Scientific Name: *Cornus sericea* ssp. *sericea* L. **Family:** *Cornaceae*

Common Names: red-osier dogwood, dogwood, red willow

***Cornus sericea* ssp. *sericea* a. branch with inflorescence. b. fruit. c. individual flower. d-e. seeds.**

Plant Description

Deciduous, perennial, upright shrub, 1 to 3 m high, with spreading rhizomes; lower branches often prostrate; deep-red (green-purple) pubescent twigs; oval to ovate-lanceolate leaves 2 to 6 cm long, glaucous beneath; flat-topped terminal clusters of many white flowers with 2 to 3 mm long petals (Moss 1983).

Fruit: White round drupe, succulent, 6 to 8 mm in diameter (Banerjee et al. 2001).

Seed: 3.5 to 5 mm oval stone, 1 to 2 embryos, grey to deep brown with pale striations, smooth.

Habitat and Distribution

Common in moist woods, ponds, riverbanks, thickets, clearings and coulees throughout the Canadian prairies (Moss 1983). Also, found in river flood plains.

Seral Stage: Early to late seral species.

Soil: Found on well drained to poorly drained soils. Most successful on free draining soils with adequate moisture availability. Tolerant of a wide range of pH values (3.2 to 8.0), preference for nutrient rich sites (Smithberg 1974). In a greenhouse study, Mustard and Renault (2006) found that NaCl reduced shoot dry mass and height.

Distribution: Widespread across Alberta (boreal forest, aspen parkland and Rocky Mountains). Alaska, Yukon, western District of Mackenzie to James Bay, Newfoundland south to California, Arizona, New Mexico, Nebraska, Ohio, West Virginia, Pennsylvania (Moss 1983).

Phenology

Flowers April to August (September). Fruit ripens from mid-July to mid-October in north-eastern Alberta. Fruit bearing at 3 to 4 years of age (Rook 2002).

Pollination

Cross-pollinated by *Andrena, Apis* and *Bombus* spp. (Gunatilleke and Gunatilleke 1984), some beetles, flies and butterflies (Eyde 1988).

Seed Dispersal

Used for food by white-tailed deer, mule deer, elk, mountain goats, cottontail rabbits, snowshoe hares, and numerous birds (Gucker 2012) and black bears and beavers (Smithberg 1974), all of which may disperse seed.

Genetics

2n=22 (Moss 1983).

Symbiosis

Endomycorrhizal inoculation with *Glomus fasciculatum and Glomus macrocarpum* during propagation significantly increases the growth of the plant during later stages of development (Verkade et al. 1988).

***Cornus sericea* berries.**

Seed Processing

Collection: Berries are easily shaken or picked from taller bushes or trees. Large clumps make collection particularly easy. Seeds should not be picked from isolated plants to avoid the risk of self-sterile seed or empty fruit collection (Young and Young 1992).
Seed Weight: 24.7 to 28.6 g/1,000 seeds (27.0 average).
Fruit/Seed Volume: 2,050 to 2,890 fruit/L (2,460 average), 2,460 seeds/L fruit.
Fruit/Seed Weight: 4,520 to 5,470 fruit/kg (4,900 average).
4,900 seeds/kg fruit.
Average Seeds/Fruit: 1 seed/fruit (occasionally with 2 embryos).
Harvest Dates: Collect in late July to late August in north-eastern Alberta; September 1 to September 30 (Formaniuk 2013). Harvest as soon as fruits are ripe (snowy white to blue tinged) (Banerjee et al. 2001).
Cleaning: Mash fruit in a sieve (1.40 mm works well). A blender with taped blades may also be used to macerate the fruit. Suspend residue in water allowing seeds to settle. Decant water and chaff. Repeat suspension and decanting until only seeds remain. Allow seed to dry at room temperature.
Storage: Store dry in sealed containers at cool temperatures (3 to 5°C) (Roof 2008, Young and Young 1992).
Longevity: 4 to 8 years when stored in sealed glass containers at 1 to 3°C (Harrington et al. 1999, Smithberg 1974).

Propagation

Natural Regeneration: Both by seed and vegetative means (new shoots from roots and prostrate branches) (Gucker 2012). Will produce stolons in very moist soil. Reproduces from sprouts and root shoots (Hardy BBT 1989, Smithberg 1974).
Germination: 11% in 30 days from 1 or 2 year old seeds harvested in north-eastern Alberta.
Pre-treatment: McTavish and Shopik (1983) recommend 60 to 90 days cold stratification at 1°C. Needs 60 days cold stratification (Wood pers. comm.). Both Nichols (1934) and Young and Young (1992) recommend 2 to 3 months cold stratification at 3 to 5°C. Formaniuk (2013) recommends 120 days stratification.
Seeds may be stored at cold temperatures for a month and then stratified for a month using light dark cycles during incubation (Acharya et al. 1991). The short warm stratification period can be replaced with mechanical scarification or by bathing the seeds in sulphuric acid (Roof 2008).
Direct Seeding: Less than 1% emergence from seeds sown in north-eastern Alberta. Sowing intact fruit results in numerous robust seedlings (> 7% emergence for fall sown fruit). Fruit should be

sown immediately after harvest. Sow seeds using drills and occasionally broadcast (Roof 2008). If using frozen stored berries, fall sowing resulted in slightly better emergence than spring sowing. Young seedlings are drought intolerant.

Seeds sown in a nursery should be at a soil depth of 0.6 to 1.25 cm (0.25 to 0.5 in) (Roof 2008). Beds sown in the fall should be mulched during the winter (Roof 2008).

Seeding Rate: 100 seeds/m² and 50 fruits/m² to obtain 1 to 4 plants/m².

Vegetative Propagation: Hardwood pole cuttings placed directly are often successful (Smreciu and Barron 1997). Can establish from softwood stem and root cuttings in high moisture conditions (Hartmann et al 1990, Tannas 1997). 80% rooting using hardwood cutting with seradix #2 treatment in a mixture of 1:1:1 peat/sand/reground styrofoam chips with 16 °C bench heat (McTavish and Shopik 1983). Meilleur et al. (1997) report larger crown diameters 3 years after layering.

Root cuttings from early August were found to be 100% rooted within 5 weeks, while those cut mid-April were 90% rooted within 8 weeks (Gucker 2012).

French layering and/or division are also effective (Roof 2008).

Can be grown as a bare-root, containerized, or balled and burlapped plant (Pijut 2004).

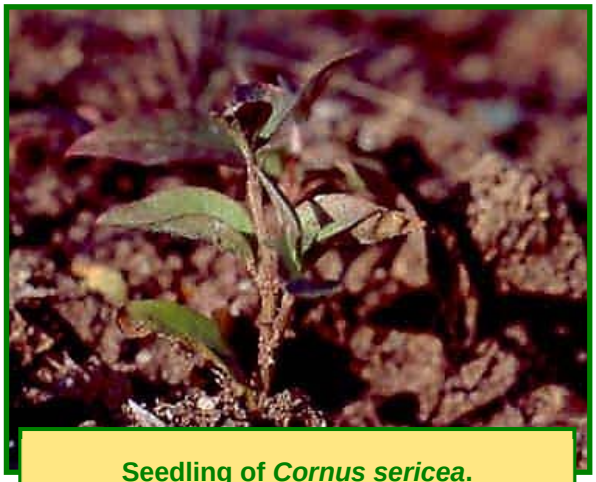
Greenhouse Timeline: 12 weeks in greenhouse before out planting. Dormant seedlings can be stored frozen overwinter for spring or early fall planting (Wood pers. comm.). Grow for 90 days before harvest (Formaniuk 2013).

Aboriginal/Food Uses

Food: Some tribes mix the berries with other sweeter berries (Turner 1997).

Medicinal: Tea made from roots is used to treat dizziness; tea from stems is used to relieve chest trouble, as an emetic, or for coughs and fevers. A decoction made from the bark is used as a laxative. Peeled bark mixed with other plants and boiled can treat sore eyes. A wash, made of fruit or stem pith, is used to treat snow blindness or cataracts. A decoction made from ripe fruit can treat tuberculosis. A decoction made of roots mixed with other herbs is used to treat diarrhoea in children (Marles et al. 2000).

Other: Thicker stems can be used to make ribs for spruce bark canoes (Marles et al. 2000). Has been used by the First Nations people to make dream catchers, dye, baskets, tanning hides as well as arrows and other tools. They also used *C. sericea* as a toothbrush because the twigs can whiten teeth. Various native cultures have used the inner bark of *C. sericea* in the tobacco mixture for smoking the sacred pipe (Turner 1997, USDA NRCS n.d.).



Seedling of *Cornus sericea*.

Wildlife/Forage Uses

Wildlife: One of the most valuable browse species in Alberta (Tannas 1997) especially for moose. Used for food and cover by white-tailed deer, mule deer (heavy summer use) elk, mountain goats, cottontail rabbits, snowshoe hares, and numerous birds (Gucker 2012) including ruffed grouse (Hardy BBT 1989). Berries are also eaten by black bears and beavers (Smithberg 1974).

Livestock: Mature leaves are relatively unpalatable to livestock however, the young sprouts are palatable. It is not a preferred species for livestock browse (Gucker 2012).

Grazing Response: Resistant to heavy browsing (Tannas 1997). Extensive deer browsing increases branching and fruit/seed production on reclaimed sites (Smreciu and Barron 1997).

Reclamation Potential

High tolerance for oil and high salinity oil sands tailings water (Hardy BBT 1989, Renault et al. 1999).
Grows successfully (from container seedlings) on various reclamation sites (Fedkenheuer et al. 1980, Fung 1984, Smreciu and Barron 1997).
Dogwood has a high tolerance to sodium and sulphate enriched consolidated tailings water (Renault et al. 1998).
C. sericea is a prolific seed producer (Smreciu and Barron 1997).
Useful in stabilization of eroding stream banks. Rooting from cuttings may accelerate this stabilization. Rapid growth and easy establishment of seedlings and transplants make it an ideal reclamation species.

Commercial Resources

Availability: Produced commercially by several Alberta and Saskatchewan nurseries. Seeds have been collected by the Oil Sands Vegetation Cooperative for use in the Athabasca oil sands region.
Cultivars: Numerous horticultural cultivars are available but these are not suitable for reclamation.
Uses: As an ornamental shrub, and dried or preserved floral product (Marles et al. 2000). Common for windbreaks and border plantings (Smithberg 1974).

Notes

C. sericea is listed as 89% intact (less occurrences than expected) in the Alberta oil sands region (Alberta Biodiversity Monitoring Institute 2014).
Red-osier dogwood is able to tolerate extremely cold temperatures, and flooding. It is a semi fire-tolerant, seed banking species that generally increases in abundance following a fire (Gucker 2012).
Synonym: *Cornus stolonifera* (Pijut 2004, Rook 2002).

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References

Acharya, S., G. Schaalje, R. Hermesh and C. Chu, 1991. Factors affecting red-osier dogwood seed germination. Canadian Journal of Botany 70(5): 1012-1016.

Alberta Biodiversity Monitoring Institute, 2014. The status of biodiversity in the oil sands region of Alberta. Alberta Biodiversity Monitoring Institute, Edmonton, Alberta. 47 pp. http://www.abmi.ca/FileDownloadServlet?filename=The%20Status%20of%20Biodiversity%20in%20the%20Oil%20Sands%20Region%20of%20Alberta_2014_Supplemental%20Report.docx&dir=REPORTS_UPLOAD [Last accessed June 16, 2014].

Banerjee, S.M., K. Creasey and D.D. Gertzen, 2001. Native woody plant seed collection guide for British Columbia. British Columbia, Ministry of Forests, Tree Improvement Branch, Victoria, British Columbia. 147 pp.

Eyde, R.H., 1988. Comprehending *Cornus*: Puzzles and progress in the systematics of dogwoods. Botanical Review 54(3): 233-351.

Fedkenheuer, A.W., H.M. Heacock and D.L. Lewis, 1980. Early performance of native shrubs and trees planted on amended Athabasca oil sand tailings. Reclamation Review 3: 47-55.

Formaniuk, S., 2013. "It's all in the timing". Canadian Reclamation 13(2): 26-31.

Fung, M.Y.P., 1984. Vegetative propagation of native shrubs in the Fort McMurray Area, Alberta, Canada. The Plant Propagator 30(4): 7-9.

Gucker, C., 2012. *Cornus sericea*. IN: Fischer, W.C. (compiler). The fire effects 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/corser/introductory.html [Last accessed July 18, 2013].

Gunatilleke, C.V.S. and I.A.U.N. Gunatilleke, 1984. Some observations on the reproductive biology of three species of *Cornus (Cornaceae*). Journal of the Arnold Arboretum 65: 419-427.

Hardy BBT Limited, 1989. Manual of plant species suitability for reclamation in Alberta - 2ndEdition. Alberta Land Conservation and Reclamation Council Report No. RRTAC 89-4. 436 pp. http://hdl.handle.net/10402/era.22605 [Last accessed May 15, 2013].

Harrington, C.A., J.M. McGrath and J.M. Kraft, 1999. Propagating native species: experience at the Wind River Nursery. Western Journal of Applied Forestry 14(2): 61-64. http://www.fs.fed.us/pnw/olympia/silv/publications/opt/422_HarringtonEtal1999.pdf [Last accessed October 7, 2013].

Hartmann, H.T., D.E. Kester and F.T. Davies, 1990. Plant propagation: Principles and practices 5th Edition, Prentice Hall, Englewood Cliffs, New Jersey. 647 pp.

Marles, R.J., C. Clavelle, L. Monteleone, N. Tays and D. Burns, 2000. Aboriginal plant use in Canada's northwest Boreal Forest. Natural Resources Canada and Canadian Forest Service. UBC Press, Vancouver, British Columbia. 368 pp.

McTavish, B. and T. Shopik, 1983. Propagation and use of native woody plants in northern latitudes. IN: Reclamation of lands disturbed by mining. Proceedings of the Seventh Annual British Columbia Mine Reclamation Symposium. Technical Research Committee on Reclamation, Mining Association of British Columbia, Victoria. pp. 159-181.

Meilleur, A., H. Veronneau and A. Bouchard, 1997. Shrub propagation techniques for biological control of invading tree species. Environmental Management 21(3): 433-442.

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. 435.

Mustard, J. and S. Renault, 2006. Response of red-osier dogwood (*Cornus sericea*) seedlings to NaCl during the onset of bud break. Canadian Journal of Botany 84: 844-851.

Nichols, G.E., 1934. The influence of exposure to winter temperatures upon seed germination in various Native American plants. Ecology 15(4): 364-373.

Pijut, P.M., 2004. *Cornus sericea* L. IN: Francis, J.K. (ed.). Wildland shrubs of the United States and its territories. Thamnic. Vol. 1. General Technical Report IITF-26. U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry, Rio Piedras, Puerto Rico. pp. 249-251. http://www.fs.fed.us/global/iitf/pdf/shrubs/Cornus%20sericea.pdf [Last accessed May 27, 2013].

Renault, S., E. Paton, G. Nilsson, J.J. Zwiazek and M. MacKinnon, 1999. Responses of boreal plants to high salinity oil sands tailings water. Journal of Environmental Quality 28: 1957-1962.

Rook, E.J.S., 2002. *Cornus sericea* Red osier dogwood. IN: Plants of the North. http://www.rook.org/earl/bwca/nature/shrubs/cornusser.html [Last accessed July 17, 2013].

Roof, L., 2008. *Cornus sericea, C. stolonifera* Michx. Red osier dogwood. University of Washington, Seattle, Washington. http://courses.washington.edu/esrm412/protocols/COSES.pdf [Last accessed July 18, 2013].

Smithberg, M., 1974. Red-Osier Dogwood. USDA Forest Service, General Technical Report NE 9:44-47.

Smreciu, A. and D. Barron, 1997. Clover Bar Landfill site revegetation and naturalization. Phases 1, 2 and 3a (1994-1997). Prepared for the City of Edmonton, Asset Management and Public Works Department, Waste Management Branch. 118 pp. + Appendices.

Tannas, K., 1997. Common plants of the western rangelands. Volume 2 – Forbs. Lethbridge Community College. Lethbridge, Alberta. 310 pp.

Turner, N.J., 1997. Red osier dogwood *Cornus sericea* L. IN: Food Plants of Interior First Peoples. Royal British Columbia Museum Handbook, Victoria, British Columbia. pp. 106-107.

USDA NRCS, n.d. *Cornus sericea* L. red osier dogwood. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana. http://plants.usda.gov/core/profile?symbol=COSE16 [Last accessed June 24, 2013].

Verkade, S., D. Hamilton and L. Elson, 1988. Effect of endomycorrhizal inoculation during propagation on growth following transplanting of *Cornus sericea* cuttings and seedlings. Acta Horticulturae 227: 248-250.

Wood, B., 2011. Head Grower. Smoky Lake Tree Nursery. Personal communication.

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