OPUNTIA BENTONII: A TEXAS GULF COAST BEACH CACTUS (CACTACEAE: OPUNTIOIDEAE)

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ABSTRACT

Opuntia bentonii Griffiths is a little-known prickly pear cactus that grows in the aeolian foredunes and uncommonly in the back dunes along the Gulf Coast of Texas. Despite the unique features of *O. bentonii*, it has been essentially overlooked and, if noticed, incorrectly identified. This work provides a thorough photographic documentation and description of the species and briefly documents its ecology. Though it was described as a component of the pest-pear infestation of Australia, the literature from that time suggests that it may have been confused with *O. anahuacensis* Griffiths, *O stricta* (Haw.) Haw., or other Gulf of Mexico coastal species (from more easterly locations). Herein we present our observations of *O. bentonii* and the sympatric *O. anahuacensis*.

KEY WORDS: *Opuntia bentonii*, Texas, Gulf of Mexico, aeolian dunes, foredunes, back dunes, prickly pear, pest-pear

RESUMEN

Opuntia bentonii Griffiths es un cactus espinoso poco conocido que crece en las dunas eólicas primarias y, con poca frecuencia, en las dunas maduras de la costa del Golfo de Texas. A pesar de las características únicas de *O. bentonii,* se ha pasado esencialmente por alto y, si se ha observado, se ha identificado incorrectamente. Este trabajo proporciona una exhaustiva documentación fotográfica y descripción de la especie y documenta brevemente su ecología. Aunque se describió como componente de la plaga del perico de Australia, la bibliografía de la época sugiere que puede haberse confundido con *O. anahuacensis* Griffiths, *O stricta* (Haw.) Haw. u otras especies costeras del Golfo de México (de lugares más orientales). Aquí presentamos nuestras observaciones de *O. bentonii* y la simpátrica *O. anahuacensis*.

INTRODUCTION

Opuntia bentonii Griffiths was described in 1911 as a prickly pear found on the Texas Gulf Coast. Benson (1982) treated it as a variety of *O. stricta* (Haw.) Haw. Britton and Rose (1919) regarded it as a synonym of *O. stricta*. Hunt (2016) does not address it. Small (1933) accepted *O. bentonii* as a discrete species. POWO (2024) treats it as a synonym of *O. stricta* and unfortunately lists 18 heterotypic synonyms for that taxon. Tropicos (2024) lists *O. bentonii* but does not confer legitimate species status. Weniger (1969) was imprecise in his treatment of the taxon but discussed it in the context of *O. alta* Griffiths suggesting the two might be related. This report seeks to clarify the situation by fully describing the species, its habitat, and its range along the Gulf of Mexico in the United States.

MATERIALS AND METHODS

Plants were observed in the field on the Texas Gulf Coast in 1995 and 1996 and again in 2004–2008 in all seasons and documented photographically with DSLR cameras. Plants were also grown in a garden in Albuquerque, New Mexico and also documented photographically. The habitat of *O. bentonii* was also documented photographically. Measurements were taken with a metric ruler. The environment was surveyed visually, and common plant associates were identified. Images of herbarium specimens were downloaded from the Smithsonian Learning Lab and compared with present-day specimens.

TAXONOMIC TREATMENT

For *Opuntia bentonii*, Holotype, Description, and Ecology

Opuntia bentonii Griffiths, Rep. (Annual) Missouri Bot. Gard. 22:25. 1911. TYPE: FLORIDA: McClenny (Macclenny), cultivated plant, 26 Apr 1906, *Harmon Benton s.n.*; type specimen collected from cultivated plant (SAG), 24 Apr 1910, David Griffiths 8374 (HOLOTYPE: US-2607635[barcode 00115793]).

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***Note.*—**The voucher is notated "HOLOTYPE," but there is no indication when or by whom. The voucher was reannotated *O. stricta* by Lyman Benson in 1958 at the Herbarium of Pomona College via the Consortium of California Herbaria (2024) (Fig. 1).

***Distribution.*—**"… Fernandina, Florida, to the mouth of the Brazos [River, Texas], always in cultivation in the eastern portion of this range and native in southwestern Louisiana and Texas" (Crook & Mottram 1995).

DESCRIPTION

Tight or irregular shrubs, 1.5–2 m across, 1–1.5(2) m tall; juvenile plants with semi-vertical or horizontal branches from which cladodes grow up and out, forming shrubs (Fig. 2). Cladodes subcircular, broadly ovate, or oval, 17–18 cm wide, to 28 cm long, never narrowly obovate; vascular system between areoles visible on first-year cladodes. Areoles widely spaced, elliptical, 3–4 per diagonal row, attended by light yellowish glochids initially less than 0.3 cm long in an adaxial crescent, often scattered throughout, in age lengthening to 1 cm and turning brown. Spines 0–2(3), 1.5–2.5 cm long, yellow, becoming white, gray, or black with age, porrect or gently deflexed, slender, terete, annulate with alternating shades of yellow, sometimes modestly twisted; occasionally shorter spines present, these semi-erect or gently reflexed; spines often absent from areoles; overall, plants modestly spiny in appearance (Griffiths 1911; Small 1933) (Fig. 3). Flowers yellow, attractive, 9–10 cm across, petaloid tepals broadly ovate, margins irregular; style greenish-white, stigma yellow or pale yellow-green (never green); flower buds green, pointed sepaloid tepals ovate, acute, pointing toward the apex, unopened petaloid tepals rhomboid. Fruits copious, 3–4.5 cm long, egg-shaped or short-pyriform, areoles more or less distributed equally over surface of fruit; umbilici pronounced when new, later mildly depressed. Seeds numerous, roundish, modestly reniform ca. 2.5–3 mm in diameter, mostly flat, 1 mm unevenly thick margins (Fig. 4).

The only other large *Opuntia* growing in the foredunes along the east Texas Gulf Coast is *O. anahuacensis*. The two species were occasionally observed to be sympatric. They are easily differentiated (Table 1). Mature *O. bentonii* plants are shrubs to 1.5–2 m across and 1–1.5 m tall, whereas *O. anahuacensis* is a shorter, wider, low-spreading plant, 0.5(1) m tall and 2–3 m across. *Opuntia bentonii* has broadly obovate, oval, or subcircular cladodes that do not taper manifestly to their bases (Fig. 5). The surface of first-year cladodes may have elevated lines where vascular tissue connects areoles. Additionally, *O. bentonii* has all-yellow flowers, whereas *O. anahuacensis* may have all-yellow or red and yellow flowers. *Opuntia bentonii* has egg-shaped or short-pyriform, purplish-red fruits, whereas *O. anahuacensis* has pyriform, long-pyriform, or clavate fruits. Moreover, *O. bentonii* has yellow or pale yellowish-green stigmas in contrast to the white stigmas of *O. anahuacensis*.

Opuntia bentonii is not mentioned in the recent literature and botanists are generally unaware of the taxon. The reason for this may be because the species was conflated with the Florida beach cactus, *O. stricta,* by some authorities. However, *O. stricta* is not known to occur naturally in Texas. Or perhaps it has been confused with the very different *O. anahuacensis* (Table 1). Or because hundreds of vouchered herbarium specimens of *O. stricta* or *O. dillenii* (Ker Gawl.) Haw. are returned through a general online search for *O. bentonii* at the SEINet Portal Network (2024) (e.g., records ASU0297450 and PH00777328). Narrowing the search to Texas returned about twenty records for *O. stricta*, but some were, in fact, *O. anahuacensis* or unidentifiable species. No records were recovered for *O. bentonii* in said searches. Misidentification of herbarium specimens is a persistent problem for *Opuntia* species that confounds the proper identification of plants (Majure et al. 2013). Likely all of these reasons account for the lack of information about *O. bentonii*. Nonetheless, searches of the Smithsonian Learning Lab (2024) and the Consortium of California Herbaria (2024) did recover images of several vouchered specimens. These vouchers were over 100 years old, and nothing more recent was recovered.

The ploidy of both species is unknown, and such knowledge would be useful differentiate them from other Texas *Opuntia* species.

Fig. 1. *Opuntia bentonii*. Holotype voucher, obovate cladode. Some glochids visible within areoles. Deposited at the United States National Herbarium record No. 2607635 (now barcoded 00115793). Collected by Harmon Burton from a cultivated plant in 1906. Recovered from the Smithsonian Learning Lab.

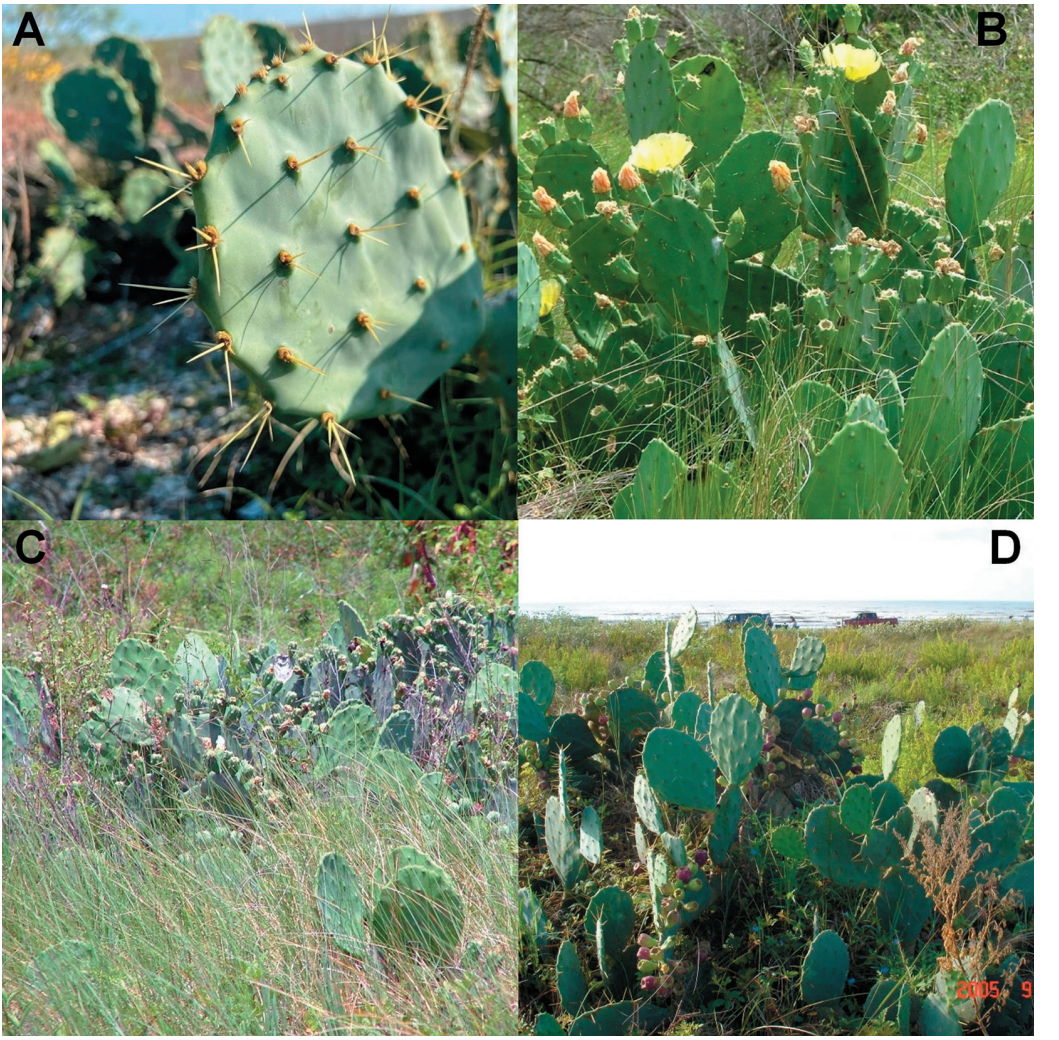

Fig. 2. *Opuntia bentonii*. (**A**) Juvenile plants send out low branches that send cladodes up and out. Yellowish glochids in adaxial crescent on juvenile subcircular cladode. (Matagorda, Texas). (**B**) Mature plant in flower, typical shape (Bolivar Peninsula, Texas). (**C**) Mature plant with juvenile plant in foreground growing with dune grasses (Texas Point National Wildlife Refuge). (**D**) Mature plant with damage to the center. Decay of the central cladodes was described by Griffiths (1911), water in the background (Texas Point National Wildlife Refuge). Photographic credits: Daniel Marteeny: A; Joseph Shaw: B, C, D.

ECOLOGY

Opuntia Small (1933) described plants of *O. bentonii* in northern Florida, but Griffiths (1911) reported that Florida plants of *O. bentonii* were always in cultivation and that *O. bentonii* was native only to southwestern Louisiana and Texas along the Gulf Coast. Populations of *O. bentonii* were observed by us in Louisiana from Sabine Lake to Pecan Island and west into Texas. *Opuntia bentonii* was observed by us in Texas in the foredunes at Matagorda, Seadrift, and Bolivar Peninsula, as well as Texas Point National Wildlife Reserve. At the latter location, infrequent plants of *O. bentonii* grew in the back dunes. Some plants of *O. bentonii* on Bolivar Peninsula grew near a popular, public beach and had been vandalized.

Fig. 3. *Opuntia bentonii*. (A) Broadly obovate cladode with zero to three spines on the surface areoles and irregularly present on the sides. Vasculature visibly raised between areoles. Pointed flower buds (Bolivar Peninsula, Texas). (B) Cladode with variable spination and widely spaced areoles (Bolivar Peninsula, Texas). (C) Oval cladode (Texas Point National Wildlife Refuge, Texas). (D) Cladode with apparent fungal lesions 2–3 mm that coalesced to cover much of the surface. Three aborted green or reddish fruits that were full-length. They appeared different from the aborted fruits on plants at Texas Point National Wildlife Refuge, which were yellow and smaller (Seadrift, Texas). See Fig. 6. Photographic credits: Joseph Shaw: A, B, C; Angela Huang: D.

In the foredunes, there were generally no large shrubs except *Yucca aloifolia* L. and *Y. recurvifolia* Salisb., which sometimes grew in the general vicinity of *O. bentonii* at Texas Point National Wildlife Refuge. The cactus grew amongst typical low dune plants such as *Uniola paniculata* L., other perennial grasses and sedges, and herbaceous, broad-leaved plants including *Amaranthus greggii* S. Watson, *Cakile geniculata* (B.L. Rob.) Millsp., and *Sesuvium portulacastrum* (L.) L. The sporadic plants in the back dunes were loosely associated with *Tamarisk* sp , *Iva frutescens* L., and *Baccharis halimifolia* L. In most locations, the cactus was overgrown by the smaller plants, but judging by the robust fruit set, the plants did not appear to be adversely affected. The large, wide, shallow root systems reported for other Opuntias (Ramakatane 2003; Snyman 2006) probably

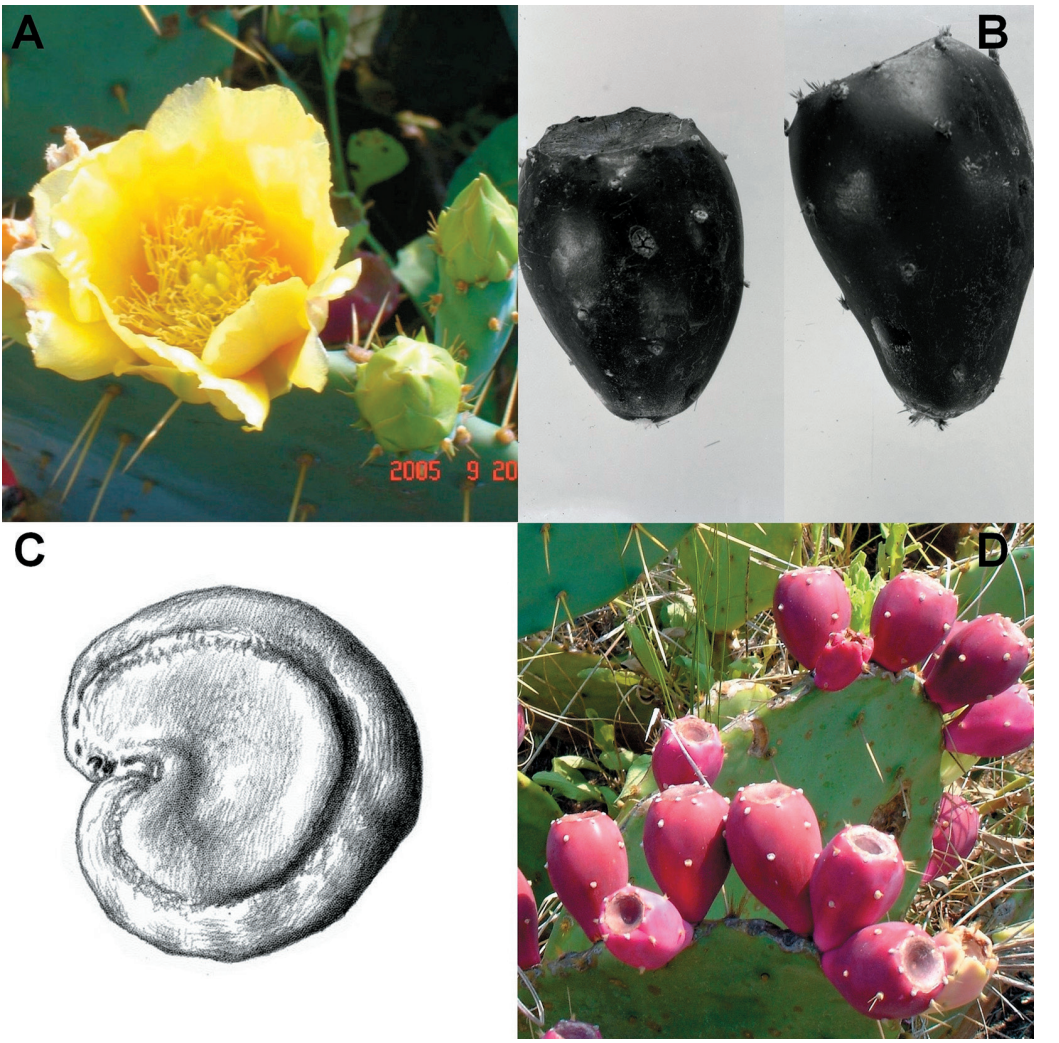

Fig. 4. *Opuntia bentonii.* (**A**) Flower, yellow stigma, pointed flower buds with green sepals and petaloid tepals. (**B**) Fruit, egg-shaped or short pyriform. Umbilici flattish in time. (Funk & Tuccinardi 1988; GGN plate No. 1549). (**C**) Seed roundish but modestly reniform, flat, thick margin to 1 mm (Smithsonian Museum of Natural History Botany Collections). (**D**) Cladodes with newly ripe, egg-shaped or short pyriform fruit, pronounced umbilici. Photographic credits: Joseph Shaw: A, B, C, D.

occur in *O. bentonii* and likely help stabilize the dunes. In the foredunes, plants grow above the high tide mark of the Perigean spring tides. They face salt spray, wind-blown sand, and storms year-round.

Some plants of *O. bentonii* were infested with armored scale insects, but no plants were observed with signs of cactus moth, soft scale, or cactus weevils. Small ants, flies, beetles, bees, and Lepidopterans visited the plants, the latter three especially during bloom. It seems likely that the species is important to these insects.

In several locations, *O. bentonii* plants had black lesions (ca. 2–3 mm in diameter) on cladodes that coalesced to cover much of the surface, possibly caused by one or more of the fungi reported to affect *O. ficus-indica* (Chavarría-Cervera et al. 2024). The blotches were dry and did not develop soft rot. Large plants were occasionally observed to have dieback in their centers. A similar dissolution of the plant centers was mentioned by Griffiths (1911) in cultivated plants. The precise cause was unclear to him.

Table 1. Differences between *Opuntia bentonii* and *O. anahuacensis*.

Opuntia bentonii	***Opuntia anahuacensis***
Shrub to 1.5–2 m across and 1.5 m tall	Low spreading to 0.5(1) m tall and 2–3 m across
Plants taller, shrub-like, not low spreading	Plants shorter, horizontally spreading, sometimes prostrate
Cladodes wider, mostly ±18 cm wide and ±27 cm long	Cladodes narrower, mostly ±13 wide and 22–27 cm long
Cladodes broadly obovate, oval, or subcircular, never narrow. Cladodes not noticeably tapering to the base, never forming a neck	Cladodes obovate, rarely broadly obovate, manifestly tapering to the base sometimes forming a neck
Areoles 3–4 in a diagonal line on cladode surface	Areoles 4–5 in a diagonal line on cladode surface
Areoles slightly raised when new	Areoles always flat
Vasculature between areoles may be visible and somewhat elevated as raised lines on new cladodes	Vasculature not elevated
Glochids yellow or golden brown, not in an adaxial tuft	Glochids initially brownish-yellow in an adaxial tuft
Glochids in areoles on face of pads longest in semicircle or cluster near upper edge of areole with some scattered throughout the areole from the beginning	Glochids in areoles on face of pads initially in small, tight, fairly even tuft above center of areole, becoming scattered sparsely throughout the areole only uncommonly after several years
Zero to 2(3) spines, erect, semi-erect, or one occasionally deflexed, plants appearing moderately spiny	Zero to 2 spines, sometimes one reflexed, plants sometimes appearing essentially spineless
Flowers 9–10 cm across	Flowers to 8–9 cm across
Flowers all yellow	Flowers all yellow or red and yellow
Filaments yellow	If flowers red and yellow, filaments may be tinted pink
Style greenish-white at anthesis	Style white at anthesis
Cylindrical style	Bulbous style
Stigma pale yellow to pale yellowish-green	Stigma white
Pericarpel not elongate, ±3 cm	Pericarpel elongate, 4–6 cm
Fruit egg-shaped or short pyriform	Fruit pyriform to clavate
Seeds modestly reniform, margin thickish	Seeds subcircular, margin thin
Seeds overall flat and thin	Seeds thickish

Fig. 5. Cladodes. (A) Oval cladode of *Opuntia bentonii* (Bolivar Peninsula, Texas) (B) Obovate cladode of *O. anahuacensis*. Cladode strongly tapering to a neck (Galveston Island, Texas). Photographic credits: Joseph Shaw: A, B.

Fig. 6. *Opuntia bentonii* (A) Mature plant with approximately 50% aborted fruit. Gulf Coast Water in Background (Texas Point National Wildlife Refuge). (B). Close-up of aborted fruits. Aborted fruits yellow, narrowly obovate, and sometimes modestly curved. See Fig. 3. Photographic credits: Joseph Shaw: A, B.

Flowering in *O. bentonii* was observed from late April to early July. The greatest bloom was in late May to early June, and a few flowers were noted in early fall. Ripe fruit was observed beginning in July. Multiple cladodes at the Texas Point National Wildlife Refuge bore ripe fruits adjacent to aborted fruits. Aborted fruits also occurred on plants at Seadrift, Texas. However, the aborted fruits were of different shapes and colors at the two locations (Fig. 3; Fig. 6). Possibly the fruit failures were due to lack of pollination or larval insect damage to developing ovaries as reported for other Opuntias (Miller et al. 2009; Piña et al. 2010). Overt evidence of herbivory was not observed though some fruits showed damage indicative of small mammal or bird frugivory.

Opuntia bentonii was reported to be a possible component of the pest-pear invasion of Australia that devastated millions of square kilometers of agricultural land in the late Nineteenth and early Twentieth centuries (Alexander 1927). However, it is unclear if the references are actually to *O. bentonii*, *O. anahuacensis*, *O. stricta,* or some other species because the identification of *Opuntia* was imprecise at that time in Australia (Johnston & Tryon 1914). Therefore, the potential of *O. bentonii* as a weedy species is unknown. However, viable pieces of *O. bentonii* have been observed floating in the ocean surf and at least temporarily rooting among washed-up debris from Biloxi, Mississippi to Galveston, Texas. Thus, *O. bentonii* may be dispersed by maritime means as has been proposed for other Opuntias (Majure et al. 2007).

DISCUSSION

Opuntia bentonii is essentially unknown or unreported. It is found along the Texas and west Louisiana Gulf Coast primarily in foredunes and infrequently in back dunes. It is distinct and different from *O. anahuacensis*, another Texas and Louisiana beach plant with which it is sometimes sympatric. *Opuntia bentonii* may have been a component of the Australian pest-pear invasion, but this is not certain. No meaningful information has apparently been published about it since Small wrote about it in 1933.

Because it may have a broad root system as described for other *Opuntia* species, *O. bentonii* may be important in dune stabilization and could assist in restoration efforts. Its relationships with dune plants or animals are unknown, but it produces copious fruit, which may be important to insects, mammals, and birds. Studies are needed to understand the overall *O. bentonii* distribution, possible invasiveness, and contributions to dune ecosystems of this overlooked plant.

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