

Scientific Name: *Salix exigua* Nutt.

Family: *Salicaceae*

Common Names: sand bar willow, coyote willow, narrow leaf willow, desert willow

Plant Description

Perennial, erect, colonial shrubs or small trees, 0.5 to 4 m high, spreads by extensive creeping rhizomes that form thickets (Anderson 2006); branches grayish; leaves parallel-sided linear narrow, 5 to 13 cm long (5 to 20 times as long as wide); apex sharply acute, base tapering, shallowly denticulate margins; linear stipules 7 mm long; catkins 1 to 7 cm long borne on leafy branchlets (Moss 1983).

Fruit: Glabrous capsules, 4 to 7 mm long, narrowly ovoid (Moss 1983).

Seed: Non-dormant seeds, 1 to 2 mm long and 4 mm wide attached to the hairs at the radical end, no endosperm (Zasada et al. 2003).

Habitat and Distribution

Commonly found in riparian communities (Anderson 2006). Pioneer on slough margins and sandy or gravelly floodplains, in wet to moist places along streams, rivers, ditches and roadsides. Intolerant of shade, high tolerance to flooding (Hale et al. 2005). It is the only willow to grow in the lowest and hottest portions of the North American deserts, provided the roots are in moist soil (Anderson 2006).

Soil: Tolerant to a wide range of soil textures and soil types. Bare gravel or sand substrate with adequate moisture (Anderson 2006).

Distribution: Alaska, Yukon, District of Mackenzie to New Brunswick south to California, Texas, Louisiana, Kentucky, and New Jersey (Moss 1983).

Phenology

Flowers May to July, fruit ripens June to July.



***Salix exigua* growing on a reclaimed site in Alberta.**

Pollination

Insects, commonly bees (Anderson 2006). *Salix* species are also pollinated by wind (Macdonald 1986).

Seed Dispersal

Seed are attached to pappus for wind dispersal.

Genetics

$2n=38$ (Moss 1983).





Salix exigua spreading in lines from a parent plant (off to the right) on a revegetated site.

Seed Processing

Collection: Because *Salix* seeds are quickly dispersed by wind, branches may be cut just before seed dispersal and placed in water for easier seed collection. Seeds are then easily stripped from branches (Macdonald 1986).

Seed Weight: 0.0454 g/1,000seeds (Young and Young 1992).

Seed/Fruit: 25 (15 to 36) seeds/capsule (Zasada et al. 2003).

Harvest Dates: When catkins change from green to yellow-brown (June to July). For most efficient seed extraction, wait until the capsules begin to open (Zasada et al. 2003).

Cleaning: Dried seeds separate from the cotton if tumbled or shaken (Zasada et al. 2003).

Storage Behaviour: Possibly orthodox; seed should be dried prior to storage at freezing temperatures (Royal Botanic Gardens Kew 2008).

Storage: Seed, dried to approximately 6% to 10% of dry weight, can be stored in sealed containers under constant humidity (Zasada et al. 2003).

Longevity: Stored at 1 to 5°C, dried seeds can remain viable for up to 6 months; if stored at subfreezing temperatures (-10 or -20°C) can last up to 36 to 44 months (Zasada et al. 2003).

Propagation

Natural Regeneration: Regenerates by suckering from root system (Zasada et al. 2003) and by seed (Gerling et al. 1996).

Germination: Seeds require light for germination (Anderson 2006).

Fresh seeds will germinate within 12 to 24 hours if kept constantly moist (USDA NRCS n.d.).

Pre-treatment: None required.

Direct Seeding: Direct seeding of fruit was not successful in a trial in northeast Alberta (Smreciu et al. 2008).

Vegetative Propagation: Root and twig cuttings (Tannas 1997). If planted in early spring, hardwood cuttings can root rapidly (USDA NRCS n.d.). Hardwood cutting (18 to 25 cm long and 1.3 to 2.5 cm thick) should be collected and prepared for insertion from November to March; no rooting hormone required; 90% to 100% (Dirr and Heuser 1987).

Cuttings (particularly hardwood) were a successful propagation method on wetland sites in the oil sands reclamation area in Fort McMurray.

Aboriginal/Food Uses

Medicinal: Salicin is a chemical derived from the plant and, chemically, it is related to acetylsalicylic acid (the active ingredient in Aspirin). These chemicals were used by the Native North Americans in preparations to treat toothache, stomach ache, diarrhea, dysentery and dandruff (Anderson 2006). Willow roots were mixed with grease from animal kidneys and used to treat scalp sores and dandruff (Wilkinson 1990).

Other: The bark was used by the Woods Cree to make fishing nets, as an aid in canoe-making and as all-purpose cord. Stems were used to make rims for baskets, bows and arrows, bead weaving looms, and fish roasting sticks. Flexible branches were also used in the construction of backrests and sweat lodges (Tannas 1997).

The inner bark was shredded to make diaper linings and wound dressings. Leaves used to wrap and serve fish (Wilkinson 1990).



Wildlife/Forage Uses

Wildlife: Excellent forage value (Gerling et al. 1996).

Important food source for beaver, moose and elk. Good to fair browsing for mule deer. Dense stands provide cover for wildlife such as waterfowl, small non-game birds, small mammals, white-tailed deer and mule deer (Anderson 2006).

Livestock: One of the less palatable willows (Tannas 1997). High browsing tolerance because of its ability to spread rapidly and form extensive colonies (Tannas 1997).

Fair browse for sheep, fair to poor browse for cattle (Anderson 2006).

Grazing Response: Decreases in response to grazing and heavy utilization may eliminate this species from riparian areas (Hale et al. 2005).

Reclamation Potential

Coyote willow is easily propagated (USDA NRCS n.d.). Once planted, sandbar willow requires little care (Stevens et al. 2003).

Because of its rapid rhizome spreading and dense colony formation (thickets may be several metres in diameter) it can be used as an increaser, declining once trees and shrubs become established (Tannas 1997).

Used to stabilize sand and gravel deposits thus allowing other species to grow (Anderson 2006).

Often found as a natural pioneer on disturbed sites along waterways. In riparian habitats, the dense root system of sandbar willow can serve as an effective shallow groundwater filter and can form overhanging banks which provide habitat for fish and other aquatic living organisms (Stevens et al. 2003).

Resilient to natural disturbances (sediment deposition, flooding, high winds, heavy precipitations, and wildlife browsing) (USDA NRCS n.d.).

Commercial Resources

Availability: This species is prolific and cuttings can often be harvested from natural sites without harm to

the parent site. Numerous nurseries and companies in Alberta and Saskatchewan will contract harvest and production of coyote willow.

Cultivars: Greenbank (Northern Great Plains cultivar) (Stevens et al. 2003). Not suitable for reclamation purposes in northeastern Alberta.

Uses: Stabilization of stream bank and lakeshore; development and restoration of riparian habitat and erosion control (Stevens et al. 2003). Flexibility of stems makes it ideal for basket weaving (Hale et al. 2005).

Notes

Well-adapted to fires, will sprout from roots and its numerous wind-dispersed seeds play an important part in the revegetation of burned areas. Because of its typical streamside habitat, which has higher soil moisture content, sandbar willow communities may act as natural fire breaks (Anderson 2006).

Photo Credits

Photos: Wild Rose Consulting, Inc.

References

Anderson, M., 2006. *Salix exigua*. IN: Fischer, W.C. (compiler). The fire effect information system. United States Department of Agriculture, Forest Service, Intermountain Research Station, Intermountain Fire Sciences Laboratory. Missoula, Montana.
<http://www.fs.fed.us/database/feis/plants/shrub/salexii/introductory.html> [Last accessed June 12, 2013].

Dirr, M.A. and C.W. Heuser, 1987. The reference manual of woody plant propagation: From seed to tissue culture: A practical working guide to the propagation of over 1100 species, varieties, and cultivars. Varsity Press, Athens, Georgia. 239 pp.

Gerling, H.S., M.G. Willoughby, A. Schoepf, K.E. Tannas and C.A Tannas, 1996. A Guide to Using Native Plants on Disturbed Lands. Alberta Agriculture, Food and Rural Development and



Alberta Environmental Protection, Edmonton, Alberta. 247 pp.

Hale, G., N. Ambrose, A. Bogen, K. Spicer-Rawe, M. Uchikura and E. Saunders, 2005. Sandbar Willow *Salix exigua*. IN: A Field Guide to Common Riparian Plants of Alberta. Cows and Fish Program, Lethbridge, Alberta. p. 20.

Macdonald, B., 1986. Practical woody plant propagation for nursery growers. Timber Press, Inc., Portland, Oregon. 669 pp.

Moss, E.H., 1983. Flora of Alberta. A manual of flowering plants, conifers, ferns, and fern allies found growing without cultivation in the province of Alberta, Canada. 2nd edition. University of Toronto Press, Toronto Ontario. p. 207.

Royal Botanic Gardens Kew, 2008. *Salix exigua*. Seed Information Database. <http://data.kew.org/sid/SidServlet?ID=20211&Num=12d> [Last accessed June 14, 2013].

Smreciu, A., M. Pahl and K. Gould, 2008. Establishment of native boreal plant species on reclaimed oil sands mining disturbances. Interim Report, prepared for Canadian Oil Sands Network for Research and Development (CONRAD). 36 pp.

Stevens, M., G. Fenchel and C. Hoag, 2003. Coyote willow: *Salix exigua* Nutt. USDA plant guide fact sheet.

http://plants.usda.gov/plantguide/pdf/cs_saex.pdf [Last accessed June 12, 2013].

Tannas, K., 1997. Common plants of the western rangelands. Volume 1 – Grasses, grass-like species, trees and shrubs. Lethbridge Community College, Lethbridge, Alberta. 311 pp.

USDA NRCS, n.d. *Salix exigua* Nutt. – narrowleaf willow. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana.

<http://plants.usda.gov/java/profile?symbol=SAEX> [Last accessed June 24, 2013].

Wilkinson, K., 1990. Sandbar Willow; Coyote Willow; Silver Willow *Salix exigua*. IN: Trees and Shrubs of Alberta. A Habitat Field Guide. Lone Pine Publishing, Edmonton, Alberta. pp. 76-77.

Young, J.A. and C.G. Young, 1992. Seeds of woody plants in North America. Dioscorides Press, Portland, Oregon. 407 pp.

Zasada, J.C., D.A. Douglas and W. Buechler, 2003. *Salix* L.: willow. In: Woody plant seed manual. <http://www.nsl.fs.fed.us/S%20genera.pdf> [Last accessed July 18, 2013].

