Phytotaxa 772 (1): 030–042
https://www.mapress.com/pt/

Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

https://doi.org/10.11646/phytotaxa.772.1.2

Taxonomic review of the *Bauhinia goldmanii* complex (Cercidoideae, Leguminosae)

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Abstract

Bauhinia goldmanii Rose is widely distributed in Chiapas (Mexico), extending into Guatemala, however, morphologically distinct populations from Oaxaca and Veracruz suggested the existence of a taxonomic complex in the region and highlighted the need for a taxonomic revision. Therefore, this study examined all relevant specimens from the MEXU as well as from the F and MO herbaria and recircuscribed this taxon as comprising two distinct populations: *Bauhinia goldmanii* var. *zapoteca* R. Torres & A. Saynes *var. nov.* it is endemic to the dry forests of the municipalities of Magdalena Tlacotepec and San Bartolo Yautepec (Oaxaca), and *Bauhinia sousae* R. Torres *sp. nov.*, it is endemic to Xalapa, Veracruz (Mexico), near to Trans-Mexican Volcanic Belt, while *B. goldmanii* var. *goldmanii* is distributed from the in the foothills of the Sierra Madre de Chiapas (Mexico) and Guatemala.

Resumen

Bauhinia goldmanii Rose se distribuye ampliamente en Chiapas (México), extendiendose hasta Guatemala; sin embargo, la presencia de poblaciones morfológicamente distintas en Oaxaca y Veracruz sugirió la existencia de un complejo taxonómico en la región y puso de manifiesto la necesidad de una revisión taxonómica. Por ello, en este estudio se examinaron todos los ejemplares pertinentes de los herbarios MEXU, F y MO, y se reclasificó este taxón reconociendo dos poblaciones diferenciadas: *Bauhinia goldmanii* var. *zapoteca* R. Torres & A. Saynes *var. nov.*, endémica de los bosques secos de los municipios de Magdalena Tlacotepec y San Bartolo Yautepec (Oaxaca), y *Bauhinia sousae* R. Torres *sp. nov*., endémica de Xalapa, Veracruz (México), cerca del Eje Neovolcánico Transmexicano.

Key words: *Bauhinia divaricata,*, Chiapas, Mexico, Oaxaca, section *Bauhinia*, Veracruz

Introduction

Currently, the genus *Bauhinia* Linnaeus (1753:374) is classified in the subfamily Cercidoideae (LPWG, 2017), within the legumes; it has an estimated richness of 150–180 species and a pantropical distribution (Wunderlin, 2010; POWO, 2026). *Bauhinia goldmanii s.l.* is a morphologically variable taxon, due to its similarity to *Bauhinia divaricata* Linnaeus (1753:374), it was considered a synonym of this species (Wunderlin, 1983), but based on the revised differences (Linnaeus, 1753; Rose, 1906; Torres-Colín, 1999; Torres-Colín, 2009), and as discussed here, now they are considered different species. Taking into account the above, in this work a revision of *Bauhinia goldmanii s.l.* was carried out, for its taxonomic delimitation.

 Accepted by Marcus Falcão: 16 Aug. 2026; published: 27 Aug. 2026

Material and methods

The study area corresponds to localities in Mexico (Chiapas, Oaxaca, and Veracruz) and Guatemala (fig. 1). This taxonomic review was based on the examination of botanical collections mainly from the MEXU herbaria, some collections from F and MO, the photograph of the holotype of *Bauhinia goldmanii* deposited at US, as well as the fragment of an holotype deposited at NYBG and digitized in JSTOR Global Plants. We also made collections in the field. The descriptions and illustrations of taxa were based on measurement and comparison of vegetative and reproductive structures of the specimens examined under stereomicroscopes OLYMPUS SZ60 and NIKON SMZ745T and photographed using a digital microscope ZEISS STEMI 508, and camera ZEISS AXIOCAM 208 COLOR 8 MP. A distribution map was prepared with georeferenced records representative of the taxa and modeled in the program ArcGIS 10.8 (2021). The morphological terminology was based on the glossaries of Moreno (1984) and Harris & Harris (1995). The classification of the Leguminosae at the subfamily level was based on LPWG (2017).

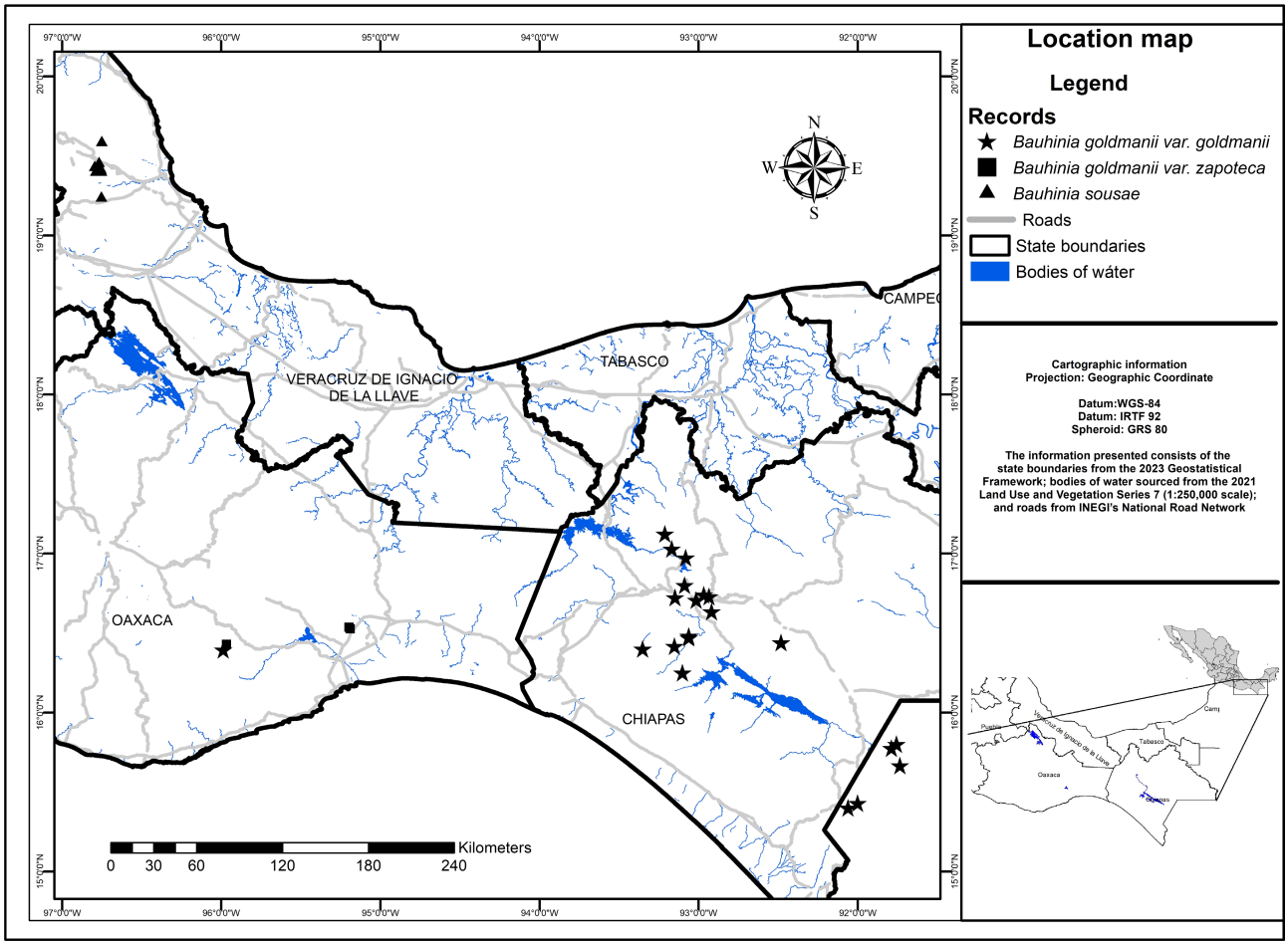

FIGURE 1. Geographic distribution map of *Bauhinia goldmanii* var. *goldmanii*, *B. goldmanii* var. *zapoteca*, and *B. sousae* (map designed by José M. García-López).

Results

This revision allowed the identification of populations of *Bauhinia goldmanii s.l.* in Guatemala and Mexico (Chiapas, Oaxaca, and Veracruz). Based on the differences found, such as habit (fig. 5), branch and inflorescence architecture, leaf shape, petal arrangement and shape, variations in the number and shape of the androecium, as well as geographic distribution, it was possible to establish the epithet *B. goldmanii* as *Bauhinia goldmanii* var. *goldmanii*, distinct from *Bauhinia goldmanii* var. *zapoteca* and *Bauhinia sousae*, which are described here as new taxa. All morphological differences between the three taxa are detailed in table 1. The results of this revision contribute to the knowledge of the taxonomic richness of the genus, especially of the section *Bauhinia* Wunderlin, Larsen & Larsen (1987: 11), a group of species endemic to Mexico, whose diversification and phylogeny are currently under study.

Taxonomic treatment

Identification key

1. Trees, rarely shrubs; branches and inflorescences usually descending, 13–23 flowers; rachis, pedicels, and calyx deep red; petals strongly imbricated; blade of the petals straight to slightly reflexed; fertile stamen 1; staminodes 7 of them connate 2/3 of their length or almost at the apex, 2 more inserted 2/3 on the adaxial surface, lanceolate, forming a conduplicated lamina. Endemic to Xalapa, Veracruz, Mexico ..... *Bauhinia sousae*.
1. Shrubs; branches and inflorescences usually erect, 16–40 flowers; rachis, pedicels, and calyx reddish; corolla with petals conspicuously separated, the blade of the petals conspicuously reflexed; fertile stamens 1–5, when 5, forming fascicles with staminodes; staminodes 5–9, connate 1/3 to 2/3 of their length, never until the apex, linear, forming or not a conduplicated lamina. Mexico and Guatemala 2
2. Leaf lobe apex rounded to acute; 20–40 flowers; fertile stamens 1; staminodes 9, connate 1/3–1/2 of their length, forming a conduplicated lamina. Mexico (Chiapas) and Guatemala ..... *Bauhinia goldmanii* var. *goldmanii*
2. Leaf lobes apex acute to rounded; 16–20 flowers; fertile stamens 1, 2, 3 or 5, with 5,7, 8 or 9 staminodes forming fascicles with the stamens or forming a conduplicated lamina. Endemic to Tehuantepec and Yautepec, municipalities, Oaxaca..... ..... *Bauhinia goldmanii* var. *zapoteca*.

Bauhinia goldmanii Rose (1906: 97) var. ***goldmanii***, *Contribution. U.S. National Herbarium. Smithsonian Institution.* 10(3): 97. 1906.

Type: México, Chiapas: Tuxtla Gutierrez, 8 march 1904, *Goldman 742*, (holotype US 470546 photograph MEXU!,holotype fragment NY-[bc] NY00003416). Fig. 2.

Shrubs, rarely trees, 1–5 (–7) m, andromonoecious. Branches not descending, young branches ferruginous, villous to hirsutulous, old branches grayish, scarcely hirsutulous to glabrous. **Leaves** 2-lobed, bilobed for 1/3 of their length, lobes 2–7(–12) cm long with apex rounded to acute, blade 2–7(–12) × 2.5–8(–10.8) cm, widely ovate, chartaceous, 7–9 veined, upper surface hirsutulous, lower surface densely hirsutulous, the base cordate to subcordate; petiole (0.8–)1–3(–4) cm, canaliculate, densely hirsutulous, ferrugineous. **Stipules** 0.9–1.7 × 0.3–1.1 mm, triangular to lanceolate, caudate, densely hirsutulous, ferrugineous; intrastipular excrescence ca. 1.0 × ca. 0.7 mm, oblong, green to black. **Inflorescences** usually not descending**,** racemose, terminal, and subterminal, axillar, 20–40 flowers; rachis hirsutulous, reddish, ferrugineous; floral buds 1–2 × c. 0.3 cm, linear, reddish, hirsutulous, and ferrugineous; bracts 1–2(–2.5) × (0.1–)0.3–0.5(–0.6) mm, linear to lanceolate, and hirsutulous; bracteoles (0.7–)0.9–1.5 × ca. 0.2 mm, linear to lanceolate, hirsutulous, and ferrugineous; pedicels (0.6–)0.8–1.5(–2.4) cm, articulated at their apex with the flower, persistent, hirsutulous, slightly reddish. **Hermaphrodite flowers**; hypanthium (2–)2.8–3.5(–3.9) mm, crateriform to infundibuliform, reddish, and hirsutulous; **calyx** 0.9–1.4 × ca. 0.5 cm, spathaceous, usually with 2 or 3 clefts at the base, reddish, 5-lobed at the apex, lobes 1–2 mm long, and densely strigulose, with white strigulose trichomes, hirsutulous; **corolla** pentamerous, 1.2–2.4 cm, conspicuously separated at the beginning of anthesis, unguiculated, white, red when mature, blade (0.8–)1–1.5(–1.7) × 0.2–0.4 cm, slightly trullate, long caudate, reflexed, claw 4–9(13) mm, glabrous; **androecium** diadelphous, fertile stamen 1, (2.3–)2.5–3(–3.2) cm, almost straight, connate with 9 staminodes not forming fascicles; anthers 1.9–2.9 × 0.4–0.7 mm, lanceolate, glabrous, dorsifixed; **staminodes 7**, 1.3–2(–2.3) × ca. 0.2 cm; connate 1/3 to 1/2 of its length, 2 others, 0.7–0.9 cm inserted on the blade adaxial surface, forming a conduplicated lamina, linear, anthers poorly developed, persistent or deciduous; **gynoecium** 2.5–4(–4.3) cm, slightly arcuate, ovary long-stipitate, densely hirsutulous, style with trichomes, stigma ca. 1 mm diam., capitate; **male flower** similar with gynoecium non-functional. **Fruit** a legume 7–11(–14.2) × ca. 1.5 cm, narrowly oblong, elastically dehiscent, reddish-brown, strigulose, apiculate, rostrum 2–5 mm long, stipe ca. 2 cm long; **seeds** 7–9 × 5–7 mm, ovate to oblong, dark brown, aril lobes short, hylum subapical.

Distribution and habitat:—Is distributed in Chiapas, Mexico, reaching Guatemala. It occurs in vegetation of deciduous forest, rarely in an ecotone with oak-pine forest, usually at an elevation of 300 to 900 m.

Phenology:—Flowering from October to February; fruiting from March to July.

Discussion:—*Bauhinia goldmanii* var. *goldmanii* was considered a synonym of *B. divaricata* (Wunderlin, 1983), but it is very different due to the differences reviewed elsewhere (Linnaeus, 1753; Rose, 1906; Torres-Colín, 1999; Torres-Colín, 2009). It is a shrub or tree (vs usually shrubs); leaves widely ovate (vs. leaves ovate-lanceolate), base slightly cordate (vs. base rounded (obtuse) to cordate), 2-lobed 1/3 their length (vs. 2/3 their length), 5–7 cm long (vs. 2–14 cm long), lobes ovate (vs. ovate-lanceolate (acuminate), lobes slightly divaricate (vs. lobes conspicuously divaricate); legume 10–12 cm long (vs. 8–10 cm long). Also *B. goldmanii* var. *goldmanii* has leaves and pedicel

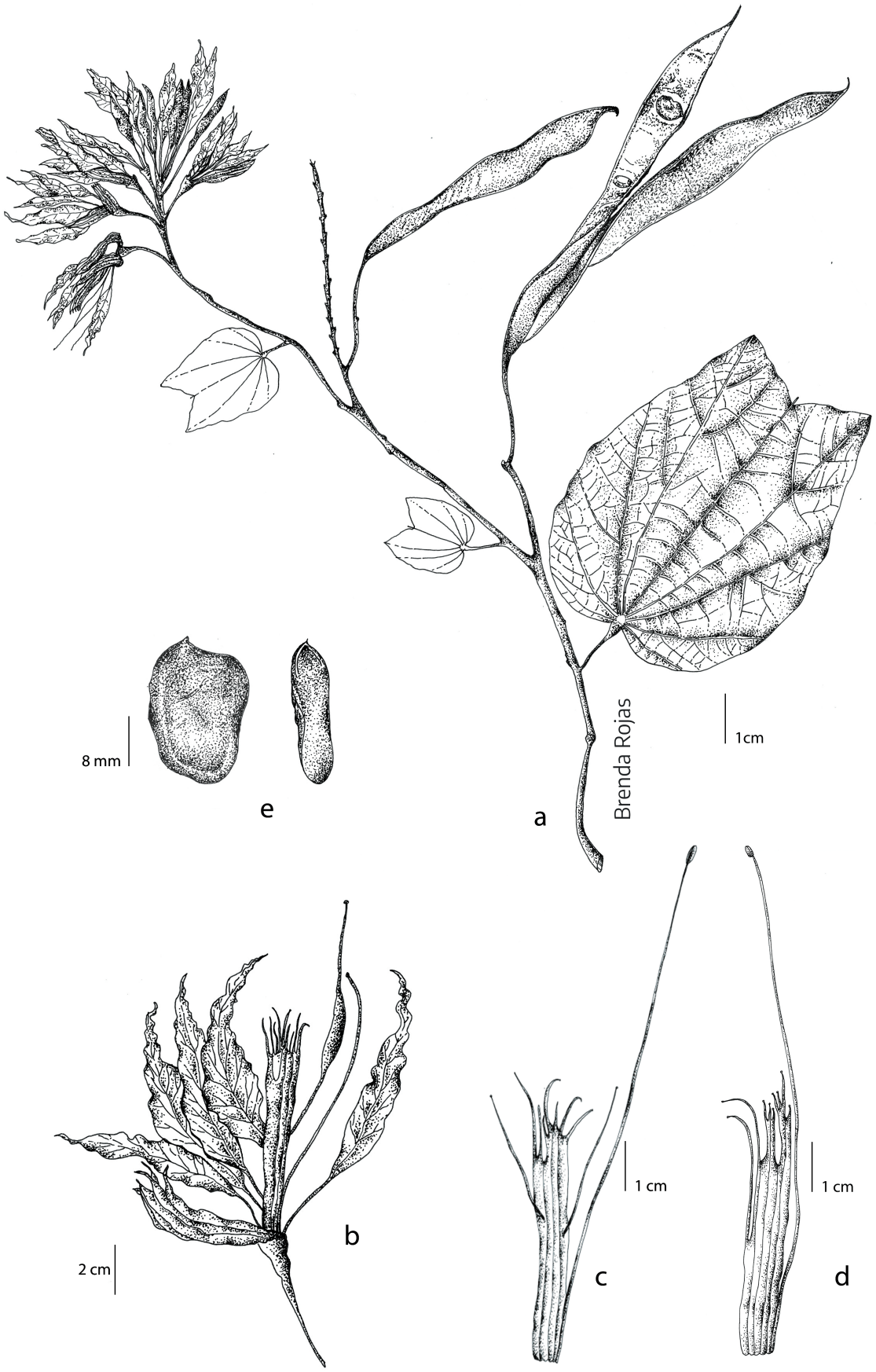

FIGURE 2. *Bauhinia goldmanii* var. *goldmanii*: a) Branch with leaves, flowers and fruits; b) hermaphrodite flower; c) staminate flower with adaxial staminodes in a conduplicated lamina; d) staminate flower with adaxial staminodes in a conduplicated lamina; e) seed (illustration by Brenda Rojas Martínez: a–d from Torres 15377 MEXU).

with hirsutulo-ferruginous pubescence; inflorescences rachis, bracts, bracteoles and pedicels, reddish with flowers in the apex in anthesis, white (petals) and deep red at the base when the flowers whither, giving the appearance of a bicolor inflorescence (*B. divaricata* does not). It is mainly distributed in Chiapas (Mexico), reaching some localities in Guatemala (vs. mainly in southeastern Mexico, The Antilles, Belize, Guatemala, Honduras, El Salvador, Nicaragua and Costa Rica).

Additional material examined:—**GUATEMALA**; Loc. Huehuetenango, Nentón, Nueva Catarina, 850 m., 29 September 2003, *Avila* 56 (MEXU, USCG): Loc. Huehuetenango, Nenton, Llano Grande, 2 km from the Village, 15.48N, 91.45W, 800 m, 6 February 1993, *Castillo 1729* (**F**). Nentón, 400 m., 26 October 2000, M. *Véliz 99.7609 et al.* (**BIGUA**, **MEXU**): Jacaltenango, aldea Buxup, 500 m., 13 February 2002, *Véliz 12423 et al.* (**BIGUA**, **MEXU**). **MEXICO**. **Chiapas**; Loc. Municipio de Berriozabal, Berriozabal (near), 830 m, 2 January 1981, *Breedlove 49067* (**MEXU**); Loc. Municipio de Chiapa de Corzo, 6 miles SE on Mexican Highway 190, 3000 ft, 29 January 1965, *Breedlove 20140* (**MEXU**); Loc. El Chorreadero (Above), 800 m, 27 January 1981, *Breedlove 49632* (**MEXU**); Loc. Municipio Copainala, 60 km NW of Soyalo, above Copainala, 550 m, 13 March 1973, *Breedlove 34052 et al.* (**MEXU**); Loc. Municipio Frontera Comalapa, 6–8 km E, along road to Ciudad Cuauhtémoc, 1000 m, 23 October 1974, *Breedlove 39039* (**MEXU**); Loc. Municipio Las Margaritas, Laguna Miramar E of San Quintin, 300 m, 11 February 1973, *Breedlove 33332* (**MEXU**); Loc. Municipio Ocozocoautla, along road to Malpaso, 3 km N, 900 m, 20 December 1971, *Breedlove 23370* (**MEXU**); Loc. Municipio de Ocozocoautla, La Cima 15 km W-NW of Ocozocoautla, 800 m, 15 October 1972, *Breedlove 29039* (**MEXU**); Loc. Derna, río de La Venta to Chorreadero, 800–1000 m, 16 December 1972, *Breedlove 30317* (**MEXU**); Loc. Municipio Terán, San Juan Crispín, 4 km N, along road to San Fernando, 600 m, 17 December 1972, *Breedlove 30394* (**MEXU**); Loc. Municipio Tuxtla Gutiérrez, 8 km N, road to El Sumidero, 3400 ft, 16 February 1965, *Breedlove 9021* (**MEXU**); Loc. Tuxtla Gutiérrez, along road to El Sumidero, 2500 ft., 27 October 1965, *Breedlove 13839* (**MEXU**); Loc. Municipio Tzimol, 15 km S of Comitan, on road to Tzimol and Tuxtla Gutiérrez, 1200 m, 19 November 1980, *Breedlove 47582* (**MEXU**); Loc. Comitán, 15 km S, on road to Tzimol and Tuxtla Gutiérrez, 1200 m, 20 March 1981, *Breedlove 50209* (**MEXU**); Loc. Tuxtla Gutiérrez, 10 km al N sobre el camino al Parque El Sumidero, 3 December 1983, *Cabrera 5956* (**MEXU**); Loc. El Aguacero, en el fondo de la barranca, 13 km al NO de Ocozocoautla, 29 March 1985, *Cabrera 7899 Cabrera* (**MEXU**); a 3 km al E de la desviación a Pichucalco, sobre la Carretera San Cristóbal de las Casas-Tuxtla Gutiérrez, April 1 1985, *Cabrera 7988* (**MEXU**); Loc. Ejido Portales, 700 m, 16 Nov 1977, *Calzada 3872 et al.* (**MEXU**); Loc. Reserva del Ocote, campamento Bajada del Macho, ribera del río Cintalapa, 380 m, 5 May 1983, *Calzada 9996* (**F**); Loc. Municipio de Ixtapa, cerro El Escopetazo, 16.44N, 92.48W, 1500 m, 10 January 1995, *Chamé 938 Luna* (**MEXU**); Loc. La Trinitaria, 33.7 miles al S, 10 mi N of Guatemala Border, 15.43N, 92.00W, 730 m, 14 February 1987, *Croat 64760* (**MEXU, MO**); Loc. Tuxtla Gutiérrez, 12 km al S, rumbo a San Cristóbal De Las Casas, 860 m, 1 December 1977, *Delgado 866 et al.* (**MEXU**); Loc. 10 km de Tuxtla Gutiérrez, carretera del Cañon del Sumidero, 950 m, 11 March 1978, *Delgado 970 et al*. (**MEXU**); Loc. Municipio San Lucas, cerca de V. Acala, paraje El Nacimiento, 580 m, 17 February 1994, *Díaz s/n* (**MEXU**); Loc. Municipio de San Lucas, cerca de Chiapilla, 660 m., March 2008, *Díaz s/n* (**MEXU)**; Loc. Municipio de Ocozocouautla, 30 km adelante, rumbo a Cintalapa, 520 m, 11 January 1988, *Flores 517 et al*. (**MEXU**); Loc. Municipio de Ocozocuautla, cerca de Vicente Guerrero, March 23 2002, *Pérez s/n* (**MEXU**); Loc. Municipio Copainala, Nuevo Vergel, 2 km al S del ejido La Nueva, 645 m, 17°01'43.3''N; 93°10'02.6''W, 22 October 2009, *Martínez* 378 (MEXU); Municipio Copainala, on roadside in Miguel Hidalgo, 763 m.; Loc. La Trinitaria, 19 km al S-SE, 1100 m, 10 December 1978, *Grether 1170* (**MEXU**); Loc. Municipio Venustiano Carranza, Presa de la Angostura (orillas), about 15 km SW of colonia El Reparo, 530 m, 9 February 1985, *Hughes 515* (**MEXU**); Loc. Acala, 10 km S of Mexican Highway 190 along the road to Acala, 763 m, 17°07'21.8''N; 93°12'37.6''W, 18 November 2014, *Geck 518* (**MEXU**); Loc. Nandabur, Municipio Acala, 1600 ft, 24 October 1966, *Laughlin 2629* (**MEXU**); Loc. Municipio de Chiapilla, along the road Chiapilla to San Lucas, 2400 ft, 25 November 1966, *Laughlin 2854* (**US**); Loc. Motozintla, 14.3 mi S of jct. of highway 190 and road to Motozintla, 6 January 1984, *Lavin 4552 et al*. (**MEXU**); Loc. 8.2 miles east of Eastern most turnoff to Chiapa de Corzo, 66.6 miles west of San Cristobal Obelisk, *Lavin 5316* (**MEXU**); Loc. Municipio. Chicoasén, 2 km al SE sobre el camino a Rivera El Zapote, entrando por el entronque del libramiento Chicoasén con la Carretera Soyaló, 601 m, 16°58'20.4''N; 93°04'46.81''W, November 2009, *López-Cruz* 1022 (**MEXU**); Loc. Municipio Frontera Comalapa, 5 km past Comalapa, 15.40N, 92.06W, 10 Dec 1991, *Macqueen 341* (**MEXU**); Loc. Municipio. Copainala, Nuevo Vergel, 2 km al S del ejido La Nueva, 645 m, 17°01'43.3''N; 93°10'02.6''W, 22 October 2009, *Martínez-Meléndez 378* (**MEXU**); Loc. 21 km al W de Tuxtla Gutiérrez, 1030 m, 31 May 1987, *Martínez 21453* (**MEXU**); Loc. Municipio de Tzimol, 15 km al S de Tzimol, camino a Pujiltic, 850 m, February 1987, *Martínez 20078* (**MEXU**); Municipio, Chicoasén, en el tunel del camino Tuxtla Gutiérrez- Chicoasén. 800 m, 19 April 1987, *Martínez 20125 et al.* (MEXU); Loc. Municipio de Comitán, Trapichito, 1350 m, 2 June 1945, *Matuda 15719*: Loc, Municipio. Villa Las

Rosas, a 7 km de Villa Las Rosas, Carretera a Pujiltic, 16°20'41''N; 93°23'18''W, 13 November 1995, *Mejía 953 et al.* (**MEXU**); Loc. Tuxtla Gutiérrez, cerros secos NE, 18 December 1948, *Miranda 4940* (**MEXU**); Loc. El Aguacero, orillas del río Venta, 750 m, 4 March. 1979, *Montúfar 41* (**MEXU**); Loc. Tuxtla Gutiérrez, 15 km N, Parque Nacional Cañon del Sumidero, 16.48N, 93.06W, 960 m, 8 April 1993, *Neff 93488* (**MEXU**); Loc. Cañon del Sumidero National Park. Near Mirador La Ceiba, km 7, 16.47N, 93.06W, 3000 ft, 5 March 1983, *Neill 5475* (**MEXU**); Loc. El Zapotal, al SE de Tuxtla Gutiérrez, 800 m, 24 January 1987, *Palacios 205* (**MEXU**); Municipio Tuxtla Gutiérrez, loc. Cerro Mactumacza, a 2 km al S de Tuxtla Gutiérrez, 1100 m., 16°43'22''N; 93°08'47''W, 20 May 2002, *Pérez 57* (MEXU); Municipio. Ocozocoautla, 15 m, *Pérez-Nangullasmu s/n* (**MEXU**); Loc. Tuxtla Gutiérrez 10 km from, along road to Canyon Sumidero, 900–1100 m, 3 January 1978, *Perino 3045* (**MEXU**); Loc. Ocozocoautla (Cerca), 21 km al W de Tuxtla Gutiérrez, 500 m, 11 December 1987, *Reyes 106* (**MEXU**); Loc. Municipio de Chicoasén, 500 m al S, 200 m, February 1988, *Reyes 273 et al*. (**MEXU**); Loc. Tuxtla Gutiérrez, 1 km al N de 5a Avenida Norte, 600–640 m, 5 July 1990, *Reyes 1758* (**MEXU**); Loc. Tzimol, 7 km al SW, 1080 m, 25 October 25 1989, *Reyes 335 et al*. (**MEXU**); Loc. Tzimol, 5 km al SW, 1150 m, 14 September 1988, *Reyes 787* (**MEXU**); Loc. Tzimol, 3 km al SW, 1250 m, 25 October 1989, *Reyes 1299 et al*. (**MEXU**); Loc. Meseta de Capoya, al Sur de Tuxtla Gutiérrez, 900 m, 24 February 1958, *Riba 231* **MEXU**); Municipio Chiapa de Corzo, subiendo al mirador La Ceiba en el Mirador La Coyota, 1137 m, 16.80023N, -93.08613W, 16 April 2010, *Salazar 8950* (**MEXU**); Loc. En El Carmen, 13 km al SO de Tuxtla Gutiérrez, 600 m, 21 October 1989, *Soto 13275* (**MEXU**); Loc. Chiapa de Corzo, 12 km al NE, hacia San Cristóbal De Las Casas, 900 m, 11 December 1980, *Sousa 11449 et al*. (**MEXU**); Loc. mirador Manos que Imploran, 700 m, 16 December 1980, *Sousa 11624 et al*. (**MEXU**); Loc. Frontera Comalapa, 15 km al NE, 650 m, 9 March 1981, *Sousa 11812 et al*. (**MEXU**); Loc. Municipio Las Rosas, 5 km al S de Las Rosas, 1050 m, 30 October 1976 *Sousa 6727* (**MEXU**); Loc. El Aguacero, 400 m. 21 February 1988, *Sousa 11136 et al*. (**MEXU**); Loc. Tzimol, 4 km al S, 1300 m, 4 December 1980, *Sousa 11311 et al*. (**MEXU**); Loc. Tzimol, a 10 km del Aeropuerto de Comitán, 1300 m, 15 March 1981, *Sousa 11890 et al.* (**MEXU**); Municipio. Ocozocoautla, El Aguacero, 400 m, 21 February 1988, *Sousa 13136* (**MEXU**)**;** Loc. Chamic, en la rivera del Río Grijalva, a 7 km al S de Frontera Comalapa, 600 m, 11 March 1981, *Sousa 11841 et al.* (**MEXU**)**;** Loc. Cintalapa, 30 km from, 13 km N of la Colonia Francisco I. Madero, 16.40N. 93.35W, 24 January 1990, *Stafford 29 et al*. (**MEXU**); Loc. Ciudad Cuauhtémoc, 10 km al NW, 600 m, 14 April 1978, *Téllez 638 et al*. (**MEXU**); Loc. Chiapa de Corzo, 17 km al SE, rumbo a San Cristóbal, 10 April 1983, *Téllez 6673* y *Villaseñor* (**MEXU**); Loc. Tuxtla Gutiérrez, camino a Villa Flores, 6 April 1983, *Téllez 6590* y *Villaseñor* (**MEXU**); Loc. Municipio de Tuxtla Gutiérrez-El Chorreadero, entre los kms 14–18, 12 February 1983, *Téllez 6513 et al*. (**MEXU**); Loc. Municipio de Villa Flores, Rancho Tierra Blanca, 50 km al SE de Tuxtla Gutiérrez, 16.25N, 93.10W, 28 March 1984, *Tenorio 5673 et al*. (**MEXU**); Loc. Municipio Villa Flores, Rancho Blanco, al NE de Villa Flores, 815 m, 16°25'N; 93°09'W, 24 February 1998, *Tenorio 19715 et al*. (**MEXU**); Loc. Municipio Chiapa de Corzo, Rancho El Recuerdo, 365 m, 16°38'N; 92°55'W, 3 October 2002, *Zepeda 40* (**MEXU**); Loc. Chiapa de Corzo, aproximadamente 2 km al SE de Chiapa de Corzo hacia San Cristóbal de las Casas, 420 m, 16°42'25''N; 93°00'50''W, 18 February 1999, *Torres 15376* (**MEXU**); Loc. Chiapa de Corzo, 8 km al SE hacia San Cristóbal de las Casas, 420 m, 16°42'25''N; 93°00'50''W, 18 February 1999, *Torres 15377* (**MEXU**); Loc. Municipio de Ocozocoautla, a 2 km del crucero, libramiento Tuxtla Gutiérrez-Ocozocoautla, 19 February 1999, *Torres 15381A et al*. (**MEXU**); Loc. Municipio Chiapa de Corzo, a 0.5 km de la entrada al Chorreadero, hacia San Cristóbal de Las Casas, 2 April 1999, *Torres 15399* (**MEXU.**

Bauhinia goldmanii (Rose) var. ***zapoteca*** R. Torres & A. Saynes *var. nov.* (Fig. 3)

Type:—MEXICO. Oaxaca: Distr. Tehuantepec, Municipio, Magdalena Tlacotepec. Loc.Tlacotepec, entrando por Ixtepec. 7 February 1984 Rafael Torres C. 4618 & Cipriano Martínez (holotype MEXU1621346!, isotypes MEXU1621345! to distributed: MO, OAX).

Bauhinia goldmanii var. *zapoteca* is morphologically similar to *Bauhinia goldmanii var. goldmanii,* but it differs because usually the apex of the leaf lobes is acute, rarely rounded (vs. usually apex of the leaf lobes rounded); the stipules 1.4–3.6 × 0.7–1.6 mm (vs. 0.9–1.7 × 0.3–1.1 mm); inflorescence with 16–20 flowers (vs. inflorescences with 20 to 40 flowers); fertile stamens 1–5, in fascicles (vs. fertile stamen 1); staminodes 5–9 usually connate at 1/3 of their length towards the base or almost free, (vs. 9 staminodes connate to 1/3–2/3 their length, in a conduplicated lamina); endemic to the municipalities of Magdalena Tlacotepec and San Bartolo Yautepec, Oaxaca, Mexico (vs. Mexico (only Chiapas) to Guatemala).

Shrubs, 1.8 m high, andromonoecious. Branches not descending; young branches ferruginous and densely hirsutulous; old branches grayish and scarcely hirsutulous to glabrous. **Leaves** 2-lobed, bilobed for 1/3 their length, lobes 4.4–9(–11.5) cm long with apex usually acute, rarely rounded, blade 4.4–9(–11.5) × 3.9–10.9 cm, widely ovate, chartaceus, 9-veined, upper surface strigulose, lower surface hirsutulous, base cordate to obtuse; petiole 1.1–3.1 cm, canaliculate,

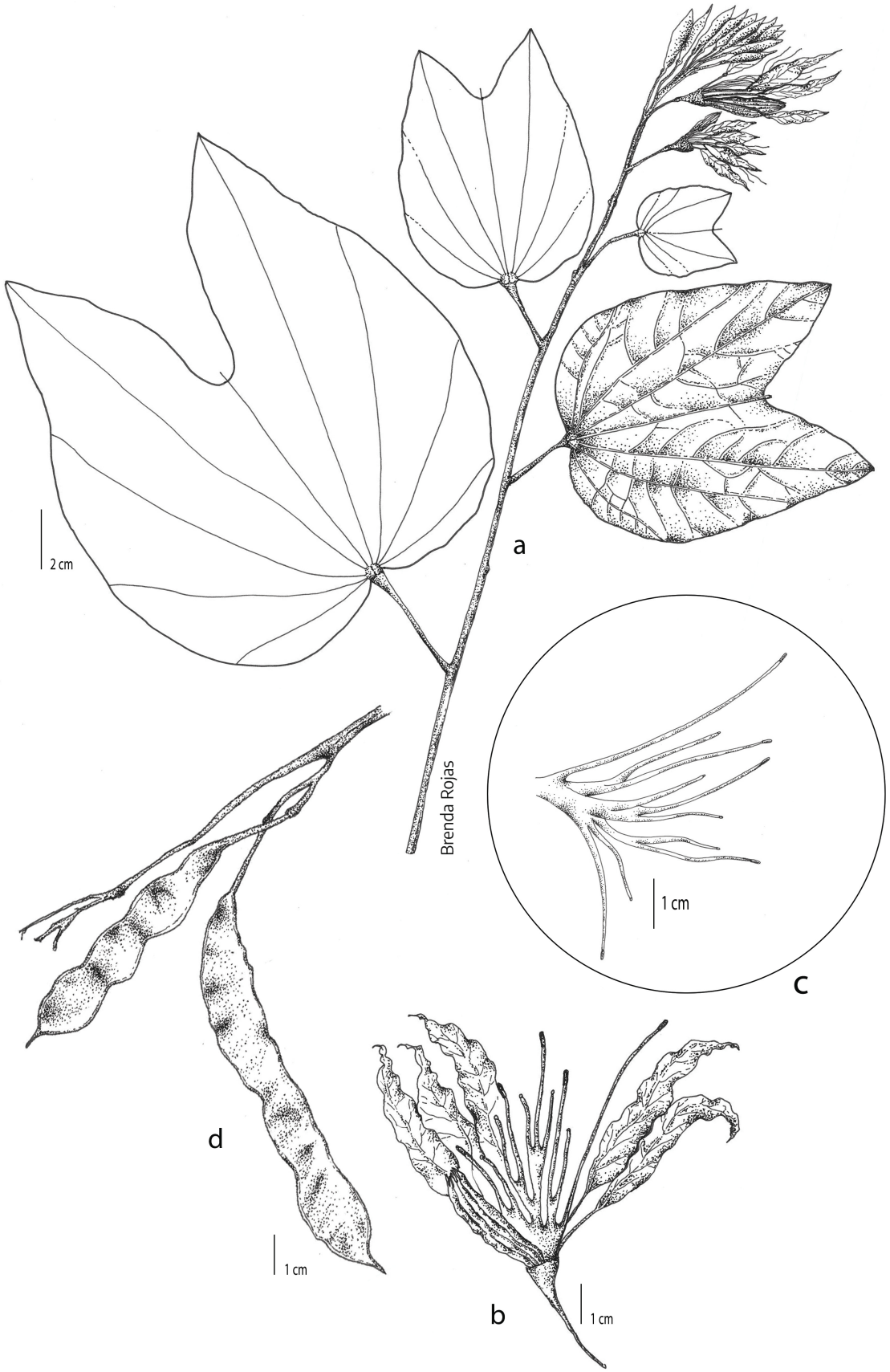

FIGURE 3. *Bauhinia goldmanii* var. *zapoteca*: a) branch with leaves and flowers; b) male flower with 5 stamens and 5 staminodes; c) stamens and staminodes; d) immature legume (illustration by Brenda Rojas Martínez: a-d from Torres 4618).

red, densely hirsutulous, ferrugineous. **Stipules** 1.4–3.6 × 0.7–1.6 mm, ovate to lanceolate, hirsutulous; intrastipular excrescence 0.8–2 × 0.3–1.3 mm, triangular with rounded apex, black. **Inflorescences** racemose, axillar, terminal, lax, 16–20 erect flowers; rachis densely hirsutulous, red, and ferrugineous; floral buds 1.2–1.5 × 0.2–0.4 cm, narrowly elliptic, reddish, hirsutulous with white strigulose trichomes; bracts 1–1.4 × 0.2–0.7 mm, linear to lanceolate, hirsutulous, and ferrugineous; bracteoles 0.8–1.9(–2.3) × ca. 0.3 mm, linear to lanceolate, hirsutulous, and ferrugineous; pedicels 0.8–1.5 cm, articulate at apex, persistent, reddish, and densely hirsutulous. **Hermaphrodite flowers** with hypanthium 2.9–5 × 0.6–2.5 mm, cyathiform to infundibuliform, red, hirsutulous, ferrugineou; **calyx** 0.9–1.3 0.35–0.6 cm, spathaceous at anthesis, reddish to red, hirsutulous, 5-lobed in apex, lobes 1–2.5 mm long, hirsutulous, usually 2 to 3-basal clefts; **corolla** pentamerous, subequal, 1.3–2.7 cm long, conspicuously separated at anthesis, reflexed, unguiculated, white, reddish with age, blade 1.4–2.2 × 0.3–0.6(–0.9) cm, slightly trullate, margin slightly crisped, caudate, reflexed, claw 3.5–6 mm; **androecium**, diadelphous, fertile stamens 1–5 ca. 3 cm long; 1 of these, 2.5 cm, free, 4 others, 2.1–2.3, connate ca. 1/3 to their lengths, near its base with 5–9 staminodes, forming 4 groups or fascicles; 3 of these with 1 staminode; other 1 with 2 staminodes, anthers 1.1–3(–3.3) × 0.4–1 mm, narrowly elliptic to lanceolate, dorsifixed; **staminodes** 5–9, 1.2–1.8 cm, usually connate 1/3–1/2 their length or almost in the base, when connate near the base in fascicles alternating with the stamens, when connate 1/2–2/3, in a conduplicated lamina, linear; **gynoecium** 1.4–2.3 cm, slightly arcuate, ovary log-stipitate, hirsutulous, style scarcely hirsutulous, stigma 0.5–0.6 mm diam., capitate; **male flower** similar. **Fruit** a legume, 6.1–8.9 × 1.1–1.2 cm, narrowly oblong, with slight constrictions, elastically dehiscent, brown, softly strigulose, margin pubescent, apiculate, rostrum 2–4 mm long, stipe 1.4–1.7 cm; **seeds** (immature) ca. 7 × ca. 4 mm, widely elliptic, oblong, dark brown, aril lobes short, hilum subapical.

Distribution and habitat:—*Bauhinia goldmanii* var. *zapoteca* is endemic to Oaxaca; it is known from the type specimen in Tlacotepec (Tehuantepec) and San Bartolo Yautepec. It occurs in vegetation of deciduous tropical forests at an elevation of 150-936 m.

Phenology:—Flowering from November to February; fruiting from February to April.

Etymology:—The name of this variety is dedicated to the Zapotec peoples of the Isthmus of Tehuantepec, Oaxaca, Mexico, where it was collected.

Discussion:—This taxon is described as a new variety morphologically similar to the typical variety, *B. goldmanii* var. *goldmanii*, based on the androecium of the latter taxon consists of 1 fertile stamen and 9 staminodes arranged in a conduplicated lamina, whereas the androecium of *B. goldmanii* var. *zapoteca* is composed of 1, 2, 3, and 5 fertile stamens (fig. 6, b, c y d), and their corresponding staminodes forming a 10-part androecium arranged either in a conduplicated lamina or in fascicles of fertile stamens (fig. 7). All the differences between these taxa are presented in the diagnosis and table 1.

TABLE 1. Data comparing the species of the *Bauhinia goldmanii* complex.

Characters	*B. goldmanii* Rose var. *goldmanii*	*B. golmanii* var. *zapoteca var. nov.*	*B. sousae sp. nov.*
Habit	Shrubs, rarely trees	Shrubs	Trees, rarely shrubs
Branches	Not descending	Not descending	Descending
Shape of the apex of the leaf lobes	Acute to rounded	Usually acute	Acute to rounded
Stipules size (mm)	0.9–1.7 × 0.3–1.1	1.4–3.6 × 0.7–1.6	1–1.6(–2.9) × 0.1–0.4
Inflorescence and flowers	Not descending	Not descending	Descending
Flowers/inflorescence	20–40	16–20	13–23
Corolla	Petals conspicuously separated at anthesis	Petals conspicuously separated at anthesis	Petals imbricated at anthesis
Blade of petals	Reflexed	Reflexed	Straight to slightly reflexed
Number of stamens	1	1–5	1
Staminodes	7, connate 1/3 to 2/3 of their length and 2 inserted adaxially, linear, never connate at the apex	5–9, usually connate 1/3–2/3 their length near at base, never connate at the apex, when connate near the base in fascicles alternating with the stamens, linear, or connate 2/3, in conduplicated lamina	7, connate 2/3 of their length or almost at the apex and 2 inserted adaxially, lanceolate
Geographic distribution	Mexico (Chiapas) and Guatemala	Endemic to Tlacotepec (Tehuantepec), and San Bartolo Yautepec, municipalities in Oaxaca, Mexico.	Endemic to Xalapa Veracruz, Mexico

Additional material examined: **MEXICO**. **Oaxaca**; Loc. Distrito de Tehuantepec, Municipio Magdalena Tlacotepec, 2.5 km al W de Ojo de Agua Magdalena Tlacotepec, entronque al camino a Tlacotepec, 10 December 1982, *Cedillo 1964* (**MEXU**)**;** Tlacotepec, entrando por Ixtepec, 11 February 1984, *Torres 4647, 4650, 4652* (**MEXU**)*;* 17 February 1984, *Torres 4655, 4656, 4657, 4659, 4661, 4663, 4665* (**MEXU**); a 2 km del crucero Tlacotepec-Ojo de Agua, 16° 32′08" N, 95°11′53"W, 14 November 2017, *Torres 18307* & *Saynes* (**MEXU**); a 150 metros antes de llegar al ojo de agua a orillas de un terreno abandonado, 11 April 2024, *Saynes 7165, 7166, 7167, 7168* (**MEXU**); a 100 m antes de llegar al ojo de agua Tlacotepec, 16° 32′09.3" N, 95°11′52.4"W, 1 February 2025, *Torres 18473, 18474, 18475, 18476 et al.* (**MEXU**); a 2.4 km de Tlacotepec, carr. a Ixtepec, 16° 31′31.9" N, 95°11′21.8" W, 1 February 2025, *Rafael Torres C. 18479, 18480, 18481 et al.* (**MEXU**). Municipio San Bartolo Yautepec, Los Cocos, 16° 25′46.2" N, 95°57′59.9" W, 840 m., 5 November 2010, *Dionisio López Pascual 578* (**MEXU**).

Bauhinia sousae R. Torres *sp. nov.* (Fig. 4).

Type:—MEXICO. Veracruz: Municipio Emiliano Zapata, 11.3 km al SE de Chavarrillo, hacia el Palmar, 14 May 2000, Torres 15678 *et al.* (holotype MEXU1621348!, isotypes MEXU1621347!, to distribute B, MO, XAL).

This species is morphologically similar to *Bauhinia goldmanii* var. *goldmanii,* but it differs because usually it is a tree, rarely a shrub; with branches usually descending (vs. usually a shrub with erect branches), apex of the leaf lobes usually acute (vs. acute to rounded); inflorescences descending, lax with ca. with 20 (13–23) flowers (vs. inflorescences erect with 20–40 flowers per inflorescence), rachis, pedicels, and calyx deep red (vs. rachis, pedicels, and calyx reddish); corolla with petals strongly imbricated at the beginning of anthesis (fig. 6e), (vs. corolla with petals conspicuously separated at the beginning of anthesis), blade of petals straight to slightly reflexed (vs. blade of petals conspicuous reflexed); staminodes 7–connate 2/3 of their length or almost at the apex, 2–inserted adaxially, linear (vs. staminodes 7–connate 1/3 to 2/3 of their length never at the apex and 2 inserted adaxially, lanceolate); endemic to Veracruz (vs. occurring from Chiapas to Guatemala).

Trees, rarely shrubs, 2.5–6 m high, andromonoecious. Some branches descending, young branches ferruginous and densely hirsutulous, old branches grayish and scarcely hirsutulous to glabrous. **Leaves** 2-lobed, bilobed for 1/3 length, lobes (1–)5.2–9.5 cm long with apex acute to rounded, blade (1.2–)3.5–8.6(–10) × 3.9–6.5(–9.3) widely ovate, chartaceous, 7–9 (–10)–veined, upper surface hirsutulous, lower surface densely hirsutulous, base cordate, rounded to slightly truncate; petiole (0.7–)2–2.8(–3.2) cm, canaliculate, densely hirsutulous, ferrugineous. **Stipules** 1–1.6(–2.9) × 0.1–0.4 mm, linear to lanceolate, hirsutulous, ferrugineous; intrastipular excrescence ca. 1.0 × ca. 0.7 mm, oblong, green to black; **Inflorescences** racemose, terminal, axillar, in some branches descending, lax, (13–)16–19(–23); rachis densely hirsutulous, ferrugineous, deep red; floral buds (1.4–)1.6–2.3 × ca. 0.3 cm, narrowly elliptic, reddish to deep red, hirsutulous with white strigulose trichomes; bracts 1.5–2.5 × 0.2–0.4 mm, linear to lanceolate, densely hirsutulous, ferrugineous; bracteoles 1.0–1.8 × ca. 0.1–0.4 mm, linear to lanceolate, hirsutulous, ferrugineous; pedicels 1.1–1.9 cm, articulate at apex, persistent, reddish to deep red, densely hirsutulous. **Hermaphrodite flowers**; hypanthium ca. 4 × ca. 1.9 mm, cyathiform, red, densely hirsutulous, ferrugineous; **calyx** 1.3–1.6 × ca. 0.5 cm, spathaceous at anthesis, reddish to deep red, densely hirsutulous with white strigulose, 5-lobed in apex, lobes 1–1.9 mm long, hirsutulous, usually 2 to 3-basal clefts; **corolla** pentamerous, subequal, (1.4–)2–2.6(–3.3) cm long, strongly imbricated, unguiculated, white, red with age, blade 1.1–2(–2.6) × 0.4–0.6(–0.9) cm, slightly trullate, caudate, straight to slightly reflexed, claw 3–8 mm; **androecium**, diadelphous, fertile stamen 1, 2.7–3.0 cm, connate less than 1/3 of its length, near base with 9 staminodes; anthers 2.7–3(–3.6) × ca. 1 mm, lanceolate, dorsifixed; **staminodes** 9, (1.4–)1.8–2.1(–2.5) × 0.3–0.4 cm; 7–connate 2/3 of their lengths or almost at the apex, 0.9–2.3 mm, 2, 0.9–1.7 mm, inserted on the adaxial surface 2/3 of their lengths or near of the apex, lanceolate, forming conduplicated lamina, anthers poorly developed, persistent; **gynoecium** 3–4.4 cm, slightly arcuate, ovary log-stipitate, sericeous or hirsutulous, style scarcely hirsutulous, stigma ca. 0.5 mm diam., capitate; **male flower** similar. **Fruit** a legume 6.0–9.5 × ca.1.7 cm, narrowly oblong, elastically dehiscent, brown, softly strigulose, apiculate, rostrum 2–3 mm long, stipe 1.7–2.2 cm; **seeds** 7.7–8.7 × 5.5–7.2 mm, widely elliptic, dark brown, aril lobes short, hilum subapical.

FIGURE 4. *Bauhinia sousae*: a) branch with leaves and flowers; b) hermaphrodite flower; c) corolla with 5 subequal petals, d) abaxial view of staminodes, e) androecium of male flower, f) adaxial view of staminodes, g) indehiscent legume, h) seed, aril lobes, and micropyle (illustration by Brenda Rojas Martínez: a–h from Torres 15678).

Distribution and habitat:—*Bauhinia sousae* is endemic to Veracruz surroundings of Xalapa, a locality of the Transmexican Volcanic Belt. It occurs in vegetation of deciduous tropical forest in an ecotone with oaks, at an elevation of 500 to 900 m.

Phenology:—Flowering from September to May; fruiting in February.

Etymology:—The name of this species is dedicated to Mario Sousa Sánchez†, a Mexican botanist, for his valuable contribution to the taxonomic knowledge of the Leguminosae.

FIGURE 5. Types of habit: a) *Bauhinia goldmanii* var. *goldmanii*, shrub; b) *B. goldmanii* var. *zapoteca*, shrub (photographs by Rafael Torres C.).

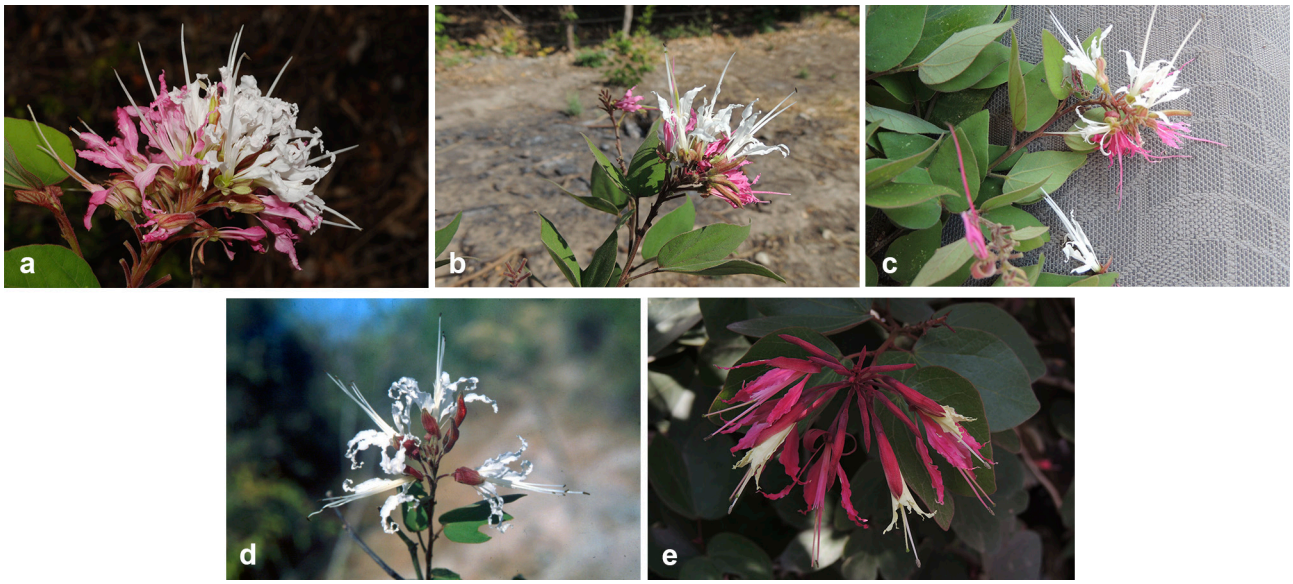

FIGURE 6. Inflorescences: a) of *Bauhinia goldmanii* var. *goldmani*; b) *B. goldmanii* var. *zapoteca*, flowers with 1 and 2 fertile stamens; c) *B. goldmanii* var. *zapoteca*, flowers with 1and 3 fertile stamens; d) *B. goldmanii* var. *zapoteca*, flowers with 3 and 5 fertile stamens; e) *B. sousae* (photographs by Rafael Torres C.).

Discussion:—*Bauhinia sousae* is morphologically more similar to *Bauhinia goldmanii* var. *goldmanii*. It differs in the architecture of the branches and inflorescences, leaf shape, number of flowers per inflorescence, rachis, pedicel, and calyx color, shape of the corolla at the beginning of anthesis, shape of the petal blade, and union with each other of staminodes (table 1, and fig. 7), It is endemic to Xalapa, Veracruz, Mexico, near to Trans-Mexican Volcanic Belt, while *B. goldmanii* var. *goldmanii* is distributed from the highland provinces of Chiapas and Guatemala. All differences between these taxa are presented in the diagnosis and table 1.

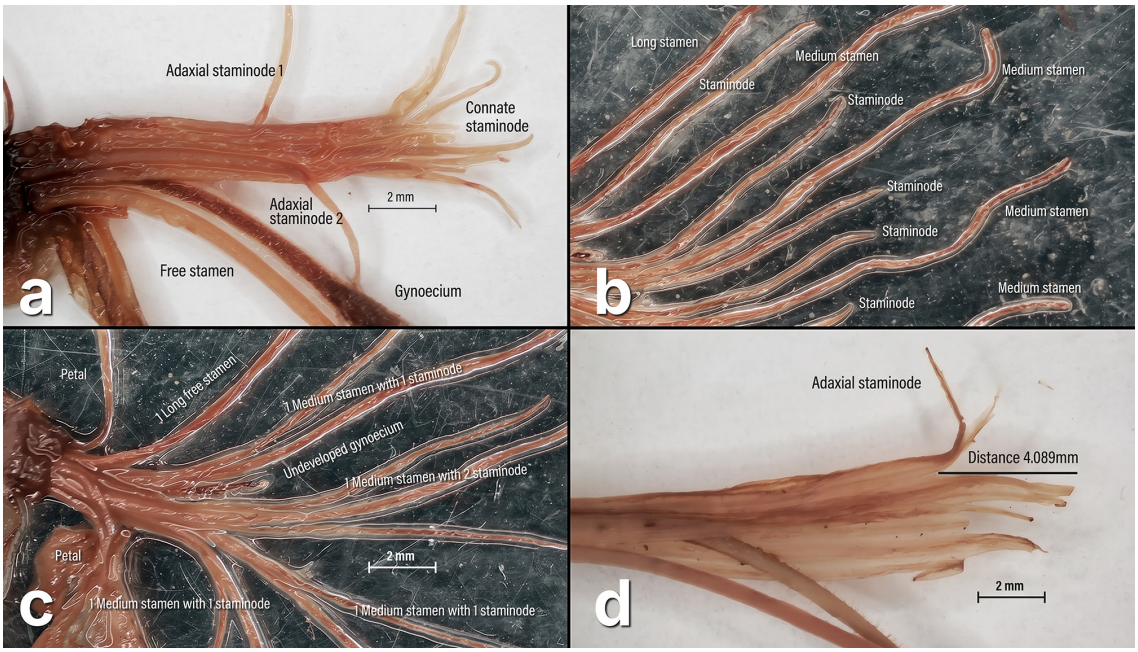

FIGURE 7. Photographs of staminodes: a) *Bauhinia goldmanii* var. *goldmanii*, view with adaxial staminodes; b) *B. goldmanii* var. *zapoteca*, apical view; c) *B. goldmanii* var. *zapoteca*, basal view; d) *B. sousae*, side view with adaxial staminodes (photographs by Alfredo Saynes and Rafael Torres C.).

Additional material examined:—**MEXICO**. **Veracruz**: Municipio Xalapa, cañada a orillas de la ciudad de Jalapa, 600 m., 21 September 21 1975, *Germán 216* (**MEXU**)**;** Municipio Emiliano Zapata, Corral Falso, carretera Xalapa-Veracruz, 19° 35.17" N, 95°57′48.66" W, 800 m., 20 January 1973, *Márquez 54 et al.* (**MEXU**); La Laja, entre Corral Falso Pinoltepec a 900 m. de la carretera Jalapa-Veracruz, desv. A 16 km al SE de Jalapa, 900 m.s.n.m., 20 March 1975, *Sousa 4537* (**MEXU**); La Laja, entre Corral Falso Pinoltepec a 900 m. de la carretera Jalapa-Veracruz, desv. A 16 km al SE de Jalapa, 900 m.s.n.m., 20 September 1975*, Sousa 4537* (**MEXU**): Municipio de Dos Ríos, Chavarillo, 750 m., 30 April 1973, *Ventura 8242* (**ENCB, MEXU**); Municipio Emiliano Zapata, Monte Oscuro (Curva del Diablo), 22 km al SW de Trancas, antiguo camino a Baños el Carrizal (la desv. está entre Jalapa y Corral Falso), elev. 700 m, 16 February 1996, *Torres 14415 y 14415a et al.* (**MEXU**); 1 km al N del palmar camino a Miradores, 19 April 2000, *Torres 15665* (**MEXU**).

Conclusion

This work presents the taxonomic novelties that we found when reviewing collections similar to *Bauhinia goldmanii s.l.* We recognize the widest ranging taxon as *B. goldmanii* var. *goldmanii*; also, *Bauhinia goldmanii* var. *zapoteca* is described as a new variety, with populations located in Tehuantepec and Yautepec, Oaxaca, and *Bauhinia sousae*, is described as a new species, the most geographically isolated population near to Trans-Mexican Volcanic Belt, in the vicinity of Xalapa, Veracruz.

Acknowledgements

We thank; David Gernandt for his review of the English language and constructive comments, Fernando Chiang for his advice on nomenclatural aspects, Brenda Rojas-Martínez for her excellent illustrations of the three taxa, José M. García-López for the design of distribution map, Samuel Aguilar-Ogarrio for his support in editing some photographs, Julio César Montero-Rojas for the design of the figures with photographs, as well as preparing these in different formats, Luis R. Nuñez-Ramos for editing the phrases in the photographs of the staminodes, Jesús Gallegos for their support with the fieldwork and Marcus Falcão for his observations on improving the manuscript.

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