Pinedrops (Pterospora andromedea Nutt.)

Pterospora andromedea (*Pterospora* – winged seed; *andromedea* - from the nodding reddish to white flowers that are similar to the flowers of *Andromeda polifolia*) ranges in height from 30 to 100 centimeters, although it can occasionally attain a height of 2 meters. It is the tallest species of the mycotrophic wildflowers in the Heath family (Ericaceae). Pinedrops is a tall, reddish-purple plant with a sticky, unbranched stem. It has small, white to pink, urn-shaped flowers which hang upside-down. The leaves are small and scale-like, mostly on the lower stem, also purplish. Following flowering in mid to late summer, the stems become quite woody and stiff, making an interesting dried flower. Once ripened, seed is released through a slit occurring from the base to the tip. It is found in mature, moist, shaded, coniferous or mixed forests from 60 to 3,700 meters.

Pinedrops is a member of the Indian-pipe family (*Monotropaceae*). Pinedrops is a root parasite, depending on its association with a mycorrhizal fungus that is also associated with a conifer tree. Pinedrops produces very little chlorophyll and is therefore not green in color and does not conduct photosynthesis.
Pinedrops is primarily a western species. It typically occurs in small populations and individual pinedrops plants may not appear above ground every year.

Pinedrops is listed as threatened. Reasons for its rarity include typically small population sizes; short-lived seeds; variable occurrence and dormancy at a given site; and association with specific fungal and conifer partners. Pinedrops seeds are difficult to germinate and establish, and plants do not transplant well. This woodland oddity is best enjoyed where one finds it. It is widespread across much of Canada as well as the western and northeastern United States to northern Mexico. Along with *Monotropa* it is one of the more frequently encountered genera of the Monotropoideae.

The genus name is derived from the morphology of the seeds which have narrow flaps of tissue on the side and therefore appear winged: *pteron* (Gr.) = wing, *spora* (Gr.) = seed. The specific name *andromedea* derives from the resemblance of the flowers to those of another genus in the Ericaceae, *Andromeda*.

Bob Harvey, July 2021

P. andromedea, like all members of Monotropoideae, is a mycoheterotroph. This is a form of carbon acquisition that is parasitic on fungal organisms and epiparasitic of photosynthetic plants which are symbionts to the fungal host.

Because *P.andromedea* is achlorophyllous this relationship is an obligate symbiosis for it, but is not ubiquitous in the fungal host. All Monotropoideae are host specific to a select few fungal counterparts which in turn makes them specific to the photosynthetic organism associated with their fungal host. In the case of *P. andromedea* fungal host specificity leans heavily towards *Rhizopogon salebrosus* in the western distribution and *Rhizopogon kretzerae* in the eastern distribution but broadly seems to be ubiquitous symbionts with *Rhizopogon* subgenus *Amylopogon*. *Rhizopogon* species also exhibit high host specificity and sub-genus *Amylopogon* is primarily associated with the *Pinus* genus. Fungal exoenzymatic activity has been shown to be required for seed germination of *P. andromedea* however the requisite enzymes are not exclusively produced within subgenus *Amylopogon* indicating that seed colonization by fungi outside of the observed host specificity is possible however ecologically restricted by some currently unknown mechanism.