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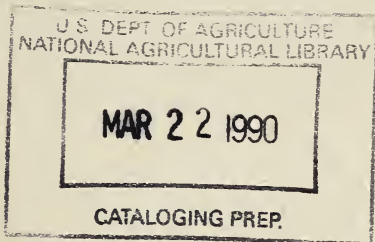


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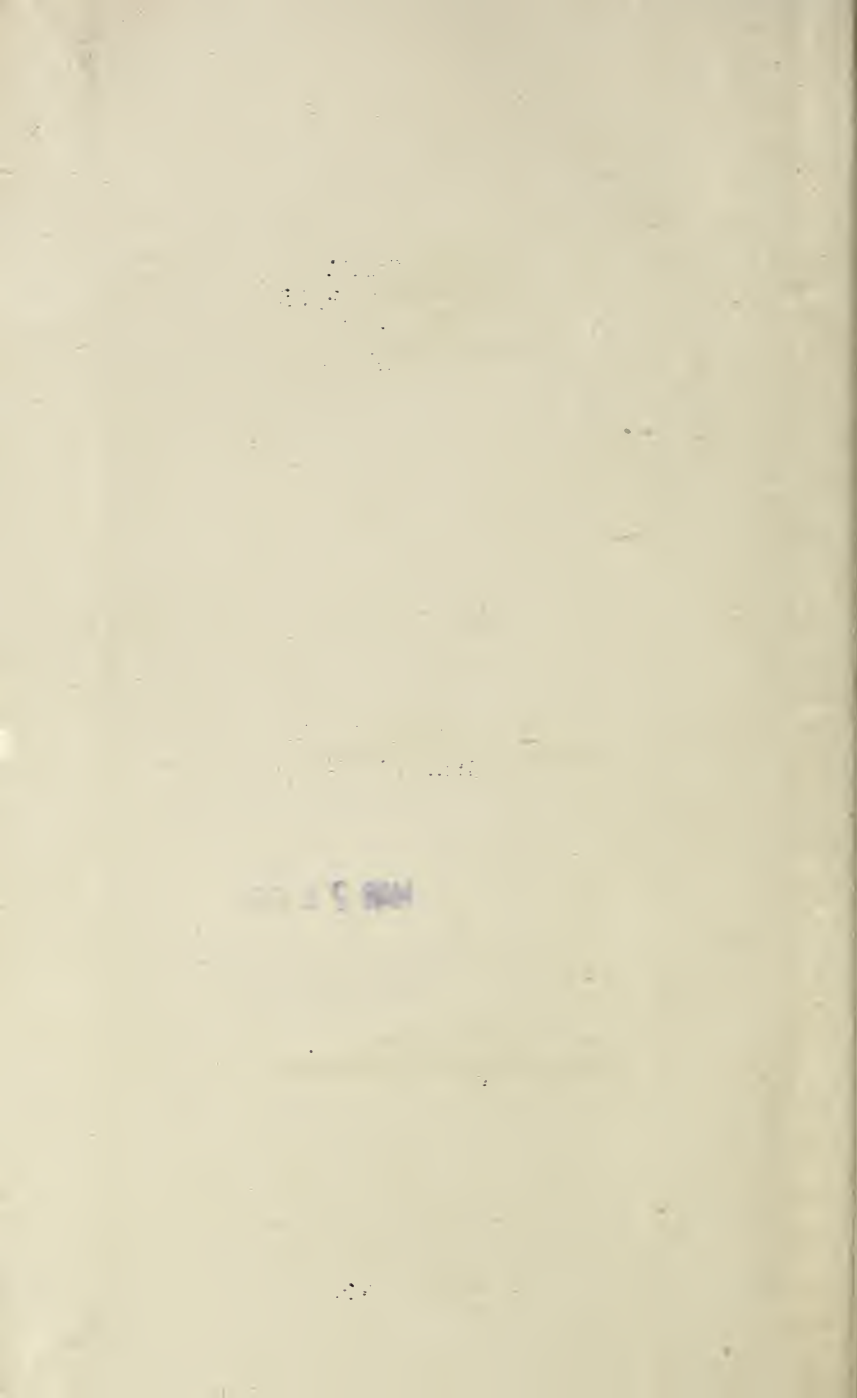
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GRAMA  
BUNCH GRASS  
and  
BUCKBRUSH

M. W. TALBOT.  
Grazing Examiner.



U.S.F.S.  
Southwestern District





## PREFACE

The aim in bringing together the material for this pamphlet has been to straighten out somewhat the tangle of three important groups of forage plants found on the National Forest ranges of Arizona and New Mexico. Too often, GRAMA is-- just GRAMA; the term BUNCH GRASS is applied promiscuously to any grass that grows in a "bunch"; while BUCKERUSH may be most any common shrub of most any region. No plants are here described except ones to which this confusion of common names applies.

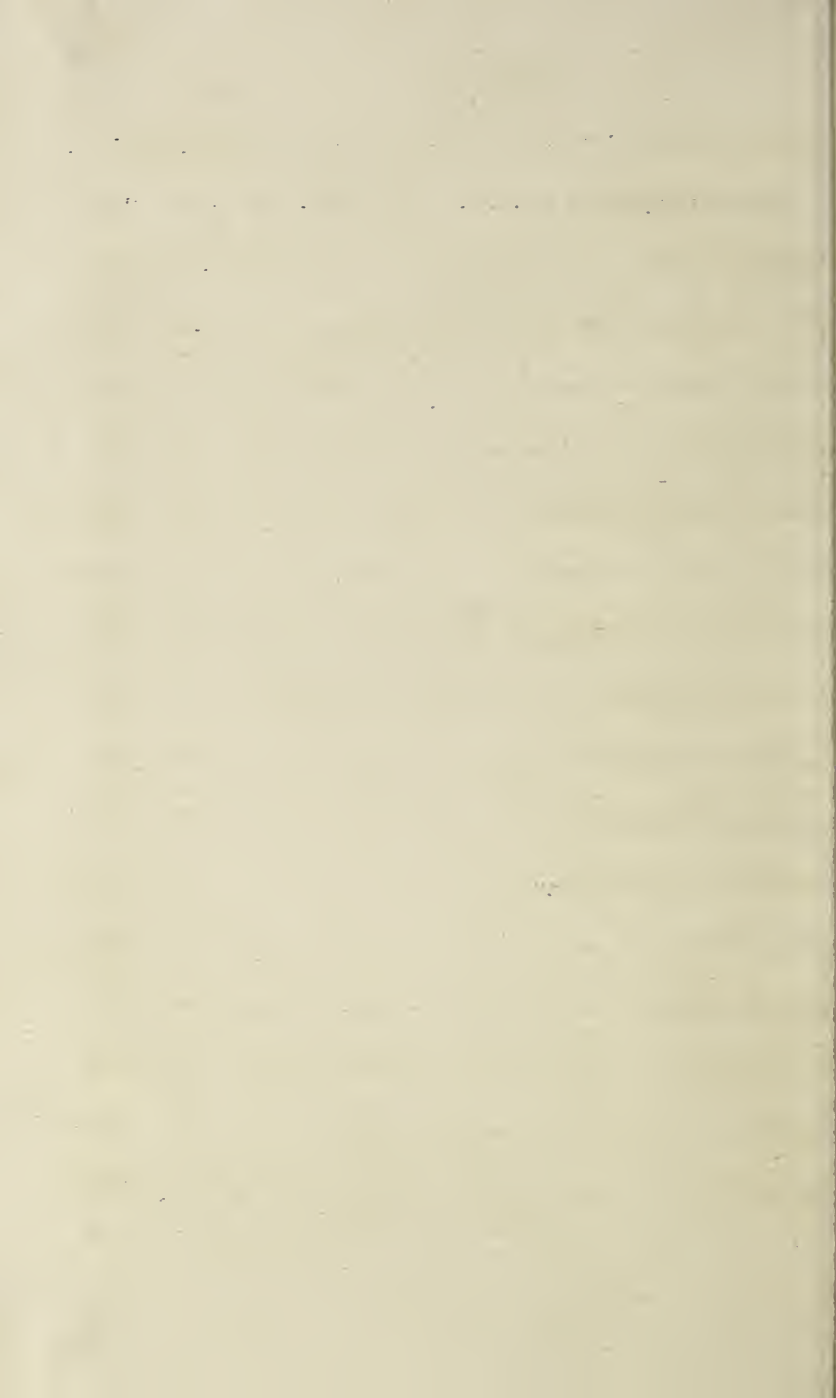
This cannot be considered a botanical manual. Its scope is very limited. Many important range plants are necessarily omitted. The handling of the subject matter is popular and pictorial, rather than scientific. It is a rough reference to aid our field men in learning the few plants described. Botanical and most generally accepted common names are given, as well as descriptive notes and a few observations on range importance, based on what information we have.

Identification is attempted largely by photos. The two series of grass illustrations are preceded in each case by a close-up of the flowering or seed stalks of all of the five kinds of grass in that series. The attempt has been made in the remaining photos to depict the typical growth form of each species. For the shrubs, only short branches were taken in order to show identification points clearly. A few additional plants, not illustrated, will be found commented upon. On each plate a 6" scale provides a guide to size.



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## GRAMA

The history of this word is vague. We are told it has Spanish origin and means "a sort of grass". In the early days of the Conquerors it may have very likely been applied to the "sort of grass" dominating certain portions of the tablelands of Central Mexico, perhaps Blue or Hairy Grama. At any rate the term Grama is now widely accepted as the common name of the group (genus) of closely related grasses botanically known as Bouteloua, although the name is occasionally used for other grasses.

The Gramas are native only to America. The main grama region extends from Manitoba and Saskatchewan down thru the Great Plains, over most of our Southwest, from coast to coast in Mexico, and on into South America and the West Indies. At present about thirty-eight kinds (species) are known. About eighteen are found in the United States, being especially plentiful in the arid portions of the Southwest.

In D-3, at least, the gramas comprise the most important genus of forage plants. As a group they furnish nutritious feed for stock from the hot desert mesas to the cool, yellow pine summer ranges. A few are of little value.

Four important types (plus one false "grama") of this variable group have been chosen for description in the following pages. Another "short-lived perennial" called Rothrock's Grama (Bouteloua rothrockii) is most important over open foothill areas in southern Arizona. Purple Grama (B. radicata) is another perennial usually of scattered occurrence in southern Arizona, and only reported in New Mexico from the southwest corner. Two Annual (or Six Weeks) Gramas (B. aristoides & B. barbata) often grow abundantly over the more semi-desert foothills and mesas of both States, while a third annual (B. procumbens) is commonly found above the "Rim" in Arizona and usually above 6000' in New Mexico.

## POINTS OF DIFFERENCE BETWEEN GRAMAS

1 Side-Oats (*Bouteloua curtipendula*) has a large number of spikes--more than any other grama. Needle (*B. aristoides*) has a fewer number of little spikes about the same length as Side-Oats, but more slender and the seed-husks (glumes) have three-pronged beards (awns), unlike other gramas. It is an easily-pulled-up annual instead of a deep-rooted perennial, and is a smaller, more slender plant of lower elevations.

Purple (*B. radicata*) resembles Side-Oats somewhat but does not usually grow as tall and has fewer spikes which are often 1" long and  $\frac{1}{2}$ " wide--about twice the usual size for Side-Oats. A decided purplish tinge often aids identification.

Slender (*B. filiformis*) might be described as a stunted specimen of Purple. Both are found over hot, dry, desert foothills. Purple is the larger, coarser plant. Its stems often are 2' to 3' high and about as heavy as those of cultivated timothy, while stems of Slender remind one more of Blue and are usually 1 to  $1\frac{1}{2}$  feet high.

2 Black (*B. eriopoda*) differs from either (3) Blue or Hairy by more spikes on a stalk, by "fuzzier" spikes, and by a tiny bunch of "wool" at the base of the spike.

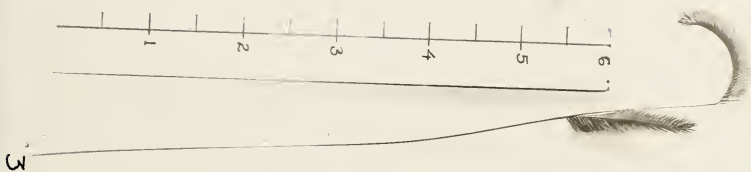
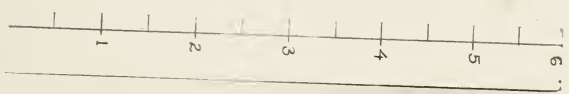
4 Hairy (*B. hirsuta*) has shorter spikes than Blue, and the axis (rachis) projects in Hairy but not in Blue.

5 Bush Grass (*Muhlenbergia porteri*) bears no resemblance to any of the true gramas.

Rothrocks (*B. rothrockii*) grows spikes similar to Blue, but several (4-12) to a stalk instead of 1-3. It also occurs mostly below 5000' while Blue is found mostly above this altitude.

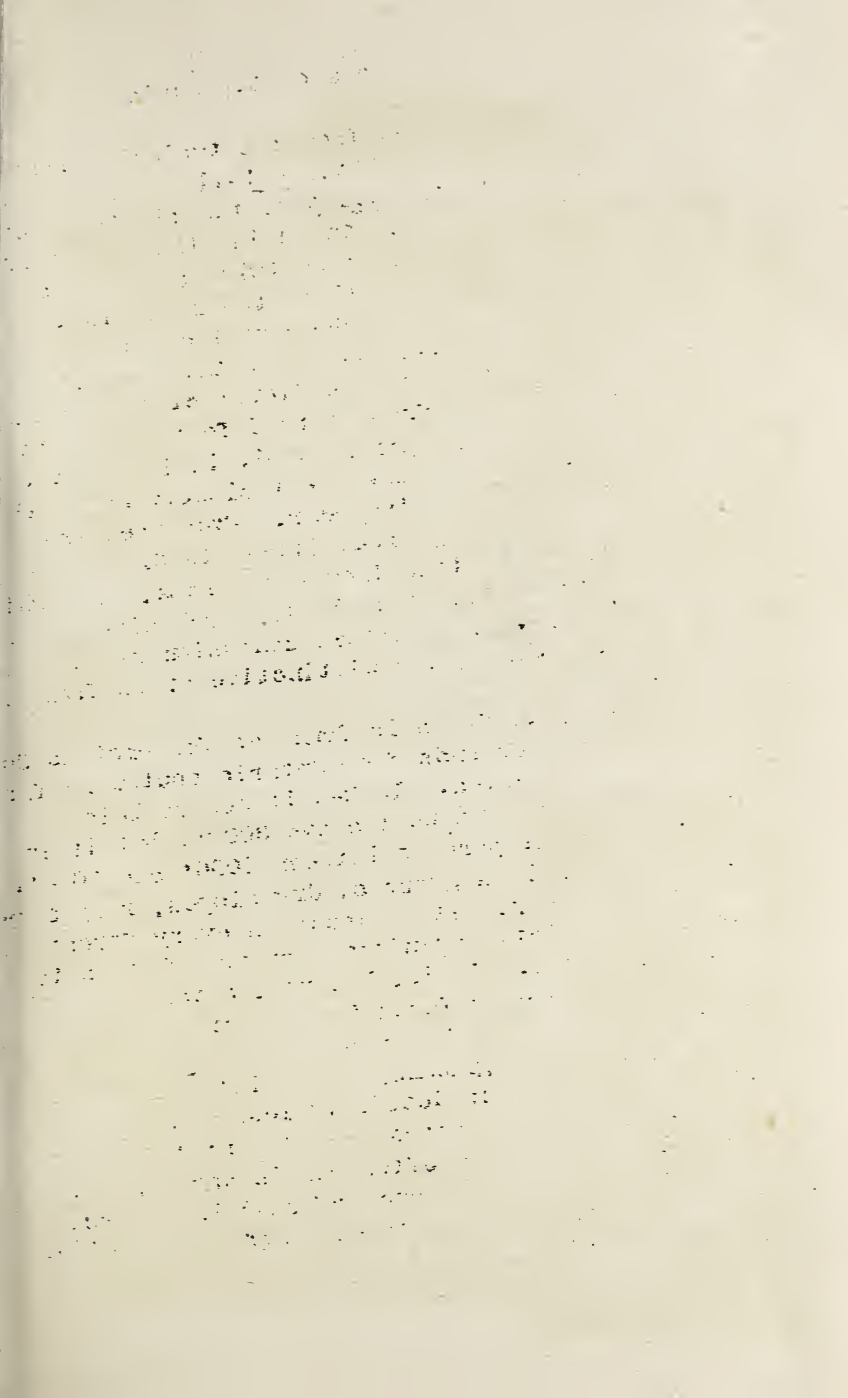
Tall Annual (*B. barbata*) has spikes fashioned somewhat after those of Blue, but decidedly shorter and more slender. The plant is found mostly at lower elevations, is not so tall, and is a short-lived "Six-Weeks" grass.

Prostrate (*B. procumbens*) is also a short-lived annual of sprawling, almost prostrate,



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SIDE-OATS GRAMA  
(*Bouteloua curtipendula*)

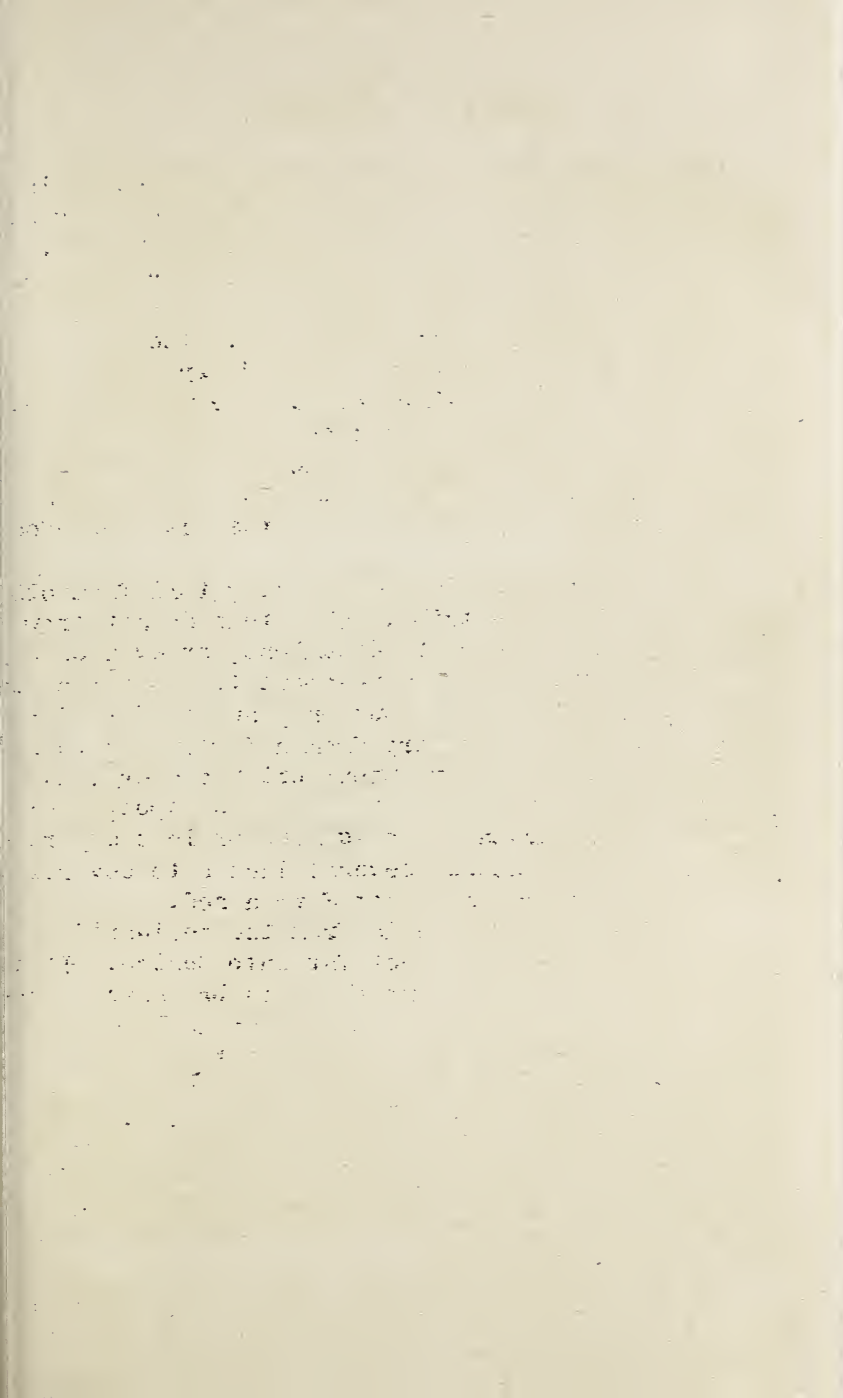
The name comes from the typical arrangement of the 20-50 little oat-like spikes attached alternately to the sides of the flattened axis. The delicate stems, connecting the pendulous spikes to the axis, often twist and bend so that most of the spikes fall to the same side.

This is a coarse deep-rooted perennial of erect growth habit. It grows taller than any of the other gramas, the flower stalks (culms) commonly growing from  $1\frac{1}{2}$  to 3 feet high, and occasionally 4. In growth habit it is often tuft or bunch-like, but when kept closely eaten this habit may largely disappear. Even when the range is closely grazed, Side-Oats Grama may still be easily told from Blue Grama, with which it is often associated, by the much wider leaves--often  $\frac{1}{4}$  inch. Very little confusion should exist in telling this quite distinctive grass from any other.

Side-Oats Grama is found as far east as Connecticut and extends from Ontario southward far into South America. In D-3 it occurs below 3000' at times and well above 8000', but it is most important perhaps between 4000' and 7000'. It is typically a grass of dry slopes, ridges and rocky hillsides. It is found on every Forest in the District. Opinions vary somewhat as to its real value. It is, however, a valuable forage plant wherever found in sufficient abundance. In most regions it is eaten quite readily by stock during the growing season but its value as a winter feed is decidedly less than Blue Grama. The basal leaves are of most food value. The bare seed stalks often remain uneaten thru the winter. A fair amount of seed is produced but the grass probably spreads mostly by underground root-stocks.



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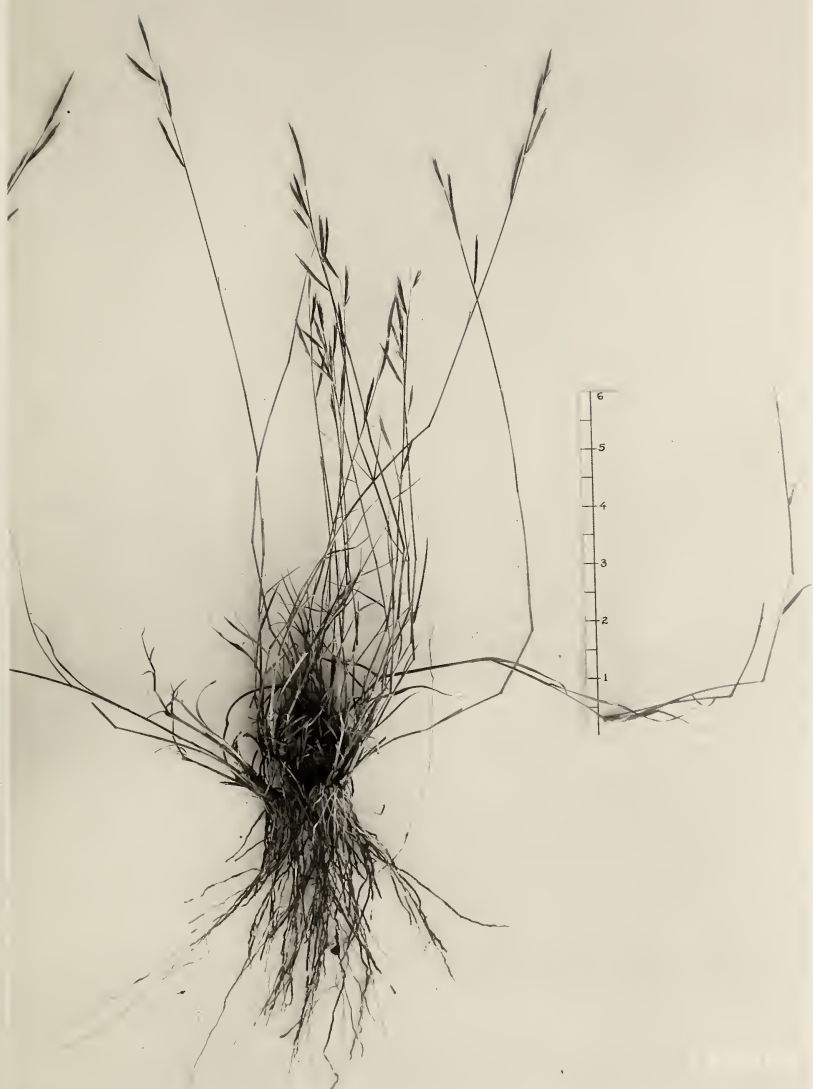
BLACK GRAMA  
(*Bouteloua eriopoda*)

The common name given has been established quite firmly in some regions, particularly on the Jornada Plains of southwest New Mexico. It is not known whether the adjective "black" referred originally to the spikes or to the leaves and stems, probably the latter. The plant is not black, but the tuft of old dry stems near the ground is dark colored. The name Woolly-Foot, while perhaps not so generally used, seems much more appropriate since the lower portions of the stems are noticeably "woolly", and a tiny bunch of "wool" is found at the base, or "foot", of each spike.

This grass is quite easily told from other members of the tribe. The stems do not grow erect, but are bent, decumbent, or even creeping. The spikes are slender--about twice as long as those of Side-Oats--but only number 3 to 6 to a stem. The stems vary from a few inches to 2 feet long, usually appear crisp and dry, and "crunch" under the feet when trod upon. This perennial grama grows as more or less separated tufts, or bunches, several inches to several feet apart and does not form a sod.

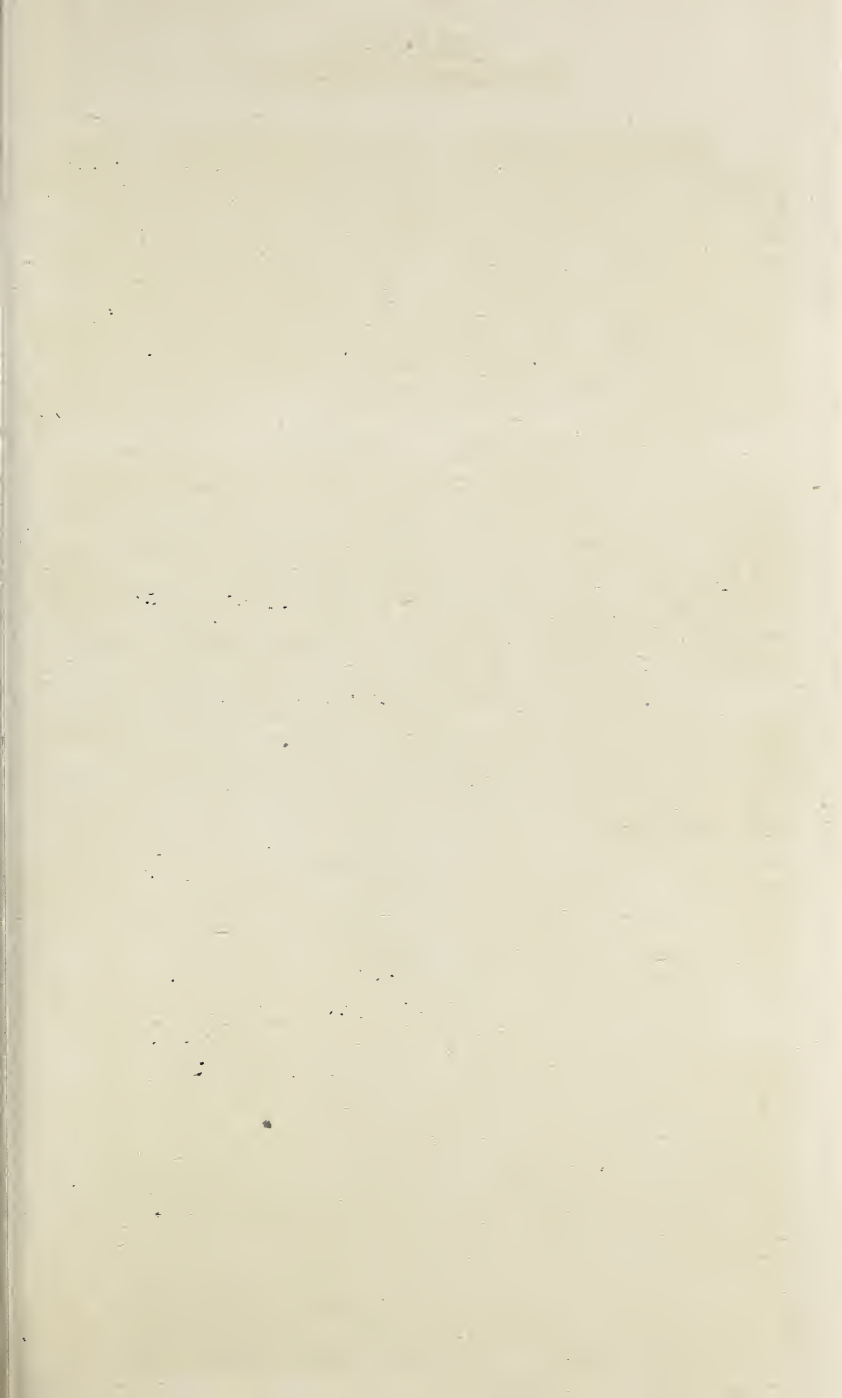
Its range extends from the semi-arid portions of the Southwest far into Mexico. It is more drouth resistant than its brothers, Side-Oats, Hairy, or Blue. It is at home on dry, sandy, or gravelly soils and often grows in almost pure stands over the plains and mesas of the mesquite and lower woodland belts. Its most important altitude zone is perhaps about 3500' to 5000', altho it has been noted on the Manzano in mixture at over 6000'. It is found locally on all Forests of the District except the Santa Fe, Carson, and Sitgreaves.

It is the most important forage over large areas in the lower Rio Grande valley. On the Jornada Range Reserve it cures fairly well on the stalk and forms the mainstay of winter feed.









BLUE GRAMA  
(*Bouteloua gracilis*)

This grass needs little introduction, however, it is not always called Blue Grama. Locally, the adjectives, Crowfoot, White, or Purple are found; and on the Manzano we find Red Grama as its "handle". However, the widespread usage of Blue Grama justifies its standardization as a common name. The color of the leaves and "flags" varies with the season, and to some extent with the region, and this results in the great confusion in names.

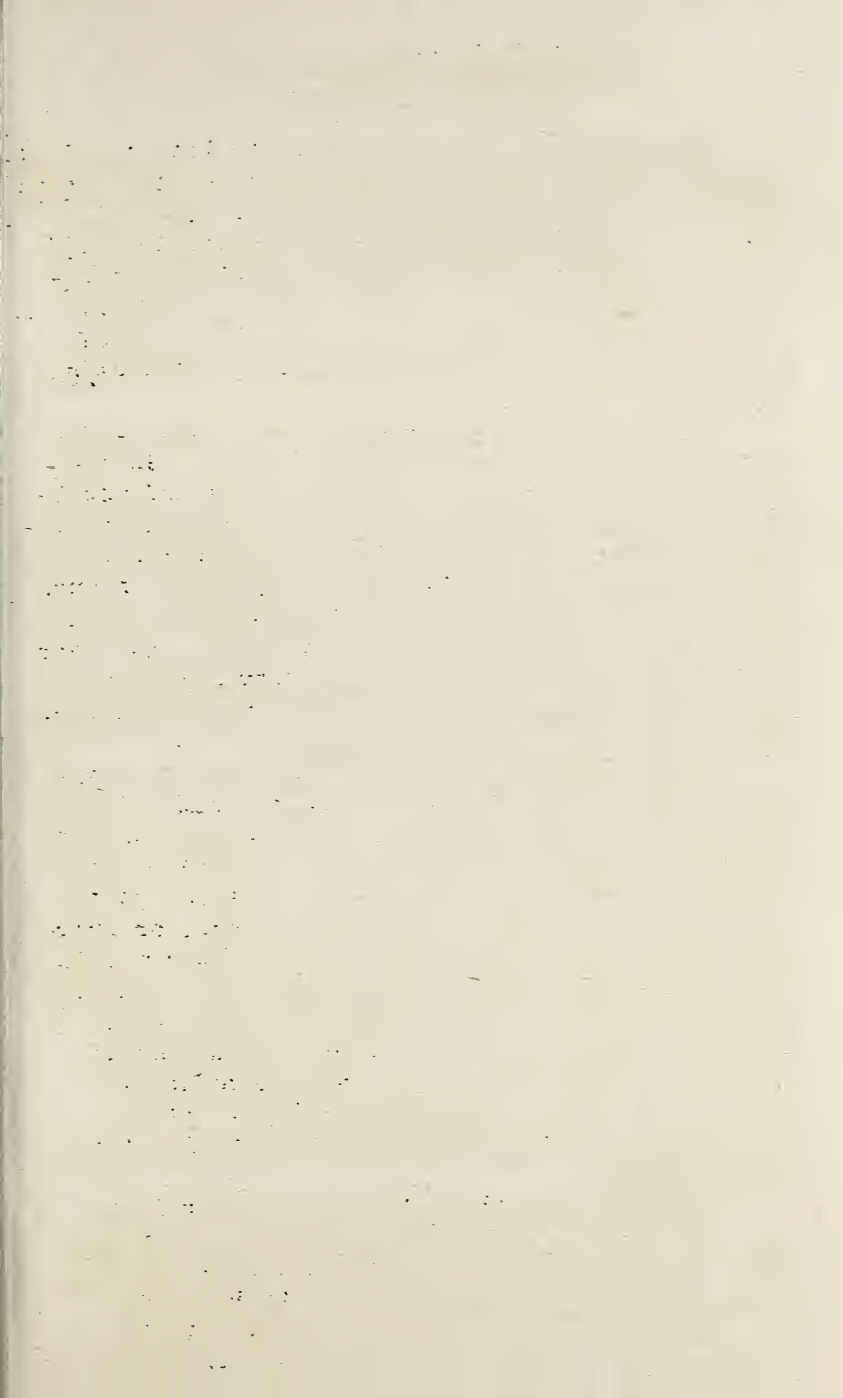
It is a perennial. Under best growth conditions the separate tufts merge to form a sod. Stalks grow erect and usually run from 8 to 16" high, but under best conditions and seasons, may reach 30". The little one-sided spikes of densely packed seeds are usually about 1" long. One or two--or rarely three-- of these spikes are found on a single slender seed stalk (culm).

It ranges from Manitoba to South America. Here it is the most abundant grama of the woodland and yellow pine types, often dominating large expanses of plain, park, or open timber. Farther east it thrives at 1000'. On the Tonto it goes down to 4500' and lower yet in the Santa Rita Mts. It has been noted on the Datil at over 9000', on the Santa Fe at about 10,000', and on the Carson at 10,500'. However, for D-3, its main altitude belt lies between 5000' and 8000'.

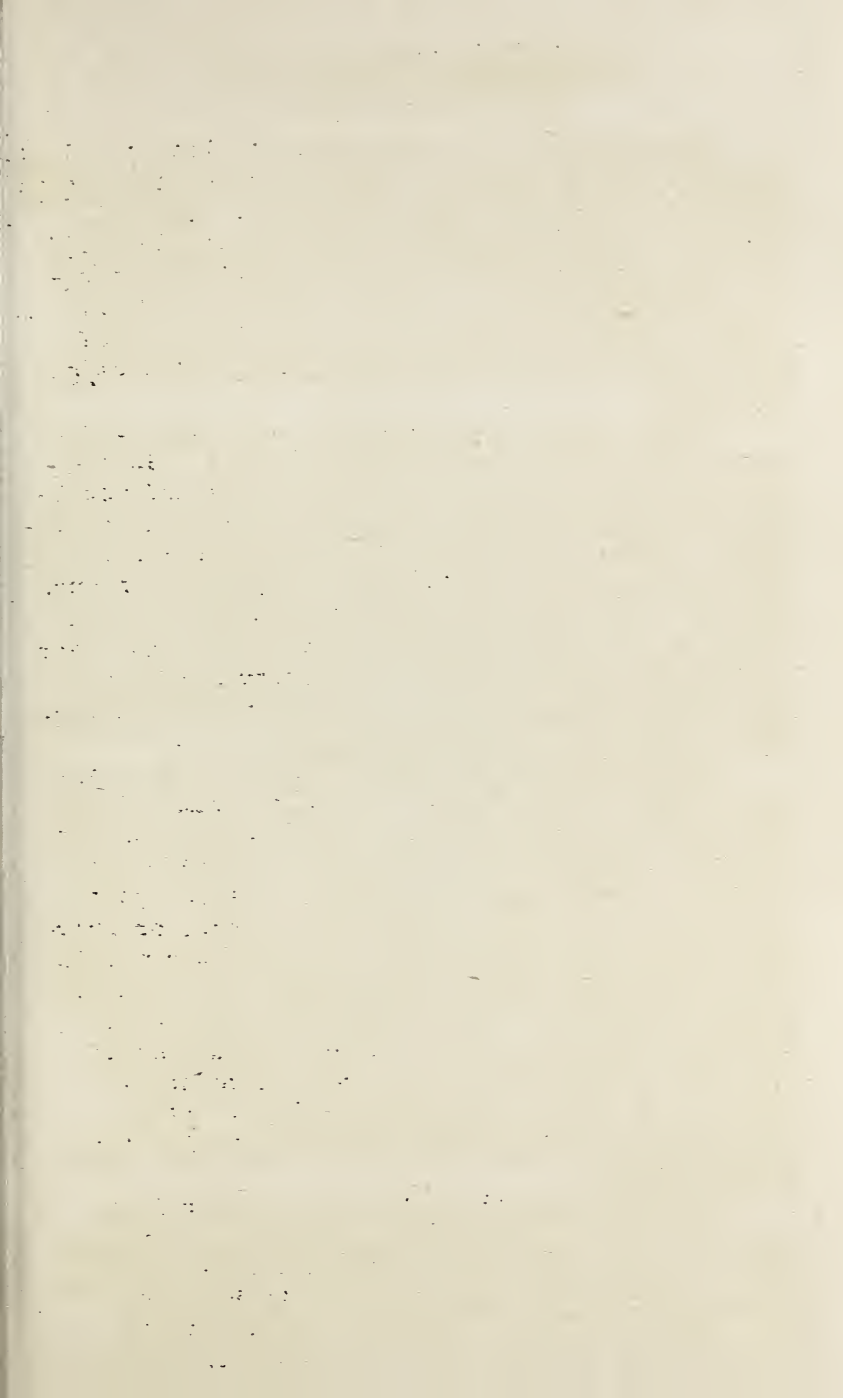
This is the most important forage plant of its belt, and perhaps of the two states. The herbage cures very well as it stands, and the basal leaves often remain partly green thru the winter. It is very nutritious forage and relished by all classes of stock. It withstands grazing and drouth to a marked degree, but can be readily killed out by repeated overgrazing--after which it reseeds very slowly. Its one weak point is that it is a very poor spring feed. It greens up but furnishes little forage until after the summer rains. However, when rains come, it develops very rapidly.











HAIRY GRAMA -- "SPIKED GRAMA"  
(*Bouteloua hirsuta*)

The adjective "hairy" refers to both the leaf margins and the spikes. The reason for the second name can be readily seen in Plate 1. The axis (rachis), along which the seeds are crowded side by side, projects out beyond the last seed forming a distinct point. However, the name Hairy Grama is likewise appropriate and, in point of usage, seems to have the better claim as a standard term.

Hairy Grama is a perennial with finer roots than either of the two preceding kinds. In the Southwest it grows quite stiffly erect and usually as separate bunches, but in some regions it becomes a scd. In size it is usually smaller than Blue Grama and is not believed to produce as much forage. The unbranched seed stalks grow from 8 to 12 or 15 inches (occasionally taller) and bear near their summits from 1 to 4 fuzzy spikes usually about  $\frac{3}{4}$  inch long and nearly always shorter than neighboring Blue Grama spikes.

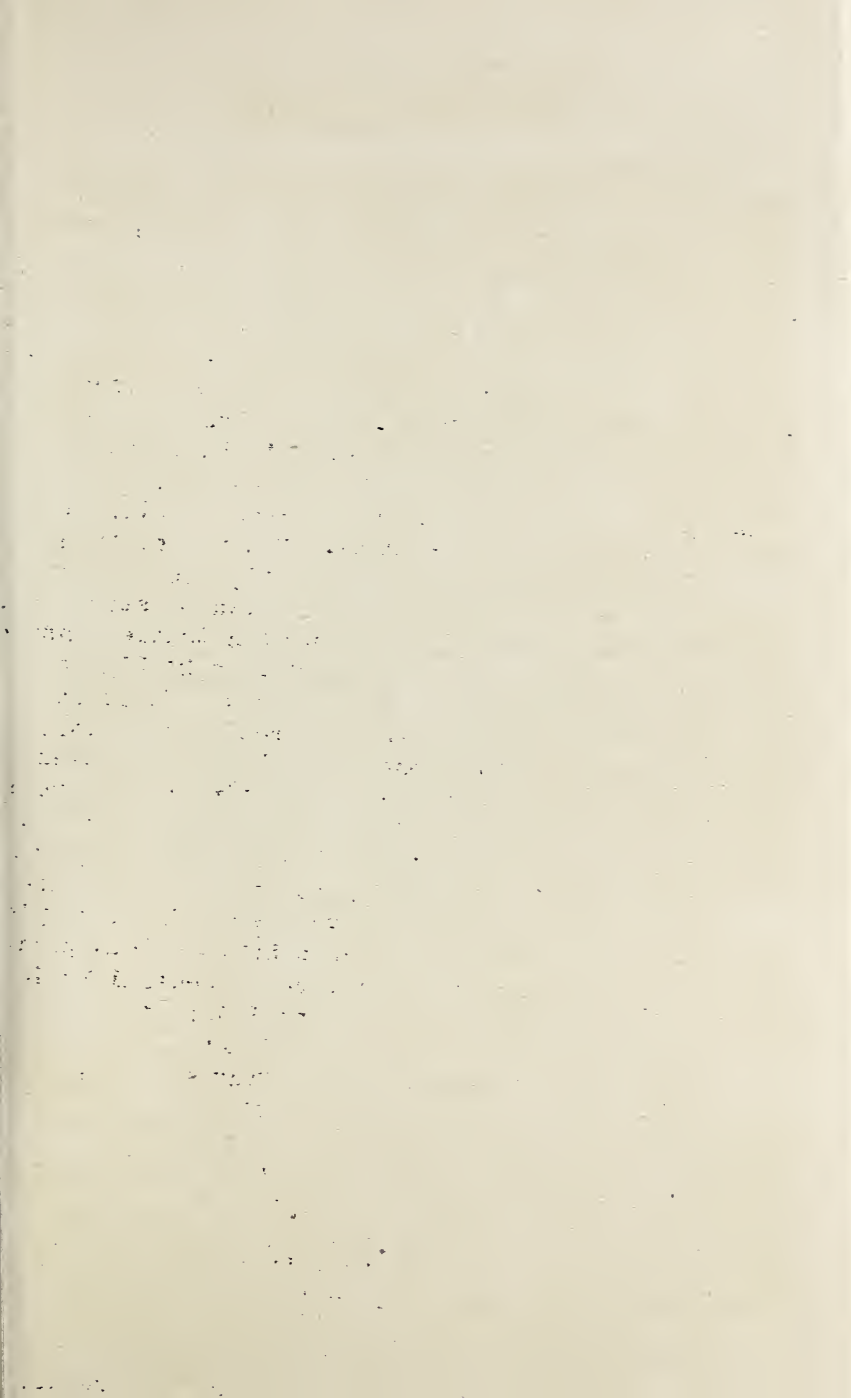
The honor of the widest distribution of any grama falls to this one. It occurs from British Columbia far down into Mexico and as far East as Florida. In D-3 it is primarily a grass of the woodland and the next lower zone. It is apt to be found on dry hills, sandy mesa lands, or gravelly slopes and thruout much of the lower margin of the Blue Grama belt both grasses are commonly found in mixture. Its altitudéanal zone is accordingly lower than that of Blue Grama and is also not so wide, lying from somewhere about 4000' up to 6000', or possibly 6500'. It is more typical of the hotter, drier foothills than is Blue Grama.

It stands drouth better than either Side-Oats or Blue, being more like Black in this respect. Its palatability to stock and its feeding value are believed quite similar to Blue and consequently it is a valuable addition to the range forage list wherever it occurs in any abundance.









BUSH GRASS ("BLACK GRAMA")  
(*Muhlenbergia porteri*)

On the opposite page is pictured a "grama" which is not a grama. In D-3 most of its "folks" reside higher up in the world and count among their number several bunch grasses of the pine and spruce belts. It is not even a near relative of the gramas. Just the same it is the "Black Grama" of many desert ranges of southern Arizona. The grass has been described under the name of Porter's *Muhlenbergia* which is very unsatisfactory; however, the name Black Grama is considered untenable since the grass is not a true grama. The use of Bush Grass as a common name has recently been suggested to the District.

If unmolested by stock, this deep-rooted perennial forms a tangled mass of leaves and slender stems 1 to 2' high and occasionally as much as 3' across. It is usually found growing up thru and protected by various desert shrubs, but has been observed growing in the open. The wire-like appearing stems are in reality quite brittle and remain green for a portion of their length at least over one year and perhaps longer, and after becoming dry are often supported by the live stems for a couple of years more.

It is a Southwestern plant, being found from Colorado to Central Mexico. In D-3 it is limited to semi-desert types below 5000', and has been noted mostly between 2000' and 4000' on hot, dry, gravelly or rocky, mesas and foothills.

It is readily grazed by all classes of stock, and is said to make very good hay. Most pioneers agree as to its great importance during early chapters of Arizona's range history, but at present on National Forest ranges at least--it is so scattered that it is of little economic importance except very locally. It seems to be quite readily killed out by over-grazing. A special study of it is in progress on the Santa Rita Range Reserve but final conclusions are not yet available.



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## BUNCH GRASS

Confusion everywhere attends the use of the word Bunch-Grass. Common and widespread usage has attached this name, not only to closely related grasses, but to a number of widely differing groups as well. Truly, any grass that tends to grow in a bunch is apt to be known as Bunch Grass. From among the plants so named, we have pictured typical representatives of 5 distinct genera, important on D-3 ranges, in the hope of setting apart a few of the main groups at least.

D-3 bunch grasses are mostly perennials. In general they are considered secondary forage plants, but in total comprise a valuable part of our forage. They vary greatly and include a few kinds rarely eaten by stock, some greatly relished, and many commonly grazed but not so palatable as plants like Blue Grama. They thus present problems in management as yet but partially solved.

Among the important kinds not pictured in the following pages, it is desired to mention three. Two kinds of Sporobolus (airoides and wrightii)--often called Alkali Sacaton, Sacaton, or Salt Grass-- are distributed over alluvial bottom-lands and alkali flats, usually outside the forests but now and then important locally over the middle and southern forests. They are coarse-stemmed plants. The first grows from 1 to 3' high, and the second often 5 or 6'. The large open panicles somewhat resemble those of Redtop. Then over the high cold "tundras" of the Santa Fe and Carson, above 8000', we find one of the most palatable of all bunch grasses, Thurbers Fescue (Festuca thurberi). Near the Tierra Amarilla grant it grows very abundantly and is so eagerly grazed by all classes of stock that it can be readily killed out by continued close grazing. It grows in distinct tussocks, with stems often 3' high and tipped by long panicles similar to #8, Plate 7, but bent over a little more like wild oats heads.

## FIVE COMMON BUNCH GRASSES

Each grass "head" (flower cluster) pictured on the opposite page belongs to a different genus-- closely related group of grasses. In numerical order the common names of the species shown are as follows:

- 6- Small Feather Grass
- 7- Mountain Muhlenbergia - "Mountain Bunch"
- 8- Arizona Fescue - - - - "Pine Bunch"
- 9- Beardless Bunch
- 10- Arizona Three-Awn - - - "Curly Three-Awn"

Small Feather Grass is typical of the various Feather Grasses which have "beards" (awns), and also solid stems instead of the usual hollow ones of grasses. The axes of the racemes-- and usually the seed-husks (glumes)--are quite hairy, which gives a "feathery" appearance to the little branches of the flower cluster. The stems usually turn reddish brown in the fall. The awns are about  $\frac{1}{2}$ " long and twisted.

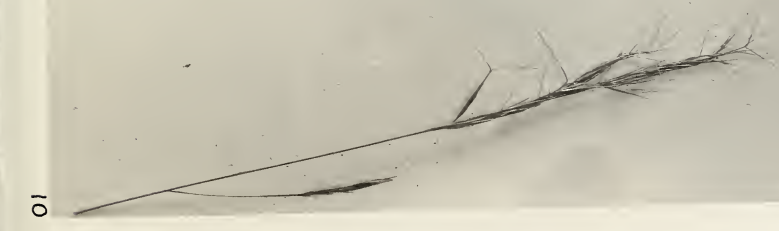
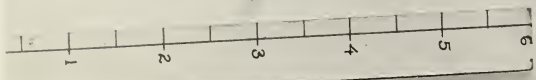
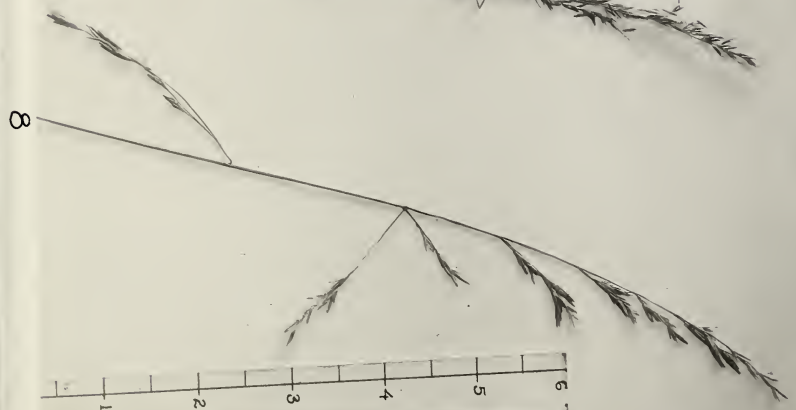
Mountain Muhlenbergia, or "Mountain Bunch", also has bearded seeds, but more closely crowded, not "feathery", and arranged in a distinctive manner quite clearly shown in the photo.

Arizona Fescue, or "Pine Bunch" typifies very well the large genus of Fescues. The arrangement of the flowers or seeds in the clusters will be seen to be quite different from the other four kinds. This arrangement of the branches of the panicle is similar to that of the Bromes or Wild Oats, but the little seed clusters are supported by slender but quite stiff little "stems" rather than bent-over, flexible ones as in the Bromes.

Beardless Bunch has a panicle usually a little more open than No. 7 and the seed husks are "beardless".

Arizona Three-Awn, or Curly Three-Awn, is a good sample of its group, all members of which differ from practically all other grasses in having three-pronged awns attached to the seed-husks.





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SMALL FEATHER GRASS  
(*Andropogon scoparius* )

The common name of Feather Grass comes from the "feathery" hairs which usually cover the terminal portions of the branches of the flower clusters--called in this case racemes. The racemes occur at intervals along the upper portions of the stem.

This grass belongs to a very large group. Its members number perhaps over 150 of which there are some 30 in the U.S. They are mostly grasses of the warmer regions of the world. 9 species have so far been identified in this District. They are all very close relatives of the cultivated sorghums, milo maize, and kafir corn.

The Small Feather Grass pictured is one of the most common kinds in the District and grows in an erect straight-stemmed bunch. It sometimes reaches a height of 4' but is usually less than 3'. Due to the many leafy stems, the bunch is often quite dense at 1' to 1½' from the ground. In D-3 specimens have been sent in from the Santa Fe, Manzano and Coconino, and it has been noted over a much wider range. It is found in both yellow pine and woodland and often seems especially common in the zone where these two types meet.

Small Feather Grass is the subject of many varying reports. A part of this uncertainty may hinge on a difference in species, since several kinds resemble each other closely. At any rate, it is occasionally reported as of slight value, while over portions of the Coconino Plateau region on mixed C&H range it is closely eaten. Some other members of the genus -- usually taller plants -- are of much less value and are often almost untouched by stock under normal grazing conditions.





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MOUNTAIN "MUHLENBERGIA -- "MOUNTAIN BUNCH"  
(*Muhlenbergia montana*)

This large genus of grasses, named for an early botanist, Muhlenberg, is found in both the Old and New Worlds. Some 75 species are known.

Twenty four kinds have been collected so far on the forests of Arizona and New Mexico. And yet, the group has no usable common name. From widespread local usage the kind described here has perhaps a better claim to the name Mountain Bunch than any other single species in D-3.

Usually the dense tuft is 6-10" high and the slender flower stalks under 2', altho occasionally several inches higher. The leaves are narrow, usually inrolled, and more or less curled. It is not often distinguished from Early (or Broadleaf) Muhlenbergia (*M. virescens*), which has flatter wider leaves (often  $\frac{3}{4}$ " ), and is considered a poorer grass.

From plates 7 and 9 this will perhaps be recognized as one of the most common bunch grasses of the yellow pine zone thruout both states. It is commonly associated with "Pine Grass", and occurs from the Manzano to the Tusayan, and from the Carson to the Coronado, both in timber and parks. It does not thrive in dense shade.

This is a secondary forage plant but important on many ranges. It is considered better for cattle and horses than for sheep, especially on ranges where there is real danger of damage by grazing to yellow pine seedlings. Opinions vary, but it seems that a relation exists between the value of this grass and its abundance. It is never relished like Blue Grama but in pure bunch grass types is often quite readily grazed during the growing season and also after the seed ripen, and can be utilized where it is practicable to hold stock on it; but under continued close grazing it will be killed out more quickly than Blue Grama.







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ARIZONA FESCUE -- "PINE BUNCH"  
(*Festuca arizonica*)

The first common name is derived from the botanical equivalent, however, over large areas the name "Pine Bunch" is well established by usage and comes from its habit of growing more exclusively in the pine timber than does "Mountain Bunch".

This is the tallest of the bunch grasses described. The dense tuft of very fine, narrow, and stiff leaves varies from 6" to 1½' high and under favorable conditions the seed stalks often exceed 3'. The long very slender leaves bend or wave slightly but do not have the tendency to curl like those of "Mountain Bunch". The "tuft" is quite different from any other bunch grasses except closely related fescues, of which 11 kinds have so far been identified from D-3 forests.

This is typically a Southwestern grass and occurs thruout much the same zone as the one on the preceding page. In D-3 its important altitudinal range is perhaps from 6000' to 10000'. In places it is the most important bunch grass; in others it is decidedly secondary in amount to "Mountain Bunch" which is its most common associate.

It is eaten in varying degree, often very slightly. Sheep graze it slightly while it is young and tender, C&H somewhat more during the growing season, and all classes of stock relish the ripened seeds. Opinions differ as to which is the more palatable -- "Mountain Bunch" (#7) or "Pine Bunch" (#8). In general over D-3 we believe the balance to be quite decidedly in favor of No. 7. The opposite has been reported from several localities but one such case has been recently cleared up. On the north end of the Apache where No. 8 was reported fully as good as No. 7, recently received identifications of 7 Reconnaissance specimens from below 8000' to over 11000', show that the grass is not F. arizonica, but a "brother", F. calligera. The two are difficult to tell apart.



#163073



BEARDLESS BUNCH  
(*Blepharoneuron tricholepis*)

We come at last to a bunch grass with only one generally used common name, and one which is quite apt as well, since no "beards" (awns) are found on the tiny seed "husks" (flowering glumes).

This erect bunch grass usually is found with somewhat shorter leaves and a smaller tuft than "Mountain Bunch" which it sometimes resembles when no flower or seed stalks are present. Also, Beardless Bunch has smooth leaves rather than rough margined ones. Seed stalks occasionally reach 2' in height but are usually shorter. When in flower or seed this grass is quite easily told from others; and once recognized, little uncertainty need be felt, for it is one of the few instances in the plant world where a genus is composed of only one species.

Its range extends from Colorado to Mexico. In Arizona and New Mexico, it is usually found in small percentages in mixture with the two previously described bunch grasses. It is essentially a grass of the Yellow Pine zone, but is sometimes found considerably higher.

Its palatability certainly varies with the composition of type in which it occurs and may vary also to some extent with the region. It is recognized as inferior to Blue Grama, but is sometimes judged better and sometimes of less value than the two preceding grasses. More data are needed to fix the relative range values of these three grasses under the varying sets of conditions in which they are found in the Southwest.





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ARIZONA THREE-AWN -- "CURLY THREE-AWN"  
(*Aristida arizonica*)

The name Three-Awn refers to the peculiar 3-pronged awn attached to the little husks enclosing the grain or seed. This is found in every species except one (*A. schiedeana*). The first adjective comes from the second scientific name; the second adjective from the tendency of matured leaves to curl up. The *Aristidas* are also collectively called Needle Grasses in some regions -- or sometimes Poverty Grasses.

The group comprises 35 to 40 kinds in the U.S. and over 100 more in warmer regions of the world. Fourteen species from D-3 forest ranges are found in our herbarium.

Several kinds are not easily told apart, but of course the characteristic awn spots the genus, almost always. In one species Long-Awned Needle Grass (*A. Longiseta*) the prongs of the awns are 2" or 3" long and sometimes longer. The species here pictured is usually found below 6000'. It sometimes grows well over 2' in height, but is usually between 12" and 18". The awn prongs are about  $\frac{3}{4}$ " long. The basal leaves toward maturity begin to roll up and many twist into spiral curls.

In D-3 this grass seems to belong mostly to the upper woodland and the yellow pine belts. It is usually found as scattered plants comprising a small percentage of the vegetation.

It is grazed slightly when young by all classes of stock but is of very little value on the range. In general the Three-Awn grasses are very poor forage although some species are of considerable value where they occur very abundantly over local areas.



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## BUCKBRUSH

As a colloquial range term "Buckbrush" may mean almost anything ever called shrub, brush, or browse. It seems that every region must have its Buckbrush. The list of species so included is large, relationship apt to be very remote, and even similarity in appearance often lacking. Forage values of the different species likewise vary from excellent to almost negligible.

From this varied collection of shrubs, we have chosen six of the more important or common range plants of the Southwest masquerading now and then under the collective but hopeless name of Buckbrush.

These few shrubs do not complete the list of valuable browse forage plants by any means. Various important species rarely or never called Buckbrush are omitted, as well as a few kinds occasionally so-called in some regions. Such a case concerns a low shrub of slight forage value found in the yellow pine and spruce belts of both states and usually called Snowberry (*Symphoricarpus* spp.) from the clusters of 2-seeded white berries. Another low creeping shrub -- often only a few inches high -- is found over local areas of semi-desert foothills of the southern forests. This excellent forage plant, (*Calliandra* spp.) has leaves like a miniature mesquite, and bunches of rose-tinted blossoms. It is often called Dwarf Mesquite, and over portions of the Tonto is known as "Wahee".

MOUNTAIN MAHOGANY -- "PALO DURO"  
(*Cercocarpus* species)

We are told that the botanical name of the genus comes from the Greek and means "fruit" with a "tail". The common name is in quite wide usage among English-speaking stockmen; the second is usually heard in Spanish-speaking communities. The term "Mahogany" no doubt comes from the close resemblance of the very heavy and dense heartwood to the wood of the true mahogany of the tropics. In the Guadalupe Mountains (Lincoln) it is often called "Black Brush".

There are several species in the District but all quite similar in general appearance. They are usually shrubs from 5'-10' high, but some species under favorable conditions grow 15' or more and develop trunks 1' or more in diameter. Many exceptionally large specimens have been noted in the Big Burros Mountains (Gila). The alternate, rather leathery leaves have toothed margins similar to little Alder leaves. The whitish flowers are not at all showy but the fruits develop feathery plumose "tails" from 1" to 2" long.

Mountain Mahogany of some kind is found on all Forests in the District in both woodland and yellow pine zones, being often most abundant on open hills in thin woodland or "browse" types. Its zone of greatest importance probably might be put between 5000' and 8000', altho it occurs somewhat lower and much higher. It often seems especially abundant in limestone regions.

It is one of the best liked shrubs on "brush ranges" and wherever it is found in any abundance is a very valuable browse. Its leaves and tender twig ends are relished by all classes of stock - less by horses. It withstands heavy use unusually well, assuming the leaf habits of "ornamental shrubs" when repeatedly cropped closely, but of course, can be killed out on the range if overgrazed for any length of time.





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CLIFF ROSE -- "QUININE BUSH"  
(*Cowania mexicana*)

Clements gives the origin of the botanical name by stating it comes from the name of a British explorer, Cowan. The first common name refers to its quite common habitat and also to the fact that it belongs to the Rose family. It is called "Quinine Bush" over large areas because its twigs are very bitter.

There are several species in the Southwest but the one mentioned is the only one in our Albuquerque herbarium. The specimen came from the Coconino near Cliffs. This shrub varies from 4' to 10' in height-- sometimes higher. The tiny "fingered" leaves of leathery texture occur thickly along the twigs, near the ends of which are clustered the little yellowish blossoms a scant inch across and shaped like little wild roses. When the seeds (called achenes) ripen they possess long plumed tails 1" to 2" long and similar to those of Mountain Mahogany. However, it may be easily told from that browse from its tiny "fingered" leaves, while those of Mahogany are much larger, entire, and alder-shaped. The bark of small twigs and branches is quite firm, but on old large stems it hangs in long loose shreds somewhat like juniper, but more loose and paper-like.

While often locally abundant, this plant has rather a limited range in D-3. It is usually considered a shrub of the woodland and occurs very abundantly over the north portions of the Prescott and Tusayan. However, it is locally abundant in yellow pine near Cliffs on the Coconino.

It is sometimes not eaten much but is usually considered a good emergency browse. It is especially valuable when deep snows hit "yearlong" ranges. Its stems are very brittle and during periods of heavy use by cattle it is damaged more by being broken down than by browsing.





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APACHE PLUME  
(*Fallugia paradoxa*)

This common name is quite generally supposed to have originated from the fancied resemblance of the clusters of "feathery" fruits to the eagle plumed war bonnets of the Apaches. The plumose "tails" of the achenes certainly do resemble miniature feathers.

This plant is usually a low shrub about 2 feet high, but under most favorable conditions it reaches a height of 6 or 7 feet. The newer twigs are covered with a light "down", the leaves resemble Cliff Rose somewhat, but the bark never becomes shreddy, and in the autumn the plant can always be told from Cliff Rose by the clusters of numerous "plumes"  $\frac{3}{4}$  to  $1\frac{1}{2}$  inches long, whereas Cliff Rose has usually less than 5 "plumes", considerably heavier and longer. The blossoms are white and 1 to  $1\frac{1}{2}$  inches across and like little wild roses in shape. This plant is often confused with Cliff Rose and is a fairly close relative -- both belonging to the rose family.

Apache Plume is very common over the south half of the District. It belongs essentially to the woodland type, but is found at higher elevations. It usually occurs abundantly along drainage lines but now and then on slopes and dry ridges. On the San Augustine Plains (Datil) it reaches a fine development.

It is a browse of value wherever it occurs thick enough. It is quite readily eaten by cattle sheep and goats, and occasionally nipped by horses. It is difficult to kill out by grazing, becoming quite stunted and distorted under excessive browsing, but hanging on remarkably well. It is a valuable erosion control plant in many swales, little valleys, and arroyos.









## SQUAW BUSH

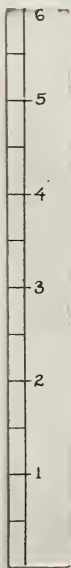
(*Rhus trilobata* = *Schmaltzia trilobata*)

Wootton and Standley, in their Flora of New Mexico, give perhaps the best clue available to the origin of the common name. "The roots of these plants are used by the Indians in forming patterns for their basketry.---The plants are also used in setting dyes,---The berries were used as food by some of the Indians". It is also called Skunkbush

This group of shrubs is somewhat unsettled among botanists. Several forms are recognized but they are all very close to the one listed above, are difficult to distinguish and, as far as known, are quite similar in value anyway. This shrub is really a sumac. It sheds its leaves in the autumn and blooms in the spring before the new leaves appear. The blossoms are yellowish and the fruits little pulpy reddish berries about  $\frac{1}{2}$ " in diameter. It may be distinguished from most all associated shrubs by the deeply cut three-lobed leaves. (See Plate 16)

In D-3 it ranges all the way from the low "Brush ranges" up thru the woodland and into the yellow pine, but seems to be most abundant in the lower woodland and the brush types. It does not occur as solid stands but as scattered plants or small clumps.

Again we have a plant about which reports vary widely. However, it may be safely described as a very secondary browse species. It is browsed occasionally, but over many fully used C&H ranges it is scarcely touched by stock, and this fact, coupled with its scattered occurrence on the range, makes it of little economic forage value.





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JOJOBE -- "COFFEE BERRY"  
(*Simmondsia californica*)

The origin of the first common name is not known, altho it seems to be used over portions of Southern Arizona. For the forest ranges, the name Coffee Berry is the one most often heard. It refers to the brown, nut-like seeds which somewhat resemble "coffee berries".

This is a shrub sometimes 5 or 6' high, but usually kept down lower by continued cropping of the leaves and shoots by stock. The thick leathery leaves are often  $1\frac{1}{2}$ " long and are oval in shape. They occur very abundantly along the stems, especially on plants closely browsed, resulting in a dense opaque bush.

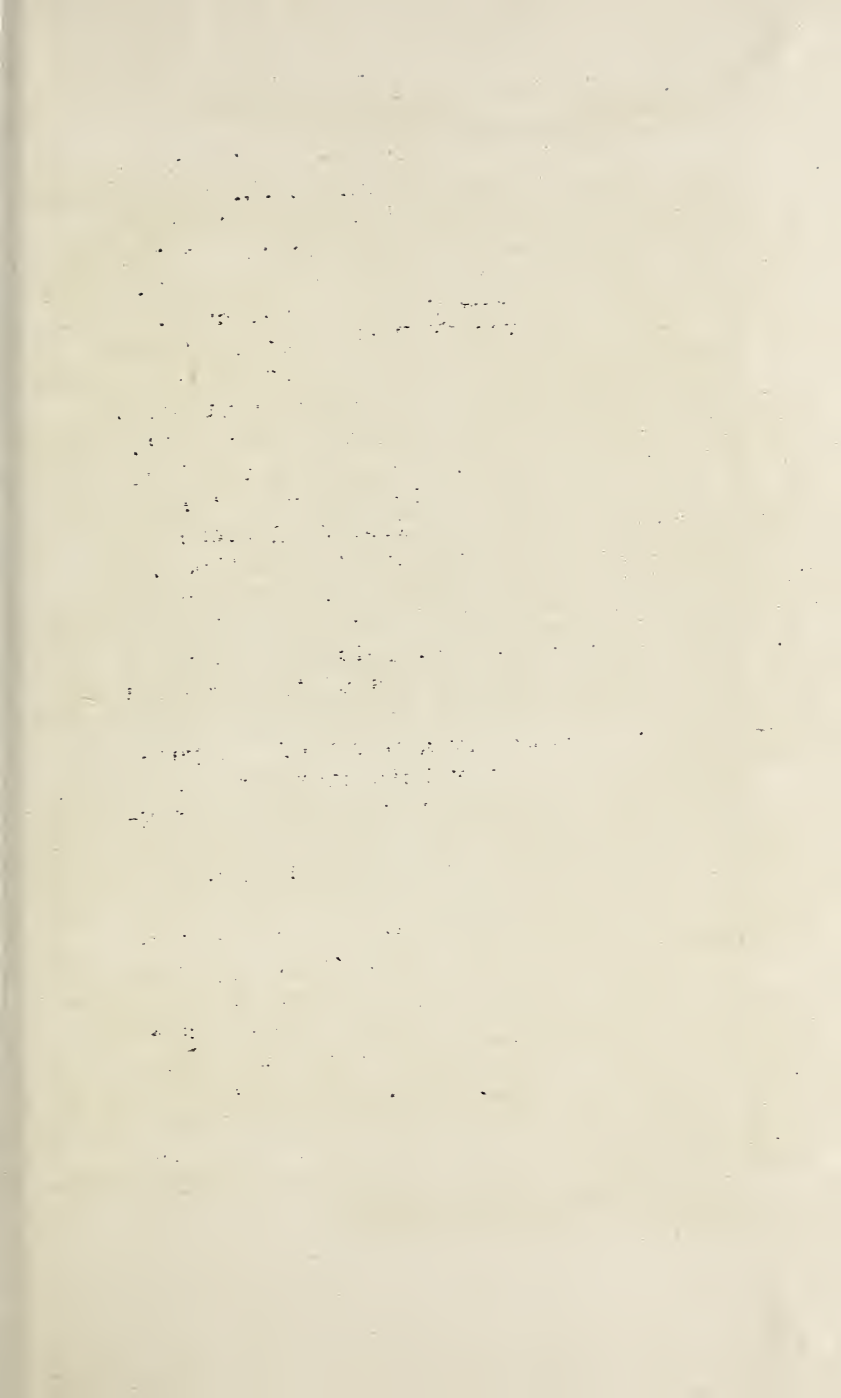
This is a plant of the hot desert foot hills and mesas. It occurs mostly below 4000' and is important over portions of the Prescott, Tonto, Crock, and Coronado.

Wherever it is found in any abundance, it is a valuable element of the range forage supply. The leaves and tender twigs are relished by cattle and sheep, and no doubt by goats; horses also nip the bushes to a lesser extent. The plant withstands excessive cropping to a marked degree, and also is quite drouth resistant, but during bad drouth periods furnishes very little stock feed since the leaves dry up, turn brown, and in extreme cases fall off from a portion of the bush.









DEERBRUSH -- "FENDLER'S CEANOOTHUS"  
(*Ceanothus fendleri*)

This brush is generally reported to be greatly relished by deer--hence the name Deerbrush. This same characteristic, plus its thorny branches, gives rise to another common name often heard--"Buckthorn". The second common name noted is, of course, derived from the botanical name.

Small plants are more or less erect in growth habit but large plants bend over and often form almost a tangle of low shrubbery. This plant usually is found less than 3', and often less than 2', high. It tends to grow in patches or communities. Its blossoms resemble pale white lilacs, later developing into dry berry-like fruits. A close relative (*C. greggi*), called "Desert Ceanothus", is a rigidly erect shrub, often several feet high and with little oval, netted-veined leaves  $\frac{1}{4}$ " to  $\frac{1}{2}$ " long, borne on stubby twigs. This species has been called Wild Lilac on portions of the Prescott and Tonto.

Deerbrush is essentially a plant of the yellow pine type, occurring over both states and probably on all Forests. The second species (*C. greggi*) is a semi-desert shrub extending down thru the woodland and browse types to 5000' and below. The two kinds overlap but little.

Deerbrush is considered a very palatable forage for cattle and sheep and goats. It is apparently not eaten much by horses. Under continued heavy grazing it disappears from the range. As a rule it does not occur abundantly enough to be a large factor in range feed, but is a good browse wherever found.

Desert Ceanothus is likewise a browse usually grazed to a decided extent.

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