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Novelties in the genus *Stylosanthes* (Leguminosae, Papilionoideae, Dalbergieae) for Mexico

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Abstract

Taxonomic and molecular studies support the description of three new species of the genus *Stylosanthes* (Leguminosae, Papilionoideae, Dalbergieae), occurring in Mexico. These new species are described and illustrated. In addition, habitat data, distribution maps and comparative SEM photographs of the fruits are given for the new taxa and their related species. *Stylosanthes leticiana* has a wide distribution in Mexico and affinity with *S. humilis*. *Stylosanthes rosalindae* is distributed in central-southern Mexico, mainly in the Tehuacán-Cuicatlán Valley, and is morphologically similar to *S. subsericea* and *S. viscosa*. *Stylosanthes gretheriae* grows in western Mexico and has similarities to *S. guianensis*.

Key words: Mexico, *Stylosanthes leticiana*, *Stylosanthes rosalindae*, *Stylosanthes gretheriae*, taxonomy, Tehuacán-Cuicatlán Valley

Resumen

Estudios taxonómicos y moleculares respaldan la descripción de tres nuevas especies del género *Stylosanthes* (Leguminosae, Papilionoideae, Dalbergieae), para México. Se describen e ilustran estas nuevas especies. Además, se proporcionan datos de hábitat, mapas de distribución y fotografías comparativas del MEB de los frutos para los nuevos taxones y sus especies relacionadas. *Stylosanthes leticiana* tiene una amplia distribución en México y afinidad con *S. humilis*. *Stylosanthes rosalindae* se distribuye en el centro-sur de México, principalmente en el Valle de Tehuacán-Cuicatlán, y es morfológicamente similar a *S. subsericea* y *S. viscosa*. *Stylosanthes gretheriae* crece en el occidente de México y tiene similitudes con *S. guianensis*.

Palabrasclave: México, *Stylosanthes leticiana*, *S. rosalindae*, *S. gretheriae*, taxonomía, Valle de Tehuacán-Cuicatlán

Introduction

The genus *Stylosanthes* Swartz (1788: 108) is a member of tribe Dalbergieae in the Pterocarpus clade (Klitgaard & Lavin 2005) and is related to the genera *Arachis* Linnaeus (1753: 741), *Chapmannia* Torrey & Gray (1838: 355), *Fiebrigiella* Harmas (1908: 95), and *Fissicalyx* Bentham (1860: 79), which form a monophyletic group (Lavin *et al*. 2001). *Stylosanthes* includes 30 to 40 species of Neotropical origin, which are distributed mainly in the tropics and subtropics of Central and South America, although some species are found in the southeastern United States of America, Antilles, Galapagos Islands, southern and central Africa including Madagascar, south India, Sri Lanka and Australia (Mohlenbrock 1958, Mohlenbrock 1960, Burt *et al*. 1980, Williams *et al*. 1984). It has been considered that this genus includes three diversification centers. The first one is found in South America, while the second one comprises Mexico and Central America, and the third corresponds to the Antilles (Polhill *et al*. 1981, Stace & Cameron 1984, Sawkins *et al*. 2001). *Stylosanthes* is characterized by herbaceous or suffrutescent species, which are characterized by pedicels supported by bracteoles (1 or 2) and occasionally axis rudiment, sessile or subsessile flowers, sessile ovary, monadelphous stamens united in a generally closed and elongated tube, dimorphic anthers, and for having a biarticulated fruit or loment. The upper article has a persistent style that can be straight, uncinate, or coiled. The lower article can be abortive or, when present, fertile and glabrescent or densely hairy.

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According to literature consulted at the start of this study, Mohlenbrock (1958, 1963) recognized eight species of *Stylosanthes* in Mexico: *S. calcicola* Small (1933: 730), *S. guianensis* (Aublet 1775: 776) Swartz (1789: 301) [*S. guianensis* var. *guianensis* and *S. guianensis* var. *dissitiflora* Robinson & Seaton (1893: 105) 't Mannetje (1977: 358)], *S. hamata* [*Hedysarum hamatum*] (Linnaeus 1759: 1170) Taubert (1890: 22), *S. humilis* Kunth (1823: 506), *S. macrocarpa* S.F. Blake (1920: 47), *S. mexicana* Taubert (1890: 21), *S. subsericea* S.F. Blake (1920: 50), and *S. viscosa* Swartz (1788: 108). Different floristic studies in Mexico mentioned these species in the states of Chiapas, Nayarit, Oaxaca, Puebla, Quintana Roo and Veracruz (Breedlove 1986, Téllez & Cabrera 1987, Ibarra-Manríquez & Sinaca 1987, Dávila *et al*. 1993, Téllez *et al*. 1996). In the course of time, different techniques have been used to evaluate the taxonomic delimitation of the genus. Within these studies, it can mention those carried out by Burt *et al*. (1971, 1974), who established their own classification according to the results obtained from the use of morphological and agronomic characters of *Stylosanthes*. Their studies included 14 species in 154 different locations. Stace & Cameron (1984) characterized each section of the genus of according to the different levels of ploidy. They indicated that the polyploid taxa (2n = 40, 60) are present in *Stylosanthes* sect. *Styposanthes* Vogel (1838: 68), while the diploids occur in *Stylosanthes* sect. *Stylosanthes.* Stace & Cameron (1984) also conducted a study based on the analysis of the enzyme alcohol dehydrogenase (ADH). The electrophoretic results showed that the species *S. hamata*, *S. viscosa*, *S. humilis*, *S. guianensis* and *S. macrocarpa* are diploid. In contrast, *S. subsericea*, *S. scabra* Vogel (1838: 69), *S. fruticosa* [*Arachis fruticosa*] (Retzius 1789: 26) Alston (1931: 77) and *S. erecta* P. Beauvois (1807: 28, t. 77) have different levels of ploidy (4× and 6×). Meanwhile, Williams *et al*. (1984), began studies on the biogeographic aspects of *Stylosanthes*, to know and understand the distribution patterns of their species.

Among the works explaining the evolutionary relationships of the genus, those carried out by Gillies & Abbott (1996) were based on the variation of the chloroplast DNA of 86 samples, corresponding to 18 species. These authors used 20 samples from seven species of *Stylosanthes* and made polymorphic DNA amplifications to identify and analyse their phylogenetic relationships. Vander Stappen *et al*. (1998) recognized the existence of morphological and genetic variation in the *S. guianensis* complex, using the sequences of the ITS1 region as a molecular tool. In 1999, Vander Stappen developed and used molecular markers for studies on gene diversity and to determine inter and intraspecific relationships in *Stylosanthes*, with a perspective towards the conservation of the genetic resources of the genus. Furthermore, Vander Stappen *et al*. (2000) determined the genetic diversity between the Mexican and South American populations of *S. humilis*, through the analysis of AFLP.

As mentioned above, South America contains the largest number of species of the genus *Stylosanhtes* worldwide, with Brazil being the first center of diversification ('t Mannetje 1984, Silva *et al*. 2020). Due to the wide morphological variation among species in this genus, new species continue to be described and analyzed in different regions of Brazil (Silva *et al*. 2020, Gissi 2023). Likewise, exhaustive systematic work has been carried out, focusing primarily on morphological, anatomical, and histochemical analyses of leaflets and fruits (Silva *et al*. 2021, Gissi *et al*. 2022, 2023, 2024, 2025). This work has served as support for nomenclatural changes to intraspecific categories in *S. guianensis*, new combinations (*S. microcephala* [*S. guianensis* var. *microcephala*] (M.B. Ferreira & Sousa Costa 1979: 46) Gissi (2025: 10), *S. pauciflora* [*S. guianensis* var. *pauciflora*] (M.B. Ferreira & Sousa Costa 1990: 236) Gissi (2025: 8), and *S. pubescens* [*S. guianensis* var. *pubescens*] (Pilger 1901: 160) Gissi (2025: 9) and typifications (*S. nunoi* M.B. Ferreira 1991: 5), as well as the reestablishment of *S. pohliana* Taubert (1890: 29). These new investigations and the taxonomic re-evaluation, mainly in *S. guianensis*, facilitate the understanding of the relationships between the species of the genus *Stylosanthes*. Therefore, in this work *S. guianensis sensu lato* will be considered as a taxonomic identity.

Costa & Van den Berg (2001) described *Stylosanthes salina* Sousa Costa & Van den Berg (2001: 239) for the state of Guerrero. However, this species is not recognized in the present study because the holotype could not be located at FCME, and the populations described as *S. salina* were not found. Furthermore, the specimens collected by *L. Lozada (31, 242, 520*, and *1143*; FCME, MEXU), which had been previously identified as *S. salina*, were reviewed and redetermined as *S. viscosa*.

The studies supporting the existence of new species of *Stylosanthes* in Mexico were those conducted by Vander Stappen *et al*. (2002a), who carried out a phylogenetic analysis of the genus *Stylosanthes*, based on the molecular sequences of nrDNA (ITS1–5.8S–ITS2). These authors found that *Stylosanthes* and *Arachis* Linnaeus (1753: 741), are monophyletic groups and evidenced the origin of the allopolyploid species of *Stylosanthes*. In a second molecular report, Vander Stappen *et al*. (2002b) determined, through the sequences of cpDNA (*trn*L intron) and nrDNA (ITS), the hybrid origin of a new endemic species of *Stylosanthes* in the Yucatan Peninsula [*S. quintanarooensis* Gama & Dávila (2009: 461)]. Likewise, these authors used AFLP and ITS, to identify their diploid progenitors and genetic relationships with other species of the genus. A conclusive work that determined the macro, micromorphological and genetic diversity of the *Stylosanthes* species in Mexico was the one published by Gama-López *et al*. (2007),

who, in addition to morphologically describing the Mexican species of *Stylosanthes*, also indicated their phylogenetic relationships. This study also showed the genetic diversity of the anthracnose fungus *Colletrotrichum gloeosporioides* [*Vermicularia gloeosporoides*] (Penzig (1882: 450) Penzing & Saccardo in Penzing, (1884: 670) in relation to co-existence or interaction with its guests, in this case the species of *Stylosanthes*. The studies of Vander Stappen *et al*. (2002a) and Vander Stappen *et al*. (2002b) supported the existence of a new species for Mexico, which was described under the name of *S. quintanarooensis* (Gama & Dávila 2009). Gama-López (2006) and Gama-López *et al*. (2007) disclosed under other names, the existence of new species to be publicly validated and indicated in this work. Unfortunately, the authors did not carry out the effective publication of these new species in a timely manner. Due to this, Calles and Schultze-Kraft (2016) considered the initially proposed names invalid (*Stylosanthes pseudohumilis*, *S. tehuacanensis* and *S. guianensis* var. *occidentalis*), based on Greuter *et al*. (2025); Art. 30.9.

Consequently, and according to Greuter *et al.* 2025); Art. 32.1, three new species of the genus *Stylosanthes* are described and illustrated, providing data on the distinctive characters of each, as well as information on their habitat and distribution in Mexico.

Materials and methods

After an exhaustive bibliographic review to know the distribution of the Mexican species of *Stylosanthes* (Mohlenbrock 1958, ‘t Mannetje 1977, Williams *et al*. 1984, Téllez & Cabrera 1987, Ibarra-Manríquez & Sinaca 1987, Dávila *et al*. 1993, Téllez *et al*. 1996), and examination of herbarium specimens of national (ENCB, FCME, IBUG, MEXU and XAL) and foreign herbaria (BM, BR, F, GH, F, K, MO, NY and USA), new species of *Stylosanthes* were detected for Mexico. The information obtained allowed intensive field work to be carried out in most of the Mexican Republic, to cover the different types of vegetation and environments in which the *Stylosanthes* species grow. The field work was aimed at herborization of specimens and the collection of reproductive and foliar structures for macro and micromorphological studies.

From the collected material, samples of fruit and pollen grains were selected for observation under the scanning electron microscope (SEM), Hitachi brand, model S2460N. The samples were covered with gold in the K550-Emitech kit for 1:30 minutes. Panf-plus high sensitivity film 50 (30 × 35 mm) was used in all photographs. The selected images were printed on paper number IV UPP-110 AA (110 × 18 mm) and scanned for publication. The fruits of each species were described from the samples analyzed and new distinctive characters were detected among them. The botanical glossaries of Radford *et al.* (1974), Moreno (1987), Sousa and Zárate (1988), and Kirkbride *et al.* (2003) were used for morphological descriptions.

Based on the collected information, both from the herbarium specimens and the collected specimens, the distribution maps of the three new species, as well as their related species, were prepared. ArcMap v.10.1 (Esri, 2012) software was used to prepare these maps.

Taxonomic treatment

Stylosanthes leticiana Gama, *sp. nov*. (Figs. 1, 2, 3A–C).

Type:—MEXICO. Oaxaca: Municipality Juchitán de Zaragoza, entronque entre la carretera a Juchitán y Tuxtla Gutiérrez, 3 km al NE de La Ventosa, 16°34'29"N, 94º54'48"W, 32 m, 3 November 1993, *S. Gama-López et al. 136* (holotype MEXU!, isotypes ENCB!, IBUG!, MEXU!, MO!, NY!, UAMIZ!, XAL!).

Diagnosis:—*Stylosanthes leticiana* similis *S. humilis*, sed caulibus non viscidis; inflorescentiis longioribus quam latioribus vel tam longis quam latis; bractea extima trifoliolata; axis rudimentario absenti vel praesenti, bracteola externa una, internis duabus; fructu articulis duobus fertilibus, articulo superiore secus margines vel latera sparce hirsuto vel hirsutulo; trichomatibus glandularibus carentibus; rostro involuto, articulo inferiore omnino hirsutulo; fructus basis longiori quam latiori distinguitur.

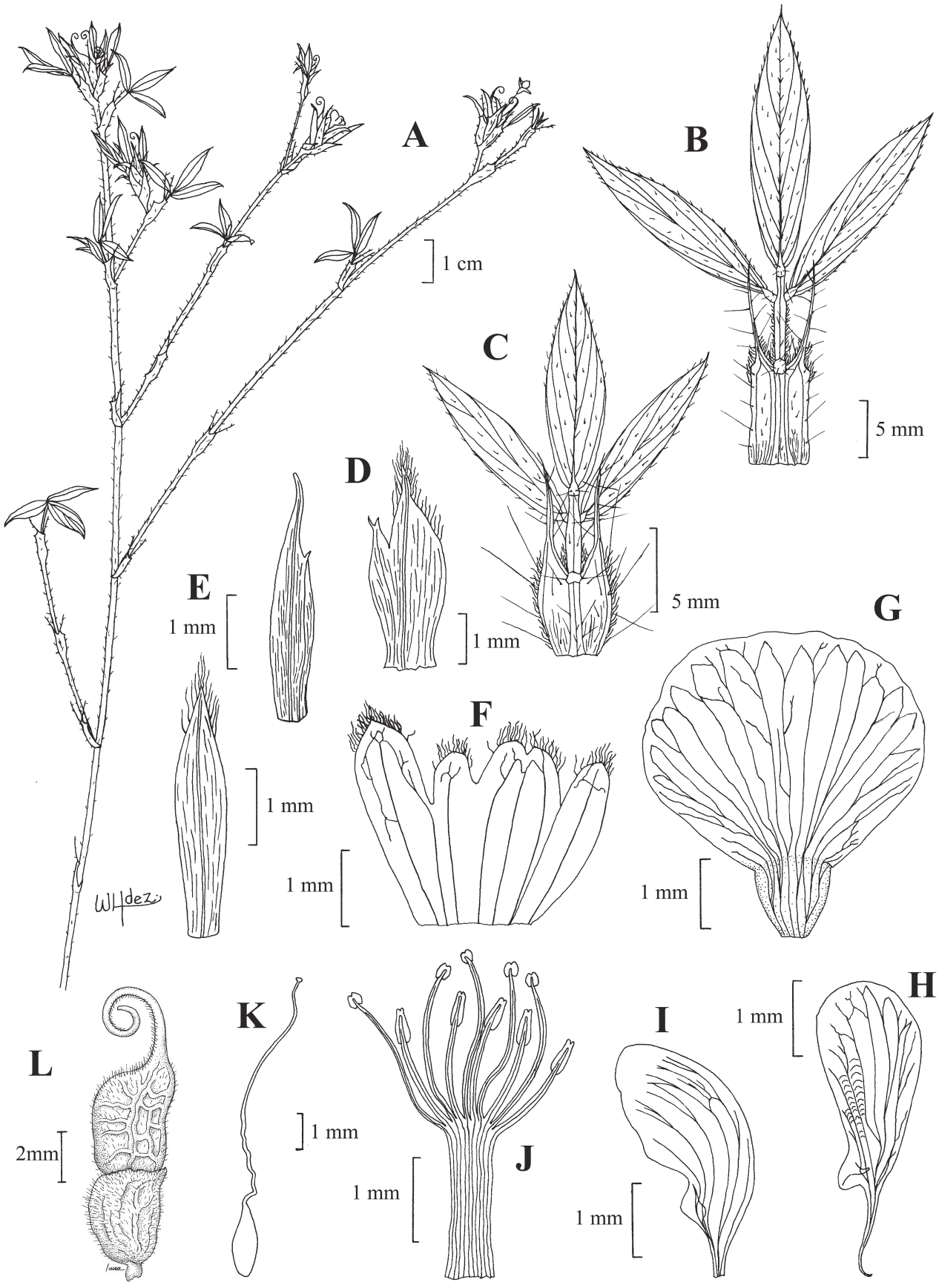

FIGURE 1. *Stytosanthes leticiana* Gama. A. Branch with inflorescences. B. Stipules with leaves 3–foliolate. C. Outermost bract 3–foliolate. D. External bracteole. E. Internal bracteoles, 2. F. Calyx. G. Standard. H. Wings. I. Keel petals. J. Androecium. K. Gynoecium. L. Fruit a loment with 2 fertile articles. Drawing by Wendy Hernández Rodríguez (A–K) and Albino Luna (L), based on the specimen S. Gama-López *et al*. 136 (MEXU, holotype).

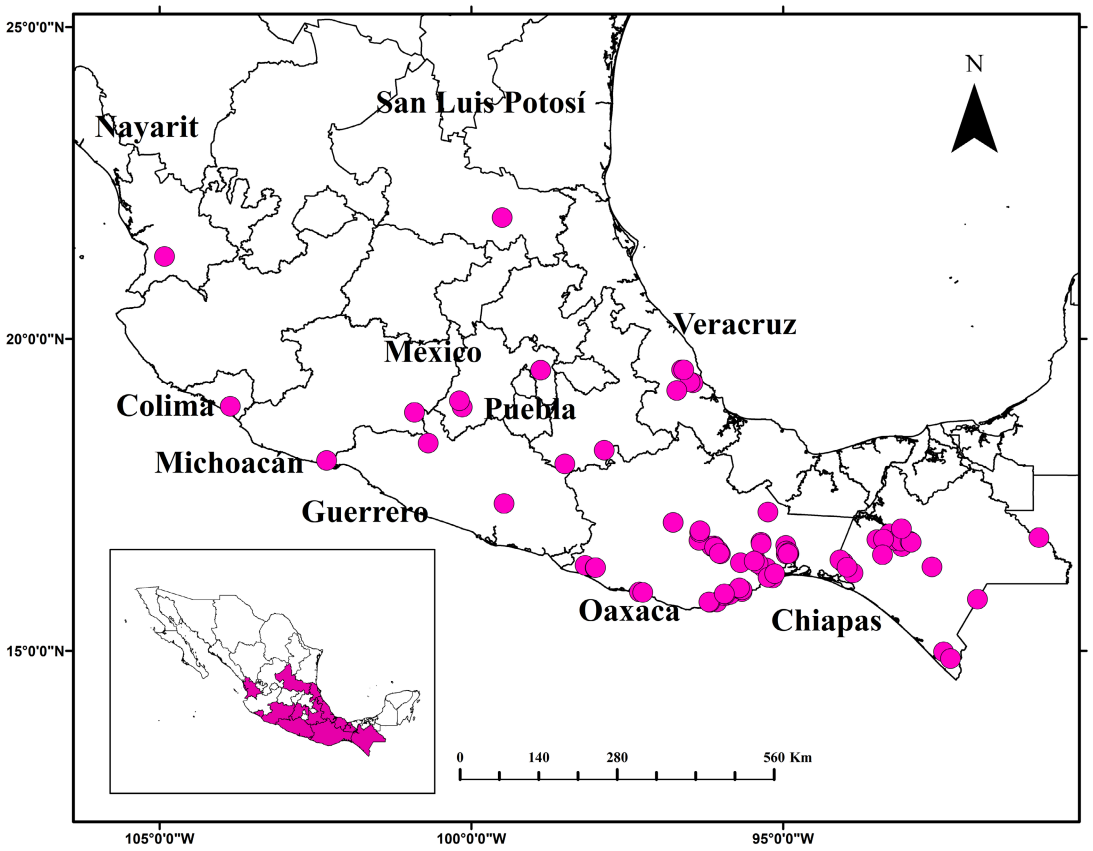

FIGURE 2. Distribution map of *Stytosanthes leticiana* Gama.

Description:—Perennial *herbs*, suffruticosus, *stems* erect or erect-decumbent, 10–45 (–50) cm high, sericeous-hirsutulous-strigose or hirsutulous-strigose, non-viscid; sericeous trichomes 0.1–0.5 mm long, the hirsutulous ones 0.6–1 mm long, the strigose ones 1–2 mm long, white-yellow, yellow to brown-yellow, distributed to one side or scattered along the stem and at the base of the stipules, internodes (1–) 1.5–4.5 cm long. *Stipules* persistent along the stem, 6–18 × 2.5–6 mm, adaxial surface glabrous or hirsutulous, abaxial surface sericeous-strigose or strigose, yellow to brown-yellow, bidentate; teeth shorter than the base of the stipule, 3–8 (–10) mm long, apex acuminate to abruptly acuminate, margin crenate; basal region of the stipule (3–) 4–8 mm long, 2–3 pairs of veins; abscission zone between the petiole and the basal region of stipule, 0.5–1.5 mm long. *Leaves* pinnate with reduced rachis giving the appearance of palmate leaves, with pulvinus, diminished petiole, 3–foliolate, lanceolate to lanceolate-elliptic, apex mucronate, margin entire or crenate, non-coriaceous, adaxial surface sericeous or sericeous-strigose, abaxial surface sericeous-strigose, the strigose trichomes arranged on the central vein and between secondary veins, macules absent, veins conspicuous, 3–4 (–5) pairs; terminal leaflet (5–) 10–28 (–35) × 1.5–5.5 mm; lateral leaflets (4.7–) 9–21 (–30) × 1.5–5 mm. *Inflorescence* paniculate, longer than wide or similar in width and length, 10–18 (–20) × (5–) 10–20 mm, 6–10 (–12) flowers; peduncles (1–) 2–3 per bract, (5–) 10–45 (–50) mm long, sericeous-hirsutulous-strigose, hirsutulous trichomes distributed on one side of the peduncle, the strigose ones arranged at the base of the outermost bract. *Outermost bract* 3-foliolate, 7–10 (–11.5) × 3–6 (–6.5) mm, bidentate, teeth shorter than the base, (2.0–) 3.5–6 (–7) mm long, base (3–) 3.5–6 (–6.5) mm long, apex acuminate to abruptly acuminate, margin crenate, the adaxial surface glabrous or hirtellous, abaxial surface sericeous-strigose or strigose, brown-yellow; 2–3 pairs of veins. *Leaflets of the bract* lanceolate or rarely lanceolate-elliptic, apex mucronate, non-coriaceous, adaxial surface sericeous-strigose, abaxial surface sericeous-strigose, the strigose on the central vein and between secondary veins, macules absent, veins conspicuous 2–4 (–5) pairs, margin crenate; terminal leaflet (6.5–) 8–18 (–20) × 2–4.5 mm; lateral leaflets (4.5–) 6–16 (–17) × 1–3.4 (–3.8) mm. *Floral rudimentary axis* absent or present, when present 0.5–4 (–5) × 0.1–0.3 mm; *external bracteole* 1, (2.25–) 3–5 × 0.9–1.8 (–2) mm, lobes 2–3, veins 1–3; *internal bracteoles* 2, 3.0–4.5 × 0.4–1 mm, lobe 1, vein 1. *Flowers* exserted. *Calyx* 2–3 (–3.4) × (2.25–) 2.5–3.5 mm; calyx tube (5.5–) 6–9 (–9.5) mm long; lateral lobes 2, 1.5–2.1 × 0.4–0.75 mm, apex acute or rounded, vexillary lobes 2, 1.5–2.5 × 0.85–2 mm, apex acute; carinal lobe 1, 2–2.8 × 0.5–1.1 mm, apex acuminate. *Corolla* yellow, standard 3–4.5 × (1.75–) 2.25–4.0 mm; wings (1.5–) 2.75–4 × 1–2.5 mm; keel petals (2.5–) 3–4.75 × 0.6–1.25 mm. *Androecium* monadelphous, stamens 10; stamen tube 6.5–10

(–11) mm long, filaments of the anthers basifixed 5, 2.5–4.5 mm long, filaments of the anthers dorsifixed 5, 3–4.5 mm long. *Gynoecium* with ovary 1.1–2 mm long, style (4–) 5.5–9.5 mm long, short stigma. *Fruit* a loment with (1–) 2 fertile articles. *Lower article* 1.5–4.5 × 1.5–3.7 mm, hirsutulous in both surfaces; the base of the fruit longer than wide. *Upper article* 5.5–8.5 × 2–3.5 mm, sparsely hirtellous or hirsutulous, on the marginal and-or lateral regions, without glandular trichomes; veins conspicuous, 1 dorsal, 1 lateral, the secondary reticulated; rostrum coiled, 2–4.8 mm long, hirtellous on the margins. 2n = 40.

Sequence data:—5.8S rRNA gene, internal transcribed spacer (ITS1) and internal transcribed spacer 2 (ITS2), specimen voucher Gama L. 136, GenBank accession number AJ320364.1 (Vander Stappen *et al*., 2002a).

Etymology:—This species is dedicated to M. Sc. María Leticia Torres-Colín, who has worked persistently and exhaustively in the Leguminosae family, mainly in the genera *Desmodium* and *Macroptilium.*

Distribution and habitat:—*Stylosanthes leticiana* is described from Mexico. It is known from northwestern Mexico and along the Pacific coast, in the states of Nayarit, Colima, Michoacán, Guerrero, Oaxaca and Chiapas; along the Gulf of Mexico coast, Veracruz state; and the center of the country in the states of San Luis Potosí, México and Puebla (Figure 2). *Stylosanthes leticiana* grows in an elevational range of (0–)50–1,800 m, and it is part of the oak forest, pine-oak forest, tropical deciduous forest, xerophytic scrub, and is also found in ruderal environments.

Phenology:—The flowering season of *Stylosanthes leticiana* is long, as it generally begins in June and extends until December. In some populations of Oaxaca, flowering can continue until February. Fruiting occurs in September to December and may continue until March in some Oaxacan populations.

Preliminar conservation assessment:—*Stylosanthes leticiana* has a wide distribution along the eastern and western slopes of Mexico and is therefore considered as Least Concern (LC), according to the criteria of the Red List (IUCN 2020).

Taxonomic notes:—According to the results obtained in morphological and molecular studies (Vander Stappen *et al*. 2002, Gama-López *et al*. 2007,), this new species is similar to *Stylosanthes humilis*, in that the upper article of the fruit features a coiled rostrum. Additionally while the calcium oxalate crystals show no distinctive differences in size or shape, they are markedly more abundant on the fruit surface. The information obtained on the external micromorphology of the fruits did not provide substantial differences between the fruits of *S. leticiana* and *S. humilis*. Nevertheless, discrepancies could be seen in the dimensions of the fruit and the length of the rostrum, being larger in *S. leticiana*. Likewise, variations were observed in the size, position, and quantity of the trichomes in the fruit and along the rostrum (Fig. 3). However, *S. leticiana* is distinguished by having two internal bracteoles, and a floral rudimentary axis is generally present. Another difference is that the flowering and fruiting times are longer in *S. leticiana* (June-December and September-December, respectively). In contrast, in *S. humilis*, the flowering occurs from August to November and the fructification between October and December. Likewise, ploidy levels are an important difference, since the ploidy level is (4×) in *S. leticiana*, while in *S. humilis* is (2×). The molecular results revealed that the Mexican populations, initially identified as *S. hamata*, presented different molecular marks than the rest of the *S. humilis* populations. The studies by Vander Stappen *et al*. (2002a) also allowed determining the origin of *S. leticiana*, which consisted of the genomes of *S. hamata* (2×) and *S. humilis* (2×). Therefore, the molecular characters, together with the morphological traits, which were previously mentioned, allowed to determine to *S. leticiana* as a separate and new tetraploid species (Table 1).

TABLE 1. Morphological differences between *Stylosanthes leticiana* and *S. humilis*.

Characters	*S. leticiana*	*S. humilis*
Habit	perennial, suffruticosus, erect to decumbent herb	annual, non suffruticosus, usually decumbent herb
Stipules persistent	yes	not
Number of internal bracteoles	2	1
Presence of rudimentary axis	present / absent	absent
Calix, size (mm)	2.0–3.0 × 2.5–3.5	1.5–2.5 × 1.2–3
Number of fertile articles in the fruit	(1–) 2	2
Upper article (mm)	5.5–8.5 × 2.0–3.5	4.0–8.5 × 1.6–2.9
Lower article (mm)	1.5–4.5 × 1.5–3.7	0.5–4.0 × 0.5–2.6
Rostrum length (mm)	2.0–4.8	1.8–4.0
Pollen grains, shape	prolate, tricolpate (sincolpate), with anomalous apertures	prolate, tricolpate (sincolpate), with normal apertures
Colpus width of the pollen grains (μm)	3.82	3.04
Chromosome number (mitotic)	2n = 40	2n = 20

Additional specimens examined:—MEXICO. **Chiapas:** Municipality Arriaga, 5.87 km al N de Lázaro Cárdenas camino a Adolfo López Mateos, 210 m, 16°20'23"N, 93°58'24"W, 12 July 2004, *D. Álvarez 10113* (MEXU!); NE de Arriaga, sobre la carretera de Arriaga a Tuxtla Gutiérrez, 115 m, 16°14'58"N, 93°52'49"W, 3 November 1993, *S. Gama-López et al. 137* (MEXU!). Municipality Berriozábal, 6–8 km N of Berriozábal near Pozo Turipache and Finca El Suspiro, 900 m, 16°52'40"N, 93°17'38"W, 10 October 1971, *D.E. Breedlove 20341* (MEXU!, MO!). Municipality Chiapa de Corzo, 3 km al SE de Escopetazo, cruce de caminos Chiapa de Corzo-San Cristóbal de las Casas con el camino a Pichucalco, 1150 m, 16°44'33"N, 92°56'52"W, 31 October 1976, *M. Sousa-Sánchez et al. 6766 Bis* (MEXU!); *loc. cit.*, *M. Sousa-Sánchez et al. 6767* (MEXU!); 31 km al W de Tuxtla Gutiérrez, 13 km NE de Chiapa de Corzo, 1036 m, 16°45'14"N, 92°57'51"W, 22 October 1989, *J.C. Soto-Núñez et al. 13368* (MEXU!). Municipality Chicoasén, 500 m al S de Chicoasén, 200 m, 16°57'33"N, 93°6'13"W, 10 November 1988, *A. Reyes-García et al. 1225* (MEXU!). Municipality Cintalapa, 0.8 km al NNW del Mirador Iris, sobre la carretera Tapanatepec-Rizo de Oro, 744 m, 16°27'15"N, 94°5'8"W, 10 July 2004, *E.M. Martínez-Salas & G. Aguilar M. 36805* (MEXU!); 10.2 km al S de la desviación a la Estación de Microondas Las Minas, carretera San Pedro Tapanatepec-Cintalapa, 841 m, 16°24'55"N, 94°1'57"W, 01 December 1998, *S. Gama-López & J.I. Calzada 282* (MEXU!). Municipality Huehuetán, Cantón Guachipilín, 150 m, 14°59'2"N, 92°25'38"W, 9 November 1985, *E. Ventura-Ventura et al. 2567* (ENCB!, MEXU!, NY!, UAT!). Municipality La Trinitaria, Lagartero San Jerónimo, 6 Km NE de San Gregorio, 600 m, 15°49'38"N, 91°53'1"W, 15 December 1980, *M. Sousa-Sánchez et al. 11594* (MEXU!). Municipality Ocosingo, Reserva zona urbana, a 1.78 km W de Frontera Corozal, 117 m, 16°48'57"N, 90°53'54"W, 19 July 2004, *G. Aguilar & F. Cruz G. 10915* (MEXU!). Municipality Ocozocoautla de Espinosa, El Aguacero, 16°46'54"N, 93°29'39"W, 2 October 1984, *R. Torres-Colín et al. 6410* (MEXU!); Juárez, entre Cintalapa y Ocozocoautla, 20 km al WSW de Ocozocoautla, 600 m, 16°32'22"N, 93°24'25"W, 29 October 1976, *M. Sousa-Sánchez et al. 6671* (MEXU!); 1 km N of Ocozocoautla on road to Malpaso, 16°47'31"N, 93°23'27"W, 29 March 1980, *A. Kretschmer 3526* (MO!). Municipality Tapachula, Río Pumpuapa, 150 m, 14°52'31"N, 92°18'50"W, 20 October 1984, *E. Ventura-Ventura & E. López 567* (ENCB!, MEXU!, MO!). Municipality Tuxtla Gutiérrez, in the sitios of Tuxtla Gutiérrez, 530 m, 16°45'29"N, 93°6'27"W, 7 October 1971, *D.E. Breedlove 20026* (MEXU!, MO!, NY!); Parque Madero, 16°45'27"N, 93°6'34"W, 8 September 1949, *F. Miranda 5526* (MEXU!); Terán, 12 km S of Tuxtla Gutiérrez along road of Villa Flores overlooking the town Suchiapa, 800 m, 16°40'17"N, 93°5'43"W, 26 September 1972, *D.E. Breedlove 28021* (F!, ENCB!, MEXU!, MO!); Terán, 6.5 km W of Tuxtla Gutiérrez along Mexican hwy 190, 600 m, 16°46'19"N, 93°12'4"W, 8 October 1971, *D.E. Breedlove 20113* (ENCB!, MEXU!, MO!, NY!). Municipality Venustiano Carranza, 5 km al W de Venustiano Carranza, 550 m, 16°20'45"N, 92°36'47"W, 29 October 1976, *M. Sousa-Sánchez et al. 6738* (MEXU!); above Finca Carmen, along the road from Acalá to Pugiltik, 550 m, 16°24'38"N, 92°42'56"W, 7 November 1967, *T.A. Shilom 3205* (NY!). Colima: Municipality Tecomán, Tecomán, 18°55'15"N, 103°51'56"W, 20 October 1910, *C.R. Orcutt 4447* (F!, GH!, MEXU!, K!, MO!, NY!). **Guerrero:** Municipality Chilpancingo de los Bravo, Acahuizotla, carretera libre Chilpancingo-Acapulco, 960 m, 17°21'45"N, 99°28'35"W, 30 October 1993, *S. Gama-López et al. 129Bis* (MEXU!). Municipality Coyuca de Catalán, Coyuca, Cutzamala, 18°19'48"N, 100°41'29"W, 15 November 1934, *G.B. Hinton et al. 6985* (F!, K!). Municipality Temascaltepec, Salitre, 1300 m, 19°0'34"N, 100°11'32"W, *G.B. Hinton 4767* (GH!, K!, US!). Municipality Xochihuehuetlán, Cañada Cuyulí, al N del cerro Xilotzin, Jilotepec (Xilotepec Chiquito), 1270 m, 17°59'44"N, 98°30'1"W, 17 September 1995, *E. Moreno-Gutiérrez 1021* (MEXU!). **México:** Municipality Tejupilco, Tejupilco, 1340 m, 18°54'23"N,100°8'44"W, 30 September 1932, *G.B. Hinton 1931* (GH, K, MEXU). **Michoacán:** Municipality Huetamo, 30 km de Huetamo, carretera a Zitácuaro, 750 m, 18°49'22"N, 100°54'39"W, 2 November 2002, *J.S. Soto-Núñez & R. López S. 14361* (MEXU!); La Cuesta del Mango, 30 km al NE de Huetamo, carretera a Zitácuaro, 18°49'21"N, 100°54'42"W, 6 September 1978, *J.S. Soto-Núñez 951* (MEXU!). Municipality Lázaro Cárdenas, 10 km al N de Playa Azul, carretera a Nueva Italia, 250 m, 18°3'10"N, 102°19'13"W, 22 August 1985, *J.S. Soto-Núñez & G. Simón-Román 10179* (MEXU!). **Nayarit:** Municipality Xalisco, km 25 carretera Compostela-Tepic 960 m, 21°19'21"N, 104°55'17"W, 7 October 1996, *S. Gama-López et al. 229Bis* (MEXU!). **Oaxaca:** Municipality Asunción Ixtaltepec, Mezquite, 200 m, 16°41'31"N, 94°57'24"W, 3 October 1975, *M. Sousa-Sánchez 5002* (MEXU!); 6 km N de La Ventosa, en la desviación a La Mata, 20 m, 16°36'5"N, 94°56'53"W, 21 September 1978, *M. Sousa-Sánchez et al. 9606* (MEXU!); 66 km from Tehuantepec on Acayucan road, 120 m, 16°38'8"N, 94°56'42"W, 9 December 1963, *H.S. MacKee 11000* (K!, MEXU!, US!). Municipality Heroica Ciudad de Juchitán de Zaragoza, 10 km al E de La Venta, 10 m, 16°33'28"N, 94°54'28"W, 21 February 1978, *M. Sousa-Sánchez et al. 9157* (MEXU!); 3 km al NE de La Ventosa, entronque entre la carretera a Juchitán y Tuxtla Gutiérrez, 16°34'29"N, 94°54'48"W, 3 November 1993, *S. Gama-López 136 et al.* (MEXU!); 3 km al E de la caseta de revisión La Ventosa, 5 m, 16°33'27"N, 94°55'28"W, 18 November 1994, *S. Gama-López et al. 190* (MEXU!). Municipality Magdalena Te quisistlán; km 193 carretera Oaxaca-Tehuantepec, 370 m, 16°24'47"N, 95°41'1"W, 29 November 1998, *S. Gama-López et al. 276, 277* (MEXU!).

Municipality Nejapa de Madero, 1 km al S de El Gramal, 830 m, 16°36'18"N, 96°2'11"W, 11 October 1988, *R. Aguilar-Santaelises 309* (MEXU!); 5 km al E de El Camarón, carretera Oaxaca-Tehuantepec, 800 m, 16°33'17"N, 96°0'25"W, 26 October 1976, *M. Sousa-Sánchez et al. 6563* (MEXU!); cerca del poblado de Camarones, carretera Oaxaca-Tehuantepec 816 m, 16°33'46"N, 96°1'23"W, 29 November 1998, *S. Gama-López et al. 275* (MEXU!). Municipality Salina Cruz, km 391 carretera 200 Huatulco-Salina Cruz, 10 m, 16°10'45"N, 95°14'29"W, 18 November 1994, *S. Gama-López et al. 192Bis* (MEXU!); La Ventosa near Salina Cruz, 0 m, 16°10'2"N, 95°10'4"W, 10 December 1963, *H.S. MacKee 11005* (MEXU!). Municipality San Dionisio Ocotepec, km 63 carretera Oaxaca-Tehuantepec, al SE de la ciudad de Oaxaca, 1560 m, 16°46'15"N, 96°20'57"W, 17 November 1994, *S. Gama-López et al. 187* (MEXU!). Municipality San Juan Mazatlán, 4 km al SE de Díaz Ordaz, 24 km al SE de Tres Islas, 110 m, 17°13'34"N, 95°14'40"W, 31 October 1977, *M. Sousa-Sánchez & O. Téllez-Valdés 8803* (MEXU!). Municipality San Mateo del Mar, 2 km N de Reforma, 150 m, 16°14'13"N, 95°8'4"W, 21 September 1976, *O. Téllez-Valdés & A. Solís-Magallanes 195*. Municipality San Pablo Villa de Mitla, 2 km al N de Xaaga, 1465 m, 16°54'3"N, 96°20'17"W, 14 October 1996, *S. Gama-López et al. 237* (MEXU!); 3 km al N de Xaaga, 1495 m, 16°55'25"N, 96°20'1"W, 14 October 1976, *S. Gama-López et al. 239* (MEXU!); Municipality San Pedro Huamelula, 1.8 km al S de San Isidro Chacalapa, 220 m, 15°54'55"N, 95°56'31"W, 15 October 2003, *A. Saynes-Vásques & S. H. Salas-Morales 3884* (MEXU!); 50 km al E del entronque de Huatulco a Salina Cruz, 10 m, 15°54'12"N, 95°51'12"W, 3 November 1993, *S. Gama-López et al. 134* (MEXU!); El Naipu, Estación Climatológica Astata, 1.1 km al N del puente de Santa María Huamelula, 75 m, 16°0'34"N, 95°42'1"W, 26 September 2001, *S. H. Salas-Morales et al. 4027* (MEXU!); San Isidro Chacalapa, 0.8 km N de la desviación de la carretera costera, 160 m, 15°52'49"N, 95°56'8"W, 10 October 1997, *S. H. Salas-Morales et al. 1502* (MEXU!); San Isidro Chacalapa, 5.4 km N de la desviación de la carretera costera, 220 m, 15°54'19"N, 95°55'44"W, 25 October 1999, *C. Perret et al. 677* (MEXU). Municipality San Pedro Totolápam, 146 km from Tehuantepec on Oaxaca road, 101 km from Oaxaca, 860 m, 16°40'43"N, 96°8'59"W, 10 December 1963, *H.S. MacKee 11013* (US!); 4 km al W de San José de Gracia, 29 km al E de Totolápam, 900 m, 16°40'1"N, 96°7'43"W, 17 September 1978, *M. Sousa-Sánchez et al. 9438* (MEXU!); W de San José de Gracia, carretera 190 Oaxaca-Tehuantepec, 695 m, 16°39'33"N, 96°5'59"W, 17 November 1994, *S. Gama-López et al. 188* (MEXU!). Municipality Santa María Atzompa, km 5 de la carretera Oaxaca-Monte Alban, 1625 m, 17°3'32"N, 96°45'51"W, 16 November 1994, *S. Gama-López et al. 185* (MEXU!); same locality, 16 October 1996, *S. Gama-López et al. 240* (MEXU!). Municipality Santa María Guienagati, Santa María Guienagati, 180 m, 16°44'26"N, 95°21'16"W, 30 November 1998, *S. Gama-López et al. 278* (MEXU!); 1.6 km al N de Lachivixá, carretera Santa María Guienagati-Ixtepec, 305 m, 16°42'59"N, 95°21'7"W, 30 November 1998. *S. Gama-López et al. 280* (MEXU!). Municipality Santa María Huatulco, 3.19 km (L.R.), 274° de la UMAR, orilla de carretera, 140 m, 15°46'58"N, 96°11'25"W, 24 July 2005, *A. Saynes-Vásques et al. 5742* (MEXU!); Bahía Conejos, 0.5 km NE por un arroyo seco que cruza la carretera costera, 30 m, 15°47'1"N, 96°3'48"W, 17 September 1999, *C. Perret 441* (MEXU!); Puente del Río Cacaluta, 45 m, 15°46'36"N, 96°10'30"W, 6 October 2004, *A. Saynes-Vásques & A. Sánchez 5082* (MEXU!). Municipality Santa María Jalapa del Marqués, 30 km al W de Tehuantepec, en Jalapa del Márquez, 16°26'57"N, 95°26'21"W, 4 November 1993, *S. Gama-López et al. 138* (MEXU!); km 219, carretera 190 Oaxaca-Tehuantepec, 105 m, 16°26'22"N, 95°27'44"W, 17 November 1994, *S. Gama-López et al. 189* (MEXU!). Municipality Santiago Astata, Gualanpamo, 9 m, 15°58'40"N, 95°39'29"W, 23 August 2009, *F. Petri-L. 299* (MEXU!); Lanipi, 33 m, 15°59'6"N, 95°40'48"W, 10 August 2009, *F. Petri-L. 244* (MEXU!). Municipality Santiago Pinotepa Nacional, 3 km al S de la desviación de Pinotepa Nacional a Puerto Escondido, 50 m, 16°19'51"N, 98°0'47"W, 31 October 1993, *S. Gama-López et al. 132* (MEXU!); 4 km al S de la desviación de Pinotepa Nacional a Puerto Escondido, 80 m, 16°20'5"N, 98°0'28"W, 3 November 1994, *S. Gama-López et al. 182Bis* (MEXU); Ñango Paja, 12 m, 15°57'4"N, 95°39'28"W, 23 September 2009, *F. Petri L. 494* (MEXU); Rancho del Santo, 170 m, 16°22'13"N, 98°10'35"W, 20 August 1976, *M. Sousa-Sánchez 5869* (MEXU!). Municipality Santo Domingo Tehuantepec, 21 km W de Tehuantepec, en cerro, 200 m, 16°23'57"N, 95°24'11"W, 4 October 1975, *M. Sousa-Sánchez 5035* (MEXU!); 5 km W de Tehuantepec, en la Penitenciaría, 50 m, 16°19'48"N, 95°16'8"W, 3 October 1975, *M. Sousa-Sánchez 5010* (MEXU!); Jalapa del Márquez, cerca de Tehuantepec, 100 m, 16°20'34"N, 95°19'20"W, 16 September 1965, *R. Hernández-Magaña 116* (MEXU!). Municipality Villa de Tututepec, Laguna Manialtepec, carretera Pinotepa Nacional a Puerto Escondido, 0 m, 15°56'12"N, 97°15'3"W, 3 November 1994, *S. Gama-López et al. 183* (MEXU!); Laguna Manialtepec 'El Paraiso', 0 m, 15°56'38"N, 97°18'16"W, 16 October 1999, *S. Gama-López et al. 241Bis* (MEXU!). **Puebla:** Municipality Totoltepec de Guerrero, Totoltepec, al SW del poblado, cerca de la escuela secundaria, 1240 m, 18°13'5"N, 97°52'5"W, 28 October 1998, *S. Gama-López et al. 269* (MEXU!). **San Luis Potosí:** Municipality Rayón, Las Canoas, al E de Cárdenas, 970 m, 21°56'46"N, 99°30'22"W, 10 November 1997, *S. Gama-López et al. 245* (MEXU!). **Veracruz:** Municipality Actopan, 3 km al SE del Chapopote, 295 m, 19°30'17"N, 96°35'41"W, 19 December 1993, *S. Gama-López et al. 141* (MEXU!); El Chapopote, 250 m, 19°30'23"N, 96°37'39"W, 15 October 1977, *F. Ventura-Aburto 14565*

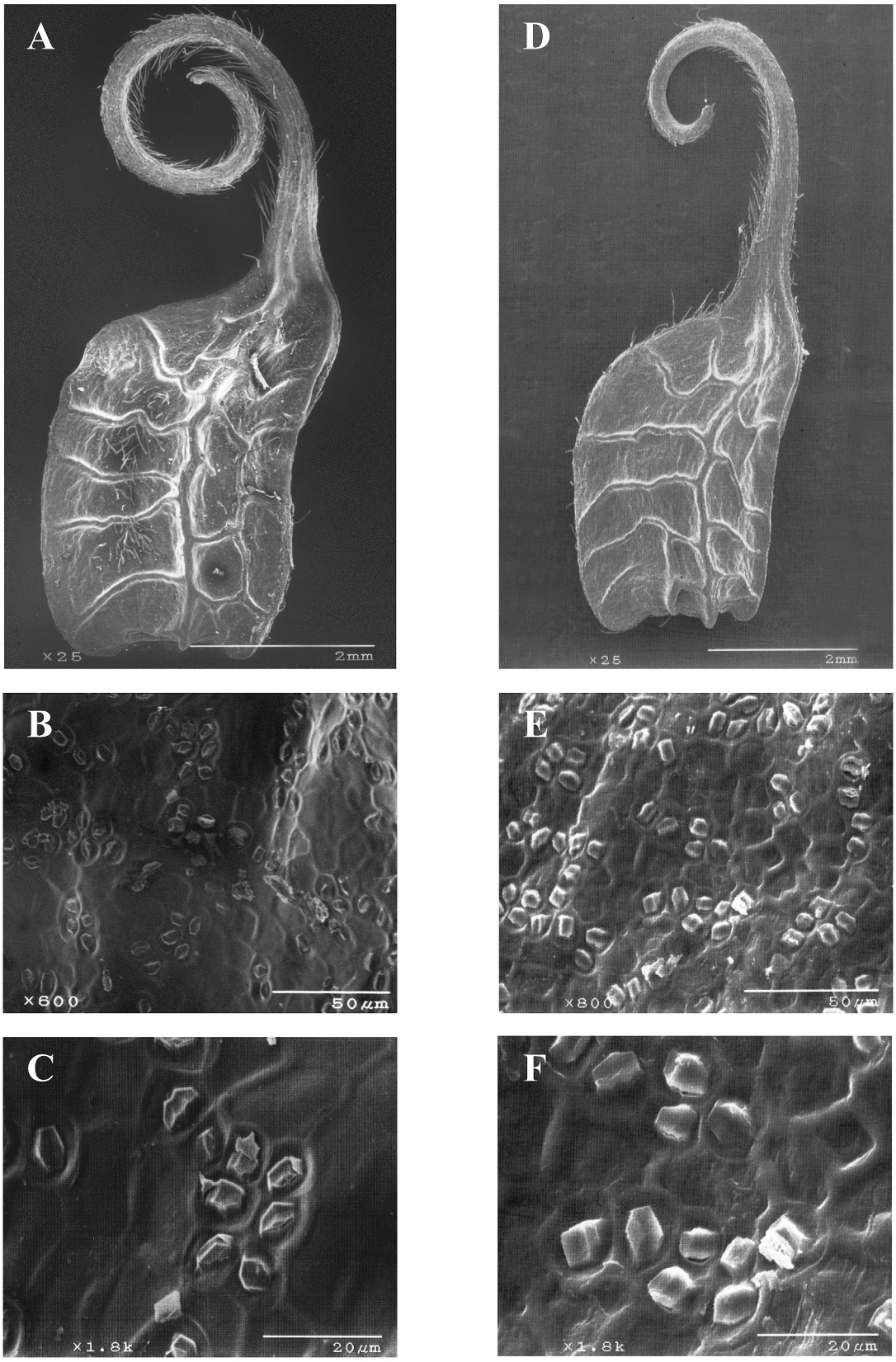

FIGURE 3. Micromorphological comparison of fruits of *Stylosanthes leticiana* and *S. humilis*. *S. leticiana* (left). A. Fruit (×25), B.–C. Crystals of calcium oxalate (×800 and ×1.8k, respectively). *S. humilis* (right). D. Fruit (×25). E–F. Crystals of calcium oxalate (×800 and ×1.8k, respectively).

(ENCB!, MEXU!, NY!). Municipality Comapa, Barranca de Panoaya, 1 km al NW de El Coyol, 500 m, 19°10'25"N, 96°42'22"W, 25 September 1985, *M.E. Medina-A. & F. Vázquez-B. 483* (ENCB!, F!). Municipality Cuitláhuac, Cuitláhuac, 400 m, 18°48'18"N, 96°44'33"W, 7 November 1963, *H.S. MacKee 10892* (K!, MEXU!); Municipality Paso de Ovejas, Paso de Ovejas, 50 m, 19°17'49"N, 96°26'51"W, 18 September 1972, *F. Ventura-Aburto 6083* (ENCB!, MEXU!). Municipality Puente Nacional, Conejos, a orilla del camino, 200 m, 19°18'35"N, 96°29'33"W, 26 October 1970, *F. Ventura-Aburto 2704* (ENCB!, MEXU!, MO!).

Stylosanthes rosalindae Gama, *sp. nov*. (Figs. 4, 5, 6A–C).

Type:—MEXICO. Puebla: Municipio Coxcatlán, 4.3 km al NE de Coxcatlán, por el camino a Zoquitlán, 18°16'36"N, 97°7'55"W, 28 November 1998, *S. Gama-López et al. 274* (holotype MEXU!, isotypes ENCB!, MEXU!, MO!, UAMIZ!).

Diagnosis:—*Stylosanthes rosalindae* similis *S. subsericea*, sed caulibus erectis, non viscidis; stipulis secus caulem plerumque persistentibus; inflorescentiis longioribus quam latioribus vel tam longis quam latis, bractea extima uni- vel trifoliolata; axe rudimentario plerumque praesenti, bractéola externa una, internis duabus; fructu plerumque articulis duobus fertilibus, articulo superie secus margines lateraque vel omnino hirsutulo; trichomatibus glandularibus carentibus, rostro recurvato vel leviter involuto, articulo inferiore (ubi praesenti) secus margines lateraque hirsuto vel hirsutulo, fructus basi tam longa quam lata distinguitur.

Description:—Perennial *herbs*, suffruticose, *stems* erect (40–) 50–60 cm high, hirsutulous-strigose or sericeous-strigose, non-viscid; the hirsutulous trichomes 0.6–1 mm long, white or pale yellow, distributed on one side or all the stem, the strigose ones 1–2 mm long, yellow to brown-yellow, distributed throughout the stem; internodes 2.5–3.5 cm long. *Stipules* generally persistent along the stem, 8–10 × 2.5–4 mm, adaxial surface glabrous, abaxial surface with indumentum sericeous-strigose, yellow to brown-yellowish, bidentate; teeth slightly shorter or equal to the base of the stipule, 3–4 mm long, apex abruptly acuminate, margin entire-crenate; basal region of the stipule (4–) 5 (–6) mm long, 2 pairs of veins; abscission zone between the petiole and the basal region of stipule 1–1.5 mm long. *Leaves* pinnate with reduced rachis giving the appearance of palmate leaves, short pulvinus, diminished petiole, 3-foliolate, lanceolate or lanceolate-elliptic to elliptic-obovate, apex mucronate, margin entire or crenate, non-coriaceous, adaxial surface sericeous-strigose or sericeous, abaxial surface sericeous-strigose, the strigose trichomes distributed above the central vein and between secondary veins, macules absent, veins conspicuous, 3–5 pairs; terminal leaflet 11–17 × 5.5–7.0 mm; lateral leaflets 10.5–14 × 4.5–5 mm. *Inflorescences* paniculate, longer than wide, 15–21 (–25) × 7–15 mm, with 6 or 8 (–10) flowers; peduncles 1 or 3 per bract, 20–30 mm long, hirsutulous-strigose trichomes, distributed throughout the peduncle. *Outermost bract* generally 1-foliolate, rarely 3-foliolate, 7–8 × 3–6 mm, bidentate; teeth generally shorter than the base, 3–3.5 mm long, base 4.5–5 mm long, apex acuminate, margin crenate, adaxial surface hirtellous, abaxial surface sericeous-strigose, yellow to brown-yellow, 2–3 pairs of veins. *Leaflets of the bract* elliptic-lanceolate, apex mucronate, non-coriaceous, adaxial surface sericeous, abaxial surface strigose, the strigose trichomes on the central vein and between secondary veins, macules absent, veins conspicuous, 2–3 pairs, margin crenate; when 3-foliolate, terminal leaflet 8.5–11.0 × 3.5–4.5 mm, lateral leaflets 6.5 × 2.0 mm. *Floral rudimentary axis* present or rarely absent, (2–) 4–8 × 0.15–0.3 mm; external bracteole 1, 4–4.5 × 1.5 mm, lobes 3, veins 2–3; internal bracteole 1, rarely divided into two, 3–4 × 0.3–0.5 mm, lobe 1, central vein 1. *Flowers* exserted. *Calyx* 3–3.5 × 5–5.8 mm, calyx tube 9.5–10 mm long, lateral lobes 2.5–3 × 1 mm, apex acute; vexillary lobes 2, 3–3.5 × 1.75–2.1 mm, apex acute to rounded; carinal lobe 1, 3–3.5 × 1.25–1.5 mm, apex acuminate. *Corolla* yellow; standard 6–8.5 × 5.5–7.5 mm; wings 2.2–3.5 × 1.7–3.2 mm; keel petals 3.5–8.8 (–9.5) × 0.9–1.6 mm. *Androecium* monadelphous, stamens 10, stamen tube 6–11.5 mm long, filaments of anthers basifixed 2.5–5.5 (–6.5) mm long, filaments of anthers dorsifixed 3–6.5 (–7.5) mm long. *Gynoecium* with ovary 0.75–1.5 (–2) mm long, style 6.5–11.5 (–13.5) mm long, short stigma. *Fruit* a loment usually with 2 fertile articles. *Lower article* when present, 0.7–4 (–4.6) × 0.8–3 mm, hirtellous to hirsutulous on the marginal and lateral regions, the base of the fruit equally wide as long. *Upper article* 2.5–6 (–6.3) × 2.7–3.3 mm, hirtellous in the marginal and lateral regions or throughout the article, without glandular trichomes, veins conspicuous, 1 dorsal vein, 1 lateral, secondary veins perpendicular; rostrum recurved to slightly coiled, hirsutulous on the whole rostrum. $2\underline{n} = 40$

Sequence data:—GenBank: AJ489512, 5.8S rRNA gene, ITS1 and ITS2, specimen Gama L. 274, version AJ320364.1 GI:15722418 (Vander Stappen *et al*., 2003).

Etymology:—This species is dedicated to Biol. Rosalinda Medina Lemos, who has intensively worked on the Flora of the Tehuacán-Cuicatlán Valley, for her tenacity, passionate dedication, and relevant contributions to the knowledge of the Mexican flora.

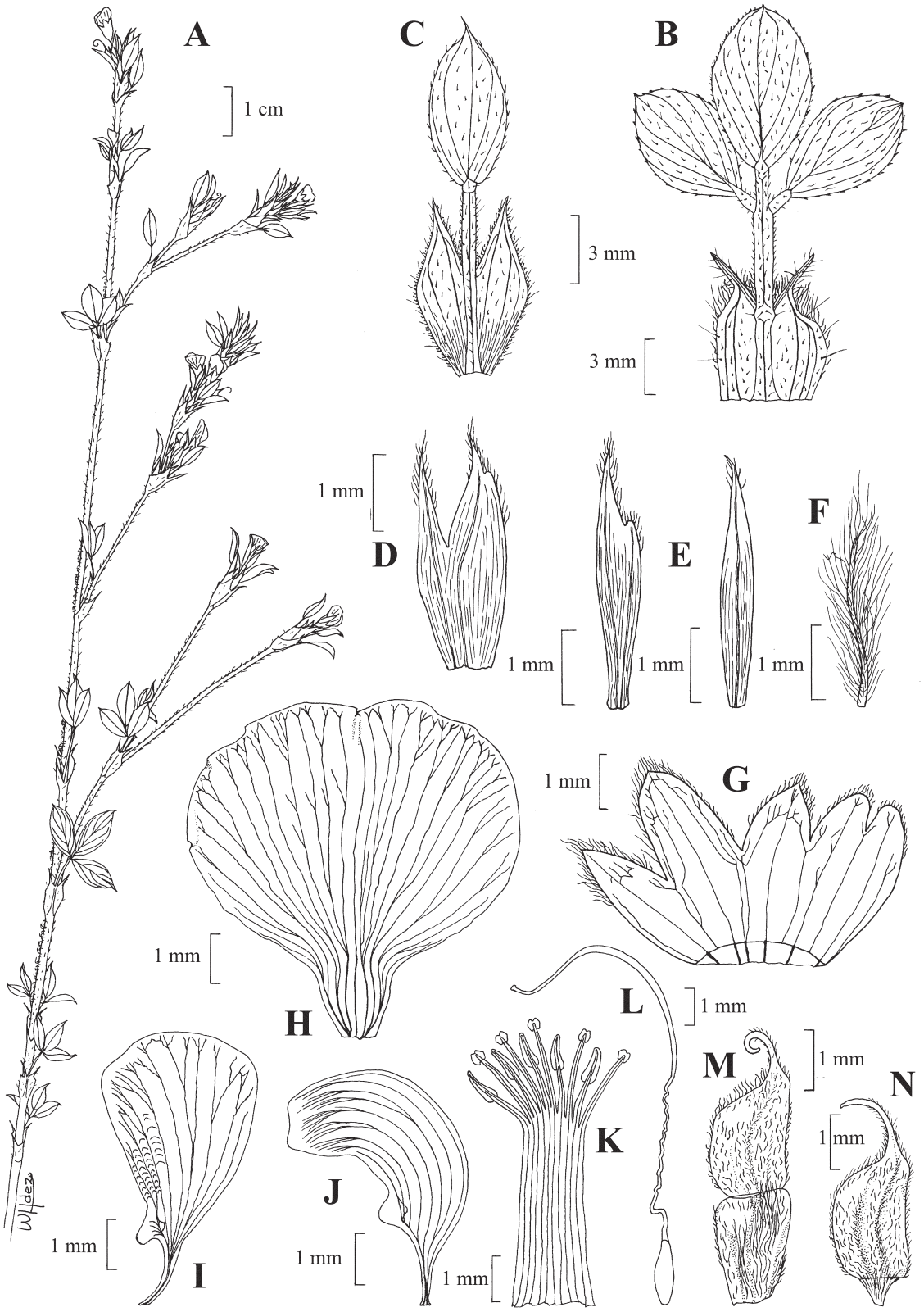

FIGURE 4. *Stytosanthes rosalindae* Gama. A. Branch with inflorescences. B. Stipules with leaves 3-foliolate. C. Outermost bract 1–foliolate. D. External bracteole. E. Internal bracteoles, 2. F. Floral rudimentary axis. G. Calyx. H. Standard. I. Wings. J. Keel petals. K. Androecium. L. Gynoecium. M. Fruit usually with 2 fertile articles. N. Fruit with 1 fertile upper article. Drawing by Wendy Hernández Rodríguez based on the specimen *S. Gama-López et al. 274* (MEXU, holotype).

Distribution and habitat:—*Stylosanthes rosalindae* is described from Mexico. This species has a restricted distribution, in central and southern Mexico, in the states of Oaxaca and Puebla (Figure 5). It grows in tropical deciduous forest, and it is also found in disturbed places along the roads, at elevations of 800–2100 m.

Phenology:—Flowering from September to November and fruiting from November to January.

Preliminary conservation assessment:—*Stylosanthes rosalindae* grows in the Tehuacán-Cuicatlán Biosphere Reserve, which is a protected natural area located in southeastern Mexico, between the states of Puebla and Oaxaca with an extension of 490,186 hectares, and recognized by UNESCO as a World Heritage Site, Mixed (UNESCO, 2018). Nevertheless, *S. rosalindae* is considered in the Vulnerable category (VU D2), according to the IUCN (2020) Red List criteria, because its distribution is restricted within the reserve and due to the economic activities, that carried out by the inhabitants of this area.

Taxonomic notes:—*Stylosanthes rosalindae* is similar to *S. viscosa* Swartz (1788: 108), by the type and distribution of the strigose indumentum on the stem and by the number of internal bracteoles. It resembles *S. subsericea* in the erect habit, the shape of the inflorescence external bract (1-foliolate or 3-foliolate), and by having the base of the fruit wider than long (Figure 6). However, it differs from those two species by lacking macules in the leaflets, the presence of a floral rudimentary axis, the larger size of the upper article and the recurved rostrum of the fruit (Table 2). This aligns with Vander Stappen *et al*. (2003), who suggested that *S. viscosa* is a probable donor of the allotetraploid parental genome of *S. rosalindae*, since it has a type of ETS sequence like that found in *S. viscosa*.

Additional specimens examined:—MEXICO. **Puebla:** Municipality Totoltepec de Guerrero, Totoltepec, 1540 m, 18°14'9"N, 97°51'10"W, 5 July 1986, *P. Tenorio-Lesama & A. Salinas-Tovar 11562* (MEXU!); 7 km al W de Coxcatlán, *P. Tenorio-Lesama 15237* (MEXU!, UAT!).

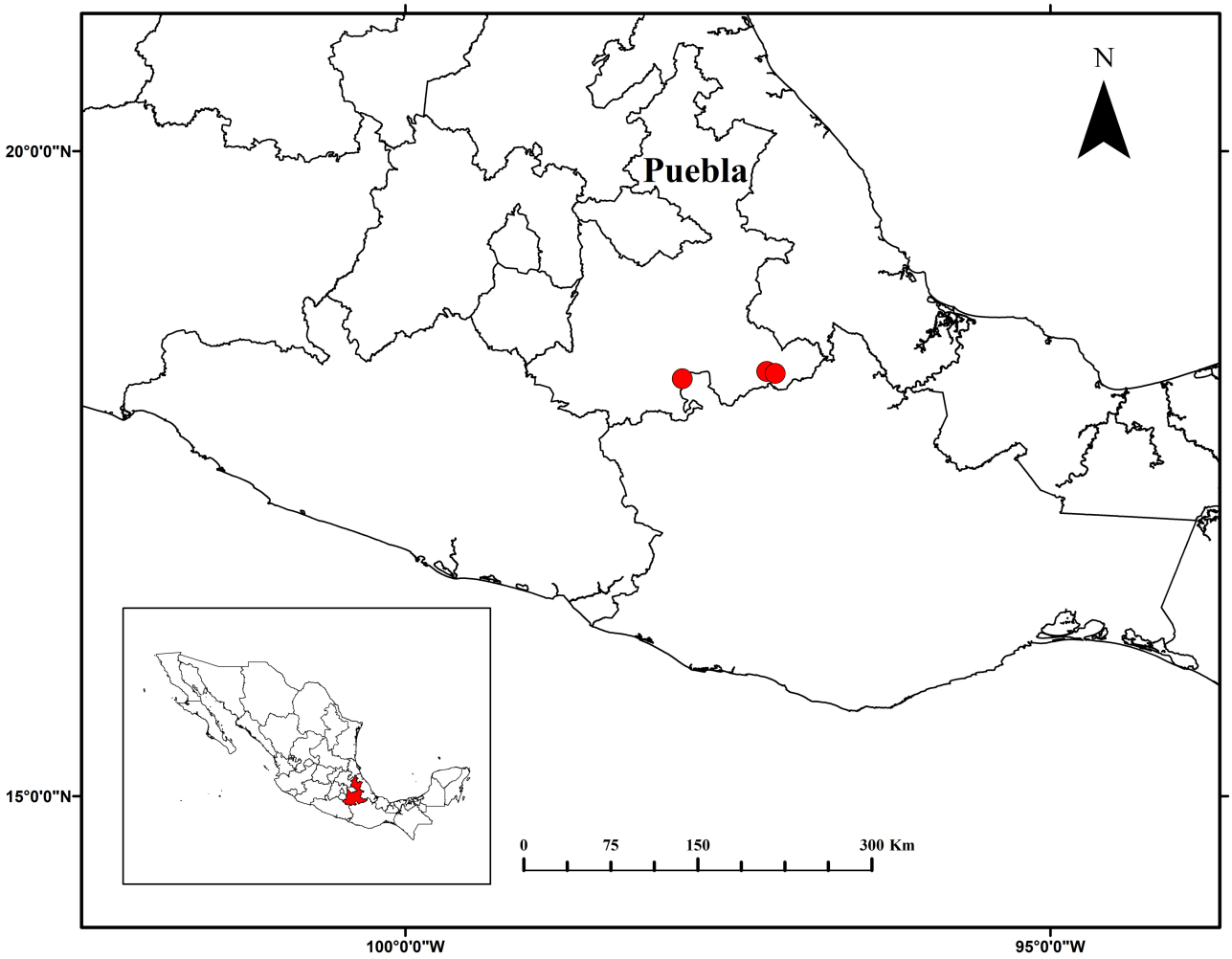

FIGURE 5. Distribution map of *Stytosanthes rosalindae* Gama.

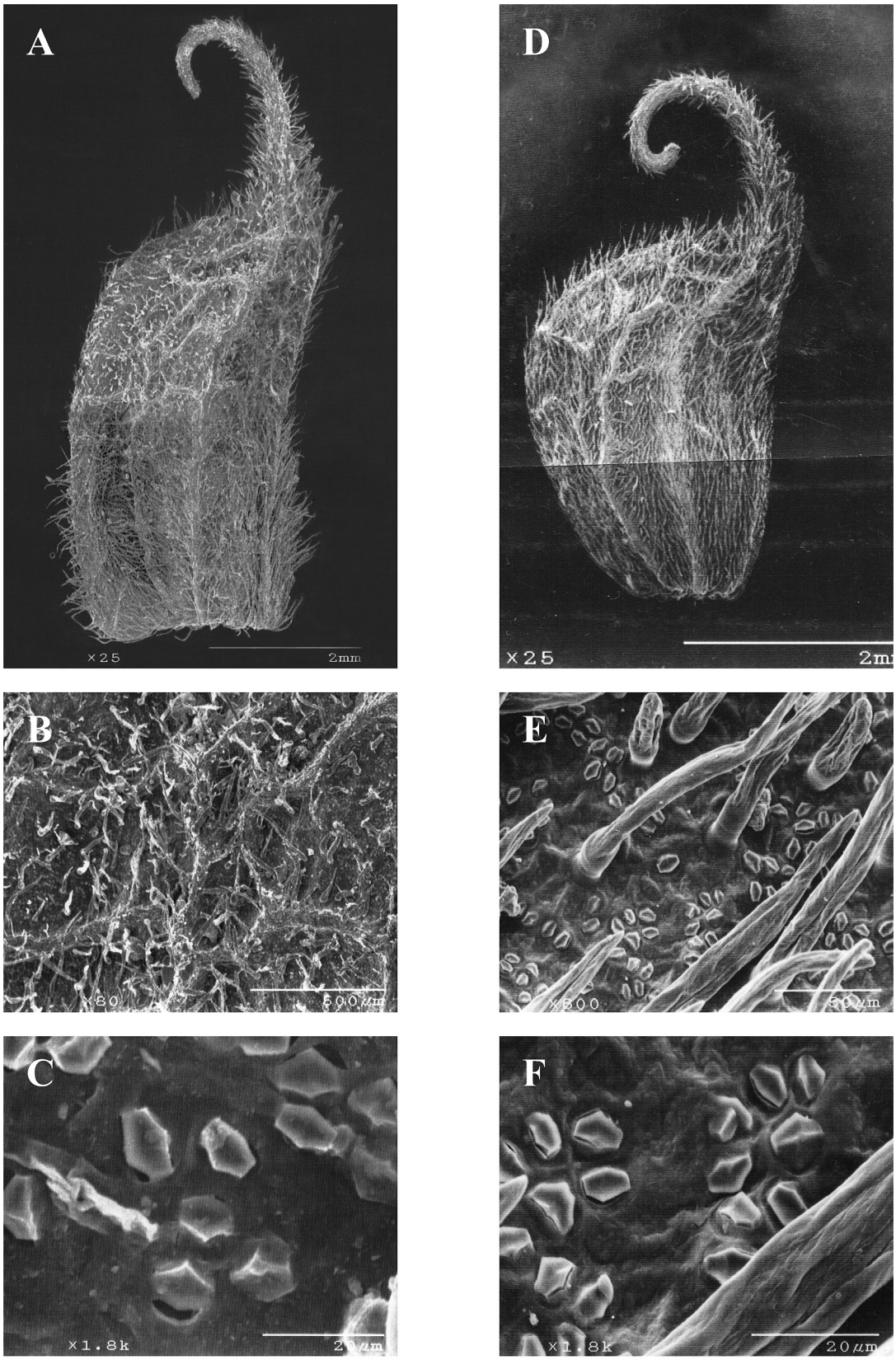

FIGURE 6. Micromorphological comparison of fruits of *Stylosanthes rosalindae* and *S. vicosa*. *Stylosanthes rosalindae* (left). A. Fruit (×25). B. Trichomes and crystals of calcium oxalate (×800). C. Crystals of calcium oxalate (×1.8k). *S. vicosa (*right). D. Fruit (×25), E. Trichomes and crystals of calcium oxalate (×800). F. Crystals of calcium oxalate (×1.8k).

TABLE 2. Morphological differences between *Stylosanthes rosalindae*, *S. subsericea*, and *S viscosa.*

Characters	*S. rosalindae*	*S. subsericea*	*S. viscosa*
Habit	erect, suffruticose	erect, suffruticose	erect to erect-prostrate, suffruticose
Indumentum sericeous	on one side or scattered along the stem	along the stem	along the stem
Indumentum strigose	on whole stem	absent	on whole stem
Pubescence	viscid or not viscid	not viscid	viscid
Macules on leaflets	absent	present	present
Outermost bract	unifoliolate and/or trifoliolate	unifoliolate and/or trifoliolate	unifoliolate
Abaxial surface of the outermost bract	sericeous-hirsutulous	sericeous	strigose-sericeous
Number of internal bracteoles	1–2	2	1
Floral rudimentary axis	present, rarely absent	absent	absent
Calyx size (mm)	3.0–3.5 × 5.0–5.8	4.5–5.0 × 3.0–3.5	2.5–4 × 3–5.5
Base of the fruit	wider than long	wider than long	as wide as long
Rostrum	recurved to slightly coiled	straight to coiled at the apex	coiled
Polar axis of the pollen grains (μm)	x = 43.01	x = 24.59	x = 33.15
Colpus width of the pollen grains (μm)	3.71	3.37	2.75
Level of ploidy	4×	4×	2×

Stylosanthes gretheriae Gama, *sp. nov*. (Figs. 7, 8, 9A–C).

Type:—MEXICO. Jalisco: Municipio Mixtlán, km 48 carretera Ameca-Mascota, 6 km al NE de Atenguillo, 20°28'48"N, 104°22'33"W, 1690–1760 m, 27 October 1993, *S. Gama-López et al. 124,* (holotype MEXU!, isotypes ENCB!, IBUG!, MEXU!, NY!, UAMIZ!).

Diagnosis:—*Stylosanthes gretheriae* similis *S. guianensis*, sed caulibus erectis vel prostratis, viscidis (vs. ascendentibus, non viscidis); stipulis secus caulem persistentibus (vs. non persistenibus); inflorescentiis latioribus quam longioribus; fructibus articulo uno fertili, basi tam longa quam lata, et rostro uncinato distinguitur.

Description:—Perennial *herbs*, suffruticose, *stems* erect to prostrate, 30–130 cm high, sericeous-hirsutulous-strigose, viscid; the sericeous trichomes 0.1–0.5 mm long, the hirsutule ones 0.6–1 mm long, white or pale yellow, distributed on one side of the stem, the strigose ones when present, 1–2 mm long, pale yellow to brown-yellowish, distributed throughout the stem, internodes (1–)2–10 cm long. *Stipules* generally persistent at the base of the stems, 6–19.5 × 1.2–7 mm, adaxial surface glabrous, abaxial surface sericeous or sericeous-strigose, white or pale yellow to yellowish-brown, bidentate, teeth shorter than the base of the stipule, 2.5–8.0 mm long; apex acuminate to abruptly acuminate, margin crenate; basal region of the stipule 5.0–13.0 mm long, 3–6 pairs of veins; abscission zone between the petiole and the basal region of the stipule 5–13 mm long. *Leaves* pinnate with reduced rachis giving the appearance of palmate leaves, short pulvinus, diminished petiole, 3-foliolate, lanceolate, apex mucronate, margin entire-crenate, non–coriaceous, adaxial surface hirsutulous-strigose, abaxial surface sericeous-hirsutulous-strigose, the strigose trichomes distributed over the central vein and between secondary veins, macules present on both surfaces, brown-reddish, veins conspicuous, 4–10 pairs; terminal leaflet 10–36 × 2–6 mm; lateral leaflets 7–30 × 2.5–6.5 mm. *Inflorescence* paniculate, longer than wide, (5–) 8–15 × (3–) 5–15 mm, (6–) 8–10 flowers; peduncles 1–5 per bract, (5–) 10–45 mm long, sericeous-hirsutulous-strigose along the peduncle. *Outermost bract* 1-foliolate, 7–9 × 4–5.5 mm; bidentate, teeth generally shorter than the base, 2–4.5 mm long; base 4.5–6 mm long, apex acuminate to abruptly acuminate, margin crenate, the adaxial surface sericeous-strigose, abaxial surface hirsutulous-strigose, yellow to brown-yellowish, 3–6 pairs of veins. *Leaflet of the bract* lanceolate to elliptic-lanceolate, apex mucronate, non-coriaceous, adaxial surface sericeous-strigose, abaxial surface sericeous-strigose, the strigose trichomes distributed in the central vein and between secondary veins, macules present on both surfaces, brown-reddish, veins conspicuous 3–6 pairs, margin entire-crenate; terminal leaflet 7.5–18 × 2.5–5.5 mm. *Floral rudimentary axis* absent; external bracteole 1, 3.5–6.5 × 1–1.8 mm, lobe usually 1, vein 1; internal bracteole 1, 3.5–5 × 0.7–1.2 mm, lobe 1, vein 1. *Flowers* exserted. *Calyx* 3.2–4 × 4–6.1 mm,

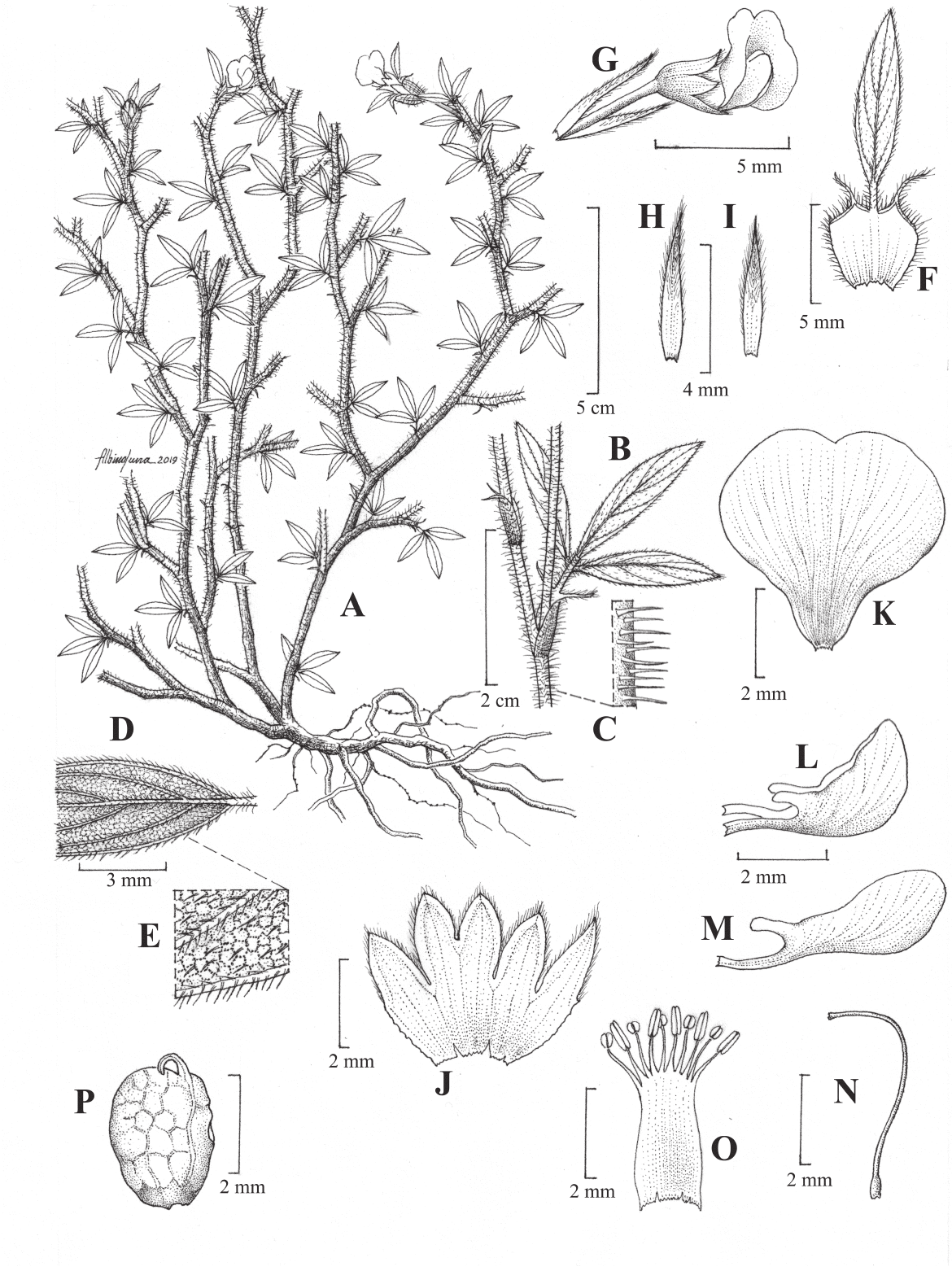

FIGURE 7. *Stytosanthes gretheriae* Gama. A. Habit. B. Stipules with leaves 3–foliolate. C. Stem trichomes approximation. D. Terminal leaflet. E. Approximation of the maculas on the leave surface. F. Outermost bract 1–foliolate. G. Flower with bracteoles. H. External bracteole. I. Internal bracteoles, 1. J. Calyx. K. Standard. L. Wings. M. Keel petals. N. Gynoecium. O. Androecium. P. Fruit a loment with an upper article. Drawing by Albino Luna on the specimen *S. Gama-López et al. 124* (MEXU, holotype).

calyx tube 6.5–10.5 mm long, lateral lobes 2, 2.75–3.75 × 0.7–1.7 mm, apex acute; vexillary lobes 2, 2.7–4 × 1.5–2.5 mm, apex acute to rounded or rarely acuminate; carinal lobe 1, 3.2–4.2 × 0.7–1.5 mm, apex generally acuminate or rarely acute. *Corolla* yellow; standard 1, 4–6.5 × 3.75–6.6 mm; wings 3.5–6 x 1–3 mm; keel petals 4.25–6 × 1.25–2 mm. *Androecium* monadelphous, stamens 10, stamen tube 6–12.5 mm long, filaments of anthers basifixed 5, 3–4.8 mm long, filaments of anthers dorsifixed 5, 3.5–5.5 mm long. *Gynoecium* with ovary 0.8–1.5 mm long, style 6–10 mm long, short stigma. *Fruit* a loment usually with 1 fertile article. *Upper article* 3.1–4.2 × 1.5–2.2 mm, generally glabrous, rarely hirtellous on the lateral regions, without glandular trichomes, veins conspicuous, 1 dorsal, 1 lateral, secondary reticulated, rostrum uncinate, usually glabrous or rarely hirtellous on the margin and lateral regions. *Lower article* generally absent, when present 0.6–1.8 × 0.5–1.1 mm, usually hirtellous all over the surface, the base of the fruit as wide as long. 2n = 20.

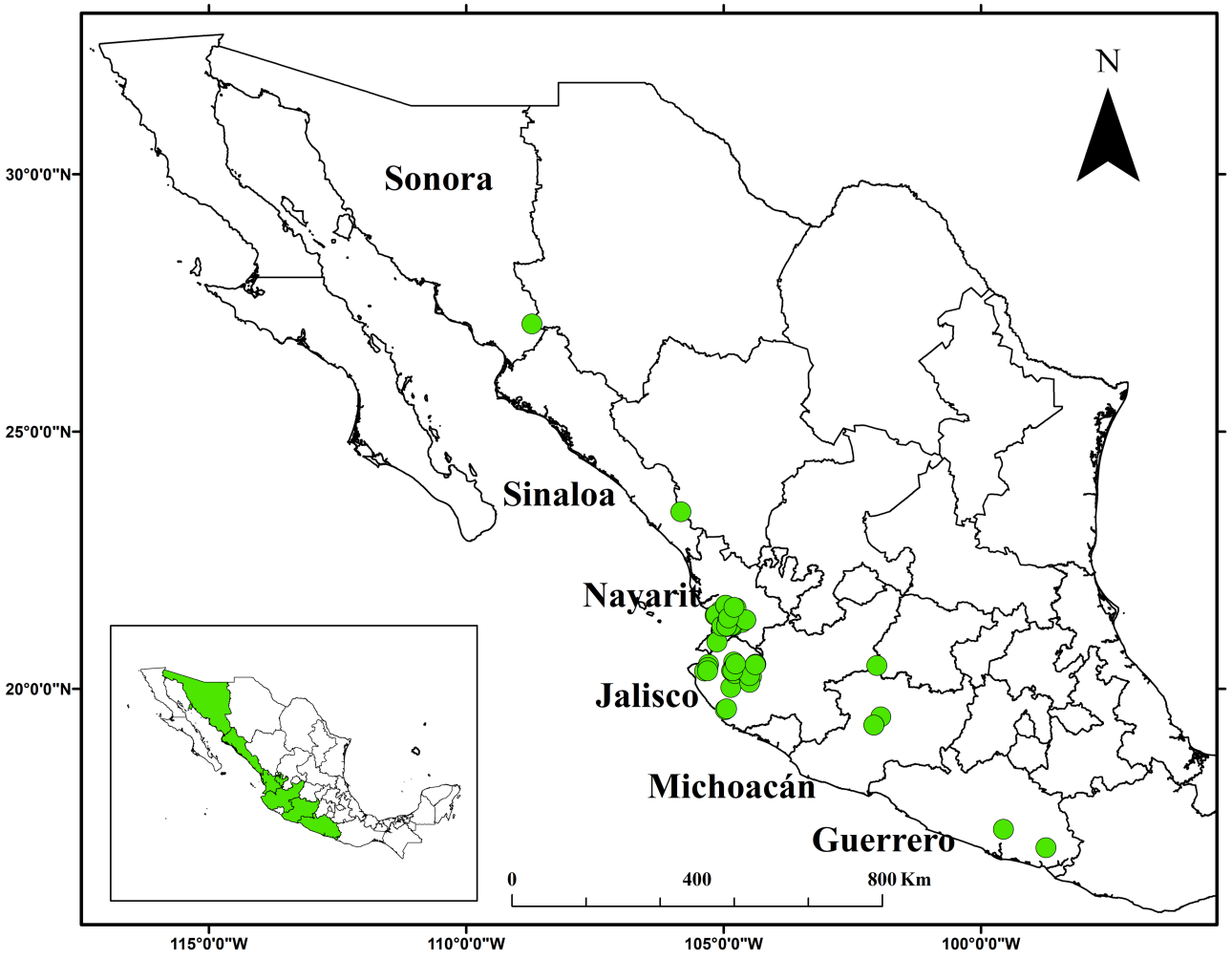

FIGURE 8. Distribution map of *Stytosanthes gretheriae* Gama.

Sequence data:—GenBank: AJ320304, 5.8S rRNA gene, ITS1 and ITS2, specimen Gama L. 197, version AJ320304.1 GI:15722358 (Vander Stappen *et al*., 1998; 2002a).

Etymology:—The epithet of this specie is dedicated to Dr. Rosaura Grether for the valuable contribution of her studies in the genus *Mimosa* and other legumes.

Distribution and habitat:—*Stylosanthes gretheriae* is described from Mexico. It is distributed in northwestern to southwestern Mexico, in the states of Sonora, Sinaloa, Nayarit, Jalisco, Michoacán and Guerrero (Figure 8). It grows in oak forest, pine-oak forest, and disturbed areas, on ferrous soils and at elevations of (100–)630–1690(–1860) m.

Phenology:—Flowering from June to February and fruiting from October to March.

Preliminary conservation assessment:—According to the IUCN (2020) Red List categories and criteria, it is not possible to provide adequate information on the extinction risk assessment or to determine the degree of conservation of *Stylosanthes gretheriae*, since it has not been possible to visit most of the populations of this taxon due to the insecurity that prevails in the country, for this reason it is included in the category of Data Deficient (DD).

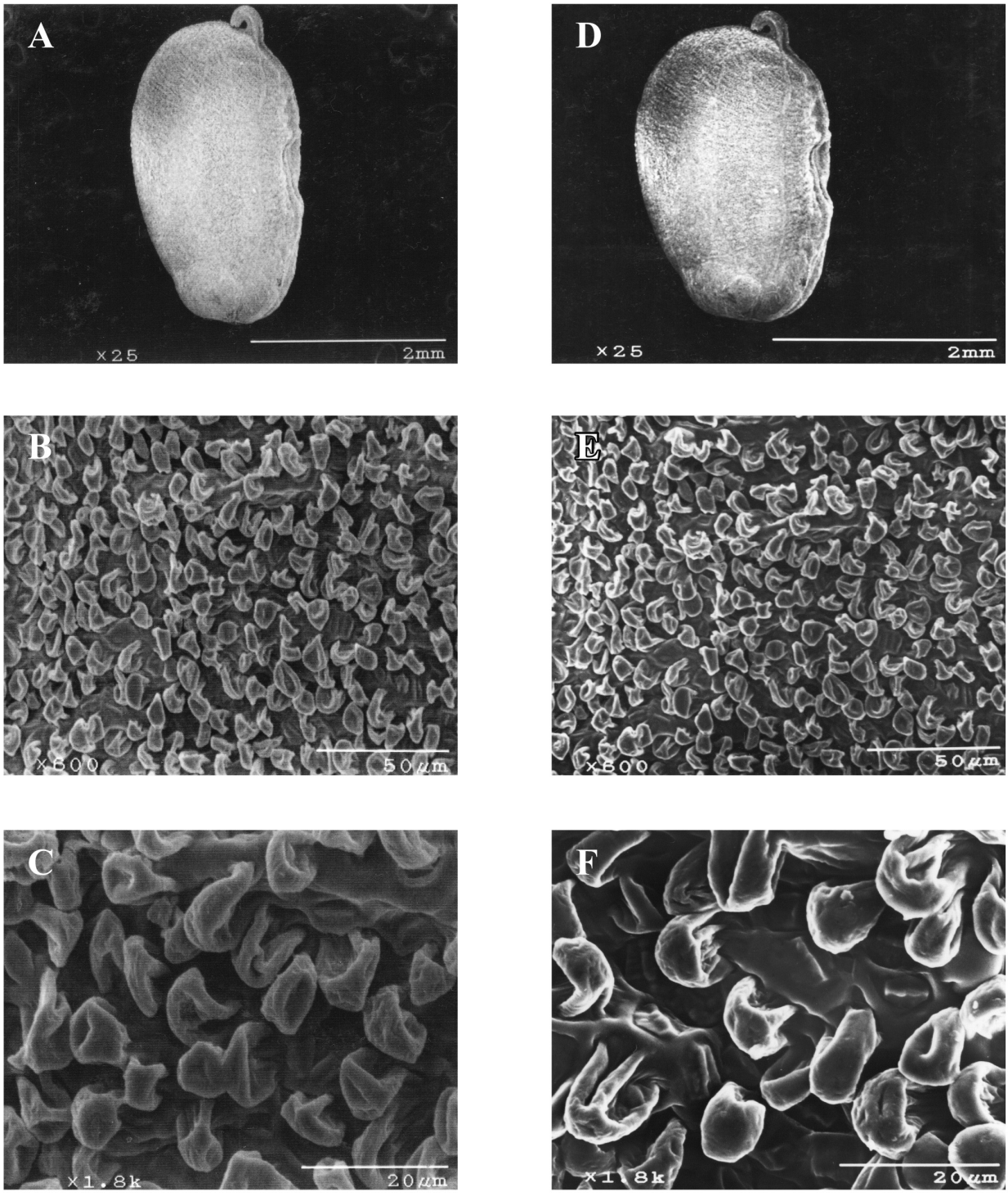

FIGURE 9. Micromorphological comparison of fruits of *S. gretheriae* and *S. guianensis*. *S. gretheriae* (left). A. Fruit (×25), B. and C. Crystals of calcium oxalate (×800 and ×1.8k, respectively). *S. guianensis* (right). D. Fruit (×25). E. Crystals of calcium oxalate and glandular trichomes (×700). F. Glandular trichome (×8k).

Taxonomic notes:—According to the DNA sequences (ITS) performed by Vander Stappen *et al.* (1998), in the *Stylosanthes guianensis* complex, they determined that it is a heterogeneous group made up of different species, since they found seven types of ITS, due to the high degree of polymorphism caused by the exogamy they present. This is consistent with the macro and micromorphological work performed by Gissi *et al*. (2025), who elevated the varieties of *S. guianensis* var. *guianensis*, *S. guianensis* var. *microcephala* and *S. guianensis* var. *pauciflora* to species level, due to the results that supported these taxonomic changes. In accordance with the results obtained in this work and those obtained by Vander Stappen *et al.* (1998; 2002a), it was decided to consider *Stylosanthes gretheriae* at the species level.

Stylosanthes gretheriae is similar to *S. guianensis* in the type and distribution of the sericeous indumentum, hirsutulous-strigose on the stem, in having an internal bracteole, the absence of a floral rudimentary axis, in the fruit having an uncinate rostrum and a base as long as wide (Figure 9). The new species is distinguished by its the habit (erect to prostrate vs. ascending to prostrate-ascending), the presence of viscid indumentum on the stem, the lanceolate and smaller leaflets, as well as by the size and number of flowers per inflorescence ((6–) 8–10 vs. (6–)10–20) (Table 3).

TABLE 3. Morphological differences between *Stylosanthes gretheriae* and *S. guianensis*.

Characters	*S. gretheriae*	*S. guianensis*
Habit	erect to prostrate	ascending to prostrate-ascending
Stem height (cm)	30–130	25–100
Indumentum	viscid	not viscid
Leaflet shape	lanceolate	lanceolate-elliptic
Number of peduncles by bract	1–5	1–4
Peduncle length (mm)	(5–)10–45	(5–)10–60
Outermost bract (mm)	7–9 × 4–5.5	7.5–12 × 6–6
Standard size (mm)	4–6.5 × 3.75–6.6	4.25–6 × 3–5.5
Upper article size (mm)	3.1–4.2 × 1.5–2.2	3–3.8 × 1.5–2.2
Lower article size (mm)	0.5–0.6 × 0.4–0.8	0.65–1.8 × 0.5–1.1
Lower article size (mm)	0.65–1.8 × 0.5–1.1	0.5–0.6 × 0.4–0.8

Additional specimens examined:—MEXICO. **Guerrero:** Municipality Chilpancingo de los Bravo, camino el Ocotito-Jaleaca de Catalán, km 3, 17°16'9"N, 99°33'47"W, 25 March 1982, *E.M. Martínez-Salas & O. Téllez-Valdés S-136*, (MEXU!); Municipality San Luis Acatlán, 3.5 km al N de Horcasitas, camino San Luis Acatlán-Horcasitas-El Potrerillo-El Rincón, 470 m, 16°54'49"N, 98°44'15"W, 7 March 1983, *E. M. Martínez-Salas & B. Morales de Jesús 3436*, (MEXU!). **Jalisco:** Municipality Atenguillo, 3 km al S de Los Volcanes, carretera Ameca-Los Volcanes-Talpa, 1645 m, 20°18'14"N, 104°32'52"W, 22 April 1994, *S. Gama-López & G. Flores-Franco 164* (MEXU!); Municipality Ayutla, 20 km al SW de Ayutla, cerca del poblado El Chilacayote, 1895 m, 20°7'35"N, 104°29'29"W, 5 February 1998, *S. Gama-López & J. I. Calzada 267* (MEXU!); Municipality Cabo Corrientes, 24 km de la desviación al Rancho Los Otates, carretera Puerto Vallarta-El Tuito, 4 km al W de La Providencia, 650–700 m, 20°21'9"N, 105°18'41"W, 4 February 1998, *S. Gama-López & J. I. Calzada 264* (MEXU!); 6 km al W de El Tuito, camino a Chacala a 3 km al E de Ranchería Guásima, 20°20'48"N, 105°22'6"W, 5 February 1979, *J. A. Solís-Magallanes 1530* (MEXU!); km 187 carretera Puerto Vallarta-El Tuito, al S de Horcones, 350 m, 20°28'32"N, 105°17'34"W, 3 February 1998, *S. Gama-López & J. I. Calzada 262* (MEXU!); km 181 carretera Puerto Vallarta-El Tuito, al N de Horcones, 575 m, 20°24'59"N, 105°18'11"W, 3 February 1998, *S. Gama-López & J. I. Calzada 263*, (MEXU!); Municipality Cuautla, 4 km al NW de la desviación al Chilacayote, 26 km al NW de Ayutla, 1430 m, 20°15'26"N, 104°29'51"W, 10 April 1999, *S. Gama-López et al. 288* (MEXU!); 5 km al SE de Volcanes, 20 km al NE de Ayutla, carretera Ameca-Volcanes-Ayutla, 1880 m, 20°14'19"N, 104°27'27"W, 28 October 1993, *S. Gama-López et al. 126/1* (MEXU!); Municipality La Huerta, Falda del Cerro El Huehuetón, Nacastillo, 19°36'44"N, 104°56'30"W, 3 November 1978, *J. A. Solis-Magallanes 1211* (MEXU!); Falda del Cerro El Huehuetón; 20–25 km al E de Chamela, 19°35'48"N, 104°57'54"W, 5 February 1979, *J. A. Solís-Magallanes 1198* (MEXU!); Municipality Mascota, Cerro de la Barranca, 1260 m, 20°31'25"N, 104°48'1"W, 13 February 1971, *J. R. González & J. Palafox 39* (ENCB!); El Mirador, sobre la carretera a Mascota, 1348 m, 20°28'59"N, 104°45'59"W, 27 January 2016, *L. Torres-Colín et al. 1348* (MEXU!); Municipality Mixtlán, 49 km W of Ameca, on route 90 to Mascota, 1800 m, 20°28'18"N, 104°22'51"W, 27 November 1995, *T. Kajita et al. 95112716* (MEXU!); km 48 carretera Ameca-Mascota, 6 km al N de Atenguillo, 1760 m, 20°28'48"N, 104°22'33"W, 22 April

1994, *S. Gama-López & G. Flores-Franco 162* (MEXU!); same location, 26 January 1995, *S. Gama-López et al. 195* (MEXU!); same location, 6 February 1995, *S. Gama-López et al. 207* (MEXU!); same location, 8 October 1995, *S. Gama-López et al. 215* (MEXU!); same location, 9 October 1996, *S. Gama-López et al. 233* (MEXU!); same location, 10 April 1999, *S. Gama-López et al. 287* (MEXU!); Carretera Ameca-Mascota, 47 km de Ameca, 1662 m, 20°28'14"N, 104°22'57"W, 27 November 2016, *L. Torres-Colín et al. 1247* (MEXU!); km 48, carretera Ameca-Talpa (Mascota), 6 km al E de Mixtlán, Municipality Talpa de Allende, 2 km al S de Talpa, 1650 m, 20°20'59"N, 104°49'7"W, *S. Gama-López et al. 125/1/2* (MEXU!); 3 km al SW de Talpa de Allende, por el camino a Tomatlán, 1245 m, 20°21'10"N, 104°50'33"W, 22 April 1994, *S. Gama-López & G. Flores-Franco 163* (MEXU!); 4.6 km al S de la desviación a Talpa de Allende, carretera Ameca-Mascota, 20°25'50"N, 104°47'50"W, 9 October 1996, *S. Gama-López et al. 232* (MEXU!); 4 km al S de la desviación a Talpa de Allende, carretera Ameca-Mascota, al E de Talpa de Allende, 1310 m, 20°26'3"N, 104°47'10"W, 6 February 1998, *S. Gama-López & J. I. Calzada 268* (MEXU!); Ojo de Agua del Cuervo, 1800 m, 20°17'55"N, 104°46'40"W, 7 March 2010, *M. de J. Cházaro-Basáñez & R. López-V. 9721* (MEXU!); steep mountains 20–22 km, S of Talpa de Allende, in the headwaters of a W branch of Río Talpa, 1200 m, 20°12'21"N, 104°46'46"W, 28–30 March 1965, *R. McVaugh et al. 23301* (ENCB!, MEXU!); Municipality Tomatlán, 2 km al E de Llano Grande, 20°1'40"N, 104°51'27"W, 6 December 1981, *J. A. Solis-Magallanes 3412* (MEXU!). **Michoacán:** Municipality Uruapan, Cerro de la Cruz al N de Uruapan, 20°27'7"N, 102°1'20"W, 15 January 1941, *Ikhayman 3258* (MEXU!); km 95 carretera Uruapan-Playa Azul, 6 km al S de la desviación a Matanguarán, 1110–1250 m, 19°17'48"N, 102°4'38"W, 24 April 1994, *S. Gama-López & G. Flores-Franco 165* (MEXU!); same location, 30 October 1994, *S. Gama-López et al. 174* (MEXU!); same location, 30 October 1994, *S. Gama-López et al. 177* (MEXU!); same location, 9 October 1995, *S. Gama-López et al. 216* (MEXU!); same location, 10 October 1996, *S. Gama-López et al. 235* (MEXU!). Municipality Ziracuaretiro, Malpaís de San Andrés Corú, 1586 m, 19°27'25"N, 101°56'47"W, 17 March 2012, *D. Valentín-Martínez 75* (MEXU!). **Nayarit:** Municipality Bahía de Banderas, 1 km al N de El Coatante, 100 m, 20°54'41"N, 105°7'47"W, 18 November 1963, *J. Rzedowski-Rotter 17861* (ENCB!, MEXU!); Municipality Compostela, 2.5 km sobre el camino de terracería, de la carretera Compostela-Las Varas, km 6, 21°12'46"N, 104°55'51"W, 3 January 1986, *O. Téllez-Valdés 9456* (MEXU!); km 59, carretera Compostela-Las Varas, 21 km al W de Compostela, 190–285 m, 21°13'5"N, 105°1'56"W, 27 January 1995, *S. Gama-López et al. 200* (MEXU!); km 42 carretera Compostela-Las Varas, 860–960 m, 21°13'14"N, 104°56'28"W, 9 April 1999, *S. Gama-López et al. 285/1/2/Pob* (MEXU!); km 29.5 carretera Las Varas-Chapalilla, autopista número 68D, 795 m, 21°13'58"N, 104°51'7"W, 9 April 1999, *S. Gama-López et al. 286* (MEXU!); Municipality San Blas, 8 km al NE de Santa Cruz, carretera Tepic, 21°25'55"N, 105°9'49"W, 5 March 1985, *P. Magaña-Rueda 70* (MEXU!); 12.9 km al W de Jalcocotán, camino a Miramar, 21°26'29"N, 105°8'57"W, 4 February 1989, *O. Téllez-Valdés & G. Flores-Franco 11753* (MEXU!); Municipality San Pedro Lagunillas, 14 mi W of Santa Isabel, 21°13'12"N, 104°48'38"W, 13 December 1968, *V. E. Rudd et al. 3022* (MEXU!, US!); km 21.5 carretera de cuota Compostela-Guadalajara, 8 km al E de Compostela, 1020 m, 21°13'39"N, 104°49'49"W, 26 October 1993, *S. Gama-López et al. 119/1/2* (MEXU!); Municipality Santa María del Oro, 7 km en la desviación a Santa María del Oro, 1200 m, 21°19'55"N, 104°36'18"W, 24 January 1977, *A. Delgado-Salinas et al. 449* (MEXU!); 2 km de Santa María del Oro rumbo a La Laguna Santa María del Oro, 1170 m, 21°20'29"N, 104°34'6"W, 24 January 1977, *A. Delgado-Salinas et al. 458* (ENCB!, MEXU!); 54 km al N del límite Jalisco-Nayarit, carretera Guadalajara-Tepic, 1 km al SE de La Galinda, delante de Jazmines, 21°18'27"N, 104°39'19"W, 14 February 1980, *S. Zárate-Pedroche 459* (MEXU!); 2 km al N de Santa María del Oro, en el Mirador de la Laguna, 1162 m, 21°20'14"N, 104°36'38"W, 14 February 1980, *S. Zárate-Pedroche 461* (MEXU!); entre el km 189–190 de la carretera Tepic-Guadalajara, 1240 m, 21°18'39"N, 104°39'2"W, 26 October 1993, *S. Gama-López et al. 123/1* (MEXU!); km 13, carretera Santa María del Oro a la Laguna, a 2 km al N de Santa María del Oro, 945–1140 m, 21°20'29"N, 104°34'6"W, 22 January 1994, *S. Gama-López et al. 154/1/2* (MEXU!); same location, 2 April 1994, *S. Gama-López et al. 160/1/2* (MEXU!); km 160 de la autopista Guadalajara-Tepic; 60 km al S de la ciudad de Tepic, 1215 m, 21°17'22"N, 104°38'23"W, 25 January 1995, *S. Gama-López et al. 197* (MEXU!); Municipality Tepic, 9 km de Tepic, carretera a Mazatlán, 820 m, 21°34'38"N, 104°56'36"W, 23 January 1977, *A. Delgado-Salinas et al. 433* (MEXU!); along route 28, km 20–21, 830 m, 21°30'39"N, 105°3'53"W, 6 January 1979, *T. B. Croat 45297* (MEXU!, MO!); 16 km al N de Tepic, carretera Tepic-Mazatlán, 21°37'2"N, 104°57'48"W, 14 February 1980, *S. Zárate-Pedroche 462* (MEXU!); 10 km al NE de Francisco I. Madero (Ingenio Puga), camino a Pochotitán, 21°34'26"N, 104°45'36"W, 19 January 1987, *O. Téllez-Valdés. & O.J. Millar 10443* (MEXU!); 3 km al E del Cora, terracería al Cuarenteño, que empieza 300 m delante del Isote, carretera Tepic-Miramar, 21°30'33"N, 104°58'12"W, 20 March 1987, *O. Téllez-Valdés 10046* (MEXU!); La Escondida, antiguo Ingenio Azucarero, a 15 km al N de Tepic por la carretera a Mazatlán, 21°34'33"N, 104°54'6"W, 2 February 1989, *O. Téllez-Valdés & G. Flores-Franco 11659* (ENCB!, MEXU!); 5 February 1989, al O del km 11.3 del camino de Francesco I. Madero-Pochotitán, 7.6 km del camino, 21°35'6"N, 104°47'47"W, *O. Téllez-Valdés & G. Flores-Franco 11794*

(MEXU!); 2 km al NW de La Escondida, carretera Tepic-Mazatlán, 630–735 m, 21°34'41"N, 104°55'30"W, 21 January 1994, *S. Gama-López et al. 152/1/2/3/4/Pob* (MEXU!); same location, 31 March 1994, *S. Gama-López et al. 157/1/2* (MEXU!); km 15, carretera Tepic-Mazatlán carretera libre, al N de Tepic, 630–640 m, 21°37'5"N, 104°57'29"W, 21 January 1994, *S. Gama-López et al. 153/1/2/3* (MEXU!); same location, 1 April 1994, *S. Gama-López et al. 159/1/2* (MEXU!); same location, 27 January 1995, *S. Gama-López et al. 206* (MEXU!); same location, 6 October 1995, *S. Gama-López et al. 208* (MEXU!); 1 km al W de La Escondida, 655–730 m 21°34'40"N, 104°55'23"W, 6 October 1995, *S. Gama-López et al. 209* (MEXU!); same location, 2 February 1998, *S. Gama-López & J. I. Calzada 258* (MEXU!); km 15.5 carretera libre Tepic-Mazatlán, 630 m, 21°37'31"N, 104°57'44"W, 6 October 1996, *S. Gama-López et al. 225Bis* (MEXU!); same location, *S. Gama-López et al. 243* (MEXU!); same location, *S. Gama-López & J. I. Calzada 257Bis* (MEXU!); same location, *S. Gama-López et al. 284/1/2/3/Pob* (MEXU!); km 3 del corredor Tepic-Aguamilpa, borde del cultivo, 600 m, 21°30'58"N, 104°50'27"W, 5 September 1998, *A. Benítez-Paredes 3766* (MEXU!); Municipality Xalisco, 25 km by road S of Tepic, along road between Tepic and Compostela, 3000 ft, 21°19'21"N, 10°55'17"W, 18 October 1970, *G. L. Webster & G. J. Breckon 15695* (MEXU!); 4 km al W de la brecha de La Curva, km 15 carretera Tepic-Compostela, 930 m, 21°22'43"N, 104°54'13"W, 25 October 1993, *S. Gama-López et al. 115* (MEXU!); camino a Compostela, 1 km delante de La Curva, 1100 m, 21°22'12"N, 104°54'11"W, 26 January 1988, *S. H. Aguilar-Orozco 110* (MEXU!); km 24.5 carretera Tepic-Compostela, 805 m, 21°19'6"N, 104°55'24"W, 27 January 1995, *S. Gama-López et al. 198* (MEXU!); km 25 carretera Compostela-Tepic, 960 m, 21°19'21"N, 104°55'17"W, 25 October 1993, *S. Gama-López et al. 118/1/2* (MEXU!); same location, 2 April 1994, *S. Gama-López et al. 161* (MEXU!); same location, 7 October 1995, *S. Gama-López et al. 213* (MEXU!); same location, 7 October 1995, *S. Gama-López et al. 214* (MEXU!); same location, 7 October 1996, *S. Gama-López et al. 230* (MEXU!); same location, 2 February 1998, *S. Gama-López & J. I. Calzada 259* (MEXU!). **Sinaloa:** Municipality Concordia, Potrerillos a La Petaca, 1600 m, 23°26'25"N, 105°49'37"W, 2 February 1990, *R. Vega-Aviña et al. 3725*(MEXU!). **Sonora:** Municipality Álamos, Barranca Pozo Azúl above junction with arroyo Santa Barbara, 3 km S of Rancho Santa Barbara (E-NE of Álamos), 900 m, 27°5'40"N, 108°43'15"W, 5 October 2006, *T. R. Van Denver 2006–1197* (MEXU!).

Key to distinguish other species of *Stylosanthes* for Mexico

1. Fruit base width and length equal 2
- Fruit base wider than long 5
2. Fruit generally with 2 fertile articles, with coiled rostrum. Leaflets elliptic to obovate ..... *S. viscosa*
- Fruit with 1 fertile article, with rostrum uncinate. Leaflets linear, linear-lanceolate to elliptic 3
3. Fruit with glandular trichomes and with conspicuous venation. Inflorescence longer than wide. Leaflets linear or linear-lanceolate ..... *S. dissitiflora*
- Fruit without glandular trichomes and with inconspicuous venation. Inflorescence wider than long. Leaflets lanceolate, elliptic-lanceolate 4
4. Herbs erect to prostate. Stem with indument viscid. Leaflets lanceolate. Lower article generally absent ..... *S. gretheriae*
- Herbs ascending to prostrate-ascending. Stem not viscid. Leaflets lanceolate-elliptic. Lower article generally present ..... *S. guianensis*
5. Rostrum straight to recurved. Leaflets linear-lanceolate or lanceolate 6
- Rostrum recurved, enrolled to straight-enrolled. Leaflets lanceolate, elliptic or obovate 7
6. Rostrum straight. Herbs erect, annual or perennial. Axis rudiment present. Stipules deciduous or if persistent only at the stem base ..... *S. calcicola*
- Rostrum straight to recurved. Herb perennial to suffruticose sub-shrub or perennial sub-shrub. Axis rudiment absent. Stipules persistent on the whole stem ..... *S. quintanarooensis*
7. Rostrum recurved 8
- Rostrum enrolled 11
8. Foliolate with macules. Calyx tube 10–13 mm long; standard greater than 10 mm long ..... *S. subsericea*
- Foliolate without macules. Calyx tube 9–10 mm long; standard less than 9 mm long 9
9. Stems erect. Rostrum recurved, slightly coiled. Axis rudiment present ..... *S. rosalindae*
- Stems erect-decumbent. Rostrum straight, reclinate to slightly coiled 10
10. Stipules 6–13 mm long. Terminal leaflet 6–13 mm long. Fruit glabrous or rarely pubescent. Rostrum recurved. Distribution northeastern Mexico ..... *S. mexicana*
- Stipules 4–10 mm long. Terminal leaflet 4–11 mm long. Fruit pubescent. Rostrum recurved to slightly rolled at the apex. Distribution southern Mexico ..... *S. macrocarpa*
11. Annual herbs. Stems 10–35 cm high. Inner inflorescence bracteole 1. Axis rudiment absent, rarely present. Unifoliate bract and / or rarely trifoliolate. Plants diploid ($2\underline{n} = 20$) ..... *S. humilis*
- Perrenial herbs. Stems 10–50 cm high. Inner inflorescence bracteoles 2. Axis rudiment generally present. Trifoliate bracts. Plants tetraploid ($2\underline{n} = 40$) ..... *S. leticiana*

Discussion

This study was underpinned by robust fieldwork aimed at analyzing the morphological variation, habitat preferences, and geographic distribution of each species. Systematic collections ensured the acquisition of essential reproductive structures (flowers, fruits, and seeds). The collected material facilitated comprehensive morphometric analysis, encompassing both macro-morphology of vegetative and floral structures, and micro-morphology of the external fruit surface and pollen morphology. Chromosome counts (mitotic and meiotic) were also included to gather the maximum amount of comparative evidence supporting the taxonomic delimitation of the genus *Stylosanthes* in Mexico.

The generated structural characters (macro and micro-morphological) were analyzed using phenetic methods to investigate character variation and their contribution to differentiating the Mexican species of *Stylosanthes*. These analyses determined the presence of 12 species within Mexico. Eight taxa corresponded to previously described species (*S. calcicola*, *S. dissitiflora*, *S. guianensis*, *S. humilis*, *S. macrocarpa*, *S. mexicana*, *S. subsericea*, and *S. viscosa*), while four were newly recognized in this work. One of these had been previously described as *S. quintanarooensis* (Gama-López & Dávila, 2009), and the remaining three (*S. gretheriana*, *S. leticiana*, and *S. rosalindae*) are described in this manuscript. Crucially, the results demonstrated that the species delimitation based on structural characters was congruent with the molecular phylogenetic studies conducted collaboratively with VanderStappen *et al.* (1998, 1999, 2000, 2002a, 2002b, 2003), effectively ratifying the taxonomic boundaries of the Mexican *Stylosanthes* species.

The fieldwork also facilitated the detection of significant morphological variations and new populations. For instance, *S. calcicola*, previously known only from the Yucatán Peninsula (Campeche, Quintana Roo, and Yucatán), was newly found in Chiapas. *S. dissitiflora* (initially reported from Jalisco and Chiapas) now includes new localities in Sonora, Sinaloa, Nayarit, Guerrero, and Oaxaca. New populations of *S. macrocarpa* were found in Puebla (previously only Oaxaca), and the northernmost population of the widely distributed *S. viscosa* is now reported in Tamaulipas state.

Given the wide geographic distribution of species like *S. guianensis*, *S. humilis*, *S. leticiana*, and *S. viscosa*, and the morphological variation observed within and among their populations, it is vital to continue studying these populations to understand the adaptive mechanisms that have shaped these species over time.

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