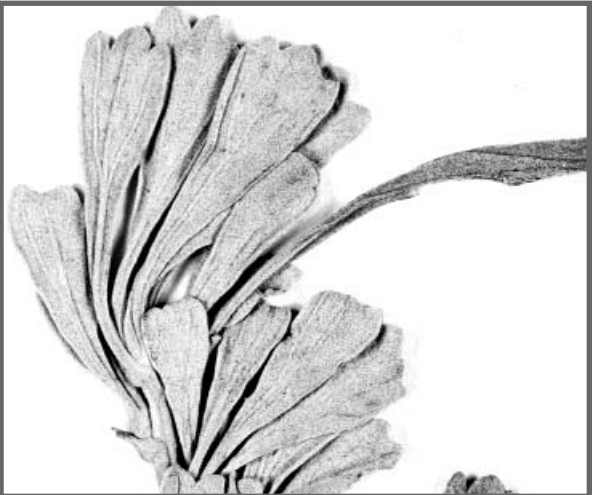




***Montana Department of Fish, Wildlife & Parks***

# **MONTANA SAGEBRUSH GUIDE**



# MONTANA SAGEBRUSH GUIDE



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**Montana Fish,  
Wildlife & Parks**



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# DEDICATION

Photo: Carl L. Wambolt



Dedicated to August L. Hormay, pioneering range scientist, a life devoted to managing rangelands from an ecological perspective.

*"Sagebrush...is a valuable component of the plant cover and ecosystem providing livestock, wildlife, recreation, watershed, and other renewable resource values."*

*--August L. Hormay, January 1992*



The utility of sagebrush is proven timeless.  
Sagebrush sandals circa 9,650 BP.  
Photo courtesy of University of Oregon  
Museum of Natural History.



Sketch by Bitsy Schultz

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## FOREWORD

Why is it important to be able to distinguish between the 16 types of sagebrush in Montana?

With the increasing interest in managing by landscape, there is a danger that broad management strategies may imply to some people that only cursory knowledge is needed before they 'do something'.

With the increasing interest in species of special concern, such as the sage-grouse, there is the danger managers will alter habitats to 'make' more of one seasonal type at the expense of another seasonal type, without understanding impacts to the habitat and the species of concern.

Because many of the sagebrushes are dominant where they occur, they set the character of the landscape. They are a very important ingredient to the biodiversity of Montana.



Some sagebrush taxa recover well after fire, some do not; some sagebrush are highly palatable to herbivores, some are not; some have growth and canopy characteristics that benefit many animal species, some do not.

This publication is an effort to expand people's knowledge of a wonderful community of plants that have been burned, sprayed, plowed, cursed and misunderstood, to the detriment of many animal species and the people who use the land.

I suggest this publication be used together with Montana Department of Fish, Wildlife, & Parks publications *Sagebrush: Ecological Implications of Sagebrush Manipulation* and *Montana Sagebrush Bibliography*.

A handwritten signature in black ink that reads "Stephen J. Knapp". The signature is written in a cursive, flowing style.

Stephen J. Knapp  
Wildlife Habitat Bureau Chief  
Montana Department of Fish, Wildlife & Parks



Carl L. Wambolt



Michael R. Frisina (Kurt Alt photo)

## PREFACE

We developed this guide to Montana sagebrush in response to numerous requests received over the years from natural resource managers and others asking for assistance in identifying the 16 different sagebrush occurring in Montana. The diversity of sagebrush we are blessed with in the Big Sky State is integral to maintaining the diversity of wildlife for which Montana is famous.

This guide closely follows Wambolt and Frisina (2002) and was designed for field use by anyone requiring taxa identification and/or related habitat requirements. Such information may often prove useful while surveying wildlife habitat, or evaluating proposed manipulations of plant communities.

All suggestions for improving future editions are welcome. Please send comments to [frisina@montana.com](mailto:frisina@montana.com).

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
millimeters	inches	0.03937
centimeters	inches	0.3937
decimeters	inches	3.937
meters	inches	39.37



## INTRODUCTION

Sagebrush (woody *Artemisia* L.), also known as wormwood, mugwort, and sagewort, are arguably the most important rangeland plants in Montana and the other western states. Sagebrush taxa occur on an estimated 109 million ha in the region (Beetle 1960, McArthur and Plummer 1978). Most of Montana's more than 25 million ha of rangeland contains at least 1 of the 16 woody sagebrush or 1 of 11 non-woody sage taxa that occur within the state (Table 1).

Generally, the most important sagebrush are those that are widely distributed and/or dominate their communities. These dominant sagebrush taxa are members of the Asteraceae family, genus *Artemisia*, and most are within the subgenus *Tridentatae* (McArthur et al. 1981)(Table 1). The *Tridentatae* is endemic to western North America (Beetle 1960, McArthur et al. 1981). In a classification of western Montana grasslands and shrublands, Mueggler and Stewart (1980) recognized 6 distinct habitat types in which sagebrush taxa are dominants. Society for Range Management (1994) includes 6 and 7 distinct rangeland cover types dominated by sagebrush in the northern Rocky Mountain and Great Basin Regions, respectively.

Our objective was to differentiate the 16 woody sagebrush taxa that occur in Montana by contrasting their habitats (Table 2) and creating a taxonomic key to their identification (Table 3).

**Table 1. Sagebrush (*Artemisia*) taxa found in Montana.**

<b>Taxon</b>	<b>Common Name</b>
<b><i>Tridentatae</i> (subgenus of ARTEMISIA)</b>	
<i>A. arbuscula</i> Nutt. <i>Arbuscula</i>	low sagebrush
<i>A. cana</i> Pursh. <i>cana</i>	plains silver sagebrush
<i>A. c. viscidula</i> (Osterhout) Beetle	mountain silver sagebrush
<i>A. longiloba</i> (Osterhout) Beetle	alkali sagebrush
<i>A. nova</i> Nels.	black sagebrush
<i>A. rigida</i> (Nutt.) Gray	scabland sagebrush
<i>A. tridentata</i> Nutt. <i>tridentata</i>	basin big sagebrush
<i>A. t. wyomingensis</i> Beetle and Young	Wyoming big sagebrush
<i>A. t. vaseyana</i> (Rydb.) Beetle	mountain big sagebrush
<i>A. t. spiciformis</i> (Osterhout) Goodrich and McArthur	subalpine big sagebrush
<i>A. tripartita</i> (Rydb.) <i>tripartita</i>	tall threetip sagebrush
<i>A. t. rupicola</i> Beetle	Wyoming threetip sagebrush
<b>Non-<i>Tridentatae</i> subshrubs and shrubs</b>	
<i>A. frigida</i> Willd.	fringed sagewort
<i>A. longifolia</i> Nutt.	longleaf sage
<i>A. pedatifida</i> Nutt.	birdfoot sage
<i>A. spinescens</i> Eat.	bud sage
<b>Non-woody ARTEMISIA</b>	
<i>A. absinthium</i> L.	common sagewort
<i>A. annua</i> L.	sweet sagewort (annual)
<i>A. biennis</i> Willd.	biennial sagewort
<i>A. campestris</i> L.	field sagewort (green)
<i>A. dracunculus</i> L.	false tarragon sagewort (green)
<i>A. lindleyana</i> Bess	
<i>A. ludoviciana</i> Nutt.	cudweed sagewort
<i>A. michauxiana</i> Bess.	Michaux sagewort
<i>A. norvegica</i> Fries.	
<i>A. scopulorum</i> Gray	alpine sagewort
<i>A. tilesii</i> Ledeb.	

**Table 2. Habitat relationships of the 16 sagebrush (woody *Artemisia*) occurring in Montana.**

Species	<i>arbuscula</i>	<i>cana</i>	<i>cana</i>	<i>longiloba</i>	<i>nova</i>	<i>rigida</i>	<i>tridentata</i>	<i>tridentata</i>	<i>tridentata</i>	<i>tridentata</i>	<i>tridentata</i>	<i>tripartita</i>	<i>tripartita</i>	<i>frigida</i>	<i>longifolia</i>	<i>pedatifida</i>	<i>spinescens</i>
Subspecies	<i>arbuscula</i>	<i>cana</i>	<i>viscidula</i>				<i>tridentata</i>	<i>wyomingensis</i>	<i>vaseyana</i>	<i>spiciformis</i>	<i>tripartita</i>	<i>rupicola</i>					
Range <sup>1</sup>	8	3	7	7	10	3	11	11	10	5	6	2	10	3	3	10	
Montana distribution	SW	NC SC NE SE	SW	SW	SW SC	SW	SW SC SE	SW NC SC NE SE	SW NW NC SC	SW	SW	SC	SW NC SC NE SE	NC NE	SC	SC	SW SC
Landform <sup>2</sup>	F	P, B	M	F	F, B	F	F	P, F, B	F, M	M	F	F	P, F, B	B	F	F	
Soils	Well drained, Alkaline	Well drained, Clayey	Well drained, Rocky	Poorly drained, Clayey, Alkaline	Shallow, Limestone rich	Rocky	Deep, Well drained	Shallow clay, Xeric, Sometimes silt	Variety	Mesic	Deep, Well drained	Shallow	Variety	Alkaline	Xeric	Saline	
Precipitation <sup>3</sup>	2	2	3	2	2	2	2	2	3	3	2	1	2	2	1	1	
Growth-form	Shrub	Shrub	Shrub	Shrub	Shrub	Shrub	Shrub	Shrub	Shrub	Shrub	Shrub	Shrub	Subshrub	Subshrub	Subshrub	Subshrub	
Relative <sup>4</sup> browsing tolerance	L	M	M	U	M	U	L	L	L	M	L	L	M	U	U	M	
Relative fire <sup>4</sup> tolerance	L	M	M	L	L	L	L	L	L	M	M	L	L	L	L	L	
Height at maturity (dm) <sup>5</sup>	Small	Medium	Medium	Small	Small	Small	Large	Medium	Medium	Medium	Small	Dwarf	Dwarf	Small	Dwarf	Dwarf	
Vegetative reproduction	N	Y	Y	N	N	N	N	N	N	Y	Y	?	N	N	N	N	

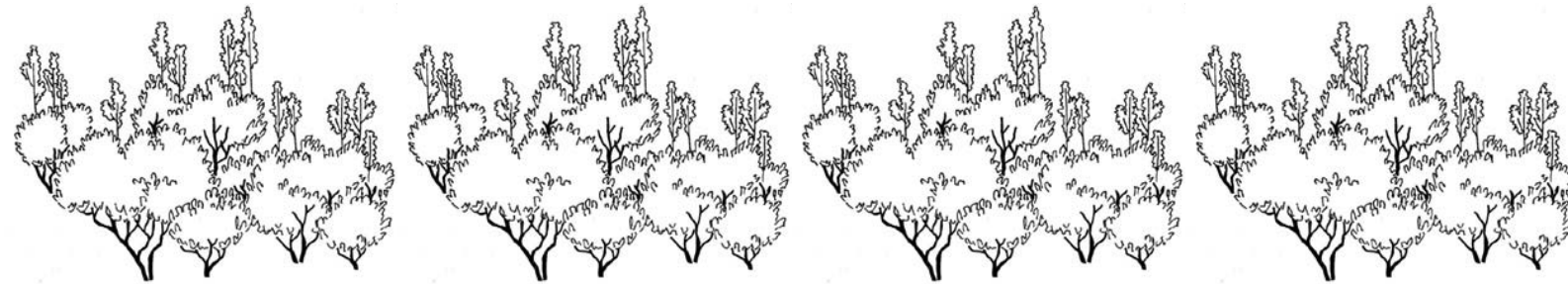
<sup>1</sup>Number of states within the 11 western states (WA, OR, ID, MT, CA, NV, UT, WY, CO, AZ, NM).

<sup>2</sup>P = plains, F = foothills, M = mountains, B = breaks.

<sup>3</sup>1 = <25 cm (10 in.), 2 = 25-36 cm (10-14 in.), 3 = 36+ cm (14 in.+)

<sup>4</sup>L = Low, M = Moderate, U = Unknown.

<sup>5</sup>Exclusive of inflorescences. Dwarf = ≤ 1 dm (4 in.), small = 1 to 4 dm (4 -16 in.), medium = 4 dm to 1 m (16 -39 in.), large = > 1 m (39 in.).



### Table 3. Key to Montana Woody *Artemisia*

1. Low shrubs or subshrubs.

2. Leaves mostly entire, linear and lance-linear, with silvery tomentose underneath; suffruticose base; alkaline soils of plains.

**Page 53 *A. longifolia***

2. Leaves divided.

3. Base suffrutescent; leaves pinnatifid with 5-10+ divisions and silky-canescens; prairies and foothills primarily.

**Page 49 *A. frigida***

3. Base suffruticose.

4. Branches spiny; base forms a low cushion; leaves 3-5 parted with divisions 3 lobed, deciduous; saline desert areas.

**Page 61 *A. spinescens***

4. Branches not spiny; low shrub < 1 dm from thick woody caudex; basal leaves cleft 3-5 times nearly to base; xeric soils.

**Page 57 *A. pedatifida***

### Table 3. Key to Montana Woody *Artemisia*

1. Obvious shrubs.

5. Leaves mostly entire.

6. Leaves broadly lanceolate, generally >2 cm long, densely canescent; rhizomatous; plains especially lowlands.

**Page 15 *A. cana cana***

6. Leaves narrowly lanceolate, generally <2 cm long, canescent to green, rhizomatous; along mountain streams and areas with heavy snow pack.

**Page 15 *A. cana viscidula***

5. Leaves not entire.

7. Leaves cleft.

8. Spike also has 3-cleft leaves similar to rest of plant; leaves deciduous; rocky scablands.

**Page 29 *A. rigida***



**Table 3. Key to Montana Woody *Artemisia***

- 8. Panicle has only entire leaves.
  - 9. Plants relatively tall, >2 dm; up to 2m; leaves seldom >2 cm long with lobes 0.5-0.75 mm wide; mostly west of the Continental Divide often on ridges with shallow soils.

**Page 43 *A. tripartita tripartita***

- 9. Short plants usually <1.5 dm tall; leaves commonly 3 cm long with lobes 1 mm wide; east of the continental divide often on ridges with shallow soils.

**Page 43 *A. tripartita rupicola***

- 7. Leaves lobed.
  - 10. Mature plants usually <50 cm tall.
    - 11. Persistent brown seed stalks arising to quite even lengths above crown; leaves dark green, viscid and flabelliform; shallow soils rich with limestone.

**Page 25 *A. nova***

**Table 3. Key to Montana Woody *Artemisia***

11. Weakly persistent gray seed stalks; leaves gray and not viscid.
  12. Involucres narrow; heads few-flowered; not layering; most leaves cuneate; well drained, dry, commonly alkaline sites.

**Page 11 *A. arbuscula arbuscula***

12. Involucres broad, heads many-flowered; often layering; the earliest flowering sagebrush with seed ripe in August (October for other *Artemisia*); poorly drained, usually clay soils with high alkalinity.

**Page 21 *A. longiloba***

**Table 3. Key to Montana Woody *Artemisia***

10. Mature plants usually >50 cm tall.

13. Tall plants 1-3 m at maturity; leaves long in relation to width and wedge shaped; panicles arise throughout a relatively uneven crown; deep, well-drained soils or along edges of talus slopes.

**Page 32 *A. tridentata tridentata***

13. Plants generally <1 m tall; leaves not wedge shaped with bases strongly tapered.

14. Crown rounded with panicles arising throughout a relatively uneven crown; leaves are bell-shaped and shorter than other big sagebrush taxa; xeric soils that are shallow and heavy in clay or sometimes silt.

**Page 32 *A. tridentata wyomingensis***

### Table 3. Key to Montana Woody *Artemisia*

14. Crown flat-topped with panicles arising to quite even lengths above foliage.
15. Leaves intermediate in size; crown relatively compact; 4-6 flowers per head, each <1.5 mm wide; not layered; a variety of soils receiving precipitation levels associated with mountains and foothills.

#### Page 32 *A. tridentata vaseyana*

15. Leaves large; crown relatively open; >6 flowers per head, each >1.5 mm wide; often layered; mesic sites compared to other big sagebrush, usually above 2,100 m elevation.

#### Page 32 *A. tridentata spiciformis*



**LOW SAGEBRUSH**  
**(*Artemisia arbuscula*)**

One subspecies of low sagebrush (*Artemisia arbuscula* Nutt. *arbuscula*) occurs in Montana (Fig. 1). Its distribution is limited to the southwestern part of the state, generally on well drained alkaline soils. These soils usually have either a B-horizon that is impermeable or bedrock near the surface. This taxon may occasionally layer. Low sagebrush is a small, stiff, many-branched shrub. This shrub is found on dry plains and hilly sites and may be the community dominant.



Figure 1. Low sagebrush (*Artemisia arbuscula arbuscula*) showing branch structure; leaf detail to right.









## SILVER SAGEBRUSH (*Artemisia cana*)

Two subspecies occur in Montana - plains silver sagebrush (*Artemisia cana* Pursh. *cana*) and mountain silver sagebrush (*A. c. viscidula* [Osterhout] Beetle) (Fig. 2). The plains taxon is distributed mainly throughout central and eastern Montana and occasionally west of the continental divide, while the mountain taxon is limited to mesic mid to high elevations, mostly in southwestern Montana. Both taxa are associated with well drained soils. Plains silver sagebrush is more prevalent on clayey sites, while mountain silver sagebrush is commonly associated with rocky sites. Although subspecies were not designated, Hansen et al. (1995) recognized 2 silver sagebrush habitat types associated with riparian areas as follows: The [plains] silver sagebrush/western wheatgrass (*Agropyron smithii* Rydb.) habitat type is a major type throughout central and eastern Montana. This habitat type occurs on early level older alluvial terraces and alluvial fans in valleys. The other habitat type, [mountain] silver sagebrush/Idaho fescue (*Festuca idahoensis* Elmer), is incidental at mid to high elevations throughout the mountains and foothills of central and southwestern Montana. Not all sites dominated by silver sagebrush are considered riparian; some are considered upland sites.



Figure 2. Plains silver sagebrush (*Artemisia cana cana*); leaf detail to right.





Figure 3. Mountain silver sagebrush (*Artemisia cana viscidula*); leaf detail to right.







**ALKALI SAGEBRUSH**  
**(*Artemisia longiloba*)**

As the name of this small shrub implies, alkali sagebrush (*Artemisia longiloba* [Osterhout] Beetle) is associated with alkaline and clayey soils on poorly drained sites in southwest Montana (Fig. 4). This low shrub often layers from its lax spreading stems. Alkali sagebrush is distinctly separated from other sagebrushes by its large flower heads and early flowering habit. It is also known as early sagebrush because it flowers and sets seed much ahead of other sagebrush taxa with flowering beginning in early June and seeds ripening in August. Its habitat is often unusual for sagebrush as it grows in heavy, highly impermeable soils derived from very alkaline shales. However, sometimes it is found on light, limestone soils.



Figure 4. Alkali sagebrush (*Artemisia longiloba*); leaf detail to right.







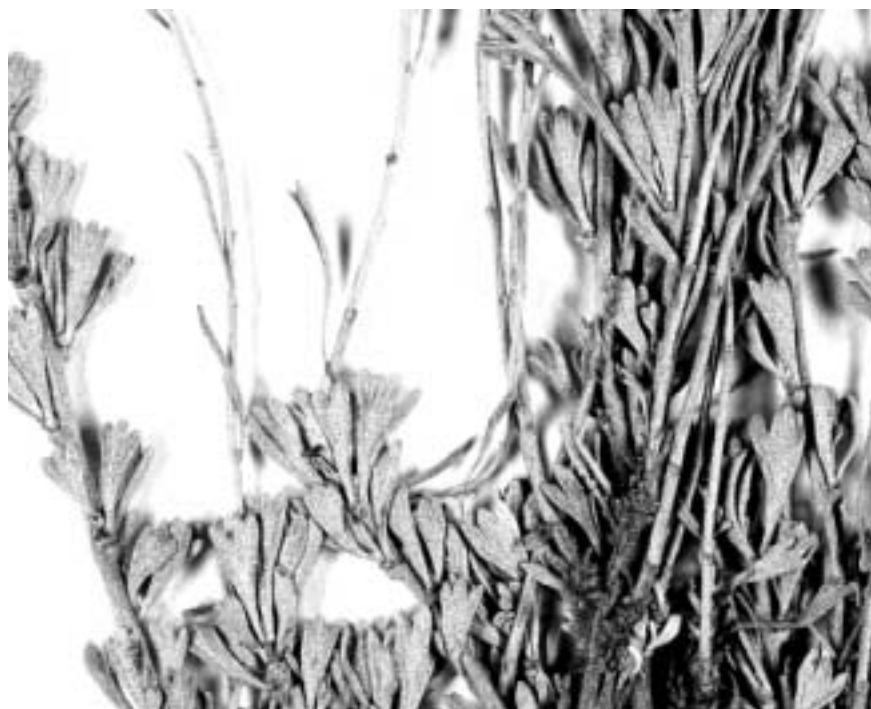


**BLACK SAGEBRUSH**  
**(*Artemisia nova*)**

Black sagebrush (*Artemisia nova* Nels.) is distributed throughout southwest and southcentral Montana (Fig. 5). It is sometimes a community dominant on shallow sites rich in limestone. Typical plants have many erect branches that arise from a spreading base. Although the form of this taxon is similar to low sagebrush, its flower stalks are more numerous, darker, and more persistent on black sagebrush. Montana plants also have a darker leaf color than does low sagebrush. The leaves have a viscid nature when touched that is provided by the high density of glandular trichomes on the surface and can often be seen as in Fig. 5.



Figure 5. Black sagebrush (*Artemisia nova*); leaf detail to right.







**SCABLAND SAGEBRUSH**  
**(*Artemisia rigida*)**

Scabland sagebrush (*Artemisia rigida* [Nutt.] Gray) is a small shrub that prefers dry rocky scablands (Fig. 6). Although reported to be scarce, its Montana distribution is in the northwest portion of the state. Scabland sagebrush was named for its common habitat in the northwest of lava outcrops (Van Dersal 1938). This plant is rigid in structure with heavy branches that break up easily. It has a deciduous habit unlike most sagebrush that are evergreen. Leaves are usually spatulate and divided deeply into 3 to 5 narrow lobes. Infrequently, linear-entire leaves may occur. The species is rare in Montana.



Figure 6. Scabland sagebrush (*Artemisia rigida*); leaf detail to right.







## **BIG SAGEBRUSH** **(*Artemisia tridentata*)**

Big sagebrush is the most common and widely distributed sagebrush species in Montana and the western United States. The genus and species for big sagebrush were described by Nuttall in 1841 based on a specimen collected by him on the Snake River Plain of Idaho. Big sagebrush is also the most important sagebrush species due to the large areas its 4 subspecies occupy and often dominate under natural conditions. Although the subspecies may occasionally be found growing together, generally they require different environmental conditions (Table 2). Understanding of these requirements provides insight to the ecological variation that exists among the many communities occupied by big sagebrush.

It has been often stated that the land occupied by basin big sagebrush (*Artemisia tridentata* Nutt. *tridentata*) could be farmed (Fig. 7). That is the case because this subspecies occupies deep, well-drained soils usually found in valley bottoms or other locations where such soils occur.

At the other habitat extreme among the big sagebrush taxa, Wyoming big sagebrush (*A. t. wyomingensis* Beetle and Young), occupies the most xeric locations (Figure 8). These sites are usually the product of shallower soils and a large amount of clay or

sometimes silt in the soil profile. The taxon does not do well on course-textured soils.

Mountain big sagebrush (*A. t. vaseyana* [Rydb.] Beetle), like basin big sagebrush, requires more moisture than does the Wyoming subspecies (Fig. 9). However, mountain big sagebrush usually obtains its moisture by growing in localities with greater amounts of precipitation, rather than occupying very deep soils like basin big sagebrush grows in. The soils occupied by mountain big sagebrush ranges from sandy through silty and clayey textures, and may often be cobbly. However, generally finer textured soils appear to be favored by the taxon. Compared to surrounding upland community types, mountain big sagebrush usually occupies the deeper more mesic locations.

The fourth subspecies of big sagebrush, subalpine sagebrush (*A. t. spiciformis* [Osterhout] Goodrich and McArthur) is of minor importance in Montana, as it is only known to occur in southwestern Montana near the Idaho border (Fig. 10). It is found in the Centennial Valley and at the mouth of Cabin Creek near Hebgen Lake.

Although it may occur occasionally elsewhere in southwestern Montana, it must be considered rare. Originally this taxon was considered to be a high elevation form of mountain big sagebrush. Subalpine big sagebrush is the only subspecies known to commonly root-sprout.



Figure 7. Basin big sagebrush (*Artemisia tridentata tridentata*); left detail to right.





Figure 8. Wyoming big sagebrush (*Artemisia tridentata wyomingensis*); leaf detail to right.





Figure 9. Mountain big sagebrush (*Artemisia tridentata vaseyana*); leaf detail to right.







Figure 10. Subalpine big sagebrush (*Artemisia tridentata spiciformis*); leaf detail to right.







### THREETIP SAGEBRUSH (*Artemisia tripartita*)

In general, both subspecies - tall threetip sagebrush (*Artemisia tripartita* Rydb. *tripartita*) and Wyoming threetip sagebrush (*A. t. rupicola* Beetle) - occur west and east of the continental divide, respectively (Figures 11 and 12). However, tall threetip sagebrush is found in the southwest portion of Montana, both east and west of the continental divide, while Wyoming threetip sagebrush is only known to occur in the southcentral portion of the state. Tall threetip sagebrush is a mid-sized sagebrush preferring deep, well-drained soils. Wyoming threetip sagebrush is a dwarf associated with shallow rocky, ridgeline soils. Both subspecies are known to layer in the field. This habit is most common in Wyoming threetip sagebrush. Only tall threetip sagebrush is known to be a prolific stump-sprouter under the right conditions such as following fire or herbicide application.



Figure 11. Tall threetip sagebrush (*Artemisia tripartita tripartita*); leaf detail to right.





Figure 12. Wyoming threetip sagebrush (*Artemisia tripartita rupicola*); leaf detail to right.









**FRINGED SAGEWORT**  
**(*Artemisia frigida*)**

The most widely distributed sagebrush subshrub in Montana, fringed sagewort (*Artemisia frigida* Willd.), occurs throughout the state on relatively dry plains, foothills and breaks except in the northwest (Figure 13). This mat-forming species is found on a variety of soil types and may readily pioneer recently disturbed sites. It occurs throughout successional stages to climax.



Figure 13. Fringed sagewort (*Artemisia frigida*); leaf detail to right.







**LONGLEAF SAGEBRUSH**  
**(*Artemisia longifolia*)**

Longleaf sagebrush (*Artemisia longifolia* Nutt.), a subshrub, is mostly limited in distribution to small populations in northcentral and northeastern Montana. It is usually found on alkaline sites associated with river breaks (Fig. 14).



Figure 14. Longleaf sage (*Artemisia longifolia*); leaf detail to right.









**BIRDFOOT SAGEBRUSH**  
**(*Artemisia pedatifida*)**

Birdfoot sagebrush (*Artemisia pedatifida* Nutt.) is a subshrub with limited distribution in southcentral Montana on plain and foothill xeric alkaline sites (Fig. 15).

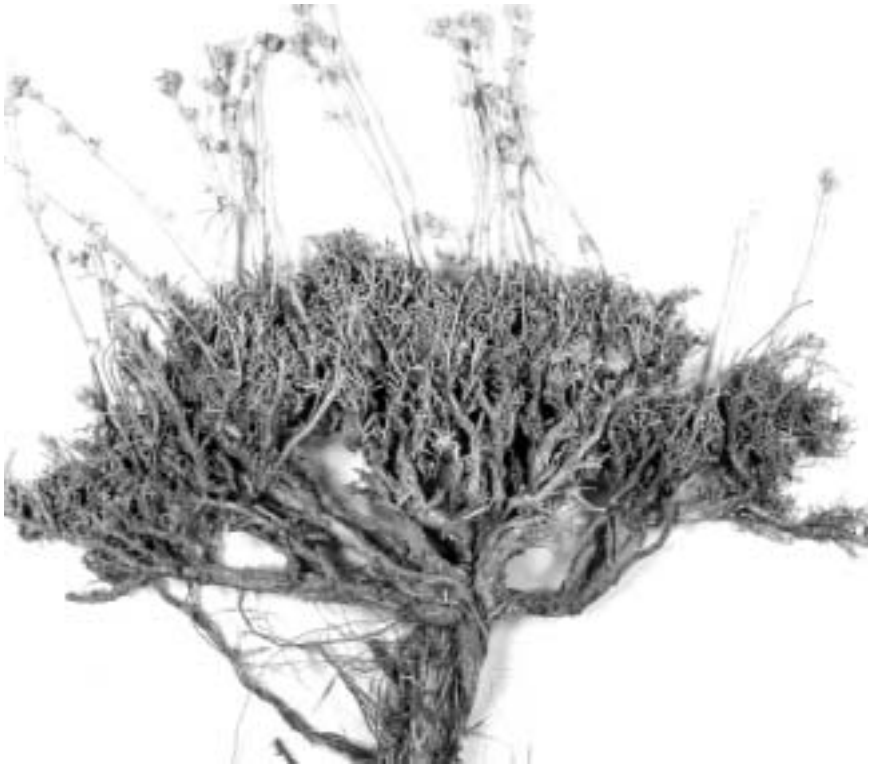
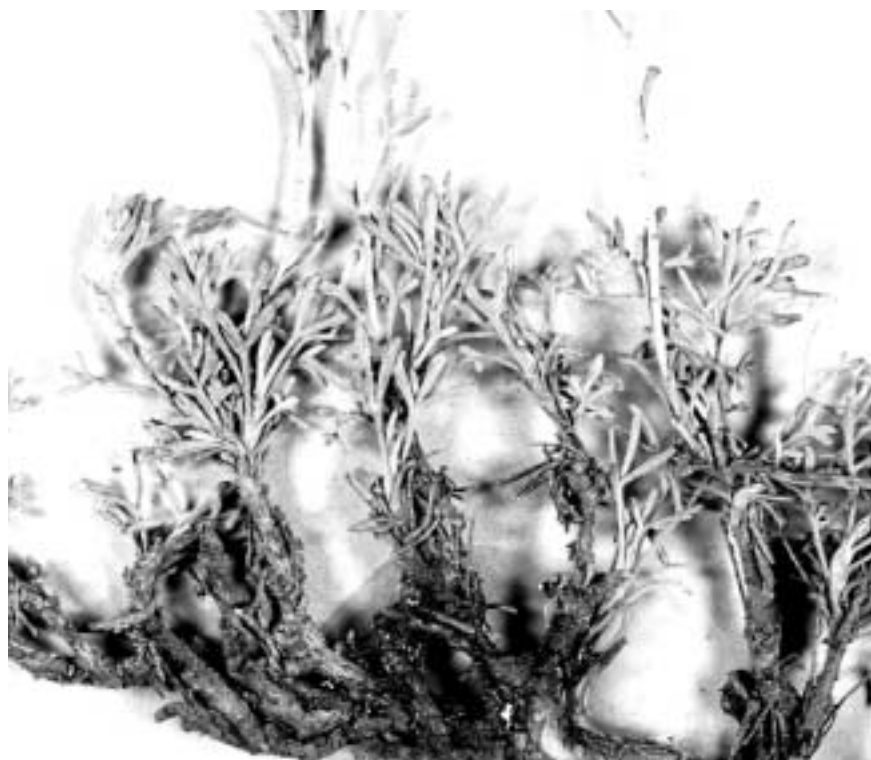


Figure 15. Birdfoot sage (*Artemisia pedatifida*); leaf detail to right.







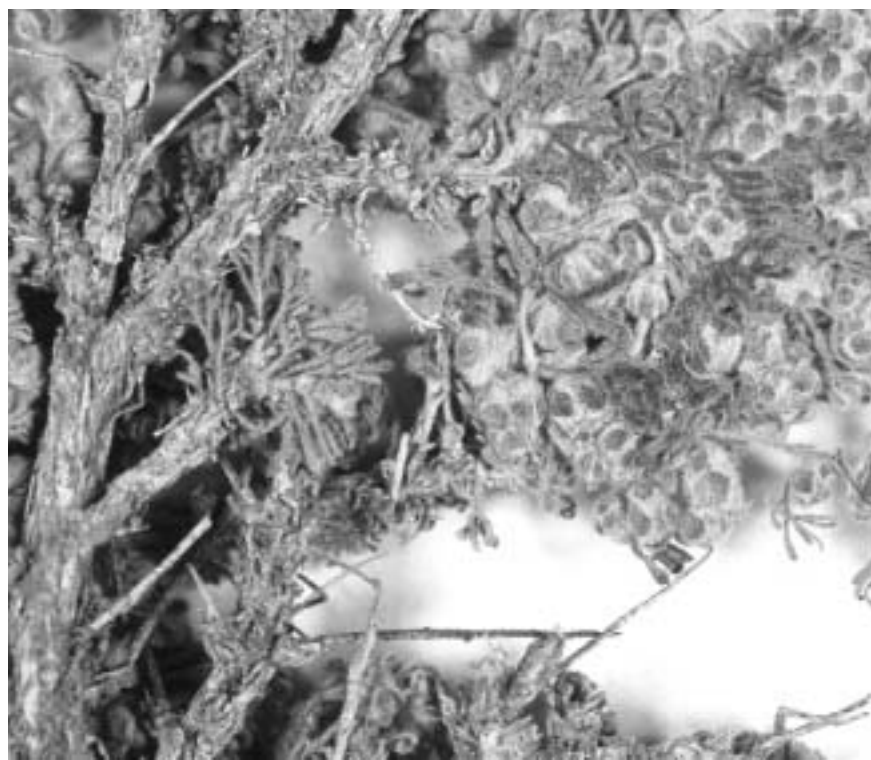
**BUD SAGEBRUSH**  
**(*Artemisia spinescens*)**

Bud sagebrush (*Artemisia spinescens* Eat.) is a subshrub associated with xeric saline areas on plain and foothill sites in southwest and southcentral Montana (Fig. 16). The deciduous leaves on this subshrub fall during the dry period in midsummer. This exposes a stout many branched base with the same white tomentum on the leaders as occurs on the leaves. In the Great Basin, new leaves occur early in February or March and blooming is also very early, generally occurring from late April through late May. In Montana, the same phenological stages occur somewhat later.



Figure 16. Bud sage (*Artemisia spinescens*); leaf detail to right.







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## GLOSSARY

**Alluvial fans** - Deposits of coarse alluvium (sand and gravel), the apex pointing upstream laid down by a stream where it issues from a constricted course, e. g. from a gorge, or to a more open valley or to a plain.

**Alluvial terraces** - Parts of an alluvial flat, in some cases paired by another on the opposite side of the river, left standing as the river cuts down its bed following rejuvenation.

**B-horizon** - The soil layer immediately beneath the A-horizon from which it obtains humic and other organic matter chiefly by illuviation and is usually distinguished by less weathering.

**Canescent** - Gray or white due to short, fine hairs.

**Caudex** - The persistent and often woody swollen base of an otherwise herbaceous perennial.

**Community dominant** - The plant most dominant (important) within a community. It is often the most abundant also, in terms of canopy coverage, but, not necessarily in number.

**Cleft** - Cut or split about halfway to the middle or base.

**Climax** - The final stable community that results after a series of changes (succession) in the vegetation life in a particular area.

**Cobbly** - Naturally rounded, water-worn stone, larger than a pebble, smaller than a boulder.

**Crown** - The persistent base of a herbaceous perennial.

**Cuneate** - Wedge-shaped, triangular and tapering to a point at the base.

**Endemic** - Native to a particular geographic or edaphic area; not introduced.

**Flabelliform** - In the shape of a fan.

**Glandular trichomes** - Hairs bearing glands.

**Involucre** - A whorl of bracts subtending a flower or flower cluster.

**Lance-linear** - Narrowly lanceolate (shaped like a lance, much longer than wide with the widest point below the middle).

**Leader** - The terminal portion of stems on woody plants. It is the current years growth.

**Layer** - The habit of initiating a new plant when a shoot or twig is covered with soil and subsequently initiates new roots.

**Lanceolate** - Shaped like a lance-head, several times longer than wide, broadest toward the base and narrowed to the apex.

**Lax** - Loose with spreading appearance, not compact.

**Linear entire** - Long and narrow with nearly parallel smooth margins.

**Lobed** - Bearing lobes which are cut less than halfway to the base or midvein.

**Mat-forming** - A low-compact growth form.

**Mesic** - Conditions that are in the middle of a moisture continuum. Between xeric (dry) and hydric (water).

**Panicle** - An inflorescence that is essentially a compound raceme, that is, with more than 1 flower on each stalk that arises from each node of the main axis, the central and terminal flowers the youngest.

**Pinnatifid** - Pinnately cleft or lobed half the distance or more to the midrib, but not reaching the midrib.

**Rhizomatous** - Having horizontal underground stems known as rhizomes. Rhizomes provide a means of asexual reproduction.

**Spatulate** - A leaf shape with a rounded blade above gradually tapering to the base.

**Spike** - An unbranched, elongated inflorescence with sessile or subsessile flowers or spikelets maturing from the bottom upwards.

**Spiny** - Bearing spines.

**Suffrutescent** - A growth form in which the plant is slightly woody at the base, but has herbaceous branches.



**Suffruticose** - Very low and woody; diminutively shrubby.

**Talus** - A sloping heap of rock debris at the foot of a cliff or mountain slope.

**Tomentose** - Deeply pubescent with matted woolly hair.

**Tomentum** - Closely implexed woolly hair.

**Viscid** - Glutinous; sticky.

**Xeric** - Having a low or inadequate supply of moisture to sustain plant life.

