

Bidens mitis

Small-fruit Beggars-ticks

Asteraceae



Bidens mitis by Sean Patton, 2022

***Bidens mitis* Rare Plant Profile**

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

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Life History

Bidens mitis (Small-fruit Beggars-ticks) is generally identified as an annual herb, although the plants can sometimes persist for more than a year. The stems are smooth or nearly so, reaching up to a meter in height. The leaves have short petioles and they are usually pinnately divided with a distinctly larger terminal leaflet. However they are known to be highly variable: Sherff (1926) remarked that "*the variation in leaf division is so fickle that it is not worthwhile to attempt the maintenance of varieties.*" Like other members of the Asteraceae, *Bidens mitis* has composite flowers. The flower heads have bright yellow disc and ray florets. The 25–50 disc florets are fertile while the 8–13 ray florets are long (12–25 mm) and showy but sterile. The mature fruits (achenes or cypselae) are dark brown to nearly black, more or less smooth-margined, and less than 5 mm long. When appendages are present they are very short (under 1 mm) and toothlike. (See Fernald 1950, Correll and Correll 1972, Eleuterius 1981, Gleason and Cronquist 1991, Tiner 2009, Strother and Weedon 2020).



USDA NRCS 2024a.



Eric M. Powell, 2020.



Janet Wright, 2020.

Bidens mitis may bloom as early as July and as late as November (Watts and Habeck 1991, Strother and Weedon 2020, Weakley et al. 2024). In New Jersey it has been found flowering and fruiting in October (NJNHP 2024). Positive identification of *B. mitis* is easiest when mature fruits are present. In the northeast is most likely to be confused with two other species that have showy flowers and pinnately divided leaves: *B. aristosa* and *B. trichosperma*. Both of those species have longer achenes (those of the innermost florets exceeding 5 mm in length) with margins that are barbed or ciliate (Gleason and Cronquist 1991, Moore et al. 2016, Strother and Weedon 2020).

Pollinator Dynamics

The flowers of *Bidens mitis* look very different to insects than they do to humans. Eisner et al. (1969) demonstrated that by using ultraviolet light to mimic an insect-eye view. Their photographs showed that the outer half of the ray flowers reflected light while the disc florets

and inner half of ray flowers were non-reflective, producing a target effect. A similar pattern has been found in some other *Bidens* species (King and Krantz 1975).

Bidens mitis blooms are often visited by nectar-seeking butterflies (eg. Watts and Habeck 1991, Hall et al. 2012), although close observation of some butterflies that were visiting other *Bidens* species showed that they were not transporting significant amounts of pollen (Grombone-Guaratini et al. 2004). Budumajji and Raju (2018) found that butterflies, beeflies, and wasps visiting *B. pilosa* flowers did carry pollen but in much smaller amounts than the bees. Bees are probably the most important pollinators of *B. mitis*. Many bees specialize on plants in the Asteraceae and will visit *Bidens* flowers, including various kinds of *Andrena*, *Colletes*, *Dieunomia*, *Melissodes*, *Perdita*, and *Pseudopanurgus* (Fowler and Droege 2020). *Ceratina dupla*, a generalist bee that visits the flowers of plants in many different families, has also been reported as a pollinator of *B. mitis* (Krombein et al. 1979, Stubbs et al. 1992).

It is generally expected that *Bidens* species with rayless flowers are more likely to be self-compatible and Steele (1992) found that *B. aristosa*—which is visually similar to *B. mitis*—was strongly self-sterile. However that is not always the case. Self-fertilization and vector-mediated self-compatibility have been documented in other *Bidens* species with ray florets (Sun and Ganders 1988, Grombone-Guaratini et al. 2004, Budumajji and Raju 2018). It is possible that *Bidens mitis* utilizes a mixed mating system, but at present that cannot be confirmed.

Seed Dispersal and Establishment

The achenes of *Bidens mitis* do not have any evident structural modifications to facilitate long-distance dispersal. Plumed dispersal structures are most frequently found in the perennial composites, whereas annual members of the family are more likely to have adhesive structures such as barbs or awns if they have any at all (Venable and Levin 1983). The cypsela of *B. mitis* are smooth, and when appendages are present they are generally too small to help the propagules cling to fur or feathers. The seeds may sometimes adhere to wet animals but most are probably gravity-dispersed with occasional assistance from wind or water. Johnson (2006) identified *B. mitis* achenes as a potential food source for wintering sparrows, so post-consumption dispersal also appears to be a possibility. *Bidens* fruits can remain in the dried flower heads on standing dead stems and be released slowly over a period of several months (Leck et al. 1994, Levine 1995).

Seed banking has been documented in some other annual *Bidens* species: For example, Leck and Simpson (1995) found that *B. laevis* was abundant in the seed bank of a freshwater tidal marsh. However, *Bidens mitis* did not emerge from seed banks during studies conducted at several sites where it was present in the vegetation (Wetzel et al. 2001, Kalk 2011, Sharma et al. 2018) and no reports of seed banking were found for the species.

Germination and establishment has not been studied in *Bidens mitis*, but some information about this life history phase can be inferred from research on other annual members of the genus (*B. bipinnata*, *B. laevis*, *B. pilosa*, *B. polylepis*) which tend to exhibit similar characteristics. All of those species are summer annuals, and they generally germinate the first spring after dispersal

but sometimes defer some germination until summer or the second spring. The seeds are initially dormant and require several months at low temperatures to fully ripen followed by high temperatures to induce sprouting. Other germination requirements include light and adequate aeration in the soil (Baskin and Baskin 1988, Leck and Simpson 1993, Baskin et al. 1995, Gurvich et al. 2004). *Bidens* species often form arbuscular mycorrhizae (Wang and Qiu 2006), although it is not clear whether fungal relationships are established during the seedling stage.

Habitat

Bidens mitis is usually found between 0–100 meters above sea level but it has sometimes been reported at elevations up to 300 meters (Strother and Weedon 2020). Small-fruit Beggars-ticks can grow in fresh or brackish water (Correll and Correll 1972, Tiner 2009, Weakley et al. 2024). In Virginia the species is primarily found in tidal marshes (Fernald 1940, Stalter and Lamont 2016) but in the Gulf Coast states where it is more common *B. mitis* can grow in a variety of wet places including bogs, marshes, ponds, prairies, wet woodlands, and swamps (Grout 1941, Lelong 1977, Rogers 1977, Lowe 1986, Bridges and Orzell 1990, Easley and Judd 1990, Martin et al. 2002, Clewell et al. 2009, Payne 2010). Weakley et al. (2024) categorized *B. mitis* as a species that may tolerate partial shading but has a very strong preference for sunny conditions.

Cypert (1972) observed that *Bidens mitis* was often one of the most abundant species on free-floating or partially anchored masses composed of peat, litter and growing vegetation that he referred to as 'batteries'. On the Delaware Bay, *B. mitis* may be found in mucky bog communities dominated by *Cladium mariscoides*, *Eriocaulon decangulare*, and *Eriophorum virginicum* (Largay and Sneddon 2009). In southern wet prairies, *B. mitis* may co-occur with *Carex hyalinolepis*, *Panicum hemitomon*, *Peltandra virginica*, *P. glauca*, *Pontederia cordata*, *Rhynchospora inundata*, *Sagittaria graminea*, and *Xyris smalliana* (Cypert 1972).

When *Bidens mitis* was first seen in New Jersey, the plants were growing in shallow water in a small opening in a *Nyssa sylvatica* swamp (NJNHP 2024). In other states the species has been found in gaps within swamps dominated by species like *Taxodium ascendens*, *Nyssa biflora*, *Acer rubrum*, or *Magnolia virginiana* (Kabat et al. 2004, FDACS 2024) and also in rare *Chamaecyparis thyoides* stands in Florida (Ward and Clewell 1989). Zomlefer et al. 2007 reported *B. mitis* in open pine flatwoods with widely spaced trees.

The second population of *Bidens mitis* to be documented in New Jersey was situated on an old dike at the edge of a marsh (NJNHP 2024). *B. mitis* has been found in disturbed habitats in other parts of its range, including one occurrence that was located along the side of a highway (Kabat et al. 2004, Zomlefer et al. 2007, Payne 2010). Additional anthropogenic habitats where *B. mitis* has been reported include both highly managed and semi-natural pastures (Medley et al. 2015), a *Pinus elliottii* plantation that was created and managed by thinning and periodic burns (Sharma et al. 2018), and a restored wetland at the site of a former pine plantation (Johnson 2012). During the course of a project to restore and/or create Delmarva Bay wetlands in Maryland, *B. mitis* was most strongly associated with one of the wettest sites, along with *Bidens tripartita*, *Echinochloa crus-galli*, *Euthamia graminifolia*, *Phytolacca americana*, *Pontederia cordata*, and *Xanthium strumarium*. It was noted that the site might have had elevated levels of nitrogen and

phosphorus as the result of runoff from an adjacent agricultural field (Russell and Beauchamp 2017).

Wetland Indicator Status

Bidens mitis is an obligate wetland species, meaning that it almost always occurs in wetlands (U. S. Army Corps of Engineers 2020).

USDA Plants Code (USDA, NRCS 2024b)

BIMI

Coefficient of Conservancy (Walz et al. 2020)

CoC = 10. 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

Bidens mitis is native to the southeastern and mid-Atlantic United States. It has been introduced in Cuba (POWO 2024). The map in Figure 1 depicts the extent of the species in North America.

The USDA PLANTS Database (2024b) shows records of *Bidens mitis* in one New Jersey county: Cape May County (Figure 2). A new record of the species was recently added for Cumberland County (Moore et al. 2016).

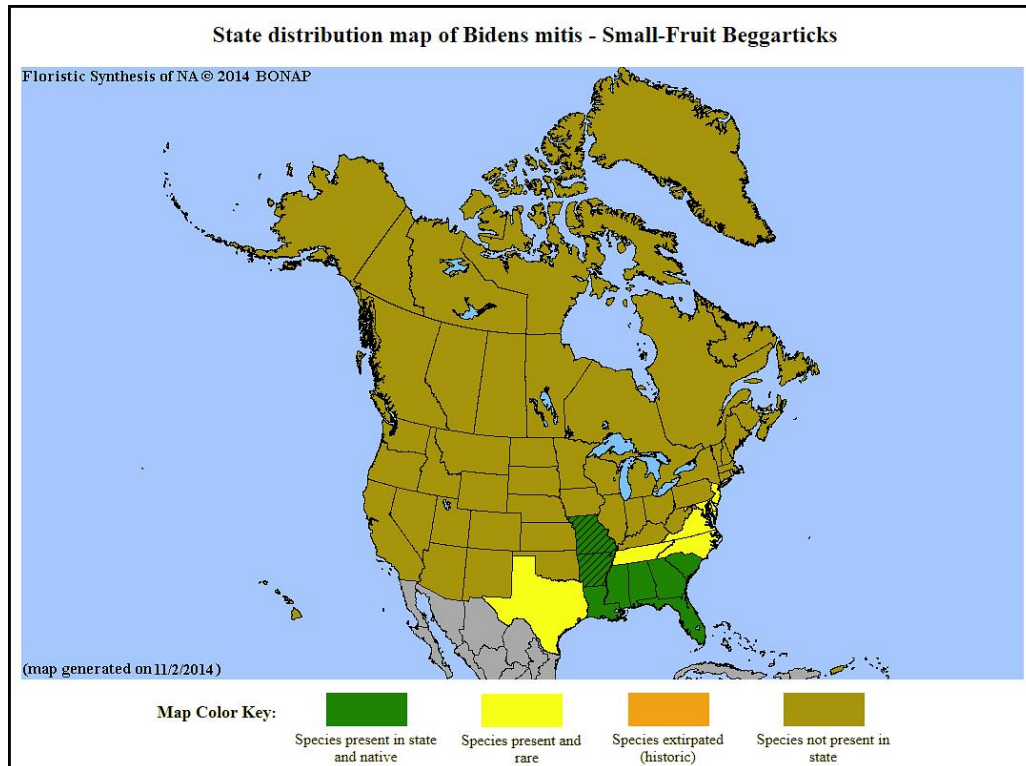


Figure 1. Distribution of *B. mitis* in North America, adapted from BONAP (Kartesz 2015). The cross hatching /// indicates a questionable presence.

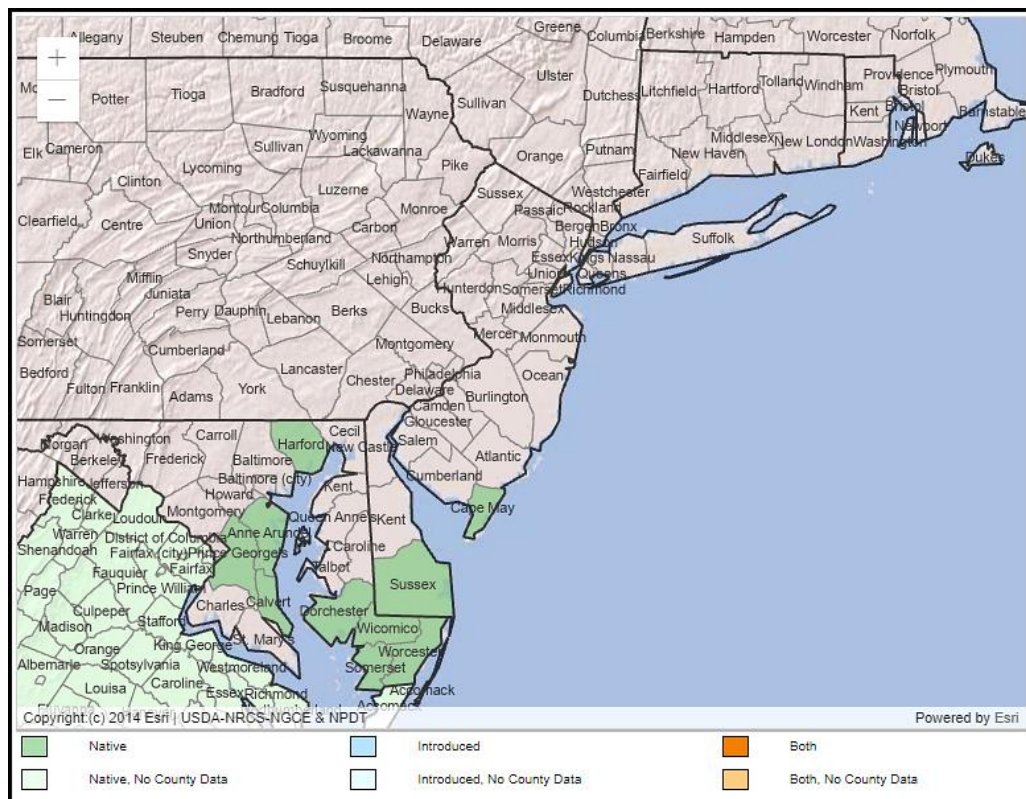


Figure 2. County records of *B. mitis* in New Jersey and vicinity (USDA NRCS 2024b).

Conservation Status

Bidens mitis 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. The question mark indicates that the status of the species is in need of review (NatureServe 2024). The map below (Figure 3) illustrates the conservation status of *B. mitis* in the United States. The species is critically imperiled (very high risk of extinction) in one state and imperiled (high risk of extinction) in three additional states. In the six other states where Small-fruit Beggars-ticks has been documented it is secure, apparently secure, or unranked.

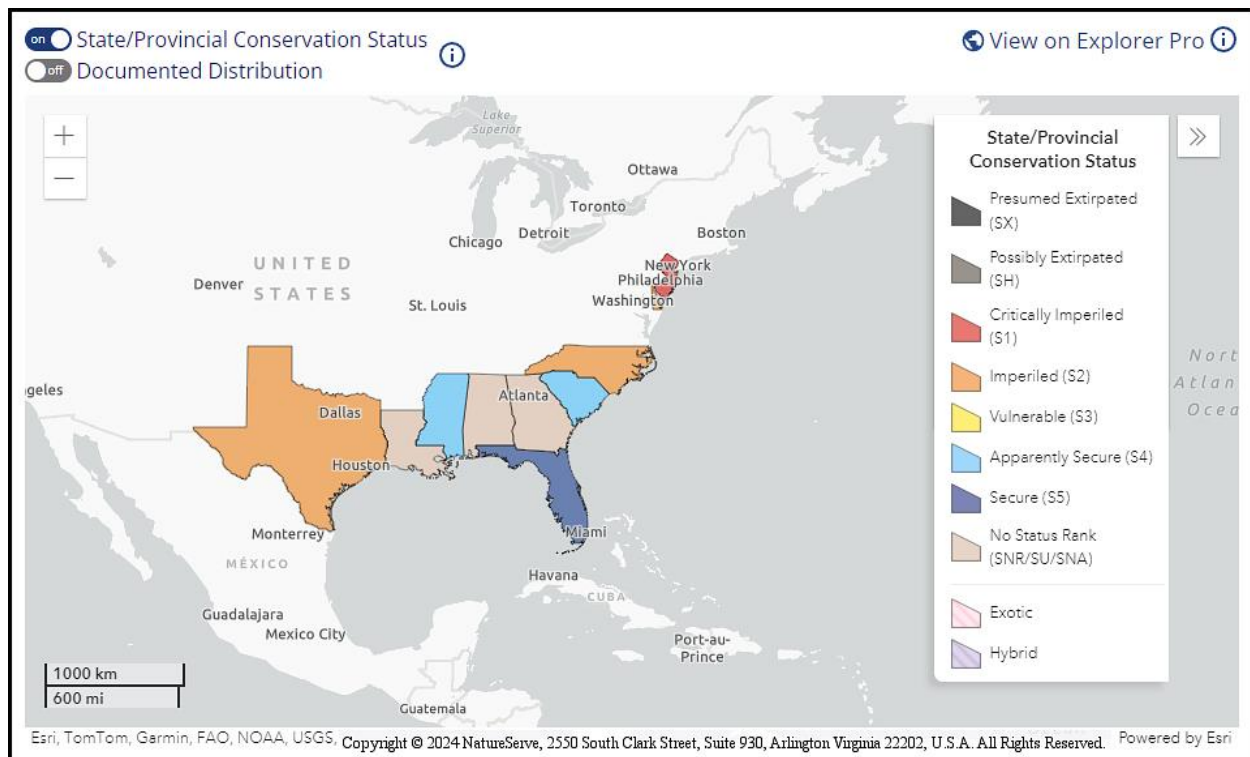


Figure 3. Conservation status of *B. mitis* in North America (NatureServe 2024).

New Jersey is the state where *Bidens mitis* is critically imperiled (NJNHP 2024). 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. *B. mitis* 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 *B. mitis* 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).

Bidens mitis was not documented in New Jersey prior to the 1990s, when two small populations were discovered in Cape May County. The larger of the two has already been extirpated and the

second was not seen during the last site visit although it may still be present. The recently reported population in Cumberland County has not yet been surveyed (NJNHP 2024).

Threats

When *Bidens mitis* was first discovered in New Jersey, Common Reed (*Phragmites australis* ssp. *australis*) was noted as a threat to the occurrence. The tall grass is detrimental to native plant communities because it spreads rapidly and forms monospecific stands. A recent visit revealed that the *Phragmites* had completely taken over the site and the *B. mitis* plants could no longer be found. *P. australis* ssp. *australis* is well-established along the Atlantic and Gulf coasts (Kartesz 2015) and could become a threat to populations of Small-fruit Beggars-ticks in other states. No concerns were noted at the site of New Jersey's second documented population.

A bacterial wilt disease (*Ralstonia solanacearum*) was recently detected in some *Bidens mitis* plants in northern Florida (Hong et al. 2008). *R. solanacearum* is actually a species complex that has long been a problem in crop plants in the Solanaceae and is currently documented in more than 50 plant families. The strain found in Florida appears to be a new introduction to the continental United States. The disease can be transmitted via soil or water and once it enters a host plant it multiplies rapidly, causing the collapse of the plant which then permits the bacteria to return to the environment (Hong et al. 2008, Álvarez et al. 2010). The potential for the disease to spread and the extent of the threat to *Bidens mitis* are uncertain.

Fire does not appear to be a threat to *B. mitis*. The species was found growing at a Florida site that had been managed with controlled burns (Sharma et al. 2018), and Johnson (2006) indicated that exposure to fire increased stem density and seed production of *B. mitis* in *Pinus palustris* savannas in Louisiana.

Matthews et al. (2014) listed *Bidens mitis* as a larval host plant of the Common Pug (*Eupithecia miserulata*) but the moth is a generalist feeder so it is unlikely to have a significant effect on populations of the beggars-ticks. In the southeastern United States, feral swine (*Sus scrofa*) activity has been known to alter the species composition of native communities so that could be a threat to some *B. mitis* occurrences in that region (Bankovich et al. 2016). Feral swine have been recorded in New Jersey and are identified as an emerging threat in the state (USDA 2013, FoHVOS 2023).

Climate Change Vulnerability

Information from the references cited in this profile was used to evaluate the vulnerability of New Jersey's *Bidens mitis* populations to climate change. The species was assigned a rank from NatureServe's Climate Change Vulnerability Index using the associated tool (Version 3.02) to estimate its exposure, sensitivity, and adaptive capacity to changing climactic conditions in accordance with the guidelines described by Young et al. (2016) and the state climactic computations by Ring et al. (2013). Based on available data *B. mitis* was assessed as Moderately Vulnerable, meaning that it is likely to show some decrease in abundance or range extent in New

Jersey by 2050. However, its vulnerability may have been underestimated due to gaps in knowledge about some relevant factors.

The only New Jersey population of *Bidens mitis* presently listed as extant in the Natural Heritage Program database is located in close proximity to the coast where it is susceptible to rising sea levels as the climate continues to warm, making that particular occurrence highly vulnerable (NJDEP 2024). However, there is less certainty regarding other possible occurrences in the state, and the extent of the species' ability to colonize new sites is unknown. In addition to rising seas, shifting climactic conditions in New Jersey are resulting in higher temperatures, more frequent and intense precipitation events, and increasing periods of drought (Hill et al. 2020). As a southern species, *B. mitis* can probably tolerate the warmer temperatures but as an obligate wetland plant is it likely to be sensitive to drought. The spread of *Phragmites australis* ssp. *australis*—which has already eliminated one *B. mitis* population in the state—is expected to be exacerbated by climate change (Mozdzer and Megonigal 2012, Tougas-Tellier et al. 2015, Eller et al. 2017).

Management Summary and Recommendations

The status of *Bidens mitis* in New Jersey is somewhat uncertain. The one location where the species is currently thought to be extant has not been monitored for a long time due to site access issues, and additional unsearched suitable habitat was originally noted to be present (NJNHP 2024). Examination of other wetlands in the area where the two original populations were documented might turn up some new occurrences. The reported population in Cumberland County does not appear to have been assessed.

Bidens mitis is fairly common in six southeastern states but rare elsewhere (see Figures 1 and 3), raising questions about the factors that govern its distribution. It would be useful to know if the species is self-compatible, if birds utilize its achenes as a food source and distribute viable propagules, how long the seeds can persist in the soil and if they are dispersed by water movement in tidal habitats, and whether fungal associations play a role in seedling establishment or development.

Synonyms

The accepted botanical name of the species is *Bidens mitis* (Michx.) Sherff. Orthographic variants, synonyms, and common names are listed below (ITIS 2024, POWO 2024, USDA NRCS 2024b).

Botanical Synonyms

Bidens mitis (Michx.) Sherff var. *leptophylla* (Nutt.) Small
Coreopsis cuspidata Bertol.
Coreopsis jasminifolia Bertol.
Coreopsis mitis Michx.

Common Names

Small-fruit Beggars-ticks
Small-fruited Tickseed
Coastal Plain Tickseed-sunflower

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