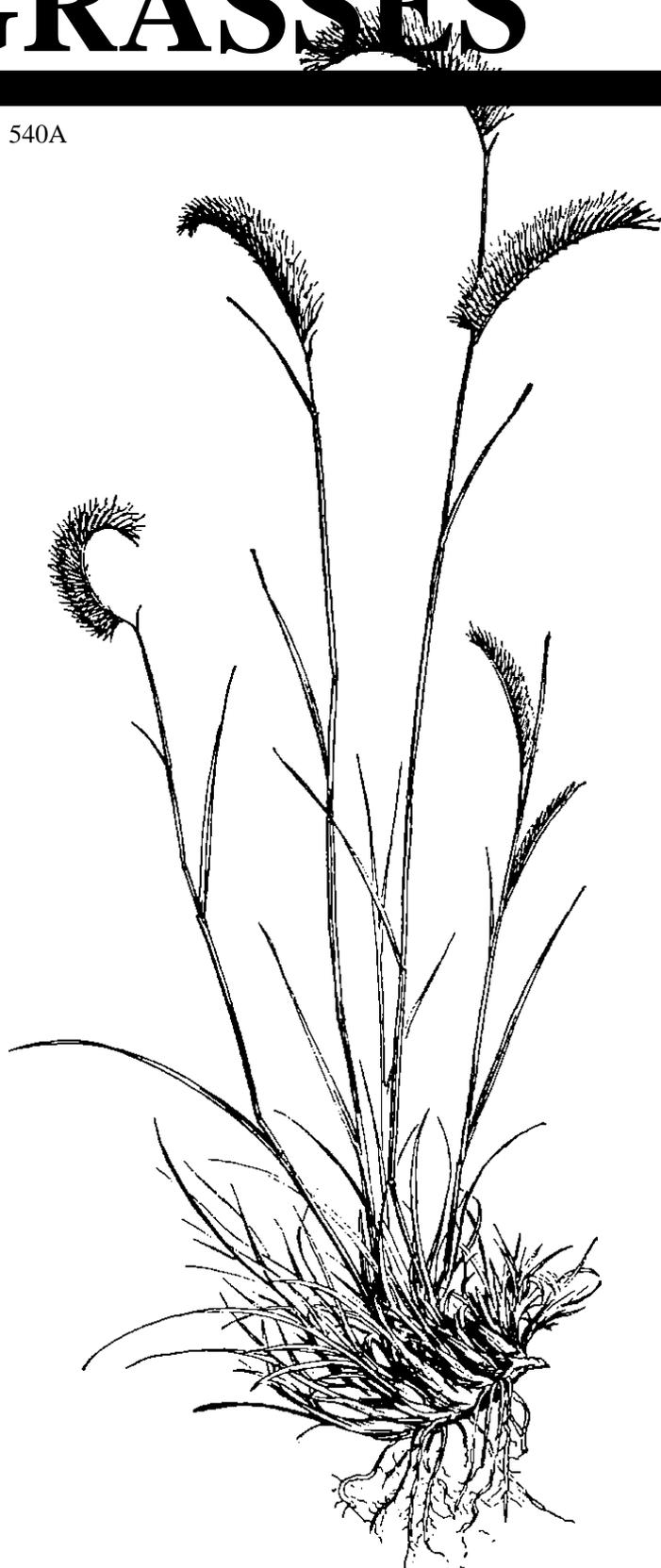

NATIVE GRASSES

Bulletin 540A



GRASS

By JOHN J. INGALLS

Next in importance to the divine profusion of water, light, and air, those three physical facts which render existence possible, may be reckoned the universal beneficence of grass. Lying in the sunshine among the buttercups and dandelions of May, scarcely higher in intelligence than those minute tenants of that mimic wilderness, our earliest recollections are of grass; and when the fitful fever is ended, and the foolish wrangle of the market and the forum is closed, grass heals over the scar which our descent into the bosom of the earth has made, and the carpet of the infant becomes the blanket of the dead.

Grass is the forgiveness of nature--her constant benediction. Fields trampled with battle, saturated with blood, torn with the ruts of cannon, grow green again with grass, and carnage is forgotten. Streets abandoned by traffic become grass-grown like rural lanes, and are obliterated; forests decay, harvests perish, flowers vanish, but grass is immortal. Beleaguered by the sullen hosts of winter, it withdraws into the impregnable fortress of its subterranean vitality and emerges upon solicitation of Spring. Sown by the winds, by wandering birds, propagated by the subtle horticulture of the elements, which are its ministers and servants, it softens the rude outline of the world. Its tenacious fibers hold the earth in its place, and prevent its soluble components from washing into the sea. It invades the solitude of deserts, climbs the inaccessible slopes and forbidding pinnacles of mountains, modifies climates and determines the history, character and destiny of nations. Unobtrusive and patient, it has immortal vigor and aggression. Banished from the thoroughfare and field, it bides its time to return, and when vigilance is relaxed, or the dynasty has perished, it silently resumes the throne from which it has been expelled but which it never abdicates. It fears no blazonry of bloom to charm the senses with fragrance or splendor, but its homely hue is more enchanting than the lily or the rose. It yields no fruit in earth or air, and yet should its harvest fail for a single year famine would depopulate the world.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Milan A. Rewerts, interim director of Cooperative Extension, Colorado State University, Fort Collins, Colorado. Cooperative Extension programs are available to all without discrimination. To simplify technical terminology, trade names of products and equipment occasionally will be used. No endorsement of products named is intended nor is criticism implied of products not mentioned.

Handbook of Colorado

NATIVE GRASSES

Bulletin 450-A

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FOREWORD

Domestic livestock and big game animals depend primarily on grass for food. Rodents consume a large amount of grass in their diet. Microscopic organisms living in the soil feed on grass roots. These organisms, together with the grass roots, decay, adding organic matter to the soil. Most grasses are, therefore, more effective than any other kind of vegetation in conditioning the soil for continued high production. Common cereal plants, like corn and wheat, are members of the grass family that have been bred for certain factors such as seed production or forage. When all these uses and the wide distribution of grass are considered, the truth of John J. Ingalls' grass tribute is evident: "Should its harvest fail for a single season, famine would depopulate the earth."

In the United States nearly a billion acres, or a little over half the total acreage of the country, produce grass that is used for grazing by livestock. In the West, the percentage is even higher.

Grass is a living organism and, like animals, must have food, air, water, and light to live and develop. Grass has certain requirements for growth, one of which is a plant body large enough to produce leaves, stems, roots, and seeds. It takes a thrifty plant and an abundant supply of plant materials to make a good forage crop. The grass plant has roots that take in water and minerals, and green tops that take in air and light. From the water, minerals, and carbon dioxide in the air the green leaves manufacture plant food and plant tissues from which new growth in the form of stems, leaves, roots, and seeds is produced. Without sunlight, plants cannot manufacture food in the leaves. Without leaves, the roots are helpless because they cannot manufacture plant food. The roots can send up green leaves only as long as they have stored plant food material, but the roots cannot make plant food for new growth.

Most important, the grass plant must have a chance to grow and develop at the time the soil, moisture, temperature and light are in the right combinations for growth.

The rancher thinks of himself principally as a producer of livestock. The average rancher has well-bred herds and some fine animals in which he takes a great deal of pride. He is also interested in, and concerned with, his rangeland and the plants that grow on it. The rancher does not need to be told that his livestock depend on these plants for livelihood. He recognizes the truth of the statement: "Take care of the range and it will take care of the stock." To produce good livestock, the rancher knows he must have good feed for them. This he can supply most easily and cheaply from good range.

Present operating conditions make ranching a highly competitive industry. Each acre of land and each forage plant must produce a good yield if the rancher is to prosper. It is important that the rancher fully understand the needs and requirements of the plants in order that each plant may do its bit to add to the supply of meat in the butcher's shop.

By careful consideration of the needs of important range plants, a rancher can maintain and improve his range and at the same time harvest a good crop of livestock products. To do this, there are certain things about the management of these plants and the land on which they grow that the rancher must know and use. He must know and understand what plants need in order to develop and maintain themselves. He must know the kinds of plants that fit together to make a good range, the kinds that will hold the soil and water and produce a high yield of forage. He must know when each kind of plant grows, when it seeds, and how and when new seedlings develop. He must know at what season each plant is most valuable for forage. He must understand at what season each plant is eaten by animals, and has different requirements. Each plant must compete with other plants. The differences in the time of growth, type of root system, and amount and type of growth are among the things that help plant species to compete with each other.

The rancher can apply his knowledge of forage plant development and adjust grazing so the plants will produce a maximum forage crop. He must harvest his crop of forage at such a time, and use it at such a rate, that the plants will stay vigorous and productive and will reseed themselves. The rancher who studies these things and applies his knowledge is the rancher who will stay in business and continue to prosper.

This bulletin is published to aid the needs of the rancher for grass knowledge, particularly as to grass plant identification.

ELEMENTS OF RANGE MANAGEMENT

Range Improvement

The present condition of each range is the result of past use and management. The future condition of the range is up to the operator. For each range which is in unsatisfactory condition, improvement in range condition will provide increased quantity and quality of forage, reflecting improvement in the soil, the plants, the livestock production and the net income.

How to Improve a Range

1. Adjust degree of grazing use to the annual forage production.
2. Use the grass moderately.
3. Distribute grazing uniformly.
4. Give grass rest during the growing period as needed to improve vigor and produce seed.
5. Use hay, concentrated feeds, and irrigated pasture to supplement native grass.
6. Reduce competition from undesirable plants.
7. Reseed depleted ranges and marginal or abandoned cropland.

Adjust Grazing to the Annual Forage Production

Allow the grass to make a good growth before grazing use is started. If this is impractical, rotation or deferred grazing in adjoining pastures should help. Adjust the rate of stocking in accordance with current forage production.

Use Grass Moderately

Plant food is manufactured in the leaves. At least half of the leaf growth produced each year must be left to produce vigorous grass growth. Leave about fifty percent of the yearly growth of forage each year. Vigorous grass will sometimes produce more forage in a dry year than non-vigorous grass produces in a normal or a wet year. In years of average moisture there will be a stubble of about 2 inches on short grass, 4 to 7 inches on mid grass and 7 to 10 inches on tall grass when 50 percent of current forage has been removed.

Distribute Grazing Uniformly

Adequate stock water and division fences should be installed to provide as uniform grazing distribution as the topography will permit. Salt between watering places and

in areas that are under-utilized, moving the salt stations frequently. A combination of salting, water developments, riding, and drift fences will sometimes be necessary in mountain areas to obtain uniform use of the grass.

Give Grassland Occasional Rest

Divide the range into three or more pastures according to available water and range site. Plan to rest alternate pastures as often as practical during the entire growing season or at least until after seed maturity. Keep all livestock out of pasture while it is being rested. The range will not benefit as a whole if the individual pastures are over-used.

Use Hay, Concentrated Feeds and Irrigated Pasture to Supplement Native Grass

Feed reserves should be maintained for periods of snow or drouth as an emergency measure. Ranches having irrigated pasture or meadow can frequently use such areas to supplement native grass ranges.

Reduce Competition from Undesirable Plants

Vast areas of Colorado are covered with brush or weeds that have but little forage value. In many cases the stands of such plants can be reduced by mechanical or chemical means. This encourages the growth of desirable plants by making more light, moisture and plant food available for their use.

Reseed Depleted Ranges and Marginal or Abandoned Cropland

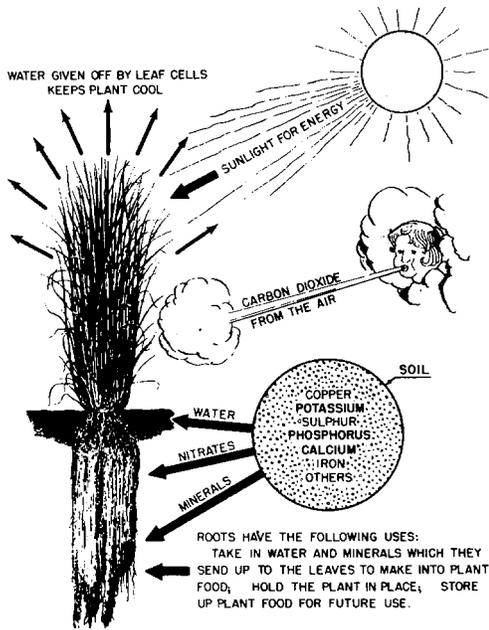
Drouth years or past over-use has left many ranges badly depleted of desirable forage species. Where topography and soils permit, reseeding these areas may be economically feasible. In addition, cultivated land that produces small crop yields may produce better returns when seeded to grass for livestock.

THE GRASS PLANT

To obtain maximum forage production we must first understand how grass grows and how it reacts to varying degrees of use. The drawings on the following pages serve to illustrate these essentials.

Grasses are identified by certain specific characteristics of the plants themselves. The grass species known to exist in Colorado number into the hundreds.

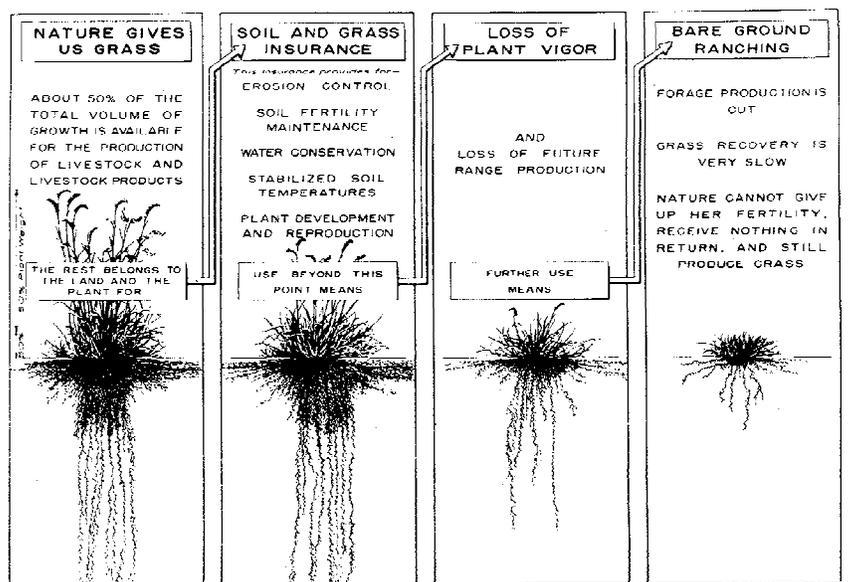
To become fully familiar with all the species of grass would require use of detailed identification keys. Illustrations of the principal plant parts referred to in such keys are included on the following pages. This publication is helpful to identify the most important grasses of Colorado.



HOW GRASS GROWS

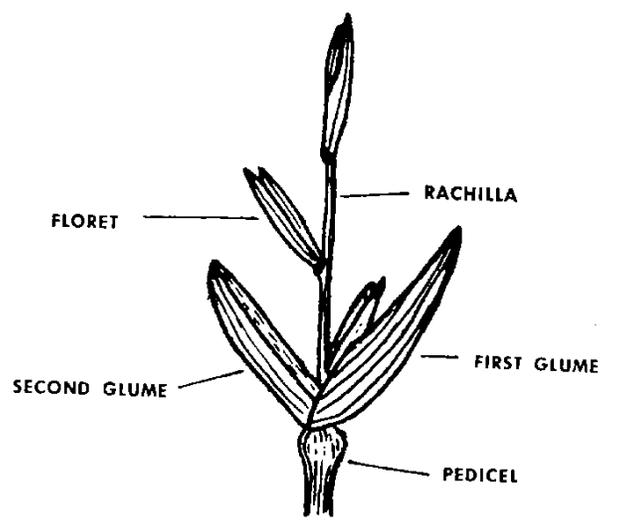
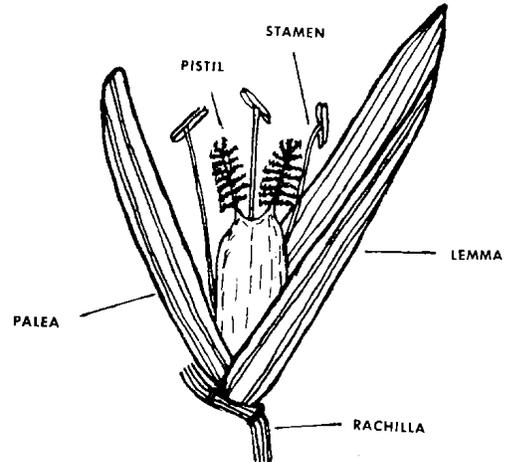
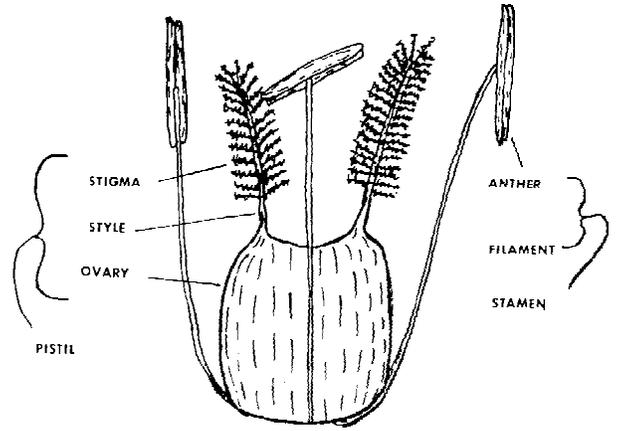
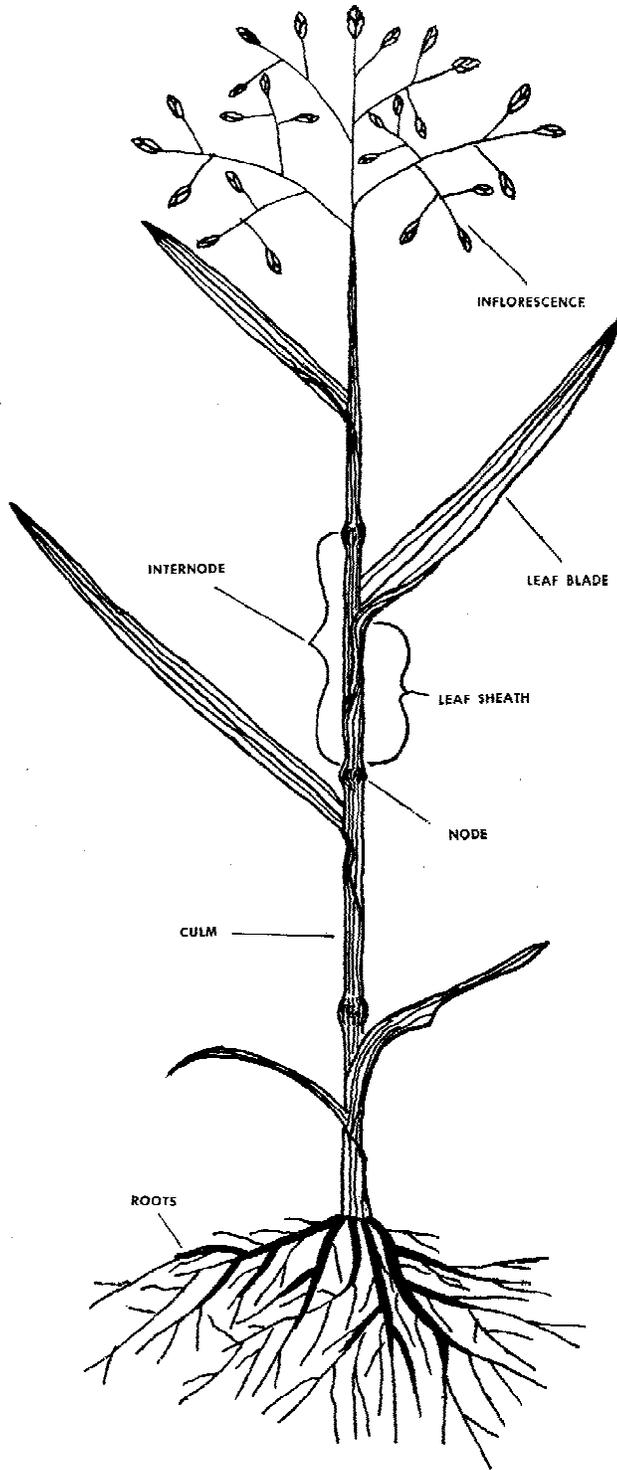
Grass leaves use sunlight for energy to manufacture plant food. Grass leaves manufacture the plant food which the plants use for growth, seed production and to store in the roots for next season if the plants are perennials.

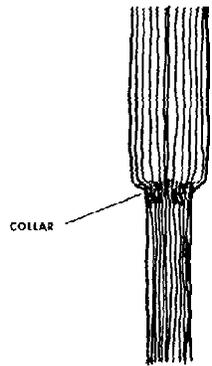
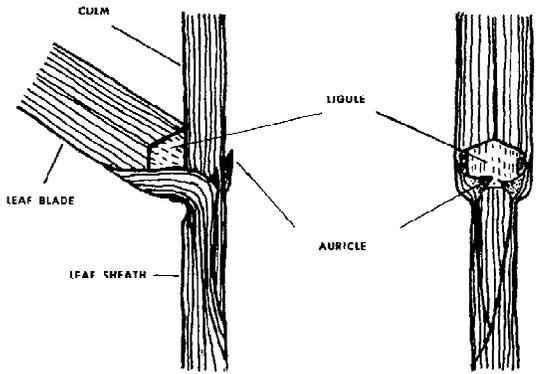
Wise use of grass plant protects future growth.



Grass Parts

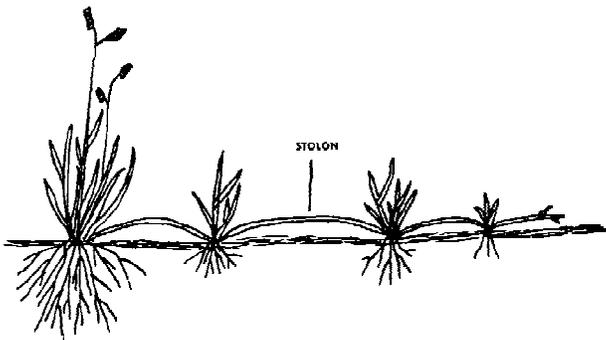
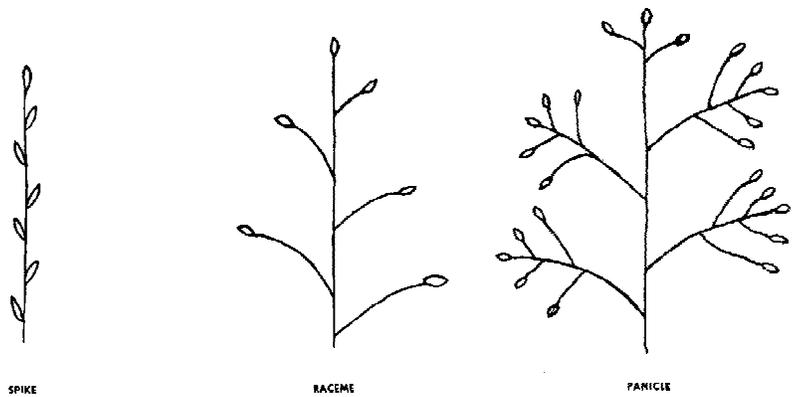
Grasses are identified by certain specific characteristics of the plants. Study these parts of the grass for help in identification of the grasses of Colorado.





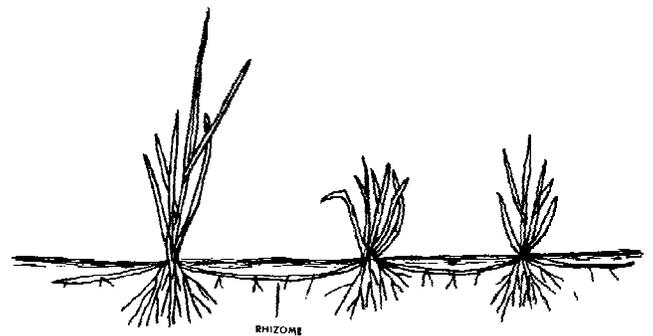
Grass Parts

Basic inflorescences.



Stolon--Modified, trailing above-ground stem that roots at the nodes.

Rhizome -- Modified underground stem that roots at the nodes.



IMPORTANT NATIVE GRASSES OF COLORADO

The ranges of Colorado are not all alike. They vary according to temperature, altitude, soil and precipitation. Each different situation, in regard to those elements, produces a different association of range plants. Ranges may be divided according to the kind of plants that should grow on them. Such a division, according to the association of plants, is called a "range site."

The grasses illustrated on the following pages represent only a portion of those found on the many varied Colorado range sites. They were chosen on the basis of their relative abundance and to portray the grass types to be found in the state as you progress from the eastern border across the plains, through the foothills, over the mountains, and down the western slope to the rolling uplands and salt desert ranges near the Utah line.

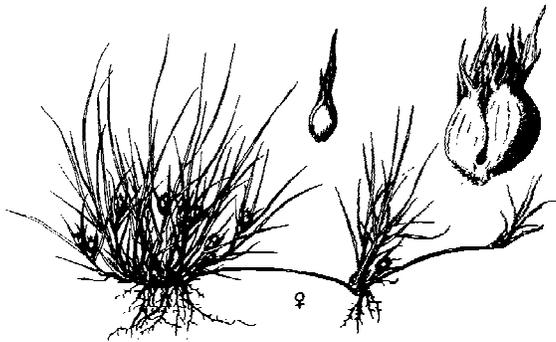
Source of prints:

Range Plant Handbook, prepared by U.S.D.A. Forest Service

Manual of Grasses of the United States, by A. S. Hitchcock, Washington, Government Printing Office, 1951.

Charts of Grass Parts by A. C. Everson, Colorado State University.

Charts by the Soil Conservation Service.



1. Buffalo grass (*Buchloe dactyloides*)

Warm season, short grass, associated with blue grama and western wheatgrass on the heavy textured "hardlands" of the plains.

Produces a fair amount of forage for summer and winter grazing. Forage is high in nutrients even after maturity (cures well).

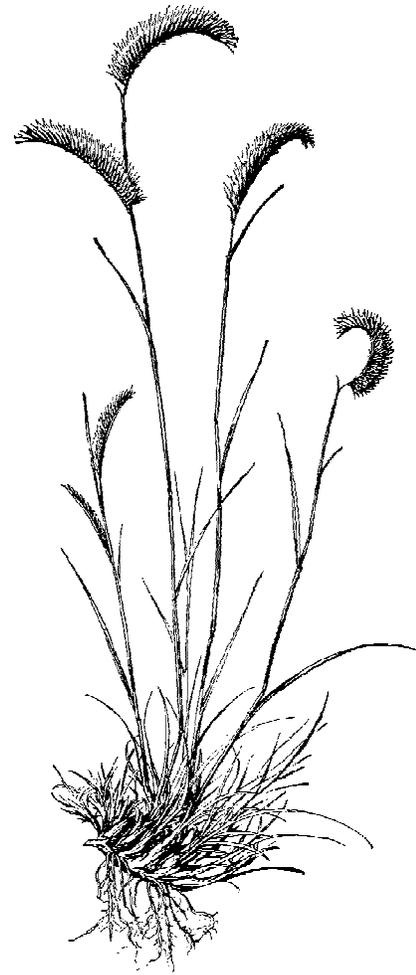
Reproduces by stolons and forms dense mats or small patches. Female flowers are enclosed in the leaves and form burr-like fruit. Male flowers are one or two one-sided spikes on 2- to 3-inch culms. Some plants have only female flowers, some have only male flowers, and others have both male and female flowers. The leaf blades are gray green, short, tend to curl, and have a few short, straight hairs on the margins. Leaves are in clusters at the nodes of the stolons.

2. Blue grama (*Bouteloua gracilis*)

Warm season, short grass. Most extensive distribution of all grasses on sandy to heavy textured soils of the plains, mesas and sandhills. Found most often with buffalo grass, western wheatgrass and needle grasses. Also in the mountains, but not so important as forage there. Not reported from northwestern Colorado.

Produces a good amount of nutritious forage for summer and winter grazing.

A bunchgrass that forms a sod under heavy grazing. Occasional plants have rhizomes. Seed stalks (culms) 6 to 30 inches tall, in groups, with 1 to 3, usually 2, one-sided, comb-like spikes on each culm. Spikes up to two inches long. The central axis (rachis) of the spike does not extend beyond the last spikelet. Leaves mostly basal; 1 to 4 inches long; may tend to curl; a few soft, white hairs at the junction of the leaf blade and leaf sheath.



3. Switchgrass (*Panicum virgatum*)

Warm season, tall grass. Scattered throughout the plains on soils that are medium textured to sandy. Most often on open ground, along drainages and bottomlands, or meadows in the eastern half of the state. Associated with bluestems, sideoats grama, prairie cordgrass, indian grass and sand reed grass.

Produces large amounts of forage that is grazed mostly in late spring and early summer. The leaves and especially the culms become rank and tough as the plant matures.

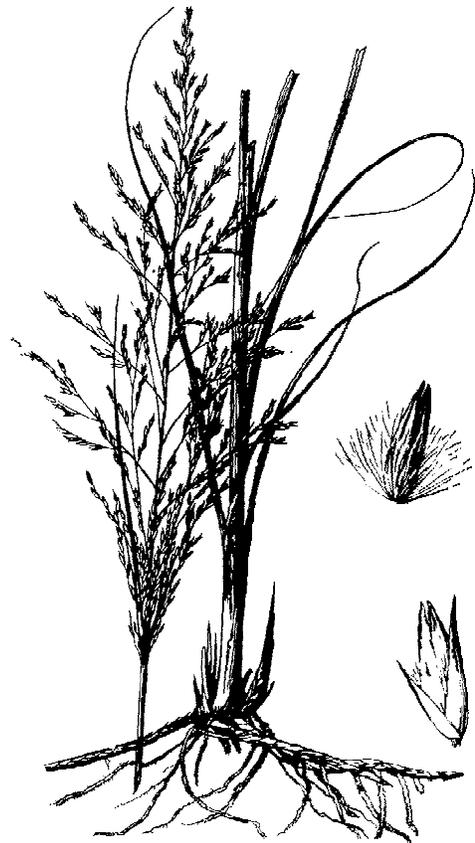
A bunch-like grass that tends to form a sod, especially when grazed heavily. Has numerous scaly, strong rhizomes. Culms are 2 1/2 to 5 feet tall. Leaf blades blue-green, up to 24 inches long; sometimes with soft, straight hairs on the upper side at the base next to the culm. The inflorescence is an open, wide-spreading panicle 6 to 18 inches long; 1/3 to 1/2 as wide as long.

4. Sandreed grass (*Calamovilfa longifolia*)

A warm season, tall grass. Principally on sandy soils from the foothills to the eastern border.

Grazed rather lightly during the growing season. It produces a considerable amount of forage that is important for winter feed.

A sod forming, drouth resistant grass. Has extensive stout, scaly, shiny rhizomes. Culms are 1 1/2 to 5 feet tall, smooth, erect and shiny. Leaf blades 6 to 18 inches long, inrolled, stiff, taper to a long fine point. Inflorescence is a narrow panicle 6 to 15 inches long, straw-colored, shiny when mature. Spikelets one-flowered; numerous white hairs at the base of the floret.



5. Indian grass (*Sorghastrum nutans*)

A warm season, tall grass. On moist, sandy and medium textured soils of plains, dry slopes and bottom lands of eastern Colorado, except in the extreme south.

Produces fair amounts of forage that is grazed during the summer and winter.

A sod forming grass with short scaly rhizomes. Culms are 2 to 5 feet tall. Leaf blades rough to the touch. Inflorescence is a narrow, yellow, dense panicle 6 to 12 inches long, darker when mature. Lemmas have a bent, twisted awn 1 to 1.5 centimeters long.

6. Vine mesquite (*Panicum obtusum*)

A warm season, mid grass. Found on sandy or gravelly soil, in moist sites along streams, drainage ways and wet meadows in the southeastern part of the state.

Fair forage while it is green. Dense sod-forming grass. Has extensive stolons up to 10 feet long, leafy, often rooting at the swollen, woolly joints. May have short rhizomes. Culms 8 to 32 inches tall, wiry, flattened, decumbent at the base. Leaf blades up to 10 inches long, firm, inrolled, long narrow-pointed at the tip. Inflorescence is a narrow panicle up to 5 inches long, densely flowered, lower end partly enclosed by upper leaf sheath. Mature inflorescence is a close group of knot-like seeds. Inflorescence is green at first and turns brown at maturity.



7. Galleta (*Hilaria jamesii*)

A cool season, mid grass. Scattered stands on the mesas, plains and foothills except in the central and north central parts of the state. Grows on heavy and medium to shale soils.

Most palatable and nutritious during the spring and early summer. The forage is dry, harsh, and tough after it is mature.

It usually appears to be a bunchgrass, but has tough, woody rhizomes up to 6 feet long. Culms are 6 to 20 inches tall, somewhat hairy at the nodes. Leaves mostly basal, up to 6 inches long, stiff, sharp pointed, blue-green. Inflorescence is a spike, often purple color. There are three spikelets at each joint of the rachis; the group of three spikelets falls entirely when mature and leaves a zig-zag rachis at the end of the culm. The spikelets are hairy at the base.

8. Indian ricegrass (*Oryzopsis hymenoides*)

Cool season, mid to tall grass. Widely distributed throughout the state, characteristically on dry sandy soils.

The forage cures very well and is nutritious. The seeds are high in food value. The early spring forage is good, but ricegrass is most important as a winter feed. It is not nearly so abundant as formerly because of over-grazing. It is one of the most drouth-enduring native range grasses.

A densely tufted bunchgrass. Culms are 1 to 2 feet tall, erect and stiff. Leaves are numerous, slender, 6 to 15 inches long, flat or inrolled, stiff and smooth or somewhat harsh to the touch. Inflorescence is a loose, open panicle, 6 to 10 inches long; branches are in pairs, widely spreading; end branches hair-like. Spikelets one-flowered; lemma firm, black at maturity, densely hairy.



9. Prairie cordgrass (*Spartina pectinata*)

Warm season, tall grass. Found in the eastern half of the state in sloughs, drainage ways and wet meadows.

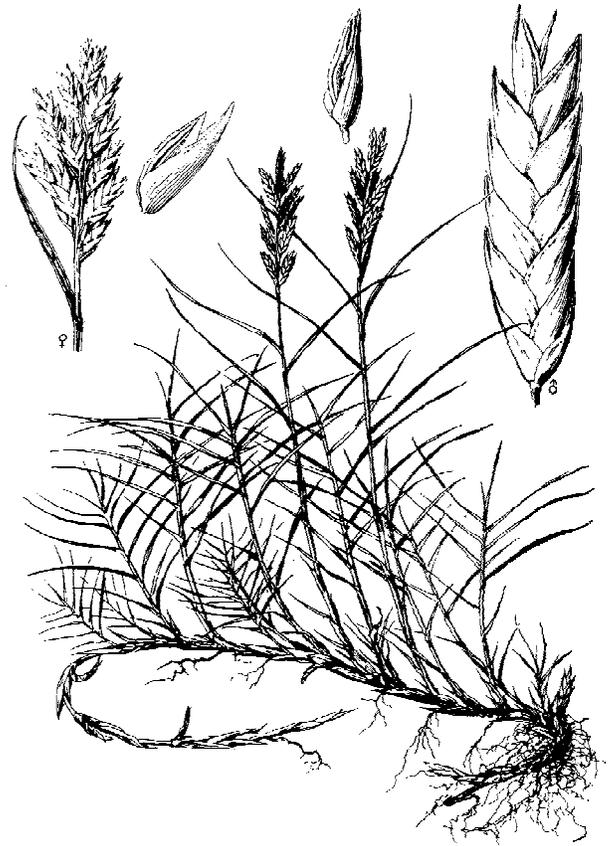
Fair forage when young and growing, but becomes harsh, tough and unpalatable as it matures.

A sod-forming grass with stout creeping rhizomes. Culms 3 1/2 to 7 feet tall, coarse. Leaf blades are 8 to 24 inches long, flat when green, inrolled when dry, margins rough. Inflorescence is a series of 5 to 30 one-sided, comb-like spikes.

10. Inland saltgrass (*Distichlis stricta*)

Grows in the spring and summer; a short grass. Widely distributed in the state except in the high mountains; alkaline soil of marshes, wet meadows arid drainage ways.

May be grazed in the spring and early summer, but it is rather harsh and not very palatable. A sod-forming grass with short or long scaly rhizomes. Culms 4 to 16 inches tall, those with male flowers taller than those with female flowers. Leaf blades 2 to 6 inches long, numerous above and reduced to two-ranked leaf sheaths below. Male flowers and female flowers are in separate inflorescence. A plant has either male or female flowers, but not both. The inflorescences are contracted panicles; pale green female inflorescence is on a shorter culm and does not extend above the leaves; the male inflorescence usually extends above the leaves.



11. Sand dropseed (*Sporobolus cryptandrus*)

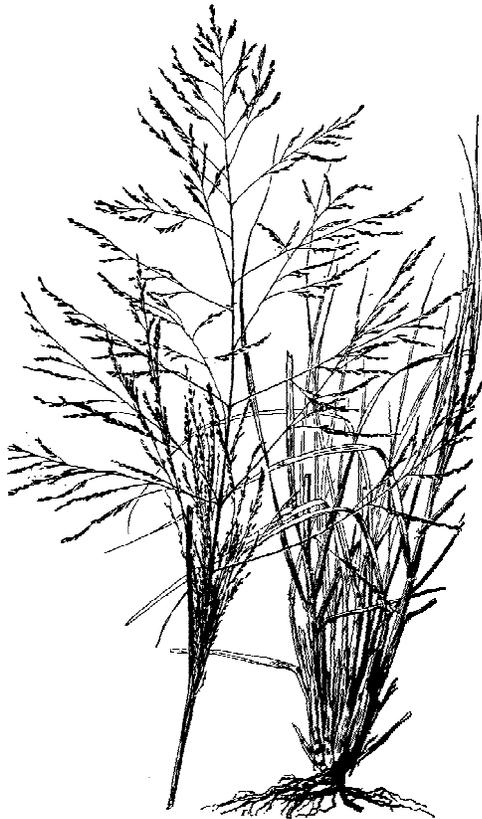
A cool season, mid grass. Widely distributed over the state on sandy open ground of the plains and foothills, especially on overgrazed ranges and abandoned fields.

Grazing use varies from range to range and depends upon associated plants and perhaps soil and climatic conditions. The season of use may be spring, summer, and/or winter.

A bunchgrass. The culms are 1 1/2 to 3 1/2 feet tall, erect to sometimes prostrate. Leaf blades up to 12 inches long; a dense tuft of white hairs at the junction of the leaf blade and leaf sheath. The leaves extend at right angles to the culm when mature and dry and give a flag-like appearance. The inflorescence is a contracted panicle, 3 to 10 inches long, lead-colored or purplish; the base is usually enclosed in the leaf sheath.

12. Ring muhly (*Muhlenbergia torrey*)

Grows during the spring and summer. A short grass. Plains, mesas, dry hills in the eastern half of the state and scattered elsewhere. Usually on medium textured soil, but often in rocky or sandy soil. Poor forage on the bases of quantity and quality. A weak sod-forming grass with slender, short rhizomes. The middle of the patch dies, leaving a characteristic ring from 2 to 4 inches wide and with a diameter of 6 to 24 inches. Culms are slender, spreading to erect, up to 20 inches tall. Leaves mostly basal, up to 4 inches long, strongly curved, matted, with a fine point. The inflorescence is an open panicle about one-half the length of the culm, with slender branches purplish. Lemma has a slender awn about one-eighth inch long.



13. Alkali sacaton (*Sporobolus airoides*)

Grows during the spring and summer. A mid grass. Widely scattered over the state except in the northeastern and northwestern corners. Meadows and plains, especially in dry alkaline soil.

Produces an abundance of forage but it is not readily eaten. It becomes coarse, tough and unpalatable as it matures.

A bunchgrass that has deep, coarse roots which sometimes give the appearance of short, thick rhizomes. Culms are 1 to 3 feet tall, stout, erect. Leaves wide at the base and taper to a long point. Sometimes there are a few hairs at the junction of the leaf blade and leaf sheath, but not dense. The inflorescence is a spreading panicle 4 to 16 inches long, pyramidal in shape, often one-half the length of the culm.

14. Little bluestem (*Andropogon scoparius*)

A warm season mid grass. Eastern half of the state, as far west as Larimer and Archuleta counties; plains, dry hills, and open woods; on medium to sandy and gravelly soil.

Grazed most when young and growing. After the seedheads are produced livestock do not readily eat the forage. On ranges that are grazed heavily or continuously in the spring and early summer each year little bluestem is replaced by blue grama and other shortgrasses.

A bunchgrass with occasional short rhizomes. Culms are usually about 2 feet tall up to 4, numerous, in groups (tufts): pithy like cornstalks. Leaves are rather rough, narrow, up to 10 inches long. The culms and the leaves become a purple-red color when mature. The inflorescence is several racemes on each culm. There is only one raceme at each point of origin. Spikelets are in pairs -- one sessile and produces a seed, the other on a pedicel and does not produce a seed. The lemma of the seed-producing spikelet has a bent, twisted awn about 1/2 inch long. The lemma of the non-seed producing spikelet has a shorter awn. The pedicels are covered with short, white hairs.



15. Big bluestem (*Andropogon gerardi*)

A warm season, tall grass. Eastern half of the state, mostly along the foothills. Might be found anywhere in the state. Plains, meadows and sand hills. Produces a lot of forage that is grazed most in the spring and early summer. Some use is sometimes made of it during the winter. Heavy grazing reduces the stand of big bluestem.

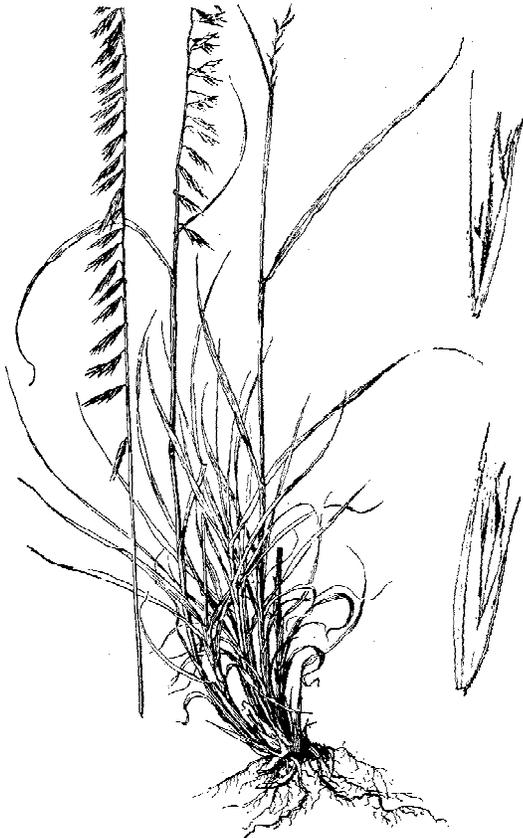
A robust bunchgrass with occasional short, thick rhizomes. Culms 2 1/2 to 6 feet tall, solid or pithy. Leaf blades 4 to 18 inches long, margins rough, with fine hairs near the base. The leaves and the culms become a purple-red color when mature. The inflorescence is made up of 2 to 6 spike-like racemes arising from a common joint. Spikelets in pairs, one sessile and produces a seed, the other on a pedicel and does not produce a seed. The lemma of the sessile seed-producing spikelet has a bent, twisted awn about 1/2 to 1 inch long. The pedicellate spikelet is awnless. The pedicels are covered with numerous white or gray hairs.

16. Green needlegrass (*Stipa viridula*)

Cool season, mid grass. Scattered over most of Colorado. Plains, dry slopes, foothills and mountain meadows.

Produces a fair amount of forage for early spring and summer grazing. The plants cannot withstand heavy spring use year after year. The plants decrease under those conditions.

A rather coarse bunchgrass. Culms are 1 1/2 to 3 feet tall. The leaves are mostly basal, about one-third to one-half as long as the culms. The culms, leaves and the inflorescence are a uniform bright green color. The inflorescence is a narrow, loose, spike-like panicle 4 to 8 inches long. The glumes are large and papery. The lemma has an awn that is 3/4 to 1 1/4 inches long, bent twice.



17. Side-oats grama (*Bouteloua curtipendula*)

Warm season, mid to tall grass. Widely distributed over the eastern half of the state and in the south extending west to La Plata County. Plains, hillsides, mesas and valleys.

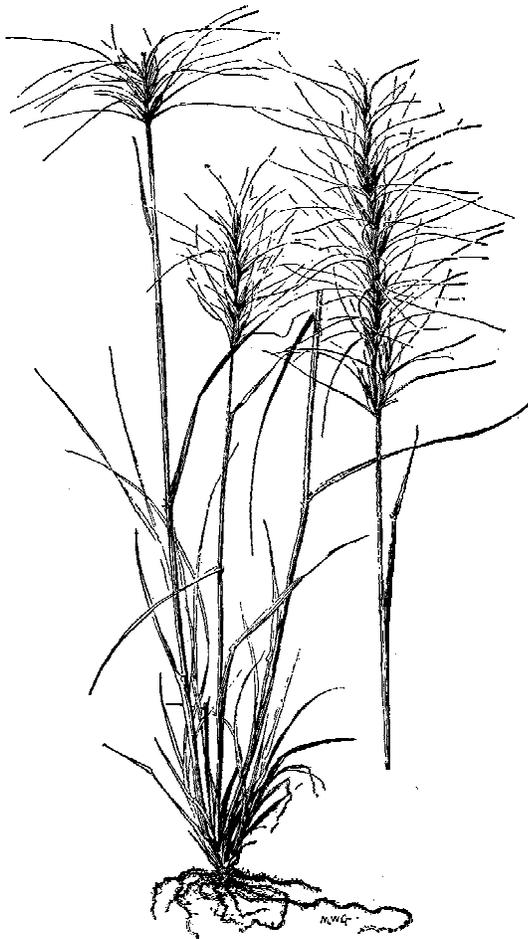
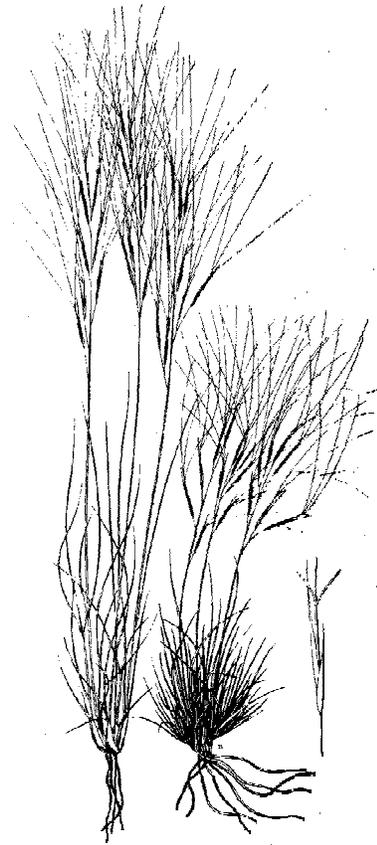
Produces a considerable amount of forage per plant and is an important source of forage wherever it is abundant. It is readily eaten when green and is a good summer and winter forage.

An erect bunchgrass. Strong, short rhizomes may be present, but the plant growth is usually like a bunchgrass. Culms are 1 to 3 1/2 feet tall, dark purplish at the nodes. Leaf blades up to 12 inches long, flat, the margins with scattered long hairs from pimple-like bases. The inflorescence is a 4- to 12-inch raceme of 10 to 50 one-side spikes. The spikes droop, turn to one side of the zig-zag central stem. The individual spikes fall entirely when mature, and leave a purplish short stalk.

18. Red three-awn (*Aristida longiseta*)

Grows in the spring and early summer. A mid grass. Widely distributed over the state, except in the northwest corner. Plains, foothills, mesas, rocky slopes. One of the first grasses to come in on abandoned fields. Forage value is low. It may be grazed to some extent while it is green and before the seedheads are produced.

A cushion-like bunchgrass. Culms 6 to 12 inches tall. Leaves basal, fine, forming a dense cushion-like mat, usually less than 6 inches long, sharp pointed. The inflorescence is a rather narrow panicle, 2 to 6 inches long; spikelets less than 1/2 inch long, pale or purplish; lemmas have a trifid (three-parted) awn; awns are 1 to 5 inches long, divergent. The inflorescence has a purple-red color when mature. The awns may cause mechanical injury to livestock.



19. Bottlebrush squirreltail (*Sitanion hystrix*)

Cool season, short to mid grass. Throughout the state. Dry hills, plains, open woods, meadows, and rocky slopes.

May be fair forage in the spring and early summer before the seedheads develop. Poor forage later.

A bunchgrass. Culms are 4 to 20 inches tall, in groups or tufts. Leaves are narrow, rather stiff, have prominent veins, somewhat rough on upper surface. Inflorescence is a spike 1 to 5 inches long, bristly with spreading awns 2 to 3 1/2 inches long. Usually two spikelets at each joint of the rachis. The seedhead breaks apart when mature.

20. Junegrass (*Koeleria cristata*)

Cool season, mid grass. Widely distributed throughout the state. Plains, open woods, rocky hillsides, often in sandy soil. Usually occurs as scattered plants and not in pure stands. Fairly good to good forage. Does not produce much total forage since the leaves are mostly basal and short. Grazed primarily in the spring.

A bunchgrass. Culms are 1 to 2 1/2 feet tall, tufted, have a few very fine hairs just below the inflorescence. Leaves mostly basal, numerous, 1 1/2 to 5 inches long. The inflorescence appears to be a spike but it is a narrow, contracted panicle; may tend to open when flowering; 1 to 5 inches long, tends to taper at both ends, often interrupted near the base; pale green to purplish. Lemmas acute or short-awned.



21. Needle-and-thread grass (*Stipa comata*)

Cool season mid grass, Widely distributed over the state. Plains, mesas, dry hills and often in sandy soil.

Especially important for early spring feed. The forage is good and is readily eaten until the seedheads are produced. May green up and be grazed in the fall when moisture conditions are favorable. Continued heavy use in the spring causes this grass to die.

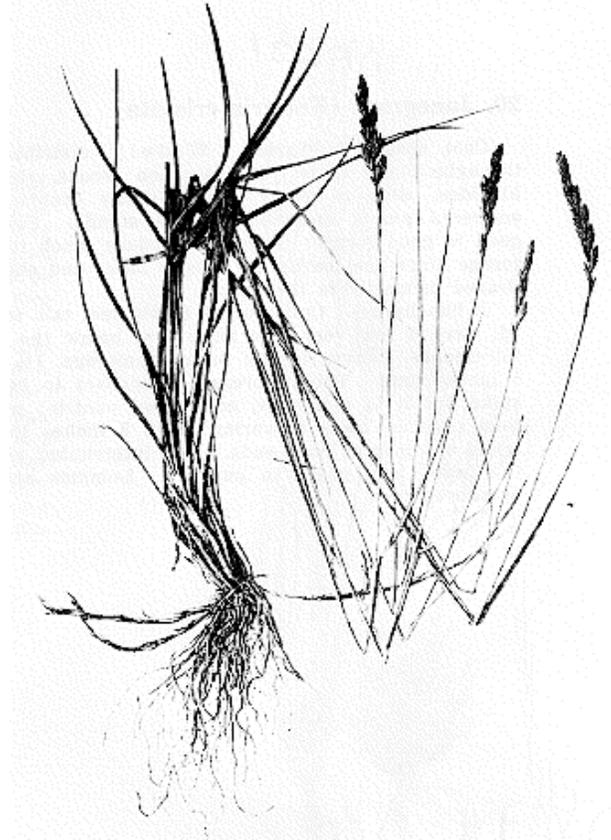
A bunchgrass. Culms 1 to 3 feet tall, erect, rather stout. The basal leaves are narrow, inrolled, and 3 to 12 inches long; the culm leaves are shorter and broader. The inflorescence is an open, loosely spreading panicle, 5 to 10 inches long. The uppermost leaf sheath loosely encloses the base of the inflorescence. The glumes are 3/4 to 1 inch long, papery, persistent after the seed falls. Lemma has a wavy and indistinctly bent awn, usually 4 to 5 inches long. The seed is hard, cylindrical, with a long, sharp-pointed, bearded base.

22. Western wheatgrass (*Agropyron smithii*)

A cool season mid grass. Widely distributed in the state. From dense stands in moist drainage ways and bottomlands of the plains to less dense, scattered plants on hills and drier sites. Soil usually tends to be alkaline.

A very good forage plant. It grows fairly early and is grazed year around. Nutrient content is high, even after maturity, so the winter forage is good. The seedheads are especially palatable.

A sod-forming grass with long, gray, scaly rhizomes. Often forms a dense, compact sod. Culms are 1 to 2 1/2 feet tall, erect and numerous. Leaves are 4 to 10 inches long, stiff, ridged on the upper surface, blue-green color, taper to a sharp point. The inflorescence is a spike, 2 to 6 inches long, pale bluish color. Spikelets usually solitary (occasionally 2) at each joint of the rachis, overlapping or imbricate. Glumes rigid, awl-shaped, taper into a short awn.



23. Foxtail barley (*Hordeum jubatum*)

A cool season short to mid grass. Widely distributed over the state. Open ground, meadows, plains, along streams and ditches, along roadsides and in fields. May supply a limited amount of fair forage before the seedheads are produced. After the seedheads are mature, they are mechanically injurious to all grazing animals. An undesirable grass that comes in on abandoned fields and increases on overgrazed ranges.

A bunchgrass. Culms 8 to 24 inches tall, erect or decumbent at the base. Leaves 1 to 6 inches long, rather harsh. The inflorescence is a spike 2 to 4 inches long, nodding, green or purple. Three spikelets at each joint of the rachis. Lemmas and glumes have rough awns up to 2 1/2 inches long. The two outside spikelets do not produce seeds (sterile) and consist of 1 to 3 spreading awns. The inflorescence breaks up when mature.

24. Sleepy grass (*Stipa robusta*)

Grows during spring and summer. A tall grass. North central, central and south central Colorado on dry plains, hills and in open woods.

Each plant produces an abundance of forage, but it is low in palatability. It is not readily grazed but may be eaten if other forage is not available. Reported to cause a narcotic effect on grazing animals. Horses are chiefly affected, but it may also cause sleepiness in cattle and sheep.

A coarse bunchgrass. Culms are robust, 2 1/2 to 6 feet tall. Leaves wide, up to 2 feet long, bright green. The inflorescence is a narrow panicle, densely flowered, 6 to 15 inches long. Lemmas are covered with soft, short, white hairs; have a twice-bent, harsh awn about 3/4 to 1 1/2 inches long. The seed has a blunt-pointed, densely bearded base. Glumes large, papery.



25. Wolftail (*Lycurus phleoides*)

Grows in the spring and summer. A short grass. Plains and rocky hillsides. Not very abundant. Usually occurs as scattered plants. Along the eastern foothills from Larimer to Pueblo County and in the southeastern part of the state.

Usually considered a good forage grass. It is grazed most in the spring and lightly in the summer and winter. Produces a limited amount of forage. A bunchgrass. Culms 8 to 24 inches tall, many per plant, somewhat spreading at the base and bent at the joints.

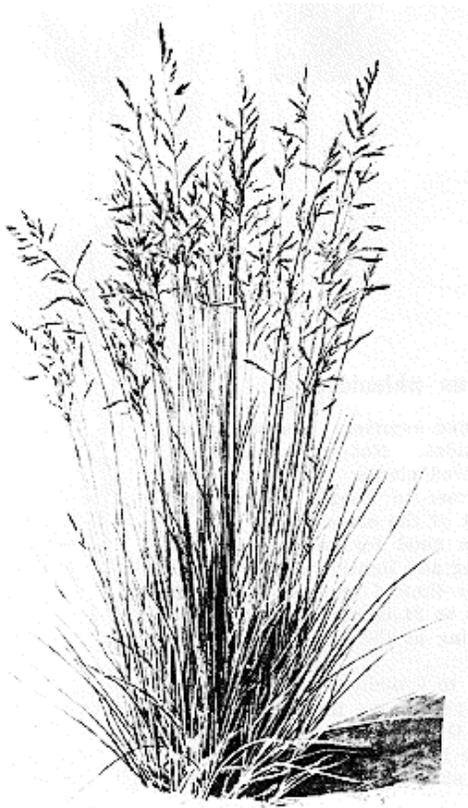
Leaves gray-green, 2 to 6 inches long, resembles Timothy. Spikelets in pairs; one produces a seed, the second is sterile. One glume has two bristle awns, the second glume has one awn. The lemma is soft-hairy and has a short awn.

26. Mountain muhly (*Muhlenbergia montana*)

Grows during the spring and summer months. A mid grass. Canyons, mesas, rocky hillsides, open parks in the ponderosa pine and spruce-fir forests. In the mountainous two-thirds of the state except in the northwestern part.

Fairly palatable and good forage while the foliage is young. Becomes less palatable as it matures. An important forage in the ponderosa pine forests.

A dense bunchgrass. Culms are 1 to 2 feet tall, numerous, erect. Leaves 2 to 6 inches long, mostly basal, narrow, inrolled, sharp-pointed. Prominent membranous ligule. Leaf sheath becomes papery and loose from the culm. Inflorescence is a narrow, loose panicle 2 to 6 inches long. Lemmas have a slender, straight or bent awn from 1/4 to 3/4 inch long. Glumes are persistent after the seed has fallen; the second glume has three teeth at the apex.



27. Arizona fescue (*Festuca arizonica*)

Grows principally during the summer months. A mid grass. Open ponderosa pine types, on rocky slopes, mesas, and in open parks. In the mountains from 6,500 to 10,500 feet in the southern part of the state. Frequently occurs in pure stands.

A fair amount of forage is produced. Although apparently not as palatable as some other grasses, it is grazed equally by cattle and horses in late spring and early summer. Moderate to heavy grazing reduces the stand of Arizona fescue.

A dense bunchgrass. Culms are 1 to 3 feet tall; many culms per plant. Leaves mostly basal, pale blue-green, 6 to 12 inches long, slender, inrolled, appear almost round; become tough with maturity. The inflorescence is a panicle, 3 to 8 inches long. The lemmas may be awnless or have a short awn about 1/16 of an inch long.

28. Pine dropseed (*Blepharoneuron tricholepis*)

Grows principally during the summer months. Short to mid grass. Rocky slopes and open parks in the ponderosa pine, lodgepole pine and spruce-fir forests between 6,500 and 12,000 feet. In the western two-thirds of the state except the northwest corner.

Very palatable when young, culms and seedheads only slightly grazed. Ordinarily not much forage is produced per plant.

A slender, densely tufted bunchgrass. Culms are 8 to 24 inches tall, erect, sometimes purplish. Leaves mostly basal, narrow, 2 to 8 inches long, inrolled. Inflorescence is a narrow, but open and loosely flowered panicle, 2 to 6 inches long. The three nerves of the lemma are densely silky-hairy. The palea two-nerved, hairy between the nerves.



29. Kentucky bluegrass (*Poa pratensis*)

A cool season mid grass. Widely distributed throughout the state. Open woods, meadows, fields, and roadsides from 4,000 to 12,000 feet.

Forage is palatable to all classes of livestock, but low total productivity causes it to be rated as fair forage. It tends to increase under heavy grazing and form a dense sod.

A sod forming grass with many slender rhizomes. Much variation in general appearance. Culms are 1 to 3 feet tall. Leaves 2 to 10 inches long, dark green, numerous and longer at the base, flat or folded, boat shaped at the tip. Inflorescence is an open panicle 2 to 6 inches long. Panicle branches are in whorls of 3 to 5, horizontal, and the branches decrease in length from the bottom to the top which makes a pyramidal shaped inflorescence. Lemma is cobwebby, hairy at the base. (There is some question as to whether Kentucky bluegrass is native to the United States. It is believed to be introduced from England.)

30. Bearded wheatgrass (*Agropyron subsecundum*)

Grows in the spring at lower elevations and during the summer at higher elevations. A mid to tall grass. Scattered in the western two-thirds of the state, but not reported from the northwestern part. From 5,000 to 10,500 feet in meadows, on moist slopes, often on dry hills and in partial shade of aspen, shrubs and coniferous forests.

An important forage plant, highly palatable to all classes of livestock. Each plant produces an abundance of forage. It is fairly resistant to grazing. A bunchgrass. Culms are 1 to 3 1/2 feet tall, erect. Leaves are flat, 5 to 10 inches long, erect or nodding, sometimes one-sided, often purplish color. Spikelets solitary and placed flatwise at each joint of the rachis. Lemma tipped by a straight or somewhat spreading awn up to twice as long as the lemma. Glumes taper to an awn tip.



31. Bluebunch wheatgrass (*Agropyron spicatum*)

Grows during the spring and summer. Mid to tall grass. Central, north central and northwestern parts of the state from 5,000 to 8,000 feet. Plains, dry slopes, canyons, rocky hills and open woods.

A very good forage plant. It is leafy and produces a large amount of forage per plant. The leaves remain green throughout the grazing season and are nutritious and palatable. It decreases under too early and too heavy grazing.

A bunchgrass. Many culms per plant, erect, slender, sometimes wiry, often bluish in color, 15 to 30 inches tall. Leaves flat or inrolled, narrow, pointed, 2 to 8 inches long, bluish color. Inflorescence is a slender spike, 3 to 6 inches long. Spikelets distant, little if any overlap. Lemmas tipped by a rough, strongly spreading awn 1/2 to 1 inch long.

32. Thickspike wheatgrass (*Agropyron dasystachyum*)

Grows during the spring and summer. A mid grass. Plains, dry hills, exposed ridges and dry meadows. Often in sandy or gravelly soil. North central, central and south central parts of the state from 5,000 to 10,000 feet.

Forage is rated as fair for all classes of livestock for spring and summer grazing. Becomes rather wiry as it matures. Withstands fairly heavy grazing.

A sod-forming grass with extensive rhizomes. The culms are 15 to 40 inches tall, erect or somewhat decumbent at the base. Leaves 2 to 8 inches long, sometimes flat but mostly inrolling, harsh. Inflorescence is a terminal spike 2 to 6 inches long. Spikelets rather distant to overlapping. Glumes broad in the middle to sharp pointed, not awl shaped, usually have short hairs. Lemmas densely to sparsely hairy.



33. Mutton grass (*Poa fendleriana*)

Begins growth early in the spring. Short to mid grass. On mesas, open dry woods and rocky hills. Widely distributed in the mountainous areas of the state from 5,000 to 11,500 feet. Also in the southeastern part of the state.

Excellent forage for cattle and horses and good for sheep. Grazed especially from early spring to midsummer.

A bunchgrass. Culms are 1 to 2 feet tall, many per plant, some do not produce an inflorescence. Usually rough below the inflorescence. Leaves mostly basal, 2 to 12 inches long, pale bluish green, often tightly folded, rough beneath. Inflorescence is a narrow, densely flowered panicle, 1 to 4 inches long; branches in two's or three's. Spikelets flattened, often purplish. Male flowers and female flowers usually born on separate plants (dioecious).

34. Sandberg bluegrass (*Poa secunda*)

Grows during the spring and summer months. A short grass. Plains, foothills, ridge tops, open woods; dry, rocky or sandy and usually poor, shallow-soils. Throughout the foothill and mountainous areas of the state.

Very palatable and grazed especially in the spring and early summer. Produces a small amount of total forage. Drouth resistant. Decreases under heavy spring grazing.

A bunchgrass. Varies from small plants to bunches nearly a foot across. Culms slender, smooth, with usually only 1 or 2 leaves, 6 to 30 inches tall. Leaves mostly basal and somewhat curly at maturity, 2 to 5 inches long. Inflorescence is a narrow panicle up to 4 inches long, ascending branches, lower branches unequal in length and in groups of 2 or 3. Spikelets often purplish.



35. Slender wheatgrass (*Agropyron trachycaulum*)

Grows during the spring and summer months. Mid to tall grass. In dry mountain meadows, hillsides and open woods through the ponderosa pine, aspen, lodgepole pine and Englemann spruce types. Prefers a moderately moist, well drained, light sandy-loam soil.

Palatable and nutritious. Plants remain green until late in the fall. Low in total forage produced.

A bunchgrass. Culms 1 to 4 feet tall, nodes often dark colored. Leaves 2 to 10 inches long, basal longer than upper ones, rough to touch. Inflorescence is a terminal spike, from loose and slender to thick and dense, 2 to 8 inches long, from green to violet-purple in color. Lemmas and glumes blunt to awn pointed.

36. Blue wild-rye (*Elymus glaucus*)

Grows during the spring and summer. A mid to tall grass. Most abundant in woodlands and open parks, characteristic on old burns and cut-over forests. It prefers moderately moist soils and rarely ever occurs in pure stands. In the mountainous western two-thirds of the state from 6,300 to 11,000 feet.

Produces rather coarse forage and is grazed during the spring and early summer before the seedheads are formed.

A bunchgrass, commonly growing in small bunches of only a few culms. The culms are 1 1/2 to 3 1/2 feet tall. Leaves are 4 to 10 inches long, flat, usually rather rough. Inflorescence is a narrow, erect to nodding spike 2 to 8 inches long, often purplish. Usually 2 spikelets at a node. Glumes awn-pointed. Lemmas taper to a straight, harsh awn about 3/4 of an inch long.



37. Mountain brome (*Bromus marginatus*)

Grows principally during the summer months. Mid to tall grass. Open woods, aspen and shrub types, meadows and waste places. Scattered in the western two-thirds of the state from 5,000 to 10,000 feet.

One of the best forage grasses. Each plant produces a fair amount of forage. The seedheads are palatable and nutritious.

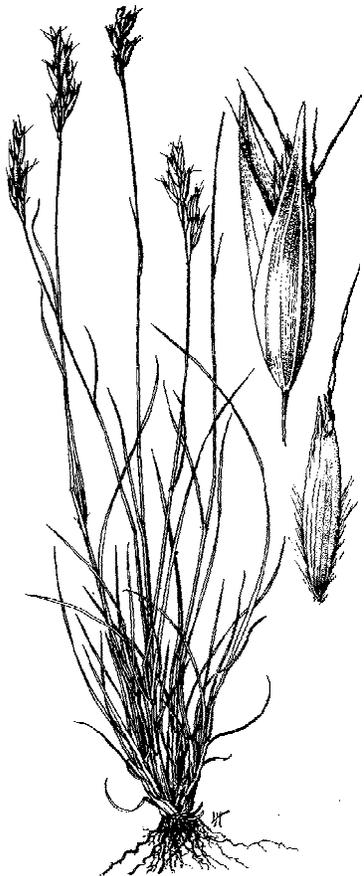
A short-lived bunchgrass. Culms are 1 to 4 feet tall, erect, stout and smooth. Leaves usually fine-hairy. Inflorescence is an open, rather narrow panicle, 4 to 12 inches long, branches erect or spreading. Lemmas soft-hairy on the back and with a terminal, straight awn about 1/4 inch long. Similar to *Bromus carinatus*, but this species infrequent in Colorado.

38. Idaho fescue (*Festuca idahoensis*)

Grows during the spring and summer. A mid grass. Hillsides, ridges, meadows, open ponderosa pine, lodgepole and aspen types. Found on many sites, but most common on fairly dry, well drained, moderately deep, sandy or gravelly loams. Often forms dense stands. In the mountains of the state from 6,000 to 11,500 feet.

A very desirable forage grass. Grazed by all classes of livestock, especially in the spring and early summer. It maintains a good nutrient content when mature and makes good fall forage.

A densely tufted bunchgrass. Numerous, erect culms 1 to 3 feet tall. Leaves mostly basal, usually more than one-half the length of the culm, blue-green, rather stiff, inrolled. Inflorescence is an open but rather narrow panicle, 4 to 6 inches long, branches ascending or spreading. Spikelets somewhat flattened. Lemma awned from the tip. Awns up to 3/16 inch long, usually about half as long as the lemma.



39. Timber oatgrass (*Danthonia intermedia*)

Grows during the spring and summer. Short to mid grass. Hillsides, meadows, open parks, open ponderosa pine, aspen and spruce types. Usually scattered plants but sometimes abundant. In the mountainous western two-fifths of the state, except the northwest corner, from 7,500 to 12,500 feet.

Rated from fair to very good forage. Grows early in the spring. There is variation as to the grazing use made of it from area to area.

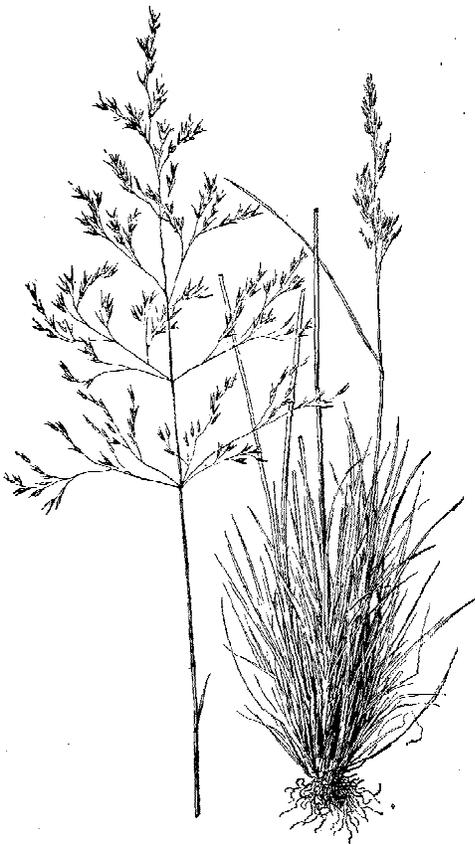
A bunchgrass. The plants tiller or stool from the base which may obscure the bunch habit and give the appearance of spreading by rhizomes. The plant does not have rhizomes. Culms are 4 to 20 inches tall, erect, densely tufted. Leaves 2 to 10 inches long, smooth or soft-hairy. Inflorescence is a narrow, spike-like panicle, often one-sided, 1 to 2 1/2 inches long. Spikelets purplish. Lemmas with soft, straight hairs on or near margins, not hairy on the back; two-toothed at the tip; teeth bristle-like with a flattened, twisted awn arising from between the two teeth. Awn about as long as the lemma.

40. Spike trisetum (*Trisetum spicatum*)

Grows principally during the summer. Short grass. Open, moist, alpine and subalpine sites; also on dry soils and in varying degrees of shade in lodgepole pine, ponderosa pine, aspen, open spruce and among shrubs. Common on old burns and cut-over areas, but practically never occurs in pure stands. Widely distributed in the mountains of the state from 8,000 to 12,500 feet.

Fair to good forage. Remains green late in the fall.

A bunchgrass that has a lot of variation in general appearance. Culms are 4 to 20 inches tall, hairless to downy hairy. Leaves 2 to 6 inches long, more or less hairy. Inflorescence is a dense, spike-like panicle, 1 to 6 inches long, often interrupted at the base, green or purplish, shiny. Glumes persistent, without awns. Lemma two-teethed at the tip, with a slender, bent, twisted awn about 3/8 inch in length, attached on the back of the lemma about 1/3 below the tip.



41. Tufted hairgrass (*Deschampsia caespitosa*)

Mid to tall grass. Prefers moist habitats, wet meadows and bogs principally in the spruce-fir forests and above timberline. Often in nearly pure stands in moist, favorable sites. On drier, less favorable sites it grows in rather open stands in association with other plants. Widely distributed over the western mountainous half of the state. None from the northwest corner. Usually 7,000 to 13,000 feet but may be down to 5,000 and up to 14,000.

Very good forage and withstands fairly close grazing. Produces an abundance of forage. Sometimes cut for hay.

A bunchgrass. Culms are 2 to 4 feet tall, in dense tufts. Leaves mostly basal, 2 to 8 inches long, numerous, bright green, flat, folded or inrolled. Inflorescence is an open panicle, 4 to 12 inches long, nodding or erect, has a purple color, branches are hair-like and harsh.

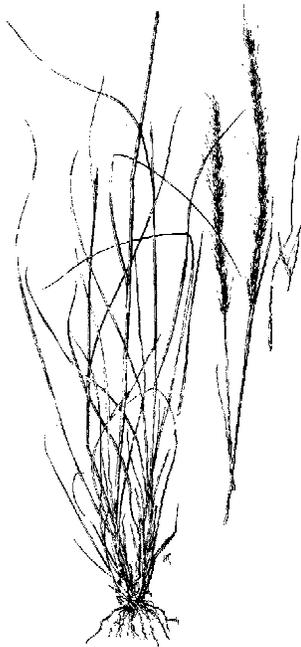
Glumes are awnless, with transparent margins. Lemmas have a flat tip with a ragged edge. There is an awn which is attached on the back of and near the base of the lemma. Sometimes the awn does not extend out beyond the glumes and is not readily visible.

42. Blue joint reedgrass (*Calamagrostis canadensis*)

Mid to tall grass. Wet meadows, along streams, semi-shaded woodlands, and wet shrubby sites. Widely distributed in the western two-thirds of the state, except for the southwest and northwest corners. From 5,000 to 11,000 feet.

Forage value varies from fair to good. It produces a large amount of forage. It is most palatable when young and growing but since it grows in wet habitats its use by livestock is often prohibited until late in the summer. Often a constituent of mountain meadow hay.

A sod-forming grass with numerous, extensive rhizomes. Culms 2 to 4 1/2 feet tall. Leaves 4 to 12 inches long, flat, often drooping, rough to the touch. Inflorescence is a loosely branched panicle, 4 to 10 inches long, rather open especially at the base, nodding, purple color. Glumes persistent, taper-pointed. Lemma with 2 to 4 teeth at the tip, hairs at the base. A delicate, straight awn is attached at or below the middle on the back of the lemma and extending to about the tip.



43. Columbia needlegrass (*Stipa columbiana*)

Grows during spring and summer. A mid grass. Dry soils in canyons, on open hillsides, mountain parks and plains. Western two-thirds of the state, except the extreme western part. From 7,000 to 10,000 feet.

Palatability varies, but usually good forage for all classes of livestock. Grazed most in the spring, but the forage remains green until late fall.

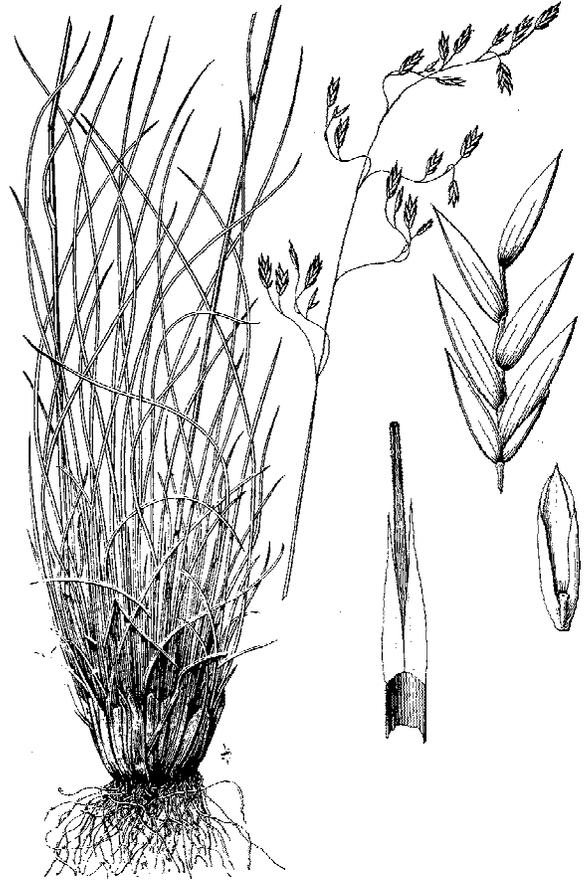
A bunchgrass. Culms are 1 to 2 1/2 feet tall, tufted, erect, often have purple nodes. Leaves 4 to 8 inches long, fine. Inflorescence is a narrow, spike-like panicle, 2 to 6 inches long, often purplish. Lemma covered with soft, short hairs, has a twisted awn that may be from 1/2 to 1 1/2, usually 3/4 to 1 inch long. Seed has a sharp pointed, bearded base.

44. Thurber fescue (*Festuca thurberi*)

Grows during spring and summer. A mid grass. Open parks, hillsides, open stands of spruce, ponderosa pine and aspen. Prefers a sandy loam soil. It sometimes occurs in almost pure stands. Mountainous areas of the state from 6,500 to 12,000 feet.

Good forage, especially for cattle and horses. Grazed from spring until fall.

A robust bunchgrass. Culms in dense tufts, 20 to 36 inches tall. Leaves 3 to 8 inches long, narrow, rough. Has a conspicuous, membranous ligule, nearly 1/4 of an inch long, taper-pointed. Inflorescence is a loose, slightly drooping panicle, 4 to 6 inches long, branches rather long, spreading. Lemma not awned but has a sharp, firm point.



RANGE TERMS

Climax Grass	The thrifty productive native grasses that comprise a high percentage of the grass cover of a range in top condition. The most permanent kinds of grasses under ideal conditions. Climax grasses decrease under heavy use.
Short Grass	Grasses normally growing less than 18 inches in height.
Mid Grass	Grasses normally growing from 1 1/2 to 3 feet in height.
Tall Grass	Grasses normally growing over 3 feet in height.
Bunch Grass	Grasses that grow in definite upright bunches. Reproducing only by seed. Not forming a sod.
Sod Grass	Grasses that form a mat or turf. Reproducing mainly by stolons or rhizomes.
Litter	Plant material or residue left on the ground to improve soil condition and fertility.
Plant Vigor	A measure of the health and thriftiness of the plant.
Density	The percent of the ground covered by growing vegetation.
Key Plants	Principal forage plants used to determine proper utilization and management. These are the plants that give clues to changes of the range condition. Plants upon which grazing management is based.
Range Site	An area of rangeland in which the soil, climate, and topography produce distinct kinds and amounts of vegetation.
Range Condition	Is a comparison of the soil and the vegetation now growing on the site with the highest stage of soil development and plant growth the site can support.
Decreasers	Plants that are reduced in the composition as a result of heavy use.
Increasesers	Plants that increase in percentage of composition under heavy grazing during the first stages of range deterioration. Under continued heavy grazing these plants decrease in percent of composition.
Invader	Plants that are present in small quantity or not present under ideal climax range condition, but tend to increase with deteriorating range condition.
Range Use	The degree to which the forage has been used; usually expressed as moderately used, lightly used, or over used. Usually expressed as percent of weight.
Proper Use	Using the plants to a degree that will maintain or improve their vigor. Usually this means leaving one-half or more of the year's grass growth by volume on the range. The percent by weight of a plant that is utilized when the range as a whole is properly utilized.
Palatability	The relative degree of relish with which animals graze different kinds of plants.
Cool Season Grass	A grass that grows primarily during the spring season and in the fall when moisture is available. Usually dormant during the warm summer months.
Warm Season Grass	A grass that grows primarily during the warm summer months.
Rachis	The central axis of a spike or raceme.

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