

Scientific Name: *Cypripedium acaule* Aiton

Family: Orchidaceae

Common Name: moccasin flower, pink lady's slipper, pink lady's-slipper orchid, pink moccasin flower, stemless lady's slipper

Plant Description

An erect perennial forb; flowering stem leafless, pubescent, 10 to 30 cm tall; two elliptical to oval opposite basal leaves with parallel veins, sparsely pubescent, 10 to 20 cm long; pink (rarely white) solitary flower, fragrant, 3 to 6 cm long, with lanceolate yellow-green to greenish-brown sepals and lateral petals and large pink lower petal in a showy slipper or pouch with reddish venation and a longitudinal fissure (Moss 1983, Royer and Dickinson 2007).

Fruit: Brown, ribbed, ellipsoid capsule, 3 to 4.5 cm long (Brackley 1985).

Seed: 10,000 to 20,000 tiny seeds without endosperm are dispersed by wind (Cullina 2000).

Habitat and Distribution

Found in dry or damp sandy woods, bogs, swamps, slopes and roadsides on acidic soil (Moss 1983, Royer and Dickinson 2007) in partial to full sun (Davis 1986).

Seral Stage: Late

Soil: Acidic, well-drained sandy soils (Brackley 1985, Stuckey 1967, US Forest Service 2010).

Distribution: Found in eastern North America (USDA NRCS n.d.); in Canada along the Canadian Shield and in the northeastern corner Alberta (Royer and Dickinson 2007).

Western District of Mackenzie, northern Saskatchewan east to Labrador, Newfoundland south to the Great Lakes, Appalachia (Moss 1983).

Phenology

Flower in Alberta in late May to mid-June. Seeds appear early in July and ripen towards the end of July.

Illustrations of all stages from seed to seedling are included in Curtis (1943).

Pollination

Pollinators, primarily bees (*Bombus* spp.), enter through the central fissure in the lower petal but cannot exit the same way and thus must pass through the base of the flower, at which time a pollen mass from either anther attaches to the thorax. However, there is no nectar reward for pollinators (deceptive pollination), which may lead to lower pollination rates as pollinators learn to avoid such flowers (Davis 1986).

Hand pollination results in 70% to 75% (Davis 1986) and up to 100% (O'Connell and Johnston 1998) of plants producing fruit.



Cypripedium acaule flowering in dry woods near Fort McMurray AB.

Seed Dispersal

Microsperm can be wind dispersed when capsule dries.

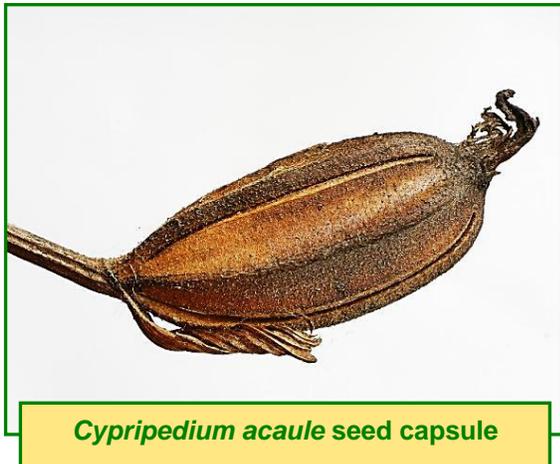
Genetics

$2n=20$ (Moss 1983).



Symbiosis

For natural regeneration, *Rhizoctonia* spp. mycorrhizae are essential for germination because the fungus breaks open the seed and provide nutrients to the protocorm as it matures over several years (Durkee 2000, US Forest Service 2010).



Seed Processing

Collection: Seeds collected 60 days after pollination had 79% germination rate after four to five months (St-Arnaud et al. 1992).

Seed Weight: 0.0030 g/1,000 seeds (Royal Botanic Gardens Kew 2008).

Average Seed/Fruit: May range from 14,000 to 54,000 seeds per capsule (Davis 1986).

Harvest Dates: Leroux et al. (1997) collected in August. Capsules may be collected in late July in northeastern Alberta.

Cleaning: Leroux et al. (1997) rinsed the capsules in running water and lightly brushed them. The capsules were then washed in 70% ethanol for 1 minute, sterilized in 0.6 sodium hypochlorite solution for 40 minutes and rinsed three times with sterile water.

Storage Behaviour: Likely orthodox (Hong et al. 1998).

Storage: Seed survive dry freezing in vacuum; also stored over calcium chloride at 8°C (Hong et al. 1998).

Longevity: Loss in viability recorded after 4 years over calcium chloride (Hong et al. 1998).

Propagation

Natural Regeneration: Mostly by seed but vegetative propagation is possible. *C. acaule* has a long, complex lifecycle, including a below-ground stage called a protocorm, and may take 8 to 10 years for the first flowering (Curtis 1943). From seed to mature plant can take several years, and these plants may live for up to 20 years (US Forest Service 2010).

C. acaule may be sensitive to disturbance such as clear-cutting, at least in the short-term (Roberts and Zhu 2002) and may respond morphologically (e.g., lower leaf length and number of inflorescences) to increased foot traffic (Bratton 1985). They may benefit from fire (Stuckey 1967).

Germination: Germination requires *Rhizoctonia* spp. to break open the seed (US Forest Service 2010), although Durkee (2000) maintains that *C. acaule* can be grown in plastic containers in very acidic and nutrient poor soils.

Germination potential may be dependent on the physiological age of the seed, and planting immature seed may bypass dormancy of mature seed (St-Arnaud et al. 1992): best time to collect seed is 60 days after pollination (Rännbäck 2007). Best germination temperature is <20°C (Rännbäck 2007).

Pre-treatment: *Cypripedium* spp. need a cold stratification to germinate (Rännbäck 2007, Smreciu and Currah 1989). Application of exogenous cytokinin can reduce the length of cold stratification; possibly eliminate the need for it completely (Rännbäck, 2007).

Scarification and sterilization *in vitro* by using hypochlorites, helps to break dormancy by breaking water repellent testa on orchid seeds (Rännbäck 2007). Ca(OCl₂) is preferred over Na(OCl₂), they

both can be applied from 0.2% to 5% concentrations (Rännbäck 2007).

Direct Seeding: No literature found.

Planting Density: No literature found.

Seed Rate: No literature found.

Vegetative Propagation: Do not survive transplanting (MacKinnon et al. 2009).

Micro-propagation: Protocols exist for propagation of other *Cypripedium* species.

Aboriginal/Food Uses

Medicinal: Used by the Algonquin, Iroquois, Mi'kmaq and Cree as a decoction for pains over the skin and as a poultice on bites from rabid dogs. *Cypripedium* species are known for their sedative, antispasmodic and tonic properties due to a compound called cypripedin in the rhizomes, which can be used to treat menstrual disorders, headaches and insomnia. It was also used to promote sleep and to relieve restlessness, hysteria and epilepsy (MacKinnon et al. 2009).

Other: Has promise as an herbal medicine as well as an ornamental flower, but it is not easily cultivated commercially nor does survive harvest from the wild (Marles et al. 2000).

Wildlife/Forage Usage

Wildlife: Likely eaten by rabbits and deer (Stuckey 1967).

Livestock: Unknown.

Grazing Response: Possible decrease.

Reclamation Potential

Notoriously difficult to cultivate or transplant; however, *C. acaule* does well in acidic nutrient poor soils (Durkee 2000).

Commercial Resources

Availability: Not available for commercial usage (Marles et al. 2000).

Cultivars: No literature found.

Uses: No literature found.

Notes

Synonyms include *Fissipes acaulis* (Aiton) Small, which is not valid (ITIS n.d.), and a variation, *C. acaule* var. *alba* (may not be valid), has a white lower petal.

Photo Credits

Photo 1: Wild Rose Consulting, Inc. 2011.

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