



Best Survey Period



Status: State threatened

Global and state rank: G5/S2

Family: Monotropaceae (Indian-pipe)

Other common names: giant birds nest, Albany beech-drops

Synonyms: *Monotropa procera* Torr.

Taxonomy: *Pterospora andromeda* is the only species in its genus (monotypic). Sometimes included in the Pyrolaceae or Ericaceae under subfamily Pyrolaceae, *Pterospora* and other species of the Monotropaceae differ in their saprophytic (absorb nutrients from dead or decaying matter) habit (Voss 1996).

Total range: A species primarily of Western North America, pine drops is disjunct in the Great Lakes region from the Black Hills and mountains of the west, and is known in scattered, rare, and localized populations further east to Quebec and New England (Voss 1996).

State distribution: Forty three occurrences of this species have been reported from Michigan, 22 of which are post-1978 records. The majority of these are associated with forested dune communities ranging from Ottawa to Keeweenaw County, with concentrations in Keeweenaw, Emmet, and Leelanau counties. Additional occurrences are widely scattered from Ottawa and St. Clair counties in southern Lower Michigan and from Drummond Island to Ontonagon County in the western Upper Peninsula. All occurrences were reported in low numbers ranging from a single individual to 11 stems, or in many cases simply

indicated as ‘rare.’ Seventeen occurrences occur on public lands or designated preserves. None of these occurrences, however, are under specific active protection.

Recognition: Pine-drop lacks chlorophyll and has one to several simple, erect stems, from 3-10 dm tall, bearing numerous scale-like leaves and a terminal raceme of numerous nodding flowers. The approx. 6-7 mm long, bell-shaped corolla is white while the sepals and vegetative parts of the plant are reddish to maroon. The stem and sepals are glandular-hairy giving the plant a clammy-sticky feel. The similar, but more widespread and common species *Monotropa uniflora* (Indian pipe) and *M. hypopithys* (pinesap), also lack chlorophyll, but are typically one half the size of *Pterospora* or smaller. In addition, the flowers of both Indian pipe and pinesap become erect in fruit, unlike the strongly nodding fruits of *Pterospora*. Indian pipe also differs in bearing only a single large flower on each stem.

Best survey time/phenology: Due to its distinctive habit and lack of chlorophyll, pine-drops should be recognizable during most of its aboveground life from June through early September, as long as the recognition characters are assessed carefully. The optimal time period, however, is when flowers and fruits are in their prime, typically from July through mid- to late August. It should be noted that pine drops is variable in its occurrence and may not appear aboveground each year.

Habitat: In Michigan, pine-drops is known from dry woods containing conifers such as pines, hemlock, spruce, balsam fir, or white cedar, and frequently including aspen or birch. Many occurrences are associated with dry to dry-



mesic forests of sand dunes along the Great Lakes shorelines, while two occurrences have been reported from maple forests. This species typically occurs in forested habitats with a well-developed needle duff. Associated herbaceous species that have been noted include large leaved aster (*Aster macrophyllus*), Hepatica (*Hepatica* spp.), spotted coralroot (*Corallorhiza maculata*), winter-green (*Gaultheria procumbens*), and various ferns.

Biology: Lacking chlorophyll, *Pterospora* is thought to be dependent upon a fungus that forms a mycorrhizal relationship (a mutually beneficial association of a fungus and plant root) with a forest tree (likely a conifer) and *Pterospora*, to obtain nutrients. The fungal mycelia (the thread-like strands that collectively form the underground body of a fungus individual) form a sheath around the roots, isolating the roots from direct contact with the soil. Because there is no evidence that it is directly parasitic on a forest tree, it is considered a saprophyte by some, or alternatively, a parasite on the fungus (Bakshi 1959, Voss 1996). Further study is necessary to resolve these alternative viewpoints. The stems arise from a tight ball of mycorrhizal roots, producing flowers at about 4 weeks, the first typically opening in June. New shoots and inflorescences, however, can be produced throughout the growing season. Fruiting usually occurs in late July and August. Depending upon the size of the plant, from 20-128 fruiting capsules are produced, each bearing up to 4800 short-lived (3-9 weeks), wind-dispersed seeds. Germination in the greenhouse or lab has been unsuccessful, as has transplantation, thus suggesting that pine drops is sensitive to disturbance. Apparently, it isn't easy to replicate the specific biological and ecological conditions required for germination and establishment. Michigan populations have all been reported to be small (the largest comprised of 11 stems), as was the case for populations studied by Bakshi (1959). However, some populations in the Great Lakes region have been reported "in great quantities" (Voss 1996). Populations have also been noted as sporadic, not appearing every year, although Garlitz observed one population consistently over a 16-year period (MNFI element occurrence record #038).

Conservation/management: Little is known regarding specific management strategies for this species with the exception of the need to maintain its mycorrhizal association. Any strategy that lacks an understanding of this relationship is doomed to failure. Until additional knowledge regarding the biology and ecology of this species is available, management strategies should focus on preservation of ecosystem function, with particular attention paid to the maintenance of soil microbe and mycorrhizal diversity.

Research needs: Further investigation of the mycorrhizal system of *Pterospora* is of critical importance for the protection of this species. Systematic surveys to provide a thorough assessment of its status in Michigan is also a high priority, since this will also help to define its habitat

requirements.

Comments: Pine-drops derives its genus name *Pterospora* from the numerous winged (Ptero) seeds (spora) it produces (Bakshi 1959). Its species name comes from the flask-shaped flowers that resemble that of the Greek goddess Andromeda (Voss 1996).

Related abstracts: dry-mesic forest, dry northern forest

Selected references

- Bakshi, T.S. 1959. Ecology and morphology of *Pterospora andromedea*. Bot. Gaz. 120:203-217.
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- Wallace, G.D. 1975. Studies of the Monotropoideae (Ericaceae): Taxonomy and distribution. Wasmann J. of Bio. 33:1-88.

Abstract citation

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