
 2. Inflorescence a single, terminal spike; spikelets arranged on opposite sides of the rachis—Barley tribe (*Hordeae*), p.
 - B. Inflorescence a panicle or raceme (certain species such as timothy and prairie junegrass appear spikeletlike).
 1. One perfect floret per spikelet.
 - a. Two imperfect florets below the perfect floret—Canarygrass tribe (*Phalarideae*), p.
 - b. One perfect floret and no imperfect florets per spikelet.
 - (1) Glumes two in number—Redtop tribe (*Agrostideae*), p.
 - (2) Glumes absent (in our species).
 - (a) Spikelets unisexual, awned, cylindrical (as in wildrice)—Wildrice tribe (*Zizanieae*).
 - (b) Spikelets bisexual, awnless, flattened (as in rice cutgrass)—Rice tribe (*Oryzeae*).
 2. Two or more perfect florets per spikelet.
 - a. Glumes as long or longer than the lowermost floret; lemmas awned from the back or awnless—Oat tribe (*Aveneae*), p.
 - b. Glumes shorter than the lowermost floret (in our species); lemmas awned from the tip or awnless—Fescue tribe (*Festuceae*), p.

FESCUE TRIBE (*Festuceae*)

Smooth Brome

Bromus inermis Leyss.

Description: Smooth brome is a cool-season, erect, leafy, long-lived perennial, 2 to 4 feet tall. It has rhizomes and commonly produces a dense sod. *Inflorescence* is a compact to somewhat open panicle, 4 to 8 inches long. *Spikelets* are long and slender, turn brownish at maturity, and contain 5 to 10 florets. Lemmas are awnless to awn-tipped and, as in all bromes, are split near the tip. *Leaves* are glabrous or occasionally pubescent, particularly on sheaths. Leaf blades are long (8 to 15 inches), flat, $\frac{1}{4}$ to $\frac{1}{2}$ inch wide, with a raised and keeled midrib below. Sheaths



Smooth Brome

are closed except near the collar, forming a tube around the stem, and are tissuelike when dry. Leaves are rolled in the bud. *Ligules* are up to $\frac{1}{8}$ inch long, rounded, and membranous. *Auricles* are absent.

Where found: Smooth brome was introduced from eastern Europe in 1884. It has been seeded as a cultivated pasture grass throughout Nebraska except in the more droughty areas.

Uses and values: Smooth brome is a cool-season grass which produces abundant herbage in the spring and late summer for hay or pasture. Growth is normally sufficient to allow grazing by late April or early May. For all classes of livestock it is quite palatable, even after seedstalk development.

Smooth brome is widely adapted for seeding in eastern and central Nebraska on clayey, silty, overflow, and subirrigated sites. It is adapted to sandy sites only when regularly fertilized with nitrogen. In western Nebraska its use is limited to the more favorable sites such as subirrigated and overflow sites. Because it does not withstand prolonged drought, do not seed on dry upland sites in the western half of Nebraska. Smooth brome is probably the leading grass for irrigated pasture in Nebraska and is adapted for this purpose throughout the state. However, it should not be planted in mixture with less palatable grasses.

When seeded on adapted sites, smooth brome is resistant to grazing, is cold tolerant, has high seedling vigor, and will tolerate moderately salty soil. Late summer seeding for fall establishment is preferred. Nitrogen fertilization is usually required to maintain high yield even when seeded with a legume. Smooth brome responds to intensive management practices such as irrigation, fertilization, and rotation grazing. Such practices lighten but do not prevent the normal summer dormancy of smooth brome. Heavy grazing is particularly damaging in very early spring and in the fall before growth stops. Lincoln, Lyon, Lancaster and Achenbach are named varieties of smooth brome.

Japanese Brome

Bromus japonicus Thunb.

Description: Japanese brome is a cool-season, weedy annual, 8 to 24 inches high, without rhizomes. *Inflorescence* is an open panicle. *Spikelets* have several florets. Lemmas differ from downy brome in being broad and glabrous rather than narrow and pubescent. Also, the awns of Japanese brome become twisted and divergent at maturity. *Leaves* are densely pubescent on both blade and sheath. Blades are flat to slightly keeled, with raised veins above and a prominent midvein below. Leaves are rolled in the bud. *Ligules* are membranous, but shorter (up to $\frac{1}{16}$ inch) and more shallowly toothed than in downy brome. *Auricles* are absent.

Where found: Japanese brome is widespread on waste areas and low condition range in Nebraska. It commonly occurs on all range sites except wetland, sands, and choppy sands sites and often grows intermixed with downy brome.



Japanese Brome

Uses and values: Japanese brome is similar to downy brome in being an early spring grower, an unpredictable forage producer, and grazed only in early spring and late fall.

Note: Japanese brome is known to cross with two similar annual bromes, hairy chess (*Bromus commutatus* Schrad.) and chess (*Bromus secalinus* L.), also called cheat. All are weedy grasses requiring similar management considerations and normally are unable to compete with healthy, vigorous, perennial grasses.

Downy Brome

Bromus tectorum L.

Description: Downy brome (also called cheatgrass brome, wild oats, military grass and junegrass) is a cool-season, weedy annual, without rhizomes, growing from a few inches to 2 feet high from a branched base. It is normally a winter annual, germinating in the fall and maturing the following spring. Plants are typically rusty-red to purple at maturity. *Inflorescence* is an open, much branched, and drooping panicle. *Spikelets* are pubescent or downy on glumes and lemmas and have 5 to 8 florets. Lemmas are narrow, and awns on lemmas are $\frac{5}{8}$ inch long or longer. *Leaves* are pubescent on blades and sheaths. Leaf blades are flat, $\frac{1}{8}$ to $\frac{1}{4}$ inch wide. Leaves are rolled in the bud. *Ligules* are $\frac{1}{16}$ to $\frac{1}{8}$ inch long, membranous, rounded to collar shaped, with long pointed teeth. *Auricles* are absent.

Where found: Downy brome is a weedy species introduced by accident from Europe. It is widely distributed in Nebraska and is particularly common on silty, limy upland, and clayey sites of western Nebraska. Since this plant invades sites primarily where the natural vegetation has been weakened by fire, improper grazing, drought, or previous cultivation, it is an indicator of low range condition. Downy brome does not compete strongly with established perennial grasses and occurs only in small amounts on good condition range. Its growth fluctuates greatly from year to year and is favored by a moist, warm fall, winter, spring, followed by a dry summer.

Uses and values: Downy brome remains green and palatable only for 3 to 5 weeks in the early spring and again in the fall if moisture favors a new crop of seedlings. As it matures in the spring, it rapidly becomes unpalatable and low in nutritive content and digestibility. The awned seeds often cause sores in the mouths and eyes of grazing animals and damage to sheep fleeces. Animals fed hay contaminated with downy brome may be damaged even more. Dry downy brome burns readily and is a fire hazard.



Downy Brome

Range sites subject to downy brome invasion must be carefully managed and maintained in high condition for control. Productive sites now supporting only dense stands of downy brome should be reseeded to competitive perennial grasses. Spring plowing and summer fallowing should precede planting to prevent seed production. Because it produces a large amount of seed which rapidly germinates under favorable moisture conditions, it is able to compete strongly with perennial grass seedlings. Chemical control under pasture and range conditions is impractical.

Orchardgrass *Dactylis glomerata* L.

Description: Orchardgrass is a cool-season, long-lived perennial bunchgrass, occasionally with short rhizomes. It commonly grows in clumps 1½ to 3 feet tall. *Inflorescence* is a panicle with spikelets grouped together in dense, one-sided clusters at the end of panicle branches. *Spikelets* have 2 to 5 florets. Lemmas are pointed to short-awned. *Leaves* are long, up to ½ inch wide, folded when immature but later flat or V-shaped, with a prominent white midrib on the under side. Leaf sheaths are flattened, keeled, and mostly closed. Both blades and sheaths are glabrous but rough when mature. Leaves are folded in the bud. *Ligules* are ⅛ to ¼ inch long, membranous, with split margins. *Auricles* are absent.

Where found: Orchardgrass was introduced into the United States from Eurasia before 1760. Its distribution in Nebraska is limited to irrigated pastures, sub-irrigated meadows, along ditch banks, and on moist soils.

Uses and values: This grass is valuable as an irrigated or subirrigated hay or pasture grass. It is shade tolerant, moderately heat and cold resistant, and establishes a stand rapidly. It does not tolerate prolonged drought and is only slightly to moderately salt tolerant. Orchardgrass should be included in nonirrigated pasture mixes only in eastern Nebraska where soil moisture conditions are favorable. This grass produces best on fertile soils and responds well to nitrogen fertilization.

Orchardgrass starts growth early in the spring, and new, immature growth is highly palatable to livestock. However, it grows and matures rapidly. As it matures, palatability and nutritive value decline. To keep orchardgrass green throughout the summer and to prevent large, unpalatable clumps from forming, it should be grazed or hayed while actively growing. Periodical heavy grazing in a rotation pasture program is the most effective way of maintaining a continuous yield of palatable forage.

Orchardgrass recovers from grazing or mowing more rapidly than smooth brome grass and continues growth during midsummer when smooth brome grass becomes somewhat dormant. Its rapid recovery from defoliation and ability to grow in midsummer result in a more uniform yield for the season. This uniform yield



Orchardgrass

also helps prevent bloat in grass-alfalfa pastures. Sterling and Potomac are moderately early maturing varieties. Later maturing varieties are Pennlate and Latar.

Saltgrass *Distichlis stricta* (Torr.) Rydb.

Description: Saltgrass (also called inland saltgrass) is a warm-season, low-growing sodgrass, 4 to 16 inches tall, with tough, scaly rhizomes and rigid stems. Above ground parts, particularly seedheads, are yellow at maturity. *Inflorescence* is a contracted, dense panicle. Male and female inflorescences are produced on separate plants. The male inflorescences are larger and more dense and are placed on a longer culm. *Spikelets* are flattened, awnless, and produce 8 to 15 florets. *Leaves* are hairy at the collar and have scattered hairs on the blade and sheath. Leaf blades are stiff, flattened at the base, sharp pointed, coarse, and spaced along the entire length of the stem. Leaf sheaths overlap. Leaves are folded in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.



Saltgrass

Where found: This native, warm-season grass is found on saline subirrigated sites in pure stands, where it forms a dense sod, or in mixed stands with alkali sacaton, foxtail barley, and other salt tolerant plants. It tolerates high soil salinity and can grow even on soils crusted with salt. Saltgrass is also capable of growing on dry soils of silty, clayey, and even sandy and sands sites.

Uses and values: Saltgrass has low palatability since it is wiry and tough, but it is grazed when other forage is not available. It is grazed to best advantage during late spring and summer when actively growing. It has a rather long period of green growth during the summer. When used for winter forage, saltgrass is quite low in phosphorus, protein, and vitamin A along with being unpalatable. Livestock grazed almost solely on dried saltgrass sometimes develop severe rumen compaction. Avoid straight saltgrass diets in the late fall and winter.

Saltgrass is highly resistant to grazing and trampling because of its vigorous rhizomes. This is a desirable feature around livestock concentration areas such as windmills, corrals, and trails. Continuous close grazing gives the most efficient use of saltgrass but may quickly destroy the more palatable and more productive grasses associated with it. Saltgrass is a strong increaser on saline subirrigated sites, but it is also very aggressive and may invade dry sites when competition from taller grasses is reduced.

Stinkgrass

Eragrostis cilianensis (All.) Lutati

Description: Stinkgrass is a warm-season, weedy annual with a disagreeable odor when fresh, 4 to 20 inches tall, without rhizomes, much branched at the decumbent base, forming a small bunch. *Inflorescence* is a panicle. *Spikelets* are awnless, placed singly at the ends of panicle branches, and include 10 to 35 florets. *Leaves* are hairy at the collar. Leaf blades are found both at the plant base and on the stems, are flat and of medium width, 3 to 10 inches long, mostly glabrous and with conspicuous nerves. Glands are distributed along edges of the blades and on the backside of the midrib. Leaves are rolled in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: Stinkgrass was accidentally introduced from Europe and is a common weed throughout Nebraska in waste places, fields, roadsides, and badly abused ranges and pastures. It grows both on sandy and silty soils.

Uses and values: This warm-season, weedy invader is worthless for forage. Since it is unable to compete with native forage grasses, it is found on ranges only where the native cover has been removed or damaged. Where common on grazing lands, a seedbed should be prepared and the land seeded to desirable grasses. Abundant stands often follow plowing and may reduce soil moisture otherwise available to young grass seedlings. Providing a cover crop on land to be seeded to grass helps control weedy grasses such as stinkgrass.

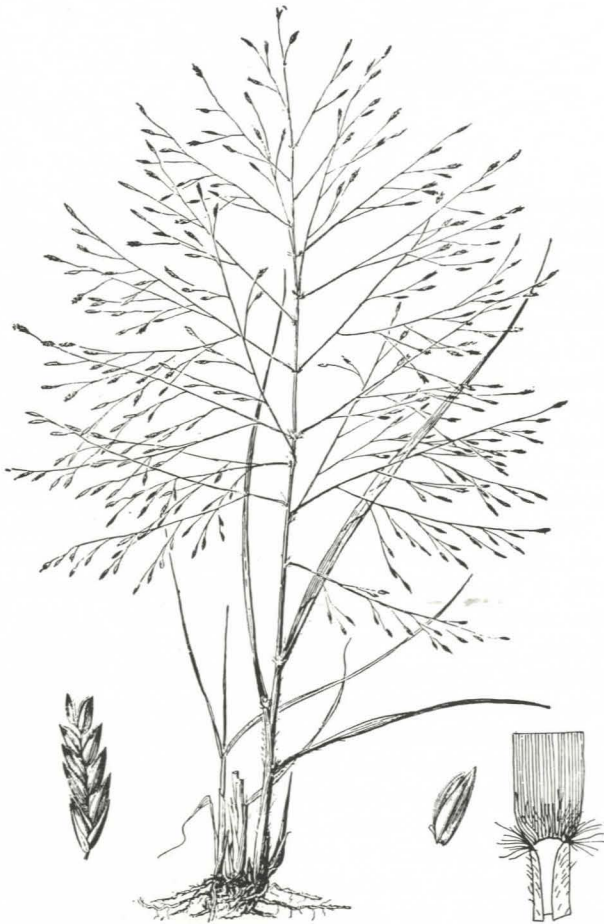


Stinkgrass

Purple Lovegrass

Eragrostis spectabilis (Pursh) Steud.

Description: Purple lovegrass is a warm-season, perennial bunchgrass, 8 to 24 inches tall, sometimes with short rhizomes. *Inflorescence* is a large, widely spreading, purplish panicle which separates from the plant at maturity and is blown by the wind. Hairs are prominent at junction of panicle branches and the rachis. Purple lovegrass resembles sand lovegrass but differs in having a panicle at maturity that is nearly as wide as long and about $\frac{2}{3}$ the total height of the plant. The lower panicle branches of purple lovegrass are spreading or even bend downward at maturity. *Spikelets* contain 4 to 12 awnless florets. *Leaves* of purple lovegrass have flat blades which often roll when dry. Leaf blades stand upright and are usually glabrous. Silky hairs ($\frac{1}{8}$ to $\frac{1}{3}$ inches long) are prominent inside and outside at the collar and on the throat of sheath but are scattered over the entire sheath. Leaves are rolled in the bud. *Ligules* are a fringe of short hairs about $\frac{1}{16}$ inch long. *Auricles* are absent.



Purple Lovegrass

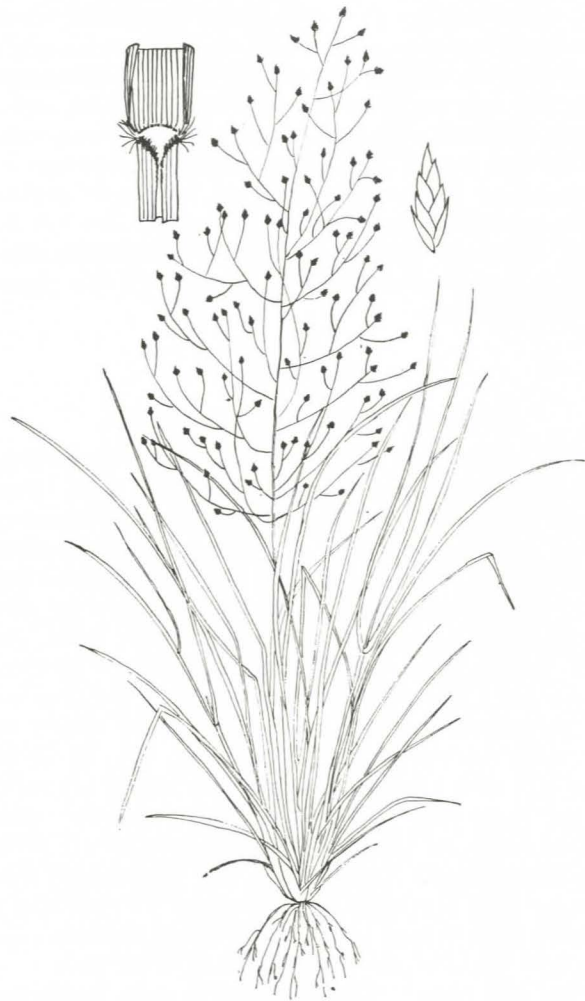
Where found: Purple lovegrass is rather common over most of the state except in the extreme west and occurs in scattered rather than dense stands. It is most abundant on sandy, sands, and choppy sands sites but occurs sparingly on dry, silty or clayey soils.

Uses and values: This native, warm-season grass is a common increaser in the Sandhills and readily establishes on "go-back" land. The herbage produced by purple lovegrass is rather coarse, and the forage value is only fair when green and growing. The seedbeds and the mature foliage are largely ignored by cattle. Purple lovegrass is not a high forage producer.

Sand Lovegrass

Eragrostis trichodes (Nutt.) Wood

Description: Sand lovegrass is a warm-season, perennial bunchgrass, without rhizomes, 1 to 4 feet tall. *Inflorescence* is a large, open panicle, much branched and often purplish. Panicles are usually half as long as the entire plant. *Spikelets* are awnless and borne at



Sand Lovegrass

the ends of fine branches, are rather small and numerous, and contain mostly 4 to 6 florets. *Leaves* have prominent hairs on the collar and upper edges of the sheath. Leaf blades are glabrous, mostly flat, long, and taper to a slender point. Leaves are rolled in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: Sand lovegrass is native to the Nebraska Sandhills where it is an important and abund-

ant grass on sands and choppy sands sites. Here it grows best on north and east facing slopes where moisture conditions are more favorable. It is found as scattered plants on sandy sites and rarely on silty sites in mixture with other native grasses.

Uses and values: This warm-season grass starts growth as much as two weeks earlier than most warm-season grasses, is a good forage producer, and remains green into the fall. It is a decreaser under heavy grazing. When green and growing it is very palatable and nutritious. During the summer it is highly preferred and may be overgrazed. Palatability is fair to good after maturity. Cattle seem to prefer sand lovegrass more in mixtures than in pure stands.

Sand lovegrass is valuable for reseeding on sands and sandy sites throughout the state. On sandy soils it is commonly seeded with other palatable, warm-season, native grasses or sometimes in pure stands. It is also recommended for including in warm-season grass mixtures on all except the driest silty sites and in eastern Nebraska on clayey sites since it increases yields for the first 3 or 4 years. It is adapted in mixtures for warm-season irrigated pasture. It has high seedling vigor, establishes quickly, and withstands low soil fertility. Although individual plants are somewhat short-lived, it reseeds itself readily. Nebraska 27 is a variety of sand lovegrass.

Tall Fescue

Festuca arundinacea Schreb.

Description: Tall fescue is a large, erect, cool-season, perennial bunchgrass, 2½ to 4 feet tall, with coarse stems and deep roots. *Inflorescence* is a branched, rather nodding panicle, 4 to 12 inches long. *Spikelets* contain 5 to 7 florets arranged in a herringbone pattern. Both glumes and lemmas are awnless or awn-tipped only. *Leaves* are numerous, mostly basal, and dark green. Both blades and sheaths are glabrous except for a few short hairs at margins of collar and are prominently veined and rough. Leaf blades are flat, wide (up to ½ inch), rather lax, 4 to 20 inches long, and with a raised midrib below. Leaves are rolled in the bud. *Ligules* are short, membranous, collar-shaped, with an irregular margin. *Auricles* are short.

Where found: Tall fescue was introduced from Europe. It is becoming more common in Nebraska as a result of increased use in subirrigated meadows and irrigated pastures, particularly on alkaline soils.

Uses and values: This cool-season grass is adapted to moist, deep soils, tolerates moderately high soil salinity, is able to survive prolonged winter flooding, but is not tolerant of extended drought. Where moisture is continuous for growth, it has outproduced tall wheatgrass. Tall fescue is ready for grazing in the spring somewhat earlier than tall wheatgrass, is more resistant to grazing, but is slightly less salt tolerant. Tall fescue has leaf-rust resistance, which meadow fescue lacks.

Tall fescue is only fair in palatability for livestock



Tall Fescue

and normally should not be seeded in mixtures. Cattle and even sheep make fair to good use of this grass when seeded in pure stands. It becomes coarse and low in palatability if left ungrazed or lightly grazed and allowed to mature. Periodic close grazing (down to 2 to 4 inches) in a rotation program is recommended. Nitrogen fertilization not only stimulates growth but also makes the herbage more palatable. Its coarse, basal leaves make it generally better suited for pasture than hay. In some areas, cattle grazing tall fescue have developed a lameness commonly called "fescue foot."

Tall fescue is well adapted for seeding on saline subirrigated sites and on poorly drained irrigated soils. It has also found some use on subirrigated range sites and in irrigated pasture. It may have a place on sloping, shallow, low fertility lands of southeastern Nebraska. However, it is not adapted and should not be seeded on the drier upland soils of central and western Nebraska without irrigation. Tall fescue is rather slow to establish but is aggressive once established. Alta, Kentucky 31, and Goar are named varieties of tall fescue.

Note: Tall fescue is similar to meadow fescue (*Festuca elatior* L.), which it has largely replaced as a forage producer. Tall fescue is distinguished from meadow fescue by more robust growth, broader leaves, the deep green of upper leaf surface, and by a few short hairs on the margin of the collar. Both tall and meadow fescue are common in lawn mixtures but are much less desirable than the buegrasses for this purpose.

Sixweeks Fescue *Festuca octoflora* Walt.

Description: Sixweeks fescue is a cool-season, slender, erect annual, has shallow roots, and grows 3 to 12 inches high. *Inflorescence* is a narrow, compact panicle, 1/2 to 3 inches long. *Spikelets* have 7 to 13 narrow florets. Glumes are narrow and short-awned; lemmas have short awns. *Leaves* are sparingly pubescent. Leaf blades are narrow, rolled, erect, and 1 to 3 inches long. *Ligules* are short, membranous, and collar-shaped. *Auricles* are absent.



Sixweeks Fescue

Where found: Sixweeks fescue is a weedy, winter annual widespread on Nebraska pastures, ranges, and waste places. It is found on practically all range sites where bare spaces between perennial grass clumps allow it to grow. It is particularly common on upland sites.

Uses and values: This grass is unpalatable and worthless for forage since it pulls up so easily livestock cannot graze it. Cattle tend to avoid grazing in areas infested with this grass. Although an abundance of sixweeks fescue is favored by heavy grazing and poor range condition, its prevalence in certain years appears due primarily to climatic conditions. If the fall weather

is warm and moist, seed of sixweeks fescue germinate and the seedlings quickly emerge. Then, in late winter or early spring, growth is very rapid and plants quickly mature.

Canada Bluegrass *Poa compressa* L.

Description: Canada bluegrass is a cool-season perennial with rhizomes and grows 6 to 15 inches tall. *Inflorescence* is a narrow panicle. *Spikelets* have 3 to 8 florets. Lemmas are awnless but have cobwebby hairs at the base. *Leaves* are basal, numerous, and glabrous. Leaf blades are up to 4 inches long, narrow, folded when young but nearly flat at maturity, and boat-shaped at the tip. Blade margins are often rough;



Canada Bluegrass

nerves except midrib are not conspicuous. Leaves are folded in the bud. *Ligules* are up to $\frac{1}{16}$ inch long, membranous, and rounded. *Auricles* are absent. This grass closely resembles Kentucky bluegrass but differs in shorter growth, bluegreen foliage, and narrow, more compact panicles. Canada bluegrass differs from all other bluegrasses in having a flattened, two-sided stem.

Where found: This grass is a native of eastern Europe, from which place it was introduced before 1792. It is widely distributed in Nebraska and has become naturalized on native hay meadows, bottom-land pastures, thin woods, waste areas, and roadsides. It is also commonly found in lawns. It requires more moisture for successful growth than occurs on upland sites of central and western Nebraska.

Uses and values: Canada bluegrass is a cool-season grass which grows rapidly early in the spring. It is very palatable and nutritious in the spring and fall. Since it matures later than Kentucky bluegrass, a grass with which it commonly grows intermixed, it remains rather palatable through the summer. It is resistant to grazing and trampling but recovers slowly after grazing.

Canada bluegrass will grow on low fertility soils and those having poor drainage but is only slightly more drought tolerant than Kentucky bluegrass. Because of low productivity, Canada bluegrass is not recommended for seeding as a forage grass and its value as a lawn grass is questionable.

Kentucky Bluegrass *Poa pratensis* L.

Description: Kentucky bluegrass is a cool-season, long-lived, perennial sodgrass, with rhizomes, and grows 6 inches to 2½ feet tall under natural conditions. Young shoots are flattened, but culms are rounded. *Inflorescence* is an open, spreading, pyramid-shaped panicle, 2 to 8 inches long. Panicle branches are whorled in groups of 3 to 5. *Spikelets* contain 3 to 5 florets. Lemmas are awnless but have a mat of cobwebby hairs at the base. *Leaves* are mostly basal and nearly glabrous. Leaf blades are V-shaped, narrow, 1 to 7 inches long, and have a distinct boat-shaped tip characteristic of all bluegrasses. Leaves are folded in the bud. *Ligules* are very short, membranous, and collar-shaped. *Auricles* are absent.

Where found: Kentucky bluegrass is reported to have been introduced from Europe as a pasture grass before 1700. Its spread was so rapid and its naturalization so complete, it commonly preceded settlers into new areas. Thus, its classification as an introduced rather than a native grass is a mere technicality. It is found in Nebraska on most range sites but is abundant only on those sites that have favorable soil moisture conditions such as subirrigated and overflow sites and in eastern Nebraska on upland sites.

Uses and values: This cool-season grass is often the earliest growing grass in the lowlands, goes into semi-



Kentucky Bluegrass

dormancy in the summer, but is revived by late summer and fall rains. Seedstalks begin appearing in early May. When green and growing, Kentucky bluegrass is highly palatable and nutritious to all species of livestock. Few grasses are able to withstand continued heavy grazing as well as this grass. For this reason it increases rapidly on overgrazed pastures and meadows. Ample ground mulch and competition from the taller grasses discourage Kentucky bluegrass.

Its summer dormancy and low herbage yield greatly limit the desirability of this grass. It is very sensitive to heat and to summer drought. It is undesirable as a hay grass because of its low growth, low yield, and maturity before other grasses are ready to cut. Although sometimes seeded in permanent, cool-season pasture mixtures, its disadvantages should be carefully weighed. Kentucky bluegrass is the principal lawn grass in Nebraska. Merion is a named variety.

Sandberg Bluegrass

Poa secunda Presl

Description: Sandberg bluegrass is a short, cool-season, perennial bunchgrass, commonly not over 12 inches tall, which grows in small tufts and has no rhizomes. *Inflorescence* is a narrow panicle up to 4 inches long with ascending panicle branches in groups of 2 or 3. *Spikelets* contain 2 to 4 florets and are often purplish before maturity. Lemmas have no awns or cobwebby base. *Leaves* are glabrous on both blade and sheath. Leaf blades are numerous, fine, 1 to 3 inches long, mostly basal and rolled, somewhat curly at maturity, with a boat-shaped tip. Leaves are rolled in the bud. *Ligules* are prominent, membranous, about $\frac{1}{8}$ inch long, and taper to the tip. *Auricles* are absent.

Where found: This grass is native to western Nebraska, where it is found on upland range sites of medium and heavy textured soils. It is particularly abundant on inferior, shallow, dry, rocky soils of slopes and ridgetops. Under heavy grazing it may become prominent on ordinary upland silty and clayey sites.

Uses and values: Sandberg bluegrass is a cool-season grass which begins growth very early in the spring, usually before needle-and-thread and western wheatgrass, and furnishes considerable forage by mid-April. When green and growing, it is palatable to range live-



Sandberg Bluegrass

stock. However, as seed is often produced by mid-June and maturity reached by early July, palatability and nutritive content drop sharply. It is largely ignored by livestock after about mid-June unless soil moisture is sufficient in late summer and fall to promote regrowth.

The volume of forage produced by this plant is low even when plants are abundant. It is quite drought resistant because of its mass of shallow roots and its ability to grow and mature early while moisture supplies are still good. It acts typically as an increaser and replaces the more desirable perennial grasses under heavy grazing and trampling. It is not recommended for range reseeding.

Note: Canby bluegrass (*Poa canbyi* (Scribn.) Piper) is a native grass resembling Sandberg bluegrass in that it has no rhizomes, has a narrow panicle, and has no cobwebby hairs at the base of the lemma. Both species may be part of the same species complex since Canby bluegrass reportedly differs only in having taller seed-stalks (over 15 inches) and being generally more robust. Since distribution and forage characteristics are similar, precise differentiation is unnecessary.

Note: Another native perennial bluegrass is plains bluegrass (*Poa arida* Vasey). It also resembles Sandberg bluegrass in having a narrow panicle and no cobwebby hairs at base of lemma. It can be distinguished by the presence of rhizomes. Like other bluegrasses, it is a cool-season grower. Plains bluegrass reportedly occurs throughout most of Nebraska but seldom is sufficiently abundant to produce much forage.

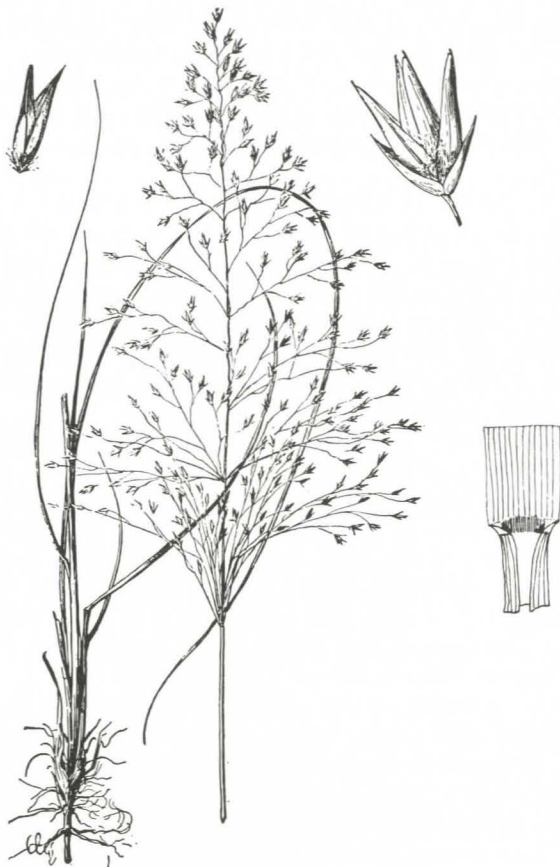
Blowoutgrass

Redfieldia flexuosa (Thurb.) Vasey

Description: Blowoutgrass is a warm-season, perennial grass with long, straw-colored rhizomes. Plants appear above ground as single stems or small clumps, root at the lower nodes, and are 20 to 40 inches tall. *Inflorescence* is a large, spreading panicle, $\frac{1}{3}$ to $\frac{1}{2}$ the height of the entire plant. *Spikelets* are awnless and contain 3 to 4 florets. Florets drop to the ground when mature leaving the glumes attached at the ends of slender panicle branches. *Leaves* are glabrous, but the raised veins on the upper blade surface may be somewhat short-haired. Leaf blades are narrow, 12 to 20 inches long, rolled, and taper to a fine point, and can endure much wind whipping without injury. Leaves are rolled in the bud. *Ligules* are up to $\frac{1}{8}$ inch long and are a collar-shaped fringe of hairs. *Auricles* are absent.

Where found: Blowoutgrass is well named since it is prominent only in blowouts in the Sandhills. Its natural habitat is loose, windblown, sandy soil, and it is of minor importance on stabilized soil even on the choppy sands site. On active blowouts it may be found in almost pure stands or mixed with lemon scurfpea and sandhill muhly.

Uses and values: The greatest value of this grass is as an early pioneer on active blowouts. Once seed-



Blowoutgrass

lings become established, the plants spread rapidly by rhizomes. Rhizomes are produced at different levels, enabling plants to meet sharp shifts in the soil surface. As the blowout begins to stabilize, grasses such as sand bluestem, prairie sandreed, sand lovegrass, and sandhill muhly take over.

Blowoutgrass is less important as a forage grass than as a soil stabilizer. This warm-season grass has fair forage value in the summer and is not readily grazed where other forage grasses are present. It does remain green in the fall after other grasses are mature and dry and may then be eaten by livestock. It is best classified as an increaser. Care should be taken to restrict livestock grazing on areas where blowoutgrass is common in order to provide maximum ground cover.

BARLEY TRIBE (Hordeae)

Crested Wheatgrass

Agropyron desertorum (Fisch.) Schult. and

A. cristatum (L.) Gaertn.

Description: Crested wheatgrass is a cool-season, perennial bunchgrass, without conspicuous rhizomes, that grows 1½ to 2½ feet tall. *Inflorescence* is a dense, conspicuously flattened spike, 1½ to 3 inches long, tapering toward the tip. *Spikelets* are much flattened, placed flatwise on the rachis, closely overlap one another, and contain 4 to 8 florets. Glumes are about

half the length of the spikelet. Both glumes and lemmas usually taper into a sharp point or short awn. *Leaves* vary from fine and numerous to sparse and somewhat coarse. Leaf blades are flat, usually glabrous, of medium width, with raised veins above and prominent midrib below. Sheaths are glabrous or pubescent below. Leaves are rolled in the bud. *Ligules* are short and membranous. *Auricles* are present but short.

Where found: This grass is native to eastern Europe and Asia. It was introduced into the U.S. in 1898, but was not commonly seeded until the 1930's. It is common in many counties in northern and western Nebraska, where it has been seeded on ranges, pasture, and roadsides.

Uses and values: Because of its rapid, early spring growth, this cool-season grass is valuable for providing early spring pasture. It commonly produces a 4-6 inch leaf growth by April 15 and is then ready for grazing. This is about 10 days to 2 weeks before intermediate wheatgrass, tall wheatgrass, western wheatgrass, and



Crested Wheatgrass

smooth brome are ready for grazing. It is highly palatable and nutritious in the spring when green and succulent. After heading, however, this grass becomes less nutritious, rather harsh, and less palatable to both cattle and sheep. Since it matures early, it is less desirable than other wheatgrasses for late spring and early summer grazing. Under ideal soil moisture conditions, it yields less forage than intermediate wheatgrass or smooth brome.

Livestock make best use of crested wheatgrass from about April 15 to June 15. Early green forage is a critical need on many Nebraska ranges. Research has demonstrated the marked improvement in breeding and milk production of brood cows and increased calf and yearling gains resulting from providing cool-season pasture in early spring. Crested wheatgrass may also provide valuable fall grazing if late summer moisture is adequate to bring regrowth.

Crested wheatgrass is highly recommended for seeding in pure stands on silty and clayey sites in the western half of Nebraska. It is less adapted on very heavy clay soils than medium texture soils and should not be planted on loose, sandy soils. Crested wheatgrass withstands drought and cold, has moderate salt tolerance, germinates well, has high seedling vigor, and establishes a stand rather rapidly. It recovers well from intense grazing, competes with weeds, and volunteers rather well from shattered seed. Under proper management, including adequate nitrogen fertilization, crested wheatgrass stands can be maintained indefinitely in western Nebraska.

Crested wheatgrass may be used as a dual purpose grass—spring—fall grazing and hay—in western Nebraska. When used for hay, it is important that it be cut just prior to flowering or in the late boot stage. *Note:* The crested wheatgrass complex is considered by some to include several species and by others as varieties within a single species. Fairway crested wheatgrass, also called Fairway wheatgrass, (*Agropyron cristatum* (L.) Gaertn.) is somewhat smaller, leafier, finer stemmed, but lower in forage yield than standard crested wheatgrass (*Agropyron desertorum* (Fisch.) Schult.), sometimes referred to as desert wheatgrass. Commercial crested wheatgrass is commonly a mixture of both species. Nordan is a named variety of standard crested wheatgrass.

Siberian wheatgrass (*Agropyron sibiricum* (Willd.) Beauv.) closely resembles standard crested wheatgrass and is often considered only a variety of the latter. It reportedly differs in that the awns on the lemmas are very short or absent. The adaptability, palatability, and forage production is very similar to standard crested wheatgrass.

Tall Wheatgrass

Agropyron elongatum (Host) Beauv.

Description: Tall wheatgrass is a coarse, cool-season, perennial bunchgrass, 2½ to 5 feet tall, without rhizomes. *Inflorescence* is an erect, robust spike up to 10



Tall Wheatgrass

inches long or longer. *Spikelets* are distant below to slightly overlapping above and contain 6 to 10 florets. Spikelets fit tightly to the rachis at the base but often bend away from the stem like a sickle at the upper end. Rachis is concave on the side toward the spikelet. Paleas are edged with fine, short hairs. Glumes are blunt (*truncate*) at the tip and are less than half the length of the spikelet. *Leaves* are glabrous and are found both basally and on the stem. Leaf blades are long, flat, firm and coarse, and deeply ridged on the upper surface. Leaves are rolled in the bud. *Ligules* are very short and collar-shaped. *Auricles* are of medium length.

Where found: This grass was introduced in 1909 from Turkey, where it grows on saline meadows and seashores. It is widespread in Nebraska but is most commonly found in valley bottoms where it has been seeded on wet, saline soils.

Uses and values: This cool-season grass is ready for grazing later in the spring than crested wheatgrass but matures slowly. It has fair palatability for cattle, remains green and productive for late spring and early summer grazing, and often makes good regrowth in the fall. Because of its coarseness, sheep make uneven and patchy use of tall wheatgrass. For best results even with cattle, tall wheatgrass should be planted in pure

stands and grazed in a rotation system to prevent undue selective and patchy grazing.

Tall wheatgrass is highly tolerant of saline and alkali soils with high water tables. For this reason it is highly recommended for seeding on saline subirrigated sites and in irrigated pastures where high pH and poor drainage are present. Although it also produces well on normal subirrigated sites, tall wheatgrass does not thrive on dry, alkaline sites. It has no advantage over intermediate wheatgrass and smooth brome on the more favorable upland sites of central and eastern Nebraska and is less adapted to the dry upland soils of western Nebraska than crested wheatgrass and Russian wildrye. Nebraska 98526 and Alkar are varieties of tall wheatgrass.

Tall wheatgrass is very productive once established on favorable sites. It is a good source of energy throughout the growing season but produces adequate quantities of protein and phosphorus for lactating animals only when the grass is young. In the western states some use is made of this grass for overwintering cattle on saline lowlands. Although rather coarse, cured tall wheatgrass has been grazed by mature cattle under difficult winter situations with fair results providing adequate protein and phosphorus supplements are fed.

Intermediate Wheatgrass

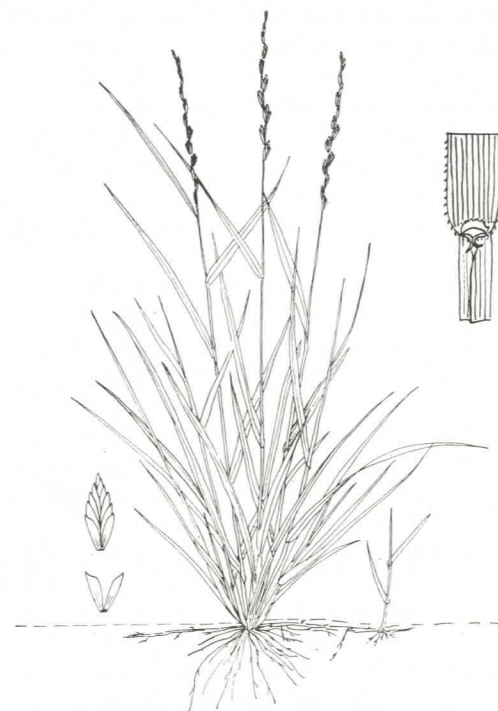
Agropyron intermedium (Host) Beauv.

Description: Intermediate wheatgrass is a cool-season perennial, growing 2½ to 4 feet high. Because of abundant rhizomes, it is distinctly sodforming. *Inflor-escence* is a spike, 4 to 8 inches long. *Spikelets* are slightly overlapping, set close to the rachis, and contain 4 to 8 florets. Glumes are slightly shorter than the lowest floret when mature and are bluntly pointed. Lemmas are awnless. *Leaves* are glabrous or somewhat pubescent on blades and sheaths. Leaf blades are flat and veined. Leaves are rolled in the bud. *Ligules* are short. *Auricles* are of medium length and clasping.

Intermediate wheatgrass resembles tall wheatgrass but is distinguished from tall wheatgrass by the presence of rhizomes. The glumes of intermediate wheatgrass are bluntly pointed at the ends but not abruptly chopped off (*truncate*) as in tall wheatgrass. Also, some intermediate wheatgrass plants have short hairs on the auricles and lower margins of the leaf blades.

Where found: This grass was introduced from Europe in the 1930's. It has become rather common over Nebraska from seedings made since that time but is less common in the eastern half of Nebraska than smooth brome.

Uses and values: This cool-season grass is ready for grazing about 2 weeks later than crested wheatgrass. It matures later than many cool-season grasses and produces excellent quality forage in the spring and



Intermediate Wheatgrass

into the summer. When growth stops during hot, dry summers, the forage cures well and remains palatable. Growth resumes in late summer with rains.

Intermediate wheatgrass is recommended for seeding on fertile soils throughout most of Nebraska. In eastern Nebraska its adaptation is similar to smooth brome. In western Nebraska it is adapted to all upland sites, except the most arid uplands west of North Platte and south of the North Platte River. On such unfavorable sites, intermediate wheatgrass may quickly establish only to be eliminated in drought years. It is more drought tolerant than smooth brome but less drought tolerant than Russian wildrye and crested wheatgrass. It produces well on overflow and subirrigated sites but will not withstand wet, salty or alkali soils. Intermediate wheatgrass is well adapted for irrigated pastures and is often seeded with smooth brome and orchardgrass for this purpose. Because of its greater drought tolerance, intermediate wheatgrass also responds well in situations where supplemental water is available only in the spring or fall.

Intermediate wheatgrass shows great promise for cool-season pasture in the Sandhills when seeded on sandy range sites or on nearly level to very gently rolling sands range sites. Stands at the Eastern Colorado Range Station near Akron have been maintained for several years under grazing in spite of drought.

Successful intermediate wheatgrass pasture on sandy soils requires preparing a seedbed, seeding alone or with alfalfa, maintaining adequate nitrogen fertility in the soil, fencing off from adjacent native range, and preventing overgrazing. Under good management, intermediate wheatgrass pastures have proved a very

successful means of providing green forage by May 1 on sites where it is adapted.

Intermediate wheatgrass is also adapted for hay production on subirrigated, overflow, and sandy sites, particularly in western Nebraska. Hay yield has also been satisfactory on fertile upland sites in the northern counties. Hay cut in early flower stage is of good quality. Varieties of intermediate wheatgrass include Nebraska 50, Amur, Oahe, and Ree.

Note: Also belonging to the intermediate wheatgrass complex or sometimes considered as a separate species is pubescent wheatgrass (*Agropyron trichophorum* (Link) Richt.), formerly called stiffhair wheatgrass. Pubescent wheatgrass intergrades with and closely resembles intermediate wheatgrass but has short, stiff hairs on heads and leaves. These hairs are particularly noticeable on the lemmas. Although it appears slightly more tolerant of drought than intermediate wheatgrass, the leaves are coarser by late spring and somewhat less palatable and nutritious. Pubescent wheatgrass is seldom seeded in Nebraska and will probably remain uncommon here. Topar is a named variety.

Western Wheatgrass

Agropyron smithii Rydb.

Description: Western wheatgrass is a rather coarse, cool-season perennial, 1 to 3 feet tall. Because of its numerous rhizomes, it grows as single stems or forms an open sod but does not form a bunch. *Inflorescence* is a spike. *Spikelets* overlap and contain 6 to 10 florets. More than one spikelet is sometimes found at a rachis joint. Glumes and lemmas are awnless but sharp pointed and rigid. Glumes are glabrous and unequal in size. *Leaves* are glabrous and bluish-green because of a grayish, waxy bloom. Leaf blades are flat but roll when dry, are of medium width, and 6 to 12 inches long. Blades are rather stiff, pointed at the ends, and ridged and rough on upper surface. Leaves are rolled in the bud. *Ligules* are very short, membranous, and collarlike. *Auricles* are moderately large and clasp the stem.

Where found: Western wheatgrass is the most common and widely distributed cool-season grass in Nebraska. It thrives in loam to heavy clay soils, withstands a claypan, and tolerates salty soil. It is often found in pure stands on overflow sites and lower slopes of silty sites. It grows intermixed with blue grama, needle-and-thread, and threadleaf sedge on silty and clayey sites but is scattered and low-growing on arid uplands. It ranges from abundant to common on saline subirrigated, subirrigated, limy upland, shallow, and thin loess and is occasionally found even on sands range sites. Western wheatgrass may spread by rhizomes and replace associated grasses damaged by trampling, drought, or dusting.

Uses and values: This cool-season grass grows rapidly in late April and May but is about two weeks later



Western Wheatgrass

than threadleaf sedge, Sandberg bluegrass, and crested wheatgrass. Palatability varies from fair to good while it is green and growing, but it becomes coarse and stemmy by early summer and is then seldom grazed in mixed stands until regrowth starts again in the fall. Fall regrowth of this grass cures well, retains much of its nutritional value, and is considered good winter range forage for sheep and cattle. The early spring and late fall growth of all cool-season grasses such as western wheatgrass is very important in shortening the carotene, phosphorus, and protein gap on winter grass range. Western wheatgrass is an increaser on all range sites in the 20–24 inch and higher precipitation zones. In the 15–19 inch precipitation zone it decreases under heavy grazing on all upland sites of medium or heavy soil texture.

This productive grass is valuable for seeding in native grass mixtures on overflow, silty, clayey, saline subirrigated, and sandy range sites, particularly in central and western Nebraska. It can also be seeded in pure stands for cool-season pasture if fully grazed but not overstocked. When compared with intermediate wheatgrass on silty soils, it is slower to establish, more drought hardy, less palatable, and matures earlier in the spring. Wheatgrass swales are commonly cut for hay in central and western Nebraska. When

cut in early bloom, western wheatgrass makes fair quality hay.

Note: Quackgrass (*Agropyron repens* (L.) Beauv.) has coarse, vigorous rhizomes yellowish in color. It resembles western wheatgrass but differs in having lax rather than stiff leaves, non-rigid glumes, and greenish rather than bluish-green leaves. It also resembles intermediate wheatgrass but has tapered, short-awned rather than oblong, bluntly-pointed glumes and short-awned rather than awnless lemmas. Quackgrass, a native of Europe, has become locally naturalized in some places in Nebraska. It is found in cultivated fields, waste places, along ditch banks, roadways, railroad right-of ways, and in moist meadows. Although a serious pest on cultivated lands, it provides palatable and nutritious forage in the spring. Quackgrass is not recommended for seeding because of its ability to rapidly invade moist, cultivated ground.

Slender Wheatgrass

Agropyron trachycaulum (Link) Malte

Description: Slender wheatgrass is a slender, cool-season, slightly coarse, perennial grass, 1/2 to 3 feet tall. Although without rhizomes, it tillers freely and grows in small bunches. *Inflorescence* is a terminal, green to violet spike, varying from thick and dense to slender and barely overlapping spikelets. *Spikelets* include 3 to 7 florets. Glumes and lemmas are awnless



Slender Wheatgrass

or awn-pointed. Glumes are nearly as long as the entire spikelet. *Leaves* are glabrous or lower sheaths occasionally pubescent. Leaf blades are flat to somewhat rolled, of medium width, and gradually taper toward the tips. Leaves are rolled in the bud. *Ligules* are short and collar-shaped. *Auricles* are small, sometimes one or both absent.

Individual plants of slender wheatgrass may resemble tall wheatgrass, intermediate wheatgrass, or even western wheatgrass. It differs from all three in having glumes nearly as long as the entire spikelet and from intermediate and western wheatgrass in not having rhizomes.

Where found: Slender wheatgrass is rather common on upland sites in western Nebraska, particularly in the northwestern corner, but grows abundantly on subirrigated range sites over the western two-thirds of the state. It seldom grows in dense or pure stands but is found mostly as scattered plants.

Uses and values: Slender wheatgrass is rated as good forage for cattle and fair to good for sheep. This native, cool-season grass remains green and nutritious through most of the summer. It has moderate forage yield where plants are abundant.

Slender wheatgrass is adapted for seeding in western Nebraska on silty and clayey sites and possibly on sandy and subirrigated sites. However, it is much less commonly included in range seeding than western wheatgrass, partly because of low to moderate forage yields. It should not be seeded in pure stands. Seed production is ample, seedlings are vigorous, and plants are cold resistant. It is moderately salt tolerant but is less drought hardy than western and crested wheatgrass. Commercial sources of seed are usually available, but seed from adapted sources should be used because of high variability in the species. Primary is a named variety.

Canada Wildrye

Elymus canadensis L.

Description: Canada wildrye (also called nodding wildrye) is a cool-season, short-lived, perennial bunchgrass. It lacks rhizomes and grows 3 to 4 1/2 feet tall. *Inflorescence* is a nodding spike, 3 to 8 inches long. *Spikelets* are usually found two at each node and have 2 to 6 florets. The glumes are distinctly broadened near their base but taper into long awns. Lemmas produce awns about 1 inch long. *Leaves* are abundant basally and on the stem. Leaf blades are flat or somewhat V-shaped at the base, rather wide, finely toothed on the margin, mostly glabrous, with prominent veins and midrib. Leaf sheaths are often fringed on the outer, overlapping margin but otherwise glabrous. Leaves are rolled in the bud. *Ligules* are short and collar-shaped. *Auricles* are moderately large and clasp the stem.

Where found: This native grass is scattered throughout Nebraska but is less common in western Nebraska. It grows primarily where moisture is abundant, such

Russian Wildrye

Elymus junceus Fish.

Description: Russian wildrye is a large, cool-season bunchgrass without rhizomes. Its naked seedstalks grow up to 3½ feet tall. *Inflorescence* is a dense, erect spike, with overlapping spikelets which readily shatter when mature. *Spikelets* are usually in groups of twos or threes at each node and include 1 to 4 florets per spikelet. Glumes are needlelike and lemmas are finely pubescent and tipped with a short awn. *Leaves* are abundant, soft, lax and glabrous and arise from the dense base of the plant. Leaf blades are distinctly nerved and 6 to 15 inches long. Leaves are rolled in the bud. *Ligules* are rather short, membranous, and rounded, with split edges. *Auricles* are prominent and clasp the stem.

Where found: Russian wildrye was introduced from Asia about 1927. Since then it has been seeded for cool-season pasture in northern and western Nebraska.

Uses and values: This cool-season grass is similar to crested wheatgrass in being ready for grazing early in the spring and in being very palatable and nutritious at that time. However, Russian wildrye foliage also



Canada Wildrye

as on overflow and subirrigated sites. On upland sites it is found primarily on gopher mounds, badger holes, and denuded places where local moisture concentration results from local disturbance.

Uses and values: This cool-season grass is a satisfactory but not outstanding range grass. It is moderately palatable in the spring when green and growing, but palatability and nutritive value drop sharply as the plant matures in early summer. It does not cure well. It is commonly rated as a decreaser since it does not tolerate continuous grazing. However, its seeding habits and seedling vigor allow it to establish quickly on locally disturbed sites. Since it normally makes up only a small part of native vegetation, it is of minor importance on Nebraska ranges.

Seed of Canada wildrye is often available for including in grass mixtures. It is sometimes seeded in mixtures on sandy soils as a cool-season component. And it has good tolerance of soil salinity. However, its general forage production characteristics offer little to recommend it for widespread use in range seeding. When cut before seedheads appear, it provides hay of fair to good quality.



Russian Wildrye

tends to remain green and palatable through the summer even after early seed maturity. Growth is rapid following late summer and fall rains. High protein content and palatability make Russian wildrye highly prized for grazing from late August to mid-November. Since the leaves cure well, it may be grazed into the winter. However, the mature seedstalks are avoided.

Russian wildrye is recommended for seeding on silty and clayey sites but not sandy soils in the western half of Nebraska. Established Russian wildrye plants are highly competitive with weeds and other grasses and tend to produce an open stand. For this reason it should not be seeded on sites subject to severe wind or water erosion. It rivals crested wheatgrass in drought tolerance and has survived hot, dry summers when crested wheatgrass died. It is better adapted than crested wheatgrass on upland salty or alkali soils. It produces less forage than tall wheatgrass on saline subirrigated sites. Its basal leaf growth makes Russian wildrye more suited to grazing than as a hay crop.

Once established, Russian wildrye plants are long-lived, vigorous, and unusually cold and drought hardy. However, stands are sometimes difficult to establish. Seedlings tend to be weak and develop slowly, being sensitive to frost and drought. Practices that help in obtaining good stands include preparation of a firm, weed-free seedbed, using seed of high viability, and planting at proper depths in pure stands. Seeding in late summer or late winter to early spring is most reliable. Vinall is a named variety of Russian wildrye.

Foxtail Barley

Hordeum jubatum L.

Description: Foxtail barley (also called wild barley) is a cool-season, short-lived, perennial bunchgrass, 1 to 2 feet tall, without rhizomes. *Inflorescence* is a nodding spike up to 4 inches long, which breaks apart readily when mature. Both glumes and lemmas produce rough awns up to 2 inches long, which give a bristly appearance. *Spikelets* grow three at each node. As is characteristic of all wild barleys, the middle spikelet of foxtail barley has a single, fertile floret. The outside spikelets are small, empty, and placed on a pedicel. *Leaves* are glabrous or lower sheaths are sometimes pubescent. Leaf blades are flat, up to $\frac{3}{8}$ inch wide, with raised veins on upper surface. Leaves are rolled in the bud. *Ligules* are short, membranous, and collar-shaped. *Auricles* are absent.

Where found: This undesirable native grass occurs throughout Nebraska. It is particularly abundant on saline subirrigated sites but is also common on subirrigated, overflow, and wetland sites and in waste places, ditches, and along streams. On upland silty and clayey sites in western Nebraska it occurs only in areas of extra water accumulation such as seeps and stock-water developments. It is a serious weed in warm-season pastures on uplands in eastern Nebraska. On wet soils it is highly salt tolerant.



Foxtail Barley

Uses and values: This cool-season grass is usually rated as poor forage for both cattle and sheep but occasionally is lightly grazed by cattle before seedhead development. Seedheads are not only unpalatable but are mechanically injurious to livestock when grazed or eaten as a contaminant in hay. The awns frequently cause sores in the mouth and around the nose and eyes and contaminate sheep fleeces. Foxtail barley greatly lowers hay grade.

An abundance of foxtail in either native or cultivated meadows indicates improper management. Dense stands are usually associated with disturbance by overgrazing, close mowing, or repeated burning. This meadow weed can best be controlled by seeding to adapted, aggressive grasses where possible. Since foxtail barley is a short-lived perennial and new seedlings come primarily from the current year's seed crop, mowing to prevent seed production has been suggested as a control measure. Chemical control in pastures is impractical at this time.

Little Barley

Hordeum pusillum Nutt.

Description: Little barley (also called little wild barley) is a cool-season annual, commonly a winter annual, without rhizomes, 6 to 18 inches tall, often somewhat decumbent at the base. *Inflorescence* is an

erect spike, $\frac{1}{2}$ to $2\frac{1}{2}$ inches long, with awns up to $\frac{1}{2}$ inch long. *Spikelets* grow three at a node. The center spikelet is fertile and has one floret; the outside spikelets are empty and placed on pedicels. *Leaves* are mostly glabrous, but lower blades and sheaths are sometimes slightly pubescent. Leaf blades are flat to somewhat folded, up to $\frac{3}{8}$ inch wide, rather short, veins somewhat indistinct. Leaves are rolled in the bud. *Ligules* are short, membranous, and collar-shaped. *Auricles* are absent.

Where found: This native grass is widespread in Nebraska and common on dry or alkaline soils, particularly in disturbed areas where competition from perennial plants is low. On go-back land or range damaged by drought or overgrazing, stands of little barley may be very dense during years of favorable winter and spring moisture conditions.

Uses and values: Some temporary grazing may be provided by this cool-season grass in late fall and early spring. However, forage production is low and highly unpredictable, and plants produce seed and become dry and very unpalatable by early to mid-June.

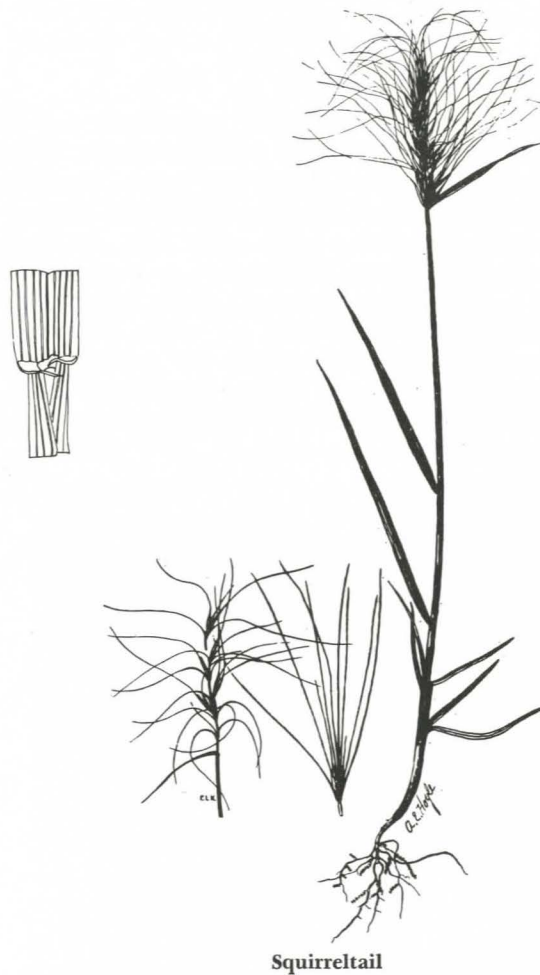
Little barley is an invader on poor condition range and cultivated pastures of poor stand, vigor, and fertility. Practices that will maintain range and pasture in a vigorous, productive condition will effectively control little barley.



Squirreltail

Sitanion hystrix (Nutt.) J. G. Smith

Description: Squirreltail (also called bottlebrush squirreltail) is a cool-season, short-lived perennial bunchgrass, 6 to 18 inches tall, without rhizomes. *Inflorescence* is a bristly, densely flowered spike, 1 to 3 inches long, often partly enclosed by the upper leaf sheath. Inflorescences break apart readily when mature. *Spikelets* of squirreltail have two to a few florets. Glumes as well as lemmas taper into harsh awns, $1\frac{1}{2}$ to 3 inches long. This grass resembles foxtail barley,



but has two fertile spikelets per node rather than one fertile and two empty spikelets as does foxtail barley. The awns are also coarser and rougher and bend at right angles when mature. *Leaves* vary from glabrous to pubescent on blades and sheaths. Leaf blades are either rolled or flat, rather narrow, with raised veins above and conspicuous midrib below. Leaves are rolled in the bud. *Ligules* are short, membranous, collar-shaped, and irregular. *Auricles* are narrow and vary from short to long.

Where found: This native grass is common on dry upland sites in central and western Nebraska. It occurs in scattered stands primarily associated with blue

grama but may be locally prominent on small, disturbed areas.

Uses and values: This cool-season grass produces fair forage for cattle and sheep during the spring and early summer. During midsummer it becomes unpalatable because of troublesome awns and is rather harsh forage. Matured awns may injure livestock. After seedheads have broken up and fallen, it may be eaten to some extent in late summer and fall. This increaser rarely becomes sufficiently abundant to produce much forage under Nebraska conditions.

OAT TRIBE (*Aveneae*)

Prairie Junegrass

Koeleria cristata (L.) Pers.

Description: Prairie junegrass (sometimes improperly shortened to junegrass) is a cool-season, erect perennial, 8 to 24 inches tall. It grows in small bunches 2 to 3 inches in diameter and has no rhizomes. *Inflorescence* is a dense panicle, 1 to 5 inches long, which is variable in appearance. The panicle is narrow and spikelike except during spring flowering when it is more or less open. Seedstalks are often pubescent just below the inflorescence. *Spikelets* have 2 to 4 awnless or pointed florets. *Leaves* are mostly basal, stems being nearly leafless. Leaf blades are narrow, 1½ to 5 inches long, flat to rolled and curly when dry,



Prairie Junegrass

and rough above from raised veins. Sheaths are also prominently veined. Leaves are glabrous or lower leaf blades and sheaths are sometimes somewhat pubescent. Leaves are folded in the bud. *Ligules* are short, membranous, collar-shaped, and finely toothed. *Auricles* are absent.

Where found: This native grass is widely distributed on Nebraska uplands and occurs on all range sites except wetland. It grows on a wide variety of soil textures from clay to sand but is less successful in competing with tall grasses in moist bottoms and draws. It is commonly associated with little bluestem, the needlegrasses (*Stipa* spp.), and blue grama but is less drought hardy than blue grama.

Uses and values: This cool-season grass grows early in the spring. It is quite palatable to all classes of livestock in the spring and again in the fall after curing. It is less palatable during seed production and until curing is completed. The seedheads are usually ignored by grazing animals.

Although spring and fall are the best seasons of use, prairie junegrass sharply decreases if grazed each year in the spring. Prairie junegrass is a low forage producer since it occurs in scattered stands and has short, basal leaves, but it is a desirable grass. Prairie junegrass is seldom included in a grass mixture for range seeding. It produces satisfactory hay, but areas where prairie junegrass is common often have low yields.

Note: Prairie wedgescale (*Sphenopholis obtusata* (Michx.) Scribn.) somewhat resembles prairie junegrass in being a non-rhizomatous midgrass and in having narrow, rather dense panicles which are spike-like to somewhat open. However, it differs from prairie junegrass in having smooth leaves and dissimilar glumes (the first glume is narrow and the second broadened near the tip) which fall entire with the spikelet. Prairie wedgescale is a cool-season grass, has good forage value, and is a decreaser. It prefers moist soil and is most common on silty sites in eastern Nebraska and on subirrigated and overflow sites.

REDTOP TRIBE (*Agrostideae*)

Redtop

Agrostis alba L.

Description: Redtop is a cool-season perennial, 2 to 3 feet tall, with stems often decumbent at the base. It has vigorous rhizomes, 2 to 6 inches long, and produces a coarse, open turf. *Inflorescence* is an open, upright, pyramid-shaped panicle, 4 to 8 inches long, and purplish-red when in blossom. Panicle branches are whorled at each of the lower rachis nodes. *Spikelets* contain only one small floret. Lemmas are awnless or rarely short-awned. *Leaves* are mostly glabrous. Leaf blades are 1/8 to 3/8 inch wide, 2 to 7 inches long, rather stiff, flat, pointed at the tip, with distinct veins above. Leaf margins are somewhat finely barbed. Leaves are rolled in the bud. *Ligules* are 1/8 to 1/4 inch long, membranous, bluntly pointed or rounded, and



Redtop

with toothed to split margins. *Auricles* are absent.

Where found: Redtop was introduced from Europe by early colonists as a pasture and hay grass. In Nebraska it has been seeded on wet, poorly drained soils where it is well adapted and spreads rapidly. Today it is common on wet pastures and hay meadows in the Elkhorn, Platte, and Loup River valleys and in the Sandhills.

Uses and values: Redtop is adapted for seeding on wetland and subirrigated range sites. It produces well on low, poorly drained meadows subject to frequent flooding where few other grasses will persist. It will grow on very acid soil and poor, clayey soil of low fertility but is moderately salt tolerant. It can withstand considerable drought, is cold resistant, and can withstand heavy trampling and close grazing.

Redtop will grow on soils with a higher water table than timothy but is earlier maturing and less palatable than timothy. Redtop makes acceptable hay on wetland if cut in the early flowering stage, but it will quickly become stemmy and unpalatable if cutting is

delayed. By periodical close grazing under a rotation grazing program, redtop can be made to produce palatable, green forage throughout the growing season.

On wet hay meadows with a reduced grass stand, interseeding redtop often greatly increases yields. However, where a good stand of native grasses is present, introduction of redtop will not always increase hay yield and may reduce quality unless cut at an equivalent growth stage. When seeding into native meadows, 3 to 4 pounds of redtop seed is ample. Redtop is commonly planted together with alsike clover with which it pairs well on wet soils. About 2 to 3 pounds of redtop and about 4 pounds of alsike clover is a good mixture for such purposes. Early seeding of redtop is suggested for fall or spring establishment.

Red Threawn

Aristida longiseta Steud.

Description: Red threawn (sometimes improperly called wiregrass) is a warm-season, perennial bunchgrass without rhizomes, 8 to 16 inches tall, leafy at the base, and with fine stems. *Inflorescence* is a narrow, erect panicle. *Spikelets* are few, contain only one



Red Threawn

floret, are placed on pedicels, and are purplish-red at maturity. Threeawns are readily recognized by the three-branched awn rising from the lemma. The awned lemma encloses the seed. Awns of red threeawn are up to 4 inches long and spread at maturity. *Leaves* are glabrous on the sheath and blade but hairy at the collar. Leaf blades are narrow, rolled, rather stiff, up to 6 inches long. Leaves are rolled in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: This native grass is widely distributed in central and western Nebraska except on low, wet sites. It grows on a wide range of soil textures and is found on all upland range sites. Stands are normally quite scattered, but red threeawn may be locally abundant on dry, sandy soils, hillsides, and rocky slopes, particularly on disturbed sites.

Uses and values: This warm-season grass provides a minor amount of forage, which is only occasionally grazed in early growth stages. After awns start to develop, the grass is worthless as forage. The long awns get into the fleece and cause irritation and abscesses in the mouth and nostrils of grazing animals.

Because this grass is seldom eaten, it is able to invade areas where productive and palatable grasses have been weakened by heavy grazing. It is a vigorous seed producer and the awned seeds are scattered by wind and animals. It is very drought resistant and rapidly invades bared or disturbed soil. It is sometimes troublesome on new grass seedings.

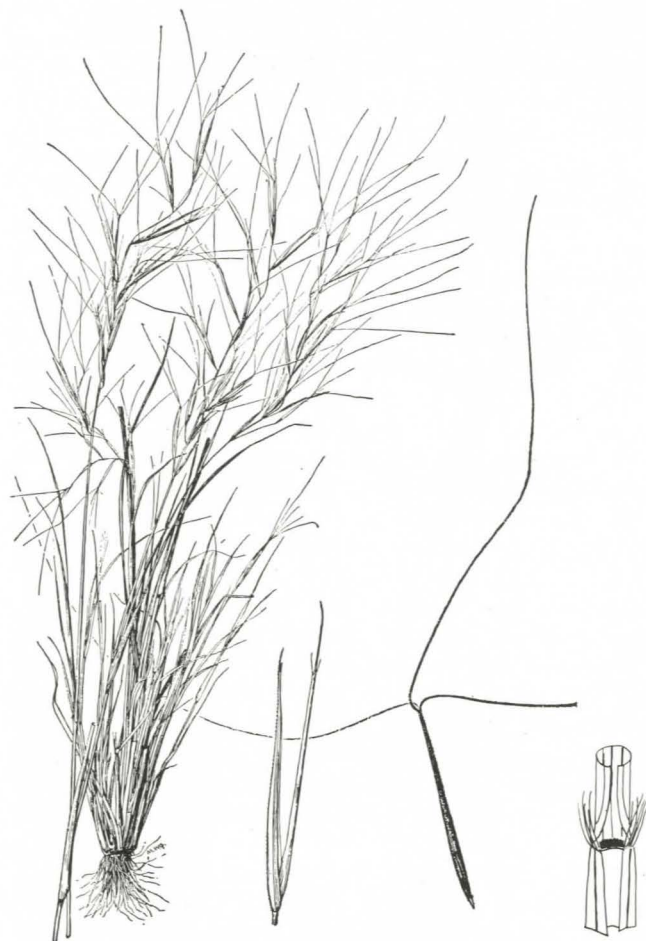
Note: Several other perennial threeawns including Fendler threeawn (*Aristida fendleriana* Steud.) are found in western and central Nebraska. All are characterized by three-branched awns, are warm-season grasses, grow on dry plains and hillsides, are poor to worthless for forage, and are increasers or invaders under heavy grazing.

Prairie Threeawn *Aristida oligantha* Michx.

Description: Prairie threeawn (also called wiregrass) is a wiry, warm-season, annual grass, 6 to 18 inches tall, branching freely at the base and at the culm nodes. Plants become a weathered, whitish color when mature. *Inflorescence* is a loose panicle. *Spikelets* are on very short pedicels, are spreading, have one floret, and are sometimes paired below. Glumes taper into awns. Awns on the lemma are in 3 segments, are 1½ to 3 inches long, and readily stick to hair or clothing. *Leaves* are hairy at the collar, otherwise generally glabrous. Leaf blades are narrow, rolled, and taper to a fine point. Leaves are rolled in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: This native grass is common over most of the state on dry soils. It becomes abundant generally only on badly deteriorated range and pasture.

Uses and values: Except for a brief period of fair to poor forage value in very early growth stages, this warm-season grass is worthless for forage. The long awns are tough and brittle and can cause injury to



Prairie Threeawn

livestock from grazing or eating in contaminated hay. Prairie threeawn in hay sharply reduces hay quality, and the tough, fine stems interfere with mowing.

This undesirable grass is a common invader on low condition range and overgrazed pastures which have been allowed to run down. Since it is seldom eaten, continued heavy grazing removes the perennial grasses, thereby allowing prairie threeawn to thrive. Sound range and pasture management is the best control since a vigorous stand of the better grasses will crowd out prairie threeawn or prevent it from becoming established.

Bluejoint Reedgrass

Calamagrostis canadensis (Michx.) Beauv.

Description: Bluejoint reedgrass (commonly called bluejoint) is a cool-season perennial, 2 to 4 feet tall. It has numerous rhizomes but remains bunchy. *Inflorescence* is a nodding, purplish panicle, 4 to 8 inches long, rather open at the base. *Spikelets* are ⅛ to ¼ inch long and contain one floret. Lemmas have 2 to 4 teeth at the tip, are awned just below the middle with a fine awn, and are surrounded at the base by numerous hairs. *Leaves* are glabrous. Leaf blades are flat, erect to drooping, up to 12 inches long and ⅜ inch

wide, and rough on the edges. Leaves are rolled in the bud. *Ligules* are up to $\frac{1}{4}$ inch long, membranous, rounded, and slightly toothed to split. *Auricles* are absent.

Where found: This native grass is locally common in Nebraska. It grows on wet soils but does not grow on upland sites. It is found on marshy lands, wet meadows, along streams, and in moist, shaded draws.

Uses and values: Forage value of this cool-season grass is fair to good in the spring for cattle and horses. Best grazing use is made when plant growth is young and succulent since palatability drops in the summer. However, wet meadows where bluejoint reedgrass commonly grows normally cannot be grazed in the spring because of high water tables and muddy soil conditions. Excessive trampling under these conditions is undesirable.

Since bluejoint reedgrass is common only on wetland range sites, its major use is as a hay grass. It makes hay of good quality where it can be cut before advanced stages of maturity. Bluejoint reedgrass often occurs in dense patches which are high yielding. This grass is not commonly included in reseeding programs on wet meadows because of inadequate seed supplies.

Note: Northern reedgrass (*Calamagrostis inexpansa* A. Gray) and narrow reedgrass (*Calamagrostis neglecta* (Ehrh.) Gartn.), also called ponygrass, are two closely related reedgrass species which occur in Ne-



Bluejoint Reedgrass

braska. Both resemble bluejoint reedgrass but have more compact and erect panicles, are shorter, and have narrower and more erect leaf blades. Both are similar in forage value, growth habits, and distribution to bluejoint reedgrass but are less common in the state.

Prairie Sandreed

Calamovilfa longifolia (Hook.) Scribn.

Description: Prairie sandreed (also called sandgrass and sand reedgrass) is a warm-season, stout, perennial grass, 2 to 5 feet tall, with long, scaly rhizomes. *Inflor-escence* is an open panicle 6 to 12 inches long, spreading near the center, but narrowed at the top and base. *Spikelets* are $\frac{1}{5}$ to $\frac{1}{3}$ inch long and have a single



Prairie Sandreed

floret. Lemmas are densely pubescent at the base. *Leaves* are found principally on the solitary stems. Foliage has a typical light green to straw color. Leaf blades are long and stiff, flat to rolled, taper to pointed tips, glabrous, and have prominent veins. Hairs are

prominent from inside the collar and are also found sparingly on edges of the lower sheaths. Leaves are rolled in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: This native grass is the most uniformly distributed and most abundant grass in the Nebraska Sandhills on sandy, sands, and choppy sands range sites. It grows on blowouts as well as on stable valley floors. Prairie sandreed may also be locally common on deep, medium textured soils on overflow, silty, and limy upland range sites. It is uncommon or absent on wetland, saline subirrigated, and shallow range sites. On rolling sandhills, it grows evenly distributed in the vegetation stand but tends to grow in large open clumps on finer textured soils.

Uses and values: Prairie sandreed is a warm-season grass, grows rapidly in late spring and throughout the summer, remains green until frost, and cures rather well. Although somewhat coarse and stemmy, palatability is fair and rather stable. Prairie sandreed is grazed primarily in midsummer and through the winter. Although more palatable in the spring when new growth starts than later, it is grazed very little then since other Sandhill grasses are relatively more palatable at that time.

After the cool-season grasses mature and the more palatable warm-season grasses have been topped by grazing in the summer, the grazing load often shifts to prairie sandreed. Following a shift to finer grasses such as the grammas and the cool-season grasses in late summer and fall, livestock again return to prairie sandreed after frost. Upland hay cut in the Sandhills includes large amounts of prairie sandreed and is of acceptable quality if not cut too late.

Prairie sandreed is drought tolerant and tends to replace the bluestems in the Sandhills during drought periods. It also tolerates grazing and increases under heavy grazing. However, it is killed out by prolonged overgrazing. Because of its stable and uniformly high production of forage on sandy soils, it is a very important Sandhills forage grass.

Inadequate seed supplies and lack of strains showing uniformly high germination, seedling vigor, and plant growth has restricted its use in reseeding sandy soils. However, it is recommended in warm-season grass mixtures for seeding on sandy soils if seed is available. Some prairie sandreed commonly occurs in seed mixtures harvested from native stands.

Plains Muhly

Muhlenbergia cuspidata (Torr.) Rydb.

Description: Plains muhly is a warm-season perennial without rhizomes. Stems are erect, leafy, much branched, 8 to 16 inches tall, from a hard bulblike and scaly base. Two stem branches commonly originate from one node in a single sheath. *Inflorescence* is a very narrow panicle, 2 to 4 inches long, with panicle branches upright and often lying against the rachis. *Spikelets* are very small and have one floret. Glumes



Plains Muhly

grows on moist places in the prairie such as overflow and subirrigated range sites. It is rhizomatous, grows upright, has leaves of medium width, and has a dense, spikelike inflorescence. The inflorescence somewhat resembles that of timothy but is not as symmetrical and tends to be lobed. Palatability is fair to good before maturity, and it is an increaser on favorable sites.

Sandhill Muhly

Muhlenbergia pungens Thurb.

Description: Sandhill muhly is a warm-season perennial with large rhizomes. Stems grow erect from a decumbent, leafy base, and 6 to 16 inches high. Plants commonly form patches or rings of growth 4 to 25 inches in width. *Inflorescence* is an open panicle, 2 to 5 inches long, with numerous slender, hairlike and spreading panicle branches. *Spikelets* are very small

and lemmas taper to a point. *Leaves* are glabrous. Leaf blades are erect, narrow, and often rolled. Leaves are folded in the bud. *Ligules* are short, membranous, but short-fringed on the margin. *Auricles* are absent.

Where found: This native grass is found on uplands and hill-sides over much of the state except on loose sands. It is particularly abundant on limy upland and thin loess range sites.

Uses and values: This warm-season grass commonly grows intermixed with little bluestem and side-oats grama and has good forage value. Stands are often somewhat scattered but may thicken up on hillsides and produce considerable forage. Plains muhly decreases under heavy grazing and is found principally on range in good and excellent condition.

Note: Green muhly (*Muhlenbergia racemosa* (Michx.) B.S.P.)

and have a single floret. Lemmas produce short awns. *Leaves* appear glabrous to the naked eye. However, under a microscope the nerves on the upper surface of the blade are seen to be raised and covered by very short, bristly hairs. Leaf blades are short (1 to 2 inches), stiff and harsh, sharp-pointed, rather narrow, and flat or rolled. Sheaths have wide, transparent margins which extend upward into triangular flaps. Leaves are folded in the bud. *Ligules* are short and are a ring of hairs. *Auricles* are absent.

Where found: This native grass is found on sands and choppy sands range sites throughout Nebraska and on sandy wastelands in general. It is most common on sandy ridge tops and on the dry south and west sides of choppy sandhills.

Uses and values: This warm-season grass produces harsh, prickly foliage of poor forage value and is undesirable as a forage grass. It is seldom grazed unless cattle are forced to eat it because of a lack of other forage. It increases under heavy grazing and fire damage and remains indefinitely on badly overgrazed range.

The primary importance of sandhill muhly is as a soil stabilizer. It combines with blowoutgrass and lemon scurfpea in providing preliminary control of active blowouts. Its extensive, much-branched root system and moderately dense surface cover make it



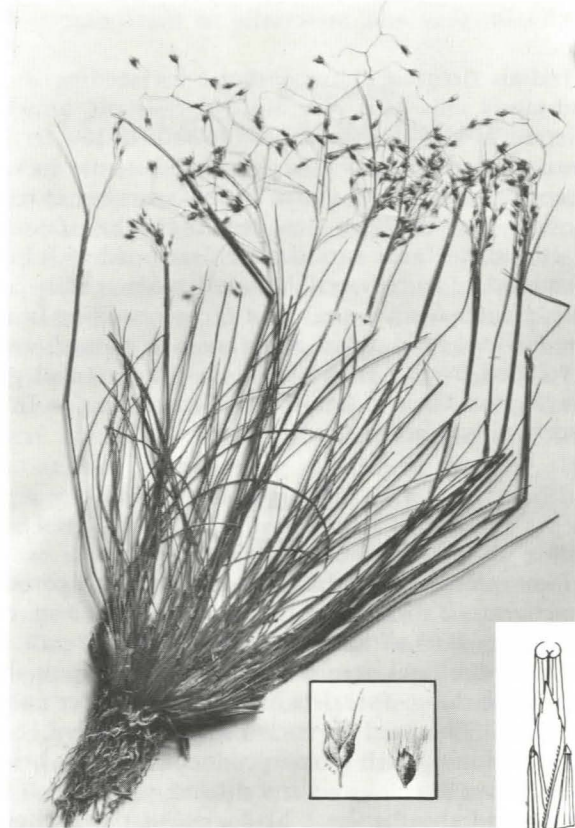
Sandhill Muhly

adapted to protect loose sands from wind erosion. As the sands begin to stabilize, sandhill muhly is replaced partly or entirely by grasses such as prairie sandreed, switchgrass, sand bluestem, sand lovegrass, and little bluestem.

Indian Ricegrass

Oryzopsis hymenoides (Roem. & Schult.) Ricker

Description: Indian ricegrass is an erect, cool-season, perennial bunchgrass, 1 to 2½ feet tall, without rhizomes. *Inflorescence* is a loose panicle with hairlike branches, which spread at distinctly wide angles. *Spikelets* contain one floret and are solitary at the ends of the panicle branches. Lemmas are hard and black,



Indian Ricegrass

remain around the seed, and are surrounded by dense hair, giving the florets a fringed appearance. Seeds readily shatter, leaving the glumes attached to the panicle branches. *Leaves* are numerous, mostly basal, and persist at the base. Leaf blades are slender, rolled, and often as long as the culms. Sheaths are hairy-fringed on one margin only. Leaves are rolled in the bud. *Ligules* are long (up to ⅜ inch), membranous, pointed, and sometimes split. *Auricles* are absent.

Where found: This native grass is found in the Sandhills and on dry hills and canyons in western Nebraska. It is most common on choppy sands, sands, and sandy range sites but also occurs on silty, limy upland, thin loess, and shallow range sites in western and

northern Nebraska. It is also found on moderately salty but rather well-drained soils.

Uses and values: This cool-season grass produces abundant foliage during spring and early summer when it is readily eaten. It has good forage value for sheep, cattle, and horses. It provides excellent winter grazing since it cures well and the lower stems remain somewhat green and succulent through the winter.

Heavy early spring grazing sharply reduces the vigor of Indian ricegrass and decreases the stand. It is more tolerant of grazing after about June 1 and responds well to spring deferment. When grazed in summer or winter, it may act as an increaser. The old stubble gives some protection against close grazing. Where Indian ricegrass plants are locally abundant in western Nebraska, they add materially to the forage production.

Indian ricegrass shows promise for seeding on dry and sandy soils. It is very drought resistant, somewhat tolerant of alkali, and adapted to soils of low fertility. Natural seed dormancy has restricted its use in range reseeding but helps native stands survive extended drought and establish new seedlings when favorable years return. If new varieties are developed with higher germination and if seed becomes more readily available, greater use is expected in range reseeding in western Nebraska. Mandan ricegrass is a named variety developed from a cross of Indian ricegrass and green needlegrass. Growth habits are more similar to Indian ricegrass than green needlegrass.

Timothy *Phleum pratense* L.

Description: Timothy is a cool-season, perennial bunchgrass, 2 to 3½ feet tall, with a swollen or bulb-like base, but without rhizomes. *Inflorescence* is a dense, cylindrical, symmetrical, spikelike panicle, 2 to 5 inches long. *Spikelets* have a single floret and are flattened. The seed is enclosed by persistent, hairy-fringed glumes, each glume producing a short, bristled awn. *Leaves* are glabrous and distinctly veined on both blades and sheaths. Leaf blades are flat to somewhat keeled, taper to a thin point at tips, are about ¼ to ⅜ inch wide at the base, 4 to 8 inches long, with midrib and veins raised on under surface. Leaves are rolled in the bud. *Ligules* are up to ⅛ inch long, membranous, rounded or bluntly pointed, with finely toothed margins. *Auricles* are absent.

Where found: Timothy was introduced from Eurasia to America by early colonists. It has been seeded primarily for hay in meadows in eastern Nebraska and across the state on subirrigated sites. Timothy commonly escapes cultivation and is found growing on moist, fertile sites. Since it is not drought tolerant, it is seldom found on upland soils in central and western Nebraska.

Uses and values: This cool-season grass is famed for its production of leafy, palatable hay. In Nebraska



Timothy

it has commonly been used for improving subirrigated meadows in the Sandhills and in the river valleys. It grows well with red clover in that both are adapted to subirrigated but not wetland or saline subirrigated sites. Where adapted, timothy is recommended over redtop as a hay grass because of later maturity and higher quality.

Timothy is commonly seeded in native subirrigated meadows at rates of 4 to 5 pounds or at rates of about 3 pounds when seeded with 5 pounds of red clover. Seedlings are strong and vigorous. Seeding can be made in early spring or in late summer if soil moisture is favorable. Timothy requires ample moisture during the growing season, is cold and shade tolerant, and prefers fertile, rather heavy, non-saline soils.

As a pasture grass timothy produces leafy, nutritious forage throughout the summer. It has occasionally been used in permanent pasture mixes in northeastern Nebraska or in subirrigated pastures across the state. However, it is not tolerant of grazing and has generally been replaced in pasture mixtures by smooth brome and orchardgrass.

Alkali Sacaton *Sporobolus airoides* (Torr.) Torr.

Description: Alkali sacaton (also called alkali dropseed) is a robust, warm-season, perennial bunchgrass,

1½ to 3 feet tall, decumbent at the base. It grows in large, tough clumps but has no rhizomes. *Inflorescence* is a spreading, pyramid-shaped panicle, 4 to 16 inches long, often about half the total plant height. *Spikelets* have one floret. *Leaves* are stiff and coarse. Leaf blades are glabrous, rather long, taper to a long point, often flat at the base but otherwise rolled, with prominent midrib and raised nerves above. Sheaths are often fringed on the margins. Collars are hairy inside and near margins on the outside; hairs grow upward. Leaves are folded to slightly rolled in the bud. *Ligule* is a fringed of short hairs. *Auricles* are absent.

Where found: This native grass is well adapted to dry or moist saline bottoms. It is common in river valleys in western Nebraska, particularly along the North Platte, White, and Niobrara Rivers. Although most common in the western third of Nebraska, it also occurs along the Platte River in central Nebraska. It grows in pure stands or intermixed with saltgrass, western wheatgrass, and switchgrass.

Uses and values: This warm-season grass has fair to good forage value. During early growth stages the herbage is palatable, but it becomes coarse and tough as it matures and is not a desirable hay grass. Palatability is much lower than in grasses such as the blue-



Alkali Sacaton

stems and the grammas. However, when compared to the plants which grow with it on saline subirrigated sites, forage value is good. Forage value before maturity is similar to western wheatgrass. Alkali sacaton is a decreaser on salty soils.

Alkali sacaton produces an abundance of forage. Solid stands of this grass are best grazed in the spring and early summer. However, mature cattle make fair use of alkali sacaton as winter range when adequate protein and phosphorous supplements are provided. Alkali sacaton has good salt tolerance and is recommended for native grass seeding on saline subirrigated sites in mixture with grasses such as western wheatgrass and switchgrass. Seed of alkali sacaton is extremely small and should be seeded only with equipment adapted to small seed. Seed harvested from native stands can often be purchased from seedstores.

Tall Dropseed

Sporobolus asper (Michx.) Kunth

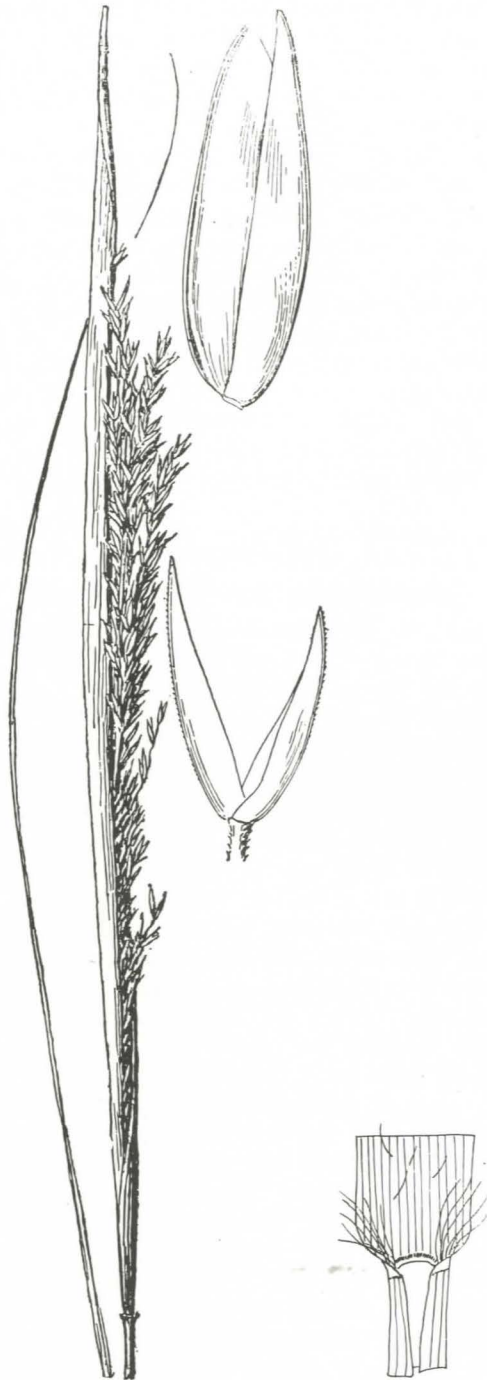
Description: Tall dropseed is a warm-season, perennial bunchgrass, 1½ to 3½ feet tall, with erect, rather stout stems, rarely with short rhizomes. *Inflorescence* is a narrow, compact panicle, 3 to 8 inches long, and is partly enclosed in an enlarged sheath. *Spikelets* are awnless and contain one floret. *Leaves* except collar are mostly glabrous but sometimes hairy on margins of sheath or with scattered hairs near base of blade. The collar is hairy on the inside and at the margins. Leaf blades are drooping (except uppermost blade), flat at base but becoming rolled near the long, slender tips, and have prominent veins. The lower leaf blades are long (up to 20 inches). Upper leaf blades are somewhat shorter. Leaves are folded to slightly rolled in the bud. *Ligules* are short and membranous but fringed by short hairs. *Auricles* are absent.

The blade of the uppermost leaf characteristically frays and waves in the wind as in sand dropseed. However, tall dropseed is distinguished from sand dropseed by narrow panicles, larger florets, taller and coarser growth, and long, narrow leaves.

Where found: This native grass is distributed generally over the state but is more common in eastern Nebraska. It is a common associate of big bluestem, little bluestem, indiagrass, and side-oats grama on medium and heavy texture soils in the eastern half of Nebraska and on subirrigated and overflow range sites across the state. It is seldom found on dry upland sites in the western half of Nebraska.

Uses and values: This warm-season grass has fair forage value. Palatability is highest when young and green but becomes low at maturity. Except on very dry sites, it increases under heavy grazing at the expense of the more palatable mid and tall grasses. Since it is more drought tolerant than many of the grasses on bluestem prairies, it becomes more conspicuous during a period of dry years. It is not nearly as drought hardy as sand dropseed.

Except locally in small areas, tall dropseed makes



Tall Dropseed

up only a small part of the vegetation. Yields are rather mediocre and it is not a particularly desirable forage grass. It is not recommended for reseeding in Nebraska. Small amounts of tall dropseed normally occur in seed harvested from native bluestem stands but are of little concern.

Sand Dropseed

Sporobolus cryptandrus (Torr.) A. Gray

Description: Sand dropseed is a warm-season, perennial bunchgrass growing in small tufts, without rhi-

zomes. Seedstalks are 1 to 2½ feet tall, rather leafy, and erect to spreading or decumbent at the base. *Inflorescence* is an open panicle, up to 10 inches long, often reddish or lead-colored at flowering, often partly or entirely enclosed in the uppermost leaf sheath. *Spikelets* contain only one floret. Seeds fall from the lemmas and paleas as in all other dropseeds. *Leaves*, particularly the blades, become frayed or "flagged" at maturity by the wind. Leaf blades are glabrous, short (2 to 8 inches), flat and moderately wide at the base, but rolled toward the pointed tips. A conspicuous tuft of stiff, white hairs is found on the collar. Sheaths are fringed on the margins, particularly on the overlapping margin, but are otherwise glabrous. Leaves are rolled in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: This native grass is common and widely distributed on dry soils throughout the state. It can be found on all range sites except wetland. Although most abundant on sandy soils, it frequently becomes locally prominent on medium texture soils also.

Uses and values: This warm-season grass begins growth in midspring, grows rapidly in early summer,



Sand Dropseed

and commonly matures by midsummer. Forage value is rated as fair. Reports of palatability are somewhat conflicting. Palatability may be similar to prairie sandreed in midsummer, but sand dropseed provides poor forage after maturity, except when basal regrowth is made in the fall of some years. Forage yields are moderate, and sand dropseed may produce a major proportion of the available forage on fair and poor condition range on sandy and sands range sites.

Sand dropseed rapidly increases on sandy and silty soils when overgrazed or damaged by drought. It is one of the most important grasses on go-back land. Sand dropseed is a prolific seed producer and is very drought resistant. It is one of the first grasses to establish on denuded range and pasture and along roadsides. On native range in upward trend in range condition, sand dropseed is gradually replaced by decreaser species. Sand dropseed is not recommended for range reseeding in Nebraska.

Sand dropseed invades thinned-out alfalfa meadows, particularly on sandy soils. It makes inferior grass hay and is very low yielding. Sand dropseed is an aggressive and undesirable invader of cool-season pastures seeded on sandy soils. On intermediate wheatgrass pastures, some use of sand dropseed can be made by decreasing stocking rates and extending the grazing season into the summer. Proper stocking, including alfalfa in the seed mixture, and maintaining adequate nitrogen fertility greatly help control but do not prevent sand dropseed invasion of intermediate wheatgrass pastures on sandy soils.

Prairie Dropseed

Sporobolus heterolepis (A. Gray) A. Gray

Description: Prairie dropseed is an erect, warm-season perennial, 1 to 2½ feet tall, sometimes with short rhizomes. It grows in bunches 4 to 8 inches wide. The enlarged, purple-tinged, underground portion of the stem base helps in identification. *Inflorescence* is a widely spreading panicle, 3 to 10 inches long. *Spikelets* are awnless and have one floret. *Leaves* are numerous, particularly at plant base. Blades are very long, soft and drooping, glabrous, gradually tapering to the tip, with indistinct veins. Sheaths are glabrous or with only a few hairs. Hairs are found on the collar, particularly at the margins. *Ligules* are short and membranous. *Auricles* are absent.

Spikelets of prairie dropseed and tall dropseed are over 1/8 inch long; those of sand dropseed and alkali sacaton are under 1/8 inch long. Prairie dropseed differs from tall dropseed in having an open panicle, the second glume as long or longer than the lemma, and an enlarged seed coat which characteristically splits the lemma and palea as it enlarges.

Where found: This native grass appears largely on upland sandy to silt loam soils in the eastern half of Nebraska. It is normally found as scattered plants growing on ridges with needle-and-thread, little bluestem, and porcupinegrass but occasionally is found on



Prairie Dropseed

lowlands with big bluestem and indiangrass.

Uses and values: This warm-season grass is rated good in forage value before maturity. When cut early enough, it provides good quality hay, but its fine leaves are rather difficult to mow. For both hay and pasture it is somewhat more palatable than sand dropseed and tall dropseed. It decreases under heavy grazing. Prairie dropseed is locally important as a pasture or hay grass in eastern Nebraska.

Needle-and-Thread

Stipa comata Trin. & Rupr.

Description: Needle-and-thread (also called needlegrass and speargrass) is an erect, cool-season perennial, 1 to 3 feet tall, without rhizomes, growing in bunches up to 3 inches in diameter. *Inflorescence* is a narrow, loosely-spreading panicle, 4 to 8 inches long. Lower spikelets are usually enclosed by the uppermost leaf sheath and emerge at margins of the sheath. *Spikelets* contain one floret. Glumes are 3/4 to 1 inch long,



Needle-and-Thread

papery, and remain attached to the plant after the seed fall. Lemmas are hard and rolled, enclose the palea and seed, have a wavy, twisted awn 4 to 5 inches long attached to the upper end, and are sharp pointed and bearded at the base. The awned seeds shatter readily at maturity. *Leaves* are glabrous. Leaf blades are narrow, usually rolled, 3 to 12 inches long, veined and rough above, and taper to a point. Sheaths are prominently veined. Leaves are folded to somewhat rolled in the bud. *Ligules* are conspicuous, about $\frac{1}{8}$ to $\frac{1}{16}$ inch long, membranous, pointed, and often frayed or notched at the tip. *Auricles* are absent.

Where found: This native grass is common to abundant on most upland sites of central and western Nebraska. In the Sandhills it is most common on sands and sandy sites and less common on choppy sands sites. On medium and heavy textured soils it is most prominent in the northern Panhandle but is scarce to common south of the North Platte River. Needle-and-thread is a common associate of blue grama, western wheatgrass, and threadleaf sedge on medium texture soils on western Nebraska ranges.

Uses and values: This cool-season grass produces early spring forage and remains actively growing until about mid-June. During this period and until seed-

heads begin to form, needle-and-thread is very palatable and nutritious. During midsummer, this grass is semi-dormant and is grazed but little. Regrowth begins in late summer if soil moisture is adequate, and it is again preferred by livestock. It cures well and is readily eaten during the winter even when dry and dormant.

Needle-and-thread is an important range grass because of its widespread distribution and abundance in the range area of Nebraska. Because of its cold resistance, fair tolerance of drought and grazing, and ample seed production, it is an increaser on the more favorable sites and further east. On the less favorable sites or when spring grazed, it is a decreaser. Continued heavy, early spring grazing is particularly harmful. The awned seeds may be troublesome and mechanically injurious to grazing animals but are rapidly shed as they mature in July.

This grass is a frequent component of upland hay, particularly in the Sandhills. It makes hay of good quality if cut before the awns are produced or after they are shed. Uplands outside the Sandhills which naturally support considerable quantities of needle-and-thread are low yielding and usually are not harvested for hay. Seed of needle-and-thread is generally not available for range seeding.

Porcupinegrass

Stipa spartea Trin.

Description: Porcupinegrass (also called needlegrass) is an erect, cool-season perennial bunchgrass, without rhizomes, and $1\frac{1}{2}$ to 4 feet tall. *Inflorescence* is a lax, nodding panicle which resembles that of needle-and-thread. However, the base of the mature inflorescence



Porcupinegrass

of porcupinegrass is usually not enclosed by the upper leaf sheath. *Spikelets* have one floret. Lemmas of porcupinegrass are longer ($\frac{5}{8}$ to 1 inch) than the lemmas of needle-and-thread ($\frac{3}{8}$ to $\frac{1}{2}$ inch). Also the glumes of porcupinegrass are longer, and the awns have a straight rather than curved terminal segment. *Leaves* are prominently veined on both blade and sheath. Leaf blades are glabrous or with very short, stiff hairs on upper surfaces, smooth and shining below, rather stiff, moderately long (8 to 12 inches) and slender, flat or rolled when dry. Leaves are folded to somewhat rolled in the bud. *Ligules* are prominent, membranous but rather firm, about $\frac{1}{8}$ to $\frac{1}{6}$ inch long, blunt, often split or irregular. *Auricles* are absent.

Where found: This native grass is found primarily in northern and eastern Nebraska. It is less drought tolerant than needle-and-thread and is uncommon in southwestern and western Nebraska. On silty and clayey sites it grows on hills, ridges, at heads of draws, and lower slopes in association with little bluestem, prairie junegrass, and side-oats grama. It is also scattered on Sandhill uplands. Its range overlaps that of needle-and-thread in the Sandhills and on clayey sites along the northern boundary of Nebraska.

Uses and values: Season of growth, palatability, and management are similar to needle-and-thread. This cool-season grass makes rapid growth in the spring and is best used for spring and fall grazing. Forage is somewhat coarser than needle-and-thread. Grazing response is largely determined by season of use. It normally is an increaser under summer grazing but a decreaser when grazed in fall, winter, or spring. Continuous, heavy spring grazing is very damaging to both porcupinegrass and needle-and-thread.

The awned seeds are very coarse and often cause serious mechanical injury to livestock. Porcupinegrass is largely avoided after the seedheads emerge and until the seeds are shed, but fall regrowth is readily grazed. Since it grows in scattered stands, herbage yield is rather low. When cut for hay, it is of medium quality, but harvesting must be done early or be postponed until after the seeds are shed. It is not recommended for range reseeding, and seed supplies are usually not available.

Green Needlegrass *Stipa viridula* Trin.

Description: Green needlegrass (also called feathergrass) is a cool-season perennial bunchgrass, $1\frac{1}{2}$ to 3 feet tall, without rhizomes. *Inflorescence* is a narrow panicle, 4 to 8 inches long. *Spikelets* have one floret, which is rather plump and brownish at maturity. Lemmas are less than $\frac{1}{4}$ inch long and have awns $\frac{3}{4}$ to $1\frac{1}{4}$ inch long. *Leaves* are mostly basal. Leaf blades are 4 to 12 inches long, narrow, rolled or sometimes flat, glabrous, with veins prominent above. Sheaths are prominently veined and have short hairs on one edge. Collar is hairy near margins. Leaves are rolled in the bud. *Ligules* are short, membranous, and collar-shaped. *Auricles* are absent.



Green Needlegrass

Where found: This native grass is most common north and west of the Sandhills. It is rather uncommon in the Sandhills and, except in the Panhandle, south of the North Platte River. Green needlegrass often becomes locally abundant on clayey range sites and on overflow sites in western Nebraska, but otherwise it occurs as scattered plants.

Uses and values: This cool-season grass starts growth early in the spring, remains green through the summer except in drought years, and usually makes regrowth in the fall. Forage value is good, and plants are grazed throughout the year. Green needlegrass is a decreaser and responds well to spring deferment. Awns are not troublesome as in other *Stipa* species. On favorable sites it may furnish a considerable quantity of good quality hay.

Because of its early spring growth, long green period, high cold tolerance, and good seedling vigor, green needlegrass is sometimes included as a cool-season component in native grass plantings on upland range. However, results have been variable and often only mediocre. In general, western wheatgrass has been

more successful than green needlegrass in native grass seedlings in central and western Nebraska. The major difficulty in establishing field stands of green needlegrass has been high seed dormancy, particularly in fresh seed, and general low quality of commercial seed. Green Stipagrass is a variety of green needlegrass. Other varieties are being developed.

GRAMA TRIBE (*Chlorideae*)

Side-Oats Grama

Bouteloua curtipendula (Michx.) Torr.

Description: Side-oats grama is an erect, warm-season perennial, 1 to 2 feet tall but sometimes taller, with scaly rhizomes, and grows in tufts or open bunches. *Inflorescence* consists of many short, one-sided spikes placed on short branches of the upright seedstalk. Each spike hangs downward at about a 45 degree angle and turns to one side of the seedstalk when ripe. Spikes are compact, often purplish, include mostly 5 to 8 spikelets, and fall entire leaving a characteristic slender, zigzag seedstalk. *Spikelets* have one perfect floret; each lemma produces 3 short awns. *Leaves* at plant base are numerous and curl when dry. Leaf blades are mostly flat, drooping, moderately wide and short, widest at the center, tapering toward the tip, and with inconspicuous veins. Hairs are found



Side-Oats Grama

on pimplelike glands along the edges of the blades. Soft hairs are also found on the collar and sometimes scattered on the sheaths and lower portions of the blade. Leaves are rolled in the bud. *Ligules* are short, collar-shaped, membranous but fringed on the margin. *Auricles* are absent.

Where found: This native grass grows throughout Nebraska but is more common in central and eastern than western Nebraska. It occurs on all upland sites except sands and choppy sands and often is particularly abundant on shallow, limy upland, silty, and thin loess range sites. It is more drought tolerant than big bluestem and indiagrass but less drought tolerant than blue and hairy grama. In eastern Nebraska it is more common on hills and drier slopes.

Uses and values: This warm-season grass grows rapidly in late spring and early summer and remains green into late summer. Forage value is good. It is grazed mostly in late summer and fall but remains moderately palatable into the winter. It is also grazed in late spring and early summer if new growth is available for grazing. The stems are unpalatable and are not normally grazed. Side-oats grama makes good quality hay but is low in yield. Side-oats is a decreaser on all range sites in the 15–19 inch precipitation zone. It increases under close grazing on favorable sites in the higher precipitation zones and replaces the taller grasses, but it does not withstand prolonged heavy grazing.

Side-oats grama is widely used for range reseeding. It is recommended for seeding in native grass mixtures on silty, clayey, and sandy sites throughout the state and also on overflow and subirrigated sites in western Nebraska. Side-oats grama is easily established, is long lived, and readily spreads by seed and rhizomes. Density and vigor decrease during drought but survival and recovery are good. Butte and Trailway are named varieties of side-oats grama.

Blue Grama

Bouteloua gracilis (H.B.K.) Lag. x Steud.

Description: Blue grama is a short, warm-season perennial, with seedstalks mostly 6 to 20 inches tall. Although a bunchgrass, blue grama often forms an open sod as a result of tillering. *Inflorescence* is a one-sided spike, up to 2 inches long, which is curved and shaped like an eyebrow at maturity. Each slender seedstalk usually produces two spikes, which remain attached to the seedstalk after maturity. *Spikelets* are short-awned, numerous, and arranged in two rows along one side of the rachis. *Leaves* are fine and mostly basal. Leaf blades are narrow, often curled but generally flat, 1 to 6 inches long, usually glabrous, sometimes slightly hairy near base. Sheaths are glabrous; collar has a few hairs at the margin. Leaves are folded to slightly rolled in the bud. *Ligules* are a fringe of very short hairs. *Auricles* are absent.

Blue grama differs from buffalograss in having no stolons, and the leaves are nearly free from hairs except at the collar.



Blue Grama

Where found: This native grass is widely distributed in Nebraska and occurs on all range sites except wetland. It is most common in central and western Nebraska and is adapted to all soil textures. It is relatively more important on dry soils since it cannot compete successfully with the taller grass species such as big bluestem and indiangrass where the latter will grow successfully. It is often the dominant grass on clayey, silty, and sandy range sites in western Nebraska where it increases under heavy grazing and frequent mowing.

Uses and values: This warm-season grass generally has good forage value. Preference for this grass by range cattle is low to moderate in the spring and early summer but very high in late summer and fall. It cures well and is grazed during the winter but is easily covered by snow. Because of its short growth, it is unimportant for hay. Herbage yields are much below the taller grasses under ideal moisture conditions. However, carrying capacity of blue grama on upland sites in western Nebraska may equal or exceed that of warm-season, mid and tall grasses in years of average or below average rainfall.

Although palatability is good, blue grama is very resistant to grazing and trampling and is an increaser. Its low growing habit allows much green, food-producing tissue to remain to maintain vigor and con-

trol erosion even under close grazing. It thrives best when not shaded by taller grasses but may rapidly increase in tall grass stands when the tall grasses are reduced by heavy grazing. Blue grama is very drought hardy on silty and clayey soils; it goes dormant in drought but renews growth quickly when soil moisture becomes available again. On loose, sandy soils its shallow root system reduces drought tolerance.

Blue grama is recommended for including in native grass seedings on silty, clayey, and sandy sites receiving about 22 inches of average annual rainfall or less. Its extreme drought tolerance and rather stable forage production on medium and heavy texture soils make it a valuable grass for seeding in central and western Nebraska. Initial stands of blue grama are slow to develop but seedlings stand more drought and salinity than seedlings of side-oats grama.

Hairy Grama
Bouteloua hirsuta Lag.



Hairy Grama

Description: Hairy grama is a short, warm-season, perennial bunchgrass, without rhizomes. Seedstalks seldom grow over 15 inches tall and are erect or somewhat decumbent at the base. *Inflorescence* consists usually of two spikes per culm and resembles that of blue grama. However, in hairy grama the rachis extends prominently beyond the last spikelet and is generally straight or only slightly curved. Also, the spikes are shorter in relation to width. *Spikelets* are rather bristly in appearance and the second glumes have short, stiff hairs and black dots. *Leaves* resemble those of blue grama, but the leaf blades differ in being hairy on the margins as in side-oats grama. Blades of hairy grama are hairy on the upper surface near the base. Collars are hairy at the margins but sheaths are glabrous. Leaves are folded to slightly rolled in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: This native grass is distributed widely over Nebraska, but it is more common in central and western Nebraska. It grows intermixed with blue grama but becomes particularly abundant on rough, rocky ridges and on loose sands. In the Sandhills it is most common on ridge tops and south and west slopes on sands and choppy sands range sites. Elsewhere, it may become common on dry soils of shallow and limy upland range sites.

Uses and values: This warm-season grass is similar to blue grama in making most of its growth in late spring and early summer and flowering by midsummer. Palatability is highest in late summer and fall, but hairy grama is not as readily grazed as blue grama.

Hairy grama is resistant to both drought and grazing and increases under heavy grazing and during drought. Because of short growth and low forage yield, hairy grama makes a very small contribution of forage even on sites where most abundant. It is not recommended for range seeding, but seed of hairy grama is commonly mixed with blue grama seed coming from native harvest. Sites where hairy grama is abundant are more valuable for grazing than for hay production.

Buffalograss

Buchloe dactyloides (Nutt.) Engelm.

Description: Buffalograss is a warm-season, low growing sodgrass, forming a continuous sod or circular patches. It spreads by seed and also by stolons which take root and produce leaves at the nodes. Most plants are either male or female. *Inflorescence* in male plants produce pollen in one or two one-sided spikes on stems that stand above the leaves and are 4 to 8 inches high. Female plants produce two to several burlike spikes which are partially hidden among the leaves and shatter readily. Each bur contains one to three seeds. *Leaves* are basal and grayish-green in color when growing. Leaf blades are pubescent on both surfaces and hairy on the edges, short (2 to 5 inches), often curly, flat, narrow, drooping, with inconspicuous nerves. Sheaths are glabrous and, in the female plant, partly enclose the inflorescence. Collars are hairy. Leaves are



Buffalograss

folded in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: This native grass is chiefly associated with blue grama and western wheatgrass but is much less abundant in Nebraska. It is most frequently found in southern and western Nebraska. It is best adapted to swales and depressions on heavy to medium texture soils and on bottomlands if competition from tall grasses is reduced. It occurs less frequently on well drained upland soils. It is uncommon in the Sandhills.

Uses and values: This warm-season grass makes rapid growth in late spring and summer. It is somewhat less palatable than blue grama and is grazed under Nebraska conditions primarily in late summer and fall. It cures well but is too short for dependable winter grazing. In general, it is of minor importance in Nebraska. Shortgrass ranges in western Nebraska commonly referred to as "buffalograss" normally support primarily blue grama and threadleaf sedge with only small amounts of buffalograss.

Buffalograss is less drought resistant than blue grama but recovers rapidly following drought. It withstands heavy grazing and trampling even better than blue grama and increases under heavy grazing. Tall grass communities may be invaded by buffalograss when damaged by drought or heavy grazing.

Seeding mixtures including buffalograss have been planted on silty and clayey range sites in western Nebraska, and buffalograss can be readily established from seed. However, its low herbage yield makes it mediocre to undesirable as a forage plant in Nebraska,

and its use in range seeding is not recommended. It is well adapted as a lawn grass on dry soils of western Nebraska, and stands can be established either from seed or sod plantings. Buffalograss makes a dense sod and effectively controls erosion on silt loam to clay soils.

Note: Falsebuffalograss (*Munroa squarrosa* (Nutt.) Torr.) grows in mats 5 to 20 inches wide and is common on recently disturbed places such as anthills, prairie dog towns, gopher mounds, and drought bared soil. It resembles buffalograss but differs in having bisexual flowers and sharp pointed leaves which grow in fascicles. Seeds are not produced in a bur but in a cluster of spikelets enclosed by a broad leaf sheath overtopped by blades of other leaves. Culms are prostrate and commonly root at the nodes. Falsebuffalograss is a native, warm-season, annual invader having poor forage value.

Prairie Cordgrass *Spartina pectinata* Link

Description: Prairie cordgrass (also called sloughgrass or ripgut) is a coarse, robust, reedlike, warm-season perennial, which grows 5 to 8 feet tall. It produces a dense mat of thick, woody rhizomes. *Inflorescence* is a spike, 6 to 16 inches long. Five to 20 spikes are arranged on branches of the common seedstalk. The spikes cling to the main stem. *Spikelets*, up to 40 in number, are arranged alternately in two rows along one side of the rachis. Each spikelet contains one floret. The florets are awnless but the outer glumes bear short, rough awns. *Leaves*, both blades and sheaths, are glabrous and prominently veined. Leaf blades are flat and wide ($\frac{1}{4}$ to $\frac{5}{8}$ inch) at the base but rolled near the tip. Blades are 8 to 24 inches long. Margins are strongly barbed, and midribs are wide and conspicuous. Leaves are rolled in the bud. *Ligules* are a fringe of hairs, about $\frac{1}{16}$ inch long. *Auricles* are absent.

Where found: This is the dominant native grass on wetland range sites. Here it occurs in pure stands or mixed with sedges and other grasses. Such soils are normally wet for several weeks each year and are too wet for big bluestem, switchgrass, and indiangrass. However, on subirrigated sites prairie cordgrass grows in scattered stands with these grasses. Prairie cordgrass is abundant on wet, non-saline soils throughout the state but is most common in sloughs and along the edges of lakes and marshes in Sandhill valleys and along the Elkhorn, Loup, Platte, and Missouri Rivers and their tributaries.

Uses and values: This warm-season grass grows rapidly in late spring and throughout the summer. It is readily grazed in early growth stages. Relative forage value is good when growing in association with coarse sedges or fair when growing with big bluestem, indiangrass, switchgrass, and bluejoint reedgrass. Under heavy spring grazing prairie cordgrass is a deceiver. As it matures, prairie cordgrass becomes harsh and stemmy and only the leaf tips are eaten.



Prairie Cordgrass

Wetland sites are normally better adapted to hay production than grazing. A high yield of fair quality hay can be obtained from prairie cordgrass on wetland sites if cut before seedheads emerge. If cut too late, stems become woody and hay is coarse and tough. Since regrowth is rapid, two or three cuttings can often be made if soils are dry enough to support machinery. Reproduction is usually by rhizomes and tillers except in bare areas where seedlings can establish. Redtop and reed canarygrass are preferred over prairie cordgrass for seeding or transplanting on wetland range sites.

Note: Alkali cordgrass (*Spartina gracilis* Trin.) closely resembles prairie cordgrass but can be distinguished by its awnless spikelets and smaller size. Leaves are narrower ($\frac{1}{5}$ inch or less), spikes are shorter (2 inches or less), and seedstalks are shorter (40 inches or less). Alkali cordgrass grows in wet, saline soils of western Nebraska where few other grasses can thrive. Forage value and characteristics as a hay grass are similar to prairie cordgrass, and it is also a native, warm-season grass.

Note: Sloughgrass (*Beckmannia syzigachne* (Steud.) Fernald), also called American sloughgrass, is another native grass which grows on wet soils. Inflorescence somewhat resembles the cordgrasses but differs in that the spikelets are globe-shaped and rounded rather than narrow, the glumes are broad and boat-shaped,

and the rachis does not extend above the upper spikelets. Sloughgrass is a stout, leafy annual, without rhizomes, and grows 3 feet high or higher. It is found in ditches and seepage areas and on wetland range sites. It is a warm-season invader, has low forage value, but is sometimes cut for hay.

CANARYGRASS TRIBE (*Phalarideae*)

Reed Canarygrass

Phalaris arundinacea L.

Description: Reed canarygrass is a coarse, vigorous, long-lived, cool-season perennial, growing 2 to 6 feet tall. Large rhizomes allow the plant to grow in bunches 2 to 3 feet in diameter or as a continuous, coarse sod. *Inflorescence* is a compact, narrow, sometimes interrupted panicle, 3 to 6 inches long. *Spikelets* are grouped in crowded clusters and contain one fertile floret with two small, infertile florets at the base. Seeds are shiny, brown, and flaxlike. *Leaves* are glabrous; stems are leafy. Leaf blades are flat or slightly keeled, wide ($\frac{3}{8}$ to 1 inch), 4 to 12 inches long, with a prominent midrib below, and moderately long tips. Leaves are rolled in the bud. *Ligules* are membranous, up to $\frac{1}{4}$ inch long, rounded, cut on the margin. *Auricles* are absent.

Where found: This grass is native to parts of Nebraska but is believed to be more widely distributed now than formerly. It prefers moist, cool sites and is found throughout the state on wet meadows and river banks and along drainage ditches.



Reed Canarygrass

Uses and values: This cool-season grass makes rapid growth very early in the spring. It grows rapidly until seed maturity in early summer, but it retains green foliage through the summer. When actively growing, the forage value of reed canarygrass is good. For best quality pasture, it should not be allowed to go to maturity but should be grazed whenever it reaches a height of 12 to 15 inches.

Reed canarygrass is known for its high yield of moderately palatable forage or hay on wetland range sites. Best quality hay is produced by mowing when the first heads of reed canarygrass begin to appear. Hay quality may be improved by early spring pasturing to delay maturity dates, thus reducing the coarseness of growth. Dense reed canarygrass sod will support equipment where haying operations were formerly impossible.

Reed canarygrass is very well adapted for seeding on wetland range sites and on wetter portions of sub-irrigated sites. Its use is increasing in Sandhill meadows. It is not injured by deep ponded water for a period of several weeks at a time but can withstand considerable midsummer drought. It is sometimes included in irrigated pasture mixtures, particularly where drainage is poor. It is moderately tolerant of salinity but should not be seeded on very salty or alkali soils. It is long-lived, has a long growing season, and recovers quickly from grazing or mowing. It is also useful for erosion control on moist or wet soils.

Drilling in late summer following disking to reduce competition from weeds and perennial plants has been the most effective method of seeding reed canarygrass. Late fall seeding for early spring germination and establishment is also possible. Early spring drilling is effective if soil is dry enough and weed competition is controlled. Broadcast seeding into native wet meadows is not effective unless means of placing seed on mineral soil and giving some coverage is provided. Trampling by cattle following broadcast seeding may help in getting the seed in contact with mineral soil. Reed canarygrass seed gives best germination when planted the same season it was harvested since seed viability drops rather quickly. Ioreed is a named variety of reed canarygrass.

Reed canarygrass can also be established by spreading sod pieces or freshly cut, well-jointed culm segments with a manure spreader on moist soil and covering with a light disking or trampling into the mud. Where seedbed preparation is impossible because of wet soils or it is desirable to establish in undisturbed sod, this method is often superior to seeding. When worked into mud or moist soil, pieces of root or mature plant cuts with a joint establish readily. On very wet soils, plant cuts have been superior to sod pieces.

MILLET TRIBE (*Paniceae*)

Sandbur

Cenchrus pauciflorus Benth.

Description: Sandbur is a weedy, warm-season annual, or at times a short-lived perennial. It has no



Sandbur

rhizomes but sometimes roots at the lower nodes of the decumbent stems. Plants may grow upright or lay flat on the ground, forming mats. *Inflorescence* is a terminal spike of 6 to 20 spiny, pubescent burs and is often topped by the upper leaf. Spikes, one to several per plant, may be produced on short stems close to the ground or on longer stems up to 2½ feet tall. *Spikelets* include one fertile floret and one sterile floret below. Each bur is composed usually of two spikelets. *Leaves* are found both basally and on the culms. Leaf blades are glabrous, flat, 2 to 5 inches long, and taper to a point at the tips. Sheaths are flattened, loose, and sparsely hairy on the margins. Leaves are folded in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: This native weedy grass is common throughout the state on range in poor condition, around farmsteads, roads, and other waste places, and in cultivated fields and lawns. It grows particularly well on sandy soils as its name implies but also occurs on heavier soils.

Uses and values: This warm-season grass begins maturing seed in July and continues throughout the summer. Reports are somewhat conflicting on forage value, probably resulting largely from the relative palatability of associated forage plants. During early growth stages and before the burs are produced, sand-

bur plants are grazed to some extent, particularly if other forage is not available in quantity. However, once the burs begin to appear the plants are avoided and become worthless for forage. Hay quality is sharply lowered if it contains sandbur.

Sandbur rapidly invades on overgrazed ranges or other disturbed or denuded soils, particularly dry, sandy soils. This grass is often troublesome on new seedings. Seed is easily transported by animals and machinery because of the spiny burs. Competition by adapted, perennial grass is the best control. Selective herbicides are not effective or practical under most conditions, and it grows too close to the ground for mowing to be effective. Proper seedbed preparation including use of a cover crop and timely seeding help control sandbur in grass seedings.

Barnyardgrass

Echinochloa crusgalli (L.) Beauv.

Description: Barnyardgrass is a weedy, warm-season annual, 1 to 4 feet tall, without rhizomes. It branches freely and is decumbent at the base. *Inflorescence* is a panicle, 3 to 8 inches long, with branches erect above but spreading on the lower portion. *Spikelets* produce one fertile floret and are covered with stiff bristles, have rough awns up to ⅓ inch long or occasionally much longer, and are arranged on one side of the panicle branches. Seeds are nearly oval, shiny, and yellowish-gray to brown. *Leaves* are mostly glabrous. Blades are ¼ to ⅝ inch wide, flat, 4 to 12 inches long,



Barnyardgrass

margins often crinkled, with veins except midrib inconspicuous. Leaves are folded in the bud. *Ligules* are absent. *Auricles* are absent.

Where found: Barnyardgrass is an introduced weed found throughout Nebraska. It grows primarily in old fields, feed grounds, waste places, and corrals, and is particularly common on low, moist, disturbed areas high in fertility.

Uses and values: This warm-season grass has fair to poor forage value. It furnishes fair pasture when grazed during early growth but becomes harsh and unpalatable at maturity. It is occasionally cut in hay and is of low quality unless cut before maturity. This grass is an abundant seed producer and rapidly invades overflow and subirrigated range sites which have been denuded or disturbed. It is an unreliable forage producer and is generally considered an undesirable forage grass.

Witchgrass

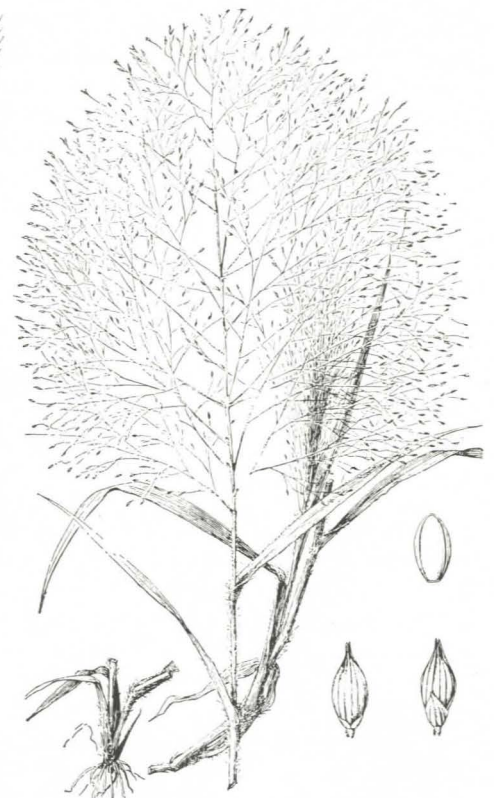
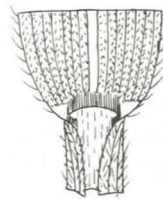
Panicum capillare (L.)

Description: Witchgrass (also called ticklegrass and tumblegrass) is a hairy, warm-season annual, 6 to 20 inches tall, without rhizomes, sometimes decumbent at the base. *Inflorescence* is an open, spreading panicle, 8 to 12 inches long, which breaks off when mature and tumbles along the ground. *Spikelets* are small, awnless, and placed at the ends of short panicle branches. Dense stiff hairs are found where branches join the rachis. *Leaves* are pubescent on both blades and sheaths. Leaf blades are soft, flat, wide, 4 to 10 inches long and often half the length of the plant, and with a broad, white midrib. Leaves are folded in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: This native weedy grass is found throughout Nebraska on cultivated land, waste places, and poor condition range, particularly where the soil is somewhat sandy.

Uses and values: This undesirable, warm-season grass has poor forage value, being slightly grazed in early growth stages but ignored after the seedhead begins to develop. Witchgrass invades land where competition from perennial plants is at a very minimum. It is often very common for one or two years on go-back land but is soon replaced by more competitive plants. When present in great abundance in new grass seedings, witchgrass may reduce establishment of the desirable grasses by removing soil moisture during dry periods.

Note: Fall Panicum (*Panicum dichotomiflorum* Michx.) is a rather coarse, weedy annual which commonly grows 1½ to 3½ feet tall and has a spreading panicle. It is commonly found on disturbed areas in southeastern Nebraska but probably extends westward over most of the eastern two-thirds of the state. It is a warm-season grass which invades pastures under heavy grazing. Forage value may be fair when young and growing but otherwise poor. It can be easily distinguished from witchgrass since the foliage is nearly



Witchgrass

glabrous. It differs from all other annual panicums in Nebraska in having first glumes which are truncate or triangular tipped and not over ¼ as long as the spikelet. Other annual panicums have first glumes which are pointed at the tips and are at least ⅓ as long as the spikelet.

Scribner Panicum

Panicum scribnerianum Nash

Description: Scribner panicum is a low growing, cool-season perennial, without rhizomes. It forms a rosette of broad, smooth leaves in the fall and winter. Plants develop in spring into small bunches with spreading tops. The leafy seedstalks grow from 6 to 15 inches tall. *Inflorescence* is an open panicle, 1½ to 2½ inches long, often partly enclosed by the uppermost leaf sheath. *Spikelets* are awnless and have one fertile floret and one sterile floret, the latter resembling a third glume. The first glume is about ⅓ as long as the total spikelet, and the second glume is nearly as long as the spikelet. *Leaves* are pubescent on the sheaths, on lower margins of the blade, and sparsely so on under surface of blade. Leaf blades are flat and smooth, short (2 to 4 inches) and wide (up to ⅝ inch) below the center, and rounded at the base but tapering to the tip. Leaves are rolled in the bud. *Ligules* are a fringe of short hairs. *Auricles* are absent.

Where found: This native grass is widely distributed and common throughout Nebraska. It is found on all range sites except wetland. It grows between the



Scribner Panicum

bunches of taller grasses and does best where other vegetation is not too dense.

Uses and values: This cool-season grass starts growth in the fall, remains dormant but somewhat green through the winter, grows rapidly in the spring, and starts heading in early June. Forage value is rated as fair. During the fall and spring, it is quite palatable and selected by grazing livestock. By late spring it begins to dry, and grazing shifts to other grasses.

Because of low growth, short period of good palatability, and ability to reseed rapidly, scribner panicum is able to increase under heavy grazing. This grass never yields a large volume of herbage, but it is valuable for providing range cattle with green forage in early spring.

Note: Wilcox panicum (*Panicum wilcoxianum* Vasey) closely resembles scribner panicum in appearance, growth characteristics, and forage value. It is scattered over much of the state but is less common than scribner panicum. It can be distinguished from scribner panicum by its leaf blades which are narrower ($\frac{1}{4}$ inch or less) and are hairy on both upper and lower surfaces. Also, the panicle of wilcox panicum is narrower, being $\frac{1}{2}$ to $\frac{2}{3}$ as wide as long compared to the panicle of scribner panicum which is nearly as wide as long.

Switchgrass

Panicum virgatum L.

Description: Switchgrass is an erect, warm-season, stout perennial, 2 to 5 feet tall, growing in clumps or patches. Although bunchlike in appearance, strong rhizomes may produce a coarse sod, particularly under grazing. *Inflorescence* is a large, spreading panicle, up to 15 inches long. *Spikelets* are numerous, very small, egg-shaped, and awnless but pointed at the tips of the glumes and lemma. Each spikelet includes one fertile floret and one sterile floret, the latter resembling a

third glume. Glumes are of unequal length. *Leaves* are short and bractlike at base, longer on the stem, and green to blue-green in color. Leaf blades are wide, long (up to 24 inches above), mostly erect, and glabrous except for a distinct clump of hairs on the upper surface near the collar. Sheaths have hairy margins, otherwise glabrous. Leaves are rolled in the bud. *Ligules* are a fringe of short hairs, topped by dense hairs at the base of the blade. *Auricles* are absent.

Where found: This native grass occurs throughout Nebraska on subirrigated, overflow, sands, sandy, and choppy sands range sites. In the eastern half of the state it is also found on upland silty and clayey sites. It grows best where moisture is abundant and thrives on sites where the tall bluestems grow. However, like the bluestems, it is unable to survive prolonged drought and seldom grows on dry, upland plains of western Nebraska. It is moderately salt tolerant and is common on saline subirrigated sites. It withstands considerable flooding for short periods.

Uses and values: This warm-season grass grows rapidly in late spring and early summer. At this time it has good forage value and is readily grazed by cattle, horses and sheep. As the stems and seedheads begin to mature in midsummer, nutrient content and palatability decline rapidly. On fall and winter range, palatability is low and only the leaves and seedheads are normally eaten. Matured stems are rank and tough and are normally avoided by livestock.

On adapted sites switchgrass is a high yielder of pasture or hay. It makes good quality hay if cut early. Palatability and feeding qualities drop more rapidly with maturity than in sand or big bluestem. Switch-



Switchgrass

grass is a decreaser when grazed during its growing season but may replace other tall grasses when winter grazed.

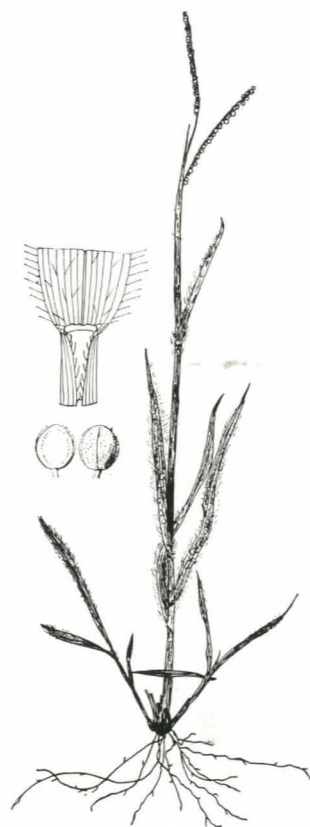
Switchgrass has a wide range of adaptation for range and pasture seeding. It is a major component of warm-season, native grass seedings and is most commonly planted in mixture with the bluestems, side-oats grama, indiagrass, and sand lovegrass. High quality seed is readily available. Switchgrass is readily established from seed. Although stands are somewhat slow to establish, they tend to improve through natural reseeding and rhizome spread. Nebraska 28 and Blackwell are varieties of switchgrass.

Switchgrass is recommended for seeding throughout Nebraska on subirrigated, overflow, sands, and sandy range sites and on most saline subirrigated range sites. It is recommended also for silty and clayey range sites receiving 20 inches or more of average annual precipitation. Switchgrass is adapted for use in warm-season irrigated pastures when seeded alone or in mixture with other tall, warm-season grasses. Because of good control of soil erosion, it is commonly seeded in waterways also.

Sand Paspalum

Paspalum stramineum Nash

Description: Sand paspalum (sometimes called beadgrass) is an erect, warm-season perennial without rhizomes, commonly 10 to 30 inches tall. *Inflorescence* is a raceme 2 to 5 inches long. Two or three racemes are produced on each culm, the lower raceme often



Sand Paspalum

remaining in the sheath. *Spikelets* are round and bead-like, placed on pedicels, and spaced in two rows along one side of an arching rachis. Each spikelet has one fertile floret, also one sterile floret. The first glume is usually missing, and the second glume is as large as the spikelet. *Leaves* grow both basally and on the stem. Leaf blades are flat, $\frac{1}{4}$ to $\frac{5}{8}$ inch wide, 2 to 8 inches long, crinkly and hairy at the margins, and sparingly pubescent on both surfaces. Sheaths are somewhat flattened, loose, and hairy on the margins, otherwise glabrous or sparingly pubescent. Leaves are rolled in the bud. *Ligules* are short, membranous, and collar-shaped. *Auricles* are absent.

Where found: This native grass is found on sands, sandy, and choppy sands range sites throughout the state. It grows as scattered, small bunches on dry, sandy soils intermixed with typical Sandhill plants.

Uses and values: This warm-season grass is considered to have fair forage value. Although widely distributed on sandy soils, plants of sand paspalum are normally scattered and comprise only a minor part of the vegetation composition. For this reason herbage yield is low and the grass warrants only minor consideration by the range manager. Although not recommended for range seeding, it readily establishes naturally on go-back land and seeded range.

Yellow Bristlegrass

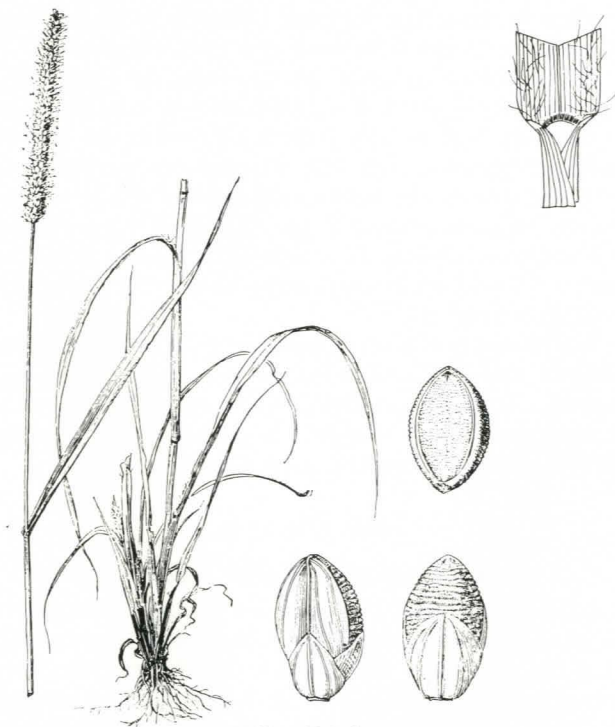
Setaria lutescens (Weigel) Hubb.

Description: Yellow bristlegrass (also called yellow foxtail and pigeongrass) is a summer annual, without rhizomes, $\frac{1}{2}$ to 3 feet tall. Plants are distinctly flattened, also branched and sometimes decumbent at the base. *Inflorescence* is a dense, bristly, cylindrical panicle 1 to $3\frac{1}{2}$ inches long. *Spikelets* have one fertile floret. The first glume is half as long as the spikelet, the second glume is two-thirds as long as the spikelet. Five or more yellowish-green to brownish bristles are found below each spikelet. *Leaves* have blades which are flat to folded, wide, 3 to 10 inches long, twisted in a loose spiral, and have crooked hairs at base of the blade. Sheaths are glabrous and somewhat keeled. Leaves are rolled in the bud. *Ligules* are mostly a ring of short hairs. *Auricles* are absent.

Where found: This weedy grass is a native of Europe. It is common on cultivated ground, waste places, roadsides, and range and pasture in low condition. Although widely distributed over Nebraska, it is most abundant in central and eastern Nebraska.

Uses and values: This warm-season grass is moderately palatable and considered fair forage when rapidly growing. However, it becomes unpalatable upon maturity and has poor forage value thereafter. Its growth should not be encouraged on grazing lands.

Yellow bristlegrass rapidly invades disturbed areas and its presence on range or pasture in considerable amounts indicates a deteriorated stand of forage plants. It is an early invader on go-back land. It is very troublesome in range seedings since it often produces



Yellow Bristlegrass

dense stands which strongly compete with new seedlings of seeded grasses.

Practices which reduce competition from weedy grasses such as the bristlegrasses in new pasture and range seedings are: providing a weed-free seedbed, using a cover crop such as close-sown sorghums, seeding early in the season directly into the stubble, and mowing if weedy grasses outgrow the new seedlings.

Green Bristlegrass *Setaria viridis* (L.) Beauv.

Description: Green bristlegrass (also called green foxtail) is a summer annual, without rhizomes, $\frac{1}{2}$ to $2\frac{1}{2}$ feet tall, usually branched at the base. It resembles yellow bristlegrass but is commonly somewhat smaller and less coarse. *Inflorescence* is a dense, bristly, cylindrical panicle 1 to 3 inches long. *Spikelets* are similar to yellow bristlegrass but have fewer bristles (1 to 3 but sometimes branched), which are green. The first glume of green bristlegrass is $\frac{1}{3}$ as long as the spikelet, the second glume is about the same length as the spikelet. *Leaves* have blades mostly flat, wide, 2 to 10 inches long, glabrous, with margins weakly barbed. Leaf sheaths are seldom keeled, are hairy on the margins, glabrous on the surface or sometimes slightly pubescent on lower sheaths. Leaves are rolled in the bud. *Ligules* are short and collar-shaped, the outer half consisting of hairs. *Auricles* are absent.

Where found: This grass is a native of Europe but commonly grows intermixed with yellow bristlegrass in Nebraska. It is widely distributed throughout the state and is more abundant in western Nebraska than yellow bristlegrass. It is also a serious pest on disturbed lands.

Uses and values: This warm-season, weedy grass flowers and matures somewhat earlier than yellow bristlegrass. Forage value, response to grazing, and management considerations are the same as for yellow bristlegrass.



Green Bristlegrass

Note: Another weedy grass which resembles large plants of green bristlegrass is hooked bristlegrass (*S. verticillata* (L.) Beauv.), also called bristly or bur foxtail. It differs from both green and yellow bristlegrass in having bristles which are downwardly rather than upwardly barbed, making the seedheads sticky and burlike. It is found in central and eastern Nebraska but is less common than green and yellow bristlegrass.

BLUESTEM TRIBE (*Andropogoneae*)

Big Bluestem

Andropogon gerardi Vitman

Description: Big bluestem (also called turkeyfoot) is an erect, robust, warm-season, perennial bunchgrass, 3 to 6 feet high, often reddish-purple at maturity. Rhizomes are short or absent, tillering is pronounced, and young shoots are somewhat flattened. *Inflorescence* consists of three (sometimes two or more) racemes which arise from a common joint of the seedstalk, resembling a turkey's foot. *Spikelets* are paired at each fringed rachis joint as in all bluestems. One of the paired spikelets is sessile, has one perfect floret, and is awned. The other spikelet sets on a pedicel and usually produces no seed. *Leaves* are medium to dark green. Leaf blades are wide, flat to V-shaped, keeled with a prominent midrib on the under side, rather long and drooping, tapering at the tip, and somewhat



Big Bluestem

rough on the edges. Leaf blades are pubescent on upper surface near the base and glabrous on lower surface. Leaf sheaths are often pubescent and somewhat flattened. Leaves are rolled in the bud. *Ligules* are collar-shaped, membranous, up to $\frac{1}{8}$ inch long, with an irregular margin. *Auricles* are absent.

Where found: Big bluestem grows abundantly on moist, deep, rather well-drained soils of valleys and ravines in conjunction with little bluestem, switchgrass, and indiagrass. It is often the predominant grass on overflow and subirrigated range sites throughout the state. In eastern Nebraska it grows on upland sites. However, since it is not drought tolerant, it is largely replaced by blue grama, needle-and-thread, and side-oats grama on upland sites in central and western Nebraska, but small amounts may be found on sharp breaks and moist slopes. Its prominence on adapted sites is due to rapid growth, dense growth habits, tall stature, and tolerance of shade by mature plants and seedlings.

Uses and values: This warm-season grass grows rapidly from midspring to early fall and produces flowering stalks in late summer and early fall. It is highly palatable and nutritious. It is possibly the most palatable native grass common in Nebraska and is usually eaten in preference to other grasses on summer range. Because of its high palatability even after maturity, big bluestem is a decreaser on all sites. Although a tall growing grass, big bluestem withstands considerable grazing. But if continually grazed closer than 6 to 8 inches during the growing season, it will be replaced by less desirable grasses. Under proper

grazing an abundance of basal foliage is produced from new shoots at the stem base and from rhizomes.

Big bluestem is highly recommended for range seeding on subirrigated and overflow sites throughout most of the state and on silty and clayey sites in the eastern half of Nebraska. It is also adapted for warm-season, irrigated pasture throughout the state in mixed or pure stands. Pawnee and Kaw are improved, later maturing varieties. Champ is a somewhat earlier maturing variety developed from a cross of big bluestem and sand bluestem.

Big bluestem is a very desirable grass where adapted because of high production of very palatable forage and hay. It is the principal component of prairie hay in true prairie and is largely responsible for the widespread fame of Nebraska prairie hay.

Sand Bluestem

Andropogon hallii Hack.

Description: Sand bluestem is a robust, warm-season perennial, 3 to 6 feet tall. Sand bluestem closely resembles big bluestem with which it intergrades; thus, some consider them to be the same species. Rhizomes are long and creeping in sand bluestem but are short or absent in big bluestem. *Inflorescence* is composed of three racemes (sometimes two or more), is very hairy, and the hairs give the seedhead a pale golden to white or grayish color. *Leaves* of sand bluestem are light green to bluish in color, whereas the leaves of big bluestem are medium to dark green. Leaf blades of sand bluestem are prominently veined, have a broad white midrib on the upper surface, and are glabrous or pubescent on upper surface near the base and behind the ligule. Sheaths are glabrous and have prominent veins. Leaves are rolled in the bud. *Ligule* is $\frac{1}{8}$ to $\frac{1}{4}$ inch long, membranous, rounded, and irregularly toothed. *Auricles* are absent.

Where found: This native grass is common on sandy soils throughout Nebraska and grows abundantly on top of sandhills. On choppy sands and sands range sites it is normally exceeded in percent composition and herbage production only by prairie sandreed. Although less abundant on sandy range sites and shallow sites of sandy texture, it is still common and a major forage contributor. Sand bluestem is occasionally found locally on moderately coarse soil pockets in thin silty range sites.

Uses and values: This warm-season grass has a long growing season similar to big bluestem. It is highly palatable and has good forage value throughout the year. Except when associated cool-season grasses are making rapid growth, sand bluestem is normally one of the first sandhill grasses to be grazed. Because of its rhizomatous growth habit, sand bluestem withstands considerable grazing. However, continuous heavy grazing causes this decreaser grass to lose vigor, develop a prostrate growth habit, and gradually be replaced by less desirable grasses.

Sand bluestem is recommended for range seeding



Sand Bluestem

throughout Nebraska on sandy, sands, and choppy sands range sites. Champ is a named variety resulting from a cross of big bluestem and sand bluestem. Seed of sand bluestem from native harvest is often available.

Because of its high yield of palatable forage, sand bluestem is a very desirable grass on Sandhills range and should be given special consideration in grazing programs. Sand bluestem is an important component of upland hay in the Sandhills and provides palatable and nutritious hay. It readily invades blowouts and assists in stabilizing them. It grows typically in large patches and its extensive rhizome system makes it an important sand stabilizing grass.

Little Bluestem

Andropogon scoparius Michx.

Description: Little bluestem (also called bunchgrass) is a warm-season perennial, which grows in distinct bunches, often 6 to 12 inches in diameter, as a result of tillering and occasional short rhizomes. Stems are numerous, closely crowded, 1 to 4 feet tall. Stems and shoots are flattened. Mature foliage and seedstalks are conspicuously reddish-brown when mature. *Inflores-*

cence consists of several racemes, each on the end of a slender branch of the seedstalk. *Spikelets* are paired; one is sessile, has a twisted awn $\frac{1}{3}$ to $\frac{3}{4}$ inch long, and produces seed. The other spikelet is much reduced, is placed on a short, hairy stalk, is awnless, and produces no seed. Rachis joints are densely hairy. *Leaves* are numerous at base of plant and usually glabrous. Leaf blades are rather narrow, up to 10 inches long, flat or V-shaped at the base, midrib conspicuous above and protruding below. Sheaths are flattened. Leaves are folded in the bud. *Ligules* are about $\frac{1}{16}$ inch long, collar-shaped to rounded, and membranous but fringed on the margins. *Auricles* are absent.

Where found: This native grass is widely distributed in Nebraska and is found on all range sites except saline subirrigated and wetland range sites. It is a major species on stabilized sandy and sands range sites and on the north slopes of choppy sandhills. Outside the sandhills it is most abundant on rocky hillsides, steep slopes, ridgetops, and rolling terrain. It is often the most prominent grass on limy upland, shallow, and thin loess range sites. It is abundant on silty sites in eastern Nebraska. It is scattered or absent on silty sites



Little Bluestem

in southwestern Nebraska. Where moisture is ample but soils are not wet, little bluestem produces a dense sod in conjunction with other mid and tall grasses. In central and western Nebraska it grows characteristically as a bunchgrass.

Uses and values: This warm-season grass grows rapidly and uniformly from mid-June to early August in Nebraska. It is readily grazed after regrowth has exceeded the old basal growth, and it has good forage value when the leaves are tender and succulent. Seed-stalks begin to appear by midsummer and exceed the foliage. Although livestock tend to avoid the seedstalks and seedheads, they continue to select the basal leaves until maturity. Little bluestem does not appear to cure well and has only moderate palatability for fall and winter grazing. Full use during its growing season helps to extend the period of palatable, nutritious forage production. However, continuous close grazing at this time will damage and even kill little bluestem.

Little bluestem is a decreaser in the 15–19 inch precipitation zone but is an increaser on favorable sites in central and eastern Nebraska. Season of grazing also affects the grazing response of little bluestem since it tends to be a decreaser under late spring and summer grazing and an increaser under winter use. Little bluestem is severely damaged by prolonged, drought, particularly on upland clayey and silty sites, and is replaced by more drought hardy grasses such as the grammas. On adapted sites, it is a high forage producer. It is an important component of upland prairie hay and makes good quality hay if cut early.

Little bluestem is widely used for range seeding in Nebraska. It is recommended for use in warm-season mixes on sandy soils and on subirrigated and overflow sites throughout the state and on silty and clayey sites in the 20 to 24 inch and higher precipitation zones. It is less adapted for seeding on clayey and silty sites receiving less than 20 inches of precipitation. Even if successfully established here, little bluestem often produces no more forage than blue grama and tends to be replaced by it even under moderate grazing. Little bluestem seed is often available for purchase, and new varieties are being developed.

Indiangrass

Sorghastrum nutans (L.) Nash

Description: Indiangrass is an erect, warm-season, robust perennial, 3 to 6 feet tall, with short rhizomes and bearded nodes on the culms. *Inflorescence* is a golden-bronze panicle in contrast to the fingerlike racemes of big bluestem. Panicles are 6 to 12 inches long, rather dense and narrow, and produce a large quantity of seed. *Spikelets* are paired, hairy, and borne at the ends of short panicle branches. One spikelet produces a single, fertile floret which bears a bent, partially twisted awn about 1/2 inch long. The second spikelet is reduced to a pedicel only. *Leaves* have prominent veins and are glabrous, or lower sheaths are sometimes pubescent. Leaf blades are 6 to 20 inches

long, narrow and thickened at the base, 1/4 to 1/2 inch wide and flat at the midsection, and taper to a point at the tip. Blades are erect, but drooping at the tip, and have a conspicuous midrib above. Leaves are rolled in the bud. *Ligules* are about 1/8 inch long, membranous, two-toothed, and appear as a continuation of the sheath. *Auricles* are absent.

Where found: This native grass is most common on subirrigated and overflow range sites throughout Nebraska. It is best adapted to moist, well-drained bottomlands but also grows on sandy soils. It is commonly associated with big bluestem but is less abundant. Indiangrass is moderately salt tolerant and may be common on saline subirrigated sites if the salt content is not excessive. Indiangrass also occurs sparingly on most other range sites where soil moisture is not too limiting. It will withstand occasional flooding. On upland range sites with medium to heavy textured soils, indiangrass is more common in eastern than in central and western Nebraska.

Uses and values: This warm-season grass provides palatable forage throughout the summer. At this time forage value is nearly as high as for big bluestem. Indiangrass does not cure particularly well and is generally considered only moderately palatable after maturity and fair forage for winter grazing. Indian-



Indiangrass

grass is not tolerant of repeated close grazing and is a decreaser on all range sites.

Indiangrass is recommended for range seeding on subirrigated, overflow, sands, and sandy range sites throughout the state and on clayey and silty range sites in the eastern half of Nebraska. It is adapted for use in irrigated, warm-season pasture when grown in either pure stands or in mixtures with other tall, warm-season grasses such as big bluestem and switch-

grass. Holt is a moderately early maturing variety. Nebraska 54 is a later maturing variety.

Although of nearly equal quality to big bluestem for grazing, total yield per acre in native stands is usually lower since it normally grows in small patches or scattered bunches. Indiangrass makes good quality hay if cut before it becomes coarse. It is an important component of hay in the subirrigated valleys of the Sandhills.

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