



A taxonomic synopsis of the genus *Zornia* J.F.Gmel. (Leguminosae: Papilionoideae) for the Neotropics

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ABSTRACT

The genus *Zornia* J.F.Gmel. (Leguminosae: Papilionoideae) includes around 80 species and is unique in the Adesmia clade for its pantropical distribution. Despite its ecological significance, taxonomic studies on *Zornia* are scarce. There is no information on the conservation status of its species, although many of which are narrowly endemics. This study updates the taxonomic and distributional knowledge of *Zornia* in the Neotropics and includes an identification key, field photographs, maps and conservation assessments based on IUCN Red List criteria. The research involved reviewing literature and analyzing specimens from 50 herbarium collections, documenting 50 species in the Neotropics. Conservation assessments indicate significant concerns for many *Zornia* species, with only three classified as Least Concern. Additionally, the study provides second-step lectotypifications for two species and re-establishes two other names at species rank. This study contributes to a refined understanding of *Zornia* taxonomy and emphasizes the need for targeted conservation efforts in the Neotropics.

Keywords: Conservation, Dry environments, Fabaceae, Neotropical region, Taxonomy.

Introduction

The genus *Zornia* J.F.Gmel. (1792: 1076) belongs to the Adesmia clade of the tribe Dalbergieae (Klitgaard & Lavin, 2005; Lavin *et al.*, 2001; Vatanparast *et al.*, 2013), together with four more genera: *Adesmia* DC., *Amicia* Kunth, *Nissolia* Jacq. and *Poiretia* Vent. The genus is the second most speciose of the Adesmia clade, with ca. 80 species (Fortuna-Perez *et al.*, 2013, 2021; Mohlenbrock, 1961).

Zornia was established based on the species *Zornia bracteata* (Gmelin, 1791), beginning the taxonomic history of the group (Fig. 1). Later, Desvaux (1813) proposed the related genus *Myriadenus*, based on the solitary-flowered specimens of the group. De Candolle (1825) endorsed Desvaux's proposal and classified the species into the two genera, *Zornia* and *Myriadenus*. However, Vogel (1830) disagreed with Desvaux's taxonomy and grouped species with solitary flowers and those with flowers arranged in inflorescences under one genus *Zornia*. This proposition was

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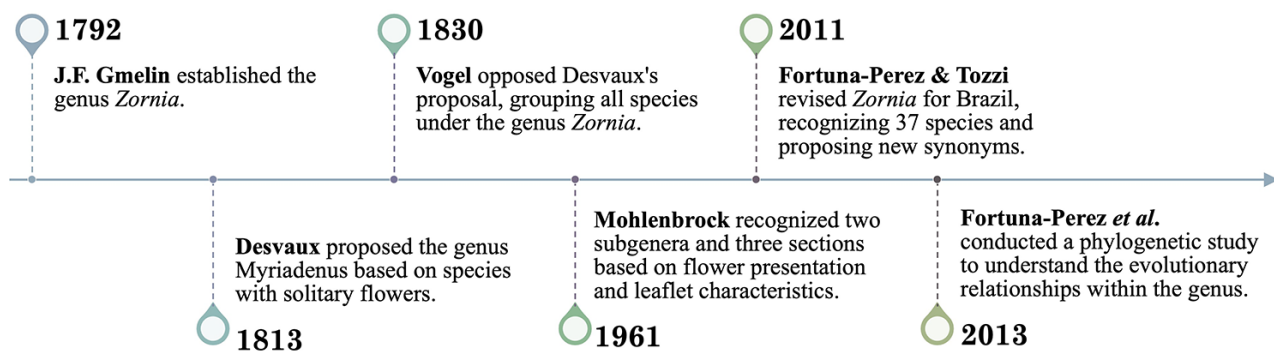


Figure 1. Timeline of the genus *Zornia* taxonomy in previous studies.

subsequently accepted by Moricand (1844) and Bentham (1859; 1860; 1865).

Among the species recognized by Bentham (1859) is *Zornia diphylla* (L.) Pers., for which he listed 14 varieties. This resulted in a species with more variable characteristics and, consequently, a broader geographic distribution. It is largely due to the influence of his work that many *Zornia* specimens with 2 leaflets have been misidentified as *Z. diphylla* in herbaria around the world (Mohlenbrock, 1961).

Zornia was revised by Mohlenbrock (1961), and he recognized two subgenera: *Zornia* subg. *Myriadena* (Desv.) Mohlenbr. (with solitary, pedicellate flowers), and *Zornia* subg. *Zornia* (with subsessile flowers in inflorescences). Mohlenbrock subdivided *Zornia* subg. *Zornia* into three sections: *Zornia* sect. *Zornia*, *Zornia* sect. *Isophylla* Mohlenbr., and *Zornia* sect. *Anisophylla* Mohlenbr. These sections were distinguished by the number of leaflets per leaf and their form (Mohlenbrock, 1961).

During studies of *Zornia* for Brazil, 37 species have been recognized and 18 names proposed as new synonyms (Fortuna-Perez et al., 2013, 2015; Fortuna-Perez & De Azevedo Tozzi, 2011). The phylogenetic study by Fortuna-Perez et al. (2013) which focused on the genus *Zornia*, presented a significant contribution to the knowledge of evolutionary relationships of *Zornia* within the *Adesmia* clade. The phylogeny showed that the subgenera and sections proposed by Mohlenbrock (1961) were not monophyletic and thus they were not maintained.

To date, no studies have specifically focused on the conservation of *Zornia*, notwithstanding many species occurring in the Neotropics being endemic and having a restricted distribution. Furthermore, many specimens of *Zornia* are misidentified in herbarium collections due to insufficient taxonomic knowledge of the genus. This study aims to (1) summarize and update the taxonomic and distribution knowledge of the genus *Zornia* in the Neotropics, (2) provide an identification key for taxa occurring in this region, (3) present photographs of selected

species in the field, and (4) assess the conservation status of these species using criteria and categories from the IUCN Red List.

Materials and Methods

The taxonomic study is based on a review of relevant literature and morphological analysis of specimens, including types, deposited in important collections of the following herbaria (acronyms according to Thiers, 2018 [continuously updated]; accessed August 2023): B, BM, BOTU, BR, CEN, CEPEC, CTES, E, ESA, F, FHO, G, H, HAL, HRCB, HST, HUEFS, HUFMS, HVASE, IAC, IAN, INPA, INTA, IPA, K, LIL, M, MBM, MEXU, MG, MICH, MO, OUPR, OXF, NY, P, PACA, PAMG, PEUFR, RB, S, SP, SPF, UB, UEC, US, VEN, W, Y, Z.

All types were analyzed either personally or as high-resolution digital images (JSTOR; <https://plants.jstor.org/>). The nomenclatural data were extracted from relevant literature on Tropicos (<http://www.tropicos.org/>) and IPNI (<http://www.ipni.org/>). Protologues were obtained from the BHL – Biodiversity Heritage Library (<http://www.biodiversitylibrary.org/>). Collections without location, date and/or collection numbers are indicated as “s.loc.”, “s.d.” and “s.n.”, respectively. An exclamation mark (“!”) indicates that the material has been seen by the authors. The two lectotypes here designated are second-step lectotypifications, following Article 9.17 of The International Code of Nomenclature for algae, fungi, and plants (Turland et al., 2018).

The distribution and conservation data are based on a selection of specimens of the species occurrences in the Neotropics, using the following online repositories: *speciesLink* (<https://specieslink.net/>), GBIF, 2022 (<https://gbif.org/>), REFLORA (<https://floradobrasil.jbrj.gov.br/>) and IBdata (<https://www.ibdata.abaco2.org/web/>). These combined databases resulted in ca. 22,000 occurrence records that were subject to an extensive manual reviewing

process (Zeferino, 2024). The final dataset created here and used to describe and plot the *Zornia* species distribution are available at Scielo Data (<https://data.scielo.org>).

Distribution maps were generated with the QGIS software version 3.34 (QGIS Development Team, 2020), using country layers of the Neotropical region and federative states of Brazil available from IBGE (2020). The diversity map was built using the R package *monographaR* version 1.3.1 (Reginato, 2016).

The conservation status was assessed using criteria and categories of the IUCN Red List 3.1. Specifically for our study, we used criterion B. This criterion is based on the area of occupancy (AOO), a scaled metric that represents the area of suitable habitat currently occupied by the taxon (IUCN, 2012). The possible categories are Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW), Extinct (EX) and Data Deficient (DD). The extent of occurrence (EOO) and area of occupancy (AOO) were estimated using the GeoCAT “Geospatial Conservation Assessment Tool” version BETA (Bachman *et al.*, 2011), available at <http://geocat.kew.org/>. The standard IUCN cell size of 2 km² was employed for the AOO estimations.

Results and Discussion

Taxonomic treatment

Zornia J.F.Gmel., Syst. Nat., ed. 13 [bis] 2(2): 1076, 1096. 1791 [1792], non *Zornia* Moench., *Methodus* 410. 1794, nom. illeg. superfl.

Type: *Zornia bracteata* J.F.Gmel.

Myriadenus Desv., J. Bot. Agric. 1: 121. 1813. **Type:** *Myriadenus tetraphyllus* (L.) Desv.

Shrub 20 cm to 2 m tall. Stems erect, decumbent or prostrate, branched or not, glabrous to pubescent. Leaves with 2–4 leaflets, sessile, subsessile or petiolate, 2–66 × 0.5–20 mm, linear to orbicular, pubescent to glabrous. Stipules linear to ovate, 1–10 veined. Flowers papilionaceous, solitary or inflorescences spiciform, axillary or terminal, to 50 cm long; corolla yellow, usually with details in orange or red; bracteoles 3–20 × 1–10 mm, linear to ovate, 1–11 veined, punctate or not, sericeous to glabrous, red or green. Fruit a loment, with 2–15 articles; articles 1–7 × 1–5 mm, reticulate-veined or not, bristle-like trichomes 0.5–3.5 mm long or absent.

Etymology: Johannes Zorn (1739–1799) was a German pharmacist, botanist, and botanical illustrator. Zorn published six volumes of *Icones plantarum medicinalium*, illustrating and describing over 600 medicinal plants. The genus *Zornia* was named in his honor (Brummitt & Powell, 1992).

Ecology and economic importance: Some Neotropical species of *Zornia* have pharmacological uses, such as *Zornia brasiliensis* Vogel with molluscicidal and anti-tumor activity

(Costa *et al.*, 2015; David *et al.*, 2007), and *Zornia latifolia* Sm. with anticonvulsant activity (Alloisio *et al.*, 2022; Cornara *et al.*, 2018). Despite these promising findings, further research is needed to explore the chemistry of other species within the genus. Additionally, like many other species in the Papilionoideae subfamily, *Zornia* is commonly used as forage for livestock (Polhill, 1994).

Distribution and habitat: Together the 50 Neotropical species of *Zornia* occur across the entire region. Notably, a center of diversity for the genus is in Brazil, with 37 species (Fig. 2). Furthermore, it is evident that *Zornia* exhibits significant levels of endemism, with 22 species exclusively occurring within their respective countries: Brazil (15 spp.), Mexico (4 spp.), Paraguay (1 sp.) and Venezuela (2 spp.).

The species occur within a wide range of biomes and vegetation types across the Neotropics, including Tropical Dry Forests, Savannas, Tropical Moist Forests, Montane Grasslands, and Temperate Grasslands (Dinerstein *et al.*, 2017). But, even within Tropical Moist Forests, the species generally prefer dry habitats, as evidenced by their occurrence in *campinarana* vegetation in the Amazon. This suggests that *Zornia* species are well adapted to dry environments (Fig. 3). As such, the genus could serve as a key model to understand the ecology and evolution of the dry environments existent in the Neotropics as a whole (Dinerstein *et al.*, 2017).

Conservation Status: Nine species were found to be Endangered (18%), 15 are considered Vulnerable (30%), 11 Near Threatened (22%), and only three species were considered of Least Concern. Twelve species (24%) are Data Deficient.

Overall, the data suggests a notable level of concern for a significant number of the *Zornia* species in the Neotropics. The high percentage of Data Deficient species also underscores the importance of ongoing research to fill knowledge gaps and inform effective conservation strategies. All this, combined with the fact that Neotropical Dry Forests and associated areas are under serious threat (DRYFLOR *et al.*, 2016), highlights the urgency of carrying out studies like this one, which focus on the taxonomy and ecological aspects of groups intrinsically associated with these environments.

Notes: The species treated in this study can be distinguished by a combination of floral characteristics (such as solitary flowers *vs.* spiciform inflorescences) and leaflet morphology (tetrafoliolate *vs.* bifoliolate). When the flowers are arranged in inflorescences, they vary by being axillary or terminal. The bracteoles are also key morphological characters, varying in shape, indumentum, and whether they are punctate or not. For example, *Zornia fimbriata* Mohlenbr. is the only species in this study with non-punctate bracteoles, while *Zornia flemmingioides* Moric. is the only one with red-colored bracteoles (Fig. 7C). Additionally, fruit morphology is an important feature for species differentiation (Fig. 4; Fortuna-Perez *et al.*, 2015), with loment articles either



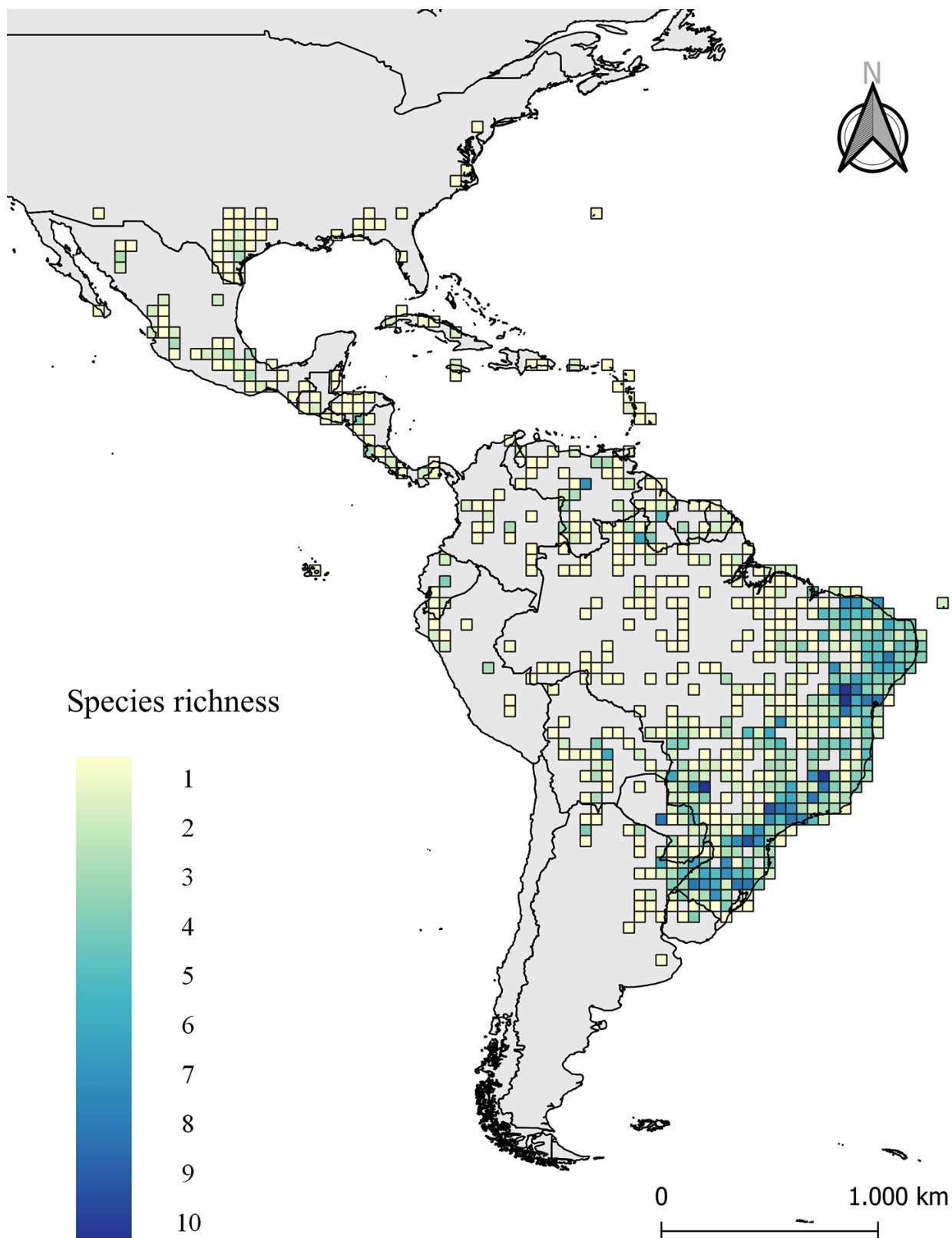


Figure 2. *Zornia* richness in the Neotropics, all 50 species represented (map prepared using the *monographaR* package).



Figure 3. Main preferred vegetation types of *Zornia* species. **A.** *Campo rupestre* vegetation, sandy soil, Savanna **B.** Cerrado vegetation, Savanna **C.** Roadsides **D.** Caatinga vegetation, Tropical Dry Forest **E.** *Campo rupestre* vegetation, Savanna **F.** Cerrado vegetation, Savanna **G.** Cattle pastures **H.** Caatinga vegetation, Tropical Dry Forest. (Photos A, B, C, E, F, G: L.C. Zeferino; D, H: F.F. Pezzini).

having bristle-like trichomes or being smooth, and the surface either showing or lacking a reticulate-veined pattern.

In this study, *Zornia echinata* Mohlenbr. and *Z. crinita* (Mohlenbr.) Vanni were re-established. Also, second-step lectotypifications were made for *Zornia lasiocarpa* Ant. Molina and *Z. thymifolia* Kunth. Together with these

nomenclature changes, our taxonomic study is the most comprehensive on *Zornia* for the Neotropical region to date.

To aid in more accurate identification, we provide here two identification keys that differentiate species based on the number of leaflets (bifoliolate vs. tetrafoliolate leaves).



Identification key to the tetrafoliolate species of *Zornia* in the Neotropics

1. Flowers solitary	2
1'. Flowers in spiciform inflorescences	3
2. Loment with 15 articles, bristle-like trichomes absent	<i>Z. myriadena</i>
2'. Loment with up to 10 articles, bristle-like trichomes present	<i>Z. echinocarpa</i>
3. Loment with bristle-like trichomes absent	4
3'. Loment with bristle-like trichomes present	8
4. Bracteoles red-colored	<i>Z. flemmingioides</i>
4'. Bracteoles green-colored	5
5. Bracteoles obovate	<i>Z. mitziana</i>
5'. Bracteoles oblong	6
6. Leaflets linear	<i>Z. harmsiana</i>
6'. Leaflets ovate to obovate	7
7. Stems with a villous indumentum; inflorescence approx. 7 cm long; bracteoles with a villous indumentum	<i>Z. ulei</i>
7'. Stems with a hirsute indumentum; inflorescence approx. 20 cm long; bracteoles with a pilose indumentum	<i>Z. glaziovii</i>
8. Occurring in Temperate Grasslands of North America	<i>Z. bracteata</i>
8'. Occurring in Tropical Dry Forests and Savannas of South America	9
9. Leaves sessile or subsessile	<i>Z. subsessilis</i>
9'. Leaves petiolate	10
10. Stems prostrate to decumbent	11
10'. Stems erect	12
11. Stipules lanceolate; bracteoles elliptic, strigose	<i>Z. brasiliensis</i>
11'. Stipules ovate; bracteoles ovate, glabrous	<i>Z. cearensis</i>
12. Loment with 2–3 articles, bristle-like trichomes 3.5 mm long.	<i>Z. virgata</i>
12'. Loment with 3–6 articles, bristle-like trichomes up to 1.5 mm long	13
13. Bracteoles ovate, 7–13 veined	<i>Z. gardneriana</i>
13'. Bracteoles elliptic, 4–7 veined	14
14. Inflorescence up to 15 cm long; loment not reticulate-veined	<i>Z. guanipensis</i>
14'. Inflorescence up to 25 cm long; loment reticulate-veined	<i>Z. tenuifolia</i>

Identification key to the bifoliolate species of *Zornia* in the Neotropics

1. Loment with bristle-like trichomes absent	2
1'. Loment with bristle-like trichomes present	7
2. Stems not branched	<i>Z. melanocarpa</i>
2'. Stems branched	3
3. Bracteoles ovate; occurring in North America	4
3'. Bracteoles elliptic; occurring in South America	5



4. Stipules elliptic, 3–5 veined	<i>Z. laevis</i>
4'. Stipules linear, 1 veined	<i>Z. sinaloensis</i>
5. Inflorescence spiciform terminal, 30 cm long	<i>Z. pardina</i>
5'. Inflorescence spiciform axillary, 20 cm long	6
6. Leaflets ovate to elliptic, strigose	<i>Z. hebecarpa</i>
6'. Leaflets ovate to lanceolate, tomentose	<i>Z. ramboana</i>
7. Inflorescence spiciform, terminal	8
7'. Inflorescence spiciform, axillary	11
8. Loment reticulate-veined	<i>Z. burkartii</i>
8'. Loment not reticulate-veined	9
9. Loment articles with bristle-like trichomes 1.5 mm long	<i>Z. sericea</i>
9. Loment articles with bristle-like trichomes 2 mm long	10
10. Stems decumbent and glabrous	<i>Z. echinata</i>
10'. Stems erect and velutinous	<i>Z. cryptantha</i>
11. Stems not branched	<i>Z. decussata</i>
11'. Stems branched	12
12. Stems decumbent or prostrate	13
12'. Stems erect	21
13. Loment not reticulate-veined	14
13'. Loment reticulate-veined	17
14. Loment articles with bristle-like trichomes up to 0.5 mm long	<i>Z. herbacea</i>
14'. Loment articles with bristle-like trichomes 1 mm long	15
15. Leaflets orbiculate	<i>Z. orbiculata</i>
15'. Leaflets ovate to lanceolate	16
16. Stipules elliptic to lanceolate, 7–9 veined; bracteoles elliptic, sericeous	<i>Z. crinita</i>
16'. Stipules obovate to lanceolate, 5–7 veined; bracteoles ovate, glabrous	<i>Z. multinervosa</i>
17. Inflorescence spiciform, 30 cm long	<i>Z. curvata</i>
17'. Inflorescence spiciform, up to 15 cm long	18
18. Bracteoles elliptic to lanceolate	<i>Z. microphylla</i>
18'. Bracteoles ovate	19
19. Bracteoles with a glabrous indumentum	<i>Z. thymifolia</i>
19'. Bracteoles with a sericeous indumentum	20
20. Loment with 6–8 articles; articles 2 × 2 mm; occurring in Montane Grassland and Savanna of South and Central America	<i>Z. contorta</i>
20'. Loment with 3–4 articles; articles 3–3.2 × 3–3.4 mm; occurring in Tropical Dry Forest of North America	<i>Z. megistocarpa</i>
21. Loment not reticulate-veined	22
21'. Loment reticulate-veined	23



22. Leaflets filiform; bracteoles linear-lanceolate, 3–4 veined, glabrous	<i>Z. filifoliola</i>
22'. Leaflets ovate to elliptic; bracteoles elliptic, 5–7 veined, strigose	<i>Z. confusa</i>
23. Loment with bristle-like trichomes 3.5 mm long	<i>Z. trachycarpa</i>
23'. Loment with bristle-like trichomes up to 2 mm long	24
24. Stems glabrous	25
24'. Stems pubescent to villous	32
25. Inflorescence spiciform, up to 15 cm long	26
25'. Inflorescence spiciform, 30–40 cm long	29
26. Bracteoles linear	27
26'. Bracteoles ovate	28
27. Stipules elliptic; loment with 2–3 articles	<i>Z. lasiocarpa</i>
27'. Stipules linear to lanceolate; loment with 3–7 articles	<i>Z. leptophylla</i>
28. Inflorescence spiciform 10 cm long; occurring in Mexico	<i>Z. venosa</i>
28'. Inflorescence spiciform 15 cm long; occurring in Peru and Ecuador	<i>Z. piurensis</i>
29. Stipules lanceolate	30
29'. Stipules elliptic	31
30. Bracteoles 11–14 × 5–6 mm, ovate–lanceolate, 5–7 veined; loment with articles 1.5–2 × 1.5–2 mm	<i>Z. glabra</i>
30'. Bracteoles 5–12 × 2–4 mm, linear, 3–6 veined; loment with articles 2–3 × 2–2.5 mm	<i>Z. latifolia</i>
31. Bracteoles 6–9 × 2–3 mm	<i>Z. vichadana</i>
31'. Bracteoles 10–15 × 5–7 mm	<i>Z. reticulata</i>
32. Bracteoles not punctate	<i>Z. fimbriata</i>
32'. Bracteoles punctate	33
33. Bracteoles lanceolate and villous	<i>Z. villosa</i>
33'. Bracteoles ovate and glabrous	34
34. Inflorescence spiciform 3 cm long; loment with 5–6 articles; articles 2 × 1.5–2 mm	<i>Z. grandiflora</i>
34'. Inflorescence spiciform 10 cm long; loment with 4–5 articles; articles 2–3.5 × 2.5–3 mm	<i>Z. afranioi</i>

***Zornia afranioi* Vanni, Bol. Soc. Argent. Bot. 29 (3–4): 207–209. 1993.**

Fig. S1

Type: BRAZIL. Ceará: Parambú. BR 020, próximo à divisa com o Piauí, 18 April 1980, A. Fernandes & E. Nunes 8407 (holotype EAC-0008407!; isotype CTES-0000686!).

Shrub to ca. 60 cm tall. Stems erect, branched, pubescent. Leaves with 2 leaflets, petiolate. Leaflets 7–30 mm × 3–11 mm, ovate to lanceolate, pubescent. Stipules lanceolate, 6–7 veined. Inflorescences spiciform, axillary, 10 cm long. Bracteoles 8–10 × 4–7 mm, ovate, 5–7 veined, punctate, glabrous, green. Loment with 4–5 articles; articles 2–3.5 × 2.5–3 mm, reticulate-veined, bristle-like trichomes 1.5 mm long.

Distribution and habitat: Brazil, endemic. It occurs in sandy soils within Caatinga vegetation of Tropical Dry Forests.

Conservation Status: Endangered (EN). *Zornia afranioi* is known only from northeastern Brazil and is restricted to a relatively small area of approximately 64 km², resulting in an extremely limited AOO (EOO=182,338.732 km²; AOO=64 km²).

Notes: *Zornia afranioi* differs from the other species in the genus by a combination of its erect stems and its bracteoles ovate and pubescent.

Representative specimens examined: BRAZIL. Bahia: BR 235 em direção a Bem-Bom, Remanso, 10 April 2002, R.S. Rodrigues 1512 (UEC); **Ceará:** Rodovia Crato, Araripina,



Figure 4. Neotropical *Zornia* fruit morphology showing variation in the loment. It shows the article indumentum and presence or absence of bristle-like trichomes. **A.** *Z. subsessilis* **B.** *Z. sericea* **C.** *Z. myriadena* **D.** *Z. ulei* **E.** *Z. bracteata*. (Photos A: T.C. Monteiro; B: T.M. de Lima C, D: R.T. Queiroz; E: N. Frade).



km 22. Aeroporto desativado de Crato. Chapada do Araripe, Crato, 24 July 1987, *L. Coradin et al.* 7771 (BOTU); **Pernambuco:** Rodovia Petrolina, Santa Maria da Boa Vista, km 87, Petrolina, 5 April 1979, *L. Coradin et al.* 1292 (BOTU); **Piauí:** São Miguel do Tapuio, 18 May 1988, *L.B. Bianchetti et al.* 679 (CEN).

***Zornia bracteata* J.F.Gmel., Syst. Nat. [ed. 13] 2 (2): 1096. 1791 [1792].**

Figs 4E, 5, S1

Type: UNITED STATES. Georgia: McDuffie County, 3 miles west of Marion, 7 July 1927, *K. M. Wiegand & W. E. Manning* 1624 [Neotype GH-00277013! designated by R.H. Mohlenbrock (1961)]

Shrub to ca. 80 cm tall. Stems erect, branched, glabrous. Leaves with 4 leaflets, petiolate. Leaflets 12.8–25 × 3.6–8 mm, ovate to lanceolate, glabrous. Stipules lanceolate, 5–7 veined. Inflorescences spiciform, axillary, 10 cm long. Bracteoles 10 × 7 mm, lanceolate to ovate, 5–7 veined, punctate, glabrous, green. Loment with 2–6 articles; articles 2.5–3.5 × 2.4–3.5 mm, not reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Mexico, United States. It occurs mainly in sandy soils of Temperate Grasslands.

Conservation Status: Vulnerable (VU). *Zornia bracteata* is relatively widespread, occurring from northern Mexico to the southeastern United States. Its extent of occurrence (EOO) is estimated to be 3,041,883.396 km², while its area of occupancy (AOO) is only 268 km². This suggests that the species has fragmented populations.

Notes: *Zornia bracteata* is distinguished by the 4 leaflets that are ovate to lanceolate and glabrous, and by its relatively large articles of the loment (up to 2.5–3.5 × 2.4–3.5 mm).

Representative specimens examined: **MEXICO.** s.loc., s.d., *Berlandier* 2034 (P). **UNITED STATES. Alabama:** Ozark, s.d., *Biltmore* 4512f (NY); **Florida:** Hawthorn, s.d., *Barnhart* 2047 (NY); **Georgia:** West of Swainsboro, s.d., *Duncan* 9919A (GH); **Mississippi:** Bay St. Louis, s.d., *Langlois* 35 (NY); **North Carolina:** 6 miles South of Hallsboro, s.d., *Wilbur* 4189 (GH); **South Carolina:** 3 miles West of Marion, s.d., *Wiegand & Manning* 1624 (GH); **Texas:** Bastrop, s.d., *Duval* 37 (US); **Virginia:** Richmond, s.d., *Fernald & Long* 12381 (GH).

***Zornia brasiliensis* Vogel, Linnaea 12: 62. 1838.**

Figs 5, S2

Type: BRAZIL. Espírito Santo: Colatina, 28 January 1997, *M.M. Arbo. et al.* 7767 1624 [Neotype NY-00277013! designated by Fortuna-Perez and De Azevedo (2011)].

Zornia brasiliensis var. *adenocarpa* L.P. Queiroz, Bol. Bot. Univ. São Paulo 16: 107–109. 1997. **Type: BRAZIL. Minas Gerais:** Grão-Mogol, 10 December 1989, *P.T. Sano et al.* 12384 (holotype SPF-68011!; isotypes K-000118495!, NY-01132068!)

Shrub to ca. 60 cm tall. Stems decumbent, branched, tomentose to glabrous. Leaves with 4 leaflets, petiolate. Leaflets 7–25 × 5–10 mm, elliptic to obovate, tomentose to glabrous. Stipules lanceolate, 5–6 veined. Inflorescences spiciform, axillary, 25 cm long. Bracteoles 6–9 × 3–4 mm, elliptic, 5–7 veined, punctate, strigose, green. Fruit loment with 4–5 articles; articles 2–3 × 1.5–2 mm, not reticulate-veined, bristle-like trichomes 0.5 mm long.

Distribution and habitat: Brazil, Venezuela. It occurs in Tropical Dry Forests and Savanna. In Brazil, it occurs in the Cerrado, Caatinga and *Campo rupestre* vegetation.

Conservation Status: Vulnerable (VU). *Zornia brasiliensis* has a disjunct distribution and while it is abundant in Northeast Brazil, only one record was found in Venezuela (EOO=3,176,454.400 km²; AOO=940.000 km²).

Notes: *Zornia brasiliensis* morphologically resembles *Zornia cearensis*, but it differs by its elliptic bracteoles (vs. bracteoles ovate in *Z. cearensis*).

Representative specimens examined: BRAZIL. Alagoas: s.loc., 1838, *Gardner* 1273 (K, P); **Bahia:** Crisópolis, 27 August 2007, *A.P. Fortuna-Perez et al.* 303 (UEC); **Ceará:** Humaitá, 2 July 1908, *A. Ducke* 1017^a (P); **Espírito Santo:** Colatina, 28 January 1997, *M.M. Arbo et al.* 7767 (NY); **Goiás:** Teresina de Goiás, 10 February 1994, *G. Hatschbach et al.* 60311 (MBM); **Maranhão:** Rodovia Timon, Caxias BR316, km 33, Timon, 2 July 1987, *L. Coradin et al.* 7929 (BOTU); **Minas Gerais:** Grão-Mogol, 16 February 1969, *H.S. Irwin et al.* 23339 (W); **Paraíba:** São Gonçalo, 21 March 1936, *von Luetzelburg* 26978 (M); **Pernambuco:** Caités, 20 May 1971, *K. Kubitzki* 71–81 (M); **Piauí:** Estrada Buriti dos Montes, a 10,2km de Buriti dos Montes, São Miguel do Tapuio, 18 May 1988, *L.B. Bianchetti et al.* 680 (BOTU); **Rio Grande do Norte:** Currões Novos, s.d., *Luetzelburg* 12434 (M). **VENEZUELA.** Esdo. Bolívar, 27 June 1981, *E. Rutkis* 355 (NY).

***Zornia burkartii* Vanni, Bonplandia 5(20): 175. 1981.**

Figs 6, S2

Type: ARGENTINA. Corrientes: Ituzaingó, Playadito, 24 September 1974, *A. Krapovickas et al.* 26354 (holotype CTES-0000688!).

Shrub to ca. 70 cm tall. Stems erect, not branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 4–44 × 1–5 mm, linear to orbicular, glabrous. Stipules linear to lanceolate, 5–6 veined. Inflorescences spiciform, terminal, 10 cm long. Bracteoles 10–15 × 5–8 mm, elliptic, 5–8 veined, punctate, glabrous, green. Loment with 4–7 articles; articles 2–3 × 1.5–2 mm, reticulate-veined, bristle-like trichomes 1.5 mm long.

Distribution and habitat: Argentina, Bolivia, Brazil, Paraguay. It occurs in Savanna.

Conservation Status: Vulnerable (VU). *Zornia burkartii* occurs in a small AOO as compared to the EOO, which increases its vulnerability (EOO=1,561,277.527 km²; AOO=236.000 km²).

Notes: *Zornia burkartii* morphologically resembles *Zornia reticulata*; the distinguishing features between the two species include the position of the spiciform inflorescences (terminal in *Z. burkartii* vs. axillary in *Z. reticulata*) and the stem characteristics (erect, not branched in *Z. burkartii* vs. erect to prostrate, branched in *Z. reticulata*).

Representative specimens examined: ARGENTINA.

Corrientes: Dep. Santo Tomé, 12 December 1984, S.G. Tressens et al. 2831 (CTES); **Misiones:** Dep. Apostoles, 22 January 1983, E.R. Guaglianone et al. s.n. (CTES). **BRAZIL.** **Mato Grosso do Sul:** Amambai, 14 October 1984, G. Hatschbach & R. Kummrow 48408 (Z); **Minas Gerais:** s.loc., 1816, A. Saint-Hilaire 97 (P); **Paraná:** Porto Amazonas, 17 December 1929, Gurgel 24 (RB); **Rio Grande do Sul:** São Jerônimo, 4 October 1978, J. Mattos et al. 20184 (RB); **Santa Catarina:** Abelardo Luz, 15 November 1964, L.B. Smith & R.M. Klein 13334 (PAMG); **São Paulo:** São José dos Campos, 24 November 1961, I. Mimura 106 (K). **PARAGUAY.** s.loc., 14 September 1874, B. Balansa 1849 (P).

***Zornia cearensis* Huber, Bull. Herb. Boiss. Ser. II. 1(3): 307. 1901.**

Figs 6, S4

Type: BRAZIL. Ceará: Fortaleza, 09 September 1897, Huber 21 (holotype G-00370077!; isotype BM-000931681!). Shrub to ca. 50 cm tall. Stems prostrate, branched, tomentose to glabrous. Leaves with 4 leaflets, petiolate. Leaflets 4–30 × 5–10 mm, oblong to lanceolate, glabrous. Stipules ovate, 4–6 veined. Inflorescences spiciform, axillary, 2.2 cm long. Bracteoles 4–6 × 4–4.5 mm, ovate, 5–7 veined, punctate, glabrous, green. Loment with 4–5 articles; articles 2 × 2 mm, not reticulate-veined, bristle-like trichomes 2 mm long.

Distribution and habitat: Brazil, endemic. It occurs preferentially in sandy soil in the Caatinga and Cerrado vegetation, within the Tropical Dry Forest and Savanna biomes.

Conservation Status: Near Threatened (NT). *Zornia cearensis* has an extent of occurrence (EOO) of 2,245,044.283 km², which places it outside the threshold for the threatened category. However, its area of occupancy (AOO) is only 152.000 km² and it is considered vulnerable in its restricted area of occupancy in the Caatinga and Cerrado vegetation, fragile environments in Brazil known to suffer from anthropization.

Notes: *Zornia cearensis* and *Z. gardneriana* are morphologically similar, but *Z. cearensis* has oblong to lanceolate leaflets (vs. elliptic leaflets in *Z. gardneriana*). Also, *Z. cearensis* has bracteoles with up to 6 veins (vs. up to 13 veins in *Z. gardneriana*).

Representative specimens examined: BRAZIL. Bahia: Urandi, 4 April 1992, G. Hatschbach et al. 56530 (NY); Ceará: Fortaleza, 29 June 1977, L. Coradin et al. 7848 (UEC); Goiás: Caiaponia, 20 April 1978, G.J. Shepherd et al. 7485 (UEC); Maranhão: Poconé, 104 km E de Cáceres, 17 May

1985, A. Krapovickas et al. 40105 (K); **Mato Grosso do Sul:** Aquidauana, saída norte de Aquidauana, junto a um posto de saúde no final do asfalto, 30 October 1986, J.F.M. Valls et al. 10408 (BOTU); **Minas Gerais:** Entroncamento dos Pastos, 30 March 1985, M. Brandão 11190 (PAMG); **Piauí:** Campo Maior, 12 June 1995, M.S. Bona Nascimento & M.E. Alencar 1039 (K); **São Paulo:** São José do Rio Preto, 15 April 1964, Y. Tsuda & Hiroko 11 (RB).

***Zornia confusa* Vanni, Brittonia 48 (4): 495–497. 1996, publ. 1997.**

Fig. S2

Type: BRAZIL. Minas Gerais: Serra do Espinhaço, rocky slope ca. 30 km SW of Diamantina, on road to Gouveia, 13 January 1969, Irwin et al. 21854 (holotype NY-01522943!; isotypes F-1736552!, UB-12616!).

Shrub to ca. 70 cm tall. Stems erect, branched, pubescent to villous. Leaves with 2 leaflets, petiolate. Leaflets 6–22.5 × 2–7 mm, ovate to elliptic, sericeous to glabrous. Stipules elliptic, 4–6 veined. Inflorescences spiciform, axillary, 40 cm long. Bracteoles 8–10 × 5–6 mm, elliptic, 5–7 veined, punctate, strigose, green. Loment with 3–5 articles; articles 2 × 2 mm, not reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Brazil, Colombia, Guatemala, Honduras, Mexico, Nicaragua, Panama, Venezuela. It occurs at high elevation (approx. 1300 m) in Savanna.

Conservation Status: Vulnerable (VU). *Zornia confusa* has a disjunct distribution and, despite being widely distributed, it has an area of occupancy of only 124.000 km² (EOO=5.622.501.922 km²; AOO=124.000 km²).

Notes: *Zornia confusa* morphologically resembles *Z. reticulata*. However, *Z. confusa* differs by its pubescent indumentum on the stems (vs. glabrous in *Z. reticulata*) and by its loment which is not reticulate-veined (vs. reticulate in *Z. reticulata*).

Representative specimens examined: BRAZIL. Bahia: Urandi, 4 April 1992, G. Hatschbach et al. 56533 (K); **Minas Gerais:** Diamantina, 27 October 2006, A.P. Fortuna-Perez et al. 120 (UEC). **COLOMBIA. Cordillera Oriental:** Uribe, 20 December 1942, F.R. Fosberg 19453 (NY). **MEXICO. Chiltepec:** Tuxtepec, Oaxaca, 23 January 1966, G. Martinez 636 (CTES). **VENEZUELA. Táchira:** Represa Dorada, 10 March 1981, R. Liesner & A. González 10417 (P).

***Zornia contorta* Mohlenbr., Webbia 16 (1): 117. 1961.**

Fig. S2

Type: ARGENTINA. Salta: Dpto. Orán, San Andrés, 18 April 1945, Pierotti 1238 (holotype LIL-000654!)

Shrub to ca. 80 cm tall. Stems decumbent, branched, glabrous to sericeous. Leaves with 2 leaflets, petiolate. Leaflets 5–22 × 3–11 mm, ovate to lanceolate, sericeous to glabrous. Stipules ovate to elliptic, 5–6 veined. Inflorescences spiciform, axillary, 15 cm long. Bracteoles 6–8 × 4–6 mm,



ovate, 5–7 veined, punctate, sericeous, green. Loment with 6–8 articles; articles 2×2 mm, reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Argentina, Bolivia, Brazil, Guatemala. It occurs at high elevation (approx. 1800 meters) of Montane Grassland and Savanna.

Conservation Status: Near Threatened (NT). The distribution of *Zornia contorta* is fragmented, covering AOO of only 136 km², while its EOO is 2,835,852.658 km².

Notes: *Zornia contorta* may be mistaken for *Zornia curvata*, but it differs mainly by the bracteoles that are ovate and sericeous in *Z. contorta* vs. elliptic and glabrous in *Z. curvata*.

Representative specimens examined: ARGENTINA.

Catamarca: Dep. Ambato, 28 March 1995, C. Saraiva Toledo et al. 12961 (K). **BOLIVIA. Chuquisaca:** ca. 8 km from Sucre on road to Cochabamba on a hill beyond cement factory, 26 March 1995, J.R.I. Wood 9591 (K). **BRAZIL. Rio Grande do Sul:** Caçapava do Sul, 13 December 1997, R. Wasum et al. 12237 (NY). **GUATEMALA. Quetzaltenango:** s.loc., 23 April 1989, H. Förther 2408 (M).

***Zornia crinita* (Mohlenbr.) Vanni, Darwiniana 33 (1–4): 1–20. 1995.** *Zornia diphylla* var. *gracilis* f. *sericea* Chodat & Hassl., Bull. Herb. Boissier II, 4: 888. 1904. *Zornia pardina* var. *crinita* Mohlenbr., Webbia 16 (1): 86–87. 1961. Fig. S1

Type: PARAGUAY. Arroyo Primero: Apa, 1901–1902, Hassler 8435 (holotype G–00400380!; isotype BM–000081079!).

Shrub to ca. 50 cm tall. Stems decumbent, branched, villous. Leaves with 2 leaflets, petiolate. Leaflets $3\text{--}40 \times 3.5\text{--}9$ mm, ovate to lanceolate, sericeous. Stipules elliptic to lanceolate, 7–9 veined. Inflorescences spiciform, axillary, 20 cm long. Bracteoles $8\text{--}14 \times 3\text{--}6$ mm, elliptic, 5–9 veined, punctate, sericeous, green. Loment with 4–7 articles; articles 2×2 mm, not reticulate-veined; bristle-like trichomes 1 mm long.

Distribution and habitat: Argentina, Bolivia, Brazil, French Guiana, Paraguay, Suriname, Venezuela. It occurs in high elevation areas (approx. 1050 m), in the Montane Grassland and Savanna.

Conservation Status: Vulnerable (VU). *Zornia crinita* has a disjunct distribution. Its area of occupancy is limited to only 240,000 km², while its extent of occurrence stretches across a vast 6,874,510.630 km².

Notes: *Zornia crinita* was synonymized under *Z. pardina* var. *crinita* (Govaerts et al., 2021). *Zornia crinita* shares morphological similarities with *Z. pardina*, but *Z. crinita* is a species characterized by densely villous stems and branches vs. glabrous branches in *Z. pardina*. Also, the loment has bristle-like trichomes 1 mm long in *Z. crinita* (vs. bristle-like trichomes absent in *Z. pardina*). Furthermore, previous taxonomic and phylogenetic studies confirm that both species are well delimited (Fortuna-Perez et al., 2013, 2015,

2021). In this study, we accept *Z. crinita* as a distinct species, rather than as a variety of *Z. pardina*.

Representative specimens examined: ARGENTINA.

Corrientes: Dep. Mburucuyá, s.d., T.M. Pedersen 4491 (P). **BOLIVIA. Sara:** Santa Cruz, 22 February 1921, J. Steinbach 5357 (F). **BRAZIL. Acre:** Rio Branco, 26 August 1943, A. Ducke 1602 (US); **Mato Grosso:** Barra do Garças, 13 January 1968, D. Philcox & J. Bertoldo 4007 (P); **Mato Grosso do Sul:** Amambai, 1979, W.G. Garcia 13686 (UEC); **Minas Gerais:** Serra da Anta, ca. 5 km NW of Paracatú, 04 February 1970, H.S. Irwin 25952 (NY); **Roraima:** Rodovia Boa Vista, Alto Alegre, km 19, Boa Vista, 24 November 1981, L. Coradin 4924 (BOTU). **BOLIVIA. Santa Cruz:** Chiquitos, 22 February 2006, J.R.I. Wood 22255 (K). **FRENCH GUIANA. Waramadong:** s.loc., 7 October 1938, A.S. Pinkus 20 (M). **PARAGUAY. Caaguazú:** 1905, E. Hassler 9122 (P); **VENEZUELA:** s.loc., 7 April 1921, M. Grisol (P).

***Zornia cryptantha* Arechav., Anales Mus. Nac. Montevideo 3: 358. 1901.**

Figs 7, S4

Type: URUGUAY. Tacuarembó: s.loc, s.d., P. Pintos s.n. (holotype MVM–5362!)

Zornia cryptantha Arechav. var. *latibracteata* Vanni, Bonplandia (Corrientes) 5: 180–181. 1981. **Type: ARGENTINA. Corrientes:** Dep. Lavalle, 3 km de Yataity Calle, Rt. 120, 25 November 1979, A. Schinini, R. Vanni & G. Normann 19140 (holotype CTES–0000817!).

Shrub to ca. 40 cm tall. Stems erect, branched., velutinous. Leaves with 2 leaflets, petiolate. Leaflets $10\text{--}42 \times 6\text{--}12$ mm, elliptic to lanceolate, velutinous. Stipules elliptic to lanceolate, 6–10 veined. Inflorescences spiciform, terminal, 50 cm long. Bracteoles $15\text{--}20 \times 7\text{--}10$ mm, ovate, 6–7 veined, punctate, velutinous, green. Loment with 5–8 articles; articles $2\text{--}3 \times 2\text{--}2.5$ mm, not reticulate-veined, bristle-like trichomes 2 mm long.

Distribution and habitat: Argentina, Bolivia, Brazil, Colombia, Paraguay, Suriname, Uruguay, Venezuela. It occurs mainly at high elevations (approx. 1000 m) in the Savanna.

Conservation Status: Vulnerable (VU). *Zornia cryptantha* presents a discontinuous geographical distribution. The species has an estimated area of occupancy of only 444,000 km² (EOO=8,000,766.794 km²; AOO=444.000 km²).

Notes: *Zornia cryptantha* morphologically resembles *Z. villosa*. However, the bracteoles of *Z. cryptantha* are oval (vs. elliptic to lanceolate in *Z. villosa*), and the trichomes on the articles are 2 mm long in *Z. cryptantha* (vs. 0.5 mm in *Z. villosa*).

Representative specimens examined: ARGENTINA.

Corrientes: Dep. Ituzaingó, 28 January 1987, A. Schinini et al. 25303 (K). **BOLIVIA. Yungas:** s.loc., 1890, A.M. Bang 416 (K). **BRAZIL. Distrito Federal:** Brasília, 13 December 1965, H.S. Irwin et al. 11250 (NY); **Goiás:** Pirenópolis,



Figure 5. *Zornia brasiliensis* **A.** Inflorescence spiciform **B.** Shrub habit **C.** Flower detail; *Zornia bracteata* **D.** Detail of ovate bracteole, loment with 2–6 articles, and presence of bristle-like trichomes **E.** Leaves with 4 leaflets **F.** Flower. (Photos A, B, C: R.T. Queiroz; D, E, F: N. Frade).



Serra dos Pirineus, 14 January 1972, H.S. Irwin et al. 34067 (NY); **Mato Grosso**: Fazenda Congonha, 22 October 1988, J.M. Pires & P.P. Furtado 17237 (NY); **Mato Grosso do Sul**: Amambai, 24 April 1984, J.F.M. Valls et al. 7703 (RB); **Minas Gerais**: São Sebastião do Paraíso, 20 November 2008, A.P. Fortuna-Perez et al. 457 (UEC); **Rio Grande do Sul**: Júlio de Castilhos, 5 December 1993, J.R. Stehmann 1200 et al. (UEC); **São Paulo**: Floresta Estadual de Botucatu (FEB), Estrada Municipal Represa do Rio Pardo, Botucatu, November 2021, C.S. Ballarin 55 (BOTU); **Santa Catarina**: Lages, 16 January 1988, A. Krapovickas & C.L. Cristóbal 42026 (G). **COLOMBIA**. **San José del Guaviare**: s.loc., 10 November 1939, J. Cuatrecasas 7634 (US). **PARAGUAY**. **Caaguazú**: s.loc., 20 December 1876, B. Balansa 1524^a (P). **VENEZUELA**. Rio Orinoco, 27 September 1886, M. Chaffanjon 61^a (P).

Zornia curvata Mohlenbr., *Webbia* 16(1): 132, figs. 62, 91. 1961.

Fig. S5

Type: VENEZUELA. **Cotiza**: near Caracas, 8 July 1917, H. F. Pittier 7241 (holotype US-00001997!).

Zornia gavilanesii Brandão & Sousa Costa, *Daphne* 1(1): 5. 1990. **Type: BRAZIL**. **Minas Gerais**: Pouso Alegre, 5 November 1984, M. Brandão 10923 (holotype RB-312785!; isotype PAMG-55121!).

Zornia amaralaensis Brandão, *Daphne* 4(3): 5. 1994. **Type: BRAZIL**. **Minas Gerais**: Carneirinhos, 7 May 1975, M. Brandão 906 (holotype PAMG-10275!).

Shrub to ca. 60 cm tall. Stems prostrate, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 7–35 × 7–15 mm, ovate to lanceolate, glabrous. Stipules ovate to lanceolate, 5–7 veined. Inflorescences spiciform, axillary, 30 cm long. Bracteoles 6–9 × 2–5 mm, elliptic, 5–7 veined, punctate, glabrous, green. Loment with 4–8 articles; articles 1.5–2 × 2 mm, reticulate-veined, bristle-like trichomes 1 mm long. **Distribution and habitat**: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Guyana, Martinique, Mexico, Nicaragua, Panama, Paraguay, Porto Rico, Peru, Suriname, Uruguay, United States, Venezuela. *Zornia curvata* is typically found thriving in grassy fields and rocky or stony soils. This species can be found within Tropical Dry Forest, Savannas, and Tropical Moist Forest.

Conservation Status: Least Concern (LC). The species has a large geographical range (22,087,307.508 km²) and has a considerable AOO of 816.000 km².

Notes: *Zornia curvata* is readily identified by its ovate to obovate leaflets and elliptic bracteoles. The fruits are reticulate-veined, with articles up to 2 mm long and bristle-like trichomes 1 mm long.

Representative specimens examined: ARGENTINA. **Corrientes**: Estância Santa Teresa, Beron de Estrada, 7 December 1945, T. Subarrola 3840 (NY). **BOLIVIA**. s.loc.,

5 February 1928, C. Troll 1159 (M). **BRAZIL**. **Bahia**: Icatu, 12 March 2007, A.P. Fortuna-Perez et al. 138 (UEC); **Distrito Federal**: Sobradinho, 8 November 1965, H.S. Irwin et al. 10080 (NY); Espírito Santo: Vila Velha, 29 August 1987, L. Coradin 8346 (UEC); **Goiás**: Alto Paraíso de Goiás, 10 October 1979, E.P. Heringer et al. 2359 (K); **Minas Gerais**: Joaquim Felício, 2 November 2022, L.C. Zeferino et al. 100 (BOTU); **Mato Grosso do Sul**: Dourados, 12 November 1982, G. Hatschbach 45937 (K); **Pará**: Ilha do Mosqueiro, 5 August 1974, A. Lasseigne 4375 (US); **Paraíba**: Areia, 10 July 1953, J.C. Moraes 743 (NY); **Paraná**: Guarapuava, 15 December 1965, Reitz & Klein 17719 (NY); **Pernambuco**: Arcoverde, 22 July 1987, L. Coradin et al. 7699 (CEN); **Rio Grande do Sul**: s.loc., s.d., Riedel 595 (K); **Rio de Janeiro**: Rio de Janeiro, 1910, Lützelburg 19 (K, M); **São Paulo**: Campinas, September 2007, A.P. Fortuna-Perez et al. 323 (UEC). **COLOMBIA**. **Cundinamarca**: Fusagasugá, 2 December 1965, E. Forero & J. Garzón 225 (NY). **COSTA RICA**. **Turrialba**: 1 January 1964, McKee 11124 (P). **UNITED STATES**. Texas: October 1849, M. Trécul 1208 (P). **ECUADOR**. **Cumbaya**: s.loc., 27 May 1930, M.R. Benoist 2575 (P). **GUYANA**. s.loc., 1841, Schumburgk 362 (F). **FRENCH GUIANA**. **Rupununi Distr.**: Shea Rock., 24 August 1995, M.J. Jansen-Jacobs et al. 4812 (K). **MEXICO**: **Ovzaba**: s.loc., 1856, Botteri 682 (P). **PANAMA**. **Aguadulce**: Coclé, 3 December 1911, H. Pittier 4846 (US). **PARAGUAY**. **Assunção**: s.loc., 8 December 2007, A.P. Fortuna-Perez & M.J. Silva 325 (UEC). **PERU**. s.loc., 11 October 1976, D.C. Wasshausen & F. Encarnación 755 (NY). **PORTO RICO**. **Orizaba**: 1866, F. Müller 272 (P). **SURINAME**. **Edo**. **Miranda**: entre Urb. El Cafetal y Urb. El Hatillo, 24 July 1964, G. Agostini & M. Farinas 158 (K).

Zornia decussata Fort.-Perez, G.P. Lewis & A.M.G. Azevedo, *Kew Bull.* 64: 719. 2009, publ. 2010. Fig. S4

Type: VENEZUELA. **T.F. Amazonas, Depto. Atures**: em la región de Rincones de Chacorro, 11 July 1980, Huber 5269 (holotype K-000555759!).

Shrub to ca. 20 cm tall. Stems prostrate, not branched, villous. Leaves with 2 leaflets, petiolate. Leaflets 5–15 × 2–10 mm, ovate to lanceolate, villous. Stipules lanceolate, 2–3 veined. Inflorescences spiciform, axillary, 10 cm long. Bracteoles 5–7 × 2–3 mm, elliptic, 1–3 veined, punctate, villous, green. Fruit loment with 2–4 articles; articles 2 × 1.5–2 mm, reticulate-veined, bristle-like trichomes 1.5 mm long.

Distribution and habitat: Venezuela, endemic. It occurs on sandy soil in Savanna.

Conservation Status: Data Deficient (DD). *Zornia decussata* is known from a single collection, which was made in 1980, in an area that is known to be well collected. Although the field label describes the species as being locally common, *Z. decussata* is classified as Data Deficient due to the lack

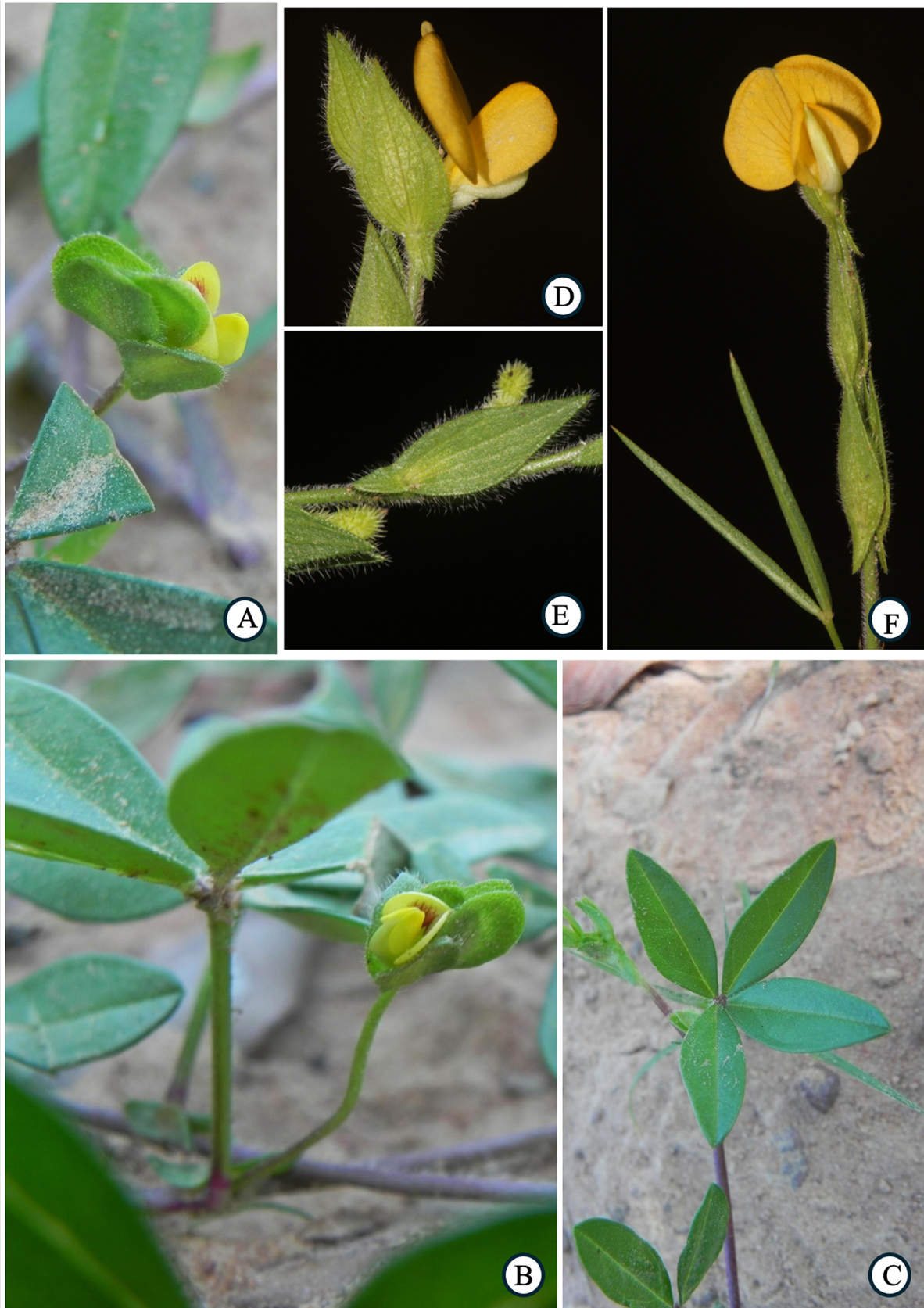


Figure 6. *Zornia cearensis* **A.** Bracteoles ovate **B.** Inflorescence spiciform axillary **C.** Leaves with 4 leaflets; *Zornia burkartii* **D.** Flower detail **E.** Details of bracteoles and fruits **F.** Inflorescence spiciform terminal, leaves with 2 leaflets. (Photos A, B, C: T.R.F. Sinani; D, E, F: T.C. Monteiro).



of recent and sufficient data about its distribution (EOO=0 km²; AOO=4.000 km²).

Notes: *Zornia decussata* is distinguishable by its prostrate and non-branched stems, bracteoles decussate, ellipt and villous.

Representative specimens examined: VENEZUELA.

T.F. Amazonas: Depto. Atures: em la región de Rincones de Chacorro, a unos 30km al N de Puerto Ayacuchoy a unos 5 km al NE de Galipero, 11 July 1980, O. Huber 5269 (K).

***Zornia echinata* Mohlenbr., Webbia 16 (1): 132. 1961.**
Fig. S3

Type: ARGENTINA. Salta: Caldera, Mojotoro, 9 January 1941, Meyer 3563 (holotype LIL-000656!; isotypes MO-714951!, NY-01477287!).

Shrub to ca. 50 cm tall. Stems decumbent, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 7–35 × 5–10 mm, elliptic to lanceolate, glabrous. Stipules ovate to lanceolate, 5–7 veined. Inflorescences spiciform, terminal, 30 cm long. Bracteoles 8–14 × 4–6 mm, elliptic, 4–6 veined, punctate, glabrous, green. Loment with 4–7 articles; articles 2–3 × 2–3 mm, not reticulate-veined, bristle-like trichomes 2 mm long.

Distribution and habitat: Argentina, Brazil. It occurs in open grassy field of Savanna.

Conservation Status: Data Deficient (DD). *Zornia echinata* has only been recorded from a few locations, and it is not possible to access its conservation status (EOO=129,898.387 km²; AOO=16.000 km²).

Notes: *Zornia echinata* morphologically resembles *Z. reticulata*, but is distinguished by its fruit characteristics, a loment comprising 4–7 articles, each measuring 2–3 mm in both length and width, the surface with a non-reticulate pattern, and trichomes that are 2 mm long. In contrast, *Z. reticulata* has a loment with 4–9 articles, each measuring 1.4–2.5 × 1.9–2 mm, the surface with a reticulate-veined pattern, and with trichomes 1 mm long. *Zornia echinata* was synonymized under *Z. reticulata* (Pena-Chocarro et al., 2010), but here we recognize it as a distinct species.

Representative specimens examined: ARGENTINA.

Salta: Caldera, Mojotoro, 9 January 1941, Meyer 3563 (NY). **BRAZIL. Rio Grande do Sul:** Fazenda do Arroio, 4 January 1950, Rambo 45113 (MO).

***Zornia echinocarpa* (Moric. ex Meisn.) Benth., Fl. Bras. (Martius) 15(1): 85. 1859.** *Myriadenus echinocarpus* Moric. ex Meisn., Pl. Vasc. Gen. [Meisner] 3: 64 (69–104, Tab. Diagn.). 1837.

Fig. S3

Type: BRAZIL. Bahia: s.loc., 1 April 1834, J.S. Blanchet 1682 (holotype G-00370085!).

Shrub to ca. 1.5 m tall. Stems erect, branched, tomentose. Leaves with 4 leaflets, petiolate. Leaflets 2–11 × 1–4 mm, spatulate, pubescent to glabrous. Stipules ovate, 1–5 veined. Flowers solitary. Bracteoles 3–4 × 2–2.5 mm, elliptic, 5–6

veined, punctate, glabrous, green. Loment with 6–10 articles; articles 4–5 × 2.5–3 mm, not reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Brazil, endemic. It occurs in sandy soil in the Caatinga vegetation of Tropical Dry Forest.

Conservation Status: Near Threatened (NT). *Zornia echinocarpa* has a distribution restricted to the Caatinga vegetation in northeast Brazil (EOO=574,879.574 km²; AOO=144.000 km²).

Notes: *Zornia echinocarpa* can be identified by the solitary flowers and their loment, which consist of 6–10 articles with bristle-like trichomes 1 mm long.

Representative specimens examined: BRAZIL. Bahia:

Crisópolis, 27 August 2007, A.P. Fortuna-Perez et al. 304 (UEC); Feira de Santana, Martius 2220 (M); Raso da Catarina, estação Ecológica do Raso da Catarina, 25 June 1982, L.P. de Queiroz 357 (K); s.loc., 1882, Blanchet 1928 (K, P); s.loc., s.d., Martius s.n. (M); s.loc., s.d., May 1866, A. De Candolle s.n. (K).

***Zornia filifoliola* Pittier, Bol. Soc. Venez. Cien. Nat. 6: 195. 1940.**

Fig. S4

Type: VENEZUELA. Near Santomé, 7 December 1940, Pittier 14431 (holotype K-000328085!).

Shrub to ca. 60 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 10.2–70 × 0.6–2 mm, filiform, glabrous. Stipules lanceolate, 3–5 veined. Inflorescences spiciform, axillary, 20 cm long. Bracteoles 6.8–9.5 × 1–1.6 mm, linear-lanceolate, 3–4 veined, punctate, glabrous, green. Loment with 3–9 articles; articles 1–2.8 × 1–1.6 mm, not reticulate-veined, bristle-like trichomes 2 mm long.

Distribution and habitat: Venezuela, endemic. It occurs in Tropical Dry Forests.

Conservation Status: Data Deficient (DD). *Zornia filifoliola* is known from only four collections. Without more detailed information about the distribution of this species, it is difficult to assess its true conservation status (EOO=139,402.180 km²; AOO=16.000 km²).

Notes: *Zornia filifoliola* can be identified by its filiform leaflets and its punctate, glabrous bracteoles that are linear-lanceolate and have 3–4 veins.

Representative specimens examined: VENEZUELA. Near Santomé, 7 December 1940, H. Pittier 14431 (K).

***Zornia fimbriata* Mohlenbr., Webbia 16: 108. 1961.**

Fig. S3

Type: PARAGUAY. Yerbables: mountains of the Sierra de Maracayú, 1898, Hassler 5339 (holotype K-000328082!; isotype P-02937439!).

Shrub to ca. 50 cm tall. Stems erect, branched, villous. Leaves with 2 leaflets, petiolate. Leaflets 15–40 × 10–15 mm, ovate to lanceolate, villous. Stipules lanceolate, 6–7 veined. Inflorescences spiciform, axillary, 15 cm long. Bracteoles

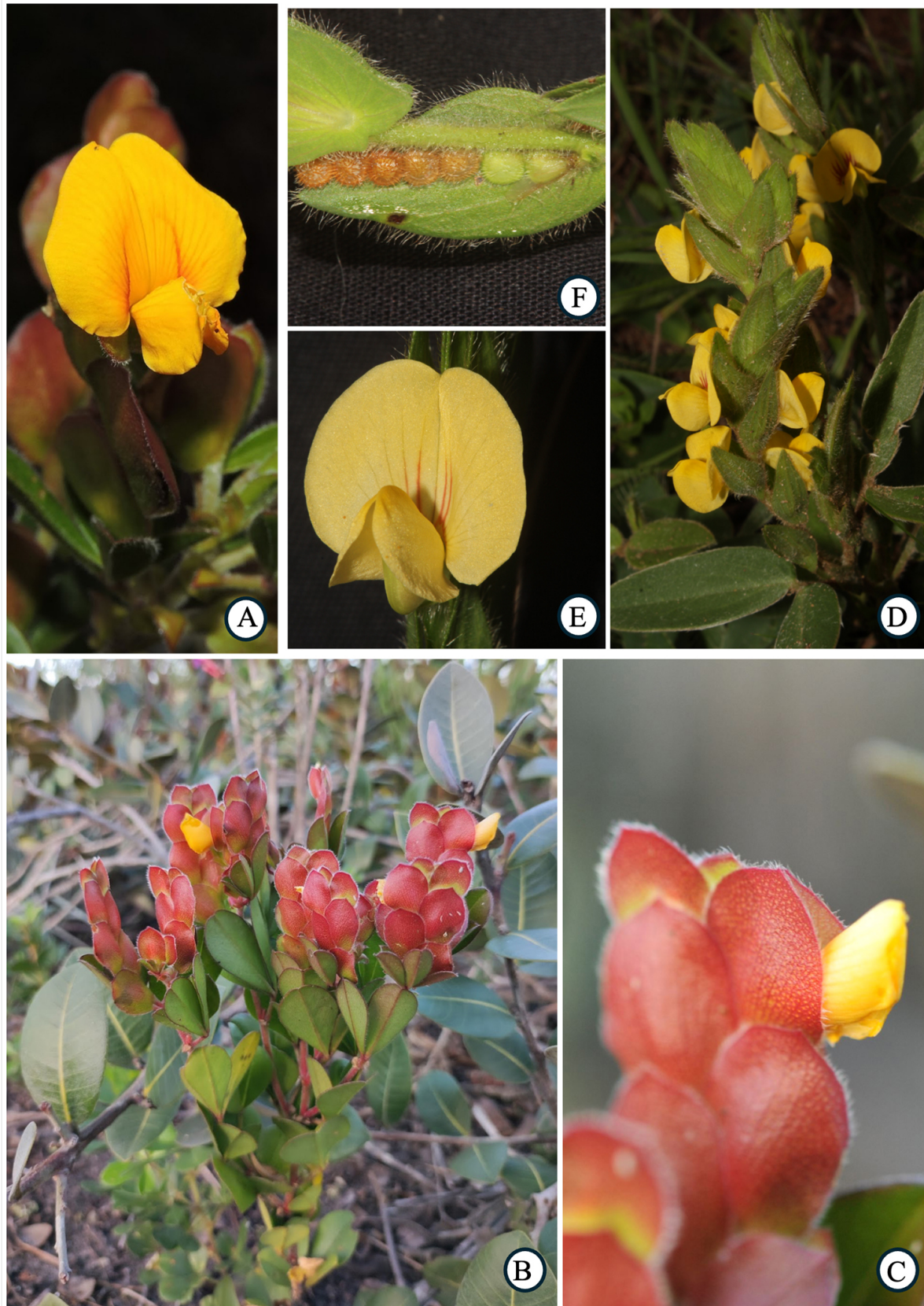


Figure 7. *Zornia flemmingioides* **A.** Flower detail **B.** Shrub in habitat **C.** Bracteoles ovate, punctate, and red-coloured; *Zornia cryptantha* **D.** Inflorescence spiciform terminal **E.** Flower detail **F.** Loment with 7 articles. (Photos A: R.T. Queiroz; B: L.C. Zeferino; C: T.M. de Lima; D, E, F: T.C. Monteiro).



16–19 × 5–7 mm, lanceolate, 5–7 veined, not punctate, villous, green. Loment with 6–articles, each 1.9–2 × 1.9–2 mm, reticulate-veined, bristle-like trichomes 0.6 mm long.

Distribution and habitat: Paraguay, endemic. It grows in Tropical Dry Forests.

Conservation Status: Data Deficient (DD). There is insufficient information available about *Z. fimbriata* to make a definitive assessment of its conservation status. The species has only been documented by a single collection made in 1898 (EOO=0.000 km²; AOO=4.000 km²).

Notes: *Zornia fimbriata* morphologically resembles *Z. cryptantha*, but it can be distinguished by its lanceolate and not punctate bracteoles (vs. ovate and punctate bracteoles in *Z. cryptantha*).

Representative specimens examined: PARAGUAY.

Verbarles: mountains of the Sierra de Maracayú, 1898, Hassler 5339 (K, P)

***Zornia flemmingioides* Moric., Pl. Nouv. Am. 127. 1844.**
Figs 7, S1

Type: BRAZIL. Bahia: Jacobina, 1843, *Blanchet* 3670 (holotype G-00370103!; isotype P-02142426!).

Shrub to ca. 2 m tall. Stems erect, branched, villous. Leaves with 4 leaflets, petiolate. Leaflets 15–35 × 5–16 mm, obovate, glabrous. Stipules ovate to lanceolate, 5–10 veined. Inflorescences spiciform, axillary, 15 cm long. Bracteoles 12–16 × 9–10 mm, ovate, 7–15-veined, punctate, glabrous, red. Loment with 2–3 articles; articles 2–2.5 × 2–2.5 mm, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Brazil, endemic. Mainly occurs at high elevations (approx. 1300 m) in Caatinga and *Campo rupestre* vegetation of Tropical Dry Forest.

Conservation Status: Vulnerable (VU). *Zornia flemmingioides* is limited to the Espinhaço mountain range, with an EOO of 109,269.462 km² and an AOO of 16.000 km².

Notes: This species can be easily identified by its distinctive ovate, red bracteoles.

Representative specimens examined: BRAZIL. Bahia: Lençóis, 6 July 2024, *G.M. Nascimento et al.* 709 (BOTU).

Minas Gerais: Formoso, Parque Nacional Grande Sertão Veredas, 4 December 1997, *M.A. da Silva et al.* 3708 (RB).

***Zornia gardneriana* Moric., Pl. Nouv. Amer. 129. 1844.**
Fig. S4

Type: BRAZIL. Piauí: Oeiras, May 1839, *Gardner* 2102 (holotype P-02142428!; isotypes F-0093427F!, G-00370115!, GH-00063394!, K-000205309!, NY-01477288!).

Shrub to ca. 60 cm tall. Stems erect, branched., villous. Leaves with 4 leaflets, petiolate. Leaflets 8–30 × 3–7 mm, elliptic to lanceolate, sericeous to glabrous. Stipules ovate

to lanceolate, 5–6 veined. Inflorescences spiciform, axillary, 5 cm long. Bracteoles 7–11 × 5–6 mm, ovate, 7–13 veined, punctate, glabrous, green. Loment with 4–6 articles; articles 2–2.5 × 1.5–2 mm, not reticulate-veined, bristle-like trichomes 1.5 mm long.

Distribution and habitat: Brazil, endemic. It occurs mainly in sandy soils of the Caatinga vegetation in Tropical Dry Forest.

Conservation Status: Endangered (EN). Endemic to Brazil, *Zornia gardneriana* is exclusively found in the Caatinga. The EOO is estimated to be 25,957.607 km², while its AOO measures only 24,000 km².

Notes: *Zornia gardneriana* can be distinguished by its loment with 4–6 articles (each 2–2.5 mm × 1.5–2 mm), their surfaces not reticulate-veined and their trichomes 1.5 mm long.

Representative specimens examined: BRAZIL. Piauí: São Raimundo Nonato, Serra Branca, January 1907, *E. Ule* 7185 (K).

***Zornia glabra* Desv., Mem. Soc. Linn. Paris 4: 325. 1826.**
Fig. S3

Type: BRAZIL. s.loc., s.d., *Lavalleé s.n.* (holotype P-02142431!; isotype F-935518!).

Zornia perforata Vogel, *Linnaea* 12: 59. 1838. *Zornia diphylla* var. *perforata* (Vogel) Kuntze, *Revis. Gen. Pl.* 3(3): 74. 1898.

Type: BRAZIL. Bahia: s.loc., s.d., *Luschnath s.n.* [lectotype P-02937474! designated by Fortuna-Perez and De Azevedo (2011)].

Zornia diphylla (L.) Pers. var. *elatio* Benth., *Fl. Bras.* (Martius) 15(1): 81. 1859, non *Zornia diphylla* var. *elatio* Micheli, *Bull. Herb. Boissier* 6, App. 1: 33. 1898, nom. illeg. **Type: BRAZIL. Bahia:** Ilhéus, s.d., *Luschnath* 401 [lectotype BM-000081081! designated by Fortuna-Perez and De Azevedo (2011); isolectotypes G-00370075!, K-000205375!, NY-00050700!]

Shrub to ca. 70 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 12–46 × 5–10 mm, ovate to lanceolate, glabrous. Stipules lanceolate, 5–6 veined. Inflorescences spiciform, axillary, 30 cm long. Bracteoles 11–14 × 5–6 mm, ovate–lanceolate, 5–7 veined, punctate, glabrous, green. Loment with 4–9 articles; articles 1.5–2 × 1.5–2 mm, reticulate-veined, bristle-like trichomes 2 mm long.

Distribution and habitat: Brazil, Guyana, French Guiana, Martinique, Suriname. It occurs preferentially in coastal regions of Tropical Moist Forest.

Conservation Status: Vulnerable (VU). *Zornia glabra* has a disjunct distribution, with a preference for coastal regions. In Brazil, where the species mostly occurs, *Z. glabra* is found in Atlantic Forest vegetation (EOO=6,300,226.298 km²; AOO=508.000 km²).

Notes: *Zornia glabra* morphologically resembles *Zornia reticulata*. However, the bracteoles of *Z. glabra* are ovate (vs. lanceolate in *Z. reticulata*).

Representative specimens examined: **BRAZIL Alagoas:** Maceió, 20 July 1980, L. Coradin 3099 (UEC); **Bahia:** Belmonte, 23 March 1974, R.M. Harley et al. 17326 (P, M); **Espírito Santo:** Linhares, 13 March 1990, G.L. Farias 358 (K); **Rio de Janeiro:** Rio de Janeiro, Copacabana, 1867, Simart 3214 (P); **Santa Catarina:** Laguna, 23 January 1982, A. Krapovickas & C.L. Cristóbal 37748 (F); **São Paulo:** Ubatuba, 13 April 2007, A.P. Fortuna-Perez & E. Dias 213 (UEC). **MARTINICA: Antilhas:** n.loc, n.d, A. Plée s.n. (P). **SURINAME. Lelydorp:** n.loc, 19 September 1963, McKee 10704 (P).

***Zornia glaziovii* Harms, Bot. Jahrb. Syst. 42: 213. 1908.**
Fig. S3

Type: **BRAZIL. Goiás:** entre le Rio Bananal et le Rio Torto, 13 May 1895, Glaziou 20917 (holotype F-0BN002251!; isotypes F-0059984F!, G-00370098!, K-000328079!, NY-01477289!, P-02142434!, S-9533!).

Zornia villosa Glaz., Mém. Bull. Soc. Bot. France 53: 133. 1906; nom. nud.

Shrub to ca. 70 cm tall. Stems prostrate, branched, hirsute. Leaves with 4 leaflets, petiolate. Leaflets 10–25 × 5–15 mm, ovate to obovate, pubescent to glabrous. Stipules lanceolate, 5–7 veined. Inflorescences spiciform, axillary, 20 cm long. Bracteoles 10–12 × 5–7 mm, oblong, 6–8 veined, punctate, pilose, green. Loment with 3–4 articles; articles 1.5–2 × 1.5–2, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Brazil, endemic. This species occurs at high elevations (approx. 1200 m) in Cerrado vegetation of the Savanna biome.

Conservation Status: Endangered (EN). *Zornia glaziovii* has a limited distribution. It has relatively small EOO of 99,095.246 km² and an even smaller AOO of 28,000 km².

Notes: *Zornia glaziovii* morphologically resembles *Zornia ulei*, but it differs by its stems with a hirsute indumentum (vs. villous in *Z. ulei*). Furthermore, the spiciform inflorescences of *Z. glaziovii* are 20 cm long and the bracteoles have a pilose indumentum (vs. inflorescences 7 cm long and bracteoles with a villous indumentum in *Z. ulei*).

Representative specimens examined: **BRAZIL. Goiás:** Cristalina, 4 April 1973, W.R. Anderson 8160 (K).

***Zornia grandiflora* Fort.-Perez & A.M.G. Azevedo, Novon 20: 35. 2010.**

Figs 8, S4

Type: **BRAZIL. Pernambuco:** Buíque, estrada para Catimbau, 10 July 1997, A.M. Frazão et al. s.n. (holotype HUEFS-38032!; isotype PEUFR-6809!).

Shrub to ca. 70 cm tall. Stems erect, branched, villous. Leaves with 2 leaflets, petiolate. Leaflets 15–40 × 5–15 mm, ovate to lanceolate, sericeous. Stipules lanceolate,

5–6 veined. Inflorescences spiciform, axillary, 3 cm long. Bracteoles 5–15 × 3–6 mm, ovate, 7–9 veined, punctate, glabrous, green. Loment with 5–6 articles; articles 2 × 1.5–2 mm, reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Brazil, endemic. It grows on sandy soil of Caatinga vegetation in the Tropical Dry Forest.

Conservation Status: Endangered (EN). *Zornia grandiflora* has a limited distribution range, with an estimated extent of occurrence (EOO) of 33,370.134 km² and an area of occupancy (AOO) of 48.000 km².

Notes: This species resembles *Z. sericea* in some morphological features such as its erect branches and oval bracteoles. However, *Z. grandiflora* is distinguished by having glabrous bracteoles (vs. sericeous in *Z. sericea*).

Representative specimens examined: **BRAZIL. Bahia:** Barra, 4 February 2000, A.T. Rodarte 59 (RB); **Pernambuco:** Serra do Catimbau, 17 October 1994, M.B. Costa e Silva 252 (K).

***Zornia guanipensis* Pittier, Bol. Soc. Venez. Cienc. Nat. 6: 194. 1940.**

Figs 8, S3

Type: **VENEZUELA. Anzoategui:** Near El Tigre, Pittier 14315 (holotype US-00001990!).

Zornia marajoara Huber, Bol. Mus. Goeldi Hist. Nat. Ethnogr. 5: 150. 1908. **Type:** **BRAZIL. Pará:** Ilha de Marajó, de Miranda 3147 (holotype P-02142436!; isotypes BM-000931677!, G-00370147!, US-00001990!).

Zornia tenuifolia var. *latifolia* Benth., C.F.P.von Martius & auct. suc. eds., Fl. Bras. 15(1^a): 81. 1859. **Type:** **BRAZIL. Bahia:** Serra do Açurua, Blanchet 2842 (holotype K-000205336!; isotype BM-000931678!).

Shrub to ca. 1 m tall. Stems erect, branched, glabrous to tomentose. Leaves with 4 leaflets, petiolate. Leaflets 2–35 × 1–16 mm, obovate to elliptic, villous. Stipules ovate, 4–5 veined. Inflorescences spiciform, axillary, 15 cm long. Bracteoles 3–6 × 1.5–3 mm, elliptic, 5–7 veined, punctate, glabrous, green. Loment with 3–5 articles; articles 2 × 2.5 mm, not reticulate-veined, bristle-like trichomes 0.5 mm long.

Distribution and habitat: Brazil, Colombia, Venezuela. It occurs in Savanna and Tropical Dry Forest.

Conservation Status: Near Threatened (NT). *Zornia guanipensis* has a fragmented distribution (EOO=3,737,926.026 km² and AOO=144.000 km²).

Notes: *Zornia guanipensis* morphologically resembles *Z. tenuifolia*. But it differs mainly by the obovate to elliptic leaflets (vs. filiform in *Z. tenuifolia*).

Representative specimens examined: **BRAZIL. Bahia:** Gentio do Ouro, Serra do Açurua, s.d., Blanchet 2842 (K); **Maranhão:** s.loc., July 1914, A. Lisboa 4757 (P); **Pará:** Marajó, Belterra et al. 105 (RB); **Pernambuco:** Olinda, 20 June 1925, F.C. Hoehne 737 (SP); **Piauí:** s.loc., s.d., Allemão & Cysneiros 341 (P). **FRENCH GUIANA.** Kourou–Sinnamary,



35 September 1963, *McKee 10719* (P). **VENEZUELA. Esdo. Monagas:** Jusepin, 8 October 1963, *McKee 10776* (K, P). ***Zornia harmsiana* Standl., Publ. Field Mus. Nat. Hist. Chic., Bot. Ser., 11(5): 161. 1936.**

Figs 9A, S3

Type: BRAZIL. Bahia: Remanso, December 1906, *Ule 7374* (holotype F-BN002252!; isotypes F-0093430F!, HBG-518947!, K-000205323!).

Zornia gracilis Harms, Eng. Bot. Jahrb. 42: 212. 1909, nom. nud., non DC. 1825.

Zornia harmsii Herter, Rev. Sudamer. Bot. 6: 154. 1940, nom. nud.

Shrub to ca. 30 cm tall. Stems prostrate, branched, pubescent. Leaves with 4 leaflets, petiolate. Leaflets 5–40 × 1–3 mm, linear, pubescent. Stipules ovate, 4–5 veined. Inflorescences spiciform, axillary, 20 cm long. Bracteoles 5–9 × 2.5–4 mm, oblong, 8–10 veined, punctate, glabrous, green. Loment with 3–4 articles; articles 1.5–2 × 1–1.5, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Brazil, endemic. It occurs in sandy soils of the Caatinga vegetation in Tropical Dry Forest.

Conservation Status: Endangered (EN). *Zornia harmsiana* is considered endangered due to its limited distribution range within the Caatinga in Brazil (EOO=300,080.950 km²; AOO=120.000 km²).

Notes: This species is easily recognizable by its typically prostrate branches, linear leaflets and oblong bracteoles.

Representative specimens examined: BRAZIL. Bahia: Bom Jesus da Lapa, 18 April 1980, *R.M. Harley 21512* (K);

Pernambuco: Caboclo, entre Caboclo e Dormentes, 22 April 1971, *E.P. Heringer 274* (RB); **Piauí:** São Raimundo Nonato, 22 July 1983, *L. Coradin et al. 5925* (K); **Rio Grande do Norte:** s.loc., 1877–78, *Jobert 1178* (P).

***Zornia hebecarpa* Mohlenbr., Webbia 16 (1): 63. 1961.**

Figs 9D, S2

Type: BRAZIL. Minas Gerais: Lagoa Santa, s.d., *Palácios et al. 3262* (holotype LIL).

Shrub to ca. 60 cm tall. Stems erect, branched, tomentose. Leaves with 2 leaflets, petiolate. Leaflets 9–25 × 5–8 mm, ovate to elliptic, strigose. Stipules elliptic, 4–6 veined. Inflorescences spiciform, axillary, 20 cm long. Bracteoles 9–11 × 4–5 mm, elliptic, 5–7 veined, punctate, sericeous, green. Loment with 3–5 articles; articles 1.5–2 × 1–2 mm, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Brazil, endemic. It occurs at high elevations (approx. 1400 m) in the *Campo rupestre* vegetation of the Savanna biome.

Conservation Status: Near Threatened (NT). The fact that *Zornia hebecarpa* is restricted to *Campo rupestre* areas, indicates that the species is confined to a relatively small area within its larger distribution range (EOO=477,731.185 km²; AOO=156.000 km²).

Notes: *Zornia hebecarpa* morphologically resembles *Z. ramboana*, as both share sericeous bracteoles and loment articles without trichomes. However, *Z. hebecarpa* has leaflets measuring 9–25 × 5–8 mm, and a strigose indumentum (vs. leaflets measuring 5–35 mm × 2–11 mm, and a tomentose indumentum in *Z. ramboana*).

Representative specimen examined: BRAZIL. Minas Gerais: Lagoa Santa, s.d. *Simart 17181* (P).

***Zornia herbacea* Pittier, Bol. Soc. Venez. Cienc. Nat. 6: 192. 1940.**

Fig. S5

Type: VENEZUELA. Anzoátegui: Sabanas de Guaraguara, cerca de Santomé, 25 March 1940, *Pittier 14337* (holotype US; isotype VEN-5282!).

Shrub to ca. 20 cm tall. Stems prostrate, branched, puberulent. Leaves with 2 leaflets, petiolate. Leaflets 15–20 × 3–5 mm, ovate to lanceolate, strigose. Stipules elliptic, 3–5 veined. Inflorescences spiciform, axillary, 10 cm long. Bracteoles 6–8 × 3–4 mm, lanceolate, 5 veined, punctate, strigose, green. Loment with 4–6 articles; articles 2–2.5 × 1.5–2 mm, not reticulate-veined, bristle-like trichomes 0.5 mm long.

Distribution and habitat: Venezuela, endemic. It occurs in Savanna.

Conservation Status: Data Deficient (DD). *Zornia herbacea* is known only from a few collections. Information about its distribution is insufficient to make an accurate conservation assessment (EOO=0 km²; AOO=8.000 km²).

Notes: *Zornia herbacea* morphologically resembles *Zornia ramboana*, but it differs by its prostrate stems (vs. erect in *Z. ramboana*) and its 10 cm long inflorescences (vs. 20 cm in *Z. ramboana*).

Representative specimen examined: VENEZUELA. Zulia: near Santa Rosa de Tierra, Maracaibo, s.d., *Pittier 10701* (NY, US).

***Zornia laevis* Schltdl. & Cham. Linnaea 5: 582. 1830.**

Fig. S3

Type: MEXICO. Collibus apricis prope Jalapam, August 1828, *Deppe & Schiede s.n.* (holotype HAL-0098427!).

Shrub to ca. 60 cm tall. Stems prostrate, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 12–36.3 × 1.3–12.2 mm, elliptic to lanceolate, glabrous. Stipules elliptic, 3–5 veined. Inflorescences spiciform, axillary, 18 cm long. Bracteoles 13.5–14 × 4.8–7 mm, ovate, 5–7 veined, punctate, glabrous, green. Loment with 3–5 articles; articles 1.6–2.4 × 1.3–1.6 mm, reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Mexico, endemic. It occurs in Tropical Dry Forest.

Conservation Status: Data Deficient (DD). With only three points of occurrence, there is insufficient information

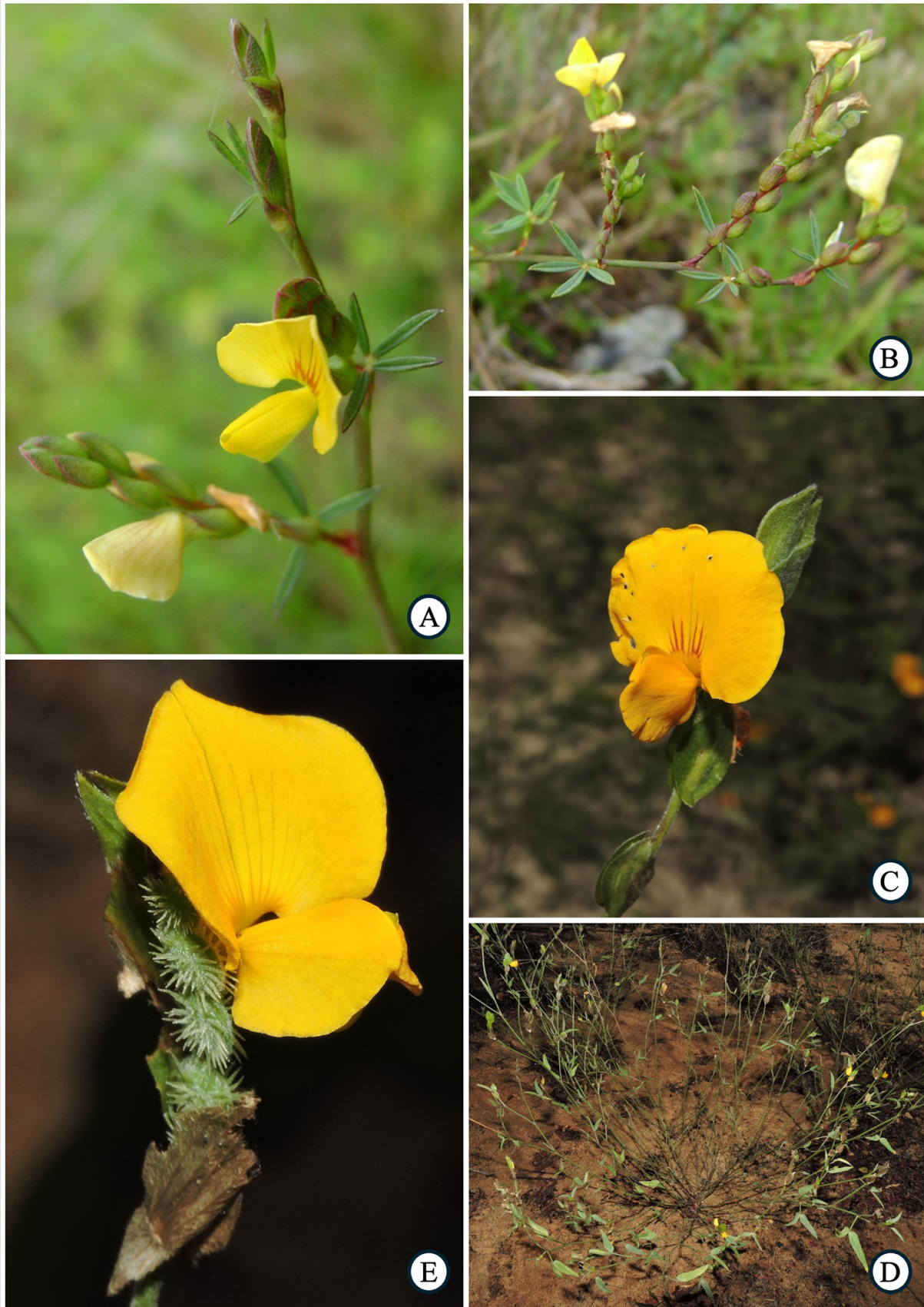


Figure 8. *Zornia guanipensis*. **A.** Flower detail **B.** Inflorescence spiciform axillary; *Zornia grandiflora* **C.** Flower detail **D.** Shrub in habit, stems erect **E.** Details of fruit and inflorescence. (Photos: R.T. Queiroz).



available to assess the conservation status of the species (EOO=249,828,333 km²; AOO=12,000 km²).

Notes: *Zornia laevis* differs from other species by its prostrate and glabrous stems. The loment has a reticulate-veined pattern on their articles and no trichomes.

Mohlenbrock (1961) proposed a neotype of *Zornia laevis* based on Muller 1625 (NY) from Vera Cruz, Mexico. However, here we disregard this neotype as the species was originally described from material collected by Deppe & Schiede s.n. and deposited in the Martin-Luther-Universität herbarium (holotype HAL-0098427!).

Representative specimen examined: **MEXICO. Jalisco:** Guadalajara, s.d., Palmer 495 (US); **Vera Cruz:** Orizaba, s.d., Muller 1625 (NY).

***Zornia lasiocarpa* Ant. Molina, Ceiba 1: 257. 1951.**

Fig. S1

Type: **HONDURAS. Quebrada Dantas:** 20 km noroeste de Yuscarán, drainage of the Río Yeguaré, 23 November 1948, Molina 1660 (Lectotype here designated: US-00001995!; isolectotypes: F-0059982F!, GH-00241663!, MO-126299!, US-01107554!).

Shrub to ca. 30 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 15–30.6 × 1–1.7 mm, linear to filiform, glabrous. Stipules elliptic, 3–5 veined. Inflorescences spiciform, axillary, 11 cm long. Bracteoles 5–6 × 1.2–1.5 mm, linear, 3 veined, punctate, glabrous, green. Loment with 2–3 articles; articles 2.5–3.2 × 2–2.5 mm, reticulate-veined, bristle-like trichomes 1.5 mm long.

Distribution and habitat: Honduras, Mexico, Nicaragua, Venezuela. It occurs in sandy soils of Savanna.

Conservation Status: Data Deficient (DD). *Zornia lasiocarpa* has a lack of adequate collection data, with only four known occurrences (EOO=558,050,277 km²; AOO=24,000 km²).

Notes: The linear to filiform leaflets are particularly noteworthy in *Z. lasiocarpa*; and also its loment with 2–3 articles, bearing bristle-like trichomes up to 1.5 mm long. Mohlenbrock (1961) cited the type materials based on the collection Molina 1660, but did not designate a holotype from amongst the available duplicates. Therefore, we here make a second step lectotypification.

Representative specimen examined: **HONDURAS.**

Moran: beyond Las Mesas, s.d., Standley 29254 (US).

MEXICO. Sinaloa: Mazatlan, n.d., Rose et al. 13828 (US).

VENEZUELA. Distrito Federal: Augustura to Ciudad Bolívar, s.d., Grosourdy 13 (P).

***Zornia latifolia* Sm., A.Rees, Cycl. 39: 4. 1818. non *Zornia latifolia* DC., Prodr. (DC.) 2: 317. 1825.**

Figs S5, 9C

Type: **FRENCH GUIANA. Cayenne:** s.loc., s.d., Aublet s.n. (holotype P-00631807!).

Zornia gemella Willd. ex Vogel, Linnaea 12: 61. 1838, **syn.**

Nov. *Hedysarum gemellum* Willd. ex Vogel, nom. nud. **Type:**

BRAZIL. “Habitat in Brasilia”, s.d., Sched. Willdenow Herb. 13778-01 0 (holotype B-W).

Zornia gracilis DC., Prodr. (DC.) 2: 316. 1825, non *Zornia gracilis* Harms, Bot. Jahrb. Syst. 42(2–3): 212. 1908. *Zornia diphylla* var. *gracilis* (DC.) Benth., Fl. Bras. (Martius) 15(1): 83. 1859. **Type:** **GUYANA.** s.loc., 1821, Perrottet 18 (holotype G).

Zornia diphylla (L.) Pers. var. *bernardinensis* Chodat & Hassl., Bull. Herb. Boissier, ser. 2, 4: 888. 1904. *Zornia latifolia* Sm. var. *bernardinensis* (Chodat & Hassl.) Mohlenbr., Webbia 16(1): 128. 1961. **Type:** **PARAGUAY.** “Paraguay in campo San Bernardino”, s.d., Hassler 3502 [lectotype G-00400373! Designated by Fortuna-Perez and De Azevedo (2011); isolectotypes BM-000081074!, W].

Zornia maranhensis G.Don, Gen. Hist. 2: 280. 1832. **Type:** **BRAZIL. Maranhão:** s.loc., s.d., G. Don s.n. (holotype BR).

Zornia surinamensis Miq., Ann. Mag. Nat. Hist. 11: 14. 1843.

Type: **SURINAME.** “Surinam, locis elevatioribus”, s. coll. (holotype BR).

Shrub to ca. 80 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 15–55 × 4–17 mm, elliptic to lanceolate, glabrous. Stipules lanceolate, 3–5 veined. Inflorescences spiciform, axillary, 40 cm long. Bracteoles 5–12 × 2–4 mm, linear, 3–6 veined, punctate, glabrous, green. Loment with 4–8 articles; articles 2–3 × 2–2.5 mm, reticulate-veined, bristle-like trichomes 2 mm long.

Distribution and habitat: Argentina, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Ecuador, Florida, French Guiana, Guyana, Jamaica, Mexico, Nicaragua, Paraguay, Peru, Puerto Rico, Suriname, USA (Texas), Uruguay, Venezuela, Windward Islands. It occurs in Savanna, Tropical Dry Forest, Tropical Moist Forest, and Montane Grassland.

Conservation Status: Least Concern (LC). *Zornia latifolia* is widely distributed in open grasslands across South and Central America. According to Mohlenbrock (1961), it is also becoming weedy in Africa (EOO=28,115,263.359 km²; AOO=3,940,000 km²).

Notes: *Zornia latifolia* is commonly known as “arrozinho-do-campo”. It is distinguished by its characteristic linear (3–6 veined) and glabrous bracteoles.

Representative specimen examined: **ARGENTINA.**

Corrientes: Dep. Mercedes, 21 February 1984, S.G. Tressens et al. 2317 (K). **BOLIVIA. Velasco:** Santa Cruz, 27 June 1991, M. Nee 41482 (NY). **BRAZIL. Acre:** Cruzeiro do Sul, 27 September 1987, M.C. Ferreira & A.P. Araújo 21 (RB);

Amazonas: São Lourenço, 27 November 1968, G.T. Prance et al. 8917 (P); **Bahia:** Belmonte, 24 March 1974, R.M. Harley et al. 17329^a (P); **Ceará:** Fr. Allemão & M. de Cysneiros 465 (P);

Espírito Santo: Alegre, 30 August 1987, L. Coradin 8366 (UEC); **Goiás:** Araguaína, Rio das Lontras, 12 March 1968, H.S. Irwin et al. 21057 (NY); **Maranhão:** Açailândia, 04 July 1987, L. Coradin 7984 (UEC); **Mato Grosso:** Xavantina, 5 April 1968, D. Philcox & B. Freeman 4735 (P); **Minas Gerais:**

Parque Estadual da Serra do Cabral, 05 November 2022,

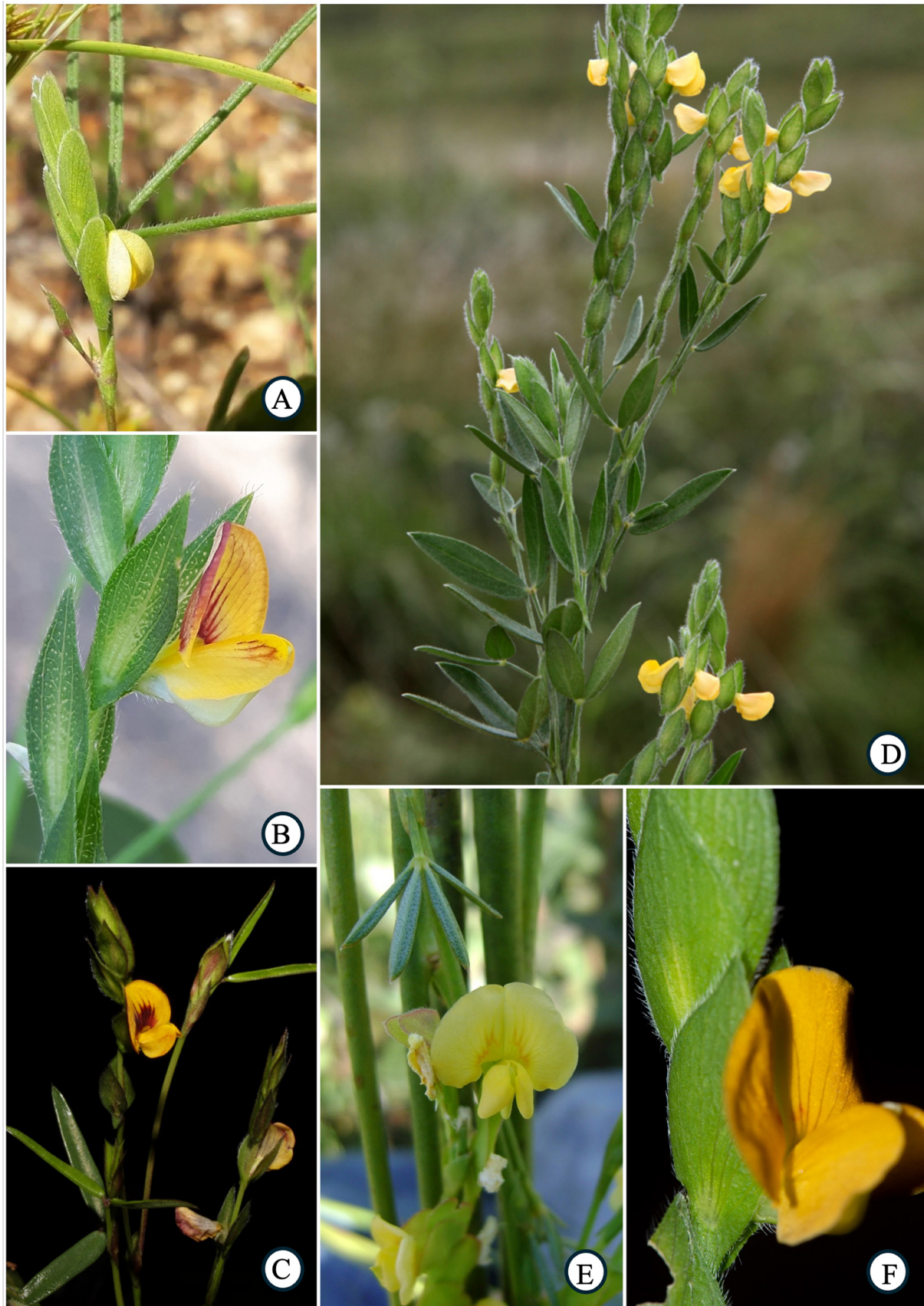


Figure 9. *Zornia* species. **A.** *Z. harmsiana* **B.** *Z. reticulata* **C.** *Z. latifolia* **D.** *Z. hebecarpa* **E.** *Z. virgata* **F.** *Z. multinervosa* (Photos A, B, D, E: R.T. Queiroz; C, F: T.C. Monteiro).



L.C. Zeferino et al. 142 (BOTU); **Mato Grosso do Sul:** Rio Verde do MS, 11 April 2001, *R.S. Rodrigues et al.* 1120 (UEC); **Pará:** Almeirim, 1 August 1985, *M.J.P. Pires et al.* 524 (NY); **Paraíba:** Conde, 20 July 1980, *L. Coradin* 3152 (UEC); **Paraná:** Sete quedas, 11 December 1965, *G. Hatschbach et al.* 13347 (P); **Pernambuco:** Arcoverde, 21 October 1980, *L. Coradin et al.* 2476 (UEC); **Piauí:** Piracuruca, 4 April 2002, *A.S. Flores et al.* 924 (UEC); **Rio de Janeiro:** Rio de Janeiro, 1843, *M. Weddel* 492 (P); **Rio Grande do Norte:** Pirangi do Sul, 8 September 1953, *S. Tavares* 314 (NY); **Rio Grande do Sul:** s.loc., 1816–21, *A. Saint-Hilaire* 2625B (P); **Rondônia:** Abunã, 18 November 1968, *G.T. Prance et al.* 8608 (M); **Roraima:** Boa Vista, 24 November 1981, *L. Coradin* 4922 (UEC); **São Paulo:** Campinas, 25 March 2004, *A.P. Fortuna-Perez* 66 (UEC); **Sergipe:** Rio Tocantis, 8 September 1844, *M. Weddell* 2416 (P). **BOLIVIA. Santa Cruz:** Chiquitos, 27 December 1999, *J.R.I. Wood & D.J. Goyder* 15658 (K). **COLOMBIA. Del Tolima:** s.loc., 28 October 1952, *H. Humbert et al.* 26961 (P). **ECUADOR. Las Chinchas:** Prov. Loja, 12 April 1944, *M. Acosta Solís* 7810 (F). **GUYANA. Barima-Waina Region:** 11 August 1986, *J.J. Pipoly & H. Lall* 8408 (P). **FRENCH GUIANA. Acarocany:** 1858, *Sagoti* 128 (P). **MEXICO. Prov. Huasteca:** Watenberg, near Tantyuca, 1858, *L.C. Ervendberg* 12 (G). **PARAGUAY. Dep. Paraguari:** s.loc., 15 November 1978, *M.M. Arbo et al.* 1788 (MEXU). **PERU. Calca:** Cusco, La Quebrada, 22 October 1985, *L.v.d. Hoogte & C. Roersch* 1825 (F). **SURINAME. Hostmann 1072 (P). **URUGUAY. Dep. Artigas:** s.loc., 28 December 1929, *Herter* 19 (Z). **VENEZUELA. Esdo. Monagas:** El Tejero, 9 October 1963, *H.S. McKee* 10789 (P).**

***Zornia leptophylla* (Benth.) Pittier, Bol. Soc. Venez. Cien. Nat. 6: 196. 1940.**

Figs 10, S5

Zornia diphylla var. *leptophylla* Benth. In Mart. Fl. Bras. 15 (1): 83. 1859. **Type: BRAZIL. Piauí:** s.loc., s.d., *Martius s.n.* (holotype M-0233822!).

Shrub to ca. 70 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 20–40 × 1–3 mm, linear, glabrous. Stipules linear to lanceolate, 3–5 veined. Inflorescences spiciform, axillary, 8 cm long. Bracteoles 5 × 1 mm, linear, 3 veined, punctate, glabrous, green. Loment with 3–7 articles; articles 2–2.5 × 2–2.3 mm, reticulate-veined, bristle-like trichomes 2 mm long.

Distribution and habitat: Brazil, Colombia. This species has a disjunct distribution; it occurs in Savanna and Tropical Dry Forests.

Conservation Status: Near Threatened (NT). *Zornia leptophylla* has a relatively wide distribution. However, the disjunct distribution contributes to the vulnerability of the species (EOO=3,342,561.976 km²; AOO=220.000 km²).

Notes: *Zornia leptophylla* is primarily characterized by having filiform leaflets that are identical in shape on the upper and lower parts of the plant.

Representative specimen examined: BRAZIL. Alagoas: Olho d'Água do Casado, Fazenda Nova Esperança, 20 July 2000, *Moura D. & Silva R.A.* 1296 (RB); **Bahia:** Juazeiro, March 1912, *Lofgren* 911 (RB); **Ceará:** Cedro, May 1933, *Luetzelburg* 23613 (M); **Minas Gerais:** Itaobim, 9 March 1977, *G.J. Shepherd et al.* 4403 (F); **Paraíba:** Pocinhos, 8 July 1994, *A.M. Miranda & L.P. Félix* 1861 (PEUFR); **Pernambuco:** Parnamirim, 7 May 1971, *E.P. Heringer* 629 (RB); **Piauí:** s.loc., s.d., *Martius s.n.* (M); **Sergipe:** Canindé do São Francisco, 19 October 1999, *R.A. Silva* 1173 & *D. Moura* (US). **COLOMBIA. Vaupes:** Cerro de Circasia, s.d., *Cuatrecasas* 7200 (US).

***Zornia megistocarpa* Mohlenbr., Webbia 16 (1): 102. 1961.**

Fig. S4

Type: MEXICO. Oaxaca: Cerros de Salina Cruz, 18 October 1919, *C. Conzatti* 3677 (holotype: US-00001993!; isotypes: GH-00241646!, MEXU-01169252!, NY-00842229!).

Shrub to ca. 25 cm tall. Stems prostrate, branched, sericeous. Leaves with 2 leaflets, petiolate. Leaflets 10–27 × 5–10 mm, ovate, sericeous. Stipules lanceolate, 5–7 veined. Inflorescences spiciform, axillary, 10 cm long. Bracteoles 12–15 × 7–9 mm, ovate, 7–9 veined, punctate, sericeous, green. Loment with 3–4 articles; articles 3–3.2 × 3–3.4 mm, reticulate-veined, bristle-like trichomes 0.8 mm long.

Distribution and habitat: Mexico, endemic. It occurs in Tropical Dry Forest.

Conservation Status: Data Deficient (DD). *Zornia megistocarpa* is known only by a few collections from the state of Oaxaca, Mexico. Therefore, due to the limited information available about its distribution, it is not possible to assess the level of threat facing this species (EOO=584.141 km²; AOO=16.000 km²).

Notes: *Zornia megistocarpa* is distinguished by its prostrate, sericeous stems combined with ovate, also sericeous, leaflets and bracteoles.

Representative specimen examined: MEXICO. Oaxaca: Cerro de Picacho, s.d., *Purpus* 7202 (NY).

***Zornia melanocarpa* Fort.-Perez, Syst. Bot. 41(2): 299. 2016.**

Fig. S2

Type: BRAZIL. Minas Gerais: Parque Estadual do Rio Preto, São Gonçalo do Rio Preto, 24 February 2015, *Fortuna-Perez, Vatanparast, Cândido, Soldevila & Zeferino* 2100 (holotype BOTU-39518!; isotypes BOTU-39519!, OUPR, US).



Figure 10. *Zornia mitziana* **A.** Leaf with 4 leaflets, stem, and stipules **B.** Inflorescence spiciform with obovate, hirsute bracteoles; *Zornia leptophylla* **C.** Loment detail **D.** Flower detail **E.** Leaves with 2 linear leaflets. (Photos: R.T. Queiroz).



Shrub to ca. 15 cm tall. Stems erect, not branched, villous. Leaves with 2 leaflets, petiolate. Leaflets 7–20 × 1.5–10 mm, elliptic to ovate, villous. Stipules lanceolate, 5–7 veined. Inflorescences spiciform, axillary, 5 cm long. Bracteoles 5–7 × 2–4 mm, lanceolate, 5–6 veined, punctate, villous, green. Loment with 2 articles; articles 1.6–2 × 1–1.2 mm, reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Brazil, endemic. This species occurs in the Espinhaço range, growing in the *Campo rupestre* vegetation of the Savanna biome.

Conservation Status: Data Deficient (DD). *Zornia melanocarpa* is currently known from only a single collection from the Espinhaço mountain range, an important biodiversity hotspot in Brazil. It is currently classified as DD due to a lack of information about its threats (EOO=0.000 km²; AOO=4.000 km²).

Notes: *Zornia melanocarpa* is distinguished by its shrubby growth habit, with erect, unbranched, villous stems, and by its loment, characterized by two articles and the absence of trichomes.

Representative specimen examined: **BRAZIL. Minas Gerais:** Parque Estadual do Rio Preto, São Gonçalo do Rio Preto, 18°07'45.1" S; 43°21'58.7" W, 993 m alt., 24 February 2015, *Fortuna-Perez, Vatanparast, Cândido, Soldevila & Zeferino 2100* (BOTU).

***Zornia microphylla* Desv., Mem. Soc. Linn. Par. 4: 325. 1826.**

Fig. S1

Type: **SAINT LUCIA.** January 1821, *Plee s.n.* [neotype P-02142437! designated by R.H. Mohlenbrock (1961)]. Shrub to ca. 40 cm tall. Stems prostrate, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 2.2–15 × 2.6–8 mm, ovate to obovate, glabrous. Stipules lanceolate, 1–3 veined. Inflorescences spiciform, axillary, 15 cm long. Bracteoles 5–6.3 × 1.7–2.5 mm, elliptic to lanceolate, 1–3 veined, punctate, glabrous, green. Loment with 3–7 articles; articles 1.5–2.1 × 1.7–2.4 mm, reticulate-veined, bristle-like trichomes 0.5 mm long.

Distribution and habitat: Antigua, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Guadeloupe, Guyana, Saint Lucia, Trinidad and Tobago, Venezuela. It occurs in Tropical Dry Forest.

Conservation Status: Vulnerable (VU). The fact that the species occurs mostly on islands adds to its vulnerability, due to a limited AOO (EOO=1,561,277.527 km²; AOO=236.000 km²).

Notes: *Zornia microphylla* is distinct from the other species by its prostrate stems and small (2.2–15 × 2.6–8 mm) ovate to obovate leaflets.

Representative specimen examined: **ANTIGUA.** Near Tyrrells, s.d., *Box 1123* (US). **BARBADOS.** Turners Hall Wood, s.d., *Eggers 7160* (P). **CUBA.** Pinar del Rio, s.d., *Wright 2308* (P). **DOMINICA.** Hampstead, s.d., *Lloyd 621* (NY).

DOMINICAN REPUBLIC. Between Bayaguena and Guerra, s.d., *Howard & Howard 9538* (NY). **GUADELOUPE.** s.loc., s.d., *Richard s.n.* (P). **MARTINIQUE.** Fort de France, s.d., *Duss 1046* (US). **ST. GEORGE.** Mardigras, s.d., *Way 1816* (NY). **TRINIDAD AND TOBAGO.** s.loc., s.d., *Sieber 246* (P). **VENEZUELA. Dpto. Pedro Camejo:** Parque Nacional “Santos Luzardos”, 31 March 1989, *G. Aymard s.n.* (MO).

***Zornia mitziana* Sousa Costa, Daphne 1(2): 16. 1991.** Figs 10, S1

Type: **BRAZIL. Minas Gerais:** Bonfinópolis, Urucuaia, 4 February 1989, *Brandão 11667* (holotype PAMG-56862!). Shrub to ca. 60 cm tall. Stems decumbent, branched, sericeous. Leaves with 4 leaflets, petiolate. Leaflets 10–40 × 5–9 mm, lanceolate, sericeous. Stipules elliptic, 3–5 veined. Inflorescences spiciform, axillary, 25 cm long. Bracteoles 10–15 × 8.5–10 mm, obovate, 5–11 veined, punctate, hirsute, green. Loment with 4–5 articles; articles 1.5–2 × 1.5–2 mm, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Brazil, endemic. It occurs in the Cerrado vegetation of the Savanna biome.

Conservation Status: Data Deficient (DD). There are only four known records of *Zornia mitziana*, and the available data is insufficient to conduct a precise conservation assessment.

Notes: *Zornia mitziana* morphologically resembles *Z. glaziovii*, but it differs by stipule morphology and inflorescences dimensions. In *Z. mitziana* the stipules are elliptic (vs. lanceolate in *Z. glaziovii*), and its inflorescences are up to 25 cm long (vs. 7 cm long lanceolate in *Z. glaziovii*).

Representative specimen examined: **BRAZIL. Goiás:** BR-050, Ipameri, km 88, as margens do Rio Imburucu, Campo Alegre de Goiás, 12 March 1989, *T.P. Cavalcanti 415* (K). **Minas Gerais:** Bonfinópolis, estrada para Unai, 4 March 1989, *M. Brandão 11667* (PAMG).

***Zornia multinervosa* Burkart ex Bacigalupo, Darwiniana 21 (1): 174. 1977.**

Figs 9F, S4

Type: **ARGENTINA. Entre Ríos:** Federación, *Burkart 30855* (holotype SI-I019205!, isotype CTES-0000690!). *Zornia reticulata* Sm. var. *neurada* Vogel, *Linnaea* 12: 58. 1838. **Type:** **BRAZIL. F. Sellow s.n.** (holotype K).

Shrub to ca. 20 cm tall. Stems decumbent, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 2–30 × 2–5 mm, ovate to lanceolate, glabrous. Stipules obovate to lanceolate, 5–7 veined. Inflorescences spiciform, axillary, 25 cm long. Bracteoles 7–11 × 2–5 mm, ovate, 8–9 veined, punctate, glabrous, green. Loment with 4–6 articles; articles 2–3 × 2–2.5 mm, not reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Argentina, Brazil, Paraguay. It occurs in Savanna.

Conservation Status: Vulnerable (VU). The species has an AOO of only 104,000 km² and an EOO of 373,332.111 km².

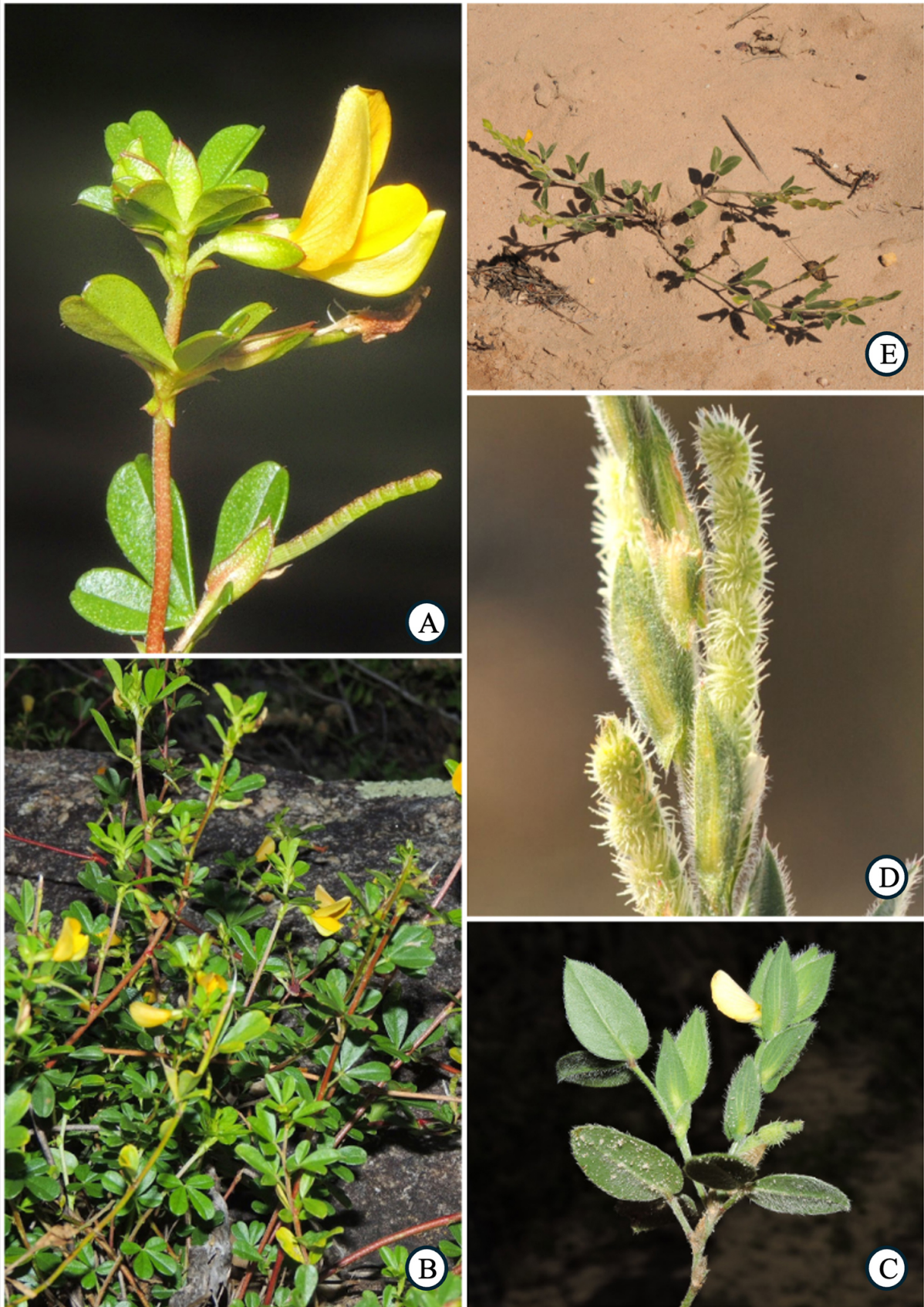


Figure 11. *Zornia myriadena* **A.** Solitary flower, loment lacking trichomes **B.** Stems decumbent, branched; *Zornia sericea* **C.** Inflorescence, bracteoles lanceolate and sericeous **D.** Fruits **E.** Shrub in habit. (Photos A, B, C: R.T. Queiroz; D, E: T.M. de Lima).



Notes: *Zornia multinervosa* differs from the other species in the genus by its obovate stipules, each with 5–7 veins, and its ovate bracteoles with 8–9 veined.

Representative specimen examined: ARGENTINA.

Corrientes: Dep. Mercedes, 21 February 1984, S.G. Tressens et al. 2268 (K). **BRAZIL. Rio Grande do Sul:** Porto Alegre, 1897, Reineck & Czermak 94 (K, M, P). **PARAGUAY. Carapegna:** s.loc., 1885–95, E. Hassler 1221 (P).

***Zornia myriadena* Benth., Fl. Bras. (Martius) 15(1): 85. 1859.**

Figs 4C, 11, S2

Type: BRAZIL. Bahia: s.loc., s.d., Martius s.n. [lectotype M-0233826! designated by Fortuna-Perez and De Azevedo (2011)].

Shrub to ca. 80 cm tall. Stems decumbent, branched, glabrous to villous. Leaves with 4 leaflets, petiolate. Leaflets 5–17 × 3–6 mm, obovate, villous to glabrous. Stipules obovate, 4–6 veined. Solitary flower. Bracteoles 5–5.5 × 2–2.5 mm, elliptic, 6–7 veined, punctate, villous, green. Loment with up to 15 articles; articles 2–3 × 2–2.3 mm, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Cuba, Brazil, Jamaica. It occurs mainly in Tropical Dry Forests.

Conservation Status: Near Threatened (NT). The disjunct distribution adds complexity to the assessment, emphasizing the need for targeted conservation measures in both regions of occurrence (EOO=4,946,100.470 km²; AOO=364.000 km²).

Notes: Due to the presence of solitary flowers, *Z. myriadena* resembles *Z. echinocarpa*, but it differs by an absence of trichomes on the loment (vs. bristle-like trichomes 1 mm long in *Z. echinocarpa*).

Representative specimen examined: BRAZIL. Alagoas: Maragogi, 20 September 1954, J.I.A. Falcão et al. 1179 (RB);

Bahia: Andaraí, 12 February 1977, R.M. Harley 18568 (K, P); **Minas Gerais:** Pedra Azul, 11 December 1984, G.P. Lewis et al. 6704 (K); **Pernambuco:** Panelas, 16 September 1981, J.D.C. Arouck Ferreira 128 (K). **CUBA. Provincia of Santa Clara:** district of Cienfuegos, 8 October 1895, Rob Combs 404 (K, P). **JAMAICA.** Ashley Hall savanna, Lower Clarendon, 6 December 1917, Harris 12731 (K).

***Zornia orbiculata* Mohlenbr., Webbia 16 (1): 118. 1961.**
Fig. S3

Type: ARGENTINA. Misiones: Candelaria, San Juan, 9 June 1947, Schwindt 301 (holotype LIL-000655!, isotype CTES-0000692!).

Shrub to ca. 30 cm tall. Stems prostrate, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 7–15 × 3–12 mm, orbiculate, glabrous. Stipules lanceolate, 5–7 veined. Inflorescences spiciform, axillary, 25 cm long. Bracteoles 5–10 × 2–5 mm, ovate, 3–7 veined, punctate, glabrous, green. Loment with 3–8 articles; articles 2–2.5 × 1.5–2 mm, not reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Argentina, Bolivia, Brazil, Peru, Uruguay. It occurs in Savanna.

Conservation Status: Near Threatened (NT). While *Zornia orbiculata* has a relatively wide distribution, it is primarily found in Pampa vegetation of southern Brazil (EOO=3,118,467.452 km²; AOO=248.000 km²).

Notes: *Zornia orbiculata* can be easily identified by its leaves with two orbiculate leaflets.

Representative specimen examined: ARGENTINA.

Corrientes: Dep. Ituzzaingó, 4 March 1987, A. Krapovickas et al. 41101 (K). **BRAZIL. Rio Grande do Sul:** Caçapava do Sul, 13 December 1997, R. Wasum et al. 12237 (M).

***Zornia pardina* Mohlenbr., Webbia 16 (1): 84. 1961.**
Fig. S5

Type: BRAZIL. Rio Grande do Sul: Torres, 19 January 1955, Rambo 56482 (holotype MO-714955!; isotype PACA-28235!).

Zornia diphylla var. *gracilis* f. *microphylla* Chodat & Hassl., Bull. Herb. Boiss. Ser. 2 (4): 888. 1904. **Type: PARAGUAY.** s.loc., 1897, Hassler 2981 (holotype G-00400364!; isotypes BM-000081072!, P-00631812!).

Shrub to ca. 80 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 13–35 × 3–15 mm, ovate to elliptic, pubescent to glabrous. Stipules elliptic to lanceolate, 6–11 veined. Inflorescences spiciform, terminal, 30 cm long. Bracteoles 8–14 × 4–6 mm, elliptic, 4–6 veined, punctate, glabrous, green. Loment with 4–7 articles; articles 1.5–3 × 1.5–2.5 mm, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Argentina, Brazil, Guyana, Paraguay, Venezuela. It occurs in Savanna.

Conservation Status: Near Threatened (NT). The disjunct distribution adds complexity to conservation planning, requiring a comprehensive and coordinated approach across the countries where *Zornia pardina* is found (EOO=7,003,218.759 km²; AOO=320.000 km²).

Notes: *Zornia pardina* morphologically resembles *Z. crinita*, but it differs by its glabrous indumentum (vs. villous to sericeous in *Z. crinita*). Also, the loment has no bristle-like trichomes in *Z. pardina* (vs. bristle-like trichomes 1 mm long in *Z. crinita*).

Representative specimen examined: ARGENTINA.

Misiones: Caniguás, 1 April 1958, J.E. Montes 27666 (NY).

BRAZIL. Goiás: Catalão, 22 January 1970, H.S. Irwin et al. 25074 (F); **Mato Grosso do Sul:** Piumhi, 21 February 1978, J. Semir et al. 7105 (UEC); **Paraná:** Jaguariáiva, 4 March 1966, J.C. Lindeman & J.H. de Haas 1454 (NY);

Santa Catarina: Capetinga, 24 January 1952, R. Reitz 6429 (PACA); **Rio Grande do Sul:** Campo Bonito, 10 February 1983, A. Krapovickas & C.L. Cristóbal 38466 (F);

Roraima: Estrada das Confianças I, II, III., Boa Vista Mun., 30 July 1986, J.A. Silva 498 (NY); **São Paulo:** Itapetininga, February 1826, Riedel 197 (P); **Tocantins:** Estrada de acesso à Carolina - MA, cerca de 3km a leste do asfalto, Barra

do Ouro, 5 March 2005, *Pereira-Silva et al.* 9808 (BOTU). **GUYANA.** s.loc., 1837, Schomburgk 257 (F). **PARAGUAY.** s.loc., 6 March 1876, *B. Balansa* 1521A (P). **URUGUAY.** s.loc., March 1945, *Rambo s.n.* (PACA). **VENEZUELA.** **Rio Meta:** La Ochovera, 28 October 1938, *J. Cuatrecasas* 4164 (F).

***Zornia piurensis* Mohlenbr., Webbia 16(1): 120. 1961.**
Fig. S3

Type: PERU. **Depto. Piura:** Prov. Huancabamba: Serran, 2 April 1939, *H.E. Stork* 11375 (holotype GH; isotypes F-0043455F!, K-000328087!, MO-277460!, UC-658225!). Shrub to ca. 50 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 12–45 × 2.8–14 mm, lanceolate, glabrous. Stipules elliptic, 3–5 veined. Inflorescences spiciform, axillary, 15 cm long. Bracteoles 9–12 × 3.7–7 mm, ovate, 5–7 veined, punctate, glabrous, green. Loment with 3–5 articles; articles 2–2.3 × 1.6–2 mm, reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Ecuador, Peru. It occurs in Montane Grassland and Tropical Dry Forest.

Conservation Status: Endangered (EN). *Zornia piurensis* has a limited geographical range, and it occupies a relatively small portion of its overall extent of occurrence (EOO=616.869.299 km²; AOO=32.000 km²).

Notes: This species is distinguished by its glabrous, punctate leaflets and its ovate bracteoles.

Representative specimen examined: ECUADOR. **Guayaquil:** near the cement mill Guayas, 15 April 1939, *Asplund* 5711 (US); **Galapagos Islands:** Albemarle Island, Tagus Cove, 24 May 1932, *Howell* 9507 (US). **PERU.** **Lambayeque:** s.loc., s.d., *Vidal-Senege s.n.* (P).

***Zornia ramboana* Mohlenbr., Webbia 16 (1): 90. 1961.**
Fig. S5

Type: BRAZIL. Rio Grande do Sul: Vila Oliva, 4 January 1934, *Rambo* 30761 (holotype LIL).

Shrub to ca. 50 cm tall. Stems erect, branched, tomentose. Leaves with 2 leaflets, petiolate. Leaflets 5–35 × 2–11 mm, ovate to lanceolate, tomentose. Stipules elliptic, 4–6 veined. Inflorescences spiciform, axillary, 20 cm long. Bracteoles 10–11.5 × 5–6 mm, elliptic, 5–8 veined, punctate, sericeous, green. Loment with 4–7 articles; articles 1–2 × 1–2 mm, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Brazil, endemic. It occurs in sandy soils of the Cerrado vegetation in the Savanna biome.

Conservation Status: Vulnerable (VU). The species only occupies a fraction of its overall extent of occurrence within Cerrado vegetation in Brazil (EOO=388,554.686 km²; AOO=208.000 km²).

Notes: *Zornia ramboana* differs from the other species of the genus by its tomentose indumentum on its stems and leaflets. It also can be identified by its elliptic, sericeous bracteoles.

Representative specimen examined: BRAZIL. **Minas Gerais:** Falcão, Ouro Preto, s.d., *J. Badini s.n.* (OUPR);

Paraná: Lapa, 17 March 1966, *G. Hatschbach* 14049 (P); **Rio Grande do Sul:** RS-625 para Minas do Camaquã (Guaritas), Caçapava do Sul, 3 December 2020, *T.C. Monteiro et al.* 379 (BOTU); **São Paulo:** São Paulo, 4 January 1934, *F.C. Hoehne* 32076 (NY); **Santa Catarina:** s.loc., s.d., *Burchell* A278-5 (K).

***Zornia reticulata* Sm., A.Rees, Cycl. 39, No 2: 205. 1818.**
Figs 9B, S2

Type: JAMAICA. s.loc., s.d., *D.J. Browne s.n.* [lectotype LINN-921.23!, designated by Fortuna-Perez and De Azevedo (2011)].

Hedysarum bifolium Vell., Fl. Flumin. 318. 1825 [1829].

Type: BRAZIL. “Habitat inter iliate pascuis Regii Praedii Sanctae Crucis” [Vellozo, 1827: tab. 147] [lectotype tab. 147 in Vellozo, 1827 (1831), designated by Fortuna-Perez and De Azevedo (2011)].

Zornia diphylla (L.) Pers. subsp. *cuyabensis* Malme, Ar^a. Bot. 23A(13): 75. 1931. **Type:** BRAZIL. **Mato Grosso:** Cuiaba, 23 November 1902, *G.O.A. Malme* 2611a (holotype S).

Zornia diphylla (L.) Pers. subsp. *subperforata* Malme, Ark. Bot. 23A(13): 75. 1931. **Type:** BRAZIL. **Rio Grande do Sul:** s.loc., November 1901, *G.O.A. Malme* 114^a (holotype S).

Zornia diphylla (L.) Pers. f. *intermedia* Chodat & Hassl., Bull. Herb. Boissier, ser. 2, 4: 888. 1904. **Type:** PARAGUAY. s.loc., December 1898–1899, *E. Hassler* 5912 (holotype G-00400371!; isotypes BM, K, P).

Zornia diphylla (L.) Pers. var. *paraguariensis* Chodat & Hassl., Bull. Herb. Boissier, ser. 2, 4: 887. 1904. **Type:** PARAGUAY. s.loc., 1898–1899, *E. Hassler* 5115 (holotype G; isotypes BM, F, K, P-02936746!, W).

Zornia diphylla (L.) Pers. f. *ciliata* Chodat & Hassl., Bull. Herb. Boissier, ser. 2, 4: 887. 1904. **Type:** PARAGUAY. “In campo pr. Lacus Ypacaray”, *E. Hassler* 3700 [lectotype G designated by Fortuna-Perez and De Azevedo (2011); duplicates BM, F, K, W].

Zornia diphylla (L.) Pers. var. *rupestris* Chodat & Hassl., Bull. Herb. Boissier, ser. 2, 4: 888. 1904. **Type:** BRAZIL. s.loc., 1900, *E. Hassler* 6453 (holotype G; isotypes BM, P, W).

Zornia diphylla (L.) Pers. f. *diversifolia* Chodat & Hassl., Bull. Herb. Boissier, ser. 2, 4: 887. 1904. **Type:** PARAGUAY. s.loc., November 1898–1899, *E. Hassler* 3449 (holotype G-00400371!; isotype BM).

Zornia ovata Vogel, Linnaea 12: 58. 1838. **Type:** BRAZIL. **Minas Gerais:** Datas, 28 October 2006, Fortuna-Perez *et al.* 125 [neotype UEC, designated by Fortuna-Perez and De Azevedo (2011)].

Zornia diphylla (L.) Pers. var. *pubescens* (Kunth) Benth., Fl. Bras. (Martius) 15(1): 82. 1859. *Zornia pubescens* Kunth, Nov. Gen. Sp. (quarto ed.) 6: 515. 1823. **Type:** COLOMBIA. Fusagasuga, s.d., A.J.A. Bonpland & F.W.H.A. von Humboldt s.n. (holotype B!, B-W 13775).

Zornia reticulata Sm. var. *punctata* Vogel, Linnaea 12: 58. 1838. **Type:** BRAZIL. s.loc., s.d., *F. Sellow s.n.* (holotype K).



Shrub to ca. 1 m tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 10–60 × 5–17 mm, elliptic to lanceolate, pilose to glabrous. Stipules elliptic, 5–9 veined. Inflorescences spiciform, axillary, 40 cm long. Bracteoles 10–15 × 5–7 mm, lanceolate, 5–9 veined, punctate, villous to glabrous, green. Loment with 4–9 articles; articles 1.4–2.5 × 1.9–2 mm, reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Antilles, Argentina, Belize, Bolivia, Brazil, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, French Guiana, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Porto Rico, Trinidad and Tobago, Venezuela. It occurs in Tropical Dry Forests and Savannas.

Conservation Status: Least Concern (LC). The extent of occurrence demonstrates that the species is found over a wide geographic range. The area of occupancy is substantial enough to indicate that the species is not severely restricted or fragmented within its overall range (EOO=30,544,071.270 km²; AOO=2,184.000 km²).

Notes: Although *Z. reticulata* can mainly be distinguished by its spiciform, axillary, and 40 cm long inflorescences, morphologically it is the most variable of all species of *Zornia*. This phenotypic plasticity may be influenced by varying environmental conditions throughout the occurrence range of the species in the Neotropics (Bradshaw, 1965; Scheiner, 1993; Schlichting 1986).

Representative specimen examined: **ANTILLES.** s.loc., 28 January 1959, G.R. Proctor 18925 (US). **ARGENTINA.** **Misiones:** Dep. San Ignacio, 26 March 1970, A. Krapovickas et al. 15717 (P). **BELIZE.** Western Highway, 11 September 1980, C. Whiteford 2466 (BM). **BOLIVIA.** **Dep. Beni:** Yacuma, Santa Ana, January 1965, O. Braun 1 (US). **BRAZIL.** **Bahia:** Mucugê, 12 March 2007, A.P. Fortuna-Perez et al. 140 (UEC); **Distrito Federal:** Brasília, 27 January 1966, H.S. Irwin et al. 12063 (NY); **Goiás:** São Domingos, 19 August 2007, A.P. Fortuna-Perez et al. 244 (UEC); **Maranhão:** Loreto, 15 March 1962, G. Eiten & L. Eiten 3812 (K); **Mato Grosso:** Cáceres, Faz. Descalvados, 4 November 1978, A. Allem et al. 2394 (NY); **Mato Grosso do Sul:** Campo Grande, Campo Grande para Aquidauana, 14 December 1976, G. Shepherd et al. 4088 (F); **Minas Gerais:** Diamantina, 27 October 2006, A.P. Fortuna-Perez et al. 122 (UEC); **Pará:** Reserva Florestal de Gorotire, Rio Fresco, 17 January 1983, G.K. Gottsberger & D.A. Posey 19–17183 (NY); **Paraná:** Jaguariaiva, 18 January 1965, L.B. Smith et al. 14745 (P); **Pernambuco:** Ibirimir, 2 June 1982, M. Ataíde et al. 48 (IPA); **Rio Grande do Sul:** São Leopoldo, February 1941, E. Leite 2420 (NY); **Rio de Janeiro:** Rio de Janeiro, 1843, M. Weddel 208 (P); **Roraima:** Alto Alegre, 17 June 1986, M.J.G. Hopkins et al. 827 (NY); **Santa Catarina:** Florianópolis, 17 March 1971, A. Bresolin 192 (NY); **São Paulo:** Distrito de Rubião Júnior, Estância Santa Catarina, Botucatu, 03 October 2015, W. Vargas 22 (BOTU). **COSTA RICA.** **Prov. Alajuela:** s.loc.,

24 November 1990, P. Döbbeler 5796 (M). **CUBA.** **Prov. Las Tunas:** Zarandico, 22 July 1996, L. Rico et al. 2120 (K). **DOMINICAN REPUBLIC.** Leonór, 5 December 1930, E.J. Valeur 576 (P). **EL SALVADOR.** **San Salvador:** s.loc., 1922, S. Calderón 1288 (US). **EQUADOR.** **Isla Puná:** s.loc., 6 May 1987, J.E. Madsen 63277 (K). **FRENCH GUIANA.** **Cayenne:** s.loc., 1859, Sagot s.n. (P). **HONDURAS.** Dursuna Forest, 4 February 1981, G.R. Proctor 38884 (BM). **JAMAICA.** s.loc., January 1850, P. Brown s.n. (K). **NICARAGUA.** **Nueva Segovia:** s.loc., 10–13 August 1977, W.D. Stevens 3291 (MEXU). **PANAMA.** **Chiriqui:** s.loc., April 1858, M. Wagner 308 (M). **PARAGUAY.** **Paraguari:** s.loc., January 1877, B. Balansa 1523 (P). **PORTO RICO.** **Bayamon:** s.loc., 22 August 1963, H.S. McKee 10597 (K). **TRINIDAD AND TOBAGO.** **Centeno:** s.loc., 2 November 1989, W. Johnson 252 (BM). **VENEZUELA.** **Bolívar:** Villa Lola, 16 August 1989, F. Zuloaga et al. 4491 (K).

Zornia sericea Moric., Pl. Nouv. Am.: 126. 1844.

Figs 11, S4

Type: **BRAZIL.** **Bahia:** Jacobina, 1837, Blanchet 2690 [lectotype G–00370156!, designated by Fortuna-Perez and De Azevedo (2011); isolectotypes: K–000205436!, NY–00625245!, P–02936740!].

Zornia latifolia DC., Prod. II: 317. 1825. nom. illeg. non Smith. 1819.

Zornia diphylla var. *latifolia* Benth. In Mart. Fl. Bras. 15 (1): 81. 1859.

Zornia diphylla subsp. *latifolia* (DC.) Malme. 1931. nom. illeg. Shrub to ca. 60 cm tall. Stems erect, branched, sericeous. Leaves with 2 leaflets, petiolate. Leaflets 7–40 × 3–20 mm, ovate to lanceolate, sericeous. Stipules elliptic, 5–9 veined. Inflorescences spiciform, terminal, 20 cm long. Bracteoles 7–15 × 4–9 mm, lanceolate, 5–9 veined, punctate, sericeous, green. Loment with 3–5 articles; articles 2.5–3 × 2–3 mm; not reticulate-veined, bristle-like trichomes 1.5 mm long.

Distribution and habitat: Bolivia, Brazil. It occurs in sandy soil of Savanna and Tropical Dry Forest.

Conservation Status: Near Threatened (NT). The species has an AOO of 736.000 km², and mostly occurs mostly occur in Caatinga and *Campo rupestre* vegetation in Brazil. (EOO=10,611,720.165 km²; AOO=736.000 km²).

Notes: *Zornia sericea* can be easily identified by the sericeous indumentum of its stems, leaflets, and bracteoles.

Representative specimen examined: **BOLIVIA.** **La Paz:** prov. Sud Yungas, Yanacachi, 27 November 1987, E. Vargas & R. Seidel 1012 (NY). **BRAZIL.** **Bahia:** Caeté-Açu, próximo à estrada para Mucugê, Palmeiras, 07 July 2024, R.P. Campos et al. 395 (BOTU); **Ceará:** Juazeiro do Norte, 25 June 1987, L. Coradin et al. 7795 (UEC); **Maranhão:** São Raimundo das Mangabeiras, 15 March 1962, G. Eiten & L. Eiten 3665 (NY); **Pernambuco:** Petrolina, 6 April 1979, L. Coradin et al. 1312 (UEC); **Piauí:** Demerval Lobão, 25 May 1980, L. Coradin et al. 2612 (UEC).

***Zornia sinaloensis* Mohlenbr., Webbia 16 (1): 49. 1961.**
Fig. S4

Type: MEXICO. Sinaloa: Santa Lucia, east of Panuco, 28 August 1935, *F.W. Pennell* 0037 (holotype US-00001989!; isotype GH-00063392!).

Shrub to ca. 30 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 10–18 × 1–1.5 mm, linear, glabrous. Stipules linear, 1 veined. Inflorescences spiciform, terminal, 5 cm long. Bracteoles 8–10 × 4–5 mm, ovate, 2–3 veined, punctate, glabrous, green. Loment with 4–5 articles; articles 2 × 2 mm, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Mexico, endemic. It occurs in Tropical Dry Forest.

Conservation Status: Data Deficient (DD). *Zornia sinaloensis* is currently known from only three localities in Mexico. The limited information available on the population sizes and their distribution means that it is not possible to accurately assess the level of threat facing this species (EOO=4,681.322 km²; AOO=12.000 km²).

Notes: *Zornia sinaloensis* is recognized by its linear leaflets and stipules, with ovate bracteoles, and by its loment which lacks bristle-like trichomes.

Representative specimen examined: MEXICO: Sinaloa: Santa Lucia, east of Panuco, 28 August 1935, *F.W. Pennell* 0037 (US).

***Zornia subsessilis* Fort.-Perez & A.M.G.Azevedo, Brittonia 60(3): 271. 2008.**

Figs 4A, 12, S1

Type: BRAZIL. Minas Gerais: Serra do Cabral, a 3 km de Armazém da Lage, Joaquim Felício, *Fortuna-Perez et al.* 105 (holotype UEC-142241!; isotypes HUEFS-142241!, K-000555222!, MBM-348024!, NY-01043477!, HUEFS-142241!, K-000555222!).

Shrub to ca. 1.60 m tall. Stems erect, branched, glabrous. Leaves with 4 leaflets, sessile or subsessile. Leaflets 6.7–52.5 × 0.6–7.4 mm, lanceolate to linear, glabrous. Stipules lanceolate, 3–4 veined. Inflorescences spiciform, terminal, 50 cm long. Bracteoles 5–10 × 2–5 mm, elliptic, 4–5 veined, punctate, villous, green. Loment with 2–4 articles; articles 4–5 × 2–3 mm, reticulate-veined; bristle-like trichomes 3.5 mm long.

Distribution and habitat: Brazil, endemic. It occurs in sandy soil at high elevation (1200 m) of the *Campo rupestre* vegetation in the Savanna biome.

Conservation Status: Endangered (EN). *Zornia subsessilis* is limited to a single mountain, the Serra do Cabral region, in the state of Minas Gerais (EOO=362.788 km²; AOO=44.000 km²).

Notes: *Zornia subsessilis* can be distinguished from other 4-foliolate species of *Zornia*, primarily by its almost sessile leaves. Additionally, the leaflets are lanceolate on the basal portion of an individual plant and linear on the apical portion. The inflorescences are spiciform, terminal and ca. 50 cm long.

Zornia subsessilis has a xylopodium, which enables it to regenerate after fire. In regions where human-induced fires are prevalent and for a species with a limited distribution, the presence of this adaptive trait is vital for its survival. However, despite this characteristic, there are concerns over the longer-term survival of the species.

Representative specimen examined: BRAZIL. Minas Gerais: Parque Estadual da Serra do Cabral, Buenópolis, 4 November 2022, *L.C. Zeferino et al.* 132 (BOTU).

***Zornia tenuifolia* Moric., Pl. Nouv. Am. 132. 1844.**

Fig. S2

Type: BRAZIL. Bahia: Jacobina, Serra do Açuruá, June 1844, *J.S. Blanchet* 3794 (holotype G-00370158!; isotype BR!, F-0093435F!, K-000848813!, MO-714957!, P-02142442!).

Shrub to ca. 80 cm tall. Stems erect, branched, glabrous. Leaves with 4 leaflets, petiolate. Leaflets 5–35 × 1–3.5 mm, filiform, glabrous. Stipules elliptic, 3–6 veined. Inflorescences spiciform, axillary, 25 cm long. Bracteoles 4–6 × 2–3 mm, elliptic, 4–6 veined, punctate, sericeous, green. Loment with 4–5 articles; articles 2–2.8 × 2–2.5 mm, reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Brazil, endemic. It occurs in the Caatinga vegetation of Tropical Dry Forest.

Conservation Status: Endangered (EN). Considering the species is endemic to Brazil and occurs exclusively in the caatinga region, *Zornia tenuifolia* faces significant threats to its survival (EOO= 140,485.652 km²; AOO= 60.000 km²).

Notes: *Zornia tenuifolia* can be distinguished by its filiform leaflets, and its elliptic stipules and bracteoles.

Representative specimen examined: BRAZIL. Bahia: Gentio do Ouro, 24 August 2007, *A.P. Fortuna-Perez et al.* 275 (UEC).

***Zornia thymifolia* Kunth, Nov. Gen. et Sp. 6: 514. 1824.**

Figs 12, S1

Type: MEXICO. Chihuahua: gravelly plains near Chihuahua, October 1886, *C.G. Pringle* 726 (Neotypification here designated: W-0272598!; isoneotypifications CAS-00005028!, MEXU-01169209!, NDG-27133!, NY-01546367!, NY-01546368!, P-02936702!, P-02936703!, P-02936704!, P-02936705!, US-000838667!).

Shrub to ca. 30 cm tall. Stems prostrate, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 5–14 × 3–6 mm, lanceolate, glabrous. Stipules elliptic, 3–5 veined. Inflorescences spiciform, axillary, 15 cm long. Bracteoles 5–10 × 3–5 mm, ovate, 5–7 veined, punctate, glabrous, green. Loment with 2–4 articles; articles 1.5–2 × 1.5–2 mm, reticulate-veined, bristle-like trichomes 0.5 mm long.

Distribution and habitat: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua. It occurs mainly in Tropical Dry Forest.

Conservation Status: Vulnerable (VU). *Zornia thymifolia* occupies a fragmented AOO of its overall extensive range



in the Central America and Mexico (EOO=1,209,460.180 km²; AOO=192.000 km²).

Notes: This species is identified by its glabrous indumentum and its ovate bracteoles.

Mohlenbrock (1961) designated *Pringle* 726 as a neotype for *Zornia thymifolia*, but he did not specify a particular specimen from amongst the multiple duplicates of this collection. Therefore, a second-step neotypification is presented here.

Representative specimen examined: EL SALVADOR.

Ahuagapan: Sierra de Apaneca, Fina Colima, s.d., *Standley* 20113 (NY). **GUATEMALA. Alta Verapaz:** Cohan, s.d., *von Tuerckheim* 8495 (US). **HONDURAS. El Paraiso:** Guinope, s.d., *Rodriguez* 1677 (F). **MEXICO. Chiapas:** Tonala, s.d., *Nelson* 2896 (US).

***Zornia trachycarpa* Vogel, Linnaea 12: 60. 1838.** *Zornia diphylla* var. *trachycarpa* (Vogel) Benth., Fl. Bras. (Martius) 15(1): 82. 1859.

Fig. 13, S2

Type: BRAZIL. “In Brasil. Merid.”, s.d., *F. Sellow s.n.* (holotype K-000328081!). *Zornia linearifoliolata* N.F.Mattos, Loefgrenia 90:1. 1986. **Type: BRAZIL. Rio Grande do Sul:** Viamao, 22 February 1984, S.T.S. Miotto, M. Sobral & J. Waechter 938 (holotype ICN).

Shrub to ca. 80 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 12–66 × 0.5–8 mm, linear to lanceolate, glabrous. Stipules elliptic to lanceolate, 5–8 veined. Inflorescences spiciform, axillary, 40 cm long. Bracteoles 5–16 × 2–5 mm, elliptic to lanceolate, 5–7 veined, punctate, glabrous, green. Loment with 3–8 articles; articles 2–3 × 1.5–2 mm, reticulate-veined, bristle-like trichomes 3.5 mm long.

Distribution and habitat: Argentina, Brazil, Paraguay, Uruguay. It occurs in the Savanna.

Conservation Status: Vulnerable (VU). *Zornia trachycarpa* has a limited AOO of 132.000 km² within its overall range (EOO=968,364.473 km²; AOO=132.000 km²).

Notes: *Zornia trachycarpa* is distinguished from the other bifoliate species of the genus by its loment trichomes 3.5 mm long.

Representative specimen examined: ARGENTINA.

Chaco: colônia Vanguardia, May 1876, *M. Calot* 56 (P). **BRAZIL. Rio Grande do Sul:** Porto Alegre, 1833, *C. Gaudichaud* 1484 (P). **PARAGUAY. Cordillera de Altos:** s.loc., November 1902, *K. Fiebrig* 401 (K). **URUGUAY.** s.loc., 1816, *A. Saint-Hilaire* 2371 (P).

***Zornia ulei* Harms, Bot. Jahrb. Syst. 42: 213. 1908.**

Figs 4D, 13, S4

Type: BRAZIL. Bahia: Remanso, 1 January 1907, *Ule* 7201 (holotype: K-000205311!; isotypes: F-0BN002254!, G-00370180!, HBG-518944!, L-0416939!).

Shrub to ca. 40 cm tall. Stems prostrate, branched, villous. Leaves with 4 leaflets, petiolate. Leaflets 10–25 × 5–15 mm, ovate to obovate, pubescent. Stipules lanceolate, 5–7 veined. Inflorescences spiciform, axillary, 7 cm long. Bracteoles 10–15 × 5–7 mm, oblong, 5–8 veined, punctate, villous, green. Loment with 3–4 articles; articles 1.5–2 × 1.5–2 mm, not reticulate-veined, bristle-like trichomes absent.

Distribution and habitat: Brazil, endemic. It occurs in sandy soil of the Caatinga vegetation, in Tropical Dry Forests.

Conservation Status: Endangered (EN). For over a century, *Z. ulei* remained known only from the type collection from the state of Bahia. However, recent field surveys have provided more information about the distribution of *Z. ulei*. In 2022, a new population of the species was discovered in the state of Pernambuco, Brazil, extending the known range of the species. Despite the new discovery, the AOO of *Z. ulei* remains limited (EOO=1,561,277.527 km²; AOO=236.000 km²).

Notes: *Zornia ulei* is commonly known as “trevo-do-brejo”. It differs from other morphologically similar species by its leaves with 4 obovate leaflets, villous bracteoles, and its inflorescences 7 cm long.

Representative specimen examined: BRAZIL. Bahia:

Lago de Sobradinho, Ilhas dos Americanos, Casa Nova, 16 August 2014, *A.P. Fontana* 8312 (HUEFS). **Pernambuco:** Bairro Loteamento Recife, rua 34, Petrolina, 26 December 2022, *R.T. Queiroz* 1700 (HVASF).

***Zornia venosa* Mohlenbr., Webbia 16(1): 80, f. 15 & 58. 1961.**

Fig. S4

Type: MEXICO. Chihuahua: Municipio de Temosachic, 8 miles S of Temosachic, 21 September 1939, *C.H. Müller* 3397 (holotype F-0059983F!; isotype UC-720055!)

Shrub to ca. 40 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 7–24 × 3.5–13 mm, lanceolate, glabrous. Stipules elliptic, 3–5 veined. Inflorescences spiciform, axillary, 10 cm long. Bracteoles 7–12 × 5–9 mm, ovate, 5–9 veined, punctate, glabrous, green. Loment with 3–5 articles; articles 2–2.5 × 2–2.2 mm, reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Mexico, endemic. It occurs in Tropical Dry Forest.

Conservation Status: Data Deficient (DD). There is a lack of data on the distribution of *Z. venosa*, with only three known occurrences (EOO= 357,928.549 km²; AOO= 16.000 km²).

Notes: *Zornia venosa* morphologically resembles *Zornia piurensis*, but differs by the size of its loment articles (2–2.5 × 2–2.2 mm vs. 2–2.3 × 1.6–2 mm in *Z. piurensis*), and its inflorescences spiciform 10 cm long (vs. inflorescences spiciform 15 cm long in *Z. piurensis*).

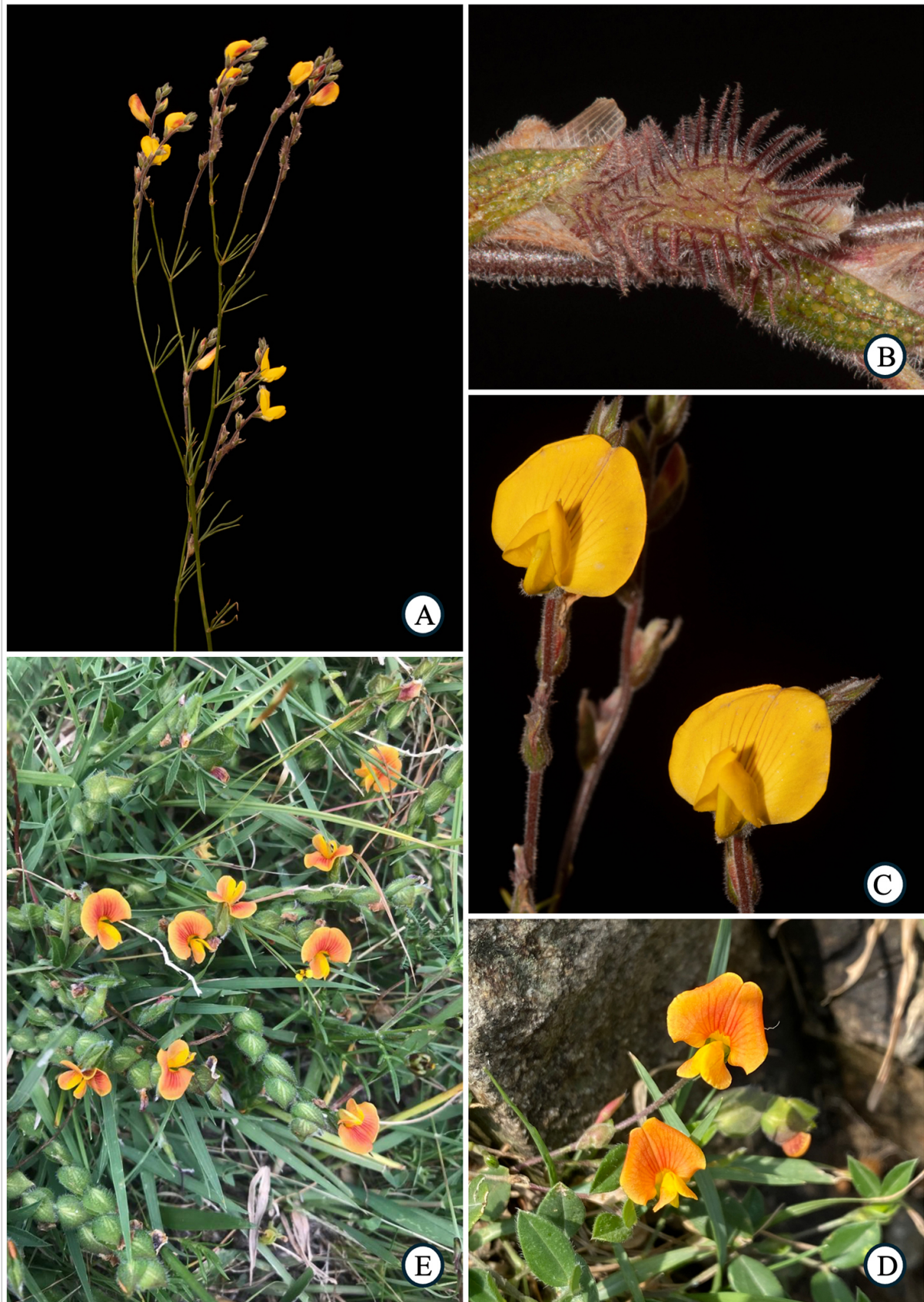


Figure 12. *Zornia subsessilis* **A.** Habit with erect, branched stems **B.** Loment articles **C.** Inflorescences spiciform terminal; *Zornia thymifolia* **D.** Flowers **E.** Inflorescences with obovate bracteoles, stems prostrate. (Photos A, B: T.C. Monteiro D, E: J.C.G. Morales).



Representative specimen examined: MEXICO. Durango: La Providencia, n.d., *Nelson 4973* (US). **Jalisco:** 11 miles SE of Lagos de Moreno, n.d., *Vaugh 12803* (US).

***Zornia vichadana* (Killip ex Mohlenbr.) Fort.-Perez & A.M.G.Azevedo, Novon 21: 336. 2011.** *Zornia pardina* Mohlenbr. var. *vichadana* Killip ex Mohlenbr., *Webbia* 16(1): 87. 1961.

Fig. S2

Type: COLOMBIA. El Vichada: s.loc., 1 May 1939, *O. Haught 2797* (holotype US-00001992!; isotype US-00001991!).

Shrub to ca. 80 cm tall. Stems erect, branched, glabrous. Leaves with 2 leaflets, petiolate. Leaflets 5–30 × 4–15 mm, elliptic to lanceolate, sericeous. Stipules elliptic, 5–7 veined. Inflorescences spiciform, axillary, 40 cm long. Bracteoles 6–9 × 2–3 mm, lanceolate, 5–6 veined, punctate, sericeous, green. Loment with 5–7 articles; articles 2 × 2 mm, reticulate-veined, bristle-like trichomes 1 mm long.

Distribution and habitat: Colombia, Brazil, French Guiana. It occurs in Savanna.

Conservation Status: Data Deficient (DD). There is insufficient data available to assess the extinction risk of *Zornia vichadana* (EOO=226.884.263 km²; AOO=40.000 km²).

Notes: *Zornia vichadana* morphologically resembles *Z. pardina*, but differs by its lanceolate, sericeous bracteoles (vs. ovate and glabrous on *Z. pardina*).

Representative specimen examined: BRAZIL. Roraima: BR-401, Colônia do Cantá, km 21, Boa Vista, 28 November 1981, *L. Coradin et al. 5055* (BOTU).

***Zornia villosa* (Malme) Herter, Revi. Sudamer. Bot. 7: 210. 1943.** *Zornia latifolia* var. *villosa* Malme, *Ark. Bot.* 23A(13): 24. 1931.

Fig. S3

Type: ARGENTINA. Misiones: Posadas, Bonpland, 11 January 1908, *E.L. Ekman 1700* (holotype NY-01477289!; isotype S-1212677!).

Zornia vestita Mohlenbr., *Webbia* 16(1): 97. 1961. **Type: BRAZIL. São Paulo:** Itirapina, 22 January 1951, *G.A. Black 51-11117* (holotype IAN).

Shrub to ca. 50 cm tall. Stems erect, branched, villous. Leaves with 2 leaflets, petiolate. Leaflets 10–50 × 5–20 mm, lanceolate, pubescent. Stipules elliptic, 5–6 veined. Inflorescences spiciform, axillary, 30 cm long. Bracteoles 11–15 × 4–7 mm, lanceolate, 5–8 veined, punctate, villous, green. Loment with 4–7 articles; articles 2 × 2 mm, reticulate-veined, bristle-like trichomes 0.5 mm long.

Distribution and habitat: Argentina, Brazil, Uruguay. It occurs mainly in Savanna.

Conservation Status: Vulnerable (VU). The habitat of *Z. villosa* across its distribution range has been fragmented

into vulnerable isolated patches (EOO=1,934,880.012 km²; AOO=160.000 km²).

Notes: *Zornia villosa* is characterized by its villous stems and bracteoles.

Representative specimen examined: ARGENTINA.

Posadas: Bonpland, 11 January 1908, *E.L. Ekman 1700* (S). **BRAZIL. Bahia:** Espigão Mestre, 8 March 1972, *W.R. Anderson et al. 36827* (NY); **Distrito Federal:** Brasília, 2 February 1981, *E.P. Heringer et al. 6111* (M); **Goiás:** Alto Paraíso de Goiás, 20 March 1969, *H.S. Irwin et al. 24704* (NY); **Mato Grosso:** Torixore, 14 February 1974, *G. Hatschbach 34175* (Z); **Minas Gerais:** Campo Alegre, 18 November 1973, *G. Hatschbach & C. Kocziki 33381* (NY); **Paraná:** Laranjeiras do Sul, 10 December 1968, *G. Hatschbach & O. Guimarães 20617* (NY); **São Paulo:** Itirapina, 28 January 1984, *H.F. Leitão-Filho et al. 15928* (UEC); **Rio Grande do Sul:** Bom Jesus, 1 January 1947, *Rambo 35059* (NY). **URUGUAY. Rivera:** s.loc., 11 December 1997, *V.S. Neffa et al. 447* (NY).

***Zornia virgata* Moric., Pl. Nouv. Amer. 131. 1844.**

Figs 9E, S3

Type: BRAZIL. s.loc., s.d., *Martius 1116* (holotype G-00370177!; isotypes K-000328078!, M-0233830!).

Zornia paniculata N.F. Mattos, *Loefgrenia* 63:1. 1975. **Type: BRAZIL. São Paulo:** Luiz Antônio, s.d., *M. Kuhlmann s.n.* (holotype SP-001045!).

Zornia virgata var. *major* Hoehne, *Exped. Roosevelt-Rondon, Bot. 2, Bot. 48, pl. 6.* 1914. **Type: BRAZIL. Mato Grosso:** Serra do Tapirapóan, January 1914, *Hoehne 5638* (holotype R-000065373!).

Shrub to ca. 1 m tall. Stems erect, branched, glabrous. Leaves with 4 leaflets, petiolate. Leaflets 15–55 × 2–12 mm, linear to lanceolate, glabrous. Stipules lanceolate, 4–5 veined. Inflorescences spiciform, axillary, 30 cm long. Bracteoles 6–15 × 5–10 mm, elliptic, 7–10 veined, punctate, glabrous, green. Loment with 2–3 articles; articles 6–7 × 4–5 mm, reticulate-veined, bristle-like trichomes 3.5 mm long.

Distribution and habitat: Brazil, endemic. It occurs in the Cerrado vegetation of the Savanna biome.

Conservation Status: Vulnerable (VU). *Zornia virgata* has an AOO limited to southern Brazil (EOO=1,263,290.892 km²; AOO=224.000 km²).

Notes: *Zornia virgata* can be identified by its fruits, characterized by articles approximately 6–7 × 4–5 mm in size, and the bristle-like trichomes 3.5 mm long.

Representative specimen examined: BRAZIL. Distrito

Federal: Brasília, 9 March 1981, *E.P. Heringer et al. 6387* (K); **Goiás:** Abadiana, 22 May 1975, *G. Hatschbach 36693* (K); **Mato Grosso:** Cuiabá, Burity, June 1927, *D. Smith 290* (K); **Minas Gerais:** Estrada para Curvelo BR 259 km 601, Diamantina, 08 April 2008, *A.P. Fortuna-Perez 428* (BOTU); **São Paulo:** Batatais, June 1834, *Riedel 2256* (K, P).

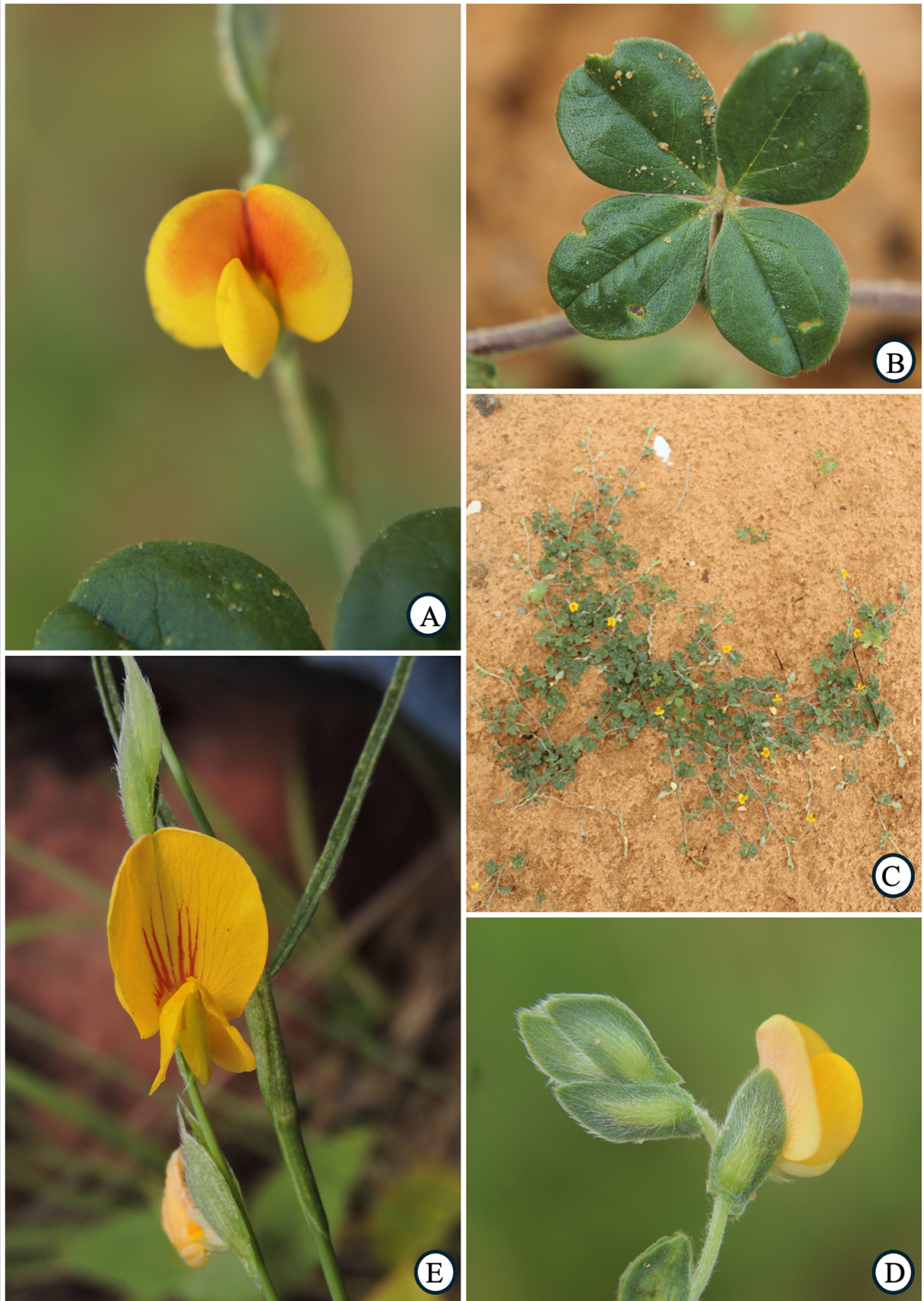


Figure 13. *Zornia ulei* **A.** Flower detail **B.** Leaf with 4 obovate leaflets **C.** Habit, with branched prostrate stems **D.** Bracteoles villous; *Zornia trachycarpa* **E.** Flower, and leaf with linear leaflets. (Photos: R.T. Queiroz)



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Authors' Contribution

Laís Couto Zeferino: conceptualization, data curation, formal analysis, funding acquisition, investigation, writing – original draft, writing – review & editing; Gwilym Peter Lewis: writing – review & editing; Flávia Fonseca Pezzini: writing – review & editing; Ana Paula Fortuna-Perez: conceptualization, supervision, funding acquisition, writing – review & editing.

Conflict of Interest

The authors declare no conflict of interest.

Supplementary Material

The following online material is available for this article:

Figure S1. Distribution maps A. *Z. afranoi*, *Z. crinita*, *Z. subsessilis*, *Z. thymifolia*; B. *Z. flemmingioides*, *Z. mitziana*; C. *Z. bracteata*, *Z. microphylla*, *Z. lasiocarpa*.

Figure S2. Distribution maps A. *Z. hebecarpa*, *Z. myriadena*, *Z. trachycarpa*; B. *Z. contorta*, *Z. confusa*, *Z. tenuifolia*; C. *Z. reticulata*; D. *Z. brasiliensis*, *Z. burkartii*, *Z. vichadana*.

Figure S3. Distribution maps A. *Z. glabra*, *Z. fimbriata*, *Z. piurensis*, *Z. laevis*; B. *Z. glaziovii*, *Z. harmsiana*, *Z. orbiculata*; C. *Z. echinata*, *Z. virgata*, *Z. echinocarpa*; D. *Z. villosa*, *Z. guanipensis*.

Figure S4. Distribution maps A. *Z. sericea*, *Z. sinaloensis*; B. *Z. cryptantha*, *Z. gardneriana*; C. *Z. multinervosa*, *Z. ulei*, *Z. decussata*, *Z. filifoliola*, *Z. megistocarpa*, *Z. venosa*; D. *Z. cearenses*, *Z. gardneriana*, *Z. grandiflora*.

Figure S5. Distribution maps A. *Z. latifolia*; B. *Z. leptophylla*, *Z. ramboana*; C. *Z. curvata*; D. *Z. herbacea*, *Z. pardina*.

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