

**ZANTHOXYLUM ARBORESCENS (RUTACEAE)
IN THE FLORA OF GUERRERO, MEXICO**

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ABSTRACT

Zanthoxylum arborescens Rose is recorded for the flora of the states of Guerrero, Mexico. The specimens from Guerrero differ in its morphology by presenting elliptic to long elliptic leaflets with entire and revolute margin, 1-branched inflorescences, ovoid and stipitate follicles, and ovoid seeds. The species is described, and illustrated, and data of habitat and phenology are included.

RESUMEN

Se registra a *Zanthoxylum arborescens* Rose para la flora del estado de Guerrero, México. Los ejemplares de Guerrero, presentan variación morfológica pues presenta folíolos elípticos a largamente elípticos con margen entero y revoluto, las inflorescencias 1-ramificadas, los folículos ovoides, estipitados y las semillas ovoides. Se describe e ilustra la especie y se adicionan datos de distribución y fenología.

In study of collections of *Zanthoxylum* L. (Rutaceae) from the Balsas depression, Mexico, deposited at the herbarium FCME (Faculty of Sciences, National Autonomous University of Mexico), some specimens were found to belong with sect. *Macqueria*, which is characterized by species with hyaline to yellow-translucent simple straight trichomes, flowers with perianth, generally pentamerous and gynoeceium with a discoid flat stigma. In Mexico, 10 species of the section have been recorded (Reynel 2017).

From the FCME collections, we analyzed characters using the stereoscopic and scanning electron microscope, concluding that the specimens should be identified as *Zanthoxylum arborescens* Rose, a species with wide distribution in Mexico and Nicaragua but not recorded for Guerrero and Puebla in the last review of the genus by Reynel (2017).

Zanthoxylum arborescens is described and illustrated here for the state of Guerrero and data of habitat and phenology are given. The description includes some collections from the state of Puebla.

ZANTHOXYLUM ARBORESCENS Rose, Contr. U.S. Natl. Herb. 5: 112. 1897. *Fagara arborescens* (Rose) Engler, Nat. Pflanzenfam. (Engler & Prantl) ed. 2, 19a: 219. 1931. **LECTOTYPE** (designated by Reynel 2017): **MEXICO. Sinaloa.** Imala, along river Banks, *E. Palmer 1454* (US). (Figs. 1 and 3).

Zanthoxylum peninsulare Brandegee, Zoe 5: 249. 1906. **LECTOTYPE** (designated by Reynel 2017): **MEXICO. Baja California.** At San Jose del Cabo, San Bartolome, Sierra de la Laguna, and at Las Animas, C.A. *Purpus* 270 (NY).

Zanthoxylum goldmanii Rose ex P. Wilson, N. Amer. Fl. 25: 195. 1911. *Fagara goldmanii* (Rose) Engler, Nat. Pflanzenfam. (Engler & Prantl) ed. 2, 19a. 219. 1931. **TYPE: MEXICO. Sinaloa.** On the road from Culiacan to Las Flechas, E.A. *Goldman* 311 (holotype: US).

Shrubs 1.1-3 (-4) m tall or **trees** 3-4 m tall, dioecious, with hispid indument, the trichomes simple, straight, acute, and hyaline; stems with bark with longitudinal fissures and spines 8-10 mm long, straight, and conical; vegetative buds broadly ovate, surrounded by hyaline erect trichomes (Fig. 2D). **Leaves** (5-) 6-12.2 cm long, imparipinnate, with 7 leaflets; petioles (1.2-) 1.4-2.7 (-3.1) cm long, hispid; rachis hispid; leaflets (2-) 2.2-5 (-5.5) × (0.8-) 1-2 (-2.3) cm, elliptic to long elliptic, opposite, the terminal larger, the basal ones generally smaller, 0.8-1.6 (-1.8) × (0.6-) 0.9-1.2 cm, suborbicular, with (7-) 8-13 (-14) secondary veins per side, leaflet adaxial surface pubescent, the abaxial surface with median and secondary veins hispid (Fig. 2C) and glands scattered (Fig. 2E), the apex acute, the base obtuse to acute, the margin entire, revolute. **Inflorescences** in terminal panicles, 1-time branched; rachis hispid (Figs. 2A and 2B), the pedicels hispid; bracts linear, hispid. **Female inflorescences** (3.6-) 4.6-5 cm long; peduncle (0.7-) 1-1.7 cm long, hispid. **Male inflorescences** 1.8-2.2 (-2.6) cm long, the peduncle 0.6-1 cm long, hispid. **Female flowers** white; sepals 5, 0.7 × 0.5-0.6 mm, deltoid, hispid on the external side, the trichomes concentrated towards the margin; petals 5, 3.5-3.8 × 1.3-1.4 mm, oblong, with galeate apex; staminodes absent; gynoecium bicarpellar, with the stigmas fused, ovary 1.5 × 1 mm, green, style 0.7-1 mm long, gynophore 0.5-0.6 mm high, orange, greenish, the stigma discoid. **Male flowers** greenish; sepals 5, 0.7 × 0.5 mm, deltoid, petals 5, 3-3.5 × 1-1.6 mm, oblong, with galeate apex and scattered glands (Fig. 2F); stamens 5, 3.5-3.6 mm long, filaments 2.4-2.5 mm long, anthers 1-1.2 mm long; gynoecium with 2 pistilodia, 0.5 mm long; gynophore 0.5-0.7 mm high, red; pollen spherical to sub-spherical, tricolporate with thickened margins of the colpus, sculpture reticulated rugulated and structure reticulated; isopolar, radiosymmetric; C.P. circular, C.E. circular, P = 15.5 μ, E = 5.5 μ (Figs. 2G and 2H). Follicles 7 × 7.5 mm, ovoid, glabrous; pericarp fleshy, with surface slightly tuberculated, reddish to cherry; stipe 1-1.5 mm long. **Seeds** 4.5-5 × 3-3.5 mm, ovoid, black, with an oblong funicular scar.

Distribution and habitat. In the state of Guerrero *Z. arborescens* can be found in tropical deciduous forest, in shallow sandy dark limestone soil, associated with *Jatropha riojae* Miranda and Burseraceae Kunth (Euphorbiaceae), on slopes and limestone conglomerates, from (330-) 662 to 1352 m above sea level.

According to Villaseñor (2016) *Zanthoxylum arborescens* is an endemic species of Mexico, with distribution in the states of Baja California Sur, Chiapas, Colima, Durango, Hidalgo, Jalisco, Michoacan, Morelos, Nayarit, Oaxaca, Puebla, Sinaloa, Sonora, and Veracruz. Nevertheless, according to Reynel (2017) the species is distributed in Mexico (Baja California, Baja California Sur, Chihuahua, Jalisco, Nayarit, Oaxaca, and Sinaloa), and in Nicaragua.

Phenology. Flowering in May-July and fruiting from June to November (-February).

Specimens examined. MEXICO. Guerrero. Mpio. Tlapa de Comonfort: Alpoeyca, 1.5 km al O de Tecoyo, 17°36'10"N, 98°29'29"W, 8 Nov 1993 (fr), *Calónico* 724, 736 (FCME!); Alpoeyca, cruceo Tecoyame de Guadalupe-Tecoyo, 17°36'5"N, 98°29'29"W, 26 Feb 1994 (fr), *Calónico* 755 (FCME!); 0.5 km antes del poblado de Tecoyo, 29 Jun 1993 (fl, ♂), *Calónico* 392 (FCME!); cañada el cruceo, hacia el pueblo de Tecoyo, 21 Aug 1993 (fr), *Calónico* 605, 607 (FCME!); 13 km al O de Tlapa, por la carretera Chilapa-Tlapa, 18 May 1982 (fl, ♀), *Fonseca* 307 (FCME!); 2 km al O de Otate, 17°34'59"N, 98°33'09"W, 2 Nov 1993 (fr), *Toledo & Escalante* 1283 (FCME!); Axoxuca, 4 May 1981 (fl bud, ♂), *Diego* 7282 (FCME!). Mpio. Copalillo: 0.32 km al O de ruinas de Tlalcozotitlán, 17°54'9.7" N, 99°6'52.5"W, 29 Jun 2007 (fr), *Cruz* 6976 (FCME!). Mpio. Ixcateopan de Cuauhtémoc: 2 km al O de Ixcateopan, 1 Jun 1982 (fl, ♀), *Monzón & Bello* 28 (FCME!). Mpio. Quechultenango: Colotlipa,

17 Sep 1981 (fr), *Martínez* (FCME!). Mpio. Zirándaro: 3 km al O de La Parota, camino a Aratichianguio, 21 Mar 1982 (fr), *Renaud, Díaz & Palacios* 157 FCME!).

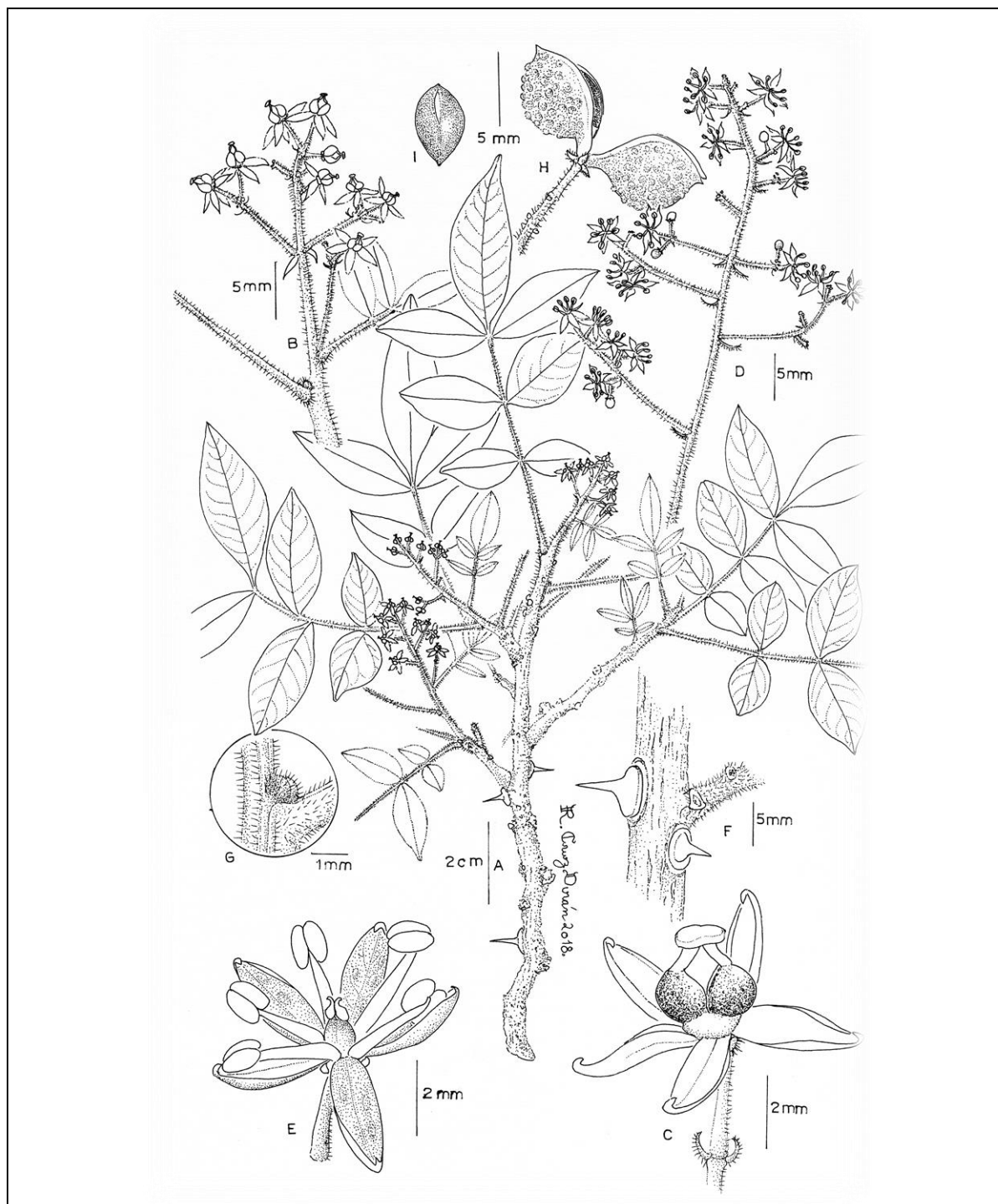


Figure 1. *Zanthoxylum arborescens*. A. Branch with leaves and female inflorescences. B. Female inflorescence. C. Female flower. D. Male inflorescence. E. Male flower. F. Spines. G. Vegetative bud. H. Follicles. I. Seed. (A-C, *Jiménez & Vega* 59-JJR (FCME), D-G, *Jiménez & Vega* 58-JJR (FCME), H-I, *Toledo & Escalante* 1283 (FCME). Drawn by Ramiro Cruz Durán.

Complementary specimens. MEXICO. Puebla. Mpio. Acatlán de Osorio: Cerro al S de Acatlán, 18°10'3.3"N, 98°4'13.5"W, 12 Jul 2012 (fl, ♂), *Jiménez & Vega 58-JJR* (FCME!). Vereda hacia El Pelado, sobre montañas adyacentes a la barranca, 18°13.832N, 98°0.69W, 11 Oct 2013 (fr), *Rojas & Castillo 293* (MEXU!). Cerro al S de Acatlán, 18°10'3.3" N, 98°4'13.5"W, 12 Jul 2012 (fl, ♀), 1217 m, *Jiménez & Vega 59-JJR* FCME!, MEXU!).

Considering the description of *Zanthoxylum arborescens* by Reynel (2017), the specimens from Guerrero present morphological variation in the size of the spines (8 mm vs. 0.1–0.4 mm), the shape of its leaflets (elliptical to long elliptical vs. ovate to oblong-ovate), their size ((2–) 2.2–5 (–5.5) × (0.8–) 1–2 (–2.3) cm vs. 7–10 (–14) × 3.5–5 cm), the leaflet base (obtuse to acute vs. acute, commonly revolute), the leaflet margin (entire vs. subentire to crenate), the branching and the length of the inflorescences (1-branched, 1.8–5 cm long vs. 2–3-branched, 3–9 cm long), the style size (0.7–1 mm vs. 0.2–0.4 mm long), the number of staminodia (absent vs. (4–) 5), the number of pistilodia in male flowers (2 vs. 1), the shape of the follicles (ovoid vs. globose to subovoid), size of the stipe (1–1.5 mm long vs. obsolete), and the shape and the diameter of the seeds (ovoid, 3–3.5 mm vs. subglobose to ovoid, 4.5–5 mm).

Reynel (2017) stated that *Zanthoxylum arborescens* can be recognized by having leaves with few leaflets, usually densely pubescent-velutinous, short panicles (3–9 cm long), flowers (1–) 2-carpelled and a remarkable character is the deciduous aborted fruiting follicle. In contrast, samples from Guerrero do not have leaflets with abaxial surface densely pubescent-velutinous, although their panicles are shorter (1.8–5 cm long), and each flower always presents two carpels and the fruit always develops 2 follicles.

The pollen resembles the type III of Cao et al. (2014), who described it as striated-rugulated, prolate to spheroidal, with small lumina and more or less rounded.

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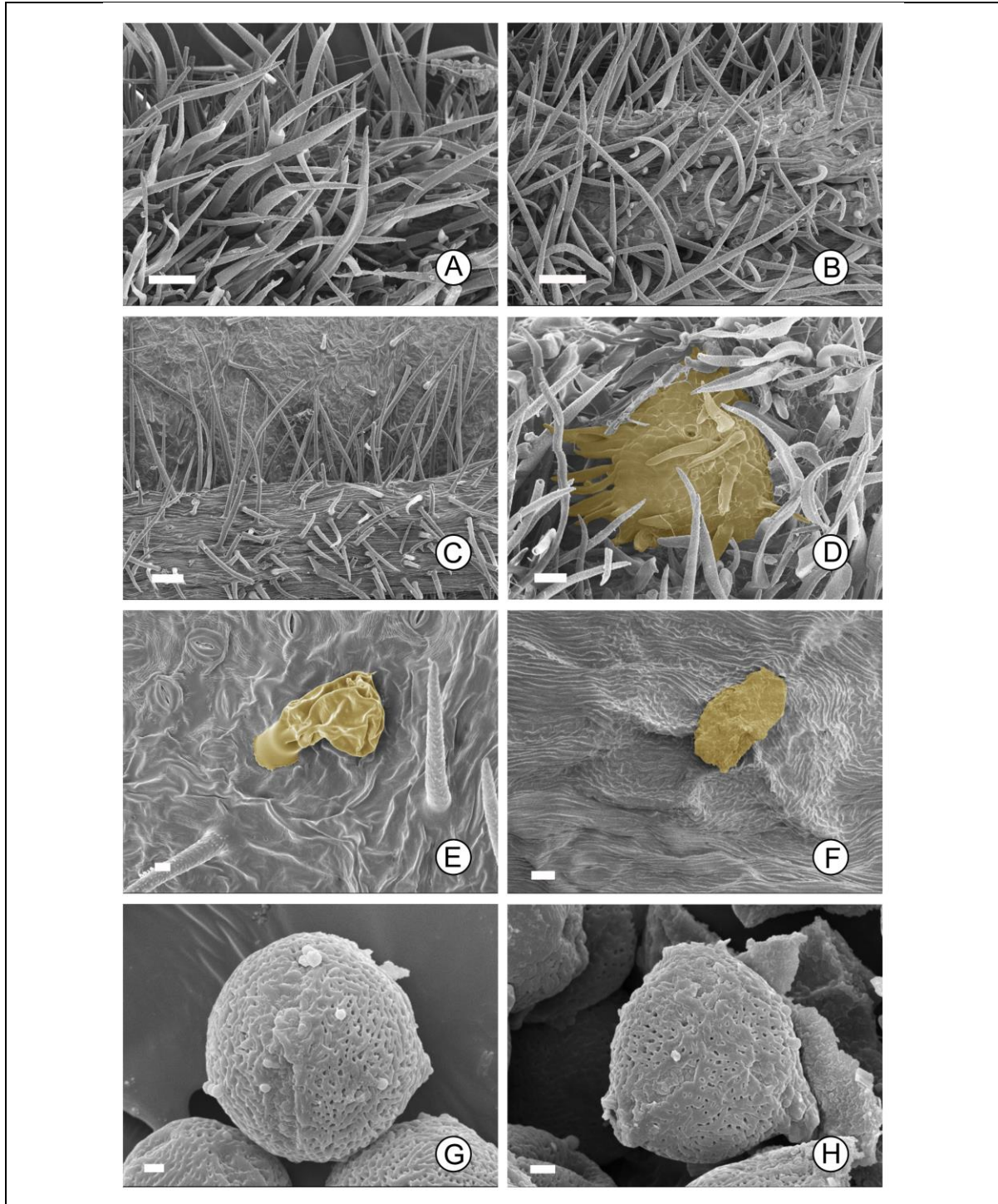


Figure 2. *Zanthoxylum arborescens*. A. Pubescence in the rachis of the female inflorescence. B. Pubescence in the rachis of the male inflorescence. C. Pubescence of the middle vein on the abaxial surface of the leaflet. D. Vegetative bud E. Gland on the abaxial surface of the leaflet. F. Gland of male flower petal. G. Pollen, equatorial view. H. Pollen, polar view. (A, C, D, E, Jiménez 59-JJR, FCME; B, F, G, H, Jiménez 58-JJR, FCME); (barr=100 μ (A, B, C), 50 μ (D), 10 μ (E, F), 2 μ (G, H)).



Figure 3. *Zanthoxylum arborescens*. A. Plant with female inflorescence. B. Plant with male inflorescence. Photograph credits: Karla Vega Flores.