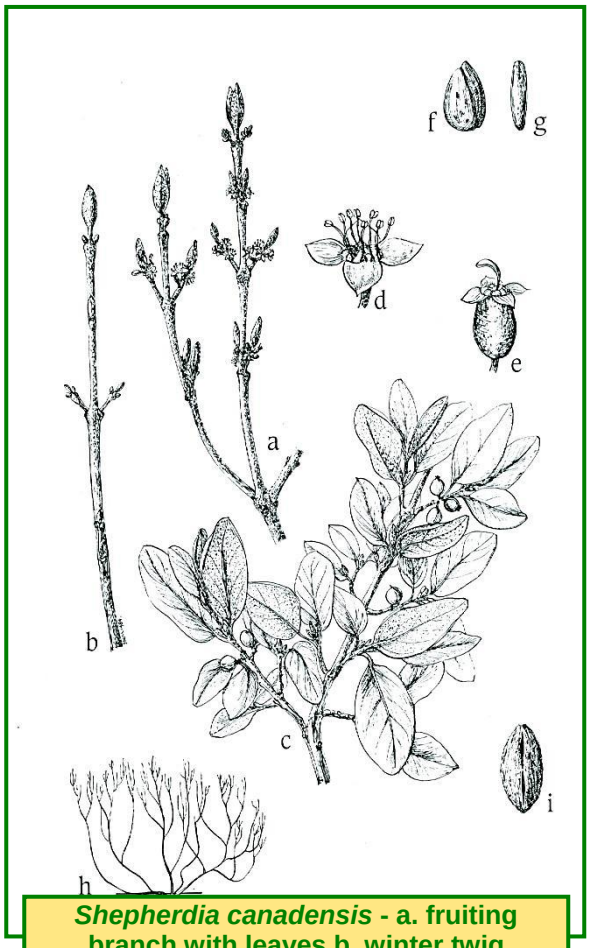
Scientific Name: *Shepherdia canadensis* L. (Nutt.) **Family:** *Elaeagnaceae*

Common Names: buffaloberry, Canadian buffaloberry, soapberry, russet buffaloberry, soopalalie



Shepherdia canadensis **- a. fruiting branch with leaves b. winter twig c. flowering twig d. staminate (male) flower e. pistillate (female) flower f-g. seeds h. growth habit i. pollen.**

Plant Description

Spreading shrub 0.5 to 3 m high, brown branches covered with tiny scales; opposite elliptic to narrowly ovate leaves 2 to 5 cm long reddish-brown hairs; single or small clusters of yellowish brown flowers 4 mm wide, inconspicuous, on stems in leaf axis; male and female flowers are on separate plants (dioecious) (Johnson et al. 1995).

Fruit: Bright red or yellow drupes (spherical to oval) 4 to 6 mm long, may be slightly hairy, juicy and extremely bitter.

Seed: Oval to round, up to 4 mm long, dark brown, somewhat shiny.

Habitat and Distribution

Fairly common in open woods, thickets, coulees, around sloughs and. Moderately tolerant to shade (Hardy BBT 1989).

Seral Stage: Early to late seral species (Gerling et al. 1996).

Soils: Medium to coarse soil texture, wet to mesic soil moisture and possibly somewhat saline tolerant (Gerling et al. 1996). Found on silt loam to sandy loam, well to moderately well drained soils (Inkpen and Van Eyk n.d.); tolerates moderately alkaline to moderately acidic soils (Hardy BBT 1989).

Distribution: Widespread across Alberta. Alaska, Yukon, District of Mackenzie to Hudson Bay, Newfoundland south to Oregon, New Mexico, South Dakota, North Dakota, Minnesota, Ohio, New York (Moss 1983).

Fruit on *Shepherdia canadensis* plants.

Phenology

Flowers May and June prior to leaf flush. Seeds ripen in mid-July to early August.
Fruit ripens June to August. Seeds disperse June to September (Young and Young 1992).
Leaves drop throughout September (Walkup 1991).

Inconspicuous male flowers of *Shepherdia canadensis*.

Pollination

Fly pollinated. Pollination is primarily conducted by Syrphidae and Empididae (Borkent and Harder 2007).

Seed Dispersal

Animal dispersed.

Genetics

2n=22 (Moss 1983).

Symbiosis

Frankia sp. and vesicular-arbuscular mycorrhiza (Visser et al. 1991). *Shepherdia canadensis* forms an association with a different group of *Frankia* species than those that associate with *Alnus sp.* Those strains, which associate with members of the *Elaeagnaceae*, are also more diverse than those that associate with *Alnus sp.* (Huguet et al. 2001).

Seed Processing

Collection: Handpick directly into picking bags or by flailing or stripping from the bush onto a canvas tarp.
Seed Weight: 6.13 g/1,000 seeds. 7.69 g/1,000 seeds (Gerling et al. 1996).
8.42 g/1,000 seeds (Royal Botanic Gardens Kew 2008).
Fruit/Seed Volume: 5,640 fruit/L average (5640 seeds/L fruit).
Fruit/Seed Weight: 8,090 fruit/kg average (8,085 seeds/kg fruit).
Average Seeds/Fruit: One seed/fruit.
Harvest Dates: Late July to mid-August when the fruit is bright red or orange in colour (Banerjee et al. 2001).
September 1 to September 30 (Formaniuk 2013).
Cleaning: Macerate fruit in a blender. 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 over a moving air stream.
Storage Behaviour: Possibly orthodox; seeds can be dried, without damage, to low moisture contents, their longevity increases with reductions in both moisture content and temperature (Royal Botanic Gardens Kew 2008).
Storage: Store cool and dry in sealed containers (Luna and Wick 2008).
Longevity: Up to five years (Luna and Wick 2008).

Propagation

Natural Regeneration: By seeds (Gerling et al. 1996).

Germination: McLean (1967) obtained 37% germination (maximum 68% germination) after 120 days following 60 days of cold stratification (1°C). Thilenius et al. (1974) obtained 72% to 80% germination after 20 to 30 minutes sulphuric acid scarification.

Pre-treatment: 30 to 60 days in cold stratification before seeding (Wood pers. comm.).

90 days stratification (Formaniuk 2013).

Hudson and Carlson (1998) recommend five months cold stratification whereas Young and Young (1992) were successful performing acid scarification followed by 60 to 90 days of pre-chilling. McTavish and Shopik (1983) recommend 5 to 15 minute acid treatment followed by 30 day cold stratification.

Visser et al. (1991) suggest acid scarification for 30 minutes. Hudson and Carlson (1998) suggest cleaning seed with 5% to 10% H_2O_2 for 15 minutes; soak seed for 24 hours; stratify for five months in plastic bag with perlite at 2°C; sow April-May first in 100% peat in styro container at 20°C day/15°C night for germination and 15 to 20°C for growing, add 30 to 50 ppm N one to two times/week.

Smreciu and Barron (1997) report that seeds are dormant and require a two winters prior to emergence.

Direct Seeding: When entire frozen fruit were sown in the fall at a northeastern Alberta trial, 3% of seedlings emerged during the third growing season (Smreciu et al. 2012).

Fruit-Sowing Rate: 25 fruit/m².

Vegetative Propagation: Semi-hardwood cuttings (Fung 1984) or root cuttings (Holloway and Zasada 1979).

Inoculations with *Frankia* and/or vesicular-arbuscular mycorrhiza may increase productivity, root nodulation and shoot length (Visser and Danielson 1988, Visser et al. 1991).

Can be successfully grown from containerized seedlings on amended tailings sand (56% to 100%) (Fedkenheuer et al. 1980).

Cuttings taken in July and treated with 8,000 ppm IBA can propagate successfully (Dirr and Heuser 1987).

Greenhouse Timeline: 20 weeks in the greenhouse until out-planting. Plants may be over wintered for Spring or Fall planting (Wood pers. comm.). Grow for 180 days before harvest (Formaniuk 2013).

Seed of *Shepherdia canadensis* each up to 4 mm long.

Aboriginal/Food Uses

Food: Fruit were eaten by many native people, although some considered them to be poisonous. Can be added to buffalo meat for flavouring (Royer and Dickinson 1996, Wilkinson 1990). If large volumes are ingested they can cause diarrhoea, vomiting and abdominal pain. The berries are high in Vitamin C, calcium and iron. The bitter taste improves after the first frost. The berries were often whipped into froth and eaten as a dessert (Droppo 1987, Marles et al. 2000, Royer and Dickinson 1996, Turner 1997, Wilkinson 1990).

Medicinal: Fruit are used to treat constipation, tuberculosis, cuts and sores. Leaves and stems were used to relieve arthritis; shoots were used to prevent miscarriage and treat arthritis and venereal disease;

roots were used for heart medicine; inner bark was used as a laxative; the fresh roots, stems, and twigs were used to relieve infant fever (Gray 2011, Johnson et al. 1995, Turner 1997).
Other: The name soapberry derives from the saponin content in the berry juice (Royer and Dickinson 1996, Wilkinson 1990). Boiled mid-summer branches can be used as a brown hair dye while berries can be used as a shampoo (Gray 2011).

Wildlife/Forage Usage

Wildlife: Fair forage value. Lightly browsed by deer and elk. Black bears, grizzly bears, grouse and snowshoe hares eat the berries (CYSIP: Botany n.d., Favorite and Anderson 2003). Northern Chipmunk harvests the seeds and discards the pulp (CYSIP: Botany n.d.).
Livestock: Low palatability. Poor forage value; fair for sheep only. Used only in the absence of other browse (Walkup 1991).
Grazing Response: Increases with grazing (Tannas 1997).

Reclamation Potential

Tolerant of short term exposure to high salinity water from oil sand tailings (Renault et al. 1998).
Can survive on nutrient poor soils (Favorite and Anderson 2003). Commonly found on disturbed sites throughout Alberta to the subalpine (Hardy BBT 1989).
Buffaloberry often forms dense thickets and is able to fix nitrogen, which in turn contributes to erosion control and soil building.
Visser and Danielson (1988) tested mycorrhizae-inoculated buffaloberry on Syncrude. Overwinter mortality was higher for inoculated buffaloberry but growth of remaining shrubs was three to five times greater over two growing seasons.

Commercial Resources

Availability: Seed is commercially available in Montana from the Native Seed Foundation (Native Seed Network 2009), however this is not recommended for reclamation in Alberta. Seeds have been collected by the Oil Sands Vegetation Cooperative for use in the Athabasca oil sands region.
Cultivars: 'Rubra' and 'Xanthocarpa' are identical to the native species but vary in fruit colour (UMCA 2006) however they are not suitable for reclamation in Alberta.
Uses: Sometimes used as an ornamental.

Notes

Shepherdia canadensis is listed as 89% intact (less occurrences than expected) in the Alberta oil sands region (Alberta Biodiversity Monitoring Institute 2014).
Name given by Plains Indians who believed that when the berries were ripe the buffalo were fat enough to hunt (Royer and Dickinson 1996).
Moderately resistant to burning. May increase in vigour and intensity following low to moderate intensity fires by sprouting from surviving root crowns or establishment from seed transported from off-site (Walkup 1991).

Photo Credits

Photo 1: Walter Siegmund, Wikimedia Commons http://upload.wikimedia.org/wikipedia/commons/f/f1/Shepherdia_canadensis_38574.JPG
Photo 2: Bruce Byrne, Philadelphia, Pennsylvania.
Photo 3: Wild Rose Consulting, Inc.
Line Diagram: John Maywood, used by permission of Bruce Peel Special Collections, University of Alberta.

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