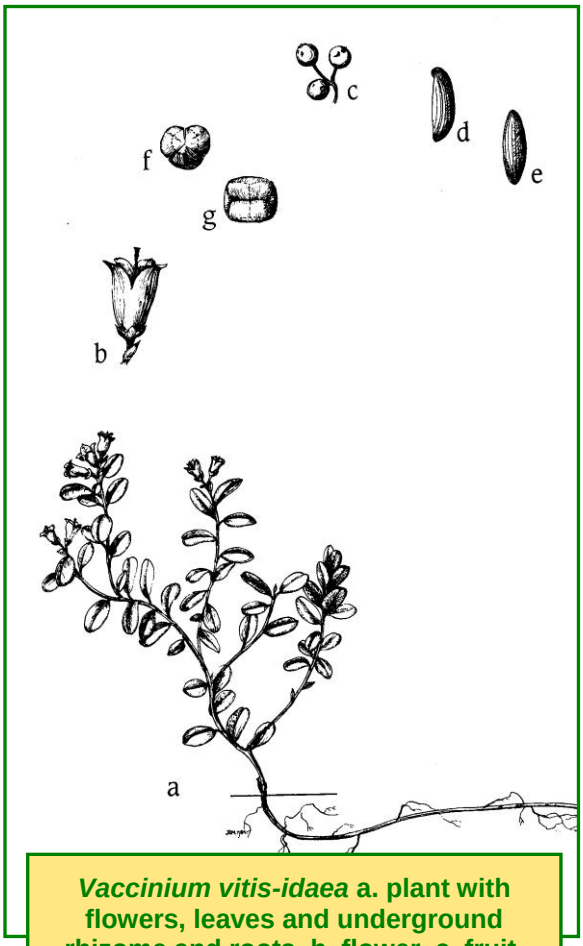
Scientific Name: *Vaccinium vitis-idaea* L. **Family:** *Ericaceae*

Common Names: bog cranberry, cowberry, lingonberry, mountain cranberry, partridgeberry, northern mountain cranberry, lowbush cranberry



***Vaccinium vitis-idaea* a. plant with flowers, leaves and underground rhizome and roots, b. flower, c. fruit, d-e. seeds, f–g. pollen.**

Plant Description

Perennial, semi-erect or creeping dwarf shrub, 5 to 20 cm high; forms large clones; fine hair-like roots from rhizomes with maximum rooting depths of 5 to 28 cm (Tirmenstein 1991), occasionally a taproot; stem creeping or trailing; leaves evergreen, alternate, entire (not toothed), shiny above, pale with black glandular dots beneath, thick, rolled edges (under), 6 to 15 mm long, leaves turn purple to red in the fall; inflorescence a short terminal cluster of 5 to 15 flowers; flower rose to white, cup shaped, 5 mm diameter (Moss 1983). Rhizomes may be more than 20 years old (Gustavsson 2000).

Fruit: Carmine, spherical berry, 5 to 10 mm diameter; edible, acidic (Moss 1983).

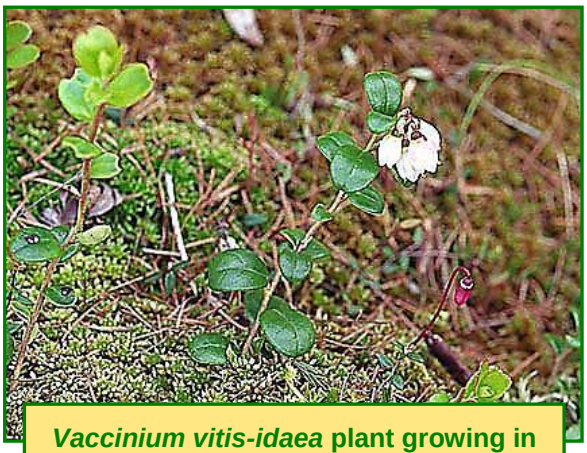
Seed: 1 mm long, egg-shaped, brown to yellow, smooth to rough texture with a short beak.

Habitat and Distribution

Habitat: Northern temperate forests; dry, open woods particularly as a subdominant under *Pinus* spp. and *Betula papyrifera*, open spruce (*Picea* spp.) and aspen (*Populus tremuloides*) woods; dry bogs with *Sphagnum* moss, *Picea mariana* and *Larix laricina* as well as alpine slopes. Can tolerate shade but blooms more abundantly in more open areas. Drought-resistant (Tirmenstein 1991).

Seral Stage: Not generally a pioneer species but can be an early invader in some communities.

Soils: Dry, poorly developed, mineral soils or well-drained peat bogs; best on pH 4.0 to 4.9 (Tirmenstein 1991).



***Vaccinium vitis-idaea* plant growing in moss.**

***Vaccinium vitis-idaea* flowers.**

Distribution: Very common and widespread across boreal forest, aspen parkland, and montane regions of Alberta. Circumpolar and circumboreal. Alaska, Yukon, Victoria Island to southern Baffin Island to Newfoundland, south to British Columbia, Alberta, central Saskatchewan, southern Manitoba, Minnesota, southern James Bay, southern Quebec (Moss 1983).

Phenology

Vegetative growth resumes in late May to early June; flowers in late June and July (early August), fruit ripens in late August and September; leaves often turn reddish-purple in fall as dormancy commences; rhizomes grow actively in spring and fall.

Pollination

Pollinated by bumblebees or syrphid flies, and butterflies (Rook 2002).

Although self-pollinated individuals have reduced fruit set, the reduction is not significant. *Vaccinium vitis-idaea* is not reliant on pollinators (Froborg 1996).

Seed Dispersal

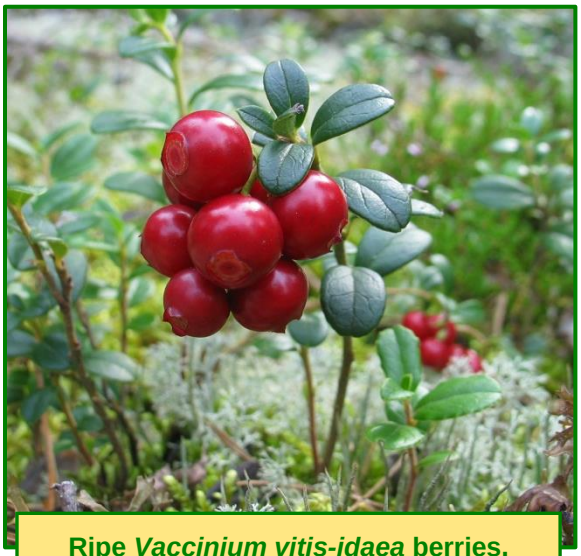
Animal dispersal.

Genetics

2n=24 (Moss 1983).

Symbiosis

Forms ericoid mycorrhizae with a diverse assemblage of fungal endophytes (e.g., *Hymenoscyphus ericae*) (Hambleton et al. 1999, Massicotte et al. 2005). *V. vitis-idaea* is host of the root endophytic fungus *Phialocephala fortinii* (Addy et al. 2000).



Ripe *Vaccinium vitis-idaea* berries.

Seed Processing

Harvest Dates: Late August early September.
Collection: Low growing plants make collection difficult; hand collection is time consuming.
Seed Weight: 0.21 g/1,000 seeds.
Royal Botanic Gardens Kew (2008) measure the weight at 0.3 g/1000 seeds.
Fruit/Seed Volume: 1,850 to 4,780 fruit/L (3,190 average), 38,200 seeds/L fruit.

Fruit/Seed Weight: 380 to 10,200 fruit/kg (7,050 average), 84,600 seeds/kg fruit.
Average Seeds/Fruit: 12 seeds/fruit.
Cleaning: Place pulpy fruits in a blender (use about 3:1 water with fruit) on low speed until fruits are fully macerated (20 to 30 seconds). Pour through sieve(s) to remove chaff smaller than seeds. Re-suspend residue in water and mix; allow seeds to settle and decant water with floating and suspended larger chaff. Repeat re-suspension step until seeds are clean; sieve if necessary and place seeds on paper toweling or cloths to dry. Dry at room temperature or up to 25°C over a moving air stream.
Storage Behaviour: Orthodox (Royal Botanic Gardens Kew 2008).
Storage: Store dry at ambient room temperatures; fruit can be frozen soon after collection and seeds removed up to several years later. Dry to 15% relative humidity and freeze at -20°C (Royal Botanic Gardens Kew 2008).
Longevity: 5 year old seeds can remain viable (Granström 1987).

***Vaccinium vitis-idaea* Seed.**

Propagation

Natural Regeneration: Spreads by rhizomes and can form dense patches (St-Pierre 1996).
Germination: >85% germination after 60 to 90 days stratification with fresh or one year old seeds. Baskin et al. (2000) found that germination increased significantly in the presence of light after 12 to 20 weeks of stratification.
Holloway (1981) found the best substrate for seed germination is milled peat or an equal mixture of peat and sand.
Pre-treatment: Stratification of 60 to 90 days for fresh or older seeds; seed lots extracted from fruit frozen for several years germinated reasonably well after a 28 day stratification. No stratification is necessary if seeds are exposed to 250 mg/L GA3 (Royal Botanic Gardens Kew 2008).
Direct Seeding: No significant emergence observed, only small seedlings observed in later years (Smreciu, et al 2008).
Fruit Sowing: Produced small seedlings (0.58% 4 years after fall sowing). Direct fruit sowing produced slightly greater emergence than direct seed sowing.
Vegetative Propagation: Plants enlarge by means of horizontal rhizomes and by nodal rooting of above-ground branches; daughter plants can be separated from parent plants.
Semi-hardwood cuttings collected in early May root well when treated with Stim-root #3 (Dirr and Heuser 1987, Smreciu and Gould 2003). Babb (1959) suggests division. Terminal stem cuttings (4 to 5 cm) were harvested regularly every month in more than one year and rooted in peat mixed with 30% perlite without auxin treatment (Martinussen et al. 2006). Cuttings harvested during spring and summer rooted poorly compared to cuttings harvested in late autumn and during winter (Martinussen et al. 2006). The best rooting was obtained using cuttings harvested in September and November (Martinussen et al. 2006). Gustavsson (2000) found variable results for harvest time but suggested that July and August would produce good results.

Gustavsson (2000) found the best rooting occurred in outdoor plastic tunnels with bottom heat compared to a heated greenhouse.
A relatively short cold period is needed to induce bud break and shoot growth (Martinussen et al. 2006).
Planting Density: 130 to 517 plants per hectare (USDA NRCS n.d.).
Micro-propagation: Leaf explants placed with the adaxial side in contact with zeatin (a medium with 5 to 30 µM ZN) with a seven day dark treatment were the best conditions for organogenesis (Debnath and McRae 2002).
Nodal segments supplemented with 9.1 µM zeatin and 5.7 µM IAA, 72% of explants developed multiple shoots (Meiners et al. 2007).
Planted directly, *in vitro* shoots root better than field cuttings (Meiners et al. 2007).
Greenhouse Timeline: 30 to 60 days of cold stratification prior to sowing.
26 weeks in the greenhouse prior to outplanting.
Dormant seedlings can be stored frozen over winter for spring or early fall planting (Wood pers. comm.).

Aboriginal/Food Uses

Food: Primarily berries are used for food; berries eaten fresh or made into sauce and jelly and used in pemmican. Sweetest after a few frosts – stay ripe and juicy into the next spring (CYSIP: Botany n.d.). Rich in vitamin C (Royer and Dickinson 1996) and pectin (Gray 2011).
Medicinal: Ho et al. (2001) isolated the active components of *Vaccinium vitis-idaea* and found that it may be used as an alternative treatment of periodontal disease. The active ingredients were identified as: arbutin, hyperin, hydroquinone, isoquarcetin and tannins. Contains high levels of flavonoids that can help lower blood-sugar and reduce symptoms of allergies (Gray 2011). Used raw to relieve fevers, sore throats and upset stomachs. Berries were used in hot packs to treat swellings, aches, pains, and headaches. Drinking a juice from the berries is said to cleanse the urinary tract (Gray 2011 – active ingredient is arbutin, Royer and Dickinson 1996).

Wildlife/Forage Usage

Wildlife: Browsed by black bear, moose, caribou and snowshoe hare; berries are an important source of food for black bears in fall and spring, for grouse and for migrating birds in spring and for numerous other birds; berries also eaten by red-backed voles and red fox in fall; numerous small mammals burrow under snow to obtain fruits that persist on plant (Tirmenstein 1991).
Livestock: Plants are of little value to livestock; eaten by domestic sheep if more preferable species are unavailable (Tirmenstein 1991).

Reclamation Potential

Vaccinium vitis-idaea is proven to survive on extremely harsh sites. Well-adapted to fire; vigour and cover increase following a light fire (St-Pierre 1996).

Commercial Resources

Availability: The fruit is commercially produced in Europe and Canada and imported by United Sates (Tirmenstein 1991). Harvested from wild in Nova Scotia and in LaRonge, Saskatchewan.
Seeds have been collected by the Oil Sands Vegetation Cooperative for use in the Athabasca oil sands region.
Cultivars: Eurasian cultivars are available for fruit production (Finn and Mackey 2006, St-Pierre 1996) but these are not suitable for reclamation purposes.
Uses: Bog cranberry is an important berry crop in many parts of northern Europe and to a lesser extent in North America. It is primarily wild harvested. Products from the berries include jams, jellies, syrups, juices, sauces candies, wines and liqueurs. Also used as ornamental landscape plants, good for ground covers and edging plants. Arbutin is extracted from the leaves of this plant and used by the pharmaceutical industry to produce preparations to treat intestinal disorders (Marles et al. 2000).

Notes

Vaccinium vitis-idaea is listed as 96% intact (less occurrences than expected) in the Alberta oil sands region (Alberta Biodiversity Monitoring Institute 2014).

As an evergreen shrub, *Vaccinium vitis-idaea* retains its capacity for photosynthesis through the winter. Plants may continue to photosynthesize up to 25% of their annual maximum. This is beneficial in a variety of ways. The plants are able to take advantage of early thaws or temporary breaks in snow cover during the winter. Also, the sugars produced lead to high concentrations of soluble sugars which reduce the damage to leave tissues caused by sudden fluctuations in temperatures (Lundel et al. 2008).

Photo Credits

Photos: Glen Lee, Regina, Saskatchewan.
Photo 3: *Vaccinium_vitis-idaea*_Jonas Bergsten@ wikipedia commons 2012.
Line Diagram: John Maywood, used by permission of Bruce Peel Special Collections, University of Alberta.

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