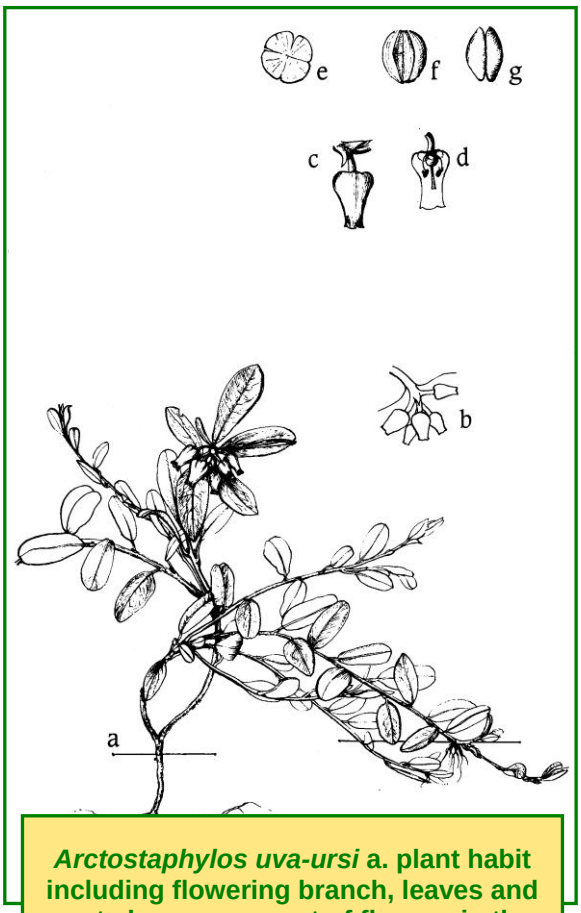
Scientific Name: *Arctostaphylos uva-ursi* (L.) Spreng**. Family:** Ericaceae

Common Names: bearberry, kinnikinnick, red bearberry, cowberry, manzanita, mealberry



***Arctostaphylos uva-ursi* a. plant habit including flowering branch, leaves and roots b. arrangement of flowers in the inflorescence c. flower d. flower (cut away) e – g. seed.**

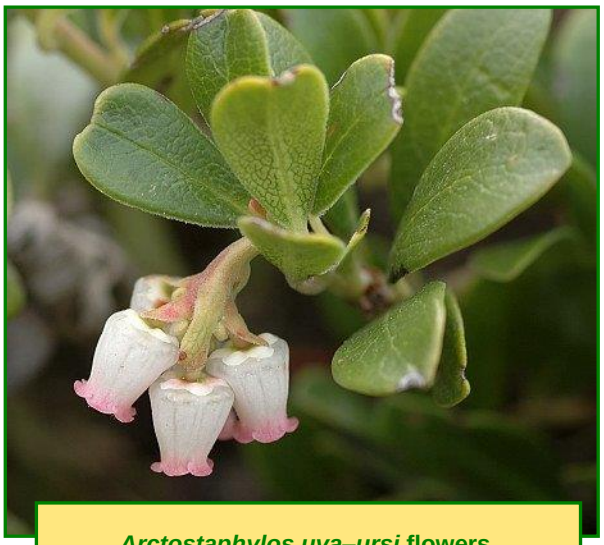
Plant Description

Trailing evergreen perennial shrub 7.5 to 10 cm tall; forms mats with prostrate and rooting branches 50 to 100 cm long; alternate leaves, coriaceous, obovate to spatulate 1 to 2 cm long; 1 to 3 cm long drooping urn-shaped flowers nodding in a dense raceme (3 to 10); rhizomatous with nodal feeder roots that form in the second years (Moss 1983). Roots up to 1 to 2 m deep (Nimlos et al. 1968).

Fruit: Mealy (not juicy) drupe with dry, shell-like skin; 6 to 8 mm diameter, spherical, dull red.
Seed: 5 to 6 seeds in a generally united round stone, individual 3.5 x 2 mm, sectioned, rough, porous, yellow brown.

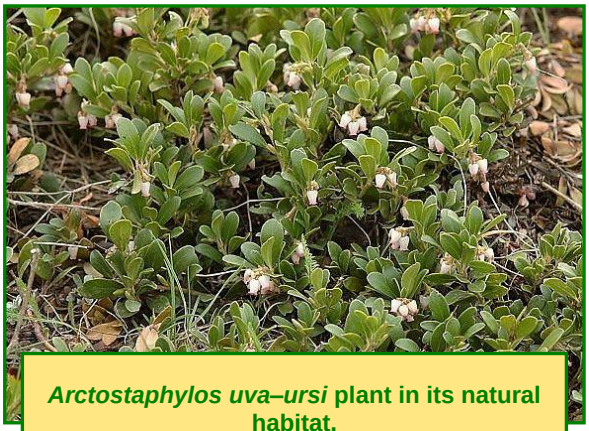
Habitat and Distribution

Prefers rocky, open woodlands, dry, sandy hills and pine forest (Lady Bird Johnson Wildflower Center 2013). It is adapted to coarse and medium textured soils; has moderate carbonate tolerance and is highly drought tolerant. Can handle pH from 5.5 to 8.0, medium salinity and prefers intermediate shade (USDA NRCS n.d.).
Seral Stage: Early, recovers well after fire (Crane 1991, Tannas 1997).
Soils: Sandy and well-drained sites in woodlands and throughout the prairie, roadside, exposed rocks. Relatively low shade tolerance. Moderate acid tolerance. Tolerant to a wide range of soil textures. Common on coarse and well drained soils. Preference to gravely and sandy loams (Hardy BBT 1989).



***Arctostaphylos uva–ursi* flowers.**

Drought tolerant and moderate tolerance to salinity, prefers pH ranges between 5.5 to 8 (Gerling et al. 1996, USDA NRCS n.d.).
Distribution: Widespread across Alberta, circumpolar. Alaska, Yukon, southwestern District of Mackenzie to Hudson Bay, Newfoundland south to California, New Mexico, South Dakota, North Dakota, Minnesota, Great Lakes, Virginia (Moss 1983).



***Arctostaphylos uva–ursi* plant in its natural habitat.**

Phenology

Flowers from April to June. Fruit ripens from June through September. Seeds are dispersed over the winter, August to March (Crane 1991).

Pollination

Hummingbirds occasionally take nectar from *Arctostaphylos uva-ursi* (Pojar 1975). It is also cross-pollinated by bees and can self-pollinate (Knuth 1909).

Genetics

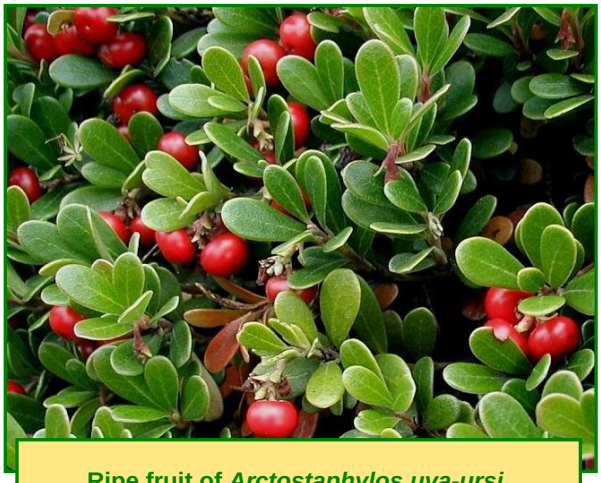
2n=26, 39, 52, 78 (Moss 1983).

Symbiosis

Both endotrophic tolypophagous mycorrhiza as well as ectotrophic *Cenococcum graniforme* occur in the wild and in plots (Gawlowska 1969). *Arctostaphylos uva-ursi* is also a host of the root endophytic fungus *Phialocephala fortinii* (Addy et al. 2000, Stoyke and Currah 1991). Arbutoid mycorrhizal inoculations (*Laccaria laccata)* increase root growth in hardwood cuttings (Scagel 2004). Host to *Melampsorella caryophyllacaerum* (Crane 1991).

Seed Processing

Collection: Low bushes make collection relatively difficult. Harvest by hand or using drop sheets or berry scoops.
Seed Weight: 6.31 g/1,000 seeds.
Fruit/Seed Volume: 1,694 fruit/L average (10,164 seeds/L fruit).
Fruit/Seed Weight: 3,720 fruit/kg average (22,320 seeds/kg fruit).
Average Seeds/fruit: 6 seeds/fruit.
Harvest Dates: Late August or September when fruit are bright red.
Cleaning: Mash fruit in a sieve or macerate with a blunt blender. Suspend residue in water, allowing seeds to settle. Decant water and chaff. Repeat as needed. Allow seeds to dry at room temperature in a moving air stream.
Storage Behaviour: Uncertain (Royal Botanic Gardens Kew 2008).
Storage: Store dry at cool temperatures.
Longevity: Seed can be stored up to 20 years at cool temperatures (Luna et al. 2008).



Ripe fruit of *Arctostaphylos uva-ursi.*

Propagation

Natural Regeneration: Seedlings recruit into adult clones (Eriksson 1989). Adventitious roots from the rhizomes or stolons form in the second year and latent buds (often many aggregated into a nodule-like structure) on horizontal stems allow plants to re-sprout especially in response to disturbances (Crane 1991).

Germination: 1% after two years, field emergence is better than *in vitro* germination (Smreciu et al. 2008). McLean (1967) obtained 34% germination after seed had been moistened and scarified in concentrated sulphuric acid for seven hours, kept at room temperature for 90 days, and finally, stratified at 1°C for 90 days.

Up to 60% germination was obtained using a combination of acid scarification (3 to 5 hours), cold stratification (3 to 4 months) and warm stratification (2 to 3 months) with seeds from north-eastern Alberta (Smreciu et al. 2006).

Optimal temperature for seed germination was found to be 10°C to 21°C depending on where the seed was collected (Baskin and Baskin 2001).

Pre-treatment: 1 hour in 5% sulphuric acid followed by 30 days cold stratification (Wood pers. comm.). Acid scarification from 3 to 6 hours followed by warm stratification (20 to 30ºC) of 60 to 120 days followed by 60 to 90 days cold stratification at 5ºC (Baskin and Baskin 2001, Smreciu et al. 2008, Young and Young 1992). This is supported by King (1980).

Direct Seeding: In an oil sands reclamation area in Fort McMurray, Smreciu et al. (2008) obtained 1% emergence after two years to 5% emergence after four years, seedlings are healthy and continue to thrive. Less than 1% emergence of seedlings from direct sowing of fruit was observed.

Seed Rate: 100 seeds/m², 25 fruit/m².

Planting Density: 700 to 4,400 plants/ha (USDA NRCS n.d.).

Vegetative Propagation: 80% rooting in 6 weeks was observed with semi-hardwood stem cuttings (10 to 20 cm) taken in May and treated with Stim–root 3® and placed on a mist bench under ambient greenhouse conditions (Smreciu et al. 2008). Hardwood cuttings and softwood cuttings 10 cm long initiate roots after approximately six weeks (Holloway and Zasada 1979). Herbaceous cuttings with hormone treatments were successful 93% of the time in Poland (Gawlowska 1969).

Greenhouse Timeline: 20 weeks in greenhouse prior to out-planting. Seedlings can be stored frozen overwinter for planting the following spring to fall (Wood pers. comm.).

***Arctostaphylos uva-ursi* stones comprised of approx. 6 seeds (left) and individual seeds (right). Seed 3.5 x 2 mm**

Aboriginal/Food Uses

Food: Cooked in lard, pounded and mixed with other foods or boiled and then fried in grease and sugar added (Marles et al. 2000). Dried berries can be ground and cooked into a porridge or can be popped when fried in grease (Northern Bushcraft n.d.). High in vitamin C and carbohydrates (Gray 2011, Royer and Dickinson 1996).

Not very good when eaten raw (mealy, insipid, tasteless) but quite nourishing (Droppo 1987, Northern Bushcraft n.d.). Flavour may vary by location (Turner 1997).

Medicinal: Fruits can relieve childhood diarrhoea; leaves can treat kidney and urinary tract disease (Royer and Dickinson 1996); roots can treat coughs and slows menstrual flow; stems can help prevent miscarriages (Marles et al. 2000); a tea made from

leaves was used as an astringent and diuretic (Royer and Dickinson 1996). The Cheyenne used as a poultice for back pain (Hart 1992).
A main constituent of bearberry is arbutin which acts as an antibacterial in the genitourinary tract (Gray 2011).
Other: Also used as a tobacco additive, extender or substitute (Marles et al. 2000, Royer and Dickinson 1996, Turner 1997). The tannins in the leaves create an ash-coloured dye that can be used for tanning hides (Gray 2011).

Wildlife/Forage Usage

Wildlife: Songbirds, game birds, deer, elk and small mammals eat the fruit. The fruit are especially important to black and grizzly bear in the early spring. Gray (2011) reports that bearberries have a numbing/paralyzing effect on the intestine. Many birds including ptarmigan and grouse eat the berries (CYSIP: Botany n.d.). Terrestrial birds and small mammals make moderate use of this pant for cover. Is also attractive to hummingbirds and butterflies (Crane 1991).
Livestock: Unpalatable to domestic livestock (Crane 1991).
Grazing Response: Tolerant to browsing; vigour and reproductive capacity are maintained (Tannas 1997).

Reclamation Potential

High drought tolerance, high winter hardiness, high persistence, and often found as a pioneer on disturbed sites (Hardy BBT 1989).
Arctostaphylos uva-ursi is recommended for revegetation projects on moist to dry sites in montane and boreal regions of Alberta. Very useful for erosion control because of formation of trailing mats.
Adaptable to soils low in nutrients. Excellent ground cover species used for watershed protection to prevent erosion and maximize the soil moisture absorption capacity (Tannas 1997).
Because of its moderate growth rate, bearberry is best suited as a long-term re-vegetative species (Crane 1991).
Uses intensive branching to adapt to soil toxicity and can spread roots to deeper less contaminated soils for improved growth (Salemaa and Sievänen 2002).

Commercial Resources

Availability: Available commercially in seed and plant form in Alberta and elsewhere.
Seeds have been collected by the Oil Sands Vegetation Cooperative for use in the Athabasca oil sands region.
Cultivars: Several horticultural cultivars are commercially available but none are suited for reclamation.
Uses: Used as a diuretic herbal treatment. Prolonged use may cause stomach and liver problems (Northern Bushcraft n.d.).
It is also a popular ornamental ground cover for landscaping.

Notes

Arctostaphylos uva-ursi is listed as 94% intact (less occurrences than expected) in the Alberta oil sands region (Alberta Biodiversity Monitoring Institute 2014).
Bearberry increases in number following moderate disturbance. Its re-sprouting capacity is a rapid recovery mechanism after disturbances such as burning and cutting. Latent buds on the horizontal stems and dormant buds on the stem base allow sprouting of surviving plants or rooted stems (Crane 1991). Furthermore, its capacity to survive fire acts as a natural firebreak as it stops fire from spreading thus protecting the trees and shrubs around it (del Barrio et al. 1999).
This species listed as endangered in Illinois and Iowa, rare in Indiana and presumed extirpated in Ohio and Pennsylvania (USDA NCRS n.d.).
Kinnikinnick is a regulated plant and plant part for entering Canada by the CFIA due to its ability to carry Sudden Oak Death (*Phytophthora ramorum*) (CFIA 2009).
The fungus associated with witch's broom alternates between spruce and bearberry (Gray 2011).

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