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THALES SILVA COUTINHO

TAXONOMIA DE *WALTHERIA* L. (BYTTNERIOIDEAE, MALVACEAE) NO BRASIL

Recife
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Orientador: Dr. Marccus Vinícius da Silva Alves

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Área de Concentração: Sistemática e Evolução

Tese apresentada e aprovada pela banca examinadora em 27/04/2021

Dr. Marccus Vinícius da Silva Alves (Orientador)

Universidade Federal de Pernambuco

Dra. Marília Cristina Duarte (Examinadora externa)

Universidade de Mogi Guaçu

Dra. Valéria da Silva Sampaio (Examinadora externa)

Universidade Estadual do Ceará

Dra. Maria Regina de Vanconcellos Barbosa (Examinadora interna)

Universidade Federal da Paraíba

Dr. Victor Martins Gonçalez (Examinador externo)

Colégio Novo Espaço

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“Sou de uma terra que o povo padece
Mas não esmorece e procura vencer”

Patativa do Assaré

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RESUMO

Waltheria L. é um gênero de plantas heterostílicas atualmente circunscrito à família Malvaceae e subfamília Byttnerioideae, com distribuição majoritariamente em regiões tropicais, sendo o Brasil o principal centro de diversidade e endemismo. O objetivo deste trabalho é realizar um estudo taxonômico das espécies brasileiras do gênero, fornecendo uma listagem atualizada dos representantes no país, bem como informações sobre nomenclatura, morfologia, distribuição e conservação. O estudo foi realizado mediante análises de protólogos, exemplares físicos e imagens online de exsicatas contidos em diversos herbários nacionais e internacionais, além de espécimes coletados. Um total de 36 espécies de *Waltheria* é registrado para o Brasil, cujas espécies distribuem-se preferencialmente em áreas de Cerrado e Caatinga. Ao longo desta pesquisa, *W. biribiriensis*, *W. glabribracteata*, *W. marielleae*, *W. mixta*, *W. saundersiae* e *W. terminans* foram novas espécies descritas, e *W. carmensarae* e *W. glomerata* tem sua área de distribuição geográfica expandida para o Brasil. As flores brevistílicas de *W. hoehnei* e longistílicas de *W. hatschbachii* são apresentadas pela primeira vez. Quatro espécies são homostílicas e o restante distílica, com *W. glabribracteata* a única conhecida por suas flores longistílicas. *Waltheria eriocladа* é reconhecida como um nome aceito, anteriormente sinônimo de *W. indica*. O Sudeste é a região com maior índice de ocorrência e endemismo, com 23 spp. e nove endêmicas, algumas delas ocorrendo apenas em campos rupestres de Minas Gerais. *Waltheria cinerascens*, *W. communis* e *W. indica* são as espécies mais polimóficas, e merecem mais atenção quanto à estudos taxonômico-integrativos. Seis nomes são considerados sinônimos, e 24 lectótipos são designados. Quatorze espécies são sinalizadas como sofrendo algum grau de ameaça segundo a IUCN. *Waltheria* não tem sido estudado do ponto de vista taxonômico nos últimos anos no Brasil, e sua diversidade tem sido subestimada. Este trabalho mostra que um olhar mais acurado sobre essas espécies tem revelado ainda questões a serem resolvidas, desde a morfologia até sua nomenclatura.

Palavras-chave: campo rupestre; cerrado; Hermannieae; heterostilia; sistemática.

ABSTRACT

Waltheria L. is a heterostylous plant genus currently circumscribed to the Malvaceae family and subfamily Byttnerioideae, with distribution mainly in tropical regions, with Brazil being the main center of diversity and endemism. The aim of this work is to carry out a taxonomic study of the Brazilian species of the genus, providing an updated list of representatives in the country, as well as information on nomenclature, morphology, distribution and conservation. The study was carried out through analyzes of protologues, physical specimens and online images of exsiccates contained in several national and international herbariums, in addition to collected specimens. A total of 36 species of *Waltheria* are registered for Brazil, whose species are preferably distributed in areas of Cerrado and Caatinga. Throughout this research, *W. biribiriensis*, *W. glabribracteata*, *W. marielleae*, *W. mixta*, *W. saundersiae* and *W. terminans* were new species described, and *W. carmensarae* and *W. glomerata* has their geographical range expanded to Brazil. The brevistylous flowers of *W. hoehnei* and longistylous flowers of *W. hatschbachii* are presented for the first time. Four species are homostylous and the rest distylous, with *W. glabribracteata* the only one known for its longistylous flowers. *Waltheria eriocladа* is recognized as an accepted name, previously synonymous with *W. indica*. The Southeast is the region with the highest rate of occurrence and endemism, with 23 spp. and nine endemics, some of them occurring only in campo rupestre from Minas Gerais. *Waltheria cinerascens*, *W. communis* and *W. indica* are the most polymophical species and deserve more attention regarding taxonomic-integrative studies. Six names are considered synonyms, and 24 lectotypes are designated. Fourteen species are identified as suffering some degree of threat according to the IUCN. *Waltheria* has not been studied from a taxonomic point of view in recent years in Brazil, and its diversity has been underestimated. This work shows that a more accurate look at these species has revealed issues to be resolved, from the morphology to their nomenclature.

Keywords: campo rupestre; cerrado; Hermannieae; heterostyly; systematic.

SUMÁRIO

1 INTRODUÇÃO

Waltheria L. foi proposto em 1753 por Lineu com duas espécies, *W. americana* L. e *W. indica* L. O gênero é um dos poucos representantes de Malvaceae com flores heterostílicas, um fenômeno onde o comprimento dos estames e estiletes diferem de acordo com o morfo floral, com indivíduos portando apenas flores longistílicas (estiletes mais longos que os estames) ou brevistílicas (estiletes mais curtos que os estames). Embora bem representado em coleções de herbários, estudos taxonômicos envolvendo estas espécies ainda são escassos, e mesmo aqueles mais existentes, nunca foram publicados, principalmente sobre as espécies do Brasil, onde muitos táxons permanecem pouco conhecidos e sua delimitação morfológica ainda seja frágil.

O objetivo desta tese foi apresentar um estudo taxonômico do gênero *Waltheria* no Brasil, em uma abordagem morfológica e nomenclatural, fornecendo descrições completas para as espécies citadas para o país, uma chave de identificação atualizada, ilustrações, mapas de distribuição geográfica, e status de conservação. Para esta finalidade foram realizadas expedições de campo, bem como análise de cerca de 7000 exemplares contidos em diversos acervos nacionais e internacionais, incluindo espécimes-tipos, e análise de protólogos a fim de resolver quaisquer questões sobre a nomenclatura do grupo.

Os resultados obtidos são apresentados em cinco capítulos, com quatro já publicados, como segue:

Artigo 1: **A new distylous *Waltheria* L. (Byttnerioideae, Malvaceae) from the state of Bahia, Brazil.** Publicado no periódico Systematic Botany 44 (3): 681–685, 2019. Este artigo apresenta uma nova espécie de *Waltheria* endêmica do estado da Bahia.

Artigo 2: **Primer registro de *Waltheria glomerata* (Malvaceae) para Brasil.** Publicado no periódico Revista Mexicana de Biodiversidad 90: e902821, 2019. Traz a primeira ocorrência de *W. glomera* para o Brasil, no estado do Mato Grosso.

Artigo 3: ***Waltheria glabribracteata* (Byttnerioideae, Malvaceae), a new species with elongate-plumose stigmas from South America.** Publicado no periódico Phytotaxa 430 (4): 294–299, 2020. Apresenta uma nova espécie de *Waltheria* ocorrente longistílica do Brasil e Bolívia.

Artigo 4: **Novelties in Brazilian *Waltheria* L. (Byttnerioideae, Malvaceae): two new species and one re-establishment.** Publicado no periódico Acta Botanica Brasilica 34 (3): 449–459, 2020.

Artigo 5: **Taxonomy of *Waltheria* L. (Byttnerioideae, Malvaceae) from Brazil** – neste trabalho descrições completas, tipificações, sinonimizações, dados sobre conservação, morfologia e distribuição geográfica são fornecidas. A ser submetido ao periódico Phytotaxa.

2 REFERENCIAL TEÓRICO

2.1 BREVE HISTÓRICO E CLASSIFICAÇÃO DE *WALTHERIA* L.

O gênero *Waltheria* L. foi proposto por Linnaeus em 1753 na obra *Species Plantarum*, com duas espécies, *W. americana* L. e *W. indica* L. (LINNAEUS, 1753). Posteriormente, o primeiro nome foi sinonimizado sob o último por Brown (1818), com Saint-John (1976) fornecendo uma breve avaliação sobre os mesmos. O nome genérico foi dado em homenagem ao seu contemporâneo Augustin F. Walther, de Leipzig (VERDOORN, 1981).

Waltheria foi posicionada na antiga família Sterculiaceae (DC.) Bartling por Schumann (1886). Anteriormente, Brown (1814) propôs a família Byttneriaceae R. Br., onde *Waltheria* foi posicionada; Marquis (1820) descreveu Hermanniaceae Marquis alocando *Waltheria* junto de *Hermannia* L. e *Sterculia* L.; De Candolle (1824) aceitou a classificação de Robert Brown e posicionou novamente o gênero em Byttneriaceae, mas também propondo a tribo Hermannieae DC., onde *Waltheria* foi incluída com *Melochia*, *Riedleia* DC., *Altheria* Thouars (os dois sinônimos de *Melochia*), *Hermannia* e *Mahernia* L. (= *Hermannia*). Atualmente, *Waltheria* pertence à Malvaceae, subfamília Byttnerioideae e subtribo Hermannieae (BAYER et al., 1999; WHITLOCK et al., 2001).

O gênero não tem sofrido alterações quanto a sua circunscrição, todavia, Forster e Forster & Fortser (1776) descreveram *Lophanthus* J.R. Forst. & G. Forst. (não *Lophanthus* Adans., Lamiaceae) com uma espécie, *L. tomentosus*, e Sprengel (1822) descreveu *Astropus* Spreng. incluindo apenas *A. tomentosus*, que mais tarde foram listados sob a sinonímia de *Waltheria* (SCHUMANN, 1886). Já Bailey (1941) segregou *Waltheria involucrata* Benth. e descreveu *Sitella* L.B. Bailey, combinando aquela espécie sob *S. involucrata* (Benth.) L.B. Bailey, alegando que o hábito "arbóreo" (assim chamado por ele) bem como as brácteas totalmente fundidas em um invólucro eram caracteres suficientes para esta separação. No entanto, Berry (2007) sinonimizou o novo gênero de Bailey sob *Waltheria*. Além disso, poucas espécies têm sido descritas em outros gêneros, a exemplo de *W. berteroi* (Spreng.) J.G. Saunders em *Malachra berteroi* Spreng. (como *"berterii"*) (SAUNDERS, 2005; SPRENGEL, 1826), *W. operculata* Rose em *Turnera valleana* Standl. & L.O. Williams (SAUNDERS, 2007; STANDLEY & WILLIAMS, 1950), e *W. scabra* (Colla) P.L.R. Moraes & Guglielmone em *Visenia scabra* Colla (COLLA, 1833; DE MORAES et al., 2013).

Schumann (1886) foi o primeiro autor a propor uma classificação infragenérica para *Waltheria*, o dividindo em duas seções, baseadas no tipo de deiscência das cápsulas (loculicida

ou operculada), comprimento das flores (até 7 mm ou ultrapassando os 8 mm), indumento da semente e tipo de estigma (embora estes últimos não mencionados simultaneamente nas duas seções). Em *Waltheria* sect. *Stegowaltheria* K. Schum., ele incluiu apenas *W. bracteosa* A. St.-Hil. & Naudin e *W. macropoda* Turcz. como as duas únicas espécies com flores com mais de 8 mm comprimento, estigma plumoso e cápsula com deiscência operculada. Em *W.* sect. *Waltheria* (como *Euwaltheria*) incluiu outras 19 espécies com flores atingindo até 7 mm comprimento, cápsulas com deiscência loculicida e sementes glabras, mas sem referência à morfologia do estigma. Outras cinco espécies não foram classificadas e foram mantidas como *incertae sedis.* Posteriormente ao grande estudo de Schumann (1886), Rose (1899) descreveu *W. operculata* do México e a classificou sob *W.* sect. *Stegowaltheria*, adicionando à seção as estípulas designadas como grandes e amplas como característica útil nesta separação, ao passo que para outras espécies da América do Norte ele agregou as estípulas filiformes à seção *Waltheria*.

Saunders (1995) também propôs uma classificação infragenérica baseada em dados de morfologia e grãos de pólen, dividindo o gênero em três subgêneros, duas seções, e outros agrupamentos menos inclusivos, como alianças e grupos de espécies. Apesar desse esforço os dados gerados pela autora não foram publicados.

O gênero é representado por plantas subarbustivas ou arbustivas, e ervas eretas ou prostradas, as folhas com lâminas serreadas, presença de estípulas, inflorescências axilares ou terminais, geralmente condensadas, flores heterostílicas, bractéolas ladeando um par de flores geralmente sésseis, sépalas fundidas e persistentes, tubo campanulado ou tubular, pétalas geralmente amarelas, planas, aderentes ao tubo estaminal na base, cinco estames com filamentos formando um tubo, estaminódios ausentes, gineceu formado por um único carpelo, ovário unilocular, estigma clavado a plumoso, o fruto tipo cápsula, envolvida pelo cálice persistente, com deiscência longitudinal ou operculada, com uma a raramente 2 sementes (BAYER & KUBITZKI, 2003; COUTINHO & ALVES, 2020; SAUNDERS, 2007).

2.2 DIVERSIDADE DE *WALTHERIA* L.

Waltheria compreende cerca de 60 espécies, das quais 53 ocorrem no continente americano (SAUNDERS, 2007), com *W. indica* a única espécie Pantropical (RONDÓN, 2008). Para a região paleotropical, destacam-se as endêmicas *W. lanceolata* R. Br. ex Master (oeste da África), *W. madagascariensis* Hochreutiner (Madagascar), *W. tomentosa* (Ilhas Marquesas), e *W. virgata* Ewart & Cookson (Austrália) (SAUNDERS, 2011). Nas América do Norte, *W.*

arenaria Ridley do Haiti e Malásia, e *W. pyrolifolia* A. Gray no Havaí, são espécies pouco conhecidas (SAUNDERS, 2011).

O Brasil e o México são os dois centros de diversidade e endemismo para o gênero, com o primeiro aquele com maior número de espécies (SAUNDERS, 2005; 2007). Para o México, 12 espécies são reconhecidas por Saunders (1993), com nove delas endêmicas. Seguindo os dados mais atuais disponíveis para o Brasil (COUTINHO et al., 2020), 27 espécies têm sido registradas, com 18 delas endêmicas. Todavia, recentemente Saunders (2021) descreveu cinco novas espécies endêmicas ao país, totalizando atualmente 32 espécies brasileiras, com 23 endêmicas. Coutinho et al. (2020) afirmaram ainda que as espécies ocorrem primariamente em áreas de Cerrado, mas também com número representativo na Caatinga. Esse padrão de distribuição pode ser observado de maneira geral em Colli-Silva e Pirani (2020), que estimaram biorregiões em representantes de Byttnerioideae e outras subfamílias relacionadas.

2.3 ESTUDOS TAXONÔMICOS E/OU REVISIONAIS

Estudos com maior representatividade de espécies são aqueles da região neotropical, onde o maior número de espécies pode ser encontrado, no entanto, para o Velho Mundo podem ser citados aqueles de Masters (1868) para a África tropical, Verdoorn (1981) para a África do Sul, e Arènes (1959) na Flora de Madagascar.

Nas Américas, Rose (1899) monografou dez espécies para a América do Norte, o mesmo número registrado por Standley (1920) para o México. Saunders (1993) adicionou quatro novas espécies mexicanas para o país, mas reconheceu 13 espécies para o México e América central. Standley e Steyermark (1949) registraram apenas *W. americana* (= *W. indica*) para a Guatemala. Robyns (1964) citou duas espécies para o Panamá. Baksh-Comeau et al. (2016) apontaram a ocorrência somente de *W. indica* para Trinidad e Tobago. Saunders (2005a) registrou para a flora da Guiana Venezuelana nove táxons. Rondón e Campos (2007) citaram dez espécies para Venezuela, e no ano seguinte Rondón (2008), em uma revisão taxonômica, reportou também, dez espécies. Saunders (2007) registrou oito espécies para a Flora do Paraguai. Para o Peru, Macbride (1954) registrou duas espécies. Na Bolívia, atualmente o país conta com sete espécies (TROPICOS, 2021).

No Brasil, como estudos mais abrangentes destacam-se aqueles de Saint-Hilaire (1825) que reportou dez espécies para o Sudeste do país, sendo oito descritas por ele. Schumann (1865) forneceu a primeira grande monografia para o gênero no país na *Flora Brasiliesnsis*. Na época, ele registrou 26 espécies, nove descritas por ele, além de nove novas variedades. A contribuição mais recente e robusta envolvendo o gênero foi realizada por Saunders (1995), que revisou a

taxonomia de *Waltheria* em sua quase totalidade, reconhecendo 30 espécies brasileiras. Neste trabalho, no entanto, Saunders não fornece ilustrações para todas as espécies, apenas para as novas descritas por ela, e apenas uma pequena parte de seus resultados foi efetivamente publicada, embora a maioria voltada às novidades taxonômicas (SAUNDERS, 2005b, 2005c, 2011, 2021), deixando de lado problemas nomenclaturais e de taxonomia geral, especialmente voltados aos nomes citados para o Brasil.

Outros estudos sobre o gênero foram realizados através de floras e/ou listagens de espécies da família ou subfamília, com abrangência local (ALVES et al. 2011; AMORIM et al., 2009; COLLI-SILVA et al. 2019; SAUNDERS, 2006; LIMA et al., 2019; SAUNDERS, 1995a), estadual (AMORIM, 2013; CRUZ & ESTEVES, 2009; REIS et al., 2011), ou regional (DORR, 2006). Listas de espécies foram apresentadas em nível nacional por Esteves (2010), e por Coutinho et al. (2020a). Novidades taxonômicas e de distribuição geográfica tem sido recentemente apresentadas em Saunders (2021).

2.4 FILOGENIA

Não existem estudos filogenéticos com foco no gênero *Waltheria*, e mesmo aqueles em que o gênero é incluído são escassos (WHITLOCK et al., 2001). O estudo mais específico foi realizado por Whitlock et al. (2001) em uma análise filogenética molecular da subfamília Byttnerioideae utilizando o loci plastidial *ndhF*. Neste trabalho os autores incluíram apenas uma espécie de *Waltheria* nas análises e sugeriram o monofiletismo de Hermannieae, cujos representantes compartilhavam as pétalas amplas e planas, cinco estames e ausência de estaminódio. Devido à única amostra de *Waltheria* nas análises, nenhuma inferência sobre seu monofiletismo pôde ser feita.

2.5 HETEROSTILIA EM *WALTHERIA* L.

A denominação heterostilia foi cunhada por Hildebrand (1867), e é definida como um polimorfismo geneticamente controlado em que algumas populações de plantas de algumas famílias de Angiospermas possuem dois (distílico) ou três (tristílico) morfos reciprocamente diferentes quanto à altura dos estames e estigmas nas flores (BARRET, 1992; BRAMOW et al., 2013), sendo a distilia o tipo mais comum (WELLER, 2009). A principal função é prevenir a fertilização auto e intramorfos (BARRET, 1992), logo, essas populações experimentam o fenômeno chamado hercogamia recíproca (FERRERO, 2014).

Darwin (1877) foi o primeiro a notar este tipo de morfologia em flores de *Primula* L. (Primulaceae), no qual baseou seus estudos ao publicar o livro *Different Forms of Flowers on*

Plants of the Same Species, que foi um marco para posteriores discussões sobre o tema. Ele nomeou os dois morfos como ‘short-styled’ (estilete curto) e ‘long-styled’ (estilete longo) (Fig. 1) para denotar espécies brevistílicas e longistílicas, respectivamente.

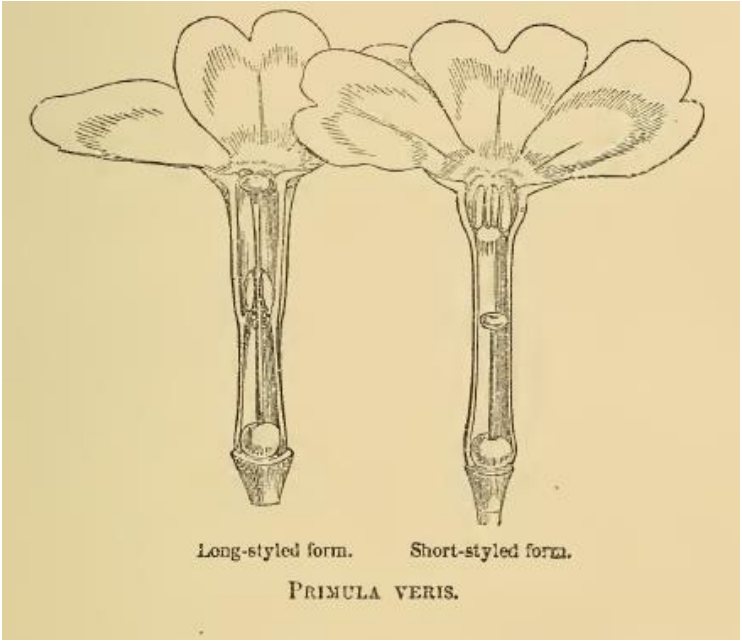

Fig. 1. Ilustração esquemática mostrando flores longistílicas e brevistílicas, respectivamente, de *Primula* L. (Primulaceae). Extraído de Darwin (1877).

Ganders (1979) utilizou os termos “thrum” e “pin” para denotar os morfos brevistílicos e longistílicos, respectivamente, mencionados também por Darwin, mas substituídos por aqueles citados acima. Ainda segundo o autor, morfos thrum possuem flores com estiletes curtos e estames longos, ao passo que morfos pin possuem estiletes longos e estames curtos. Em espécies trístilas, as três formas são chamadas brevistílicas, longistílicas e mediostílicas, e apresentam flores com dois verticilos de estames, com a forma mediostílica situada entre os verticilos superior e inferior (FERRERO, 2014; GANDERS, 1979) (Fig. 2).

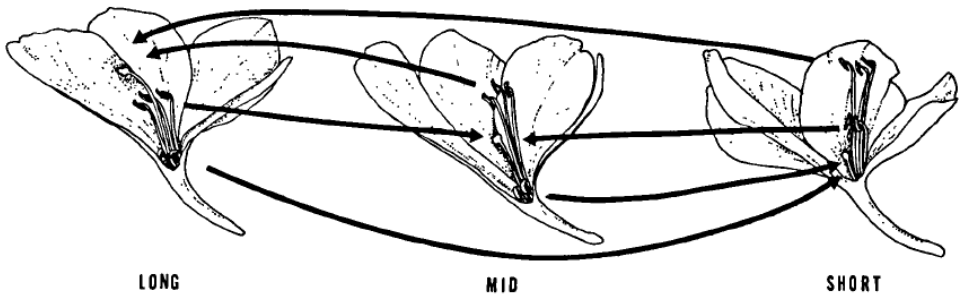

Fig. 2. Ilustração esquemática de flor de uma espécie tristílica. Extraído de Ganders (1979).

A heterostilia é encontrada em uma pequena porcentagem de plantas com flores (GANDERS, 1974), no entanto, segundo Barret (1992) o número de famílias botânicas com representantes heterostílicos tem crescido com o aumento dos esforços em pesquisas com plantas, especialmente em regiões tropicais. Na obra de Darwin (1877), o autor listou 15 famílias de plantas com representantes heterostílicos, e Barret (2002) e Cohen (2010) estimaram que esse número é de cerca de 28 famílias, embora para Cohen (2010) o número de espécies total seja ainda reduzido.

Para Cohen (2010), tem sido observadas muitas distinções morfo-específicas em taxa heterostílicos, embora poucas dessas diferenças sejam di- ou trimórficas nestes, como por exemplo, o tamanho do pólen e comprimento das células epidérmicas estilares.

Estima-se que apenas os gêneros *Melochia*, *Melhania* Forssk. e *Waltheria* possuam representantes heterostílicos (BAYER & KUBITZKI, 2003). Especificamente para o último gênero, aproximadamente 40 espécies são distílicas (SAUNDERS, 1993), e caracteres distintos entre os morfos florais são evidentes apenas em grãos-de-pólen. Saunders (2021) ao descrever cinco espécies brasileiras de *Waltheria*, afirmou que duas delas também são potencialmente distílicas (dada a natureza heterostílica do gênero), com *W. hatschbachii* J.G. Saunders (brevistílicas) e *W. hoehnei* J.G. Saunders (longistílicas) conhecidas por uma e poucas coleções, respectivamente.

Os termos “pin” e “thrum” tem sido frequentemente utilizados em publicações sobre as espécies do gênero (SAUNDERS, 1993, 2005, 2007, 2021), no entanto, as denominações “longistílicas” e “brevistílicas” foram utilizadas por Schumann (1886) e tem sido seguidas em recentes publicações por Amorim et al. (2009), Amorim (2012), Colli-Silva et al. (2019), Cruz e Esteves (2009) e Lima et al. (2019).

2.6 PALINOLOGIA

Darwin (1877) já atestava que a diferença mais marcante quanto as flores heterostílicas estava nos grãos-de-pólen, e isso pode ser comprovado em diversos estudos polínicos envolvendo espécies de *Waltheria*. Para Saba e Santos (2015), os grãos-de-pólen de espécies com flores brevistilas são micro-equinados, já aqueles de flores longistilas são supra reticulados. Este padrão de dimorfismo já havia sido observado por Köhler (1971, 1973), embora denominando de espinulosos aqueles de flores brevistilas, bem como por autores

subsequentes (MIRANDA & ANDRADE, 1989; SABA et al., 2004; SAUNDERS, 1993, 2005, 2007; SILVEIRA JÚNIOR et al., 2017).

O estudo polínico mais abrangente foi realizado por Köhler (1971) que analisou os grãos-de-pólen de 44 espécies (algumas determinações equivocadas ou sinônimos de espécies atuais) de *Waltheria*. Neste trabalho, o autor classificou os grãos em dois tipos principais de acordo com a morfologia da exina, espinulosos e supra reticulados, como anteriormente apontados. O autor sugere que caracteres relacionados a ornamentação da exina, bem como o padrão de evolução das aperturas são de significado taxonômico para classificação das espécies do gênero, bem como para *W. indica*, a espécie mais amplamente distribuída do gênero. O autor também observou que o pólen desta espécie (homostílica ou mediostílica) se assemelha àqueles de flores longistílicas de outras espécies.

Saba e Santos (2003) em um estudo polínico sob microscopia óptica de *Ayenia*, *Melochia* e *Waltheria* (quatro espécies) das dunas de Abaeté, Bahia, sugeriram que a morfologia distinta dos grão-de-pólen era de importância taxonômica para a separação dessas espécies. A mesma conclusão foi feita por Miranda e Andrade (1989) ao examinar as "Sterculiaceae" no Nordeste Setentrional. Saba et al. (2004) em uma pesquisa sobre as tribos Byttnerieae, Hermannieae e Helicteriese, sugeriram que caracteres relacionados a ornamentação da exina podem auxiliar na classificação das espécies de *Waltheria*.

Além desse dimorfismo, analisando os grãos-de-pólen de cinco espécies distílicas de *Waltheria* sob microscopia óptica (MO) e eletrônica de varredura (MEV), Saba e Santos (2015) notaram que essas estruturas tem tamanho variando de médio a grande, com apertura do tipo colporada, e em *W. cinerascens* A. St.-Hil., a estrutura da exina dos grãos-de-pólen de morfos longistilos analisados sob microscopia eletrônica de transmissão (MET) é formada por quatro camadas, as sexinas 1, 2, 3 e 4.

A morfologia do pólen de 14 espécies de *Waltheria* da Bahia foi estudada por Silveira Júnior (2017) sob microscopia de luz, varredura e transmissão. Os autores além chegaram à conclusão que, além do esperado dimorfismo polínico morfo-dependente, a distribuição, número e tipo de apertura auxiliaram no agrupamento das espécies em três (3-4-zonocolporado, 5-6-zonocolporado e 10-14-pantocolporado) e quatro categorias (4-5-zonocolporado, 6-7-zonocolporado, 9-14-pantocolporado, 10-16-pantocolporado), de acordo com a morfologia da exina, dentro dos tipos reticulado e equinado, respectivamente.

2.7 BIOLOGIA REPRODUTIVA

Estudos de polinização não são tão frequentes em *Waltheria*, mas Brizicky (1966) afirmou que no Brasil vespas e abelhas tem sido registradas em flores de *W. indica* e *W. viscosissima* A. St.-Hil. Em um estudo realizado em populações de *W. americana* (= *W. indica*) do campus da Universidade Federal de Minas Gerais, Macedo e Martins (1999) também observaram que vespas e abelhas eram os visitantes florais da espécie. Os autores registraram 37 espécies de abelhas e 72 de vespas, cujas visitas variavam quanto a produção de flores pela planta, que por sua vez estava relacionada aos períodos seco e chuvoso. Saunders (2005) citou para *W. carmensarae* J.G. Saunders, que são as abelhas (*Augochloropsis* sp. e *Apis mellifera* L.) os visitantes florais. Vespas, borboletas, mariposas e moscas foram observadas para *W. coriacea* J.G. Saunders e *W. flavovirens* J.G. Saunders (SAUNDERS, 2021).

Bramow et al. (2013) estudaram a morfologia das flores e biologia reprodutiva de populações da distílica *W. ovata* Cav. das Ilhas Galápagos, e observaram que em resposta ao isolamento geográfico dessas plantas, o sistema auto-incompatível das flores parece ter sido quebrado a fim de promover uma autofecundação eficiente, garantindo a produção de frutos e sementes, e assim a manutenção dessas populações insulares.

2.8 USOS MEDICINAIS

Waltheria tem sido largamente utilizada em estudos biológicos, embora esse tipo de abordagem não tenha sido tão abrangente em termos de diversidade de espécies-alvo, tendo na pantropical *W. indica* o modelo mais largamente pesquisado. Do ponto de vista químico e/ou fitoquímico são registrados para diferentes espécies e distintas partes da planta muitos compostos da classe dos esteroides, triterpenos, glicosídeos cardoativos, alcaloides, flavonoides, saponinas, taninos, antraquinonas, fenois (ATIF et al., 2014; CARIDADE et al., 2018; FERREIRA et al., 2019; KOMA et al., 2017; RAFIU et al., 2019), além de macro e micronutrientes como cálcio, cobre, ferro, magnésio, potássio e zinco (RAFIU et al., 2019) e outros compostos diversos (BANAKAR et al., 2018). Vale citar também um alcaloide descoberto e isolado a partir de *W. douradinha* A. St.-Hil. (um sinônimo de *W. communis* A. St.-Hil.), que foi chamado de waltheriona-A cuja fórmula metilada com diazometano, chamada derivativo *O*-metilado, mostrou-se com potencial efeito bactericida (HOELZEL et al., 2005). Dois outros novos alcalóides 4-quinolonas também foram isolados e descritos a partir de *W. douradinha*, waltheriona-b e vanessina, com esta última apresentando atividade antibacteriana (GRESSLER et al., 2007).

Como exemplos de estudos sobre atividade biológica de *W. indica* podem ser citados alguns focando em potencial antioxidante (MONGALO et al., 2012; RAFIU et al., 2019),

antibacteriano (KOMA et al., 2017; MONGALO et al., 2012), antinociceptivo (AVOSEH et al., 2019; MOHAMMED et al., 2005; YOUGBARE-ZIEBROU et al., 2016), anti-inflamatório (AVOSEH et al., 2019; YOUGBARE-ZIEBROU et al., 2016), antifúngico (CRETTON et al., 2016; KOMA et al., 2017), e anticatarática (ATIF et al., 2014), em diferentes partes da planta e em preparos na forma de extratos e/ou óleos essenciais. Em um olhar mais geral, Zongo et al. (2013) conduziram uma revisão bibliográfica sobre as diferentes potencialidades farmacológicas sobre esta espécie, bem como seu perfil fitoquímico e usos tradicionais, observando aqueles trabalhos cujos sinônimos foram citados. Nirmala e Sridevi (2021) também apresentam uma visão geral sobre a etnobotânica, fitoquímica e farmacologia desta espécie.

Para outras espécies do gênero destacam-se atividades larvicida (FERREIRA et al., 2019), hipotensora e bradicárdica (VASQUES et al., 1999) para *W. viscosissima*; antiacetilcolinesterase para *W. brachypetala* Turcz. (LIMA et al., 2009); antioxidante e analgésica para *W. ovata* (HERRERA-CALDERON et al., 2016).

3 RESULTADOS

3.1 ARTIGO 1 – **Taxonomy of *Waltheria* L. (Malvaceae, Byttnerioideae) in Brazil, with description of two new species (A ser enviado ao periódico Phytotaxa).**

THALES SILVA COUTINHO[1] & MARCCUS ALVES[2]

[1]*Programa de Pós-graduação em Biologia Vegetal, Departamento de Botânica, Centro de Biociências, UFPE. E-mail: thales_scoutinho@hotmail.com*

[2] *Departamento de Botânica, Centro de Biociências, UFPE. E-mail: alves.marccus@gmail.com*

Abstract – *Waltheria* is a genus of Malvaceae (Byttnerioideae) which includes ca. 60 species, with Brazil the main endemism and diversity center. The genus is recognized by simple leaves, presence of stipules, calyx 10-ribbed with venose lobes, heterostylic flowers, penicilate stigmas, gynoecium 1-carpelar and with lateral style, and capsule covered by a persistent calyx and with usually only one seed, rarely 2. After intense herbaria consultation, as well as observation in field, we recognize 36 species in Brazil, 25 endemics, with Southeast and Northeast regions with higher diversity, 23 spp. and 18 spp., respectively. *Waltheria marielleae* and *W. mixta* are described as new species, and *W. carmensarae* is here firstly registered to the country. *Waltheria indica*, *W. collina*, *W. maritima*, *W. mixta* e *W. operculata* are the only species with homostylous flowers, whereas *W. glabribracteata* is known only by its longistylous flowers. *Waltheria erioclada* is re-established as an accepted name, and a complete description is provided, including its brevistylous flowers, unknown until then. First description of brevistylous flowers in *W. hoehnei* and longistylous in *W. hastachbachii*, two new recently described species, is presented here. Six synonyms and 24 lectotipification are proposed. In this study are provided descriptions, identification key, synonymous list, lectotypifications, synonymizing, illustrations, geographical distribution maps, taxonomic comments and conservation status.

Keywords: Bracteoles, Cerrado, endemism, Hermannieae, heterostyly, stigmatic polymorphism.

Introduction

Waltheria Linnaeus (1753: 673) is a genus belonging to Malvaceae, subfamily Byttnerioideae and tribe Hermannieae (Bayer & Kubitzki 2005), which comprises approximately 60 species distributed in subtropical and tropical regions (Saunders 2011), with *Waltheria indica* Linnaeus (1753: 673) the only pantropical species (Saunders 2007). In South America, Brazil stands out for the high number of species, being considered the main center of diversity and endemism (Saunders 1993).

The genus is recognized for being composed of herbs and shrubs, some species considered small trees, stipules 2, flowers commonly sessile, heterostylous, arranged in pairs and flanked by bracteoles, campanulate to tubular-campanulate calyx, 10-ribbed and with nectaries at the base of the inner face, petals generally yellow, flat, venous and adnate to the staminal tube, stamens 5 and fused in a tube, lateral style, penicillate stigma with different shape, and capsule-type fruit with persistent calyx. It differs of *Melochia* Linnaeus primary by pentacarpelar gynoecium and stigmas 5 and not fimbriate, whereas in *Waltheria* the gynoecium is unicarpelar and it has only one and fimbriate stigma (Goldberg 1967).

Different authors were responsible by important studies focusing the genus in Brazil, and three of them can be highlighted. Saint-Hilaire (1825) presented ten species to Southeast Brazil, with eight of them new. Schumann (1886) in the *Flora Brasiliensis* was the first to present a comprehensive taxonomic study of Brazilian *Waltheria*, and registered a total of 26 species for the country, in addition to nine varieties, eight of them related to *W. communis*, with three species' Saint-Hilaire reduced to this infra-specific category. He proposed the first infra-generic grouping, classifying the genus into two sections, based specially in characters related

to flowers and fruits, being *W.* sect. *Stegowaltheria* represented only *W. bracteosa* and *W. macropoda*, and *W.* sect. *Waltheria* with remaining species, and this classification was followed by subsequent authors (Rose 1899). Later, Saunders (1995, unpublished) provided the largest and most extensive taxonomic revision of the genus in its almost totality (excluding only *W. indica* and allied species), listing for Brazil 30 species, seven of which were proposed as new. The author provided a new infra-generic classification to *Waltheria*, grouping the genus in three subgenera and two sections, besides grouping she calls alliances and species group, five each. Although of great importance for the taxonomic knowledge of the group, her work was never published in its entirety, only occasional studies on extra Brazilian species (Saunders 2005a, 2005b, 2005c, 2011; Saunders & Pozner 2007), leaving Brazil with a large information gap.

After Saunders' work, the species of the genus have been compiled in lists such as Catálogo de Plantas e Fungos do Brasil (Esteves 2010) and Flora do Brasil 2020 Project (Coutinho *et al.* 2020). Other studies are limited to local floras (Amorim *et al.* 2010, Amorim 2012, Cruz & Esteves 2009, Colli-Silva *et al.* 2020, Saunders 2006), and new species have been recently described (Coutinho & Alves 2019, 2020; Coutinho *et al.* 2020; Saunders 2021), new occurrences are presented (Silva-Coutinho *et al.* 2019) and estimates of biogeographic patterns presented (Colli-Silva & Pirani 2020).

Given the above, the objective of this work was to study the species of *Waltheria* occurring in Brazil from a taxonomic point of view, thus providing a better understanding about morphology, nomenclature and geographic distribution of the group, and contributing to future studies with the taxon.

Material and methods

This study was conducted based on observation of specimens collected in the field, analysis of more than 7,000 samples housed in the ALCB*, ASE*, BR*, BHCB, CEN, CEPEC,

COR, CPAP, CSTR, CTES, E*, EAC, EAN, ESA, F*, FCQ*, FLOR*, FURB*, G*, GH*, HBRA*, HCDAL, HDJF*, HST** (Sérgio Tavares Herbarium from Universidade Federal Rural de Pernambuco), HTSA** (Trópico Semiárido Herbarium from Embrapa Semiárido), HUEFS*, HUFU*, HUVA, HVASF, IBGE, INPA*, JPB, K*, KW*, LE*, LL*, LINN*, M*, MA*, MO*, MAC, MEL*, MBM, MPU*, MEXU*, MICH*, MOSS, MUFAL, NY*, P*, PEUFR, R, RB, RBR*, RFA, RN, S*, SI, SP, SJRP, SPF, TCD*, TO*, UB, U*, US*, UEC, UFMT, UFP, UFRN, UPCB, VIC*, VIES, W* (acronyms according Thiers 2021, continuously updated; *online digital images; **unindexed) herbaria, including nomenclatural typus, as well as studies of original works. Terms ‘not found’ was used to specimens cited in the literature but not found *in loco* or in database online, and ‘not seen’ to online data whose images not were available to check that information.

Due to the large number of specimens studied, material examined list provided was selected based on range of occurrence criteria, where for species more widely distributed (e.g., *W. indica*; all national territory) only one specimen per state and phytogeographic domain registered was cited, always prioritizing samples collected within Protected Areas when possible; species with distribution geographic restricted (e.g., *W. hatschbachii* J.G. Saunders; campos rupestres from Minas Gerais), all specimens were cited. In the synonyms list only names published to the Brazil are cited, except in *W. indica* with *W. americana* Linnaeus also cited. Mostly lectotypes chosen follow suggestion provided in Saunders (1995, unpubl.).

The morphological terminology followed Harris & Harris (2001) and Radford *et al.* (1974) for general characters. The trichomes types were classified according to Webster *et al.* (1996); and stigmas morphology followed Saunders (1993). Terms ‘Longistylous’ and ‘Brevistylous’ for flowers are used here in place of term ‘pin’ and ‘thrum’, respectively, used by Ganders (1979). Morphological descriptions of the genus and species were based specially analysis of exsiccates studied, and follows recent studies published in *Waltheria* by Coutinho

& Alves (2019; 2020) and Coutinho *et al.* (2020). Description provided for *W. collina* Schumann was based on the protologue. Infra-generic classification follows the currently accepted and validly published by Schumann (1886).

Geographic distribution data in Brazil were obtained from labels of examined material, when available, specialized bibliographies or extracted from speciesLink website (geoLoc tool; http://splink.cria.org.br) or Google Earth tool. These data were used to produce distribution maps with support of the QGIS version 3.0.1, and to assessment of the conservation status using GeoCat tool (Bachman *et al.* 2011) to estimate the Area of Occurrence (AOO) and Extent of Occurrence (EOO) and analyze according to IUCN (2019) criteria.

The illustrations were made freehand and the morphological diagnostic structures for each species were prioritized with five illustrated here for the first time.

Results and Discussion

Waltheria is represented in Brazil by 36 species (Fig. 1), being 25 of them (69.44%) endemics, occurring in all territory as well as all phytogeographic domains (Fig. 2). Southeast region houses the higher species number (23 spp.) followed by Northeast (18 spp.), Midwest (17 spp.), North (13 spp.) and South (three spp.). While Acre, and Amazonas and Amapá are the states with the fewest species number (one and two spp., respectively), Minas Gerais is the state with the greatest diversity (19 spp.), followed by Bahia (17 spp.) and Goiás (13 spp.). Regarding endemism, the Southeast also is the region with higher number, with nine species known only for the area. Northeast and Midwest regions present three endemic species each, and North and South do not have any endemic species.

Waltheria indica is the species more widespread by Brazil, occurring in all states as well as in different vegetation types, besides it is the only pantropical taxon. *Waltheria biribiriensis* J.G. Saunders ex T.S. Coutinho & Colli-Silva, *W. erioclada* De Candolle, *W. ferruginea* Saint-

Hilaire, *W. hatschbachii* J.G. Saunders, *W. polyantha* Schumman and *W. terminans* J.G. Saunders ex T.S. Coutinho & Colli-Silva (all from Minas Gerais), *Waltheria hoenhei* J.G. Saunders (Mato Grosso), *W. mixta* T.S. Coutinho & M. Alves (Goiás), *W. saundersiae* T.S. Coutinho & M. Alves and *W. selloana* Schumman (both from Bahia) are the species known for only one state. *Waltheria mixta* is known only one collection from type locality. Species as *W. mixta*, *W. petiolata* and *W. saundersiae* are microendemic, and known by few collections. *Waltheria maritima* is the only species endemic to Restingas.

Of the 36 species recorded, 26 of them are included within 117 protected areas (Table 1). Despite that, 14 species are accessed with some degree of threat according to IUCN (2019) criteria, and four as Deficient Data (DD).

Habit

Habit can be useful taxonomic to separate some species (Fig. 3A–C). *Waltheria polyantha* is one of the larger species, reaching 4 m in height. Species with prostrate lifeform are rare, and represented only by *W. bracteosa*, *W. carmensarae* and *W. excelsa*. It is important to mention that although in some labels of exsiccates it presents the information that *Waltheria albicans* is prostrate, in recent collected materials it was observed that in young individuals its branches are decumbent, but the adult individual this species shows up as a shrub. *Waltheria communis* Saint-Hilaire is the only species that has a xylopodium-like root. This belowground system is present in several species from Cerrado (Appezzato-da-Glória *et al.* 2008), predominant habitat of this species. Similar organ was observed also in *Erioteca saxicola* Carvalho-Sobrinho (2013: 50).

Indumentum and Trichomes

Indumentum is according to density and trichomes type present. There are no glabrous species, although some morphotypes of *W. cinerascens* have trichomes arranged very sparsely on the branches and leaves, appearing to be glabrous to the touch. A similar case can be observed in *W. maritima*, however, in this species minute and sessile glandular trichomes are present.

Trichomes are particularly more important taxonomically to distinguish species (Fig. 3D–H) when contrasted to the indumentum (Saunders 1993), and they can vary only in density in the same species, except in *Waltheria indica* which can or not present glandular long-stalked trichomes associated to stellate. In *W. sect. Stegowaltheria*, only simple trichomes are present in branches and leaves, in contrast in *W.* sect. *Waltheria* trichomes are more diverse and present in all species. In this species are observed predominantly stellate trichomes in branches and leaves, and variable quantity in stipules, calyx, petals and capsules. Stellate are mixed by other types of trichome, as 2–4-armed (*W. mixta*), glandular sessile (e.g., *W. ackermanniana*, *W. cinerascens*, *W. petiolata*, and predominantly in *W. maritima*) or long-stalked (*W. albicans*, *W. carmensara*, some *W. indica*, *W. mixta*, *W. viscosissima*), multirradiate which can be short- (e.g., *W. terminans*) or long-stalked (e.g., *W. ferruginea*, *W. matogrossensis*), but rarely sessile (*W. flavovirens*), and simple (leaves of rare specimens of *W. viscosissima*). Due to the predominance of glandular trichomes in *W. viscosissima*, this is the only species with sticky appearance. Shaheen *et al.* (2009) claimed that glandular trichomes were taxonomically useful in distinguishing *Hibiscus* species from Pakistan.

Stipules

Morphology stipules is not useful to distinguish species (Fig. 3I–K), however, foliaceous stipules characterize *Waltheria* sect. *Stegowaltheria* and scarious one *W.* sect. *Waltheria* (Rose 1899). Foliaceous stipules are wide and with rounded base. Scarious stipules have truncate base and can be linear or linear-triangular, but this morphology can vary in the same species. It

presents vein which can be conspicuous or not, and almost always can be ciliate to long-ciliate. In *Waltheria eriocladа* DC., base of this trichomes can be prominent and appear a dentate margin. Trichomes type on the stipules can assist to distinguish some species.

Heterostyly

One of the most markable characteristics of *Waltheria* genus is its heterostylous flowers, and of the 36 species from Brazil, only *W. indica*, *W. collina*, *W. carmensarae W. maritima* and *W. operculata* have homostylous flowers (gynoecium and androecium with same length). In *Waltheria glabribracteata* T.S. Coutinho & M. Alves only longistylous flowers are known, which may be due to low sampling of the species, and it can be called as monomorphic longistylous species.

Calyx

The calyx is 5-merous and gamosepalous, but with free lobes (Fig. 3N–P), and it is campanulate (tube more open; most species) or tubular-campanulate (narrower tube). Externally the indument is variable, although in many species are sericeous. It can display high variety of trichomes, and stellate are more common, which can be accompanied with other types like glandular, 2–3-armed, and/or multiradiate. Internally the tube is usually glabrous, with exception of a few species (e.g., *W. brachypetala* Turczaninow, *W. coriacea* J.G. Saunders and others) which present some simple or stellate trichomes in median portion, but the lobes are always have indumenta. Two types of calycinal veins or ribs can be observed: in the first, ten longitudinal ribs are disposed (Fig. 3N–P), of the base to the apex lobes and in the sinus between two adjacent lobes, and can be thick or slender according to species, and are best viewed internally. In *Waltheria* sect. *Stegowaltheria*, as well as, in *W. maritima* (*W.* sect. *Waltheria*), these ribs are quite noticeable externally. Second type is found in lobes calyx (Fig. 3Q–R), and

they are thinner and more delicate, comparable to the secondary ribs in blades leaf since their disposition is generally perpendicular to the longitudinal rib. They are arranged in pairs, conspicuous or not, and may be absent. At the base of the internal surface minute nectaries are arranged forming a ring.

Corolla

Corolla is 5-merous and dialypetalous, with petals adnate to the staminal tube at the base to a lesser extent, but in *W. viscosissima* this adnation can reach 2.4 mm long. Petals are yellow, varying from a lighter shade (called here pallid yellow; *W. indica* and *W. marielleae*) to a brighter one (called here gold-yellow). *Waltheria glomerata* C. Presl. is known by its white corolla (only species with this character), however, in the specimen recorded by us to Brazil, the available information mentioned that the corolla is yellow, which was followed by us. Only the base of abaxial surface of the petals is reddish in brevistylous flowers of *Waltheria ackermanniana*, and *W. vernonioides* (in this species *A. Krapovickas et al. 37873* [CEN] cites erroneously 'pinkish flowers'). In only one sample of brevistylous flowers of *W. communis*, the base of adaxial surface is reddish. Petals are small, however, in *W. albicans*, *W. excelsa* and *W. viscosissima* are the longest among Brazilian species. They are usually spatulate, but some species display oblanceolate petals (*W. ferruginea*). Spatulate petals present a narrowled claw in proximal portion and a distal blade (or limb) that is larger. This limb varies in shape, but usually it is elliptic, obovate, but exceptions are oblong (*W. indica*) and obtriangular (*W. viscosissima*). Petals totally glabrous are rarer to found and are more common that with trichomes medially in the adaxial surface, and glabrous in the abaxial. Apex petals varies among rounded, truncate, emarginate and are usually ciliate, with few species with eciliate apex (e.g., *W. marielleae*).

Stigmas

Stigmas in *Waltheria* consists of small stigmatic branches arranged at the style apex, and is called penicillate, already mentioned since Schumann (1886) in *Flora Brasiliensis* as plumose (in *W.* sect. *Stegowaltheria*). Four type shape in the stigmas were observed in Brazilian *Waltheria*: clavate, elongate-plumose, fan-plumose and filiform. These morphologies were cited by first time by Saunders (1993) to Mexican *Waltheria*, with notes about some Brazilian species, and followed by Coutinho & Alves (2019, 2020), Coutinho *et al.* (2020), Saunders (2005, 2007, 2011, 2021). The fan-plumose stigmas has a rounded appearance (Fig 7 N.) and was the most frequent, represented in 15 species. Elongate-plumose is characterized by stigmatic branches along style (Fig. 10 K), has a cylindrical appearance and is found in 16 species (in *W. hatschbachii* only in longistylous flowers). In the clavate type the stigmatic branches are less prominent and resemble papillae, that are arranged in a more dilated body (Fig. 4 W), and it is represented in three species. Filiform stigmas are rarer and are similar to clavate one, however, the papillae are disposed in a slender body (Fig. 12 J), found in *W. terminans* and brevistylous flowers of *W. hatschbachii*. Stigma morphology remains the same in both flowers type (distylous), except in *W. hatschbachii* which has brevistylous flowers with filiform stigmas, and the longistylous with elongate-plumose.

Fruit and Seeds

Fruits are an obovoid or obpyramidal capsules, and usually are not taxonomically useful to separate species but groups of species. Obovoid capsules have a rounded apex, unlike obpyramidal that are truncate. Some species present an intermediary morphology, with truncate-rounded apex (e.g., *W. selloana*). The trichomes commonly are centered at the apex and is almost always sericeous. Tomentose apex is rare and can be found in *Waltheria rotundifolia* and *W. communis*. Consistency can vary between totally chartaceous and

chartaceous only at the apex. That are membranaceous below, and this portion is almost translucent. Dehiscence defines the two sections in the genus (commented later), as commented by Schumann (1886). In the operculate, the capsules open through an apical suture flanking the operculum. In contrast, in the loculicide type the opening takes place through a suture that goes from the base to the apex, crossing it. This opening can be partial, ending after crossing the apex of the capsule or total (rarer), when the suture crosses the entire capsule and it opens in two parts or valves (*W. communis*, *W. rotundifolia* and *W. vernonioides*), showing the seed.

Seed are obovoid, blackish, blackish-brown or brown and are verrucose in *W.* sect *Stegowaltheria* and smooth but usually with apex slightly crenulate in *W.* sect. *Waltheria*.

Taxonomic Treatment

***Waltheria* Linnaeus** (1753: 673). Type species of the genus:—*Waltheria indica*.

Astrophus Sprengel (1822: 64). Type species of the genus:—*Astropus tomentosus* Sprenguel (1822: 64).

Lophanthus Forster & Foster (1776: 27). Type species of the genus:—*Lophanthus tomentosus* Forster & Forster (1776: 28). *nom. illeg.* Non *Lophanthus* Adanson (1763: 164) (Lamiaceae).

Sitella Bailey (1941: 349). Type species of the genus:—*Sitella involucrata* (Bentham) Bailey (1941: 350).

Herbs prostrate (*W. brateosa*, *W. carmensarae*, *W. excelsa*) or erect, subshrub or shrub. Branches not sticky or rarely so (*W. viscosissima*), with simple, 2–3-armed, glandular, stellate and/or multirradiate trichomes, sessile or stalked, isolate or mixed. Stipules in pairs at the petioles base, foliaceous or scarious, linear, narrowly lanceolate, lanceolate or ovate, base truncate or rounded, apex acute or acuminate; veins conspicuous or not. Leaves simple, entire,

rarely inconspicuously 3-lobate (*W. albicans*, *W. excelsa*, *W. mixta*), alternate, distichally or spirally arranged along or in terminal portion of the branches, petiolate; petioles terete or angulate; leaf blades membranaceous, chartaceous or coriaceous, concolorous or discolorous, variable in shape, linear to circular, serrate along the margins or rarely above the base; venation actinodromous. Inflorescences a cyme, axillary, along or in terminal portion of the branches, or only terminal, sessile to long-pedunculate, lax or congested; bracts entire or 2–3-lobed. Flowers bisexual, actinomorphic, heterostylous, with distylous or homostylous forms, rarely monomorphic longistylous (*W. glabribracteata*), sessile or rarely short-pedicellate (*W. marielleae*, *W. viscosissima*), arranged in pairs and surrounded by 3–5 bracteoles as a floral unit, bracteoles distinct or fused at the base in higher or lesser extent, rarely fused from the base to the apex as a cupulate structure or involucre (*W. involucrata*), variable in shape, vestiture and trichomes type. Calyx 5-merous, gamosepalous, campanulate or tubular-campanulate, 5-lobed, 10-ribbed being prominent or not, externally variable in vestiture, internally totally glabrous on the tube or rarely with few trichomes dispersed from median region up to base of the lobes, lobes with indumentum, apex acute, acuminate or long-acuminate; secondary veins absent or present, conspicuous or not; nectary internally at the base of the tube forming a ring. Corolla 5-merous, dialypetalous, petals flat, pallid yellow to bright yellow or rarely reddish-yellow abaxially in brevistilous flowers (*W. ackermanniana* and *W. vernonioides*), oblanceolate, spatulate to oblong-spatulate, adnate to the staminal tube at the base, adaxial surface with trichomes in the median region or totally glabrous, abaxial surface glabrous or rarely with few trichomes, apex rounded, truncate or emarginate, ciliate or eciliate; venose. Stamens 5, connate into a staminal tube, anthers ditechae, techae parallel, dorsifixed, longitudinal, staminodes absent; brevistylous flowers filaments free; longistylous flowers filaments absent or free, staminal tube papillate or rarely slightly tomentose to villous (*W. cinerascens*, *W. communis*) apically. Gynoecium apocarpous, carpel 1, ovary 2-ovular, totally

sericeous or, sericeous to tomentose only at the apex, style 1, lateral, usually tortuous at the base, with stellate trichomes, usually uniformly distributed, rarely dense (*W. involucrata*, *W. matogrossensis*), stigma clavate, elongate-plumose, fan-plumose or filiform, same shape in both flowers type, rarely distinct (*W. hatschbachii*). Capsule 1, obpyramidal or obovoid, totally chartaceous or chartaceous only at the apex, membranaceous below, apex truncate, rounded or truncate-rounded, pilose, tomentose or sericeous, trichomes stellate, simples, 2–3-armed, internally glabrous, shiny, dehiscence loculicide (*W.* sect. *Waltheria*) or operculate (*W.* sect. *Stegowaltheria*), calyx persistent; seed 1, rarely 2, glabrous, smooth or verrucose, sometimes slightly crenulate apically.

Waltheria has been for a long time confused with *Melochia* Linnaeus (1753: 675) by share many characters related to Hermannieae tribe where two taxa are circumscribed. Along this research many herbaria samples belonging to *Melochia* were found mixed to collection of *Waltheria*, what take us to provide an identification key to facilitate the correct separation of this genera.

Key to Distinguish the *Melochia* L. and *Waltheria* L. from Brazil (*Melochia* based on personal observations, Goldberg (1967), Gonçalez (2020) and Gonçalez & Esteves (2015, 2017)).

1. Yellow, white, pink or purple corolla, with or without a basal spot; gynoecium 5-carpelar; style-5; pappilate stigmas; globoid or pyramidal pentapterous capsules; ovoid or trigonal seeds ……..…….... *Melochia* L.

-. Yellow corolla, rarely reddish-yellow; gynoecium 1-carpelar; style-1; penicillate stigmas; obovoid or obpyramidal never pentapterous capsules; obovoid seeds ……..……...…… *Waltheria* L.

Key to the Sections (sensu Schumann (1886)) and Species of *Waltheria* L. from Brazil

1. Branches with only simple trichomes; foliaceous stipules, 2.3–7.5 mm width, rounded base; capsules with operculate dehiscence; verrucose seeds (*Waltheria* sect. *Stegowaltheria* Schumann) ……..…….. 2

-. Branches with stellate, multirradiate, 2-armed, simple (never isolated) and/or glandular trichomes, isolated (only stellate) or mixed; scarious stipules, 0.2–1.3 mm width, truncate base; capsules with loculicide dehiscence; smooth seeds or with some crenulation at the apex, never verrucose (*Waltheria* sect. *Waltheria* Linnaeus) ……..…….…. 4

2. Prostrate herbs; hirsute branches ……... 1. *W. bracteosa* Saint-Hilaire & Naudin

-. Erect herbs; sericeous branches …….…….. 3

3. Distylous flowers; calyx with glandular trichomes externally ……...…….. 2. *W. macropoda* Turczaninow

-. Homostylous flowers; calyx without glandular trichomes ……. 3. *W. operculata* Rose

4. Bracteoles totally fused into a cupuliform shape ……..…….. 24. *W. involucrata* Bentham

-. Bracteoles distinct or partially fused but never forming an involucre …..……...… 5

5. Terminal inflorescences …….....…… 6

-. Axillary inflorescences along or in terminal portions of the branches ……...… 10

6. Homostylous flowers ……...… 26. *W. maritima* Saint-Hilaire

-. Distylous flowers ……..…… 7

7. Xilopodium present; capsule with tomentose apex, totally dehiscent ……..…….……. 12. *W. communis* Saint-Hilaire

-. Xilopodium absent; capsule with hirsute or sericeous apex, partially dehiscent ……..……..…… 8

8. Branches, stipules and leaf blades with glandular and sessile trichomes; concolor leaf blades; capsule with truncate apex …… 10. *W. cinerascens* Saint-Hilaire

-. Branches, stipules and leaf blades without glandular trichomes; discolor leaf blades; capsule with rounded to truncate-rounded apex …….…….. 9

9. Linear triangular to narrowly triangular stipules; angulate petioles; leaf blades > 4 cm long, coriaceous, scabrous; calyx with acute lobes apex; staminal tube with free filaments in longistylous flowers; chartaceous capsule …. 9. *W. carpinifolia* Saint-Hilaire & Naudin

-. Linear stipules; terete petioles; leaf blades ≤ 3 cm long, chartaceous, densely canescent; calyx with acuminate lobes apex; staminal tube without free filaments in longistylous flowers; chartaceous capsule only at the apex …….……. 33. *W. selloana* Schumann

10. Homostylous flowers ……..…….. 11

-. Distylous flowers ……...…….……. 13

11. Petals and style glabrous ……... 11. *W. collina* Schumann

-. Petals and style with trichomes …… 12

12. Prostrate plants; elongate-plumose stigmas ……..… 8. *W. carmensarae* J.G. Saunders

-. Erect plants; fan-plumose stigmas ……..... 23. *W. indica* Linnaeus

13. Plants with long-stalked glandular trichomes ……..……..… 14

-. Plants without long-stalked glandular trichomes …… 16

14. Branches with simple, stellate, 2–3-armed and glandular trichomes; leaf blades with strigose adaxial surface ……..… 28. *W. mixta* T.S. Coutinho & M. Alves

-. Branches with stellate and glandular trichomes; leaf blades with pubescent to canescent or tomentose adaxial surface …….……. 15

15. Sticky plants; hirsute branches; leaf blades with acuminate apex …...…….……... 36. *W. viscosissima* Saint-Hilaire

-. Plants never sticky; tomentose branches; leaf blades with acute or rounded apex …… 5. *W. albicans* Turczaninow

16. Branches with multiradiate trichomes 17

-. Branches with stellate trichomes, mixed or not with simple, 2-armed and/or sessile glandular trichomes …….……...… 25

17. Scabrous branches ……..…….. 18

-. Canescent, puberulent or tomentose branches ……..… 19

18. Inflorescences axillary but restricted to the terminal portions of the branches ……..…….…… 34. *W. terminans* J.G. Saunders ex T.S. Coutinho & Colli-Silva

-. Inflorescences along to the branches …… 17. *W. flavovirens* J.G. Saunders

19. Coriaceous leaf blade, strigose on adaxial surface …… 13. *W. coriacea* J.G. Saunders

-. Chartaceous leaf blade, tomentose or pubescent on adaxial surface ……...… 20

20. Bracteoles shorter than the calyx in length …….…….. 21

-. Bracteoles longer than the calyx in length …….…….. 22

21. Slender petiole; lanceolate or elliptic leaf blade; bracteoles with 2-3-armed trichomes on adaxial surface; glabrous petals; clavate stigmas …….. 22. *W. hoehnei* J.G. Saunders

-. Petiole tick; ovate to widely elliptic leaf blade; bracteoles with glandular trichomes on adaxial surface; petals with tomentose adaxial surface; elongate-plumose stigmas …….…… 27. *W. matogrossensis* J.G. Saunders

22. Leaves with scabrous adaxial surface, cuneate at the base; oblanceolate petals ……...…….……... 16. *W. ferruginea* Saint-Hilaire

-. Leaves with pilose, pubescent or velutine adaxial surface, cordate or rounded at the base; spatulate petals …….…… 23

23. Linear bracteoles, all entire at the apex, adaxial surface with multiradiate trichomes; filiform stigmas in brevistylous flowers ……. 21. *W. hatschbachii* J.G. Saunders

-. Elliptic, widely elliptic, or oblong bracteoles, at least one of them with apex not entire, adaxial surface with stellate trichomes; clavate in both flowers ……...……...…….. 24

24. Stipules with stellate and multiradiate trichomes on the adaxial surface; elliptic to widely elliptic bracteoles, 2–3-dentate at the apex, rarely entire; scabrous calyx externally, stellate trichomes …… 7. *W. brachypetala* Turczaninow

-. Stipules with only multiradiate trichomes on the adaxial surface; oblong to lanceolate bracteoles, 2–3-lobate at the apex; pubescent calyx externally, multiradiate trichomes ……..……. 6. *W. biribiriensis* J.G. Saunders ex T.S. Coutinho & Colli-Silva

25. Scabrous or strigose branches ……...…… 26

-. Canescent, sericeous, tomentose, villous or woolly branches …….…….……..… 30

26. Inflorescences in terminal portions of the branches …… 30. *W. polyantha* Schumman

-. Inflorescences along to the branches …….…….……. 27

27. Bracteoles shorter than the calyx, glabrous adaxial surface; elongate-plumose stigmas …… 18. *W. glabribracteata* T.S. Coutinho & M. Alves

-. Bracteoles longer than the calyx, sericeous or pubescent adaxial surface; fan-plumose stigmas .....… 28

28. Leaves distichally arranged; leaf blades with pubescent adaxial surface; acute lobes calyx; glabrous petals, eciliate apex …….……..… 20. *W. glomerata* Presley

-. Leaves spirally arranged; leaf blades with scabrous or strigose adaxial surface; acuminate lobes calyx; petals with adaxial surface villous or sparsely pilose, ciliate apex ……..……..… 29

29. Leaf blade with lanate abaxial surface; linear bracteoles ……...…. 4. *W. ackermanniana* Schumann

-. Leaf blade with strigose abaxial surface; narrowly elliptic bracteoles ……..… 32. *W. saundersiae* T.S. Coutinho & M. Alves

30. Canescent branches; bracteoles shorter than the calyx ……..…… 31

-. Sericeous, tomentose, villous or woolly branches; bracteoles longer than the calyx ……..…..…. 32

31. Branches with only stellate trichomes; yellow corolla in both flowers types; capsule tomentose apically ……..…….. 31. *W. rotundifolia* Shrank

-. Branches with stellate and glandular trichomes; yellow corolla in longistylous flowers and reddish-yellow in brevistylous flowers; capsule pilose apically …… 35. *W. vernonioides* Fries

32. Prostrate plants; at least one of the bracteoles up to 2 mm width; elongate-plumose stigmas ……..……..... 15. *W. excelsa* Turczaninow

-. Erect plants; bracteoles never exceeding 1.5 mm width; fan-plumose stigmas …….... 33

33. Only stellate trichomes on the branches; narrowly triangular stipules; at least one bracteole of the pair of flowers with 2–3-dentate apex; externally pubescent calyx, acute lobes; petals ≥ 7 mm long ……. 25. *W. marielleae* T.S. Coutinho & M. Alves

-. Stellate and glandular sessile trichomes on the branches; linear stipules; all bracteoles of the pair of flowers with entire apex; externally pilose to sericeous, scabrous or sericeous calyx, acuminate lobes; petals ≤ 6.5 mm long …….…… 34

34. Bracteoles 9–11 mm long, only stellate trichomes on both the surfaces; only stellate trichomes on the calyx externally ……..….. 29. *W. petiolata* Schumann

-. Bracteoles 5.3–8 mm long, adaxial surface with simple, 2–3-armed and glandular trichomes and abaxial surface with simple, 2-armed and glandular trichomes; stellate, 2–3-armed and glandular trichomes on the calyx externally ……..…… 35

35. Leaf blades concolorous, lanate adaxial surface; bracteoles with simple and 2-armed trichomes on the adaxial surface, and simple, 2-armed, stellate and glandular on the abaxial surface; calyx 2.5–3 mm width; petals up to 6.5 mm long, glabrous abaxial surface …….. 14. *W. eriocladа* De Candolle

-. Leaf blade slightly discolorous, strigose adaxial surface; bracteoles with simple, 2–3-armed and glandular trichomes on the adaxial surface, and stellate and 2-armed on the abaxial surface; calyx 1.8–2 mm width; petals up to 4.5(–5.5) mm long, sparsely pilose abaxial surface ……..…….. 19. *W. glazioviana* Schumman

Waltheria sect. ***Stegowaltheria*** Schumann (1886: 50). Type species of the section:—*Waltheria bracteosa* Saint-Hilaire & Naudin (1842: 37).

Branches only with simple trichomes and foliaceous stipules, 2.3–7.5 mm width, rounded base. Capsule with operculate dehiscence and verrucose seeds.

Schumann (1886) also mentioned to this section that flowers length (exceeding 8 mm long) and stigmas morphology (plumose; not mentioned in the sect. *Waltheria*) are characters useful to separate two section proposed by him, however, in our analysis these peculiarities can be present in *Waltheria* sect. *Waltheria* L.

1. *Waltheria bracteosa* Saint-Hilaire & Naudin (1842: 37). Tipe:—BRAZIL. Goyaz [Goiás]: s.l., 1841, *Gardner 3607* (holotype: W W0070921 [image!]; isotypes: E E00012597 [image!],

F F0073609F and F0073610F [images!], G G00358710, G00358711 and G00358712 [images!], GH GH00057000 [image!], K K000380968 [image!], NY NY00074097 and NY00074074 [images!], P P02273692 and P02273693 [image!]). **Figure 4 A–B.**

= *Waltheria regnellii* Schumman ex Fries (1908: 15). Type:—BRAZIL. Minas Gerais: Uberava, 18 December 1848, fl., fr., *Regnell III 276* (holotype: S S-R-7493 [image!]; isotypes: BR BR0000005934560 [image!], F F0073611F and F0073612F [images!], LE LE00006879 [image!], NY NY00074075 [image!], R!, S S13-3106 and S13-3107 [image!], US US00479020 e US00512654 [images!]). *syn. nov.*

Herbs prostrate. Branches terete, hirsute, trichomes simple, whitish to yellowish; lenticels absent. Stipules 6–12 × 4–7.5 mm, ovate, base rounded, asymmetrical, margins ciliate, apex acuminate, glabrous to glabrescent, trichomes simple; veins 7–8, conspicuous. Leaves spirally arranged along the branches; petiole 0.2–0.8(–1.5–3.5) × 0.1 cm, terete, canaliculate, sparsely pilose; leaf blades membranaceous, concolorous, (1–)1.7–6(–6.3) × (0.6–)0.9–2.7 cm, lanceolate to elliptic, base rounded, rarely cuneate, margins serrate, apex rounded to slightly acute, adaxial surface sparsely pilose, trichomes simple, abaxial surface sericeous, trichomes simple; basal veins 1 pairs, secondary veins 8–9 pairs. Inflorescence terminal, congested, long-pedunculate, many-flowered; peduncle 1.8–7.9 cm long, sericeous. Flowers distylous, sessile; bracteoles 4, 7.5–8 × 2.5–4.5 mm, distinct, elliptic to widely elliptic, apex acuminate, 2–3-dentate, adaxial surface glabrescent to sparsely strigose, trichomes simple, abaxial surface glabrescent to glabrous, trichomes simple; veins 3–5, conspicuous. Calyx 7–7.7 × 2.4–2.5 mm, campanulate, sericeous externally, trichomes 2-armed and stellate, sessile, glabrous internally, tomentose on the lobes, lobes 4.2–4.5 × 1 mm, apex long-acuminate; veins 2 pairs, conspicuous. Corolla yellow, petals adnate to the staminal tube c. 1.5 mm long, 9 × 3 mm, spatulate, glabrous, apex rounded, eciliate. Anthers 1.1–1.2 mm long, ovary ca. 1 × 0.9 mm, sericeous apically,

style tomentose, stigma elongate-plumose. **Brevistylous flowers:** stamens 4–4.5 mm long, staminal tube 1.5–2.1 × 1 mm, free filaments ca. 2.4 mm long, gynoecium 4.5–5 mm long, style ca. 2 mm long, stigma 1.5–2 × 0.2 mm. **Longistylous form:** stamens 4.2–4.4 mm long, staminal tube 2.4–2.5 × 0.8 mm, free filaments 0.6–0.7 mm long, gynoecium ca. 6.5 mm long, style 4.1–4.5 mm long, stigma ca. 1.5 × 0.2 mm. Capsule 2.4–2.6 × 2 mm, obpyramidal, chartaceous on the operculum, membranous below, apex truncate, hirsute apically, trichomes simple; seed 1, ca. 2 × 1 mm, obovoid, blackish, glabrous, verrucose.

Distribution and habitat:—Endemic to Brazil, occurs in Northeast (Bahia, Maranhão and Piauí), North (Tocantins), Midwest (Goiás and Mato Grosso do Sul), and Southeast (Minas Gerais) (Fig. 5), growing primarily in areas of Cerrado, but with some collection also from Caatinga, between 250–700 m a.s.l., rarely to the 1000 m elevation.

Conservation status:—Least Concern (LC).

Notes:—Schumann (1886) when commenting about *Waltheria macropoda* Turczaninow (1858: 216), cited a specimen by *Regnell* (*Regnell III 276*, but not cited in this work) naming it of *W. regnellii* and stating to be a possible new species, and related to *W. macropoda*. Later, Fries (1908) described *W. regnelli* based on *Regnell III 276*, the same material analyzed by former author. Analyzing this specimen, we observed that the morphological characters indicated by Fries classify it under *W.* sect. *Stegowaltheria* Schumann, but it is most related to *W. bracteosa* specially by a prostrate herb, hirsute branches and leaf blade with rounded apex, contrasting with *W. macropoda* morphology (erect herb, sericeous branches and leaf blade with acute apex). *Waltheria regnelli* is here formally synonymized under *W. bracteosa*.

Waltheria bracteosa shares with *W. macropoda* Turcz. and *W. operculata* Rose the characters related to *W.* sect. *Stegowaltheria*, however, it is quickly distinguished from them by

prostrate habit (vs. erect), hirsute branches (vs. sericeous), and leaf blade with usually with rounded apex (vs. acute).

Selected specimens examined:—BRAZIL. **Bahia:** Barreiras, estrada para riachão das Neves, 13 May 1997, fl., fr., *F. França et al. 2261* (HUEFS [digital image], UB). Maracás, Fazenda Juramento, 27 April 1978, fl., *S.A. Mori et al. 10040* (CEPEC [not seen], NY [image]). Mucugê, 58 km from Mucugê on road to Barra da Estiva, 20 March 1990, fl., *J.G. Saunders & A.M. de Carvalho 3143* (CTES, SI). **Goiás:** Alvorada do Norte, Rio Macacos, 9 January 1977, fl., *G. Hatschbach 39377* (CTES, MBM). **Maranhão:** São Raimundo das Mangabeiras, BR-230, 06 December 1980, fl., fr., *E. Nunes & P. Martins s.n.* (EAC 9440). **Mato Grosso do Sul:** Rio Brilhante, 27 January 1971, fl., *G. Hatschbach et al. 26172* (CTES [2 sheets], MBM, UPCB). **Minas Gerais:** Pirapora, estrada para Morro da TELEMIG, 13 April 1996, fl., *G. Hatschbach et al. 64615* (BHCB, CTES, MBM, NY [image]). **Piauí:** Corrente, BR-135, 4 April 1983, fl., *A. Krapovickas et al. 38727* (CEN, CTES). **Tocantins:** Arraias, estrada Natividade para Arraias, 8 March 2015, fl., *R.C. Forzza et al. 8691* (CEPEC [not seen], CTES [not found], RB, UPCB).

2. *Waltheria macropoda* Turczaninow (1858: 216). **Lectotype (designated here):**—BRAZIL. Bahia: Serra Jacobina, s.d., fl., *Blanchet 2579* (G G00358724 [image!]; isolectotypes: E E00012601 [image!], F F0073624F [image!], KW KW001000116 [image!], LE LE00006874 and LE00006875 [image!], P P02273713 and P02273714 [images!], W W0071727 [image!]). [Remaining syntypes: *Gardner s.n.*]. Non *Waltheria macropoda* Klotzsch ex Schomburgk (1848: 1173), *nom. nud.* **Figure 4 C–G.**

= *Waltheria martiana* J.G. Saunders ex G. Esteves (2010: 1225), *nom. nud.*

Herbs erect, 0.5–1 m tall. Branches sericeous, trichomes simple, whitish; lenticels present, not

verrucose, inconspicuous. Stipules 7–10 × 2.5–4, lanceolate to ovate, base rounded, margins ciliate, apex acuminate, adaxial surface glabrous, abaxial surface sparsely sericeous, trichomes simple; veins 5, conspicuous. Leaves spirally arranged along to the branches; petioles 0.8–2.3 × 0.1 cm, terete, slightly canaliculate, sericeous; leaf blades chartaceous to membranaceous, concolorous, rarely slightly discolorous, 3.5–7.3 × (0.5–)0.9–1.8 cm, narrowly elliptic, lanceolate to oblong-lanceolate, base cuneate to rounded, margins coarsely dentate, apex acute, adaxial surface sericeous, trichomes simple, abaxial surface pilose to sericeous, trichomes simple; basal veins 1–2, secondary veins 7–9 pairs. Inflorescences axillary to terminal, congested, long-pedunculate, many-flowered; peduncle 2.5–11 cm long, sericeous. Flowers distylous, sessile, rarely short-pedicellate; pedicels ca. 0.5 mm long; bracteoles 6–8 × 2.5–4 mm, elliptic to widely elliptic, apex acute, entire to 2–3-dentate, sericeous, trichomes simple, and glandular, sessile to short-stalked; veins 4–6, conspicuous. Calyx 5.5–6 × 1.5–3 mm, campanulate, hispid externally, trichomes simple and glandular, glabrous internally, hispid on the lobes, trichomes simple, lobes 3–3.2 × 1 mm, apex long-acuminate; veins 3–4 pairs, conspicuous. Corolla bright yellow, petals adnate to the staminal tube for ca. 4 mm long, 6.5−8 × 2.2 mm, spatulate, glabrous, apex truncate to rounded, sparsely ciliate. Anthers 1.2–1.4 mm long, ovary 1–1.1 × 0.9 mm, sericeous apically, style tomentose, stigma elongate-plumose. **Brevistylous flowers:** stamens 5–5.4 mm long, staminal tube 2–2.6 × 1 mm, filaments 2.5–2.6 mm long, gynoecium 4.6 mm long, style ca. 1.4 mm long, stigmas 1.4 × 0.2 mm. **Longistylous flowers:** stamens ca.3.2 mm long, staminal tube ca. 2.2 × 0.9 mm, filaments 0.3 mm long, gynoecium ca. 7.2 mm long, style ca. 5 mm long, stigmas 2 × 0.2 mm. Capsule 2.8–3 × 1.5–1.8 mm, obpyramidal, chartaceous on the operculum, membranous below, apex truncate, hirsute apically, trichomes simple; seeds 1, 1.9–2 × 1.2 mm, obpyramidal, brownish, glabrous, verrucose.

Distribution and habitat:—Endemic to Brazil and the most geographically restricted species from *W.* sect. *Stegowaltheria*, and it occurs in Midwest (Goiás), Northeast (Alagoas, Bahia, Pernambuco and Piauí), and Southeast (Minas Gerais) regions (Fig. 5), in areas of Caatinga, Cerrado (and campos rupestres), and Atlantic forest (and restinga), between 405–1300 m a.s.l.

Conservation status:—Least Concern (LC).

Notes:— *Waltheria macropoda* shares with *W. bracteosa* and *W. opercutala* many characters related to the *W.* sect. *Stegowaltheria* (see identification key), however, it is morphologically more related to *W. operculata*, differing by distylous flowers (vs. homostylous) and calyx with glandular trichomes externally (vs. absent).

Selected specimens examined:—BRAZIL. **Alagoas:** Pão de Açúcar, estrada para Pão de Açúcar, 23 March 2002, fl., *R. Lyra-Lemos et al. 6440* (ESA). **Bahia:** Barreiras, 10 km W of Barreiras on BR-242, 18 February 1990, fl., *J.G. Saunders et al. 2079A* (K [image], MBM); Bom Jesus da Lapa, Juá, 5 April 1992, fl., *G. Hatschbach et al. 56619* (MBM). Catolés, estrada Catolés/Inúbia, 18 June 1992, fl., *W. Ganev 530* (K [image], SPF); Cocos, 5 km of Cocos, 16 March 1972, fl., fr., *W.R. Anderson et al. 37086* (R, UB); Conde, Fazendinha, 20 June 2003, fl., *G. Hatschbach et al. 75588* (MBM). Morro do Chapéu, Cachoeira do Ventura, 21 August 2017, fl., fr., *T.S. Coutinho 231* (UFP, HUEFS). Sento Sé, Parque Nacional do Boqueirão da Onça, 15 April 2014, fl., *D.S. Fernandes et al. 158* (HVASF). Xique-Xique, rodovia Xique-Xique a Barra, 13 March 1998, fl., *G. Hatschbach et al. 67737* (MBM, W [image]). s.l., Espigão Mestre, 4 March 1972, fl., fr., *W.R. Anderson 36563* (UB [2 sheets], NY [image], SPF). **Goiás:** Flores de Goiás, Fazenda Estância Paraná, 8 Dezember 2003, fl., *G. Pereira-Silva et al.* (CEN). **Minas Gerais:** Grão-Mogol, Vale do Rio Itacambiruçu, 12 December 1989, fl., *T.R.S. Silva et al. CFCR 12546* (SPF). **Pernambuco:** Serrita, 19 February 1997, fl., *A.M. Miranda et al. 2585* (HST, JPB, UFRN). **Piauí:** [No specific location], *Boa Esperança*, February 1839, fl., *G.*

Gardner 2056 (IPA [photo]); s.l., near Retiro, March 1839, fl., *G. Gardner 2054* (IPA [photo]).

3. *Waltheria operculata* Rose (1899: 183). Type:—MEXICO. Between Tapana, state of Oaxaca and Tonala, state of Chiapas, 200 to 500 feet, 1 to 3 August 1895, fl., fr., *Nelson 2876* (holotype: US US00479029 [image]!; isotypes: GH GH00056991 and GH00056992 [images]!). **Figure 4 H–L.**

Herbs erect, 0.2–0.9 m tall. Branches terete, sparsely sericeous, trichomes simple, hialin; lenticels sparse in old branches, not verrucose. Stipules 5–8.2 × 2.3–2.5 mm, ovate to lanceolate, base rounded, margins long-ciliate, apex acuminate, sparely sericeous, trichomes simple; veins 3–4, conspicuous. Leaves spirally arranged along the branches; petiole 0.7–1.5(–2–2.7) × 0.1 cm, terete, canaliculate, sericeous; leaf blade membranaceous, concolorous, 1.7–4.2 × 0.6–1.8 cm, narrowly elliptic, elliptic to lanceolate, base cuneate, margins coarsely serrate, apex acute, sericeous, especially on the veins; basal veins 2 pairs, secondary veins 6–7 pairs. Inflorescences axillary and terminal, congested, long-pedunculate, many-flowered; peduncle 3.5–10.2 cm long, sericeous. Flowers homostylous, sessile to short-pedicellate; pedicels ca. 0.3 mm long; bracteoles 3–4, 6–7 × 0.5–4 mm, distinct, unequal in shape, ovate to elliptic to narrowly elliptic to oblanceolate, ciliate, apex acute to acuminate, entire to 2–3-dentate, sericeous, trichomes simple; veins 1–4, conspicuous. Calyx 6–7 × 2.3–2.5 mm, campanulate, sericeous externally, trichomes 2–3-armed and stellate, sessile, glabrous internally, sericeous on the lobes, trichomes simple, lobes 2.8–3 × 0.8–1 mm, apex long-acuminate; veins 3–4 pairs, conspicuous. Corolla bright yellow, petal adnate to staminal tube by ca. 2 mm long, lobes 6.2–7.5 × 1.1–2.5 mm, spatulate, glabrous, apex truncate to rounded, eciliate. **Homostylous flowers:** stamens 3.2–4.5 mm long, staminal tube 2.5–3.5 mm long, free filaments 0.2–0.5 mm long, anthers ca. 0.8–1 mm long, gynoecium 3.2–5.5 mm long, ovary 1–1.3 × 0.8 mm, sericeous

apically, style 0.9–1.5 mm long, erect, glabrous, stigma 1.4–2.5 × 0.2 mm long, elongate-plumose. Capsule 2.5–3 × 1.5–1.8 mm, obpyramidal, chartaceous on the operculum, membranaceous below, apex truncate, sericeous apically, trichomes simple; seed 2–2.2 × 1.2–1.3 mm long, obovoid, blackish, glabrous, verrucose.

Distribution and habitat:—*Waltheria operculata* is the most widely distributed species from *W.* sect Stego*waltheria*, and has distribution in Bolivia, Brazil, Honduras, Mexico, Paraguay and Venezuela (Saunders 2007). In Brazil it occurs in Midwest (Goiás, Mato Grosso, Mato Grosso do Sul), North (Tocantins), Northeast (Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, and Sergipe), and Southeast (Minas Gerais) regions (Fig. 5), growing mainly in Caatinga areas, but also with records in Cerrado, Atlantic Forest (and restinga), in elevations varying between 62–1000 m a.s.l. Saunders (2007) indicates that *W. operculata* also occurs in Rio de Janeiro state, however, no voucher was found to check this record.

Conservation status:—Least Concern (LC).

Notes:— *Waltheria operculata* is morphologically similar to *W. macropoda*, however, it can be differentiated by homostylous flowers (vs. distylous) and calyx without glandular trichomes externally (vs. present).

Vernacular names:—Compota (Ceará), folha-nervurada (Piauí), malva (Rio Grande do Norte) and perpétua-brava (Pernambuco).

Selected specimens examined:—BRAZIL.—**Alagoas:** Pão de Açúcar, Quixaba depois de Riacho Grande, 26 May 2007, fl., *R.P. Lyra-Lemos et al. 10334* (MAC). **Bahia:** Paulo Afonso, Fazenda Arrasta, 18 May 1981, fl., *G. Pinto 126/81* (HUEFS [image]). São Inácio, Serra do Uçuruá, 25 February 1977, fl., *R.M. Harley 19024* (IPA). **Ceará:** Aiuaba, Estação Ecológica de Aiuaba, 22 March 1984, fl., *E. Nunes s.n.* (EAC13403); Granja, entre Martinópole e Granja, 21 May 2015, fl., *E.B. Souza et al. 3472* (EAC, HUVA); Fortaleza, Reserva Ecológica

Particular da Sapiranga, 6 June 1999, fl., *A.M. Teixeira 8* (MOSS). **Goiás:** Alvorada do Norte, Fazenda Estância Paraná, 2 December 2003, fl., *G. Pereira-Silva et al. 8021* (CEN). **Mato Grosso:** Cuiabá, 1902, fl., *G.O.A. Malme 2661* (R, S [not found]). **Mato Grosso do Sul:** Corumbá, Fazenda Monjolinho, 2 September 2006, fl., *A. Takahasi & S.M. Ribas 939* (COR [not seen], UEC]. **Minas Gerais:** Pedra Azul, a 5 km de Pedra Azul, 16 January 1965, fl., *E. Pereira & G. Pabst 8322* (R). **Paraíba:** Santa Terezinha, Reserva Particular do Patrimônio Natural Fazenda Tamanduá, 25 March 2011, fl., fr., *D.S. Lucena et al. 62* (CSTR). **Pernambuco:** Goiana, após a cidade de Goiana, 12 July 1985, fl., fr., *R. Pereira 30* (PEUFR, ESA [not found]). Mirandiba, Fazenda São Gonçalo, 12 March, fl., *B.S. Amorim et al. 279* (NY [image], UFP). **Piauí:** Campo Maior, Fazenda Sol Posto, 12 June 1995, fl., fr., *M.S. Bona Nascimento & M.E. Alencar 1046* (IPA). **Rio Grande do Norte**: Rio do Fogo, Punaú, 2 June 2009, fl., *A.C.P. de Oliveira 1280* (UFRN [2 sheets]); Serra Negra do Norte, Estação Ecológica do Seridó, 6 June 2019, fl., fr., *T.S. Coutinho et al. 420* (UFP, UFRN, RB). **Sergipe:** Canindé de São Francisco, Fazenda Posso Verde, 8 July 2005, fl., *D.V. Braga et al. s.n.* (IPA73837). **Tocantins:** Tocantinópolis, Estrada vicinal à ferrovia Norte Sul, 21 February 2005, fl., *G. Pereira-Silva et al. 9473* (CEN).

Waltheria sect. ***Waltheria*** L. (as *Euwaltheria*) (1753: 673). Type species of the section:—*Waltheria indica* Linnaeus (1753: 673).

Branches with stellate trichomes isolated or mixed with simple, 2-armed, multiradiate and/or glandular trichomes and scarious stipules, 0.2–1.3 mm width, truncate base. Capsule with loculicide dehiscence, partial or total and smooth seeds, sometimes somewhat crenulate only along the hilum and at the apex.

Schumman (1886) also mentioned flowers length (up to 7 mm long) and seeds indumentum (glabrous; not mentioned in the sect. *Stegowaltheria*) are useful characters to

distinguish two section proposed by him, however, flowers in *W.* sect. *Waltheria* can exceed this average, and seeds in *W.* sect. *Stegowaltheria* also are glabrous.

4. *Waltheria ackermannianna* Schumann (1886: 61). **Lectotype (designated here):**—BRAZIL. Rio de Janeiro: *in collib. siccis R. Jan.*, 1831, *Riedel 63* (LE LE00006869 [image!]; isolectotypes: E E00012599 [image!], F F0073606F fragment [image!], LE LE00006868 [image!]). [Remaining syntype: *Sello 1171*. Excluded syntype: *Ackermann s.n.* (= *Waltheria eriocladа* DC.)]. **Figure 4 M–N.**

Subshrubs to shrubs, 0.7–1.5 m tall. Branches terete up to apex, strigose, trichomes stellate, sessile to subsessile, yellow, and trichomes glandular, sessile; bark with lenticels, usually verrucose. Stipules 6–8 × 0.4–0.8 mm, linear to linear tringular, base truncate, margins sparsely long-ciliate, apex acuminate, adaxial surface pubescent, trichomes stellate and glandular, both sessile, abaxial pubescent, trichomes stellate, sessile; vein 1, conspicuous, prominent abaxially. Leaves spirally arranged along the branches; petiole 0.9–3(–4) × 0.1 cm, terete, slightly canaliculate, pilose; leaf blades chartaceous, discolorous, 3.2–7.5 × 2.3–5.7 cm, ovate to circular or elliptic to widely elliptic, base rounded to cordate, margins slightly to coarsely serrate, apex acute to rounded or truncate, adaxial surface scabrous, trichomes stellate and glandular, both sessile, abaxial lanate, trichomes stellate, sessile; basal veins 2 pairs, secondary vein 5–7 pairs. Inflorescences axillary along the branches, congested, pedunculate, many-flowered; peduncle 0.5–2.1 cm long, canescent. Flowers distylous, sessile; bracteoles 4–5, 8.5–11 × 0.7–1 mm, distinct, linear, apex acuminate, entire, adaxial surface pubescent, trichomes stellate, abaxial surface pubescent, trichomes stellate, sessile; veins 1–3, conspicuous. Calyx 5.5–8 × 2.3–4.5 mm, campanulate, scabrous externally, trichomes stellate, sessile, glabrous internally, pubescent on the lobes, simple trichomes, lobes 3.8–4 × 1–1.1 mm, apex long-

acuminate; veins 2 pairs, conspicuous. Corolla bright yellow or reddish-yellow, petals adnate to the staminal tube by 0.4–1 mm long, 6.2 × 1.2 mm, spatulate, adaxial surface sparsely pilose medially, trichomes simple and stellate, abaxial surface glabrous, apex rounded, ciliate. Anthers 1.4–1.5 mm long, ovary 1.1–1.2 × 0.8–0.9 mm, sericeous apically, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens 7–7.5 mm long, staminal tube 2.7 × 0.9 mm, free filaments 4–4.2 mm long, gynoecium 4.2 mm long, style ca. 2.2 mm long, stigma ca. 2 × 2 mm. **Longistylous form:** stamens 3.4 mm long, staminal tube 2.5 × 1 mm, free filaments absent, gynoecium 6–6.3 mm long, style 4.3–4.4 mm long, stigma 2 × 2 mm. Capsule 3−3.8 × 2−2.1 mm, obpyramidal, chartaceous at the apex, membranaceous below, apex truncate, sericeous apically, trichomes stellate and 2-armed, dehiscence partial; seed 1, 2.2 × 1.5 mm, obovoid, brown, glabrous, apex rounded, slightly crenulate.

Distribution and habitat:—Endemic to Brazil, *Waltheria ackermanniana* is known in the Northeast (Alagoas, Bahia and Pernambuco) and Southeast (Minas Gerais and Rio de Janeiro) regions (Fig. 6), growing in areas of Atlantic forest, Caatinga, Cerrado, campos rupestres and restinga in 460–1000 a.s.l.

Conservation status:—Endangered (EN); B2ab(ii, iv).

Notes:—This species can be recognized by strigose branches with stellate sessile and subsessile trichomes, and glandular sessile, linear stipules, axillary inflorescences arranged along the branches, and linear to narrowly lanceolate bracteoles and longer than the calyx. Some specimens can present verrucose lentils, a character state found only in this species. It resembles *Waltheria polyantha* in branches indument and trichomes type, however, they are distinguished specially by axillary inflorescences in *W. ackermanniana* (vs. terminal).

Selected material examined:—BRAZIL. **Alagoas:** Mata Grande, Serra do Parafuso, 08 November 2016, fl., *A.P. Fontana & P.M.G. Caxias 9836* (PISF, RB). **Bahia**: s.l., Parque

Nacional da Chapada Diamantina, 16 January 1990, fl., *L.P. Félix 2726* (EAN); Abaíra, estrada nova Abaíra/Catolés, 19 December 1991, fl., *R.M. Harley & V.C. Souza 50117* (CTES); Brotas de Macaúbas, estrada para Buriti, 13 March 1998, fl., *G. Hatschbach et al. 67676* (CTES, MBM); Glória, Salgado, 19 October 2016, fl., *A.P. Fontana & J.R. Silva 9752* (PISF, RB); Morro do Chapéu, Chapada Diamantina, 14 March 2008, fl., *M.L. Guedes et al. 14533* (ALCB [not seen], MBM). Rio de Contas, ca. 5 km na estrada da cidade para Pico das Almas, 27 December 1997, fl. and fr., *A.M. de Carvalho et al. 6367* (CEPEC [not seen], CTES, NY [digital image], SP). **Minas Gerais:** s.l., Serra do Espinhaço, 14 February 1972, fl., *W.R. Anderson et al. 35976* (UB); Monte Azul, Serra do Espinhaço, 18 April 1966, fl., *G. Hatschbach et al. 64985* (MBM). **Pernambuco:** Buíque, Parque Nacional do Catimbau, 24 March 2018, fl., fr., *T.S. Coutinho et al. 344, 335, 338* (UFP). Flores, Serra do Sabá, 20 November 2014, fl. and fl., *J.L. Costa-Lima 1946* (PISF). Tacaratu, acesso Areia, 28 May 2019, fl., *D.P. Souza & J.R. Silva 554* (PISF). **Rio de Janeiro:** Cabo Frio, estrada do matadouro, 19 January 1967, fl., *D. Sucre 1404* (RB); Rio de Janeiro, Pedra da Gávea, 8 March 1981, fl., *C.A.R. Carauta 83* (CTES).

5. ***Waltheria albicans*** Turczaninow (1858: 214). Type:—BRAZIL. Bahia: la Serra Jacobina, 1837–1839, *Blanchet 2691* (erroneously cited '*2791*' [type of *Eugenia flavescens* – Myrtaceae]) in protologue) (holotype: KW KW001000121 [image!]; isotypes: G G00358705, G00358706 and G00358707 [images!], LE LE00006870 [image!], P P02273668 [image!]). **Figure 4 O–R.**

Shrubs, 0.2–2 m tall. Branches erect or decumbent, terete, tomentose, trichomes stellate, sessile, and glandular, long-stalked, whitish to slightly yellowish; bark ridged, lenticels absent. Stipules 4–5 × 0.8–1.1 mm, narrowly triangular or semi elliptic, base truncate, margins ciliate, apex acute, adaxial surface sericeous, trichomes stellate and glandular, abaxial surface hirsute, trichomes similar; vein 1–2, conspicuous. Leaves spirally arranged along the branches; petiole

0.4–2.5(–4.2–6) × 0.1 cm, terete, not canaliculate or inconspicuously so, villous or pilose; leaf blades chartaceous, concolorous or discolor, (1.2–)3.5–10.5 × (0.6–)2–9 cm, ovate to widely ovate or elliptic, lanceolate, rarely inconspicuously 3-lobate, base cordate, margins slightly serrate, apex acute, adaxial surface pubescent to canescent, trichomes stellate, sessile, and glandular, sessile to stalked, abaxial surface canescent, trichomes similar; basal veins 2 pairs, secondary veins 6–7 pairs. Inflorescence axillary along the branches, congested, pedunculate, many-flowered; peduncle 1.2–7 cm long, tomentose. Flowers distylous, sessile; bracteoles 4, 5–7 × 1–3.2 mm, distinct, narrowly elliptic to ovate, apex acute, entire to 3-dentate, adaxial surface sericeous, trichomes 2–3-armed and glandular, sessile to short-stalked, abaxial surface sericeous, trichomes long 2–3-armed, glandular, long-stalked; veins 2–5, conspicuous. Calyx 4–7 × 1.6–2.5 mm, campanulate, externally sericeous, trichomes stellate, sessile, 2-armed, and glandular, long-stalked, internally glabrous, hispidulous on lobes, trichomes simples to 2-armed, lobes 2–3.5 × 0.7–1 mm, apex acuminate; veins 1(–2) pairs, inconspicuous. Corolla bright yellow, petals adnate to the staminal tube by 0.4–1.2 mm long, 8–10.5 × 5.3–5.5 mm, spatulate, both surfaces glabrous, apex truncate to emarginate, eciliate. Anthers 1.1–1.2 mm long, ovary 1.3–1.5 × 0.7–0.8 mm, sericeous apically, style tomentose, stigma elongate-plumose. **Brevistylous form:** stamens 6.6–7 mm long, staminal tube 1.5–1.8 × 0.9–1 mm, free filaments 4.8–5 mm long, gynoecium 3.7–3.8 mm long, style 1.2–1.3 mm long, stigma 1.2–1.3 × 0.3 mm. **Longistylous form:** stamens ca. 4 mm long, staminal tube ca. 3 × 0.8 mm long, free filaments absent, gynoecium ca. 6.6 mm long, style ca. 4 mm long, stigma ca. 1.2 × 0.2 mm. Capsule 3.2–3.6 × 1.6–1.8 mm, obpyramidal, chartaceous at the apex, membranaceous below, apex truncate, hirsute apically, trichomes stellate, dehiscence partial; seed 1, 1.8–2.1 × 1.1–1.2 mm, obovoid to obpyramidal, brown to dark brown, glabrous, apex finely crenulate.

Distribution and habitat:—Occurs in Mexico, Colombia, Guiana, Venezuela,

Paraguay, Argentina and Brazil (Saunders 2007). In Brazil, it is recorded in Northeast (Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Piauí, Maranhão and Sergipe), Midwest (Goiás and Mato Grosso do Sul), North (Pará and Roraima) and Southeast (Minas Gerais) regions (fig. 6), especially in areas of Caatinga, but also in Cerrado, Chaco and Atlantic Forest (restinga) and Amazonian, at 359–829 m a.s.l.

Conservation status:—Least Concern (LC).

Notes:—This species is related morphologically to *Waltheria carmensarae* and *W. viscosissima*. From *W. carmernsarae* it differs mainly by erect shrubby (vs. prostrate herbs) and distylous flowers (vs. homostylous), and from *W. viscosissima* by not sticky branches (vs. sticky) and by leaf blades with rounded to acute apex (vs. acuminate). Some herbaria sample can be confused with *W. indica*, especially those specimens with elliptic leaf blade, however, bracteoles in *W. albicans* that can reach up to 3.2 mm width (vs. up to 1.5 mm width), distylous flowers (vs. always homostylous) and elongate-plumose stigmas (vs. fan-plumose).

Vernacular names:—Malva-do-mato (Ceará).

Selected specimens examined:—BRAZIL. **Alagoas:** Marechal Deodoro, Área de Proteção Ambiental de Santa Rita, 14 May 1988, fl., *G.L. Esteves et al. 2095* (SP). **Bahia:** Canavieiras, Km 25 da Rodovia Uma/Canavieiras, 02 April 1980, fl., *L.A. Matos Silva et al.* (SPF). Xique-Xique, Rodovia Barra, 15 Februry 2004, fl., *G. Pereira-Silva et al. 8452* (CEN). **Ceará:** Aiuaba, Estação Ecológica de Aiuaba, 30 May 1998, fl., *L.W. Lima-Verde et al. s.n.* (EAC 26725, MAC 48591). **Goiás:** Alvorada do Norte, Fazenda Estância Paraná, 24 August 2003, fl., *A.C. Sevilha et al. 3055* (CEN). **Maranhão:** s.l., BR-230, 23 April 1980, fl., *A. Fernandes & E. Nunes s.n.* (EAC 8517). **Mato Grosso do Sul:** Corumbá, Fazenda Leque, 08 June 1989, fl., *V.J. Pott & N.C. Bueno* (CTES, CPAP [not seen]). **Minas Gerais:** Cristália, Soberbo, 18 August 1998, fl., *G. Hatschbach et al. 68003* (CTES, MBM). **Pará:** s.l. [Alenquer?], Sete Varas, 10 August 1981, fl., *J.J. Strudwick et al. 4439* (L, NY). **Paraíba.**

Maturéia, Parque Estadual Pico do Jabre, 5 June 2019, fl., fr., *T.S. Coutinho et al. 412* (UFP). **Pernambuco:** Petrolina, Campus Agronomia da UNIVASF, 8 July 2019, fl., fr., *T.S. Coutinho 458* (UFP); *ibidem, T.S. Coutinho 459* (UFP). **Piauí:** São Raimundo Nonato, Parque Nacional Serra da Capivara, May 1978, fl., *L. Emperaine 274* (CTES). **Roraima:** Boa Vista, Estação Ecológica de Maracá, 25 May 1987, fl., *J.L. dos Santos et al. 822* (CTES, INPA [image]). **Sergipe:** Itaporanga d'Ajuda, Fazenda Trapsa, 07 July 2008, fl., *I.S. Matos et al. 48* (RB, SP).

6. *Waltheria biribiriensis* J.G. Saunders ex T.S. Coutinho & Colli-Silva (2020b: 454). Type:—BRAZIL. Minas Gerais: Diamantina, "estrada para Biribiri, c. 4 km para Biribiri", 18°10'13.3"S, 43°36'53.8"W, 950 m elev., 23 January 2007, *Pirani et al. 5689* (holotype: SPF!; isotypes: SP!, UFP!). **Figure 4 S.**

Shrubs, 0.7–2 m tall. Branches erect, terete, flat upward the apex, puberulent, glabrescent, trichomes multiradiate, short- to long-stalked, whitish to slightly yellowish; bark rugose longitudinally, lenticels not verrucose. Stipules ca. 6 × 1 mm, linear triangular, base truncate, margins eciliate, apex acute, scabrous, trichomes multiradiate, short-stalked; vein 1, inconspicuous. Leaves distically arranged along the branches; petiole 0.4–1.3 × 0.1–0.2 cm, angulate, not canaliculate, pubescent to canescent; leaf blade chartaceous, strongly discolor, 3.5–13 × 1.3–6.5 cm, narrowly elliptic to elliptic or lanceolate, base subcordate to cordate, margin finely serrate, apex acute, densely pilose, trichomes multiradiate, stalked; basal veins 3 pairs, secondary veins 8–11 pairs. Inflorescences axillary along the branches, congested, sessile to subsessile, many-flowered; peduncle ca. 0.2 cm long, densely pubescent. Flowers distylous, sessile; bracteoles 4, 8 × 1.5–1.8 mm, distinct or fused by ca. 1.5 mm long basally, oblong to lanceolate, apex acute, 2–3-lobed, to rarely entire, adaxial surface tomentose, trichomes stellate, sessile, abaxial surface scabrous, trichomes multiradiate, short-stalked; veins 2–4, conspicuous.

Calyx 5–7 × 2.8–3.2 mm, tubular-campanulate, scabrous externally, trichomes multiradiate, short- to long-stalked, glabrous internally, tomentose on the lobes, lobes 1–2.2 × 1–1.2 mm, apex acute to subacute; veins absent. Corolla yellow, petals adnate to the staminal tube by ca. 0.4 mm long, 6–6.5 × 1.5–2 mm, spatulate, glabrous, apex rounded to emarginate, eciliate. Anthers 1.3–1.8 mm long, ovary 1.3–1.5 × 0.9–1 mm, sericeous apically, style tomentose, stigma clavate. **Brevistylous form:** stamens 5–6 mm long, staminal tube 2–2.1 × 1 mm, free filaments 2–2.2 mm long, gynoecium 4–5.2 mm long, style 2.0–2.1 mm long, stigma 0.5–0.6 × 0.2 mm. **Longistylous form:** stamens ca. 4 mm long, staminal tube ca. 2.5 × 1 mm long, free filaments ca. 0.8 mm long, gynoecium ca. 7.1 mm long, style ca. 5.5 mm long, stigma ca. 1.0 × 0.2 mm. Capsule 3–3.4 × 1.5–2 mm, obovoid, chartaceous at the apex, membranous below, apex rounded, hirsute apically, trichomes stellate, dehiscence partial; seed 1, 2.2–2.5 × 1.3–1.5 mm, obovoid, brown to dark brown, glabrous, apex not crenulate.

Distribution and habitat:—Endemic to Brazil, this species is known only from Minas Gerais state (fig. 6), with mostly collection from Diamantina municipality, where it is also endemic to Cerrado domain, growing only in campos rupestres in elevations between 800–1200 m a.s.l.

Conservation status:—Vulnerable (VU).

Notes:—*Waltheria biribiriensis* is quickly recognized by multiradiate trichomes, at least two bracteoles that surround pair of flowers with 2–3-lobed apex, and clavate stigmas. It resembles *W. hatschbachii*, a species from campos rupestres, sharing lifeform and multiradiate trichomes on the branches, but differs by puberulent branches (vs. tomentose), oblong to lanceolate with apex 2–3-lobate to entire (vs. linear and always entire), scabrous calyx (vs. tomentose), and clavate stigmas (vs. elongate-plumose and filiform in longistylous and brevistylous flowers, respectively).

Additional material examined—BRAZIL.—**Minas Gerais:** Diamantina, estrada para Biribiri, 08 April 1982, fl., fr., *N. Hensold et al. CFCR 3103* (MBM, SPF); estrada para povoado de Três Barras, 15 May 1987, fl., *V.L. Scatena s.n.* (RB 341682, SPF 47251); estrada para Milho Verde, 19 May 2018, fl., *J.N. Nakajima et al. 4807* (SP); margem da estrada para Curralinho, 21 May 2016, fl., *J.E.Q. Faria 5862* (HDJF [image], RB, SP); Mirante do Cruzeiro, 09 April 2016, fl., *J.E.Q. Faria 5616* (HDJF [image], RB, SP); Rio dos Cristais, 25 March 1966, fl., *A.P. Duarte 9648* (RB); 6 km N de Diamantina, 14 February 1991, fl., *M.M. Arbo et al. 5028* (SPF); 5 km from road to Diamantina on road to Biribiri, 26 March 1990, fl., *J.G. Saunders et al. 3167* (BHCB, F [image], K [3 sheets; images], MBM [2 sheets], NY [2 sheets; image]); road Diamantina-Biribiri, 08 December 1997, fl., *R.C. Forzza et al. 510* (SPF); Ponte do Acaba Mundo, 08 February 2009, fl., *M.S. Ferrucci et al. 2856* (SPF); Serra do Espinhaço at Lapinha, 24 February 1968, fl., *H.S. Irwin et al. 20799* (MBM). c. 20 Km E to Diamantina, 15 March 1970, fl., fr., *H.S. Irwin et al. 27546* (CTES, MBM, NY [image], RB); estrada para Biribiri, 08 December 1992, fl., *H.F. Leitão Filho et al. 27508* (ESA, RB, UEC). Serro, base do Pico do Itambé, 05 May 1942, fl., *G.M. Magalhães 2088* (BHCB).

7. *Waltheria brachypetala* Turczaninow (1858: 215). Type:—BRAZIL. Bahia: La Serra Acurua, 1838, fl., *Blanchet 2744* (holotype: KW KW001000120 [image!]; isotypes: BR BR0000005934317 and BR0000005934621 [images!], F F0073608F [image!], G G00358709 [image!], GH GH00056999 [image!], K K000380987 [image!], LE LE00006872 [image!], MO MO-279572 [image!], P P02273691 [image!]). **Figure 4 T–X.**

Shrubs, 1.2−2.5 m tall. Branches erect, terete, little angulate apically, canescent, trichomes multiradiate, long-stalked, yellowish; lenticels absent. Stipules 7−11 × 0.6 mm, linear triangular, base truncate, margins eciliate, apex acute, pilose, trichomes multirradiate, stalked,

and stellate, sessile; vein 1, inconspicuous. Leaves distically arranged along the branches; petiole 0.6−1.1 × 0.1 cm, angulate, not canaliculate, tomentose; leaf blade chartaceous, concolorous, rarely discolorous, 4.2−10.2 × 1.7−4 cm, conduplicate or plane, lanceolate, base cordate to rounded, margins dentate, apex acute, adaxial surface pubescent, trichomes stellate, sessile, abaxial canescent, trichomes sessile stellate and multiradiate, stalked; basal veins 2 pairs, secondary veins 14−17 pairs. Inflorescences axillary along the branches, congested or lax, then elongate, pedunculate, many-flowered; peduncle 0.3−2.2 cm long, tomentose. Flowers distylous, sessile; bracteoles 4, 6−7.2 × 1.8−3.2 mm, distinct or fused by 1.8−2.2 mm long basally, elliptic to widely elliptic, apex acute, entire to 2–3-dentate apically, tomentose, trichomes stellate, sessile; multinervate, conspicuous. Calyx 7−7.2 × 2.7−3 mm, tubular-campanulate, pubescent externally, trichomes stellate, sessile, pubescent internally ca. 2 mm long above base, tomentose on lobes, trichomes sessile, stellate, lobes ca. 2 × 2 mm, apex acute; veins absent. Corolla yellow, petals adnate to the staminal tube by ca. 0.3 mm long, 7−7.5 × 2.3−2.5 mm, spatulate, glabrous, apex emarginate, eciliate. Anthers 1.1–1.3 mm long, ovary 1.3–2 × 0.7–0.9 mm, sericeous apically, style tomentose, stigma clavate. **Brevistylous form:** stamens 7−7.2 mm long, staminal tube ca. 2 × 1 mm, free filaments ca. 4.1 mm long, gynoecium ca. 3.2 mm long, style ca. 1.5 mm long, stigma ca. 1 × 0.3 mm. **Longistylous form:** stamens 4.2−5 mm long, staminal tube 3−3.4 mm long, free filaments 0.3−0.6 mm long, gynoecium 7.5−8.2 mm long, style ca. 3.8−5 mm long, tortuose, stigma 1−1.2 × 0.3 mm. Capsule 2.8−3.5 × 2.5 mm, obovoid, chartaceous an the apex, membranous below, apex truncate-rounded, pilose apically, trichomes stellate, dehiscence partial; seed 1, 2.5−3.2 × 2 mm, obovoid, brown, glabrous, apex rounded.

Distribution and habitat:—This species is endemic to Brazil, occurring in North (Tocantins state), Northeast (Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Piauí and Rio

Grande do Norte states) and Southeast (Minas Gerais state) regions (fig. 6). It can be found in Atlantic Forest (and restinga), Caatinga, and Cerrado domains, in open and dry areas, in elevation between 30–718 m. A specimen housed in K herbarium (K001213115; *A. Glaziou 9646*) from Rio de Janeiro was found, however, in the label is wrote that sample belongs to cultivated plant.

Conservation status:—Least Concern (LC).

Notes:—*Waltheria brachypetala* is morphologically related to *W. flavovirens* and *W. hoehnei*, sharing shrubby habit and multiradiate trichomes on the branches. It differs from *W. flavovirens* by canescent branches with long-stalked trichomes (vs. strigose and sessile to short-stalked), distichous leaves (vs. spirally arranged), leaf blade with pubescent adaxial surface (vs. scabrous) and pubescent calyx (vs. scabrous); and from *W. hoehnei* by bracteoles longer than the calyx and elliptic to widely elliptic (vs. shorter and lanceolate), bracteoles with stellate trichomes on the adaxial surface (vs. stellate and 2-3-armed trichomes), pubescent calyx (vs. strigose), petals with emarginate apex (vs. rounded) and elongate-plumose stigmas (vs. clavate).

***Selected material examined*—**BRAZIL.—**Alagoas:** Maceió, 2002, fl., *R.A. Silva 1796* (MAC). Traipu, Serra das Maos, 15 May 1990, fl., *R.P. Lyra-Lemos & G.L. Esteves 2526* (MAC). **Bahia:** Andaraí, Rio Paraguacu, 19 June 1984, fl., *G. Hatschbach & R. Kummrow 48064* (SPF!). Bom Jesus da Lapa, rodovia para Santa Maria da Vitoria, 05 April 1992, fl., *G. Hatschbach et al. 56608* (F [image], MBM). Casa Nova, Sitio Recanto, 16 February 2008, fl., *J.A. Siqueira-Filho 1947* (HVASF, MAC). Feira da Mata, 06 May 2007, fl., *M.L. Guedes et al. 13302* (ALCB [not seen], MBM). Morro do Chapéu, Lagedo Bordado, 05 May 2007, fl., *J.M. Gonçalves et al. 217* (SPF). Oliveira dos Brejinhos, Serra da Água Quente, 15 November 2012, fl., *E.L.M. Assis et al. 1087* (RB). Xique-Xique, 17 March 1990, fl., *J.G. Saunders & A.M. de Carvalho 3119* (CTES). **Ceará:** Aracati, 17 June 1976, fl., *A. Fernandes s.n.* (EAC 2800). Crateús, Reserva Particular do Patrimônio Natural Serra das Almas, 06 June 2002, fl., fr., *F.S.*

Araújo 1582 (EAC). Granja, Distrito de Santa Terezinha, 22 April 2015, fl., *E.B. Souza et al. 3384* (HUVA). Tianguá, entre Tianguá e Viçosa do Ceará, 30 May 1979, fl., *A. Nunes s.n.* (EAC 6226). **Minas Gerais:** Manga, Gleba C-3, 30 April 1991, fl., *L.V. Costa et al. s.n.* (BHCB 2243). São João das Missões, 20 January 2010, fl., *C. Vidal 836* (BHCB). **Paraíba:** Monte Horebe, 23 August 2012, fl., *R.A. Silva 2188* (HVASF). **Pernambuco:** Buíque, Parque Nacional do Catimbau, 24 March 2018, fl., fr., *T.S. Coutinho et al. 334* (UFP). Ibimirim, Lagoa de Areia, 23 July 1994, fl., *A.M. Miranda et al. 1940* (HST, RB, UFP). Petrolina, Campus da UNIVASF, 08 July 2019, fl., fr., *T.S. Coutinho 457* (UFP). **Piauí:** Amarante, Lage, 03 March 2005, fl., *A.M. Miranda et al. 4973* (ASE [image], EAC, HST, HUEFS [image], MAC). Castelo do Piauí, 31 March 2004, fl., *J.M. Costa et al. 153* (UEC). Floriano, 15 March 2009, fl., *A. Santos et al. s.n.* (HST 16554). Parnaíba, Lagoa Portinho, 03 October 1973, fl., *D. Araújo et al. 454* (RB). **Rio Grande do Norte:** Ceará-Mirim, Praia de Muriu, 04 July 2014, fl., *J.S. Carvalho-Júnior & L.A. Cestaro 36* (UFRN). Mossoró, rodovia para Tibau do Sul, 17 July 2013, fl., *J. Jardim & A. Roque 6464* (RB, UFRN). **Tocantins:** Mateiros, Região do Jalapão, 07 May 2001, fl., fr., *A.B. Sampaio et al. 504* (CEN).

8. ***Waltheria carmensarae*** J.G. Saunders (2007: 202). Type:—ARGENTINA. Corrientes: Dpto. San Cosme, Paso de la Patria, en médano, 27°13’ S, 58°34’60’’ W, 45 m, 24 April 1990, fl., fr., *Cristóbal & Saunders 3213* (holotype: CTES [not found]; isotypes: A [not seen], BR BR0000005581078 [image!], CEPEC [not seen], CTES [not found], G G00358716 [image!], K K000381052 [image!], F F0073613F [image!], FCQ [image!], LE [not found], LL LL00208254 [image!], LPB [not seen], M [not found], MA [not found], MBM 200982!, MEXU MEXU00883348 [image!], MICH MICH1210203 [image!], MO MO-309283 [image!], NY NY00074044 [image!], P [not found], PR [not seen], SI SI000570!, US US00516523 [image!]).

Figure 7 A–D.

Herbs prostrate. Branches terete, pubescent, trichomes stellate, sessile, and glandular long-stalked; bark slightly bright lustrous, lenticels sparse in old branches, not verrucose. Stipules 6–6.2 × 0.9–1 mm, narrowly-elliptic to linear triangular, base truncate, margins long-ciliate, apex acute, adaxial surface sericeous, trichomes stellate, sessile, abaxial surface pubescent, trichomes stellate long and short, and glandular, long-stalked; vein 3–4, conspicuous. Leaves spirally arranged along the branches; petiole 0.3–1.5 × 0.1 cm, terete, slightly canaliculate, pubescent; leaf blade chartaceous, concolorous, 3–5.5 × 2.3–4.5 cm, ovate to widely ovate, base cordate, margins serrate, apex acute to rounded, adaxial surface pubescent, trichomes stellate, sessile and glandular long-stalked, abaxial surface densely pubescent, trichomes similar; basal veins 2 pairs, secondary veins 8–9 pairs. Inflorescences axillary along the branches, congested, sessile to pedunculate, many-flowered; peduncle 0.5–4 cm long, pubescent. Flowers homostylous, sessile; bracteoles 4, 5.2–6.2 × 0.5–1.5 mm, distinct, unequal in shape, narrowly-elliptic to elliptic, long-ciliate, apex acute, entire to 3-dentate in the wider, adaxial surface sericeous, trichomes stellate, sessile, abaxial surface canescent, trichomes stellate short and long, and glandular, long-stalked; veins 3–5, conspicuous. Calyx 5–5.2 × 2–2.5 mm, campanulate, sericeous externally, trichomes stellate and glandular long-stalked, glabrous internally, sericeous on the lobes, trichomes simple and 2–3-armed, lobes 2–2.1 × 0.9– mm, densely long-ciliate, apex acuminate; veins 2 pairs, thick. Corolla yellow, petal adnate to staminal tube by ca. 0.8 mm long, 6.5–6.8 × 1.5 mm, spatulate, adaxial surface abaxial surface sparsely villous, trichomes stellate, apex truncate, ciliate. **Homostylous flowers:** stamens ca. 3.6 mm long, staminal tube 3.1–3.2 mm long, free filaments 0.4–0.5 mm long, anthers 0.6–0.8 mm long, gynoecium ca. 3.5 mm long, ovary 1.3 × 0.7 mm, style ca. 1.2 mm long, tomentose, stigma ca. 1.2 × 0.2 mm long, elongate-plumose. Capsule 2.8–3.3 × 1.7 mm, obpyramidal, carthaceous at the apex, membranaceous below, apex truncate, pilose to sericeous apically,

trichomes 2-armed to stellate, dehiscence partial; seed 1, 2–2.2 × 1–1.3 mm, obovoid, blackish, glabrous, apex rounded, crenulate.

Distribution and habitat:—Occurs in Venezuela, Argentina, and Paraguay (Saunders 2005a). Rondón (2008) cites the occurrences to Brazil, however, he does not cite any voucher to check this information. Here, we firstly documented to Brazil, occurring only in Mato Grosso do Sul in Chaco areas (fig. 6).

Conservation status:—Deficient Data (DD).

Notes:—*Waltheria carmensarae* is morphologically similar to *W. excelsa*, another species with prostrate lifeform, however, it can be distinguished by presence of glandular long-stalked trichomes on the branches (vs. absence) and homostylous flowers (vs. distylous).

Additional specimens examined—BRAZIL.**—Mato Grosso do Sul:** Corumbá, Fazenda Aguaçuzinha, 14 May 1953, fl., fr., *E. Pereira et al. 304* (RB [2 sheets]).

9. *Waltheria carpinifolia* Saint-Hilaire & Naudin (1842: 38). Type:—BRAZIL. São Paulo, *in campis prope Paulopolim*, January 1839, fl., *s.c. s.n.* (holotype: P P02273694 [image!]; isotypes: F [not found], MO [not found]). **Figure 7 E–G.**

Subshrub to shrub erect, 0.5–1.5 m tall. Branches terete, little flat in apex, scabrous, trichomes stellate, sessile, white-yellowish; bark not lenticellate. Stipules 4–10 × 0.8–1 mm, linear triangular to narrowly triangular, base truncate, margins eciliate, apex acute, strigose, trichomes stellate, sessile; veins 1, conspicuous, prominent. Leaves spirally arranged along the branches; petioles 0.7–1.5 × 0.1 cm, angulate, canaliculate, scabrous; leaf blades coriaceous, discolorous, 4.2–11.5 × 2.1–7.4 cm, widely lanceolate to rhombic, base rounded to subcordate, margins coarsely serrate, apex acute, scabrous, trichomes stellate, sessile, in both surfaces; basal veins

2 pairs, secondary veins 8–9 pairs. Inflorescences terminal, congested, pedunculate, many-flowered; peduncle 0.3–1 cm long, scabrous. Flowers distylous, sessile; bracteoles 4, 4.3–5.1 × 0.5–1 mm, distinct, linear to narrowly elliptic, apex acute, entire, tomentose, trichomes stellate, sessile, sparsely ciliate, trichomes stellate; veins 1–3, inconspicuous. Calyx 5.3–5.5 × 2.1–2.2 mm, tubular-campanulate, tomentose externally, trichomes stellate, sessile, glabrous internally, tomentose on the lobes, lobes 1.4–1.6 × 1–1.1 mm, apex acute; veins 1 pair, inconspicuous. Corolla yellow, petals adnate to the staminal tube by ca. 0.8 mm long, 4.9–5.5 × 1.8 mm, oblanceolate, adaxial surface glabrous, abaxial surface sparsely pilose, trichomes stellate, apex rounded, sparsely ciliate. Anthers 1–1.2 mm long, ovary 1–1.1 × 0.6 mm, sericeous apically, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens ca. 4.8 mm long, staminal tube ca. 1.4 × 0.7 mm, free filaments 1.4–1.7 mm long, gynoecium ca. 3.5 mm long, style ca. 2.5 mm long, stigma 1–1.1 × 1 mm. **Longistylous form:** stamens 2.8–3 mm long, staminal tube ca. 1 × 1 mm, free filaments 1.2–1.4 mm long, gynoecium ca. 5 mm long, style ca. 4 mm long, stigma ca. 1 × 0.8 mm. Capsule 2.1 × 1.5 mm, obovoid, totally chartaceous, apex rounded, sericeous apically, trichomes stellate, dehiscence partial; seed 1, ca. 1.6 × 1.1 mm, obovoid, brown, glabrous, apex inconspicuously crenulate.

Distribution and habitat:—Endemic to Brazil, *Waltheria carpinifolia* is known only from Southeast (Minas Gerais and São Paulo states) and South (Paraná, Santa Catarina and Rio Grande do Sul states) regions (fig. 8), growing in Atlantic forest, Cerrado (and campo rupestre) and Pampa areas, at 15–1050 m a.s.l.

Conservation status:—Least Concern (LC).

Notes:—*Waltheria carpinifolia* is morphologically similar to *W. coriacea*, specially by leaf blades morphology and consistence, however, it can be distinguished by scabrous branches with stellate sessile trichomes (vs. tomentose and multiradiate stalked trichomes), stipules with

stellate trichomes (vs. multiradiate), spirally arranged leaves (vs. distichous), leaf blade with rounded to subcordate base (vs. cordate), terminal inflorescences (vs. axillary), linear to narrowly elliptic bracteoles (vs. lanceolate), and fan-plumose stigmas (vs. elongate-plumose).

Selected material examined:—BRAZIL.**—Minas Gerais:** Gouveia, Serra do Espinhaço, 7 February 1972, fl., *W.R. Anderson et al. 35601* (CTES, CEN, NY [image]). **Paraná:** Jaguariaíva, Fazenda Barros, 8 February 1997, fl, fr, *O.S. Ribas & L.B.S. Pereira 1661* (CTES, BHCB, MBM). Ponta Grossa, Parque Estadual Vila Velha, 14 April 1992, fl., *J.M. Silva & A.C. Cervi 1108* (CTES, CEN, MBM). **Rio Grande do Sul:** Torres, Campo Bonito, 10 February 1983, fl., *A. Krapovickas & C.L. Cristóbal 38471* (CTES, F [image], MBM, MO [not seen]). **São Paulo:** Itapeva, Estação Ecológica de Itapeva, 12 November 1994, fl., *V.C. Souza et al. 7044* (ESA, SJRP, SP [2 sheets], SPF [2 sheets], SPSF [not seen], UEC [2 sheets]). **Santa Catarina:** Sombrio, Curralinhos, 7 December 1944, fl., *P.R. Reitz C891* (CTES, RB).

10. *Waltheria cinerascens* [as '*cinerescens*'] Saint-Hilaire (1825: 152–153). **Lectotype (designated here):**—BRAZIL. Minas Novas [Minas Gerais], *in sabuletis prope pagum Nossa Senhora da Penha*, 1816–1822, fl., *Saint-Hilaire 1195* (P P02273696 [image!]; isolectotypes: P P02273695 [image!], F fragment F0073614F [image!], MO [not found], MPU MPU016437 [image!]). **Figure 7 H–N.**

= *Astropus tomentosus* Sprengel (1822: 64). Type:—BRAZIL. s.l., 1814–1831, fl., fr., *Sello s.n.* (B† destroyed; **lectotype (designated here):** HAL HAL0071529 [image!]). *syn. nov.*

= *Waltheria aspera* Schumann (1886: 55). **Lectotype (designated here):**—BRAZIL. Bahia: Mucuri, *ad pagum Macusi* [sic], 1816, *Wied 455* (TO [image!]). [Remaining syntype: *Sello 1127*; excluded syntype: *Glaziou 6097* (= *Waltheria maritima* Saint-Hilaire)]. *syn. nov.*

= *Waltheria lantanaefolia* Saint-Hilaire & Naudin (1842: 38). Type:—BRAZIL. *in Brasilia australiorum*, 1834, *Blanchet 1677* (holotype: P P02273698 [image!]; isotypes: F fragment

F0073623F [image!], F neg. no 23850 [image!], G [not found], NY [not found]). *syn. nov.*

= *Waltheria scabra* (Colla) Moraes & Guglielmone (2013: 32). ≡ *Visenia scabra* Colla (1833: 431). Lectotype (designated by Moraes et al. 2013):—BRAZIL. Bahia: Mucuri, *ad pagum Macusi*, s.d., *Wied s.n.* (TO [image!]). *syn. nov.*

Shrubs, 1–2(–3) m tall. Branches terete, sparsely strigose, strigose, tomentose, trichomes stellate, sessile, yellowish, and glandular, sessile; bark with sparse lenticels, not verrucose. Stipules 5.5–12 × 0.3–0.8 mm, linear to narrowly triangular, base truncate, margins ciliate, apex acute to acuminate, glabrescent, trichomes stellate and glandular, sessile; veins 1, conspicuous or not. Leaves spirally arranged at apex of the branches or along of them; petioles 0.2–2.2 × 0.1–0.2 cm, terete to flat, canaliculate, sparsely strigose; leaf blades chartaceous, rarely coriaceous, concolorous, 2–17 × 2–16.4 cm, circular, oblate, elliptic, widely elliptic, widely ovate, very widely ovate, widely depressed ovate, rarely widely obovate, base cuneate, rounded, truncate or cordate, margins finely or coarsely dentate, apex rounded, truncate or retuse, adaxial surface scabrous, sparsely strigose, sometimes only on the veins, trichomes stellate and glandular, both sessile, abaxial surface strigose, sometimes only on the veins, trichomes stellate and glandular, both sessile; basal veins 2 pairs, secondary veins 4–8 pairs. Inflorescences terminal, congested, rarely little lax, pedunculate, many-flowered; peduncle 1–5 cm long, densely strigose or hirsute. Flowers distylous, sessile, or rarely pedicellate; pedicels when present ca. 0.3 mm long; bracteoles 4, 5–13 × 0.6–4 mm, distinct, narrowly elliptic to lanceolate, rarely obovate, apex acuminate, entire, to rarely 2-lobed, tomentose to densely strigose in both surfaces, trichomes stellate and glandular, or rarely minutely sericeous in adaxial surface, trichomes simple; veins 1–2, conspicuous. Calyx 5.5–9 × 2–3 mm, campanulate to tubular-campanulate, scabrous to strigose or densely sericeous externally, trichomes stellate, sessile, glabrous internally, tomentose on lobes, lobes 2–5 × 1.1–1.5 mm, apex acuminate; veins

inconspicuous. Corolla yellow, petals adnate to the staminal tube by 0.4–0.7 mm long, 5.8–7 × 1.6–2.5 mm, spatulate, adaxial surface pubescent to villous medially, trichomes stellate, simple and 2-armed, abaxial surface glabrous, apex rounded, sparsely ciliate. Anthers 1.2–1.5 mm long, gynoecium with ovary 1–1.5 × 0.8–0.9 mm, sericeous apically, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens 5.5 mm long, staminal tube 2.5 × 1 mm, free filaments 2.1 mm long, gynoecium 4 mm long, style 1.1–1.3 mm long, stigma 1 × 1 mm. **Longistylous flowers:** stamens 4–5 mm long, staminal tube 2.8–3.2 × 0.9–1 mm, apex glabrous, or rarely villous, trichomes stellate, free filaments absent, gynoecium 6–9 mm long, style 4–6.5 mm long, glabrous apically, stigma ca. 1 × 1 mm. Capsule 3–4 × 2 mm, obpyramidal, chartaceous apically, membranaceous below, apex truncate, hirsute apically, trichomes stellate and 2-armed, dehiscence partial; seed 1, 2.3–2.6 × 1.2–1.3 mm, obovoid, brown to dark brown, glabrous, smooth.

Distribution and habitat:—Endemic to Brazil, *Waltheria cinerascens* occurs in Northeast (Alagoas, Bahia, Pernambuco and Sergipe) and Southeast (Espírito Santo and Minas Gerais) regions (fig. 8), habiting areas of Atlantic Forest (and restinga), Caatinga, and Cerrado (and campo rupestre), at 2–1850 m a.s.l.

Conservation status:—Least Concern (LC).

Notes:—Saint-Hilaire (1825) described this species under '*W. cinerescens*' name, and is commented in Colli-Silva *et al.* (2019).

Schumann (1886) described *Waltheria aspera* based on *Neuwied 455* (Bahia), *Sello 1127* (unknown location) and *Glaziou 6097* (author not informed, but the sample label says "restinga de la Tijuca, Rio de Janeiro"). However, analyzing these three samples we came to the conclusion that the Glaziou's collection fits in the circumscription of *W. maritima* Saint-Hilaire, a species occurring in sandbank environments in the states of Espírito Santo and Rio

de Janeiro. In our study, *W. cinerascens* not occurs in Rio de Janeiro, corroborating exclusion of this specimen. In addition, description provided by Schumann shows that flowers are distylous, whereas *W. maritima* is homostylous. *Waltheria cinerascens* is a distylous species which abundantly occurs in areas of campos rupestres and restingas from Bahia, where types of *W. aspera* was collected. Saunders (1995, unpubl.) suggested synonymizing of *W. aspera* under *W. maritima*, but not followed here.

Waltheria cinerascens is the one of the species most polymorphic as to the shape of leaf blades, however, all these specimens sharing the terminal inflorescences. This species also present leaves and branches with different colors due to its indumentum that can vary according to the intensity of trichomes. Its leaf blades can also reach up to 17 cm in length (*A.A. Conceição 321*; SPF), being among the largest dimensions found within the genus in Brazil. A villous staminal tube in longistylous flowers is exceedingly rare.

Vernacular names:—Malva-de-garimpeiro (Bahia).

Selected specimens examined:—BRAZIL. **Alagoas:** Piaçabuçu, Pato, 27 July 1988, fl., fr., *G.L. Esteves et al. 2145* (EAC, MAC). **Bahia:** Conde, Barra do Itariri, 23 October 2014, fl., fr., *H.C. Lima et al. 7878* (HUEFS [image], RB). Lençóis, Morro do Pai Inácio, 20 August 1996, fl., fr., *A.A. Conceição & A.A. Grillo 146* (SPF, UFP). Maraú, estrada vicinal partindo de Ubaitaba-Maraú, 21 July2007, fl., fr., *C.S.D. Souza et al. 191* (CEPEC [not seen], RB). Morro do Chapéu, Cachoeira do Ventura, 21 August 2017, fl., *T.S. Coutinho 232* (UFP). Mucugê, ca. 7 km de Andaraí em direção a Mucugê, 08 July 2009, fl., *C.N. Fraga et al. 2635* (HUEFS [image], RB). **Espírito Santo:** Santa Teresa, Pedra da Onça, 16 April 1986, fl., *H.Q.F. Boudet & W. Boone 1914* (RB). s.l., *inter Victoria et Bahia*, s.d., fl., *F. Sellow 191* (W [image]). **Minas Gerais:** Conselheiro Pena, Distrito de João Pinto, 12 February 2017, fl., *P. Fiaschi et al. 4795* (FLOR [image]). Grão-Mogol, estreito do Riacho Ribeirão, 16 June 1990, fl., fr., *A.A. Oliveira et al. CFCR 13146* (R). Rio Vermelho, Pedra Menina, 14 July 1974, fl., *A.M. Giulietti et al.*

CFCR 4476 (SPF). **Pernambuco:** Ibimirim, November 1996, fl., *G. L. Webster 23736* (IPA). **Sergipe:** Areia Branca, Estação Ecológica Serra de Itabaiana, 25 January 1996, fl., *M. Landim et al. 821* (ASE [image], JPB, MOSS). Estância, rodovia para Abais, 23 November 2012, fl., *D.A. Campos et al. 220* (ASE [image], MOSS).

11. *Waltheria collina* Schumann (1886: 63). Type:—BRAZIL. Rio de Janeiro: *habitat in collibus umbrosis*, 1831, fl., fr., *Riedel 64* (holotype B† destroyed, **lectotype designated here:** F neg. no. 9565 F0BN009565 [image!]; isotypes: F fragment F0073615F [image!], K K000380972 [image!], P P02273700 [image!]).

Subshrub, 0.4–0.6 cm tall. Branches terete, trichomes stellate, sessile, and glandular, long-stalked; bark brown. Stipules ca. 5 mm long, linear. Leaves spirally arranged along the branches; petioles 0.5–1.8 × 0.1 cm, terete, canaliculate; leaf blades chartaceous, concolorous, 3–5 × 0.6–2 cm, narrowly elliptic to lanceolate, base truncate to subcordate, margins serrate, apex acute. Inflorescence axillary along the branches, glomeruliform, sessile to rarely pedunculate; peduncle 0.5–1 cm long. Flowers homostylous. Calyx ca. 3.5 mm long, sericeous externally, glabrous internally, sparsely tomentose on the lobes, lobes long-acuminate. Corolla with petals 3 × 8 mm, glabrous, apex rounded, eciliate. Stamens with staminal tube ca. 3 mm long, glabrous, anthers ca. 0.6 mm long, gynoecium ca. 3 mm long, ovary sericeous apically, style glabrous. Capsule 2.3 × 2 mm, pubelurent apically; seed 2 mm long, blackish, glabrous, apex truncate.

Distribution and habitat:—Occurs in Venezuela, Colombia and Brazil (Rondón & Cumana Campos 2007; Rondón 2008; Saunders 2005b). In Brazil, just one specimen apart of the typus was recorded. It is registered only to Rio de Janeiro (unknown locality) and São Paulo, in restinga areas (fig. 8).

Conservation status:—Deficient Data (DD).

Notes:—In protologue Schumann (1886) mentioned that *Waltheria collina* is a species with homostylous flowers by citing '*floribus paristiles*', and showing that the dimensions of the stamens and pistil are equal to 3 mm in length. This information, however, contrasts with that presented in Saunders (1995, unpubl.) who describes flowers as longistylous (three samples, including *Gibbs et al. 3510* and typus), as well as Rondón (2008) (a sample from Venezuela and the typus) and Cruz & Esteves (2009) as brevistylous (*Gibbs et al. 3510*).

Waltheria collina is similar to *W. indica*, however, it can be differentiated of it by glabrous petals (vs. with trichomes adaxially and at apex) and glabrous style (vs. tomentose). It also can be differentiated of *W. indica* by presence of glandular long-staked trichomes (vs. absence in mostly specimens).

Selected specimens examined:—BRAZIL.**—São Paulo:** São Sebastião-Bertioga, 10 November 1976, fl., *P.E. Gibbs et al. 3510* (UEC).

12. *Waltheria communis* Saint-Hilaire (1825: 155). **Lectotype (designated here):**—BRAZIL. Minas Geraes [Minas Gerais]: *in campis herbidis provinciae Minas Geraes haud infrequens*, 1816-1821, fl., *Saint-Hilaire 602* (P P02273684 [image!]; isolectotypes: F F0073616F [image!], P P002273685 and P002273686 [images!]). **Figure 7 O–Q.**

= *Waltheria communis* var. *dietrichii* Schumman (1886: 59). **Lectotype (designated here):**—BRAZIL. s.l., 1837, *Pohl D. no. 1325* (W 0071716 [image!]; isolectotypes: K p.p. K000380984, K p.p. K000380981 [images!], W 0071717 [image!]).

= *Waltheria communis* var. *erosa* Buxbaum (1924: 122). Type:—BRAZIL. São Paulo: *in circuitu urbis Franca ad confines prov. Minas Geraes*, 1902, *M. Wacket s.n.* (W 5240). *syn. nov.*

= *Waltheria communis* var. *glabriuscula* (Saint-Hilaire) Schumann (1886: 59). ≡ *Waltheria*

glabriuscula Saint-Hilaire (1825: 155). **Lectotype (designated here):—**BRAZIL. *Inveni in pascuis prope pagum Nossa Senhora da Penha, ahud longe a Paulopoli*, 1816-1821, fl., *Saint-Hilaire 673* (P P02273673 [image!]; isolectotype: P02273674 [image!]).

= *Waltheria communis* var. *gracilis* (Saint-Hilaire) Schumann (1886: 59). ≡ *Waltheria gracilis* Saint-Hilaire (1825: 154). **Lectotype (designated here):—**BRAZIL. Spiritus Sancti [Espírito Santo]: *Inveni in apricis prope pagum Aldea Velha*, 1816-1821, fl., *Saint-Hilaire 398* (P P02273669 [image!]; isotypes: MPU MPU016432 [image!], P02273670, P02273671, P02273672 [images!]).

= *W. communis* var. *henningsii* Schumman (1886: 59). **Lectotype (designated here):**—BRAZIL. unknown locality, s.d., *Raben 551* (BR BR0593461 [image!]). [Remaining syntypes: *Regnell III 275 {cited also in W. communis var. platyphylla}, Riedel 1605, Burchell 5469, Sello 5096*].

= *Waltheria communis* var. *lanata* (Saint-Hilaire) Schumann (1886: 59). ≡ *Waltheria lanata* Saint-Hilaire (1825: 154). **Lectotype (designated here):—**BRAZIL. Minas Geraes [Minas Gerais]: *in campis herbosis part. occid. prov. Minas Geraes quam vocant Certaõ*, 1816-1821, fl., *Saint-Hilaire 1727* (P P02273688 [image!]; isolectotypes: F F0073622 [image!], MPU MPU016433 [image!], P P02273687, P02273689 [images!], US US00479027 [image!]).

= *Waltheria communis* var. *paraibana* Monteiro (1953: 197-198). Type:—BRAZIL. Paraíba: próximo a João Pessoa em tabuleiros, *Monteiro 4000* (holotype: RBR RBR00037633 [image!]).

= *Waltheria communis* var. *platyphylla* Schumann (1886: 59). **Lectotype (designated here):—**BRAZIL. Minas Geraes [Minas Gerais]: Caldas, 1867, fl., *Regnell III. 275* ex parte. (R R000026922!; isolectotypes: K p.p. K000380977 [image!], U U006826 [image!], US US00479015 [image!]). [Remaining syntype: *Mosén 417* (not found)].

= *Waltheria communis* var. *tomentella* Schumann (1886: 59). **Lectotype (designated here):—**BRAZIL. Bahia: *S. Ignacio* [Santo Inácio] *in Brasilia australis*, *Sello 1438* (F0073617F

[image!]). [Remaining syntypes: *Sello s.n.*; *Lindberg 202*; *Sello 1749*; *D'Orbigny 920*].

= *Waltheria communis* var. *vulgaris* Schumman (1886: 59). **Lectotype (designated here):—** BRAZIL. Congonhas do Campo, 1844, *Stephan 457* (BR BR013480967 [image!]). [Remaining syntypes: *Blanchet 3664*; *Claussen 370*; *Saint-Hilaire s.n.*; *Widgren 1056*; *Sello 1936*].

= *Waltheria douradinha* Saint-Hilaire (1825: 153). **Lectotype (designated here):—**BRAZIL. *in locis pretosis ad ripas fluminis Uruguay, provinciis Rio Grande do Sul et Missionum*, 1816-1821, fl., *Saint-Hilaire 2495* (P P02273676 [image!]; isolectotypes: P P02273675 [image!] and P02273677 [image!]).

= *Waltheria prostrata* Schumman (1886: 56). Type:—BRAZIL. *provinciis meridionalibus Brasiliae*, fl., fr., *Sello 1060* (holotype: B† destroyed, **lectotype designated here:** F neg. no. 9573 F0BN009573 [image!]; isolectotypes: F0073629F [images!], LE LE00006878 [image!], P P02273678 [image!]).

Herbs to subshrubs, 0.1–1.2 m tall, xylopodium-like root. Branches terete, becoming flat or angulate toward to apex, hirsute, tomentose, or canescent, trichomes stellate, with or without 2-armed, sessile, yellowish; bark ridged, lenticels absent. Stipules 6–12 × 0.2–0.5(–0.9) mm, linear, or rarely narrowly triangular, base truncate, margins sparsely long-ciliate, apex acute to acuminate, canescent or sparsely hirsute, trichomes simple, 2–3-armed or stellate, sessile; vein 1, conspicuous or not, prominent abaxially. Leaves spirally arranged along the branches; petioles 0.2–3 × 0.1 cm, terete or slightly angulate, slightly canaliculate, densely hirsute or canescent, trichomes similar to the branches; leaf blades membranaceous to chartaceous, concolorous, 2.2–11.5 × 0.4–9 cm, circular, narrowly elliptic, elliptic, widely elliptic, ovate, widely ovate or oblanceolate, rarely obovate, base cuneate, rounded or cordate, rarely attenuate, margins serrate, apex acute, rounded or truncate, adaxial surface sparsely to densely scabrous, hispid or tomentose, trichomes stellate, 4-armed, sessile, abaxial surface hispid to sparsely

scabrous, or canescent, trichomes stellate, 4-armed, rarely with glandular, sessile; basal veins 2(–3) pairs, secondary veins 5–8 pairs. Inflorescences terminal, rarely axillary in terminal portions or along the branches, congested, pedunculate, many-flowered; peduncle 0.5–4(–7) cm long, pilose to densely hispid, or rarely canescent. Flowers distylous, sessile; bracteoles 4, 6–7 × 0.3–0.5 mm, distinct, linear, apex acuminate, entire, adaxial surface sericeous, trichomes stellate, abaxial surface sericeous overlapping a tomentose layer, trichomes stellate, 2–3-armed, sessile; veins 1, conspicuous. Calyx 6–7 × 2–2.5 mm, campanulate to tubular-campanulate, pubescent to sericeous externally, trichomes stellate, with or without glandular trichomes, both sessile, glabrous internally, pubescent to tomentose on the lobes, trichomes simple, stellate and/or glandular, lobes 3–4.5 × 0.8–1.1 mm, apex acuminate or rarely acute; veins 1(2) pairs apically or absent. Corolla yellow, petals adnate to the staminal tube by ca. 0.1 mm long, 4.1–5.5 × 1–2.5 mm, spatulate, adaxial surface pilose medially, trichomes simple, abaxial surface glabrous, apex rounded, eciliate or sparsely ciliate. Anthers 1.1–1.4 mm long, ovary 1.2–1.3 × 0.7–0.8 mm, sericeous apically, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens 4.5–5.5 mm long, staminal tube 2.1–3 × 0.8 mm, free filaments 2.5 mm long, gynoecium 4.2–4.5 mm long, style 2.3–2.5 mm long, stigma ca. 1 × 1 mm. **Longistylous form:** stamens ca. 5 mm long, staminal tube ca. 3.5 × 1.1 mm, papillate and sparsely pilose apically, free filaments absent, gynoecium ca. 8 mm long, style ca. 6 mm long, stigma ca. 1 × 1 mm. Capsule 3 × 1.9 mm, obovoid, totally chartaceous, apex truncate to truncate-rounded, tomentose apically, trichomes stellate, dehiscence total, 2-valvate; seed 1, 2.5 × 1.5 mm, obovoid, brown, glabrous, apex rounded.

Distribution and habitat:—Occurs in Brazil, Paraguay, Argentina and Uruguay (Saunders 1993, 2007). In Brazil, *Waltheria communis* is one of the species more widely distributed, occurring in North (Tocantins), Midwest (Distrito Federal, Goiás, Mato Grosso and

Mato Grosso do Sul), Northeast (Alagoas, Bahia, Paraíba and Pernambuco), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro and São Paulo) and South (Paraná, Rio Grande do Sul and Santa Catarina) (fig. 8), in areas of Atlantic Forest (and restinga), Chaco, Cerrado (and campo rupestre), and Pampas.

Conservation status:—Least Concern (LC).

Notes:—*Waltheria communis* exhibits wide variability in the dimensions and shapes of its leaf blades, besides of the different types of indument a factor that led Schumann (1886) to describe eight varieties (although difficult to define) for this species, later synonymized in Saunders (2007). Its blade leaf varies of 2.2–11.5 × 0.4–9 cm, and can be circular, narrowly elliptic, elliptic, widely elliptic, ovate, widely ovate, oblanceolate or obovate. The indumentum of the blades also can be variable, where hispid, hirsute, densely to sparsely scabrous, tomentose or canescent morphotypes are found. The trichomes on the branches and leaves are essentially stellate and sessile, however, in some specimens (2–)4-armed trichomes were observed in leaf blade, and rarely glandular and sessile too. The inflorescences are usually terminal, a striking feature in this species.

Waltheria communis is similar to the *W. carpinifolia*, sharing especially stellate trichomes on the branches, blade leaf morphology and terminal inflorescences (taking into account the variation in *W. communis* for these characters), but differs by presence of a xylopodium-like root (vs. absence), membranaceous to chartaceous and concolorous blade leaf (vs. coriaceous and discolor), acuminate calyx lobes (vs. acute) and capsule totally dehiscent (vs. partially dehiscent).

Vernacular names:—Douradinha (Minas Gerais) and Vassourinha (Goiás).

Selected specimens examined:—BRAZIL. **—Alagoas:** Maceió, Campus da UFAL, 28 September 2009, fl., *E.C.O. Chagas & M.C. Mota 5785* (MAC). **Bahia:** Piatã, Serra do Atalho, 23 February 1994, fl., *P.T. Sano et al. CFRC 14471* (ESA, SPF). Porto Seguro, estrada de Arraia

d'Ajuda para Trancoso, 20 April 1982, fl., *A.M. de Carvalho et al. 1266* (CEPEC [not seen], HUEFS [image], MBM). **Distrito Federal:** Brasília, Parque Nacional de Brasília, 06 November 2016, fl., *C.R. Martins 2345* (CEN). **Goiás:** Cavalcante, Parque Nacional Chapada dos Veadeiros, 26 November 2014, fl., *M. Verdi et al. 7335* (CEN, RB). **Mato Grosso:** Barra do Garças, Serra do Roncador, 6 October 1968, fl., *G. Eiten & L.T. Eiten 9127A* (SP). **Mato Grosso do Sul:** Porto Murtinho, Fazenda Nossa Senhora do Perpétuo Socorro, 10 November 2002, fl., fr., *G. Hatschbach et al. 74032* (CTES, MBM). **Minas Gerais:** Araguari, Fazenda Furna, 8 April 2010, fl., *A.O.R. Santos & B.F. Bartelli s.n.* (HUFU [image]). Nova Lima, Parque Estadual da Serra do Rola-Moça, 13 April 2015, fl., fr., *S.G. Rezende & A.G. Justo 4821* (BHCB). **Paraíba:** Rio Tinto, Reserva Biológica Guaribas, 22 August 2002, fl., *A.C. Sevilha et al. 2342* (CEN). **Pernambuco:** Goiana, 28 January 1958, fl., fr., *D. Andrade-Lima 58-2885* (IPA). **Paraná:** Ponta Grossa, Parque Estadual de Vila Velha, 17 May 2003, fl., *R. Gonçalves 106* (MBM). Palmeira, Córrego das Antas, 11 October 1989, fl., *J. Cordeiro & J.M. Silva 641* (BHCB, MBM). **Rio de Janeiro:** s.l., February 1882, fl., *A. Glaziou 12457* (K [image]). **Rio Grande do Sul:** Cruz Alta, 23 January 1964, fl., *E. Pereira 8587* (RB). **Santa Catarina:** Xanxerê, 4-11 km north of Abelardo Luz, 25 December 1956, fl., *L.B. Smith & R. Reitz 9239* (R). **São Paulo:** Mogi Guaçu, Reserva Biológica da Fazenda Campininha, 20 November 1980, fl., *W. Mantovani 1398* (ESA, SP). **Tocantins:** Almas, estrada para Natividade, 22 July 2000, fl., *V.C. Souza et al. 24486* (ESA).

13. *Waltheria coriacea* J.G. Saunders (2021: 8). Type:—BRAZIL. Bahia: 60 km E of Mimoso on BR-242 Mimoso-Barreiras, 33 km W of Barreiras, ca. 12˚07′S, 45˚25′W, 18 February 1990, *Saunders et al. 2071* (holotype UB 217282!; isotypes CEPEC 71876!, CTES 254948!, barcode K 000381059!, TEX 00557325!, TEX 00557326). **Figure 7 S–U.**

Shrubs, 1.0–2.0 m tall. Branches terete, angulate to compressed apically, tomentose, trichomes multiradiate, long-stalked, yellowish; bark striate, lenticels not verrucose. Stipules 5–6 × 0.9 mm, narrowly triangular, base truncate, margins eciliate, apex acute, tomentose, trichomes multiradiate; vein inconspicuous. Leaves distically arranged along the branches; petiole 0.5–1.2 × 0.1 cm, terete to angulate, canaliculate, densely tomentose; leaf blades coriaceous, strongly discolorous, 3.5–8.0 × 2.0–3.2 cm, lanceolate to oblong-elliptic, base cordate, margins coarsely serrate, apex acute, rarely rounded, adaxial surface strigose, trichomes stellate, subsessile, and multiradiate, subsessile, abaxial surface lanate, trichomes stellate, stalked; basal veins 2–3 pairs, secondary veins 7–9 pairs. Inflorescences axillary along the branches, lax, elongate, short pedunculate, many-flowered; peduncle 0.3–1.2 cm long, densely tomentose. Flowers distylous, sessile; bracteoles 3–4, 4–5.2 × 0.8–1.5 mm, distinct or fused by 0.8–1.2 mm long basally, narrowly lanceolate, apex acute, entire apically, adaxial surface tomentose, trichomes stellate, sessile, abaxial pubescent, trichomes stellate, sessile, and multiradiate, sessile to short-stalked; veins 3–4, inconspicuous. Calyx 6.2−7.5 × 2.7−3 mm, tubular-campanulate, pubescent externally, trichomes multiradiate, sessile to short-stalked, pilose of the median region up to apex lobe internally, trichomes stellate, sessile, more concentrated on the lobes, lobes ca. 2 × 1.8 mm, apex acute; vein absent. Corolla yellow, petals adnate to the staminal tube by ca. 0.2 mm long, 4−4.8 × 1.8−2 mm, spatulate, glabrous, apex rounded, eciliate. Anthers 1–1.3 mm long, ovary ca. 1.2–1.5 × 0.7–0.9 mm, sericeous apically, style tomentose, stigma clavate. **Brevistylous form:** stamens ca. 5 mm long, staminal tube 1.8−2 × 1 mm, free filaments 2.5−3 mm long, gynoecium ca. 4.1 mm long, style ca. 2 mm long, stigma ca. 1 × 0.3 mm. **Longistylous form:** stamens 3.2−4.0 mm long, staminal tube 2.2−3 × 0.8−0.9 mm long, free filaments ca. 0.2 mm long, gynoecium ca. 5.5 mm long, style ca. 4.2 mm long, erect, stigma ca. 1.1 × 0.2−0.4 mm. Capsule 3.2−3.3 × 1.3−2 mm, obovoid, totally chartaceous, apex rounded, pilose along the length and denser apically, trichomes stellate, sessile, dehiscence

partial; seed 1, ca. 2.2 × 1.3 mm, obovoid, brown, glabrous, apex rounded, smooth.

Distribution and habitat:—Endemic to Brazil, *Waltheria coriacea* occurs in North (Tocantins state), Northeast (Bahia, Maranhão, and Piauí states) and Midwest (Goiás state) regions (fig. 6), in Cerrado areas, between 300-900 m a.s.l. It can be found growing on rock outcrops. This species has its distribution area expanded to Piauí according to Saunders (2021).

Conservation status:—Least Concern (LC).

Notes:—*Waltheria coriacea* resembles *W. carpinifolia*, differing by characters mentioned previously. In addition, these species do not occur in sympatry since *W. carpinifolia* is recorded only to Southeast and South regions.

***Selected Specimens Examined*—**BRAZIL.**—Bahia:** Barreiras, Roda Velha, 12 January 1977, fl., *G. Hatschbach 39440* (ESA, HUEFS [image], MBM, RB); BR-020, 26 March 1984, fl., *E.F. Almeida et al. 289* (RB); rodovia BR-020, 20 Junuary 1986, fl., *G. Hatschbach & J.M. Silva 50534* (MBM); estrada para o aeroporto de Barreiras, 11 June 1992, fl., *A.M. de Carvalho et al. 4002* (CEPEC [not seen], NY [image]). Correntina, Espigão Mestre, 03 March 1972, fl., fr., *W.R. Anderson et al. 36517* (MBM, NY [image], R, UB); ca. 100 km WSW from Barreiras, 07 March 1972, fl., fr., *W.R. Anderson et al. 36740* (NY [image], UB); Fazenda Jatobá, 04 March 1991, fl., *L.G. Viollati et al. 251* (IBGE); near to Rio Piau, 14 April 1966, fl., *H.S. Irwin et al. 14817* (F [image], NY [image], UB). Cristópolis, Conglomerado BA-681, 13 July 2017, fl., fr., *E.O. Moura 1314* (UB). Formosa do Rio Preto, Reserva Legal da Coaceral, 05 June 2015, fl., *E. Melo 13079* (HUEFS [image]). Luiz Eduardo Magalhães, estrada entre Rosário e Luiz Eduardo Magalhães, 01 February 2010, fl., *T.B. Flores et al.* (ESA, RB). São Desidério, a margem da BR-020, 20 March 1981, fl., *G.C.P. Pinto 187/81* (RB). **Goiás:** Guarani de Goiás, Km 303 da BR-020, 16 August 1990, fl., *T.B. Cavalcanti et al. 745* (CEN, HUEFS [image], SP). Posse, sopé da Serra Geral de Goiás, 25 July 1971, fl., *I. Gottsberger & G. Gottsberger*

150-25771 (CTES). **Maranhão:** Balsas, Condomínio Kissy, 09 March 1996, fl., *G.P. da Silva et al. 3473* (CEN). Carolina, Transamazonian highway, 14 April 1983, fl., *E.L. Taylor et al. E1210* (F [image], HUEFS [image], NY [image]). Sambaíba, margem da estrada BR-120, 27 January 2012, fl., *R.M. Harley et al. 56527* (HUEFS [image]). Tasso Fragoso, 13 May 2009, fl., *A.M. Miranda et al. 5961* (HST, HUEFS [image], UFRN). **Piauí:** Bom Jesus, 1 May 2018, fl., *G. Pereira-Silva et al. 17154* (CEN). **Tocantins:** Jardim Novo, estrada para Barreiras, 21 July 2000, fl., *V.C. Souza et al. 24423* (ESA). Mateiros, Jalapão, 04 May 2001, fl., fr., *A.B. Sampaio et al. 409* (CEN); Parque Estadual do Jalapão, 26 January 2014, fl., *G. Antar & L.F. Nascimento 399* (CEN, SPF). Rio da Conceição, 16 Mar 2018, fl., *P.P. Santos 98* (CEN).

14. *Waltheria erioclada* De Candolle (1824: 493). Type:—BRAZIL. unknown locality, s.d., unknown collector (holotype: G G00208637 [image!]; isotypes: F neg. no 8002 [image!]). **Figure 10 A–H.**

Shrubs, ca. 0.75 m tall. Branches erect, terete, becoming flat toward apex, lanate, trichomes stellate, subsessile, yellow, and glandular, sessile; bark reddish-brown, shiny. Stipules 6−10 × 0.5−0.6 mm, linear, base truncate, apex acute, margins densely long-ciliate, adaxial surface densely strigose, trichomes simple to 2-armed, and glandular, sessile, abaxial surface glabrescent, trichomes stellate, sessile, and glandular, sessile; vein 1, conspicuous. Leaves spirally arranged along the branches; petioles 0.1−0.6 × 0.1 cm, terete, canaliculate, densely lanate; leaf blades 1.5−4 × 1.7−3.5 cm, chartaceous, concolor, lanceolate to narrowly elliptic, base round to subcordate, apex acute, margins serrate, adaxial surface lanate, trichomes stellate and glandular, both sessile, abaxial surface densely lanate; basal veins 2 pairs, secondary veins 7−8 pairs. Inflorescences axillary along the branches, glomeruliform, pedunculate, many-flowered; peduncle 0.7−2.5 cm long, lanate. Flowers distylous, sessile; bracteoles 4, 7−8 ×

0.5−0.8 mm, distinct, linear to narrowly elliptical, densely ciliate, apex acute, entire, adaxial surface sparsely pilose, trichomes simple and 2-armed, abaxial surface pilose, trichomes stellate, simple, long 2-armed, and glandular, sessile and sparse; veins 1, conspicuous. Calyx 4.5–6 × 2.5–3 mm, campanulate, pilose to sericeous externally, trichomes stellate, short and long, sessile, and glandular, sessile, glabrous internally, pubescent on the lobes, simple trichomes, lobes 2.6–3 × 1–1.2 mm, apex acuminate; veins 3–4 pairs, conspicuous. Corolla bright yellow, petals adnate to the staminal tube by ca. 0.4 mm long, 6.2–6.5 × 2.2–2.4 mm, spatulate, adaxial surface pilose, trichomes simple, abaxial surface glabrous, apex rounded to truncate, eciliate or sparsely ciliate. Anthers ca. 1.2 mm long, ovary ca. 1.1–1.2 × 0.8–0.7 mm, sericeous apically, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens ca. 6.5 mm long, staminal tube ca. 3 × 0.9–1 mm, free filaments ca. 3 mm long, gynoecium 4.1 mm long, style ca. 2 mm long, stigma ca. 2 × 2.1 mm. **Longistylous form:** stamens 3.1–3.2 mm long, staminal tube 2–2.1 × 0.8 mm, free filaments absent, gynoecium 6.2–6.5 mm long, style 4.2 mm long, trichomes sparse, stigma 0.7 × 0.8 mm. Capsule 2.2−2.6 × 1.5−2.2 mm, obpyramidal, chartaceous at the apex, membranous below, apex truncate, sericeous apically, trichomes stellate and 2-armed, dehiscence partial; seed 1, 2−2.1 × 1.8−1.9 mm, obovoid, brown, glabrous, apex rounded, slightly crenulate apically.

Distribution and habitat:—*Waltheria erioclada* is a microendemic species, and occurs only in Minas Gerais state (Fig. 9), in areas of campos rupestres, in elevation of 1500 m a.s.l.

Conservation status:—Critically Endangered (CR); B1b(i, ii, iv)c(iv).

Notes:—Robyns (1964) in Flora of Panama listed *Waltheria erioclada* as a synonym of *W. indica*, but he did not provide any reason about this. *Waltheria erioclada* has lanate branches (vs. pubescent to canescent in *W. indica*), branches with stellate and glandular sessile trichomes (vs. stellate and if associated to glandular trichomes, long-stalked), stipules with glandular

trichomes on abaxial surface (vs. absent), calyx with stellate and glandular sessile trichomes externally (vs. only stellate), and distylous flowers (vs. homostylous). Here, we are proposing the re-establishment of *W. erioclada* as an accepted name.

***Additional specimens examined*—**BRAZIL.**—Minas Gerais:** Mariana, Mina da Samitri, 05 November 2000, fl., *R.C. Mota & L. Viana 525* (BHCB); *ibid.*, Mina da Alegria, 01 February 2007, fl., *R.C. Mota 3338* (BHCB); *ibid.*, 3 km N of Mariana, road to Santa Bárbara, 2 February 1971, fl., fr., *Irwin et al. 29647* (CTES, RB). Ouro Preto, 13 January 1951, fl., *J.G. Kuhlmann s.n.* (RB 72908). s.l., *ad Villa Rica*, s.d., fl., *J.B.E. Pohl 3694, D. no.1356* (W [2 sheets, images]). s.l., s.d., fl., *G. Schüch 58* (W [image]).

15. *Waltheria excelsa* Turczaninow (1858: 215). Type:—BRAZIL. Bahia: La Serra Jacobina, data, *Blanchet 2685* (holotype: KW KW001000110 [image!]; isotypes: F fragment F0073618F, F neg. no. 2686 [image!], G G00358718 and G00358719 [images!], K K000380986 [image!], MO MO-309282 [image!], P P02273701 [image!]). **Figure 10 I–K.**

Herbs prostrate. Branches terete, little flat in apex, canescent, trichomes stellate, sessile, whitish-yellow; bark without lenticels. Stipules 4–10 × 0.8–1 mm, narrowly triangular, base truncate, margins sparsely ciliate, apex acute, adaxial surface tomentose, trichomes stellate, sessile, abaxial surface pubescent, trichomes stellate and glandular stalked; vein 1, conspicuous, prominent. Leaves spirally arranged along the branches; petioles 0.3–1.1 × 0.1 cm, terete, canaliculate, densely pubescent; leaf blades chartaceous, concolorous, 4.2–9.0 × 2.1–4.2(–5.3) cm, elliptic to ovate, base rounded to subcordate, margins coarsely serrate, apex acute, canescent, trichomes stellate, sessile; basal veins 2 pairs, secondary veins 6–9 pairs. Inflorescence axillary, congested, pedunculate, many-flowered; peduncle 3.5–8.5 cm long, pubescent. Flowers distylous, sessile; bracteoles 4, 6–8.5 × 1–3.8 mm, distinct, unequal shape,

oblanceolate to narrowly elliptic, apex acute, entire, and 2–3-dentate in the wider, adaxial surface pilose, trichomes stellate and glandular, stalked, abaxial surface pubescent, trichomes stellate and glandular, stalked; veins 2–5, conspicuous. Calyx 7–8 × 2.1–2.8 mm, campanulate, tomentose externally, trichomes stellate, sessile, and glandular, stalked, glabrous internally, sparsely tomentose on the lobes, trichomes simple, lobes 3.2–4 × 1 mm, apex long-acuminate; veins 2-3 pairs, conspicuous. Corolla yellow, petals adnate to the staminal tube by ca. 0.6 mm long, 5.5–6.5 × 1–1.5 mm, spatulate, adaxial surface sparsely pilose medially, abaxial surface glabrous, apex rounded to truncate, eciliate. Anthers 1.2–1.3 mm long, style tomentose, stigma elongate-plumose. **Brevistylous form:** stamens ca. 6 mm long, staminal tube 1.2 × 1 mm, free ca. filaments 3.3 mm long, gynoecium 3.5 mm long, ovary ca. 1 × 0.8 mm, style 1 mm long, stigma 1.2 × 0.5 mm. **Longistylous form:** stamens 3–3.8 mm long, staminal tube 1.8–2.5 × 1 mm long, free filaments absent, gynoecium 5.1–6.2 mm long, ovary 1.4–1.8 × 0.7–0.8 mm, style 3–4 mm long, stigma 1.1–1.6 × 0.2 mm. Capsule 3–3.5 × 1.5–2 mm, obpyramidal, chartaceous at the apex, membranous below, apex truncate, pilose apically, trichomes stellate and 2-3-armed, dehiscence partial; seed 1, 2.4–3 × 1.3–1.5 mm, obovoid, blackish-brown, glabrous, apex not crenulate.

Distribution and habitat:—Endemic to Brazil, *Waltheria excelsa* occurs in North (Tocantins), Northeast (Bahia and Maranhão), Midwest (Goiás) and Southeast (Minas Gerais) regions (fig. 9), habiting in areas of Caatinga and Cerrado, between 280–1080 m a.s.l.

Conservation status:—Least Concern (LC).

Notes:—*Waltheria excelsa* is similar to *W. albicans* and *W. carmensarae*, sharing bracteoles, stigmas and capsule shapes, but differs from two species by it has only stellate trichomes on the branches (vs. stellate and glandular long-stalked). In addition, it differs from *W. albicans* by prostrate herbaceous habit (vs. erect shrubby). With *W. carmensarae*, *W. excelsa*

shares the prostrate habit, however they are distinguished by distylous flowers (vs. homostylous in *W. carmensarae*).

***Selected specimens examined*—**BRAZIL. **Bahia:** Bom Jesus da Lapa, Rio das Rãs, 15 February 1991, fl., *G. Hatschbach 55162 et al.* (MBM); Xique-Xique, 17 March 1990, fl., *J.G. Saunders 3122 & A.M. Carvalho* (MBM). **Goiás:** Serra dos Cristais, 10 km N de Cristalina, 3 April 1973, fl., *W.R. Anderson 8040 et al.* (MBM). **Maranhão:** Carolina, rodovia BR-010, 24 April 2008, fl., *G. Pereira-Silva et al. 13270* (CEN). **Minas Gerais**: Formoso, Parque Nacional Grande Sertão Veredas, 05 July 1997, fl., *M.A. Silva et al. 3716* (CTES [not found], IBGE); s.l., Rio Pandeiros, ca. 52 km by road W of Januaria near road to Serra das Araras, 21 April 1973, fl., fr., *W. Anderson et al. 9275* (UB). **Tocantins:** s.l., 40 km S of Taguatinga on road to Monte Alegre de Tocantins, 21 February 1990, fl., *J.G. Saunders et al. 2094A* (NY [image]).

16. *Waltheria ferruginea* Saint-Hilaire (1825: 150). Lectotype (designated by Coutinho et al. 2020b):—BRAZIL. Minas Gerais, *"crescit in rupidus prope vicum Tapanhoacanga, haud longè ab urbe Villa do Principe"*, 1816-1822, *Saint-Hilaire s.n.* (P P02273702 [image!]; isolectotypes: MO [not seen], MPU MPU016436 [image!], P P02273703 [image!]). **Figure 10 L–M.**

Shrubs, 0.5–2 m tall. Branches terete, flattened at apex, tomentose, trichomes multiradiate, long-stalked, ferrugineous; bark not rugose, lenticel absent. Stipules 3–3.2 × 0.3 mm, linear, base truncate, margins eciliate, apex acute, tomentose, trichomes multiradiate, stellate and 2-radiate, sessile; vein 1, inconspicuous. Leaves distically arranged along the branches; petiole 0.6−0.8 × 0.1 cm long, slightly flattened, inconspicuously canaliculate, tomentose; leaf blades chartaceous, discolorous, 3.4−10.4 × 1.1−2.3(−3.5) cm, elliptic, base cuneate, margin slightly involute when dried, finely serrate to 1.7−2 cm above at the base, apex acute, adaxial surface

strigose, trichomes multirradiate, sessile, abaxial tomentose, trichomes multiradiate, stalked; basal veins 1−2 pairs, secondary veins 7−11 pairs. Inflorescences axillary, congested, subsessile, few-flowered; peduncle 0.4−0.6 cm long, tomentose. Flowers distylous, sessile; bracteoles 6.5–8 × 3−3.9 mm, distinct, elliptic to widely elliptic, apex acute, entire to 2-dentate, adaxial surface pubescent, abaxial surface tomentose, trichomes multiradiate in both surfaces; veins 1−3, inconspicuous. Calyx 6.2−8 × 2.7−3 mm, tubular-campanulate, tomentose externally, trichomes multiradiate, short-stalked, glabrous internally, tomentose on the lobes, trichomes stellate and sparse trichomes glandular, lobes 2.1−2.2 × 1.5–1.8 mm, apex acute; veins absent. Corolla yellow, petals adnate to the staminal tube by ca. 0.5 mm long, 5−6.1 × 1.2−1.5 mm, oblanceolate, glabrous, apex rounded, eciliate. Anthers 1.1–1.5 mm long, style tomentose, stigma elongate-plumose. **Brevistylous form:** stamens ca. 7.5 mm long, staminal tube 2.2–2.5 × 0.8 mm long, free filaments 3.6–3.8 mm long, gynoecium ca. 3.5 mm long, ovary ca. 1.1 × 0.8 mm, style ca. 1.6 mm long, stigma ca. 1.1 × 0.3 mm. **Longistylous form:** stamens ca. 4.2 mm long, staminal tube ca. 3 mm long, free filaments ca. 0.6 mm long, gynoecium ca. 6 mm long, ovary 1.5 × 0.7 mm, style ca. 4 mm long, stigma ca. 1 × 0.4 mm. Capsule ca. 2.8 × 1.8 mm, obovoid, chartaceous at the apex, membranous below, apex rounded, pilose apically, trichomes stellate, dehiscence partial; seed 1, ca. 2.0 × 1.5 mm, obovoid, black, glabrous, apex rounded.

Distribution and habitat:—Endemic to Brazil, *Waltheria ferruginea* is found only few collection of campos rupestres from Minas Gerais state (fig. 9), specifically habiting areas from Espinhaço Range, with elevation between 700–948 m a.s.l.

Conservation status:—Endangered (EN); B2a, b (i, ii).

Notes:—*Waltheria ferruginea* resembles *W. brachypetala*, and Coutinho *et al.* (2020) pointed characters related to stipules, leaf blades, inflorescences and petals to distinguish them.

Waltheria ferruginea also is similar to *W. hatschbachii*, another species from campos rupestres, but differs by elliptic to widely-elliptic bracteoles and 3–3.9 mm width (vs. linear and 1–2 mm width in *W. hatschbachii*), petals oblanceolate and 5–6.1 mm long (vs. spatulate and 3–4 mm long), elongate-plumose stigmas (vs. filiform in brevistilous flowers), and capsule with chartaceous only at the apex (vs. totally chartaceous).

***Additional specimens examined*—**BRAZIL. **Minas Gerais**: Botumirim, c. 12 Km de Botumirim em direção à Adão Colares, 12 March 1999, fl., fr., *A. Rapini & M.L. Kawasaki 760* (SPF, UFP). Cristália, Bem Querer, 10 November 1991, fl., *G. Hatschbach et al. 54991* (MBM). Diamantina, 15 Km para estrada de Mendanha, 22 February 2003, fl., fr. *G.O. Romão et al. 942* (ESA, RB). Grão-Mogol, 13 August 1989, fl., fr., *A. Freire-Fierros et al. s.n.* (BHCB 88955, CTES 188027, K 1213095 [image], SPF 67939); *ibid.*, Vale do Rio Itacambiruçu, 26 February 1986, fl., *T.B. Cavalcanti et al. s.n.* (SPF 42952, UEC 45885); *ibid.*, 28 March 1990, fl., *J.G. Saunders et al. 3179* (MBM, NY 2342594, 813681 [images]).

17. *Waltheria flavovirens* J.G. Saunders (2021: 12). Type:—BRAZIL. Goiás, 9 km past turnoff to Santa Rosa heading N on BR-20 to Barreiras from Brasilia, and 96 km S of turnoff to Flores de Goiás, 15˚00′S, 47˚00′W, 16 February 1990, *Saunders et al. 2053* (holotype: UB [not found]; isotypes CEPEC [not seen], CTES [not found], K K000381058 [image]!, MBM!, TEX [not seen]). **Figure 10 N–P.**

Shrub, 0.5–2.5 m tall. Branches terete, angulate apically, scabrous, trichomes multiradiate, sessile to short-stalked, orangish-yellow; bark finely striate, lenticels not. Stipules ca. 7 × 1 mm, narrowly triangular, base truncate, margins eciliate, apex acute, densely tomentose, trichomes multiradiate, sessile to short-stalked; vein 1, inconspicuous. Leaves spirally arranged along branches; petiole 0.6–1.1 × 0.1 cm, angulate, not canaliculate, densely tomentose; leaf blade

chartaceous, concolor or discolor, 5.8–10.5(–12–13.3) × 1.1–4.2(–7) cm, elliptic or lanceolate, base rounded or cordate, margins coarsely serrate, apex acute, scabrous, trichomes stellate, and multiradiate, sessile to subsessile; basal veins 2 pairs, secondary veins 7–10 pairs. Inflorescences axillary along the branches, congested, short-pedunculate, many-flowered; peduncle 0.3–1.2 cm long, strigose. Flowers distylous, sessile; bracteoles 4, 7.5–8 × 1.8–3 mm, distinct or fused by 1.9–2 mm long basally, narrowly elliptic to elliptic or obovate, apex acute, entire or 2-dentate apically, tomentose, trichomes stellate, sessile; veins 3–4, conspicuous. Calyx ca. 7 × 2.2 mm, tubular-campanulate, scabrous externally, trichomes stellate, sessile, pubescent ca. 3 mm above of the base up to apex lobe internally, tomentose on lobes, trichomes stellate, sessile, lobes 1.3–2.2 × 1.2–1.5 mm, apex acute; veins absent. Corolla yellow, petals adnate to the staminal tube by ca. 0.3 mm long, 3.2−3.5(–5–6.2) × 1.3−1.5 mm, spatulate, glabrous, apex rounded to truncate, eciliate. Anthers 1.2–1.4 mm long, ovary 1.4–1.5 × 0.7–0.8 mm, sericeous apically, style tomentose, stigma elongate-plumose. **Brevistylous form:** stamens 5.5−5.6 mm long, staminal tube 2–3 × 1 mm, free filaments 2.8–3.2 mm long, gynoecium ca. 4.5 mm long, style ca. 1.8 mm long, stigma ca. 1.4 × 0.3 mm long. **Longistylous form:** stamens ca. 4 mm long, staminal tube ca. 2.8 × 0.8 mm long, free filaments ca. 0.3 mm long, gynoecium ca. 6 mm long, style ca. 3.8 mm long, tortuose basally, stigma 1 × 0.3 mm. Capsule 2.4–3.2 × 2.1–2.2 mm, obovoid, chartaceous at the apex, membranaceous below, apex rounded, pilose specially at the apex, trichomes stellate and 2-armed, sessile, dehiscence partial; seed 1, (1.6–)2–2.2 × (1.0–1.1–)2 mm, obovoid to obpyramidal, brown to dark brown, apex truncate, crenulate apically.

Distribution and habitat:—Endemic to Brazil, *Waltheria flavovirens* is recorded in North (Tocantins state), Northeast (Bahia), Midwest (Goiás and Mato Grosso), and Southeast (Minas Gerais) (fig. 11), habiting mainly Cerrado areas (and campos rupestres), besides of the

few records in Atlantic Forest. It grows in elevation between 300–1300 m a.s.l. Although recently described (Saunders 2021), *W. flavovirens* has its distribution area expanded to Mato Grosso state, as well as, to Atlantic Forest domain.

Conservation status:—Least Concern (LC).

Notes:—*Waltheria flavovirens* is morphologically related to *W. brachypetala* and *W. hoehnei*, but differs by characters previously mentioned and cited.

Selected specimens examined—BRAZIL.**—Bahia:** Jequié, rodovia BR-365, 17 February 1991, fl., *G. Hatschbach et al. 55235* (HUEFS [image], MBM). **Goiás:** Cavalcante, Reserva Particular do Patrimônio Natural Soluar, 18 May 2004, fl., *M.L. Fonseca et al. 5223* (IBGE). Colinas do Sul, estrada para Minaçu, 17 April 2004, fl., fr., *M.L. Fonseca et al. 5196* (IBGE, UB). **Mato Grosso:** Alto Paraguai, crista da Serra da Bocaína, 20 May 1997, fl., *V.C. Souza et al. 16556* (ESA, UFMT). Cáceres, entre Barranco Vermelho e Descalvado, 25 November 1984, fl., *N. Saddi 5108* (UFMT). **Minas Gerais:** Buenópolis, Parque Nacional Sempre Vivas, 19 Junuary 2008, fl., *D.T. Souza et al. 444* (BHCB). Buritizeiro, rodovia BR-365, 11 March 1995, fl., *G. Hatschbach & M. Hatschbach 62101* (BHCB, MBM, NY [image]). Formoso, Parque Nacional Grande Sertão Veredas, 21 May 1998, fl., *R.C. Mendonça et al. 3485* (IBGE). Grão Mogol, Lagoa Nova, 27 May 2005, fl., *A.C. Sevilha et al. 4553* (CEN). Joaquim Felício, Serra do Cabral, 14 April 1996, fl., *G. Hatschbach et al. 64684* (MBM). São Gonçalo do Rio Preto, Parque Estadual do Rio Preto, 19 October 2000, fl., *J.A. Lombardi 4181* (BHCB). **Tocantins:** Natividade, Serra de Natividade, 06 March 2015, fl., *P.H. Labiak et al. 5921* (ACLB [image], MBM, UPCB). Paranã, estrada São Salvador, 10 June 2006, fl., *G. Pereira-Silva et al. 10551* (CEN). Porto Nacional, área da FAB, 7 May 1994, fl., fr., *K.P. Borges 01* (UB).

18. ***Waltheria glabribracteata*** T.S. Coutinho & M. Alves (2020: 430). Type:—BRAZIL. Mato Grosso: Vila Bela da Santíssima Trindade, Serra de Ricardo Franco, topo da Cachoeira do Jatobá, 650 m elev., 14º55'06''S, 60º04'36''W, 21 March 2014, fl., fr., *Simon et al. 2232* (holotype: CEN CEN00087243!, isotypes: NY [image]!, RB RB00912393!). **Figure 10 Q–T.**

Shrubs, 0.80–1.80 m tall. Branches terete, strigose, trichomes stellate, sessile; bark not lenticellate. Stipules ca. 4 × 0.7 mm, linear triangular, base truncate, margins ciliate, apex acute, adaxial surface pubescent, abaxial surface scabrous, trichomes stellate, sessile in both surfaces; vein 1, inconspicuous. Leaves spirally arranged along the branches; petioles 0.7–1.2 × 0.2–0.3 cm, compressed, scabrous; leaf blades chartaceous to subcoriaceous, discolorous, 5.3–8 × 4–7.5 cm, circular to oblate or rarely ovate, base rounded or cordate, margins finely or coarsely serrate, apex rounded to truncate or acute, strigose, trichomes stellate, sessile; basal veins 2 pairs, secondary veins 7–8 pairs. Inflorescences axillary, glomeruliform, pedunculate, many-flowered; peduncle 0.5–8.4 cm long, strigose; bracteoles 4, 3–3.5 × 0.9–2.2 mm, unequal in shape, lanceolate to ovate, the apex acute to acuminate, entire, adaxial surface glabrous, abaxial surface sericeous, trichomes stellate, sessile; veins 3–4, conspicuous adaxially. Flowers potentially distylous, monomorphic longistylous, sessile. Calyx 6–7 × 3.2–3.5 mm, campanulate, sericeous externally, trichomes stellate, sessile, glabrous internally, pubescent on the lobes, trichomes simple, lobes 2–3.2 × 1.1–1.7 mm, the apex acute to acuminate; veins 2-3 pairs, conspicuous. Corolla yellow, petals adnate to the staminal tube by 1.8–2 mm long, 7–8.5 × 2.2–2.5 mm, oblanceolate, glabrous, the apex rounded, eciliate. **Brevistylous form:** not observed. **Longistylous flowers:** stamens 3.8–5.5 mm long, tube ca. 3.5 mm long, glabrous, free filaments 0.5–1.1 mm long, papillate, anthers 1.2–1.3 mm long, gynoecium 6–7 mm long, ovary 1.5 × 0.8 mm, sericeous, style ca. 3.2 mm long, tortuose basally, pubescent, stigma 1.5–2.1 × 0.8 mm, elongate-plumose. Capsule ca. 4 × 3 mm, obpyramidal, chartaceous at the apex,

membranaceous below, apex truncate, sericeous apically, trichomes long-simple and short-stellate, dehiscence partial; seed 1, ca. 2.8 × 1.7 mm, obovoid, black, brownish basally, glabrous, crenulate at the base.

Distribution and habitat:—Occurs in Brazil and Bolivia. In Brazil, *Waltheria glabribacteata* is known of a few collections from Mato Grosso and Rondônia states (fig. 11), in ecotonal zones of Amazonia, Cerrado and Pantanal domains, as well as in Ombrophiles forest. This species was recently described by Coutinho & Alves (2020) as occurring in Bolivia and Brazil (only in Mato Grosso state), however revisiting collection from Brazil, one specimen were found in Rondônia was identified, extending its occurrence area.

Conservation status:—Endangered (EN); B2a, b (ii, iii, iv).

Notes:—*Waltheria glabribracteata* is easily recognized and distinguished from the other *Waltheria* species because it is the only taxon with glabrous adaxial surfaces of the bracts and bracteoles.

Additional specimens examined—BRAZIL.—Unknow locality, Cataqui-iamani, Campos dos Urupais, December 1918, fl., *J.G. Kuhlman 2146* (R, RB). **Mato Grosso**, Vila Bela da Santíssima Trindade, fl., 18 August 1997, *G. Hatschbach et al. 66985* (MBM); *ibid.*, topo da Cachoeira do Jatobá, 17 May 2013, fl., *J.E.Q. Faria et al. 3484* (RB, UB); *ibid.*, Serra Ricardo Franco, 22 March 1978, fl., *P.G. Windisch 1739* (RB, UEC); *ibid.*, 25 May 1978, fl., *P.G. Windisch 1939* (CTES, RB, UEC). **Rondônia:** Ji-Paraná, Reserva Biológica do Jaru, 4 May 2006, fl., *J.F. Ramos & A.M.G. Anjos 2882* (INPA [image]).

19. *Waltheria glazioviana* Schumman (1886: 63). **Lectotype (designated here)**:— BRAZIL. Rio de Janeiro, s.d., *Glaziou 8273* (P P02273705 [image!]; isolectotypes: F neg. no. 9567 F [image!], F [fragment] F0073619F, [image!], F F0073620F [image!], G G00358720 [image!],

P P02273706 [image!], R R000007700!, S S12-17534 [image!]). **Figure 12 A–E.**

Herbs or shrub erects, 0.30−1 m tall. Branches terete, sparsely villous, trichomes stellate, subsessile, and glandular, sessile; bark glossy, lenticels inconspicuous. Stipules 5.3−5.5 × 0.6 mm, narrowly triangular, base truncate, margins sparsely ciliate, apex acute, adaxial surface sericeous, trichomes 1−2-armed, and glandular, stalked, abaxial surface sparsely pilose, trichomes stellate, sparse, and glandular sessile to short-stalked; vein 1, little prominent. Leaves spirally arranged along the branches; petioles 0.4−0.9(−1.7) × 0.09 cm long, terete to plane, slightly canaliculate, tomentose; leaf blades membranaceous or chartaceous, slightly discolorous, 2−3(−4.2−4.5) × 0.9−1.7(−2.7−3.2) cm, ovate, base rounded, margin coarsely serrate, apex acute to rounded, adaxial surface strigose, abaxial surface scabrous to densely strigose, trichomes stellate, sessile in both surface; basal veins 2 pairs and 4−7 pairs of secondary veins. Inflorescence axillary along the branches, glomeruliform, short-pedunculate, many-flowered; peduncle 0.2−0.3(−1) cm long, tomentose. Flowers distylous, sessile or rarely short-pedicellate; pedicels when presents ca. 0.3 mm long; bracteoles 3−4, 5.3−7.2 × 0.6−0.8 mm, distinct, narrowly elliptical, sparsely long-ciliate, trichomes 2-armed, apex acute, entire, adaxial surface pilose, trichomes simple, minute 2−3-armed, and glandular subsessile, abaxial surface sparsely pilose, trichomes stellate and 2-armed; vein 1, conspicuous. Calyx 5−6.2 × 1.8−2 mm, campanulate, strigose externally, trichomes stellate, sessile, and long 2−3-armed, glabrous internally, tomentose on the lobes, trichomes stellate, lobes 2.2−3 × 0.9−1 mm, apex acuminate; veins 2−3 pairs, inconspicuous. Corolla yellow, petals adnate to the staminal tube by 0.7−1 mm long, 4.2−4.5(−5.5) × 1.1−1.2 mm, spatulate, adaxial surface villous medially, trichomes simple and 2-armed, abaxial surface sparsely pilose, trichomes stellate, apex rounded, eciliate or rarely sparsely ciliate. Androecium with anthers 1.1–1.2 mm long, gynoecium with ovary ca. 1.1 × 0.6 mm, sericeous apically, style sparsely tomentose, stigma

fan-plumose. **Brevistylous form:** stamens 4−4.2 mm long, staminal tube 2.6−2.8 × 0.9 mm long, free filaments ca. 1.8 mm long, gynoecium ca. 3 mm long, style ca. 2 mm long, stigma ca. 1 × 1 mm long. **Longistylous form:** stamens ca. 3.2 mm long, staminal tube 2.8 mm long, free filaments absent, gynoecium ca. 6.8 mm long, style 2.5−4.8 mm long, stigma 0.9−1 mm long. Capsule 2.7−3.1 × 1.3−2 mm, obpyramidal, chartaceous at the apex, then membranaceous below, apex truncate-rounded, pilose apically, trichomes 3-armed and stellate, dehiscence partial. Seed 1, rarely 2 (*Luber 90*), 2 × 1.2−1.3 mm, obovoid, blackish, glabrous, apex rounded.

Distribution and habitat:—Endemic to Brazil, *Waltheria glazioviana* occurs only Espírito Santo and Rio de Janeiro states (fig. 11), in areas of Atlantic forest and restinga, and is commonly associated to rocky outcrops. It grows between 420–578 m a.s.l.

Conservation status:—Endangered (EN); B2a, b (ii, iii, iv).

Notes:—*Waltheria glazioviana* is similar to *W. erioclada*, but differs by sparsely villous branches (vs. densely lanate), discolorous blade leaf and with strigose abaxial surface (vs. concolorous and lanate), calyx 1.8−2 mm width (vs. 2.5−3 mm), and petals up to 5.5 mm long (vs. up to 6.5 mm long). In addition, these two species are allopatric, since *W. glazioviana* is endemic to Atlantic forest and restingas from Espírito Santo and Rio de Janeiro, and *W. erioclada* endemic to campos rupestres and Cerrado from Minas Gerais.

Additional Specimens Examined—BRAZIL. **Espírito Santo:** Água Doce do Norte, estrada para Morro das Torres, 12 March 2010, fl., fr., *D.P. Saraiva et al. 24* (RB, UFP). Nova Venécia, Área de Proteção Ambiental Pedra do Elefante, 12 January 2008, fl., fr., *R.F. Monteiro et al. 293* (CTES (not found), RB, SP (not found), UFP); *ibid.*, 18 February 2008, fl., fr., *P.H. Labiak et al. 4691* (CEPEC (not found), MBML (not seen), RB, UFP); *ibid.*, 5 June 2015, fl., fr., *J. Luber 90* (VIES); *ibid.*, *J. Luber 80* (VIES); *ibid.*, 7 March 2016, fl., *A. Alves-Araújo &*

N.T.L. Pena 1800 (VIES). **Rio de Janeiro:** Rio de Janeiro, Pedra de Itaúna, 30 November 1972, fl., *D. Araujo 133* (RB).

20. *Waltheria glomerata* Presley (1835: 152). Type:—PANAMÁ. Unknow locality: *"habitat in isthmo panamensi"*, s.d., *T. Haenke s.n.* (holotype: PR [not seen]; isotypes: MO MO-271832, S [not found]). **Figure 12 F.**

Subshrub, ca. 2.5 m tall. Branches scabrous, trichomes stellate, sessile; bark not lenticellate. Stipules caducae. Leaves distichally arranged along the branches; petiole 0.4–0.8 × 0.1 cm, scabrous; leaf blade chartaceous, discolorous, 7.2–13.3 × 3–5.3 cm, elliptic to rhombic, base rounded, margins serrate, apex acute, adaxial surface pubescent, abaxial surface canescent, trichomes stellate, sessile, in both surface; basal veins 2 pairs, secondary veins 8–11 pairs. Inflorescences axillary along the branches, glomeruliform, short-pedunculate, many-flowered; peduncle ca. 3 mm long, scabrous; bracteoles 2–3, 6–7.1 × 1.5–2.5, 2–3-lobed, fused to ca. 2.3–4 mm long, apex acute, entire, pubescent, trichomes stellate. Flowers distylous, sessile. Calyx 6–7 × 2.5–3.5 mm, densely sericeous externally, trichomes stellate, glabrous internally, tomentose on the lobes, trichomes stellate, lobes 2–3 × 1.5 mm, acute; veins 1 pair, inconspicuous. Corolla yellow, petals adnate to staminal tube by ca. 0.5 mm long, 3.8–4 × 1.8 mm, spatulate, glabrous, apex rounded, eciliate. **Brevistylous flowers:** stamens ca. 5 mm long, staminal tube 0.5–0.8 mm long, free filaments 3.5–4.5 mm long, anthers 1.2–1.3 long, gynoecium 4–4.5 mm long, ovary ca. 1.3 × 0.9 mm long, sericeous, style ca. 1.6 mm long, tomentose, trichomes stellate, stigmas ca. 1.1 × 0.3 mm long, clavate. **Longistylous flowers:** not observed. Capsules not observed.

Distribution and habitat:—This species occurs in Mexico, El Salvador, Nicaragua,

Costa Rica, Panamá, Colombia and Brazil (Saunders 1993; Silva-Coutinho *et al.* 2019). In Brazil, it is known only of one collection from Mato Grosso state (fig. 11), specifically in Matupá municipality, occurring in areas of Amazonian forest, along the highway.

Conservation status:—Deficient Data (DD).

Notes:—It is recognized for being a shrub with leaves arranged distichally along the branches, discolor and large leaf blade (7.2–13.3 × 3–5.3 cm), elliptic to rhombic.

Additional specimens examined:—BRAZIL.**—Mato Grosso:** Matupá, margem da BR-080, 3 June 1997, fl., *L. Amorim Neto & equipe/F.S.N. 646* (EAC, UFMT).

21. *Waltheria hatschbachii* J.G. Saunders (2021: 16). Type:—BRAZIL. Minas Gerais: Cunha Magalhães, Mendanha, 16 November 1971, *Hatschbach & Pelanda 28038* (holotype: MBM!; isotypes: C [not seen], CTES [not found], US US00479016 [image!]). **Figure 12 G–J.**

Shrubs, 1–1.5 m tall. Branches terete, plane apically, tomentose, trichomes multiradiate, long-stalked, yellowish to brownish; bark ridged longitudinally, lenticel not verrucose. Stipules ca. 10 × 0.9 mm, narrowly triangular, base truncate, margins eciliate, apex acute, tomentose, trichomes stellate, sessile to subsessile; veins inconspicuous. Leaves distically arranged along branches; petioles 0.5−0.7 × 0.1 cm, little planed, canaliculate, densely tomentose; leaf blade chartaceous, discolorous, 5.3−8.5 × 1.7−3.5 cm, lanceolate, base cordate, margins finely serrate, apex acute, adaxial surface velutine, trichomes multiradiate, sessile and short-stalked, abaxial canescent, trichomes multiradiate, short-stalked; basal veins 2 pairs, secondary veins 10−11 pairs. Inflorescences axillary along the branches, congested, short-pedunculate, few-flowered; peduncle 0.2−0.7 cm long, densely tomentose. Flowers distylous, sessile; bracteoles 4, 8−12 × 1−2 mm, distinct or fused ca. 1.5 long basally, linear, apex acute, entire, adaxial surface villous, trichomes multiradiate, sessile, abaxial surface tomentose, trichomes

multiradiate, sessile and stalked; veins 2−3, inconspicuous. Calyx 5−7 × 1.5−2.8 mm, tubular-campanulate, tomentose externally, trichomes multiradiate, sessile and stalked, glabrous internally, tomentose on the lobes, trichomes stellate, lobes 1.5−1.8 × 1.2−1.3 mm, apex acuminate; veins absent. Corolla yellow, petals adnate to the staminal tube by ca. 0.3 long, 3−4 × 0.8−1 mm, spatulate, glabrous, apex rounded, eciliate. Anthers 1.3–1.4 mm long, ovary 1.2–1.3 × 0.6–0.8 mm, sericeous apically, style tomentose. **Brevistylous form:** stamens ca. 4.1 mm long, staminal tube ca. 1.7 × 1 mm, free filaments 2.2–2.4 mm long, gynoecium 3.5–3.8 mm long, style 2.0–2.5 mm long, erect, stigma ca. 1 × 0.1 mm, filiform. **Longistylous form:** stamens 3.5−3.6 mm long, staminal tube 2.2−2.3 × 0.8 mm long, free portion of the filaments 0.2−0.3 mm long, gynoecium 5−5.1 mm long, style 3.2−4 mm long, erect or tortuous apically, stigma 0.8–1 × 0.3 mm, clavate. Capsule ca. 2.8 × 1.1 mm, obovoid, totally chartaceous, apex rounded, pilose, trichomes stellate, sessile, dehiscence partial; seed 1, ca. 2.1 × 1.8 mm, obovoid, brown, glabrous, apex rounded, smooth.

Distribution and habitat:—Endemic to Brazil, *Waltheria hatschbachii* is known of few collection of the campos rupestres from Minas Gerais states (fig. 13), and can be found in elevations between 800–1000 m a.s.l.

Conservation status:—Critically Endangered (CR); D.

Notes:—Recently described by Saunders (2021), only with its brevistylous flowers, here we provided the first description of the longistylous flowers. Yet, we can observe that in this species there is a stigmatic dimorphism, with brevistylous and longistylous flowers presenting filiform (clavate according to Saunders (2021)) and clavate stigmas, respectively. This condition was observed only in this species among the Brazilian species.

Waltheria hatschbachii is morphologically similar to *W. biribiriensis* and *W. ferruginea* and differs by characters previously mentioned to these species. Besides, these three species

occurs in campos rupestres from Minas Gerais, and sympatric in Diamantina municipality, however, the bracteoles morphology are specially important to distinguish these species.

Additional specimens examined:—BRAZIL.**—Minas Gerais:** Diamantina, Estrada Turmalina/Diamantina, 13 May 1979, fl., *G. Martinelli 5904* (RB [2 sheets], UFP); [São Gonçalo do Rio Preto], Parque Estadual do Rio Preto, 22 March 2016, fl., *G. Martinelli et al. 19265* (RB [image]).

22. *Waltheria hoehnei* J.G. Saunders (2021: 19). Type:**—**BRAZIL. Mato Grosso: Cuyabá [Cuiabá], Coxipó da Ponte, April 1911 *Hoehne 3032* (holotype SP [not found]). **Figure 12 K–M.**

Shrubs, (0.4–)1.5–3.0 m tall. Branches terete, angulate apically, puberulent, trichomes multiradiate, long-stalked, slightly yellowish to ferrugineous; bark striate, lenticel absent. Stipules 4.8–5 × 1.2–1.3 mm, narrowly triangular, base truncate, margins eciliate, apex acute, adaxial surface sericeous, trichomes stellate, sessile, abaxial surface pubescent, trichomes multiradiate, sessile and short-stalked; vein inconspicuous. Leaves distically arranged along the branches; petiole 0.2–0.5 × 0.1 cm, angulate, canaliculate, puberulent; leaf blade chartaceous, concolorous to discolorous, 6.5–11.3 × 2.6–4.3 cm, lanceolate to oblong-elliptic, base rounded to subcordate, margin finely serrate, apex rounded to acute, pubescent, trichomes multiradiate, sessile to short-stalked, rarely long-stalked; basal veins 2 pairs, secondary veins 9–13 pairs. Inflorescences axillary along the branches, sessile to short pedunculate, lax, elongate, many-flowered; peduncle 0.4–2.0 cm long, densely puberulent. Flowers distylous, sessile; bracteoles 4, 3.2–5 × 0.8–2 mm, distinct, lanceolate, apex acute, entire apically, adaxial surface pubescent, trichomes stellate and 2–3-armed, sessile, abaxial surface tomentose, trichomes stellate, sessile; veins 2–3, inconspicuous. Calyx 6–7 × 2.8–3 mm, tubular-campanulate, strigose externally,

trichomes stellate and multiradiate, sessile to short-stalked, villous of the median region up to apex lobe internally, more concentrated on the lobes, lobes 1.5–2 × 1.2–1.3 mm, apex acute; veins absent. Corolla yellow, petals adnate to staminal tube by ca. 0.2 mm long, 4–6.2 × 1.5–2.2 mm, spatulate, glabrous, apex rounded, eciliate. Anthers 1.1–1.4 mm long, ovary ca. 1.2–1.5 × 0.8–0.9 mm, sericeous apically, style tomentose, stigma elongate-plumose. **Brevistylous form:** stamens ca. 6.2 mm long, staminal tube 2–2.2 × 1 mm, free filaments ca. 3 mm long, gynoecium ca. 4.5 mm long, style 1.7 mm long, stigma ca. 1.2 × 0.8 mm. **Longistylous form:** stamens ca. 4.0 mm long, staminal tube ca. 3.0 × 1.0 mm long, free portion absent, gynoecium ca. 5.5 mm long, ovary 1.5 × 0.8 mm, style ca. 4.0 mm long, stigma ca. 1.0 × 0.5 mm. Capsule 3–3.1 × 1.9–2.2 mm, obovoid, totally chartaceous, apex rounded, hirsute apically, trichomes stellate and 2-armed more centered in the apex, dehiscence partial; seed 1, 2.3–2.5 × 1.0– mm, obovoid, brown, glabrous, apex rounded, crenulate apically or slightly along seed.

Distribution and habitat:—Endemic to Brazil, *Waltheria hoehnei* is known only few collections from Mato Grosso state (fig. 13), growing in Cerrado areas, between 150–300 m a.s.l.

Conservation status:—Critically Endangered; CR, B2ab(iii).

Notes:—Saunders (2021) described *Waltheria hoehnei* based on specimen with longistylous flowers, and although she has presented some paratypes, no one of them carry brevistylous flowers. Here, we provided the first description for this flower type. Yet, she described seeds as '*densely verrucose*', but in our studies we observed after been hydraded slightly crenulate seeds at the apex and along the hilum.

Waltheria hoehnei is morphologically similar to *W. brachypetala*, sharing multiradiate and long-stalked trichomes on the branches, but differs by characters previously mentioned for that species.

Additional Specimens Examined—BRAZIL.**—Mato Grosso:** Cuiabá, Coxipó da Ponte, April 1911, fl., *F.C. Hoehne 3027* (R); *ibidem*, *F.C. Hoehne 3028* (R); *ibidem*, *F.C. Hoehne 3029* (R); *ibidem*, *F.C. Hoehne 3030* (R); *ibidem*, *F.C. Hoehne 3031* (R); estrada da Guia, altura do Km 15, 08 April 1969, fl., *N. Saddi 301* (UFMT); Guia, Km 15, 08 April 1973, fl., *N. Saddi 802* (UFMT). Santo Antônio do Leverger, Morrinho, 24 April 2005, fl., *M.N.S. Stapf et al. 423* (HUEFS [image], RB). Rondonópolis, Campus Universitário de Rondonópolis/UFMT, 07 March 2014, fl., *E.P. Campos et al. s.n.* (UFMT 42956); 26 June 2012, fl., fr., *E.C. Campos et al. s.n.* (UFMT 42973).

23. *Waltheria indica* Linnaeus (1753: 673). Type:—Lectotype (designated by Gillis 1981): *habitat in India*, 852.2 (BM [not seen]). **Figure 12 N–O.**

= *Waltheria americana* Linnaeus (1753: 673). Type:—Lectotype (designated by Gillis 1974): *habitat in Bahama, Barbiches, Surinamo*, 852.1 (LINN LINN-HL852-1 [image!]).

= *Waltheria americana* var. *elliptica* (Cavanilles) Schumann (1886: 68). ≡ *Waltheria elliptica Cavanilles* (1788: 316). Type:—INDIA. *Habitat in India orientalis*¸ s.d., Neé s.n., MA MA476495 [image!]).

= *Waltheria martii* Colla (1833: 433). Lectotype (designated by Moraes *et al.* 2013):—BRAZIL. Espírito Santo: Itapemirim, December 1815, *Wied s.n.* (TO [image!]; isolectotype: MEL MEL2341129 [image!]).

Herbs to subshrubs erect, 0.35–3 m tall. Branches terete, tomentose, trichomes stellate, sessile, with or without glandular long-stalked trichomes; bark not lenticellate. Stipules 5–7 × 0.6 mm, linear triangular, base truncate, margins long-ciliate, apex acute, adaxial surface sericeous, trichomes simple, abaxial surface pilose, trichomes stellate with or without glandular long-stalked; vein 1, conspicuous. Leaves spirally arranged along the branches; petiole 0.3–4 × 0.1

cm, terete, canaliculate, canescent; leaf blade chartaceous, concolorous, 1.3–12 × 0.8–5.7 cm, elliptic, lanceolate, elliptic, ovate, rarely circular, base cuneate, rounded or cordate, margins serrate, apex acute, rarely rounded, adaxial surface pubescent, trichomes stellate with glandular long-stalked or not, abaxial surface canescent, trichomes stellate, with glandular long-stalked or not; basal veins 2 pairs, secondary veins 6–7 pairs. Inflorescences axillary along the branches, congested, pedunculate, many-flowered; peduncle 0.2–4 cm long, canescent. Flowers homostylous, sessile; bracteoles 4–5, 3.5–5.2 × 0.3–1.5 mm, distinct, unequal in shape, lanceolate to narrowly elliptic, densely ciliate, apex acute, entire apically, adaxial surface sericeous, trichomes stellate, abaxial surface; veins 1–4, conspicuous. Calyx 4–5.5 × 1.5–1.8 mm, campanulate, sericeous externally, trichomes stellate and 2–3-armed, sessile, glabrous internally, tomentose on the lobes, trichomes simple, lobes 2–2.1 × 0.8 mm, apex acuminate; veins 1–2 pairs, slender. Corolla pallid yellow, petal adnate to staminal tube by ca. 0.8 mm, 4.1–5.2 × 0.7–1.2 mm, spatulate, adaxial surface sparsely villous to villous medially or occasionally along all petal, abaxial surface glabrous or with sparse stellate trichomes, apex truncate to rounded, ciliate. **Homostylous flowers:** stamens 3–3.5 mm long, staminal tube ca. 2.2–2.8 mm long, free filaments absent, anthers ca. 0.8 mm long, gynoecium 3.3–3.8(–4) mm long, ovary 1–1.1 × 0.7 mm, style 1.3–2 mm long, erect, sparsely pilose, stigma 1 × 1 mm long, fan-plumose. Capsule 2.2–2.8 × 1.2–1.6 mm, obpyramidal, chartaceous at the apex, membranaceous below, sericeous apically, trichomes simple to 2–3-armed, and stellate, apex truncate, dehiscence partial; seed 1.8–2 × 1–1.3 mm long, obovoid, blackish, glabrous, slightly crenulate apically.

Distribution and habitat:—Pantropical species (Rahman *et al.* 2012; Robyns 1965; Saunders 2007). In Brazil, it is widely distributed and occurs in all phytogeographic domains (fig. 13), being very common in disturbed environments as roadsides and highways, in addition

to abandoned lands, at 2–1650 m elevation.

Conservation status:—Least Concern (LC).

Notes:— Because it is the most widely distributed species in the country, *Waltheria indica* displays a wide variation in its morphology mainly on the trichomes type on the branches and leaf blades shape. Usually, the branches and leaves have only stellate trichomes, however, many specimens were observed also with glandular long-stalked trichomes, what can take to misinterpretation about circumscription of the taxon. This trichomes type is shared by many species, nevertheless only homostylous flowers are known to *W. indica*, facilizing the correct identification. Fries (1908) described *W. americana* var. *glandulosa* Fries (1908: 42) based on *Anisits 2041* from Paraguay, doing reference to a specimen similar to the *W. americana* (=*W. indica*), but with '*glandulis stipitatis tomento intermixtis*'.

As for specimens with glandular long-stalked trichomes, *Waltheria indica* shares many characters with *W. albicans* but differs by morphology mentioned previously. With *W. collina*, it differs by petals with sparsely villous to villous adaxial surface and ciliate apex (vs. totally glabrous) and tomentose style (vs. glabrous).

Populations with only stellate trichomes can be confused with *W. marielleae*, *W. erioclada* and *W. rotundifolia*, differing of them mainly by homostylous flowers (vs. distylous). Additional morphological characters are discussed in Notes for each species separately.

Vernacular names:—Amazonas (vassourinha-do-campo), Bahia (guaxuma, guaxuma-de-porco, malva, malva-branca, plaina), Ceará (malva, malva-branca, vassourinha-de-botão), Goiás (malva-branca), Maranhão (malva-cidreira, malva-de-porco), Mato Grosso (malva, malva-branca, malva-do-campo), Minas Gerais (guanxuma-branca, malva-branca, malva-veludo, vassoura-branca), Pará (malva-branca), Paraíba (malva, malva-branca), Piauí (malva), Rio Grande do Norte (malva, malva-amarela, malva-sedosa), Roraima (malva-branca, malva-vermelha), e São Paulo (guanxuma-branca, malva-branca, malva-sedosa, malva-veludo).

Selected specimens examined:—BRAZIL.—**Acre:** Rio Branco, km 45 da rodovia Rio Branco-Porto Velho, 20 February 1978, fl., *J.U. Santos et al. 36* (NY [image], US [image]). **Alagoas:** Água Branca, Serra do Paraíso, 4 April 2018, fl., *D.P. Souza et al. 196* (PISF). Marechal Deodoro, Barra Nova, 8 November 2009, fl., *A.N. Costa 3* (MAC). Quebrangulo, Reserva Biológica Pedra Talhada, 25 May 2012, fl., *E.S. França et al. 118* (MAC). **Amapá:** Macapá, Parque Florestal da Fazendinha, 31 July 1983, fl., *S.A. Mori et al. 15725* (NY [image]). **Amazonas:** Barcelos, Cemitério do Castelo, 29 June 1979, fl., *L.A. Maia et al. 193* (INPA [image]). Manaus, Distrito Agropecuário da SUFRAMA, 13 June 1992, fl., *C. Dick 173* (INPA [image], MBM, NY [image], US [image]). **Bahia:** Andaraí, Chapada Diamantina, 13 January 1991, fl., *C.S.S. Barros & G.L. Esteves 431* (HUEFS [image]). Camamu, povoado de Barcelos do Sul, 16 July 2005, fl., fr., *A.M. Miranda et al. 5098* (HST, HUEFS [image]). Correntina, ca. 46.3 km W de Correntina na estrada para Brasília, 16 February 2000, fl., *L.P. Queiroz et al. 6063* (HUEFS [image]). Morro do Chapéu, Cachoeira do Ventura, 21 August 2017, fl., fr., *T.S. Coutinho 229, 233* (UFP). Paulo Afonso, Estação Ecológica do Raso da Catarina, 29 November 2005, fl., *R.M. Castro et al. 1276* (HUEFS [image]). **Ceará:** Aiuaba, Estação Ecológica de Aiuaba, 30 June 2004, fl., *J.R. Lemos & P. Matias 219* (EAC). Crato, Floresta Nacional do Araripe, 19 July 2017, fl., fr., *T.S. Coutinho & M. Bazante 214* (EAC, RB, UFP). São Gonçalo do Amarante, Estação Ecológica do Pecém, July 1999, fl., fr., *H. Magalhães 33* (EAC, HUVA). **Distrito Federal:** Brasília, Reserva Ecológica do IBGE, 26 September 1995, fl., *M.A. da Silva 2670* (IBGE). **Espírito Santo:** Conceição da Barra, Pontal do Sul, 3 January 1997, fl., *N.M. Andrade 94* (VIES). Serra, Área de Proteção Ambiental Mestre Álvaro, 13 May 2016, fl., *A.D. Firmino et al. 28* (VIES). **Goiás:** Cavalcante, Reserva Natural Serra do Tombador, 10 October 2015, fl., *T. Zupo et al. 05* (CEN). Pirenópolis, Reserva Particular do Patrimônio Natural Santuário de Vida Silvestre Flor das Águas, 18 July 1998, fl., *R.C. Mendonça et al. 3639* (IBGE). **Maranhão:** Balsas, barragem de Pedras, 24 March 1994, fl., *M.S. Bona Nascimento*

& J.H. de Carvalho 641 (US [image]). Mirador, Parque Estadual do Mirador, 8 April 1998, fl., *L.P. Félix et al. 8073* (EAC, HST). São Luís, 1940, fl., *R. Froes 11844* (NY [image]). **Mato Grosso:** Cuiabá, caminho para a Guia, 3 March 1990, fl., *N. Saddi 11559* (UFMT). Peixoto de Azevedo, ca. 92 km de Matupá em direção ao rio Xingu, 24 Abril 1997, fl., *V.C. Souza et al. 15497* (ESA, UFMT). **Mato Grosso do Sul:** Campo Grande, Sede da Embrapa Gado de Corte, November 2020, *A. Pott & J. Pott 8406* (CEN). Jataí, Parque Estadual das Várzeas do Rio Ivinhema, 25 Sepetmber 2019, fl., fr., *A.K.P. Santos et al. 61* (BHCB). **Minas Gerais:** Marliéria, Parque Estadual do Rio Doce, 26 September 1975, fl., fr., *E.P. Heringer & G. Eiten 15245* (UB). Ouro Preto, Pico do Itacolomí, 1 Februaru 1971, fl., *H.S. Irwin et al. 29557* (NY [image], UB). Jaboticatubas, Parque Nacional da Serra do Cipó, 14 April 2012, fl., *S.S. Oliveira & C. Schlindwein 33* (BHCB). Rio Acima, região do rio de Peixe, 21 April 2010, fl., *M.S. Mendes s.n.* (BHCB 151937). **Pará:** Marabá, Serra dos Carajás, 6 April 1977, fl., *M.G. da Silva & R. Bahia 3050a* (INPA [image]). Salinópolis, dunas da Praia do Atalaia, 9 March 1989, fl., *L. Carreira et al. 1089* (INPA [image]). São Geraldo do Araguaia, Serra dos Martírios/Andorinhas, 18 July 2009, fl., *M.G.C. Souza et al. 703* (HBRA [image]). **Paraíba:** João Pessoa, Tambaú, 4 March 2009, fl., *G.B. Freitas s.n.* (JPB 58009). Mamanguape, Reserva Biológica Guaribas, 23 July 2019, fl., fr., *T.S. Coutinho et al. 433, 456* (UFP). Maturéia, Parque Estadual Pico do Jabre, 5 June 2019, fl., fr., *T.S. Coutinho et al. 405* (UFP, JPB). São José de Piranhas, 23 May 2012, fl., *E.V.R. Ferreira & A.C.C.P. Silva 668* (HVASF). **Paraná:** Foz do Iguaçu, Parque Nacional do Iguaçu, 17 April 1964, fl., *G. Hatschbach 11228* (MBM). Loanda, Paleovossoroca 1, 27 May 2014, fl., *E.L. Siqueira et al. 1079* (MBM). Santa Fé, Rio Bandeirantes, 1 September 1989, fl., *J.M. Silva & G. Hatschbach 648* (BHCB, MBM). Sengés, rodovia PR-11, 6 December 1988, fl., *G. Hatschbach & J. Cordeiro 52640* (MBM). **Pernambuco:** Buíque, Parque Nacional do Catimbau, 24 March 2018, fl., fr., *T.S. Coutinho et al. 333* (UFP, RB). Fernando de Noronha, ilha Rasa, 7 April 1999, fl., *A.M. Miranda 3177*

(HST, UB). Gravatá, Reserva Particular do Patrimônio Natural Serra do Contente, 21 July 2017, fl., fr., *T.S. Coutinho et al. 296* (UFP). Recife, Parque Estadual de Dois Irmãos, 3 March 1993, fl., fr., *L.C. Gomes 266* (PEUFR). **Piauí:** Brasileira, Parque Nacional de Sete Cidades, 22 July 1999, fl., fr., *M.E. Alencar 706* (UEC). **Rio Grande do Norte:** Natal, Parque Estadual das Dunas de Natal, 2 March 2017, fl., fr., *A.A. Roque 1960* (HST). Mossoró, Fazenda Experimental da UFERSA, s.d., fl., *C.M. Silva 11* (MOSS). **Rio Grande do Sul:** Alegrete, estrada Alegrete-Serro do Tigre, 11 February 1990, fl., *D.B. Falkenburg & M.E.G. Sobral 5231* (MBM). **Rio de Janeiro:** Araruama, Praia Seca, 20 April 2008, fl., *A.C.S. Cavalcanti et al. 145* (MBM, RB). Itatiaia, Parque Nacional do Itatiaia, 30 December 1959, fl., *O.M. Barth 16* (RFA). **Rondônia:** Guajará-Mirim, Parque Estadual Serra dos Parecis, 3 February 1983, fl., *L.M.M. Carreira 506* (INPA [image], NY [image]). Porto Velho, arredores do aeroporto internacional, 3 September 1975, fl., *C.D. Mota & L. Coêlho 06* (INPA [image]). **Roraima:** Boa Vista, BR 401 que liga Boa Vista-Bonfim, 31 July 1986, fl., *J.A. Silva et al. 529* (INPA [image], NY [image]). Caracaraí, Parque Nacional do Viruá, 29 August 2002, fl., *C.A.C. Ferreira 12374* (INPA [image]). **Santa Catarina:** Araquarí, Barra do Sul, 29 October 1953, fl., *P.R. Reitz 5792* (NY [image]). Florianópolis, 18 April 2015, fl., *L.A. Funez 4409* (FURB [image]). **São Paulo:** Mogi Guaçu, Reserva Biológica Fazenda Campininha, 20 November 1980, fl., fr., *W. Mantovani 1389* (ESA, SJRP, UB). São José do Barreiro, Serra da Bocaina, 28 June 1994, fl., *K.D. Barreto et al. 2631* (ESA, SJRP). Teodoro Sampaio, Parque Estadual Morro do Diabo, 4 June 1994, fl., *J.B. Silva 54* (UB). **Sergipe:** Barra dos Coqueiros, Ilha de Santa Luzia, 13 october 1994, fl, *M. Landim 178* (ASE [image]). Itabaiana, Parque Nacional Serra de Itabaiana, 7 July 1987, fl., *G. Viana 1832* (ASE [image]). Nossa Senhora do Socorro, 21 December 2012, fl., *T.R. Silva & J.P.S. Santos 92* (ASE [image]). **Tocantins:** Ananás, acampamento de ENGEVIX, 14 April 2004, fl., *G. Pereira-Silva et al. 8523* (CEN). Lagoa da Confusão, Ilha do Bananal, Parque Nacional do Araguaia, 24 March 1999, fl., *M.A. da Silva et al. 4131* (IBGE). Paranã, Fazenda

São João, 27 March 2004, fl., *A.C. Sevilha et al. 3848* (CEN).

24. *Waltheria involucrata* Bentham (1841: 125). Type:—GUIANA. Rupununi District, 1837, *Schomburgk 722* (holotype: K K000380988 [image!]; isotypes: F F0073621F [image!], G G00358721, G00358722 and G00358723 [images!], GH GH00057001 [image!], K K000779776 [image!], L L0820699 [image!], KW KW001001725 [image!], MO [not found], P P00273707 [image!], TCD p.p. TCD0003752 [image!], US US00433596 [image!]). **Figure 12 P–Q.**

≡ *Sitela involucrata* (Benth.) Bailey (1940: 350).

Subshrubs to shrubs, 0.5–2 m tall. Branches terete from the base to the apex, scabrous, trichomes stellate, sessile, yellowish; bark brown when dried, bright to slightly opaque, striate, lenticels present, inconspicuous. Stipules 5–5.5 × 0.5–0.6 mm, narrowly triangular, base truncate, margins eciliate or sparsely ciliate, apex acuminate, scabrous, trichomes stellate, sessile; vein inconspicuous. Leaves distichally arranged along the branches; petiole 1.2–2.5 × 0.1 cm, terete, slightly canaliculate, densely scabrous; leaf blade membranaceous, strongly discolorous, 6–10.5 × 3.2–4.3 cm, ovate to elliptic or rhombic, base cordate, margins finely dentate, apex acuminate, adaxial surface sparsely strigose, trichomes stellate and glandular, both sessile, abaxial surface canescent, trichomes stellate, sessile; basal veins 2–3 pairs, secondary veins 11–12 pairs, tertiary veins reticulate, conspicuous. Inflorescences axillary along the branches, glomeruliform, short-pedunculate, many-flowered; peduncle 0.1–0.3 cm long, densely strigose. Flowers distylous, sessile, arranged in pairs; bracteoles 10–12 × 8–10 mm, totally fused into a cupuliform shape, apex multidentate, entire dentate, adaxial surface sparsely scabrous, trichomes stellate and glandular, both sessile, abaxial surface sparsely pubescent, trichomes stellate, sessile; veins ca. 10. Calyx 6−6.2 × 2.5−2.8 mm, tubular-

campanulate, strigose externally, trichomes stellate, sessile, glabrous internally, tomentose on the lobes, trichomes simple to 2-armed, lobes 1.3−1.5 × 1−1.2 mm, apex acute; vein 1 pairs, slender. Corolla yellow, petals adnate to the staminal tube for ca. 0.5 mm long, ca. 4.5 × 1.5 mm, spatulate, adaxial surface sparsely pilose medially, abaxial scabrous, trichomes stellate, sessile, apex rounded, eciliate. Anthers 1.3–1.5 mm long, ovary 1.2–1.5 × 0.6–0.8 mm, sericeous apically, style tomentose, stigma elongate-plumose. **Brevistylous form:** stamens ca. 6.2 mm long, staminal tube 2.5 × 0.8 mm, free filaments 3 mm long, gynoecium ca. 3.5 mm long, style ca. 1.5 mm long, geniculate basally, stigma ca. 1 × 0.3 mm long. **Longistylous form:** stamens 2.7−3.5 mm long, staminal tube 1.5−2.5 × 0.8−0.9 mm long, free filaments absent, gynoecium ca. 5 mm long, style ca. 3 mm long, erect, stigma ca. 1 × 0.3 mm. Capsule 1, 2.8−3 × 1.2−1.5 mm, obovoid, totally chartaceous, apex rounded, sericeous apically, trichomes stellate and 2–3-armed, sessile, dehiscence partial; seed 1, ca. 2.1 × 1.5 mm, obovoid, brown, glabrous, apex rounded, smooth.

Distribution and habitat:—Occurs in Guiana, Colombia, Venezuela and Brazil (Rondón 2008; Saunders 2005b). In Brazil it occurs Acre, Rondônia and Roraima states (fig. 13), and it is the only species endemic to North region, habiting Amazonian forest and narrow disjunct Cerrado strips from Roraima, at ca. 100 m a.s.l.

Conservation status:—Least Concern (LC).

Notes:— *Waltheria involucrata* is one of the easiest species to be recognized because its bracteoles are totally fused to form an involucre or “cup”, where the pair of flowers is inserted inside.

Vernacular name:—Acre (malva-do-campo, malva-chumbinho).

Additional specimens examined:—BRAZIL. **Acre:** Rio Branco, base da serra da Normandia, 23 October 1954, fl., *R. Jaccoud s.n.* (HEPH00014422 [image]). **Rondônia**: Jaru,

December 1912, fl., fr., *J.G. Kuhlmann 98* (RB, UFP); s.l., São Marcos, July 1927, fl., *P. von Luetzelburg 20528* (NY [image]); *ibid.*, Ilha do Ajavany, March 1913, fl., fr., *J.G. Kuhlmann 336* (RB). **Roraima**: Alto Alegre, Ilha de Maracá, 16 June 1986, fl., *M.J.G. Hopkins 779* (F [image], INPA [image], NY [image]); *ibid.*, 20 February 1987, fl., *R.A. Ratter 5359* (INPA [image]); *ibid.*, 24 March 1987, fl., *R.A. Ratter 5839* (INPA); ibidem, Reserva Ecológica de Maracá, 06 March 1987, fl., *P.J. Edwards 2471* (MO [image], NY [image], U [image]); Boa Vista, beira do Rio Branco, 26 August 1951, fl., *G.A. Black 51-13012* (INPA [image]); ibidem, a 20 km da Ponte dos Macuxis, 11 November 1977, fl., *N.A. Rosa & M.R. Cordeiro 1432* (MBM, MO [image], NY [image], RB); ibidem, margem inundada do Igarapé Caxangá, 10 Sep 1943, fl., *A. Ducke 2078* (NY [image], R, SP, U [image]); ibidem, Cauamé region, 16 October 1977, fl., *L. Coradin & M.R. Cordeiro 717* (CEN, INPA [image], NY [image]); ibidem, estrada BR0174-Boa Vista-Venezuela, 05 August 1986, fl., *J.A. Silva et al. 617* (INPA [image], NY [image], UB); ibidem, 15 May 1987, fl., *J. Lima 708* (NY [image]); ibidem; 7 km along dirt east of paved road heading N from Boa Vista to Caracas, 7 March 1990, fl., *J. Santo 3070* (CEPEC [not seen], F [image], MBM); ibidem, Fazenda Truaru, 27 October 2004, fl., *R.I. Barbosa 136* (INPA [image!]). Normandia, B.R. Branco, 23 October 1954, fl., *R. Jaccoud s.n.* (INPA267 [image]); ibidem, 10 November 1954, fl., *W.A. Rodrigues 63* (INPA [image]). sin. loc., Território do Rio Branco, Fazenda Brasilândia, 27 November 1958, fl., *W. Rodrigues 692* (INPA [image]); margem do Rio Anauá, 7 March 1978, fl., *N.T. Silva 4553* (F [image]).

25. *Waltheria marielleae* T.S. Coutinho & M. Alves *sp. nov.* Type:—BRAZIL. Pernambuco, Mun. Bonito, Parque da Cidade, 13 June 2018, *Coutinho, Melo, Pessoa, Guedes & Neves 375*, fl., fr., (holotype: UFP!; isotypes: BHCB!, HUEFS!, MAC!, RB!, MBM!, SPF!). **Figure 14, 15 A–D.**

Diagnosis—Waltheria marielleae resembles *W. indica* by indument of its branches, narrowly lanceolate stipules, elliptic leaf blade, axillary inflorescences and fan-plumose stigmas, but differs by olive green to grayish-green color of the leaf blades (vs. greenish), larger and distylous flowers (vs. smaller and homostylous flowers), acute calyx lobe apex (vs. acuminate), and spatulate and eciliate petals (vs. oblong and ciliate).

Herbs to shrubs, 0.7–1.5 m tall. Branches terete, compressed apically, sericeous, trichomes stellate, sessile or subsessile, whitish; bark sparsely lenticellate. Stipules 6.5–8 × 0.8–1 mm, narrowly triangular, base truncate, margins sparsely ciliate, apex acuminate, adaxial surface pubescent, trichomes simple and stellate, sessile, abaxial pubescent, trichomes stellate, sessile; vein 1, conspicuous, prominent abaxially. Leaves spirally arranged along the branches; petiole 1–2.5 × 0.1 cm, terete to slightly flat, canaliculate, densely sericeous; leaf blades chartaceous, discolorous, 4.7–9 × 1.5–4.6 cm, plane, elliptic, widely elliptic to lanceolate, base rounded, apex acute, margins serrate, adaxial surface, pubescent, abaxial canescent, trichomes stellate, sessile; basal veins 2 pairs, secondary veins 7–9 pairs. Inflorescence axillary along the branches, congested, short-pedunculate, few-flowered; peduncle 0.4–1.4 cm long, sericeous. Flowers distylous, sessile or short-pedicellate; bracteoles 4, 6–6.5 × 1–1.5 mm, distinct, elliptic to narrowly elliptic, apex acute, entire to 2–3-fid, adaxial surface sericeous, trichomes stellate, abaxial surface with a layer canescent of trichomes stellate small and dense, and a layer pilose of trichomes stellate big and sparse, sessile; veins 2–3, conspicuous. Calyx 4.5–5.5 × 2.5–3.5 mm, campanulate, pubescent externally, trichomes stellate and 2-armed, sessile, glabrous internally, pubescent on the lobes internally, simple trichomes, lobes 2.8–3 × 1.1–1.2 mm, apex acute; veins 2-3 pairs, conspicuous. Corolla pallid yellow, petals adnate to the staminal tube by ca. 0.8 mm long, 4.3–7.5 × 2–2.2 mm, spatulate, adaxial surface pilose, trichomes simple, abaxial surface glabrous, apex rounded to slightly emarginate, eciliate. Anthers 1.1–1.4 mm

long, ovary ca. 0.5–1.2 × 0.8 mm, sericeous apically, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens ca. 6.5 mm long, staminal tube 2–2.3 × 0.8–1 mm, free filaments 3.1–3.5 mm long, gynoecium 2–3.5 mm long, style ca. 1.5 mm long, stigma ca. 1 × 1 mm long. **Longistylous form:** stamens ca. 4 mm long, staminal tube 3.2 × 1.2 mm, free filaments ca. 0.2 mm long, gynoecium 6.2–6.5 mm long, style 4.2–4.5 mm long, stigma 1.1 × 1.1 mm. Capsule (2.0−)2.3−2.5 × (1.2−)1.5−1.8 mm, obpyramidal, chartaceous at the apex, membranous below, apex truncate, sericeous apically, trichomes stellate, dehiscence partial; seed 1, 1.3−2 × 0.8−1.2 mm, obovoid, brown, glabrous, apex rounded.

Etimology:—The specific epithet honors Marielle Franco, a sociologist and former Brazilian councilwoman who vehemently fought for LGBTQI+ causes, a community that the first author is proud to be part of. Marielle Franco was cowardly murdered along with her driver Anderson Pedro Gomes in 2018, however, her name remains alive in the memory of those who shared her proposals with her. Marielle Franco is now eternized under plant name.

Distribution and habitat:—Endemic to Brazil, *Waltheria marielleae* occurs only Northeast (Alagoas and Pernambuco) region (Fig. 16), habiting areas of Atlantic Forest and Caatinga, between 300–700 m a.s.l.

Conservation status:—Endangered (EN); B2ab (ii, iii).

Notes:—Besides *Waltheria marielleae* to be similar to *W. indica* as showed in diagnosis, it also can be confused with *W. rotundifolia* sharing grayish leaves color, axillary and sessile to short pedunculate inflorescences, distylous flowers, calyx with acute lobe apex, and fan-plumose stigmas, but differs by narrowly lanceolate stipules (vs. linear), long-petiolate leaves (vs. short-petiolate), discolorous leaf blades (vs. concolorous), narrowly elliptic to elliptic bracteoles, longer than calyx and with glandular trichomes absent (vs. linear to lanceolate, shorter than calyx and with glandular trichomes present), pallid-yellow corolla (vs.

gold yellow), eciliate petal apex (vs. ciliate), calyx 2.5–3.5 mm width (vs. 1.5–1.8 mm), capsule with sericeous apex and partial dehiscence (vs. tomentose and total dehiscent).

Additional specimens examined (Paratypes):—BRAZIL. **Alagoas:** Quebrangulo, Pedra Talhada, 06 January 1986, fl., *R. Lyra-Lemos & G.L. Esteves 1140* (HUEFS [image], MAC); *ibid.*, Reserva Biológica de Pedra Talhada, 11 June 2011, fl., *R. Lyra-Lemos et al. 13296* (MAC); *ibid.*, 23 October 2011, fl., *W.T.C.C. Santos & E.S. França 21* (MAC); *ibid.*, 01 Aug 2014, fl., *J.S. Correio et al. 134* (MAC); São Sebastião, Povoado Sucupira, 01 December 2003, fl., *I.A. Bayma s.n.* (MAC 19983). **Pernambuco:** Bonito, 17 September 1997, fl., *V. Santos 49* (PEUFR); *ibid.*, Parque da Reserva Municipal, 17 September 1997, fl., *A.C.M. Espíndola 08* (PEUFR); *ibid.*, Reserva Municipal de Bonito, fl., 13 June 2018, *T.S. Coutinho et al. 376* (UFP, RB); *ibid.*, Fazenda Tudo Muito, fl., 13 June 2018, *T.S. Coutinho et al. 382* (UFP); *ibid.*, Reserva Municipal de Bonito, 12 September 1995, fl., *M.R.C.S. Melo et al. 245* (PEUFR). Garanhuns, Fazenda Serra Branca, 23 October 2010, fl., *M. Oliveira et al. 5128* (IPA). *sin. loc.*, margem da estrada entre Baraúna e Jurema, 26 July 1966, fl., *D. Andrade-Lima 66-4712* (IPA); estrada para Petrolina, 05 September 1986, fl., *Z.M.T.S. Freitas 26* (PEUFR).

26. *Waltheria maritima* Saint-Hilaire (1825: 153). **Lectotype (designated here):**—BRAZIL. Espírito Santo, *"inveni in arenosis maritimis prope Meïahypè, haud longè ab urbe Benevente*, September 1816-1822, fl., fr., *Saint-Hilaire 288* (P P02273710 [image!]; isotypes: F fragment F0073625F [image!], P P02273709 and P02273711 [images!], MPU MPU016431 [image!, cited *2885*]). **Figure 15 E–G.**

Subshrubs, 0.25–1.3 m tall. Branches terete, glabrescent to glabrous, trichomes glandular sessile, with stellate trichomes or not; bark glossy, not lenticellate, ridged. Stipules 2.1–3.2 × 0.3–0.4 mm, narrowly triangular, base truncate, margins eciliate, apex acute, glabrescent,

puberulent, trichomes glandular, sessile; veins inconspicuous. Leaves spirally arranged usually apically; petioles 0.1–0.2 × 0.1 cm, terete, puberulent, trichomes; leaf blades chartaceous, concolorous, 1–2.5 × 0.7–2.1 cm, obovate to circular, base rounded to slightly cuneate, apex rounded to truncate, margins coarsely dentate, specially at the apex, puberulent to glabrescent or rarely scabrous, trichomes glandular, sessile, and sparse stellate or glandular sessile and densely stellate; basal veins 2 pairs, secondary veins 4–5 pairs. Inflorescences terminal, congested, sessile to pedunculate, many-flowered; peduncle 0.1–0.8 cm long, pubescent. Flowers homostylous, sessile to subsessile; bracteoles 3–5, 5–5.5 × 0.3–1.0 mm, distinct, linear to narrowly lanceolate, apex acuminate, entire apically, puberulent, trichomes glandular, sessile, eciliate; veins 1–2. Calyx 3.5−5.5 × 1.8−2 mm, tubular-campanulate, sparsely sericeous to pilose externally, trichomes simple to 2-armed and glandular, all sessile, glabrous internally, sparsely pilose on the lobes, trichomes simple and 2−3-armed, sessile, lobes 2–2.5 × 0.7–1.2 mm, eciliate, apex acuminate; veins absent. Corolla yellow, petals adnate to the staminal tube for ca. 1 mm, 4.2 × 1.2 mm, spatulate, adaxial surface sparsely pilose, trichomes simple, abaxial glabrous, apex rounded, eciliate. **Homostylous form:** stamens 2.5 mm long, staminal tube 2 × 0.8 mm long, free filaments absent, anthers 1 mm long, gynoecium ca. 2.7 mm long, ovary 1.1 × 0.7 mm, style ca. 1.2 mm long, geniculate at the base, stigma ca. 1 × 0.8−0.9 mm, fan-plumose. Capsule 2.5−2.8 × 1.8−2 mm, obpyramidal, chartaceous at the apex, membranaceous below, apex truncate, pilose medially to apically or tomentose, trichomes simple, 2-armed and stellate, dehiscence partial. Seed 1, 2 × 1.3 mm, obovoid, black, glabrous, black, apex rounded.

Distribution and habitat:—Endemic to Brazil, *Waltheria maritima* is known only Espírito Santo and Rio de Janeiro states (fig. 13), associated to restinga environments.

Conservation status:—Although it be classified as Near Threatened (NT) according IUCN (2019) criteria, we suggest that this species be classified as Least Concern (LC) since

most of the collected species are within protected areas.

Notes:—Two morphotypes can be found in *Waltheria maritima*, one with branches and leaves with many sessile glandular trichomes and sparse stellate trichomes, and the other with a significant amount of both glandular and stellate trichomes. The latter causes the organs of this species to have a rough texture, and a slightly more grayish color. Despite of this distinct appearance, two morphotypes can be found in sympatry in some locations.

Waltheria maritima has been usually misidentified as *W. cinerascens* due its similarity of the leaf blade shape and terminal inflorescences, however, they can be easily distinguished due *W. maritima* has shorter bracteoles (5–5.5 mm vs. 11–13 mm long), shorter calyx (3.5–5.5 mm vs. 6.5–9 mm long) and homostylous flowers (vs. distylous). Besides, *W. maritima* is a common species from restingas of Espírito Santo and Rio de Janeiro, while *W. cinerascens* is most commonly associated to campos rupestres, but when associated to restinga, is many rare in Espírito Santo (only one collection) and no records in Rio de Janeiro.

Selected specimens examined:—BRAZIL. **Espírito Santo:** Anchieta, Área da C.A.F., 5 June 1997, fl., *O.J. Pereira et al. 5975* (VIES). Conceição da Barra, Parque Estadual de Itaúnas, 1 April 2015, fl., *R.N. Amaral et al. 15* (VIES). Guarapari, Parque Estadual Paulo César Vinha, 29 March 2000, fl., *J.M.L. Gomes 2784* (VIES). Serra, Área de Proteção Ambiental Mestre Álvaro, 10 March 2012, fl., *P.H.D. Barros et al. 198* (VIES). Vila Velha, Reserva Estadual de Jacarenema, 17 May 2004, fl., *G.G.K. Lube & O.J. Pereira 36* (VIES). Vitória, Reserva Ecológica de Camburi, 2 September 1988, fl., *A.M. Assis et al. 576* (VIES). **Rio de Janeiro:** Carapebus, 26 June 1996, fl., *V.L.C. Martins et al. 299* (R). Cabo Frio, bosque do Horto de Salinas Perynas, 19 October 1995, fl., *T. Konno et al. 445* (R). Macaé, Parque Nacional da Restinga de Jurubatiba, April 2005, fl., *L. Fonseca* (R). Maricá, Barra de Maricá, 30 July 1987, fl., *A. Souza 178* (R). Saquarema, Reserva Ecológica Estadual de Jacarepiá, 22 August 1996, fl., *L.E.M. Filho et al. 6038* (R).

27. *Waltheria matogrossensis* J.G. Saunders (2021: 22). Type:—BRAZIL. Mato Grosso, Cuiabá, Chapada dos Guimarães, Morro São Jerônimo, entre a Rodovia e o Morro, 4 km depois da Casa de Pedras, 25 June 1990, *Saddi 12445* (holotype: UFMT [not found]; isotypes: CTES [not found], TEX [not seen]). **Figure 15 H–L.**

Shrubs, 0.5–2.0 m tall. Branches terete, angulate apically, tomentose, trichomes multiradiate, long-stalked, yellowish; bark ridged, lenticels absent. Stipules ca. 6 × 0.8–0.9 mm, narrowly triangular, base truncate, margins eciliate, apex acute, tomentose, trichomes similar to the branches; veins inconspicuous. Leaves distically arranged along the branches; petiole 0.3–1.3 × 0.2–0.3 cm, angulate, canaliculate, densely tomentose; leaf blade chartaceous, discolorous, 5–12.5 × 3–7.5 cm, ovate to widely ovate or widely elliptic, base subcordate to cordate, rarely rounded, margins finely or coarsely serrate, apex acute, adaxial surface tomentose, trichomes multiradiate, short to long-stalked, abaxial surface densely tomentose to lanate, trichomes multiradiate; basal veins 2 pairs, secondary veins 8–9 pars. Inflorescences axillary along the branches, congested, short-pedunculate, many-flowered; peduncle 0.3–1.3 cm long, tomentose. Flowers distylous, sessile; bracteoles 4, 4–4.8 × (0.8–)1.2–2 mm, distinct or fused for 0.3 mm long, lanceolate to widely lanceolate, apex acute, entire apically, adaxial surface tomentose, trichomes stellate, sessile, and glandular, subsessile, abaxial surface scabrous, trichomes multiradiate, short-stalked, and stellate, sessile; veins 1–3, conspicuous only on adaxial surface. Calyx 5.3–7.5 × 2.0–3.5 mm, campanulate, scabrous externally, trichomes multiradiate, sessile and short-stalked, villous internally, except near to the base, lobes 1.5–2.0 × 1.0–1.2 mm, apex acute; veins absent. Corolla yellow, petals adnate to the staminal tube for 0.3 mm, 3.5−5.2(–6.1) × 1−1.5 mm, spatulate, adaxial surface tomentose medially, trichomes simple, abaxial surface sparsely pilose or glabrous, trichomes stellate, sessile, apex rounded, eciliate. Anthers

1–1.2 mm long, ovary 1.3–1.5 × 0.4–1, style tomentose, stigma clavate. **Brevistylous form:** stamens ca. 6.2 mm long, staminal tube ca. 2.4 × 1 mm, free filaments 2.2–3 mm long, gynoecium ca. 5.1 mm long, style ca. 2.3 mm long, stigma ca. 1.2 × 0.3 mm. **Longistylous form:** stamens ca. 3 mm long, staminal tube ca. 2 × 1 mm, free portion of the filaments absent, gynoecium ca. 5 mm long, style ca. 2.5 mm long, basally geniculate, stigma 0.8–1.5 × 0.3 mm. Capsule 3.3−3.5 × 2−2.2 mm, obovoid, chartaceous at the apex, membranaceous below, apex rounded, pilose, trichomes stellate, sessile, dehiscence partial; seed 1, 2.8−3.0 × 1.5−1.8 mm, obovoid, brown, glabrous, apex rounded, smooth.

Distribution and habitat:—Endemic to Brazil, *Waltheria matogrossensis* is known only from Midwest (Goiás, Mato Grosso and Mato Grosso do Sul) (fig. 16), in Cerrado and Amazonian, and it can be associated to rocky outcrops. This species grows between 450–600 m a.s.l. Here, we are expanding the occurrence area of this species also to Goiás according to Saunders (2021).

Conservation status:— Least Concern (LC).

Notes:—*Waltheria matogrossensis* can be confused with *W. glabribracteata* by both present the bracteoles shorter than the calyx, however, by tomentose branches with multiradiate trichomes (vs. strigose and stellate), stipules ca. 6 mm long (vs. ca. 4 mm), ovate to widely ovate or widely elliptic leaf blades (vs. circular to oblate), presence of trichomes on the adaxial surface of the bracteoles (vs. absence), calyx externally scabrous (vs. sericeous), spatulate petals with presence of trichomes on the adaxial surface (vs. oblanceolate and glabrous) and apically rounded capsule (vs. truncate). Besides, although *W. matogrossensis* be widely distributed in Mato Grosso state (where *W. glabribracteata* has occurrence records), they are allopatric since *W. glabribracteata* occurs in the state only Parque Estadual Serra Ricardo Franco (Vila Bela da Santíssima Trindade municipality), where *W. matogrossensis* do not has been registered.

Vernacular name:—Mato Grosso (breixo).

Selected Specimens Examined—BRAZIL**—Goiás:** Aragarças, 09 April 1958, fl., *D. Andrade-Lima 58-3021* (IPA [not found], RB). **Mato Grosso:** Barra do Garças, 27 August 1968, fl., *G. Eiten & L.T. Eiten 8430* (IBGE, SP, UB); Serra do Roncador, ca. 210 km N of Xavantina, 28 May 1966, fl., fr., *H.S. Irwin et al. 16172* (NY [image], UB, R). Canabrava do Norte, 10 August 1997, fl., *L.C. Bernacci 2335* (ESA). Chapada dos Guimarães, Salgadeira, 27 April 1975, fl., *N. Saddi 1281* (UFMT). Rio Verde, Serra da Pimenteira, 08 February 1975, fl., *G. Hatschbach et al. 35955* (MBM, SPF). **Mato Grosso do Sul:** Rio Brilhante, Rodovia Campo Grande-Cuiabá, 15 May 1973, fl., *G. Hatschbach 31924* (F [image], MBM, NY [2 sheets, images]). Rio Verde de Mato Grosso, Fazenda Anhumas do Rio Negrinho, 10 June 1974, fl., *G. Martinelli 390* (RB, UFP).

28. *Waltheria mixta* T.S. Coutinho & M. Alves, *sp. nov.* Type:—BRAZIL. Goiás, Minaçu, 18 April 2001, fl., fr., *Pereira-Silva et al. 4977 [a]* (holotype: SP!). **Figure 15 M–R.**

Diagnosis:—Waltheria mixta resembles *W. operculata* but differs by branches with stellate, simple, 2–3-armed and glandular trichomes (vs. only simple), scarious stipules (vs. foliaceous), distylous flowers (vs. homostylous), and capsule with loculicide dehiscence (vs. operculate).

Subshrubs. Branches terete, pilose, trichomes stellate, sessile, 2–3-armed, and glandular long-stalked, and glandular sessile; bark glossy, lenticels not verrucose. Stipules 3.5–5 × 0.4–0.9 mm, narrowly triangular to linear, base truncate, margins ciliate, apex acute, pilose, adaxial surface with stellate, 2-armed, glandular sessile to stalked trichomes, abaxial with simple trichomes; veins 1. Leaves spirally arranged along branches; petioles 2.5–5 × 0.1 cm, terete, pilose; leaf blade conduplicate, chartaceous, concolorous, 9–12 × 3.2–3.4 cm, lanceolate, slightly lobate, base cordate to rounded, margins serrate, apex acute to rounded, adaxial surface

strigose, trichomes simple, 2-armed, stellate, and glandular sessile to stalked, abaxial surface scabrous, trichomes stellate, glandular sessile to stalked; basal veins 2 pairs, secondary veins 8–13 pairs. Inflorescences axillary along the branches, congested, long-pedunculate, many-flowered; peduncle 3.5–6.5 cm long, pilose. Flowers distylous; bracteoles 4, 4–4.2 × 0.9–2 mm, unequal in shape, distinct, narrowly elliptic to elliptic, apex acute, entire to 2–3-dentate apically, adaxial surface sericeous, trichomes simple, 2-armed and glandular long-stalked, abaxial surface sericeous, trichomes 2–3-armed, and glandular, densely ciliate with stellate trichomes; veins 3–5. Calyx 4.8−5 × 1.5−1.8 mm, campanulate, externally sericeous, trichomes stellate, sessile, internally glabrous, pilose on the lobes internally, trichomes stellate, sessile, lobes 1.5–2 × 0.8 mm, apex acuminate; vein 1 pair basal. Corolla yellow, petals adnate to the staminal tube for ca. 1 mm long, 4.5−5.2 × 1.5 mm, spatulate, glabrous, apex rounded, sparsely ciliate. Anthers 0.8–1.5 mm long, ovary 1–1.3 × 0.5–0.6 mm, style tomentose, stigma elongate-plumose. **Brevistilous flowers:** stamens 4.5–5.5 mm long, staminal tube 1.3–1.6 × 0.7 mm long, free filaments 2–3.2 mm long, gynoecium 2.5–2.6 mm long, style 0.5–0.8 mm long, tortuous basally, stigma 0.5–0.8 × 0.2 mm. **Longistylous flowers:** stamens ca. 2.8 mm long, staminal tube 1.8 × 0.6 mm long, free filaments absent, gynoecium ca. 4 mm long, style 2–2.2 mm long, tortuous basally, stigma ca. 1 × 0.5 mm. Capsule 1, 2.3−3 × 1.5−1.7 mm, obpyramidal, chartaceous at the apex, membranaceous below, apex truncate-rounded, sparsely sericeous apically, trichomes stellate, sessile, dehiscence partial; seed 1, ca. 2 × 1.1 mm, obovoid, blackish, glabrous, apex rounded, minutely crenulate apically.

Etimology:—Specific epithet refers to the different types of trichomes on the branches.

Distribution and habitat:—*Waltheria mixta* is known only from type locality, in Minaçu municipality, Goiás state (Fig. 16). It occurs in Cerrado areas, associated to the rocky outcrops.

Conservation status:—Deficient Data (DD). This species is known only by one collection.

Notes:—*Waltheria mixta* is distylous, and although it is known only from the type collection, we believe that more than one specimen was collected, since the holotype and duplicates have different types of flowers. Here, we designate as holotypus the specimen with brevistylous flowers deposited in SP herbarium.

Waltheria mixta recognized by its branches with different types of trichomes, stellate, simple, glandular long-stalked and 2-armed. It shares with *W. albicans* the branches with stellate and long-stalked glandular trichomes on the branches but differs by presence of simple and 2-armed trichomes (vs. absence), pilose branches (vs. tomentose), leaf blades strigose and scabrous adaxial and abaxial surfaces, respectively (vs. pubescent and pubescent to canescent) and petals 4.5–5.5 long with rounded apex (vs. 8–10 mm long and emarginate to truncate apex).

Additional specimens examined:—BRAZIL. Goiás, Minaçu, 18 April 2001, fl., fr., *G. Pereira-Silva et al. 4977 [b]* (CEN, SJRP).

29. *Waltheria petiolata* Schumann (1886: 61). **Lectotype (designated here):**— BRAZIL. unknown locality, s.d., *Pohl 1354* (K barcode K000380974 [image!]). [Remaining syntypes: *Glaziou 3874*]. **Figure 15 T–W.**

Shrubs, ca. 0.4 m tall. Branches terete, tomentose, trichomes stellate, and glandular, both sessile; bark slightly bright lustrous, lenticels sparse, not verrucose. Stipules 5–5.5 × 0.2–0.3 mm, linear, base truncate, margins sparsely ciliate, apex acuminate, tomentose, trichomes stellate, and glandular, subsessile, sparse only on abaxial surface; vein inconspicuous. Leaves distichally arranged along the branches; petiole 0.5–3.5 × 0.1 cm, subterete, not canaliculate, densely tomentose; leaf blade chartaceous, discolorous, 3–7.5 × 1.5–4 cm, ovate to lanceolate,

base rounded, cuneate or truncate, margins serrate, apex acute, adaxial surface pilose, trichomes stellate, sessile, abaxial surface canescent, trichomes stellate, sessile; basal veins 2 pairs, secondary veins 5–7 pairs. Inflorescences axillary along the branches, lax, pedunculate, few-flowered; peduncle 0.2–2.7 cm long, densely tomentose. Flowers distylous, sessile; bracteoles 3–4, 9–11 × 0.7–0.9 mm, distinct, narrowly elliptic to elliptic, long-ciliate, apex acute, entire apically, adaxial surface pubescent, trichomes stellate, sessile, abaxial surface pubescent, trichomes stellate, sessile; veins 1. Calyx 5.5–7 × 2.2–2.7 mm, campanulate, sericeous externally, trichomes stellate, sessile, glabrous internally, tomentose on the lobes, trichomes stellate, lobes 2.5–3.2 × 1–1.1 mm, apex acuminate; veins 3–4 pairs. Corolla yellow, adnate to staminal tube by ca. 0.5 mm long, petals ca. 4.2 × 1.5 mm, spatulate, adaxial surface villous, abaxial surface sparsely pilose, apex rounded, ciliate. Anthers ca. 1.1 mm long, ovary ca. 1.3 × 0.9 mm, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens ca. 4 mm long, staminal tube ca. 3 mm long, free filaments absent, gynoecium ca. 5.2 mm long, style ca. 3.5 mm long, geniculate basally, stigma ca. 1 × 1 mm long. **Longistylous form:** stamens ca. 4–4.5 mm long, staminal tube 3–3.5 mm long, free filaments absent, gynoecium 5–5.2 mm long, ovary 1.3 × 0.9 mm, style 3–3.5 mm long, geniculated, stigma ca. 1 × 1 mm long. Capsule 2.2–2.8 × 1.5–1.7 mm, obpyramidal, chartaceous at the apex, membranaceous below, apex truncate, sericeous apically, trichomes 2–3-armed, dehiscence partial; seed 2–2.1 × 1.3–1.4 mm, obovoid, brownish, glabrous, apex slightly crenulate.

Distribution and habitat:—Endemic to Brazil, *Waltheria petiolata* is known only Rio de Janeiro state (Southeast region) (Fig. 17), habiting areas of Atlantic forest and restinga, being associated also to rocky outcrops, between 250–315 m a.s.l.

Conservation status:—Critically Endangered (CR); B1b(i, ii, iiii), c(i, ii).

Notes:—*Waltheria petiolata* can be recognized by its tomentose branches, petioles

which can reach up 3.5 cm long, discolorous blade leaf with canescent abaxial surface and ovate to lanceolate, bracteoles 9–11 mm long, narrowly elliptic to elliptic and long-ciliate, and distylous flowers. It is similar to *W. indica* and has been misidentified in exsiccate labels sharing leaves shape (*W. indica* has high variability in shape; see comments in this species), fan-plumose stigmas, capsules with truncate apex. They are distinguished due *W. petiolata* has stipules with glandular sessile trichomes on adaxial surface (vs. only stellate), leaves with distichal arrangement (vs. spirally), lax inflorescences (vs. congested), distylous flowers (vs. homostylous), and bracteoles 9–11 mm long (vs. 3.5–5.2 mm long).

Additional Specimens Examined—BRAZIL.**—Rio de Janeiro:** Distrito Federal [Rio de Janeiro], Tijuca, February 1914, fl., *A. Lutz 693* (R); ibidem, Pedra da Gávea, 22 March 1931, fl., *A.C. Brade 11024* (R); Guanabara [Rio de Janeiro], matas da Barra da Tijuca, July 1972, fl., *C. Pereira & F.V. Agarez s.n.* (RFA 12738); Rio de Janeiro, Pedra Bonita, 17 February 1929, fl., *A.C. Brade 10544* (R!); Pão de Açúcar, 04 October 1959, fl., *J.P.P. Carauta 100* (R); Pedra do Itanhangá, December 1989, fl., *S.T. Meireles 23208* (UEC); Recreio dos Bandeirantes, 10 December 1998, fl.fr., *J.M.A. Braga 5107* (RB, UFP). s.l., s.d., fl., fr., *J.G. Kuhlman 666* (RB). S.l., in arenosis Brasilia ad Magé, s.d., fl., *G. Schüch s.n. D. no. 1374* (W [image]). S.l., s.d., fl., *G. Schüch s.n.* (W [image]).

30. *Waltheria polyantha* Schumann (1886: 60). **Lectotype (designated here):**—BRASIL. [Minas Gerais] *habitat in deciduous woods near or at Serra do Itambé,* s.d., *Sello 1938, 1437* (F neg. no. 9572 F 0BN009572, [image!]; isolectotype: F barcode F0073627F [image!]). [Remaining syntypes: *Martius s.n.*]. **Figure 15 X–Y.**

Shrubs, 1–4 m tall. Branches erect, terete, wooly, trichomes stellate, yellow, subsessile, and trichomes glandular, sessile; bark slightly glossy, lenticels present in old branches, hidden by

trichomes layer. Stipules 6.1−9 × 0.5−1 mm, linear to narrowly triangular, base truncate, margins ciliate, apex acute, adaxial surface sericeous or strigose, trichomes 2−3-armed, and glandular, sessile, abaxial surface glabrescent to strigose, trichomes short stellate, and glandular, sessile; vein 1, inconspicuous. Leaves spirally arranged along the branches; petioles 0.4−1.5 cm long, canaliculate, terete, densely wooly, trichomes stellate and glandular; leaf blades 1.5−7.5 × 1.7−5.5 cm, chartaceous, concolorous to discolorous, ovate to widely ovate, base slightly cordate to cordate, rarely truncate, apex acute, rarely rounded, margin serrate, adaxial surface scabrous, trichomes stellate and glandular, both sessile, abaxial surface densely wooly or scabrous, trichomes stellate; basal veins 2 pairs, secondary veins 6−9 pairs. Inflorescences terminal or subterminal, congested to little lax, pedunculate; peduncle 0.3−3.4 cm long, wooly. Flowers distylous, sessile; bracteoles 3−5, 5−5.5 × 0.3−1 mm, lanceolate to narrowly elliptic, apex acute, entire, adaxial surface sericeous, trichomes stellate and glandular, both sessile, abaxial surface strigose, trichomes stellate, sessile; 1−3-nerved, conspicuous. Calyx 5−6 × 2.2−3 mm, campanulate, externally sericeous to hirsute, trichomes stellate, sessile, and 2-armed, internally glabrous, densely tomentose on the lobes, trichomes stellate, lobes 1.5−2.5 × 1−1.3 mm, margins ciliate, apex acute to acuminate; veins 1−2 pairs, inconspicuous. Corolla yellow, petals adnate to the staminal tube by 0.5 mm long, 2.7−2.9 × 1.1 mm, spatulate, adaxial surface densely pilose medially, abaxial surface glabrous, apex rounded, ciliate. Anthers 1–1.5 mm long, ovary 1.2−1.8 × 1.1 mm, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens 5−5.3 mm long, staminal tube 2−2.8 × 1 mm, free filaments 2.1−2.5 mm long, gynoecium 3.2−3.4 mm long, style 1.5−1.7 mm long, stigmas 1 × 1 mm. **Longistylous form:** stamens 4.2−5.1 mm long, staminal tube 3.2−4.2 mm long, free filaments absent, gynoecium 5.2−7.2 mm long, style 3.8−5 mm long, stigmas 0.9−1 × 1 mm. Capsule 2.5−3 × 1.8−2 mm, obpyramidal, chartaceous at the apex, membranaceous below, apex truncate, sericeous apically,

trichomes 2−3-armed and stellate, sessile, dehiscence partial; seed 2−2.3 × 1.2−1.5 mm, obovoid, brownish, glabrous, apex rounded, slightly crenulate.

Distribution and habitat:—*Waltheria polyantha* is a micro endemic species, known only to the Minas Gerais state (Southeast region) (fig. 17), occurring along to Serra do Cipó, in areas of Cerrado (and campos rupestres), in altitude varying between 1309–1500 m a.s.l.

Conservation status:—Endangered (EN); B1a, b (i, ii, iv).

Notes:—*Waltheria polyantha* can be confused with *W. ackermanniana*, by which it is easily distinguished by terminal inflorescences (vs. axillary). In many exsiccate labels the *W. polyantha* name has been adopted to determinate specimens of *W. matogrossensis*. These species have several different morphological characteristics, among them are the stellate and glandular trichomes on the branches in *W. polyantha* (vs. multiradiate in *W. matogrossensis*), terminal inflorescences (vs. axillary), fan-plumose stigmas (vs. elongate-plumose), and obpyramidal capsule with truncate apex (vs. obovoid with rounded apex). Besides, they are allopatric with *W. polyantha* limited only to the Southeast region as already pointed out in Coutinho & Alves (2020) and *W. matogrossensis* in Midwest region.

Additional specimens examined—BRAZIL. **Minas Gerais:** Conceição do Mato Dentro, Cava do Sapo, February 2012, fl., *J.A.M. Paiva s.n.* (BHCB 156226); *ibidem*, (BHCB 156222); *ibidem*, fl., *L.B. Carvalho s.n.* (MBM 156166); *ibidem*, Serra do Sapo (Gondó), 20 November 2013, fl., *S.N. Moreira & E. Pereira 551* (HDJF [image]); *ibidem*, Cava Sul – Anglo American, 13 January 2016, *S.N. Moreira & E. Pereira 1849* (HDJF [image]); *ibidem*, Parque Estadual da Serra do Intendente, 8 July 2015, fl., fr., *S.N. Moreira 1784 et al.* (BHCB); *ibidem*, 24 May 2017, fl., *A.S. Quaresma 782* (BHCB). Santana do Riacho, ao longo da rodovia Belo Horizonte/Conceição do Mato Dentro, 18 August 1978, fl., *A.M. Giulietti et al. CFSC 5631* (SP); *ibidem*, Serra do Cipó, 25 April 1978, fl., *G. Martinelli 4284* (RB); *ibidem*, Serra do Cipó,

22 May 1982, fl., *H.P. Bautista 619* (RB). s.l., Morro do Pilar, 11 July 2016, fl., *J.E.Q. Faria et al. 6252* (HDJF [image], SP, UB [not found]); *ibidem*, *J.E.Q. Faria et al. 6260* (HDJF [image]). S.l., s.d., fl., *J.B.E. Pohl 3447 D. no. 1328* (W [image]).

31. *Waltheria rotundifolia* Schrank (1828: 65–66). **Lectotype (designated here):**—BRAZIL. Caldário, *Martius s.n.* (M M0209849 [image!]; isolectotype: M M0209847 and M0209848 [images!]). Non *W. rotundifolia* Presley (1836: 151). **Figure 18 A–D.**

= *Waltheria pohliana* Schumann (1886: 62). **Lectotype (designated here):—**BRAZIL. *Serras Gonzalves*, s.d., *Pohl 2935 Diar. no. 1337* (K p.p. K000380970 [image!]; isolectotypes: F. neg. no. 9571 F0BN009571 [image!], F F0073628F [image!], W W0071731 [image!].). *syn. nov.* [Excluded syntype: *Regnell III 274 = W. communis*].

Subshrubs, 0.4–2 m tall. Branches terete, densely canescent, trichomes stellate, sessile, yellow; bark striate, lentils absent. Stipules 4–8 × 1–1.2 mm, narrowly triangular, base truncate, margins ciliate, apex acute, adaxial surface canescent, trichomes stellate, glandular, both sessile, abaxial surface pubescent, trichomes stellate, and minute glandular. Leaves spirally arranged along the branches; petiole 0.3–2.5 × 0.1 cm, terete, canaliculate, densely canescent, trichomes stellate, sessile; leaf blades chartaceous, concolorous, 1.2–6 × 1.2–5.5 cm, circular, elliptic to widely elliptic, ovate to very widely ovate, base cuneate to rounded or subcordate, margins serrate to 0.4–0.9 cm from the base, apex rounded to acute, both the surfaces tomentose to canescent, trichomes stellate, sessile; basal veins 2 pairs, secondary veins 6–7 pairs. Inflorescence axillary along the branches, glomeruliform, sessile to short-pedunculate, many-flowered; peduncle 0.3–1(–2–3.5) cm long, densely tomentose. Flowers distylous, sessile; bracteoles 4, 3–3.5 × 0.7–1.5 mm, linear to lanceolate, distinct, apex acute, entire apically, adaxial surface sparsely pilose, trichomes stellate, sessile, and glandular, subsessile, abaxial surface pubescent, trichomes

stellate, sessile, and glandular, subsessile; veins 1–3, conspicuous. Calyx 4–4.5 × 1.5–1.8 mm, campanulate, hirsute externally, trichomes stellate, sessile, and glandular, subsessile, concentered on the lobes, glabrescent to glabrous internally, hirsute on the lobes, trichomes stellate, lobes 2–2.4 × 0.5–0.8 mm, margins ciliate, apex acute; veins 2–3 pairs, inconspicuous. Corolla gold yellow, petals adnate to the staminal tube for ca. 0.3 mm long, 3.2−4.5 × 1.3–1.5 mm, spatulate, adaxial surface sparsely pilose medially, abaxial glabrous, apex rounded, ciliate. Anthers 1–1.2 mm long, ovary 0.8−1.1 × 0.5−0.8 mm, stigma fan-plumose. **Brevistylous form:** stamens ca. 3.8 mm long, staminal tube 1.7 × 0.7 mm, free filaments 1.5 mm long, gynoecium ca. 3 mm long, style ca. 1.2 mm long, tomentose, geniculate basally, stigma ca. 1 × 1 mm. **Longistylous form:** stamens 3−3.2 mm long, staminal tube 2.1−2.3 × 0.9 mm long, free filaments absent, gynoecium 5.1–5.5 mm long, style 3.5−3.6 mm long, tortuous basally, glabrous, sparsely pubescent apically, stigma ca. 1 × 1 mm. Capsule 2.2−2.3 × 1.5−1.9 mm, obpyramidal, chartaceous at the apex, membranaceous below, apex truncate, tomentose only apically, trichomes stellate, sessile, dehiscence totally loculicidal or 2-valvate; seed 1, ca. 1.4 × 0.9−1 mm, obovoid, brown, glabrous, apex rounded, smooth.

Distribution and habitat:—Occurs in Mexico, Guatemala and Brazil (Saunders 1993). In Brazil, *Waltheria rotundifolia* is restricted to the Northeast (Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Piauí, Rio Grande do Norte and Sergipe) region (Fig. 17), habiting preferably areas of Caatinga, but with few occurrences records also in Atlantic Forest, under altitudes varying between 14–800 m a.s.l. Schumann (1886) cited *Glaziou 10320* from Rio de Janeiro state, however, this voucher was not found to check this occurrence.

Conservation status:—Least Concern (LC).

Notes:—Schumann (1886) described *Waltheria pohliana* based on *Pohl 1337* (unknown location) and *Regnell III 274* (São Paulo). Saunders (1995) suggested *Pohl 2935*

(Diary no. 1337) deposited in W herbarium as a lectotype, however, we prefer to choose the sample K000380970 for having a handwriting "sp. nov." probably by Schumann, besides it is a well-preserved flowering branches.

Waltheria rotundifolia is characterized mainly by canescent and grayish branches and leaves, axillary and congested inflorescences, bracteoles shorter than the calyx, and capsule com dehiscence totally loculicide. Although this species has its name in reference to the rounded shape of its leaf blades, they exhibit great variability in shape. Its inflorescences are usually sessile, however, it is not uncommon to find reaching more than 1 cm long.

Waltheria rotundifolia is more similar to *W. vernonioides*, and they can be easily confused because they share the same indumentum type of branches and leaves, position and arrangement of inflorescences, distylous flowers, fan-plumose stigmas and capsules with totally loculicidal dehiscence, but differs by linear to lanceolate bracteoles in *W. rotundifolia* (vs. narrowly elliptic to ovate), completely yellow petal on both types of flowers (vs. reddish-yellow at the base of the adaxial surface in brevistylous flowers), and capsule with tomentose apex (vs. pilose). In addition, these specimens are sympatric only Bahia state, where *W. rotundifolia* is more widely represented, and *W. vernonioides* is known for few specimens.

Many specimens of *Waltheria rotundifolia* has been misidentified as *W. indica*, and they are easily confused because share branches and leaves indument (due *W. indica* presents high variability in many characters), position and arrangement of the inflorescences, fan-plumose stigmas, petals with ciliate apex, and capsule with truncate apex, however, *W. rotundifolia* has only stellate trichomes on the branches (vs. stellate and glandular long-stalked in some specimens), bracteoles shorter than calyx (vs. same size or longer), distylous flowers (vs. homostylous), and capsule with tomentose apex and totally loculicide dehiscence (vs. sericeous and partially).

Waltheria rotundifolia seems to be the target of some type of pathogen that delays the

development of the leaves, and promotes the abnormal growth of inflorescences, making them very elongated and lax. With the development of this structure, the flowers become pedicellate (reaching up to 3 mm in length), the bracteoles seem to be restricted to one per flower (in some cases), the larger chalice and the gynoecium of those most affected flowers, with the ovary stretching but never forming fruit. This phenomenon was observed in *Chagas & Mota 2153* and *Santos et al. 6* (both at MAC). This condition was found also in one specimen of *W. albicans* (*P. Campos Porto 2448*, RB). Thulin (1999) described *W. laxa* Thulin based on a specimen of *W. indica* from Somália with the same condition but unknown by him. Verdoorn (1981) in *Waltheria* in southern Africa noted that some specimens had an abnormal condition, and claimed that it could be an injury caused by insects.

Vernacular names:—Alagoas (erva-de-besta), Bahia (malva), Ceará (malva-amarela, malva-branca, malva-brava, malva-preta, malva-roxa), Pernambuco (malva, malva-branca, papaconha), Piauí (malva), Rio Grande do Norte (malva, malva-preta, malva-de-veludo) and Sergipe (malva, vassourinha-dourada).

Selected specimens examined:—BRAZIL.—**Alagoas:** Água Branca, Refúgio da Vida Silvestre Morros do Craunã e do Padre, 30 August 2013, fl., fr., *M.C.S. Mota et al. 12031* (MAC). **Bahia:** Juazeiro, Univasf, 19 April 2007, fl., *D.D. Agra et al. 4* (HVASF). Ibirapitanga, plantação de cacau, 11 March 1966, fl., fr., *R. Pinheiro 93* (UB). **Ceará:** Crateús, Reserva Particular do Patrimônio Natural Serra das Almas, 22 February 2000, fl., *L.W. Lima-Verde s.n.* (EAC35260). **Paraíba:** Araruna, Parque Estadual Pedra da Boca, 13 November 2012, fl., *D.G. Oliveira 659* (HVASF). Itabaiana, July 1928, *B. Pickel 1752* (IPA). **Pernambuco:** Belo Jardim, entrada da cidade, 24 March 2018, fl., fr., *T.S. Coutinho et al. 340, 341* (UFP, RB). **Piauí:** Queimada Nova, cabeceira do Açude do Roque, 19 June 2013, fl., *J.A. Siqueira-Filho et al. 2947* (HVASF). **Rio Grande do Norte:** Jucurutu, Reserva Particular do Patrimônio Natural Stoessel de Brito, 01 March 2008, fl., *A.A. Roque 453* (HUVA, RN, UFRN). Nísia Floresta,

Sítio Currais, 25 October 2002, fl., fr., *R.T. Queiroz 56* (HUVA, UFRN). Serra Negra do Norte, Estação Ecológica do Seridó, 6 June 2019, fl., fr., *T.S. Coutinho et al. 421, 422* (UFP, UFRN). **Sergipe:** Porto da Folha, Povoado Lagoa Grande, 31 August 2011, fl., *D.G. Oliveira et al. 305* (ASE [image], MAC).

32. *Waltheria saundersiae* T.S. Coutinho & M. Alves (2019: 681−685). Type:—BRAZIL. Bahia: Morro do Chapéu, Rio Ferro Doido, 11°37'34"S, 41°00'14"W, 898 m, 01 September 2017, fl., fr., *Coutinho & Alves 238* (holotype: UFP!; isotypes: HUEFS!, RB!). **Figure 18 E.**

Shrubs, 1.50−1.60 m tall. Branches flexuous to erect, terete, becoming flat toward apex, strigose, trichomes stellate, yellow, sessile, trichomes glandular, sessile; bark not lenticellate. Stipules 4−5 × 0.8 mm, narrowly triangular, base truncate, margins ciliate, apex acute, adaxial surface sparsely strigose, trichomes stellate and glandular, both sessile, abaxial surface glabrescent, trichomes 2−3-fid and glandular. Leaves spirally arranged along the branches; petioles 0.3−0.5 cm long, canaliculate, compressed, scabrous, trichomes stellate and glandular; leaf blades 1.5−3 × 1.7−3.5 cm, chartaceous, circular, oblate to transversely elliptical, base truncate to obscurely cordate, margin irregularly serrate from 0.4−1 cm above the base, apex retuse to truncate, strigose, trichomes sessile, stellate, ray appressed, glandular; basal veins 2 pairs, secondary veins 4−5 pairs. Inflorescences axillary along the branches, congested, sessile to pedunculate; peduncle 1.2−4.6 cm long, scabrous to hispid. Flowers distylous, sessile, 7.5−8 mm long; bracteoles 3−4, 9−11 × 0.9−3 mm, narrowly elliptical, apex acute, entire to 2-dentate apically, adaxial surface sericeous, abaxial surface strigose, hirsute on veins, stellate trichomes; veins 1−4, conspicuous. Calyx 6.5−8.5 × 3.5−4 mm, campanulate, strigose externally, scabrous to hirsute along the vein, trichomes sessile, stellate, glandular and 2−3-armed, glabrous internally, tomentose on the lobes, trichomes simple and 2−3-armed, lobes 2.6−4 × 1.4−2 mm,

apex acuminate; vein 3−4 pairs, conspicuous. Corolla bright yellow, adnate to the staminal tube by ca. 1 mm long, petals 6.8−8 × 2.6−2.8 mm, spatulate, adaxial surface villous medially, trichomes simple, abaxial surface glabrous, apex rounded, ciliate. Anthers ca. 1.5 mm long, ovary 1−1.6 × 0.8 mm, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens ca. 8 mm long, staminal tube 3.7−4 mm long, free filaments ca. 3.4 mm long, gynoecium ca. 6.5 mm long, ovary 1.6 × 1.2 mm, style ca. 4.6 mm long, stigma ca. 1.8 × 1.5 mm. **Longistylous form:** stamens ca. 4.5 mm long, staminal tube ca. 3.3 mm long, free filaments absent, gynoecium ca. 8 mm long, style ca. 5 mm long, stigma ca. 1.1 × 1 mm long. Capsule ca. 4 × 2.5 mm, obpyramidal, membranaceous, apex truncate, hirsute apically, trichomes 2−3-fid, stellate, dehiscence partial; seed 1, 3.2 × 2 mm, obovoid, brownish, glabrous, apex crenulate.

Distribution and habitat:—Occurring only in Brazil, *Waltheria saundersiae* is a micro endemic species, restricted to the Bahia state (Northeast region), in areas of campo rupestre along Rio Ferro Doido, in Morro do Chapéu municipality (fig. 17), under altitudes 900–1000 m a.s.l.

Conservation status:—Critically Endangered (CR); B2ab(iii).

Notes:—*Waltheria saundersiae* is similar to *W. cinerascens*, both growing in Campos Rupestres and sharing strigose branches, distylous flowers and fan-plumose stigmas, however, they can be easily separated by axillary inflorescences in *W. saundersiae* (vs. terminal), and narrowly elliptic bracteoles (vs. linear to lanceolate or obovate). It *also* resembles *W. maritima*, but it differs especially by axillary inflorescences (vs. terminal), distylous flowers (vs. homostylous), and by geographic distribution since *W. maritima* occurs only Espírito Santo and Rio de Janeiro states.

Additional specimens examined:—BRAZIL.**—Bahia:** Morro do Chapéu, Cachoeira do Ferro Doido, 23 May 2008, fl., *N. Roque 1778 & alunos de botânica III* (ALCB [image]);

vizinhança da ponte sobre Rio Ferro Doido, 17 June 1981, fl., fr., *S.A. Mori & B.M. Boom s.n.* (RB 14494); Rio Ferro Doido, 1 September 2017, fl., fr., *T. S. Coutinho & M. Alves 236* (UFP); s.d., fl., *N. Roque 1115 & alunos de botânica III* (ALCB [image]).

33. *Waltheria selloana* Schumann (1886: 53). Type:—BRAZIL. Bahia: s.l., entre Vitoria e Bahia, s.d., *Sello 188* (holotype: B† destroyed; **lectotype designated here**):—Tabula nostra XVIII, fig. I., pag. 13, *Flora Brasiliensis*). **Figure 18 F.**

Subshrubs, 0.3–1.5 m tall. Branches terete from the base to the apex, canescent, trichomes stellate, sessile, yellowish; bark striate, lenticels not verrucose, sparse. Stipules 2.5–5 × 0.2 mm, linear, base truncate, margins ciliate, apex acute to acuminate, adaxial surface with simple, 2-armed and glandular sessile trichomes, abaxial with stellate trichomes; vein inconspicuous. Leaves spirally arranged along the branches; petiole 0.2–0.3 × 0.01–0.09 cm, terete, slightly canaliculate, densely canescent; leaf blade chartaceous, discolorous, 0.7–1.7(–3) × 0.4–1.5(–3) cm, obovate, elliptic or transversely elliptic to circular, base rounded to slightly cordate, margins dentate ca. 0.7 cm above the base, apex acute, rounded to truncate, dentate apically, canescent, trichomes stellate, sessile; basal veins 2 pairs, secondary 3–4 pairs, tertiary veins conspicuous. Inflorescences terminal, glomeruliform, sessile to short-pedunculate, many-flowered; peduncle ca. 0.4 cm long, densely canescent. Flowers distylous, sessile; bracteoles 3–5, 5–6 × 0.2–0.5 mm, distinct, linear or narrowly elliptic, apex acute to acuminate, entire apically, adaxial surface sericeous, trichomes stellate, sessile, abaxial surface densely sericeous, trichomes stellate, densely long-ciliate, trichomes stellate, sessile; veins 1–2, inconspicuous. Calyx 4.1−5 × 2.1 mm, tubular-campanulate, sericeous externally, trichomes stellate, sessile, glabrous internally, pilose on the lobes, trichomes stellate, sessile, lobes 1.2–1.8 × 0.8–1 mm, apex acuminate; veins absent. Corolla yellow, petals adnate to the staminal tube for ca. 0.4 mm,

4.2−4.8 × 1.2−1.8 mm, spatulate, adaxial surface pilose, abaxial surface glabrous, apex emarginate to rounded, sparsely ciliate. Anthers 1.1–1.3 mm long, ovary 1−1.3 × 0.7−0.9 mm, style tomentose, stigma fan-plumose. **Brevistylous form:** stamens 5−5.5 mm long, staminal tube 2−2.2 × 0.8−1 mm, free filaments 2.5−3 mm long, gynoecium 3−3.3 mm long, style 1.5−2 mm long, geniculate basally, stigma ca. 1 × 0.9 mm. **Longistylous form:** stamens 3.1−3.2 mm long, staminal tube 2.3−2.5 × 0.8 mm long, free filaments absent, gynoecium ca. 4 mm long, style 4.3−4.4 mm long, stigma ca. 1 × 1 mm. Capsule 1, 1.8−2 × 1.4 mm, obovoid, chartaceous at the apex, membranaceous below, apex truncate-rounded, sericeous apically, trichomes stellate and 2−3-armed, sessile, dehiscence partial; seed 1, ca. 1.3 × 0.8 mm, obovoid, brown, glabrous, apex rounded, smooth.

Distribution and habitat:—Endemic to Brazil, *Waltheria selloana* is known only Bahia state (Northeast region) (fig. 19), habiting areas of Cerrado (campos rupestre) and Atlantic Forest (restinga), at 50−1850 m a.s.l.

Conservation status:—Least Concern (LC).

Notes:—*Waltheria selloana* is one of the easiest species to be recognized due to its discolorous, densely canescent and the smallest leaf blades 0.7–1.7 × 0.4–1.5 among the Brazilian species of the genus, with the exception of a specimen that can reach 3 × 3 cm (*R.M. Harley et al. 20132*; CTES), and terminal inflorescences.

Selected Specimens Examined—BRAZIL.**—Bahia:** Maraú, 18 May 1995, fl., *G. Martinelli et al. 11068* (CEPEC [not seen], SI [not found], RB, UFP). Mucugê, Parque Nacional da Chapada Diamantina, 19 June 2005, fl., *A.A. Conceição & D. Cardoso 1388* (CTES, HUEFS [image]). Prado, km 15-25 da rodovia para Itamaraju, 12 August 1995, fl., *G. Hatschbach et al. 63054* (BHCB, CTES, ESA, MBM, NY [image], SPF). Porto Seguro, Parque Nacional Monte Pascoal, 18 July 1997, fl., *W.W. Thomas et al. 11663* (NY [image]). Rio de Contas, serra do

Rio de Contas, 28 March 1977, fl., *R.M. Harley et al. 20132* (CTES).

34. ***Waltheria terminans*** J.G. Saunders ex T.S. Coutinho & Colli-Silva (2020b: 456). Type:—BRAZIL. Minas Gerais: Joaquim Felício, Serra do Cabral, Bocaina, 23 November 1984, *Mamede, Giulietti, Harley & Stannard CFCR 6381 [erroneously cited s.n.]* (holotype: SPF 35981!; isotypes: K K1217181 and 1217182 [images]!, UFP 86645!). **Figure 18 G.**

Shrubs, 0.7–3.0 m tall. Branches erect, terete, flat upward at apex, scabrous, trichomes multiradiate, stalked, yellowish; bark not rugose, lenticels on older branches. Stipules 7–9 × 0.6 mm, linear, base truncate, margins eciliate, apex acute, scabrous, trichomes multiradiate, sessile; veins 1, inconspicuous. Leaves spirally arranged throughout the branches; petiole 0.2–0.3 × 0.2 cm, angular, not canaliculate, canescent; leaf blade chartaceous, discolorous, 1.6–2.6 × 0.9–1.4 cm, elliptic to oblong-elliptic or lanceolate, base rounded to subcordate, margin finely serrate, apex acute, rarely rounded, scabrous, trichomes stellate; basal veins 2 pairs, secondary veins 7–8 pairs. Inflorescences axillary in terminal portions of the branches, pedunculate, congested, few-flowered; peduncle 0.5–1.0 cm long, scabrous. Flowers distylous, sessile; bracteoles 4, 7–10.5 × 2.1–4 mm, distinct or fused by 0.4–2.0 mm long basally, oblanceolate to widely obovate, apex acute to rounded, entire to 2–3-dentate apically, adaxial surface pubescent, trichomes stellate and sessile, abaxial surface scabrous, trichomes multiradiate and short-stalked; veins 6−7. Calyx 5−7 × 1.8−3.1 mm, tubular-campanulate, scabrous externally, trichomes multiradiate, sessile, glabrous internally, tomentose on the lobes, lobes up to c. 2.2 × 1 mm, apex acuminate; veins absent. Corolla yellow, petals adnate to the staminal tube by 0.4–0.8 mm long, 5.5–6.5 × 1.8–2.0 mm, spatulate, glabrous, apex rounded, eciliate. Anthers 1.4–1.5 mm long, ovary 1.2−1.8 × 0.9 mm, style tomentose, stigma linear. **Brevistylous form:** stamens 6.2−6.5 mm long, staminal tube 2−2.5 × 1 mm, free filaments 3.2−3.5 mm long,

gynoecium 4.3−5.5 mm long, style 2.5−3.5 mm long, tortuous near the apex, stigma 0.6−0.8 × 0.1 mm. **Longistylous form:** stamens 4.2−5.0 mm long, staminal tube 2.2−2.8 × 1.0 mm long, free filaments ca. 0.8−1 mm long, gynoecium 5−6 mm long, style 3−4.3 mm long, stigma ca. 0.8 × 0.1 mm. Capsule ca. 3.3 × 1.8 mm, obpyramidal, chartaceous at the apex, membranous below, apex truncate-rounded, hirsute entire, trichomes stellate, more centered on the apex, dehiscence partial; seed 1, ca. 2 × 1.2 mm, obovoid, dark brown, glabrous, apex rounded, crenulate.

Distribution and habitat:—Endemic to Brazil, *Waltheria terminans* is known and micro endemic to the Minas Gerais state (Southeast region) (Fig. 19), habiting areas of campos rupestres in elevations varying between 1100–1300 m a.s.l.

Conservation status:—Vulnerable (VU).

Notes:—*Waltheria terminans* is quickly recognized among *Waltheria* species by it is the only species with axillary inflorescences in terminal portion of the branches which are covered by with multiradiate trichomes. In Diamantina, this species is sympatric with *W. biribiriensis*, *W. ferruginea* and *W. hatschbachii*, but it differs of them specially by inflorescences in terminal portions (vs. axillary).

***Additional Specimens Examined*—**BRAZIL**—Minas Gerais:** Buenópolis, Cachoeira de Curimataí, 14 November 2010, *E. Barbosa et al. 2906* (MBM); Joaquim Felício, Bocaína, 22 November 1984, *B. Stannard et al. s.n.* (K barcode K001217140 [image], SPF 35919); Serra do Cabral, 18 January 1996, *G. Hatschbach et al. 64342* (MBM); Diamantina, 20-26 km WSW de Diamantina, 18 May 1990, *M.M. Arbo et al. 4380* (SPF); *ibid.*, 02 April 1992, *P. Schwake 8333* (RB); 8 km NE Diamantina, caminho a Mendanha, 14 February 1991, *M.M. Arbo 5086 et al.* (CTES, SPF). Lassance, Serra do Cabral, 24 March 2000, *J.R. Pirani et al. 4634* (SPF).

35. *Waltheria vernonioides* Fries (1908: 13). Type:—BRAZIL. Mato Grosso: Cuiabá, *in dumetis subhumidis solo argillaceo*, 27 April 1903, fl., fr., *Malme 3161* (holotype: S S-R-7494 [image!]; isotype: S S13-3153 [image!]). **Figure 18 H–I.**

Shrubs erect, 0.7−1.3 m tall. Branches erect, terete, canescent, rarely pubescent, trichomes stellate, white to bright yellow, sessile to subsessile, and trichomes glandular, sessile; bark inconspicuously lenticellate. Stipules 2.5−3 × 0.5−0.8 mm, narrowly triangular, base truncate, margins sparsely ciliate, apex acute, adaxial surface sericeous, trichomes 2−3-armed, short stellate ca. 0.3 mm and glandular, abaxial surface sparsely pilose, trichomes stellate, 2−3-rad, and sessile glandular; vein 1, conspicuous. Leaves spirally arranged along the branches; petioles 0.2−0.7 cm long, canaliculate, terete, canescent, trichomes stellate and glandular; leaf blades 1.7−4.2 × 0.2−1.2 cm, chartaceous, concolorous, occasionally conduplicate, linear, oblanceolate, rarely elliptical, base cuneate, apex acute to rounded, margins serrate ca. 0.7 cm up the base, pilose or canescent, stellate; basal veins 2 pairs, secondary veins 5−6 pairs. Inflorescences axillary along the branches, glomeruliform, sessile to subsessile, many-flowered; peduncle 0.1–1 cm long, pubescent. Flowers distylous, sessile; bracteoles 2.4–4 × 0.9–2 mm, unequal in shape, distinct, narrowly elliptic to ovate, margins densely ciliate, apex acute, entire, adaxial surface glabrous to sparsely pilose, trichomes simple, abaxial surface sparsely pubescent, trichomes stellate, 2−3-armed; veins 3−4, conspicuous. Calyx 4.3−4.5 × 1.5 mm, campanulate, sericeous externally, trichomes 2-armed, sessile, stellate, and glandular, sessile, glabrous internally, pilose on the lobes, trichomes simple and 2-armed, lobes 2−2.1 × 1−1.1 mm, apex acuminate; veins absent or 1−2 pairs, inconspicuous. Corolla yellow, but reddish-yellow adaxially in brevistylous flowers, petals adnate to the staminal tube by 0.3 mm long, 3–3.8 × 1.1–1.2 mm, spatulate, adaxial surface pilose, trichomes simple, abaxial surface glabrous, apex rounded, ciliate. Anthers ca. 1 mm long, ovary 1−1.1 × 0.9 mm, stigma fan-

plumose. **Brevistylous form:** stamens 4 mm long, staminal tube 2.1 × 0.9 mm, free filaments 1.3 mm long, gynoecium 3 mm long, style 1.2 mm long, tomentose, tortuous near the apex, stigma 1 × 1 mm. **Longistylous form:** stamens 3 mm long, staminal tube 2.5 × 1 mm long, free filaments absent, gynoecium 4−4.1 mm long, style ca. 3 mm long, glabrous, stigma ca. 1 × 1 mm. Capsule 2.3 × 2.1 mm, obpyramidal, totally chartaceous, apex truncate, pilose apically, trichomes stellate, dehiscence total or 2-valvate; seed 1, ca. 2.1 × 1.3 mm, obovoid, brown, glabrous, apex rounded, crenulate.

Distribution and habitat:—Endemic to Brazil, *Waltheria vernonioides* is known from North (Tocantins), Northeast (Bahia) and Midwest (Goiás and Mato Grosso) regions (Fig. 19), growing in Cerrado, and can be associated to rocky environments, at 349−1000 m a.s.l.

Conservation status:—Endangered (EN); B2b (ii, iv, v), c(ii, iv).

Notes:—*Waltheria vernonioides* is similar to *Waltheria rotundifolia*, however, they can be morphologically separated by characters mentioned previously.

Additional specimens examined:—BRAZIL**—Bahia:** Barreiras, 3 km E de Barreiras, 18 March 1982, fl., fr., *A. Krapovickas et al. 37873* (CEN, CTES, MO [not seen]); ibidem, Ibotirama, 17 May 1982, fl., fr., *A. Fernandes & Matos s.n.* (CTES 271342, EAC 11354). s.l., 10 km N de Barreiras, 12 March 1979, fl., *G. Hatschbach 42102* (BHCB, CEPEC [not seen], CTES, ESA, MBM). **Goiás:** Monte Alegre de Goiás, 9 May 2000, fl., *G. Hatschbach et al. 70774* (CTES, MBM). s.l., Parque Nacional da Chapada dos Veadeiros, 17 March 1969, fl., *H.S. Irwin et al. 24618* (CTES, MO [not seen], UB). **Tocantins:** Arraias, rodovia Arraias-Paranã, 12 February 1994, fl., *G. Hatschbach et al. 60463* (ASU [not seen], CTES, MBM, SPF). Conceição do Tocantins, Fazenda São José, 11 May 2000, fl., *G. Hatschbach et al. 70889* (CTES [2 sheets], MBM). Paranã, terceira parada após a ponte do rio São Domingos, 28 March 2004, fl., *A.C. Sevilha et al. 3901* (CEN). s.l., 3 km SW of Monte Alegre de Tocantins on road

to Brasilia, 22 February 1990, fl., *J.G. Saunders et al. 3005* (CTES). **Mato Grosso:** Cuiabá, Coxipó da Ponte, April 1911, fl., *F.C. Hoehne 2976* (R, SP).

36. *Waltheria viscosissima* Saint-Hilaire **(**1825: 150). Type:—BRAZIL. Minas Novas [Minas Gerais]: crescit prope presidiorum vulgo *Quartel de Texeira, in sylvis vulgo Caatingas quo quotannis folia demittunt*, May-June, fl., *Saint-Hilaire 1452* (holotype: P; isotype: F fragm., MPU, P). **Figure 18 J–K.**

= *Waltheria machrisiana* Smith (1958: 10). Type:—BRAZIL. Goiás: forest gallery along stream, 17 km east of Formoso, region of the southern Serra Dourada, 13°45'S, 48°50' W, 19 May 1956, fl., *Yale Dawson 14974* (holotype: R R000104986!; isotypes: MO [not found], RSA RSA0006326 [image!], US US00479028 [image!]).

= *Waltheria mollis* Willdenow ex Schumann (1886: 53). *nom. nud.*

= *Waltheria tubiflora* Klotzsch (1840: 300). Type:—BRAZIL. Bahia: Ilheos [Ilhéus], 12 June 1837, *Luschnath s.n.* (holotype: HAL HAL002035 [image!]; isotype: HAL HAL0071739 [image!]). *nom. invalid.*

Shrubs, 0.4–2 m tall. Branches hirsute, trichomes predominant glandular, long-stalked, and stellate, sessile; bark sticky, lenticel absent. Stipules 4.5–5 × 0.7–1 mm, linear to narrowly triangular, base truncate, margins long-ciliate, apex acute, adaxial surface glabrescent, trichomes 2-armed, stellate, sessile, and glandular, long-stalked, abaxial pubescent, trichomes 2-armed; veins 1–3, conspicuous. Leaves spirally arranged along the branches; petioles 0.4–5 × 0.1 cm, hirsute, trichomes stellate, sessile, glandular, long-stalked; leaf blades chartaceous, discolorous, 3–11 × 1.5–8.5, ovate to lanceolate, base truncate to cordate, margins serrate, apex acuminate, adaxial surface pubescent to tomentose, trichomes stellate, sessile, glandular, long-talked, and simple, or rarely only simple, abaxial surface canescent, trichomes similar; basal

veins 2 pairs, secondary veins 7–12 pairs. Inflorescences axillary, congested, pedunculate, many-flowered; peduncle 0.3–10.5 cm long, hirsute. Flowers sessile to short-pedicellate; pedicels 0.2–2 mm long; bracteoles 4.5–6.5 × 0.5–0.8 mm, equal in shape, distinct, lanceolate to narrowly elliptic, margins densely ciliate, apex acute, entire, adaxial surface glabrescent, trichomes stellate, abaxial surface pilose, trichomes stellate, simple and glandular, long-stalked; veins 1–3, conspicuous. Calyx 5.2−7 × 1.8 mm, campanulate, densely sericeous externally, trichomes stellate, 2-armed sessile, and glandular, long-stalked, glabrous internally, pilose on the lobes, trichomes simple, lobes 3.5–4.5 × 1–1.1 mm, apex acuminate; veins 2(–3) pairs, conspicuous. Corolla yellow, petals adnate to the staminal tube by 2–2.4 mm long, 7–8.5 × 3 mm, spatulate, glabrous, apex truncate, eciliate. Anthers 1.1−1.2 mm long mm long, ovary 1−1.4 × 0.6−0.9 mm, style tomentose, stigma elongate-plumose. **Brevistylous form:** stamens 6−6.3 mm long, staminal tube 3−3.5 × 0.9 mm, free filaments 2.8−3 mm long, gynoecium 3.8−4 mm long, style 1.1−1.5 mm long, tomentose, tortuous at the base, stigma 1.1−1.2 × 0.4 mm. **Longistylous form:** stamens 3.1-4.1 mm long, staminal tube 2.8−3.7 × 1 mm long, free filaments ca. 0.3−0.4, gynoecium 7 mm long, style 5−5.2 mm long, tomentose, stigma ca. 1.2 × 0.6 mm. Capsule 3.8 × 3 mm, obpyramidal, chartaceous at the apex, membranaceous below, apex truncate, pilose to sericeous apically, trichomes stellate, dehiscence partial; seed 1, ca. 2.1 × 1.2 mm, obovoid, brown, glabrous, apex rounded, slightly crenulate.

Distribution and habitat:—Occurs in Mexico, Guyana, Venezuela, Colombia, Brazil, Bolivia and Paraguay (Rondón 2008; Saunders 1993, 2005b, 2007). In Brazil, *Waltheria viscosissima* is widely distributed except for the states from South region, Rio de Janeiro (Southeast), and Acre and Roraima (North) (Fig. 19). This species can be found growing Atlantic Forest (and restingas), Amazonia, Caatinga, Cerrado (and campos rupestres), at 30–1150 m a.s.l.

Conservation status:—Least Concern (LC).

Notes:—*Waltheria viscosissima* is easily recognized by its sticky branches, leaves and inflorescences due high density of glandular trichomes, and its leaf blades with acuminate apex.

Vernacular names:—Bahia (malva-de-sebo), Ceará (engorda-bode, melosa), Pará (malva-meladinha) and Paraíba (malva, malva-preta).

Selected specimens examined:—BRAZIL.**—Alagoas:** Paripueira, Reserva Particular do Patrimônio Natural Placas, 01 September 2016, fl., fr., *J.W. Alves-Silva et al. 1570* (MAC). **Amapá:** Macapá, estrada Porto Santana-Porto Platon, 16 March 1962, fl., *J. Mattos & N. Mattos 9975* (SP). **Amazonas:** Boca do Acre, around Boca do Acre airstrip, 20 September 1966, fl., *G.T. Prance et al. 2453* (INPA [image], MO [not seen], NY [image], R, US [image]). **Bahia:** Mucugê, Chapada Diamantina, 8 July 2015, fl., *M.G. Bovini et al. 4179* (CTES, RB). Porto Seguro, Parque Nacional de Monte Pascoal, 17 July 1997, fl., *W.W. Thomas et al. 11568* (HUEFS [image], NY [image]). **Ceará:** Crateús, Reserva Particular do Patrimônio Natural Serra das Almas, 18 July 2001, fl., *M.S. Sobrinho & M.M.A. Bruno s.n.* (EAC 32908). **Distrito Federal:** Brasília, Estação Florestal Cabeça de Veado, 11 April 1983, fl., *M.A. Alves 74* (INPA [image], UFMT). **Espírito Santo:** Guarapari, Parque Natural Municipal Morro da Pescaria, 17 January 2014, fl., fr., *A.C.S. Dal col & J. Rodrigues Filho 250* (VIES). **Goiás:** Minaçu, Reserva Biológica Canabrava, 9 June 1995, fl., *C. Proença et al. 1269* (CTES, UB). **Maranhão:** Loreto, Ilha de Balsas, 9 June 1962, fl., fr., *G. Eiten & L. Eiten 4846* (NY [image], SP, SPF, US [image]). **Mato Grosso:** Nova Xavantina, Parque Natural Municipal do Bacaba, 18 April 2005, fl., *T.R.R. Santos & C. Fernandes-Bulhão 13* (RB). Barra do Garças, 14 October 1964, fl., *H.S. Irwin & T.R. Soderstrom 6845* (NY, RB). **Mato Grosso do Sul:** Três Lagoas, margem esquerda do rio Sucurió, 17 June 1964, fl., fr., *J.C. Gomes Júnior 1933* (UB, SP). **Minas Gerais:** Grão-Mogol, 18 km from Grão-Mogol at bridge crossing Rio Ventania, 28 March 1990, fl., *J.G. Saunders et al. 3175* (CTES, F [image], NY [image]). **Pará:** Itaituba, estrada Santarém-Cuiabá,

26 April 1983, fl., *I.L. Amaral et al. 976* (INPA [image], NY [image], UB, US [image]). **Paraíba:** Mamanguape, Reserva Biológica Guaribas, 17 December 2009, fl., *S.R. Nóbrega 65* (JPB). **Pernambuco:** Bonito, Reserva Ecológica Municipal de Bonito, 15 March 1995, fl., *A.B. Marcon et al. 23* (NY [image], PEUFR). **Piauí:** S. Gonzalo D'Amarantes [Amarante ou Regeneração], fl., *C.F.P. von Martius 2519* (M [image]). **Rio Grande do Norte:** Goianinha, margem da BR-101, 12 November 1980, fl., *O.F. Oliveira 1566* (MOSS). **Rondônia:** Ariquemes, Mineração Mibrasa, 16 May 1982, fl., *L.O.A. Texeira et al. 513* (CTES, F [image], INPA [not found], RB, US [image]). **Roraima:** Boa Vista, Parque Anauã, 17 November 1994, fl., *S.J.R. Silva 06* (INPA [image]). **São Paulo:** s.l., a 9 km a W de Vicentinópolis, 30 April 1982, fl., *J.G. Guimarães 1463* (RB). **Sergipe:** Aracaju, Morro do Urubu, 24 May 1985, fl., *M. Fonseca et al. 4172* (ASE [image], CSTR). **Tocantins:** Almas, estrada para Natividade, 22 July 2000, fl., fr., *V.C. Souza et al. 24500* (ESA).

Excluded Names

1. *Waltheria pentagynia* Velloso (1825: 274).

Based on protologues, illustrations and specimens analyzed from several herbaria, this name is probably related to *Melochia* [although not cited by Goldberg (1967)] by flowers with conspicuous pedicels, style 5 and simple stigma (vs. flowers rarely pedicellate, style 1 and stigma plumose-penicillate in *Waltheria* species) and requires a further synonymization.

2. *Waltheria terminalis* Velloso (1825: 275).

This name is clearly under Turneraceae (Passifloraceae *s.l.*) and is under synonymous of *Turnera ulmifolia* Linnaeus in POWO (2019). The 3-fid stigmas and capsule with many seeds are common in the family.

Excluded Names for Brazil

1. *Waltheria paniculata* Bentham (1841: 126)

This species was cited by Schumann (1886) in *Flora Brasiliensis*, however, voucher mentioned by him is from Guyana and no other specimens collected in Brazil was found since now.

Doubtful name

1. *Waltheria capitata* Velloso (1825: 274).

With the brief diagnosis and few characters illustrated available is not possible to recognize this taxon. Characters as sessile flowers and subulate bracts (probably alluding to bracteoles) are related to *Waltheria* as well as small flowers (showed in the tabula) and the inflorescences very condensed. The sample used by Velloso (1825) was probably collected in an area of restinga ("*habitat silvis, campis maritimis*") and could be *W. indica* or *W. glazioviana*, despite inflorescences are more similar that of *W. glazioviana*.

2. *Waltheria monogynia* Velloso (1825: 274).

As in the previous comment, the characters and illustrations provided by Velloso are insufficient to determine the species. In addition, solitary flowers have not been found in *Waltheria*.

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FIGURE 1. Representants of *Waltheria* from Brazil. A – *Waltheria ackermanniana*, B – *W. albicans*, C – *W. brachypetala*, D-E – *W. cinerascens*, F – *W. communis*, G – *W. coriacea*, H – *W. flavovirens*, I – *W. glabribracteata*, J – *W. indica*, K – *W. involucrata*, L – *W. marielleae*, M – *W. operculata*, N – *W. rotundifolia*, O – *W. saundersiae*, P – *W. viscosissima*. (Photos of: E – *A. Rios*; F – *Z.J.G. Miranda*; G-H – *M. Figueira & B. Schindler*; I – *M.F. Simon*; K – *R.G. Barbosa-Silva*; M – *M.E. Engels*).

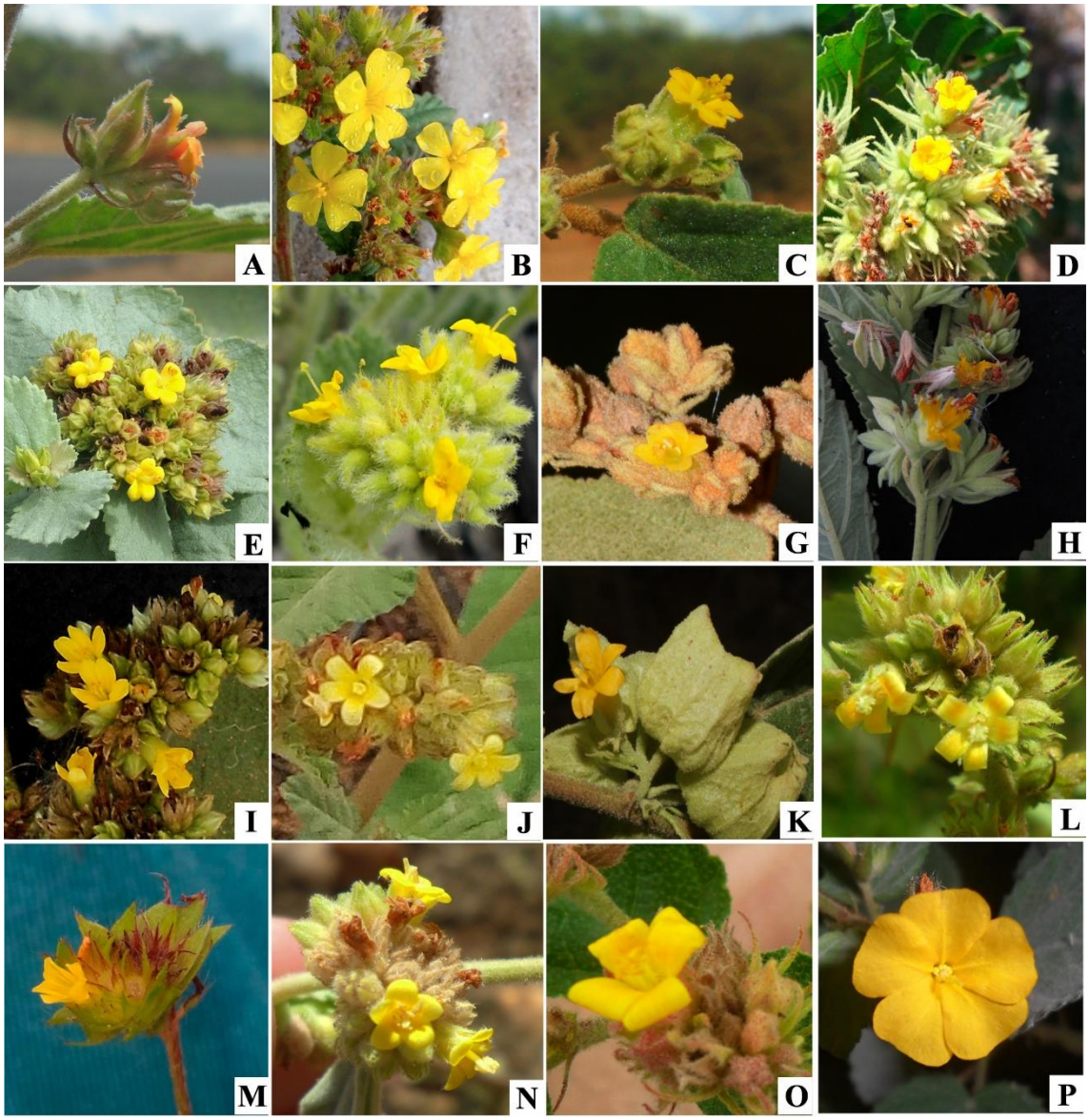

FIGURE 2: Distribution map of *Waltheria* species in Brazil.

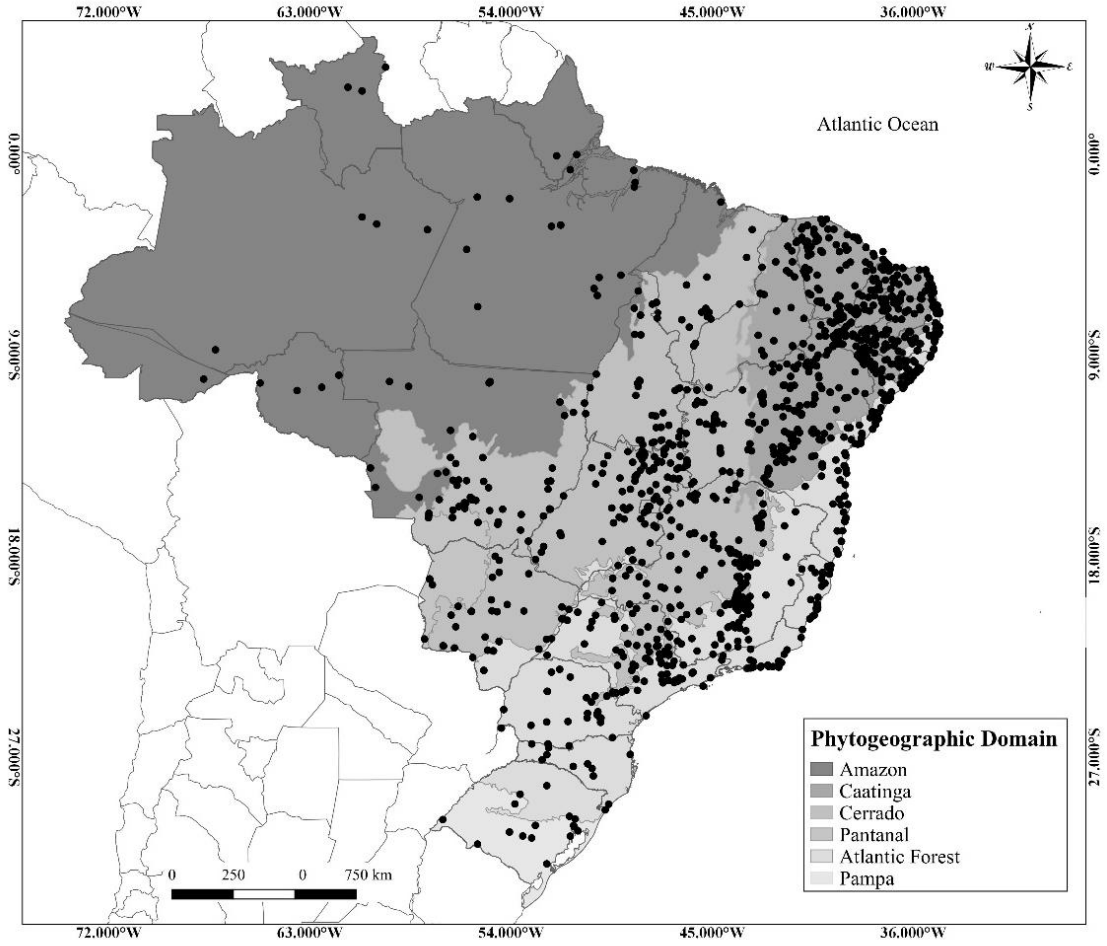

FIGURE 3: General characters in *Waltheria* from Brazil. A-C: Habit. A – Shrub, *Waltheria brachypetala*, B – Erect herb, *W. communis*, C – Prostrate herb, *W. excelsa*; D-H: Trichomes. D – Simple, *W. bracteosa*, E – Stellate, *W. glazioviana*, F – Multiradiate, *W. biribiriensis*, G – Glandular stalked, *W. viscosissima*, H – Glandular sessile, *W. maritima*; I-K: Stipules. I – Foliaceous and ovate, *W. bracteosa*, J – Scarious and linear triangular, *W. marielleae,* K – Scarious and linear, *W. communis*; L-M: Inflorescences. L – Congested, *W. communis*, M – Lax, *W. coriacea*; N-P: Calyx lobes. N – Acuminate, *W. viscosissima*, O – Acute, *W. marielleae*, P – Acute, *W. involucrata*; Q-R. Calyx lobe veins. Q – Veins absent, *W. brachypetala*, R – Veins presente, *W. petiolata*. (B – *Z.J.G. Miranda*; C – *A.J. Fernandes Júnior*; D, I – *P. Martins*

& E. Nunes s.n. [EAC 9464]; E – *J. Luber 90*; F – *M.M. Arbo et al. 5028*; G, N – *T.S. Coutinho et al. 400*; H – *C. Farney et al. 3511*; J, O – *T.S. Coutinho et al. 376*; K – *A.B. Joly 568*; L, M – *M. Figueira & B. Schindler*; P – *J.G. Kuhlmann 98*; Q – *T.S. Coutinho 457*; R – *J.M.A. Braga et al. 5107*).

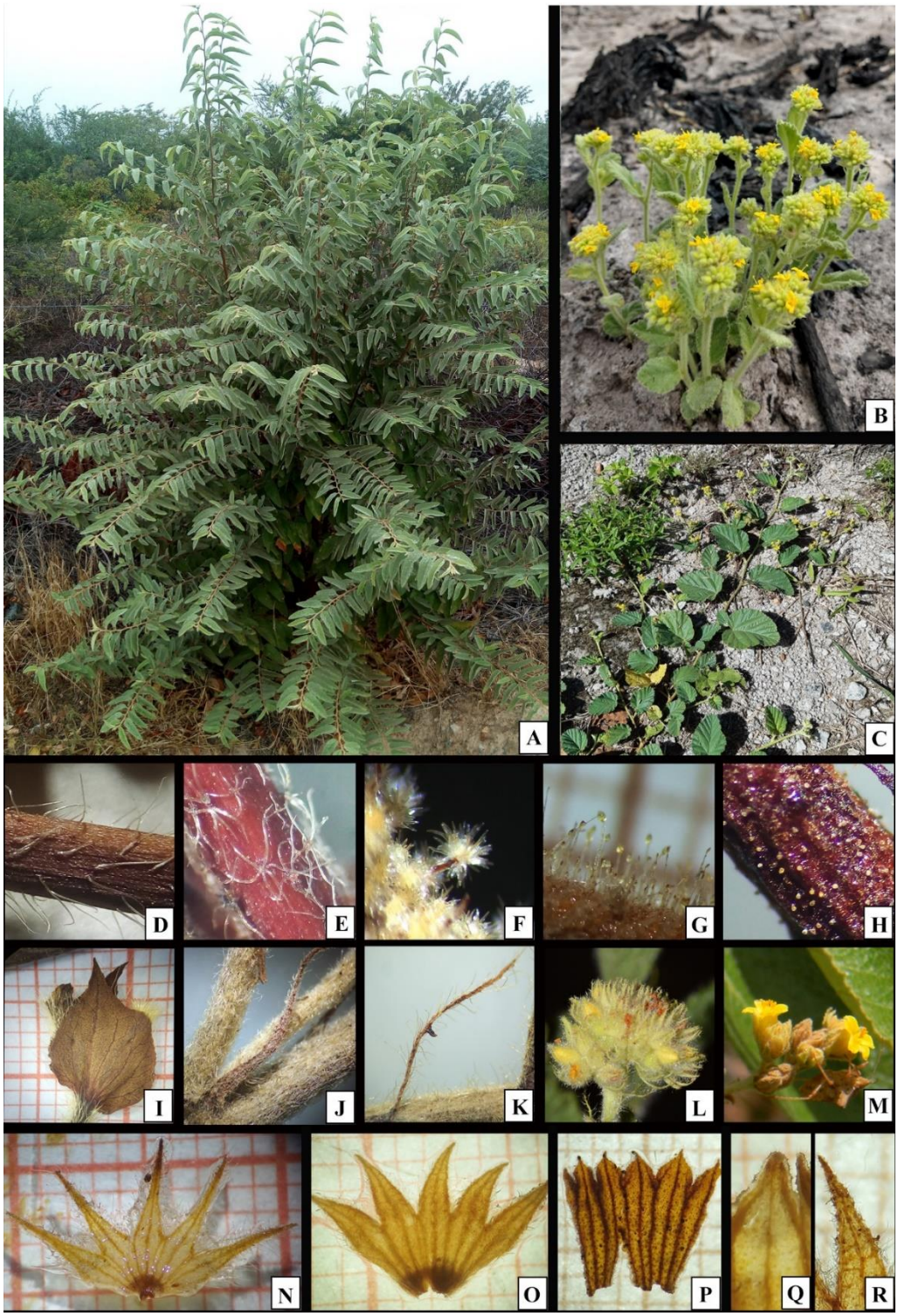

FIGURE 4: Diagnostic characters in *Waltheria* species. *Waltheria bracteosa* – A. Habit, B. Detail of the simple trichomes on the branch; *W. macropoda* – C. Habit, D. Detail of the trichomes on the branch, E. Calyx, F. Detail of the glandular trichomes on the calyx lobes, G. Staminal tube and stigmas of a Brevistylous flower; *W. operculata* – H. Calyx, I. Detail of the calyx lobes, J. Staminal tube of the homostylous flower, K. Capsule, L. Seed; *W. ackermanniana* – M. Habit, N. Bracteoles; *W. albicans* – O. Flowering branch, P. Detail of the glandular long-stalked trichomes on the branch, Q. Bracteoles, R. Staminal tube and elongate-plumose stigmas of a brevistylous flower; *W. biribiriensis* – S. Bracteoles; *W. brachypetala* – T. Habit, U. Multiradiate stipitate trichomes on the branch, V. Bracteoles, W. Clavate stigma. (A-B – *G. Hatschbach et al. 60430*; C-G – *T.S. Coutinho 231*; H-L – *T.S. Coutinho et al. 420*; M – *L.J.T Cardoso et al. 1585*; N – *A.M. Carvalho & C.E.Q. Souza 7039*; O-R – *T.S. Coutinho 412*; S – *M.M. Arbo et al. 5028*; T-W – *T.S. Coutinho & M. Alves 289*).

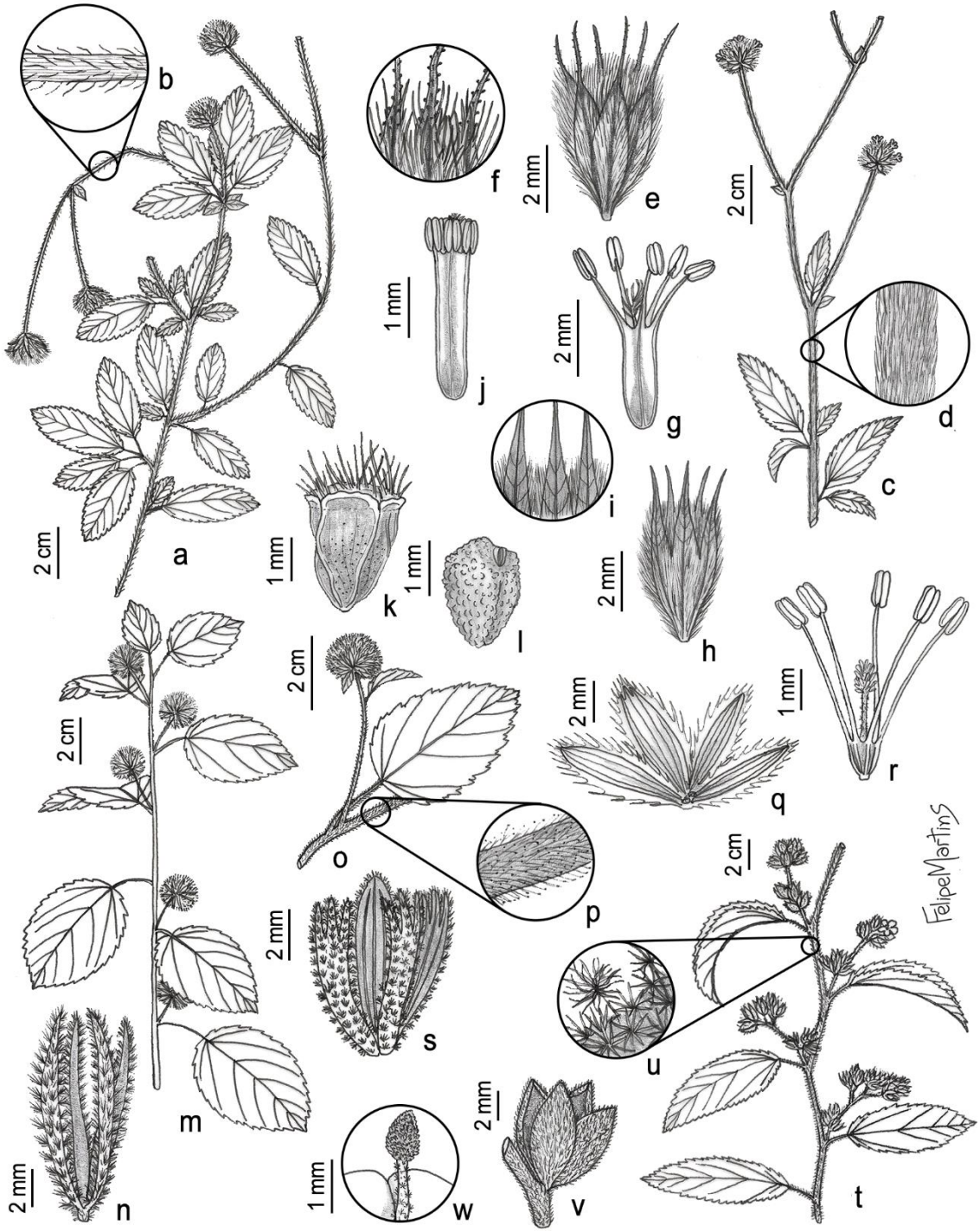
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FIGURE 5: Distribution map of *Waltheria* sect. *Stegowaltheria* species in Brazil.

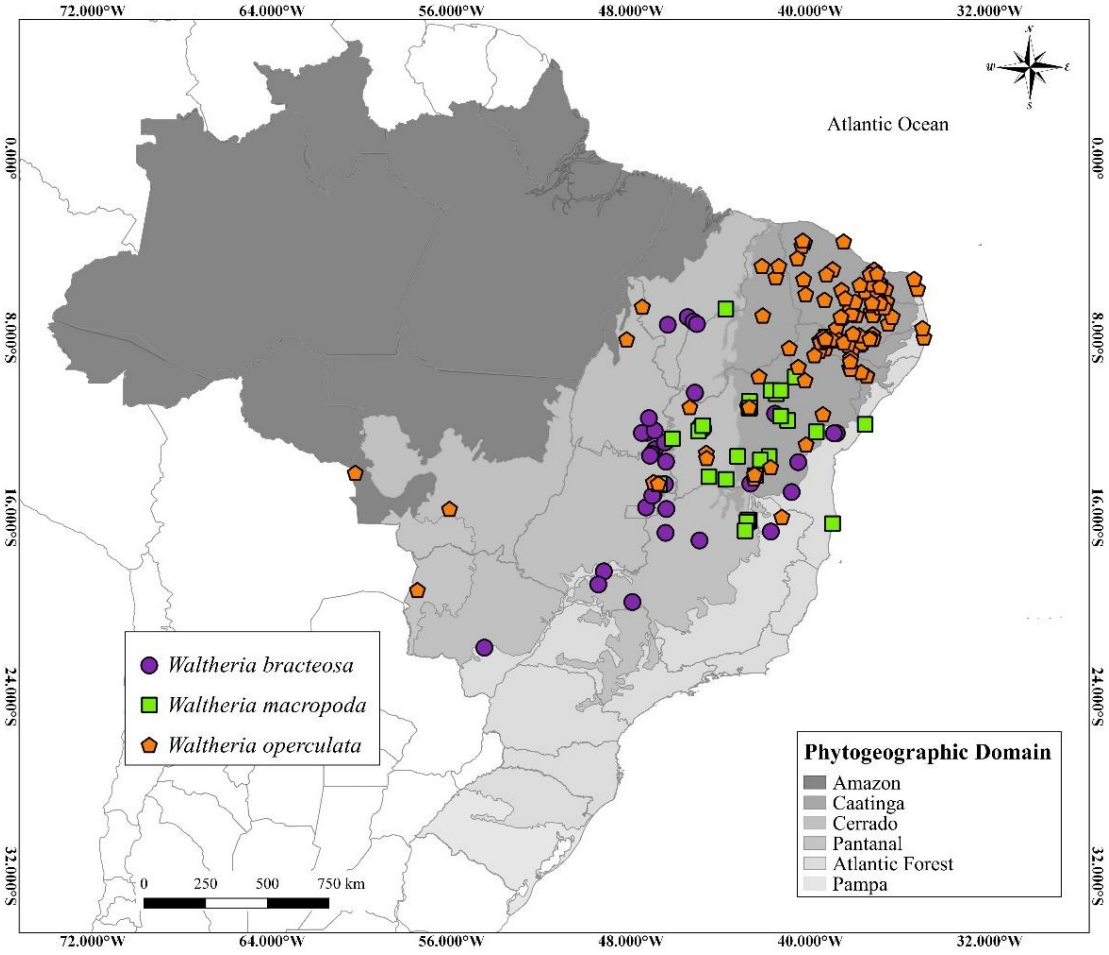

FIGURE 6: Distribution map of *Waltheria ackermanniana*, *W. albicans*, *W. biribiriensis*, *W. brachypetala* and *W. carmensarae* in Brazil.

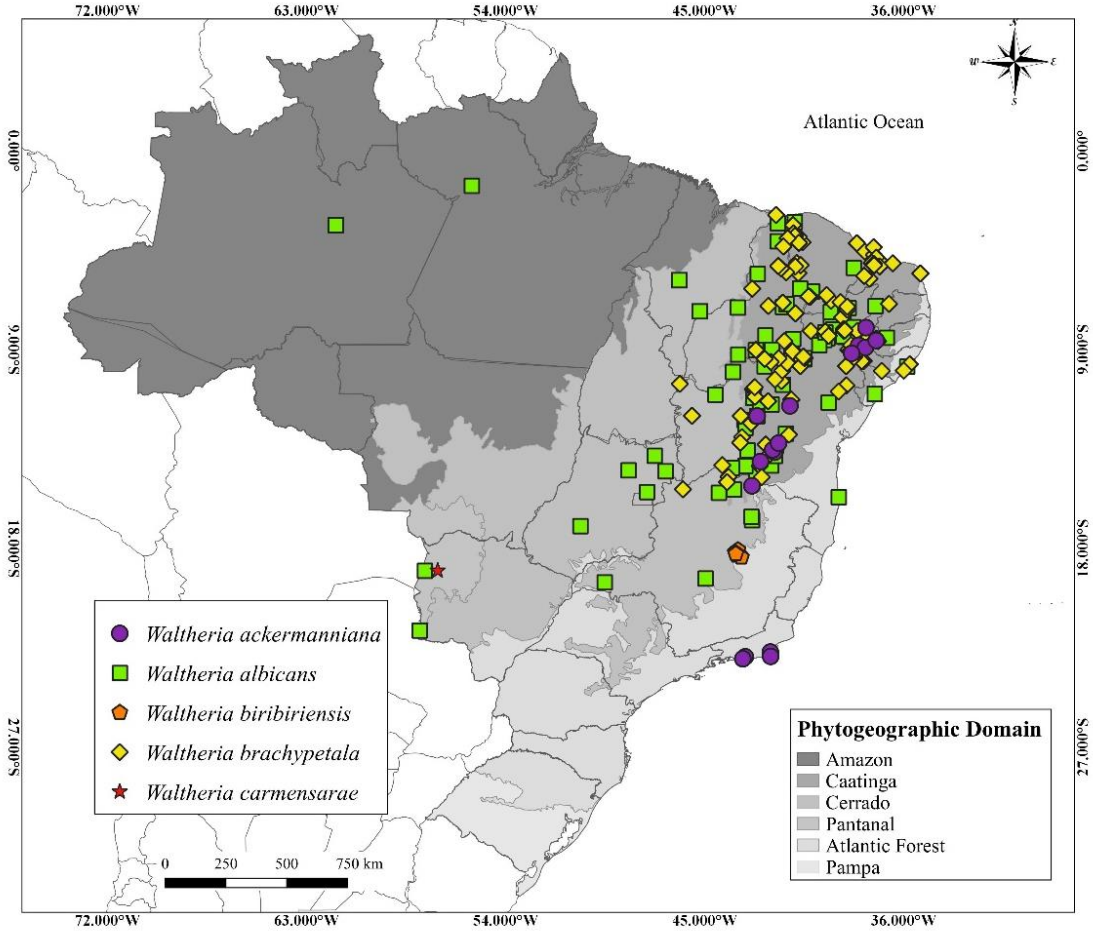

FIGURE 7: Diagnostic characters in *Waltheria* species. *Waltheria carmensarae* – A. Habit, B. Detail of the glandular long-stalked trichomes on the branch, C. Bracteoles, D. Staminal tube of the homostylous flower; *W. carpinifolia* – E. Habit, F. Detail of the stipule and petiole, G. Staminal tube and style (removed stigmas) of a longistylous flower; *W. cinerascens* – H. Habit, I-M. Different morphologies of leaf blades, N. Staminal tube and fan-plumose stigmas of a longistylous flower; *W. communis* – O. Habit, P. Detail of the stipules, Q. Calyx, R. Capsule; *W. coriacea* – S. Flowering branch, T. Bracteoles and flower buds, U. Capsule. (A-D – *E. Pereira et al. 304*; E-F – *V.C. Souza et al. 7044*; G – *O.S. Ribas & L.B.S. Pereira 1661*; H, N – *T.S. Coutinho 232*; I – *R.M. Harley et al. 20540*; J – *A. Furlan et al. CFCR 742*; K – *R.M. Harley et al. 50533*; L – *R.M. Harley et al. 17081*; M – *A.A. Conceição 243*; O-P – *J. Paula-Souza et al. 8797*; Q-R – *A.B. Joly 568*; S – *G. Antar & L.F. Nascimento 399*; T-U – *G. Hatschbach et al. 71230*).


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FelipeMartins

FIGURE 8: Distribution map of *Waltheria carpinifolia*, *W. cinerascens*, *W. collina*, and *W. communis* in Brazil.

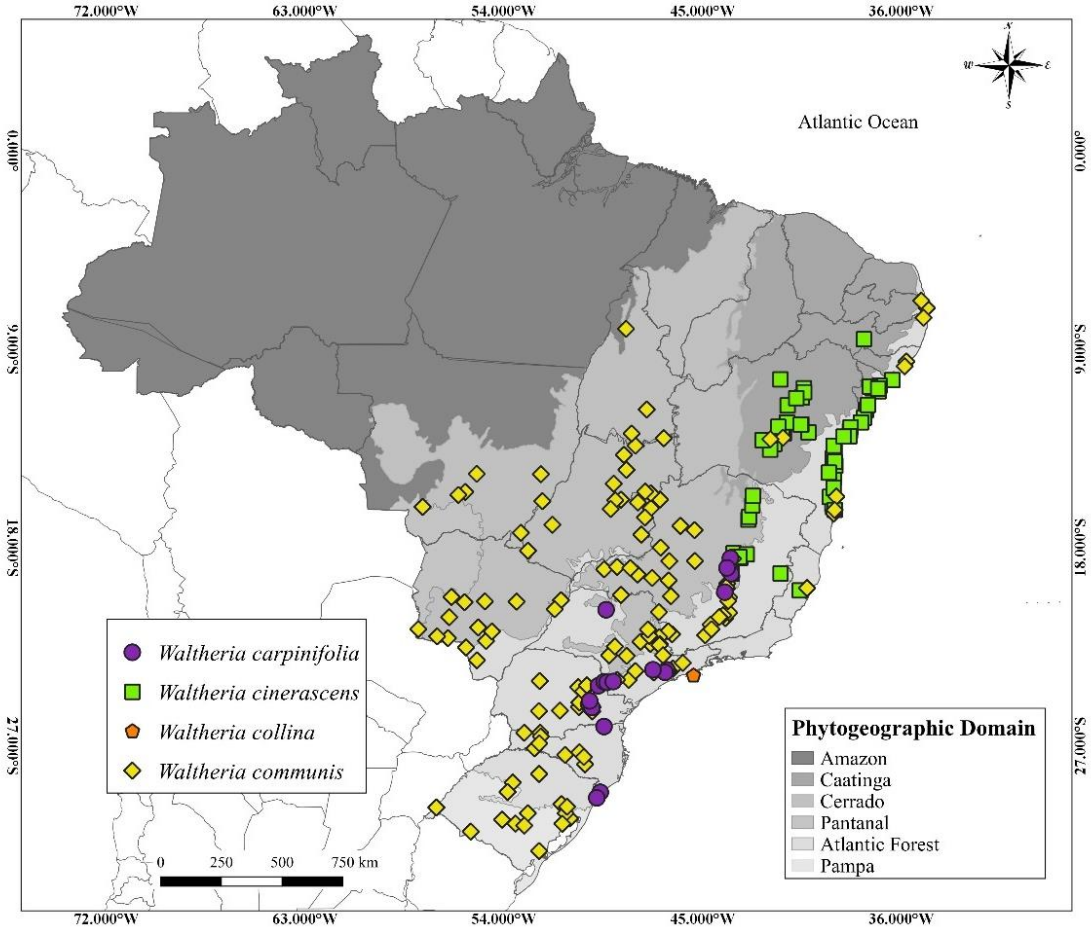


FIGURE 9: Distribution map of *Waltheria coriacea*, *W. erioclada*, *W. excelsa*, and *W. ferruginea* in Brazil.

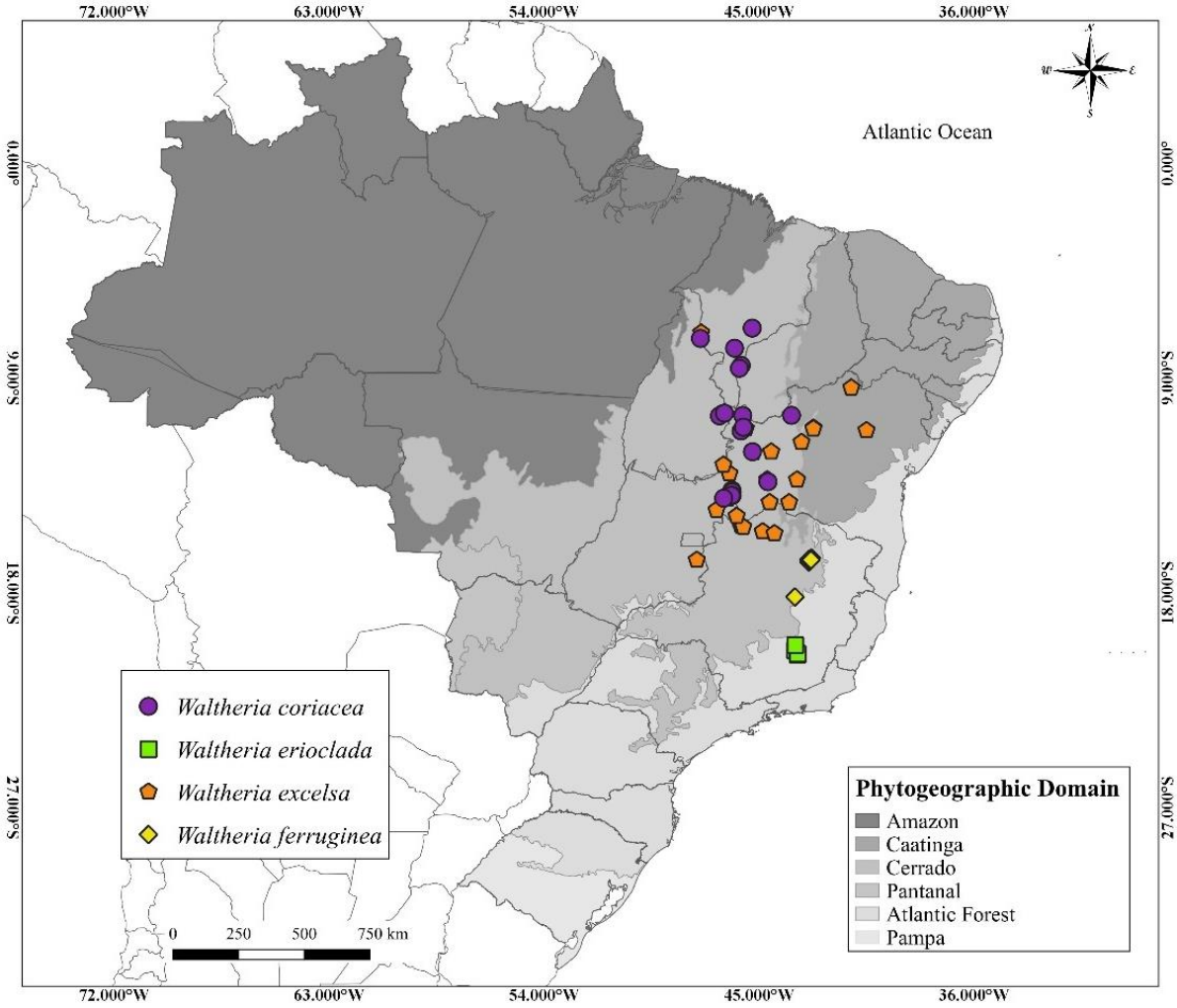
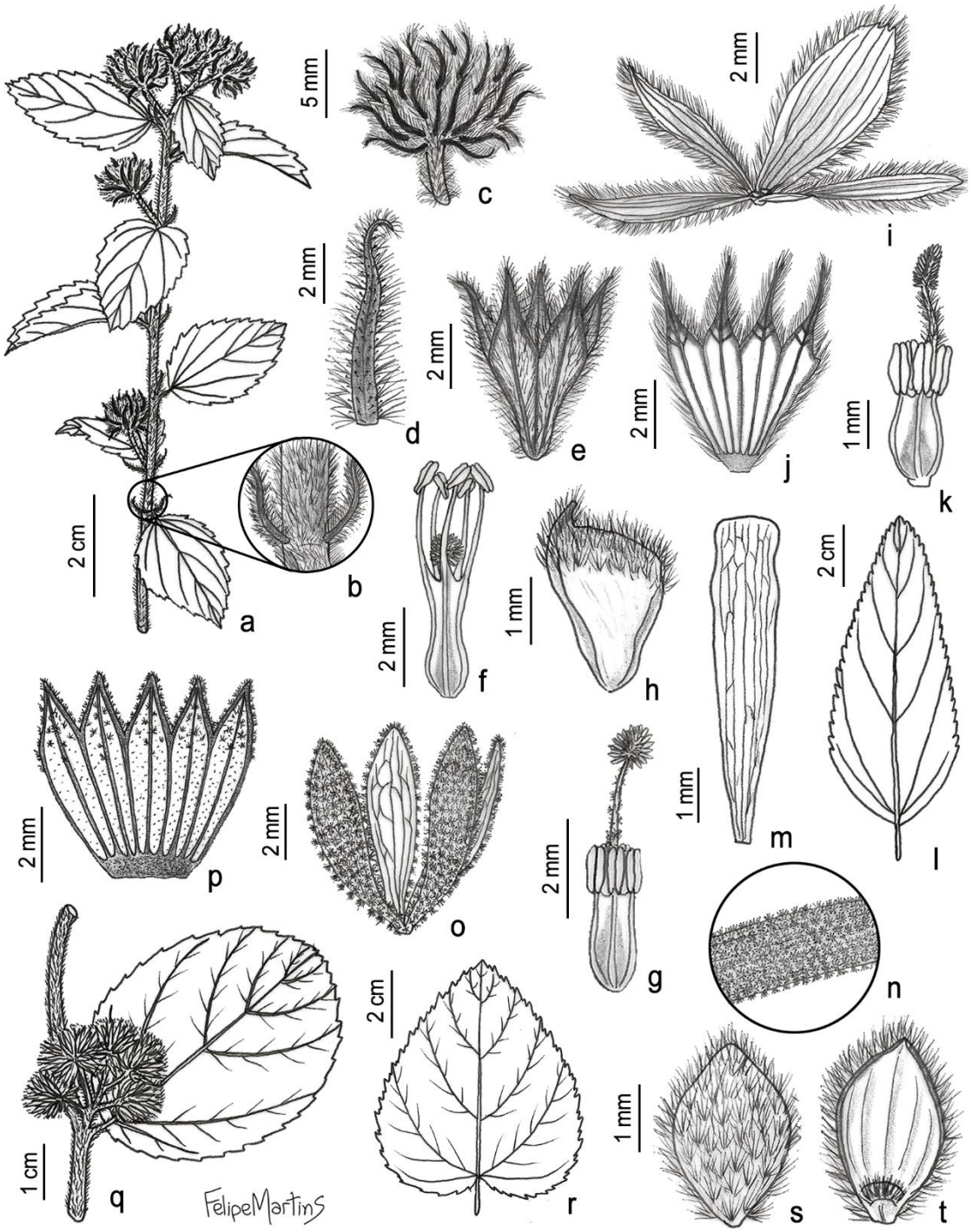


FIGURE 10: Diagnostic characters in *Waltheria* species. *Waltheria eriocladа* – A. Habit, B. Detail of the stipules, C. Detail of am inflorescence, D. One bracteole with glandular sessile trichomes, E. Calyx, F. Staminal tube and fan-plumose stigmas of a Brevistylous flower, G. Staminal tube, style and fan-plumose stigmas of a longistylous flower; *W. excelsa* – H. Bracteoles, I. Calyx opened showing veins of the lobes, J. Staminal tube and elongate-plumose stigmas; *W. ferruginea* – K. Leaf, L. Petal; *W. flavovirens* – M. Detail of the multirradiate sessile trichomes on the branch, N. Bracteoles, O. Calyx opened showing lobes without veins; *W. glabribacteata* – P. Flowering branch, Q. Ovate leaf, R. Abaxial surface of a bracteole, S. Adaxial surface of a bracteole. (A-C, E, F, H – *R.C. Mota 3338*; D, G – *R.C. Mota & L. Viana 525*; I-J – *A. Freire-Fierro et al. 1829*; K – *A. Freire-Fierro et al. 1912*; L – *J.G. Saunders et al. 3179*; M – *A. Freire-Fierro et al. CFCR 12740*; N – *A.P. Duarte 10306*; O-P – *C. Sakuragui et al. CFCR 15196*; Q, S-T – *M.F. Simon et al. 2232*; R – *J.G. Kuhlmann 2146*).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FelipeMartins
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FIGURE 11: Distribution map of *Waltheria flavovirens*, *W. glabribracteata*, *W. glazioviana*, and *W. glomerata* in Brazil.

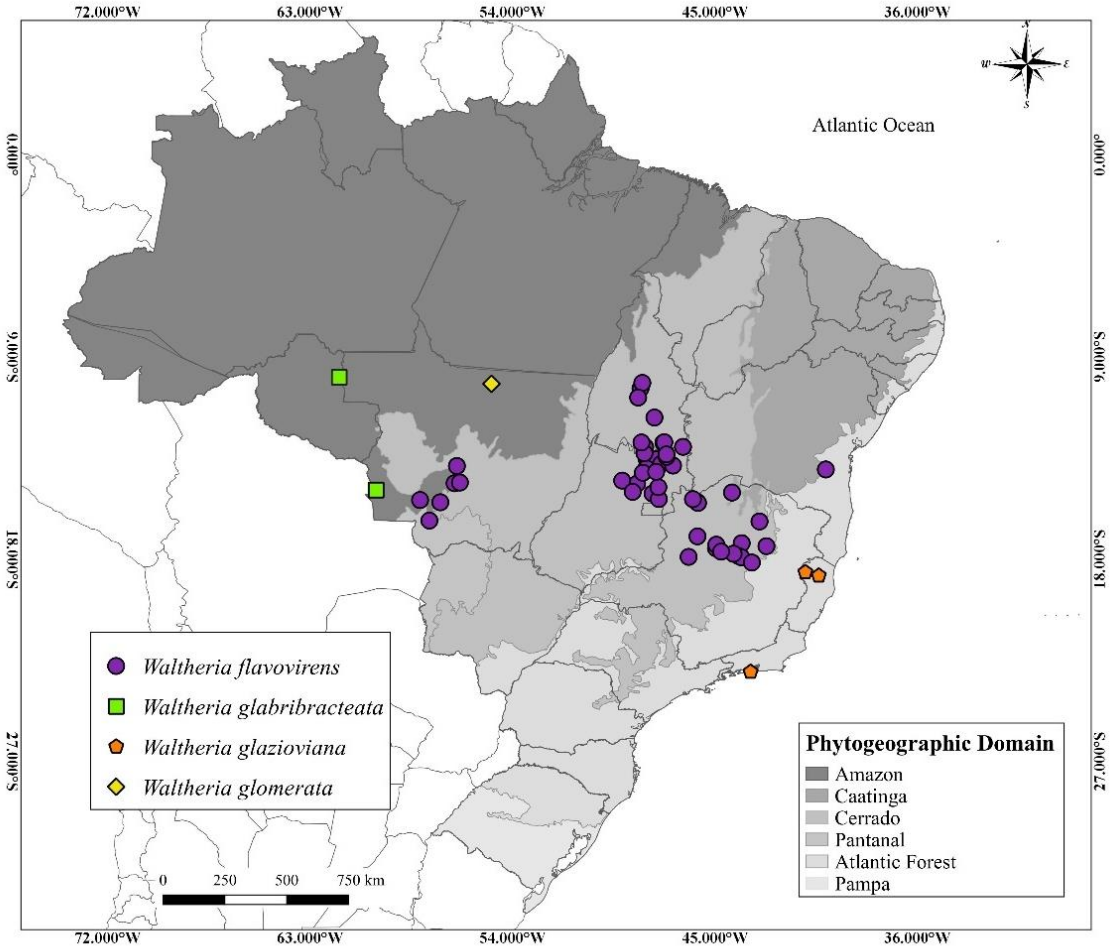
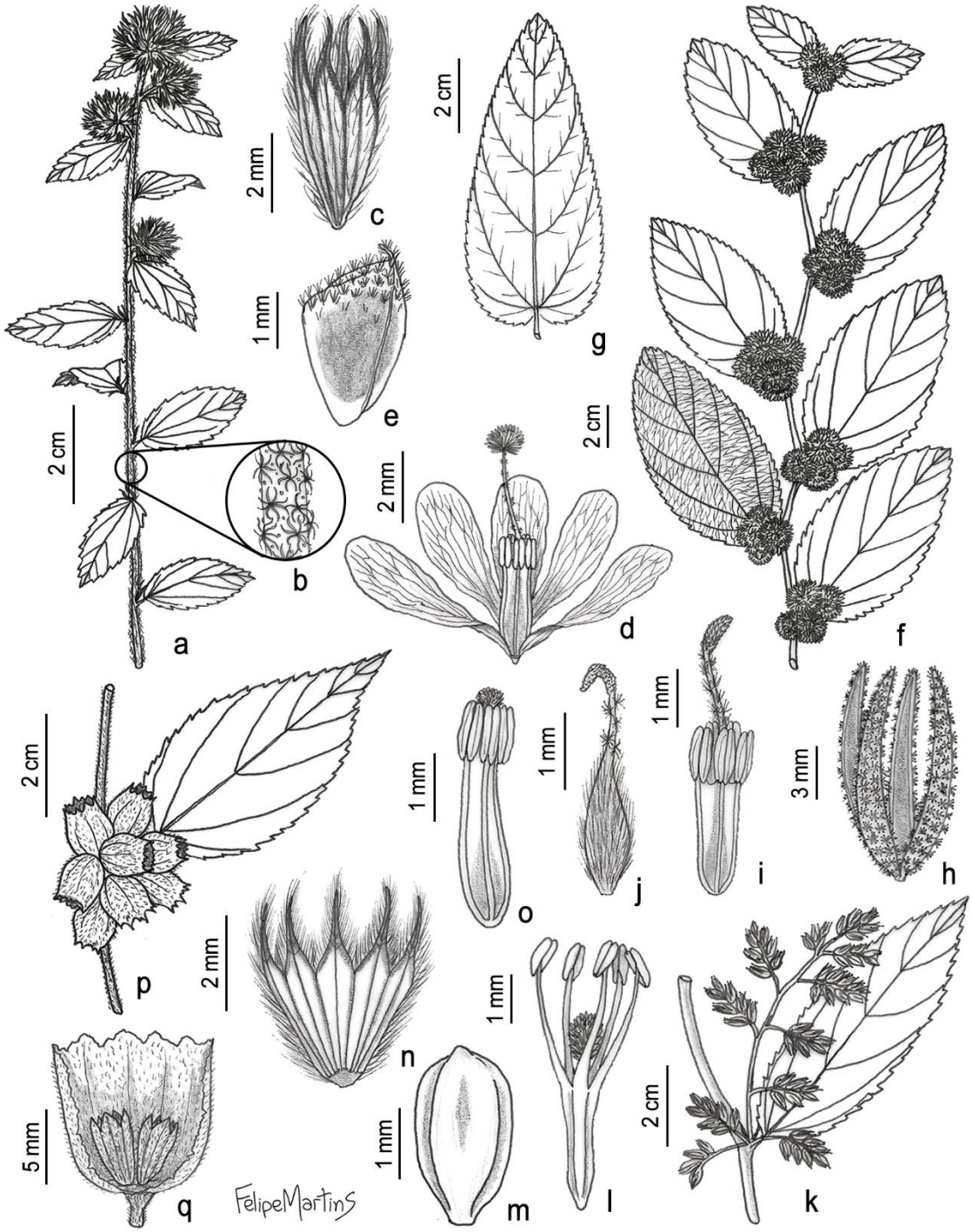


FIGURE 12: Diagnostic characters in *Waltheria* species. *Waltheria glazioviana* – A. Habit, B. Detail of the glandular and stellate trichomes (both sessile) on the branch, C. Calyx, D. Longistylous flower with calyx removed showing staminal tube, part of the style and fan-plumose stigmas, E. Capsule; *W. glomerata* – F. Flowering branch; *W. hatschbachii* – G. Leaf, H. Bracteoles, I. Staminal tube, part of the style and clavate stigmas of a longistylous flower, J. Gynoecium of a Brevistylous flower with filiform stigmas; *W. hoehnei* – K. Flowering branch, L. Staminal tube of a brevistylous flower; *W. indica* – N. Calyx opened showing acuminate lobes, O. Staminal tube of a homostylous flower; *W. involucrata* – P. Flowering branch, Q. Bracteoles opened showing two flowers. (A-B – *D.P. Saraiva et al. 24*; C-E – *J. Luber 90*; F – *L. Amorim & Equipe 646*; G, H, J – *G. Martinelli 5904*; I – *L.M. Borges et al. 687*; K – *M.N.S. Stapf et al. 423*; L – *E.P. Campos et al. s.n.*; M – *N. Saddi 12386*; N-O – *T.S. Coutinho et al. 386*; P-Q – *J.G. Kuhlmann 336*).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FelipeMartins

FIGURE 13: Distribution map of *Waltheria hatschbachii*, *W. hoehnei*, *W. indica* and *W. involucrata* in Brazil.

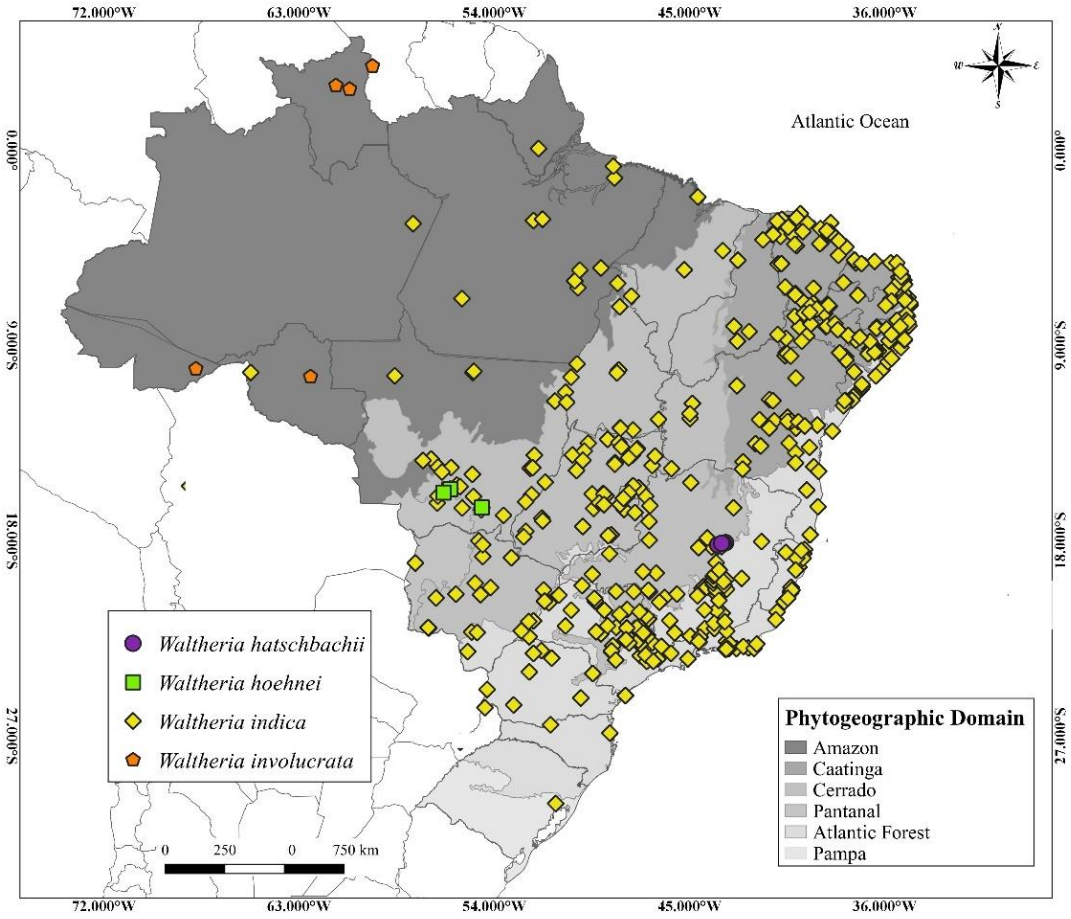

FIGURE 14: *Waltheria marielleae*. A. Flowering branch with detail of the trichomes, B. Bracteoles, C. Brevistylous flower, D. Longistylous flower, E. Calyx showing internal surface, F. Calyx lobe with trichomes removed showing veins, G. Petal (adaxial surface), H. Stamens and part of the gynoecium of a longistylous flower, I. Stamens and stigma of a brevistylous flower, J. Gynoecium of a brevistylous flower, K. Capsule, L. Seed. (A-B, D-H – *T.S. Coutinho et al. 375*, holotype; C, I-L – *T.S. Coutinho et al. 376*, paratype).

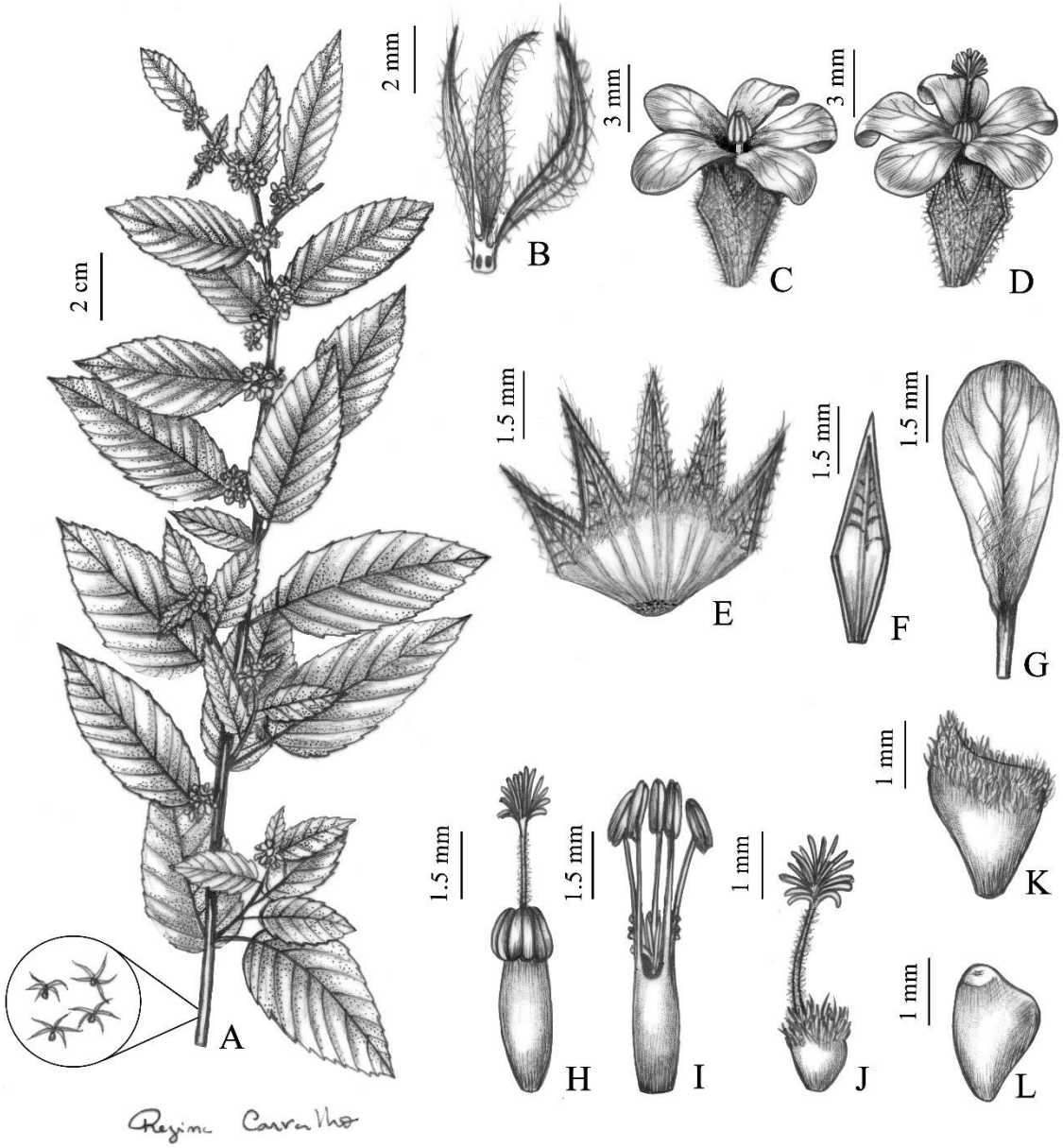

FIGURE 15: Diagnostic characters in *Waltheria* species. *Waltheria marielleae* – A. Detail of the stipules, B. Detail of the inflorescences, C. Petal with eciliate apex, D. Staminal tube (opened) and gynoecium of a longistylous flower; *W. matitima* – E. Habit, F. Detail of the tricomes glandular and stellate (both sessile) on the branch, G. Calyx opened showing lobes without veins; *W. matogrossensis* – H. Flowering branch, I. Detail of the multirradiate trichomes, J. Leaf, K. Calyx, L. Gynoecium with clavate stigmas; *W. mixta* – M. Habit, N. Detail of the glandular stipitate, stellate and 2–3-armed trichomes on the branches, O. Bracteoles, P. Calyx opened showing acuminate lobes and veins, Q. Staminal tube of a Brevistylous flower, R. Staminal tube of a longistylous flower, S. Capsule; *W. petiolate* – T. Habit, U. Stipules, V. Bracteoles and flowers, W. Capsule; *W. polyantha* – X. Habit, Y. Bracteoles. (A-C – *T.S. Coutinho et al. 376*; D – *T.S. Coutinho et al. 375*; E-F – *R.N. Amaral et al. 15*; G – *C. Farney et al. 1408*; H-I – *G. Hatschbach et al. 35955*; J – *A.G. Nave et al. 1408*; K-L – *A. Oliveira Filho 291*; M-Q, S – *G. Pereira-Silva et al. 4977 [a]*, holotype; R – *G. Pereira-Silva et al. 4977 [b]*, paratype; T-U – *J.P. Lanna Sobrinho 1887*; V – *J.G. Kuhlman 666*; W – *J.M.A. Braga et al. 5107*; X – *S.N. Moreira et al. 1784*; Y – *A.S. Quaresma et al. 782*).

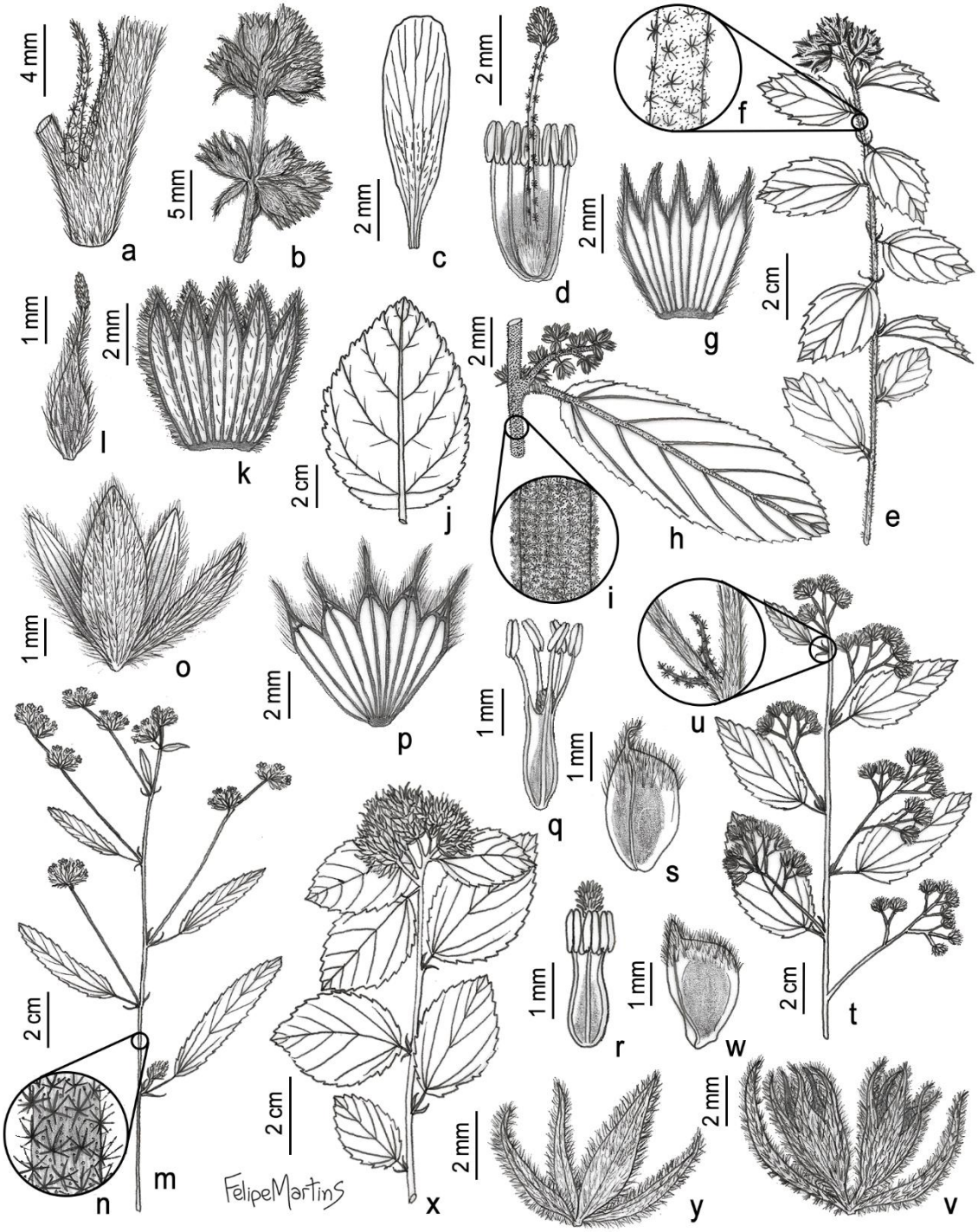
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FIGURE 16: Distribution map of *Waltheria marielleae*, *W. maritima*, *W. matogrossensis*, and *W. mixta* in Brazil.

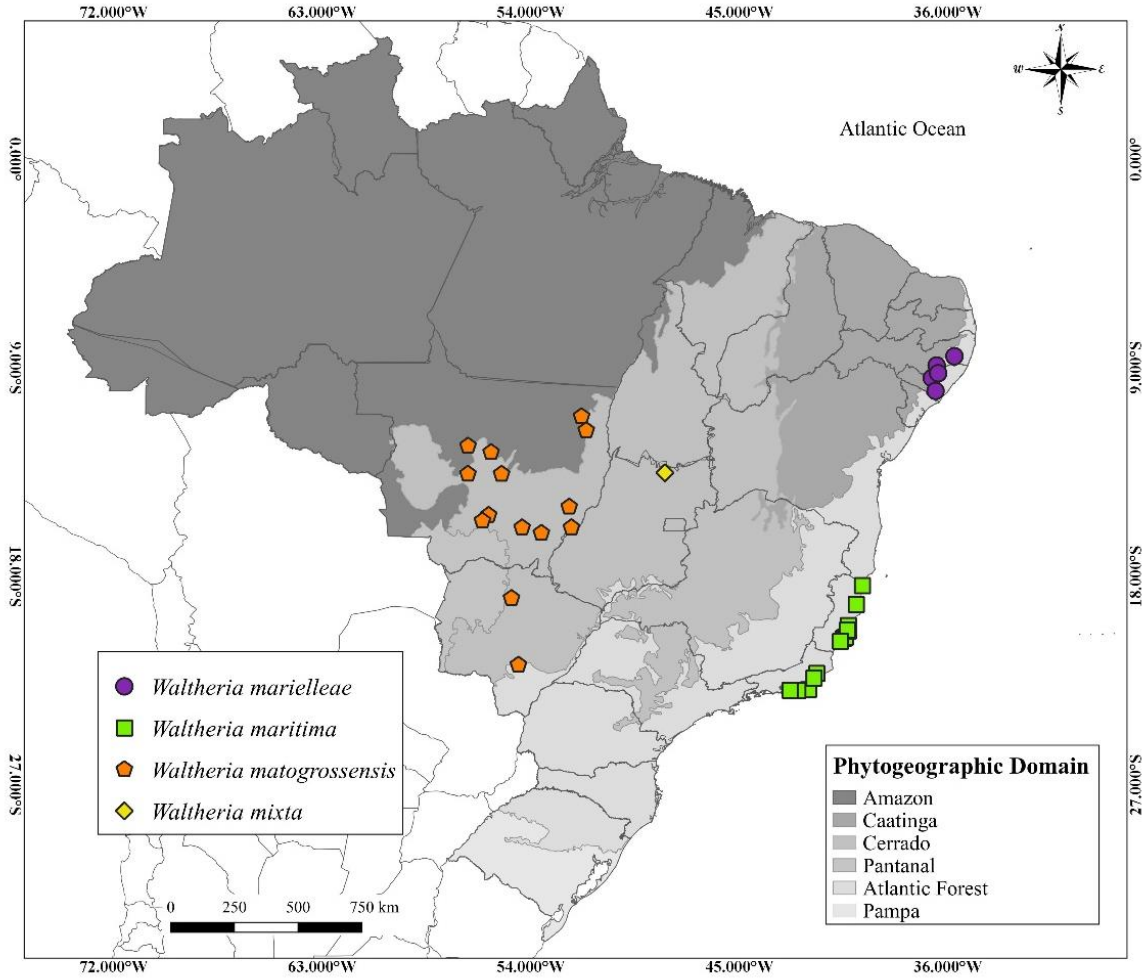

FIGURE 17: Distribution map of *Waltheria petiolata*, *W. polyantha*, *W. rotundifolia*, and *W. saundersiae* in Brazil.

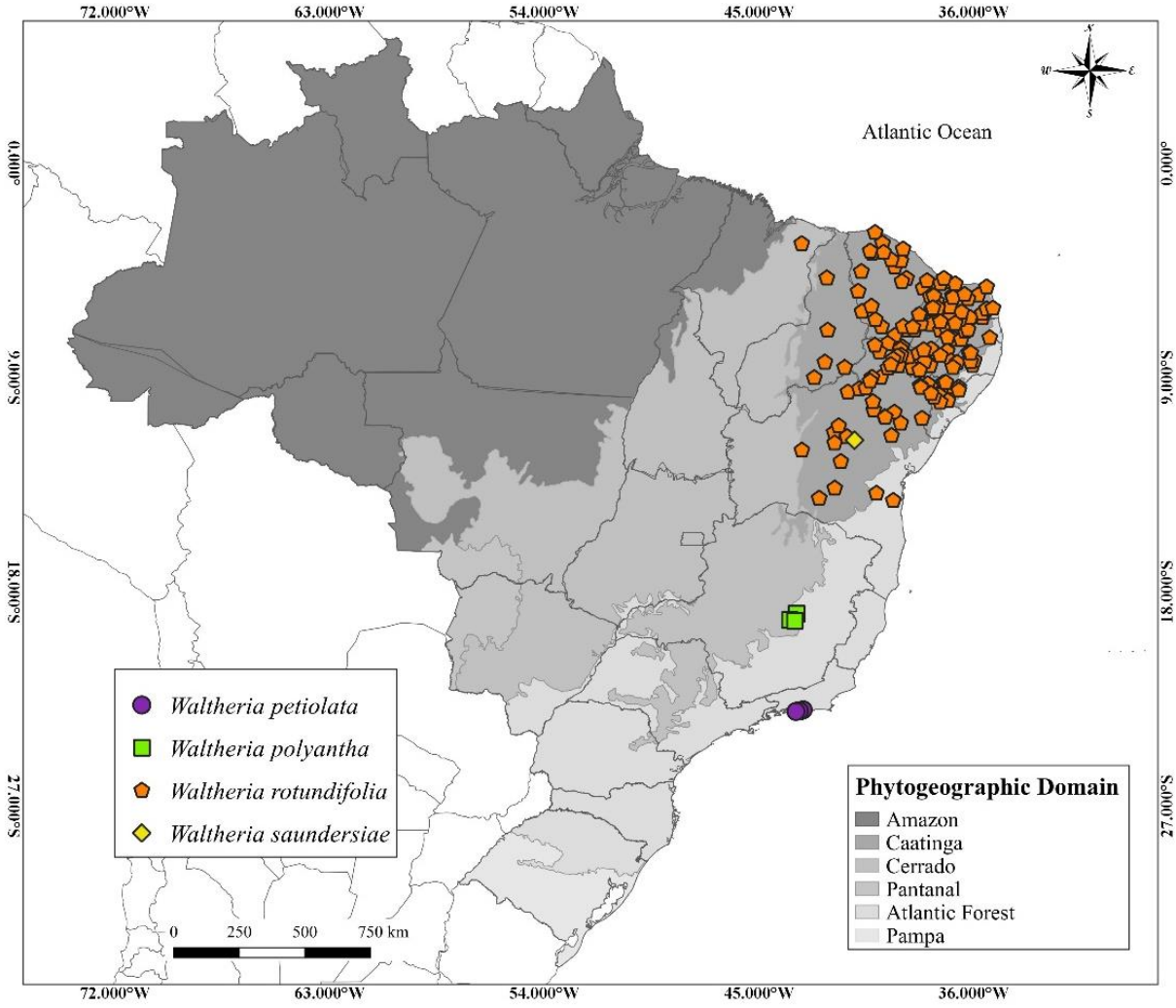

FIGURE 18: Diagnostic characters in *Waltheria* species. *Waltheria rotundifolia* – A. Habit, B. Leaf, C. Bracteoles, D. Capsule; *W. saundersiae* – E. Flowering branches; F. Flowering branch; *W. terminans* – G. Habit; *W. vernonioides* – H. Habit, I. Bracteoles; *W. viscosissima* – J. Flowering branch, K. Detail of the glandular long-stalked trichomes on the branch. (A – *T.S. Coutinho et al. 275*; B-D – *T.S. Coutinho 422*; E – *T.S. Coutinho & M. Alves 238*; F – *R.M. Harley et al. 54405*; G – *M.C. Mamede et al. CFCR 6381*; H – *G. Hatschbach 42102*; I – *A. Krapovickas et al. 37873*; J-K – *T.S. Coutinho et al. 400*).

FIGURE 19: Distribution map of *Waltheria selloana*, *W. terminans*, *W. vernonioides*, and *W. viscosissima* in Brazil.

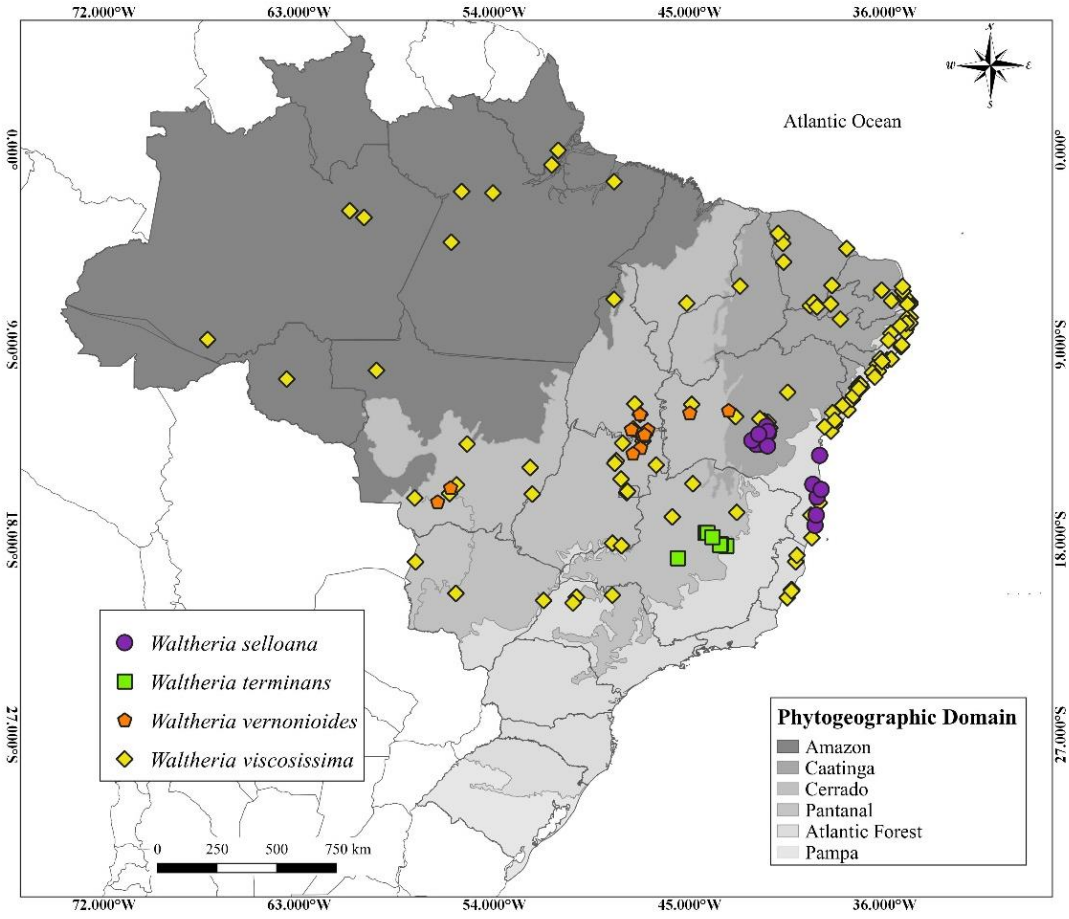

TABLE 1: *Waltheria* species from Brazil and their respective conservation units where they are recorded. AL – Alagoas, BA – Bahia, CE – Ceará, DF – Distrito Federal, ES – Espírito Santo, GO – Goiás, MG – Minas Gerais, PB – Paraíba, PE – Pernambuco, PI – Piauí, PR – Paraná, RJ – Rio de Janeiro, RN – Rio Grande do Norte, RO – Rondônia, RR – Roraima, SE – Sergipe, SP – São Paulo, TO – Tocantins; APA – Área de Proteção Ambiental, APP – Área de Proteção Permanente, ESEC – Estação Ecológica, FLONA – Floresta Nacional, PARNA – Parque Nacional, REBIO – Reserva Biológica, RPPN – Reserva Particular do Patrimônio Natural.

Species	**Conservation Unit**
W. ackermanniana	PARNA da Chapada Diamantina (BA) PARNA do Catimbau (PE)
W. albicans	APA Santa Rita (AL) Estação Ambiental Galheiro (MG) ESEC de Maracá (RR) Parque Estadual Pico do Jabre (PB) PANA de Sete Cidades (PI) PARNA Serra da Capivara (PI) PARNA Serra das Confusões (PI)
W. brachypetala	ESEC de Aiuaba (CE) ESEC Raso da Catarina (BA) PARNA do Catimbau (PE) RPPN Serra das Almas (CE)
W. carpinifolia	ESEC de Itapeva (SP) Parque Estadual de Vila Velha (PR)
W. cinerascens	APA de Maraú (BA) Área de Relevante Interesse Ecológico Serra do Orobó (BA) ESEC Serra de Itabaiana (SE) Parque Estadual de Grão Mogol (MG) Parque Estadual de Serra Nova (MG) PARNA das Sempre Vivas (MG) REBIO do IBGE (BA)
W. communis	Estação Ambiental Galheiro (MG)

	ESEC Águas de Santa Bárbara (SP) ESEC de Itirapina (SP) ESEC do Panga (MG) Parque Ecológico da Klabin (PR) Parque Estadual da Serra dos Pirineus (GO) Parque Estadual da Serra do Rola-Moça (MG) Parque Estadual de Vila Velha (PR) PARNA do Araguaia (TO) PARNA de Brasília (DF) PARNA Chapada dos Veadeiros (GO) PARNA das Emas (GO) PARNA Serra da Canastra (MG) REBIO da Fazenda Campininha (SP) REBIO Guaribas (PB) REBIO do IBGE (DF) Reserva Ecológica do Guará (DF) RPPN Soluar (GO)
W. coriacea	ESEC Serra Geral do Tocantins (TO) PARNA do Jalapão (TO) Reserva Legal de Coaceral (BA) Santuário Ecológico Pedra Caída (MA)
W. excelsa	PARNA Grande Sertão Veredas (MG)
W. flavovirens	Parque Estadual do Lajedo (TO)

	Parque Estadual do Rio Preto (MG) PARNA das Sempre Vivas (MG) PARNA Grande Sertão Veredas (MG) RPPN Soluar (GO) RPPN Arara Vermelha (MG)
W. glabribracteata	Parque Estadual Serra Ricardo Franco (MT) REBIO do Jaru (RO)
W. glazioviana	APA Pedra do Elefante (ES)
W. hatschbachii	Parque Estadual do Rio Preto (MG)
W. indica	APA da Barra do Rio Mamanguape (PB) APA Mestre Álvaro (ES) APA do Rio Pacoti (CE) APP Lagoa Encantada (ES) Estação Ambiental de Peti (MG) ESEC das Águas Emendadas (DF) ESEC de Aiuaba (CE) ESEC de Caetés (PE) ESEC da Mata do Cedro (MG) ESEC do Panga (MG) ESEC do Pecém (CE) ESEC do Raso da Catarina (BA) ESEC da UFMG (MG) FLONA Araripe (CE) FLONA de Carajás (PA)

	FLONA de Negreiros (PE) Jardim Botânico de São Gonçalo do Amarante (CE) Parque Botânico do Ceará (CE) Parque Estadual de Dois Irmãos (PE) Parque Estadual das Dunas de Natal (RN) Parque Estadual de Itaúnas (ES) Parque Estadual do Mirador (MA) Parque Estadual Morro do Diabo (SP) Parque Estadual da Pedra da Boca (PB) Parque Estadual do Rio Doce (MG) Parque Estadual do Rio Preto (MG) Parque Estadual Serra dos Parecis (RO) Parque Estadual das Várzeas do Rio Ivinhema (MS) Parque Florestal da Fazendinha (AP) Parque Municipal das Mangabeiras (MG) Parque Municipal Chácara do Lessa (MG) Parque Natural Municipal do Bacaba (MT) Parque Natural Municipal Morro da Pescaria (ES) Parque Natural Municipal de Jacarenema (ES) Parque Natural Municipal da Prainha (RJ)

	PARNA do Catimbau (PE) PARNA das Emas (GO) PARNA do Iguaçu (PR) PARNA do Itatiaia (RJ) PARNA Serra da Canastra (MG) PARNA Serra da Capivara (PI) PARNA da Serra do Cipó (MG) PARNA Serra de Itabaiana (SE) PARNA de Sete Cidades (PI) PARNA do Viruá (RR) REBIO de Pedra Talhada (AL) REBIO Comboios (ES) Refúgio Ecológico Charles Darwin (PE) Reserva de Desenvolvimento Sustentável Estadual Ponta do Tubarão (RN) Reserva Natural Serra do Tomador (GO) Reserva Natural Vale (ES) RPPN Santuário da Vida Silvestre Flor das Águas (GO) RPPN Serra das Almas (CE) RPPN Soluar (GO)
W. involucrata	ESEC de Maracá (RR)
W. maritima	APA Mestre Álvaro (ES) Parque Estadual de Itaúnas (ES) Parque Estadual Paulo César Vinha (ES)

	PARNA Restinga de Jurubatiba (RJ) Reserva Ecológica de Camburi (ES) Reserva Ecológica Estadual de Jacarepiá (RJ) Reserva Ecológica Estadual de Massambaba (RJ) Reserva Estadual de Jacarenema (ES) Reserva Florestal de Linhares (ES)
W. marielleae	Parque Municipal de Bonito (PE) REBIO de Pedra Talhada (AL)
W. matogrossensis	PARNA Chapada dos Guimarães (MT)
W. petiolata	Parque Natural Municipal da Prainha (RJ)
W. polyantha	Parque Estadual Serra do Intendente (MG) PARNA Serra do Cipó (MG)
W. rotundifolia	ESEC de Aiuaba (CE) ESEC do Seridó (RN) FLONA de Assú (RN) Parque Estadual Pedra da Boca (PB) PARNA Serra da Capivara (PI) Refúgio da Vida Silvestre dos Morros de Craunã e Padre (AL) RPPN Maurício Dantas (PE) RPPN Serra das Almas (CE) RPPN Stoessel de Brito (RN)
W. selloana	PARNA da Chapada Diamantina (BA)

	PARNA Monte Pascoal (BA)
W. terminans	Parque Estadual Serra do Cabral (MG)
W. vernonioides	PARNA Chapada dos Veadeiros (GO)
W. viscosissima	Estação Florestal Cabeça de Veado (DF) FLONA do Araripe (CE) FLONA Ibura (SE) PARNA Monte Pascoal (BA) PARNA de Ubajara (CE) Parque Natural Municipal do Bacaba (MT) Parque Natural Municipal Morro da Pescaria (ES) REBIO Canabrava (GO) REBIO de Sooretama (ES) Reserva Ecológica Municipal de Bonito (PE) RPPN Nossa Senhora do Oiteiro de Maracaípe (PE) RPPN Placas (AL) RPPN Serra das Almas (CE)

5 CONCLUSÕES

O Brasil mostra-se como o principal centro de diversidade e endemismo de *Waltheria*, e esse dado é confirmado a partir das diversas novas espécies descritas para o país, bem como sobre as primeiras novas ocorrências de espécies extra brasileiras. As espécies brasileiras podem ser reconhecidas e distintas entre si mediante análise dos tipos de tricomas sobre diferentes partes da planta, morfologia das bractéolas, tipo de flor quanto a sua heterostilia, morfologia dos estigmas, morfologia e tipo de deiscência dos frutos. Os caracteres morfológicos observados nesses representantes corroboram as seções previamente propostas.

Waltheria erioclada, *W. ferruginea*, *W. glabribracteata*, *W. hatschbachii*, *W. hoehnei*, *W. mixta*, *W. petiolata* e *W. saundersiae* são conhecidas por poucos espécimes, e merecem especial atenção quanto às políticas conservacionistas, bem como de seus hábitats de preferência. Este é o primeiro estudo onde são avaliados os status de conservação dessas espécies, o que é se torna preocupante quando o número de espécies ameaçadas é avaliado em 14.

Pouco representado em estudos taxonômicos, o gênero trouxe questões nomenclaturais a serem resolvidas, o que foi possível mediando a análise dos tipos e protólogos. Quanto a morfologia, algumas espécies foram ilustradas pela primeira vez, e a delimitação taxonômica entre espécies pouco conhecidas foi elucidada. Uma atualização da distribuição geográfica dessas espécies também foi possível dada a grande quantidade de imagens de espécimes disponíveis online.

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APÊNDICE A – ARTIGO PUBLICADO NO PERIÓDICO SYSTEMATIC BOTANY 44 (3): 681-685, 2019.

A New Distylous *Waltheria* L. (Byttnerioideae, Malvaceae) From the State of Bahia, Brazil

Thales Silva Coutinho[1,2] and Marccus Alves[1]

[1]Programa de Pós-graduação em Biologia Vegetal, Departamento de Botânica, Universidade Federal de Pernambuco, CEP 50670-901, Recife-PE, Brazil.

[2]thales_scoutinho@hotmail.com

Abstract*—**A new distylous *Waltheria* species from Bahia, Brazil, is described and illustrated. ***Waltheria saundersiae is endemic to the campos rupestres from Bahia and is a shrub with erect to flexuous branches. It can be confused morphologically with *Waltheria cinerescens*, *W. maritima*, and *W. selloana*, however, it is distinguished mainly by the bark ornamentation, leaf arrangement, leaf blade margin, inflorescence position, stylar polymorphism type, calyx size and staminal tube indument.

***Keywords*—**Campos rupestres, cerrado, heterostyly, Hermannieae, taxonomy.

Heterostyly, a term used for the first time by Hildebrand (1867), refers to a genetically controlled floral polymorphism, whose two or three morphs generate flowers with different style and stamen lengths (Ganders 1979). Distylous plants have two floral forms (Ganders 1979). This condition is found in approximately 40 species of *Waltheria* L., according to Saunders (1993).

Waltheria belongs to Malvaceae (Byttnerioideae Burnett, Hermannieae DC.) (Bayer et al. 1999) and includes about 60 species with tropical and subtropical distribution, of which 53 are from the Americas and one species is pantropical (Saunders 2007). Two centers of diversity and endemism are cited for the genus, Brazil and Mexico. The Brazilian one holds the highest diversity with 21 species (BFG 2015; Saunders 2005, 2007). Within Brazil, the highest richness is registered to Serra do Espinhaço in Minas Gerais and Bahia states, the latter one with 13

species (BFG 2015; Saunders 1995). The Espinhaço Range includes the remarkable campos rupestres, which stand out for their endemic flora, geography, geology and climate (Giulietti & Pirani 1988). According to Rapini et al. (2008), many new taxa have been discovered from floristic surveys in *campo rupestre* areas, showing their importance to plant diversity studies in Brazil.

Species of *Waltheria* are characterized as having simple, stipulate leaves, with a serrate, dentate or crenulate margin; cymose and clustered inflorescences with four bracts surrounding two flowers, which are often sessile, hypogynous, distylous or homostylous. The calyx is valvate and gamosepalous with five sepals and the corolla is yellow with five petals distinct or adnate to the base of the stamen tube and lacking staminodes. The filaments of the five stamens are connate in a staminal tube and the single pistil holds an eccentric or lateral style and a penicillate or capitate-penicillate stigma. Fruits are single-seeded capsules with an accrescent calyx and loculicidal, bivalvate or operculate dehiscence (Saunders 1995, 2007).

Schumann (1886) provided a broad review of the Brazilian species, recognizing 26 species distributed in two sections: *Waltheria* sect. *Stegowaltheria* K. Shum. with two species and *W.* sect. *Waltheria* (as *Euwaltheria*) with the remaining ones. His infra-generic proposal was based on capsule dehiscence, seed indument and flower size. Saunders (1995), in a taxonomic revision of *Waltheria*, organized the species within three subgenera (*W.* subg. *Pringlei* J. G. Saunders, *W.* subg. *Virgata* J. G. Saunders and *W.* subg. *Waltheria*), two sections, five alliances and five species groups. She reinforced the number of pollen apertures and some fruit characters as essential to the infra-generic classification. However, it is still unclear if the groups defined in these classifications are monophyletic because of the low sampling of the genus in phylogenetic studies (Alverson et al. 1999; Whitlock et al. 2001).

During a taxonomic revision of Brazilian species by the first author, a new *Waltheria* was collected on rocky outcrops, in the municipality of Morro do Chapéu (Bahia state, Brazil). The new species is here described and illustrated. Morphological comparisons to allied species, geographical distribution, ecological data, and suggestions about its conservation status are also provided as well as an identification key to the species of *Waltheria* found in the *campos rupestres* of the Espinhaço Range in Brazil.

TAXONOMIC TREATMENT

Waltheria saundersiae T. S. Coutinho & M. Alves, sp. nov. TYPE: BRAZIL. Bahia: Morro do Chapéu, Rio Ferro Doido, 11°37'34"S, 41°00'14"W, 898 m, 01 Sep 2017 (fl., fr.), *T. S. Coutinho & M. Alves 238* (holotype: UFP!; isotypes: HUEFS!, K!, RB!).

Waltheria saundersiae is morphologically close to *Waltheria cinerescens* A.St.-Hil., *W. maritima* A. St.-Hil. and *W. selloana* K. Schum. by the branch indument, stipule shape, leaf shape, and arrangement of the teeth along the margin. It can be differentiated by having leaves along branches (vs. apically), inconspicuous teeth along the leaf margins (vs. conspicuous teeth), narrowly elliptical bracts (vs. linear, narrowly lanceolate or lanceolate) and axillary inflorescences (vs. terminal).

Shrubs ca. 1.50−1.60 m tall. Branches flexuous to erect, terete, becoming flat toward apex, strigose, trichomes stellate, yellow, sessile, trichomes glandular, sessile; bark reddish when fresh, not resinous. Stipules 4−5 × 0.8 mm, narrowly triangular, base truncate, apex acute, margins ciliate, adaxial surface sparsely strigose, trichomes stellate and glandular, abaxial surface glabrescent, trichomes 2−3-fid and glandular. Leaves alternate, spirally arranged along the branches; petioles 0.3−0.5 cm long, canaliculate, compressed, scabrous, trichomes stellate and glandular; leaf blades 1.5−3 × 1.7−3.5 cm, chartaceous, circular, oblate to transversely elliptical, base truncate to obscurely cordate, apex retuse to truncate, margin undulate when fresh, plane when dried, irregularly serrate from 0.4−1 cm above the base, teeth inconspicuous, ca. 1 × 0.4 mm, strigose, trichomes sessile, stellate, ray appressed, glandular; venation actinodromous, 4−5 pairs of secondary veins, 2 ones basal. Inflorescence cymose, corymbiform, axillary; sessile to pedunculate, 1.2−4.6 cm long, scabrous to hispid, trichomes similar to those on the branches; bracts 9−11 × 0.9−3 mm, narrowly elliptical, apex acute, entire to bifid, adaxial surface sericeous, abaxial surface strigose, hirsute on veins; 1−4-nerved. Flowers distylous, sessile, 7.5−8 mm long; bracteoles ca. 10 × 0.8 mm, linear, apex acute, entire, indument and trichomes similar to those on the bracts; calyx 5-merous, gamosepalous, reddish when fresh, 6.5−8.5 × 3.5−4 mm, tubular-campanulate, 10-ribbed, externally strigose, scabrous to hirsute along the vein, trichomes sessile, stellate, glandular and 2−3-fid, internally glabrous, tomentose on free lobes, trichomes simple and 2−3-fid, free lobes 2.6−4 × 1.4−2 mm, apex acute; corolla 5-merous, gamopetalous, bright yellow, tube ca. 1 mm long, petals 6.8−8 × 2.6−2.8 mm, spatulate, apex rounded, ciliate, adaxial surface villous above the claw, abaxial surface glabrous; stamens fully or partially connate into a staminal tube, glabrous, papillose apically, anthers dithecous, thecae parallel, dehiscence longitudinal; ovary obovoid, sericeous

apically, trichomes simple and 2−3-fid, style lateral, tomentose, trichomes stellate, sessile, ray appressed, stigma round-penicillate; **longistylous form:** stamens ca. 4.5 mm long, staminal tube ca. 3.3 mm long, free filaments absent, anthers ca. 1.5 mm long, pistil ca. 8 mm long, ovary 1 × 0.8 mm, style ca. 5 mm long, stigma ca. 1.1 mm long; **brevistylous form:** stamens ca. 8 mm long, staminal tube 3.7−4 mm long, free filaments ca. 3.4 mm long, anthers ca. 1.5 mm long, pistil ca. 6.5 mm long, ovary 1.6 × 1.2 mm, style ca. 4.6 mm long, stigma ca. 1.8 mm. Capsule ca. 4 × 2.5 mm, obtrianguloid, membranaceous, apex truncate, base glabrous, apex hirsute, trichomes 2−3-fid, stellate, dehiscence loculicidal; seed solitary, 3.2 × 2 mm, obovoid, brownish, glabrous, apex crenulate. Figures 1, 2; Table 1.

Distribution and Habitat*—Waltheria saundersiae* is known only from the type locality, although from various collections, in the municipality of Morro do Chapéu, state of Bahia, northeastern Brazil (Fig. 3). The area is part of the Diamantina Plateau region (Espinhaço Range), reaching up to 1300 m elevation (Rocha and Costa 1995). It is characterized by savanna (caatinga, cerrado and campos rupestres) and forest vegetation (Atlantic Forest) (Silva 1995). *Waltheria saundersiae* is found at about 900 m elevation, in *Campo Rupestre*, which is characterized by rocky outcrops with litholic soils and quartz sand (Silva 1995). Several other species of *Waltheria* are also found in the region, such as *W. ackermanniana* K. Schum., *W. albicans* Turcz., *W. brachypetala* Turcz., *W. cinerescens* A. St.-Hil., *W. indica* L., *W. macropoda* Turcz., *W. operculata* Rose and *W. rotundifolia* Schrank. However, *W. saundersiae* was observed growing sympatrically only with *W. indica* and *W. rotundifolia*.

***Etymology*—**The specific epithet honors Dr. Janice Saunders, an American botanist who has contributed greatly to the taxonomic knowledge of *Waltheria*.

***Phenology*—**The species was collected in flower in May and September and in fruit in September.

***Conservation*—**According to the IUCN red list criteria (IUCN 2017), *Waltheria saundersiae* is preliminary assessed here as critically endangered (CR; B2a, B2biii and D). The species is known only from one locality and occurs close to roads in open environments with intense tourism activities. It is assessed as B2 and D, because its occupancy area is estimated to be less than 10 km^2 and population size less than 50 individuals, respectively.

Notes*—*Waltheria saundersiae belongs to *Waltheria* sect. *Waltheria* (as *Euwaltheria*) which is based mainly on the loculicidal dehiscence (vs. operculate dehiscence in *W.* sect. *Stegowaltheria*) and glabrous seed (vs. seed with indument). Schumann (1886) also used flower size (up to 7 mm length) as a diagnostic character for the section, however, *Waltheria saundersiae* has flowers about 7.5−8 mm long and would not be in this section based on this character.

Saunders (1995) proposed an infra-generic classification of *Waltheria* based on capsule morphology. Following her classification, *W. saundersiae* can be included in *W.* subg. *Waltheria* because of its obtrianguloid capsule (vs. obovoid in *W.* subg. *Pringlei* J.G. Saunders) and truncate apex (vs. round apex). In this paper we prefer not to place the new species in any of the species alliances proposed by Saunders (1995) because they are informal taxonomic units, and for some of them Saunders did not indicate any clear synapomorphies.

Waltheria saundersiae resembles *W. cinerescens*, *W. maritima* and *W. selloana*. They share branches with stellate and sessile trichomes, leaf blades with a rounded, truncate to retuse apex and serrate to dentate margins from 0.4 cm above the base, besides the linear to linear-triangular stipules. However, a set of morphological characters (Table 1) can distinguish *W. saundersiae* from the three species above.

Waltheria saundersiae has often been misidentified as *W. cinerescens* in herbarium collections, but it can be distinguished from the latter by the leaf arrangement along branches, not resinous bark, slightly serrate leaf blade margins, teeth ca. 1 × 0.4 mm, axillary inflorescences, calyx 3.5−4 mm wide, narrowly elliptical bracts and glabrous staminal tube (vs. apical leaves, resinous bark, leaf blade margins coarsely dentate, teeth 5−10 × 2.5−4 mm, terminal inflorescences, calyx 2−2.4 mm, linear bracts and villous staminal tube in *W. cinerescens*).

Waltheria maritima and *W. saundersiae* are allopatric, with the former species occurring in Rio de Janeiro and Espírito Santo states (Southeast region) and the latter in Bahia state (Northeast region). They can be distinguished by several characters (Table 1).

Waltheria saundersiae can be readily distinguished from *W. selloana* by the same set of characters cited above (Table 1). However, *Waltheria selloana* can have homostylous or heterostylous flowers in different plants. Therefore, a specimen of *W. selloana* with homostylous flowers can easily be distinguished from *W. saundersiae*, which always has heterostylous flowers.

***Additional Specimens Examined (Paratypes)*—Brazil**. BAHIA: Morro do Chapéu, Cachoeira do Ferro Doido, 11°37'69"S, 41°00'05" W, 23 May 2008 (fl.), *N. Roque 1778 & alunos de botânica III* (ALCB); BR052, vizinhança da ponte sobre Rio Ferro Doido, ca. 18 km a leste de Morro do Chapéu, ca. 1000 m, 17 Jun 1981 (fl., fr.), *S. A. Mori & B. M. Boom s.n.* (RB 14494); Rio Ferro Doido, 11°37'34"S, 41°00'14"W, 898 m, 1 Sep 2017 (fl., fr.), *T. S. Coutinho & M. Alves 236* (UFP); 11°37'69"S, 41°00'05"W, s.d. (fl.), *N. Roque 1115 & alunos de botânica III* (ALCB).

KEY TO SPECIES OF *WALTHERIA* FROM CAMPOS RUPESTRES OF THE ESPINHAÇO RANGE, BRAZIL

1. Only simple trichomes on the branches and leaves *W. operculata*
1. Trichomes on branches and leaves usually stellate, never simple 2
2. Branches and leaves sticky *W. viscosissima* A.St.-Hil.
2. Branches and leaves never sticky 3
3. Leaf margins serrate or dentate above the base or post-medially 4
3. Leaf margins serrate along the entire length of the leaf blade 7
4. Leaves along the branches; inflorescences axillary 5
4. Leaves arranged near the apex of the branches; inflorescences terminal 6
5. Branches and leaves strigose; leaf margins inconspicuously serrate; bracts narrowly elliptical *W. saundersiae*
5. Branches and leaves tomentose; leaf margins coarsely serrate or dentate; bracts linear *W. rotundifolia*
6. Blade leaf > 3 cm long, teeth ≥ 5 mm long; staminal tube villous *W. cinerescens*
6. Blade leaf < 2 cm long, teeth ≤ 2.5 mm long; staminal tube glabrous *W. selloana*
7. Erect branches; branches without glandular trichomes 8
7. Decumbent branches; branches with glandular trichomes 9
8. Branches with hyaline to yellowish-white trichomes; inflorescences axillary, erect; flowers homostylous *W. indica*
8. Branches with ferruginous trichomes; inflorescences terminal, flexuous; flowers heterostylous *W. polyantha* K. Schum.
9. Bark smooth; leaf blades ovate to widely ovate, concolorous *W. albicans*
9. Bark corrugate-verrucose; leaf blades elliptical to widely elliptical, discolorous *W. ackermanniana*

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AUTHOR CONTRIBUTIONS

Coutinho and Alves conceived and conducted the study; Coutinho wrote the manuscript with input from Alves.

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TABLE 1. Comparison of the morphological characters of *Waltheria saundersiae* T.S. Coutinho & M. Alves and morphologically related species.

	Species			
Morphological characters	***W. saundersiae* T.S. Coutinho & M. Alves**	***W. cinerescens* A. St.-Hil.**	***W. maritima* A. St.-Hil.**	***W. selloana* K. Schum.**
Bark	Not resinous	Resinous	Resinous	Resinous
Leaf arrangement on the branches	Distributed	Apical	Apical	Apical
Leaf blade size (cm)	1.7−3 × 1.7−3.5	3.3−9(−14.7) × 3−9.2 (−12)	0.4−1.8 (−2.6) × 0.2−1.6 (−2.5)	0.5−1.8 × 0.4−1.4
Leaf teeth (margins)	Slightly serrate	Coarsely dentate	Coarsely dentate	Coarsely dentate
Teeth size (mm)	1 × 0.4	5−10 × 2.5−4	1.5−3 × 0.9−1.8	1−2 × 0.4−0.6
Inflorescence position	Axillary	Terminal	Terminal	Terminal
Flower type	Heterostylous	Heterostylous	Homostylous	Homostylous and heterostylous
Calyx size (mm)	6.5 × 3.5−4	6.2−7 × 2−2.4	1.5−2.5 × (0.7−)1.1−1.2	(3−)3.4−5 × 1.6−3.2
Bract shape	Narrowly elliptical	Linear	Narrowly lanceolate to lanceolate	Lanceolate or linear
Staminal tube indument	Glabrous	Villous	Glabrous to sparsely pubescent	Glabrous

Capsule shape	Obtrianguloid	Obtrianguloid	Obtrianguloid	Obovoid
Capsule apex	Truncate	Truncate	Truncate	Round

FIG. 1. *Waltheria saundersiae* T. S. Coutinho & M. Alves. A. Habit. B. Glandular and stellate trichomes on leaf blade. C. Brevistylous flower. D. Longistylous flower. E. Bracts. F. Calyx. G. bifid and 3-fid trichomes. H. Internal surface of the free lobe of the calyx showing the veins. I. Abaxial surface of the petal. J. Staminal tube of the brevistylous flower. K. Staminal tube of the longistylous flower. L. Longitudinal section of the staminal tube of the brevistylous flower evidencing pistil. M. Pistil of the longistylous flower. N. Fruit. O. Seed. A−C, I, J, L, N, O from *T. S. Coutinho & M. Alves 236* (UFP - paratype); D−H, K, M from *T. S. Coutinho & M. Alves 238 (UFP* – holotype*)*. Drawn by R. Carvalho.

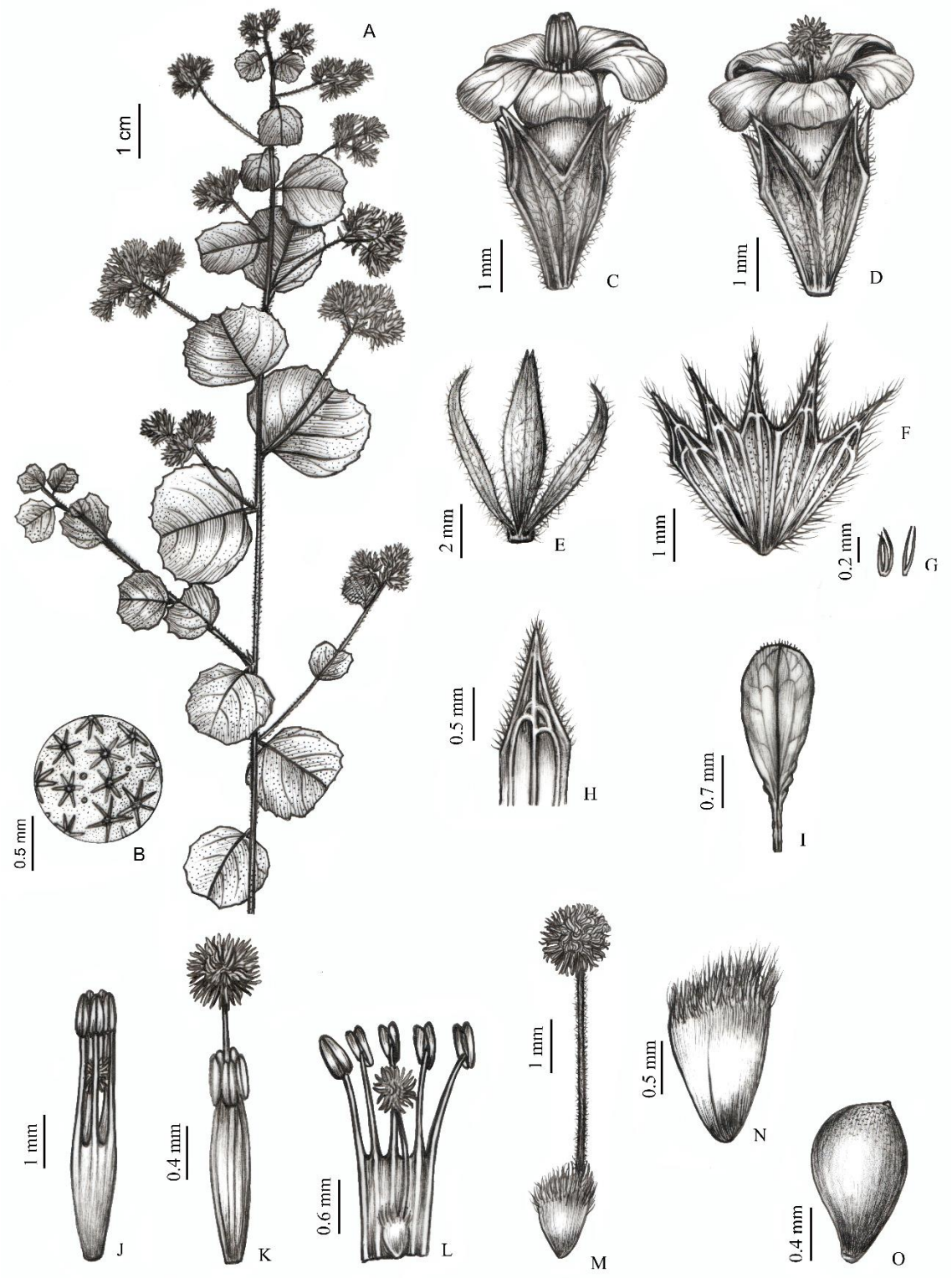


FIG. 2. *Waltheria saundersiae* T. S. Coutinho & M. Alves. A. Habit. B. Branch with an inflorescence. C. Bark. D. Longistylous flowers (arrow indicating the stigma). E. Brevistylous flowers (arrow indicating the stamens). F. Fruit and seed of the brevistylous flower. A-E from

T. S. Coutinho & M. Alves 238 (holotype – UFP); F from *T. S. Coutinho & M. Alves 236* (paratype – UFP). Photographs by T. S. Coutinho.

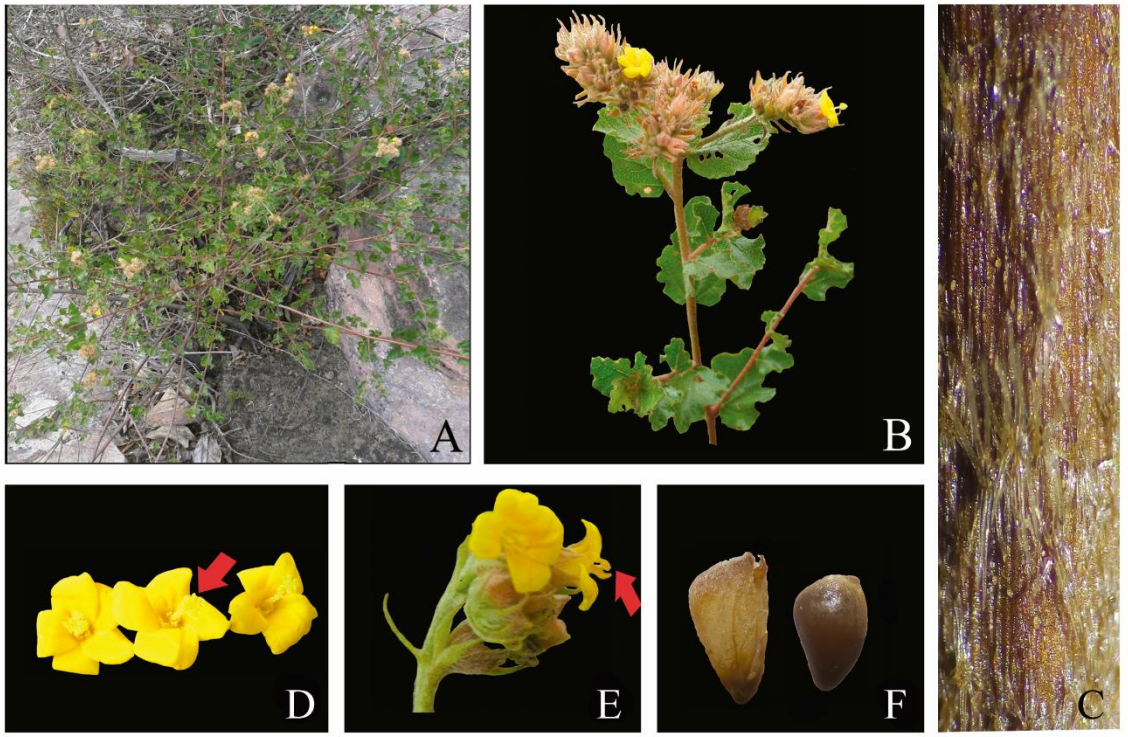
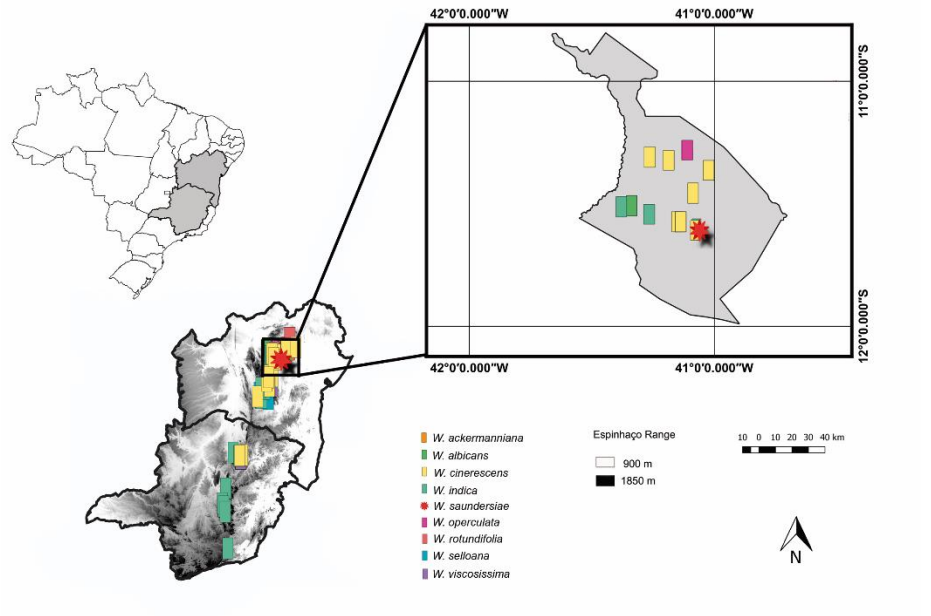


FIG. 3. Geographical distribution of *Waltheria saundersiae* T. S. Coutinho & M. Alves and other species occurring in *Campos Rupestres* of the Espinhaço Range with a detail of the municipality of Morro do Chapéu, Bahia. Map based on coordinates of selected specimens.



APÊNDICE B – ARTIGO PUBLICADO NO PERIÓDICO REVISTA MEXICANA DE BIODIVERSIDAD 90: e902821, 2019.

Primer registro de *Waltheria glomerata* (Malvaceae) para Brasil

First record of *Waltheria glomerata* (Malvaceae) to Brazil

Thales Silva Coutinho[a,*], Lucia Marín Perez[a] e Marccus Alves[b]

[a]Programa de Pósgraduación en Biologia Vegetal, Departamento de Botânica, Universidade Federal de Pernambuco, Brasil.

[b]Departamento de Botânica, Universidade Federal de Pernambuco, Brasil.

[*]thales_scoutinho@hotmail.com

Resumen

Waltheria glomerata C. Presl. (Malvaceae) se registra por primera vez en Brasil, en el estado de Mato Grosso. Se conocía de México, El Salvador, Nicaragua, Costa Rica, Panamá y Colombia, se amplía su área de ocurrencia para el dominio amazónico brasileño. Este trabajo incluye la descripción de la especie, comentarios taxonómicos, mapa de distribución, ilustración y clave de identificación para las especies presentes en el estado de Mato Grosso, Brasil.

Palabras clave: Byttnerioideae; Brasil central; distribución geográfica; Hermannieae.

Abstract

Waltheria glomerata C. Presl. (Malvaceae) is recorded by first time to Brasil in the state of Mato Grosso. Previously known only to Mexico, El Salvador, Nicaragua, Costa Ryca, Panama and Colombia, its occurrence area is now expanded to the Brazilian Amazonian domain. This study includes description of the species, taxonomic comments, distribution map, illustration and identification key to the species which occurs in Mato Grosso state, Brazil.

Key-words: Byttnerioideae; Central Brazil; Geographic distribution; Hermannieae.

Introducción

Malvaceae pertenece a Malvales (APG IV, 2016) y está representada por aproximadamente 4300 especies y 243 géneros (Bayer y Kubitzki, 2003). En Brasil, la familia ocupa el décimo lugar por su riqueza de especies (BFG, 2015). *Waltheria* L. se incluye en la subfamilia Byttnerioideae y tribu Hermannieae (Bayer et al., 1999), y cuenta con cerca de 60 especies, 53 presentes en el continente Americano (Saunders, 2007).

Waltheria está representado por 21 especies en Brasil, de las cuales 13 son endémicas del país y 4 habitan en la Amazonia (BFG, 2015), siendo *Waltheria involucrata* Benth., la única endémica de este dominio. Apenas 6 especies de *Waltheria* son citadas para el estado de Mato Grosso: *Waltheria bracteosa* A. St.-Hil. & Naudin, *W. communis* A. St.-Hil., *W. indica* L., *W. operculata* Rose, *W. vernonioides* R.E.Fr. y *W. viscosissima* A. St.-Hil.

Con los avances de estudios taxonómicos de *Waltheria* en Brasil realizados por el primer autor de este artículo, *W. glomerata* fue registrada para el estado de Mato Grosso. Siendo el objetivo de este articulo presentar el primer registro de esta especie para el territorio brasileño, acompañado de datos referentes a la distribución geográfica, ilustración de caracteres diagnósticos, comentarios taxonómicos y una clave de identificación con las especies presentes en el estado.

Materiales y métodos

Durante la preparación del tratamiento taxonómico de las especies brasileñas de *Waltheria* a través de coletas y visitas a herbarios nacionales (ASE, CEN*, EAC, EAN, HCDAL, HPISF*, HUVA, HST, HSTA*, IPA, JPB, MAC, MBM*, MOSS, MUFAL, PEUFR, R, RB, RFA, RN, SJRP, SP, SPF, UEC, UFRN, UFMT*; *imágenes), un espécimen depositado en el herbario EAC fue diagnosticado e identificado apenas a nivel genérico, seguido de análisis y re-identificación a partir de protólogos e imágenes online de los especímenes-tipo de los taxones del género.

La descripción aquí presentada fue elaborada con base en el ejemplar depositado en el herbario EAC (Thiers, 2018), siguiendo la terminología morfológica propuesta en Harris & Harris (2001) para los tipos de indumento, Radford et al. (1974) para forma de estructuras y Hickey (1973) para tipos de venación. *Waltheria glomerata* es una especie con flores distilas, sin embargo, solo las flores brevistilas son disponibles en la muestra. El mapa de distribución geográfica fue elaborado usando el software Q-Gis, con coordenadas extraídas de Google Earth, de la ciudad de Matupá donde el espécimen fue colectado. La clave de identificación se elaboró unicamente a partir de material de los herbarios visitados. La ilustración fue realizada a mano libre.

Descripción

***Waltheria glomerata* C. Presl.**, Reliq. Haenk. 2: 152. 1835. (Fig. 1).

Subarbusto ca. 2.5 m de altura. Xilopódio no observado. Ramas escabrosas, tricomas estrellados, sésiles. Estipulas caducas. Hojas alternas, dísticas, distribuidas a lo largo de las ramas; pecíolo 0.4–0.8 cm de largo, escabro; lámina 7.2–13.3 × 3.0–5.3 cm, cartácea, elíptica a romboidal, base redondeada, ápice agudo, márgenes cerradas, cara adaxial pubescente, abaxial canescente, tricomas estrellados; venación actinódroma, 8–11 pares de nervaduras secundarias, nervaduras terciarias reticuladas, bien visibles en la parte abaxial. Inflorescencia cimosa, glomeruliforme, axilar, subsésil, pedúnculo ca. 3.0 mm de largo, escabro; brácteas 1–2, 6.0–7.1 mm de largo, 2–3-partidas, fundidas hasta ca. 2.3–4.0 mm de largo, ápice agudo, pubescente, bractéolas ca. 4.5 × 1.0 mm, ápice agudo pubescente. Flores sésiles; forma brevistila: cáliz gamosépalo, pentámero, 6.0-7.0 × 2.5–3.5 mm, externamente seríceo, tricomas corto-estrellados densamente distribuidos, largo-estrellados dispersos, lóbulos libres 2.0–3.0 × 1.5 mm; corola gamopétala, pentámera, soldada hasta ca. 0.5 mm de largo, pétalos 3.8–4.0 × 1.8 mm, espatulados, ápice redondo, eciliado, glabras; estambres 5.0 mm largo, tubo 0.5–0.8 mm largo, filamentos libres ca. 3.5–4.5 mm de largo, antera 1.2-1.3 de largo; pistilo 4.0–4.5 mm de largo, ovario ca. 1.3 mm de largo, seríceo, estilete ca. 1.6 mm de largo, lateral tomentoso, tricomas estrellados, estigma 1.1 mm largo, subclavado; forma longistila: no observada. Frutos: no observados.

Material examinado: Brasil: Mato Grosso: Matupá, margen de la BR-080 [10°03’27’’ S, 54º55’58’’ W, 280 m], fl., 03 jun. 1997, L. *Amorim Neto y equipe/F.N.S. s.n.* (EAC31206).

Material adicional examinado: Panamá: Local desconocido, fl., s.d., *Haenke s.n.* (holotipo, MO3264404 [fotografía]).

Distribución y hábitat.

Saunders (1993, 1995) citó la ocurrencia de *Waltheria glomerata* para México, El Salvador, Nicaragua, Costa Rica, Panamá y Colombia. Puede ser encontrada en diversos tipos de vegetación como sabana, bosques mixtos secos, bosques pluviales y en áreas perturbadas como pastizales (Saunders, 1995). En este trabajo, es realizado el primer registro de *Waltheria glomerata* para Brasil encontrada en el estado de Mato Grosso (Fig. 2). La especie habita los bosques ombrófilos submontanos abiertos (Borges et al., 2014; IBGE, 2004), a cerca de 280 m de elevación, siendo también el primer registro para este tipo de vegetación. Esta vegetación puede ser comparada a los llamados bosques tropicales de Rzedowski (2006) para México, y los bosques tropicales pluviales e semideciduos de Greller (2000) para América Central.

El espécimen fue colectado en área antrópica, ocurriendo en las márgenes de una carretera. En las búsquedas (muestras online o herborizadas en herbarios) por coletas en el municipio de Matupá, donde el espécimen es registrado, no fue encontrada ningún otro ejemplar de *Waltheria.*

Comentarios taxonómicos

Waltheria glomerata fue descripta teniendo como base un espécimen proveniente de Panamá (Presl, 1835) y caracterizado como un arbusto con hojas de lámina ovalada-elíptica,

inflorescencia axilar, sésil y glomeruliforme y brácteas 2-3-lobadas. La especie es reconocida por sus hojas de lámina foliar elíptica a romboide, con venación reticulada bien visible en la cara abaxial e inflorescencia sésil a subsésil, glomeruliforme y flores fuertemente congestas. Standley (1920) y Saunders (1993, 1995) hacen mención a la corola de color albo. La muestra analizada presenta en la etiqueta color amarillento para las flores. Futuras observaciones en campo deberán ser realizados y podrán esclarecer esta cuestión.

El ejemplar analizado posee flores brevistilias, sin embargo, Saunders (1995) señaló que las flores longistilias son semejantes a éstas, difiriendo unicamente en caracteres del androceo y gineceo en relación a las dimensiones de las estructuras y fusión del tubo estaminal.

Considerando la proximidad morfológica con *W. berteroi* (Spreng.) J.G. Saunders (Colombia y Venezuela; Saunders, 2005), *W. lanceolata* R. Br. ex Mast. (Continente Africano; Saunders, 1993) y *W. involucrata* Benth. (Brasil; BFG, 2015), *W. glomerata* puede ser fácilmente distinguida, incluso en fase vegetativa (Saunders, 1995). Esto se debe a la lámina foliar elíptica a rómbica y cara abaxial con nervuras terciarias de disposición reticulada. En Brasil, a pesar de ser citada en este estudio por primera vez, *Waltheria glomerata*, es alopátrica en relación con *W. involucrata* que ocurre unicamente en los estados de Roraima, Amazonas, Acre y Rondonia.

Clave para las especies de *Waltheria* presentes en el Centro Oeste de Brasil

1. Plantas con apenas tricomas simples en las ramas y hojas……..……...…….....….. 2

1´. Plantas con tricomas estrellados e/o glandulares en las ramas y hojas……..…….....… 3

2. Hierbas postradas; ramas hirsutas; flores distilas…….....……. *W. bracteosa*

2´. Hierbas erectas; ramas sedosas; flores homostilas……..……..…..….....…. *W. operculata*

3. Tricomas glandulares presentes …….....……. 4

4. Ramas y hojas con aspecto adhesivo; ápice de la lámina foliar acuminado ……..…….…….…….....….. *W. viscossissima*

4´. Ramas y hojas sin aspecto adhesivo; ápice da lamina foliar agudo a levemente redondeado …….....… *W. albicans*

3´. Tricomas glandulares ausentes……..…….....…….... 4

5. Inflorescencia terminal…….....……. *W. communis*

5´. Inflorescencia axilar……..……..…….....…….. 6

6. Flores homostilas……..……..…….....……. *W. indica*

6´. Flores distilas ……..…….....….. 7

7. Hierbas; lámina foliar < 4 cm largo……..…….....…….. *W. vernonioides*

7´. Subarbusto; lámina foliar > 7 cm largo…..…….…….....….. *W. glomerata*

Discusión

Con el nuevo registro de *Waltheria glomerata* para Brasil, el país se mantiene como el centro de diversidad del género, totalizando ahora 23 especies con base en BGF (2015) y pasando a contar con siete de ellas en el estado de Mato Grosso.

El color de la corola merece ser atentamente analizado en muestras herborizadas y siempre que sea posible registrada en las etiquetas de coleta, ya que en caso de ser confirmado lo indicado por Saunders (1995), es un estado de carácter único en el género. Investigaciones de campo, además de visitas a herbarios permitirán confirmar la existencia de individuos con flores longistilas. A pesar de haber sido revisado por Saunders (1995), estudios taxonómicos en *Waltheria* son fundamentales, ya que permiten elucidar cuestiones de cuño morfológico, taxonómico, de nomenclatura y ocurrencia que todavía no se han resuelto en el grupo.

Waltheria glomerata fue colectada en las márgenes de la carretera BR-080, lo que corrobora las observaciones de Saunders (1995) en lo que refiere a la preferencia de hábitat de la especie por ambientes antropizados.

Agradecimientos

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Figura 1. Ilustración de *Waltheria glomerata* C. Presl. A, Hábito; B, Cara abaxial de la hoja; C, Bráctea; D, Cara interna de un sépalo; E, Cara adaxial del pétalo; F, estambres; G, pistilo. (Ilustración elaborada a partir de *L. Amorim Neto 646*).

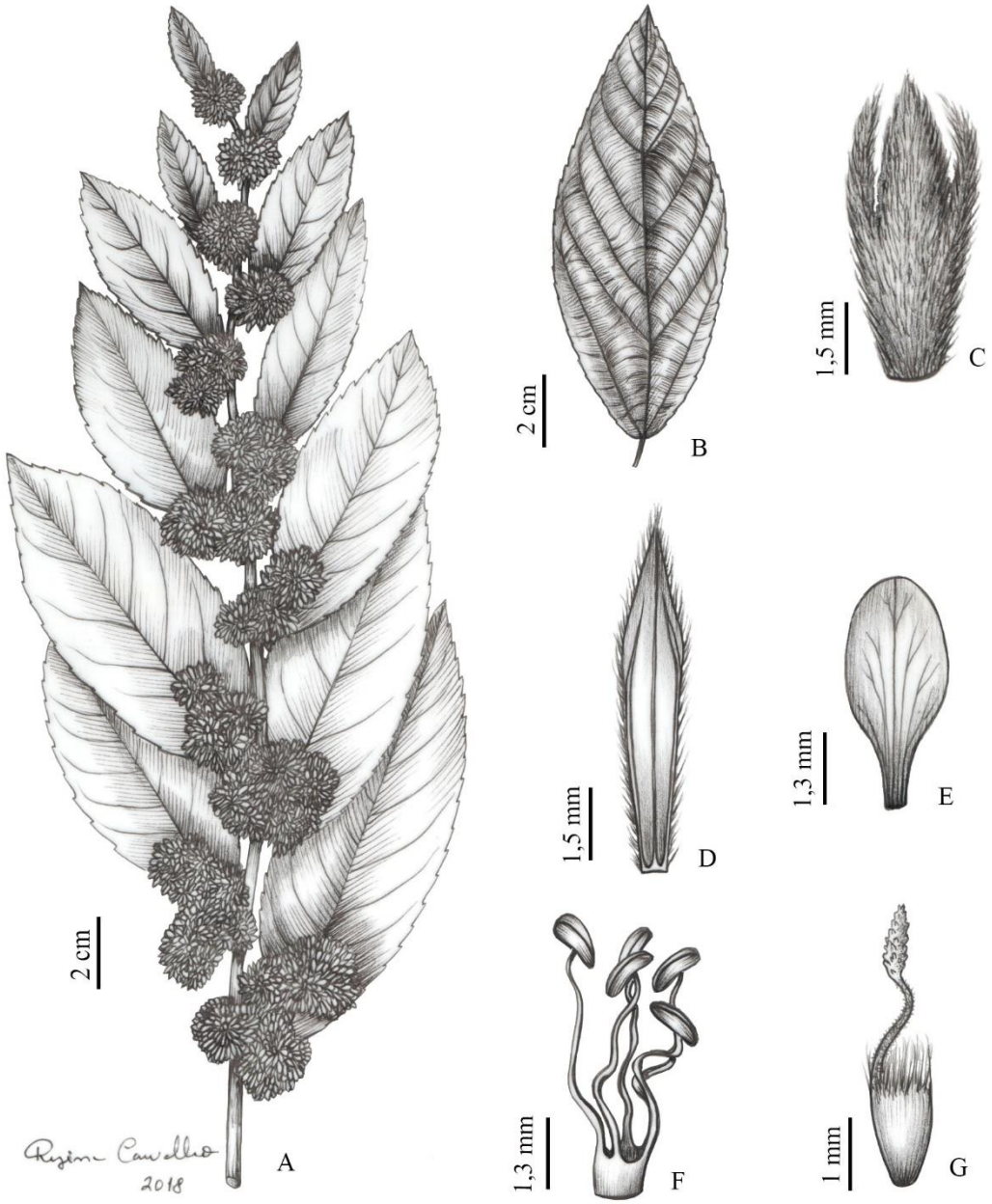
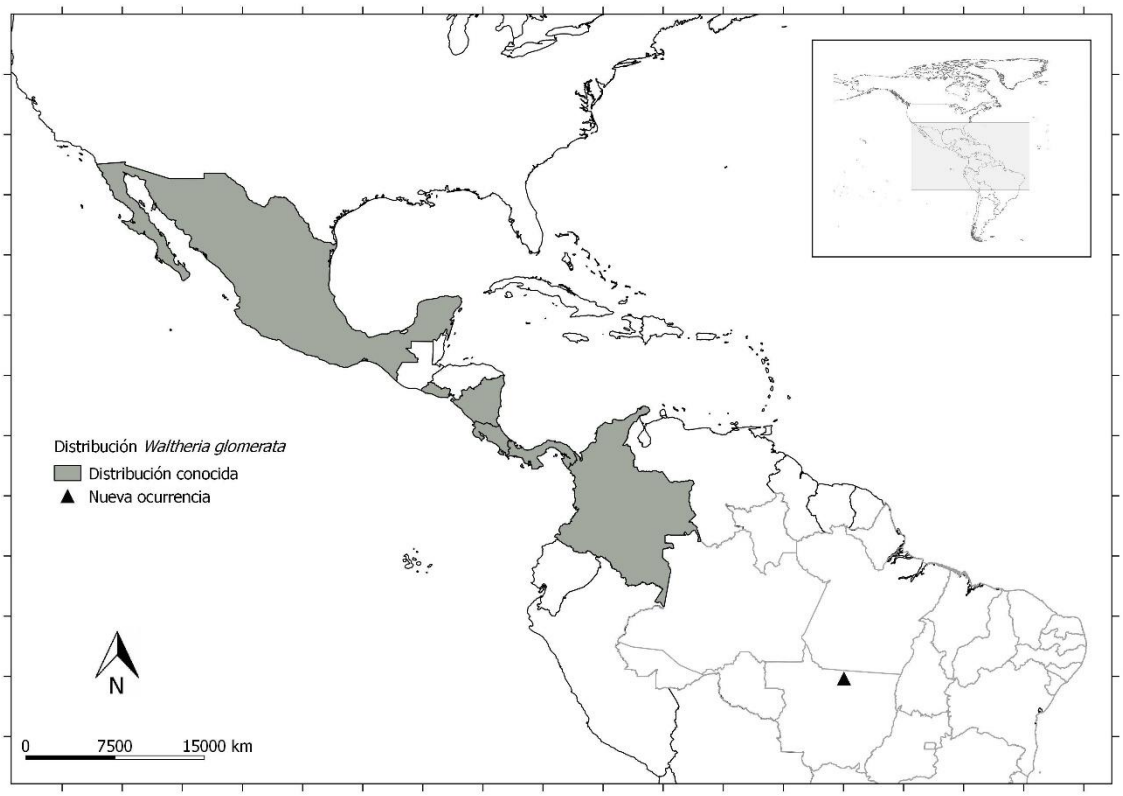


Figura 2. Distribución geográfica de *Waltheria glomerata* C. Presl.


Distribución *Waltheria glomerata*
Distribución conocida
Nueva ocurrencia
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APÊNDICE C – ARTIGO PUBLICADO NO PERIÓDICO PHYTOTAXA 430 (4): 294-299, 2020.

Waltheria glabribracteata (Byttnerioideae, Malvaceae), a new species with elongate-plumose stigmas from South America

THALES SILVA COUTINHO[1] & MARCCUS ALVES[2]

[1]*Programa de Pós-graduação em Biologia Vegetal, Departamento de Botânica, Universidade Federal de Pernambuco, CEP 50670-901, Recife-PE, Brazil. E-mail: thales_scoutinho@hotmail.com*

[2]*Departamento de Botânica, Universidade Federal de Pernambuco, CEP 50670-901, Recife-PE, Brazil. E-mail: alves.marccus@gmail.com*

Abstract

A new *Waltheria* species (Malvaceae) is described and illustrated here. *Waltheria glabribracteata* is known from *ecotone* areas in Brazil and Bolivia and can be readily distinguished from other *Waltheria* species by its bracts which are glabrous on the adaxial surface. This study presents a description of the new taxon, taxonomic comments, a distribution map, conservation status and an illustration.

Keywords: Ecotone, Glabrous bracts, Hermannieae, Malvales, Taxonomy.

Introduction

Waltheria Linnaeus (1753: 673) is a genus of Byttnerioideae (Malvaceae) characterized by herbaceous, subshrubby to shrubby habits, stipules present, axillary or terminal inflorescences, heterostyly, bracts surrounding two sessile flowers, plane petals, five stamens, with filaments connate into a staminal tube and only one carpel. The stigma in *Waltheria* is called penicillate, and in Saunders (1993) its morphology was used to classify species into groups, especially Mexican ones. The four types of stigmas found in *Waltheria* are fan-plumose, elongate-plumose, clavate and filiform and species are categorized according to the size and disposition of the stigmatic branches (or papillae) on the style.

The genus comprises approximately 60 species, 53 of them restricted to the Americas (Saunders 2011). Brazil is considered the main diversity center for *Waltheria*, with 24 species (Coutinho & Alves 2019, Saunders 2007, Silva-Coutinho *et al.* 2019), Schumann (1886) and Saunders (1995a, unpublished) have prepared the most comprehensive taxonomic studies of the genus for the country. However, Saunders work was never published. After these studies, some new data have come out and the genus has become better known mainly in northeastern and southeastern Brazil (Amorim *et al.* 2009, Amorim 2012; Cruz & Esteves 2009; Saunders 1995b). In addition to Brazil, in South America the genus has been taxonomically studied in the Venezuelan Guayana (Saunders 2005), Venezuela (Rondón 2008, Rondón & Campos 2007), Paraguay (Saunders 2007) and Argentina (IBONE 2018). However, knowledge about the genus is still incipient for Bolivia, where only five species are recorded (Saunders 1995a, unpublished).

During the preparation of the taxonomic study about Brazilian *Waltheria* species by the first author, a new species from Brazil and Bolivia was discovered in herbarium collections.

Methods

This study was based on the analysis of the collections at ASE*, CEN*, CTES, EAC, EAN, ESA, HCDAL, HPISF*, HST [Sérgio Tavares Herbarium of the Universidade Federal Rural de Pernambuco; no indexed], HTSA*, HUVA, IPA, INPA*, JPB, MAC, MBM, MOSS, MUFAL, PEUFR, R, RB, RN, RFA, SI, SJRP, SP, SPF, UB*, UFP, UFRN, UEC, UPCB; acronyms follow Thiers 2019; *digital images). Morphological studies were carried out under a stereomicroscope. Morphological terminology follows Harris & Harris (2001) and Radford (1998), and the type of stigma is according to Saunders (1993). The distribution map was made by QGis, version 3.0.1, with coordinates extracted from exsiccate labels or, when absent, based on data from Google Earth. The conservation status is assessed based on IUCN (2012) criteria and was also analyzed using the GeoCat Tool (Bachman *et al.* 2011).

Taxonomic treatment

Waltheria glabribracteata T.S. Coutinho & M. Alves, *sp. nov.* (Figure 1).

Type:—BRAZIL. Mato Grosso: Vila Bela da Santíssima Trindade, Serra de Ricardo Franco, topo da Cachoeira do Jatobá, 650 m elev., 14º55’06’’S, 60º04’36’’W, 21 March 2014, *M.F. Simon, G. Pereira-Silva, J.L. Barros, M. Mendonza & T.S. Reis 2232* (holotype: RB!, isotype: CEN [digital image]!, NY [digital image]!).

Diagnosis:—*Waltheria glabribracteata* is morphologically close to *Waltheria rotundifolia* Shrank (1828: 65), differing by its discolorous leaf blades (*vs.* concolorous), glabrous adaxial surface of the bracts (*vs.* pilose), lanceolate to ovate bracts (*vs.* linear), calyx 6–7 mm long (*vs.* 4–5 mm long), oblanceolate and glabrous corolla lobes (*vs.* spatulate and sericeous), and elongate-plumose stigmas in longistylous flowers (*vs.* fan-plumose).

Description:—Shrubs 0.80–1.80 m tall. Branches terete, strigose, the trichomes stellate and sessile; trunk not resinous, not lenticellate. Stipules ca. 4 × 0.7 mm, lanceolate, adaxial surface pubescent, abaxially scabrous, the apex acute, the margins ciliate. Leaves simple, alternate, spirally arranged; petioles 0.7–1 × 0.26–0.36 cm, compressed, scabrous, the trichomes similar to those on the branches; leaf blades 5.3–8 × 4–7.5 cm, circular to oblate, discolorous, chartaceous to subcoriaceous, the trichomes strigose, stellate and sessile; venation actinodromous, 7–8 pairs of secondary veins, 2 basal, tertiary veins reticulate, the base cordate, the apex rounded to truncate, the margins irregularly and finely serrate, teeth 2.2–3 × 1–1.5 mm. Inflorescences cymose, axillary, the peduncle 5-20 mm long, strigose; bracts 4, 3–3.5 × 0.9–2.2 mm, lanceolate to ovate, the apex acute to acuminate, adaxial surface glabrous, abaxial sericeous, longitudinally nerved. Flowers potentially distylous, ca. 9 mm long, sessile, in pairs, surrounded by bracts. Calyx 5-merous, gamosepalous, 6–7 × 3.2–3.5 mm, 10-ribbed, externally sericeous, trichomes stellate, internally glabrous, pubescent on the free lobes, trichomes simple, lobes free, 2–3.2 × 1.1–1.7 mm, the apex acute to acuminate; veins not reaching the margins; nectary ca. 0.3 mm long. Corolla 5-merous, gamopetalous, yellow, tube ca. 1.8–2 mm long, claw 1-1.4 mm long, limb ca. 6–7.5 × 2.2–2.5 mm, oblanceolate, glabrous, the apex rounded. **Longistylous form:** stamens 3.8–5.5 mm long, staminal tube adnate to corolla, ca. 3.5 mm long, glabrous, free filaments 0.5–1.1 mm long, papillate, anthers dithecous, 1.2–1.3 mm long, dehiscence longitudinal; pistil ca. 6–7 mm long, the ovary 1.5 × 0.8 mm, sericeous, the style 3.2 mm long, tortuose basally, pubescent, the stigma 1.5–2.1 × 0.8 mm, penicillate, elongate-plumose. **Brevistylous form:** not observed. Capsule ca. 4 × 3 mm, obovoid, membranaceous on the lower third, chartaceous on the upper third, the dehiscence loculicidal, sericeous, the trichomes concentrated apically, long-simple and short-stellate, the apex truncate; seed 1, ca. 2.8 × 1.7 mm, obovoid, glabrous, black, brownish basally, crenulate at the base.

Etymology:—The specific epithet refers to the glabrous adaxial surface of the bracts, a unique character among *Waltheria* species.

Distribution and Habit:—*Waltheria glabribracteata* is known from a few collections in Brazil (Mato Grosso state, in the municipally of Vila Bela da Santíssima Trindade) and Bolivia (Santa Cruz department, province of José Miguel de Velasco) (Figure 2). In both countries, *W. glabribracteata* is found in protected areas within the Serra Ricardo Franco State Park (Brazil) and Noel Kempff Mercado National Park (Bolivia), which are on the border of both countries.

The species occurs in transitional vegetation among Amazonian forest, *Cerrado* and Pantanal (Killeen 1998, IBGE 2004), at 600 to 900 m elevation.

In Serra Ricardo Franco State Park, this is the first record of the genus *Waltheria* (speciesLink 2019), whereas in Noel Kemp National Park, *W. glabribracteata* occurs sympatrically with *W. indica* Linnaeus (1753: 673) and *Waltheria* sp., erroneously identified as *W. polyantha* Schumann (1886: 60), however, this latter species is restricted to Minas Gerais state in Brazil.

Phenology:—Collected with flowers in March to May and August, fruits in May.

Conservation status:—*Waltheria glabribracteata* is known only from a few collections in the two localities previously indicated. The State Park Serra de Ricardo Franco is officially a fully protected area comprising ca. 158,000 ha. However, the locality is also the target of deforestation for cattle breeding, as well as exploitation of its natural resources. These anthropogenic actions may cause a decrease in population size in the short term, promoting ultimately the total elimination of these individuals. Because of this, *W. glabribracteata* should

be classified as Critically Threatened (CR), B1b (i, ii, iii, iv), C2a (i), according to GeoCat data and IUCN Criteria 2012 (IUCN 2019).

Additional specimens examined (Paratypes):—BOLIVIA. Santa Cruz, José Miguel de Velasco, 21 April 1993, *T.J. Killeen 5413* (CTES!). BRAZIL. Mato Grosso, Vila Bela da Santíssima Trindade, Córrego da Cascata, 18 August 1997, *G. Hatschbach, A. Schinini & E. Barbosa 66985* (MBM!); topo da Cachoeira do Jatobá, 14º55'06"S, 60º04'26"W, 17 May 2013, *J.E.Q. Faria, M.R.V. Zanatta & D. Villarroel 3484* (RB!, UB [digital image]!); Serra Ricardo Franco, 15ºS, 60ºW, 22 March 1978, *P.G. Windisch 1739* (RB!, UEC!); *ibidem*, 25 May 1978, *P.G. Windisch 1939* (CTES!, RB!, UEC!).

Discussion:—*Waltheria glabribracteata* can be recognized mainly by the fact that it is the only species of the genus having bracts with a glabrous adaxial surface (Fig. 1d-e). In the taxonomic revision of *Waltheria*, Saunders (1995) cites the adaxial surface of the bracts of *Waltheria collina* Schumann (1828: 63) as "essentially glabrous but with 1–2 branched trichomes… and sessile glandular trichomes", so in this species cannot be considered glabrous, but sparsely pilose according to our own data. Regarding its morphology, the new species shares with *Waltheria rotundifolia* the stellate and sessile trichomes, the leaf blade shape, with finely serrate margins, but differs by its pedunculate inflorescences (*vs.* sessile to subsessile in *W. rotundifolia*), lanceolate to ovate bracts (*vs.* linear), glabrous adaxial surface of the bracts (*vs.* pilose), glabrous corolla lobe apex (*vs.* densely ciliate) and elongate-plumose stigma (*vs.* fan-plumose) (Table 1). Comparing with *Waltheria ackermanniana* Schumann (1886: 61), *W. glabribracteata* is similar in the strigose indument, pedunculate inflorescences and circular leaf blades (in some individuals), however the latter species can present a broad variation of leaf blade shape, varying from elliptical, widely elliptical, circular to ovate (Table 1). However, *W.*

glabribracteata lacks glandular trichomes (*vs.* present in *W. ackermanniana*), glabrous adaxial surface of the bracts (*vs.* sparsely pilose), bracts not exceeding 3.5 mm long (*vs.* reaching 12.5 mm long) and elongate-plumose stigma (*vs.* fan-plumose). Other characters are shown in Table 1.

Concerning geographic distribution, *Waltheria glabribracteata* is allopatric to *W. rotundifolia* and *W. ackermanniana*. While *Waltheria grabribracteata* is restricted to Mato Grosso state (Brazil) and Santa Cruz department (Bolivia), *W. rotundifolia* occurs in Mexico and Brazil (restricted to the Northeast region - Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia states), while *W. ackermanniana* was previously restricted to the states of the Bahia, Minas Gerais and Rio de Janeiro, and here in this study it is also recorded in Pernambuco state (*Coutinho et al. 335* and *Coutinho et al. 344*, UFP herbarium).

According to Silva-Coutinho *et al.* (2019), are registered seven species of the *Waltheria* to Mato Grosso state. *Waltheria glabribracteata* differs of them specially by circular to oblate leaf blade and absence of trichomes on the adaxial surface of the bracts.

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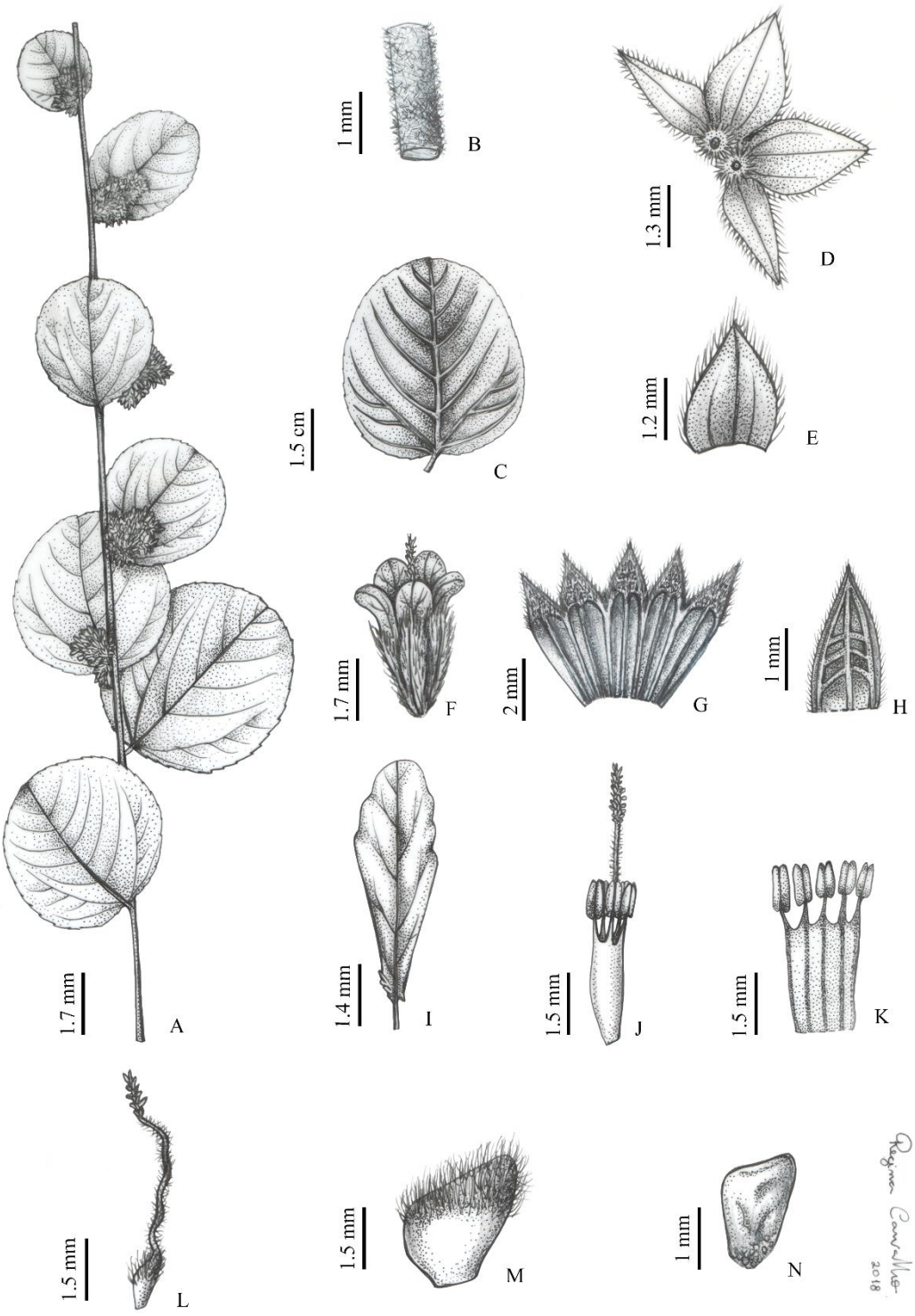
FIGURE 1. *Waltheria glabribracteata.* A. Flowering branch. B. Detail of the branch and indumenta. C. Adaxial surface of the leaf blade. D. Bracts with two flowers removed. E. Adaxial surface of the bract. F. Flower. G. Internal view of the calyx. H. Free lobe of the calyx with trichomes removed. I. Corolla lobe. J. Staminal tube and stigma elongate-plumose. K. Internal view of the staminal tube. L. Pistil. M. Capsule. N. Seed. (A–N: *M.F. Simon et al. 2232*).


1.7 mm
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Regina Carvalho
2018

FIGURE 2. Geographic distribution map of *Waltheria glabribracteata*.

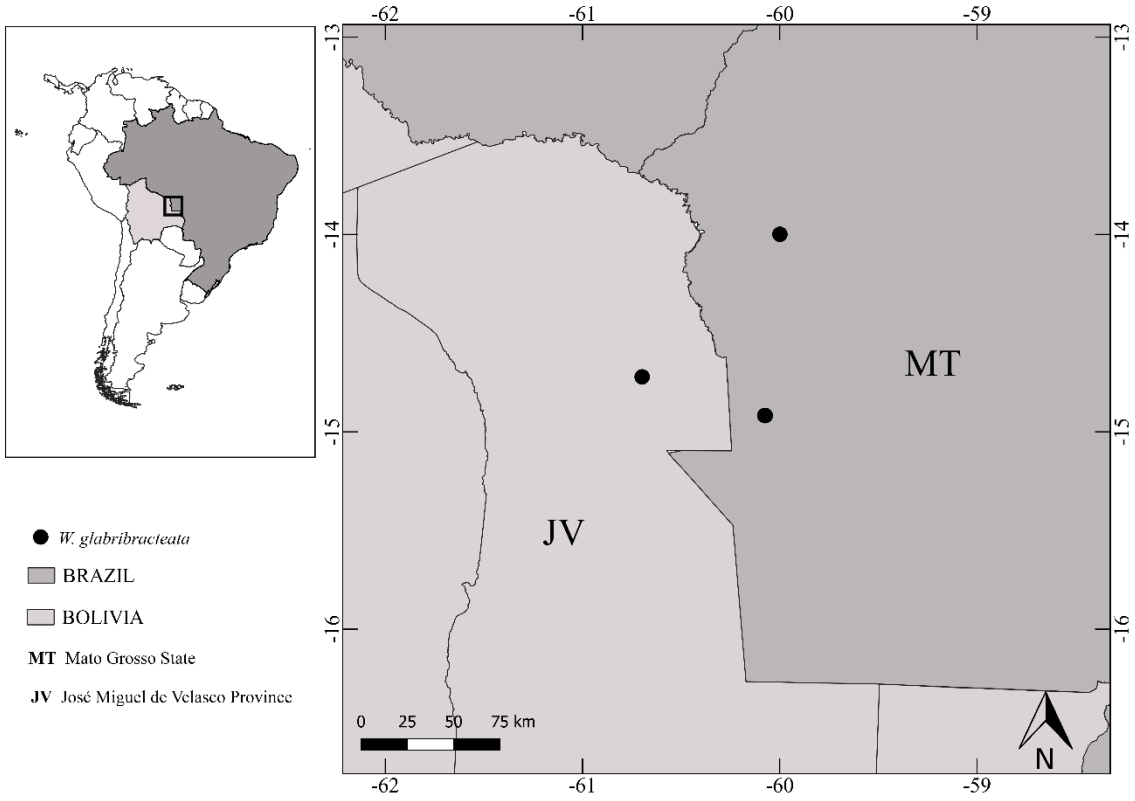

TABLE 1: Morphological comparison among *Waltheria glabribracteata* and morphological allied species, and geographic distribution. (Morphological results are based on longistylous-form flowers).

Character/Species	***W. glabribracteata***	***W. ackermanniana***	***W. rotundifolia***
Trichomes on the branches	Stellate	Stellate and glandular	Stellate
Leaf blade shape	Circular to oblate	Elliptical to widely elliptical, circular or rarely ovate	Ovate, widely ovate to very widely ovate or circular

Peduncle length (mm)	5–20	1–5	2–4
Adaxial surface of bracts	Glabrous	Sparsely pilose (stellate and glandular, sessile trichomes)	Pilose (stellate trichomes)
Bract shape	Lanceolate to ovate	Narrowly triangular	Linear
Bract size (mm)	3–3.5 × 2–2.2	4–12.5 × (0.2–0.5)0.6–1.5	3.5–4.5 × 0.3–0.7
Calyx size (mm)	6 × 3.5	(4.7)5.5–7 × 2.2–3.5	4–5 × 2–2.8
Corolla lobe size (mm)	6 × 2.2	2.8–5 × 1.3–1.8	2.7–4.8 × 1–1.6
Corolla lobe shape	Oblanceolate	Oblong	Spatulate
Corolla lobe apex indument	Glabrous	Ciliate	Ciliate
Stigma shape	Elongate-plumose	Fan-plumose	Fan-plumose
Capsule size (mm)	4 × 3	2.5–3 × 1.7–2.2	1.7–2.3 × 1.7–2
Geographic distribution	Bolivia and Brazil	Brazil	Mexico and Brazil

APÊNDICE D – ARTIGO PUBLICADO NO PERIÓDICO *ACTA BOTANICA BRASILICA* 34 (3): 449-459, 2020.

Original Article

Novelties in Brazilian *Waltheria* L. (Byttnerioideae, Malvaceae): two new species and one re-establishment

Thales Silva Coutinho[1*] https://orcid.org/0000-0002-2173-4340, **Matheus Colli-Silva**[2] https://orcid.org/0000-0001-7130-3920 **and Marccus Alves**[3] https://orcid.org/0000-0001-9281-2257

[1] Programa de Pós-graduação em Biologia Vegetal, Departamento de Botânica, Centro de Biociências, Universidade Federal de Pernambuco, Avenida Professor Morais Rego, 1235, 50670-901, Recife, Pernambuco, Brazil

[2] Departamento de Botânica, Instituto de Biociências, Universidade de São Paulo, Rua do Matão, 277, 05508-090, São Paulo, São Paulo, Brazil

[3] Departamento de Botânica, Centro de Biociências, Universidade Federal de Pernambuco, Avenida Professor Morais Rego, 1235, 50670-901, Recife, Pernambuco, Brazil

*thales_scoutinho@hotmail.com

ABSTRACT

This work validates two *Waltheria* species endemic to *campo rupestre* with complete descriptions, illustrations, updated geographical distributions and comments on taxonomic affinities. *Waltheria biribiriensis* and *Waltheria terminans* are restricted to the Southern Espinhaço Province in eastern South America, occurring on mountain tops where *campo rupestre* vegetation prevails. Furthermore, *Waltheria brachypetala*, a species of dry deciduous forests in Brazil that was long considered as conspecific with *W. ferruginea* due to its shrubby lifeform and similar indumentum, is re-established based on differences of phyllotaxy, blade shape and inflorescence type. The first occurrence records of *W. brachypetala* in the state of Paraíba are also provided, as well as the first record in the Atlantic Forest domain. Lastly, a lectotype is designated for *W. ferruginea*.

Keywords: *Campos rupestres*, Endangered species, Hermannieae, Heterostily, Malvales, Re-establishment, Vulnerable species.

Introduction

Waltheria L. is a pantropical genus including c. 50–60 species (Bayer & Kubitzki 2005), with 23 of them native to Brazil (Silva-Coutinho *et al.* 2019). Although the genus is widespread, species of *Waltheria* are usually narrowly restricted to particular regions of the Neotropics, northern Mexico and North America (Saunders 1993). Most species are endemic to the open, seasonally dry habitats in South America, namely the Brazilian Cerrado, Caatinga and Chaco (Saunders 1995, unpublished).

Waltheria is a shrubby-herbaceous genus belonging to Byttnerioideae—one of the nine clades in Malvaceae *sensu* Alverson *et al.* (1999), supported by further studies (*e.g.* Whitlock *et al.* 2011, Richardson *et al.* 2015). Byttnerioideae is characterized by having clawed and often

caducous petals, small flowers, shorter than 2-3 cm in length, without epicalyx and usually with a reduced or absent androgynophore. Palynological traits can be diagnostic for the subfamily as well, and most species exhibit elongated pollen grains with prominent operculate apertures (Cristóbal 1968, Bayer & Kubitzki 2005). *Waltheria* is placed in Hermannieae, a tribe distinguished by having flat petals and absence of androgynophore (Saunders 1995, unpublished). *Waltheria* is also within subtribe Melochinae, where trends such as the gradual reduction of the number of ovules per locule are observed (Saunders 1995, unpublished, Bayer & Kubitzki 2005).

Melochinae species usually have heterostylic flowers, where two floral morphotypes, "longistylous" and "brevistylous", exhibit different stamen/style length ratios (Kohler 1976, Saunders 1993). *Waltheria* presents the floral polymorphism typical of the subtribe as well as the uttermost case of carpel reduction, with its species bearing only one carpel with one locule and two ovules per locule, typically producing only one seed per capsular fruit (Saunders 1995, unpublished, Bayer & Kubitzki 2005).

Several infrageneric classifications have been previously applied to *Waltheria* (e.g. Schumann 1886, Rose 1899, Saunders 1995, unpublished). Saunders (1995, unpublished) provided one of the most important contributions to the systematics of *Waltheria*, addressing evolutionary aspects of heterostyly as well as infraspecific taxonomical circumscriptions (except for the *W. indica* complex). Saunders described c. ten new species (1995, unpublished), with only three of them effectively published (Saunders 2005, Saunders & Pozner 2007). We have identified unpublished names of taxa endemic to specific regions of *campo rupestre* vegetation that require revision. According to Saunders (1995, unpublished), the areas of *campo rupestre* in the eastern South American mountaintops are the major center of species richness of *Waltheria*, with many species or potential clades, such as the *Waltheria ferruginea* alliance *sensu* Saunders, restricted to this high-elevation habitat. These species are found in different

areas of *campo rupestre* determined as the newly recognized districts of the Southern Espinhaço province (Colli-Silva *et al.* 2019).

Given this background, we hereby present taxonomical and nomenclatural novelties in a set of species that belong in the informal *Waltheria ferruginea* alliance *sensu* Saunders (1995, unpublished). We provide detailed morphological information, updated distribution data and highlight morphological features that distinguish the different species in the alliance. Furthermore, we review the circumscription of the most widespread species of the alliance, *Waltheria brachypetala*, and its related taxon, *W. ferruginea*, providing detailed descriptions and a brief nomenclatural history, as both species were traditionally treated as conspecific, and data on biogeography and ecology.

Material and Methods

Specimens from the following collections were examined: ASE, BHCB, BR**, CTES, EAC, ESA, F**, G**, GH**, HCDAL, HST*, HUEFS**, HUVA*, HVASF, JPB, K**, KW**, LE**, MAC, MBM, MO**, MPU**, MUFAL*, NY**, P**, PEUFR, R, RB, SI, SP, SPF, UEC, UFP, UFRN (Thiers 2019, continuously updated; *not indexed; **photos). Protologues of *Waltheria brachypetala* and *W. ferruginea* were assessed. All examined vouchers were cited, except for *W. brachypetala*, where we selected specimens representing all states and types of vegetation where it occurs and its morphological variability.

The morphological terminology follows Webster *et al.* (1996) and Harris & Harris (2001) for trichomes and indumentum, respectively; Radford *et al.* (1998) for leaf shape, and Weberling (1989) for inflorescence. We adopted the term bracteole to the foliaceous structures associated with the flowers, previously called “bracts” by Coutinho and Alves (2019, 2020), Silva-Coutinho *et al.* (2019) and Saunders (1995, unpublished). Stigma terminology is based

on Saunders (1993). Distribution maps were built using the software QGIS (www.qgis.org), and preliminary conservation assessment was performed using the "ConR" package v. 1.2.4 in R environment (Dauby *et al.* 2017).

Results

Taxonomic treatment

Waltheria ferruginea A. St-Hil. was described based on the collection *Saint-Hilaire s.n.*, from Minas Gerais. He presented a diagnosis with a complete description of the species and a detailed illustration. Thirty-three years later, *Waltheria brachypetala* Turcz. was published based on the collection *Blanchet 2744* from the state of Bahia (Turczaninow 1858). In the *Flora Brasiliensis*, Schumann (1886) proposed to synonymize the latter name under *W. ferruginea*, as he believed they were conspecific due to the lack of characters supporting their distinction.

Later on, Saunders (1995, unpublished) proposed the re-establishment of *W. brachypetala*, listing a set of characters supporting this distinction but never effectively publishing it. Esteves (2010) listed 26 species of *Waltheria* occurring in Brazil, considering *W. brachypetala* and *W. ferruginea* as distinct entities, but not presenting arguments to support her decision. According to Esteves (2010), *W. brachypetala* occurs in the dry, deciduous Caatinga in Northeastern Brazil (i.e. states of Bahia, Ceará, Pernambuco and Piauí), whereas *W. ferruginea* is restricted to the Cerrado and *campo rupestre* vegetations in the state of Minas Gerais. Consequently, *W. brachypetala* and *W. ferruginea* are now treated as different species in online databases and in herbarium collections.

1. *Waltheria brachypetala* Turcz. Bull. Soc. Imp. Naturalistes Moscou 31(1): 215. 1858. Type: BRAZIL. Bahia: Utinga, La Serra Acurua, 1858, *Blanchet 2744* (Holotype: KW [photo]!; isotypes: BR [photo]!, F [photo]!, G [photo]!, GH [photo]!, K [photo]!, LE [photo]!, MO [photo]!, P [photo]!).

Shrubs 1.2−3.0 m tall. Branches erect, terete, slightly angulate apically, canescent, trichomes stalked, multiradiate, yellowish, c. 0.3 mm long; bark reddish-brown when dry, resinous, not lenticellate. Stipules 7.0−11.0 × 0.6 mm, linear triangular, base truncate, apex acute, trichomes stalked multirradiate and sessile stellate, veins inconspicuous. Leaves simple, alternate, distichally arranged throughout the branches; petiole 0.60−1.10 × 0.13−0.14 cm, angulate, not canaliculate, tomentose; blade leaf chartaceous, concolorous, rarely discolorous, 4.2−10.2 × 1.7−4.0 cm, conduplicate or plane, lanceolate, base cordate to rounded, margins irregularly dentate throughout, teeth 0.8−1.8 × 1.5−2.0 mm, apex acute, adaxial surface pubescent, trichomes sessile, stellate, abaxial surface canescent, trichomes sessile stellate and stalked multiradiate; venation actinodromous, 2 basal veins and 14−17 pairs of secondary veins, impressed adaxially, prominent abaxially. Inflorescence cymose, axillary along the branches, pedunculate, many-flowered; bracts 2−3-lobed, 6.0−8.0 mm long; peduncle 0.3−2.2 cm long, tomentose. Flowers distylous, sessile; bracteoles 4, 6.0−7.2 × 1.8−3.2 mm, distinct or basally fused for 1.8−2.2 mm, elliptic to widely elliptic, apex acute, entire to 2–3-dentate apically, tomentose on both surfaces, trichomes sessile stellate on both surfaces, multinervate. Calyx 5-merous, gamosepalous, 7−7.2 × 2.7−3.0 mm, tubular-campanulate, 10-ribbed, externally pubescent, trichomes sessile, stellate, internally pubescent c. 2.0 mm long above base, tomentose on lobes, trichomes sessile, stellate, lobes c. 2.0 × 2.0 mm, apex acute; nectary c. 0.3 mm long, on the base of the internal surface. Corolla 5-merous, dialypetalous, yellow, petals adnate to the staminal tube for c. 0.3 mm, 7.0−7.5 × 2.3−2.5 mm, spatulate, both surfaces

glabrous, apex emarginate, glabrous. Stamens 5, fully or partially connate into a staminal tube, papillose apically, dithecae, thecae parallel, dehiscence rimose; gynoecium apocarpous, carpel 1 and locule 1, ovary obovoid, sericeous, trichomes simple and 2−3-radiate, style 1, lateral, tomentose, trichomes sessile, stellate, stigma 1, elongate-plumose. **Longistylous form:** stamens 4.2−5.0 mm long, staminal tube 3.0−3.4 mm long, free portion of the filaments 0.3−0.6 mm long, anthers 1.1−1.2 mm long, gynoecium 7.5−8.2 mm long, ovary 1.3−2.0 × 0.8−0.9 mm, style c. 3.8−5.0 mm long, tortuose, stigma 1.0−1.2 × 0.3 mm. **Brevistylous form:** stamens 7.0−7.2 mm long, staminal tube c. 2.0 × 1.0 mm, free filaments c. 4.1 mm long, anthers c. 1.3 mm long, gynoecium c. 3.2 mm long, ovary 1.8 × 0.7 mm, style c. 1.5 mm long, stigma c. 1.0 × 0.3 mm long. Capsule 1, 2.8−3.5 × 2.5 mm, obovoid, chartaceous at the apex, then membranaceous below, apex truncate-rounded, pilose, trichomes stellate, concentrated on the apex, dehiscence loculicidal; seed 1, 2.5−3.2 × 2 mm, obovoid, brown, glabrous, apex rounded.

Distribution and Habitat—*Waltheria brachypetala* is endemic to Brazil, where it is widely distributed in the Northeastern region (Alagoas, Bahia Ceará, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, and possibly Sergipe, but without confirmed records), as well as in the state of Minas Gerais, in Southeastern Brazil. It occurs in open, dry habitats of the Caatinga, Cerrado and Atlantic Forest domains, in elevations between 30–718 m (Fig. 1). We provide the first occurrence record in the state of Paraíba, as well as the first record in the Atlantic Forest domain.

Phenology—*Waltheria brachypetala* can be found with flowers and fruits throughout the year.

Conservation status—Due to its wide distribution range, *Waltheria brachypetala* is classified as Least Concern (LC) or Near Threatened (NT) according to our preliminary conservation assessment. This species occurs in protected areas in the states of Bahia (Raso da Catarina Ecological Station, Boqueirão da Onça National Park, Canudos Biological Station and Lagoa de Itaparica Environmental Protection Area), Ceará (Aiuaba Ecological Station, Serra das Almas Private Reserve of Natural Heritage and Ubajara National Park), and Pernambuco (Catimbau National Park), and in Grande Sertão Veredas National Park in the states of Bahia and Minas Gerais. *Waltheria brachypetala* also occurs on roadsides.

Comments—Schumann (1886) considered *Waltheria brachypetala* as conspecific to *W. ferruginea*, probably based on the following characters shared between both taxa: (1) shrubby lifeform, (2) leaves distichally arranged along the branches, (3) indumentum composed of stalked and multirradiate trichomes on branches and leaves, (4) axillary and multiflorous inflorescences, (5) similar bracteole shape, (6) distylous flowers and (7) capsule and seed shape. However, *W. brachypetala* differs from *W. ferruginea* especially due to: (1) stipules 7.0−11 mm long (*vs.* 3.0−3.2 mm long), (2) leaf blades lanceolate and conduplicate or plane (*vs.* elliptic and plane), (3) cordate to rounded leaf blade base (*vs.* cuneate), (4) concolorous to rarely discolorous leaf blade (*vs.* always discolorous), (5) leaf margins with teeth throughout (*vs.* above the base for c. 1.7–2 mm), (6) inflorescences with many flowers (*vs.* few flowers), (7) spatulate petals (*vs.* oblanceolate). A more detailed list of diagnostic characters can be found in Table 1.

Saunders (1995, unpublished) noticed differences between the two species (e.g. leaf blade color, calyx lobe length, anther morphology in brevistylous flowers, seed apex color) and proposed to treat *W. brachypetala* and *W. ferruginea* as distinct. In the same work, she also

presented the illustration by Schumann (1886) in *Flora Brasiliensis* as being *W. brachypetala*. However, this illustration erroneously refers to *W. ferruginea*, being part of the protologue by Saint-Hilaire (1825).

Waltheria brachypetala belongs to *Waltheria* sect. *Waltheria* (as *Euwaltheria*) *sensu* Schumann (1886). Saunders (1995, unpublished) proposes another infrageneric classification for *Waltheria*, including *W. brachypetala* under *W.* subg. *Pringlei*. Saunders also informally named this group "*Waltheria ferruginea* alliance", including species with stalked trichomes, mainly found on *campo rupestre* habitats.

Selected specimens examined—BRAZIL. Alagoas: Maceió, 2002, *R.A. Silva 1796* (MAC!). Traipu, Serra das Mãos, 15 May 1990, *R.P. Lyra-Lemos & G.L. Esteves 2526* (MAC!). **Bahia:** Andaraí, Rio Paraguaçu, 19 June 1984, *G. Hatschbach & R. Kummrow 48064* (SPF!). Bom Jesus da Lapa, rodovia para Santa Maria da Vitória, 05 April 1992, *G. Hatschbach et al. 56608* (F [photo]!, MBM!). Casa Nova, Sítio Recanto, 9°36'49.18"S, 41°16'44,77"W, 16 February 2008, *J.A. Siqueira-Filho 1947* (HVASF!, MAC!). Feira da Mata, 14°13'54"S, 44°12'45"W, 06 May 2007, *M.L. Guedes et al. 13302* (ALCB [*not seen*], MBM!). Morro do Chapéu, Lagedo Bordado, 11°15'31"S, 41°05'43"W, 05 May 2007, *J.M. Gonçalves et al. 217* (SPF!). Oliveira dos Brejinhos, Serra da Água Quente, 12°19'46"S, 42°54'24"W, 15 November 2012, *E.L.M. Assis et al. 1087* (RB!). Xique-Xique, 10°52'S, 42°45'W, 17 March 1990, *J.G. Saunders & A.M. de Carvalho 3119* (CTES!). **Ceará:** Aracati, 17 June 1976, *A. Fernandes s.n.* (EAC 2800!). Crateús, Reserva Particular do Patrimônio Natural Serra das Almas, 06 June 2002, *F.S. Araújo 1582* (EAC!). Granja, Distrito de Santa Terezinha, 03°21'30"S, 41°00'39"W, 22 April 2015, *E.B. Souza et al. 3384* (HUVA!). Tianguá, entre Tianguá e Viçosa do Ceará, 30 May 1979, *A. Nunes s.n.* (EAC 6226!). **Minas Gerais:** Manga, Gleba C-3, 30 April 1991, *L.V.*

Costa et al. s.n. (BHCB 2243!). São João das Missões, 15°00'S, 44°00'W, 20 January 2010, *C. Vidal 836* (BHCB!). **Paraíba:** Monte Horebe, 07°11'41.30"S, 38°35'51.07"W, 23 August 2012, *R.A. Silva 2188* (HVASF!). **Pernambuco:** Buíque, Parque Nacional do Catimbau, 24 March 2018, *T.S. Coutinho et al. 334* (UFP!). Ibimirim, Lagoa de Areia, 23 July 1994, *A.M. Miranda et al. 1940* (HST!, RB!, UFP!). Petrolina, Campus da UNIVASF, 08 July 2019, *T.S. Coutinho 457* (UFP!). **Piauí:** Amarante, Lage, 03 March 2005, *A.M. Miranda et al. 4973* (ASE [photo]!, EAC!, HST!, HUEFS [photo]!, MAC!). Castelo do Piauí, ao lado da PI, 05°13'S, 41°41'W, 31 March 2004, *J.M. Costa et al. 153* (UEC!). Floriano, 15 March 2009, *A. Santos et al. s.n.* (HST 16554!). Parnaíba, Lagoa Portinho, 03 October 1973, *D. Araújo et al. 454* (RB!). **Rio Grande do Norte:** Ceará-Mirim, Praia de Muriú, 04 July 2014, *J.S. Carvalho-Júnior & L.A. Cestaro 36* (UFRN!). Mossoró, rodovia para Tibau do Sul, 05°07'51"S, 37°21'05"W, 17 July 2013, *J. Jardim & A. Roque 6464* (RB!, UFRN!).

2. *Waltheria ferruginea* A. St-Hil., Fl. Bras. Merid. (quarto ed.) 1(4): 150. 1825. Type: BRAZIL. Minas Gerais: '*crescit in rupidus prope vicum Tapanhoacanga, haud longè ab urb Villa do Principe'*, 1816-1821, *Saint-Hilaire s.n.* (lectotype, designated here: P barcode P02273702 [photo]!; isolectotypes: MPU barcode MPU016436 [photo]!, MO [*not seen*], P02273703 [photo]!).

Shrubs 0.5–2.0 m tall. Branches terete, flattened at the apex, tomentose, trichomes stalked, multiradiate, ferrugineous, c. 0.5 mm long; bark dark brown, not rugose, somewhat resinous, not lenticellate. Stipules 3.0–3.2 × 0.3 mm, linear, base truncate, apex acute, trichomes sessile, multiradiate, stellate and 2-radiate; veins inconspicuous. Leaves simple, alternate, distichally arranged throughout the branches; petiole 0.6−0.8 × 0.12 cm long, slightly flattened

dorso-ventrally, inconspicuously canaliculate, tomentose; leaf blade chartaceous, discolorous, 3.4−10.4 × 1.1−2.3(−3.5) cm, plane, elliptic, base cuneate, margin slightly involute when dried, finely serrate 1.7−2.0 cm above at the base, teeth 0.4−0.7 × 1.3−2.0 mm, apex acute, adaxial surface strigose, trichomes sessile, multirradiate, abaxial surface tomentose, trichomes stalked, multirradiate; venation actinodromous, 1−2 basal veins and 7−11 pairs of secondary veins, immersed adaxially, prominent abaxially. Inflorescence cymose, axillary, subsessile, few-flowered; bracts 5.0−8.0 mm long, 2-lobed; peduncle 0.4−0.6 cm long, tomentose. Flowers distylous, sessile, surrounded by four bracteoles; bracteoles 6.5–8.0 × 3.0−3.9 mm, distinct, elliptic to widely elliptic, apex acute, entire to 2-dentate, adaxial surface pubescent, abaxial surface tomentose, trichomes multiradiate on both surfaces, 1−3-nerved, obscured by trichomes. Calyx 5-merous, gamosepalous, 6.2−8.0 × 2.7−3.0 mm, tubular-campanulate, 10-ribbed, externally tomentose, trichomes short-stalked, multiradiate, internally glabrous, tomentose on the lobes, trichomes stellate and sparse glandular trichomes, lobes 2.1−2.2 × 1.5–1.8 mm, apex acuminate; nectary c. 0.5 mm long, on the base of the internal surface. Corolla 5-merous, dialypetalous, yellow, petals adnate to the staminal tube for c. 0.5 mm, 5.0−6.1 × 1.2−1.5 mm, oblanceolate, both surfaces glabrous, apex rounded, glabrous. Stamens 5, fully or partially connate forming a staminal tube, papillose apically, anthers dithecae, thecae parallel, dehiscence rimose; gynoecium apocarpous, carpel 1 and locule 1, ovary obovoid, sericeous, trichomes simple and 2−3-radiate, style 1, lateral, trichomes sessile, stellate, stigma 1, elongate-plumose. **Longistylous form:** stamens c. 4.2 mm long, staminal tube c. 3.0 mm long, free portion of the filaments c. 0.6 mm long, anthers c. 1.5 mm long, gynoecium c. 6.0 mm long, ovary 1.5 × 0.7 mm, style c. 4.0 mm long, stigma c. 1.0 × 0.4 mm long. **Brevistylous form:** stamens c. 7.5 mm long, staminal tube c. 2.2–2.5 × 0.8 mm long, free portion of the filaments 3.6–3.8 mm long, anthers c. 1.1–1.2 mm long, gynoecium c. 3.5 mm long, ovary c. 1.1 × 0.8 mm, style c. 1.6 mm long, stigma c. 1.1 × 0.3 mm long. Capsule 1, c. 2.8 × 1.8 mm, obovoid,

chartaceous at the apex, membranaceous below, apex rounded, pilose, trichomes stellate concentrated on the apex, dehiscence loculicidal; seed 1, c. 2.0 × 1.5 mm, obovoid, black, glabrous, apex rounded.

Distribution and habitat—*Waltheria ferruginea* is endemic to the state of Minas Gerais. It can be found in elevations between 700–948 m in the Cerrado, associated to *campo rupestre* vegetation, specifically in the Southern Espinhaço Range province (specifically in the Grão-Mogol and Diamantina Plateau districts), where several other endemic plant species are reported (Colli-Silva *et al* 2019) (Fig. 1).

Phenology—Flowers can be found in February, March, August and November and fruits in March.

Conservation Status—According to our conservation assessment, *Waltheria ferruginea* is potentially classified as Endangered (EN) under the IUCN criterium B. This species is not found within protected areas and its Area of Occurrence is less than 500 km^2.

Comments—Saunders (1995, unpublished) cites the herbarium P as the possible collection where the *Waltheria ferruginea* holotype is deposited; however, she did not verify or locate such material. We found two specimens of *W. ferruginea* labeled as *Saint-Hilaire s.n.* at P (barcodes P02273703 and P02273702), which warrants a lectotypification. We therefore chose the specimen P02273702 (barcode number) as the lectotype, as it possibly is the sample

used for the illustration originally published by Saint-Hilaire. Morphological comments about distinctive characters between *Waltheria ferruginea* and *W. brachypetala* are discussed above and in Table 1.

Waltheria ferruginea belongs to *W.* sect. *Waltheria* (as *Euwaltheria*) according Schumann (1886), and to the informal *W.* subg. *Pringlei* and *Waltheria ferruginea alliance* sensu Saunders (1995, unpublished) (see previous description).

Additional specimens examined—BRAZIL. Minas Gerais: Botumirim, c. 12 Km de Botumirim em direção à Adão Colares, 12 March 1999, *A. Rapini & M.L. Kawasaki 760* (SPF!, UFP!). Cristália, Bem Querer, 10 November 1991, *G. Hatschbach et al. 54991* (MBM!). Diamantina, 15 Km para estrada de Mendanha, 18º10'4.6"S, 43°30'22.7"W, 22 February 2003, *G.O. Romão et al. 942* (ESA!, RB!). Grão-Mogol, 16°32'S, 42°49'W, 13 August 1989, *A. Freire-Fierros et al. s.n.* (BHCB 88955!, CTES 188027!, K 1213095 [photo]!, SPF 67939!); idem, Vale do Rio Itacambiruçu, 26 February 1986, *T.B. Cavalcanti et al. s.n.* (SPF 42952!, UEC 45885!); idem, 16°37'S, 42°50'W, 28 March 1990, *J.G. Saunders et al. 3179* (MBM!, NY 2342594, 813681 [photos]!).

3. *Waltheria biribiriensis* J.G. Saunders ex T.S. Coutinho & Colli-Silva ***sp. nov.***

Type: BRAZIL. Minas Gerais: Diamantina, "estrada para Biribiri, c. 4 km para Biribiri", 18°10'13.3"S 43°36'53.8"W, 950 m elev., 23 January 2007, *J.R. Pirani, M.F.A. Calió, B.P.F. Loeuille and E.G. Martins 5689* (holotype: SPF!; isotypes: SP! UFP!). (Fig. 2).

It resembles *Waltheria ferruginea* by its stalked and multiradiate trichomes on branches and leaves and axillary inflorescences, but differs by its whitish to slightly yellowish trichomes (*vs.* ferrugineous), bracteoles usually 2–3-lobed to rarely entire apically (*vs.* always entire apically), and by the capsules chartaceous at apex and membranaceous below (*vs.* capsules chartaceous throughout).

Shrubs 0.7–2.0 m tall. Branches erect, terete, flat towards the apex, puberulent, glabrescent, trichomes stalked, multiradiate, whitish to slightly yellowish, c. 0.4 mm long; bark reddish-brown when dry, rugose longitudinally, not resinous, lenticellate. Stipules c. 6.0 × 1.0 mm, linear, base truncate, apex acute, trichomes similar to the branches, 1-nervate, hidden by the dense trichome layer. Leaves simple, alternate, distichally arranged throughout the branches; petiole 0.4–1.3 × 0.1–0.2 cm, angular, not canaliculate, pubescent to canescent; leaf blade chartaceous, strongly discolorous, 3.5–13.0 × 1.3–6.5 cm, narrowly elliptic to elliptic or lanceolate, base subcordate to cordate, margin plane, finely serrate, teeth 2.0–2.2 × 0.5–0.7 mm, apex acute, both surfaces densely pilose, trichomes stalked, multiradiate; venation actinodromous, 8–11 pairs of secondary veins and 3 basal veins, immersed adaxially, prominent abaxially. Inflorescence cymose, axillary along the branches, sessile to subsessile, many-flowered; bracts 3-lobed, 7.0–8.2 mm long; peduncle c. 0.2 cm long, densely pubescent. Flowers distylous, sessile; bracteoles 4, 8.0 × 1.5–1.8 mm, distinct or basally fused for c. 1.5 mm, oblong to lanceolate, apex acute, 2–3-lobed to rarely entire, adaxial surface tomentose, trichomes sessile, stellate, abaxial surface scabrous, trichomes short-stalked, multiradiate, 2–4 nervate. Calyx 5-merous, gamosepalous, 5.0–7.0 × 2.8–3.2 mm, tubular-campanulate, 10-ribbed, externally scabrous, trichomes short-stalked to stalked, multiradiate, internally glabrous, tomentose on the lobes, lobes 1.0–2.2 × 1.0–1.2 mm, apex acute to subacute; nectary c. 0.7 mm long, on the base of the internal surface. Corolla 5-merous, dialypetalous, yellow,

petals adnate to the staminal tube for c. 0.4 mm, 6.0–6.5 × 1.5–2.0 mm, spatulate, both surfaces glabrous, apex rounded to emarginate, glabrous. Stamens 5, partially connate forming a staminal tube, papillose apically, anthers dithecae, thecae parallel, dehiscence rimose; gynoecium apocarpous, carpel 1 and locule 1, ovary obovoid, sericeous, trichomes simple and 2−3-radiate, style 1, lateral, tomentose, trichomes sessile, stellate, stigma 1, clavate. **Longistylous form:** stamens c. 4.0 mm long, staminal tube c. 2.5 × 1.0 mm long, free portion of the filaments c. 0.8 mm long, anthers c. 1.3 mm long, gynoecium c. 7.1 mm long, ovary c. 1.5 × 0.9 mm, style c. 5.5 mm long, stigma c. 1.0 × 0.2 mm. **Brevistylous form:** stamens 5.0–6.0 mm long, staminal tube 2.0–2.1 × 1.0 mm, free portion of the filaments 2.0–2.2 mm long, anthers 1.4–1.8 mm long, gynoecium 4.0–5.2 mm long, ovary 1.3–1.5 × 1.0 mm, style 2.0–2.1 mm long, stigma 0.5–0.6 × 0.2 mm. Capsule 1, 3.0–3.4 × 1.5–2.0 mm, obovoid, chartaceous on the apex, membranaceous below, apex rounded, hirsute, stellate trichomes concentrated on the apex, dehiscence loculicidal; seed 1, 2.2–2.5 × 1.3–1.5 mm, obovoid, brown to dark brown, glabrous, apex not crenulate.

Distribution and habitat–*Waltheria biribiriensis* is endemic to the state of Minas Gerais, growing on *campo rupestre* vegetation in the Cerrado, in elevations between 800–1200 m, in the Southern Espinhaço province (Diamantina Plateau district), a bioregion that concentrates a significant amount of endemic plant species (Colli-Silva *et al* 2019) (Fig. 1).

Etymology—The specific epithet refers to “Biribiri”, a district in the municipality of Diamantina, Minas Gerais, where the type specimen was collected.

Phenology—Flowering specimens are reported from December to May, with fruits in May.

Conservation status—According to the conservation assessment under IUCN criterium B, *Waltheria biribiriensis* is potentially Vulnerable (VU). *Waltheria biribiriensis* has not yet been recorded within protected areas and its Area of Occurrence is less than 500 km^2.

Comments—The name *Waltheria biribiriensis* was firstly described by Saunders (1995, unpublished), but never effectively published. Some vouchers of *W. biribiriensis* have been determined as *W. ferruginea*, as both are shrubs with stalked multirradiate trichomes on their branches and leaves. Nevertheless, *Waltheria biribiriensis* can be morphologically distinguished from *W. ferruginea* by the following characters: whitish to yellowish trichomes (*vs.* ferruginous trichomes), leaf blade 3.5–13.0 × 1.3–6.5 cm (*vs.* up to 6.3 × 2.2 cm), cordate to subcordate base (*vs.* cuneate), oblong to lanceolate bracteoles (*vs.* elliptic to widely elliptic), bracteoles apically 2–3-lobed to rarely entire (*vs.* not 3-lobed), spatulate petals (*vs.* oblanceolate). Further diagnostic characters are presented in Table 1.

Waltheria ferruginea and *W. biribiriensis* are both endemic to the *campo rupestre* vegetation in Minas Gerais, but the latter has a more restricted distribution (Fig. 1). Some populations of the two species are found in sympatry; however, they can be easily separated by the previously mentioned morphological characters (Table 1). Additionally, *Waltheria biribiriensis* is found in elevations up to 1200 m, while *Waltheria ferruginea* is restricted to elevations around 900 m.

Waltheria biribiriensis belongs to *W.* sect. *Waltheria* (as *Euwaltheria*) according to Schumann (1886), and to the informal W. subg. *Pringlei* and *Waltheria ferruginea alliance* sensu Saunders (1995, unpublished).

Additional specimens examined (Paratypes)—BRAZIL. Minas Gerais: Diamantina, estrada para Biribiri, 18°10'S, 43°37'W, 08 May 1982, *N. Hensold et al. s.n.* (MBM 193570!, SPF 23311!); estrada para povoado de Três Barras, 3 km de Diamantina, 15 May 1987, *V.L. Scatena s.n.* (RB 341682!, SPF 47251!); estrada para Milho Verde, Km 9, 18°18'41"S, 43°33'19"W, 19 May 2018, *J.N. Nakajima et al. 4807* (SP!); margem da estrada para Curralinho, próximo a gruta do Salitre, 18°16'45"S, 43°32'02"W, 21 May 2016, *J.E.Q. Faria 5862* (RB!, SP!); Mirante do Cruzeiro, 18°13'40"S, 43°35'22"W, 09 April 2016, *J.E.Q. Faria 5616* (RB!, SP!); Rio dos Cristais, 25 March 1966, *A.P. Duarte 9648* (RB!); 6 km N de Diamantina, caminho a Biribiri, c. 18°11'S, 43°36'W, 14 February 1991, *M.M. Arbo et al. 5028* (SPF!); 5 km from road to Diamantina on road to Biribiri, 18º08'S, 43°40'W, 26 March 1990, *J.G. Saunders et al. 3167* (BHCB!, F [photo]!, K [3 sheets; photos]!, MBM [2 sheets]!, NY [2 sheets; photos]!); road Diamantina-Biribiri, 08 December 1997, *R.C. Forzza et al. 510* (SPF!); Ponte do Acaba Mundo, sobre o rio Jequitinhonha, c. 17 km E de Extração (Curralinho), base da Serra do Gavião, 18°17'25"S, 43°26'21"W, 08 February 2009, *M.S. Ferrucci et al. 2856* (SPF!); Serra do Espinhaço at Lapinha, c. 19 Km N of Serro on road to Diamantina, 24 February 1968, *H.S. Irwin et al. 20799* (MBM!). c. 20 Km E to Diamantina, near Rio Jequiti, 15 March 1970, *H.S. Irwin et al. 27546* (CTES!, MBM!, NY [photo]!, RB!); estrada para Biribiri, 08 December 1992, *H.F. Leitão Filho et al. 27508* (ESA!, RB!, UEC!). Serro, base do Pico do Itambé, 05 May 1942, *G.M. Magalhães 2088* (BHCB!).

4. *Waltheria terminans* J.G. Saunders ex T.S. Coutinho & Colli-Silva ***sp. nov.***

Type: BRAZIL. Minas Gerais: Joaquim Felício, Serra do Cabral, Bocaina, 23 Nov 1984, *M.C.H. Mamede, A.M. Giulietti, R.M. Harley & B. Stannard s.n.* (holotype: SPF 35981!; isotypes: K barcode K1217181 & 1217182 [photos]!, UFP 86645!). (Fig. 3).

Waltheria terminans resembles *W. brachypetala* by its shrubby lifeform and stalked multiradiate trichomes on the branches, but differs by having spirally arranged leaves (*vs.* distichally arranged), leaf blade with 7–8 pairs of secondary veins (*vs.* 14–17 pairs of secondary veins), and axillary inflorescences only in the terminal portion of the branches (*vs.* axillary along all the branch).

Shrubs 0.7–3.0 m tall. Branches erect, terete, flat upward at apex, scabrous, trichomes stalked, multiradiate, yellowish, c. 0.3 mm long; bark brownish when dry, neither rugose nor resinous, lenticels on older branches. Stipules 7.0–9.0 × 0.6 mm, linear, base truncate, apex acute, trichomes sessile, multiradiate, 1-nervate, hidden by the dense trichome layer. Leaves simple, alternate, spirally arranged throughout the branches; petiole 0.2–0.3 × 0.2 cm, angular, not canaliculate, canescent; leaf blade chartaceous, discolorous, 1.6–2.6 × 0.9–1.4 cm, elliptic to oblong-elliptic or lanceolate, base rounded to subcordate, margin inconspicuously serrate, teeth 0.3–0.9 × 1.0–1.5 mm, apex acute, rarely rounded, both surfaces scabrous, trichomes stellate, more abundant on the abaxial surface; venation actinodromous, 2 basal veins and 7–8 pairs of secondary veins, immersed adaxially, prominent abaxially. Inflorescence cymose, axillary in terminal portions of the branches, pedunculate, few-flowered; bracts 2–3-lobed, 7.0–8.2 mm long; peduncle 0.5–1.0 cm long, scabrous. Flowers distylous, sessile, surrounded by four bracteoles; bracteoles 7.0–10.5 × 2.1–4.0 mm, distinct or basally fused for 0.4–2.0 mm,

oblanceolate to widely obovate, apex acute to rounded, entire to 2–3-dentate apically, adaxial surface pubescent, trichomes stellate and sessile, abaxial surface scabrous, trichomes multiradiate and short-stalked, 6−7 nervate. Calyx 5-merous, gamosepalous, 5.0−7.0 × 1.8−3.1 mm, tubular-campanulate, 10-ribbed, externally scabrous, trichomes multiradiate, sessile, internally glabrous, tomentose on the free portion of the lobes, lobes up to c. 2.2 × 1 mm, apex acuminate; nectary c. 0.6 mm long, on the base of the internal surface. Corolla 5-merous, dialypetalous, yellow, petals adnate to the staminal tube for 0.4–0.8 mm, 5.5–6.5 × 1.8–2.0 mm, spatulate, both surfaces glabrous, apex rounded, glabrous. Stamens 5, partially connate into a staminal tube, papillose apically, anthers dithecae, thecae parallels, dehiscence rimose; gynoecium apocarpous, carpel 1 and locule 1, ovary obovoid, sericeous, trichomes simple and 2-radiate, style 1, lateral, tomentose, trichomes sessile, stellate, stigma 1, filiform. **Longistylous form:** stamens 4.2−5.0 mm long, staminal tube 2.2−2.8 × 1.0 mm long, free portion of the filaments c. 0.8−1.0 mm long, anthers 1.4−1.5 mm long, gynoecium 5.0−6.0 mm long, ovary 1.2−1.8 × 0.6 mm, style 3.0−4.3 mm long, stigma c. 0.8 × 0.1 mm. **Brevistylous form:** stamens 6.2−6.5 mm long, staminal tube 2.0−2.5 × 1.0 mm, free portion of the filaments 3.2−3.5 mm long, anthers 1.4−1.5 mm long, pistil 4.3−5.5 mm long, ovary 1.2−1.5 × 0.9 mm, style 2.5−3.5 mm long, tortuous near the apex, stigma 0.6−0.8 × 0.1 mm. Capsule 1, c. 3.3 × 1.8 mm, obdeltate, chartaceous at the apex, then membranaceous elsewhere, apex truncate-rounded, entirely hirsute, trichomes stellate, concentrated on the apex, dehiscence loculicidal; seed 1, c. 2.0 × 1.2 mm, obovoid, dark brown, glabrous, apex crenulate, rounded.

Distribution and habitat—Known only from the state of Minas Gerais, occurring in some municipalities and localities of *campo rupestre* vegetation in the Southern Espinhaço province (Diamantina Plateau district), in elevations between 1100–1300 m (Fig. 1).

Etymology—The specific epithet refers to the location of the inflorescences, which, in addition to being axillary, are always arranged in the terminal portions.

Phenology—*Waltheria terminans* is found with flowers between November and January to May and fruits in November.

Conservation status—According to our preliminary conservation assessment, *Waltheria terminans*, similarly to *W. biribiriensis*, is potentially Vulnerable (VU). Only one population of *Waltheria terminans* has been registered within a protected area, in Serra do Cabral State Park. Its Area of Occurrence is less than 500 km^2.

Comments—*Waltheria terminans* was previously described by Saunders (1995, unpublished) as a new taxon but not effectively published. It can be distinguished from its relative species, *W. brachypetala*, by the spiral leaf arrangement (*vs.* distichous in *W. brachypetala*), petiole 0.2−0.3 cm long (*vs.* 0.6−1.1 cm long), leaf blade 1.6−2.6 cm long (*vs.* 4.3−9.5 cm long), inflorescences only in the terminal portions (*vs.* along the branches), oblanceolate to widely obovate bracteoles (*vs.* elliptic to widely elliptic) and petals rounded at the apex (*vs.* emarginate). Further morphological characters are summarized in Table 1.

Some populations of *W. terminans* are found in sympatry with *W. biribiriensis* and *W. ferruginea*, where they share the same lifeform; however, *W. terminans* can be easily distinguished by its leaves 1.6–2.6 cm long (*vs.* 3.4–13.0 cm long) and by other characters summarized in Table 1. *Waltheria terminans* reaches the highest elevations when compared to other species above, up to 1,300 m.

Waltheria terminans belongs to *W.* sect. *Waltheria* (as *Euwaltheria*) according to Schumann (1886), and to the informal *W.* subg. *Pringlei* and *Waltheria ferruginea alliance* sensu Saunders (1995, unpublished).

Additional specimens examined (Paratypes)—BRAZIL. Minas Gerais: Buenópolis, Cachoeira de Curimataí, 14 November 2010, *E. Barbosa et al. 2906* (MBM!); Joaquim Felício, Bocaína, 22 November 1984, *B. Stannard et al. s.n.* (K barcode K001217140 [photo]!, SPF 35919!); Serra do Cabral, 18 January 1996, *G. Hatschbach et al. 64342* (MBM!); Diamantina, 20-26 km WSW de Diamantina, caminho a Conselheiro Mata, MG-220, 18°17'S, 43°49'W, 18 May 1990, *M.M. Arbo et al. 4380* (SPF!); idem, 02 April 1992, *P. Schwake 8333* (RB!); 8 km NE Diamantina, caminho a Mendanha, córrego Soberbo, 18°12'S, 43°34'W, 14 February 1991, *M.M. Arbo 5086 et al.* (CTES!, SPF!). Lassance, Serra do Cabral, 17°41'S, 44°17'W, 24 March 2000, *J.R. Pirani et al. 4634* (SPF!).

Key to the species of the informal *Waltheria ferruginea* alliance *sensu* Saunders (1995, unpublished) (based on our own studies)

1. Leaf blade ≤ 2.6 cm long; inflorescences in the terminal portion of the branches; stigma filiform ……..……..……...……. *W. terminans*

1'. Leaf blade ≥ 3.4 cm long; inflorescences along the branches; stigma elongate-plumose or clavate ……..……..……..…….. 2

2. Leaf blade base cuneate; inflorescences few-flowered; oblanceolate petals ……...……...……..…… *W. ferruginea*

2’. Leaf blade base subcordate to cordate or rounded to cordate; inflorescences many-flowered; spatulate petals ……..……..……...… 3

3. Stipules up to 6.0 mm long; leaf blade with 8–11 pairs of secondary veins; oblong to lanceolate bracteoles, apically 2–3-lobed or rarely entire …..……..…….. *W. biribiriensis*

3’. Stipules exceeding 7.0 mm long; leaf blade with 14–17 pairs of secondary veins; elliptic to widely elliptic bracteoles, entire to 2–3-dentate apically ……..….. *W. brachypetala*

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Figure 1. Geographical distribution of *Waltheria biribiriensis*, *W. brachypetala*, *W. ferruginea* and *W. terminans* in eastern Brazil, with details of **(a)** phytogeographic domains and **(b-c)** bioregion delimitations. CDp: Chapada Diamantina Province; SERp: Southern Espinhaço Province, with its districts (GMd: Grão-Mogol District, DPd: Diamantina Plateau District and IQd: Iron Quadrangle District).

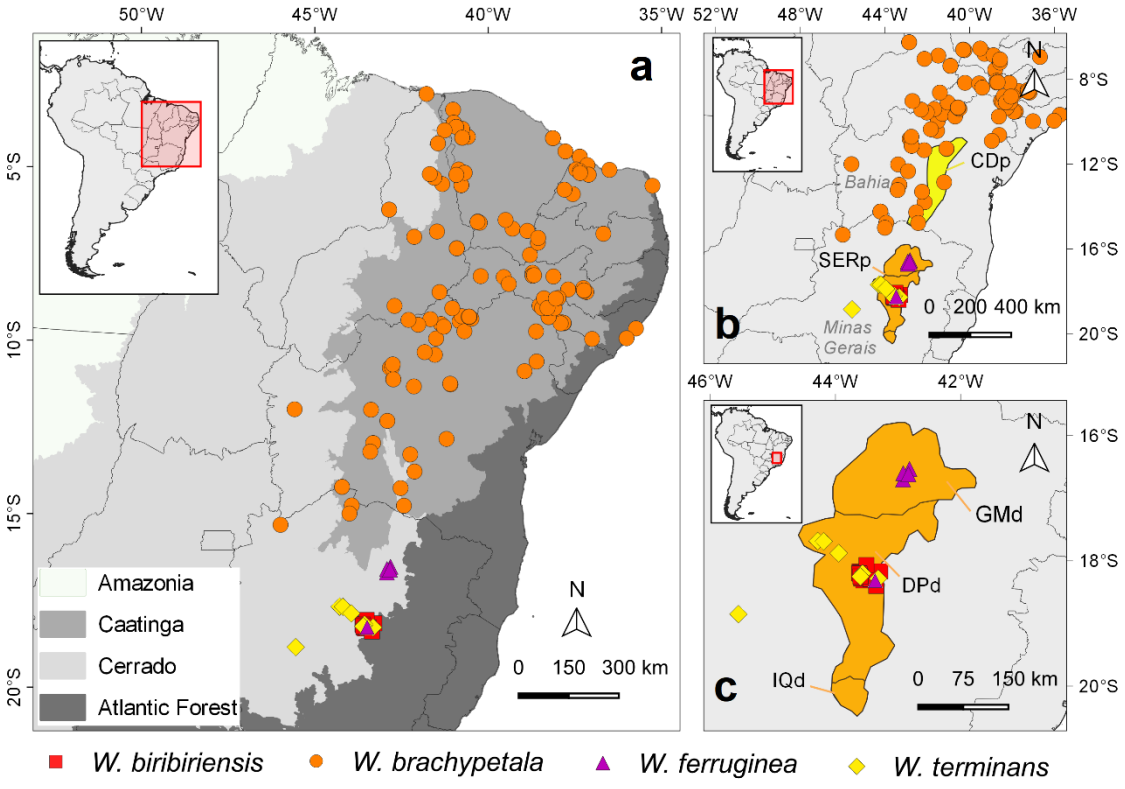

Figure 2. *Waltheria biribiriensis* J.G. Saunders ex T.S. Coutinho & Colli-Silva. **A.** Flowering branch. **B.** Stalked and short-stalked multiradiate trichomes. **C.** Detail of bracteole with two flowers removed. **D.** Calyx. **E.** Internal view of the calyx lobe with trichomes removed. **F.** Petal. **G.** Stamens of brevistylous flowers. **H.** Stamens of longistylous flowers, highlighting part of style and stigma. **I.** Gynoecium of brevistylous flowers. **J.** Capsule. **K.** Seed. **L.** Gynoecium. **M.** Capsule. **N.** Seed. (A–G, I: *J.R. Pirani et al. 5689*; H: *M.M. Arbo et al. 5028*; J–K: *N. Hensold et al. 3103*).

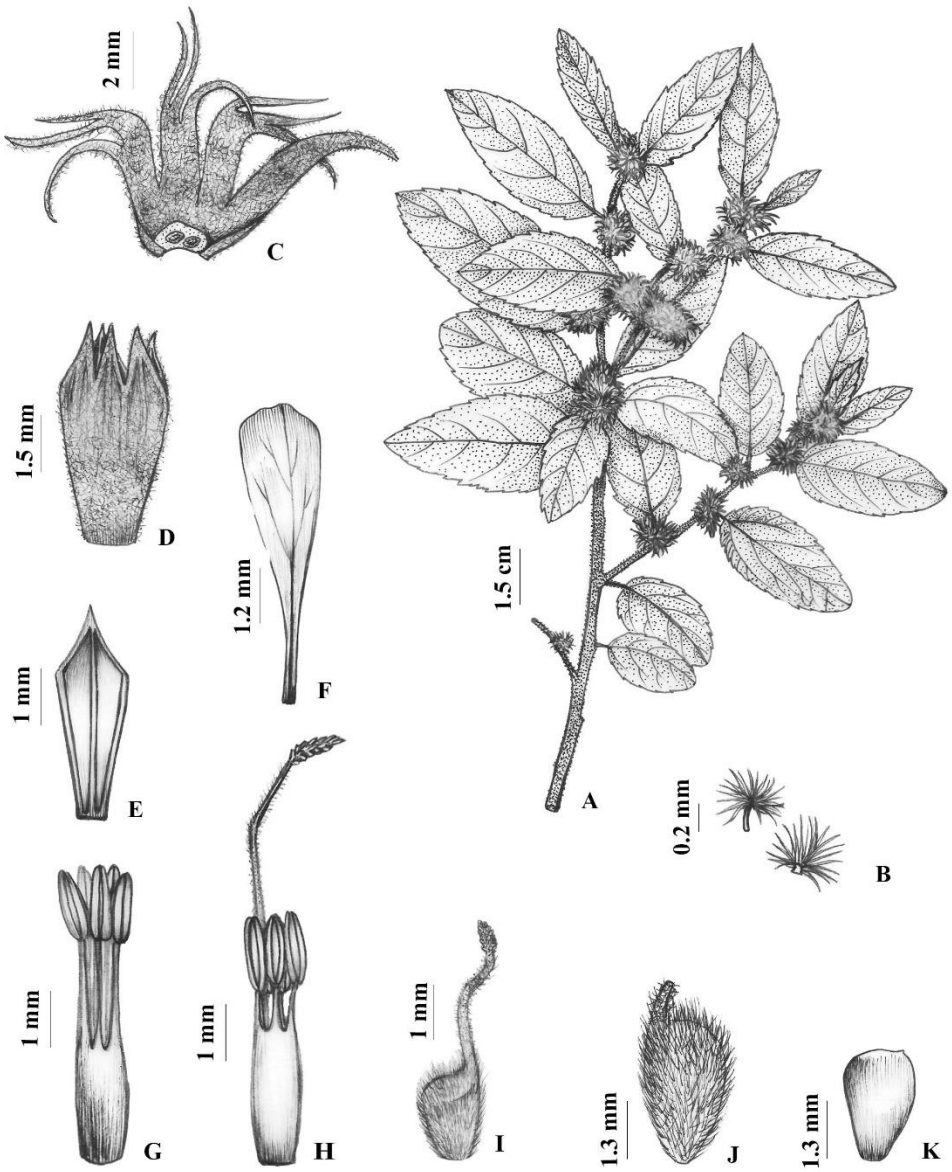

Figure 3. *Waltheria terminans* J.G. Saunders ex T.S. Coutinho & Colli-Silva. **A.** Flowering branch. **B.** Detail of the bracteoles with two flowers removed. **C.** Flower. **D.** Internal view of the calyx lobe with trichomes removed. **E.** Petal. **F.** Stamens of brevistylous flowers. **G.** Stamens of longistylous flowers. **H.** Gynoecium of brevistylous flowers. **I.** Capsule. **J.** Seed. (A–E, G–H: *M.C.H. Mamede et al. s.n.* [SPF 35981]; F: *A. Rapini et al. 477*; I–J: *B. Stannard et al. 3103*).

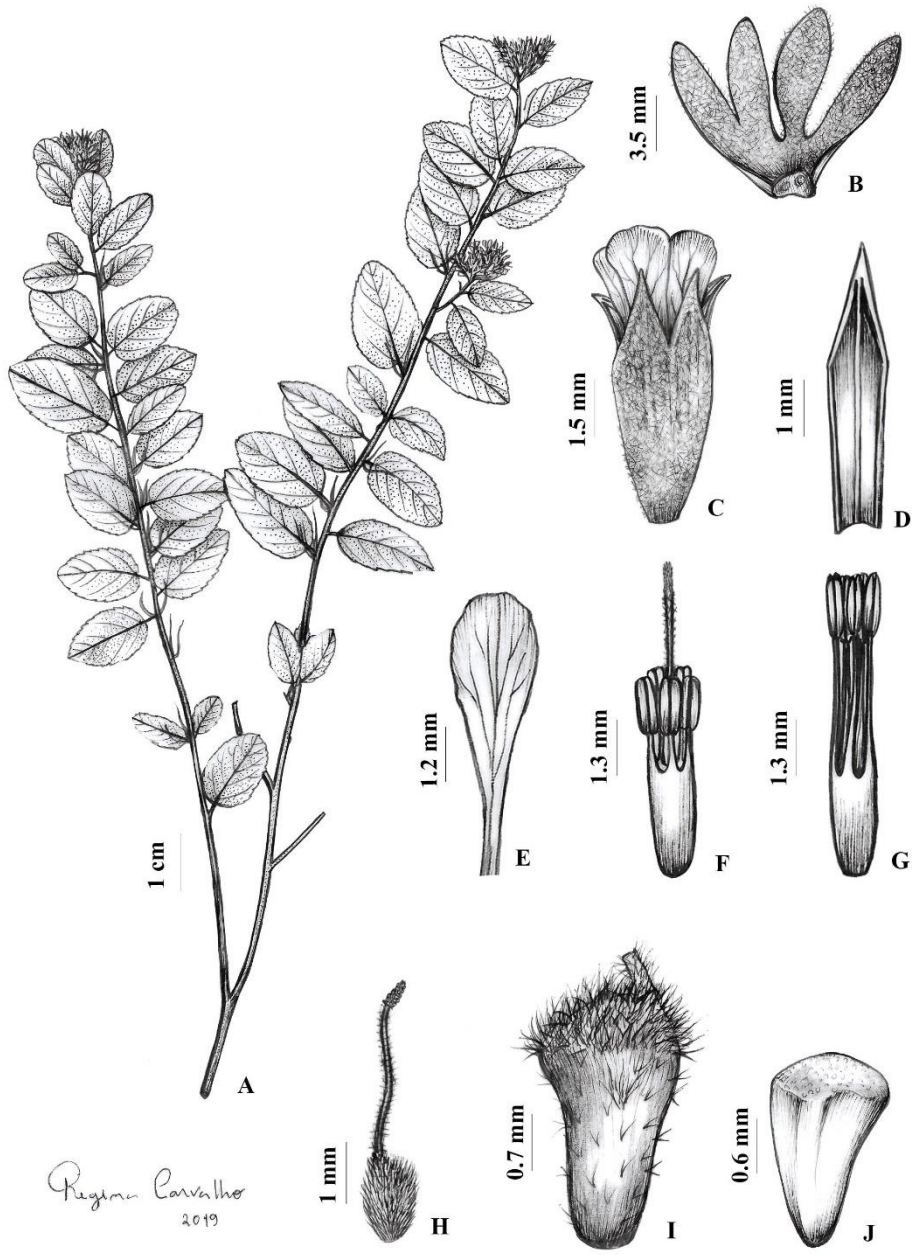

Table 1. Main diagnostic features of the "*Waltheria ferruginea* alliance" *sensu* Saunders (1995, unpublished), comparing *Waltheria biribiriensis*, *W. brachypetala*, *W. ferruginea* and *W. terminans*.

Character	*W. biribiriensis*	*W. brachypetala*	*W. ferruginea*	*W. terminans*
Stipule length (mm)	c. 6.0	7.0–11.0	3.0–3.2	7.0–9.0
Leaf blade length (cm)	3.5–13.0	4.2–10.2	3.4–10.4	1.6–2.6
Leaf blade shape	Narrowly elliptic to elliptic or lanceolate	Lanceolate	Elliptic	Elliptic to oblong-elliptic or lanceolate
Leaf blade base	Subcordate to cordate	Cordate to rounded	Cuneate	Rounded to subcordate
Leaf surfaces	Discolorous	Concolorous, rarely discolorous	Always discolorous	Concolorous to discolorous
Leaf blade margin (when dry)	Plane	Plane	Slightly involute	Plane
Leaf margin tooth arrangement	Throughout	Throughout	Above the base	Throughout
Tooth dimensions (mm)	2.0–2.2 × 0.5–0.7	0.8–1.8 × 1.5–2.0	0.4–0.7 × 1.3–2.0	0.3–0.9 × 1.0–1.5
No. of secondary vein pairs	8–11	14–17	7–11	7–8

Inflorescence position	Along the branches	Along the branches	Along the branches	In terminal portion of the branches
Peduncle length (cm)	c. 0.2	0.3–2.2	0.4–0.6	0.5–1.0
Inflorescence	Many-flowered	Many-flowered	Few-flowered	Few-flowered
Bracteole shape	Oblong to lanceolate	Elliptic to widely elliptic	Elliptic to widely elliptic	Oblanceolate to widely obovate
Fusion of the bracteoles	Distinct or basally fused for c. 1.5 mm	Distinct or basally fused for 1.8−2.2 mm	Distinct	Distinct or basally fused for 0.4–2.0 mm
Petals shape	Spatulate	Spatulate	Oblanceolate	Spatulate
Shape of petal apex	Rounded to emarginate	Emarginate	Rounded	Rounded

ANEXO A – NORMAS PARA PUBLICAÇÃO NO PERIÓDICO PHYTOTAXA

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Aim and scope

Phytotaxa is a peer-reviewed, international journal for rapid publication of high quality papers on any aspect of systematic and taxonomic botany, with a preference for large taxonomic works such as monographs, floras, revisions and evolutionary studies and descriptions of new taxa. *Phytotaxa* covers all groups covered by the International Code of Nomenclature foralgae, fungi, and plants ICNafp (fungi, lichens, algae, diatoms, mosses, liverworts, hornworts, and vascular plants), both living and fossil. *Phytotaxa* was founded in 2009 as botanical sister journal to *Zootaxa*. It has a large editorial board, who are running this journal on a voluntary basis, and it is published by Magnolia Press (Auckland , New Zealand). It is also indexed by SCIE, JCR and Biosis.

All types of taxonomic, floristic and phytogeographic papers are considered, including theoretical papers and methodology, systematics and phylogeny, monographs, revisions and reviews, catalogues, biographies and bibliographies, history of botanical explorations, identification guides, floras, analyses of characters, phylogenetic studies and phytogeography, descriptions of taxa, typification and nomenclatural papers. Monographs and other long manuscripts (of 60 printed pages or more) can be published as books, which will receive an ISBN number as well as being part of the *Phytotaxa* series.

Checklists and vegetation surveys are only included when the data provided in the checklist or survey are analysed and discussed. Data in checklists should be interpreted to make the study relevant for the international botanical community. Range extensions of single species are generally not considered for publication, although exceptions may be possible. Please contact the chief editor before submitting such articles.

Open Access publishing is strongly encouraged for authors who have funding to do so. For those without grants/funds, accepted manuscripts will be published, but access will be secured for subscribers only**.** All manuscripts will be subjected to peer review by two or more anonymous reviewers before acceptance. *Phytotaxa* aims to publish each paper within two months after the acceptance by the editors. To make this possible, authors are advised to follow

the following guidelines carefully and to consult the most recent issues of *Phytotaxa*. Therefore, when preparing your manuscript, please follow this guide carefully. During our first years, its format has varied somewhat, but we are now aiming for more uniformity.

The most recent version of the *International Code of Nomenclature for algae, fungi and plants* should be applied (Shenzhen Code 2018). Author(s) of taxon names (from the rank of genus or below) must be provided when the scientific name of any plant species is first mentioned with the year of publication. These are cited as a full reference and should be included in the reference list.