



Persicaria barbata (L.) H. Hara and *Persicaria glabra* (Willd.) M. Gómez (Polygonaceae): two newly recorded species from the Yucatan Peninsula and Mexico

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Abstract

Two species of *Persicaria* (L.) Mill. are reported for the first time in the Neotropics. *Persicaria glabra* (Willd.) M. Gómez is reported for the first time as part of the flora of the Yucatan Peninsula, Mexico, and *Persicaria barbata* (L.) H. Hara is newly recorded from Mexico and the Americas. We present morphological descriptions of these two species along with figures, a distribution map, and a dichotomous key for the identification of the six species of *Persicaria* from the Yucatan Peninsula.

Keywords

Aquatic plants, Campeche, Persicarieae, Polygonaceae, Polygonoideae

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Introduction

The genus *Persicaria* (L.) Mill. (Polygonaceae) is the second richest in the subfamily Polygonoideae, with approximately 150 species (Schuster et al. 2011). *Persicaria* was for a long time treated as *Polygonum* sect. *Persicaria* (L.) Raf., until Haroldson (1978) segregated the genus from. Subsequently, studies on the morphology of the fruit, flowers, and pollen (Hong et al. 1998; Ronse Decraene et al. 2000), as well as molecular phylogenetic studies (Kim and Donoghue 2008; Sanchez et al. 2011; Schuster et al. 2011) have supported this segregation as a distinct and phylogenetically isolated genus of *Polygonum*.

Persicaria species are perennials and aquatic or subaquatic (Kantachot et al. 2010). Most of them are

distributed in temperate regions, but a few can reach tropical and subtropical regions. The elevation range of the genus extends from sea level to over 1000 m (Heywood et al. 2007). Villaseñor (2016) estimated that 13 species of *Persicaria* occur in Mexico, and in the Yucatan Peninsula, Ortiz-Díaz (1994) reported four species of *Polygonum* sect. *Persicaria*, currently transferred to *Persicaria*. After examination of the recent herbarium collections, we identified three specimens belonging to two species not previously recorded for the flora of the Yucatan Peninsula. Here, we present the new records of *P. barbata* (L.) H. Hara and *P. glabra* (Willd.) M. Gómez and include morphological descriptions, figures,

and a distribution map. We also include a dichotomous identification key to the six *Persicaria* species from the Yucatan Peninsula.

Methods

The core of this work focused on herbarium specimens of the largest collections of the Yucatan peninsular flora CICY, F, MEXU, MO, NY, and UADY (acronyms according to Thiers 2021). We also reviewed the taxonomic treatments of the family Polygonaceae from the Yucatan Peninsula (Standley and Steyermark 1946; Ortiz-Díaz 1994) and taxonomic treatments of other geographic regions that included the genus *Persicaria* (or *Polygonum* sect. *Persicaria*) (Duke 1960; Burger 1983; Wilson 1990; Hinds and Freeman 2005; Hassannejad and Ghafarbi 2017), as well as digitized type specimens in JSTOR Global Plants (JSTOR 2021) and Tropicos.org to compare and correct changes in nomenclature, new records, and distribution patterns. To create the maps of the new records, we used the coordinates from herbarium labels (CICY, UNAM, and UADY) and the Simplemappr program (Shorthouse 2010). For the maps of the previously known records, we used the coordinates of the Tropicos.org database, JSTOR Global Plants, and the UNAM open data portal.

Results

We found records for six species of *Persicaria* in the flora of the Yucatan Peninsula (Table 1), including two previously unrecorded species, *Persicaria glabra* and *P. barbata*. The latter species is also newly reported from Mexico and the Neotropical region.

Persicaria barbata (L.) H. Hara

Figure 1

New records. MÉXICO – **Campeche** • municipality Calakmul, a 200 m al E del Rancho Las Delicias, camino a Xpujil-La Moza; 21°29'25"N, 089°15'56"W; 225 m elev.; 27.IV.1998; *E. Martínez et al.* 30715-A (MEXU) – **Quintana Roo** • municipality Lázaro Cárdenas, ejido Kantunilkin, área de reserva del CBTA; 21°07'N, 087°28'W; 15 m elev.; 02.IV.2002; *Chan Dzul 69* (CICY) (Fig. 2).

Identification. **Herbaceous** Plants perennial, 30–100 cm tall. **Stems** decumbent to erect, usually distally branched; ochreae whitish, tubular, 1.5–1.7 cm long,

papyraceous, strigose, trichomes 0.5–1.0 mm long, distal margin setaceous, setae 2–3 cm long. **Leaves** simple, alternate; petiole, 0.5–1.0 mm long, strigose; leaf-blades 12–15 × 1.5–2.0 cm, lanceolate, base acute to slightly decurrent to petiole, apex acute to acuminate, strigose. **Inflorescences** terminal, panicle racemose, 10–14 cm long, erect; peduncle 4–6 cm long, strigose; racemes 4–6 cm long; ochreolae 2.5–3.0 mm long, usually overlapping, strigose, distal margin setaceous, setae 2–3 mm long. **Flowers** 5–7 per fascicle, pedicels 4–5 mm long, erect, glabrous; perianth lobes greenish-white to white, accrescent, tepals 4; stamens 5, persistent, exserted; ovary 1 mm long, biconvex, style 2, persistent. **Fruit**, achene biconvex to slightly concave-convex, 2.0 × 1.3 mm included, dark brown to brownish black.

Geographical distribution. Sri Lanka, India, Nepal, Bhutan, Myanmar, China, Taiwan, Vietnam, Peninsular Malaysia, Indonesia, Philippines, New Guinea, Madagascar.

Observations. The two Yucatan Peninsula records of *P. barbata* are the first from Mexico and the Americas. In the Yucatan Peninsula, it is a rare species. The populations are located around lakes and sinkholes where plants occur in very moist soils together with species of Cyperaceae and Poaceae.

Persicaria glabra (Willd.) M. Gómez

Figure 3

New record. MÉXICO – **Yucatán**, municipality Tizimin, dirección este a 23 km; 21°09'66"N, 088°54'25"W; 05. XII.2000, *J. Tun 1130* (UADY) (Fig. 4).

Identification. **Herbaceous** Plants perennial, 30–100 cm tall. **Stems** decumbent to erect, usually distally branched; ochreae 1.5–3.0 cm long, light brown, cylindrical, chartaceous, margins truncate, eciliate, base inflated, glabrous, usually obscurely glandular-punctate. **Leaves** simple, alternate, petiole 1.5–2.5 cm long, glabrous, glandular-punctate; leaf-blades 13–17 × 2.0–5.4 cm, lanceolate, apex acute to acuminate, glabrous, glandular-punctate. **Inflorescences** terminal, panicle racemose, 25 cm long, erect; peduncle 3.5 cm, glabrous, glandular-punctate; raceme, 5–11 cm long; ochreolae usually overlapping, margins eciliate. **Flowers** 3–6 per fascicle; pedicels 2–5 mm long, erect to spreading; perianth lobes greenish-white to white or pink, glabrous, glandular-punctate, slightly accrescent; tepals 5; stamens 5–7, included; styles 2, 1 mm long. **Fruit** an

Table 1. Comparison of the current and old circumscription of the *Persicaria* species of the Yucatan Peninsula after the taxonomic treatment of Ortiz-Díaz (1994). Numbers in brackets = references: 1 = Ortiz-Díaz 1994; 2 = Carnevali et al. 2010; 3 = present study.

Current circumscription	Old circumscription
<i>Persicaria acuminata</i> (Kunth) M. Gómez [2]	<i>Polygonum acuminatum</i> Kunth. [1]
<i>Persicaria glabra</i> (Willdenow) M. Gómez	New record
<i>Persicaria barbata</i> (L.) H. Hara	New record
<i>Persicaria hydropiperoides</i> (Michx.) Small [2]	<i>Polygonum hydropiperoides</i> Michx. [1]
<i>Persicaria punctata</i> (Elliott) Small [2]	<i>Polygonum punctatum</i> Elliot [1]
<i>Persicaria segetum</i> (H.B. & K) Small [3]	<i>Polygonum segetum</i> H.B. & K [1]

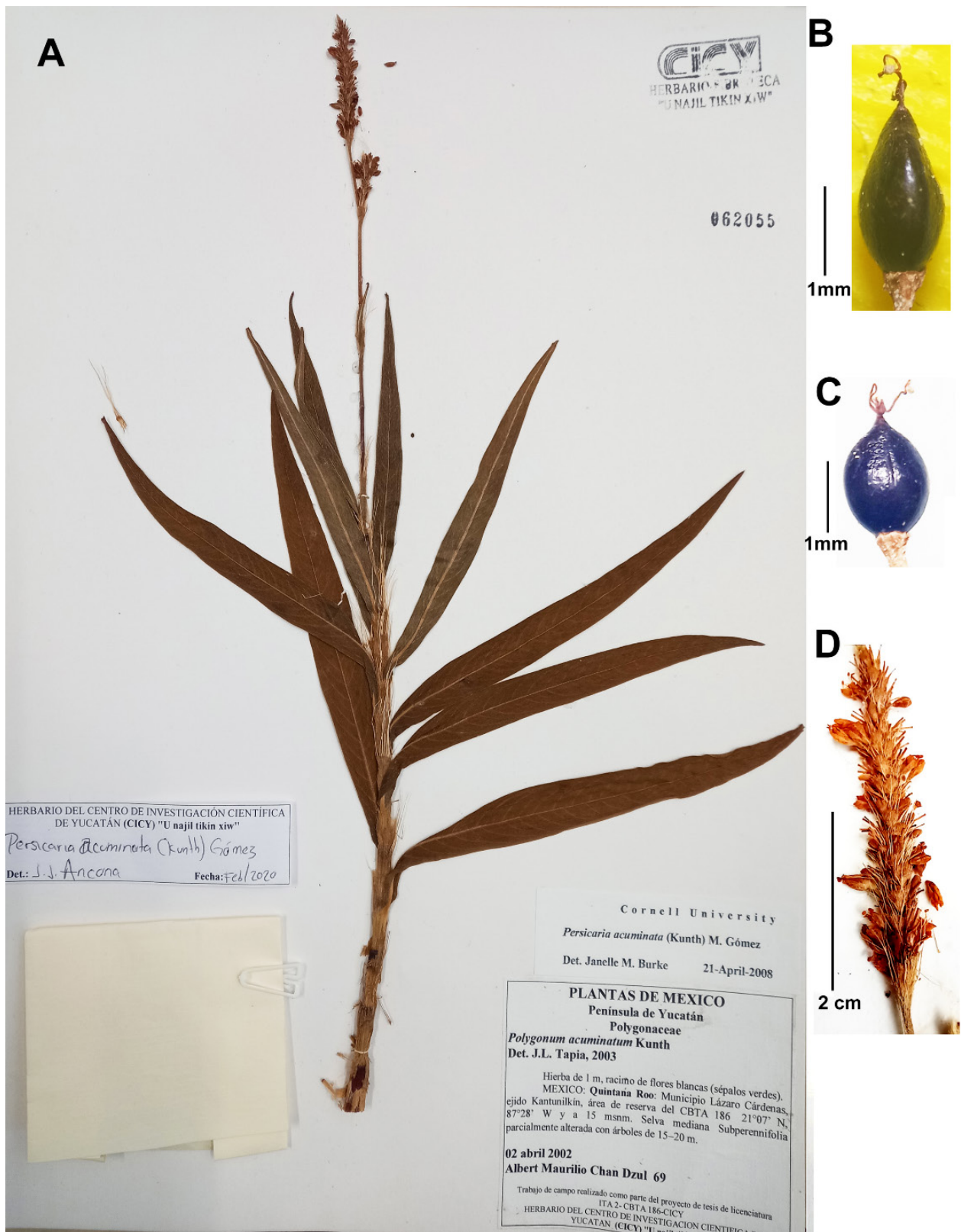


Figure 1. *Persicaria barbata*. **A.** Specimen Chan-Dzul 69 (CICY). **B.** Biconvex achene, in dorsal view. **C.** Biconvex achene, in ventral view. **D.** Inflorescence details: ochreolae strigose, setaceous, accrescent perianth with stamens exerted.



Figure 3. *Persicaria glabra*. **A.** Specimen J. Tun 1130 (UADY). **B.** Biconvex achene, with two styles. **C.** Inflorescence details: ochreolae glabrous, eciliate; perianth accrescent glandular-punctate. **D.** Ochrea glandular-punctate, glabrous, eciliate.

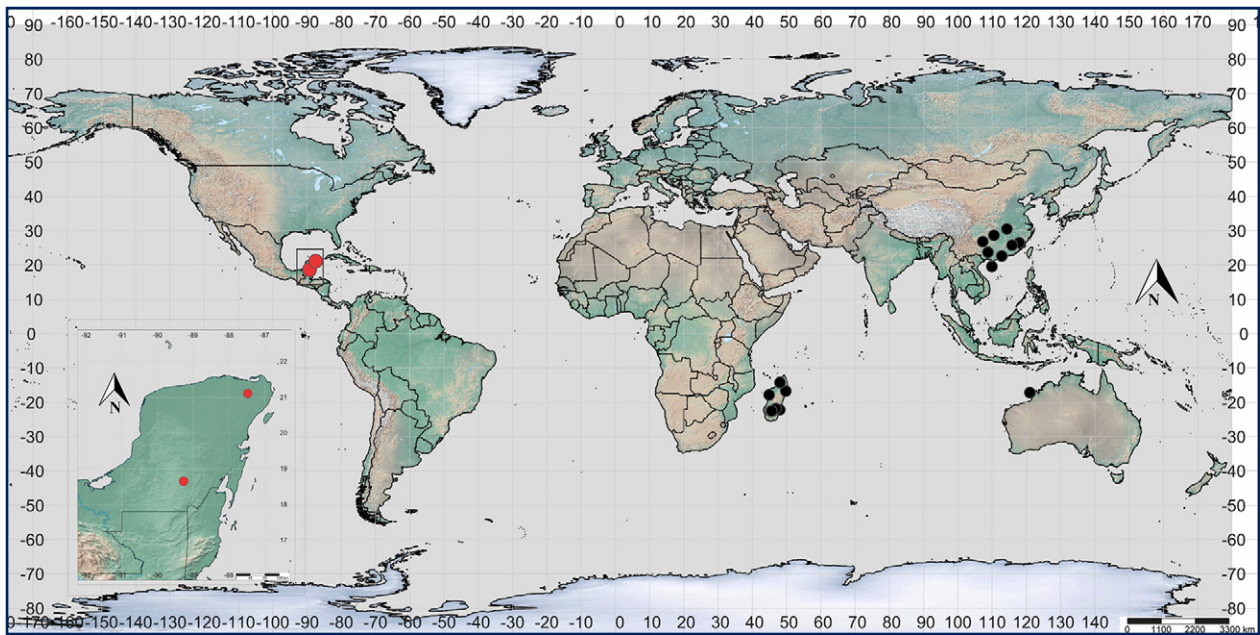


Figure 2. Distribution map of *Persicaria barbata*. Black circles = previously known distribution (Tropicos.org); red circles = new records in the Americas (Yucatan Peninsula, Mexico).

achene 2.0×1.3 mm, included, biconvex, dark brown to brownish black, smooth, shiny.

Geographical distribution: Cosmopolitan: Africa, Asia, Central America, Mexico (Baja California Sur, Chihuahua, Coahuila, Colima, Jalisco, Morelos, Nuevo León, Querétaro, San Luis Potosí, Tabasco, Tamaulipas, Veracruz), South America, USA, and some Pacific Islands (Hawaii, Philippines).

Observations. In the Yucatan Peninsula this species grows around lakes and sinkholes in very moist areas.

Key for identification of *Persicaria* species of the Yucatan Peninsula

- 1a Perianth with punctate glands 2
 - 2a Ochreae and ochreolae glabrous, eciliate; achenes biconvex, styles 2 ***P. glabra***
 - 2b Ochreae and ochreolae pubescent or strigose, ciliate; achenes trigonous, styles 3 3
 - 3a Glands prominent and evenly distributed over perianth, ochrea, petiole, and peduncle ***P. punctata***
 - 3b Glands only at base of perianth, not prominent and absent on ochrea, petiole, and peduncle ***P. hydropiperoides***
- 1b Perianth without punctate glands 4
 - 4a Ochreae and ochreolae strigose, margin setaceous, seta 1–2 cm long ***P. barbata***
 - 4b Ochreae and ochreolae glabrous, margin ciliate, cilia 0.5–1.0 cm long 5
 - 5a Distal branches and peduncle not glandular-punctate; middle vein of the leaf-blades strigose ***P. acuminata***
 - 5b Distal branches and peduncle glandular-punctate; middle vein of the leaf-blades glabrous ***P. segetum***

Discussion

Polygonum barbatum (= *Persicaria barbata*) is a conserved name proposed by Wilson (1998). Linnaeus described *Polygonum barbatum* with five diagnostic characters. However, Wilson (1998) observed that more than 20 species in the subgenus *Persicaria* have four of these five traits, and that only *Persicaria pubescens* (= *Polygonum pubescens*) has the five characters described by Linnaeus for *P. barbatum*. In addition, Wilson reviewed specimens 510.14 and 510.15 from the LINN herbarium labeled as *P. barbatum* and determined that they are *Persicaria pubescens* and *Persicaria hydropiperoides*, respectively. That is, the only existing original specimens of Linnaeus that refer to *P. barbatum* do not fit the current use of this name. The traditional species currently known as *P. barbatum* have longer and thicker cilia (bristles) in the ochreae than *P. pubescens*, which has short, thin cilia. In addition, the achenes in *P. pubescens* are trigonous, with three styles, while in *P. barbatum* the achene is biconvex with two styles (Wilson 1990). To maintain nomenclature stability, Wilson (1998) proposed the conservation of *P. barbatum* with a new type conserved in BM, this specimen unequivocally represents these taxa.

Importantly, there is no morphological description of the new type of *P. barbatum*. Taxonomic studies including *P. barbatum* (or *Persicaria barbata*) are still based on the description of Linnaeus, which currently corresponds to *P. pubescens* (Wilson 1998). *Persicaria barbata* is widespread in warmer regions, from India to China and Australia, possibly spreading to the islands of the Pacific Ocean (Wilson 1990, 1998). Until now, it was unknown from the tropical Americas. The two herbarium records of *P. barbata* were originally determined as *Persicaria acuminata* (Kunth) M. Gómez. However, the presence of

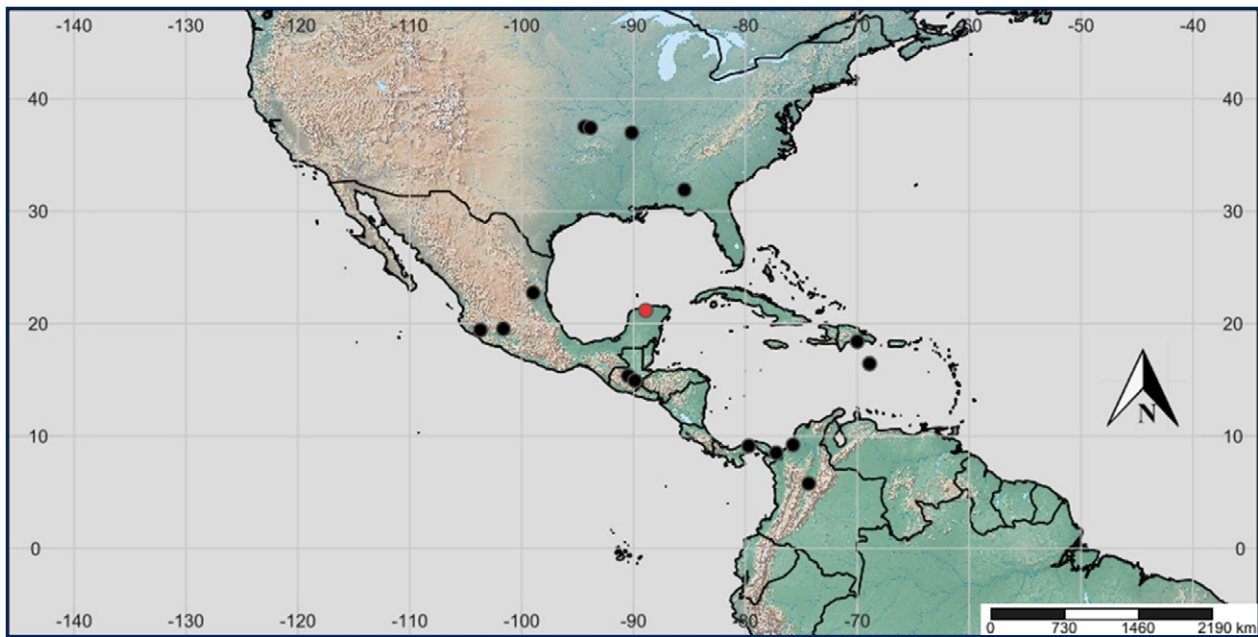


Figure 4. Distribution map of *Persicaria glabra*. Black circles = previously known distribution (Tropicos.org); red circle = new record in the Yucatan Peninsula, Mexico.

bristles, instead of cilia, on the margins of the ochreae and ochreolae serve to distinguish *P. barbata* from *P. acuminata*.

Our record of *P. glabra* is the first from the Mexican portion of the Yucatan Peninsula. In their revision of the genus, Hinds and Freeman (2005) noted that the American plants included in *P. glabra* are frequently treated as distinct and named *Persicaria densiflora* (Meisner) Moldenke. The morphological differences between *P. densiflora* from America and *P. glabra* from Asia and the Pacific are minor. There are regional trends, but they do not seem sufficient to justify the separation into two species (Hinds and Freeman 2005). Therefore, Hinds and Freeman (2005) treated *P. densiflora* as a synonym of *P. glabra*; *Persicaria portoricensis* Small and *Polygonum portoricense* Bertero ex Small are superfluous, illegitimate names and are additional synonyms *P. glabra* (Hinds and Freeman 2005). It is also noteworthy that the *P. glabra* specimens collected in Mexico and kept in Mexican herbaria (MEXU, XAL) are determined as *Persicaria portoricensis* or *Polygonum portoricense*.

Persicaria species exhibit spotty distribution, restricted to permanent or seasonal freshwater ponds throughout the Yucatán Peninsula (Ortiz-Díaz 1994). This would explain the underrepresentation of this genus in herbarium collections. We recommend a review of the genus in Mexico, which is necessary to better know the diversity and distribution of *Persicaria* species in the country.

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Authors' Contributions

Conceptualization: JJOD, JJA. Data curation: JTG, JJA. Writing – original draft: JJA. Visualization: JJA. Writing – review and editing: JTG, JJA, JJOD.

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