THE OPUNTIAS OF MISSISSIPPI

Lucas C. Majure & Gary N. Ervin

Department of Biological Sciences, Mississippi State University, PO Box GY, Mississippi State MS 39762; lcma44@msstate.edu

Abstract: Literature on distributions, habitat characteristics, and identification of Opuntia species in the southeastern US is scant. Regional treatments of Opuntia are often ambiguous, limited studies based primarily on herbarium specimens. The present work provides a detailed description of the opuntias found in Mississippi along with their distributions and habitat descriptions. Observations, collections, and measurements were made from natural populations within Mississippi and other parts of the southeastern United States. Plants of all taxa were greenhouse grown for approximately two years to monitor morphological characteristics, which sometimes can be quite plastic. Our two-year study encompassed nearly 150 natural populations among several eastern states. Five species are recognized. Of these, Opuntia cespitosa, O. humifusa, and O. pusilla are the most common in Mississippi. O. aff al-lairei and O. stricta are found infrequently.

Introduction

The Opuntia species occurring in Mississippi and the eastern United States are a complex group. The taxonomy of the species has never been resolved fully, because they exhibit extreme morphological plasticity, they are poorly studied ecologically, they potentially intergrade to form hybrid taxa that express characters intermediate between well defined taxa, and they possess numerous critical morphological characters that are difficult to preserve in herbarium vouchers. This treatment deals with the ecology, morphological variation, and taxonomy of the group for Mississippi. As the flora for Mississippi remains incomplete, this also provides a preliminary treatment and account of the diversity and distribution of Cactaceae for the state.

Opuntia species (Cactaceae: Opuntioideae; Stevens 2001–2008) are biologically complex xerophytes. The genus is native to the Americas, and species can be found from Canada to the southernmost reaches of South America (Powell and Weedin 2004). The highest diversity is found in Mexico, where Opuntia species flourish in arid habitats because of their numerous xerophytic adaptations (DeFelice 2004), including thick, waxy cuticles that reduce the amount of water lost through transpiration; modified leaves and bud scales in the form of spines and glochids (Mauseth 2006), which decrease plant surface area and transpiration rates and affect thermoregulation (Lewis and Nobel 1977, Nobel 1978, 1983); rapid root growth and shallow root systems that maximize water uptake when long periods of drought are broken by rain; Crassulacean Acid Metabolism (CAM), which helps conserve water through the closing of stomata during hot daylight hours and utilizing CO₂ stored overnight for photosynthesis; and cells rich in polysaccharides, which readily bind water molecules, thus reducing desiccation if the plant is injured (Benson 1982; Rebman and Pinkava 2001).

The platyopuntias, or genera of opuntiod cacti with flat stems (cladodes, cladophylls, or pads), are commonly known as nopalies or prickly pear cacti (Benson 1982; Wallace and Fairbrothers 1987; Hanselka and Paschal 1991; Mohamed-Yasseen 1996; Rebman and Pinkava 2001; DeFelice 2004). They can be prostrate to erect and even form small trees. Generally, they produce an abundance of many-seeded fruits, but also they are easily propagated from stem fragments. Many species easily disarticulate at the nodes, and thus form large clonal colonies by vegetative reproduction (Benson 1982; Rebman and Pinkava 2001).

Opuntia species are host to a variety of insect and mite species (Mann 1969) and are utilized by many animal species, including hu-
could be transported by water to shell middens, barrier islands, and shorelines, where they then would root and develop into new plants. Prego and Stanforth (1985) suggested that O. fragilis also could be transported along riparian systems by water.

**Taxonomy of eastern US opuntias**

The current status of the taxonomy of eastern Opuntia taxa is a work in progress. Roughly 190 years after *Cactus humifusus* was described by CS Rafinesque (1820), confusion remains about what species exist in the eastern United States. Questions of hybridization, specific status, varietal level status, and numerous morphological and physiological attributes remain unresolved. Pinkava (2003) recognizes five species of *Opuntia* in the eastern United States: *O. cubensis Britton and Rose*, *O. humifusus* (Raf.) Raf. (including varieties *humifusus* and ammomphila Small), *O. pusilla* (Haw.) Haw., *O. stricta* (Haw.) Haw., and *O. triacantha* (Willdenow) Sweet. However, according to the PLANTS Database, based on taxonomic information from John Kartesz (Biota of North America Program; USDA, NRCS 2007), there are nine taxa: *O. ammophilaa Small*, *O. austrina Small*, *O. cubensis*, *O. dillenii* (Ker Gawler) Haw., *O. humifusus*, *O. macrocentra Engelm.* , *O. pusilla*, *O. stricta*, and *O. triacantha*. Kartesz included certain taxa at the specific level, for instance, *O. austrina* and *O. dillenii*, apparently based on a 1990 dissertation by JD Doyle (J Kartesz personal communication), which in no way conclusively segregates these taxa as separate species or even varieties (Doyle 1990).

Benson (1982) cited localities for populations of *O. austrina* (*O. humifusus var austrina* (Small) L. Benson) and *O. humifusus var hum-

---

**Key to the opuntias of Mississippi**

1. Plants forming shrubs to sub-shrubs; stems ascending or erect, 0.5 to 1 m or more tall; inner tepals yellow; spines yellow or brownish, flattened, slightly curved; plants restricted to coastal areas or occasionally planted as ornamentals... *O. stricta* (V)

2. Cladodes long; 3–1.16 (32.5) cm long, 2.0–8.0 (–11.3) cm wide, 4–15 (–19) mm thick; laterally compressed (flat); easily disarticulating at the nodes; spines usually strongly retrorsely barbed to the touch, especially on terminal cladodes; 0–4 spines per areole ................................................................. *O. pusilla* (III)

3. Cladodes short; 1.8–13.6 (32.5) cm long, 2.0–8.0 (–11.3) cm wide, 4–15 (–19) mm thick; laterally compressed (flat); not subcylindrical; not easily disarticulating at the nodes; spines not strongly retrorsely barbed (except in younger spines of *O. humifusus*); 0–2 (–3) spines per areole ................................................................. 3

4. Stems strongly ascending (during growing season); cladodes strongly tuberculate, usually elliptical in outline; spines normally absent, if present, one per areole, short, 15–20 mm long; inner tepals retrorsely barbed to the touch, usually not at the nodes; spines not strongly retrorsely barbed to the touch; inner tepals wholly yellow, or yellow with red bases; .............................. *O. aff allarei* (IV)

5. Stems moderately ascending (during growing season), more often decumbent or trailing; cladodes ± tuberculate, elliptical or circular in outline; spines generally present on some plants, 0–2 (–3) per areole, long 20–71 mm long; spines sometimes retrorsely barbed to the touch; inner tepals wholly yellow, or yellow with red bases; .............................. *O. angustissima* (V)

6. Cladodes dark green to bluish-green, slightly glaucous; mostly circular in outline, elliptical or obovate; generally slightly tuberculate; inner tepals yellow with red bases; .............................. *O. humifusus* (Physalis coccus CO)
Of the two species previously recognized as native to Mississippi, *O. stricta* and *O. puilla*, present fewer taxonomic difficulties outside of potential hybridization. Both are found in the eastern United States in coastal states from North Carolina to Texas (although the occurrence of *O. puilla* in Louisiana has not been confirmed), particularly in coastal areas of those states. Most extant collections of these species are from barrier islands and sites directly adjacent to the Gulf and Atlantic coasts (Benson 1982; Pinkava 2003). As indicated here, two other taxa have been overlooked in botanical surveys of Mississippi and adjacent states: *O. cespitosa* Raf. and a species most accurately matching the description by Griffiths (1909) of *O. allairei* Grifffiths.

**Mississippi opuntias**

The five native or naturalized species of *Opuntia* within Mississippi are *O. cespitosa* Raf., *O. humifusa* (Raf.) Raf., *O. allairei* Grifffiths, *O. puilla* (Haw.) Haw., and *O. stricta* (Haw.) Haw. A putative hybrid also occurs within Mississippi but will not be treated here, as more information will be needed to determine the taxonomic level at which this entity should be recognized. The five main taxa are treated below. Cladode characteristics used here are typical of live material. Herbarium specimens are much more difficult to determine, as cladode characteristics and flower color generally are poorly preserved and frequently not noted. We prefer to use live material for identifications, and when possible, specimens that are in flower. Flower color and general characteristics of the plants and the population should be noted, as single plants within a population might not have the typical characteristics of the species. Sterile specimens often can be misleading and result in misidentification, especially with herbarium specimens. Glochid color generally changes with the age of the plant or in those most heavily subjected to environmental stresses. True glochid color can sometimes be seen by extracting the inner glochids from the areoles. It is best to use younger cladodes when determining glochid colors.

Another morphological trait that has historically been used in species determinations is the presence or absence of tuberous root thickenings. Of the *Opuntia* species that occur in Mississippi, *O. allairei*, *O. cespitosa*, *O. humifusa*, and *O. puilla* have been observed with thickened, tuberous roots (Fig. 1). This characteristic has been used by many authors to distinguish *O. macrocentra* (Engelmann 1850, 1856; Benson 1944, 1969, 1982; Gleason 1952; Lundell 1969) and *O. pollardii* Britton & Rose (syn. *O. humifusa var. australis* or *O. humifusa var. humifusa*; Small 1903, 1913) from other species, such as *O. humifusa* and *O. puilla*. However, tuberous roots are often found on plants growing in well-drained substrates, independent of the species (Wenger 1970; Doyle 1990; Powell and Weedon 2004; DJ Pinkava pers. comm.). Environmental factors are most likely the primary cause of this phenomenon, but this needs to be tested further.

All voucher specimens made during this study are housed in the Mississippi State University Herbarium (MISSA). Specimens were collected from nearly all locations given for the distribution of the taxa represented here, which includes over 100 specimens (including the putative hybrid taxon) from Mississippi. The distributions of *Opuntia* species given in this work are based partly on herbarium records, of which very few existed before this project. All herbarium records were reoucched when possible to verify the continued existence of an *Opuntia* species at a certain location. New localities were discovered through the use of soil maps, herbarium records of associated vegetation, and by word of mouth.

The following is a treatment of the known *Opuntia* taxa in Mississippi based on a thorough review and reconciliation of extant taxonomic works on the genus in North America. Measurements represented in the dichotomous

---

**Figure 2.** Distribution of *Opuntia humifusa* (black triangles) and *Opuntia cespitosa* (gray circles) in Mississippi.

**Figure 3a, b.** *O. humifusa*: typical, trailing, and decumbent growth form, Grenada Co., MS and Horn Island, Jackson Co., MS. Photos: LC Majure and GN Ervin. **Figures 4.** *O. humifusa* with (a) and without (b) spines, Horn Island, Jackson Co., MS and DeSoto National Forest, Forrest Co., MS. **Figure 5.** Glochids of *O. humifusa*, Grenada Co., MS. **Figure 6.** Flower of *O. humifusa*. **Figure 5.** Glochids of *O. humifusa*, Grenada Co., MS.
key, as well as other characters, are based on live material from natural populations.


*Opuntia humifusa* is the most widespread species in Mississippi, occurring naturally in four of nine physiographic regions; the north Central Hills, the south Central Hills, the Pine Belt, and the Coastal Zone (Fig 2), where it is sympatric with *O. paullina* and *O. stricta*. This *Opuntia* species has many different morpholog- ical forms and, therefore, has been given many different names over many years (for instance, Britton & Rose 1919).

Two varieties have been recognized for *Mis-
sissippi*: *O. humifusa var. humifusa* and *O. hu-
myfusa var. austrina*. In this treatment, only *O. humifusa* is recognized. The variety austrina is supposed to be much larger, more erect, and have longer spines than the more common va-
riety humifusa. Also, variety austrina is referred to as the variety occurring along coastal areas in deep sands of sand dunes and barrier islands (Benson 1982; Weakley 2003). This delineation is ambiguous, however, as other plants found farther inland share most of the same features as coastal populations. The degree of spine length and diameter, and pad tur- digidity are probably more a function of environmental variables acting on phenotype rather than genetic dissimilarity. Morphologi-
cal variation also seems to coincide with lati-
tude (Doyle 1990; Majure pers. obs.). However, because inland populations are typically highly disjunct, a degree of interpopulational genetic dissimilarity might be expected to result from a variety of biological mechanisms.

*Opuntia humifusa* is commonly found on sandy sub-
strates in pine forests, on barrier islands, low areas behind primary or secondary sand dunes, and scrub oak forests. Unlike inland popula-
tions of *O. paullina*, inland localities for *O. hu-
myfusa* are generally removed somewhat from riparian systems. *O. humifusa* is associated with a variety of grasses, sedge, forbs, and woody vegetation common to sandhill communities. In southern Mississippi it commonly is found associated with *Sophora phlebodes* DAUVON (1982) or other *Sophora* species, which is known to feed on the plants.

**Morphological characteristics**

*Opuntia humifusa* is generally a low, decum-
 bent, trailing plant (Fig 3), but links of clad-
dodes can reach heights of 30–40 cm and be
more ascending in certain situations during the growing season, when the cladodes are tur-
gid. It forms relatively small (< 4 m²) to large popu-
lations (> 5 hectares) depending on the quality and quantity of suitable habitat.

**Cladodes** are generally yellow-green to dark green and become cross-wrinkled in the win-
ter or under water stress. Cladode sizes are highly variable depending on microclimate, with 8.5–17 cm. *Opuntia humifusa* 2.0–5.2 (–9.0) cm wide, and 4–10 (< 19) mm thick. They can be obovate, ovate, orbicular, or elliptical in shape. Cladodes, even from the same plant, can exhibit greatly divergent morphologies (Fig 4). There is an outer chalky layer that covers the spines. In cases where this is rubbed off (for in-
stance, after a hurricane), the spines appear light green, spiny yellow-orange, or dark red. Spines can be erect, spreading, or slightly de-
flexed depending on the age of the cladode from which it is produced or the areole from which it is produced. For example, spines can become deflexed and appressed to a cladode if another cladode or flower is produced from the same areole, effectively limiting available space. Generally spines are erect or spreading and are produced from the uppermost portion of the cladode (junctum, as well as parts of Kentucky and Virginia. In Mis-
souri and Illinois this plant is found in sandy prairies. There is evidence that it also occurs in New York (Kalmbacher 1975). This taxon in Mississippi tends to grow in areas that are more mesic in nature (Fig 8) than those of *O. hemifusa, O. paullina, and O. stricta*.

This species has been included as synony-
mous with *O. hemifusa* for quite some time (Britton and Rose 1920; Small 1933; Weni-
ger 1970; Benson 1982; Doyle 1990; Anderson 2001; Pinkava 2003; Hunt 2006). As no Rafinesque specimen of *O. humifusa* exists, Leuenberger (1993) typified *O. humifusa* using a specimen from Montgomery County, considering that it was the only taxon inhab-
abitng such a broad range in the eastern United States (Benson 1982). If *O. cespitosa* was typi-
fied as *O. hemifusa*, then this typification was in error. Additionally, *O. cespitosa* and *O. hemifusa* also are easily separable between the two spe-
cies (Majure and Ervin unpublished data). The name *Opuntia cespitosa* comes from a species described by Rafinesque (1830) for a plant from the eastern United States. Al-
though no flower color is mentioned, he de-
scribed the plant as having very long spines and red glochids. The distribution he gives for the species is much more accurate than for other taxa that might be considered for the species (for instance, *O. pterocactus* ENGELMANN). Of course more work will be neces-
sary to determine the correct taxonomic level of this taxon, as this species is similar to *O. hemifusa* and could potentially just be a vari-
city thereof. Some cytological work (Bower-
and 1945) suggests that this taxon is a tetraploid,
while *O. humifusa* is diploid. Contemporary cytological work needs to be completed on these taxa.

**Morphological characteristics**

At first glance this species can be mistaken for the more common *O. humifusa*. However, it is easily separated from *O. humifusa* in having red-centered flowers, reddish glochids, and slightly glaucous cladodes. These characteristics are maintained even when this species is planted in acidic, sterile, sandy soil. This species also is decumbent, low growing, and trailing (Fig 8), although heights of 30 cm or more can occasionally be reached, especially when the plant is surrounded by supporting vegetation.

**Cladodes** are normally dark green to moderately glaucous (Fig 9), obovate, orbicular, or elliptical. They are consistently more orbiculate than *O. humifusa*. They range in size from 3.8–10.5 (–18.7) cm long, 3.2–8.0 (–11.3) cm wide and 4–10 (–19) mm thick. Cladodes become cross wrinkled during winter or in times of stress as well, and the plant becomes more purplish during times of stress, especially around the areoles.

**Spines** of *O. ceptiosa* are usually bony white with castaneous colored or maroon bases during development and right after maturity, characteristics strikingly similar to those of *O. macrobryzus* as described by Powell and Weedin (2004). In age they become light to dark gray. Spine tips are light yellow or cream when young but usually darken in age, to almost black in some specimens. Spine tips are never retrorsely barbed to the touch, although they do possess microscopic barbs. These can easily be seen under moderate magnification.

**Glochids** This species typically has crimson, reddish-brown, or dark brown glochids, although plants with light brown glochids are found. They range in length up to 7 mm long and generate the same patterns and varying lengths as those seen in *O. humifusa*.

**Flowers and Fruit** The flowers of this variety are quite striking in having dark yellow inner tepals that are dark red to orange-red basally extending to roughly ½ to ⅓ the length of the tepal (Fig 10). The outer tepals are green with light colored margins. The stigma lobes are white or a light cream color. Filaments generally are reddish, orangish, or dark yellow. Anthers are yellow. Pollen of this species is slightly larger than in *O. humifusa*, and its pollen contains more germinal pores than *O. humifusa* (Majure and Ervin unpubl. data). This is another characteristic that needs to be studied in more detail. The fruit of this species are pinkish, pale red, dark red, or purplish.

III. *Opuntia pusilla* (HAW.) HAW., Syn Pl Suce 195. 1812.

*Cactus foliosus* WILDENOW 1813.  
*Cactus pusillus* HAWORTH 1803.  
*Opuntia foliosa* SALM-DYCK 1828.

*Opuntia pusilla* is most often considered to be a coastal species, as it is found on barrier islands, coastal shorelines, sand dunes, and shell middens in the coastal states from North Carolina to Texas (Radford and others 1968; Benson 1982; Wunderlin 1998), with the exception of Louisiana (Benson 1982; Pinkava 2005). However, we have found many populations of *O. pusilla* much farther inland, generally occurring on well-drained, acidic sand deposits along river systems. In Mississippi this species is found in the Tombigbee Hills, Black Prairie, south Central Hills, north Central Hills, Jack-
quite possible that this name for our plants should be abandoned, and one of the species described from the southeastern US should be used in its place.

**Morphological characteristics**

*Opuntia pusilla*, as the name implies, is a small plant. It often forms small mounds or patches of cladodes from 5–15 cm tall that are easily hidden in grasses, forbs, and shrubs. Patch sizes increase as terminal cladodes disarticulate throughout the year and fall around the existing plant. These pads form new plants that maintain this cycle, steadily increasing the overall density of stems radiating from a central location, and many pads are dispersed away from the parent plant. Under prolonged periods of shading this species tends to form smaller and smaller cladodes that eventually resemble juvenile plants (Fig 12). Only when the canopy cover is removed (for instance, after a flooding event, beaver activity, etc.) do the plants start to recuperate (Fig 13; Majure 2007). It is not known at what reduced light level this species starts to suffer effects from shading nor for how long etiolated plants can remain in this state. More work needs to be done to test this observation.

**Cladodes** range from 1.0–4.0 (–11.0) cm long, 7–22 (–51) mm wide, and 3–9 (–16) mm thick. Cladode shapes tend to be ellipsoid, obovate, or rotund in outline and are subcylindrical or commonly flat (Fig 14). The most turgid and subcylindrical cladodes are found along coastal areas, especially on the barrier islands. In winter the cladodes become transversely cross-wrinkled and turn a purplish color, especially at the areoles.

**Spines** on this species are strongly retrorsely barbed when immature but can lose this with age and weathering. They are 4–60 mm in length and 0.45–0.60 mm in diameter at the base. 0–4 spines can be produced from a single areole. Spine production is a function of habitat characteristics, where degrees of shading and lower temperatures tend to decrease spine production and increase cladode length and width. High amounts of sunlight and subsequently high temperatures have the opposite effect and increase cladode thickness (Majure and Ervin unpubl. data). However, in natural populations typically 2–3 spines are produced when plants are in full sun. Younger spines can be maroon, creamy-yellow, or pale white with yellow tips, while older spines tend to age bright white, then darken to gray and have darker (brownish) tips.

**Glochids** of this species are strongly retrorsely barbed and can be up to 6 mm long. They also form the same pattern and have the same varying lengths as those of *O. humifusa*.

**Flowers and Fruit** Flowers of this species have wholly yellow inner tepals and outer tepals that are green with light colored margins. The style and stigma lobes are white. The filaments of the stamens are yellowish or cream colored and the anthers are yellow (Fig 15), as in *O. humifusa*. The fruit are pinkish to pale red, or purplish in color when mature.

**Putative hybrid** Plants resembling a putative hybrid between *O. humifusa* and *O. pusilla* have frequently been found in Mississippi within the Jackson Prairie, North Central Hills, South Central Hills, and the Pine Belt physiographic regions in Mississippi. The putative hybrids are typically found farther disjunct from riparian systems than is *O. pusilla*, much like *O. humifusa*, but have overall habitat characteristics similar to both *O. humifusa* and *O. pusilla* (Majure and Ervin unpubl. data).

Other authors have also noted growth forms that appear intermediate between these two species (Benson 1944, 1982; Doyle 1990; Snow unpubl. data), but all accounts have been observational and not empirically tested. Hybridization among *Opuntia* is not uncommon (for instance, Grant and Grant 1979; Benson 1982; Rebman and Pinkava 2001; Bobich and Nobel 2001; Griffith 2004). However, until further evidence elucidates the actual relationships among these taxa, this taxon will not be treated. Molecular genetic analyses are currently underway to gain a better understanding of interrelationships among these taxa (Majure and others, unpubl. data).


*Opuntia aff allairei* has been found in the floodplain of the Mississippi River in the Delta physiographic region and in the Loess Hills physiographic region (Fig 16). In the Delta Physiographic region it occurs in an area that was heavily impacted by the “great flood” in 1927, when levees along the Mississippi River failed following months of almost continuous...
winter and spring rains (Barry 1997). There are hundreds of hectares of sandy fields in that area inhabited by this species. Hilgard (1884) mentions seeing Opuntia along the Dogwood Ridge in the Mississippi floodplain that occurred from Coahoma County, which is adjacent to Boli- var County, down to Holmes County. Whether it is the same species is yet to be determined, and trips to locate Dogwood Ridge and any Opuntia species that might occur there have been unsuccessful. The other populations have been found only in one county in the Loess Hills. Through more investigation, more populations of this species should be found in the Loess Hill physiographic region. One specimen from Wilkinson County that closely resembles this species has been examined.

This plant is unlike any other Opuntia species in the state with regard to growth form, although its flower color overlaps with O. cespitosa. It is obviously within the O. humifusa complex but is probably more closely related to O. macrocephala than to O. humifusa. Due to its size, spine coverage, glochid color, and growth habit (Griffiths 1909), Opuntia allairei is morphologically the closest taxon to this species among those species described from the southwestern United States. (O. al- lairei was described from east Texas). Griffiths described O. allairei as having wholly yellow flowers; however, Britton and Rose (1920) mention yellow flowers with red centers. Only one spine per areole has been observed, and greenhouse grown plants produced no spines, even in full light under increased temperatures.

Morphological Characteristics

This plant can reach heights of 60 cm in shaded conditions, but it generally is around 30–40 cm tall with dark green to yellow-green pads. It forms large colonies of mostly ascending or occasionally slightly decumbent cladodes (Fig 17). It is the largest of the naturally occurring, inland opuntia in Mississippi.

Cladodes are generally 7.0–13.6 (–32.5) cm long, 4.0–6.8 (–8.5) cm wide and 5–25 mm thick. They tend to be more tuberculate than either O. cespitosa or O. humifusa. Younger cladodes can be slightly glaucous as well.

Spines are almost completely lacking in this species. When present they are relatively small, ranging from 15–18 mm long and about 0.6 mm in diameter at the base. Only one spine per areole has been observed, and greenhouse grown plants produced no spines, even in full light under increased temperatures.

Glochids can be up to 5 mm long and are bright yellow when young to orange-brown in age. They have the same arrangement and varying lengths as those of O. humifusa.

Flowers and Fruit

The flowers of this species are showy, with inner yellow tepals basally tinged red (Fig 18), as in O. cespitosa. Flowers of this species tend to be paler that those of O. cespitosa. The fruit are reddish in color to dark purple when mature.

Opuntia stricta is generally restricted to coastal areas (Benson 1982; Pinkava 2003; Wunderlin 1998). Benson (1982) places it “even in jungles along the Everglades, where the water table is only a few centimeters below the surface,” implying that this species can survive in areas atypical for cacti. However, humans have transported this species throughout the mid-south, planting it in yards and flower gardens. Cladodes are often taken from coastal populations for this purpose. In Mississippi this species occurs naturally in two counties in the Coastal Zone physiographic region (Fig 16).

Records from Hancock County exist as well, but these have not been reconfirmed. It occurs on barrier islands, oyster shell middens, and weedy areas along the coast. It has been seen occasionally in wrack and could potentially be dispersed by water during meteorological events, such as hurricanes (Majure and others 2007). Opuntia stricta is most well-known for its destructive invasion in Australia and parts of South Africa. These locations have also been stages for use of the successful biological control agent, the cactus moth, Cactoblastis cactorum Berg (Zimmerman and others 2000).
Australia this moth was released and eventually decimated millions of hectares of invaded rangeland by the non-native O. stricta and other Opuntia spp (Mahr 2001). Unfortunately, the moth was also released into the Caribbean islands and has since found its way to the continental United States, where it has negatively affected populations of our native opuntias (Stiling 2000; Stiling and Moon 2001; Zimmermann and others 2001; Stiling and others 2004). O. stricta has been heavily affected in certain areas, such as Bon Secour and Dauphin Island, AL (Majure and Ervin pers. obs.). Because O. stricta is relatively rare in Mississippi, the cactus moth could easily eliminate entire populations of this species. The cactus moth was found early in 2008 along the barrier islands in Mississippi (Joel Floyd and Stephen Hight, USDA APHIS, pers. commun.). In order to assess threats to its continued survival in the face of this blight, O. stricta should be put on the Mississippi Natural Heritage Program Tracking list.

Morphological characteristics

Opuntia stricta is a frutecent prickly pear that can grow up to 1 m or more tall. It can form dense colonies in certain situations, but most often populations are composed of plants that are sparsely scattered throughout an area (Fig. 18).

Cladodes

Range in size from 11.0–20.4 (–28.0) cm long, 6.3–11.4 (–17.0) cm wide, and 9–13 (–19) mm thick. They are light green to yellow-green, moderately glaucous on younger growth, and have scalloped margins (Fig. 19).

Spines

Range in size from 20–27 mm long and 1.05–1.30 cm in diameter at the base. They are dark yellow or yellow orange and are flattened longitudinally near the base or throughout. Usually they curve and may be twisted. Spines are stout, erect, spreading, or commonly deflexed. There can be from 0–3 spines per areole, at least in material seen from Mississippi.

Glochids

Of this species are dark yellow to brown in age and can be 0–6 mm long. They form a tight, fascicled adaxial crescent in the areole or can have nearly the same patterns as those discussed for O. humifusa and the other species.

Flowers and Fruit

The inner tepals are yellow and the outer tepals are green, as in O. humifusa and O. pusilla. The fruit of this species are relatively large, many seeded, and dark purple when mature (Fig 19).

Acknowledgments

We would like to thank all of the private landowners, The Nature Conservancy, the US Fish and Wildlife Service, and the Mississippi Department of Wildlife Fisheries and Parks for the use of their lands and permits. George Phillips of the Mississippi Museum of Natural Science provided locality data to LC Majure for the first population of O. erpenaeus that was found in this study. Charles Bryson and Tom Eubanks took us to the first population of what turned out to be O. aff allairei. We would also like to thank DJ Pinkava, Monica Arakaki, and two anonymous referees for reviewing the manuscript and providing additional comments and suggestions. We would also like to acknowledge the Mississippi State University Herbarium (MISSA) for allowing usage of valuable space and materials necessary for voucher specimen preservation and the databasing of those specimens collected. This work was done as partial fulfillment for the Master’s degree of LC Majure and was supported in part by funding from the USGS Biological Resources Discipline (#04HQAG0135) to Gary N Ervin.

Literature Cited


Lundell CL. 1960. Flora of Texas: Vol. 2. George Banta, Menasha, WI.


