

Adlumia fungosa

Climbing Fumitory

Fumariaceae



Adlumia fungosa by Doug McGrady, 2015

Adlumia fungosa Rare Plant Profile

New Jersey Department of Environmental Protection
State Parks, Forests & Historic Sites
State Forest Fire Service & Forestry
Office of Natural Lands Management
New Jersey Natural Heritage Program

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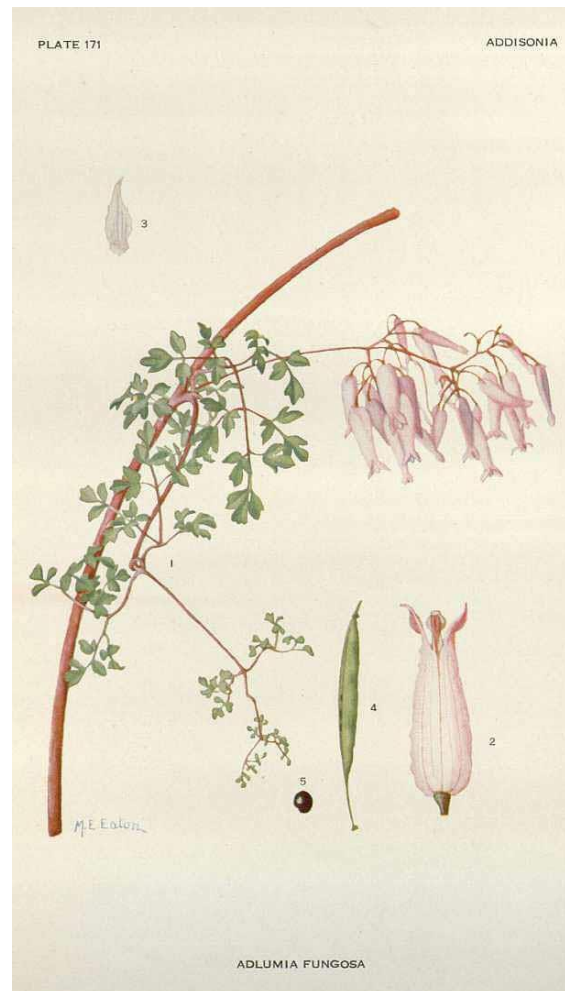
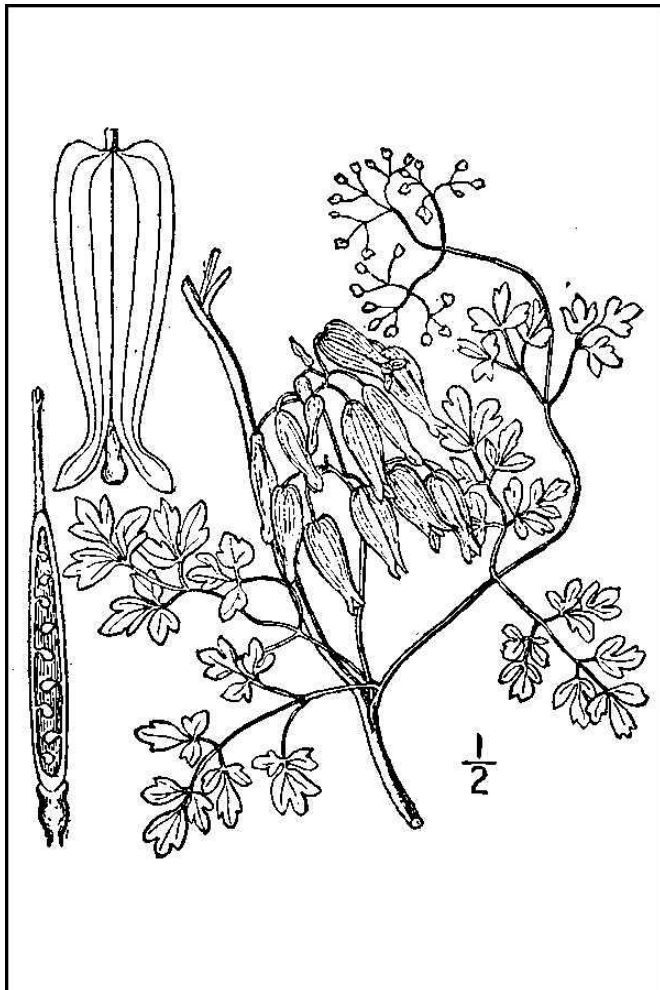
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Life History

Adlumia fungosa (Climbing Fumitory), a taprooted biennial vine in the Fumariaceae, is the only native member of its genus in North America. An *Adlumia* seedling usually forms a basal rosette, at times also initiating a shoot for the following year's growth, and during the second year a branching stem develops beginning in spring or early summer. Sometimes plants mature over the course of a single year. While in rosette form the leaves are fairly erect but in second-year plants they are placed alternately along a pale red stem. The leaves are pinnately divided 2–3 times, terminating in 3-lobed leaflets. The leaf petioles often twine around other plants to support the elongating stem which may become as long as 1–5+ meters, occasionally forming a dense tangle. *A. fungosa* typically blooms from June–September. Flowering branches emerge near the base of the leafstalks and contain clusters of pale pink or white flowers on drooping peduncles. Four petals fuse to form a bilaterally symmetrical urn-shaped flower with flaring lobes and a somewhat spongy texture that may be from 10–17 mm long. The flowers turn brown and papery but persist as the fruits develop. *A. fungosa* does not reproduce vegetatively so after blooming it must re-establish from seed. (See Britton and Brown 1913, Britton 1920, Fernald 1950, Ernst 1962, Gleason and Cronquist 1991, Tebbitt et al. 2008, Hind 2010, Sondag and Burnham 2014, Boufford 2020, Minnesota Wildflowers undated).



Left: Britton and Brown 1913, courtesy USDA NRCS 2022a. Right: M. E. Eaton, 1920.



dogtooth77, 2016



Doug McGrady, 2015

Pollinator Dynamics

The structure of flowers in the Fumariaceae suggests bee pollination (Zomlefer 1994), but unlike other genera in the family *Adlumia* flowers do not produce nectar. As a fumitory-type flower develops, structures at the stigma edge interlock with the anthers and cause pollen to be deposited on the stigma, from which it is subsequently transferred to visiting insects. For species that are not self-compatible the process promotes outcrossing, but nearly all annual and biennial species in the Fumariaceae are self-compatible and are primarily self-fertilized (Tebbitt et al. 2008). However, Tebbitt et al. noted that some cross-fertilization can also occur in the self-pollinated species, and Darwin (1874) reported that he had "often seen bees sucking the flowers of the fumariaceous genera, *Corydalis*, *Dielytra*, and *Adlumia*."

Seed Dispersal

Adlumia fungosa fruits are two-valved cylindrical capsules averaging 10 mm in length (Boufford 2020). The pale green pods contain 10–12 small, glossy, black seeds (Britton 1920). Fruits develop from July–October (Sunday and Burnham 2014), and September 1 has been recommended as an optimal date for finding mature seeds (Frett 2012). Although Climbing Fumitory belongs to a lineage in which more than 50% of the species are ant-dispersed, the seeds of *A. fungosa* lack arils (Lengyel et al. 2010, Fukuhara 1999). Sunday and Burnham (2014) indicated that Climbing Fumitory seeds are often self-sown, and no reports of other dispersal mechanisms were found for the species.

Seeds of plants in the fumitory family require a period of cold stratification in order to germinate (Tebbitt et al. 2008). Deno (1993) reported that *A. fungosa* seeds germinated after 7 days at 70°F

but details about their prior storage were not provided. Long-term seed banking has been reported for *Adlumia fungosa* (Judziewicz 2001). The species is purportedly easy to grow from seed and generally self-maintaining once established (Britton 1920, Fernwood Nursery 2017, Watkins 2022). Following an outdoor cultivation experiment, Hind (2010) observed that germination of *A. fungosa* seeds occurred sporadically over a period of 3–4 weeks and may have been influenced by weather conditions.

Habitat

Adlumia fungosa is frequently associated with moist, rocky, forested sites. Substrates may be formed from sedimentary or igneous rock and include outcrops, ledges, cliffs, talus, gravel, boulder fields, and rocky slopes (Britton 1920, Hough 1983, Judziewicz 2001, Walker et al. 2004, Rhoads and Block 2007, Tebbitt et al. 2008, Weakley 2015, MANHESP 2020, NJNHP 2022). *A. fungosa* is also known from lakeshore and dune complexes in the Great Lakes region (Cohen et al. 2020). The vine may occur from 0–1500 meters above sea level (Boufford 2020), although plants near the southern end of the species' range are usually restricted to sites at higher elevations in the Appalachian mountains Fables (1956). Climbing Fumitory generally grows in locations that offer some protection from wind, but a variety of light levels may be acceptable. Hind (2010) indicated that *A. fungosa* prefers dappled shade to full sun while Soudy and Burnham (2014) said the species prefers full sun but is able to tolerate shade. In Maryland *A. fungosa* is most abundant in open habitats (MDBP undated), and excessive shading has been identified as a threat to the species in Massachusetts (MANHESP 2020). Within one large New Jersey population *A. fungosa* was noted as growing both in deep shade and in more open areas (NJNHP 2022).

Some specific community types have been described in more detail. *Adlumia fungosa* has been reported as a constituent of three natural communities in North Carolina: Rich Cove Forest, Montane Acidic Cliff, and Montane Calcareous Cliff. Both of the cliff communities are generally steep and rocky with thin soils and hydrology that varies from xeric on exposed sites to mesic in more sheltered locations, while Rich Cove Forest occurs at lower elevations, has a more developed soil layer, and features a mesic hydrologic regime (Schafale and Weakley 1990). In Berkshire County, Massachusetts *Adlumia fungosa* was associated with Southern Acidic Cliffs, where it grew on boulder talus at the cliff bases. The acidic rock produces little in the way of soil or nutrients and the habitat is sparsely vegetated. In comparison with open summit communities the Southern Acidic Cliff community is cooler, moister, and more shaded (Weatherbee and Crow 1992). A community type where *A. fungosa* may be found in Vermont is Limestone Bluff Cedar-Pine Forest. Characteristics of the rocky bluff/outcrop community include thin soils over calcareous bedrock, warm and droughty summer conditions, and exposure to winds coming off of a large lake. Natural disturbance types cited for the community were infrequent small fires, ice storms, or high winds that topple trees (Sorenson and Popp 2006). Wisconsin's Niagara escarpment, where *A. fungosa* may occasionally be encountered, also has rugged topography and shallow soils (Howe et al. 2016) and in Maryland it has been noted that the plants are able to establish in small amounts of organic soil on the tops of boulders (MDBP undated). In Michigan, most of the communities where *A. fungosa* occurs are sandy or rocky sites with sparse vegetation such as Limestone Cobble Shore, Sand and Gravel Beach, and Open

Dunes. However, some Michigan plants may also be found in Mesic Southern Forest—a more fertile community type with better developed soil and vegetative layers (Cohen et al. 2020).

In contrast with gardeners' reports that once established at a site *Adlumia fungosa* can easily maintain a presence, natural populations have sometimes been characterized as elusive and rarely persisting for long in a single place (Minnesota Wildflowers undated). While roughly half of New Jersey's documented occurrences are no longer known from their original locations, others have remained stable for decades and at least two populations have continued at the same sites for over a century (NJNHP 2022). The endurance of an *Adlumia fungosa* population might depend on habitat requirements that have not yet been identified for the species.

There is some evidence that *A. fungosa* can benefit from periodic disturbances (Morse 2002). Judziewicz (2001) reported that Climbing Fumitory colonies may appear quickly following fire or excavation, Ohio populations have been known to spread into disturbed sites after fires or logging (OHDNR 2020), WIDNR (2021) indicated that the species was often found at sites with a history of burning, and 'burned areas' were cited as a habitat type in which the plants occur (Weakley 2015). Cohen et al. (2020) indicated that natural disturbances such as those caused by storms, wind, and winter ice were essential for the species in Michigan. While the benefits of disturbance are generally attributed to increased light or reduced competition, specific details regarding the site characteristics that favor germination are lacking.

Wetland Indicator Status

Adlumia fungosa is not included on the National Wetlands Plant List (NWPL). Any species not on the NWPL is considered to be Upland (UPL) in all regions where it occurs. The UPL designation means that it almost never occurs in wetlands (U. S. Army Corps of Engineers 2020).

USDA Plants Code (USDA, NRCS 2022b)

ADFU

Coefficient of Conservatism (Walz et al. 2018)

CoC = 9. Criteria for a value of 9 to 10: Native with a narrow range of ecological tolerances, high fidelity to particular habitat conditions, and sensitive to anthropogenic disturbance (Faber-Langendoen 2018).

Distribution and Range

Adlumia fungosa is native to the eastern and central United States and Canada, and it has been introduced in parts of western Canada and Sweden (POWO 2022). It was also noted as a garden

escape in Belgium (Ronse 2011). The map in Figure 1 depicts the extent of Climbing Fumitory in North America. A disjunct occurrence of the species was recently reported in Louisiana (Allen 2017).

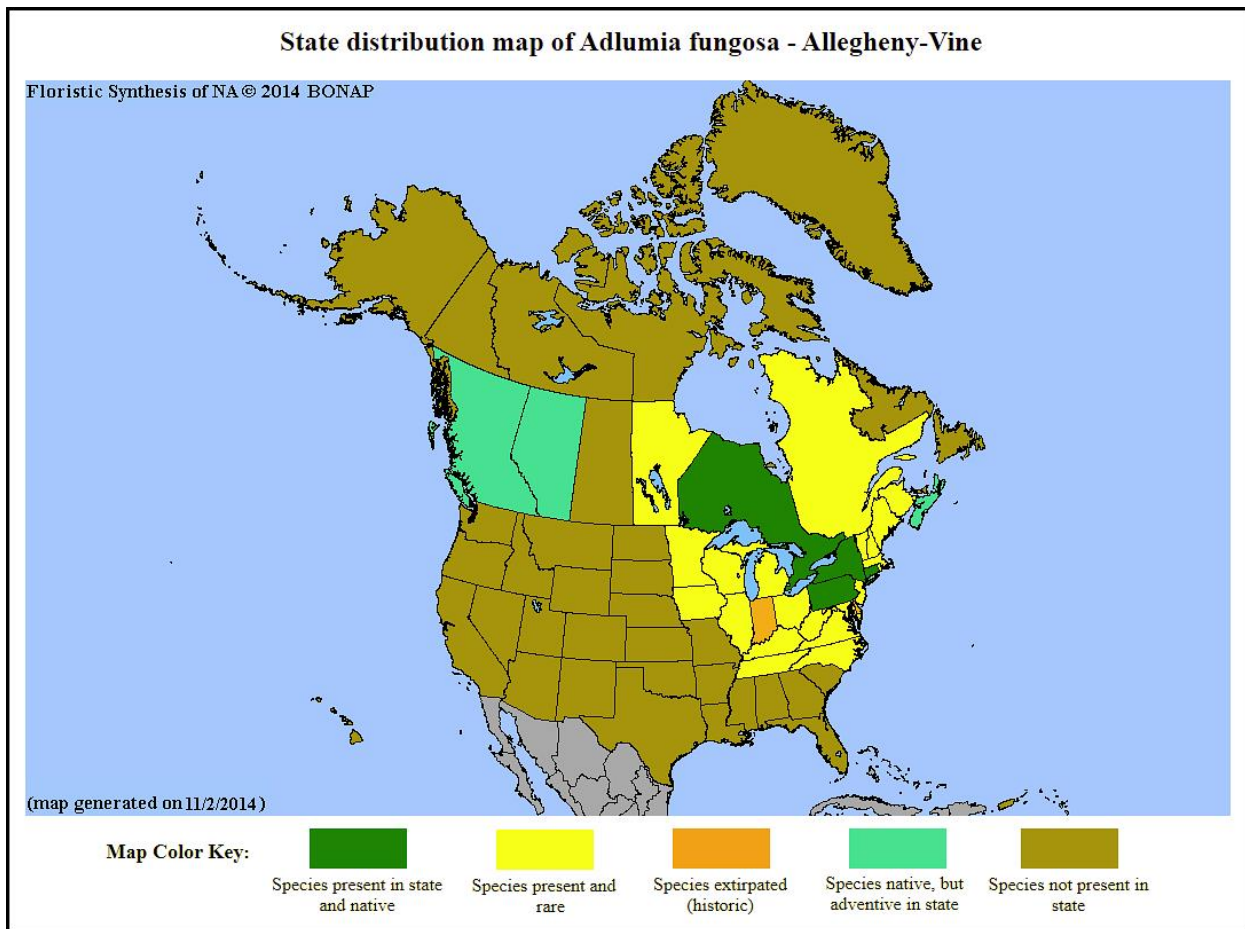


Figure 1. Distribution of *A. fungosa* in North America, adapted from BONAP (Kartesz 2015).

The USDA PLANTS Database (2022b) shows records of *Adlumia fungosa* in seven New Jersey counties: Bergen, Hunterdon, Morris, Passaic, Somerset, Sussex, and Warren (Figure 2 below). The data reflect the current distribution of the species. In New Jersey, *A. fungosa* is mainly located in the Highlands region (Fables 1956, Moore and Glenn 2011).

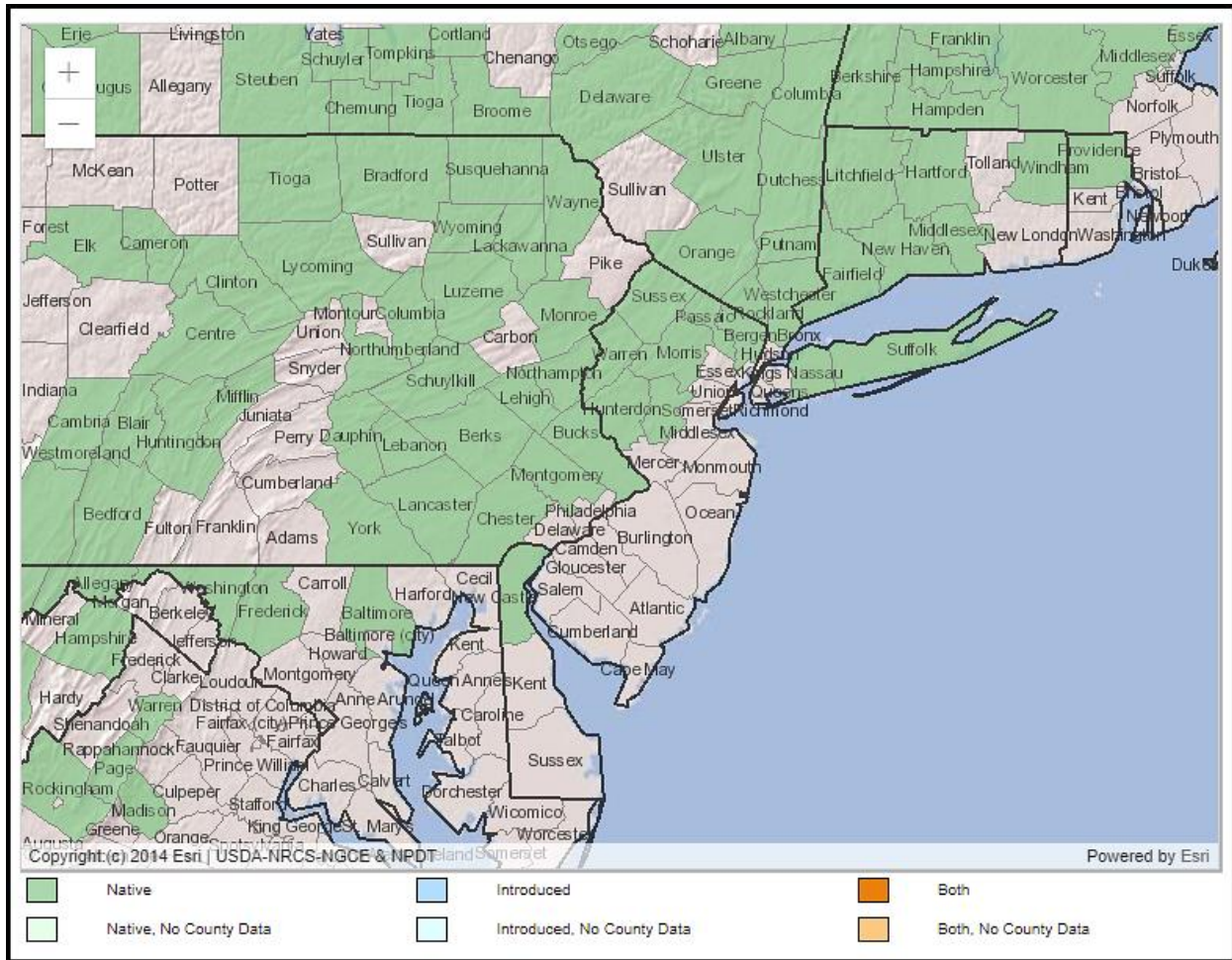


Figure 2. County records of *A. fungosa* in New Jersey and vicinity (USDA NRCS 2022b).

Conservation Status

Adlumia fungosa is apparently secure at a global scale. The G4 rank means the species is at fairly low risk of extinction or collapse due to an extensive range and/or many populations or occurrences, although there is some cause for concern as a result of recent local declines, threats, or other factors (NatureServe 2022). The map below (Figure 3) illustrates the conservation status of *A. fungosa* throughout its range. Climbing Fumitory is critically imperiled (very high risk of extinction) in four states, imperiled (high risk of extinction) in six states, and vulnerable (moderate risk of extinction) in five states and one province. It is presumed extirpated in Delaware and Indiana, and possibly extirpated in Kentucky and Manitoba. It is present but not considered native in Illinois, Nova Scotia, and New Brunswick. *A. fungosa* is apparently secure in Ontario and New York, and the species has not been ranked in three other states where it occurs.

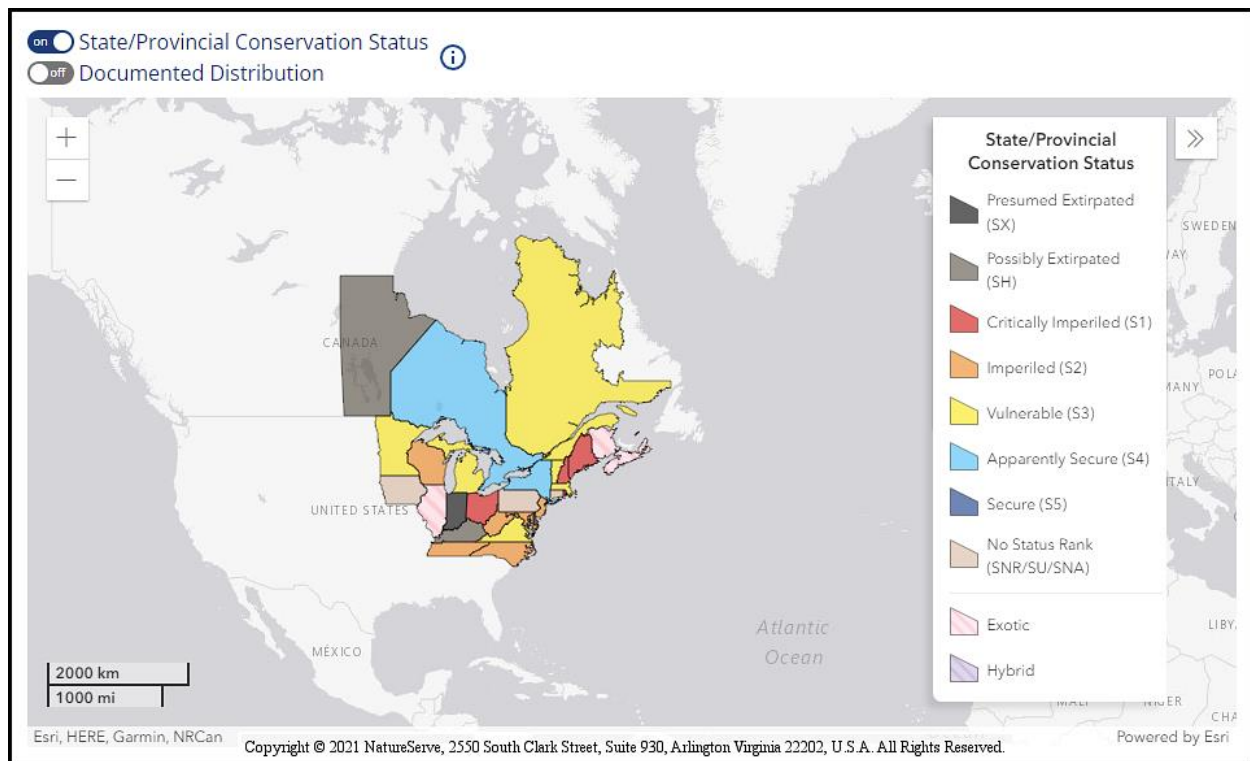


Figure 3. Conservation status of *A. fungosa* in North America (NatureServe 2022).

New Jersey is one of the states where *Adlumia fungosa* is imperiled (NJNHP 2022). The S2 rank indicates that the species is very rare in the state, with 6–20 occurrences. Species with an S2 rank may have once been more abundant but now persist in only a few of their former locations. A regional status code of HL has also been assigned to *A. fungosa*, signifying that the species is eligible for protection under the jurisdiction of the Highlands Preservation Area (NJNHP 2010).

Coddington and Field (1978) characterized *Adlumia fungosa* as 'widespread but infrequent' in Massachusetts and the same might be said regarding the distribution of the species in New Jersey. By 1900 *A. fungosa* had been documented in seven counties in the northern part of the state, and while it can still be found in all of them it is not particularly abundant in any. Climbing Fumitory is presently considered extant at 16 New Jersey sites and historical at 15 other locations (NJNHP 2022).

Threats

The proliferation of invasive plants is a recognized threat to biodiversity, and most of the vegetative communities in the Highlands Region have been affected (Moore and Glenn 2011). Invasive plants have been reported as jeopardizing many of the *Adlumia fungosa* occurrences in New Jersey (NJNHP 2022). Species noted as concerns for *A. fungosa* populations included a number that were listed by Moore and Glenn (2011) as problematic throughout the Highlands such as *Ailanthus altissima*, *Alliaria petiolata*, *Berberis thunbergii*, *Celastrus orbiculata*, *Euonymus elata*, *Lonicera maackii*, *Microstegium vimineum*, *Rosa multiflora*, and *Rubus phoenicolasius*.

Other perils reported for *Adlumia fungosa* are anthropogenic. Broad threats cited for the species are habitat loss, landscape fragmentation, and forest management practices (Morse 2002). In some locations, logging activities can result in disturbance of the substrate or direct damage to plants (MANHESP 2020). Hazards to both habitat and plants observed at New Jersey sites have included erosion, trampling, and off-road vehicle traffic (NJNHP 2022). Climbing Fumitory is widely promoted and available for sale as a garden feature, and the collection of seeds or young plants from wild populations has also been identified as a threat to the species (Coddington and Field 1978, OHDNR 2020).

High levels of deer activity were noted as a potential concern at two New Jersey sites but direct herbivory on *Adlumia fungosa* was not reported (NJNHP 2022). The leaves of plants in the fumitory family have a bitter flavor that is likely to deter browsing, although some animals can develop a taste for the plants when alternatives are lacking (Tebbitt et al. 2008). Hind (2010) cautioned gardeners that young *Adlumia* plants can be susceptible to slugs and snails, but there is no evidence that the mollusks threaten native populations.

Adlumia fungosa was assessed for vulnerability to climate change in Michigan and was categorized as Presumed Stable (Penskar 2013). Although the impacts of climactic shifts may differ in the northeastern part of the country, none of the consequences identified as significant concerns for New Jersey (see Hill et al. 2020) appear to directly threaten *A. fungosa* based on our current understanding of the species. Another member of the fumitory family—*Corydalis ambigua*—was found to flower early in response to warmer conditions, which resulted in reduced pollination and fruit set for the bee-dependent plants (Kudo et al. 2004). Because *Adlumia fungosa* has the capacity to self-fertilize, loss of synchronicity with pollinators will not be a critical issue for the species as temperatures continue to rise.

Management Summary and Recommendations

Paradoxically, *Adlumia fungosa* is rare throughout much of its native range yet the species has become established in a number of places where it is exotic. There is a lack of substantial information regarding the factors that influence its abundance and rarity. Natural mechanisms for long-distance dispersal remain unreported. The life history characteristics and/or habitat elements that facilitate the development of such a substantial plant in areas with limited soil and nutrients have not been pinpointed. No reports of mycorrhizal associations were found, although there could be a connection between the presence of lichens or mosses and nutrient availability that has not been investigated (e.g. Nystuen et al. 2019).

Additional gaps exist in our understanding of the ways in which light availability and competition influence the establishment and persistence of *Adlumia fungosa*. For example, both proliferation and decline of Hemlock (*Tsuga canadensis*) have been cited as potential threats to Climbing Fumitory (MANHESP 2020, NJNHP 2022) and the numerous anecdotal reports that disturbance benefits the species have not been linked to explicit microsite conditions. While it is logical to conclude that a species preferring sparsely vegetated environments is probably a poor competitor, more detailed data concerning the ways in which *A. fungosa* germination is affected by light or the presence of other species would help conservationists evaluate the risks from

exotic species and analyze the costs and benefits of potential habitat management strategies. Since *Adlumia fungosa* is still apparently secure on a global scale and there is already abundant information available regarding its propagation, prioritizing research to fill some of the gaps in knowledge regarding the species may be the best investment for the long-term preservation of the attractive vine in its natural environment.

Synonyms

The accepted botanical name of the species is *Adlumia fungosa* (Aiton) Greene ex Britton, Sterns & Poggenb. Orthographic variants, synonyms, and common names are listed below (ITIS 2021, USDA NRCS 2022b, POWO 2022, Britton 1889).

Botanical Synonyms

Adlumia cirrhosa Raf.
Bicuculla fumarioides Borkh.
Bicuculla fungosa (Aiton) Kuntze
Capnoides scandens Moench
Corydalis fungosa (Aiton) Vent.
Diclytra cirrosa E. H. L. Krause
Fumaria fungosa Aiton
Fumaria recta Michx.

Common Names

Climbing Fumitory
Allegheny-vine
Mountain-fringe
Fairy-creeper
Cliff-harlequin

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