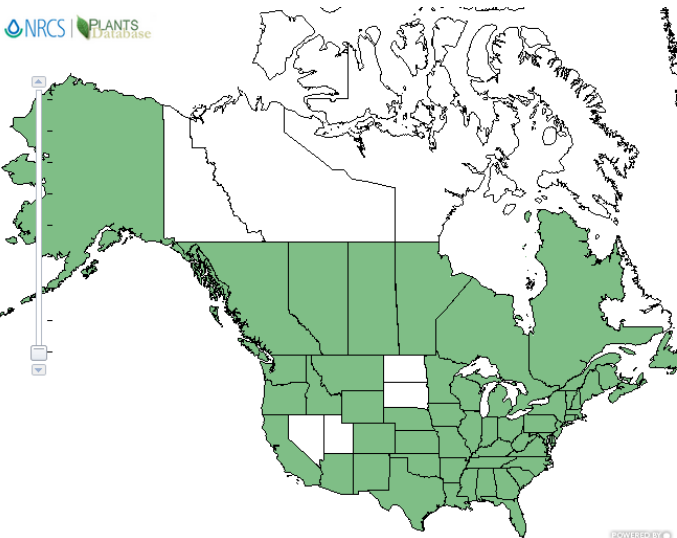


**Plant Propagation Protocol for *Monotropa hypopitys***  
**ESRM 412 – Native Plant Production**

<b>TAXONOMY</b>	
Plant Family	
Scientific Name	Monotropaceae
Common Name	Indian-pipe
Species Scientific Name	
Scientific Name	
Genus:	<i>Monotropa</i>
Species:	<i>Hypopitys</i>
Species Authority:	L.
Varieties	
Sub-species	
Cultivar	Herbs
Common Synonym(s)	<i>Monotropa hypopithys</i> var. <i>americana</i> (DC.) Domin <i>Monotropa hypopithys</i> var. <i>latisquama</i> (Rydb.) Kearney & Peebles <i>Monotropa hypopithys</i> var. <i>rubra</i> (Torr.) Farw.
Common Name(s)	Pinesap, Dutchman's pipe, yellow bird's-nest
Species Code (as per USDA Plants database)	MOHY3
<b>GENERAL INFORMATION</b>	
Geographical range	<p>Pinesap is an herbaceous perennial wildflower with a wide geographic distribution throughout the United States and Canada. However, Pinesap is a rarely encountered wildflower.</p>  <p>Monotropa hypopitys range map. USDA PLANTS Database.</p>

Ecological distribution	Rich, shade coniferous forests, on humus. [1]
Climate and elevation range	7000 to 8500 feet. [2]
Local habitat and abundance	A saprophytic perennial herb of leaf litter in shaded woodlands, most frequent under <i>Fagus</i> and <i>Corylus</i> on calcareous substrates and under <i>Pinus</i> on more acidic soils. It also grows in damp dune-slacks, where it is usually associated with <i>Salix repens</i> . 0-395 m (Buxton, Derbys.). <i>M. hypopitys</i> associated with <i>Tricholoma cingulatum</i> when <i>Salix repens</i> was the autotrophic host, and with <i>Tricholoma terreum</i> when <i>Pinus sylvestris</i> was the host [3]
Plant strategy type / successional stage	
Plant characteristics	Fleshy, saprophytic herbs, waxy white, yellow or pinkish, lacking green pigment. Commonly fragrant; stems stout, unbranched, often clustered, usually more or less downy. [4] Alternate, scale-like, smooth-edged fringed, 1-1.5 cm long on upper stem, thicker and toward stem base. Seasonal variation also occurs in the appearance of this species in that plants blooming in the summer tend to be yellowish, whereas those blooming in the autumn are more pinkish or reddish. Rarely, individuals exhibit odd color patterns, such as candy-cane-like striping of red and white or red stems with yellow flowers. More than 80 segregates have been named, but none of these have been considered to warrant taxonomic recognition in the most recent monographs. [1]
<b>PROPAGATION DETAILS</b>	
Ecotype	
Propagation Goal	Plants
Propagation Method	Seeds
Product Type	Container
Stock Type	
Time to Grow	6 weeks
Target Specifications	15-35 cm [5]
Propagule Collection Instructions	As the capsule matures, the flowers become erect. Once ripened, seed is released through slits that open from the tip to the base of the capsules. The plant is persistent after the seeds have dispersed.
Propagule Processing/Propagule Characteristics	650 seeds per pound [6]
Pre-Planting Propagule Treatments	
Growing Area Preparation / Annual	40 × 60 mm rectangles of 53 µm nylon plankton

Practices for Perennial Crops	netting. [6]
Establishment Phase Details	
Length of Establishment Phase	
Active Growth Phase	
Length of Active Growth Phase	
Hardening Phase	
Length of Hardening Phase	
Harvesting, Storage and Shipping	
Length of Storage	
Guidelines for Outplanting / Performance on Typical Sites	
Other Comments	
<b>INFORMATION SOURCES</b>	
References	See below
Other Sources Consulted	
Protocol Author	Chao Yang
Date Protocol Created or Updated	05/18/2015

[1] Rare vascular plants of Alberta (softcover). 2001. Kershaw, L.J.; Gould, J.; Johnson, J.D.; Lancaster, J., editors. University of Alberta Press, Edmonton, Alberta, Canadian Forest Service, Northern Forestry Centre, Edmonton, Alberta. P136.

[2] Epple, Anne Orth., and Lewis E. Epple. A Field Guide to the Plants of Arizona. Mesa, AZ: LewAnn Pub., 1995. Google Book. Web. 17 May 2015.

[3] Southworth, Darlene. Biocomplexity of Plant-fungal Interactions. Ames, IA: Wiley-Blackwell, 2012. Web. 18 May 2015.

[4] Klooster, Matthew R.; Culley, Theresa M. (2009), Comparative ecology of *Monotropa* and *Monotropopsis*: two mycoheterotrophic genera in the Monotropoidiae (Ericaceae), *The American Journal of Botany*

[5] Leake, J. R., McKendrick, S. L., Bidartondo, M. and Read, D. J. (2004), Symbiotic germination and development of the myco-heterotroph *Monotropa hypopitys* in nature and its requirement for locally distributed *Tricholoma* spp. *New Phytologist*, 163: 405–423. doi: 10.1111/j.1469-8137.2004.01115.x

[6] Wallace, G.D. (1975), Studies of the Monotropoidiae (Ericaceae): taxonomy and distribution, *The Wassman Journal of Biology*

Other sources.

] "Monotropa Hypopitys." Wikipedia. Wikimedia Foundation, n.d. Web. 20 May 2015.

Beatty, G. E., and J. Provan. "High Clonal Diversity in Threatened Peripheral Populations of the Yellow Bird's Nest (*Hypopitys Monotropa*; Syn. *Monotropa Hypopitys*)." *Annals of Botany* 107.4 (2011): 663-70. Web.

Duddridge, J. A., and D. J. Read. "An Ultrastructural Analysis Of The Development Of Mycorrhizas In *Monotropa Hypopitys* L." *New Phytologist* New Phytol 92.2 (1982): 203-14. <http://plants.usda.gov/core/profile?symbol=MOHY3>

[http://www.fs.fed.us/wildflowers/beauty/mycotrophic/monotropa\\_hypopitys.shtml](http://www.fs.fed.us/wildflowers/beauty/mycotrophic/monotropa_hypopitys.shtml)