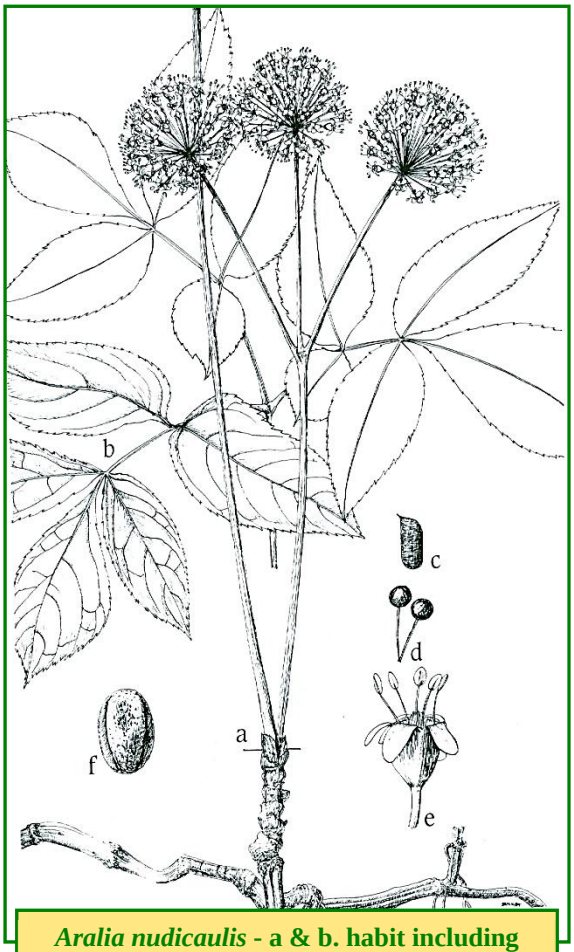
Scientific Name: *Aralia nudicaulis* L. **Family:** *Araliaceae*

Common Name: wild sarsaparilla



***Aralia nudicaulis* - a & b. habit including inflorescence, leaves and roots. c. seed d. fruit e. flower f. pollen**

Plant Description

Erect, dioecious (Barrett and Thompson 1982; Bawa et al. 1982), perennial, rhizomatous forb, often growing in patchy clonal colonies with two types of shoots, vegetative and reproductive (Edwards 1984); leaf long stalked, 30 to 60 cm high, twice compound, being ternate and each division pinnate (3 to 5 foliate); leaflets ovate-oblong to elliptic-lancolate (Moss 1983); pale green to white epigynous flowers generally in three ball-like clusters 2 to 5 cm across; female flowers with five styles and five non-functional anthers; male flowers with five long stamens with white anthers and five non-functional styles (Flanagan and Bain 1988). Plants are effectively dioecious.

Fruit: Berry-like fruit, blue-black when mature, globose; borne in globose clusters (Rook 2004).

Seed: Flat, brown to brown-black, oblong. Two of the five seeds ripen on average (Flanagan and Bain 1988).

Habitat and Distribution

Widespread and major understory native species in dry to moist aspen and mixedwood forests (Rook 2004) at latitudes higher than 60° N to lower than 40° N in many climatic regions (Flanagan and Bain 1988). Aggregated plants may be from different rhizome systems, and connected ramets are widely

***Aralia nudicaulis*, perennial rhizomatous forb, often growing in patchy colonies**

dispersed over many patches (Edwards 1984). Shade tolerant, minimum root depth of 25 cm (USDA NRCS n.d.).

Soil: Found on a range of soils from fine loamy clay to coarse loam, moderate to rich in nutrients, poorly to well drained. *A. nudicaulis* grows best in sandy soils with pH of 5 to 6 (Rook 2004). It is common on well drained Luvisols, Brunisols and Podzols (Flanagan and Bain 1988). Has no salinity tolerance, moderate drought tolerance (USDA NRCS n.d.).

***Aralia nudicaulis* berries**

Distribution: Widespread in all Canadian provinces and territories (except for Nunavut) and east to Georgia, west to Colorado (Flanagan and Bain 1988, USDA NRCS n.d.).

Southwestern District of Mackenzie, British Columbia to Newfoundland south to Washington, Montana, Colorado, Nebraska, Missouri, Georgia (Moss 1983).

Pollination

Female ramets flower before males. Pollinated primarily by bumble bees (*Bombus vagans* and *Bombus ternarius*) and possibly other insects found on flowers during pollination (Flanagan and Moser 1985).

Seed Dispersal

Birds and bears (Pavek 1993).

Genetics

Primarily 2n=24 (Flanagan and Bain 1988).
2n=48 (Moss 1983).

Phenology

Leaves and flowering stalks emerge concurrently in May and early June. Plants flower in June with fruit and seed ripening late in July or August (Flanagan and Bain 1988). Fruits mature in approximately 32 days after pollination (Helenurm and Barrett 1987).

Symbiosis

Vesicular-arbuscular mycorrhizae (Currah and Van Dyk 1986). Unidentified endomycorrhizae associated with the roots (Flanagan and Bain 1988). Isolates of *Heteroconium chaetospira* have been obtained from roots of *A. nudicaulis* (Usuki and Narisawa 2007).

This species has been shown to influence soil microfungal species community (De Bellis et al. 2007).

Flowering *Aralia nudicaulis*

Seed Processing

Collection: Harvest by hand when fruit is ripe.
Seed Weight: 198 seeds/g (9 g/1,000 seeds) from northeastern Alberta accessions (Smreciu and Gould. 2010).
220,000 seeds/kg (4.5 g/1,000 seeds) in US (USDA NRCS n.d.).
Fruit Volume: Average 3,320 fruit/L (16,660 seeds/L of fruit) (Smreciu and Gould. 2010).
Fruit Weight: Average 5,650 fruit/kg (28,250 seeds/kg fruit) (Smreciu and Gould 2010).
Average Seeds/Fruit: 5 seeds/fruit. Often only two fully develop (Flanagan and Bain 1988).

***Aralia nudicaulis* seed. Each seed is approx. 4 mm long.**

Harvest Dates: Late July to mid-August (Helenurm and Barrett 1987).
Cleaning: Macerate fruit in blender on low speed and decant in several changes of water (Bonner and Karrfalt 2008). Allow to air dry. Sieve or winnow small chaff after drying (USDA NRCS n.d.).
Storage Behaviour: Uncertain (Royal Botanic Gardens Kew 2008).
Storage: Store dry in airtight containers at low temperatures (USDA NRCS n.d.). Dry hermetic storage recommended (Royal Botanic Gardens Kew 2008).
Longevity: Unknown.

Propagation

Natural Regeneration: Once established, *A. nudicaulis* spreads primarily by rhizomes forming large colonies. *A. nudicaulis* reproduces vegetatively from rhizomes as well as from seed.
Direct Seed: Sow as soon as ripe, germinates within 4 months (Plants for a Future n.d.).
60 to 70 day cold stratification required (Baskin and Baskin 2001).
Germination: Stratified seed has higher germination than unstratified seed (Rook 2004).
Seeds taken from black bear scat have been shown to have significantly higher germination rates than undigested seeds (Rogers and Applegate 1983).
Planting Density: 1,900 to 4,500 plants per hectare (USDA NRCS n.d.).
Vegetative Propagation: Root cuttings of 8 cm, can be taken in December and stored cold, in sand, until spring. Winter division is also successful (Plants for a Future n.d.).

Aboriginal/Food Uses

Food: *A. nudicaulis* is a member of the Ginseng family. Roots, although tasteless, can be chewed for energy, and the rhizomes were an original ingredient in root beer (Royer and Dickinson 1996, 2007). Droppo (1987) notes that while the root has some use as a substitute for true sarsaparilla it should not be confused with ginseng root.
Medicinal: Tea made from roots has been used to relieve children's infected gums, venereal disease, pneumonia, heart pain, and stomach and liver problems. Roots can be eaten fresh to treat chills, fevers and rheumatism (Royer and Dickinson 1996). Poultices of bark or roots can promote healing of wounds (MacKinnon et al. 2009). It has also been used to promote sweating and for cough relief (Brussell 2004) and may have anti-cancer effects (Wang et al. 2006). It has anti-microbial effects (Li et al. 2012).

Wildlife/Forage Usage

Wildlife: Berries are a food resource for black bears in aspen and boreal forest (Payne et al. 1998, Rogers

and Applegate 1983) and grizzly bears in west-central Alberta (Munro et al. 2006). The seeds have been found in the stomachs of thrushes (Edwards 1985).

A. nudicaulis has low palatability for browsing or grazing animals (USDA NRCS n.d.), although it is an important resource for moose, which eat the flowering and vegetative shoots in the spring.

Livestock: Poor forage generally considered to be of little significance as range plant (Tannas 2004).

Grazing Response: Increaser (Tannas 2004). Increased herbivory reduces the number of flowering stems and fruit production (Edwards 1985).

Reclamation Potential

A. nudicaulis population numbers to do not recover well post logging (Moola and Vasseur 2008).

A. nudicaulis decreases initially after disturbances such as fire and logging but surviving rhizomes will sprout and produce new rhizomes (Chapman and Crow 1981). Quintilio et al. (1991) showed multiple fires had little effect on percent of *A. nudicaulis*.

It is present at several successional stages from young to old forest communities, possibly due to rapid regeneration from rhizomes after disturbance or to some benefit from disturbance (e.g., wildfire, clear cut; Flanagan and Bain 1988).

Commercial Resources

Availability: Plants are commercially available in Alberta (ANPC 2010).

Uses: None known.

Notes

Aralia nudicaulis is listed as 81% intact (less occurrences than expected) in the Alberta oil sands region (Alberta Biodiversity Monitoring Institute 2014).

Photo Credits

Photos 1 and 2: Mary T. and Frank L. Hoffman Family Foundation.

Photo 3: Katy Chayka, El Summit Perennials Nursery.

Photo 4: Wild Rose Consulting, Inc. 2012.

Line Diagram: John Maywood, used by permission of Bruce Peel Special Collections, University of Alberta.

References

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].

ANPC (Alberta Native Plant Council), 2010. Native Plant Source List. http://www.anpc.ab.ca/assets/ANPC_2010_Native_Plant_Source_List.pdf [Last accessed June 14, 2013].

Barrett, C.H. and J.D. Thompson, 1982. Spatial pattern, floral sex ratios, and fecundity in dioecious *Aralia nudicaulis* (Araliaceae). Canadian Journal of Botany 60: 1662-1670.

Baskin, C.J. and J.M. Baskin, 2001. Propagation protocol for production of container *Aralia nudicaulis* plants. IN: Native Plant Network, University of Idaho, College of Natural Resources, Forest Research Nursery, Moscow, Idaho. http://www.nativeplantnetwork.org/Network/ViewProtocols.aspx?ProtocolID=1466 [Last accessed July 17, 2013].

Bawa, K.S., C.R. Keegan and R.H. Voss, 1982. Sexual dimorphism in *Aralia nudicaulis* L. (Araliaceae). Evolution (Lawrence, Kans.) 36: 371-378.

Bonner, F.T. and R.P Karrfalt, 2008. The Woody Plant Seed Manual. United States Department of Agriculture. Agriculture Handbook 727. 1,228 pp. http://www.uri.edu/cels/ceoc/documents/WoodyPlantSeedManual-Complete.pdf [Last accessed May 15, 2013].

Brussell, D.E., 2004. Araliaceae species used for culinary and medicinal purposes in Niigataken, Japan. Economic Botany 58(4): 736-739.

Chapman, R.R. and G.E. Crow, 1981. Application of Raunkiaer's life form system to plant species survival after fire. Torrey Botanical Club 108(4): 472-478.

Currah, R.S. and M. Van Dyk, 1986. A survey of some perennial vascular plant species native to Alberta for occurrence of mycorrhizal fungi. Canadian Field-Naturalist 100(3): 330-342.

De Bellis, T., G. Kernaghan and P. Widden, 2007 Plant community influences on soil microfungal assemblages in boreal mixed-wood forests. Mycologia 99(3): 356-367.

Droppo, O., 1987. *Aralia nudicaulis* L. Wild Sarsaparilla. IN: A Field Guide to Alberta Berries. Calgary Field Naturalists' Society, Calgary, Alberta. pp. 20-21.

Edwards, J., 1984. Spatial pattern and clone structure of the perennial herb, *Aralia nudicaulis* L. (Araliaceae). Bulletin of the Torrey Botanical Club 111: 28-33.

Edwards, J., 1985. Effects of herbivory by moose on flower and fruit production of *Aralia nudicaulis*. Journal of Ecology 73: 861-868.

Flanagan, L.B. and J.F. Bain, 1988. The biological flora of Canada 8. *Aralia nudicaulis* L., wild sarsaparilla. Canadian Field Naturalist 102: 45-59.

Flanagan, L.B. and W. Moser, 1985. Flowering phenology, floral display and reproductive in dioecious, *Aralia nudicaulis* L. (Araliaceae). Oecologia 68: 23-28.

Helenurm, K. and S.C.H. Barrett, 1987. The reproductive biology of boreal forest herbs. II. Phenology of flowering and fruiting. Canadian Journal of Botany 65: 2047-2056.

Li, H., T. O'Neill, D Webster, J.A. Johnson and C.A. Gray, 2012. Anti-mycobacterial diynes from the Canadian medicinal plant *Aralia nudicaulis*. Journal of Ethnopharmacology140: 141-144.

MacKinnon, A., L. Kershaw, J. Arnason, P. Owen, A. Karst and F. Hamersley-Chambers, 2009. Edible and Medicinal Plants of Canada. Lone Pine Publishing, Edmonton, Alberta. 376 pp.

Moola, F.M. and L. Vasseur, 2008. The maintenance of understory residual flora with even-aged forest management: A review of temperate forests in northeastern North America. Environmental Reviews 16: 141-155.

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. 425.

Munro, R.H.M., S.E. Nielsen, M.H. Price, G.B. Stenhouse and M.S. Boyce, 2006. Seasonal and diel patterns of grizzly bear diet and activity in west-central Alberta. Journal of Mammalogy 87(6): 1112-1121.

Pavek, D.S., 1993. *Aralia nudicaulis*. 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/forb/aranud/introductory.html [Last accessed July 17, 2013].

Payne, N.F., B.E. Kohn, N.C. Norton and G.G. Bertagnoli, 1998. Black bear food items in northern Wisconsin. Transactions of the Wisconsin Academy of Sciences, Arts, and Letters 86: 263-280.

http://images.library.wisc.edu.login.ezproxy.library.ualberta.ca/WI/EFacs/transactions/WT1998/reference/wi.wt1998.nfpayne.pdf [Last accessed July 17, 2013].

Plants for a Future, n.d. *Aralia nudicaulis* – L. http://www.pfaf.org/user/Plant.aspx?LatinName=Aralia%20nudicaulis [Last accessed July 17, 2013].

Quintilio, D., M.E. Alexander and R.L. Ponto, 1991. Spring fires in a semi-mature trembling aspen stand in central Alberta. Forestry Canada, Northwest Region, Northern Forestry Centre, Edmonton, Alberta. Information Report NOR-X-323. 30 pp.

Rook, E.J.S., 2004. Plants of the North. http://www.rook.org/earl/bwca/nature/herbs/aralianud.html [Last accessed July 17, 2013].

Royal Botanic Gardens Kew, 2008. *Aralia nudicaulis* L. Seed Information Database. http://data.kew.org/sid/SidServlet?ID=2088&Num=4b0 [Last accessed June 14, 2013].

Royer, F. and R. Dickinson, 1996. Wild Sarsaparilla *Aralia nudicaulis* L. IN: Wild Flowers of Edmonton and Central Alberta. The University of Alberta Press, Edmonton, Alberta. p. 41.

Royer, F. and R. Dickinson, 2007. Plants of Alberta: Trees, Shrubs, Wildflowers, Ferns, Aquatic Plants & Grasses. Lone Pine Publishing, Edmonton, Alberta. 527 pp.

Rogers, L.L. and R.D. Applegate, 1983. Dispersal of fruit seeds by black bears. Journal of Mammalogy 64(2): 310-311.

Smreciu, A. and K. Gould, 2010. Establishment of native boreal plant species on reclaimed oil sands mining disturbances. Interim Report, Prepared for Canadian Oil Sands Research and Development (CONRAD). 24 pp. + appendix.

Tannas, K., 2004. Common plants of the western rangelands. Volume 3: Forbs. Olds College, Olds, Alberta and Alberta Agriculture, Food and Rural Development, Edmonton, Alberta. 505 pp.

USDA NRCS, n.d. *Aralia nudicaulis* L. wild sarsaparilla. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana. http://plants.usda.gov/core/profile?symbol=ARNU2 [Last accessed June 24, 2013].

Usuki, F. and K. Narisawa, 2007. A mutualistic symbiosis between a dark septate endophytic fungus, *Heteroconium chaetospira*, and a non-mycorrhizal plant, Chinese cabbage. Mycologia 99(2): 175-184.

Wang, J., Q. Li, G. Ivanochko and Y. Huang, 2006. Anticancer effect of extracts from a North American medicinal plant-wild sarsaparilla. Anticancer Research 26(3A): 2157-2164.