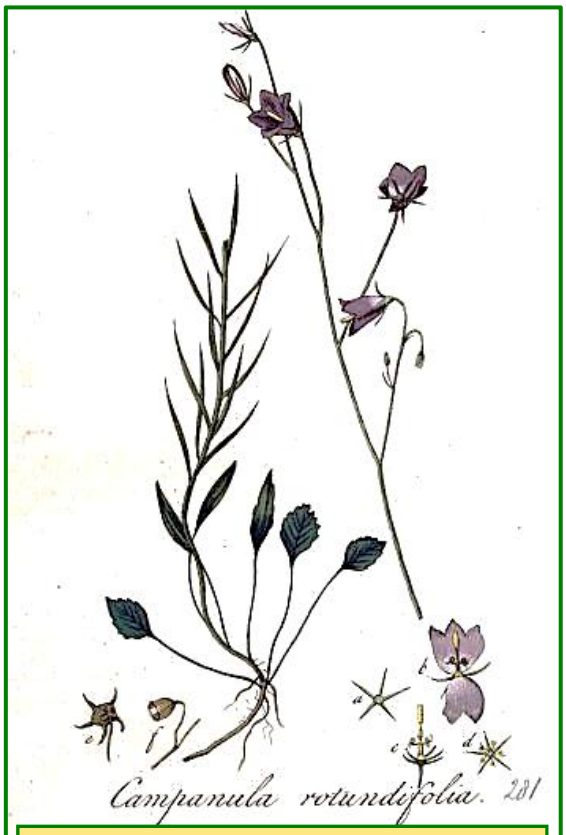
Scientific Name: *Campanula rotundifolia* L. **Family**:*Campanulaceae*

Common Name: bluebell, bluebell-of-Scotland, harebell, roundleaf harebell



***Campanula rotundifolia* flowers.**

Plant Description

Erect perennial forb from a taproot, one to several delicate-looking stems 20 to 45 cm tall; stem leaves are alternate, linear to lanceolate (less than 1 cm wide) with smooth margins; basal leaves stalked, kidney to heart shaped with rounded teeth, present when flowering (Moss 1983), all leaves glabrous; one to five flowered in a loose raceme with blue to blue-violet (occasionally white) bell-shaped nodding or (occasionally) erect flowers, 15 to 25 mm long with 5 sepals, 5 campanulate petals, 5 stamens and 1 pistil (Royer and Dickinson 2007).

Fruit: Capsule 5 to 8 mm long producing many seeds.

Seed: 1 to 1.5 mm long, oblong-elliptical, brown to black, shiny, striate surface with a peripheral ridge on one side.

Habitat and Distribution

Circumboreal on moist to dry hillsides, meadows and open woods, rocky sites and outcrops to alpine elevations (Moss 1983).

Seral Stage: Early seral, quick to respond to changes in land use (Lindborg et al. 2005).

Soil: Dry, sandy well drained soils (Lady Bird Johnson Wildflower Center 2013).

Distribution: Found throughout Canada and most of the US with the exception of Nevada, Hawaii and several south eastern states (USDA NRCS n.d.).

***Campanula rotundifolia* flowers.**

Common throughout Alberta (Royer and Dickinson 2007).
Circumpolar; Alaska, Yukon, southwestern District of Mackenzie to James Bay, northern Quebec, Newfoundland south to California, New Mexico, Texas, Nebraska, Iowa, Pennsylvania, New Jersey (Moss 1983).

Phenology

Plants flower June to August, often into September ALCLA n.d.), and seeds mature from August to October (Pahl and Smreciu 1999).

Pollination

Pollinated primarily by bumblebees and solitary bees (Bingham and Orthner 1998).
This species is protandrous; that is, pollen is released before the stigma on the same flower is receptive (Nyman 1992).
Cross pollination results in greater seeds per capsule than self-pollination (Nuortila et al. 2004).

Seed Dispersal

Seed may be wind dispersed (Royal Botanic Gardens Kew 2008) or by water and gravity (Shelter and Morin 1986).

Genetics

2n=34, 68,102 (Moss 1983) or n=17, 28, 34 (Shelter 1963).

Symbiosis

C. rotundifolia forms vesicular-arbuscular mycorrhizal associations with *Glomus* spp. (Currah and Van Dyk 1986, Nuortila et al. 2004).
Campanula benefits from mycorrhizal association in some respects such as seed and root phosphorus concentration, root/shoot ratios and seedling growth rate, but this association may reduce plant size and seed production potential (Nuortila et al. 2004).

Seed Processing

Collection: Capsules can be hand harvested (Smreciu and Gould 2010).
Seed Weight: Average 0.03 to 0.06 g/1,000 seeds (Royal Botanic Gardens Kew 2008, Wick et al. 2008).
Average Seeds/Fruit: Ranges from 54 to 108 seeds per fruit (Giblin 2005).
Harvest Dates: Mid-September to mid-October (Pahl and Smreciu 1999).
Cleaning: Scalping may be required to remove smaller chaff. To clean, use a screen shaker and a seed blower with 1/25 inch round top screen and 45 x 45 mesh bottom screen (Pahl and Smreciu 1999).
Storage Behaviour: Orthodox, seeds may be dried to low relatively humidity without damage (Royal Botanic Gardens Kew 2008).
Storage: Store dry seeds (5% to 8% moisture content) at 18 to 20°C (Liu et al. 2008). IPGRI preferred storage conditions; low moisture content (3% to 7% fresh weight, depending on the species) and storing them, in hermetically-sealed containers, at low temperature; -18ºC or cooler (Fassil and Engels 1997, Royal Botanic Gardens Kew 2008).
Longevity: Oldest collection 24 years old with seed increasing its germination percentage from 76% to 90% (Royal Botanic Gardens Kew 2008).

***Campanula rotundifolia* seeds.**

Propagation

Natural Regeneration: In natural Norwegian seed banks, vegetative sprout densities were found to be between 21 to 1,060/m^2 and 94 to 711/m^2, germination percentages were found to be 15% to 40%, seed bank densities of seedlings were 21 to 374/m^2 (Alsos et al. 2003).

Seedling emergence may benefit from low levels of litter input (Hovstad and Ohlson 2008).

Germination: 76% to 100% germination was reached on 1% agar at temperatures varying between 15 to 25°C, in some treatments 250 mg/l of gibberellic acid was added to the agar. One treatment received a cold stratification treatment at 2°C on agar and it produced the lowest percentage of germinants (Royal Botanic Gardens Kew 2008).

Seed: Seeds should be sown indoors, not covered after sowing and bottom watered (Lady Bird Johnson Wildflower Center 2013).

In stored seeds, germination percentages were 88% under treatment of 16°C and 12h light and 12 h dark (Godefroid et al. 2010).

Pahl and Smreciu (1999) had 82% seed germination in 5 to 14 days after stratification pre-treatment.

Wick et al. (2008) used the following: pre-planting treatment of 90 day cold, moist stratification followed by direct seeding with 6:1:1 milled sphagnum peat, perlite, and vermiculite with Osmocote controlled release and Micromax fertilizers. Germination continued over 4 weeks and total time to harvest was 9 months.

Vegetative Propagation: By root or stem cuttings in damp sandy soil (Lady Bird Johnson Wildflower Center 2013). Van Dyk and Currah (1982) recommend dividing mature plants.

Aboriginal Food/Uses

Medicinal: Roots are used to stop bleeding and decrease swelling when applied as a compress (Royer and Dickinson 1996). Roots may be chewed to alleviate heart ailments (Royer and Dickinson 1996, 2007). Chippewans used an infusion of the roots to treat sore ears (Densmore 1928), and Thompson Indians used a decoction as a wash for sore eyes (Turner et al. 1990).

Wildlife/Forage Usage

Attracts hummingbirds (Lady Bird Johnson Wildflower Center 2013). Ants may play a role in dispersal (Shelter and Morin 1986). Rabbits likely eat the inflorescences (Farrow 1917).

Reclamation Potential

C. rotundifolia seems to be a hardy plant able to persist in poorer quality sites and responds quickly to improved conditions in restored grassland (Lindborg et al. 2005, Lindborg and Eriksson 2004).

C. rotundifolia spreads quickly in later seral stages in open sites, particularly in gravely or shallow soils (Pahl and Smreciu 1999).

Commercial Resources

Harvest Methods: Swath and bale tough; spread dry; thresh (Pahl and Smreciu 1999).

Uses: As a garden ornamental.

Notes

Synonyms include *C. sacajaweana*, *C. alaskana*, *C. petiolata*, *C. dubia*, *C. heterodoxa* and *C. intercedens*, none of which are valid (ITIS n.d.).

C. rotundifolia is listed as 100% intact in the Alberta oil sands region (Alberta Biodiversity Monitoring Institute 2014).

Photo credits

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