

**Title: Status and Distribution of *Mimosa quadrivalvis* L. var. *nuttallii* (DC.) Barneby**

**(Nuttall's Sensitive Briar, Fabaceae) in Illinois**

**Running head: *Mimosa quadrivalvis* var. *nuttallii* in Illinois**

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ABSTRACT

We conducted herbaria searches to locate specimens of *Mimosa quadrivalvis* var. *nuttallii* (DC.) Barneby (Nuttall's sensitive briar) from Illinois. This taxon is common in the Western Plains, but is rarely observed in Illinois where populations are known from sites in Bureau, DuPage, Fayette, Kane, Morgan, Peoria, and Winnebago counties. We identified seven potential locations based on herbaria searches. Subsequent field surveys revealed the presence of two

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extant populations of ten and one individuals in DuPage and Fayette counties, respectively. The Bureau and Kane County populations are extirpated, and populations in Morgan, Peoria, and Winnebago counties could not be relocated. Nuttall's sensitive briar is considered native to central Illinois, but its nativity in the northern part of the state is uncertain. This taxon is currently listed as endangered in Illinois.

**Key words:** adventive, cat's claw, endangered, loess, nativity, prairie, *Schrankia*,

## INTRODUCTION

*Mimosa quadrivalvis* var. *nuttallii* (DC.) Barneby (Nuttall's sensitive briar, Fabaceae), commonly known as cat's claw and devil's shoestring, is an herbaceous, perennial plant characterized by a procumbent growth habit and stems having numerous yellowish, recurved, internodal prickles; pinnately compound leaves; axillary, globose heads of minute, rose-colored flowers; and long, narrow, prickly, four-valved fruits (Gleason and Cronquist 1991; Mohlenbrock 2014). Nuttall's sensitive briar is known from dry, sandy, and gravelly soils in open woodlands, glades, and prairies from Illinois west to Nebraska, and North Dakota south to Texas (Gleason and Cronquist 1991). This plant, also known by the synonyms *Schrankia nuttallii*, (DC.) Standl., *S. uncinata* Willd., *Morongia uncinata* (Willd.) Britton, *Mimosa nuttallii* (DC.) B. L. Turner, and *Leptoglottis nuttallii* DC., blooms from June through September throughout its range (Gleason and Cronquist 1991; Mohlenbrock 2014). Its leaves fold when touched, giving rise to its common name.

This taxon is critically endangered in Iowa, but is present in Missouri in all but the northeast and southeast counties (Eilers and Roosa 1994; Yatskievych 2006). Nuttall's sensitive

briar lies at the eastern edge of its range in Illinois where this species is known from seven counties in the central and northern parts of the state, and is listed as endangered due to its limited distribution and small populations (Illinois Endangered Species Protection Board 2020; Mohlenbrock 2014). The purpose of this study was to determine the habitat and current distribution of Nuttall's sensitive briar and clarify the nativity of this species throughout Illinois.

## METHODS

We reviewed literature and visited in-state and out-of-state herbaria to identify collections of Nuttall's sensitive briar from Illinois. The herbaria searched were at Northern Illinois University (DEK), Eastern Illinois University (EIU), Field Museum of Natural History (F), University of Illinois (ILL), Illinois Natural History Survey (ILLS), Illinois State Museum (ISM), Illinois State University (ISU), Knox College (KNOX), Missouri Botanical Garden (MO), Natural Land Institute (NLI), Rockford College (RCH), and Western Illinois University (MWI). We also analyzed specimen label data to determine the date of collection, location, habitat, collector's name, and associated plants as available (see Appendix).

Field studies were conducted at historic collection sites during 2019 to determine the current statewide distribution and population status of this taxon, and to more accurately define its habitat and nativity. Plants were counted and notes taken on the substrates and adjacent vegetation. Specimens were collected and deposited in the herbaria of Eastern Illinois University (EIU) and the Morton Arboretum (MOR). Nomenclature follows Mohlenbrock (2014), and Wilhelm and Rericha (2017).

## RESULTS

We identified eighteen herbarium specimens from Bureau, DuPage, Fayette, Kane, Morgan, Peoria, and Winnebago counties. The initial collections by McDonald in 1900 and 1901, and Chase in 1921 apparently were from glacial drift hill prairies at the Horseshoe Bend Overlook of Kickapoo Creek, a small tributary of the Illinois River in Peoria County. Thirty-seven years passed before E. W. Fell collected a specimen from gravelly prairie (23 June 1958) within the Greater Rockford Airport in Winnebago County. Koelling found Nuttall's sensitive briar (17 September 1965) growing along a railroad right-of-way in Bureau County, and Rexroat made eight collections from "sandy, loess bluffs" along the eastern side of the Illinois River in Morgan County in the late 1960s (see Appendix). The Kane County collection by H. E. Eilers (5 July 1970) was taken from a degraded hill prairie at the former Fellowship Deaconry, and the DuPage County collections by Lampa (7 August 1984) and Kobal and Lampa (3 July 2019) are from the West Chicago Prairie. A recent collection of Nuttall's sensitive briar by McClain (10 June 2019) from the Horn Prairie Grove Land and Water Reserve in Fayette County represents a new locality for this species in the state.

Herbaria label data indicated plants were growing on sandy loess bluffs (8 specimens), prairie (2 specimens), and one each from gravelly slope, hill prairie, dry sandy soil, gravel bluff, sloping gravel prairie, and dry hillside. One specimen lacked data, and another was taken from a railroad right-of-way. The collection dates ranged from June 7 to September 29, with most specimens collected during September. The Bureau and Kane county populations are extirpated, and no plants were found in Morgan, Peoria, and Winnebago counties where suitable habitat remains. Ten plants were located in the West Chicago Prairie in DuPage County, and a single plant was found in the Horn Prairie Grove Land and Water Reserve in Fayette County.

## DISCUSSION

The nativity of sensitive briar in Illinois has been questioned since its discovery in 1900. The initial collector, F. E. McDonald, considered this plant adventive to the Peoria area, perhaps because it was a western plains species previously unknown from Illinois. Botanist V. H. Chase visited the same collection site 20 years later, but he considered the plant to be naturally occurring because of its presence in native glacial drift hill prairie. Sixteen of the eighteen sensitive briar collections from Illinois were taken from native prairie remnants. One specimen was from a railroad right-of-way, suggesting an adventive population. Railroads are well known dispersal routes for a great variety of vascular plant species (Muhlenbach 1979).

Past land use is sometimes beneficial in determining nativity. Fell (1962) considered Nuttall's sensitive briar adventive to Bell Bowl Prairie within the Greater Rockport Airport in Winnebago County. He thought seed may have been introduced to the site by the hundreds of horses and mules stationed here when the location was used as a World War I training camp. Seed may also have been introduced at a former stockyard at the West Chicago Prairie in DuPage County. Livestock can transport seed considerable distances by ingesting and passing them in dung, or by the attachment of seed to skin or fur (Chuong *et al.* 2016). The prickly fruits of Nuttall's sensitive briar appear to be well adapted for clinging to fur.

Plant populations widely disjunct from their primary range may indicate adventiveness, but these populations should be carefully evaluated. For example, a population of slivery bladderpod (*Physaria ludoviciana* (Nutt.) O'Kane and Al-Shehbaz), the only one in Illinois, is considered native to a sand dune in Mason County known as Devil's Tower located in the Henry

A. Gleason Nature Preserve. The nearest population for this plant is 700 km north in Redwing, Minnesota (Coons *et al.* 2000). Prairie trout lily (*Erythronium mesochoreum* Knerr), another western plains species, was not discovered in Illinois until 1980 despite its presence in at least seven counties (McClain *et al.* 1999). Illinois remains the only state east of the Mississippi River that has populations of this plant. Likewise, Illinois is the only state east of the Mississippi River thought to have naturally occurring populations of Nuttall's sensitive briar. Its presence in Illinois should not be unexpected due to its presence in all but the northeast and southeast corners of the adjacent state of Missouri (Yatskievych 2006).

The presence of flora from the same geographic region as Nuttall's sensitive briar may also help determine nativity. Fell (1962) listed several western plants (*Artemisia dracunculus* L., *Froelichia gracilis* Moq., *Ratibida columnifera* (Nutt.) Wooton and Standl., *Buchloe dactyloides* (Nutt.) Englm., and *Chloris verticillata* Nutt.) that were present in Bell Bowl Prairie, but absent in other gravel prairies in the Rockford area of Winnebago County, as evidence for the potential adventive status of Nuttall's sensitive briar at this site (Fell and Fell 1956). Wilhelm and Rericha (2017) also mention the presence of western plains plants (e.g., *Baptisia australis* (L.) R. Br.) within the West Chicago Prairie in DuPage County, and the most recent collection of this taxon from this prairie lists *Baptisia australis* as an associate (Appendix).

Determining the nativity of organisms is not a precise process, and it is sometimes impossible to determine the origin of some taxa. Nuttall's sensitive briar appears native to Central Illinois based on the dates of collection, habitat, and location (Webb 1985; Fertig 2011). The Kane County population may have been native based on the habitat, associated plants, and

the distance from potential sources of introduction, such as railroads. Populations in Bureau, DuPage and Winnebago counties are presumed to be adventive due to their association with other western plants and site history, including railroads, stockyards, and use as a horse and mule training facility. This taxon was likely never common in Illinois, and naturally occurring populations may have been lost to agriculture or woody invasion. Its sprawling growth habit also makes it difficult to locate when not in bloom. Future field searches may identify additional populations that will further clarify the natural distribution of this species in Illinois.

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**Appendix:** Herbarium records for *Mimosa quadrivalvis* L. var. *nuttallii* (DC.) Barneby (Nuttall's sensitive briar, Fabaceae) in Illinois.

**BUREAU COUNTY:** Railroad right-of-way at Route 88, 4.0 km east of Sheffield, 17 September 1965, A. C. Koelling 5527 (ISM).

**DUPAGE COUNTY:** **West Chicago Prairie**, plants growing with *Eryngium yuccifolium* Michx., *Euphorbia corollata* L., *Ratibida pinnata* (Vent.) Barnh., *Poa compressa* L., and *Cornus racemosa* Lam., W. Lampa and A. Able s. n., 17 August 1984 (MOR). **West Chicago Prairie**, ten plants growing with *Baptisia australis* (L.) R. Br., *Carex bushii* Mack., *Coreopsis tripteris* L., *Desmodium canadense* (L.) DC., *Eryngium yuccifolium* Michx., and *Sorghastrum nutans* (L.) Nash., 3 July 2019, S. N. Kobal and W. Lampa s.n. (EIU, MOR).

**FAYETTE COUNTY:** **Horn Prairie Grove Land and Water Reserve**, gravelly, dry prairie remnant. A single plant growing with *Euphorbia corollata* L., *Schizachyrium scoparium* (Michx.) Nash, *Helianthus occidentalis* Riddell, and *Dalea purpurea* Vent., 8 June 2019, W. McClain 3730 (EIU).

**KANE COUNTY:** **Fellowship Deaconry**, Elburn. Six plants in hill prairie remnant with *Dalea purpurea* Vent., *Euphorbia corollata* L., *Schizachyrium scoparium* (Michx.) Nash, 5 July 1970 H. Eilers s. n. (MOR).

**MORGAN COUNTY:** **Sandy loess bluff**, R. T. Rexroat 10532, 10557, 25 September 1967 (ISM); sandy loess bluff, 29 September 1968, R. T. Rexroat 10657, 10658 (ISM); sandy loess bluff, R. T. Rexroat 16541, 16542, 16543, 16559 (ISM).

**PEORIA COUNTY: Horseshoe Bottoms Overlook**, gravelly slope, Peoria, June 1900, F. E. McDonald s. n. (ILL); dry sandy soil, Peoria, August 1901; F. E. McDonald s. n. (ILL); Jun. 1915, No collector or habitat listed, (KNOX); dry hillside, out 7<sup>th</sup> Street beyond Western Ave., Peoria, 7 June 1921, V. H. Chase 3372 (ILL).

**WINNEBAGO COUNTY: Bell Bowl Prairie**, gravel bluff, 8 km south of Rockford, Greater Rockford Airport, 23 June 1958, E. W. Fell 58-237 (ISM).