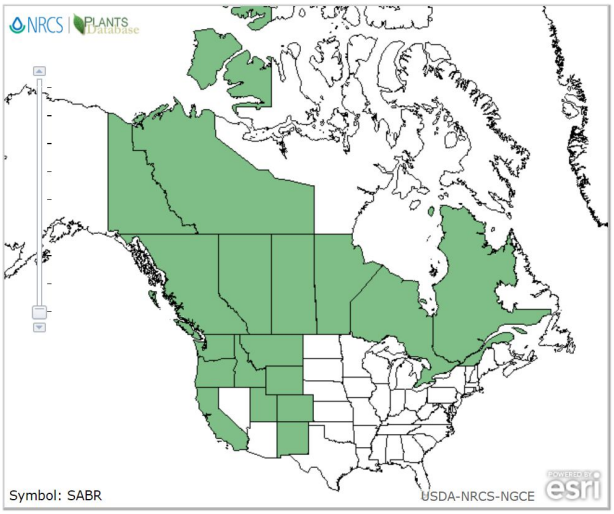
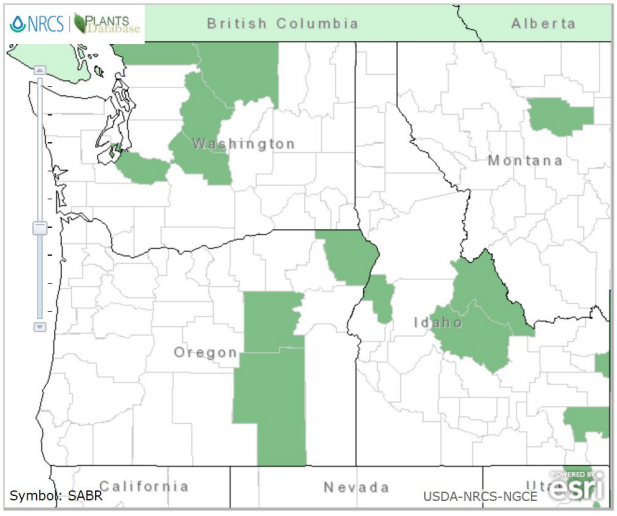
Plant Propagation Protocol for *Salix brachycarpa*
ESRM 412 – Native Plant Production
Protocol URL: https://courses.washington.edu/esrm412/protocols/*SABR.pdf*



North American Distribution[1]



Pacific Northwest Distribution[1]

TAXONOMY	
Plant Family	
Scientific Name	Salicaceae
Common Name	Willow
Species Scientific Name	
Genus	*Salix*
Species	*brachycarpa*
Species Authority	Nutt.
Varieties	*Salix brachycarpa* Nutt. var. *alticola* E.H. Kelso *Salix brachycarpa* Nutt. var. *antimima* (C.K. Schneid.) Raup *Salix brachycarpa* Nutt. var. *fullertonensis* (C.K. Schneid.) Argus *Salix brachycarpa* Nutt. var. *glabellicarpa* C.K. Schneid. *Salix brachycarpa* Nutt. var. *mexia* C.R. Ball *Salix brachycarpa* Nutt. var. *sansonii* C.R. Ball *Salix brachycarpa* Nutt. var. *psammophila* Raup[1]
Sub-species	*Salix brachycarpa* Nutt. ssp. *brachycarpa* *Salix brachycarpa* Nutt. ssp. *fullertonensis* (C.K. Schneid.) Á. Löve & D. Löve[1] *Salix brachycarpa* Nutt. ssp. *niphoclada* (Rydb.) Arugs
Cultivar	N/A

Common Synonym(s)	N/A
Common Name(s)	shortfruit willow, short fruit willow, barrenground willow,
Species Code (as per USDA Plants database)	SABR
GENERAL INFORMATION	
Geographical range	From the southeast Yukon through British Columbia and the northwestern United States south to New Mexico, and east across Canada to Hudson Bay[1,2,3]. In the Pacific Northwest, *S. brachycarpa* is found in the Cascade Mountain range in Washington, the Blue Mountains in Oregon, and the Rocky Mountains of Idaho[1]. See maps above.
Ecological distribution	*S. brachycarpa* is a montane species found on a variety of sites such as alpine slopes, limestone scree, salt flats, and on stream margins[2,4]. It can also be found in swamp margins, bogs, and muskegs[4].
Climate and elevation range	9123-10613 ft (2780.7-3234.8 m)[5]
Local habitat and abundance	Found in cool-cold, moist climates[2,5]. Codominates in many communities with other willow species including *S. planifolia* (diamondleaf willow), *S. alaxensis* (Alaska willow), *S. glauca* (grayleaf willow), and *S. arbusculoides* (littletree willow)[4].
Plant strategy type / successional stage	Obligate Initial Community Species. An early seral species that quickly establishes on exposed gravel and silt bars[4].
Plant characteristics	A low, often prostrate winter deciduous shrub growing 1-6 ft (0.5-2 m) tall[2, 4, 5]. Branches and branchlets are thick, woolly or lanate, and reddish-brown[2]. Leaves are obovate to elliptical and pubescent with especially woolly undersides[2,5]. Dioecious persistent catkins that produce tiny, downy two-valved recalcitrant capsules which can germinate within 12 hours of moist soil contact[4,5].
PROPAGATION DETAILS	
Ecotype	N/A
Propagation Goal	Plants and cuttings
Propagation Method	Vegetative: hardwood or softwood cuttings. Seed propagation is possible but difficult due to limited viability; willows root by cuttings so easily that other methods are seldom necessary[6].
Product Type	Container (plug)
Stock Type	Wild

Time to Grow	Unrooted cuttings can be outplanted immediately between October and April. Rooted cuttings in containers can be outplanted in any season[2].
Target Specifications	4-30 in (10-76 cm)[6]
Propagule Collection Instructions	Hardwood: collect after leaf fall from October-April[2]. Softwood: collect from May-October. Will require shade and mist bench to root[2]. * Without added hormones, willow rooting percentage is about 90-100% [7].
Propagule Processing/Propagule Characteristics	Hardwoods: Take mature, ripened cuttings about 7-10 in (18-25 cm) long and 0.5-1 in (1-2.5 cm) thick[7], with at least 2 nodes. Softwoods: Take at least one node and an internode section about 2in (5cm) long[9].
Pre-Planting Propagule Treatments	Remove leaves from cuttings. Dip cuttings in a fungicidal solution[2] and strike into rooting medium.**
Growing Area Preparation / Annual Practices for Perennial Crops	Prior to striking, cuttings can be stored wrapped in bags (plastic or burlap) with moist peat moss to maintain humidity. Store between 33-39°F (1-5°C)[8]. Rooting medium for hardwood cuttings should be moist, coarse sand (pure or mixed with peat)[2, 10]. Softwoods root better in peat:perlite mixture under shade and mist bench[7]. Strike cuttings in container tubes no smaller than 10 in^3 (164 cm^3) with vertical corrugation[8].
Establishment Phase Details	Bottom heating between 65-68°F (18-20°C) enhances rooting[10]. Water using intermittent mist or flood bottom 2 in (5cm) of containers[8].
Length of Establishment Phase	4-6 weeks
Active Growth Phase	Transplant newly rooted cuttings to 50-75 in^3 (800-1200 cm^3) containers with peat, perlite, and sand mixture[10].
Length of Active Growth Phase	4-6 weeks
Hardening Phase	Reduce irrigation and increase sun exposure to match outplanting conditions. Acclimate to cold conditions.
Length of Hardening Phase	6 weeks
Harvesting, Storage and Shipping	Rooted cuttings are harvested in about 1 year, but would survive out planting at any point[2]. Can be shipped in containers.
Length of Storage	Outplant immediately
Guidelines for Outplanting / Performance on Typical Sites	Avoid outplanting in dry, summer season unless irrigating. Plant each cutting 3 ft (1 m) apart, two spits deep. Compost or bonemeal can be added to amend soil[2]. Willows will continue growing throughout their

	lifespan. *S. brachycarpa* will generate flowers within about 2 years[4]
Other Comments	* *S. brachycarpa* is a dioecious species so ensure collection of both male and female cuttings[4]. **Some sources recommend using a rooting hormone[2,8] but willows have preformed root initials[7] and high levels of auxin[9] which cause them to root very easily and quickly without additional hormones. Willows are considered a source of auxin and can be used to make a low-budget rooting hormone solution known as "willow water"[9].
INFORMATION SOURCES	
References	1.USDA NRCS National Plant Data Team (ND) "Plants Profile for Salix Brachycarpa (shortfruit willow)". USDA Plants Database. United States Department of Agriculture. Accessed April 26 2019. Web. https://plants.usda.gov/core/profile?symbol=SABR 2. Newsholme C (1992) "Willows: The Genus *Salix"*. Timber Press Inc, Portland. Print. 3. Baskin J and Baskin C (2002) "Propagation protocol for production of Container (plug) *Salix brachycarpa* Nutt. plants". University of Kentucky Lexington, Kentucky. Native Plant Network. USDA, Forest Service, National Center for Reforestation, Nurseries, and Genetic Resources. Accessed April 26 2019. Web .https://npn.rngr.net/renderNPNProtocolDetails?selectedProtocolIds=salicaceae-salix-1460&referer=wildflower 4. Coladonato M (1993) "Salix brachycarpa". Fire Effects Information System (FEIS). USDA, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Accessed April 26 2019. Web. https://www.fs.fed.us/database/feis/plants/shrub/salbra/all.html#BOTANICAL%20AND%20ECOLOGICAL%20CHARACTERISTICS 5. "Shortfruit Willow, Salix brachycarpa". Calscape. California Native Plant Society. Accessed 26 2019. Web. https://calscape.org/Salix-brachycarpa-()

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