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Mazaceae in the state of Rio Grande do Sul (Brazil): new records of *Mazus pumilus* (Burm.f) Steenis

Mazaceae no estado do Rio Grande do Sul (Brasil): novos registros de *Mazus pumilus* (Burm.f) Steenis

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ABSTRACT

Mazaceae in the state of Rio Grande do Sul (Brazil): new records of *Mazus pumilus* (Burm.f) Steenis. This work contributes to the knowledge about the naturalized species existing in Brazil, with a historical review of the records of *Mazus pumilus* in the national territory and with the report of the news records of the Mazaceae family for the Pampa biome and the state of Rio Grande do Sul, Southern Brazil, with the occurrence of *M. pumilus* in the municipalities of Santa Maria and Pelotas. The material was photographed *in situ*, collected, and registered in herbaria SMDB and ECT.

Keywords: New record; Exotic species; Naturalized species

RESUMO

Mazaceae no estado do Rio Grande do Sul (Brasil): novos registros de *Mazus pumilus* (Burm.f) Steenis. Este trabalho contribui com o conhecimento sobre as espécies naturalizadas que ocorrem no Brasil, com uma revisão histórica dos registros de *Mazus pumilus* em território nacional e com o relato do primeiro registro da família Mazaceae para o bioma Pampa e o estado do Rio Grande do Sul, sul do Brasil, com a ocorrência de *M. pumilus* nos municípios de Santa Maria e Pelotas. O material foi fotografado in situ, coletado e registrado nos herbários SMDB e ECT.

Palavras-chave: Novo registro; Espécie exótica; Espécie naturalizada

1 INTRODUCTION

In recent decades, the advance of technologies and research has improved the understanding of genetic relationships between living beings, providing opportunities for the phylogenetic reconstructions relying on a broader set of molecular and phylogenetic evidence. The study of these relations between families, genera and species is interpreted according to the theoretical and technological depth that the tools available at a given time allow to achieve. Thus, species classifications can change according to recognized families and genera, while others can be allocated to new families, which are not yet described.

Mazaceae is an example of these recently described families. Studies based on macroscopic features, included the species of this family, initially in Scrophulariaceae, moving later to Phrymaceae and, more recently, based on several molecular phylogenetic studies, about 40 species became part of the family Mazaceae (Albach, Meudt, Oxelman, 2021; Souza, Lorenzi, 2019), distributed in four genera, *Dodartia* L., *Lancea* Hook.f. & Thompson, *Mazus* Loureiro and *Puchiumazus* Bo Li, D.G. Zhang & C.L. Xiang (Xiang et al., 2021). The genus *Mazus* is currently the richest in the family, with about 30 species.

Mazaceae is characterized by herbaceous habit, rarely shrubby, with generally opposite leaves, simple leaf blades, with whole or serrated margin, and without stipules. The flowers may be arranged in racemous inflorescences, solitary or arranged in fascicles, showy flowers, diclamids, calyx (3-) 5-mero, gamosepalous, corolla (3-) 5-mera, gamopetalous, imbricated prefloration, zygomorphic, 2 or 4 stamens, anthers longitudinal slits; superior ovary, bicarpelar, bilocular or with one of the atrophied loci, axial placentation, pluriovulated or rarely uniovulated, the fruit are capsules, achenes or berries (Souza, Lorenzi, 2019).

This study points out the first record of the family in the state of Rio Grande do Sul, and for the Pampa biome concomitantly, represented by the species *Mazus pumilus*

(Burm.f.) Steenis. It also addresses aspects of the naturalization of this species in Rio Grande do Sul, in heavily anthropized urban environments, and in grassland areas near the edge of a forest in the municipality of Santa Maria, located in the ecotone between the Atlantic Forest and Pampa biomes and, in the municipality of Pelotas, in the Pampa biome in anthropized environment, represented by paved roads crossing a native grassland area.

Initially, to verify if the species had not been registered in other flora surveys, floristic and phytosociology studies were analyzed in the state of Rio Grande do Sul, both practical studies in field areas (Ferreira, Setubal, 2009) and in urbanized areas (Carneiro, Irgang, 2005; Schneider, Irgang, 2005). The study by Schneider (2007), focusing on naturalized species in the state of Rio Grande do Sul was also analyzed, and no record of *M. pumilus* was found in any study so far.

Mazus pumilus is native to South and East Asia and is already established in parts of America and Europe (Cao-Shu, 1998; Kew, 2022). It grows in humid environments, near to the shore of streams, trails and on the edge of forest formations, species in light and water (Shahid et al., 2013).

In Brazil, *M. pumilus* occurs as a naturalized species, already registered in urban centers, growing as ruderal vegetation in Cocal do Sul and Blumenau (SC), Curitiba and Matinhos (PR) (GBIF, 2022), and existing between cracks of sidewalks and walls in São Bento do Sul (SC) (Schwirkowski, 2022). In international literature, the species has been registered as ruderal in Costa Rica and the United States (Nishida et al., 2009; Pringle, 2018; Morales, 2020). However, in the national scientific literature, as well as in websites and softwares which assist in the identification of plants and their distribution, no confirmed records are reported for the State of Rio Grande do Sul (Hassemer, 2022) occurrence in southern Brazil, is restricted to Paraná and Santa Catarina states (Giehl, 2022).

The publication of this record is justified by the need of knowing more about the homogenization of the global flora and the so-called cosmopolitan species. Among

the species of the Mazaceae family, according to scientific records, identification and localization software, only *M. pumilus* seems to have adaptation plasticity in different locations (GBIF, 2021). The registration of exotic species is important, since it is the first step that allows analysis of the invasive potential of naturalized exotic species, favoring studies on the conservation of native species through the structuring of management plans (Fonseca-Cortés, Peña-Torres, 2021). However, it is important to point out that the species presented in this work, historically, does not present any characteristic behavior of invasive species, being registered in several states, without showing significant increase in their populations.

Thus, this work contributes to the knowledge about the naturalized species that occur in Brazil, with a historical review of the records of *Mazus pumilus* in national territory and with the report of the first record of the Mazaceae family in the state of Rio Grande do Sul, and the Pampa biome, with the occurrence of *M. pumilus* in the municipalities of Santa Maria and Pelotas.

2 MATERIAL AND METHODS

For the survey of the occurrences of the species *M. pumilus* in the national territory, bibliographic research was carried out in floristic survey studies, in the herbarium records available at online platforms as *speciesLink* and identification and localization platforms such as *PlantNet*, *BioDiversity4ALL* and *GBIF*. From the collection of records, a timeline was elaborated, considering information such as the date, place and environment of the collection. Also, the first collections for each Brazilian state were prioritized.

The new records related in this study are from two floristic inventories in distinct localities. One study was conducted in the municipality of Santa Maria, located in the Central Depression region of the state, between the parallels 29º43'57" and 29º55'30" S and the meridians 53º42'13" and 53º48'13" W. The climate of the region is of the humid temperate type and predominant soils classified as Acrisols, Planosols, Gleysols and

Entisols (Dalmolin, Pedron, 2009; Moreno, 1961). In the second study, developed in the municipality of Pelotas, the floristic survey was conducted at the Embrapa Clima Temperado Headquarters, located in the region of the Southeastern Slope (Borges, 2015), delimited by the latitude coordinates 31°40'53.16"S and longitude 52°26'23.60"W (Google Earth, 2022). The climate of the region is humid subtropical, and the soils are classified as Acrisols, Planosols and Gleysols (Embrapa, 2022).

The specimens of *Mazus pumilus* reported for Rio Grande do Sul, in the municipalities of Santa Maria and Pelotas, were photographed *in situ*, collected and after that, herborized. The specimens of Santa Maria were deposited in the Herbarium of the Department of Biology (SMDB) of the Federal University of Santa Maria, while the specimens of Pelotas were deposited in the Herbarium of Embrapa Clima Temperado (ECT). The illustrations were made in nanquim, with details visualized with the aid of a magnifying glass.

3 RESULTS

3.1 Summarized historical of occurrence of *Mazus pumilus* in Brazil

The first record of *Mazus pumilus* in national territory is from the year 1928, a collection held in the state of São Paulo and listed in the Herbarium Maria Eneyda P. Kaufmann Fidalgo (SP), where it is registered by the synonym *M. japonicus* (SP 23673).

In the state of Minas Gerais, the first record occurred in the municipality of Ouro Preto in 1951, and the collection points to a characteristic that remains in the species over the years, the occupation of crevices between stones in the streets (SP 79260).

Registered with the synonym *M. japonicus*, and still allocated in the family Scrophulariaceae, in 1952 a listing in the Friburguense Herbarium recorded the first collection of *M. pumilus* for the state of Rio de Janeiro (FCAB 2481). The collection carried out on the campus of the Pontifical Catholic University of Rio de Janeiro does not present the digital record in the form of image or detailed information about the

place of occurrence of the specimen.

The first record for the southern region of Brazil is from 1961 in Brusque, Santa Catarina. Published in Flora Ilustrada Catarinense and with material listed in the Herbarium Barbosa Rodrigues – HBR, the characteristics described point to spontaneous growth in gardens, lawns and surroundings with human housing (Ichaso, Barroso, 1970).

In 1978, a specimen was collected in the state of Minas Gerais and deposited in the Professor José Badini Herbarium (OUPR 24595). In the information contained in the notes of the register it is possible to observe the most striking characteristic of *M. pumilus* in the national territory, the occupation of heavily modified and urbanized environments, being pointed out by the collectors that the specimen vegetated on the sidewalk of a patio.

A new record for the southern region of Brazil occurred in 1984, in Antonina, state of Paraná (Flor 29133). The collection was carried out in the Sapitanduva Biological Reserve, in slightly humid soil next to a tank. The only record of *M. pumilus* for the Northeast region of Brazil is for the State of Bahia in 1989, when it was deposited in the Herbarium of the Cocoa Research Center (CEPEC), consisting, in the file, by a specimen first of the family Gesneriaceae, passing to Campanulaceae, misconceptions due to the lack of correct identification of the species or genus (RB00686953). Despite the misconceptions, the information added in the record points that the specimen has flowers with bluish petals and that grew around the CEPEC vegetation houses, same behavior of the specimens identified in the Silviculture Laboratory of the Federal University of Santa Maria, in 2022.

Returning to the state of Minas Gerais, in 1992 a specimen of the family Scrophulariaceae is registered in the Herbarium of Viçosa as *Hydranthelium*, with herbaceous habit, prostrate and purple flowers. Yet, in 1994, it had its identification revised and corrected for *M. japonicus* (VIC 011795).

In 1994, a specimen was collected in an urban area in the municipality of Pariquera-Açu, in the state of São Paulo (SP 285509). According to the location provided by the collectors, the plant was growing in an urbanized environment. Initially, the specimen

was not identified, with the indication of the family Lamiaceae, which only in 2016 was reviewed, recognized as *M. pumilus* and associated with the family Scrophulariaceae, of which it was previously part.

In 2013, already registered as *M. pumilus* of the Mazaceae family, specimens were collected in the Votorantim Private Reserve in the state of São Paulo. The observations in the file show that the species was established next to the staff accommodation, occupying spaces at the doors of the accommodation (ESA 1223465). Fifty-four years after the first registration in Southern Brazil (Ichaso, Barroso, 1970), a collection was performed in São Bento do Sul, Santa Catarina, in 2015 (FURB 48426). Hassemer (FURB 48426) highlights that the collection was performed at the edge of a forest fragment, behavior similar to that observed in the specimens of this study, when in 2022, it was found growing in Morro do Elefante (Figure 3) at the edge of fragments of Atlantic Forest that are part of the Ecological Corridor of the Fourth Colony.

Still in 2015, four more collections were performed, two in the state of São Paulo (SPSF 50632, SPSF 50650), and two again in the Southern Region of Brazil, in the state of Paraná (HCF 17178, UNOP 10659). The specimens collected in São Paulo, grew in an area of vegetation characteristic of Dense Ombrophilous Forest, being in the collection (SPSF 50632) described that the specimens occupied areas of rocky outcrop. This perspective is similar to that observed in photographic records (Machine Observation) (FPS 789) presented as a duplicate of an exsiccate, already presented in the previous paragraph (FURB 48426).

Following in the southern region of Brazil, in 2016, a specimen was collected again in São Bento do Sul, Santa Catarina (FURB 49692). In the sickle sheet it is described that the collected plant grew at the edge of the Dense Ombrophilous Forest area, next to the train tracks and, despite the opening in the canopy, the area was considered shaded by the collector. As a duplicate of the specimen mentioned, the record (SPF 2147) of the Paulo Schwirkowski Photo Library appears, where it is possible to observe in the photographic records that the specimen grew in a rocky

and quite humid environment, sharing space with mosses.

Until then, herbarium records allowed the identification of *M. pumilus* growing in rocky or urbanized environments, in crevices of sidewalks little occupied by other species. Still in 2018, a specimen is collected in the Iguaçu National Park, growing between grasses of a housing (HCF 26336), behavior observed in the population identified in Morro do Elefante in Santa Maria, in 2022 (Figure 3) showing that, especially in the context of the Pampa Biome, this species may occupy areas characteristically dominated by grasses (Poaceae).

Similarly, in 2019, the authors who performed the collection for the state of Rio de Janeiro in the Poço das Antas Biological Reserve, described that the environment occupied by the specimen had clay and wet substrate, as well as was occupied by other species of the same size (RB 787916).

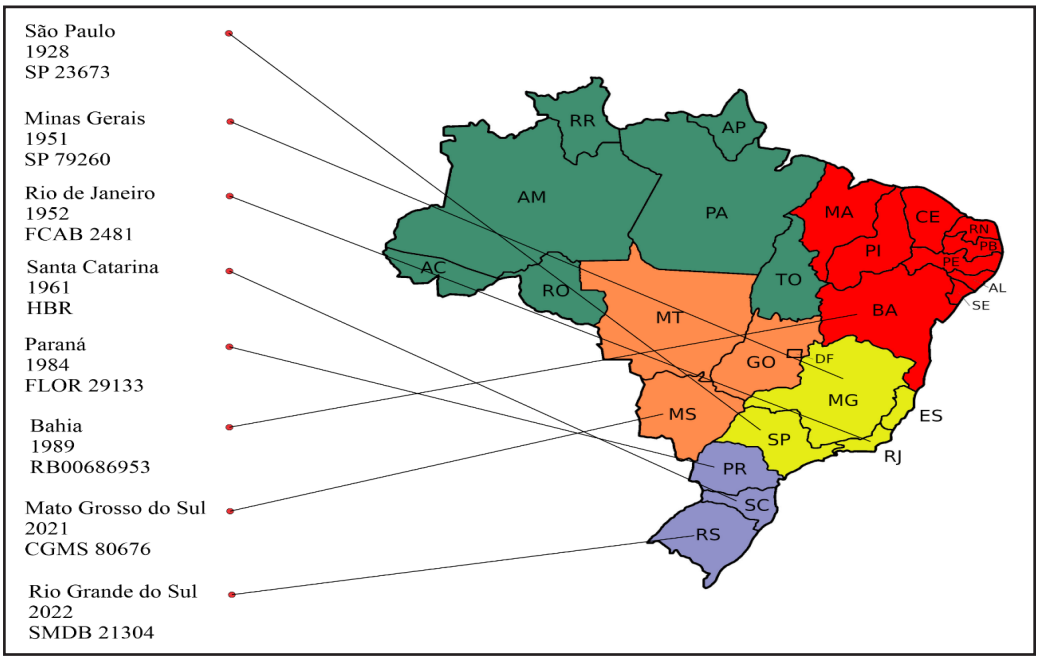
In 2020, a new collection of Schwirkowski (FURB 66868), in São Bento do Sul, Santa Catarina, draws attention to the recurrence of records over time. In this context, the first collection occurred in 2015 (FURB 48426), and new specimens were collected in the years 2016 (FURB 49692), 2018 (FURB 61029) and 2020 (FURB 66868), that is, five years of success in the establishment of *M. pumilus* in forest environment, however, always associated with modified environments such as train tracks (FURB 48426, FURB 49692, FURB 66868) or roads (FURB 61029). The sequence of records led the author to confirm, on the site Flora de São Bento do Sul – SC, *M. pumilus* as a naturalized species in the city.

Following in the Southern Region of Brazil and contributing to the formalization of the naturalization of the species, two collections were carried out in 2021 in the state of Paraná, one in São Luiz do Purunã (EFC 19507) and another in Morro do Boi in Matinhos (EFC 20074). The information contained in the notes of the exsiccate (EFC 19507) describes that the specimen grew on a “stone” inside the bed of the Lageado River. In addition, the collector points that the species has invasive behavior. However, this habit, and not even the significant increase of *M. pumilus* populations were observed or recorded in the national territory. In the specimen EFC 20074, for the first

time the concept of ruderal flora was attributed, and, as in (SPSF 50632, SPSF 50650 and FURB 49692), the specimen grew at the edge of a Dense Ombrophilous Forest.

Still in 2021, a new collection was carried out in Campo Grande, Mato Grosso do Sul, at an urbanized area of a shopping mall parking lot (CGMS 80676). Closing the history of the selected records of *M. pumilus* in national territory, in 2022 the first records are obtained for the state of Rio Grande do Sul, three in the municipality of Santa Maria (SMDB 21304, SMDB 21322, SMBD 21323) and another representing the first one to the Pampa biome in the municipality of Pelotas (NUNES, 2022). The records, in both municipalities, are best addressed in the course of this work. The records made in Santa Maria are part of the survey of the ruderal flora of the municipality of Santa Maria, in the state of Rio Grande do Sul. While, the record held in Pelotas, is part of a floristic survey of Lamiales at the headquarters of Embrapa Clima Temperado in Pelotas. Nunes (2022) reports the occurrence of *M. pumilus* in a paved road, crossing a native grassland area, but vegetating only in the concrete crevices. Figure 1 presents the first records for each Brazilian state.

Figure 1 – Timeline with the first records of *Mazus pumilus* in each Brazilian state



Source: Authors' private collection (2023)

3.2 Occurrence and characteristics of *Mazus pumilus* in Rio Grande do Sul state, Southern Brazil

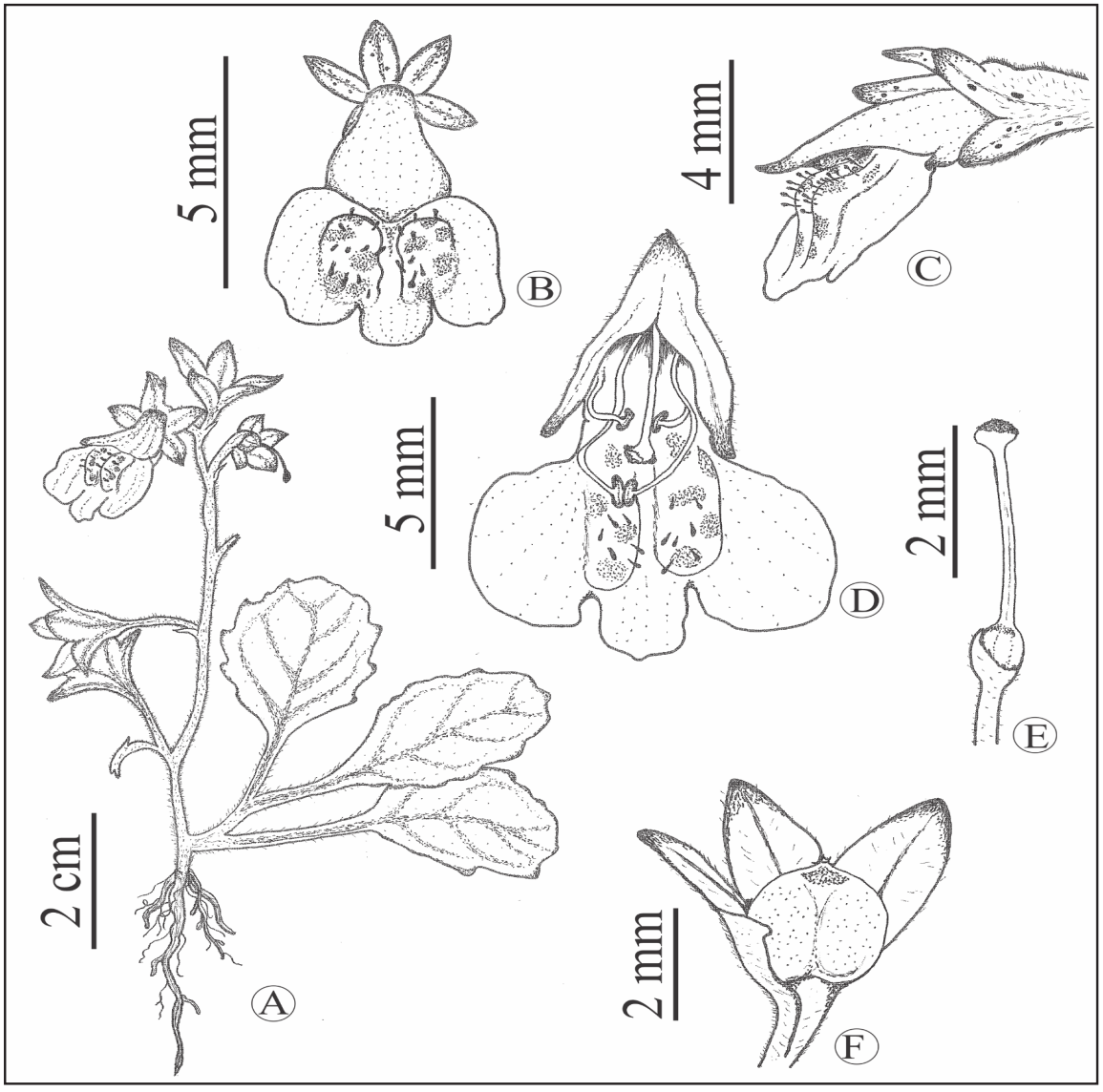
Description of Mazus pumilus (Burm.f.) Steenis (Figures 2 and 3)

Annual herb, prostrate, with a main root and numerous secondary roots, leaves 1,5 – 3,3 cm long and 0,6 – 1,0 cm wide, basal leaves usually rosette, with many or few leaves, glabrous or with few trichomes on the margin of the petiole; oblanceolate oval-oblancelated blade, 2-6 cm long, membranous to papillary texture, cuneate and decurrent base, irregularly toothed margin or pinatifid, rarely sub-whole, rounded apex, penate with 2-4 pairs of secondary veins. Leaves on the opposite stem, sometimes alternate. Racemose inflorescence terminal, elongated, glabrous or pubescent/hispid, usually with 3-10 flowers sparsely distributed. Pedicel 3-12 mm long, presence of bracts. Calyx of 0.4 – 0.7 cm, tube of 0.6-0.7 cm, glabrous or puberulent, green, with five lanceolate sepals. Campanulate corolla, gamopetalous, oval lobes, almost as long as the corolla tube, petals in purple, blue or white tones, with ca. 1 cm long, inside light lilac with yellow macules located in two longitudinal ridges. Upper petals fused into an emarginated lip, lower petals fused into a trilobed lip, lower central lobe smaller than the lateral lobes. Lower lobe with two longitudinal ridges, four didynamous stamens 0.4-0.6 cm long, medial fixed anthers ca. 0.1 cm long, superior ovary, glabrous and bilocular, style 0.4 cm long, flabelliform stigma. Fruit type a loculicidal capsule, with seeds numerous.

The figures 3 and 4 show the locations of occurrence of *M. pumilus* populations identified and examined in this study. For the elaboration of the morphological description, the structures were measured with a scale meter, comparing the sizes of different specimens found in the municipality. The identification of the species was performed by comparison with exsiccates existing in different virtual herbaria, such as: Herbarium of the Federal Technological University of Paraná – Campus Campo Mourão, collected in Paraná in the years 2015 and 2018; Botanical Garden of Rio de

Janeiro RB 787916, collected in 2019; Herbarium Dr. Roberto Miguel Klein, Blumenau, Santa Catarina, collected in São Bento do Sul in 2016 and 2018; and Herbarium ESA, being the collection carried out in Private Reserve in 2013 (Reflora, 2022).

Figure 2 – *Mazus pumilus* (Mazaceae). A. Habit. B. Flower, front view. C. Flower, side view. D. Flower with part of the calyx and upper petals removed for visualization of the organization of the reproductive organs. E. Gynoecium, superior ovary and flabelliform stigma. F. Fruit, part of the calyx removed for visualization of the capsular globous fruit



Source: Authors' private collection (2022)

Figure 3 – Records of *Mazus pumilus* (Mazaceae). A. Location of the municipality of Santa Maria, state of Rio Grande do Sul. B. Specimen registration site. C. Georeferenced point of population record in Morro do Elefante, Camobi. D. Records on the campus of the Federal University of Santa Maria. E. Location of populations growing in urbanized areas in the municipality. Records 1 and 2 in Venâncio Aires street; records 3, 4 and 5 in Barão do Triunfo street; 6 Visconde de Pelotas street and 7 Andradas street

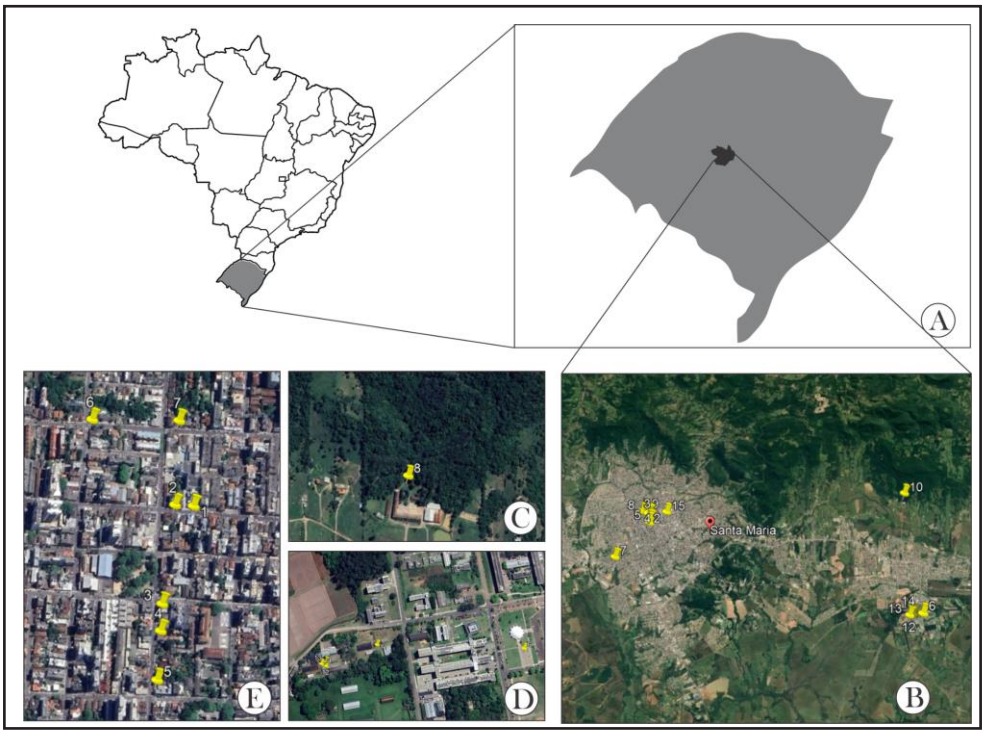
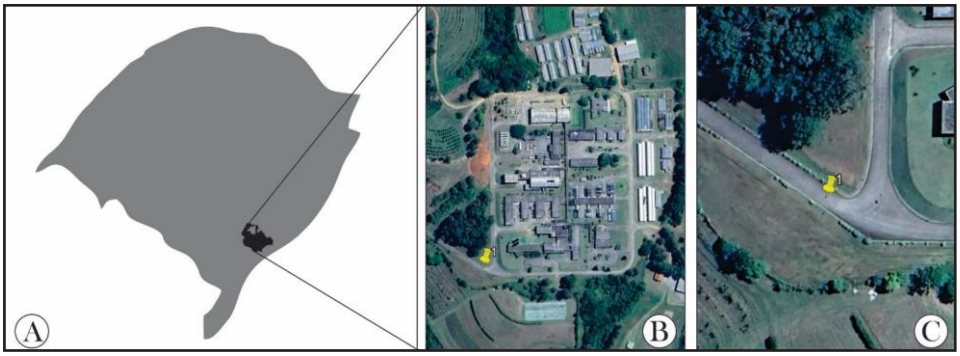


Figure 4 – Record of Mazus pumilus (Mazaceae). A. Location of the municipality of Pelotas, state of Rio Grande do Sul. B. Specimen registration site. C. Georeferenced point of population recorded vegetating in the concrete crevices of the main paved road of Embrapa Clima Temperado Headquarters, Monte Bonito



The fact that the occurrence of the species M. pumilus has not been previously reported for Rio Grande do Sul and the Pampa biome may be linked to the similarity with the species *Cymbalaria muralis* G. Gaertn., B. Mey. & Schreb (Plantaginaceae), a superficially similar species that has confirmed occurrence for the state and for the biome. Fonseca-Cortés e Peña-Torres (2021) report that these similarities can cause confusion in identification, besides having in common the habit of growing between the cracks of sidewalks and walls, they also have flowers with similar colors, patterns of stains and similar corolla shape, but can be distinguished from each other by the leaves, which in *C. muralis* are entire with palmate margins and in *M. pumilus* are elliptical to irregularly sinuous with entire margins (Figure 5).

Figure 5 – Comparison between the species *Mazus pumilus* (Mazaceae) and *Cymbalaria muralis* (Plantaginaceae). A. General view of *M. pumilus.* B. Flower of *M. pumilus.* C. General view of *C. muralis.* D. Flower of *C. muralis*

Source: Authors' private collection (2022)

The introduction of exotic plants in each region is the initial step towards a possible naturalization. According to Schneider (2007), the introduction may be intentional, when there is some specific purpose, or accidental, when it occurs randomly, opportunistically and unexpectedly.

In the context of *M. pumilus*, there are no records of cultivation for a specific purpose in Brazil, and the accidental introduction is the only explanation for expanding the area of occurrence of the species in the national territory. According to Groves (1986), the dynamics of geographic expansion of an exotic species follows three phases:

1. Introduction: when a species arrives in a geographical area where it does not occur and establishes an adult plant or population;

2. Colonization: the population or initial plant reproduces and grows in number forming a colony;

3. Naturalization: when the species perpetuates itself in the environment, dispersing and establishing itself in the autochthonous (local) flora.

In the scenario of the city of Santa Maria, the naturalization of the species can be perceived by the identification of specimens vegetating in well distributed points. Since *M. pumilus* is an annual herb, its introduction and colonization, although perceived only in 2022, occurred long enough for a single plant or colony to reach adulthood and disperse individuals to other parts of the municipality.

The specimens identified in the municipality of Santa Maria obey the ecological characteristics already mentioned throughout the historical records of the species in the national territory. The population identified occurs in the urbanized area, vegetating in crevices and broken spaces in sidewalks, walls and public places (image E of Figure 7) resembling the descriptions of the collections OUPR 24595, SP 285509, UNOP 10659 and CGMS 80676.

The identified population vegetating in the forest edge area, presented in image A of Figure 6, resembles the habit described in the collections FURB 48426, FURB 49692 and EFC 20074. In the context of the Pampa biome and the population

found vegetating in Morro do Elefante, the occupation is similar to that described in the collections HCF 26336 and RB 787916, among grasses with species of the same size, as can be observed in image A in Figure 6.

Figure 6 – *Mazus pumilus* (Mazaceae). A. Vegetating in a forest edge area along grasses and other species of the same size. B. Area of the Silviculture Laboratory of UFSM where there is a population of *M. pumilus*. C. Specimen vegetating under the grid of the greenhouse. D. Specimen vegetating in a tube. E. Specimen outside the greenhouse, growing with other species of the same size. F. Individual vegetating inside the greenhouse

Source: Authors' private collection (2022)

This behavior, vegetating with grasses and other species of the same size, was also observed in the identified population growing in the Silviculture Laboratory of the Federal University of Santa Maria. Image B of figure 6, shows a variety of species growing under the grid and trays with tubes for plant experimentation, image C enlarges the substrate just below the grid, allowing the visualization of *M. pumilus* vegetating with the species *Pilea microphylla* Liebm.

From the same point of view, image D of Figure 6 shows a specimen blooming and fruiting on the substrate of a tube with a flowering seedling (*Sebastiania commersoniana* (Baill.) L.B. Sm. & Downs). On the same population, images E and F show specimens vegetating around the greenhouse, in E *M. pumilus* grows close to plants of the families Poaceae, Convolvulaceae and Oxalidaceae.

However, the presence of specimens in the forest nursery of the Federal University of Santa Maria draws attention, since individuals were found growing inside tubes, competing for nutrients and water with the target species of the experiment.

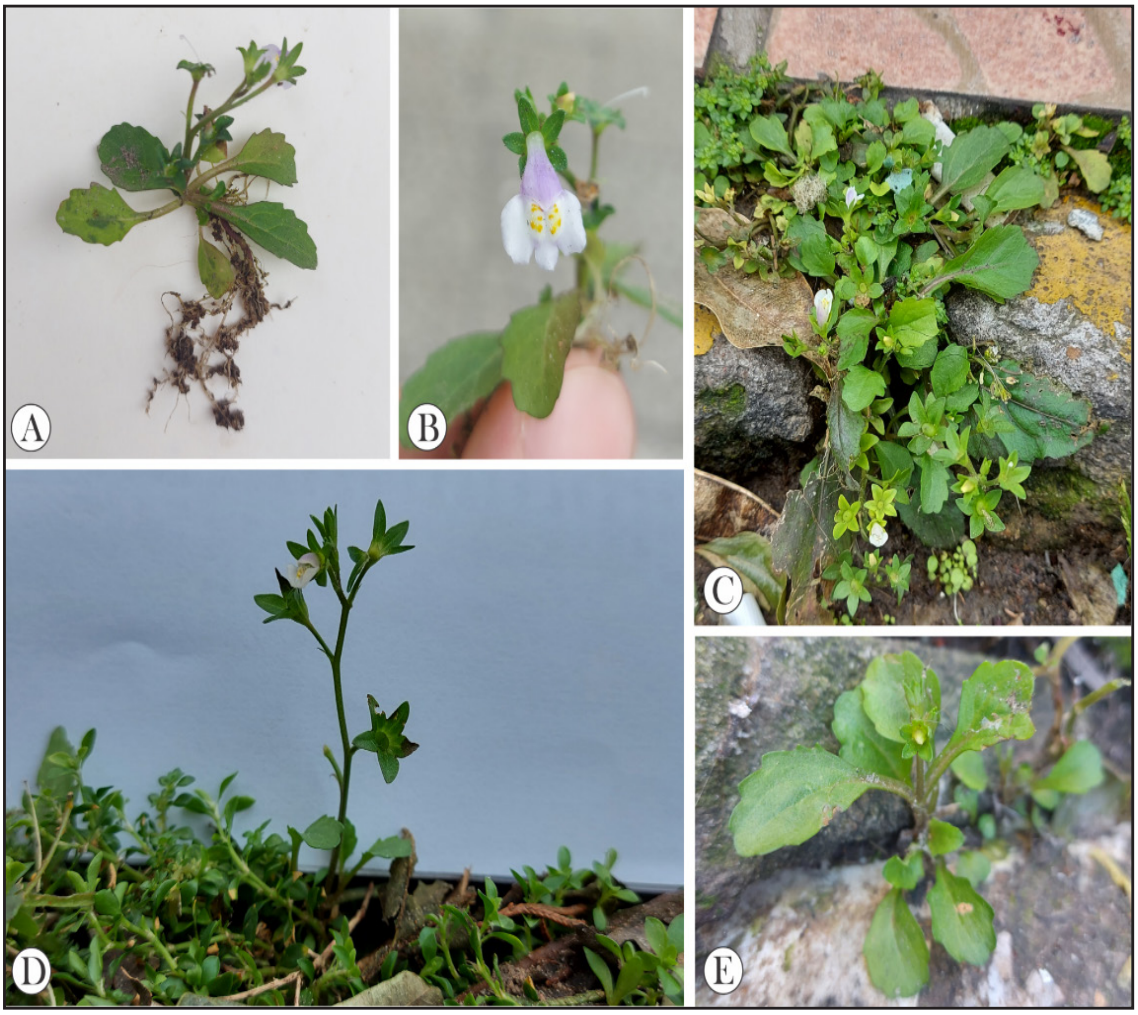
In contrast to the urban environment, where water is the element that most limits the development of *M. pumilus*, the nursery microclimate is especially favorable to the development and increase in the number of individuals of the species due to constant watering and the incidence of sunlight.

The context previously presented was described in detail by the similarity with habits already recorded in other exsiccates. In the collection RB 00686953, 1989 in the state of Bahia, the collector recorded that the specimen grew in a population around the greenhouse houses of the Cocoa Research Center – CEPEC.

According to Hassemer (2022), the phytogeographic domain of *M. pumilus*, in Brazil, is the Atlantic Forest biome, however, considering that the studied area is inserted in the ecotone between the Atlantic Forest and Pampa biomes, and there is a need for the species to grow in open and poorly shaded environments. However, whether in the record made in Morro do Elefante, Camobi, as in the Silviculture Laboratory of the Federal University of Santa Maria, the specimens of *M. pumilus*

are vegetating in the substrate with grasses and other species characteristic of the Pampa biome. In this context, Nunes (2022) recorded in a floristic survey *M. pumilus* growing in the domain of the Pampa biome, however, only specimens growing in cracks of concrete were found.

Figure 7 – Mazus pumilus (Mazaceae). A. Habit. B. Flower and part of the calyx, front view. C. Environment of occurrence, humid and stony, in crevices on the sidewalk. D. Inflorescence racemose. E. Individual growing between stones with developing fruit



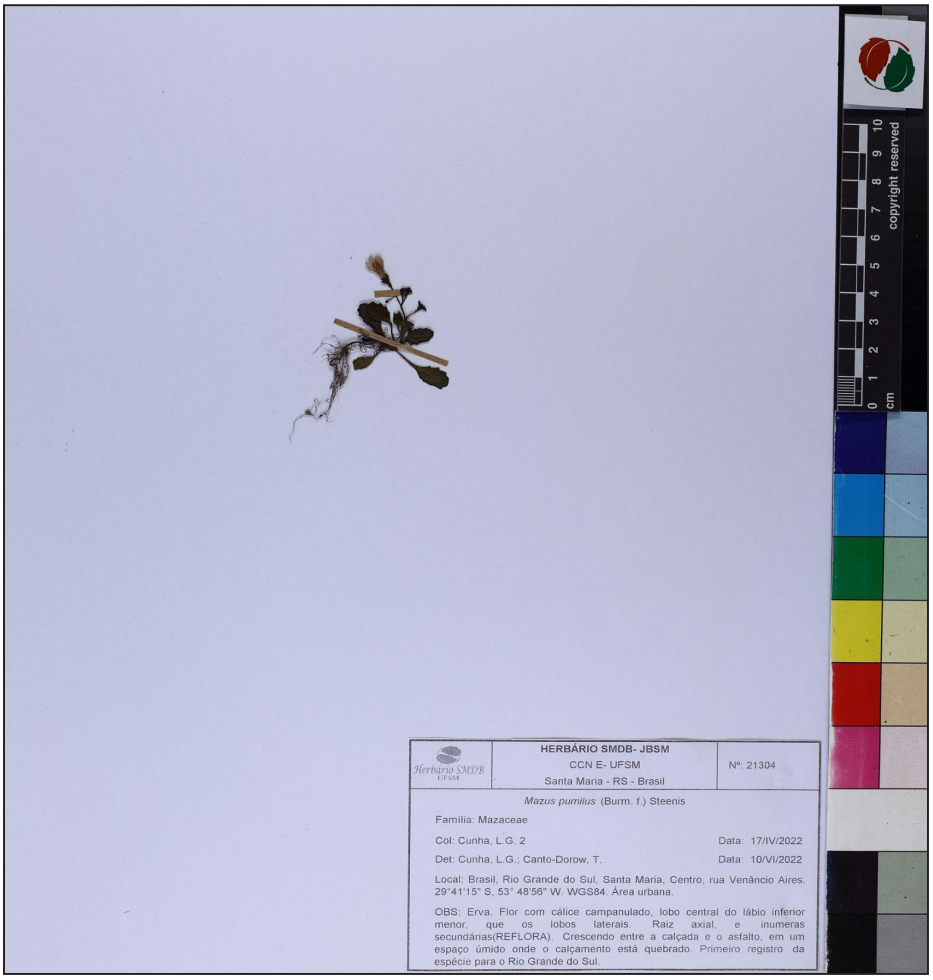
Source: Authors' private collection (2022)

Material examined: BRAZIL: RIO GRANDE DO SUL: BRAZIL: RIO GRANDE DO SUL: Pelotas, BR-392, 9th District of Monte Bonito, Embrapa Clima Temperado (Main Road) coordinates Lat. 31°40'51.6" S, Long. 52°26'27.6" O, 56m altitude; Luz,

L..; 25/08/2022 (ECT 9804).

Santa Maria, downtown, urban area, Venâncio Aires street, coordinates Lat. 29º41'14.75" S, Long. 53º48'56.22" O.139m height; Cunha, L. G., s.n.; 17/04/2022 (SMDB 21304) (Figure 8); center, urban area, Barão do Triunfo street, coordinates Lat. 29º41'21.19" S, Long. 53º48"56.00" O.139m height; Cunha, L. G., s.n.; 14/08/2022 (SMDB 21322); Camobi, Universidade Federal de Santa Maria (next to the planetarium), coordinates Lat. 29º43'14" S, Long. 53º43"18" O.139m height; Cunha, L. G., s.n.; 15/08/2022 (SMDB 21323).

Figure 8 – *Mazus pumilus* (Mazaceae), specimen listed as first record (Cunha, L. G. 2022)



Source: Authors' private collection (2022)

4 CONCLUSIONS

The new records confirm the presence and naturalization of *M. pumilus* in the Atlantic Rainforest and Pampa biomes from the state of Rio Grande do Sul, Brazil. In the ruderal environment, strongly anthropized, the species shares space with other exotic and native plants, not significantly increasing its population, since it occupies small humid spaces, usually near manholes, ditches and places of abundant runoff of water.

As a possibility of future work, it can be carried out the monitoring of the advancement of the species in areas with specific characteristics of the Pampa biome, as well as the analysis of its growth in areas such as vegetation houses and nurseries. Such perspectives are important due to the need of truly knowing the ecology of the species in the context of the phytogeographic domain of the Pampa biome, as the records of both, in Rio Grande do Sul, and in the ecotone Atlantic Forest Biome – Pampa (SMDB 21304, SMDB 21322, SMDB 21323), and specifically in the Pampa Biome (NUNES, 2022), are recent and, as we have seen in the analysis of the occurrence history and new records, the species has a certain plasticity regarding its habitat.

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