

A new *Olmeca* (Poaceae: Bambusoideae: Bambuseae) species endemic to Veracruz, Mexico

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Abstract

Olmeca, with five described species, is one of six genera in the subtribe Guaduinae. Three *Olmeca* species inhabit montane cloud forests, while the other two are found in tropical rainforests. Most *Olmeca* species produce a typical (basic) caryopsis, but *O. recta* and *O. reflexa* form bacoid (fleshy) caryopses. Morphologically, all described *Olmeca* species develop one branch per node. In this study, we describe a new *Olmeca* species, characterized by having three to four branches per node and an unique combination of morphological traits. We provide a detailed description of this new species, along with a distribution map, photographs, and a morphological key to the species of *Olmeca*. With the description of this new *Olmeca* species, the genus now comprises six species, five of them endemic to Mexico, and contributes to Mexico's remarkable woody bamboo diversity with a total of 61 woody bamboo species, 44 of them endemic.

Key words: bacoid caryopsis, Chiapas, Guaduinae, Honduras, montane cloud forest

Introduction

Within the subtribe Guaduinae, six genera are currently recognized: *Apoclada* McClure in McClure & Smith (1967: 57), *Eremocaulon* Soderstrom & Londoño (1987: 37), *Guadua* Kunth (1822: 150), *Olmeca* Soderstrom (1982: 161), *Otatea* (McClure & Smith 1973: 116) Calderón & Soderstrom (1980: 21), and *Tibisia* Tyrrell *et al.* (2018: 925) (Soderstrom 1981, Ruiz-Sanchez *et al.* 2011, Tyrrell *et al.* 2018, Ruiz-Sanchez *et al.* 2021a). Phylogenetic analyses indicate that *Olmeca* and *Otatea* are sister genera (Ruiz-Sanchez *et al.*, 2011, Ruiz-Sanchez & Sosa 2015, Tyrrell *et al.* 2018, Ruiz-Sanchez & Maya-Lastra 2025).

Olmeca includes five described species: *O. reflexa* Soderstrom (1982: 161) (type), *O. recta* Soderstrom (1982: 161), *O. fulgor* (Soderstrom 1988: 22) Ruiz-Sanchez *et al.* (2011: 93), *O. clarkiae* Davidse & Pohl (1992: 84) Ruiz-Sanchez *et al.* (2011: 93), and *O. zapotecorum* Ruiz-Sanchez *et al.* (2011: 93). The most recent molecular phylogenetic analysis, using nuclear single nucleotide polymorphisms (SNPs) derived from restriction site-associated DNA sequencing (RADseq) data, resolved *Olmeca* into two distinct clades: the Fulgor clade (containing *O. clarkiae*, *O. fulgor*, and *O. zapotecorum*) and the Reflexa clade (comprising *O. recta* and *O. reflexa*) (Ruiz-Sanchez & Maya-Lastra 2025).

The genus occurs from east-central Mexico (Veracruz) to northern Honduras (Ruiz-Sanchez *et al.* 2011, 2020), with four of its five species being Mexican endemics (Ruiz-Sanchez *et al.* 2011, 2020). Two species, *O. recta* and *O. reflexa*, are found in southern Veracruz, Oaxaca, and Chiapas, where they grow in tropical perennial forests and produce bacoid (fleshy) caryopses (Rzedowski, 1978, Soderstrom 1981, Ruiz-Sanchez *et al.* 2011, Ruiz-Sanchez & Sosa 2015). The remaining three species (*O. clarkiae*, *O. fulgor*, and *O. zapotecorum*) inhabit montane cloud forests across Veracruz, Oaxaca, and Chiapas, with *O. clarkiae* extending into Honduras. Unlike their congeners, these species produce typical (basic) caryopses (Ruiz-Sanchez *et al.* 2011).

During fieldwork in Huatusco, Veracruz in 2020, Miguel Cházaro discovered and vouchered a flowering population of *Olmea*. A subsequent visit in 2024 revealed only a single flowering individual among otherwise sterile plants. Detailed morphological analysis identified a unique combination of floral and vegetative characters distinct from all known *Olmea* species. Comprehensive examination of specimens from this population confirmed it represents an undescribed species. We present a geographical distribution map, photographs, morphological comparison of this new species with the most morphologically similar species, and a revised key to all recognized species in the genus.

Materials and Methods

Plant material including both vegetative and reproductive structures was collected in Veracruz state following the standardized protocols of Soderstrom & Young (1983). Complete voucher specimens were preserved, documenting branch systems, culm leaves, nodes, internodes and synflorescences. Herbarium collections from IBUG, MEXU, and XAL (Thiers, continuously updated) were additionally examined for comparative analysis. Macromorphological measurements were recorded using a centimeter ruler, while micromorphological features were analyzed under a Carl Zeiss Stemi DV4 stereomicroscope (Carl Zeiss AG, Oberkochen, Germany) equipped for measurements with a precision of 10 µm. Morphological descriptions adhere to the terminology established by McClure (1973), Soderstrom (1981), and Stapleton (1997).

Taxonomic treatment

Key to the species of *Olmea*

1. Rhizome necks 3–9 m long; fruit a bacoid (fleshy) caryopsis; in tropical rain forest at low elevations from 0–900 m.....2
1. Rhizome necks 4–30 cm long; fruit a basic caryopsis; in cloud forest at middle elevations, from 1500–2400 m.....3
2. Culms erect to apically arched; culm diameter 4.5–5 cm; culm leaf blades erect, rhizome necks up to 3 m long..... *Olmea recta*
2. Culms scandent; culm diameter ca. 2 cm; culm leaf blades reflexed, rhizome necks to 9 m long..... *Olmea reflexa*
3. Branches 3–4 per node; foliage leaf sheaths glabrous..... *Olmea chazaroi*
3. Branches 1 per node; foliage leaf sheaths prominently hirsute.....4
4. Culms erect and arched apically, forming clumps; culm diameter 1–2 cm; foliage leaf blades adaxially green.....
..... *Olmea clarkiae*
4. Culms scandent and decumbent, not forming evident clumps; culm diameter 0.5–1 cm; foliage leaf blades adaxially glaucous.....
.....5
5. Culms 5–6 m long; foliage leaves 4–6 per complement, the blades 0.7–1 cm wide; foliage leaf oral setae 5–10 mm long and ca. 0.2 mm wide..... *Olmea fulgor*
5. Culms 6.5–8 m long; foliage leaves 9–13 per complement, the blades 1.5–2.5 cm wide; foliage leaf oral setae 12–22 mm long and 0.5–1.0 mm wide..... *Olmea zapotecorum*

Olmea chazaroi Ruiz-Sanchez & Marinero-Sobal, *sp. nov.* Fig. 1–2

TYPE:—MEXICO. Veracruz: Huatusco, cerro de Ixpila, lado más oeste de la cordillera, 19°7′7.59″N, 96°59′13.77″W, 1600 m, 15 Noviembre 2020 (fl), *E. Marinero S., D. Canales, A. Seedorf & M. Cházaro 430* (holotype IBUG!, isotypes MEXU!, XAL!).

Olmea chazaroi differs from *O. clarkiae* by having 3–4 branches per node (vs. 1-branch), longer oral setae on culm leaves (20–45 mm vs. 8–15 mm long), foliage leaf sheaths glabrous (vs. prominently papillose-hirsute), narrower foliage leaf blades (3.5–6 mm vs. 9–15 mm wide), spikelets with 3–4 florets (vs. 2-flowered), and lemmas pubescent (vs. glabrous).

Rhizomes pachymorph 10–15 cm long and sympodial. Culms 3–8 m tall, 5–15 mm in basal diameter, erect to scandent culms; internodes 31–42 cm long, terete, asperous and retrorsely bearded, green, hollow, the walls 1–3 mm thick, the lacuna occupying >50% of the total diameter. Culm leaves 15.5–23 cm long, not-overlapping, persistent; sheaths 7.2–14 cm long, the sheaths are 1.3–1.9 times longer than the blades, persistent, triangular, abaxially hispid along the entire sheath, the hairs dark brown 1.2–1.4 mm long, auricles absent, the margins ciliate at the upper third; inner ligule ca. 0.1 mm; oral setae 20–45 mm long, 0.1–0.2 mm wide, yellowish, flattened, scabrous; fimbriae 3–12 mm long, ca. 0.1 mm wide, terete, whitish, deciduous, straight or curly, glabrous; blades 7–9.8 cm long, narrowly triangular, erect or reflexed, adaxially and abaxially glabrous, the margins glabrous. Branching intravaginal; 3–4 branches per

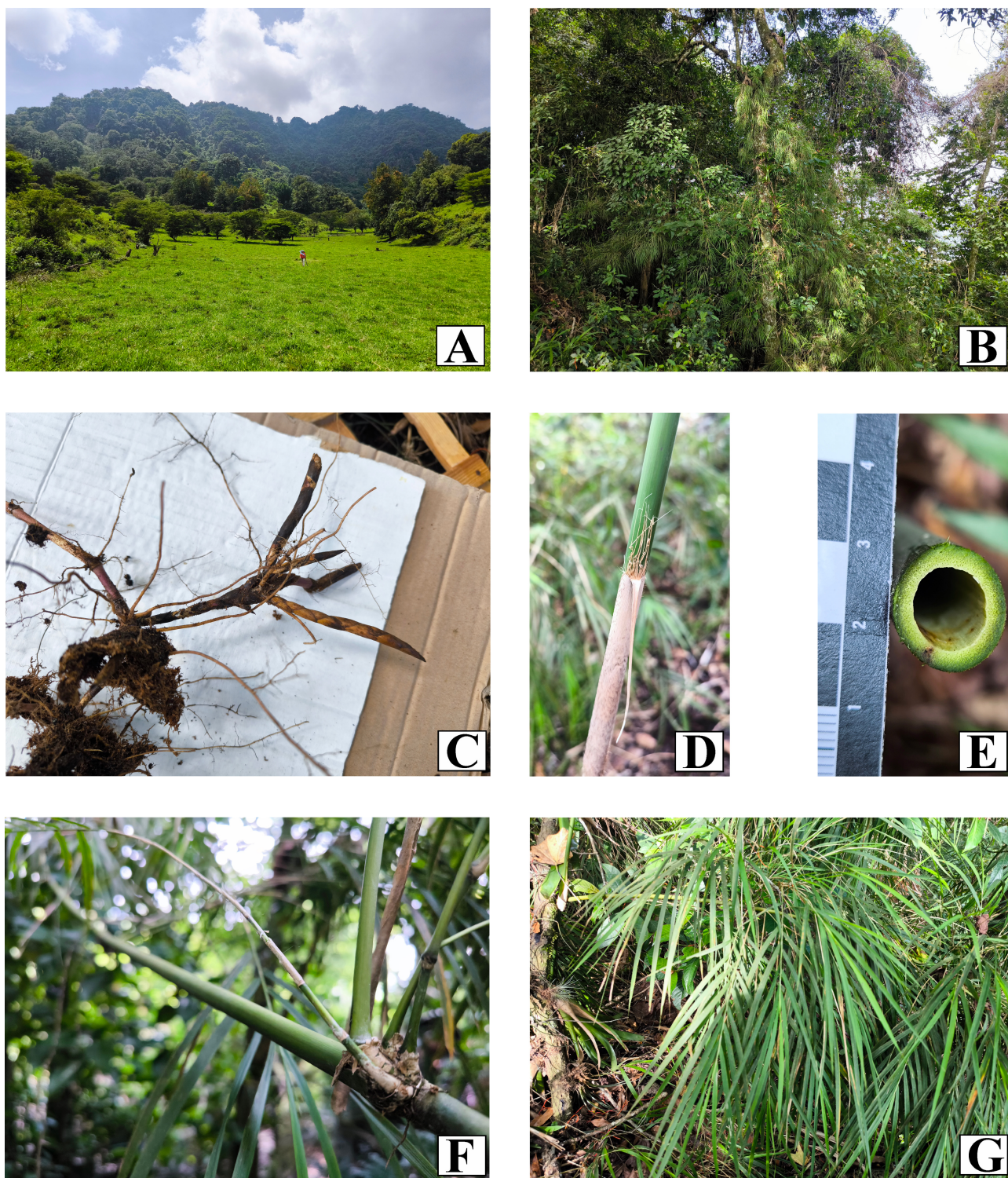


FIGURE 1. Habitat and plants of *Olmea chazaroi*. A. Ixpila Mountain, where this new species inhabits the summit in a montane cloud forest. B. Plant of *O. chazaroi* hanging on tree. C. Pachymorph rhizome and rhizome necks. D. Culm leaf sheath and blade. E. Culm cross-section showing hollow culms with thin walls. F. Branches, showing four branches per node. G. Foliage leaves.

node, diverging from each other, the main branch 276–310 cm long, 5–7 mm wide diverging from the main culm at 45–75°, secondary branches 2–3 mm wide; supranodal ridge pronounced; nodal line horizontal. Foliage leaves (9–)10–12(–15) per complement; sheaths glabrous, auricles absent; margins glabrous; outer ligule an irregular glabrous rim 0.1–0.2 mm long; inner ligule 0.2–0.5 mm long, truncate; oral setae 5–15 mm long, 0.1–0.2 mm wide, yellowish, flattened, glabrous, fused with the inner ligule; fimbriae on shoulder at one side of the blade at the sheath apex, ca. 5 mm long, terete, glabrous, straight, free; pseudopetioles hardly differentiated; blades (13–)18.5–25 cm long, 3.5–6 mm wide, linear, adaxially and abaxially glabrous, green on both sides, the base attenuate, folding, the apex acute,

midrib excentric, visible for the full length; the margins entire with short teeth. Synflorescences panicle, 5–7 cm long, terminal on leafless branches, with 8–15 spikelets, the rachis angular, scabrous; pedicels 2–5 mm long, angular, scabrous. Spikelets 17–21 mm long, with 3–4 florets, sometimes the uppermost floret sterile; rachilla joints 3.2–4 mm long, scabrous. Glumes 2, unequal, narrowly triangular and navicular, shortly awned, abaxially scabrous; glume I 3–3.8 mm long including the awn, 3-nerved, the awn 0.4–1 mm long; glume II 4.2–5 mm long including the awn, 7-nerved, the awn 1–1.5 mm long; lemmas 9–11 mm long including the awn, narrowly triangular and navicular, abaxially pubescent, 9-nerved, the awn 3–4 mm long, antrorsely scabrous; paleas 6–6.8 mm long, the keels scabrous, the sulcus pubescent, the wing glabrous to scabrous at the apex, the apex entire and pubescent. Lodicules 3, abaxially glabrous, hyaline, ciliate, the anterior pair 1.2–1.4 mm long, the posterior one 1.2 mm long, cilia hyaline, 0.05–0.09 mm long; anthers not seen; ovary not seen. Caryopsis not seen.

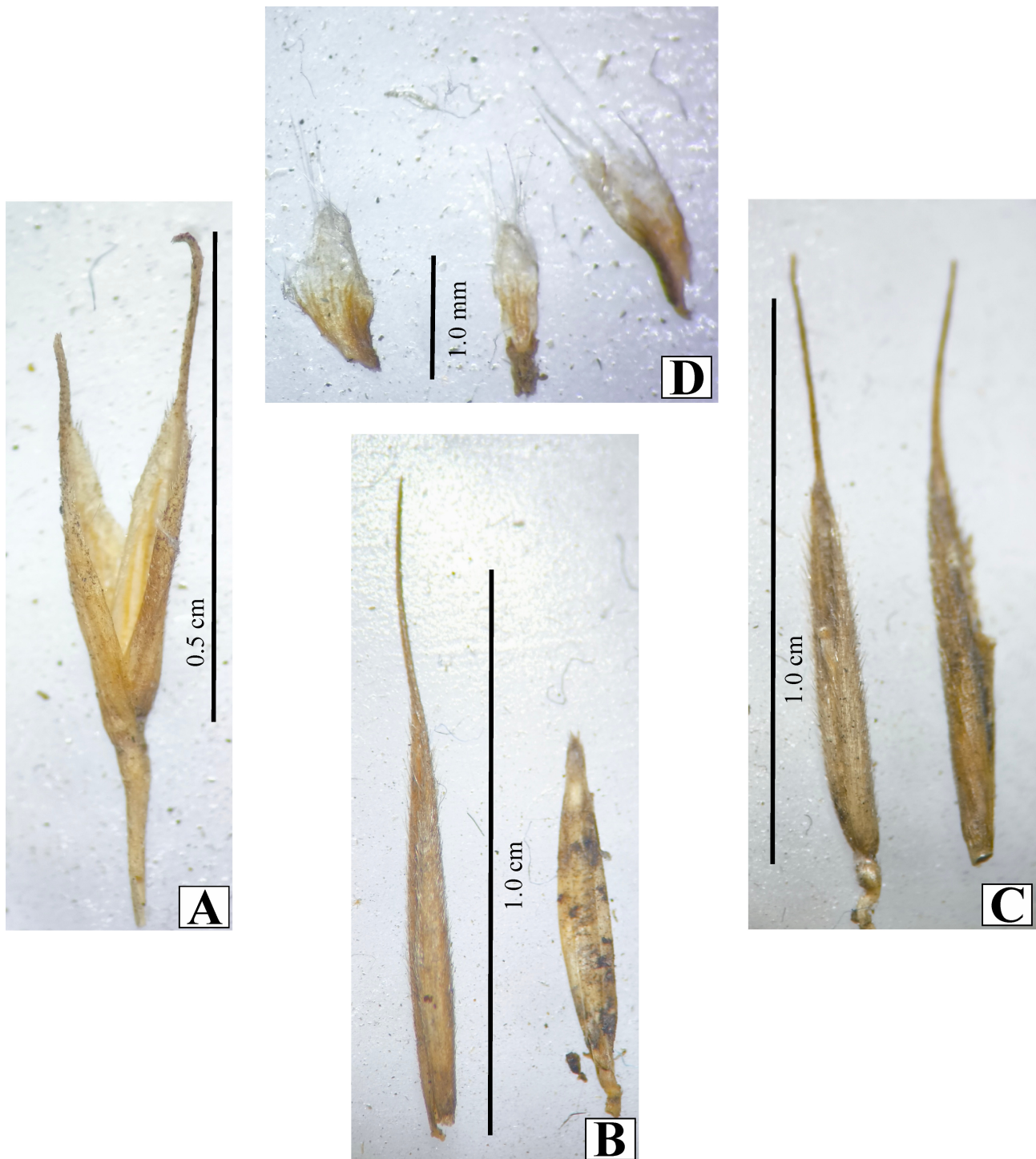


FIGURE 2. *Olmecha chazaroi*. A. Glumes. B. Lemma (left) and palea (right). C. Lemma, ventral view (left) and lateral view (right). D. Lodicules.

Etymology:—The specific epithet commemorates Miguel Cházaro Basáñez (August 15, 1949–April 4, 2023), our esteemed colleague and the collector of this species, in recognition of his contributions to Mexican botany.

Phenology:—Flowers of this species were collected in 2020 and 2024, with only a single individual flowering each year. This suggests a sporadic flowering pattern (Franklin 2024).

Distribution and habitat:—This narrowly endemic species is restricted to Cerro de Ixpila (Huatusco, Veracruz), where it occurs in a single montane cloud forest population at 1600 m elevation (Rzedowski 1978) (Fig. 3).

Notes:—The 2024 collection yielded one post-flowering individual with a single spikelet on a secondary branchlet. Its glumes, lemmas, and paleas measured twice the size of those in the 2020 specimen. We excluded the 2024 measurements due to this apparent anomaly. A formal IUCN analysis of conservation status could not be performed due to the lack of sufficient data points. Its provisional status would be Critically Endangered.

Uses:—Local people from Huatusco made baskets with this species.

Paratypes:—MEXICO. Veracruz: Huatusco, cerro de Ixpila, lado más oeste de la cordillera, 19°7'7.59"N, 96°59'13.77"W, 1600 m, 9 Agosto 2024, *E. Ruiz et al.* 866 (IBUG).

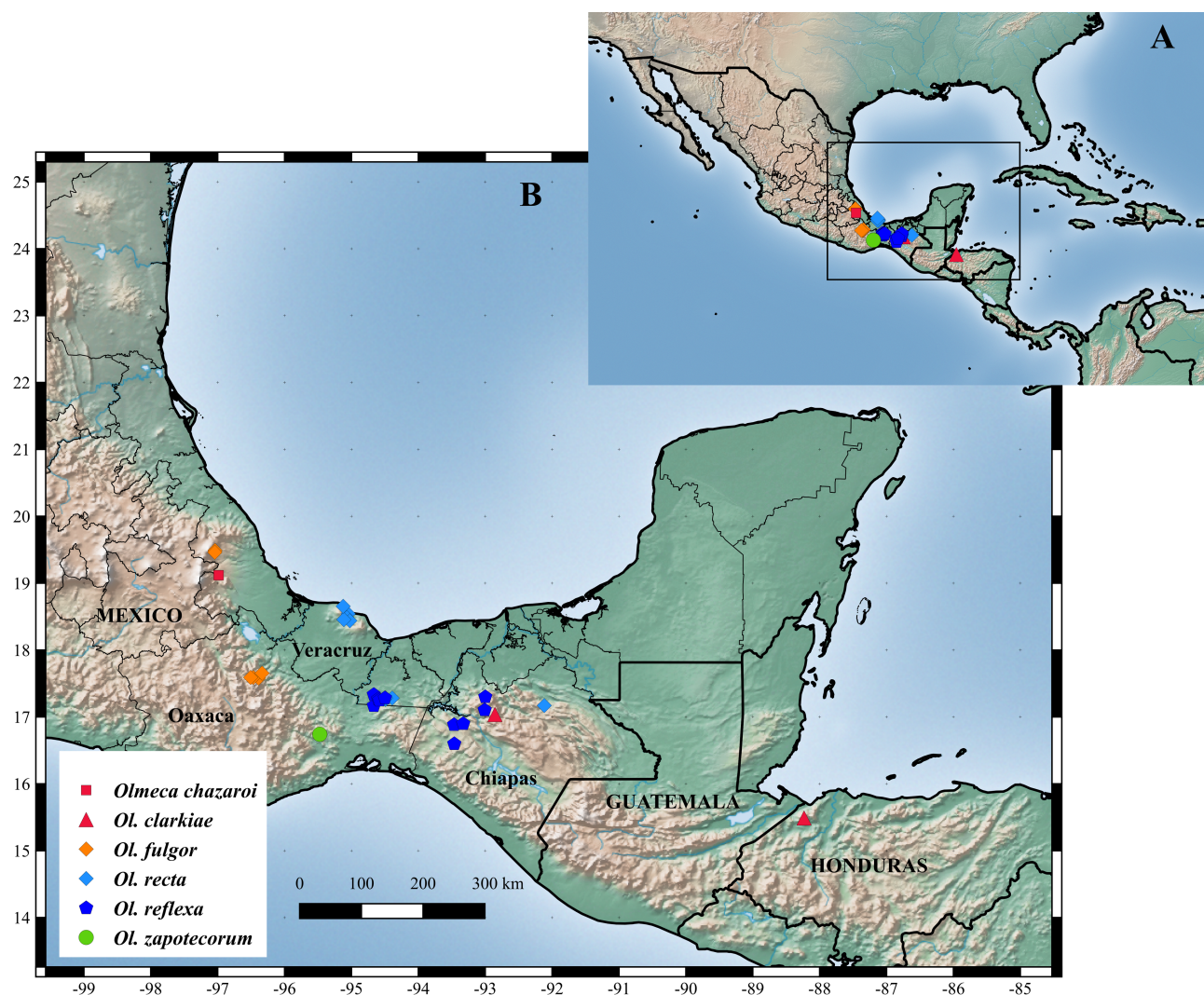


FIGURE 3. Geographical distribution of *Olmeca* species.

Discussion

With the discovery of *Olmeca chazaroi*, the genus now comprises six species (83% endemic to Mexico) and contributes to Mexico's remarkable woody bamboo diversity (61 total species, 72% endemism; Ruiz-Sanchez *et al.* 2021b, 2022a,b, 2024, McMurchie *et al.* 2025). From the six species of *Olmeca* described, four of them inhabit montane cloud forest, including this new one (Ruiz-Sanchez *et al.* 2011). Mexico's montane cloud forests rank among the nation's most biodiverse ecosystems, supporting approximately 10% of the country's vascular plant species (Ornelas *et al.* 2013).

These forests are particularly significant for bamboo conservation, containing nearly half of Mexico's woody bamboo diversity (Ruiz-Sanchez *et al.* 2015, 2020), with the majority of species classified threatened categories according to the IUCN (2019) geographic range criteria. Despite their ecological importance, montane cloud forests represent one of Mexico's most endangered ecosystems (Ramírez-Barahona *et al.* 2025).

In morphological characters, *Olmea chazaroi* shows greater similarity to *O. clarkiae* than with either *O. fulgor* or *O. zapotecorum* (Table 1). Geographically, the closest *O. fulgor* population lies 33 km distant (linear measurement), contrasting with *O. clarkiae* populations in Chiapas state at a minimum distance of 494 km. *Olmea chazaroi* is critically threatened, as only a single population is known to exist on Cerro Ixpila, where it grows exclusively on the summit. It faces two major threats: deforestation due to land-use change (from forest to pasture) and climate change. Ramírez-Barahona *et al.* (2025) found that the montane cloud forest species have shifted upward by in elevation 1.8 to 2.7 meters per year since 1979. This species already occupies the summit area of its mountain and cannot migrate further uphill. Its survival will therefore depend on preventing deforestation and its inherent ability to adapt to new climatic conditions.

TABLE 1. Comparison of morphological characters among *Olmea* species.

Character/taxa	<i>O. chazaroi</i>	<i>O. clarkiae</i>	<i>O. fulgor</i>	<i>O. recta</i>	<i>O. reflexa</i>	<i>O. zapotecorum</i>
Culm habit	erect to scandent	arching apically	erect to scandent	arching apically	scandent	scandent
Culm						
Length (m)	3–8	5–10	5–6	5–15	6–18	6.5–8
Diameter (mm)	5–15	1.5–2.0	0.5–1.0	4.5–5.0	1.5–2.0	0.7–1.0
Culm leaves						
Sheath length (cm)	7.2–14	10.5–17	11–16	15.5–30.5	22–35	7–12
Culm leaf blades						
Length (cm)	7–9.8	12.5–16	5.5–10.5	18–25	8–23	4.5–11
Position	erect or reflexed	erect or reflexed	erect or reflexed	erect	reflexed and twisted	erect or reflexed
Oral setae on culm leaves						
Length (mm)	20–45	7–18	11–22	15–37	25–40	12–19
Fimbriae on culm leaves						
Position	at shoulders	at shoulders	on auricles	at shoulders	at shoulders	on auricles
Posture	straight	straight	straight	curly	curly	straight
Length (mm)	3–12	5–13	5–15	4–24	7–13	5–10
Foliage leaf blade						
Length (cm)	(13-)18.5–25	19–30	18.5–26.5	19.5–32	9.5–27	20–30
Width (cm)	0.35–0.6	0.8–1.0	0.7–1.0	1.7–3.0	1.1–5.3	1.5–2.5
Colour adaxial surface	green	green	glaucous	green	green	glaucous
Oral setae on foliage leaves						
Length (mm)	5–15	8–11	5–10	19.5–48	9–25	12–19
Fimbriae on foliage leaves						
Length (mm)	ca. 5	2–3	5–10	7–15	2–7	5–10
Posture	straight	curly	straight	straight	straight	
Habitat	Cloud forests	Cloud forests	Cloud forests	Tropical rain forests	Tropical rain forests	Cloud forest
Distribution	Veracruz	Mexico and Honduras	Oaxaca and Veracruz	Veracruz and Chiapas	Chiapas, Oaxaca and Veracruz	Oaxaca

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