Abstract. Fonseca-Cortés, A. & J. A. Peña-Torres. 2021. First record of the family Mazaceae (Lamiales) in Colombia and the clarification of the synonyms of Mazus pumilus. *Darwiniana*, nueva serie 9(1): 245-253.

Mazaceae, a family native to Asia and Oceania, is reported for the first time for the Colombian flora, with *Mazus pumilus* (Burm.f.) Steenis. This species is easily recognized by its herbaceous habit, leaves rosetulate, elliptic to obovate cauline leaves, terminal, racemose inflorescences, bilabiate flowers with one 2-lobed upper lip and one 3-lobed lower lip, and fruit completely enclosed in the calyx. To date, this species has been recorded in three departments of Colombia, growing between the pavement. Additionally, we clarify the synonyms of this taxon.

Keywords. Flora of Bogotá; exotic flora; Mazus; urban flora.

INTRODUCTION

Mazaceae is a small family native to Asia and Oceania, with ca. 34 species (Deng et al., 2019). It was proposed within the Lamiales (Reveal, 2011) and was separated from Phrymaceae based on several molecular phylogenetic studies (Albach et al., 2005; Xia et al., 2009; Schäferhoff et al., 2010). Mazaceae include four genera, *Mazus* Loureiro, *Lancea* Hook.f. & Thomson, *Dodartia* L. and the recently described *Puchiumazus* Bo Li, D.G. Zhang & C.L. Xiang (Xiang et al., 2021). *Mazus*, with ca. 30 species, is the richest genus of the family (Deng et al., 2019). It is distributed in eastern and southeastern Asia, Australia, and New Zealand (Barker, 1991; Hong et al., 1998). China is considered the center of diversification of the genus (Yang, 1979; Hsieh, 2000), with ca. 26 species and three varieties currently recognized (Hong et al., 1998; Deng et al., 2016). This genus is characterized by its herbaceous habit, flowers with zygomorphic corollas, with one 2-lobed upper lip and one 3-lobed lower lip, and fruit usually completely enclosed in the calyx when mature (Xiang et al., 2021).
**Materials and Methods**

We made free tours in Bogotá D.C., between January and February of 2021 and collected the individuals in reproductive stage. The herbarium vouchers were deposited in UDBC (herbarium acronyms follow Thiers, 2021). To determine the generic identity of the species, we consulted the pertinent literature on the taxonomy of the Lamiales (Cao Shu, 1998; Deng et al., 2019; Kew, 2021b) and the species of this order reported for Colombia (Bernal et al., 2016). For the circumscription of Mazus, we followed Xiang et al. (2021).
For the elaboration of the description, we measured the organs with a digital caliper with an accuracy of 0.01 mm. For the review of the synonyms of *M. pumilus* we consulted in Biodiversity Heritage Library, Schoolar Google, Web of Science and Scielo, the publications who included taxonomical treatments or mentioned names related with *Mazus pumilus*, then we analyzed the protologues of these names, available at Biodiversity Heritage Library (www.biodiversitylibrary.org), and saw the types in JSTORPLANTS (https://plants.jstor.org/). For the names that did not mention the type, we searched in which herbaria the authors deposited their types (Stafleu & Cowan, 1979) and asking to the curators to search exsiccatas with collected by names author or with a label of the name. Finally, for the elaboration of the map, we use the records from our free tours and those of iNaturalist (Naturalista, 2021).

**RESULTS AND DISCUSSION**

*Mazus pumilus* (Burm.f.) Steenis, Nova Guinea 9 (1): 31. 1958. Basionym: *Lobelia pumila* Burm. f., Fl. Indica 187, pl. 60, f. 3. 1789. TYPE: Burman, Fl. Indica 187 1c. pl. 60 f.3 (Lectotype designated by Cramer, 1981). Figs. 1, 2.

*Mazus rugosus* Lour., Fl. Cochinch. 385. 1790. TYPE: China, Cochinchina, *J. Loureiro s.n.* (holotype: BM-000997856!).

*Trevirania gratiolae* Roth, in Weber, Beitr. II. 123. 1810. TYPE: without data (holotype: M-0188280!).

*Mazus laevifolius* Blume, Bijd. Fl. Ned. Ind. 14: 753. 1826. TYPE: Indonesia, Java, Buitenzorg, w.d., w.c. (holotype: L-0003532!).

![Mazus pumilus](http://www.ojs.darwin.edu.ar/index.php/darwiniana/article/view/949/1224)
Mazus bicolor (Willd.) Benth., Numer. List. 3913. 1831. Basionym: Hornemannia bicolor Willd., Enum. Pl. [Willdenow] 2: 653 1809. TYPE: without data (holotype: B -W-11582 -01 0!).

Mazus vandellioides Hance, Ann. Bot. Syst. 3(2): 193. 1852. TYPE: China, Hong Kong, w.d. Hance s.n. (holotype: FI-063202).

Lobelia esquirolii H. Lév., Fl. Kouy-Tcheou: 58. 1914. TYPE: China, Kouy-Tcheou, mont du College, IV-1910, J. Esquirol 2062 (holotype: E-00284110!).

Mazus goodenifolius (Hornem.) Pennell, J. Arnold Arbor. 24: 245. 1943. Basionym: Gratiola goodenifolia Hornem., Enum. Pl. Hort. Hafn.19. 1807. TYPE: without data (holotype: C-10019014!).

Prostrate herbs, with one long tap root or with numerous roots, and one to many shoots. Leaves 0.4-2.4 × 0.4-0.8 cm, basal leaves usually rosulate, cauline leaves alternate; glabrous or with a few trichomes on the margin at the base, elliptic to obovate, base decurrent in the petiole, apex rounded, margin entire, crenulated or with a few teeth, pinnately nerved with 2-4 pairs of secondary veins. Inflorescence 2.5-6.0 cm long; peduncles of 0.5-0.7 cm long, terminal, racemose, glabrous or puberulous. Flowers 0.5-0.8 × 0.4-0.6 cm, bilabiate, calyx 0.4-0.5 × 0.2-0.3 cm, tube 0.1-0.2 cm long, glabrous or puberulent, green, with five lanceolate sepals, 0.2-0.3 × 0.1-0.2 cm, base of the sepals with a red gland; corolla gamopetalous, lilac outside, pale lavender inside with yellow macules, upper petals fused into an emarginate lip, lower petals fused into a trilobate lip, terminal lobe 0.1-0.2 × 0.1-0.2 cm, lateral lobes 0.3-0.4 × 0.2-0.3 cm, hairy, with two longitudinal ridges; stamens four, didynamous, filaments 0.2-0.3 cm long, anthers medifixed ca. 0.1 cm long; ovary superior, glabrous, bilocular; style 0.4-0.5 cm long; stigma flabelliform. Fruit a loculicidal capsule with numerous seeds.

**Distribution.** Mazus pumilus is native of Eastern Asia and Oceania (Cao Shu, 1998), and it has spread in many countries of America and Europe (Kew, 2021a). In Colombia (Fig. 3), this species has been collected in Bogotá D.C., and has been recorded in Medellín, Antioquia and in Granada municipality, Meta (Naturalista, 2021), growing between the pavement.
Etymology. *Mazus* from the Greek, “μαστός”, breast, alluding to the two ridges on the lower lip of corolla and *pumilus* from the Latin “pūmilus” that means dwarf, alluding to the small size of this species.

Uses. Pharmacological studies show that *M. pumilus* is a promising species for medicinal use and treatment, Priya & Rao (2016) report anticancer and antioxidant activity of various leaf extracts of *M. pumilus*. This taxon also possesses antibacterial and antifungal properties (Safdar et al., 2017). Ishtiaq et al. (2019) demonstrated the anti-nociceptive, anti-inflammatory and hepatoprotective effects of the methanol extract of *M. pumilus*. Additionally, this species has wide medicinal uses in the local and popular tradition.

Examined material

**COLOMBIA. Cundinamarca.** Bogotá D.C., Engativá, Unicentro de Occidente, 4°43’22.1”N 74°06’ 5.3” W, 2600 m, 27-I-2021, A. Fonseca-Cortés 1338 (UDBC); Bogotá D.C., Engativá, Ciudadela Colsubsidio, 4°43’14.4” N 74°06’57.0” W, 2600 m, 24-II-2021, A. Fonseca-Cortés & J. Peña-Torres 1450 (UDBC); Barrios Unidos, Museo de Los Niños, 4°39’42.38” N 74°05’18.65” W, 2600 m, 24-II-2021, A. Fonseca-Cortés & J. Peña-Torres 1451 (UDBC); Bogotá D.C., Barrios Unidos, Parque del Salitre, 4°39’58.93” N 74°05’19.35” W, 2600 m, 24-II-2021, A. Fonseca-Cortés & J. Peña-Torres 1452 (UDBC).

**COMMENTS**

Burman (1768) in his description of *Lobelia pumila* just cites an illustration (Tab 60 f.3) present in the same publication, and he does not mention any exsiccat. Steenis (1958) mentions that the type of *Lobelia pumila* is at G. There are two exsiccat at G of the collection of Burman, G-00096392 and G-00096393, the former has a label of “TYPE” and the latter of “TYPE DUPLICATE”. However, there is no clarity if that labels were put by Steenis or not. Cramer (1981) states the illustration mentioned by Burman (1768) as the type. Therefore, Stennis (1958) did not lectotypify *L. pumila* (article 7.11, Turland et al., 2018), but Cramer (1981) did (article 9.12, Turland et al., 2018).

After the search in the herbaria, we found all the types of the synonyms listed in the introduction except for *Titmannia obovata*, for which we cannot contact the curator of the herbarium in which it is probably deposited (LE) (Stafleu & Cowan, 1979).
The analysis of the types and of the protologues allow us to confirm that the names cited in the different treatments listed in the introduction, with the exception of Columnnea tomentosa, Stemodia tomentosa, Lindernia japonica, Mazus bodinieri and Tittmannia obovata, are synonyms of *M. pumilus*. The holotype of *M. laevifolius* is at L (L-0003532); the holotype of *M. rugosus* is at BM (BM-000997856); the holotype *M. vandellioides* is at FI (FI-063202); the holotype of *Hornemannia bicolor* is at B (B-W-11582-010), the holotype of *Lobelia esquirolii* is at E (E-00284110), the holotype of Trevirania gratiolae is at M (M-0188280!), and the holotype of *Gratiola goodenifolia* is at C (C-10019014).

There are two collections at UPS collected by Thunberg and determined as *L. japonica* by him; UPS-14334 (which has written Lindernia japonica α) and corresponds to *M. miquelii* Makino, and UPS-14335 (which has written Lindernia japonica β) and corresponds to *M. pumilus*. Of the treatments of Mazus, only Ohwi (1965) treats the problem and mention *L. japonica* pro parte for *M. miquelii* and *L. japonica* pro parte for *M. pumilus*. However, none has purposely or not tried to lectotypified this name. The original description of *L. japonica* does not cite the α or β, but mentions “ramis… erectiusculis… pollicariibus usque spithamaeis” (Thunberg, 1784); which means, branches… erect... of one to seven inches, this length is only present in *M. miquelii*.

In this sense, here we propose UPS-14334 as the lectotype for *L. japonica*, due to their description fits better with *M. miquelii*.

When Bunge (1831) described *Tittmannia obovata*, mentioned “subsesilibus, glandulosus-pubescentibus”, *M. pumilus* does not present glandular indumentum (Pringle, 2018). Additionally, we can’t analyze the type of this name. Therefore, we could not verify this name as a synonym of *M. pumilus*.

Walpers (1844) mentions “V. (TITTMANNIA BnGe) OBOVATA Walp. Mss.”. Maximowicz (1875), Cao Shu (1998), IPNI (2021) and Tropicos (2021) cite this name as *Vandellia obovata* Walp. However, Walpers (1844) did a combination for the name *Tittmannia obovata* Bunge. For this reason, this name should be written as *Vandellia obovata* (Bunge) Walp., and not as *Vandellia obovata* Walp., following the article 41.1 (Turland, et al., 2021).

Although Hornemann (1807) wrote *Gratiola goodenifolia* and Blume (1826) wrote *Mazus laevifolia*, these names should be written as *Gratiola goodenifolia* and *Mazus laevifolius* following the article 60.10 and 23.5 respectively (Turnland et al., 2018).

Although Cheng-Yih (1984) listed to *M. bodinieri* Bonati pro parte as a synonym of *M. pumilus*, the analysis of the syntypes listed by Bonati (1908) and disponible at JSTORPLANTS (*P. bodinieri*, 1593, is not present in this plataform neither in the virtual collections of P), shows that...
this name is actually a synonym of *M. spicatus*, as reported by Cao Shu (1998). As no author has designated a lectotype for *M. bodinieri*, here we propose to *H. Wilson 931* (E-00284117), following the article 9.12 (Turland et al., 2018).

The holotype of *C. tomentosa* (LINN-HS1102-6) presents bigger plants, wider leaves and serrate margins, characters not seen in *M. pumilus*, for this reason we do not include it in the synonymy.

*Mazus pumilus* could be confused with *Cymbalaria muralis* G. Gaertn., B. Mey. & Schreb (Plantaginaceae) (Fig. 4b), and the genus *Nuttallanthus* D.A. Sutton (Plantaginaceae) (Fig. 4c), but it is clearly distinguished from these by the characters listed in the Table 1.

In Bogotá there are many plant nurseries, which usually import species from other countries. These plants come with soil, which usually carries seeds of other foreign species (Cárdenas et al., 2017). Due to the lack of control, many exotic species have gotten in Colombia (Cárdenas et al., 2017). In this way, *M. pumilus* probably arrived with imported species, and then become established in the urban zones, as reported in Costa Rica (Nishida et al., 2009; Morales, 2020) and the United States (Pringle, 2018).

*Mazus pumilus* has been reported as an annual species (Barker, 1991; Shahid et al., 2013; Pringle, 2018). However, we saw great patches covered by this species. Although its inflorescence is terminal, this species can produce many lateral shoots (Fig. 1c) and two or more inflorescences (Fig. 2a), which fits with the concept of perennial species (Albani & Coupland, 2010). In this sense, *M. pumilus* can be an annual or perennial species, and the expression of one of these habits is probably related with the environmental conditions, as reported in *Mimulus guttatus* DC. (Phrymaceae) (Baker & Diggle, 2011).

### ACKNOWLEDGMENTS

We are really thankful to Gustavo Romero (AMES) for the indispensable literature about *Mazus*, to Tom May, Nicholas Turland, David Hawksworth and Diego Giraldo-Cañas, for his help with some nomenclatural clarifications, to the curators of B, BM, C, FI, G, L, M, S, P, and UPS for his help in the search of the types and the scanning of it, and to the anonymous reviewers for their valuable comments, which notably improved the final manuscript.

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**Table 1.** Differences between *Mazus pumilus* and morphological similar species.

| Characters         | *Mazus pumilus* | *Cymbalaria muralis* | *Nuttallanthus* sp. |
|--------------------|-----------------|----------------------|---------------------|
| Habit              | Rosulate        | Reptant              | Erect               |
| Leave form         | Elliptic to obovate | Palmate             | Linear-oblong       |
| Margin type        | Irregularly sinuate | Entire              | Entire              |
| Inflorescence type | Terminal raceme | Axillar and solitary | Terminal raceme     |
| Spur               | Absent          | Present              | Present             |
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