

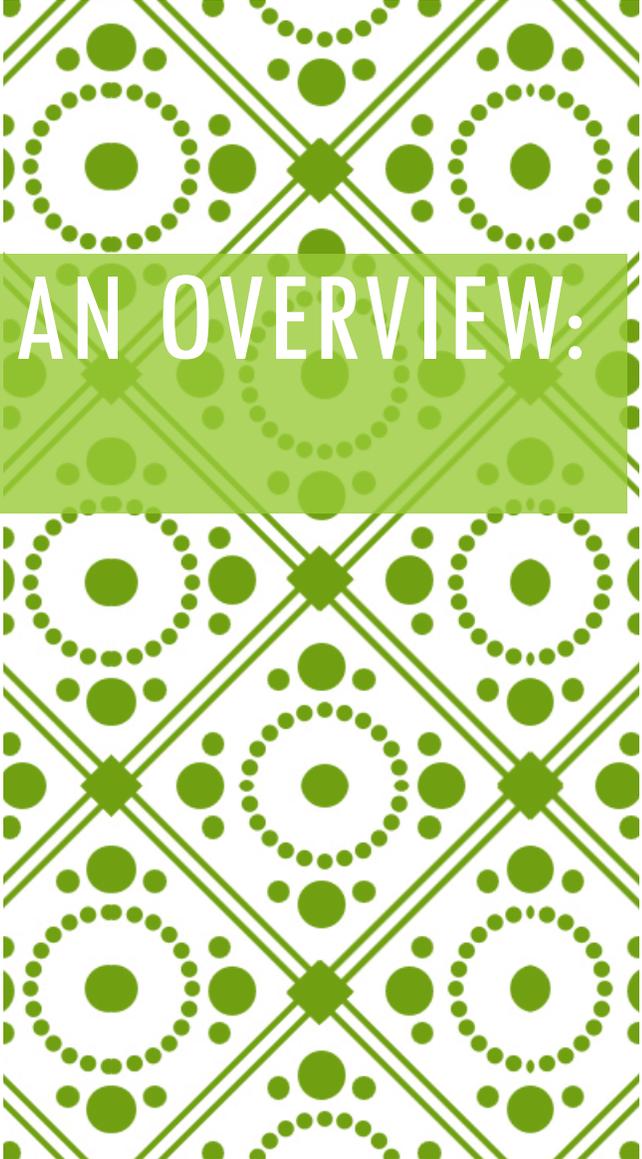
WILLOWS (*SALIX*) OF COLORADO
THEIR ECOLOGY & IDENTIFICATION
BY
GWEN KITTEL

Available as
Spiral bound paperback or an
E-book, 267 pages

PURPOSE OF THIS WORK:

Enable students, restoration ecologists, researchers, and amateur and professional botanists to successfully identify willows





AN OVERVIEW:

All Colorado taxa (40)

Native and Non-native

Taxonomy follows Dorn 2010, with a few exceptions

Introduction to willows and their Ecology

How to Identify willows

Species Descriptions

Glossary

Index

Appendices

Botanical Author Rules

Colorado Willow Author Biographies

Willow species in adjoining states

1) INTRODUCTION TO WILLOWS & ECOLOGY

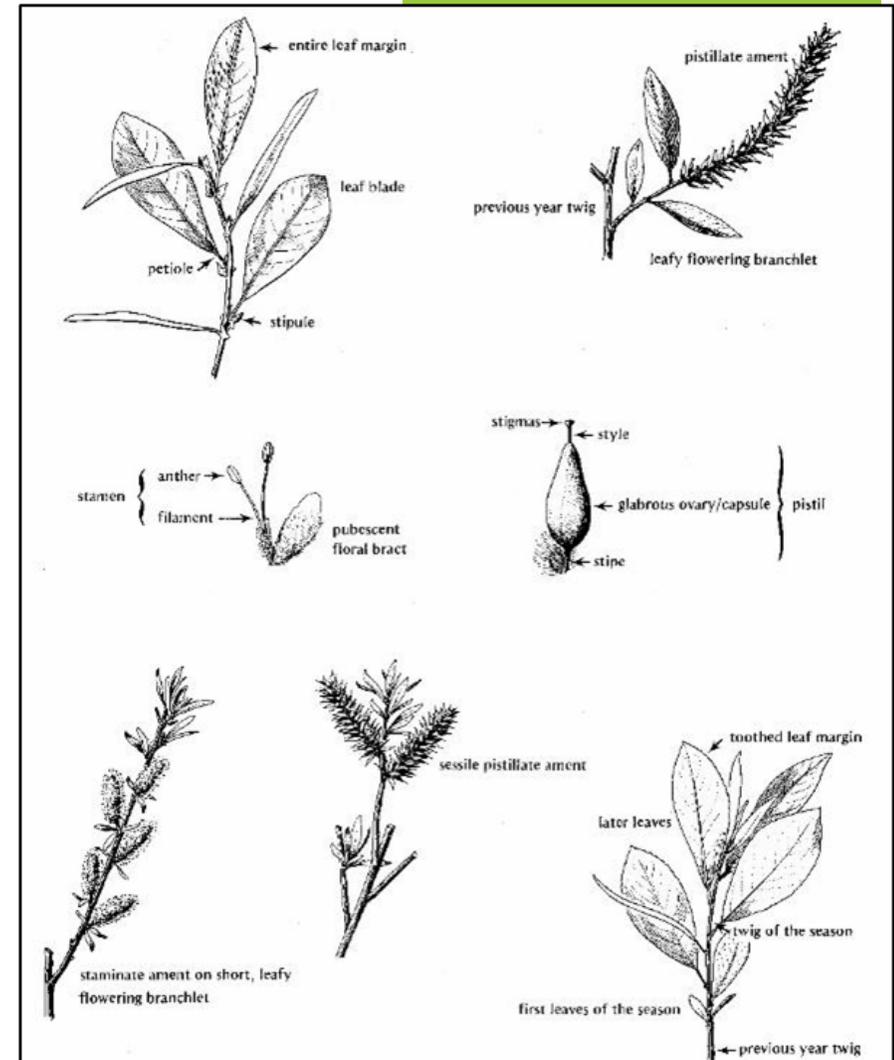
Ecology

Climate Change

Human Cultural Usage and Folklore

2) HOW TO IDENTIFY WILLOWS

- Common Terms Defined and Illustrated
- What to observe in the field
- Four Keys
 - Vegetative, Male and Female Catkins, & Winter/Dormant
- How to make good Collections
- Hybridization
- Taxonomy
- Illustrated Comparisons of Similar Species



TERM ILLUSTRATIONS

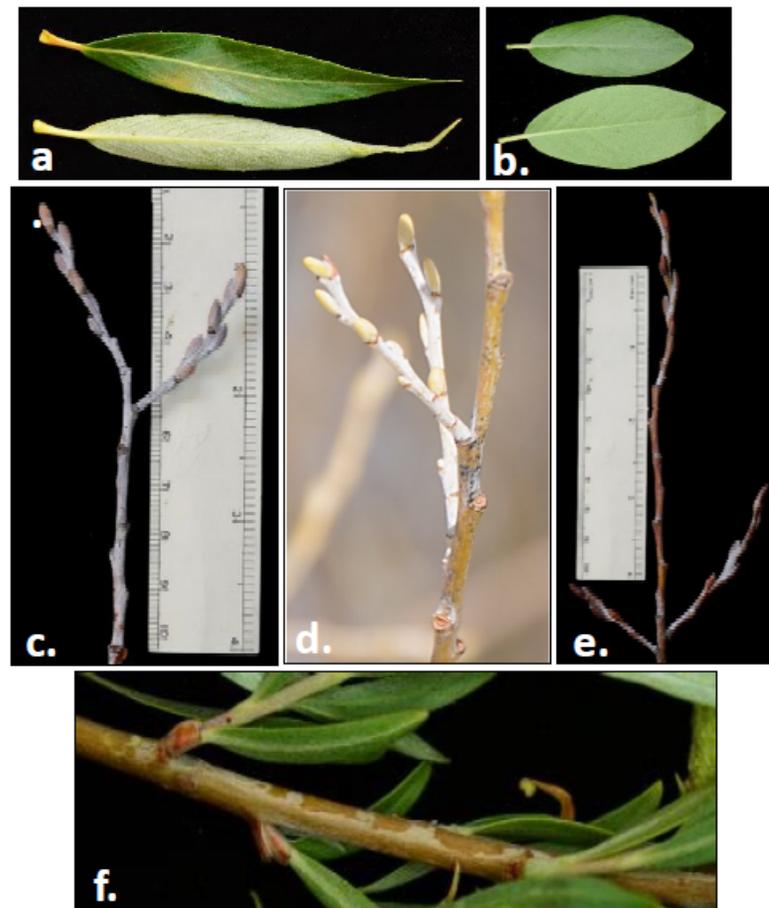


Figure 7. Glaucons Leaves and Pruinoses Stems.

- (a) Glaucons coating occurs on the abaxial (underneath) side of leaves, is difficult to remove, and often results in a strong contrast of color between the top and bottom sides of the leaf—upper leaf top side (adaxial) not glaucous; lower leaf underneath side (abaxial) is glaucous (*Salix lasiandra* var. *lasiandra*.)
- (b) Non-glaucous leaf of *Salix boothii*. Upper: top of leaf, lower: underneath, non-glaucous side.
- (c) Strongly pruinose twigs of *Salix drummondiana*. This waxy coating is easily rubbed off.
- (d) Sometimes not all twigs are pruinose.
- (e) Pruinose can reside only under the buds, as shown on this branch.

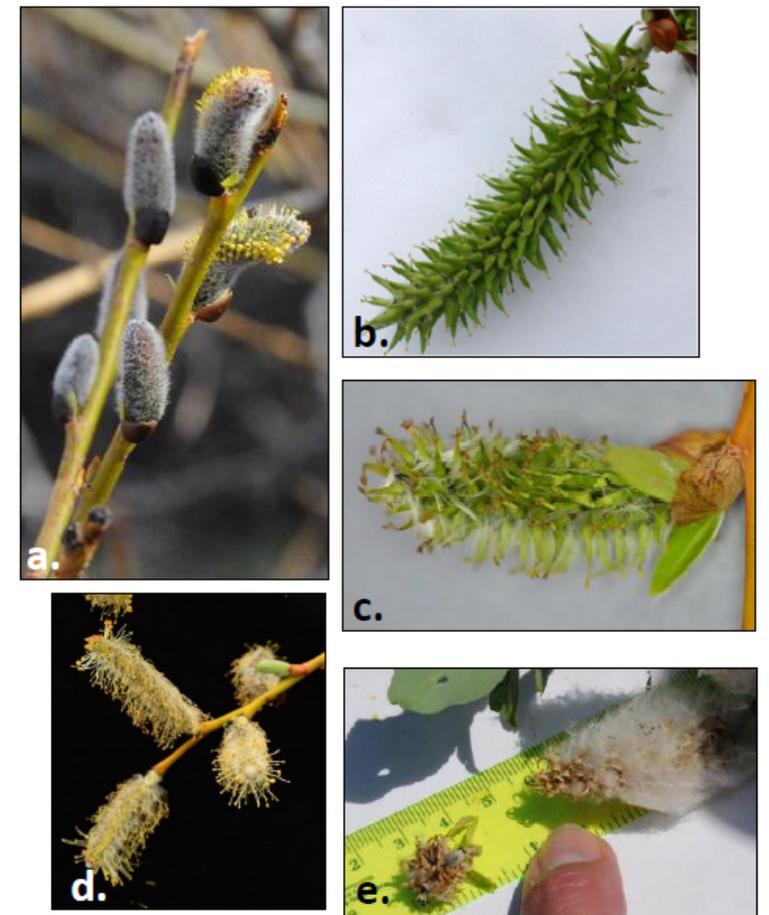


Figure 9. Catkins change and mature throughout the growing season. *Salix monticola* catkins at different stages of the growing season.

- (a) Very early catkins or “pussy willows.” Anthers are just emerging from this male catkin. Note that at this stage we cannot determine the number of stamens per flower, the final length of the catkin, nor if it will have a peduncle (stalk) with or without leaves.
- (b) A mature female catkin: at this stage we can determine capsule pubescence, style, catkin, and peduncle length, and its leafiness.
- (c) An early female catkin.
- (d) A mature male catkin.
- (e) An over-mature female catkin, capsules tend to lose any pubescence by this stage. The white fluffy stuff are seeds emerging.

COMPARISON FIGURES

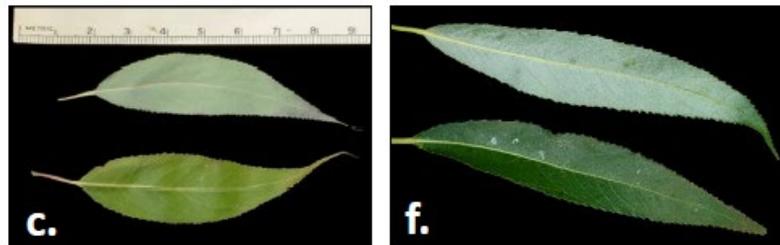
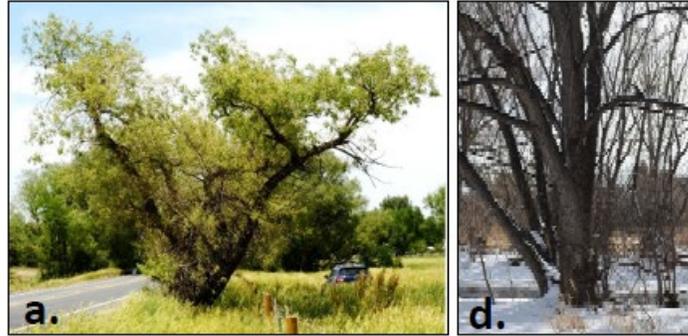


Figure 11. Compare native *Salix amygdaloides* and non-native *Salix fragilis*. Both are trees of lower elevations.

(a, b, c) *Salix amygdaloides* trunks often leaning and/or misshaped. Leaves are pale green, thin, with a long narrow acuminate tip, and weak petioles— so that the leaves appear to dangle from their branches.

(d, e, f) *Salix fragilis* are trunks usually fairly straight and are often multiple. Leaves are dark green, thick with coarse teeth, and long acuminate tip, and strong petioles, so that the leaves are erect on their branches.

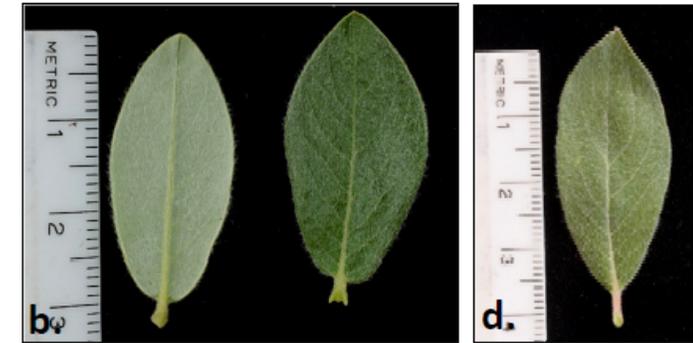


Figure 16. Compare *Salix brachycarpa* and *Salix glauca*.

(a) Both are found in subalpine and alpine habitats, are short shrubs (<4 feet tall), and generally look identical from a distance. Both species' leaves are hairy on both sides.

(b) *Salix brachycarpa* leaf petiole usually <3 mm long.

(c) *Salix brachycarpa* catkins usually < 2 cm long, peduncle 0.2-2 mm.

(d) *Salix glauca* leaf petiole usually >3 mm.

(e) *Salix glauca* catkins usually >2 cm long., peduncle 0.2-3.5 mm.

INFORMATIVE TABLES

Common Willows by Elevation

Rare & Less Common Willows by Elevation

Comparison of FNA with Dorn 2010

Catkin Characteristics



Size	<i>Salix</i> taxa	Timing of Flowers vs. Leaves	Catkin Length (cm)	Peduncle Leafiness	Peduncle Length (cm)	Fl. Bract Color & Persist.	Caps Surface	Caps Length (mm)	# Stam
	<i>alba</i>	coe	(2.5) 3-7	Leafy	(0.3) 1-4	Pale, decid	glabr	3-5	2
	<i>amygdaloides</i>	coe	2.3-11 (12.7)	Leafy	0.3-3.5 (6)	Pale, decid	glabr	3-7	3-7
	<i>babylonica</i>	sub to coe	1-3.5 (4)	Leafy	(0) 0.2-1.5	Pale, decid	glabr	(1.5) 2.8-3.8	2
	<i>fragilis</i>	coe	(2) 4-8	Leafy	1-5	Pale, decid	glabr	4-5.5	2
Trees	<i>gooddingii</i>	coe	1.9-8	Leafy	0.4-3	Pale, decid	glabr occ villous	3-7	4-6 (8)

Table 6. Catkin & Flower Characteristics of Colorado *Salix* Species.

Values in parentheses are rare extremes. Abbreviations used: caps= capsules, coe= coetaneous, pre= precocious, sub= sub-precocious, sero= serotinous, subs=sub-sessile, glabr= glabrous, pube= pubescence, persist=persistence. See glossary for definitions.

Size	<i>Salix</i> taxa	Timing of Flowers vs. Leaves	Catkin Length (cm)	Peduncle Leafiness	Peduncle Length (cm)	Fl. Bract Color & Persist.	Caps Surface	Caps Length (mm)	# Stam	
Trees	<i>alba</i>	coe	(2.5) 3-7	Leafy	(0.3) 1-4	Pale, decid	glabr	3-5	2	
	<i>amygdaloides</i>	coe	2.3-11 (12.7)	Leafy	0.3-3.5 (6)	Pale, decid	glabr	3-7	3-7	
	<i>babylonica</i>	sub to coe	1-3.5 (4)	Leafy	(0) 0.2-1.5	Pale, decid	glabr	(1.5) 2.8-3.8	2	
	<i>fragilis</i>	coe	(2) 4-8	Leafy	1-5	Pale, decid	glabr	4-5.5	2	
	<i>gooddingii</i>	coe	1.9-8	Leafy	0.4-3	Pale, decid	glabr occ villous	3-7	4-6 (8)	
	<i>matsudana</i>	coe	1-3.5 (4)	Leafy	(0) 0.2-1.5	Pale, decid	glabr	(1.5) 2.8-3.8	2	
	<i>nigra</i>	coe	1.7-9	Leafy	0.4-2.3 (4.5)	Pale, decid	glabr (pilose)	3-6	4-6	
	<i>pentandra</i>	coe	2-8.5	Leafy	0.9-9	Pale, decid	glabr	6-9	4-10	
	<i>bebbiana</i>	♂sub ♀coe	0.6-6(8.5)	Leafy	0.1-6	Pale, pers	pube	5-9	2	
	<i>boothii</i>	coe to sub	0.7-6.2(7)	Leafy	0.1-1(1.5)	Dark, pers	glabr	2.5-6	2	
Tall Shrubs	<i>cinerea</i>	pre	2.6-6.5(7.5)	none	Sessile to 0.5(1.0)	Dark, pers	pube	5-6.5	2	
	<i>discolor</i>	pre (coe)	2-8(13.5)	None (leafy)	Sessile to 2.5	Dark, pers	pube	5-11	2	
	<i>drummondiana</i>	pre (sub)	1.5-6(11)	None or leafy	Sessile to subs 0-0.3(6)	Dark, pers	pube	2.5-6	2	
	<i>e. ssp. e.† var. famelica</i>	♂pre to sub, ♀coe	1-7.4 (11.5)	None or leafy	Sessile to 0.9(1.1)	Dark, pers	glabr	3-6	2	
	<i>e. ssp. m.†† var. ligulifolia</i>	coe (sub)	1.5-6	None or leafy	Sessile to 0.9	Dark, pers	glabr	3.5-6	2	
	<i>e. ssp. m.†† var. watsonii</i>	sub to coe	1-6	None or leafy	Sessile to 0.7(1.7)	Dark, pers	glabr	3-5.5	2	
	<i>ssp. exigua</i>	coe or sero	(1)1.5-10	Leafy	0.2-1.8	Pale, decid	glabr or pube	3-5(8)	2	
	<i>ssp. interior</i>	coe or sero	(0.5)1.5-10	Leafy	0.3-1.9	Pale, decid	glabr or pube	(4)5-8(10)	2	
	<i>geyeriana</i>	coe (sub)	(0.1)0.6-2(2.5)	Leafy	0.1-1.2 (1.8)	Pale or dark, pers	pube	3-6	2	
	Tall Shrubs	<i>irrorata</i>	pre or sub	1.4-4.2	None or leafy	Sessile to 0.5	Dark, pers	glabr	3-5	2
		<i>var. lasiandra & var. caudata</i>	coe	1.7-10.3	Leafy	0.5-6.5	Pale, decid	glabr	4-11	3-6
		<i>melanopsis</i>	coe or sero	1.5-8	Leafy	0.3-7	Pale, decid	glabr	4-6	2
		<i>monticola</i>	♂pre - sub, ♀coe	1-5(6)	None or leafy	Subs to 0.8 (1.7)	Dark, pers	glabr	4-7	2
<i>petiolaris</i>		coe (sub)	1-3.9	Leafy	0.08-2	Dark, pers	pube	5-9	2	
<i>planifolia</i>		pre or sub	(1)1.5-6.7 (7)	None	Sessile, subs 0-0.6	Dark, pers	pube	(2.5) 5.5-6	2	
<i>purpurea</i>		pre	1.35-3.6	None	Sessile, subs 0-3	Dark, pers	pube	2.5-5	2*	
<i>scoleriana</i>		pre	1.5-6(9)	None (leafy)	Sessile to 1.3	Dark, pers	pube	4.5-11	2	
<i>serissima</i>		coe	(1)2-5.5(6.5)	Leafy	(0.5)1-5(6.5)	Pale, decid	glabr	(6)7-12	3-9	
Short Shrubs		<i>arizonica</i>	pre to coe	(0.5)1-4	None or leafy	Sessile to 1.2	Dark, pers	glabr	3.2-4.5(5)	2
		<i>boothii</i>	coe to sub	0.7-6.2(7)	Leafy	0.1-1(1.5)	Dark, pers	glabr	2.5-6	2
		<i>brachycarpa</i>	coe	0.5-2(3)	Leafy	0.2-2	Dark, pers	pube	3-6(7)	2
		<i>calicicola</i>	pre	(1.5) 3-7.5 (10)	None	Sessile to 0.5	Dark, pers	glabr	4-9	2
	<i>candida</i>	coe or sub	(0.5) 1-3 (6.6)	Leafy	0.1-1 (3)	Pale or Dark, pers	pube	4-10	2	
	<i>glaucavar. villosa</i>	coe	(2)3-4(6.5)	Leafy	0.2-3.5	Dark, pers	pube	5-9	2	
	<i>myrtillifolia</i>	coe	(1)2-5(8)	Leafy	(0.1) 0.2-1 (2.8)	Dark, pers	glabr	4-6(7)	2	
	<i>planifolia</i>	pre or sub	(1)1.5-6.7 (7.0)	None	Sessile to 0.6	Dark, pers	pube	(2.5)5-6	2	
	<i>wolfii</i>	coe	0.8-2(3)	None or leafy	Subs to 1.2	Dark, pers	glabr	3-5	2	
	Creeping Shrubs	<i>arctica var. petraea</i>	coe	(0.7)1-5.5 (7)	Leafy	(0.2) 1-4 (5.5)	Dark, pers	pube	3-6 (7)	2
<i>cascadensis</i>		coe	0.6-2.6 (3)	Leafy	0.1-2	Dark, pers	pube	3-5	2	
<i>reticulata var. nana</i>		sero	0.5-2(3)	None	0.2-2.0	Dark, pers	pube	1.5-4	2	
<i>reticulata var. reticulata</i>		sero	(0.5)1.5-4(6)	None	(0.4) 0.9-4.0 (6)	Pale or Dark, pers	pube	3.5-5	2	

Size	<i>Salix</i> taxa	Timing of Flowers vs. Leaves	Catkin Length (cm)	Peduncle Leafiness	Peduncle Length (cm)	Fl. Bract Color & Persist.	Caps Surface	Caps Length (mm)	# Stam	
Tall Shrubs	<i>irrorata</i>	pre or sub	1.4-4.2	None or leafy	Sessile to 0.5	Dark, pers	glabr	3-5	2	
	<i>var. lasiandra & var. caudata</i>	coe	1.7-10.3	Leafy	0.5-6.5	Pale, decid	glabr	4-11	3-6	
	<i>melanopsis</i>	coe or sero	1.5-8	Leafy	0.3-7	Pale, decid	glabr	4-6	2	
	<i>monticola</i>	♂pre - sub, ♀coe	1-5(6)	None or leafy	Subs to 0.8 (1.7)	Dark, pers	glabr	4-7	2	
	<i>petiolaris</i>	coe (sub)	1-3.9	Leafy	0.08-2	Dark, pers	pube	5-9	2	
	<i>planifolia</i>	pre or sub	(1)1.5-6.7 (7)	None	Sessile, subs 0-0.6	Dark, pers	pube	(2.5) 5.5-6	2	
	<i>purpurea</i>	pre	1.35-3.6	None	Sessile, subs 0-3	Dark, pers	pube	2.5-5	2*	
	<i>scoleriana</i>	pre	1.5-6(9)	None (leafy)	Sessile to 1.3	Dark, pers	pube	4.5-11	2	
	<i>serissima</i>	coe	(1)2-5.5(6.5)	Leafy	(0.5)1-5(6.5)	Pale, decid	glabr	(6)7-12	3-9	
	Short Shrubs	<i>arizonica</i>	pre to coe	(0.5)1-4	None or leafy	Sessile to 1.2	Dark, pers	glabr	3.2-4.5(5)	2
		<i>boothii</i>	coe to sub	0.7-6.2(7)	Leafy	0.1-1(1.5)	Dark, pers	glabr	2.5-6	2
		<i>brachycarpa</i>	coe	0.5-2(3)	Leafy	0.2-2	Dark, pers	pube	3-6(7)	2
		<i>calicicola</i>	pre	(1.5) 3-7.5 (10)	None	Sessile to 0.5	Dark, pers	glabr	4-9	2
<i>candida</i>		coe or sub	(0.5) 1-3 (6.6)	Leafy	0.1-1 (3)	Pale or Dark, pers	pube	4-10	2	
<i>glaucavar. villosa</i>		coe	(2)3-4(6.5)	Leafy	0.2-3.5	Dark, pers	pube	5-9	2	
<i>myrtillifolia</i>		coe	(1)2-5(8)	Leafy	(0.1) 0.2-1 (2.8)	Dark, pers	glabr	4-6(7)	2	
<i>planifolia</i>		pre or sub	(1)1.5-6.7 (7.0)	None	Sessile to 0.6	Dark, pers	pube	(2.5)5-6	2	
<i>wolfii</i>		coe	0.8-2(3)	None or leafy	Subs to 1.2	Dark, pers	glabr	3-5	2	
Creeping Shrubs		<i>arctica var. petraea</i>	coe	(0.7)1-5.5 (7)	Leafy	(0.2) 1-4 (5.5)	Dark, pers	pube	3-6 (7)	2
	<i>cascadensis</i>	coe	0.6-2.6 (3)	Leafy	0.1-2	Dark, pers	pube	3-5	2	
	<i>reticulata var. nana</i>	sero	0.5-2(3)	None	0.2-2.0	Dark, pers	pube	1.5-4	2	
	<i>reticulata var. reticulata</i>	sero	(0.5)1.5-4(6)	None	(0.4) 0.9-4.0 (6)	Pale or Dark, pers	pube	3.5-5	2	

**purpurea* stamen filaments are united, appearing as one.

† *eriocephala* ssp. *eriocephala*. †† *eriocephala* ssp. *mackenzieana*.

3) SPECIES DESCRIPTIONS

Species Descriptions Section 2 – Tall Shrubs

Salix eriocephala Michx. ssp. *mackenzieana* (Hook.) Dorn var. *ligulifolia* (C.R. Ball) Dorn Description

Ackerfield: *Salix ligulifolia* (C.R. Ball) C. R. Ball ex C.K. Schneid.

Dorn: *Salix eriocephala* Michaux ssp. *mackenzieana* (Hook.) Dorn var. *ligulifolia* (C.R. Ball) Dorn.

FNA: *Salix ligulifolia* (C.R. Ball) C.R. Ball ex C.K. Schneid

Kew: *Salix ligulifolia* (C.R. Ball) C.R. Ball ex C.K. Schneid

USDA: *Salix ligulifolia* (C.R. Ball) C. R. Ball ex C.K. Schneid

Weber: *Salix ligulifolia* C.R. Ball

SALI

Greek *erion* for “wool” and *cephale* for “head,” with a wooly head. “Wooly head” refers to the catkin rachis, which can be covered in dense, curly hairs.” Mackenzie in honor of Alexander Mackenzie (1755?-1820), Scotch fur trader and explorer in Canada, who discovered the Mackenzie River, where he collected the type specimen for this subspecies. Latin *liguli* a “small, tongue shaped strap” and *folia* for “leaf,” meaning narrow, strap-shaped leaves (Borrer 1971, USDA PLANTS DB 2023, Allred 2020).

Common Name(s): Strapleaf Willow.

Identifying Features:

- Current growth twigs and branches reddish or reddish brown
- Leaves strap-shaped, over 5 times long as wide, blueish green
- Catkins mostly coetaneous, floral bracts light brown, styles 0.1-0.7 mm long
- Common, montane

Similar Species: *Salix monticola* has thicker textured leaves, often broader, sometimes yellowish branches, and longer styles; var. *watsonii* has yellowish or greenish branches and usually longer stipes.

Habitat: Stream banks, shores, wetlands, 5,300-9,200 ft. (1,600-2,800 m) in elevation (rounded to the nearest 100 ft./m). Tends to form dense thickets, especially with *Salix monticola*.

Size: Tall shrub to 6 m (20 ft.) high.

Mature leaves: Glaucous underneath, lanceolate to elliptic or occasionally oblong. Petioles 3-12 mm long, convex to flat or shallowly grooved, glabrous, pilose, or velvety to glabrescent adaxially (top side). Leaf blades 5-10 cm long x 1-2.5 cm wide. Margins serrulate to entire. Surfaces glabrous or glabrate.

Stipules: Foliaceous, apex rounded, convex, acute, or acuminate.

Twigs: Year-old branches mostly reddish or reddish-brown, current growth often red on one side and green on the other.

Catkins: Mostly coetaneous (appearing with the leaves), rarely subprecocious (appearing just before the leaves), 2-6 cm long, peduncles 0-0.9 cm long, leafy when present. Capsules glabrous, 3.5-6 mm long, styles 0.1-0.7 mm, and stipes 0.5-2 (2.5) mm long. Stamens 2 per flower, filaments distinct, glabrous or hairy basally, or often connate (attached) to above the middle, sometimes for their entire length. Floral bracts black or brown, persistent, with very curly hairs, especially toward the base, catkin axis can be obscured by dense, wooly hairs.

SPECIES DESCRIPTION CONT'D

Winter ID: Tall shrub, as wide at bases as upper canopy, twigs reddish-brown to yellow-brown to greenish-brown, leaves strap-shaped – the middle section has parallel edges.

CO Literature Synonyms: *Salix ligulifolia* C.R. Ball (Weber & Wittmann 2012a & b, 1990a & b, 1996a & b, 1987a & b, Weber 1967, 1972, 1976). *Salix ligulifolia* (C. R. Ball) C.R. Ball ex C. K. Schneider (Argus 2010, Culver & Lemly 2013, Carter 2006). *Salix lutea* var. *ligulifolia* C.R. Ball (Harrington 1954). *Salix lutea* Nutt. (Weber 1953). *Salix cordata* Muhl. a valid eastern species, misapplied to *Salix eriocephala* var. *ligulifolia* specimens (Porter & Coulter 1874).

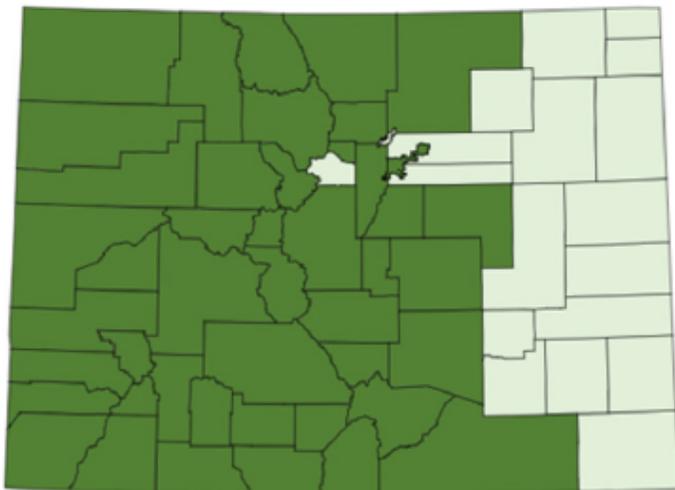
Notes: The species *eriocephala* was described in 1803 by Francois André Michaux, the subspecies *mackenzieana* in 1838 by William Jackson Hooker, the variety *ligulifolia* in 1921 by Carleton Roy Ball, and the newly combined subspecies *mackenzieana* with variety *ligulifolia* by Dorn in 1995. The type specimen of *ligulifolia* is from Apache County, northeastern Arizona. The distribution is in the four corner states, sneaking into southern Wyoming, with two disjunct populations along the Sierra Nevada foothills of California and southern Oregon.

Dorn (2003) notes that glaucousness on the underside of leaves can be absent when plants are grown under the right environmental conditions, that is, under shade (which is rather unusual conditions for willows) and does not mean necessarily genetic crossing. This was shown with an experiment with six Colorado species where *Salix amygdaloides*, *Salix fragilis*, and *Salix planifolia* leaves abandoned glaucousness altogether when grown in shade, and *Salix monticola*, *Salix ligulifolia* and *Salix brachycarpa* leaves grew a weaker glaucousness while in shade (Dorn 2003).

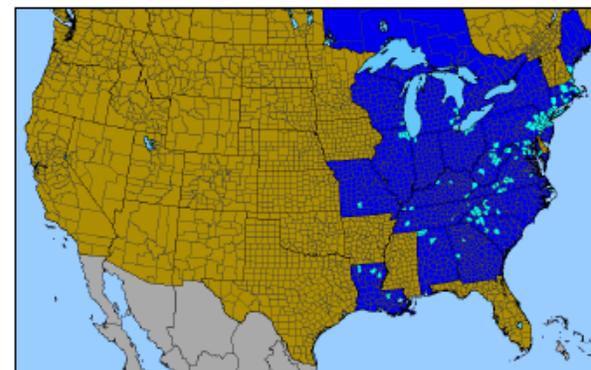
Can have “pine-cone” galls, which are egg-shaped and scaly, about 2-2.5 cm long, and are produced by the willow cone gall midge, *Rhabdophaga strobiloides* (Cranshaw 2010). This species of midge apparently uses a variety of native willows in Colorado.

MAPS

Salix eriocephala ssp. *mackenzieana* var. *ligulifolia*



Salix cinerea





PHOTOS

Species Descriptions Section 2 - Tall Shrubs

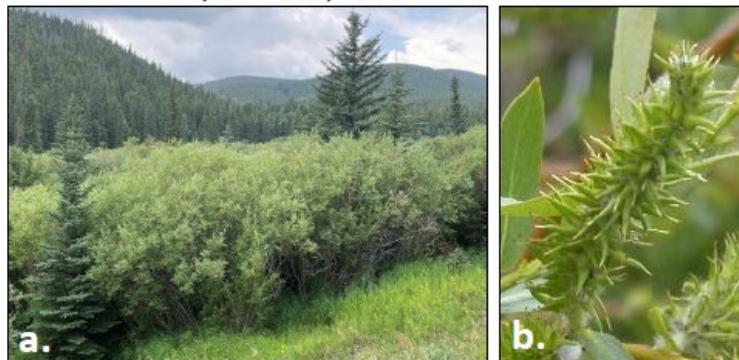
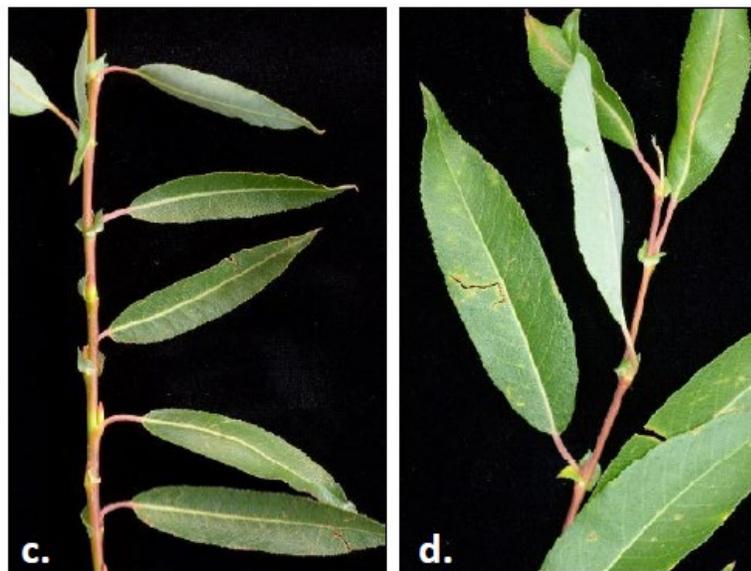


Figure 39. *Salix eriocephala* ssp. *mackenzieana* var. *ligulifolia*, Strapleaf Willow

- (a) Habit— tall shrub, as wide at top as at base, in winter.
- (b) Female catkins, with styles <0.7 mm long.
- (c) Leaves have parallel sides with acute tips, "strap-shaped".
- (d) Leaves are blueish green. Upper surface of leaves dark, underneath surface is glaucous.

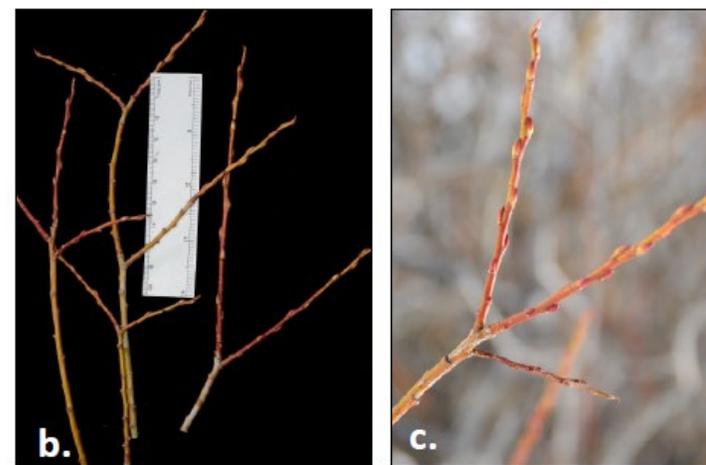


Species Descriptions Section 2 - Tall Shrubs



Figure 40. *Salix eriocephala* var. *ligulifolia* in winter.

- (a.) Tall shrub, as wide at base as upper canopy.
- (b.) Terminal twigs reddish and prior year's twigs greenish yellow.
- (c.) Reddish twigs.



WHO NAMED OUR WILLOWS?

Botanical Authorship Nomenclatural Rules

- Rules for authorship

Mini Biographies

Appendix A. cont'd.

1. **Nils Johan Andersson (1821-1880)**, a Swedish botanist and traveler. Andersson sailed around the world on the frigate HSwMS (His Swedish Majesty's Ship) *Eugenie*, 1851-1853, the first Swedish circumnavigation of the globe. Later he was appointed Professor of Botany at Lund University and was director of the Botanical Department of the Swedish Museum of Natural History and the Botanical Garden of Stockholm. His special interests were *Salix*, *Cyperaceae*, and *Gramineae*. He named five Colorado willow taxa: Geyer willow (*Salix geyeriana* Anderss.), Dewy willow (*Salix irrorata* Anderss.), Gray willow (*Salix glauca* L. var. *villosa* Anderss.), Blueberry Willow (*Salix myrtillofolia* var. *myrtillofolia* Anderss.) (Andersson authored both the species and variety), and Snow willow (*Salix reticulata* L. var. *nana* Anderss.).
2. **Irving Widmer Bailey (1884-1967)**, an American botanist known for his work on plant anatomy. He originally described Autumn willow (*Salix serissima* (Bailey) Fernald), during his freshman year at Harvard University.



THE 7 ADJOINING STATES (APPENDIX B)

AZ, KS, NE, NM, OK, UT, & WY

Neighboring State	# Salix taxa for that State	# Shared w/ CO	% Similarity w/ CO*	Neighboring State Willow (<i>Salix</i>) Taxa Not Found in Colorado. Name by Dorn 2010, FNA name (Argus 2010) in parenthesis, if different, & common name.
Arizona	20	16	36%	<i>Salix bonplandiana</i> Kunth, Bonpland willow
				<i>Salix bonplandiana</i> var. <i>laevigata</i> (Bebb) Dorn (<i>Salix laevigata</i> Bebb), Red willow
				<i>Salix exilifolia</i> Dorn (<i>Salix taxifolia</i> Kunth), Yewleaf willow
				<i>Salix lasiolepis</i> Benth., Arroyo willow
Kansas	14	10	23%	<i>Salix caroliniana</i> Michx., Carolina willow
				<i>Salix eriocephala</i> Michx. ssp. <i>eriocephala</i> var. <i>eriocephala</i> , (<i>Salix eriocephala</i> Michx.), Missouri River willow
				<i>Salix humilis</i> var. <i>humilis</i> Arbust., Prairie willow
				<i>Salix humilis</i> var. <i>tristis</i> (Ait.) Griggs, Dwarf prairie willow



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GLOSSARY, REFERENCES

Glossary

Term	Definitions mostly based on Dorn 1997 and Harris & Harris 1997.
Acuminate	Generally tapering to a sharp point and forming concave sides along the tip. Short acuminate = 1-2 cm, long acuminate =>2 cm
Acute	Tapering to a pointed apex with more or less straight sides
Abaxial	Side facing away from the central axis (or stem), lower, underneath side.
Adaxial	Side facing the central axis (or stem), top or upper side of a leaf, petiole, or floral bract)
Alternate	Leaves borne singly at a node, one leaf at a time at any one node (compare with opposite)
Appressed	Hairs laying down flat, pressed close or flat against leaf surface
Attenuate	Tapering gradually to a narrow tip or base
Blade	Flat, expanded portion of the leaf
Below	Lower or underneath surface, abaxial side of a leaf, facing away from the stem
Branchlet	Small branch
Bud Scales	Modified leaves covering a bud. Willows have just a single scale, cottonwoods have multiple scales.
Caducous	Falling off very early compared to similar structures.
Capsule	Dry fruit developed from the ovary of willow flower, where seeds develop

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