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## *Calliandra mayana* (Leguminosae, Mimosoideae), a new narrowly endemic species from Campeche, Mexico

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### Abstract

A new species of *Calliandra* (Leguminosae, Mimosoideae, tribe Ingeae) from a restricted locality of Campeche, Mexico is herein described and illustrated. The species appears to be closely related to *C. molinae*, a species from Honduras, El Salvador and Nicaragua, from which it may be distinguished by being allopatric, and by a more limited development of suberose bark in stems and branches, comparatively smaller leaflets, consistently glabrous leaflets and corollas, and by the scarcely villous pods. *Calliandra mayana* appears to be restricted to an extremely small seasonally flooded savannah surrounded by tropical deciduous forest and, based on IUCN criteria, it is provisionally considered Critically endangered.

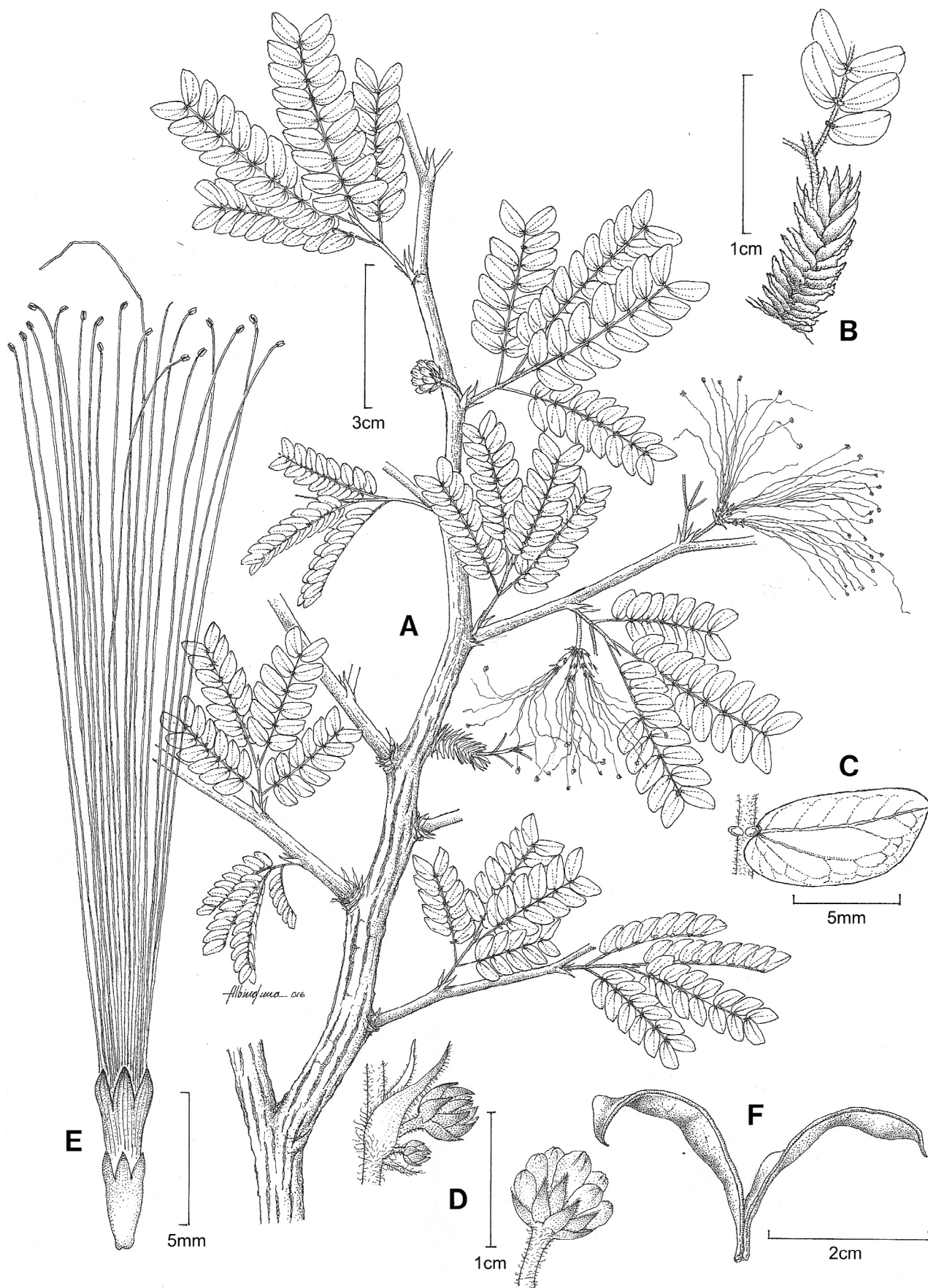
### Resumen

Se describe e ilustra una nueva especie de *Calliandra* (Leguminosae, Mimosoideae, tribu Ingeae) de una localidad restringida de Campeche, México. La especie parece estar íntimamente relacionada con *C. molinae*, que habita en Honduras, El Salvador y Nicaragua, de la cual se puede distinguir por ser alopátrica, por el desarrollo muy limitado de tejido suberoso en tallos y ramas, por los folíolos comparativamente más pequeños, por los folíolos y corolas consistentemente glabros, y por las vainas escasamente villosas. *Calliandra mayana* parece estar restringida a una pequeña sabana estacionalmente inundable rodeada de bosque tropical deciduo, y se le considera provisionalmente Críticamente amenazada, de acuerdo con los criterios de la Unión Internacional para la Conservación de la Naturaleza.

**Key words:** Calakmul, *Calliandra belizensis*, Fabaceae, Flora Mesoamerica, legumes

### Introduction

*Calliandra* Benth (1840: 138) is a genus belonging to the tribe Ingeae (Leguminosae, Mimosoideae) comprising about 135 species grouped into five distinct sections (Barneby 1998). As stated by Guinet & Hernández (1989), Hernández (1989) and Barneby (1998), the genus is characterized by a combination of characters, namely the elastically dehiscent pods, the 8-grained, bisymmetric, calymmate polyads with a mucilaginous basal appendage, and the atypical chromosome numbers ( $n = 8$  and  $11$ ). Souza *et al.* (2013) carried out a phylogenetic analysis using morphological and molecular data [nrDNA (ITS) and cpDNA (trnL-F)], concluding that the American species of *Calliandra*, including genus *Guinetia* L. Rico & M. Sousa (1999: 977) later transferred to *Calliandra* [*C. tehuantepecensis* (L. Rico & M. Sousa) E.R. Souza L.P. Quiroz (2013: 1215)], form a monophyletic group. Species are distributed from northern Mexico and southern United States to northern Argentina, northern Chile and Uruguay, including most of Mexico, Central America, West Indies and South America (Barneby 1998). Two areas of species concentration have been identified in eastern Brazil and southern and western Mexico (Barneby 1998), and 36 species are known to occur in the latter country. Examination of specimens for the Flora Mesoamericana project lead to the detection of one new species from Campeche, Mexico, which is herein described, illustrated and mapped, and its putative taxonomic relationships are discussed.



**FIGURE 1.** *Calliandra mayana* H.M. Hern. **A.** Branchlet with inflorescence at anthesis. **B.** Brachyblast. **C.** Leaflet. **D.** Capitula with flowers in bud. **E.** Flower. **F.** Pod. Vouchers: A, C–F, *H.M. Hernández et al.* 4122 (MEXU); B, D, *Álvarez et al.* 9060 (MEXU). Drawn by Albino Luna.

## Material and Methods

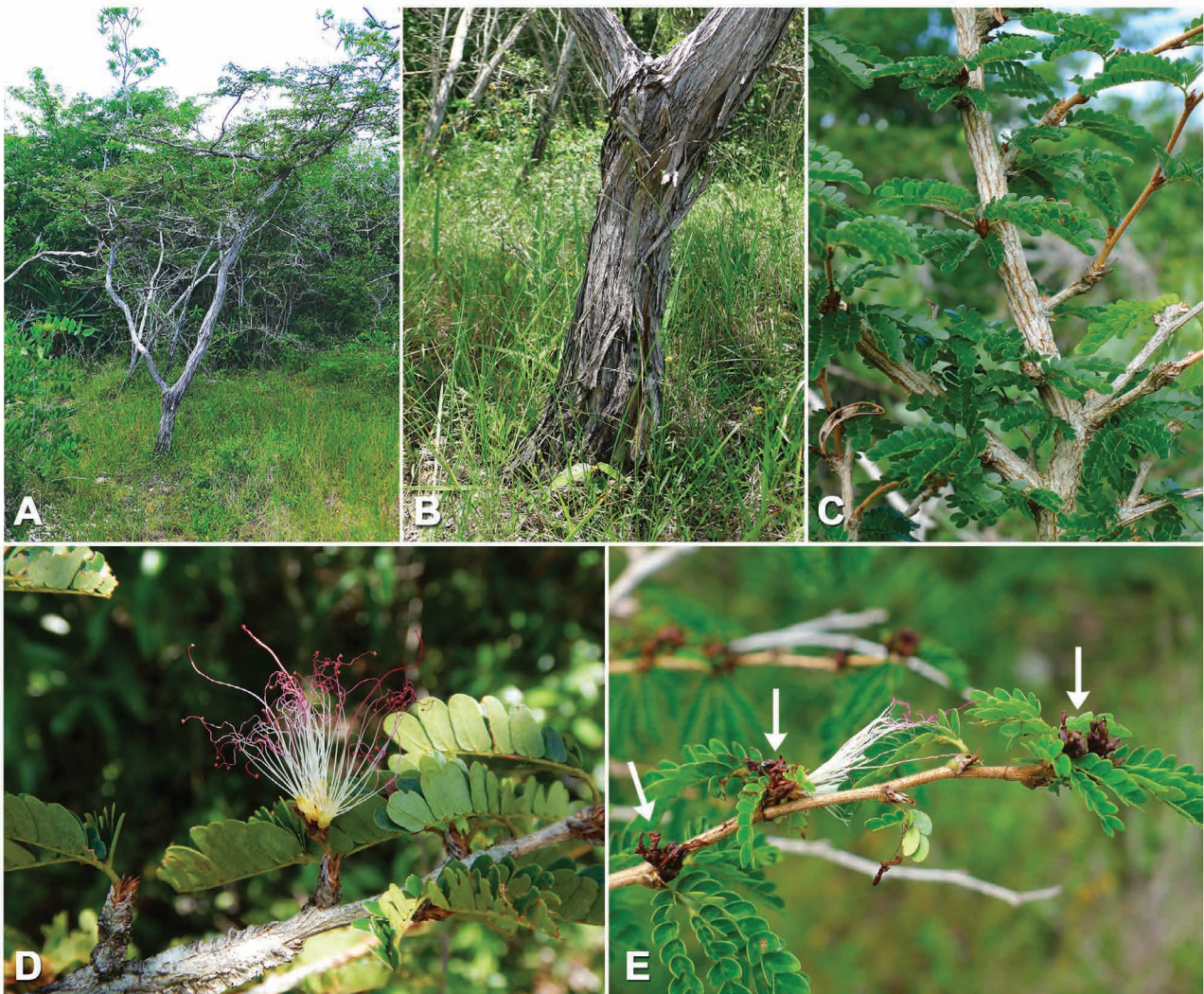
The morphological descriptions and comparisons were based on observations under a stereomicroscope of herbarium specimens at CICY, DS, ENCB, K, MEXU, MICH, MO, NY, S, TEX, UC, US, XAL (herbarium acronyms according to Thiers, 2017+), and on material collected in the field by the authors. Gold-coated polyads were observed on a scanning electron microscope (Hitachi, model SU1510) at the Instituto de Biología, UNAM, and measured with the aid of the ImageJ image-processing program (<https://imagej.nih.gov/ij/>). The conservation status was provisionally assessed using the Red List criteria of the International Union for Conservation of Nature (IUCN 2001). Locality data were obtained from herbarium specimens and plotted with the aid of ArcGIS software, version 9.3.

## Results

### *Calliandra mayana* H.M. Hern., *sp. nov.* (Figs. 1–3)

*Calliandra mayana* is closely related to *C. molinae* from which may be distinguished by being smaller shrubs up to 4 m (vs. 7 m), by the branchlets with bark slightly suberose (vs. thickly suberose), by the smaller petioles, rachis, rachillae and leaflets and less numerous pairs of pinnae and leaflets (vs. leaf parts larger and more numerous), and by the glabrous leaflets and corollas (vs. pubescent leaflets and villous corollas).

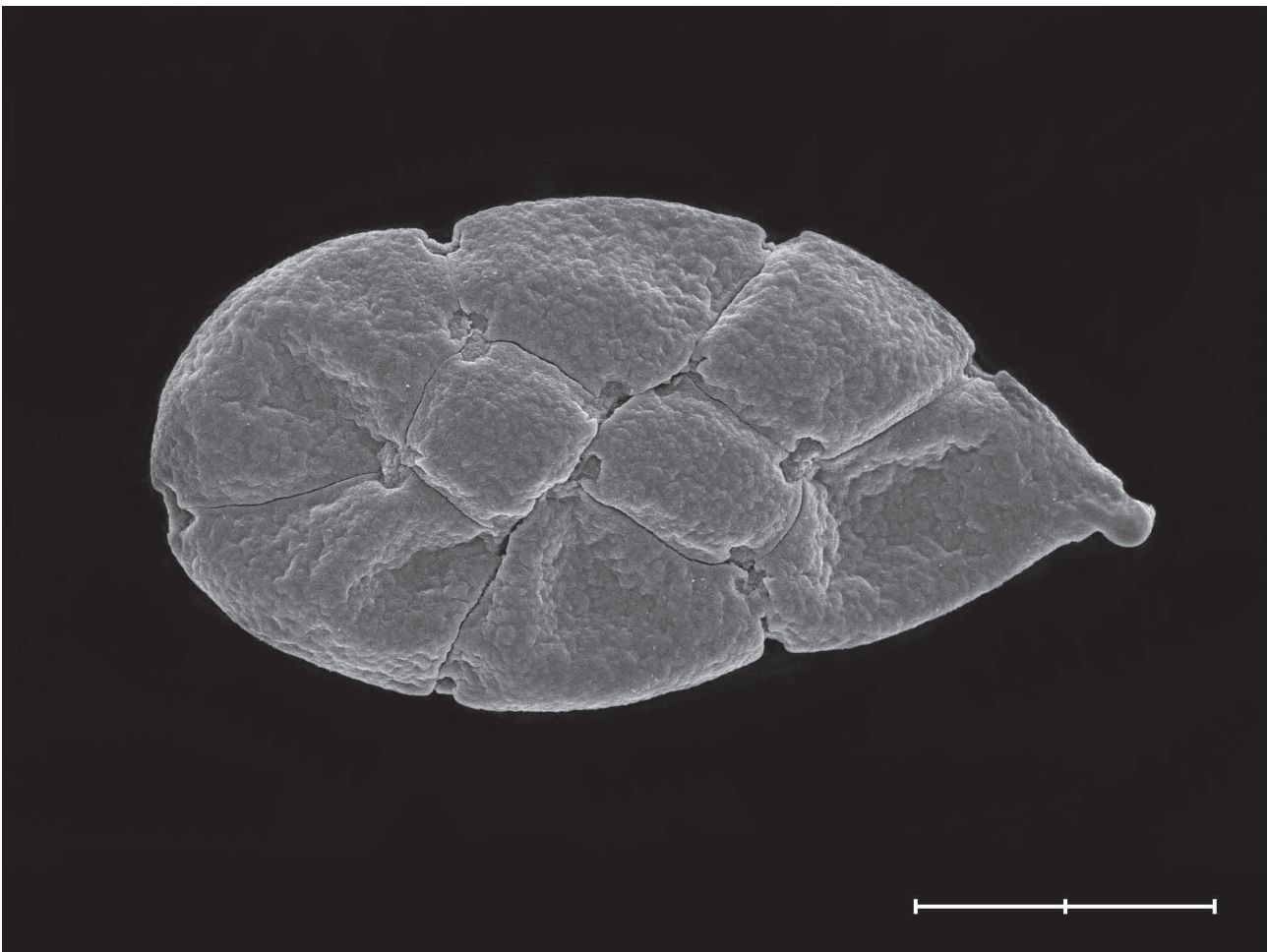
**Type**.—MEXICO. Campeche, municipality Hopelchén, 9 km S of Pachuitz, 19°4'8" N, 89°13'39" W, 80 m, 20 August 2016 (fl), *H.M. Hernández et al.* 4122 (holotype: MEXU 1446712!; isotypes: CICY!, ENCB!, K!, MEXU!, MO!, NY!, TEX!, US!, XAL!).



**FIGURE 2.** *Calliandra mayana* in its habitat. **A.** Habit. **B.** Main stem. **C.** Branch. **D.** Inflorescence with three flowers beginning anthesis. **E.** Branchlets showing remains of inflorescences damaged by Lepidoptera and Coleoptera larvae (arrows). Voucher: *H.M. Hernández et al.* 4122 (MEXU).

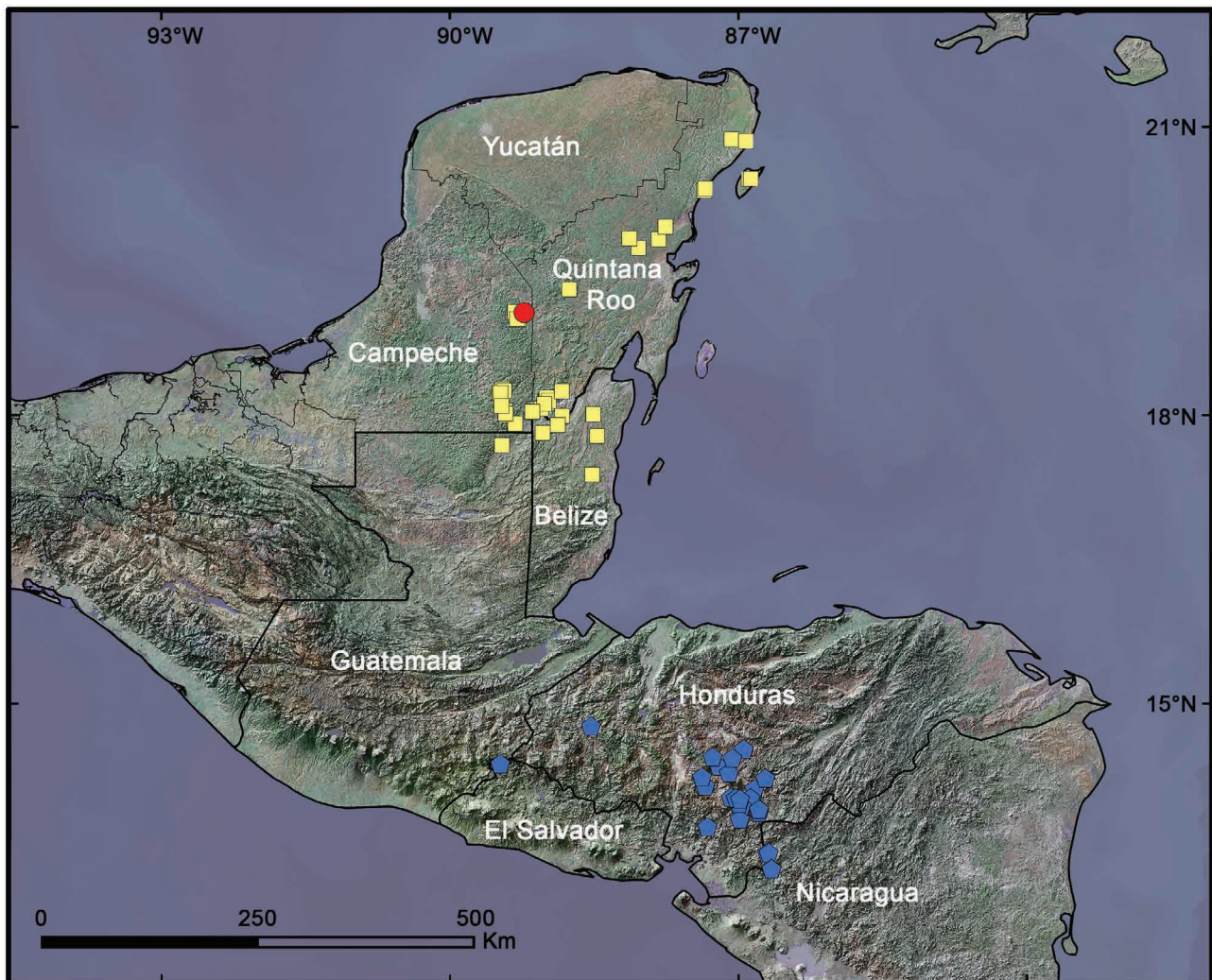
Shrubs to 4 m high, erect; stems up to 12 cm diameter at base; bark scaly, with long, longitudinal, detachable plates, woody; branchlets terete, with bark slightly suberose; stipules to 6 mm long, adpressed, triangular, narrowly triangular or lanceolate, somewhat curved, glabrous or glabrate, ciliate, persistent, densely imbricated, forming brachyblasts ca. 2(–4) cm long. Leaves usually arising from brachyblasts; pinnae (1–)2-jugate; petioles 0.3–1.1 cm long, villous; rachis (0–)0.6–1.1 cm long, villous; rachillae 2.4–4.8 cm long, villous; leaflets 7–11 pairs per pinnae, 7–11 × 3–4(–5) mm, oblong, the apical pairs obovate, thinly coriaceous, consistently glabrous at the abaxial and adaxial faces, but ciliate at margin and sometimes along the primary vein, oblique at base, rounded or minutely apiculate at apex; leaflet venation visible only under magnification, with 2 or 3 prominent veins arising from base, the thicker one eccentric, the secondary ones located on one side of the lamina, curved. Inflorescences organized in hemispheric capitula, usually arising from brachyblasts, each one with approximately 10–14 flowers; peduncles 5–9 mm long, 0.75–1 mm diameter at anthesis, always with 1–3, 2 mm long isolated bracts in the apical half, villous or glabrous. Flowers heteromorphic, 1 larger central flower with a longer staminal tube and several peripheral ones, all sessile; calyx campanulate or tubular-campanulate, membranous, striate, glabrous; corolla infundibuliform, membranous, glabrous; filaments ca. 4 cm long, white in the basal half and red in the distal half. Central flower with calyx ca. 4.5 mm long; corolla ca. 9 mm long; the staminal tube exerted, ca. 11 mm long. Peripheral flowers somewhat variable in size within one head; calyx 2–4 mm long; corolla 4–7 mm long; the staminal tube inserted, sometimes slightly exerted. Polyads 8-grained, 127–166 × 74–86 µm, flattened, bisymmetric, with a mucilaginous appendage on the basal cell. Pods erected or ascending, to 4 × 0.7 cm, rigidly coriaceous, scarcely villous, with white, short trichomes. Seeds unknown.

**Etymology:**—This species is named to honour the Maya, an indigenous people that has continuously inhabited parts of south-eastern Mexico and Central America during several millennia. The Maya civilization flourished in the Yucatan Peninsula, Chiapas, Guatemala and Belize, and the western portions of Honduras and El Salvador, from 2000 BC to 950 AD.



**FIGURE 3.** SEM micrograph of an unacetolyzed 8-grained polyad of *Calliandra mayana*. Voucher: *H.M. Hernández et al. 4122* (MEXU). Scale bar = 50 µm.

**Distribution and habitat:**—*Calliandra mayana* is currently known only from an extremely small seasonally flooded savannah area surrounded by forest in Calakmul, eastern Campeche, Mexico, close to the Quintana Roo border, at 80 meters elevation (Figure 4). The Calakmul area is the largest tract of well-preserved tropical deciduous and sub-deciduous forest in Mesoamerica.



**FIGURE 4.** Geographic distribution of *Calliandra mayana* (red dot), *C. belizensis* (yellow squares) and *C. molinae* (blue diamonds).

**Phenology:**—Flowering: June–August; fruiting: unknown.

**Conservation status:**—The new species is known only from a small area, where less than 20 individuals were detected at the edge of the savannah. Although the locality is included within the northern portion of the Calakmul Biosphere Reserve polygon, there is presence of cattle in the area and indication of recent fires is evident. In addition to its apparently small area of occupancy (<2 km<sup>2</sup>), its extremely low population number and the pressures exerted by cattle and fires, *C. mayana* appears to be under severe reproductive stress adding a further negative element to its probably critical conservation status. During a recent visit to the type locality during the flowering season, on August 2016, we noticed severe damage to most inflorescences caused by larvae of unidentified species of Lepidoptera and Coleoptera (Figure 2E). The small larvae feed on the inside of the flower buds totally consuming the stamens and pistils prior to anthesis, severely reducing the reproductive output of *C. mayana*. Although the magnitude and periodicity of this damage remains to be assessed quantitatively, we speculate that it might be extremely severe. During our visit in 2016 virtually all inflorescences were drastically damaged, and, in only few exceptional cases, 1–3 isolated flowers within a few inflorescences were able to reach normal anthesis (Figure 2D–E). Surprisingly, we were unable to see a single inflorescence with its full array of 10–14 undamaged flowers. Although the demography and reproductive biology, as well as the magnitude of the herbivore damage, of *C. mayana* need to be studied in detail, it is possible to estimate that it is a Critically endangered species, based on IUCN criteria (IUCN 2001).

**Additional specimens examined:**—MEXICO. Campeche: Hopelchén, 9.1 km S of Pachuitz, 19°4'8" N, 89°13'39" W, 109 m, 14 June 2004 (fl), *D. Álvarez et al. 9060* (MEXU); same locality, 19°4'5" N, 89°13'39" W, 119 m, 4 August 2004 (fl), *D. Álvarez et al. 10250bis* (MEXU).

## Discussion

*Calliandra mayana* belongs to section *Androcallis*, series *Androcallis* Barneby (1998: 21), which includes several microphyllid species with lateral, capitate inflorescences arising from stipulate leaf axils or from brachyblasts, never being organized into terminal, efoliate pseudoracemes. It is closely related to *C. molinae* Standley (1950: 39) as suggested by the common occurrence in both species of suberose tissue in stems, branches and branchlets, by the leaves with few [(1–)2–3] pairs of pinnae, each with a moderate number (7–13) of small leaflet pairs, heteromorphic flowers and hairy pods. However, *C. mayana* may be distinguished from that species by a more limited development of suberose bark in stems and branches, by the comparatively smaller stipules, by the smaller petioles, rachis, rachillae and leaflets and less numerous pairs of pinnae and leaflets, consistently glabrous leaflets and corollas, and by the scarcely villous pods. *Calliandra molinae* is characterized by its branches covered by a thick layer of corky bark, and by relatively larger leaf parts and consistently hairy leaflets, villous corollas, and densely pubescent or velutinous pods (Table 1). *Calliandra mayana* and *C. molinae* are restricted to south-eastern Mexico and Central America, respectively, and their geographical ranges are widely allopatric. As indicated above, the former is restricted to a single location in the Yucatan Peninsula, whereas *C. molinae* is known to occur in a larger area of Honduras, El Salvador and Nicaragua (Figure 4).

*Calliandra belizensis* (Britton & Rose 1927: 19) Standley (1929: 309) occurs in the same area as *C. mayana*, although the former occupies a larger region in parts of Campeche, Quintana Roo, Belize and Guatemala (Figure 4). This species may be easily distinguished from *C. mayana* primarily by its taller arborescent habit, larger stipules and leaf parts (petioles, rachis, rachilla, leaflets), more numerous pairs of leaflets, and by the peduncles covered by numerous, large, stipuliform bracts and the massive flowering heads (see also Table 1).

**TABLE 1.** Comparison of *Calliandra mayana*, *C. molinae* and *C. belizensis*.

	<i>C. mayana</i>	<i>C. molinae</i>	<i>C. belizensis</i>
Habit / maximum height (m)	shrubs / 4	shrubs or trees / 7	shrubs or trees / 12
Branch bark	slightly suberose	thickly suberose	woody
Stipule maximum length (mm)	6	10	20
Pairs of pinnae	(1–)2	2–3	(1–)2
Petiole length (cm)	0.3–1.1	(0.2–)0.4–1.8(–2.6)	0.4–3.3
Rachis length (cm)	(0–)0.6–1.1	(0.4–)0.6–1.4(–2.2)	(0–)0.8–2
Rachillae length (cm)	2.4–4.8	3.1–5.8(–7)	6.2–10.4
Leaflet pairs	7–11	9–13	17–27
Leaflet length × width (mm)	7–11 × 3–4(–5)	5–15 × 3–6.5	12–18 × 2–5.5
Leaflet vestiture	glabrous	pubescent	glabrous
Peduncle length × diameter (mm)	5–9 × 0.75–1	2–7(–12) × 1–1.2	4–30 × 1.4
Peduncle bract number / maximum bract length (mm)	1–3 / 2	1–3 / 2	numerous / 11
Flowers	heteromorphic	heteromorphic	homomorphic
Calyx vestiture	glabrous	glabrous or scarcely villous	glabrous
Corolla vestiture	glabrous	villous	glabrous or villous apically
Pod length × width (cm)	4 × 0.7	6.2 × 0.7	11 × 1.6
Pod vestiture	scarcely villous	densely pubescent to velutinous	villous
Geographical distribution	Campeche	Honduras, Nicaragua and El Salvador	Campeche, Quintana Roo, Belize, Guatemala

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