

Arnoglossum atriplicifolium

Pale Wild Caraway

Asteraceae



Arnoglossum atriplicifolium courtesy R. W. Smith, Lady Bird Johnson Wildflower Center, 2021

Arnoglossum atriplicifolium 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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Life History

Pale Wild Caraway (*Arnoglossum atriplicifolium*) is a rhizomatous perennial plant in the Asteraceae (Sunflower/Aster) family, native to the central and eastern United States. The genus *Arnoglossum* is derived from the Greek “arnos” for lamb and “glossum” for tongue; the species name refers to the leaf shape similarity to plants in the *Atriplex* genus. In its first year of growth, the plant forms a basal rosette of large blue-green leaves that are up to 21 cm long. The leaves have long petioles, and are triangular or heart shaped, palmately veined, with toothed or shallowly lobed margins. Various sources describe these leaves as plastic in appearance (Hilty 2020; Wheeler 2018). In its second or third year the plant produces an unbranched, rigid, flowering stalk that reaches 1 to 1.8 (sometimes up to 3) m in height (Anderson 2020; Missouri Botanical Garden 2023). This central stalk can be weakly ridged or smooth and waxy (Haddock 2009).

The upper leaf surfaces of Pale Wild Caraway are dark green, the undersides pale green and waxy (Anderson 2020; Haddock 2009; Hilty 2020). The lower stem leaves on the flowering stalk are alternate, resembling the basal leaves in shape, and become progressively smaller in size and more wedge-shaped and toothed or lobed toward the upper stem (Anderson 2020; Strausbaugh and Core 1978). The upper leaves also have a shorter petiole (Haddock 2009).



Left: Britton and Brown 1913, courtesy USDA NRCS 2022a. Right: Courtesy Stephanie Brundage, Lady Bird Johnson Wildflower Center, 2018.

Flowers are borne on flat-topped umbels with many heads pointing in all directions (LeGrand et al. 2023). Flower heads are arranged in clusters of 4–15 heads, each head 3 mm across and 5 mm long with five bracts and five disc florets. The corolla is tubular, deeply five-lobed, and white to greenish or purplish white or cream in color (Gleason and Cronquist 1963; Haddock 2009; Hilty 2020; Missouri Botanical Garden 2023).

The flowers bloom June or July–October or later in more southern regions of the species' range (Anderson 2020; Weakley et al. 2022), mid-summer to early fall farther north (mid-July to late August/September in New Jersey [Hough 1983; Stone 1911]). The basal leaves of immature (non-flowering) plants can also be readily observed (LeGrand et al. 2023).

Pollinator Dynamics

The flowers of the Pale Wild Caraway are visited and pollinated by small wasps, bees, flies, beetles, and moths in search of nectar or pollen (Hilty 2020; Wheeler 2018). In particular, Hilty (2020) mentions long-tongued bees (European Honey Bee [*Apis mellifera*], various *Bombus* species, and species of Anthophoridae and Megachilidae); short-tongued bees (Halictidae including *Halictus ligatus*, various *Lasioglossum* species, and *Sphecodes antennariae*; *Colletes kincaidii* and various *Hylaeus* species); as well as numerous Sphecoid and Vespoid wasps, five Diptera and two Coleoptera species. According to Holm (2014) the flowers are especially designed to attract wasps, producing a diluted nectar preferred by them on hot summer days. Sand wasps (*Bicyrtes*), Great Black Wasps (*Sphex pensylvanicus*), Great Golden Digger Wasps (*Sphex ichneumoneus*), and Thread-waisted Wasps (*Ammophila* spp.) are reported to visit this plant (Wheeler 2018). Clemants and Gracie (2006) mention that the Indian-plantains are “visited, and possibly pollinated by butterflies”; Holm (2014) noted the Clematis Clearwing Moth (*Alcathoe caudata*) at this plant. While other species of insects feed on the leaves of the Pale Wild Caraway, for example, the larvae of both a lizard beetle (*Languria bicolor*) and a serpentine leaf-miner moth (*Phyllocnistis insignis*) (Hilty 2020 and references therein) they do not contribute to pollination.

Seed Dispersal

Wind dispersed, the seeds of Pale Wild Caraway are produced in a 4–5 mm-long fusiform or ellipsoid achene with 8–10 ribs, and 5–7 mm tufts of white bristles (Anderson 2020; Hilty 2020). There is little information about seed dispersal distance or viability over time. However, the Missouri Botanical Garden Plant Finder website (2023) notes that the plant “freely self-seeds in optimal conditions” and other plant nurseries mention its ability to self-sow and “take over” small gardens. Apparently, in some horticultural settings its self-seeding attributes make it undesirable. Although described as rhizomatous (Anderson 2020), there is no mention in the literature that the plant spreads vegetatively.

Habitat

Pale Wild Caraway is found growing in full sun to partial shade in moist to dry woods and open places. Such areas include well-drained alluvial forests; mesic to dry upland forests; rocky woodlands, ravines, or clayey or sandy oak woodlands; stream banks; barrens, meadows, and clearings; savannas or prairies; and occasionally in pastures and along roadsides (Clemants and Gracie 2006; Deam 1940; Gleason and Cronquist 1963; Flora of Wisconsin 2023; Haddock 2009; Reznicek et al. 2011; Virginia Botanical Associates 2023; Weakley et al. 2022). It has been found growing from 10–600 m (33–1970 ft) in elevation (Anderson 2020), typically in loamy, rocky, or sandy soil (Hilty 2020).

Historically, Pale Wild Caraway populations in New Jersey were found on sites with the following descriptions: rich, loamy, or dry wooded slopes; alluvial woods; at the edge of dry woods; pastures or meadows; moist open thicket; and in a sandy swamp (NJNHP 2022). The remaining extant population was discovered in 2004 in full sun growing in an open meadow with Eastern Gammagrass (*Tripsacum dactyloides*), and at the edge of hiking trails on a wooded diabase hillside in rich, moist soil. At the same site in 2019, the species was located along a trail under a partial canopy in a degraded woodland/shrubland on a mesic south-facing slope on shallow soil. Associated canopy species at the site include Tulip Poplar (*Liriodendron tulipifera*), Red Oak (*Quercus rubra*), and American Sycamore (*Platanus occidentalis*) (see NJNHP 2022 for detailed description).

Although most members of the Asteraceae family do have mycorrhizal associations, no reports of mycorrhizal associations for the genus *Arnoglossum* were found. It is not known whether this is because Wild Pale Caraway is not mycorrhizal or that this species/genus has not been assessed.

Wetland Indicator Status

Arnoglossum atriplicifolium 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)

ARAT

Coefficient of Conservatism (Walz et al. 2018)

CoC = 8. Criteria for a value of 6 to 8: Native with a narrow range of ecological tolerances and typically associated with a stable community (Faber-Langendoen 2018).

Distribution and Range

The global range of *Arnoglossum atriplicifolium* is restricted to the eastern and central United States (POWO 2022). The map in Figure 1 depicts the extent of Pale Wild Caraway in North America.

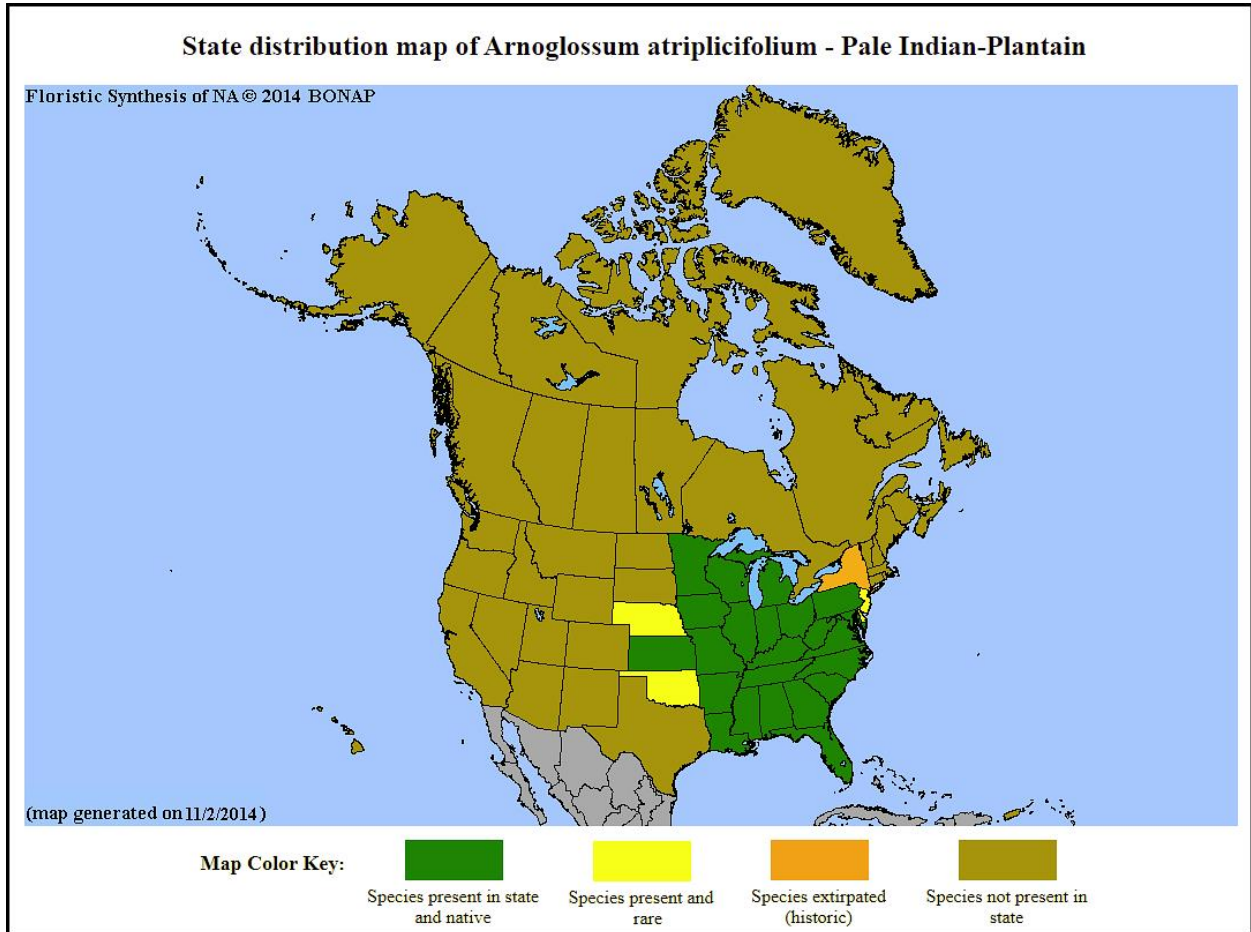


Figure 1. Distribution of *A. atriplicifolium* in North America, adapted from BONAP (Kartesz 2015).

The USDA PLANTS Database (2022b) shows records of *Arnoglossum atriplicifolium* in eight New Jersey counties: Burlington, Camden, Gloucester, Hunterdon, Mercer, Monmouth, Ocean, and Warren (Figure 2). The data include historical observations and do not reflect the current distribution of the species.

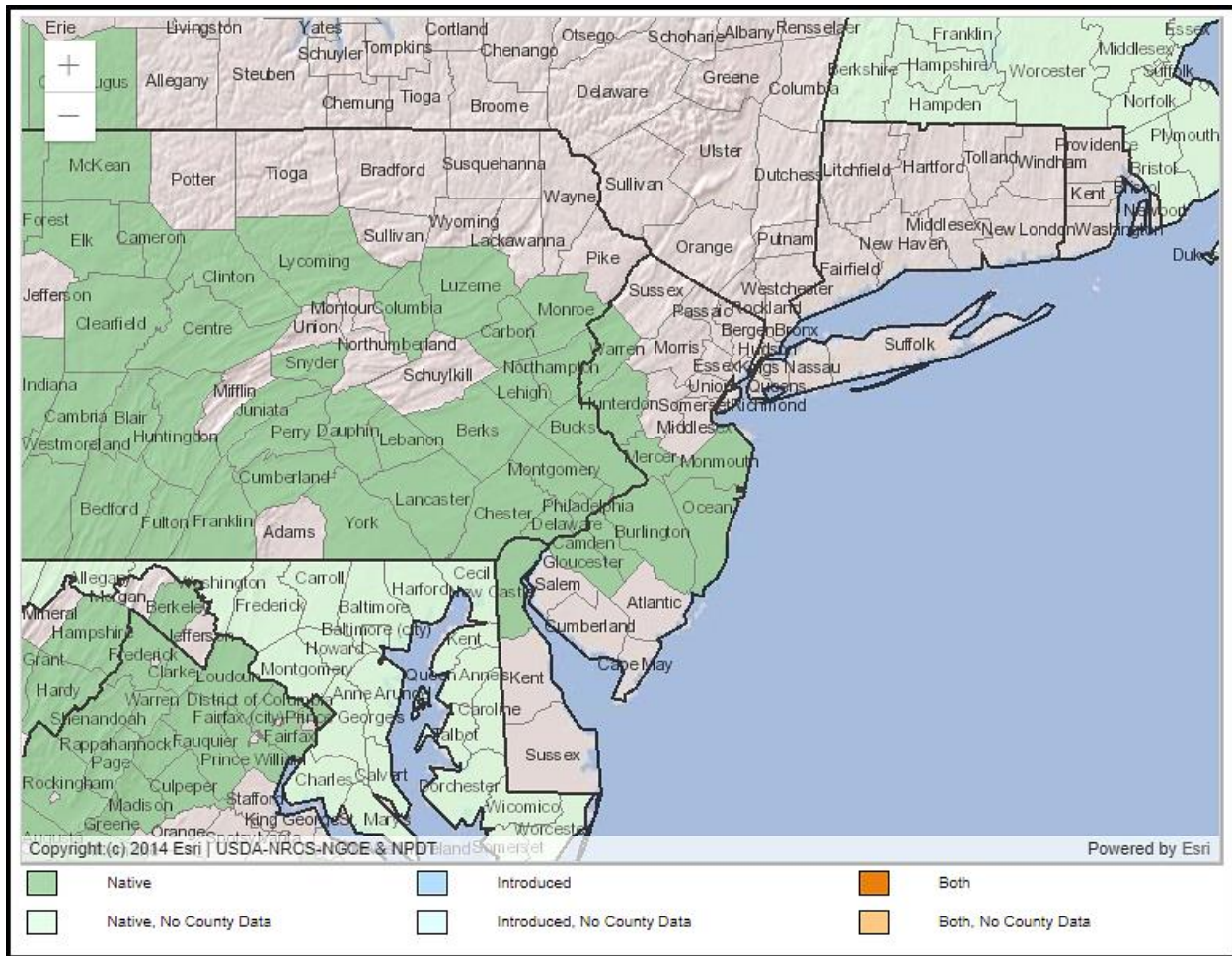


Figure 2. County records of *A. atriplicifolium* in New Jersey and vicinity (USDA NRCS 2022b).

Conservation Status

Arnoglossum atriplicifolium has a global rank of G4G5, meaning there is some uncertainty as to whether it should be considered apparently secure or secure. A G4 species has a 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 local recent declines, threats, or other factors. A G5 species has a very low risk of extinction or collapse due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats (NatureServe 2022). The map below (Figure 3) illustrates the conservation status of *A. atriplicifolium* throughout its range. Pale Wild Caraway is critically imperiled (very high risk of extinction) in two states, imperiled (high risk of extinction) in two states, and possible extirpated in New York and Louisiana. Throughout most of its range the species is secure, apparently secure, or unranked.

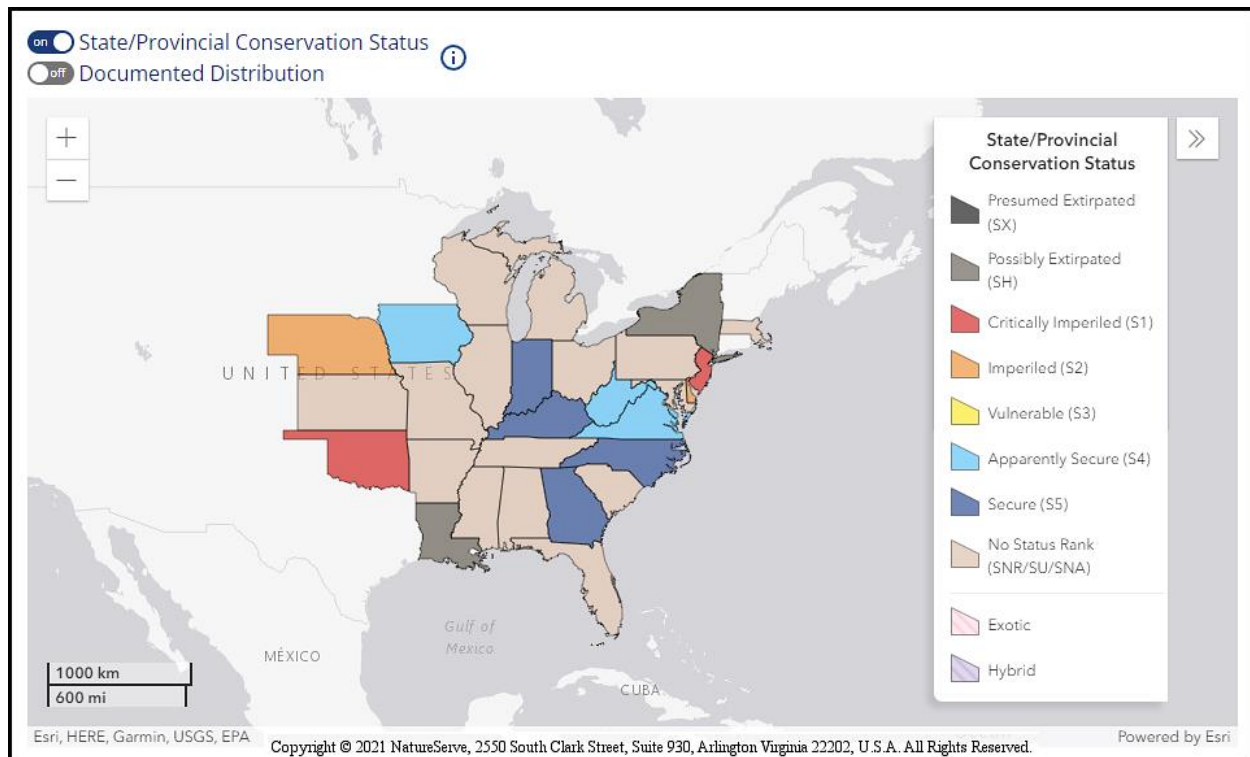


Figure 3. Conservation status of *A. atriplicifolium* in North America (NatureServe 2022).

New Jersey is one of the states where *Arnoglossum atriplicifolium* is critically imperiled (NJNHP 2022). The S1 rank signifies five or fewer occurrences in the state. A species with an S1 rank is typically either restricted to specialized habitats, geographically limited to a small area of the state, or significantly reduced in number from its previous status. *A. atriplicifolium* is also listed as an endangered species (E) in New Jersey, meaning that without intervention it has a high likelihood of extinction in the state. Although the presence of endangered flora may restrict development in certain communities, being listed does not currently provide broad statewide protection for plants. Additional regional status codes assigned to the plant signify that the species is eligible for protection under the jurisdictions of the Highlands Preservation Area (HL) and the New Jersey Pinelands (LP) (NJNHP 2010).

At one time, *Arnoglossum atriplicifolium* was collected from numerous sites in New Jersey (Mid-Atlantic Herbaria 2022), although it was apparently restricted to the Delaware River watershed (Britton 1889; Taylor 1915). Although Britton (1889) indicated that the species was known from sites in Burlington, Camden, Hunterdon, Mercer, Monmouth, and Warren counties, Taylor (1915) reported that it was "not common." In past years, the species was ranked as historical in the state (NJ ONLM 1992); however, one occurrence of Pale Wild Caraway is presently extant in New Jersey and the species is considered historical or extirpated at 32 sites (NJNHP 2022).

Threats

In New Jersey, the primary threats are habitat degradation due to invasive non-native species and deer herbivory. Over the past fifteen years, the habitat at the extant occurrence has become overgrown with a variety of invasive species including Autumn Olive (*Eleagnus umbellata*), Morrow's Honeysuckle (*Lonicera morrowii*), Multiflora Rose (*Rosa multiflora*), Japanese Honeysuckle (*Lonicera japonica*), and Japanese Stiltgrass (*Microstegium vimineum*). Concern was noted that *Lonicera japonica* may wrap around the central stalk of the Pale Wild Caraway and cause its collapse and that Stiltgrass could overgrow and shade the basal rosettes. Deer browsing also removed flowering stalks at this site (NJNHP 2022).

No other threats (e.g., disease, genetic isolation) were noted in the literature. The states with imperiled or extirpated populations are at the northeastern and west/southwestern edges of the species' range and it is not known what environmental or other factors most determine that distribution. However, the species can be found in a variety of habitats with more open areas seemingly preferred, which may make habitat succession a potential threat at some locations. Hilty (2020) suggests that prescribe fire that opens the canopy may be a useful tool for habitat management. Similarly, any populations that are near regularly used trails may suffer from overuse by hikers trampling the basal rosettes underfoot.

While the potential impacts of climate change have not been directly assessed for this species in New Jersey, a CCVI (Climate Change Vulnerability Index) was determined for populations in Illinois (Baty et al. 2015). Pale Wild Caraway is "presumed stable" in relation to predicted climatic changes in that state, with the understanding that the presence of anthropogenic barriers and potentially limited dispersal and movement capabilities may "greatly increase" or "significantly increase", respectively, the vulnerability of this species to climate change. The lack of information about genetic variation and dispersal in Illinois populations has been identified as an important research need (Baty et al. 2015). Similar vulnerabilities and research needs exist for Pale Wild Caraway in New Jersey. Here, the climate is predicted to become warmer and wetter, with altered precipitation patterns such that hotter drier summers and periods of summer drought may become more common (NJDEP 2020). Those conditions may negatively affect survival of the Pale Wild Caraway populations growing on the shallower soils of southwestern-facing woodland slopes. Baty et al. (2015) state that in times of prolonged drought in Illinois Pale Wild Caraway often does not bloom, which could have repercussions for the long-term viability of New Jersey populations if the plant species here responds similarly to drought.

Management Summary and Recommendations

Most (30 of 33 element occurrences) of New Jersey's populations of Pale Wild Caraway are considered historical or were labeled as "failed to find" during surveys conducted in 2011. Because there was extensive suitable habitat remaining in those locations (NJNHP 2022), additional survey of historical/potential sites is warranted to get a better understanding of the actual condition and status of New Jersey populations. Monitoring and management of the known extant site should continue.

Deer herbivory has been identified as a threat to New Jersey’s remaining population and active management is ongoing at this site. A deer fence has been erected to deter herbivory around a small subsection of the population (NJNHP 2022). As non-native invasive species were noted as a significant problem at this same population, removal of those invasive species near the Pale Wild Caraway population is recommended. Portions of this population are also located near trails, which may make the plant vulnerable to trampling. Actions that reduce impact from hikers would also be important to help ensure flowering. Pale Wild Caraway has been described as readily self-sowing under optimal conditions (see Seed Dispersal above). Hopefully, by addressing the local threats to the species that prevent flowering, this New Jersey population can stabilize.

Additional management to deter succession by judiciously opening some areas while minimizing the encroachment of non-native species may be useful if populations are rediscovered. Hilty (2020) and Baty et al. (2015) mention that the species can tolerate some disturbance, suggesting that fire may be a useful management tool to increase population size in appropriate habitat. Apart from maintaining habitat continuity that allows for population migration, research into the genetic variability of the species in New Jersey and filling in other life history knowledge gaps would be helpful in guiding the development of specific management strategies for climate change adaptation.

Synonyms

The accepted botanical name of the species is *Arnoglossum atriplicifolium* (L.) H. Rob. Orthographic variants, synonyms, and common names are listed below (ITIS 2021, USDA NRCS 2022b, POWO 2022).

Botanical Synonyms

Cacalia atriplicifolia L.
Cacalia atriplicifolia var. *angulata* Elliott
Cacalia paniculata Raf.
Cacalia rotundifolia (Raf.) House
Cacalia similis J. Buchholz & E. J. Palmer
Adenimesa atriplicifolia (L.) Nieuwl.
Conophora atriplicifolia (L.) Nieuwl.
Conophora similis Nieuwl.
Mesadenia atriplicifolia (L.) Raf.
Mesadenia pulverulenta Raf.
Mesadenia rotundifolia Raf.
Mesadenia similis Small
Senecio atriplicifolius (L.) Hook.

Common Names

Pale Wild Caraway
Pale Indian-plantain

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