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Research Article

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Abstract

We present an overview of the diversity, distribution, and conservation status of all 60 species of the genus *Peperomia* (“radiator plants,” Piperaceae), which are currently known from the state of Veracruz in Mexico, including a taxonomically updated reference list that includes information about life form, overall distribution, endemism, and occurrence in Mexican states and municipalities of Veracruz. Specifically, for this latter state, we provide information on elevational range, habitat, and distinguishing characters useful for identification or uses. Moreover, we realize an assessment of conservation status considering International Union for Conservation of Nature Red List categories and criteria at regional level. About 45% of *Peperomia* species from Veracruz belong to a threatened category, mainly because of the continued loss and fragmentation of natural habitats.

Keywords

anthropogenic disturbance, endangered species, endemism, floristic list, humid montane forest, International Union for Conservation of Nature Red List

Introduction

Peperomia Ruiz et Pav. is the second largest genus in the family Piperaceae, following *Piper*. It includes approximately 1,600 taxa (Mathieu, 2001–2017; Samain et al., 2009) and is one of the 10 most species-rich genera of angiosperms (Frodin, 2004). The species of *Peperomia* (e.g., ‘‘radiator plant’’, ‘‘rat tail’’) are distributed in the tropical and subtropical regions worldwide, although the largest diversity of the genus is encountered in the Americas, where it occurs in a wide range of habitats from southern USA to Argentina and Chile. Many species are endemic to the Andes and Amazon regions (de Figueiredo & Sazima, 2007; Frenzke et al., 2015; Mathieu, 2001–2017).

In Mexico, the knowledge on the genus *Peperomia* is still very poor, due to the difficulty to differentiate its species and the existence of many synonyms and illegitimate names (‘‘herbarium names’’; Mathieu, 2007). However, it is one of the most species-rich genera of the country (Villaseñor, 2016). Currently, there exist only a few species lists or inventories at regional or state level, that mention species of *Peperomia* (Castillo-Campos, Robles, & Medina, 2003; Ceja-Romero et al., 2010; Hietz & Hietz-Seifert, 1994; Krömer, Acebey, Kluge, & Kessler, 2013a; Sosa & Gómez-Pompa, 1994). However, concerning the taxonomy of the genus, these are often outdated and include synonyms or incorrectly identified species (Vergara-Rodríguez, 2013; Appendix A).

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Together with the Mexican states of Chiapas and Oaxaca, Veracruz shows the highest diversity of *Peperomia* species throughout the country (Mathieu, 2001–2017). Almost half of the 131 Mexican species can be found here; a selection of nine different taxa is shown in Figure 1. A preliminary checklist reveals the presence of 60 species in Veracruz (Vergara-Rodríguez, 2013), including three new ones that were recently published (Mathieu, Vergara-Rodríguez, Krömer, & Karger, 2015). The neighboring states show the following numbers: Chiapas: 78, Oaxaca: 68, Puebla: 35, Hidalgo: 29, San Luis Potosí: 25, Tabasco: 20, and Tamaulipas: 19 (G. Mathieu, unpublished data).

Although Veracruz has one of the highest diversities of vascular plants of any Mexican state (Castillo-Campos, Avendaño-Reyes, & Medina-Abreo, 2011; Villaseñor, 2016), it is also the one with the highest loss of natural vegetation in the country (SEMARNAT-PNUD, 2005). Deforestation and changes in land use to implement agricultural land and livestock (Ellis, Martínez-Bello, & Monroy-Ibarra, 2011) impact natural habitats and reduce species richness and populations of vascular plants in general (Dirzo & Raven, 2003; Pimm & Raven, 2000).

Species of the genus *Peperomia* are particularly vulnerable to forest destruction due to the dependence of numerous epiphytic members (ca. 43%; Zotz, 2013) to mature host trees (Barthlott, Schmit-Neuerburg, Nieder, & Engwald, 2001; Köster, Friedrich, Nieder, & Barthlott, 2009; Werner, Hohmeier, & Gradstein, 2005). Furthermore, various species of the genus (e.g., *P. hobbitoides*, *P. maculosa*, *P. peltilimba*) are extracted from the wild and sold in local markets of Veracruz and other states for ornamental, medicinal, or consumption purposes (Cházaro-Basañez, Pascual, Vázquez-Ramírez, & Navare-Flores, 2012; Vergara-Rodríguez & Krömer, 2011; Wendt, 2003). However, this human impact on *Peperomia* diversity has been poorly investigated (Gómez-Pompa, Krömer, & Castro-Cortés, 2010), and consequently there are no Mexican species of the genus mentioned in the Mexican legislation (NOM-059-SEMARNAT-2010) for protection of flora and fauna, or in the Red List of Threatened Species published by the International Union for Conservation of Nature and Natural Resources (IUCN, 2016). The only *Peperomia* species from Mexico considered in the latter treatment is *P. pseudopereskiifolia*, which was assessed as Least Concern due to its widespread distribution, large extent of occurrence, and no specifically known threats (Roberts, 2015).

For these reasons, there is a strong need to improve the knowledge about the diversity, distribution, and conservation of the *Peperomia* species in Veracruz, since due to the destruction of natural habitats, many species might be found threatened or endangered (Gómez-Pompa et al., 2010; Mathieu et al., 2015). In this study, we present the first taxonomically updated and annotated species list of *Peperomia* for Veracruz. Furthermore, we provide an evaluation of the conservation status for each species, based on distribution data compiled from available herbarium material, the "Taxonomic Repertory of the Genus *Peperomia*" database (Mathieu, 2001–2017), and recent collections by the authors.

Methods

Study Area

The state of Veracruz has a total area of ca. 72,000 km^2, divided into 212 municipalities, which are grouped into nine administrative regions (from north to south): Huasteca, Totonaca, Nautla, Capital, Altas Montañas, Sotavento, Papaloapan, Los Tuxtlas, and Olmeca (Instituto Nacional de Estadística y Geografía [INEGI], 2012; Vergara-Rodríguez, 2013). It is located in eastern Mexico along the coast of the Gulf of Mexico in a transition zone between two biogeographic regions: the Nearctic and the Neotropics (Morrone, 2005). Its geography encompasses two extensive coastal plains broken up by three important mountain ranges: (a) the Sierra Madre Oriental, (b) the Trans-Mexican Volcanic Belt with two of the highest peaks in Mexico, Pico de Orizaba (5,610 m) and Cofre de Perote (4,280 m; in the zone where the Trans-Mexican Volcanic Belt meets the Sierra Madre Occidental), and (c) the Sierra de Los Tuxtlas in the southern part of the state, with elevations up to 1,700 m (Figure 2).

The heterogeneous geomorphology of Veracruz creates a wide variety of climate types, from warm tropical-dry to cold temperate-humid (Soto-Esparza & Giddings, 2011). This variety of climates and the montane terrain delimits the presence of 19 vegetation types, including humid montane, pine-oak, and tropical humid forests, which are considered the most diverse ecosystems in Mexico (Castillo-Campos et al., 2011). The combination of the abovementioned factors places Veracruz among the three most biodiverse states in the country, with a vascular flora of between 7,800 and 8,500 species (Castillo-Campos et al., 2011; Villaseñor, 2016). Despite being considered as a priority site for national and global conservation of biodiversity due to these outstanding ecological characteristics (Olguín, 2011), less than 8.6% of its original natural vegetation remains in isolated fragments. The rest of the state is covered by agricultural and pasture land, as well as secondary vegetation (Ellis et al., 2011). Furthermore, there are still many parts of the state which lack a reliable inventory, especially in remote montane areas (Gómez-Pompa et al., 2010).

Database

The present study is based on the revision of 1,759 collections (total of 2,871 specimens including duplicates in

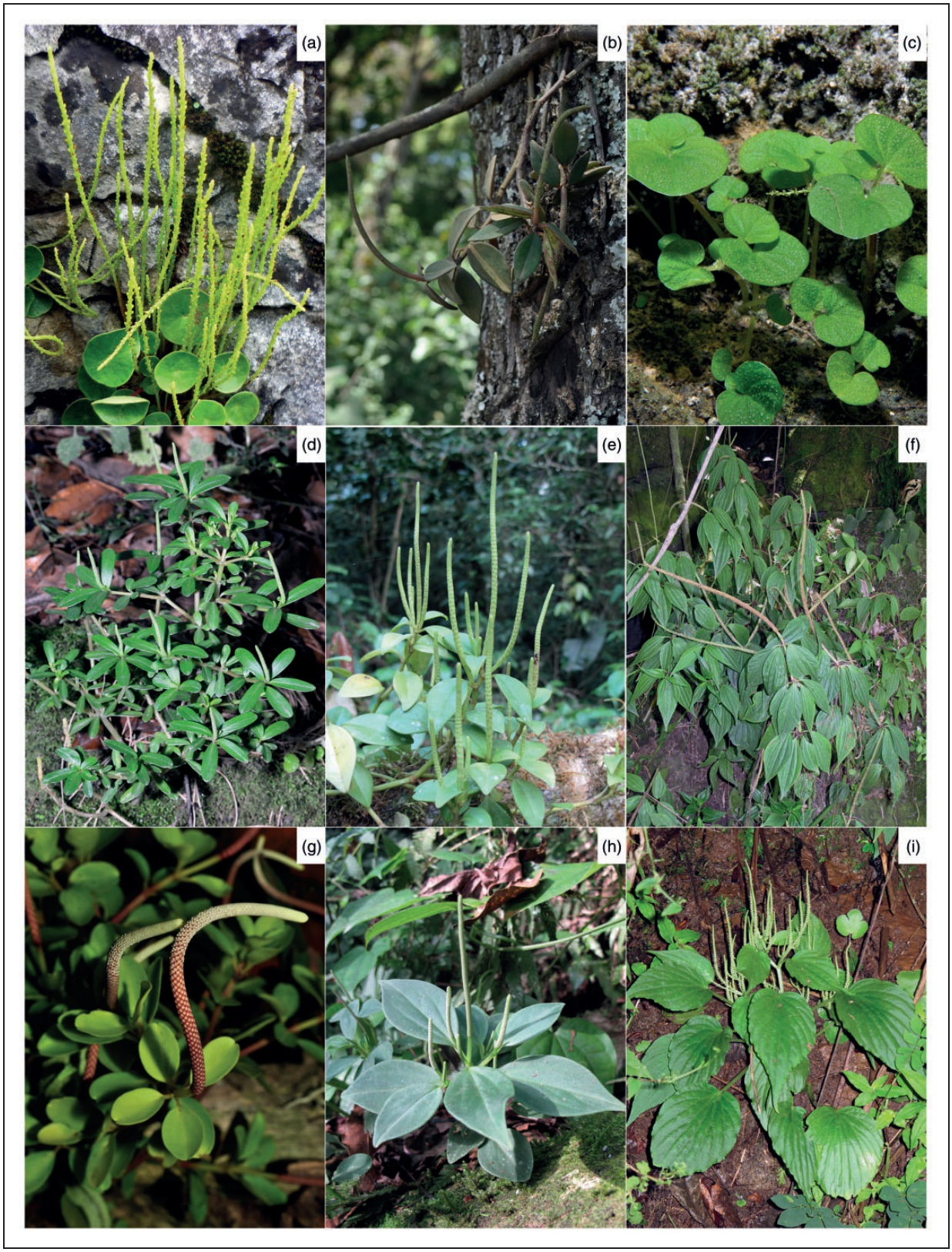

Figure 1. Some *Peperomia* species of Veracruz: (a) *P. bracteata*, (b) *P. consoquitlana*, (c) *P. hispiduliformis*, (d) *P. leptophylla*, (e) *P. glabella*, (f) *P. rhexiifolia*, (g) *P. quadrifolia*, (h) *P. sanjoseana*, and (i) *P. vazquezii* (Photographs a to d, g by D. Vergara-Rodríguez; e, f, h, and i by T. Krömer).

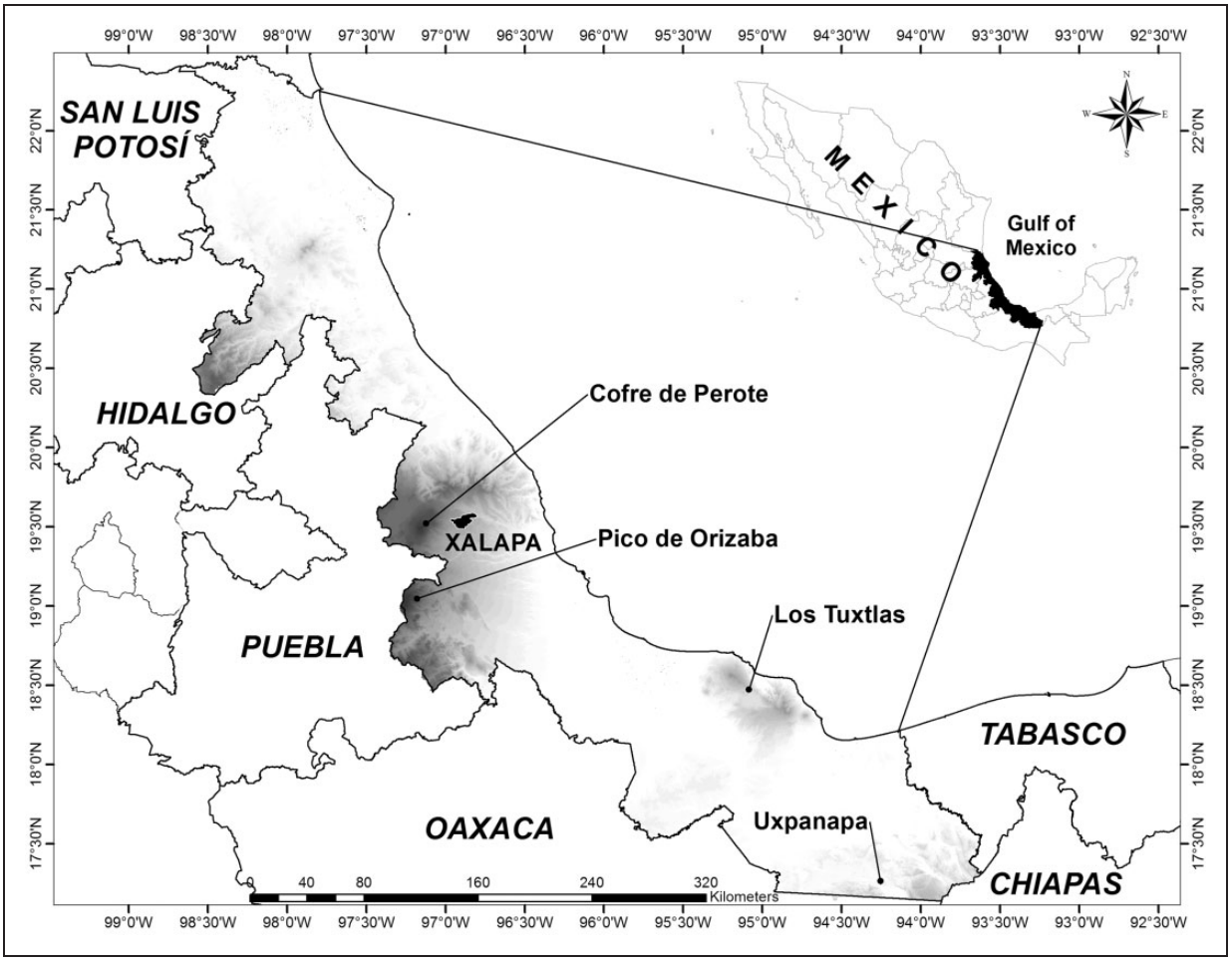

Figure 2. Map of Veracruz and bordering states, Mexico, indicating the regions of Los Tuxtlas and Uxpanapa, as well as the central montane area around the capital city of Xalapa.

several herbaria) and high-resolution digital photographs of *Peperomia* species collected in the state of Veracruz, Mexico, which were deposited in a total of 44 herbaria (Appendix B). The following data were obtained from the specimen labels and compiled in a database using FileMaker Pro 11.0v4 Advanced: species (taxonomic determination was evaluated for each revised specimen), information on the collector, collection number, specialist(s) who identified the specimen, municipality, locality, elevation, date, habitat, life form, latitude, longitude, size, and abundance. Additionally, we considered data from a total of 199 collections made between 2005 and 2016 in Veracruz by the authors and collaborators, which were deposited in the following herbaria: BR, EBT, GENT, MEXU, XAL, and XALU. The collection sites (e.g., the regions of Los Tuxtlas, Zongolica and Uxpanapa) were selected considering yet unexplored areas in relation to the genus *Peperomia*, which additionally are particularly species-rich, such as humid montane or tropical humid forests (Gómez-Pompa et al., 2010). Furthermore, the diversity of the genus *Peperomia* in Veracruz was identified based on the placement of all species in the recently published infrageneric classification of the genus (Frenzke et al., 2015).

The analysis of the number of collections and species of *Peperomia* per administrative region and municipality was conducted with all 1,759 collections (100% of the total). A total of 1,227 collections (70%) had the relevant information about the vegetation type, and 1,200 collections (68%) were analyzed regarding their information on elevational distribution.

Geographic distribution at global, state, and municipality levels in Veracruz, as well as the life form, vegetation type, and the elevational range where species occur in Veracruz, are listed for each species in Appendix C. At least one representative voucher specimen per administrative region in Veracruz is cited for each species. Furthermore, the total number of collections per species is presented, indicating recent collections made between 2005 and 2016. This was done in order to identify the

Table 1. Thresholds for Geographical Range (Criterion B) According to IUCN (2014).

	Threatened (km^2)			
	Critically Endangered	Endangered	Vulnerable	Not threatened (km^2)
B2. Area of occupancy (AOO)	<10	<500	<2,000	>2,000
(a) Severely fragmented OR Number of locations:	=1	≤ 5	≤10	
(b) Continuing decline observed in (ii) area of occupancy; (iii) area, extent, and quality of habitat				

temporality and intensity of species collections, and, based on these parameters, to be able to evaluate species rarity and threats through time.

Conservation Status

An assessment of the conservation status was made for each species, following the categories and criteria mentioned in the guidelines for using the IUCN and Natural Resources Red List categories and criteria on a global level for the endemic species of Veracruz (IUCN, 2014, version 11) and on a regional level (IUCN, 2003, 2012; version 4.0) for all other species. The application of criteria was based primarily on our extensive database, including collection data obtained from the labels of all revised specimens, together with land use information and land cover data (Ellis et al., 2011; INEGI, 2007; SEMARNAT-PNUD, 2005), as well as field observations. Although we assume that we have the best available database to assess conservation status of *Peperomia* species from Veracruz based on geographic distribution, a detailed survey on population level is lacking for all of them. In the absence of population size data, we estimated for each species the area of occupancy, defined as the area of suitable habitat currently occupied by the taxon, excluding cases of vagrancy (IUCN, 2014). We then analyzed detailed topographic maps of land use (INEGI, 2007) with ArcGIS 9.2 software and compared the distribution areas expressed in km^2 to the Criterion B (geographic range size, fragmentation, decline, or fluctuations; IUCN, 2014) to assign threat status by considering indications of continuing decline of habitat, the number of localities, or their severe fragmentation (Mathieu et al., 2015; Table 1).

Results

We recorded a total of 60 species of *Peperomia* for the state of Veracruz (Table 2; Appendix C), representing 46% of the 131 species registered so far for Mexico. Twenty species are considered as endemic to Mexico, eight of which are endemic to the state; 20 species have a limited distribution to Central America, 14 to Central and South America, 3 to Central, South, and North America, whereas 2 species are cosmopolitan. Most species grow epiphytic (23; 40%) or saxicolous (9; 16%), whereas other ones have various life forms, for example, epiphytic/saxicolous (8; 14%) or epiphytic/terrestrial (6; 11%).

The evaluation of the conservation status of *Peperomia* species present in the state of Veracruz indicated that there are 27 endangered species, that is, 45% of all species occurring in the state. All eight species endemic to Veracruz were found to be in some risk category according to the IUCN criteria (IUCN, 2012, 2014). Additionally, 11 of 12 species endemic to Mexico as well as 6 species with limited distribution to Central America are threatened in Veracruz. Finally, there are only two species with a wider distribution.

Nearly one third of the species (19) belongs to *Peperomia* subgenera *Micropiper*. The subgenera *Pseudocupula*, *Leptorhynchum*, and *Oxyrhynchum* are represented by 11, 11, and 9 taxa, respectively. Subgenera *Tildenia* and *Hispidula* are present with four and two species, respectively. The other subgenera, *Pleurocarpidium*, *Erasmia*, and *Peperomia*, are represented with one species each. Finally, one species is not placed in any subgenus because its relationships remain unclear.

The analysis of the number of collections and species by administrative region and municipalities showed the following: The regions with the highest values were Altas Montañas (327 collections/47 spp.), Capital (483/42), Los Tuxtlas (271/29), and Olmeca (253/22); *Peperomia* species were found in 103 of the 212 municipalities in Veracruz (48.5%). The municipality with the highest number of registered collections was San Andrés Tuxtla, with 191 collections (29 species), followed by Orizaba (110/23) and Hidalgotitlán (108/14).

The vegetation type with the highest number of recorded collections was the humid montane forest with 531 collections (43% of total records), followed by the tropical humid forest with 323 collections (26%). *Peperomia* species in Veracruz showed an elevational distribution between 0 to 2,850 m, where the range with the highest number of collections (249) is from 0 to 250 m. The elevational range from 1,250 to 1,500 m showed the highest species richness (37).

Discussion

This is the first study in Mexico that presents a taxonomically updated list of *Peperomia* and evaluates in detail its

Table 2. List of *Peperomia* Species of the State of Veracruz, Mexico, Indicating Their Subgenus (After Frenzke et al., 2015), Life Form, and Conservation Status as Well as Geographical Distribution.

Species	Subgenus	LF	CS	EV	EM	NA	CA	SA	CO
1. *P. angustata* Kunth	*Micropiper*	E, S	LC				X	X	
2. *P. arboricola* C.DC.	*Micropiper*	E, S	VU				X		
3. *P. asarifolia* Schltdl. & Cham.	*Oxyrhynchum*	S	NT				X		
4. *P. berlandieri* Miq.	*Pseudocupula*	E, S	LC				X		
5. *P. botterii* C.DC.	*Micropiper*	-	EN		X				
6. *P. bracteata* A.W.Hill	*Tildenia*	S	LC				X		
7. *P. camptotricha* Miq.	*Micropiper*	E, S, T	VU		X				
8. *P. chazaroi* G. Mathieu & T. Krömer	*Hispidula*	S	EN	X					
9. *P. cobana* C.DC.	*Oxyrhynchum*	E, T	LC				X		
10. *P. conocarpa* Trel.	*Pseudocupula*	E	VU				X		
11. *P. consoquitlana* C.DC.	*Micropiper*	E, T	LC		X				
12. *P. cordovana* C.DC.	*Micropiper*	-	EN	X					
13. *P. dendrophila* Schltdl. & Cham.	*Micropiper*	E, (T)	LC				X	X	
14. *P. deppeana* Schltdl. & Cham.	*Pseudocupula*	E	LC				X	X	
15. *P. donaguiana* C.DC.	*Micropiper*	S, T	LC				X		
16. *P. drusophila* C.DC.	*Micropiper*	E	VU	X					
17. *P. edulis* Miq.	*Pseudocupula*	E	EN		X				
18. *P. emarginella* (Sw. ex Wikstr.) C.DC.	*Pleurocarpidium*	E	LC				X	X	
19. *P. epidendron* C.DC.	*Micropiper*	E	VU		X				
20. *P. glabella* A.Dietr.	*Micropiper*	E, (S, T)	LC			X	X	X	
21. *P. granulosa* Trel.	*Leptorhynchum*	(E), S, T	LC				X		
22. *P. griggsii* C. DC.	*Leptorhynchum*	E	EN				X		
23. *P. hernandiifolia* var. *calva* Trel.	*Leptorhynchum*	E, S	EN	X					
24. *P. hispiduliformis* Trel.	*Hispidula*	S, T	LC					X	
25. *P. hobbitoides* T. Wendt	*Oxyrhynchum*	(E), S	VU	X					
26. *P. hoffmannii* C.DC.	*Pseudocupula*	E	LC				X	X	
27. *P. huatuscoana* C.DC.	*Micropiper*	-	EN	X					
28. *P. lanceolatopeltata* C.DC.	*Oxyrhynchum*	(E), S	VU				X	X	
29. *P. lancifolia* Hook.	*Erasmia*	E, S, T	LC				X	X	
30. *P. leptophylla* Miq.	*Micropiper*	E, S	LC				X		
31. *P. liebmannii* C.DC.	*Micropiper*	E, S	VU		X				
32. *P. macrostachyos* (Vahl) A.Dietr.	*Leptorhynchum*	E	LC				X	X	
33. *P. maculosa* (L.) Hook.	*Leptorhynchum*	(E), S, T	LC				X	X	
34. *P. magnoliifolia* (Jacq.) A.Dietr.	*Oxyrhynchum*	E, T	LC				X	X	
35. *P. matlalucaensis* C.DC.	*Micropiper*	E	EN				X		
36. *P. mexicana* (Miq.) Miq.	*Tildenia*	S	LC				X		
37. *P. monticola* Miq.	*Tildenia*	S, T	EN		X				
38. *P. nigropunctata* Miq.	*Micropiper*	E	LC				X		
39. *P. obtusifolia* (L.) A.Dietr.	*Oxyrhynchum*	E, S, T	LC			X	X	X	
40. *P. occulta* G. Mathieu	*Tildenia*	S	VU		X				
41. *P. parastriata* G. Mathieu	*Leptorhynchum*	E, T	VU		X				
42. *P. pellucida* (L.) Kunth	*Peperomia*	T	LC						X
43. *P. peltilimba* C.DC. ex Trel.	*Leptorhynchum*	E	NT				X		
44. *P. petrophila* C.DC.	*Incertae sedis*	E, S	VU				X		
45. *P. pringlei* C.DC.	*Micropiper*	E	VU		X				
46. *P. pseudoalpina* Trel.	*Oxyrhynchum*	E, S, T	LC				X		

(continued)

Table 2. Continued

Species	Subgenus	LF	CS	EV	EM	NA	CA	SA	CO
47. *P. pseudopereskiifolia* C.DC.	*Pseudocupula*	E	VU				X	X	
48. *P. quadrifolia* (L.) Kunth	*Pseudocupula*	E, S, T	LC				X	X	
49. *P. rhexiifolia* C.DC.	*Pseudocupula*	E, T	LC				X	X	
50. *P. rotundifolia* (L.) Kunth	*Micropiper*	E	LC			X	X	X	
51. *P. rupigaudens* C.DC.	*Pseudocupula*	S	EN		X				
52. *P. sanjoseana* C.DC.	*Leptorhynchum*	E, T	LC				X		
53. *P. schiedei* C.DC.	*Leptorhynchum*	E	CR	X					
54. *P. subblanda* C.DC.	*Micropiper*	E	EN		X				
55. *P. tenerrima* Schltdl. & Cham.	*Pseudocupula*	E	LC				X		
56. *P. tetraphylla* Hook. & Arn.	*Pseudocupula*	E	LC						X
57. *P. tlapacoyoensis* C.DC.	*Leptorhynchum*	E	EN				X		
58. *P. tuerckheimii* C.DC.	*Oxyrhynchum*	E, S	NT				X		
59. *P. urocarpoides* C.DC.	*Leptorhynchum*	E	LC				X	X	
60. *P. vazquezii* G. Mathieu & D. Vergara-Rodríguez	*Oxyrhynchum*	S	VU	X					
Total				8	12	3	37	18	2

Note. LF: E = epiphytic, S = saxicolous; T = terrestrial; CS: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern; EV = Endemic to Veracruz, EM = Endemic to Mexico, NA = North America, CA = Central America, SA = South America, CO = Cosmopolitan.

conservation status. The genus is represented by 60 species in Veracruz, of which, according to our analysis, the eight endemic species of this state are endangered and therefore should be included in the IUCN Red List of Threatened Species. Additionally, 11 other species endemic to Mexico and 9 species with a wider distribution are in a risk category according to the IUCN criteria (2003, 2012) at the regional level. In total, 46% of the species in the state of Veracruz were listed as threatened due to the scarcity of its historical records and lack of current collections, as well as its restricted distribution areas and habitats threatened by continued loss and fragmentation of natural vegetation (Ellis et al., 2011).

In comparison, approximately three quarters of the grammitid fern species and all *Phlegmariurus* species in Veracruz are in some IUCN risk category at the regional level (Armenta-Montero, Carvajal-Hernández, Ellis, & Krömer, 2015; Krömer, Acebey, & Smith, 2013b). However, these two groups have fewer species, 18 and 9 respectively, in addition to growing mainly epiphytic in humid montane forest, which makes them more vulnerable to deforestation, since they depend on their host trees. Similarly, Tejero-Díez, Torres-Díaz, Mickel, Mehltreter, and Krömer (2011) evaluated that 87% of the Pteridophytes of Veracruz (489 of 562 species) could be in one of three possible risk categories (endangered, threatened, and vulnerable). Of these, 28 species are in danger of extinction. These findings are related to the environmental sensitivity of these organisms, which makes them unique to different microhabitats, whereas human disturbance reduces their richness and abundance in fragmented and secondary vegetation (Carvajal-Hernández, Krömer, & Vázquez-Torres, 2014; Paciencia & Prado, 2005).

Among the 14 species belonging to the genera *Ceratozamia*, *Dioon*, and *Zamia* that constitute the family Zamiaceae in Veracruz, all of which are endemic to this state (6 spp.) or to Mexico (8 spp.; Nicolalde-Morejón et al., 2014), 10 of the 12 species evaluated were classified into some risk category (IUCN, 2016). Similarly, of the 12 lianous species of the genus *Aristolochia* present in Veracruz (Ortega-Ortiz & Ortega-Ortiz, 1997), 7 were classified in some category of risk in the Red Book of the Flora of Veracruz (Hernández-Baz & Rodríguez-Vargas, 2017). According to the evaluation of Gómez-Pompa et al. (2010), 9 of the 98 endemic plant species of Veracruz are designated as rare and endangered because they are listed in the NOM-059-SEMARNAT-2010 (SEMARNAT, 2010), CITES, and the IUCN Red List (IUCN, 2016). These species mainly belong to cacti, cycads, and orchids. For these plant groups, it is known that there is an alarming illegal collecting rate for sale abroad or locally as ornamental in markets and streets. Moreover, some 11 endemic species are considered endangered because their natural habitats are being destroyed or transformed by agricultural activities and are about to disappear, since they are limited only to a locality or region with small populations that are more vulnerable to extinction.

It should be emphasized that in this study, the conservation status of the *Peperomia* species was evaluated based on information delimited to the state of

Veracruz, so that some species considered in a risk category in this work may have a different conservation status or even be assessed as abundant if analyzed at different spatial scales. For example, the recently described species *Peperomia parastriata* is considered as endemic to Mexico (Mathieu et al., 2015), where it is classified as least concern, because it is known from several localities, including the southern states Chiapas and Oaxaca. In contrast, this species occurs in Veracruz only in a limited area of the Uxpanapa region and was therefore evaluated in this study as Vulnerable. However, its conservation status assigned at the regional level of Veracruz is part of a widespread problem of fragmentation and deforestation, as it is the state with the highest deforestation rate at the national level (SEMARNAT-PNUD, 2005). Another aspect to consider is the fact that the latitude of Veracruz represents the northernmost occurrence of some species of the genus, which generates populations that are diminished and fragmented by the proximity to its ecological limits (Brown, Mehlman, & Stevens, 1995; Thomas & Kunin, 1999).

Mexico has a total record of 131 species of *Peperomia*, ranking sixth in species richness of this genus in the world, where the Andean countries Peru (405 spp.), Colombia (258 spp.), and Ecuador (236 spp.) are the most diverse (Mathieu, 2001–2017). The 60 species known from Veracruz are equivalent to 46% of the species richness of the genus in Mexico. Only Chiapas and Oaxaca have more species (17 and 7 more, respectively), since these states generally have the highest richness of vascular plants in the country (Villaseñor, 2016). The high species richness of *Peperomia* in Veracruz is due to the high environmental heterogeneity caused by an uneven topography and the confluence of a wide variety of climates and soils (Soto-Esparza & Geissert-Kientz, 2011), which allow the presence of 19 different vegetation types, including humid montane, pine-oak, and tropical humid forests, which are considered the most diverse ecosystems in Mexico (Castillo-Campos et al., 2011).

A total of 20 species of *Peperomia* from Veracruz are considered endemic to Mexico, including 8 which occur only within the state. This is similar to the genus *Tillandsia* (Bromeliaceae), a large genus dominated by epiphytic or saxicolous species, with 52 species in Veracruz, of which 4 species are unique to the state and 12 to Mexico (Espejo-Serna, López-Ferrari, & Ramírez-Morillo, 2005). Furthermore, *Anthurium* (Araceae) has 45 and 13 species in Mexico and Veracruz, respectively, 29 of which are endemic to the country but none to the state (Croat & Acebey, 2015; Espejo-Serna, 2012), whereas *Epidendrum* (Orchidaceae) has 125 in Mexico and 33 species in Veracruz, 45 of which are endemic to the country and 2 to the state (García-Cruz & Sánchez Saldaña, 1999; Soto et al., 2007; E. Hágsater, personal communication, November 10, 2016). The high number of endemic species might reflect insufficient botanical exploration focused on specific plant groups in Mexico, and by extension in the Central American region. For instance, a series of expeditions focusing on the genus *Peperomia* were carried out in the last decade throughout the whole Neotropical region, combined with a detailed herbarium study. These efforts resulted in the discovery of 37 new taxa of *Peperomia* subgenera *Tildenia* and *Fenestratae*, which until then where little known groups of geophytic and window-leaved species, respectively, both occurring in very specific seasonal habitats (Mathieu et al., 2011; Pino, Cieza, Wanke, & Samain, 2012; Samain et al., 2011).

The abovementioned strikingly high number of species new to science emphasizes the importance and the need of field work in the (sub)tropics focusing on specific plant groups and the thorough review of herbarium material (Prance, Beentje, Dransfield, & Johns, 2000; Sobral & Stehmann, 2009). Bebber et al. (2010) suggest that, of the estimated 70,000 flowering plant species still to be described, more than half already have been collected and are stored in herbaria. Their data on new species published between 1970 and 2010 show that only 16% were described within 5 years of being collected for the first time, whereas the description of the remaining 84% involved much older specimens. Additionally, carrying out field work guided by geographical information taken from herbarium labels is also useful for the discovery of new taxa. Relevant data serve as a guide for exploring promising locations, by analyzing georeferences, vegetation type, and habitats. Consequently, field work, herbarium studies, and a revision of literature during the last decade revealed 22 new records of ferns for Veracruz (Krömer, Carvajal-Hernández, Acebey, & Smith, 2015). Additionally, Castañeda-Zárate, Viccón-Esquivel, Ramos-Castro, and Solano (2012) reported seven orchid species for the first time from this state. All of these were collected during recent field work, mainly in conserved fragments of humid montane forest. Both studies highlight the need of more floristic inventories in remote and mostly unexplored areas, as well as revisions of national and local herbaria, which may reveal additional species new to science or extensions of their distributional ranges.

With respect to the high species richness of the genus in Veracruz, due to the exceptionally high diversity of vegetation types in this state, the nine subgenera present in Mexico (*Erasmia*, *Hispidula*, *Leptorhynchum*, *Micropiper*, *Oxyrhynchum*, *Peperomia*, *Pleurocarpidium*, *Pseudocupula*, and *Tildenia*) are also represented here. The more species-rich subgenera at global level, which also contain large numbers of epiphytic species, are especially well represented. Four of them, *Leptorhynchum*, *Micropiper*, *Oxyrhynchum*, and *Pseudocupula* are represented by approximately 50% of their species that occur

in Mexico, confirming the extraordinary species richness in the state of Veracruz. Moreover, as can be observed in Table 2, most of the species of these highly diverse subgenera each show various life forms, confirming that life form flexibility is an important factor that adds to the success of the genus *Peperomia* (Frenzke, Goetghebeur, Neinhuis, Samain, & Wanke, 2016).

Regarding the municipal distribution, the species studied are found in almost half of the 212 municipalities of Veracruz, located mainly in the regions Altas Montañas, Capital, Los Tuxtlas, and Olmeca, with the municipality of San Andrés Tuxtla being the richest in both collections and species recorded. These regions are dominated by tropical humid and humid montane forests, which shows that many *Peperomia* species have a preference for living in warm or temperate areas with high humidity conditions. Consequently, these forest types harbor the majority of species, many of them growing as epiphytes on their host trees or saxicolous associated with bryophyte cushions or on rocks in riparian areas. Moreover, many epiphytes are sensitive to microclimatic changes caused by the disturbance of their habitats (Krömer, García-Franco, & Toledo-Aceves, 2014; Larrea & Werner, 2010).

Unfortunately, these two vegetation types show very high deforestation rates and are mostly threatened by land use changes in Veracruz, where many of the remnants of natural vegetation were replaced by crops, grassland, and slash and burn agriculture (Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, 2010; Ellis et al., 2011). In this situation, the reduction of natural habitats for the flora of Veracruz is alarming, since a high number of endemic species in the state currently are threatened by human activities and environmental degradation (Gómez-Pompa et al., 2010).

Implications for Conservation

Although *Peperomia* is one of the plant genera with highest species richness and many endemic representatives in Mexico (Mathieu, 2001–2017; Villaseñor, 2016), we currently lack systematic studies focused on its distribution in the country, which is essential to generate specific strategies for conservation and preservation in their natural habitats (Llorente-Bousquets, Michán, González, & Sosa, 2008). The reduction of habitats due to human activities as well as the age of the collections or lack of botanical explorations in poorly studied areas are the main factors affecting the conservation assessment of *Peperomia* species in Veracruz, which shows that about 44% belong to a threatened category.

These results contrast with the current national legislation stating that no *Peperomia* species reported for Veracruz is mentioned in the NOM-059-SEMARNAT-2010 (SEMARNAT, 2010), and none is included in the IUCN Red List (IUCN, 2016). Therefore, their protection *in situ*, that is, the conservation of their natural habitats, must be of high priority. In this context, Castillo-Campos, Halffter, and Moreno (2008) proposed to create a system of many protected sanctuaries distributed throughout the state in order to protect its flora under the plan of ''archipelago sanctuaries'' described by Halffter (2005), where all landscape units are connected by small protected areas. Furthermore, conservation *ex situ* is necessary, that is, the cultivation in Mexican and foreign botanical gardens of mainly those species that are endemic or in danger and thus might become extinct. Another viable option might be the creation of municipal or rural community greenhouses or nurseries in the framework of a Wildlife Management Unit (UMA; Ávila-Foucat & Pérez Campuzano, 2015; Robles, 2009), where a number of economical important species, for example, used for ornamental, medicinal, or consumption purposes (Cházaro-Basañez et al., 2012; Vergara-Rodríguez & Krömer, 2011), could be cultivated and preserved.

Appendix A

List of excluded *Peperomia* names. For completeness, we mention the accepted species names, listed as occurring in Veracruz (Sosa & Gómez-Pompa, 1994), with the argumentation for which they cannot be retained any longer. Names not mentioned here have been documented earlier as synonyms or are otherwise illegitimate (Mathieu, 2001–2017).

P. acuminata Ruiz and Pav.

In Mexico, *P. acuminata* appears to be restricted to Chiapas and Oaxaca.

P. alata Ruiz and Pav.

In Mexico, *P. alata* appears to be limited to Chiapas. Some historical specimens from Veracruz, identified as this species, belong to *P. epidendron*.

P. angularis C. DC.

Peperomia angularis is a South American species. Most Mexican specimens, earlier identified as this species, belong to *P. sanjoseana*.

P. blanda (Jacq.) Kunth

Peperomia blanda is likely the most misapplied name in *Peperomia*. Its occurrence appears to be limited to northern Venezuela (Zanotti, Suescún, & Mathieu, 2012).

Specimens from Veracruz, identified with this name, belong to several species: *P. arboricola*, *P. botterii*, *P. donaguiana*, *P. hondoana*, *P. liebmannii*, and *P. subblanda*.

P. galioides Kunth

Specimens from Veracruz, earlier identified as *P. galioides*, appear to belong to *P. leptophylla*.

P. gracilis Dahlst.

This is an exclusively Brazilian species.

P. hispidula (Sw.) A. Dietr.

Specimens from Veracruz, earlier identified as *P. hispidula*, appear to belong to *P. hispiduliformis*. *Peperomia hispidula* does occur in Chiapas.

P. hondoana Trel. and Standl.

We consider the specimens from Veracruz that have been identified as *P. hondoana* as belonging to *P. camptotricha*.

P. humilis A. Dietr.

Specimens from Veracruz, earlier identified as *P. humilis*, appear to belong to several other species: *P. arboricola*, *P. botterii*, *P. donaguiana*, *P. hondoana*, *P. liebmannii*, and *P. subblanda*.

P. inaequalifolia Ruiz and Pav.

Specimens from Veracruz, earlier identified as *P. inaequalifolia*, appear to belong to *P. leptophylla*.

P. microphylla Kunth

This is a South American species, also reported from Costa Rica, but not further northwards.

P. miqueliana C.DC.

This is an exclusively Ecuadorean species.

P. peltoidea Kunth

This is a South American species.

P. pereskiifolia (Jacq.) Kunth

This species does not occur in Mexico and is very likely completely lacking from Central America as well. Specimens identified as this species belong to several morphologically close species. In Veracruz, this is usually *P. angustata*.

P. polystachyos (Ait.) Hook.

Specimens from Veracruz, earlier identified as *P. polystachyos*, appear to belong to several other species: *P. arboricola*, *P. botterii*, *P. donaguiana*, *P. hondoana*, *P. liebmannii*, and *P. subblanda*.

P. praeteruentifolia Trel.

This species does occur in Chiapas. Specimens we saw from Veracruz have been misidentified.

P. serpens (Sw.) Loudon

Peperomia serpens does not occur in Mexico. Specimens, earlier identified as *P. serpens*, appear to belong to *P. urocarpoides*.

P. tacanana Trel. and Standl.

This species appears to be limited to Guatemala and El Salvador.

P. umbilicata Ruiz and Pav.

The occurrence of *P. umbilicata* is limited to the Peruvian coastal region. Specimens from Veracruz, earlier identified as *P. umbilicata*, usually belong to *P. bracteata*.

P. urocarpa Fisch. and Mey

Peperomia urocarpa does not occur in Mexico. Specimens, earlier identified as *P. urocarpa*, appear to belong to *P. urocarpoides*.

Appendix B

Information on consulted herbaria and the number of revised specimens of *Peperomia* species collected in the state of Veracruz, Mexico.

Acronym	Herbarium	Country	Specimens
B	Botanischer Garten und Botanisches Museum Berlin-Dahlem	Germany	1
BH	Cornell University	USA	15
BM	The Natural History Museum	UK	31
BR	Botanic Garden Meise	Belgium	76
C	Natural History Museum of Denmark	Denmark	40
CIB	Instituto de Investigaciones Biológicas, Universidad Veracruzana	Mexico	74
CM	Carnegie Museum of Natural History	USA	4
CORU	Facultad de Ciencias Biológicas y Agropecuarias, Zona Orizaba-Córdoba, Universidad Veracruzana	Mexico	39
E	Royal Botanic Garden Edinburgh	UK	6
EBT	Estación de Biología Tropical "Los Tuxtlas", Universidad Nacional Autónoma de México	Mexico	96
ENCB	Instituto Politécnico Nacional	Mexico	84
F	Field Museum of Natural History	USA	310
G	Conservatoire et Jardin botaniques de la Ville de Genève	Switzerland	42
GENT	Ghent University	Belgium	27
GH	Harvard University	USA	105
GOET	Universität Göttingen	Germany	5
HAL	Martin-Luther-Universität Halle	Germany	8
HUA	Universidad de Antioquia	Colombia	8
HUT	Universidad Nacional de La Libertad-Trujillo	Peru	1
IBUG	Instituto de Botánica, Universidad de Guadalajara	Mexico	59
IEB	Instituto de Ecología, A.C., Pátzcuaro	Mexico	85
ILL	University of Illinois	USA	16
ISC	Iowa State University	USA	6
K	Royal Botanic Gardens, Kew	UK	48
L	Nationaal Herbarium Nederland, Leiden	Netherlands	39
M	Botanische Staatssammlung München	Germany	7
MA	Real Jardín Botánico de Madrid	Spain	1
MEXU	Herbario Nacional de México, Universidad Nacional Autónoma de México	Mexico	500
MICH	University of Michigan	USA	67
MO	Missouri Botanical Garden	USA	92
NY	New York Botanical Garden	USA	115
P	Musée National d'Histoire Naturelle Paris	France	86
PH	Academy of Natural Sciences	USA	2
QCA	Pontificia Universidad Católica del Ecuador	Ecuador	1
S	Swedish Museum of Natural History	Sweden	9
SEL	Marie Selby Botanical Gardens	USA	27
TEX	University of Texas at Austin	USA	1
UC	University of California	USA	1
UPS	Uppsala University Sweden	Sweden	3
US	Smithsonian Institution	USA	59

(continued)

Continued

Acronym	Herbarium	Country	Specimens
USM	Universidad Nacional Mayor de San Marcos	Peru	1
W	Naturhistorisches Museum Wien	Austria	21
XAL	Instituto de Ecología, A.C., Xalapa	Mexico	627
XALU	Facultad de Biología, Campus Xalapa, Universidad Veracruzana, Xalapa, Veracruz	Mexico	71

Appendix C

Distribution, ecology, and conservation status of *Peperomia* species from Veracruz, Mexico. Abbreviations of Mexican states: AGS: Aguascalientes; BC: Baja California; CAMP: Campeche; CDMX: Ciudad de México; CHIH: Chihuahua; CHIS: Chiapas; COAH: Coahuila; COL: Colima; DUR: Durango; GRO: Guerrero; GTO: Guanajuato; HGO: Hidalgo; JAL: Jalisco; MEX: México; MICH: Michoacán; MOR: Morelos; NAY: Nayarit; NL: Nuevo León; OAX: Oaxaca; PUE: Puebla; QRO: Querétaro; QROO: Quintana Roo; SIN: Sinaloa; SLP: San Luis Potosí; SON: Sonora; TAB: Tabasco; TAM: Tamaulipas; TLAX: Tlaxcala; VER: Veracruz; YUC: Yucatán; ZAC: Zacatecas.

Peperomia angustata Kunth, Nov. Gen. et Sp. (quarto ed.) 1:68, 1815 [1816]

Distribution: Mexico (CAMP, CHIS, JAL, OAX, PUE, QRO, QROO, SLP, TAB, TAM, VER, YUC), Belize, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Guyanas, Honduras, Nicaragua, Panama, Peru, Venezuela.

Representative specimens from Veracruz: Álamo: J. I. Calzada 5801 (F, XAL). Coetzala: M. Cházaro et al. 5786 (ENCB, IBUG, IEB). Jalcomulco: M.-S. Samain et al. 2007-125 (BR, GENT, MEXU). Puente Nacional: M. Cházaro et al. 6135 (IEB, MICH, XAL). San Andrés Tuxtla: T. Krömer and A. Acebey 2162 (EBT, MEXU, XAL). Soteapan: M. Leonti 128 (MEXU).

Collections examined: 37 (recent: 6).

Ecology: Epiphytic or saxicolous herb in tropical humid, tropical deciduous, and tropical semi-deciduous forests. Elevation 20–880 m.

Conservation status: Least Concern (LC) in Veracruz. It is considered a common species, with many collections, also six recent ones. It shows a wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Olmeca, and Sotavento.

Notes: Pending or trailing species with three to four verticillate, coriaceous, somewhat rhombic leaves. Medical use: rheumatism and earache.

Peperomia arboricola C.DC., Linnaea 37:374, 1872

Distribution: Mexico (CHIS, GRO, OAX, VER), Guatemala, Honduras, El Salvador.

Representative specimens from Veracruz: Calcahualco: D. Jimeno et al. 529 (XAL). Las Vigas de Ramírez: E. K. Balls 5512 (BM, E, K, NY, US). Xico: A. Rincón G. and C. Durán 2618 (XAL).

Collections examined: 14 (recent: 7).

Ecology: Epiphytic or saxicolous herb in humid montane and pine-oak forests. Elevation 1,600–2,620 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Known from eight locations (Area of Occupancy [AOO]: 191.53 km^2). Its distribution is limited to humid forests in the regions Altas Montañas and Capital. These areas are prone to deforestation and are not part of any protected area. It is recommended to establish the precise distribution of the species.

Notes: Resembles *P. santahelenae* that is reported from Puebla and Chiapas but does not seem to occur in Veracruz. That species shows short petioles and peduncles, two to three times longer in *P. arboricola*.

Peperomia asarifolia Schltdl. & Cham., Linnaea 5:75, 1830

Distribution: Mexico (CHIH, CHIS, COL, GRO, JAL, MEX, MICH, MOR, NAY, OAX, QRO, SIN, SLP, SON, TAB, VER), Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama.

Representative specimens from Veracruz: Actopan: R. Acosta and F. Vázquez 817 (IEB, XAL). Puente Nacional: M. E. Medina A. and F. Vázquez B. 353 (IBUG, IEB, XAL, XALU). Soteapan: L. Pacheco 216 (XAL). Totutla: C. A. Purpus 7883 (GH, MO, NY, US).

Collections examined: 17 (recent: 0).

Ecology: Saxicolous herb in tropical deciduous, tropical semi-deciduous, and humid montane forests. Elevation 140–1,450 m.

Conservation status: Near Threatened (NT) in Veracruz. Although not recently reported and its habitat being threatened by changing land use, it is considered a well-collected species. It occurs in the regions Altas

Montañas, Capital, Olmeca, and Sotavento. Because it has not been collected in the last 16 years, it is recommended to establish its current distribution.

Notes: Resembles *P. hobbitoides*, but that species shows leaves with an acute apex and a hardly cordate base, whereas *P. asarifolia* exhibits suborbicular leaves with an obtuse apex and a distinctly cordate base. See notes under *P. hobbitoides* and *P. vazquezii*.

Peperomia berlandieri Miq., Syst. Piperac. 158, 1843

Distribution: Mexico (CHIS, JAL, NAY, NL, OAX, SLP, VER), Guatemala, Honduras, Nicaragua.

Representative specimens from Veracruz: Acultzingo: J. L. Martínez and P. Acosta 954 (MEXU, XAL). Catemaco: T. Krömer et al. 2466 (EBT, MEXU, SEL, XAL). Hidalgotitlán: M. Vázquez et al. 807 (ENCB, IEB, NY). Misantla: M. Cházaro and H. Oliva 2195 (XAL). Tepetzintla: J. Palma and F. Vázquez 343 (XAL). Tonayán: M. Cházaro et al. 6030 (ENCB, MEXU, XAL).

Collections examined: 52 (recent: 8).

Ecology: Epiphytic or saxicolous repent herb in tropical humid, tropical semi-deciduous, humid montane, and pine-oak forests. Elevation 35–2,800 m.

Conservation status: LC in Veracruz. Very frequently collected species with wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Nautla, and Olmeca.

Notes: Resembling *P. deppeana*, *P. edulis*, and *P. hoffmannii*, which show inflorescences with a glabrous rachis (or with minute papillae). However, the rachis of *P. berlandieri* is pubescent. *Peperomia edulis* has larger and more orbicular leaves. Use: edible. See notes under *P. edulis*.

Peperomia botterii C.DC., Journ. Bot. 4:145, 1866

Distribution: Mexico (HGO, TAM, VER). Endemic.

Representative specimens from Veracruz: Acultzingo: A. J. Sharp 44636 (P). Orizaba: M. Bourgeau 2548 (G, G-DC, P, US).

Collections examined: 12 (recent: 0).

Ecology: Preferred habitat not recorded. Elevation 2,000-2,300 m.

Conservation status: Endangered (EN) B2ab(ii,iii) in Veracruz. Known from 12 collections made in three localities (AOO: 250.30 km^2) in the municipalities of Acultzingo and Orizaba in the region Altas Montañas. Its distribution is limited and the area where it occurs is vulnerable to deforestation. In the last decades, its habitats are heavily threatened by urban expansion and changes in land use. In Veracruz, it is known from the type collection and the most recent collection dates back to almost 70 years.

Notes: The accurate identification of *P. botterii*, *P. donaguiana*, *P. liebmannii*, and *P. subblanda* apparently poses difficulties and many herbarium specimens bear each other's names. Even the name of the exclusively South American *P. blanda* is repeatedly suggested. Collections of this species rarely mention data about ecology and habitat. It is recommended to locate the plant in its environment and to take measures, *in situ* and *ex situ*, for its conservation.

Peperomia bracteata A.W.Hill, Ann. Bot. (London) 21:155, 1907 (Figure 1(a))

Distribution: Mexico (AGS, BC, CDMX, CHIH, CHIS, COAH, DUR, GTO, HGO, JAL, MEX, MICH, NAY, NL, OAX, PUE, QRO, SIN, SLP, SON, TAM, TLAX, VER), Guatemala.

Representative specimens from Veracruz: Huayacocotla: F. Vázquez 1242 (XAL). Jalacingo: F. Ventura A. 1673 (ENCB, F, MICH, MO). Orizaba: M.-S. Samain et al. 2007-112 (BR, GENT, MEXU).

Collections examined: 21 (recent: 2).

Ecology: Saxicolous, geophytic herb with small tuber, usually growing in limestone cracks, in humid montane and pine-oak forests (one collection is reported from grassland). Elevation 1,250–2,650 m.

Conservation status: LC in Veracruz. This species is well collected, also recently, and shows a wide distribution in the regions Altas Montañas, Capital, and Huasteca.

Notes: Resembles *P. monticola*. In *P. bracteata*, the fruits are ellipsoid. In *P. monticola*, they are larger, subcilindrical, and distinctly shiny black when mature. Commonly known as "ombligo de tierra" (earth navel).

Peperomia camptotricha Miq., Syst. Piperac. 144, 1843

Distribution: Mexico (CHIS, COL, OAX, VER). Endemic.

Representative specimens from Veracruz: Emiliano Zapata: J. Dorantes and V. Vázquez 4288 (XAL, XALU). Ixtaczoquitlán: M.-S. Samain et al. 2007-108 (BR, GENT, MEXU). Zongolica: T. Krömer et al. 3795 (BR, MEXU, XAL).

Collections examined: 14 (recent: 2).

Ecology: Epiphytic, terrestrial, or saxicolous herb in tropical deciduous, tropical semi-deciduous, and humid montane forests as well as in riparian habitats. Elevation 300–1,590 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Known from five locations (AOO: 1,682 km^2) in the regions Altas Montañas and Capital. These areas are prone to deforestation due to anthropogenic factors. Although the species has been found in disturbed areas, it might be at risk of disappearance.

Notes: Shows succulent and pubescent stem and leaves. Leaves arranged in whorls. Terminal compound inflorescence.

Peperomia chazaroi G. Mathieu & T. Krömer, Phytotaxa 205(4):269, 2015

Distribution: Mexico (VER). Endemic.

Representative specimens from Veracruz: Acajete: M. Cházaro et al. 9868 (BR, GENT, MEXU, MO).

Collections examined: 4 (recent: 1).

Ecology: Saxicolous herb, growing in moist, shady habitats (narrow canyons, cave entrances) or under very humid conditions in the mist of waterfalls. Occurs in pine-oak forests. Elevation 2,700–2,830 m.

Conservation status: Endangered (EN) B2ab(ii,iii), as it is known from four collections only, limited to one locality in the Capital region (AOO: 57.11 km^2), and thus considered as endemic to the central montane region of Veracruz (Mathieu et al., 2015). Besides, there are ongoing changes in land use of its pine-oak forest habitat, which is not included in the Veracruz protected areas network. Botanical exploration of similar habitats is recommended to check the presence of the species and possibly enlarge its reported area of distribution.

Notes: Resembling *P. hispiduliformis*, but differing by the trailing habit, the slightly peltate leaves with scarce villous trichomes and the main nerves four and five making an angle of 90° with the central nerve, whereas six and seven run into the lobes.

Peperomia cobana C.DC., Bot. Gaz. 19:260, 1894

Distribution: Mexico (CHIS, OAX, VER), Guatemala, Honduras.

Representative specimens from Veracruz: Acajete: D. Vergara and J. L. Salazar 018 (XAL, XALU). San Andrés Tuxtla: E. Diggs et al. 2664 (F, GH, MO, NY, US).

Collections examined: 15 (recent: 2).

Ecology: Epiphytic or terrestrial herb in tropical semideciduous, humid montane, and pine-oak forests. Elevation 820–1,900 m.

Conservation status: LC in Veracruz. Although it has been taken for a rare species, recent findings extend its distribution to the regions Capital and Los Tuxtlas.

Notes: Resembles *P. magnoliifolia*, *P. obtusifolia*, and *P. pseudoalpina*. It differs from these species by its somewhat acuminate leaves and its compound axillar inflorescences. In *P. obtusifolia*, the leaves are more obovate with an obtuse apex and have longer petioles. It shows solitary inflorescences and urn-shaped fruits with a long, slender apical beak. *Peperomia magnoliifolia* exhibits orbicular to elliptic leaves with short petioles. Its inflorescences are usually compound and fruits are ellipsoid with a short apical beak. *Peperomia pseudoalpina* shows leaves with an obtuse or sometimes emarginate or shortly acute apex and terminal or leaf opposed inflorescences.

Peperomia conocarpa Trel., Publ. Field Mus. Nat. Hist., Chicago, Bot. Ser. 17(4):332, 1938

Distribution: Mexico (CHIS, OAX, VER), El Salvador, Guatemala, Honduras.

Representative specimens from Veracruz: Atzalan: J. V. LaFrankie 1342 (GH). Ixhuacán de los Reyes: J. Márquez et al. 164 (XAL). Los Reyes: P. E. Valdivia 2152 (IEB, NY, XAL).

Collections examined: 3 (recent: 0).

Ecology: Epiphytic herb in humid montane forests. Elevation 1,480–1,600 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Known from three collections in three municipalities (AOO: 763.23 km^2) of the regions Altas Montañas, Capital, and Nautla, where several habitats are under pressure due to urban expansion and changing land use.

Notes: Resembles *P. quadrifolia* but shows smaller, narrower, somewhat obovate leaves and smaller inflorescences. Because the species is not recently collected, establishing its current occurrence is recommended.

Peperomia consoquitlana C.DC., Linnaea 37:379, 1872 (Figure 1(b))

Distribution: Mexico (CHIS, PUE, SLP, VER). Endemic.

Representative specimens from Veracruz: Coatepec: D. Vergara and I. García 029 (XAL, XALU). Ixtaczoquitlán: M. Nee 23864 (F, GH, MEXU, MO, XAL). Orizaba: M.-S. Samain et al. 2007-113 (BR, GENT, MEXU). San Andrés Tuxla: T. P. Ramamoorthy 3440 (MEXU).

Collections examined: 20 (recent: 4).

Ecology: Epiphytic or terrestrial herb in tropical humid, humid montane, and pine-oak forests. Elevation 300–1,350 m.

Conservation status: LC in Veracruz. Although this species is endemic to Mexico, it shows a large municipal distribution in the regions Altas Montañas, Capital, and Los Tuxtlas. It also appears to be found in disturbed habitats.

Notes: The species has a rather characteristic habit. It shows pubescent, reddish stems and a large, terminal, and solitary inflorescence.

Peperomia cordovana C.DC., Linnaea 37:374, 1872

Distribution: Mexico (VER). Endemic.

Representative specimens from Veracruz: Córdoba: M. Martínez 225 (US). Orizaba: M. Bourgeau 1804 (G-DC, K, P).

Collections examined: 6 (recent: 0).

Ecology: No data are included because of the age of the mentioned collections.

Conservation status: Endangered (EN) B2ab(ii,iii). Known from four collections made in the municipality of Orizaba without precise location and from two collections from Córdoba (AOO: 55.03 km^2), corresponding with the region Altas Montañas. The majority of the collections was made between 1855 and 1867, the most recent one is from 1937. Precise information about its habitat is lacking, but this species likely has been collected on the slopes of the Pico de Orizaba volcano. The forests in the municipalities Córdoba and Orizaba have been altered strongly in the last decades due to urban expansion and changes in land use.

Notes: This species resembles *P. glabella* but the margin of its leaves, especially the younger ones, shows some ciliation. One has to pay attention to the correct type: Bourgeau 1804 at G-DC, K and P (several specimens) represents *P. cordovana*. The same collection number at BR, C, GH, P (one specimen), S, and US represents *P. lanceolatopeltata*. It is recommended to establish the current distribution of the species and to take measures for its protection.

Peperomia dendrophila Schltdl. and Cham., Linnaea 5:74, 1830

Distribution: Mexico (CHIS, OAX, VER), Colombia, Costa Rica, Ecuador, Honduras, Nicaragua.

Representative specimens from Veracruz: Atzalan: T. Krömer 3347 (XAL, MEXU, SEL). Huatusco: S. Avendaño and A. C. Benavides 325 (F). Tlalnelhuayocan: T. Krömer et al. 3947 (XAL). Soteapan: R. Ortega et al. 1061 (F). Tlachichilco: L. Cabrera 50 (XAL).

Collections examined: 41 (recent: 16).

Ecology: Epiphytic or sometimes terrestrial herb in tropical humid, tropical semi-deciduous, humid montane, and pine-oak forests. Elevation 500–1,720 m.

Conservation status: LC in Veracruz. A frequently collected species with wide distribution in the regions Altas Montañas, Capital, Huasteca, Nautla, and Olmeca.

Notes: The identification of many collections from Veracruz had to be corrected. Due to misinterpretation of their types, *P. dendrophila* and *P. sanjoseana* have been considered as representing one species for a long time, resulting in quite some misidentifications.

Peperomia deppeana Schltdl. and Cham., Linnaea 5:75, 1830

Distribution: Mexico (CAMP, CHIS, COL, DUR, GRO, JAL, OAX, SLP, VER), Belize, Brazil, Costa Rica, El Salvador, Ecuador, Honduras, Mexico, Nicaragua, Panama.

Representative specimens from Veracruz: Catemaco: J. H. Beaman 5654 (F, MEXU, MICH). Chicontepec: J. I. Calzada 5623 (MEXU, XAL). Huatusco: S. Avendaño and F. Vázquez 769 (ENCB, MEXU, XAL). Jalcomulco: G. Castillo and W. Bussey 3006 (ENCB, MEXU, XAL). Uxpanapa: T. Wendt et al. 3348 (F). Yecuatla: M. Vázquez 1889 (MEXU).

Collections examined: 51 (recent: 8).

Ecology: Repent epiphytic herb in tropical humid, tropical deciduous, tropical semi-deciduous, humid montane, and pine-oak forests as well as in grasslands and riparian habitats. Elevation 120–2,600 m.

Conservation status: LC in Veracruz. A frequently collected species with wide distributions in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Nautla, and Olmeca.

Notes: Resembles *P. berlandieri*. The leaves of *P. deppeana* are glandular dotted, are widely emarginated, and show a ciliate margin in its apical half. In *P. berlandieri*, the leaves lack the glandular dots. They are narrowly emarginated and show a ciliate margin only in and near the apical notch. The fruits of *P. deppeana* show a short style, whereas in *P. berlandieri*, a long style is present. See notes under *P. edulis*.

Peperomia donaguiana C.DC., Linnaea 37: 382, 1872

Distribution: Mexico (CHIS, GRO, HGO, JAL, NAY, NL, OAX, PUE, TAM, VER), Honduras.

Representative specimens from Veracruz: Huayacocotla: L. Ballesteros and H. Morales 285 (MEXU, NY). Nogales: D. Vergara et al. 77 (BR, GENT, MEXU, XAL). Tatatila: M. Cházaro and P. Padilla 3625 (F, MEXU, XAL). Tenochtitlán: A. Rincón and C. Durán 2227 (XAL).

Collections examined: 35 (recent: 17).

Ecology: Terrestrial or saxicolous herb in tropical semi-deciduous, humid montane, and pine-oak forests. It has been found also in disturbed riparian habitats. Elevation 600–2,500 m.

Conservation status: LC in Veracruz. Considered as a frequently collected species and showing a wide

distribution in the regions Altas Montañas, Capital, Huasteca, and Nautla.

Notes: See notes under *P. botterii*.

Peperomia drusophila C.DC., Linnaea 37:372, 1872

Distribution: Mexico (VER). Endemic.

Representative specimens from Veracruz: Coatepec: L. Lorea L. 698 (XAL). Totutla: C. A. Purpus 6357 (F, GH, NY, US).

Collections examined: 7 (recent: 0).

Ecology: Epiphytic herb in humid montane and pine-oak forests. Elevation 1,150–2,150 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii). Collected between 1913 and 1992 in seven locations (AOO: 573.20 km^2) in the region Altas Montañas and Capital, where forests are being affected by human activities like deforestation and changes in land use.

Notes: Resembles *P. sanjoseana*.

Peperomia edulis Miq., Linnaea 18:711, 1844

Distribution: Mexico (HGO, OAX, VER). Endemic.

Representative specimens from Veracruz: Huayacocotla: D. Jimeno 1324 (XAL, XALU). Perote: C. J. W. Schiede s.n. (BM, HAL, U [probably Schiede s.n. (B, BR) belongs here]).

Collections examined: 3 (recent: 1).

Ecology: Epiphytic, repent herb in pine-oak and pine forests. Elevation at around 2,600 m.

Conservation status: Endangered (EN) B2ab(ii,iii) in Veracruz. Known from only one recent (Huasteca region) and two ancient collections (AOO: 44.10 km^2), the latter made in the region Altas Montañas in the municipality Perote, one by Schiede in 1829 and another one by Liebmann in 1841. Information about the precise collection sites, on the slopes of the Pico de Orizaba volcano, is not available, but forests in that area have been under heavy pressure in recent decades by urban expansion and changing land use.

Notes: Differs from *P. berlandieri* by its glabrous rachis. To be distinguished from two species that also show a glabrous rachis: *P. hoffmannii* and *P. rupigaudens*. The leaves of both these species are distinctly smaller, long obovate in *P. hoffmannii* and suborbicular in *P. rupigaudens*. It is recommended to establish the current distribution of this species, not collected in the state during the last 170 years, and to take measures for its protection.

Peperomia emarginella (Sw. ex Wikstr.) C.DC., DC. Prodr. 16(1):437, 1869

Distribution: Mexico (CHIS, OAX, VER), Belize, Bolivia, Brasil, Colombia, Costa Rica, Cuba, Ecuador, Guadeloupe, Guyanas, Haiti, Jamaica, Martinica, Nicaragua, Panama, Peru, Puerto Rico, Venezuela.

Representative specimens from Veracruz: Hidalgotitlán: P. E. Valdivia 749 (ILL, MO, XAL). Naolinco: M. Nee 28798 (F, XAL). San Andrés Tuxtla: T. Krömer et al. 1923 (EBT, MEXU). Totutla: C. Durán and S. Avendaño 1090 (XAL).

Collections examined: 30 (recent: 1).

Ecology: Tiny, repent, epiphytic herb in tropical humid, tropical semi-deciduous, humid montane, and pine-oak forests. Elevation 120–1,300 m.

Conservation status: LC in Veracruz. A frequently collected species with a wide distribution in the regions Altas Montañas, Capital, Los Tuxtlas, and Olmeca.

Notes: Resembles *P. rotundifolia* to some extent, but shows much smaller, delicate, obovate, emarginate leaves and much smaller inflorescences.

Peperomia epidendron C.DC., Linnaea 37:379, 1872

Distribution: Mexico (CHIS, GRO, OAX, PUE, QRO, VER). Endemic.

Representative specimens from Veracruz: Orizaba: M.-S. Samain et al. 2007-114 (BR, G, GENT, K, MEXU, MO, US). Tenochtitlán: A. Rincón G. and C. Durán 2156 (XAL). Xalapa: E. Seler 3589 (GH).

Collections examined: 13 (recent: 2).

Ecology: Epiphytic herb in tropical deciduous and humid montane forests. Elevation 1,100–1,250 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Although known from 13 collections made in five municipalities (AOO: 582.94 km^2), the species has a limited distribution in the regions Altas Montañas, Capital, and Nautla areas exposed to deforestation.

Notes: Robust erect plants with large alternate leaves and leaf opposed inflorescences.

Peperomia glabella (Sw.) A.Dietr., Sp. Pl. 1:156, 1831 (Figure 1(c))

Distribution: Mexico (CHIS, COL, HGO, OAX, PUE, QRO, QROO, SLP, TAB, TAM, VER), Belize, Brazil, Colombia, Costa Rica, Cuba, Dominican Rep., Ecuador, Guatemala, Guyanas, Honduras, Jamaica, Nicaragua, Panama, Peru, Puerto Rico, USA (Florida), Venezuela, Virgin Isl.

Representative specimens from Veracruz: Atoyac: R. Acevedo and M. E. Medina 65 (IEB, MEXU, MO, XAL). Chicontepec: C. Durán 165 (XAL). Coatepec: V. E. Luna 1263 (XAL). Coxquihui: P. Tenorio et al. 8602 (MEXU). Las Choapas: M. Nee and K. Taylor 29869 (BM, F, GH, NY, US, XAL). San Andrés Tuxtla: T. Krömer et al. 3899 (BR, GENT, MEXU, XAL). Tlapacoyan: W. Márquez 537 (F, MEXU).

Collections examined: 154 (recent: 15).

Ecology: Usually epiphytic, sometimes saxicolous or terrestrial, repent herb in tropical humid, tropical semi-deciduous, humid montane, pine-oak forests, and xerophytic shrubland as well as in secondary forests, citrus plantations, and road banks. Elevation 60–1,650 m.

Conservation status: LC in Veracruz. A frequently collected species with a wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Nautla, Olmeca, and Totonaca. It has also been found in disturbed environments.

Notes: Resembles *P. nigropunctata*. Dried material of both species shows black dots all over the plant. However, *P. glabella* is characterized by the presence of trichomes along the petioles whereas *P. nigropunctata* is completely glabrous.

Peperomia granulosa Trel., Journ. Wash. Acad. Sci. 19:328, 1929

Distribution: Mexico (CHIS, GRO, OAX, SLP, TAB, TAM, VER), Guatemala, Honduras.

Representative specimens from Veracruz: Actopan: R. Acosta and N. Acosta 67 (IEB, MEXU, XAL, XALU). Coxquihui: M. Mendoza et al. 35 (MEXU). Ixtaczoquitlán: M. Nee and K. Taylor 29409 (F, XAL). Jesús Carranza: M. Vázquez et al. 2428 (CIB, XAL). Misantla: J. L. Martínez and J. Martínez 1192 (IEB, XAL). Puente Nacional: M. Cházaro et al. 6103 (ENCB, IEB, MEXU, MICH, XAL). San Andrés Tuxtla: T. Krömer and A. Acebey 2494 (EBT, MEXU, XAL). Zontecomatlán: A. Rincón and C. Durán 1129 (XAL).

Collections examined: 49 (recent: 3).

Ecology: Usually saxicolous or terrestrial, sometimes epiphytic, repent or scandent herb in tropical humid, tropical deciduous, tropical semi-deciduous, humid montane, and pine-oak forests as well as in secondary forests and coffee plantations. Elevation 110–1,500 m.

Conservation status: LC in Veracruz. A frequently collected species with a wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Nautla, Olmeca, Sotavento, and Totonaca.

Notes: Resembles *P. macrostachyos*, a species that apparently is always growing epiphytically on ant nests. Moreover, *P. macrostachyos* shows floral bracts with fimbriate margin, whereas in *P. granulosa*, the floral bracts have an entire margin.

Peperomia griggsii C. DC., Candollea 1:364, 1923

Distribution: Mexico (VER), Belice, Guatemala.

Representative specimens from Veracruz: San Andrés Tuxtla: T. Krömer et al. 3896 (BR, MEXU, XAL).

Collections examined: 2 (recent: 2).

Ecology: Epiphytic herb in humid montane forests. Elevation at around 1,150 m.

Conservation status: Endangered (EN) B2ab(ii,iii) in Veracruz. Reported from only two different locations within the same municipality (AOO: 104.90 km^2). Although it concerns recent collections made in the Los Tuxtlas Biosphere Reserve, the species is considered at risk because the area is still under strong anthropogenic pressure.

Notes: Resembles *P. distachyos*, which appears not to be present in the state. *Peperomia griggsii* shows leaf opposed inflorescences, whereas they have an axillary position in *P. distachyos*. *Peperomia griggsii* is densely pubescent in all its parts, whereas *P. distachyos* is a mainly glabrous or glabrescent species.

Peperomia hernandiifolia var. calva Trel., Bot. Gaz. 73:145, 1922

Distribution: Mexico (VER). Endemic.

Representative specimens from Veracruz: Chiconquiaco: M. Rosas 572 (GH). Orizaba: M. Botteri 1160 (GH, GOET, K, US).

Collections examined: 7 (recent: 0).

Ecology: Epiphytic or saxicolous, repent, or scandent herb in humid montane forests. Elevation 1,200–1,400 m.

Conservation status: Endangered (EN) B2ab(ii,iii). Known from seven collections made in three locations (AOO: 77.58 km^2) in the regions Altas Montañas and Capital. It was collected between 1862 and 1868 and again in 1905 and 1967. In the last decades, its habitats have been heavily threatened by changing land use.

Notes: Similar to *P. granulosa*. However, *P. hernandiifolia* var. *calva* presents obovate acuminate leaves and the plant is entirely glabrous.

Peperomia hispiduliformis Trel., Lilloa 6:295, 1941 (Figure 1(d))

Distribution: Mexico (CHIS, CDMX, DUR, GRO, HGO, JAL, MEX, MICH, MOR, OAX, PUE, QRO, VER), Argentina, Bolivia, Ecuador, Peru.

Representative specimens from Veracruz: Altotonga: F. Ventura 17755 (ENCB, MEXU, US, XAL). Calcahualco: M. Nee and G. Schatz 19748 (F, MEXU). Huayacocotla: D. Vergara and F. Vergara 089 (XAL, XALU).

Collections examined: 12 (recent: 2).

Ecology: Terrestrial or saxicolous herb in humid montane and pine-oak forests. Elevation 1,750–2,700 m.

Conservation status: LC in Veracruz. Although it is not a common species, it has a wide distribution in the regions Altas Montañas, Capital, and Huasteca and it is known from recent collections.

Notes: Small species with delicate, pubescent leaves and loosely flowered inflorescences. The species exhibits minute whitish transparent tubers along the roots that have been rarely collected.

Peperomia hobbitoides T. Wendt, *Lundellia 6:37, 2003*

Distribution: Mexico (VER). Endemic.

Representative specimens from Veracruz: Minatitlán: T. Wendt et al. 3470 (F). Uxpanapa: T. Krömer et al. 3870 (BR, GENT, MEXU, XAL).

Collections examined: 8 (recent: 2).

Ecology: Occasionally epiphytic but usually saxicolous herb, generally growing in limestone cracks in tropical humid forests. Elevation 75–370 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii). Known from seven, relatively nearby locations (AOO: 1,292 km^2). The species occurs in the Olmeca region where it has been collected between 1970 and 2010 in the río Uxpanapa area. This area was heavily affected in the 1970s and 1980 s and its deforestation is considered as one of the most important cases of environmental destruction in modern Mexican history.

Notes: Edible plant, used as a condiment in regional cooking as it has a strong smell of coriander (*Coriandrum sativum*). Locally known by the name ''cilantro de monte'' or ''cilantro de la roca'' (montane cilantro or rock cilantro). See notes under *P. asarifolia* and *P. vazquezii*.

Peperomia hoffmannii C.DC., Journ. Bot. 4:133, 1866

Distribution: Mexico (CHIS, GTO, HGO, JAL, MICH, MEX, NAY, OAX, PUE, QRO, SLP, SIN, TAM, VER), Belize, Costa Rica, Ecuador, El Salvador, Guatemala, Panama, Peru.

Representative specimens from Veracruz: Chicontepec: J. I. Calzada 5623 (F, MEXU). Perote: G. Castillo et al. 1967 (F, XAL). San Andrés Tuxtla: T. Krömer and A. Acebey 2092 (MEXU, SEL, XAL).

Collections examined: 10 (recent: 2).

Ecology: Epiphytic, repent herb in tropical semi-deciduous, humid montane, and pine-oak forests. Elevation 270–2,700 m.

Conservation status: LC in Veracruz. Although infrequently collected, there are recent findings and this species shows a wide distribution in the regions Altas Montañas, Huasteca, and Los Tuxtlas.

Notes: To be distinguished from *P. berlandieri* and *P. edulis*. See notes under *P. edulis*.

Peperomia huatuscoana C.DC., *Linnaea 37:383, 1872*

Distribution: Mexico (VER). Endemic.

Representative specimens from Veracruz: Huatusco: F. M. Liebmann 129 (F, G-DC, K, P). Orizaba: G. L. Fisher 160 (CM, F, US).

Collections examined: 3 (recent: 0).

Ecology: Not known. Elevation 1,300-1,550 m.

Conservation status: Endangered (EN) B2ab(ii,iii). Known from only three collections made in 1841 and 1924 in nearby locations (AOO: 20 km^2) in the region Altas Montañas. The landscape in its distribution area has undergone enormous changes.

Notes: It is recommended to establish the current distribution of the species and to take measures for its protection.

Peperomia lanceolatopeltata C.DC., Journ. Bot. 4:136, 1866

Distribution: Mexico (CHIS, COL, GRO, JAL, MEX, MICH, NAY, OAX, SIN, VER), Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Venezuela.

Representative specimens from Veracruz: Nogales: R. Ortega 1544 (XAL, XALU). Orizaba: F. Müller 653 (BR, GH, K, L, NY, W).

Collections examined: 9 (recent: 0).

Ecology: Usually saxicolous, sometimes epiphytic herb in tropical semi-deciduous and humid montane forests. Elevation 700–1,250 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Known from nine collections and four locations (AOO: 596.05 km^2). Its distribution is limited to the region Altas Montañas, an area prone to deforestation.

Notes: Plant with some ornamental potential.

Peperomia lancifolia Hook., Ic. Pl. 4:t. 332, 1841

Distribution: Mexico (CHIS, OAX, VER), Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyanas, Nicaragua, Panama, Peru, Venezuela.

Representative specimens from Veracruz: Huatusco: T. Krömer 3289 (MEXU, XAL). San Andrés Tuxtla: T. Krömer and A. Acebey 2405 (EBT, MEXU, XAL). Soteapan: J. I. Calzada 5162 (F, XAL).

Collections examined: 30 (recent: 9).

Ecology: Epiphytic, terrestrial, or saxicolous herb in tropical humid, tropical semi-deciduous, humid montane, and pine-oak forests. Elevation 500–1,450 m.

Conservation status: LC in Veracruz. A frequently collected species with wide distribution in the regions Altas Montañas, Los Tuxtlas, and Olmeca.

Notes: Species showing large lanceolate leaves. The leaves resemble those of *P. petrophila* but that species does not have compound inflorescences.

Peperomia leptophylla Miq., Linnaea 18:712, 1844 (Figure 1(e))

Distribution: Mexico (CHIS, CDMX, COL, DUR, GTO, GRO, HGO, JAL, MEX, MICH, MOR, NAY, OAX, PUE, VER), Guatemala, Honduras.

Representative specimens from Veracruz: Acajete: D. Vergara and I. García 045 (GENT, MEXU, MO). Orizaba: F. Müller 250 (NY, W). Perote: E. K. Balls 5460 (BM, E, GH, K, US). Tlacolulan: R. Ortega 477 (F, MEXU, MO, XAL, XALU).

Collections examined: 35 (recent: 7).

Ecology: Epiphytic or saxicolous herb in humid montane, oak, and pine-oak forests. Elevation 1,500–2,850 m.

Conservation status: LC in Veracruz. A frequently collected species with a wide distribution in the regions Altas Montañas and Capital.

Notes: Many collections have been identified as *P. galioides*, a species that does not occur in Veracruz.

Peperomia liebmannii C.DC., Linnaea 37:383, 1872

Distribution: Mexico (CHIS, HGO, NL, OAX, SLP, TAM, VER). Endemic.

Representative specimens from Veracruz: Coatepec: Y. Murrieta 88 (CIB, F). Zongolica: T. Krömer et al. 3125 (MEXU, XAL). Yecuatla: M. Vázquez 1903 (ENCB, MEXU).

Collections examined: 8 (recent: 1).

Ecology: Epiphytic or saxicolous herb in tropical semideciduous, humid montane, and secondary forests. Elevation 900–2,400 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Known from eight locations and five municipalities (AOO: 658.84 km^2) with a distribution in the regions Altas Montañas, Capital, and Nautla. The area concerned is under anthropogenic pressure resulting in strong deforestation.

Notes: See notes under *P. botterii*.

Peperomia macrostachyos (Vahl) A.Dietr., Sp. Pl. 1:149, 1831

Distribution: Mexico (CHIS, OAX, VER), Bolivia, Colombia, Costa Rica, Ecuador, Guatemala, Guyanas, Honduras, Nicaragua, Panama, Peru, Venezuela.

Representative specimens from Veracruz: San Andrés Tuxtla: G. Ibarra 3109 (CORU, EBT, MEXU, XAL). Soteapan: K. Taylor and M. Nee 103 (F). Teocelo: J. I. Calzada et al. 2264 (F, NY). Totutla: C. Durán and S. Avendaño 1090 (XAL).

Collections examined: 20 (recent: 0).

Ecology: Epiphytic pendent herb in tropical humid, tropical deciduous, humid montane, and pine-oak forests as well as in plantations. Elevation 100–800 m, exceptionally up to 1,450 m.

Conservation status: LC in Veracruz. Many records from the regions Altas Montañas, Capital, Los Tuxtlas, and Olmeca.

Notes: See notes under *P. granulosa*.

Peperomia maculosa (L.) Hook., Exot. Fl. 2 (1824):t. 92, [publ. 1825]

Distribution: Mexico (CHIS, OAX, PUE, SLP, VER), Belize, Bolivia, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Panama, Puerto Rico, Venezuela.

Representative specimens from Veracruz: Atzalan: T. Krömer et al. 3458 (MEXU, XAL). Chiconquiaco: C. Gutierrez 3534 (XAL). San Andrés Tuxtla: T. Krömer and A. Acebey 2216 (EBT, MEXU, SEL, XAL). Soteapan: A. Santos 100 (CIB, XAL). Tezonapa: R. Robles 278 (XAL).

Collections examined: 13 (recent: 4).

Ecology: Usually terrestrial or saxicolous, occasionally epiphytic herb, in tropical humid, tropical semi-deciduous, humid montane, and oak forests. Elevation 450–1,500 m.

Conservation status: LC in Veracruz. This species shows a wide distribution in the regions Altas Montañas, Capital, Los Tuxtlas, Nautla, and Olmeca. Although it is not frequently collected, there are several recent reports.

Notes: Edible, known as ''oreja de burro'' (donkey ear). Ornamental because of the large shiny leaves with white midrib. Medicinal use: treatment of erysipelas.

Peperomia magnoliifolia (Jacq.) A.Dietr., Sp. Pl. 1:153, 1831

Distribution: Mexico (CAMP, CHIS, HGO, OAX, PUE, QRO, QROO, SLP, TAB, TAM, VER), Belize, Brasil, Colombia, Costa Rica, Ecuador, Guatemala, Guyanas, Honduras, Nicaragua, Panama, Puerto Rico, Venezuela, Virgin Isl.

Representative specimens from Veracruz: Atoyac: R. Acevedo and M. E. Medina 34 (IEB, MEXU, MO, XAL). Chicontepec: M. Nee and K. Taylor 26033

(F, NY). Hidalgotitlán: P. E. Valdivia 1708 (IEB, ILL, MEXU, MO, XAL). Puente Nacional: T. B. Croat 44009 (BM, MEXU, MO). Santiago Tuxtla: J. H. Beaman 6407 (F, MEXU, MICH, U). Xico: D. Vergara and J. L. Salazar 70 (GENT, MEXU, XAL).

Collections examined: 47 (recent: 4).

Ecology: Epiphytic or terrestrial herb in tropical humid, tropical semi-deciduous, humid montane, and oak forests. Elevation 60–1,500 m.

Conservation status: LC in Veracruz. A frequently collected species with a wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Olmeca, and Sotavento.

Notes: Related species are *P. cobana*, *P. obtusifolia*, and *P. pseudoalpina*. See comments under *P. cobana*.

Peperomia matlalucaensis C.DC., Linnaea 37:375, 1872

Distribution: Mexico (CHIS, OAX, VER), Belize, Costa Rica, Honduras, Nicaragua, Panama.

Representative specimens from Veracruz: Catemaco: F. Ramírez 936 (XAL). San Andrés Tuxtla: T. Krömer and A. Acebey 2021 (EBT, MEXU, XAL).

Collections examined: 10 (recent: 3).

Ecology: Epiphytic herb in tropical humid forests. Elevation 75–740 m.

Conservation status: Endangered (EN) B2ab(ii,iii) in Veracruz. The species is rarely collected and is only known from two nearby municipalities (AOO: 104.90 km^2) in the region Los Tuxtlas. The area concerned is under anthropogenic pressure resulting in deforestation and changing land use.

Notes: Although this species shows rather elliptic to obovate leaves, its vegetative habit is somewhat similar to that of *P. rotundifolia*. Different from the latter is the presence of erect flowering branches with short internodes.

Peperomia mexicana (Miq.) Miq., Syst. Piperac. 75, 1843

Distribution: Mexico (CHIS, OAX, PUE, VER), Guatemala, Honduras.

Representative specimens from Veracruz: Altotonga: M. Nee and B. F. Hansen 18550 (F, MEXU). Atzalan: T. Krömer et al. 4022 (BR, GENT, MEXU). Las Choapas: E. Martínez and J. Vaquera 33807 (MEXU). Puente Nacional: M. E. Medina and F. Vázquez 840 (XAL). San Andrés Tuxtla: M.-S. Samain et al. 2007-115 (BR, GENT, MEXU). Totutla: R. Acevedo and J. L. Martínez 1344 (XAL).

Collections examined: 22 (recent: 3).

Ecology: Saxicolous herb in tropical humid, tropical deciduous, tropical semi-deciduous, and humid montane forests. Growing in a humid and shady environment, often near waterfalls. Elevation 80–1,250 m.

Conservation status: LC in Veracruz. Frequently collected species with recent records and a wide distribution in the regions de Altas Montañas, Capital, Los Tuxtlas, Nautla, Olmeca, and Sotavento.

Notes: A small and delicate geophytic *Peperomia*, characterized by its long deltoid leaves.

Peperomia monticola Miq., Syst. Piperac. 71, 1843

Distribution: Mexico (OAX, PUE, SLP, VER). Endemic.

Representative specimens from Veracruz: Orizaba: H. Galeotti 6023 (BR, G, MEXU, P, U).

Collections examined: 2 (recent: 0).

Ecology: Saxicolous and terrestrial, geophytic herb presumably in humid montane forests. Elevation at around 2,100 m.

Conservation status: Endangered (EN) B2ab(ii,iii) in Veracruz. A rare species with a limited distribution in the region Altas Montañas (AOO: 71.87 km^2). The area is one of the most altered and now devastated due to various anthropogenic factors. Specimens from Veracruz date back to 1840.

Notes: See notes under *P. bracteata*.

Peperomia nigropunctata Miq., Syst. Piperac. 188, 1843

Distribution: Mexico (CHIS, COL, GRO, JAL, OAX, PUE, TAB, TAM, VER), Belice, Costa Rica, El Salvador, Honduras, Caribbean islands, Nicaragua.

Representative specimens from Veracruz: Atoyac: E. Matuda 1463 (F, GH, MEXU, MICH, MO). Huayacocotla: F. Ramírez 589 (XAL). Jáltipan: A. Rincón et al. 1656 (MEXU, XAL). Jilotepec: S. Avendaño 42 (F, XAL). San Andrés Tuxtla: S. Sinaca 414 (EBT, ENCB, XAL).

Collections examined: 26 (recent: 0).

Ecology: Epiphytic herb in tropical humid, tropical semi-deciduous, humid montane, oak, and secondary forests. Elevation 80–1,300 m.

Conservation status: LC in Veracruz. A frequently collected species with a wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, and Olmeca.

Notes: See notes under *P. glabella*.

Peperomia obtusifolia (L.) A.Dietr., *Sp. Pl. 1:154, 1831*

Distribution: Mexico (CAMP, CHIS, GRO, NAY, OAX, PUE, QRO, QROO, SLP, TAB, VER), Belize, Bolivia, Brasil, Colombia, Costa Rica, Cuba, Ecuador, Guyanas, Honduras, Nicaragua, Peru, USA (Florida), Venezuela.

Representative specimens from Veracruz: Atzalan: F. Vázquez 2131 (XAL). Gutiérrez Zamora: E. Meza 594 (XAL). San Andrés Tuxtla: T. Krömer et al. 2348 (EBT, MEXU, SEL, XAL). Tlalnelhuayocan: T. Krömer et al. 3910 (BR, GENT, MEXU, XAL). Uxpanapa: T. Krömer et al. 3859 (BR, GENT, MEXU, XAL). Zontecomatlán: A. Rincón and C. Durán 1129 (XAL). Zongolica: J. L. Martínez and F. Vázquez 736 (XAL).

Collections examined: 188 (recent: 20).

Ecology: Epiphytic, terrestrial, or saxicolous herb in tropical humid, tropical deciduous, tropical semi-deciduous, humid montane, oak, and pine-oak forests, as well as in citrus and coffee plantations and secondary forests. Elevation 25–1,900 m.

Conservation status: LC in Veracruz. A frequently collected species with a wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Nautla, Olmeca, and Totonaca.

Notes: Related species are *P. cobana*, *P. magnoliifolia*, and *P. pseudoalpina*. See notes under *P. cobana*.

Peperomia occulta G. Mathieu, Rev. Mex. Biodiv. 82:368, 2011

Distribution: Mexico (CHIS, OAX, VER). Endemic.

Representative specimens from Veracruz: Uxpanapa: T. Krömer et al. 3873 (GENT, MEXU, XAL).

Collections examined: 1 (recent: 1).

Ecology: Saxicolous, geophytic herb, growing in limestone cracks, in tropical humid forests. Elevation at around 70 m. In Chiapas and Oaxaca, the reported elevation is 1,320-2,265 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Recorded recently from only one location in one municipality in Veracruz (AOO: 1,292.81 km^2). Despite the wide distribution of the vegetation type where it occurs, the species appears to be restricted to dark and shady habitats like cave entrances and narrow canyons. Occurs in the region Olmeca where it is under strong pressure due to various anthropogenic factors.

Notes: Recently described species from the state of Chiapas that also occurs in Oaxaca and Veracruz.

Peperomia parastriata G. Mathieu, Phytotaxa 205(4): 272, 2015

Distribution: Mexico (CHIS, OAX, VER). Endemic.

Representative specimens from Veracruz: Hidalgotitlán: T. Wendt and A. Villalobos 3901 (F). Jesús Carranza: M. Vázquez 2488 (CIB, XAL). Uxpanapa: T. Krömer et al. 3872 (BR, GENT, MEXU, XAL).

Collections examined: 10 (recent: 1).

Ecology: Epiphytic or terrestrial herb, growing in tropical humid and tropical semi-deciduous forests. Elevation 80–1,100 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Its distribution is limited to several municipalities in the Olmeca region (AOO: 1,756.20 km^2), which is prone to environmental degradation due to agroforestal activities and urban expansion. This species is considered as endemic to Mexico. However, on a global level, it was classified as LC because it is also registered by several recent collections from the neighboring states Chiapas and Oaxaca (Mathieu et al., 2015).

Notes: Shows characteristic compound inflorescences.

Peperomia pellucida (L.) Kunth, Nov. Gen. et Sp. 1:64, 1815

Distribution: Mexico (CAMP, CHIS, GRO, JAL, MEX, NAY, OAX, QROO, SIN, TAB, VER, YUC), Belize, Bolivia, Brazil, Burundi, Cameroon, Sri Lanka, Colombia, Congo, Costa Rica, Ecuador, Equat. Guinea, Fiji Isl., Gabon, Guatemala, Guyanas, Hawaiian Isl., Honduras, India, Indonesia, Jamaica, Kenia, Mozambique, New Guinea, Nicaragua, Nigeria, Oman, Panama, Peru, Samoa, Senegal, Solomon Isl., Tanzania, Venezuela, Vietnam, Zambia, Zimbabwe.

Representative specimens from Veracruz: Las Choapas: J. Dorantes et al. 2256 (MEXU, US). San Andrés Tuxtla: R. Dressler and Q. Jones 193 (F, GH, MEXU, MICH, NY, US). Zongolica: C. Weimann 25 (XAL).

Collections examined: 15 (recent: 0).

Ecology: Terrestrial annual herb in tropical humid and tropical semi-deciduous forests as well as coffee plantations, secondary forests, and road banks. Elevation 80–1,350 m.

Conservation status: LC in Veracruz. Although not frequently collected, it shows a wide distribution in the regions Altas Montañas, Los Tuxtlas, and Olmeca. It is easy to grow and is regularly seen as a weed in gardens.

Notes: Medicinal use: mainly antibacterial and wound healing capacities, but several other ones reported. Without doubt the most studied *Peperomia* species in phytomedical and phytochemical research.

Peperomia peltilimba C.DC. ex Trel., Bot. Gaz. 73:145, 1922

Distribution: Mexico (CHIS, GRO, OAX, QRO, VER), Costa Rica, Guatemala, Honduras, Nicaragua, Panama.

Representative specimens from Veracruz: Huayacocotla: F. Ramírez 524 (LPB). Misantla: M. Cházaro 2197 (IEB). San Andrés Tuxtla: T. Krömer et al. 2378 (EBT, XAL). Tlalnelhuayocan: T. Krömer et al. 3907 (BR, MEXU, XAL).

Collections examined: 14 (recent: 6).

Ecology: Epiphytic scandent herb in tropical humid and humid montane forests. Elevation 400–1,700 m.

Conservation status: Near Threatened (NT) in Veracruz. Although not very common, the species shows a wide distribution in the regions Capital, Huasteca, Los Tuxtlas, and Nautla. Not considered at risk, but deserving attention because of the pressure on its habitat and its attraction as a useful plant.

Notes: Edible, used as a condiment in several regions of the state. Commonly known as ''cilantro de monte'' (montane cilantro) or ''nacazgüillo.''

Peperomia petrophila C.DC., Linnaea 37:369, 1872

Distribution: Mexico (CHIS, GRO, OAX, VER), Belize, Guatemala, Honduras, Nicaragua, Panama, Venezuela.

Representative specimens from Veracruz: Huatusco: F. M. Liebmann 100 (C, F, G-DC, GH, K, P, UPS). San Andrés Tuxtla: M. Sousa 3575 (MEXU, US). Soteapan: R. Ortega et al. 1141 (F, XAL). Tenochtitlán: A. Rincón and C. Durán 2188 (XAL).

Collections examined: 11 (recent: 0).

Ecology: Epiphytic or saxicolous herb in tropical humid, tropical semi-deciduous, humid montane, and secondary forests. Elevation 1,250–1,500 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Known from 11 collections and four localities (AOO: 1,189 km^2). Distribution limited to the regions Altas Montañas, Los Tuxtlas, Nautla, and Olmeca. The areas are prone to deforestation due to anthropogenic factors.

Notes: A distinct species that cannot be confused with any other *Peperomia* from Veracruz. The unbranched erect stem, the lanceolate, long acuminate leaves, and the stout 1-2(-3) terminal spadices are typical.

Peperomia pringlei C.DC., Annuaire Conserv. & Jard. Bot. Genève 2:287, 1898

Distribution: Mexico (OAX, SLP, VER). Endemic.

Representative specimens from Veracruz: Calcahualco: J. L. Martínez and F. Vázquez 474 (XAL). Chiconquiaco: L. I. Nevling and A. Gómez-Pompa 9 (GH, XAL). Tancoco: R. Pérez 316 (MEXU, XAL).

Collections examined: 9 (recent: 2).

Ecology: Epiphytic herb in humid montane forests. Elevation 800–1,200 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii) in Veracruz. Known from nine collections and five municipalities (AOO: 937.56 km^2). Distribution limited to the regions Altas Montañas, Capital, and Huasteca. The area concerned is under anthropogenic pressure resulting in strong deforestation.

Notes: Characterized by a high degree of leaf dimorphism. Leaves are small at the base of the stem and large at the top.

Peperomia pseudoalpina Trel., Contr. U.S. Natl. Herb. 26(4):217, 1929

Distribution: Mexico (CHIS, HGO, OAX, PUE, VER), Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama.

Representative specimens from Veracruz: Atzalan: T. Krömer et al. 3377 (MEXU, SEL, XAL). Chocamán: M. Nee 23323 (F, NY, XAL). San Andrés Tuxtla: T. Krömer et al. 3658 (MEXU, SEL, XAL). Tatahuicapan de Juárez: T. Krömer et al. 3719 (MEXU, SEL, XAL). Teocelo: V. Vázquez 107 (F, NY, XAL).

Collections examined: 29 (recent: 10).

Ecology: Epiphytic, terrestrial, or saxicolous herb in tropical semi-deciduous and humid montane forests. Elevation 1,000–1,600 m.

Conservation status: LC in Veracruz. A frequently collected species with a wide distribution in the regions Altas Montañas, Capital, Los Tuxtlas, Nautla, and Olmeca.

Notes: Species resembling *P. cobana*, *P. magnoliifolia*, and *P. obtusifolia*. See notes under *P. cobana*.

Peperomia pseudopereskiifolia C.DC., Prodr. 16(1):448, 1869

Distribution: Mexico (CHIS, SLP, TAB, VER), Belize, Bolivia, Costa Rica, Cuba, Ecuador, Guatemala, Nicaragua, Peru.

Representative specimens from Veracruz: Hidalgotitlán: M. Nee 30010 (F, MO, NY). Misantla: R. Riba 282 (MEXU): San Andrés Tuxtla: M. Sousa 2097 (MEXU).

Collections examined: 7 (recent: 0).

Ecology: Epiphytic plant in tropical humid and secondary forests. Elevation 100–600 m.

Conservation status: Vulnerable (VU) B2ab (ii,iii) in Veracruz. Known from five locations and seven collections (AOO: 1,218 km^2) in the regions Los Tuxtlas, Nautla, and Olmeca, but none are of recent dates.

Notes: The species might be confused with other larger species with verticillate, coriaceous leaves like *P. angustata* and *P. rhexiifolia*. *Peperomia pseudopereskiifolia* shows large leaves that are somewhat greyish when dried. They usually are opposed along the stem and 3-verticillate in the most apical node.

Peperomia quadrifolia (L.) Kunth, Nov. Gen. et Sp. 1:69, 1815 (Figure 1(g))

Distribution: Mexico (CAMP, CDMX, CHIS, DUR, GRO, JAL, MEX, MICH, MOR, OAX, PUE, QRO, SLP, TAM, VER), Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Guyana, Hispaniola, Honduras, Jamaica, Nicaragua, Panama, Peru, Puerto Rico, Venezuela.

Representative specimens from Veracruz: Calcahualco: D. Jimeno et al. 527 (BR, GENT, MEXU, XAL). Catemaco: A. Gentry and M. Lott 32430 (MEXU). Huayacocotla: L. Ballesteros and H. Morales 385 (MEXU). Ixhuacán de los Reyes: D. Vergara et al. 73 (XAL, XALU). Tatahuicapan de Juárez: T. Krömer et al. 3606 (BR, MEXU, SEL, XAL). Tenochtitlán: A. Rincón and C. Durán 2165 (XAL).

Collections examined: 127 (recent: 23).

Ecology: Epiphytic, terrestrial, or saxicolous herb in tropical humid, tropical semi-deciduous, humid montane, oak, and pine-oak forests as well as in secondary forests and riparian habitats. Elevation 300–2,900 m.

Conservation status: LC in Veracruz. Frequently collected species. It shows a wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Nautla, and Olmeca and is reported from highly populated areas.

Notes: Shows (3)-4-verticillate leaves, with obtuse, emarginate apex, and solitary, terminal inflorescences. See notes under *P. conocarpa*.

Peperomia rhexiifolia C.DC., DC. Prodr. 16(1):460, 1869 (Figure 1(f))

Distribution: Mexico (CHIS, OAX, PUE, VER), Bolivia, Colombia, Costa Rica, Ecuador, Nicaragua, Panama, Peru, Venezuela.

Representative specimens from Veracruz: Atzalan: T. Krömer et al. 4020 (BR, GENT, MEXU). Coatepec: D. Vergara and I. García 025 (BR, GENT, MEXU, MO, XAL, XALU). Huatusco: M. Nee and K. Taylor 28891 (F, GH, NY, US, XAL). Huayacocotla: L. G. Juárez and F. Vázquez 40 (F, XAL).

Collections examined: 15 (recent: 8).

Ecology: Epiphytic and/or terrestrial herb, which often appears as shrub, in humid montane and oak forests. Elevation 1,250–1,950 m.

Conservation status: LC in Veracruz. Although infrequently collected, it is known from several recent collections and shows a wide distribution in the regions Altas Montañas, Capital, Huasteca, and Nautla.

Notes: Because of its size, it is sometimes confused with a *Piper* species. It is the largest *Peperomia* species in Veracruz.

Peperomia rotundifolia (L.) Kunth, Nov. Gen. et Sp. 1:65, 1815

Distribution: Mexico (CHIS, COL, GRO, HGO, JAL, MICH, OAX, PUE, SLP, TAB, VER), Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Guyana, Hispaniola, Honduras, Jamaica, Martinique, Nicaragua, Paraguay, Peru, Surinam, USA (Florida), Venezuela.

Representative specimens from Veracruz: Atzalan: T. Krömer et al. 3349 (MEXU, XAL). Córdoba: F. Ventura 16245 (ENCB, IEB, MEXU, XAL). Coxquihui: E. Evangelista and M. Mendoza 44 (MEXU). Minatitán: T. Wendt and A. Villalobos 2555 (F). San Andrés Tuxtla: T. Krömer and A. Acebey 2068 (EBT, MEXU, XAL). Teocelo: F. Ventura 5274 (ENCB, MICH, NY).

Collections examined: 56 (recent: 6).

Ecology: Epiphytic repent herb in tropical humid, tropical semi-deciduous, humid montane, and oak forests as well as in secondary forests and citrus and coffee plantations. Elevation 60–1,600 m.

Conservation status: LC in Veracruz. A frequently collected species with wide distribution in the regions Altas Montañas, Capital, Los Tuxtlas, Nautla, Olmeca, and Totonaca.

Notes: Edible; used as condiment. In some regions, it is known as ''caminante'' (walker).

Peperomia rupigaudens C.DC., Annuaire Conserv. & Jard. Bot. Genève 21:219, 1920

Distribution: Mexico (PUE, VER). Endemic.

Representative specimens from Veracruz: Calcahualco: J. L. Martinez and J. L. Garcia 1155 (XAL). Las Minas: E. Duran and P. Burgos 558 (MEXU, XAL). Villa Aldama: M. Nee 32888 (F, HUA, NY, XAL).

Collections examined: 7 (recent: 1).

Ecology: Small caespitose herb, usually saxicolous, sometimes on tree trunks, occurring in pine-oak forests. Elevation in Veracruz 2,270–2,570 m, the type from Puebla (ca. 100 km from border with Veracruz) collected at ca. 2,750 m.

Conservation status: Endangered (EN) B2ab(ii,iii) in Veracruz. Its distribution is limited to three locations (AOO: 339.76 km^2) in the regions Altas Montañas and Capital. The landscape in these areas has dramatically changed due to urban expansion.

Notes: To be distinguished from *P. hoffmannii* and *P. edulis*. See notes under *P. edulis*.

Peperomia sanjoseana C.DC., Linnaea 37:372, 1872 (Figure 1(h))

Distribution: Mexico (CHIS, GRO, JAL, OAX, PUE, TAM, VER), Costa Rica, Guatemala, Honduras.

Representative specimens from Veracruz: Acajete: D. Vergara and J. L. Salazar 19 (BR, GENT, MEXU, XAL). Banderilla: T. Krömer et al. 3745 (BR, ENCB, MEXU, XAL). Chocamán: M. Nee 23332 (F, NY). Huayacocotla: R. Hernández and B. Rosales 1556 (F). San Andrés Tuxtla: T. Krömer and A. Acebey 2439 (EBT, MEXU, XAL). Tatahuicapan de Juárez: T. Krömer et al. 3720 (MEXU, XAL). Yecuatla: M. Nee et al. 26361 (F, G, NY).

Collections examined: 62 (recent: 15).

Ecology: Epiphytic or terrestrial herb in tropical humid, tropical deciduous, tropical semi-deciduous, humid montane, oak, and pine-oak forests. Elevation 300–2,300 m.

Conservation status: LC in Veracruz. A frequently collected species with a wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Nautla, and Olmeca.

Notes: See notes under *P. dendrophila*.

Peperomia schiedei C.DC., Candollea 1:340, 1923

Distribution: Mexico (VER). Endemic.

Representative specimens from Veracruz: Xalapa: G. Schiede 6 (MO, P).

Collections examined: 1 (recent: 0).

Ecology: Epiphytic herb in humid montane forests. Elevation at around 1,400 m.

Conservation status: Critically Endangered (CR) B2ab(ii,iii). Known from one collection only with two specimens (AOO: 5.96 km^2), made between 1896 and 1902 around Xalapa and Coatepec in the region Capital. Due to population growth, much of the humid montane forest of this region has been altered, resulting in environmental degradation and decline in native species.

Notes: Very similar to *P. tlapacoyoensis*. That species shows pubescent leaves, whereas *P. schiedei* exhibits glabrous leaves. We recommend to establish the current distribution of the species and to take measures for its protection.

Peperomia subblanda C.DC., Annuaire Conserv. & Jard. Bot. Genève 21:320, 1920

Distribution: Mexico (CHIS, HGO, NL, OAX, PUE, SLP, TAM, VER). Endemic.

Representative specimens from Veracruz: Actopan: R. Acosta and G. Castillo 964 (IEB, MEXU, XAL). Calcahualco: J. L. Martínez and F. Vázquez 500 (IBUG, IEB, MEXU, XAL). Chicontepec: R. Hernández and I. Hernández 14 (XAL).

Collections examined: 13 (recent: 2).

Ecology: Epiphytic herb in tropical deciduous and pine-oak forests. Elevation 150–2,000 m.

Conservation status: Endangered (EN) B2ab(ii,iii) in Veracruz. Known from 13 collections made in five localities in five municipalities (AOO: 123.61 km^2) of the regions Altas Montañas, Capital, and Huasteca where forest vegetation is threatened by changing land use.

Notes: See notes under *P. botterii*.

Peperomia tenerrima Schltdl. & Cham., Linnaea 6:353, 1831

Distribution: Mexico (CHIS, HGO, MEX, OAX, PUE, VER), Guatemala, Honduras, Nicaragua.

Representative specimens from Veracruz: Coscomatepec: E. Matuda 1323 (GH, MEXU, MICH, MO, US). Huayacocotla: M. Nee and K. Taylor 26916 (F, MEXU, NY, XAL). Mecayapan: F. Ramírez 845 (XAL). San Andrés Tuxtla: T. Krömer and A. Acebey 2092 (EBT, MEXU, XAL). Tlalnelhuayocan: T. Krömer et al. 3903 (BR, GENT, MEXU, XAL). Yecuatla: M. Vázquez 1864 (ENCB, MEXU).

Collections examined: 51 (recent: 18).

Ecology: Epiphytic herb in tropical semi-deciduous, humid montane, and pine-oak forests. Elevation 1,000–2,250 m.

Conservation status: LC in Veracruz. Frequently collected species with wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Nautla, and Olmeca.

Notes: Small, delicate plant with verticillate leaves and terminal, solitary inflorescences.

Peperomia tetraphylla Hook. & Arn., Bot. Beechey Voy. 2:97, 1832

Distribution: Mexico (CHIS, CDMX, COL, GRO, HGO, JAL, MEX, MICH, MOR, OAX, PUE, QRO, SIN, VER), Argentina, Australia, Belize, Bolivia, Brazil, Cameroon, Burundi, China, Colombia, Congo, Costa Rica, Cuba, Ecuador, El Salvador, Equat. Guinea, Ethiopia, Guatemala, Guyana, Hispaniola, Honduras, India, Indonesia, Comores Isl., Hawaiian Isl., Norfolk Isl., Jamaica, Kenya, Madagascar, Malawi, Malaysia, Martinique, Mauritius, Mozambique, Nepal, New Caledonia, New Guinea, New Zealand, Nicaragua, Panama, Paraguay, Peru, Philippines, Puerto Rico, Reunion, Sierra Leona, South Africa, Sri Lanka, Sudan, Sunda Isl., Taiwan, Tanzania, Thailand, Trinidad, Uganda, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe.

Representative specimens from Veracruz: Atzalan: T. Krömer et al. 3416 (MEXU, SEL, XAL). Huayacocotla: F. Ramírez 590 (XAL). Las Minas: C. Durán and S. Avendaño 1122 (MEXU, XAL). San Andrés Tuxtla: T. Krömer and A. Acebey 2091 (EBT, MEXU, SEL). Soteapan: M. Leonti et al. 593 (MEXU). Zongolica: T. Krömer et al. 3818 (BR, GENT, MEXU, XAL).

Collections examined: 71 (recent: 19).

Ecology: Epiphytic herb in tropical humid, tropical deciduous, tropical semi-deciduous, humid montane, oak, and pine-oak forests, as well as in coffee plantations, secondary forests, and riparian habitats. Elevation 750–2,100 m.

Conservation status: LC in Veracruz. Frequently collected species with wide distribution in the regions Altas Montañas, Capital, Huasteca, Los Tuxtlas, Nautla, and Olmeca.

Notes: One of the main characteristics are the 4-verticillate rhombic leaves with parallel, adaxially whitish nerves. Medicinal use: treatment of rheumatism.

Peperomia tlapacoyoensis C.DC., *Linnaea 37:376, 1872*

Distribution: Mexico (CHIS, GRO, JAL, MICH, NAY, OAX, SLP, TAM, VER), Guatemala, Honduras, Nicaragua.

Representative specimens from Veracruz: Coatepec: M. Nee and K. Taylor 26025 (F, MO, NY, XAL). Jalcomulco: G. Castillo 3021 (ENCB, MEXU, XAL). Misantla: L. A. Pérez 25 (IEB, MEXU). Omealca: P. E. Valdivia 2203 (ENCB).

Collections examined: 11 (recent: 0).

Ecology: Epiphytic repent herb in tropical humid and tropical deciduous forests. Elevation 340–1,200 m.

Conservation status: Endangered (EN) B2ab(ii,iii) in Veracruz. Its distribution, limited to six locations (AOO: 188.30 km^2) in the regions Altas Montañas, Capital, and Nautla and no recent collections are known. The landscape in these areas has dramatically changed due to urban expansion.

Notes: One of the several species with pendent or creeping habit and alternate ovate leaves with acute to acuminate apex. Plants are distinct according to the rather succulent stems and the densely pilose and long petiolate leaves. See notes under *P. schiedei*.

Peperomia tuerckheimii C.DC., Annuaire Conserv. & Jard. Bot. Genève 2:279, 1898

Distribution: Mexico (CHIS, MEX, MOR, VER), Costa Rica, Guatemala, Panama.

Representative specimens from Veracruz: Ixtaczoquitlán: M.-S. Samain et al. 2007-107 (BR, GENT, MEXU). Totutla: R. Acevedo and J. L. Martínez 1345 (XAL). Xico: M. Nee and K. Taylor 26254 (F).

Collections examined: 12 (recent: 2).

Ecology: Epiphytic and saxicolous herb in humid montane forests. Elevation 900–1,650 m.

Conservation status: Near Threatened (NT) in Veracruz. Although known from two recent collections, it is not frequently collected and its distribution is limited to the regions Altas Montañas and Capital, where the vegetation is under strong anthropogenic pressure.

Notes: Small delicate plant with contorted rhizomatous stems. Distinctly smaller than other rhizomatous species that occur in Veracruz.

Peperomia urocarpoides C.DC., Candollea 1:362, 1923

Distribution: Mexico (CHIS, PUE, TAB, VER), Belize, Colombia, Costa Rica, Guatemala, Honduras, Nicaragua, Panama.

Representative specimens from Veracruz: Catemaco: T. Krömer et al. 3902 (BR, GENT, MEXU, XAL). Minatitlán: T. Wendt 2687 (ENCB, F, MEXU). San Andrés Tuxtla: T. Krömer et al. 3660 (BR, GENT, MEXU, XAL).

Collections examined: 39 (recent: 8).

Ecology: Epiphytic repent herb in tropical humid, tropical semi-deciduous, humid montane, and oak forests. Elevation 20–1,120 m.

Conservation status: LC in Veracruz. Frequently collected species with wide distribution in the regions Los Tuxtlas and Olmeca.

Notes: Many collections from Veracruz have been identified as *P. urocarpa*, an exclusively South American species.

Peperomia vazquezii G. Mathieu & D. Vergara-Rodríguez, Phytotaxa 205(4):273, 2015 (Figure 1(i))

Distribution: Mexico (VER). Endemic.

Representative specimens from Veracruz: Hidalgotitlán: M. Vázquez 1621 (IBUG, IEB, XAL). Minatitlán: T. Wendt et al. 2914 (F). Uxpanapa: T. Krömer et al. 3854 (BR, MEXU, XAL).

Collections examined: 7 (recent: 2).

Ecology: Saxicolous herb, occurring in tropical humid forests, growing under rather moist conditions on limestone rocks. Elevation 130–250 m.

Conservation status: Vulnerable (VU) B2ab(ii,iii). Due to its distribution limited to three municipalities in the Olmeca region (AOO: 1,292.81 km^2), which are under high environmental pressure due to deforestation and land use changes. Currently, it is considered endemic to Veracruz. However, it is very likely to be found in the neighboring states of Chiapas and Oaxaca, too (Mathieu et al., 2015).

Notes: To be distinguished from two other rhizomatous species of similar size that occur in Veracruz. First, *P. asarifolia* which shows suborbicular leaves with a cordate base and thicker spadices, and second, *P. hobbitoides* which is characterized by pubescent leaves and a strong cilantro smell when crushed.

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