Ghost Pipe-*Monotropa uniflora*

Taxonomic Information:

Domain	Kingdom	Phylum	Class	Order	Family	Genus	Species
Eukaryota	Plantae	Tracheophyta	Magnoliopsida	Ericales	Ericaceae*	Monotropa	uniflora

Sometimes classified as Monotropaceae

Description:

Ghost Pipe can typically be found growing in small clusters in moist, rich soil in shaded areas of forests, growing 4-8 inches tall. They're easily recognizable by their translucent white to light pink coloring, scale like leaves, and lone flower. Sometimes they're even seen with black or dark brown spots. Each plant will grow one flower (hence the name *uniflora*) that curves downward when young, but straightens as it ages as a form of protection (fig. 2-3). Ghost Pipe is a eudicot, meaning that the flowers come in five parts. They're native to almost all parts of North America (fig. 1), though usually absent around the Rocky Mountains. On occasion, they have also been found in Asia. In these areas, there isn't an official declaration of endangerment, even though it is considered a rare species. Some independent organizations have listed it as a 'no pick' plant, encouraging foragers and those who see the plant in the wild to leave it alone. Because of its overall rarity, there is worry that it could become endangered if enough people attempt to harvest the plant. One of the more interesting things about Ghost Pipe is its lack of photosynthesis. Rather than gathering its energy from the sun, it uses underground mycorrhizal networks of fungi that it 'leeches' off of.

Biological/Ecological Significance:

The Ghost Pipe (*Monotropa uniflora*) is a unique plant that is often mistaken for a fungus. While it is not a fungus, it also doesn't have chlorophyll (hence the "ghostly" white color), and thus cannot obtain nutrients via photosynthesis from the sun. It's part of a special type of plant referred to as mycoheterotrophic, meaning that they get their nutrients and carbon through a connection to fungi. Mycorrhizal networks of fungus exist all over the forest floor, beneath our very feet. These fungal threads connect to tree roots and are able to uptake nutrients from the trees. These networks also help create more surface area for the trees, which then helps them absorb more nutrients and water in return. However, Ghost Pipe knows how to capitalize on these relationships by tapping into these fungal threads and redirecting nutrients to itself (*What Are Mycotrophic Wildflowers?*, n.d.). Another interesting part of this relationship is that certain mycotrophic plants have particular fungal preferences; specifically, *M. uniflora*

tends to associate with fungi from the Russulacea family. While research is still being done on why there is a preference, researchers do believe that it's more than chance (Yang & Pfister, 2006).

As far as structure goes, *M. uniflora's* tendency to start off hunched over and straighten up as it ages most likely has to do protection for the plant. Because the flower is at a slight angle (as opposed to directly downward) it still lets pollinators get into the flower, but the hunched position helps protect the delicate stamen from being damaged by rainwater. When the flowers are turned upwards, they have most likely been pollinated and are beginning to produce the capsule fruit ('Monotropa Uniflora', n.d.). Once the fruit is formed, the stem begins to dry out, turning the plant from a stark white to a dry, papery brown (fig. 4). The capsule dries out and then will split open to release the seeds to continue the life cycle (*Monotropa Uniflora (Indian Pipe)*, n.d.).

Cultural Significance:

There are a wide range of medicinal uses for Ghost Pipe that have been used by a variety of people for decades. The Potawatomi would use the roots of the plant to make tea for women on their menstrual cycles, and the roots have also been frequently used as a tonic among white Americans, popular for its sedative properties (Smith, 1933). Similarly, the Algonquian tribes would use the liquid from the roots diluted with water to help with pain relief (Tantaquidgeon, 1972).

In modern foraging communities, a lot of people identify this plant as a do-not-pick. Because of its rarity and the fact that there isn't a lot known about its reproductive cycles, harvest can be damaging to its population. Ghost Pipe also hasn't been able to be successfully cultivated, making this suggestion not to pick even more important. And finally, disruption of the plant can also disrupt the mycorrhizal network that it's attached to. A lot of foraging blogs where Ghost Pipe is common encourage people not to pick it, and instead respect its natural beauty. One blog post goes on to talk about how in the past, disturbing one flower to make a tincture of the roots has a drastically different effect than it does today in the age of social media and growing interest in foraging and herbalism (Sanchez, 2019).

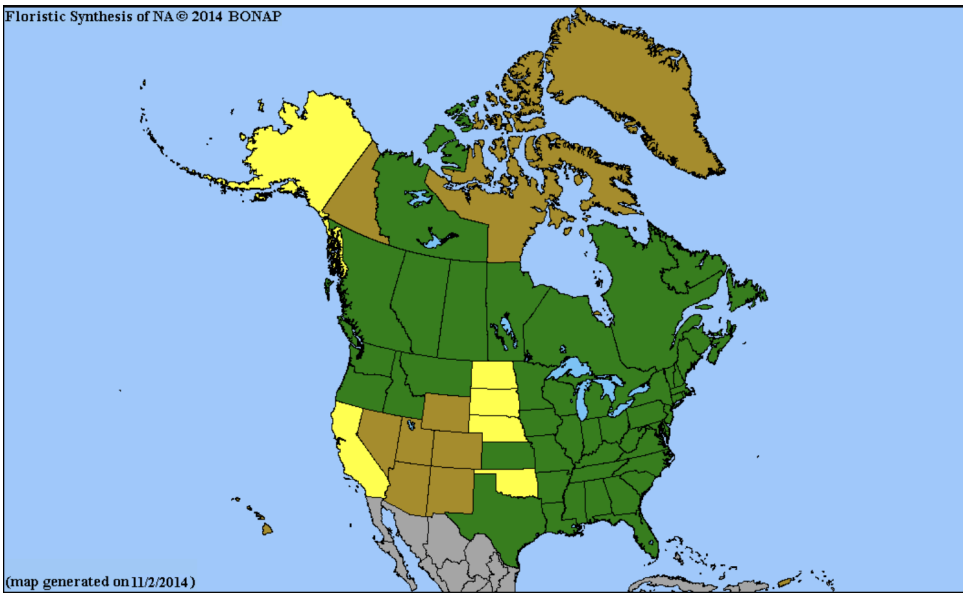

Figure 1 showing the distribution of Ghost Pipe

Figure 2 showing flowers pointing down

Figure 3 showing flowers pointing straight up

Figure 4 showing the dried up stalks with capsules on top

Works Cited

DeLay, C. (n.d.). *Ghost Pipe*. USDA Forest Service. Retrieved 27 February 2025, from https://www.fs.usda.gov/wildflowers/plant-of-the-week/monotropa_uniflora.shtml

Ghost Pipe plant—Soil Ecology Wiki. (n.d.). Retrieved 27 February 2025, from https://soil.evs.buffalo.edu/index.php/Ghost_Pipe_plant

Kartesz, J.T., The Biota of North America Program (BONAP). 2015. *North American Plant Atlas*. (http://bonap.net/napa). Chapel Hill, N.C. [maps generated from Kartesz, J.T. 2015. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). (in press)].

Monotropa uniflora. (n.d.-a). *American Journal of Botany*.

Monotropa uniflora. (n.d.-b). USDA Forest Service. Retrieved 27 February 2025, from https://www.fs.usda.gov/wildflowers/beauty/mycotrophic/monotropa_uniflora.shtml

Monotropa uniflora (Indian Pipe): Minnesota Wildflowers. (n.d.). Retrieved 28 February 2025, from https://www.minnesotawildflowers.info/flower/indian-pipe

Sanchez, C. (2019, August 14). *Ghost Pipe, a NO PICK*. Everyleafspeaks.Org. https://www.everyleafspeaks.org/blank-3/ghost-pipe-a-no-pick

Smith, H. H. (1933). *Ethnobotany of the Forest Potawatomi Indians*. *7*(1), 1–230.

Tantaquidgeon, G. (1972). *Folk Medicine of the Delaware and Related Algonkian Indains*. https://www.google.com/books/edition/Folk_Medicine_of_the_Delaware_and_Relate/-xlxH4_nufQC?hl=en&gbpv=1&bsq=indian%20pipe

What are Mycotrophic Wildflowers? (n.d.). USDA Forest Service. Retrieved 27 February 2025, from https://www.fs.usda.gov/wildflowers/beauty/mycotrophic/whatarethey.shtml

Yang, S., & Pfister, D. H. (2006). Monotropa uniflora Plants of Eastern Massachusetts Form Mycorrhizae with a Diversity of Russulacean Fungi. *Mycologia*, *98*(4), 535–540.