Lysimachia lanceolata

Lance-leaf Loosestrife
Primulaceae

Lysimachia lanceolata courtesy R. W. Smith, Lady Bird Johnson Wildflower Center

***Lysimachia lanceolata* 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

Lance-leaf Loosestrife (*Lysimachia lanceolata*) is an herbaceous perennial member of the Primrose Family (Primulaceae). Plants grow on slender stems that are 2 or 3–6 dm tall and mostly erect. Lower stem leaves have elliptical or lanceolate blades, the upper (main) leaves are opposite, lanceolate or narrowly ovate—much longer than wide, 3–10 (up to 15) cm long and 2–20 mm wide. The leaves have a smooth margin with hairs at the base of the leaf and are nearly sessile or have only a short petiole. The undersides of the leaves are pale and both sides of the leaves often fold up along the midrib. The uppermost leaves are typically whorled (Cholewa 2020; Gleason and Cronquist 1963; Strausbaugh and Core 1978).

The stems have one to four nodding yellow flowers, which may have red-orange markings around the upper pistil. Flowers are about 19 mm (3/4 inch) wide with five petals and 5 sepals (LeGrand et al. 2022). The calyces are 4–7 mm long and the corolla lobes are 5–8 (up to 10) mm long and densely glandular. The outer edge of the petals may be irregularly toothed, ragged or have conspicuous tips (Gleason and Cronquist 1963; Missouri Plants.com 2021; Strausbaugh and Core 1978). Lance-leaf Loosestrife blooms from early to mid-summer, typically from May or June to mid-August, although blooming can extend into the fall depending on location (Cholewa 2020; Gleason and Cronquist 1963; Strausbaugh and Core 1978). In New Jersey, the blooming period is from early July to mid-August (Stone 1911). Seeds develop in ovoid to globose capsules, ripening in the fall (Weakley et al. 2022).

Left: Britton and Brown 1913, courtesy USDA NRCS 2022a. Right: John Hilty, undated.

L. lanceolata is similar in appearance to *L. hybrida* and some botanists consider them to be the same species. LeGrand et al. (2022) distinguishes the two by the following differences: *L. hybridum* (=*hybrida*) has thicker stems, no creeping rhizomes, and rounded leaf bases that show a distinct petiole. It is also more restricted to wetlands.

Pollinator Dynamics

Native *Lysimachia* spp. produce floral oil instead of nectar, and this oil as well as pollen is gathered by *Macropis* bees, sometimes called Loosestrife bees (Vermont Center for Ecostudies 2022). Bees that specialize on plants in the same genus, in this case depending almost entirely on yellow *Lysimachia*, are called oligolectic. Hilty (2020) mentions *Macropis steironematis* as a *Macropis* species that has been observed gathering pollen and oil from Lance-leaf Loosestrife in Illinois. The floral oils are mixed with pollen and serve as food for larval bees. *Macropis* bees also line their underground nests with this mixture, the oils helping to make the nest more water resistant (Wilson and Carrol 2016). Small solitary bees, *Macropis* bees do not travel far and depend on large patches of consistent floral resources in close proximity to their preferred nesting sites of south facing sandy slopes (Ascher 2005). (Note: *Macropis* bees are, in turn, parasitized by the kleptoparasitic "Cuckoo Bee" *Epeoloides pilosula*, which lays its own eggs on the pollen balls in the nest of the host *Macropis* bee. The Macropis Cuckoo Bee is considered one of the rarest bees in North America, with multiple factors likely contributing to its decline [Ascher 2005]). There is little information about other insect pollinators specifically noted for *Lysimachia lanceolata*. However, related *Lysimachia* are pollinated by other *Macropis* species (*M. ciliata, M. nuda, M. patellata*—all found in New Jersey—and *M. steironematis* mentioned above) (Fowler 2016a, 2016b; Vermont Center for Ecostudies 2022) and by Halictid bees (*Lasioglossum* spp.) (Hilty 2020).

A number of non-native but related *Lysimachia* species can be invasive (e.g., *L. punctata, nummularia*, and *vulgaris*), spreading vegetatively and aggressively. *Lysimachia lanceolata* also spreads vegetatively (see Seed Dispersal below) and it may be that the primary mode of growth for most *Lysimachia* is by clonal vegetative spread, with sexual reproduction of lesser importance for population maintenance.

Seed Dispersal

Seeds are produced in ovoid to globose seed capsules 3.0–4.5 mm long and 2.5–3.0 mm in diameter and once these dry later in the fall, the capsules split open, and the seeds fall to the soil or water below. Seeds are 1.2–1.8 mm long, oblong in shape, triangular in cross section, and dark brown or black (Missouri Plants.com 2021; Strausbaugh and Core 1978). There is little to no information available about seed dispersal by animals, dispersal distances or seed viability in *L. lanceolata* or closely related native species. The seeds of the non-native species, *L. vulgaris* are reported to remain viable for 20 years in the soil (WDNR 2022).

L. lanceolata has slender underground rhizomes that form small plantlets, often creating small colonies by vegetative reproduction (Cholewa 2020; LeGrand et al. 2022). Occasionally, stems that lay on the ground may root at the nodes (Strausbaugh and Core 1978).

Habitat

In New Jersey, the only remaining extant population is located at the wooded edge of a coastal plain intermittent pond. One historical population was found on a moist wooded hillside along streamlet tributaries (NJNHP 2022).

Range wide, Lance-leaf Loosestrife is typically found in full to partial sun in dry to mesic sites including prairie swales or wet open woodlands; thickets and swamps; in moist soil along upland edges of streams, lake shores, and wetlands; gravelly seeps; limestone glades; occasionally in bogs or ditches; and in old fields with hardpan clay or sandy soil (Britton and Brown 1913; Cholewa 2020; Hilty 2020; LeGrand et al. 2022; Weakley et al. 2022). While typically found in circumneutral soils, it is found in high pH soils in some locations (LeGrand et al. 2022; Weakley et al. 2022). *L. lanceolata* has been observed growing up to 488 m (1600 ft) in elevation (Cholewa 2020).

There is no information specifically about mycorrhizal relationships for *L. lanceolata*. However, the related Creeping Jenny (*Lysimachia nummularia*) is endomycorrhizal (Helgason et al. 2002) and Wang and Qiu (2006) reported on five additional *Lysimachia* species that also have endomycorrhizal associations, so it is likely that other *Lysimachia* species, including *L. lanceolata* do as well.

Wetland Indicator Status

Lysimachia lanceolata is a facultative species, meaning that it occurs in both wetlands and nonwetlands (U. S. Army Corps of Engineers 2020).

USDA Plants Code (USDA, NRCS 2022b)

LYLA

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 native range of *Lysimachia lanceolata* includes the eastern and central United States and southern Canada (POWO 2022). The map in Figure 1 shows the extent of *L. lanceolata* in North America.

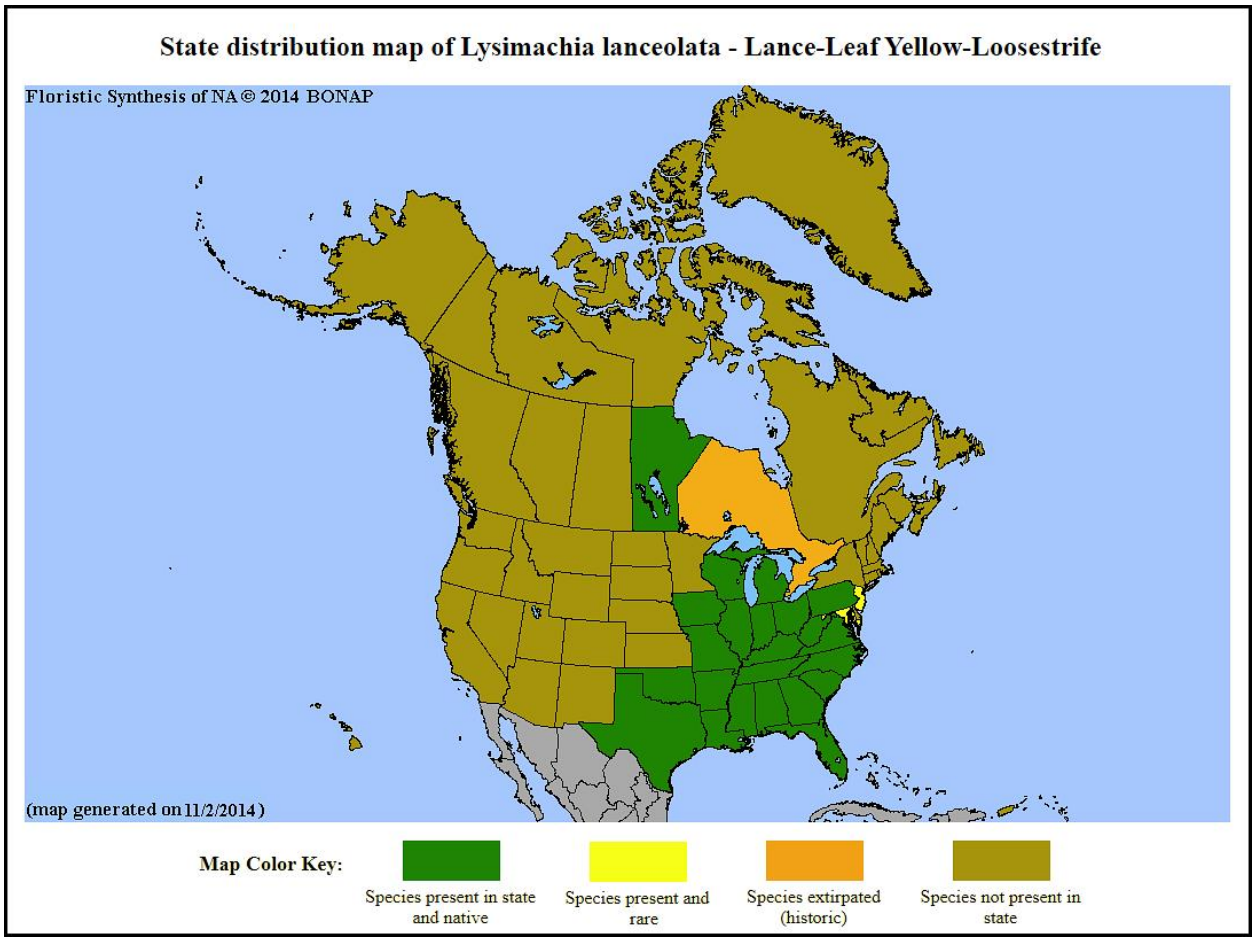

Figure 1. Distribution of L. lanceolata in North America, adapted from BONAP (Kartesz 2015).

The USDA PLANTS Database (2022b) shows *Lysimachia lanceolata* in New Jersey but does not provide records by county. The county map in Figure 2 (below) includes records for Bergen, Camden, Cape May, Gloucester, Hunterdon, Morris, Salem, Somerset, and Sussex courtesy of Mid-Atlantic Herbaria (2022) and the state biotics database (NJNHP 2022). The data include historic reports and do not reflect the current distribution of the species. The New Jersey biotics database only tracks occurrences in the three southern counties: Camden, Gloucester, and Salem. There are no occurrences currently tracked in Cape May or the northern New Jersey counties (NJNHP 2022).

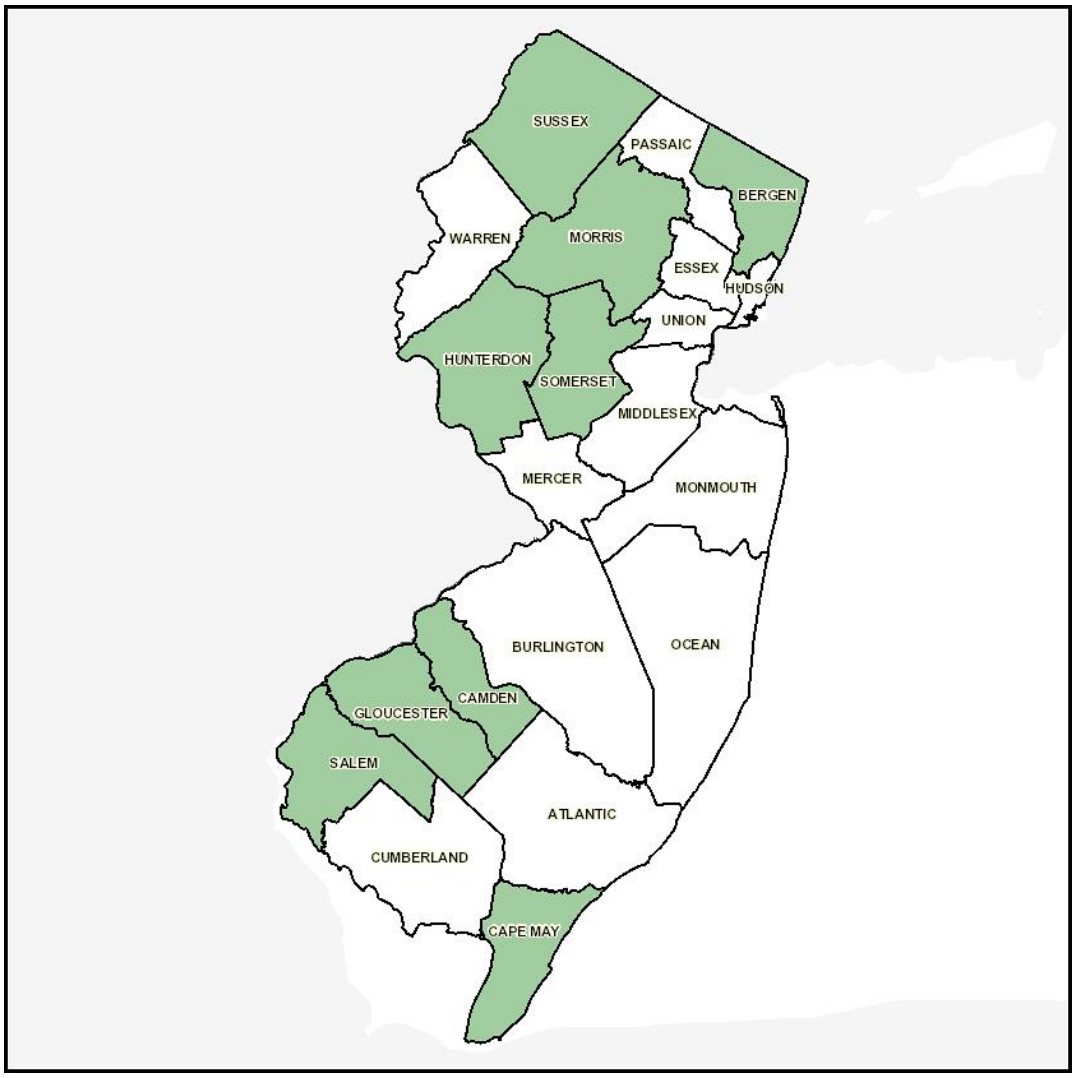

Figure 2. County records of L. lanceolata in New Jersey.

Conservation Status

Lysimachia lanceolata is considered globally secure. The G5 rank means the 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 Lance-leaf Loosestrife throughout its range. The species is critically imperiled (very high risk of extinction) in two states, vulnerable (moderate risk of extinction) in two states, and possibly extirpated in Ontario. Throughout most of its range *L. lanceolata* is secure, apparently secure, or unranked.

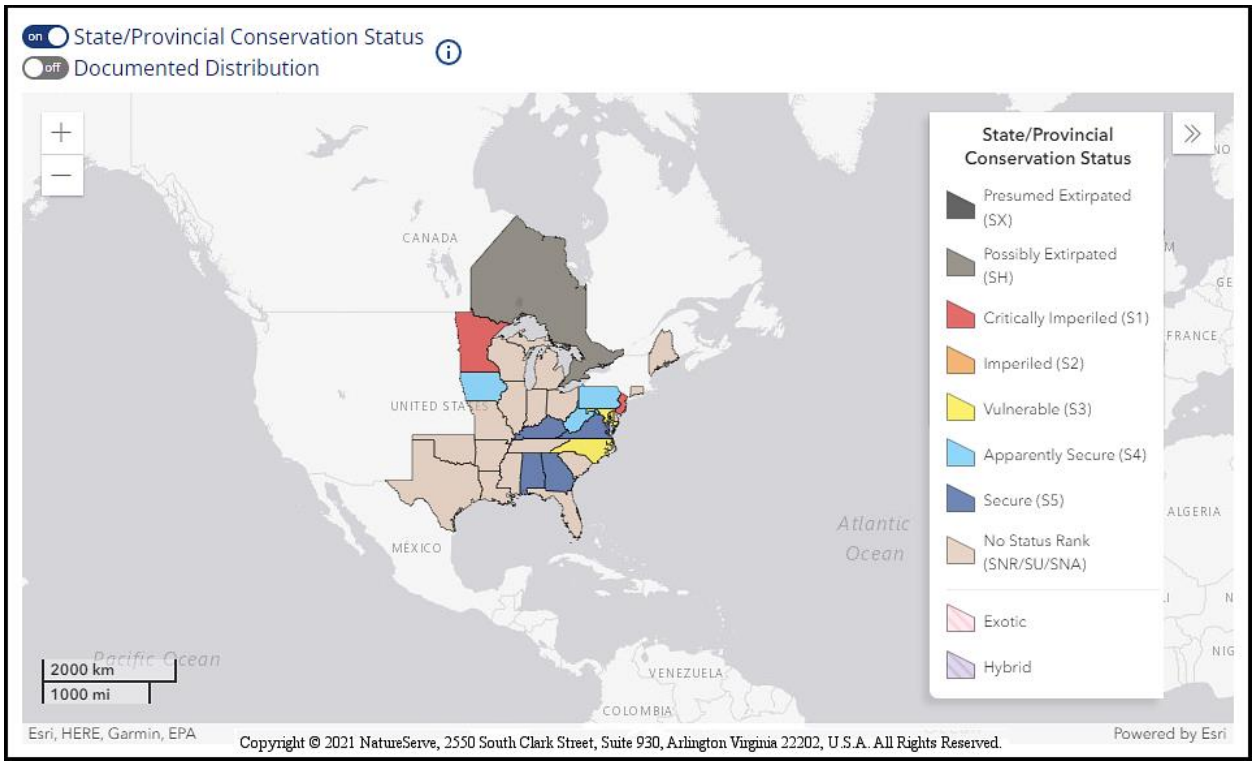

Figure 3. Conservation status of L. lanceolata in North America (NatureServe 2022).

Lysimachia lanceolata is critically imperiled (S1) in New Jersey (NJNHP 2022). The 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. *L. lanceolata* 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 such as wetlands or coastal habitats, being listed does not currently provide broad statewide protection for the plants. Additional regional status codes assigned to the loosestrife 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).

Lysimachia lanceolata has not always been rare in New Jersey. Willis (1874) noted that it was "common in damp places" and Britton (1889) indicated that it was frequent in the northern and central parts of the state. However, *L. lanceolata* was absent from the Pine Barrens except for a site where it had been introduced (Stone 1911; Taylor 1915). Stone (1911) observed that Lance-leaf Loosestrife was usually associated with the Delaware River, although collections were reported from other areas of the state (Mid-Atlantic Herbaria 2022). Hough (1983) pointed out that in some of the available specimens *Lysimachia lanceolata* was not distinguishable from *L. hybrida*. Three confirmed occurrences are presently tracked in the state database—two are considered historical and one is extant. One historical population was from the 1920s and ranked in 1999 and the other was from the 1880s and ranked in 2011; the rationale for historical ranking vs. extirpated was due to the presence of suitable habitat that had not been searched. All tracked occurrences are in counties adjoining the Delaware River (NJNHP 2022).

Threats

No specific threats were highlighted in the New Jersey biotics database. However, the fact that this species depends on relatively open habitat conditions suggests that in some areas, disturbance that maintains existing open areas or creates new ones is important to the persistence of this species. For example, although North American Beaver (*Castor canadensis*) numbers have since rebounded, their drastic decline after European settlement may have removed important wetland edge habitat supporting *Lysimachia* populations (Ascher 2005).

Herbivory by White-tailed Deer (*Odocoileus virginiana*) may not be a major concern as this species and other *Lysimachia* species are considered by many native plant nurseries to be deer resistant. Non-native invasive plants such as common reed (*Phragmites communis*), Japanese stilt grass (*Microstegium vimineum*) or others could become a problem should those species become established with populations of *L. lanceolata*, particularly along wetland edges.

It is not known whether the challenge of distinguishing *L. hybrida* from *L. lanceolata* (Hough 1983) may have contributed to a perceived contraction of the plant distribution in New Jersey. Apart from that, there is no information as to what may have led to the decline of *L. lanceolata* in the state. Perhaps past development and habitat fragmentation were contributing factors, resulting in a loss of genetic diversity in isolated populations—especially those that lacked pollinators. Although the species can grow in dry or moist soil, changes to local hydrology also may affect population persistence in those populations that are found adjacent to wetlands or in moist soil environs. There was no mention of disease in the literature.

Climate change may pose challenges to this species. New Jersey is projected to experience higher temperatures and altered precipitation patterns that could lead to hotter, drier summers and periods of short-term drought (NJDEP 2020), which may affect habitat conditions for the plant. Another potential challenge is pollinator mismatch (Gérard et al. 2020), in this case whereby the emergence of the pollinating *Macropis* bees from their nests no longer coincides with the flowering period of the loosestrife, resulting in low rates of pollination that would affect seed production. This may or may not be an issue, depending on the relative importance of outcrossing by pollinators to the long-term viability of this species. Recent research by Buckner and Danforth (2022) on projected climate change effects on *Macropis nuda* and its host plant *Lysimachia ciliata* suggests that range shifts northward will occur for both species synchronously; however, the authors do not posit as to whether the flowering and nesting periods of those two species will continue to coincide. Of additional concern is the authors' prediction that a significant portion of suitable habitat for both species will be lost to climate change, making it imperative that habitat connectivity that supports species dispersal be maintained. It is difficult to predict how *L. lanceolata* will respond to changing climate conditions, although Buckner and Danforth (2022) offer one example of what might occur in related species.

Management Summary and Recommendations

Of the three tracked New Jersey occurrences, two were ranked as historic due to the presence of potential suitable habitat (NJNHP 2022). Therefore, conducting thorough surveys of those historic occurrences and rechecking the extant occurrence would be a priority for this species. Once completed, a realistic determination of management actions can be developed. Regular monitoring would also enable early detection of future threats, such the aggressive spread of invasive species or hydrologic alterations.

Research into which factors contributed to the species' decline in New Jersey and three other states where it is currently imperiled (Delaware, Maryland, and North Carolina) would also be important. Reproduction and pollination for this species needs further study. It is unclear how much *L. lanceolata* relies on *Macropis* bees for reproduction, whether there are other pollinators available to maintain genetic diversity, or whether vegetative clonal growth is sufficient and outcrossing via pollinators of lesser importance. If *Lysimachia* is strongly dependent on the oil bees, factors contributing to the decline of those pollinators would need to be addressed.

Reintroduction of the species into suitable habitat at sites likely to persist may be a future consideration but only after developing a better understanding of the factors that contributed to its initial decline so that those threats can be managed. It is likely that climate change will have an impact on this species in New Jersey, either affecting pollinators or habitat suitability. While it is difficult to suggest specific management actions at this time, the need to maintain or create habitat continuity to allow for species migration will be important.

Synonyms

The accepted botanical name of the species is *Lysimachia lanceolata* Walter. Orthographic variants, synonyms, and common names are listed below (ITIS 2021, USDA NRCS 2022b, POWO 2022).

Botanical Synonyms	Common Names
Lysimachia angustifolia Lam.	Lance-leaf Loosestrife
Lysimachia ciliata var. *angustifolia* (Lam.) Chapm.	Lance-leaf Yellow-loosestrife
Lysimachia ciliata var. *heterophylla* (Michx.) Chapm.	
Lysimachia heterophylla Michx.	
Lysimachia hybrida var. *heterophylla* (Michx.) Alph. Wood	
Lysimachia lanceolata var. *angustifolia* (Lam.) A. Gray	
Nummularia lanceolata (Walter) Kuntze	
Steironema floridum Baudo	
Steironema heterophyllum (Michx.) Raf.	
Steironema lanceolatum (Walter) A. Gray	
Steironema lanceolatum var. *angustifolium* (Lam.) A. Gray	

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