ULISSES GONÇALVES FERNANDES

O gênero *Ruellia* L. (Acanthaceae) no Estado de Goiás e Distrito Federal, Brasil

Dissertação apresentada ao Instituto de Botânica da Secretaria de Infraestrutura e Meio Ambiente, como parte dos requisitos exigidos para a obtenção do título de MESTRE em BIODIVERSIDADE VEGETAL E MEIO AMBIENTE, na Área de Concentração de Plantas Vasculares em Análises Ambientais

SÃO PAULO

2019

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Ficha Catalográfica elaborada pelo **NÚCLEO DE BIBLIOTECA E MEMÓRIA**

Fernandes, Ulisses Gonçalves
F363g O gênero Ruellia L. (Acanthaceae) no Estado de Goiás e Distrito Federal, Brasil / Ulisses Gonçalves Fernandes -- São Paulo, 2019.
230p.; il.

Dissertação (Mestrado) -- Instituto de Botânica da Secretaria de Infraestrutura e Meio Ambiente, 2019.
Bibliografia.

1. Acanthaceae. 2. Ruellieae. 3. Taxonomia. I. Título.

CDU: 582.594.2

Dedico este trabalho à Cassilda Veloso Fernandes (*in memoriam*), minha querida avó que com o seu amor pelas plantas muito me inspirou;

Aos meus pais por todo apoio, suporte, ajuda e amor ao longo de toda a minha vida;

à Dra. Cíntia Kameyama pelo apoio e suporte, que sem estes o desenvolvimento deste trabalho não seria possível.

Agradecimentos

Agradeço,

À Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) pela bolsa concedida.

Ao Instituto de Botânica e ao Núcleo de Pesquisa Curadoria do Herbário pela infraestrutura.

A todos os diretores e técnicos o ICMBio, RPPNs e outras unidades de conservação visitadas pela autorização, atenção e facilitação durante as expedições de coleta.

À minha orientadora, Profa. Dra. Rosângela Simão Bianchini, por ter me aceitado como seu aluno no mestrado, pela orientação e paciência. Muito obrigado!

À Dra. Cíntia Kameyama, por ter me aceitado como seu aluno, naquela manhã de 2014, quando me apresentou as Acanthaceae, e me mostrou um caminho ao qual seguir na botânica. Obrigado pelo apoio, pelas conversas, longas até demais hahaha, pela atenção, pelo apoio financeiro para as expedições e desenvolvimento do trabalho, sem você nada disse seria possível. Muito obrigado!

Aos meus colegas, ex-colegas, aos que passaram, mesmo por um curto período, ao amigos e companheiros de batalha do Instituto de Botânica, que estão comigo nessa trajetória desde o início, em especial Adenilsa Rodrigues, Alexandre Indriunas, Aline Possamai Della, Aluísio Fernandes Júnior, Amanda Noronha, Ana Angélica Sousa, Augusto Francener, Bárbara Puglia, "Book", Camila Souza, Cíntia Vieira, Fátima Otavina de Souza Buturi, Fernanda Hurbath, Fernanda Satori Petrongari, Juliana Cruz, Larissa Brandine, Marcela Inácio da Silva, Marcos Enoque, Michaelle Lima, Otávio Luís Marques da Silva, Roberta Keyla Kojima, Rodolph Delfino Sartin, Rodrigo Sampaio Rodrigues, Simone Soares Silva, Stephanie Oliveira, Suzana Ehlin Martins, Valeria Leobina, Victor Martins, William Picolo e Zedenil Mendes Rodrigues.

Aos companheiros de batalha do 3º turno do Instituto de Botânica, pelo companheirismo e amizade, pelas risadas em momentos e tensão, e motivação em momentos de desânimo! Muito obrigado!

Aos companheiros da Botânica pertencentes a outras instituições: André Moreira, Maria Rosa Vargas Zanatta, Marianna Rodrigues, Isa Morais, Igor Azevedo, Fábio A. Silva, Marcus Falcão Jr., Rafael Gomes, Cassio Toledo, Guilherme Antar, Eduardo Damasceno Lozano, Maurício Mercadante, e tantos outros que colaboraram com fotografias, conversas, conselhos, abrigo de outras formas para que esse trabalho pudesse ser realizado.

Aos professores, pesquisadores e funcionários do Instituto de Botânica, em especial do Núcleo de Pesquisa Curadoria do Herbário, pelo ensinamento, conversas, conselhos, motivação e por me ajudarem a chegar até aqui, em especial à Cíntia Kameyama, Rosângela Simão Bianchini, Inês Cordeiro, Lúcia Rossi, Sonia Aragaki, Jefferson Prado, Maria Beatriz Caruzo, Maria das Graças Lapa Wanderley, Maria Margarida Fiuza de Melo, Maria Cândida Henrique

Mamede, Mizué Kirizawa, Sergio Romaniuc Neto, Eduardo Catharino, e Claudinéia Inácio. Muito obrigado!

Aos professores, curadores e técnicos de todas as instituições visitadas, de todos os herbários consultados pela recepção e atenção, pela ajuda com material físico ou com o envio de imagens.

À minha família, em especial aos meus pais, Valmir José Fernandes e Margarida Célia Gonçalves Fernandes, e à minha irmã Fabíola Gonçalves Fernandes, por todo o suporte, atenção, apoio e ajuda de todas as formas possíveis, em todos os momentos difíceis aos quais passei durante o desenvolvimento desse trabalho. Muito obrigado! Eu amo muito vocês!!!

Ao meu filho, Enzo dos Reis Fernandes, por toda a alegria e energia que me traz, que me motiva cada dia a ser alguém melhor. Eu te amo muito!!!

À Glaucia Cristina de Oliveira dos Reis Fernandes, a quem devo me desculpar também pelos muitos momentos que me ausentei para que pudesse desenvolver esse trabalho. Muito obrigado!

Um agradecimento especial à Fernanda Satori Petrongari, pela companhia nas expedições de campo e pelas “desbravuras” desse sertãozão brasileiro!, pela ajuda com sua experiência e paciência.

Agradeço ao Rodolph Delfino Sartin, pela motivação, pelas conversas, pela amizade, e pela importância que teve no desenvolvimento deste trabalho.

Agradeço ao Wandir Ribeiro pela motivação, pelas risadas e por toda ajuda nos momentos em que precisei!

Agradeço ao Henan Martins, pela velha amizada, incentivo, conversas e abrigo durante a visita ao MBM.

Agradeço ao Lucas Dias Sanglade pela amizade e parceria, nos campos e nas florestas, nas correrias, pela ajuda e motivação!

Agradeço a todos que de alguma forma participaram desse trabalho, sem vocês, não seria possível sua conclusão.

A todos sou muito grato!

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RESUMO

O gênero *Ruellia* consiste em cerca de 400 espécies, com distribuição tropical e subtropical, alcançando até algumas regiões temperadas, e caracterizado por apresentar cálice com 5 sépalas unidas somente na base, corola tubular, infundibuliforme a hipocrateriforme com a parte mais estreita do tubo reta ou recurvada, uma porção mais expandida, geralmente obcônica e cinco lobos contortos, livres, reflexos, patentes ou eretos; cápsula cilíndrica a mais ou menos compressa, e sementes lenticulares com tricomas que se tornam mucilaginosos quando molhados. No Brasil, o gênero ocorre em todos os domínios fitogeográficos, com a maioria das espécies ocorrendo no Cerrado. O estudo baseou-se na análise de materiais de 15 herbários, além de imagens de exsicatas disponíveis on-line e trabalho de campo. A estimativa inicial era de 31 espécies de *Ruellia* no Estado de Goiás e 11 espécies no Distrito Federal, distribuídas por todas as fitofisionomias encontradas nessa região. Após os estudos, são reconhecidas atualmente para Goiás e Distrito Federal, 41 espécies de *Ruellia*. O presente estudo apresenta no Capítulo 1 a sinopse do gênero *Ruellia* no estado de Goiás e Distrito Federal com descrições morfológicas, mapas de distribuição e comentários taxonômicos de 41 espécies, 1 subespécie e 2 variedades, além da lectotipificação de 37 nomes, e no Capítulo 2 a descrição de 11 espécies novas e a duas novas combinações em *Ruellia*.

Palavras-chave: Ruellieae, taxonomia, nomenclatura, Flora do Cerrado, floresta semidecidual, mata ciliar, espécie nova, nova combinação, lectotipificação, Brasil Central

ABSTRACT

The genus *Ruellia* comprehend about 400 species, with tropical and subtropical distribution, reaching some temperate regions, and characterized by the calyx with five sepals united only at the base, tubular, infundibular, hipocrateriform corollas, with a narrow unexpanded portion at the base of the tube, erect or curved, an expanded portion generally obconic, and five contort lobes, reflexed, patent or erect; capsule cylindric to more or less compressed, and lenticular seeds with hygroscopic trichomes that become mucilaginous when wet. In Brazil, the genus occurs in all vegetation domains, most of species occur in Cerrado. This study was based in herbarium specimens analysis of 15 herbaria, besides digital image available in virtual herbaria and field work. Thirty one species were the initial estimate for Goiás, and 11 species to Distrito Federal, occurring in all vegetation types. After the studies, 41 species of *Ruellia* are current listed to Goiás and Distrito Federal. This work presents in Chapter 1 the synopsis of the genus *Ruellia* in the state of Goiás and Distrito Federal with morphological descriptions, distribution maps, and taxonomic comments of 41 species, 1 subspecies and 2 varieties, besides the Lectotypification of 37 names; and in Chapter 2 the description of 11 new species and two new combination in *Ruellia*.

Key-words: Ruellieae, taxonomy, nomenclature, Cerrado Flora, Semideciduous forests, riparian forest, new specie, new combination, lectitypification, Central Brazil

INTRODUÇÃO GERAL

Acanthaceae é a segunda maior família da ordem Lamiales (Olmstead 2016), com cerca de 221 gêneros (Scotland & Vollesen 2000) e mais de 4000 espécies (Tripp & McDade 2014, Kiel et al. 2018), possui distribuição pantropical, subtropical, alcançando até zonas temperadas no Velho Mundo e no Novo Mundo (Cronquist 1981, Tripp 2007; Kiel et al. 2018). A maior concentração das espécies ocorre no sudeste asiático, Malásia, Índia, África tropical, Madagascar, México, América Central, Andes e Brasil (Daniel 2000). As espécies podem ocorrer desde regiões de baixa altitude a regiões montanhosas e ocupar uma grande quantidade de habitats, incluindo florestas tropicais, florestas estacionais, campos, desertos e áreas úmidas (Kiel et al. 2018). No Novo Mundo, ocorrem aproximadamente 85 gêneros e 2000 espécies (Wasshausen & Wood 2004). Estima-se que no Brasil ocorram cerca de 40 gêneros e 450 espécies (Flora do Brasil 2020 em construção), com a maioria das espécies ocorrendo na Mata Atlântica e no Cerrado.

Apesar de Acanthaceae ser uma família monofilética, ainda não se conhece uma sinapomorfia morfológica (McDade et al. 2008), sendo que Acanthaceae compartilha muitas características com outras plantas da Ordem Lamiales. As espécies da família apresentam-se geralmente como ervas, arbustos, lianas a árvores, com folhas opostas, decussadas, raramente verticiladas ou em roseta, as inflorescências são axilares ou terminais, flores solitárias ou dispostas em espigas, cimeiras ou racemos, frequentemente brácteas vistosas (Souza & Lorenzi 2012, Wasshausen & Wood 2004). As flores são pentâmeras com corolas gamopétalas, zigomorfas e frequentemente bilabiadas, e androceu oligostêmone. Os frutos são geralmente cápsulas, raramente drupas, com deiscência explosiva, e apresentam sementes mais ou menos achatadas, geralmente sem endosperma.

Atualmente, a monografia de Nees von Esenbeck (1847a) na *Flora Brasiliensis* ainda é o tratamento taxonômico mais amplo para as espécies brasileiras de Acanthaceae. Antes de Nees (1847a) outras obras envolvendo espécies brasileiras haviam sido publicados [e.g. Vellozo (1829), Pohl (1831)].

Entre os estudos filogenéticos ou biogeográficos incluindo espécies brasileiras podemos destacar os trabalhos de Tripp (2007) sobre o gênero *Ruellia*, Côrtes et al (2015) sobre a linhagem *Tetramerium* da América do Sul e Kiel et al. (2018) sobre as linhagens de Justicioides neotropicais. Revisões taxonômicas mais recentes que incluem espécies que ocorrem no Brasil são limitados apenas a gêneros, dentre eles destacam-se: a revisão do gênero *Aphelandra* R. Br. (Wasshausen 1975) sistemática do gênero *Pachystachys* Nees (Wasshausen 1986), revisão das espécies brasileiras de *Mendoncia* Vell. ex Vand. (Profice 1988), sistemática de *Ruellia* L. no sul da América do Sul (Ezcurra 1993), o gênero Justicia no sul da América do Sul (Ezcurra 2002), revisão do gênero *Staurogyne* Wall. (Braz 2005), revisão das espécies neotropicais de *Lepidagathis* Willd. (Kameyama 2008), revisão do gênero *Herpetacanthus* Nees ex Moric. (Indriunas, 2011), revisão do gênero *Schaueria* Nees (Côrtes et al. 2016). Os demais trabalhos envolvendo espécies de Acanthaceae brasileiras são floras ou flórulas regionais (e.g. Rizzini 1957, Wasshausen & Smith 1969, Harvey & Wasshausen 1995, Kameyama 1995, 2003, 2006, Pontes & Agra 2001, Braz et al. 2002, Wasshausen & Wood 2004, Silva et al 2010, Vilar et a. 2010, Côrtes & Rapini 2010, 2013, Indriunas & Kameyama 2012, Profice 2013, Martinelli & Mello-Silva 2015, Braz & Azevedo 2016, Reis et al. 2017a, Kojima et al. 2019).

Em 1895, Gustav Lindau, com base em estudos macromorfológicos, anatômicos e palinológicos, propôs um sistema de classificação para Acanthaceae subdividindo-a em 4 subfamílias: Nelsonioideae, Thunbergioideae, Mendoncioideae e Acanthoideae. Além dessa classificação, ele organizou a família em 16 tribos e 5 subtribos, sendo esta a mais abrangente e detalhada revisão dos gêneros na família, incluindo chaves de identificação para as

subfamílias, tribos, subtribos e secções dos gêneros, além de profundas alterações nas circunscrições dos mesmos, com ênfase na morfologia polínica para o reconhecimento dos grupos (Sartin, 2015).

Bremekamp, em 1965, propôs uma nova classificação para Acanthaceae. Nessa classificação, foi considerado que Acanthaceae incluía apenas as espécies com cápsulas portando retináculos (funículo lignificado em forma de gancho que sustenta as sementes). As subfamílias Mendoncioideae e Thunbergioideae sensu Lindau (1895) foram elevadas ao nível de família (Mendonciaceae e Thunbergiaceae, respectivamente), a subfamília Nelsonioideae sensu Lindau (1895) foi incluída dentro de Scrophulariaceae.

Bremekamp (1965) ainda organizou Acanthaceae em duas subfamílias: Ruellioideae e Acanthoideae, com base em características macromorfologicas e morfologia polínica.

Em 1981, Arthur Cronquist, em seu sistema de classificação das Angiospermas, considerou a subfamília Nelsonioideae sensu Lindau (1895) como um grupo em Acanthaceae, e manteve Mendonciaceae sensu Bremekamp (1965).

Em 2000, Scotland & Vollesen, propuseram um novo sistema de classificação de Acanthaceae, com base em estudos macromorfológicos, ontogenéticos, palinológicos e moleculares, onde foram consideradas três subfamílias: Nelsonioideae sensu Lindau (1895), Thunbergioideae (Thunbergioideae + Mendoncioideae) e Acanthoideae, subdividida em 2 tribos.

Em 2002, Schwarzbach & McDade, realizaram estudos moleculares em *Avicennia*, até então com posicionamento incerto dentro da ordem Lamiales. Os resultados mostraram que *Avicennia* é um grupo irmão de Thunbergioideae.

Em 2008, McDade et al., realizaram estudos filogenéticos com base em dados moleculares para testar o monofiletismo dos grupos até então conhecidos em Acanthaceae. Os

resultados mostraram que Nelsonioideae sensu Lindau, Thunbergioideae sensu Scotland & Vollesen, Acanthoideae e o gênero *Avicennia* formam um grupo monofilético, sendo que o gênero *Avicennia* permaneceu como grupo irmão de Thunbergioideae.

Atualmente, são reconhecidas quatro subfamílias em Acanthaceae: Nelsonioideae Pfeiffer, Thunbergioideae T. Anderson, Avicennioideae Miers e Acanthoideae Eaton (McDade et al. 2008, Daniel 2016).

Nelsonioideae é grupo irmão de todas as outras Acanthaceae (McDade et al. 2008, 2012, Daniel & McDade 2014), compreende cinco gêneros e 172 espécies. São reconhecidas por apresentarem cápsulas loculicidas sem retináculos, ausência de cistólitos na epiderme das estruturas vegetativas, a prefloração coclear descendente e a presença de endosperma na semente madura em algumas espécies (Scotland et al. 1994, Scotland & Vollesen 2000, Braz 2005, McDade et al. 2008, 2012).

A subfamília Thunbergioideae compreende cinco gêneros e cerca de 170 espécies (Borg 2008, Borg et al. 2008). São reconhecidas por apresentarem hábito escandente raramente arbustivo (e.g. *Thunbergia erecta*), cálice extremamente reduzido em relação ao tamanho do cálice de outras Acanthaceae e duas bractéolas cobrindo parcialmente a corola (Schonenberger & Endress 1998). Os frutos são em geral cápsula, com exceção de *Mendoncia* e *Anomacanthus* que possuem frutos do tipo drupa com mesocarpo carnoso.

A subfamília Avicennioideae é monotípica e grupo irmão de Thunbergioideae (Schwarzbach & McDade 2002; McDade et al. 2008), com baixo suporte molecular, entretanto Daniel (2016) em seu tratamento taxonômico para as espécies de *Avicennia* mesoamericanas e da América do Norte, considerou o grupo como uma subfamília, aqui também considerado. *Avicennia* compreende oito espécies, variando de arbustos a grandes árvores, sempre associadas

a manguezais, possuem pneumatóforos, apresentam glândulas excretoras de sal em suas folhas e sementes criptovivíparas (Daniel 2016).

Acanthoideae é a maior subfamília, com aproximadamente 4000 espécies, cuja provável sinapomorfia morfológica é a presença de retináculos nos frutos sustentando as sementes (McDade et al. 2008). A subfamília é dividida atualmente, com base em estudos moleculares, em sete tribos. Destas tribos, destaca-se a tribo Acantheae, grupo irmão das outras seis tribos, por não apresentar cistólitos em suas estruturas vegetativas (McDade et al. 2008). As outras seis tribos, Barlerieae, Andrographideae, Whitfieldieae, Neuracantheae Justicieae e Ruellieae formam o chamado "clado dos cistólitos".

Neste clado, pode-se destacar a tribo Ruellieae, onde se encontra o gênero *Ruellia*. A tribo compreende cerca de 1200 espécies em 47 gêneros (Tripp et al. 2013), distribuídas pelas regiões tropicais e subtropicais do Novo e Velho Mundo, e se estende por zonas temperadas. Os principais gêneros são *Strobilanthes*, *Sanchezia*, *Hygrophila*, *Dyschoriste* e *Ruellia*. As síndromes de polinização e morfologias florais são amplamente diversificadas neste grupo (Tripp et al. 2013).

As prováveis sinapomorfias morfológicas de Ruellieae são a prefloração contorta sinistrorsa da corola, as sementes com tricomas higroscópicos mucilaginosos, lobos do estigma desiguais e a presença da membrana estaminal ("*filament curtain*") (Tripp et al. 2013). A membrana estaminal é projeção laminar que une a porção basal dos quatro filetes dentro do tubo da corola, formando uma câmara em torno do ovário. Sua função pode estar relacionada à prevenção da evaporação e restrição de acesso ao néctar, e à estabilização e posicionamento das anteras e estilete (Manktelow 2000), porém mais estudos são necessários para o melhor entendimento dessa estrutura pela sua importância tanto taxonômica como ecológica.

O gênero *Ruellia* é o segundo maior gênero de Acanthaceae, com cerca de 400 espécies (Tripp & Tsai 2017), possui distribuição tropical, subtropical e com algumas espécies alcançando regiões temperadas. O gênero possui maior concentração na região Neotropical com cerca de 300 espécies, ocorrendo principalmente no México, Brasil, e região oeste da América do Sul (Tripp & Tsai 2017, Tripp & Manos 2008).

O nome *Ruellia* aparece pela primeira vez na história em 1703, quando Charles Plumier, em homenagem ao médico, botânico e veterinário Jean Ruelle, descreveu uma planta com flor infundibuliforme, multífida, com fruto cônico deiscente e sementes geralmente arredondadas, com uma espécie de flor azul (Plumier 1703).

Em 1753, na obra *Species Plantarum*, Linnaeus propôs o gênero *Ruellia*, descrevendo 8 espécies. Desde então, várias espécies foram descritas, principalmente para o Novo Mundo.

Em 1829, o Frei José Mariano da Conceição Vellozo, em sua obra *Flora Fluminensis* realizou um dos primeiros trabalhos para a flora brasileira, onde descreveu 10 espécies de *Ruellia*, porém a maioria das espécies tiveram os nomes transferidos para outros gêneros.

Em 1847, Nees von Esenbeck, durante a elaboração da monografia de Acanthaceae para a *Flora Brasiliensis* (Nees 1847a) e para o *Prodromus* de De Candolle (Nees 1847b), descreveu muitas novas espécies e, para acomodar a grande variedade morfológica dessas espécies, atualmente em *Ruellia*, descreveu os seguintes gêneros: *Arrhostoxylum*, *Cryphiacanthus*, *Dipterancanthus*, *Eurychanes*, *Siphonacanthus* e *Stemonacanthus*. Nees também considerou *Ruellia* L. em seus tratamentos.

Em 1876, George Bentham, colocou em sinonímia vários gêneros, a maioria descritos por Nees, em *Ruellia*, na obra *Genera Plantarum* (Bentham & Hooker 1876).

Gustav Lindau, na obra *Die Natürlichen Pflanzenfamilien* (Engler & Plantl. 1895), realizou um importante estudo taxonômico, propondo uma nova classificação para as

Acanthaceae. Neste estudo ele realizou a combinação de mais de 100 espécies e sinonimizou 19 gêneros em *Ruellia* e propôs uma classificação infragenérica em 9 seções.

Em 1993, Cecília Ezcurra realizou um estudo sistemático com o gênero para a região sul da América do Sul, classificando 23 espécies em grupos artificiais, sendo 4 destes reconhecidos como seções propostas por Lindau.

Em 2007, Erin Tripp, realizou o primeiro estudo filogenético molecular em *Ruellia*, comprovando o monofiletismo do gênero. Os resultados do estudo, revelaram a existência de clados, cujos sinapomorfias morfológicas estão relacionadas com a estrutura da inflorescência, forma do fruto e indumento da semente (Tripp 2007), diferente de classificações anteriores que utilizavam a morfologia da corola (e.g. Ezcurra 1993, Nees 1847a), como base da delimitação de taxa infragenérica.

Em 2009, Tripp et al., realizaram a combinação do gênero *Blechum* em *Ruellia*, com base em dados moleculares.

Em 2013, Tripp et al., realizaram a recircunscrição da tribo Ruellieae, e a combinação de 5 gêneros em *Ruellia*.

Em 2017, Tripp & Darbyshire em um estudo filogenético com as espécies de *Ruellia* do Velho Mundo, propuseram 5 seções cujas sinapomorfias morfológicas baseiam-se na estrutura das inflorescências, morfologia do cálice e da semente.

Morfologicamente, o gênero consiste em plantas de hábito herbáceo a arbustivo, eretas ou decumbentes, raramente lianas, com cistólitos presentes. As flores podem ser solitárias ou dispostas em vários tipos de inflorescências, cálice com cinco segmentos, iguais a desiguais, unidos somente na base, corola tubulosa, infundibuliforme a hipocrateriforme, a porção mais estreita do tubo da corola pode ser reta ou recurvada, a porção mais alargada mais ou menos evidente, com cinco lobos livres, reflexos, patentes ou eretos, contortos, iguais ou os dois lobos

posteriores mais ou menos unidos na base, às vezes formando um lábio superior, os estames são quatro e didínamos, inseridos na base da porção alargada do tubo e unidos pela membrana estaminal, anteras bitecas, oblongo sagitadas, tecas paralelas, iguais, sem apêndices, possui de 2 a 10 óvulos por lóculo e estigma bífido. A cápsula pode ser obovada, clavada, oblongo-linear ou elipsoidal, subséssil a estipitada, variando de cilíndrica a mais ou menos compressa. As sementes são discoides com margem suborbicular a orbicular, e se tornam mucilaginosas quando molhadas. (Ezcurra & Wasshausen 1992; Ezcurra 1993; Manktelow 2000; Wasshausen & Wood 2004; Tripp 2007; Tripp et al. 2013; Azevedo & Braz 2018; Azevedo & Moraes 2019; Tripp & Luján 2018).

Para o Brasil, são estimadas pelo menos 85 espécies (Flora do Brasil 2020 em construção), ou seja cerca de 21% do total de espécies existentes, ocorrendo em todos os domínios fitogeográficos brasileiros. Apenas para o Estado de Goiás eram estimadas pelo menos 31 espécies (Flora do Brasil 2020 em construção), ou seja cerca de 8% de toda a diversidade de *Ruellia* do mundo, com grande e complexa variedade morfológica ocorrendo em basicamente todos os habitats. Em 2010, Vilar et al., elaboraram a monografia de Acanthaceae para o Distrito Federal, e constataram a ocorrência de 11 espécies de *Ruellia*.

A área de estudo compreende o Estado de Goiás e Distrito Federal, situados na região Centro-Oeste do Brasil, no Planalto Central Brasileiro.

O estado de Goiás possui extensão total de 340.125,715 km² (IBGE), limitando-se ao norte com o Estado do Tocantins, ao sul com o Estado de Minas Gerais e Mato Grosso do Sul, a leste com a Bahia e Minas Gerais e a oeste com o Mato Grosso.

O Distrito Federal possui extensão total de 5.760,783 km² (IBGE) tem como limites norte, sul e oeste o Estado de Goiás e leste Goiás e Minas Gerais.A área de estudo está

predominantemente inserida no domínio do Cerrado, com uma pequena porção ao sul do Estado de Goiás sob o domínio da Mata Atlântica.

As espécies de *Ruellia* encontradas, ocorrem predominantemente em formações campestres (campos limpos, campos sujos, campos rupestres, campos com murundu) e savânicas (cerrado sensu stricto), com alguns representantes ocorrendo também nas florestas estacionais semideciduais, florestas deciduais e florestas ciliares e de galeria.

O presente trabalho teve como objetivos: 1) realizar o levantamento das espécies de *Ruellia* ocorrentes no estado de Goiás e Distrito Federal, com base em consultas a acervos de herbários e expedições de campo; 2) contribuir para o conhecimento da morfologia e taxonomia das espécies do gênero, e de distribuição na área de estudo, através de chave de identificação, descrições morfológicas, ilustrações e imagens e mapas de distribuição; 3) contribuir com o conhecimento sobre a flora do Brasil e com informações para a conservação das espécies.

Após o desenvolvimento do trabalho, no estado de Goiás são listadas 41 espécies, duas variedades e uma subespécie de *Ruellia*, até o momento, tornando Goiás o estado com o maior número de espécies desse gênero no Brasil. Para o Distrito Federal, são listadas 19 espécies, todas também ocorrentes no estado de Goiás.

Esta dissertação está sendo apresentada na forma de capítulos, uma vez que esses já estão no formato de publicação. No capítulo 1 é apresentada uma sinopse do gênero *Ruellia* L. no estado de Goiás e Distrito Federal, com notas nomenclaturais, lectotipificações, comentários taxonômicos, mapas de distribuição, para as 41 espécies de *Ruellia* ocorrentes no estado de Goiás e Distrito Federal, a ser submetido à Willdenowia. No capítulo 2, são apresentadas e ilustradas onze novas espécies e são apresentadas duas novas combinações para a região do Brasil Central, a ser submetido a Systematic Botany.

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CAPÍTULO I

Manuscrito a ser submetido à Willdenowia.

ULISSES GONÇALVES FERNANDES[1,2], CÍNTIA KAMEYAMA[1] & ROSÂNGELA SIMÃO-BIANCHINI[1]

Synopsis of Ruellia in the state of Goiás and Distrito Federal, Brazil

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Abstract

A synopsis for the genus *Ruellia* L. (Acanthaceae) in the state of Goiás and Distrito Federal, Brazil. Here we describe one new variety and one new subspecies, besides lectotype designations and new synonyms. We also provide an identification key, a brief description, distribution maps, and comments on habitat, phenology, and taxonomy of 41 species.

Key words: Brazilian Flora, campo limpo, campo rupestre, campo sujo, Central Brazil, Centro oeste, Cerrado vegetation, Neotropics, Nomenclature, Ruellieae, Semideciduous Forests, Taxonomy.

Introduction

Ruellia Linnaeus is the second most species-rich genus of Acanthaceae, comprising ca. 400 species (Tripp & Tsai 2017), occurring in tropical and subtropical regions of the world, with a few species ranging the tempered regions (Tripp 2007). In Neotropical region occur ca. 300 species of *Ruellia*, particularly in Mexico, Brazil, and western South America (Tripp & Tsai 2017, Tripp & Manos 2008).

Ruellia is a monophyletic genus and the most species-rich member of the widespread tribe Ruellieae, which was re-circumscribed in Tripp et al. (2013). The morphological synapomorphy of the genus includes spherical triporate pollen, rarely pantoporate, with a coarsely reticulate exine and chromosome number of n = 17 (Tripp 2007, Tripp et al. 2013, Tripp & Darbyshire 2017).

Ruellia consists in herbs, subshrubs, shrubs erect, prostrate, rarely scandent, and can be recognized by the following characters: the calyx united only at the base with five free

segments, rarely with the fusion beyond the base, the segments can be equal to unequal; zygomorphic corollas, tubular, funnelform or salverform corollas, and have a narrow unexpanded, erect or curved, portion at the base, followed by an obconic, campanulate, tubulose or ventricose expanded portion, and five suborbicular to orbicular free lobes; four didynamous stamens, the filaments are united at the base by a membrane termed "filament curtain", anthers bithechous and unappandage; filiform and bilobed stigmas with the anterior lobe frequently reduced in length; capsules with explosive dehiscence, two-valved, loculicide, and seeds sustained by a hook-like retinacula; seeds four to >24 ,discoid, laterally flattened, with orbicular to elliptical outline totally covered or ciliate by hygroscopic-mucilaginous trichomes. (Ezcurra & Wasshausen 1992, Ezcurra 1993, Manktelow 2000, Wasshausen & Wood 2004, Tripp 2007, Tripp et al. 2013, Azevedo & Braz 2018, Azevedo & Moraes 2019, Fernandes et al. unpublish, see Chapter II).

In Brazil there are ca. 85 species of *Ruellia* distributed in all Brazilian phytogeographic domains, the Cerrado domain is the most species-rich, with ca.40 species. There are few floristic studies focused on Acanthaceae of Brazilian Cerrado (e.g. Kameyama 1995, 2003, Harvey & Wasshausen 1995, Vilar et al. 2010, Sartin 2015), and more studies are needed to know the real number of Acanthaceae species in this domain.

The state of Goiás and Distrito Federal are inserted in Central Brazilian Plateau, inside the Cerrado domain (savanah like vegetation). In the state of Goiás, 31 species of *Ruellia* was estimated (Flora of Brazil 2020 under construction), and 11 species for Distrito Federal (Vilar et al. 2010). All species of *Ruellia* occurring in Distrito Federal also occur in Goiás.

Here we present a taxonomic treatment for the species of *Ruellia* that occur in the state of Goiás and Distrito Federal, Brazil, with an identification key for the species, brief descriptions, and comments on taxonomy, distribution, habitat and phenology. Therefore, this work aims to

contribute to the Flora of Goiás and Tocantins: Coleção Rizzo, to the Flora of Brazil 2020 project and update *Ruellia* of Flora of Distrito Federal (Vilar et al. 2010).

Material and Methods

This study was based in analysis of herbarium specimens and/or digital images from the following herbaria: B, BR, C, CEN, CTES, ESA, F, G, GZU, HAL, HAS, HEPH, HPL, HUEFS, HUFU, IAC, IBGE, K, M, MBM, MO, MPU NY, P, PMSP, R, RB, SP, SPF, UB, UEC, UFG, US, W (acronyms according to Thiers 2019, continuously updated) and Herbarium Jataiense Professor Germano Guarim Neto (HJ) of Universidade Federal de Goiás – Campus Jataí, not indexed, along with field observation of some species in their habitat and under cultivation.

Morphological descriptions followed Harris and Harris (2001), and Radford et al. (1976) for shape; Ellis et al. (2009) for leaf venation; Payne (1978) and Harris and Harris (2001) for indumentum, and Tripp (2010) for corolla morphology.

The physiognomies of Cerrado vegetation follow Ribeiro and Walter (2008): campo limpo (grasslands with a few scattered shrubs and without tress); campo úmido (wet grasslands, similar to ‘campo limpo’ but with a wet, sandy and/or organic soil, generally surrounding riparian forests or water springs); campo sujo (grasslands with shrubs and some scattered small trees); campo rupestre (grasslands with scaterred shrubs growing on rocky and sandy soils, and between the rocky outcrops); cerrado sensu stricto (savannah like vegetation, with tortuose sparse trees and shrubs, that can be open with a markedly understory community composed by herbs and subshrubs, or denser with the trees closer to each other and less herbs and subshrubs at the understory); cerradão (forestry physiognomy of cerrado vegetation, reaching up to 15 m).

The distribution maps were generated using the software ArcGIS v. 10.5 (ESRI 2016), based on the geographical coordinates taken from specimen labels. In the absence of coordinates on labels, the coordinates were determined based on the description of locality, or in case of the absence of this information the central coordinate point of the municipality was used.

Taxonomic treatment

Ruellia L., Sp. Pl. 2: 634. 1753 Type: *Ruellia tuberosa* L. — **Lectotype:** designated by Britton & Brown, Ill. Fl. N.U.S., ed 2, 3: 214. 1913.

Perennial herbs, subshrubs, shrubs, erect or prostrate, rarely scandent; subterraneous system axial to woody, sometimes with fleshy fusiform roots, or rhizomes; stems quadrangular to terete, sometimes longitudinally sulcate, frequently constricted or dilated above the nodes, green, reddish, sometimes purplish, glabrous or with indumentum; leaves opposite decussate to 3-4-whorled, sessile to petiolate, laminae entire, generally ovate to elliptic, base generally cuneate, decurrent or rounded, margin generally entire to slightly repand, apex generally acute, acuminate or rounded, concolor to discolored, glabrous or with indumentum; Flowers subsessile to pedicellate on the axils of terminal leaves or in racemes, panicles, thyrses, or cymes, bracts present, foliaceous or not, or absent; bracteoles present or absent; Calyx 5-segmented, united at the base, segments equal to unequal, generally linear triangular, lanceolate or spathulate, acute to rounded at the apex, generally glandular pubescent or pubescent with eglandular trichomes and subcapitate glandular trichomes; Corollas zygomorphic, tubular, funnelform or salverform, with an unexpanded narrow portion at the base of the tube, erect or curved, spreading distally to an obconic, campanulate, tubulose or ventricose expanded portion, straight, curved or angled, lilac, red, white, yellowish, pink with or without macula or colored lines, and five lobes, generally orbicular to suborbicular; Stamens four, strongly or weakly

didynamous, included to exserted, filaments inserted at the base of the expanded portion of the corolla, united by a filament curtain, anthers bithecous, oblong-sagittate, dorsifixed, the thecae parallel, equal, muticous, unappendaged; Styles included to exserted; stigma bilobed, generally the anterior lobe frequently reduced in length; Capsule claviform, lineariform or obovoid; Seeds 4 to <28, discoid, laterally flattened, with orbicular to elliptical outline, totally covered or ciliate by hygroscopic-mucilaginous trichomes.

Key to the *Ruellia* species of Goiás and Distrito Federal

1. Flowers on racemes, panicles, thyrses, spikes or cymose inflorescences..... **2**

– Flowers solitary or two, subsessile in the axils of the upper leaves **22**

2. Flowers on cymose inflorescences **3**

– Flowers on racemes, panicles, thyrses or spikes..... **11**

3. Calyx segments oblong to elliptic; corollas always pale yellow ..... 16. ***R. eurycodon***

– Calyx segments linear triangular, linear, lanceolate or spathulate; corollas red, lilac or white..... **4**

4. Corollas always red or reddish..... **5**

– Corollas lilac or white..... **7**

5. Plants erect to scandent; leaves sessile, frequently amplexicaulis at the base; corollas >40 mm long .....4. ***R. amplexicaulis***

– Plant erect to prostrate, never scandent; leaves subsessile or petiolate, base never amplexicaulis; corollas <35 mm long..... **6**

6. Leaves hirsute to pubescent or glabrescent; inflorescences glandular pubescent, bracts and bracteoles frequently caducous; calyx segments linear to spathulate, apex slightly rounded; stamens exserted ..... 15. ***R. elegans***

– Leaves sparsely puberulent to glabrescent; inflorescence puberulent with eglandular trichomes, bracts and bracteoles persistent; calyx segments linear triangular, apex acute; stamens subexserted.....
.....7. ***R. brevifolia***

7. Leaves linear, lanceolate to narrowly elliptic, glabrous or sparsely pubescent on the veins and/or margins ciliate..... 38. ***R. simplex***

– Leaves ovate, elliptic, obovate or spathulate, densely pubescent to pubescent on both surfaces **8**

8. Uniflora cymes, never ramified ..... 20. ***R. glaziovii***

– Cymes with more than two flores, frequently ramified **9**

9. Calyx segments equal; corollas >30 mm long ..... 24. ***R. incomta***

– Calyx segments subequal, the posterior longer; corollas < 25 mm long **10**

10. Capsules claviform, 4-seeded .....41. ***Ruellia* sp.**

– Capsules narrowly ellipsoid to narrowly oblongiform, 12-seeded ..... 32. ***R. paniculata***

11. Racemes or panicles with bracts not foliaceous or inconspicuous, sometimes secundiflorous; corollas with the unexpanded narrow portion of the tube at least 3× longer than the expanded portion ..... 12. ***R. costata***

– Spikes, spiciform racemes to panicles or congest thryrses with conspicuous bracts, never secundiflorous; corollas with unexpandend portion of the tube shorter than the expanded or if longer, not exceeding 2× the length of the expanded portion **12**

12. Corollas red or pinkish red..... **13**

– Corollas lilac, white, pink or pale yellow **16**

13. Leaves linear, narrowly elliptic to oblanceolate, covered only with subcapitate glandular trichomes.....9. ***R. cataractae***

– Leaves lanceolate, ovate, elliptic to obovate, tomentose, hirsute, pubescent or glabrescent with eglandular trichomes and subcapitate glandular trichomes **14**

14. Inflorescence with bracts squarose; corollas pinkish red; capsules 8-seeded.....
.....27. ***R. macedoana***

– Inflorescence with bracts non squarrose; corollas red, orangish red, rarely yellow; capsules 4-seeded..... **15**

15. Inflorescence with bracts imbricate, ovate to elliptic, bracteoles spathulate to narrowly oblanceolate, rarely narrowly elliptic .....1. ***R. adenocalyx***

– Inflorescence with bracts non imbricate, obovate, spathulate to linear, bracteoles absent
.....5. ***R. angustior***

16. Corolla with the unexpanded portion of the tube resupinate in 180° .....28. ***R. macrantha***

– Corolla non resupinate **17**

17. Leaves tomentose to hirsute..... **18**

– Leaves pubescent, glabrescent or only covered with subcapitate glandular trichomes . **19**

18. Leaves 3-4 whorled, rarely opposite; corollas pale yellow; stamens exserted .... 40. ***R. verbasciformis***

– Leaves opposite, rarely 3-whorled; corollas white; stamens included .... 11. ***R. chapadensis***

19. Inflorescences with imbricate bracts, pubescent with eglandular trichomes or trichomes only on the main vein and margins **20**

– Inflorescences with non imbricate bracts, glandular pubescent **21**

20. Corollas with <20 mm long; capsule with the septa and placenta breaking away at the dehiscence; seeds 10-14 ..... 6. ***R. blechum***

– Corollas >25 mm long; capsule with the placenta and septa not breaking away at the dehiscence; seeds 4 ..... 35. ***R. rizzoi***

21. Leaves ovate to elliptic; inflorescence with lanceolate bracts, ... 2. ***R. adenostachya***

– Leaves linear, lanceolate or narrowly elliptic; inflorescence with rhombic, elliptic, ovate, trulate or depressed ovate bracts ..... 33. ***R. pinguicula***

22. Leaves brochidodromous **23**

– Leaves eucamptodromous or eucamptodromous becoming brochidodromous at the apex **25**

23. Bracteoles glabrous or only with subcapitate glandular trichomes; calyx segments ciliate at the margin ..... 22. ***R. hatschbachii***

– Bracteoles pubescent to villose with eglandular trichomes and subcapitate glandular trichomes; calyx segments pubescent to villose with subcapitate glandular trichomes . **24**

24. Leaves ciliate at the margins with eglandular trichomes and totally covered by subcapitate glandular trichomes; endemic to the municipality of Cavalcante..... 34. ***R. pohlii***

– Leaves sparsely pubescent, ciliate with eglandular trichomes, and/or only with subcapitate glandular trichomes; endemic to the municipality of Alto Paraíso de Goiás ..... 26. ***R. lucindae***

25. Corollas red to orangish-red ..... 13. ***R. densa***

– Corollas lilac, pale lilac, white or pale yellow..... **26**

26. Leaves always subcordate at the base, frequently amplexicaulis, margin frequently revolute

..... 19. ***R. glandulifolia***

– Leaves decurrent, cuneate, obtuse, rounded (rarely subcordate) at the base, not amplexicaulis, margin not revolute..... **27**

27. Corollas with the narrow unexpanded portion of the tube longer at least 2× the length of the expanded .....25. ***R. jussieuoides***

– Corollas with the narrow unexpanded portion of the tube shorter, the same size or longer, not exceeding 2×, the length of the expanded **28**

28. Calyx segments linear and slightly rounded at the apex, glandular pubescent.....

..... 18. ***R. glandulicalyx***

– Calyx segments linear triangular, narrowly elliptic or lanceolate and acute at the apex, pubescent, villose or ciliate with eglandular trichomes and with glandular subcapitate trichomes..... **29**

29. Corollas white to pale yellow **30**

– Corollas lilac to pale lilac **31**

30. Leaves puberulent; endemic to the municipality of Alto Paraíso de Goiás.....
.....3. ***R. altoparadisiensis***

– Leaves pubescent; endemic to the municipality of Niquelândia ..... 37. ***R. rufipila***

31. Leaves linear, lanceolate or narrowly oblong..... **32**

– Leaves ovate, elliptic, oblanceolate or obovate **34**

32. Calyx segments subequal, the posterior segment shorter ..... 29. ***R. magniflora***

– Calyx segments equal or subequal, the posterior segment longer **33**

33. Leaves of the new branches congested; bracteoles absent .....36. ***R. rosmarinus***

– Leaves of the new branches not congested; bracteoles oblanceolate or spathulate .....
.....39. ***R. trachyphylla***

34. Bracteoles lanceolate, narrowly elliptic, oblanceolate, spathulate or linear (rarely absent)
..... **35**

– Bracteoles absent or obsolete..... **39**

35. Leaves with the adaxial surface slightly scabrous texture; calyx segments always linear triangular.....23. ***R. helianthemum***

– Leaves with the adaxial surface with a not scabrous texture; calyx segments lanceolate to narrowly elliptic, rarely linear triangular..... **36**

36. Corollas with the unexpanded portion of the tube shorter than the expanded..... **37**

– Corollas with the unexpanded portion of the tube of the same length as the expanded.....
..... **38**

37. Stems, leaves, bracteoles and calyx covered by yellow eglandular trichomes; calyx segments lanceolate to narrowly elliptic, never linear triangular, tomentose, hirsute to densely pubescent with eglandular trichomes ..... 10. ***R. ceciliae***

– Stems, leaves, bracteoles and calyx covered by white eglandular trichomes; calyx segments linear triangular or narrowly elliptic ..... 14. ***R. dissitifolia***

38. Leaves elliptic to ovate, with margin entire to slightly serrulate or slightly denticulate; calyx segments linear triangular, rarely narrowly lanceolate ..... 30. ***R. multifolia***

– Leaves always ovate to lanceolate, with margin entire to slightly repand; calyx segments lanceolate to narrowly elliptic.....21. ***R. hapalotricha***

39. Stems reddish-brown; corollas with the unexpanded portion of the tube of the same size or shorter than the expanded portion, the expanded portion not exceeding 1,5× the length of unexpanded portion, glandular pubescent; fertile mainly during the dry season (June to August); .....31. ***R. nitens***

– Stems green to purplish green; corollas with the unexpanded portion shorter than the expanded portion, the expanded portion not exceeding 2× the length of unexpanded portion, pubescent with eglandular trichomes; fertile mainly during the rainy season (October to May); **40**

40. Leaves with laminae sparsely pubescent or only sparsely pubescent on veins and margin ciliate with eglandular trichomes and subcapitate glandular trichomes, or only covered with subcapitate glandular trichomes, lustrous on adaxial surface; calyx glabrous to ciliate with eglandular trichomes.....8. ***R. bulbifera***

– Leaves hirsute, villose, or pubescent with eglandular trichomes, mainly on the veins, not lustrous; calyx hirsute to pubescent with eglandular trichomes and subcapitate glandular trichomes..... 17. ***R. geminiflora***

1. ***Ruellia adenocalyx* Lindau** in Bot. Jahrb. Syst. 25(3, Beibl. 60): 46. 1898. —**Lectotype (to be designated):** Brazil. civ. Goyaz [Goiás], inter Guariroba et Siriaeo, 11 Jul 1895, *Glaziou 21886* (P00650168 image!; isolectotypes: B [probably destroyed] photo!: 5950, BR0000013221997 image!, C10005109 image!, F n°:976916 image!, K000534199 image!, MPU018191 image!, P00650169 image!, P00650170 image!, R000011198!, S n°: S05-290 image!).

Diagnosis – Subshrubs to shrubs, erect to prostrate, 0.30–1 m tall, subterraneous system woody; **younger stems** quadrangular, mature stems subquadrangular to terete, tomentose with eglandular trichomes; **leaves** opposite to 3-whorled, sessile, blades discolored with the abaxial surface light green and adaxial surface olive to green, chartaceous to membranaceous, ovate to elliptic, rarely obovate, 1.8–8.0×0.5–5.0 cm, base cuneate, margins entire, apex acute to acuminate, tomentose to densely pubescent on both surfaces, and subcapitate glandular hairs on abaxial surface; **inflorescence** apical racemes or panicles, rarely axillar, with sessile imbricate bracts elliptic, narrowly elliptic, obovate or oblanceolate, rounded at the apex, densely glandular pubescent; **flowers** in the axils of the bracts, pedicellate, bracteoles spathulate to narrowly oblanceolate, rarely narrowly elliptic, rounded at the apex; calyx segments equal to subequal, sometimes, the posterior segment longer, linear, rounded at the apex, glandular pubescent; corollas red, orangish red, rarely yellow, 35–45 mm long, glandular pubescent, the unexpanded portion of the tube shorter than the expanded, lobes orbicular to elliptic, emarginate at the apex, patent to reflexed; stamens exserted, didynamous; ovary ovoid hirsutulous to velutinous, stigma exserted; **capsules** obovoid to elliptic, pubescent, seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 1 A).

Illustration in Vilar et al. 2010.

Distribution, habitat and phenology – Ruellia adenocalyx occur in central eastern and eastern Goiás, Distrito Federal (Fig. 2), and western Minas Gerais, growing in campos sujos and cerrado sensu stricto, on rocky and sandy or clay-sandy soils. It was collected with flowers and fruits from March to September. In the study area it occurs in elevations under 1300m.

Comments – Ruellia adenocalyx is easily recognized by red, orangish red, rarely yellow corollas on inflorescences with densely glandular pubescent bracts. It is morphologically similar to *R. angustior*, being frequently misidentified in herbaria. The similarities are in the habit and leaves, and the differences in the apical racemes to panicles with imbricate ovate to elliptic bracts (vs. racemes to panicles with non-imbricate obovate, spathulate or linear bracts).

Selected specimens examined – Brazil, Distrito Federal, Brasília, margem da DF-290, saída para a Ponte Alta, cerrado alterado, próximo a grande erosão, 16º01', 48º05'W, 984 m, 10 Jun 2001, *M. Aparecida da Silva et al. 5047* (IBGE, SP, RB, SPF); ibid., Área das FERCAL, a 6,7 km da fábrica de cimento CIPLAN, na DF 205 Leste, Cerrado ralo de encosta com mata seca nos vales, Solo pedregoso de arenito, 26 Jul 1990, *L.B. Bianchetti 932* (CEN); ibid., APA de Cafuringa, Fazenda Dois Irmãos, Ecótono Cerrado/mata, margem esquerda do Córrego Dois Irmãos, 26 Mar 1993, *B.A.S. Pereira 2497* (RB, IBGE); Goiás, Abadiania, Rod. Go-060, km 84, campo, 22 May 1975, *G. Hatschbach 36687* (MBM, INPA, NY); Cocalzinho de Goiás, Parque Estadual da Serra dos Pirineus, Área de cerrado aberto, 22K X727447;Y8250628, 12 Jun 2007, *L.B. Bosquetti 865* (ESA); Corumbá de Goiás, Proximidades do Salto, Sep 1952, *F. Lane s.n.* (SP, RB); Cristalina, Rod. BR 040, 10 k oeste de Cristalina, 15 Aug 1980, *G. Hatschbach 43133* (MBM); Jaraguá, Rodovia Belém/Brasília, entre Jaraguá e São Francisco, 28 Jun 1996, *B.A.S. Pereira 3079* (RB, IBGE); Luziânia, Local onde será a futura cidade industrial, sobre cascalho onde se extraiu ouro pesado, 2 Jun 1976, *E.P. Heringer 15901* (UB, UEC); Padre Bernardo, Fazenda Particular, cerrado conservado, 6 Jun 2004, *M.A. Abrahim 8* (UB); Pirenópolis, 09 Jul 1951, *A. Macedo 3299* (SP, RB, S); ibid., Serra dos Pirineus, margem

esquerda da estrada sentido Pirenópolis-Cocalzinho, antes do parque, ca. 7-8km do asfalto, 15 May 2010, *R.D. Sartin 54* (UFG, IBGE, UB); Santo Antônio do Descoberto, DF-280, ca. de 2km após a entrada para Santo Antonio do Descoberto, 22 Mar 2001, *A.A. Santos 910* (SP, CEN); São João d'Aliança, Cerrado, 21 May 2001, *G. Pereira-Silva 5040* (CEN, SP, RB).

2. ***Ruellia adenostachya*** **Lindau** in Bot. Jahrb. Syst. 25(3, Beibl. 60): 45. 1898. — **Lectotype (to be designated):** Brazil, civ. Goyaz [Goiás] ad Estrada da Canastra propa Santa Luzia, 3 Aug 1895, *Glaziou 21883a* (P00650167 image!; isolectotype B [probably destroyed] photo!: 5906).

Diagnosis – Shrubs, erect to prostrate, 0.5–2.5 m tall, subterraneous system woody; **younger stems** quadrangular, frequently slightly sulcate, mature stems subquadrangular to terete, with only subcapitate glandular trichomes and a few eglandular trichomes only on the nodes; **leaves** opposite, sessile, blades membranaceous, slightly discolored with the abaxial surface light green and abaxial surface dark green, ovate to elliptic, 3.5–17.5×0.5–7.1 cm, base decurrent, margins entire to slightly repand, apex acute to acuminate, sparsely pubescent with eglandular trichomes, glabrescent, on both surfaces, mainly on the veins and margins, and with subcapitate glandular trichomes on both surfaces, densely on abaxial surface; **inflorescence** apical racemes, bracts sessile, lanceolate, apex acuminate, narrowly rounded, densely glandular pubescent; bracteoles absent; **flowers** in the axils of the bracts, subsessile; calyx segments equal to subequal, sometimes, the posterior segment longer, linear to narrowly elliptic, beige to yellowish at the base, rounded and dark green at the apex, densely glandular pubescent; corollas lilac, 27–38 mm long, glandular pubescent, the unexpanded portion shorter than or the same size as the expanded portion of the tube, lobes orbicular to elliptic, apex emarginate, patent; stamens didynamous, the two longer subexserted; ovary ovoid short pubescent and glandular

pubescent at the apex, stigma subexserted; **capsules** obovoid to elliptic, pubescent and glandular pubescent at the apex, seeds 6–8, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 1 B).

Distribution, habitat and phenology – Ruellia adenostachya was collected, up to now, only in northern and central eastern Goiás and Distrito Federal (Fig. 2), growing in semideciduous, riparian and gallery forests, on organic-clay soils and organic-sandy soils. It was collected fertile from June to September.

Comments – Ruellia adenostachya is characterized by the apical spiciform racemes with foliaceus, squarrose, lanceolate, glandular pubescent bracts, and lilac flowers.

The syntypes of *R. adenostachya*, duplicates of *Glaziou 21883a*, are mixed with different species, the specimen BR0000013222000 is *Ruellia incomta* (Nees) Lindau, the specimens P00650166, F nº 976923, R000011208 are an unidentified red-flowered *Ruellia* species. Thus, we designated the specimen P00650167, that corresponds to Lindau's protologue: "…Spicae in axillis foliorum superum subterminales, simplices, pedunculatae, totae glanduloso-pubescentes. Bracteae ad apicem minores, lanceolatae, subobtusae. Flores cyanei…" as lectotype.

Selected specimens examined – Brazil, Distrito Federal, Brasília, Shaded creek bank, ca. 50km E of Brasília, 700-1000 m, 20 Aug 1964, *H.S. Irwin 5360* (UB, NY); ibid., Morro de pedras calcáreas, perto da DF-02, Mata decídua, 15º32'S, 46º50'W, 850 m, 19 Jun 1980, *M.C.G. Kirkbride & J.H. Kirkbride 1263* (SP, UFG, HRCB, UB); ibid., Reserva Biológica da Contagem (REBIO). Mata Seca Sempre verde, 14 Jul 2012/07/2012, *M.R.V. Zanatta J.E.Q. Faria 1392* (UB); Goiás, Alto Paraíso de Goiás, Floresta Estacional Semidecídua, na trilha à direita do estacionamento do Vale da Lua, ca. de 300 m de distância do estacionamento, em ambiente sombreado, 14º10'51"S, 47º47'38"W, 975 m, 03 Jul 2017, *U.G. Fernandes et al. 238*

(SP); Formosa, Cachoeira do Tiquira, Mata abaixo da queda do Tiquira, 08 Aug 1976, *E.P. Heringer 15928* (UEC, UB, NY); Formoso, Formoso p/ Campinaçu, Alto da serra, cerrado, margem do córrego, 13 Jul 1972, *J.A. Rizzo 8215* (UFG); Goiânia, Localizada nas elevações que formam o morro dos Lobos, Mata Primitiva, 08 Jul 1978, *J.A. Rizzo & A. Barbosa 1725* (UFG); Minaçu, Estrada antiga Minaçu/Serra da Mesa, cerrado fortemente antropizado, pedregoso. Área de influência da U.H.E. Serra da Mesa, 13º47'09"S, 48º23'29"W, 440 m, 07 Jul 1997, *R.C. Oliveira et al. 884* (HEPH, CEN); Niquelândia, Borda da mata de Floresta Estacional Semidecídua, na estrada, atrás do povoado de Macedo, 14º21'23"S, 48º27'20"W, 08 Jul 2017, *U.G. Fernandes & F.S. Petrongari 302* (SP); Pirenópolis, Santuário de Vida Silvestre Vagafogo, na borda da mata, logo após o restaurante, solo arenoso-humoso., 15º49'21"S, 48º59'41"W, 810 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 326* (SP); Teresina de Goiás, Na beira da GO-118, em barranco, na borda de Floresta Estacional Semidecídua, área parcialmente sombreada, 13º48'57"S, 47º15'04"W, 883 m, 02 Jul 2017, *U.G. Fernandes et al. 228* (SP); Uruaçu, Fazenda Tie Pitanga (Brahma), entrada a 5 km SE de Uruaçu, Local Próximo ao Rio Maranhão, Corrego aflora em Lagoa Azul, Mata de Galeria, 14º22'S, 49º03W, 440 m, 03 Aug 1992, *B.M.T. Walter et al. 1815* (RB, CEN).

3. ***Ruellia altoparadisiensis*** **U.G. Fern., Kameyama & E. Tripp**, unpublish. (see Chapter II). — Holotype: Brazil, Goiás, Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros, coletada próximo à trilha sentido cachoeiras dos Saltos, em cerrado sensu stricto, em solo pedregoso arenoso, área parcialmente sombreada. 14°09’53.63”S, 47°49’36.29”W, 965 m elev., 01 Jul 2017, *U.G. Fernandes et al. 217* (SP; isotypes: RB, UB).

Diagnosis – Subshrubs, erect to prostrate, 20–70 cm tall, subterraneous system woody; **stems** subquadrangular to terete, reddish, densely pubescent with eglandular trichomes and subcapitate glandular trichomes, more densely on the nodes; **leaves** opposite, sessile to subsessile, blades chartaceous, ovate to elliptic, rarely oblong or narrowly oblong, (0.6–)1–4.5(–4.8) ×0.4–2.5, base rounded to subcordate, margins entire, apex acute, pubescent with eglandular trichomes, mainly on the veins, and subcapitate glandular trichomes on both surfaces, densely on abaxial surface, glabrescent, lustrous on adaxial surface; bracteoles absent; **flowers** solitary, rarely geminate in the axils of the upper leaves, subsessile; calyx segments equal, linear triangular, acute at the apex, pubescent with eglandular trichomes and subcapitate glandular trichomes; corollas white to yellowish, 35–52 mm long, glandular pubescent, the unexpanded portion of the same size of the expanded portion of the tube, lobes orbicular, emarginate to rounded at the apex, patents; stamens included, didynamous; ovary ovoid, hirsutulous to velutinous, stigma included; **capsules** obovoid, short pubescent, seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 1 C–D).

Illustration in Chapter II.

Distribution, habitat and phenology – Ruellia altoparadisiensis, up to now, was collected only in the municipality of Alto Paraíso de Goiás, in Chapada dos Veadeiros region (Fig. 3), growing in open cerrado sensu stricto and campos sujos, on rocky and sandy soils. This species was found fertile during the months of July and August, in the dry season.

Comments – Ruellia altoparadisiensis is morphologically similar to *R. nitens* (Nees) Wassh., with which it is commonly misidentified in herbaria. *Ruellia altoparadisiensis* has stems densely pubescent with eglandular trichomes and subcapitate glandular trichomes (vs. short pubescent with eglandular trichomes and subcapitate glandular trichomes or only with subcapitate glandular trichomes), the color of corollas are white to pale yellow (vs. lilac to

purple), the fruit is 4 to 8 seeded (vs. only 4 seeded) and occurs only in Chapada dos Veadeiros area (vs. widespread in cerrado vegetation of Goiás, Mato Grosso, Bahia and Minas Gerais) [Fernandes et al. unpublish. (See Chapter II)].

Selected specimens examined – Goiás: Alto Paraíso de Goiás, Chapada dos Veadeiros, próximo ao Rio Preto, 28 Jul 1985, *S. Romaniuc Neto & M. G. Majo 374* (SP, SPF); Parque Nacional da Chapada dos Veadeiros, trilha a caminho do mirante, em cerrado sensu stricto, em solo pedregoso, 14°09'57"S, 47°49'36"W, 748 m, 1 Jul 2017, *U. G. Fernandes et al. 209* (SP); ibid., Parque Nacional da Chapada dos Veadeiros, cerrado sensu stricto, em solo pedregoso-arenoso, 14°09'56"S, 47°49'36"W, 964 m, 1 Jul 2017, *U. G. Fernandes et al. 211* (SP); ibid., Parque Nacional da Chapada dos Veadeiros, cerrado sensu stricto, em solo rochoso, dentro de buraco de garimpo de cristais de quartzo, 14°09'53"S, 47°49'51"W, 944 m, 1 Jul 2017, *U. G. Fernandes et al. 213* (SP); ibid., Parque Nacional da Chapada dos Veadeiros, em cerrado sensu stricto ao lado direito da trilha dos Saltos sentido cachoeiras, ambiente parcialmente sombreado, solo rochoso-arenoso, 14°09'53"S, 47°49'50"W, 944 m, 1 Jul 2017, *U. G. Fernandes et al. 214* (SP); ibid., Povoado de São Jorge, ao lado direito da trilha sentido mirante da janela, em cerrado sensu stricto, ambiente aberto, em solo pedregoso 14°10'40"S, 47°49'42"W, 1025 m, 6 Jul 2017, *U. G. Fernandes & F. S. Petrongari 277* (SP, CEN); ibid., Parque Nacional da Chapada dos Veadeiros, trail from entrance of park to waterfalls 120 and 80, -14.166081°, -47.820443°, 832 m, 13 Aug 2016, *E. Tripp & C. Kameyama 5941* (SP, COLO, RSA).

4. ***Ruellia amplexicaulis* (Nees) Lindau** in Nat. Pflanzenfam. 4, Abt. 3b: 311. 1895 ≡ *Arrhostoxylum amplexicaule* Nees in Fl. Bras. 9: 59. 1847 — **Lectotype (to be designated):** Brazil, Ind loc., ad Valle fundo, s.d., *Sellow s.n.* (K000534197 image!; isolectotypes: B [probably destroyed] photo: 5908!, BR000000694313 image!, BR000000694247 image!, HAL0113885 image!, W nº 0027040 image!).

Diagnosis – Shrubs, erect to scandent, 0.5–2.5 m tall, subterraneous system not seen; **younger stems** quadrangular to subquadrangular, sometimes sulcate, only with subcapitate glandular trichomes, eglandular trichomes only on the nodes; **leaves** opposite, sessile, blades membranaceous to chartaceous, ovate to elliptic, rarely obovate, (2–)4–22.5×1–8.5 cm, base decurrent, rounded or subcordate, frequently amplexicaulis, margins entire to slightly repand, apex acute to acuminate, only with sparse subcapitate glandular trichomes on abaxial surface, adaxial surface glabrous; **inflorescences** apical and lateral dichasia, bracts sessile deltoid, ovate, elliptic to linear, apex acute, only with subcapitate glandular trichomes, bracteoles sessile linear to linear triangular, apex acute, only with subcapitate glandular trichomes; **flowers** pedicellate; calyx segments equal, linear triangular, glabrous; corollas red, 45–55 mm long, pubescent with eglandular trichomes, the unexpanded portion ca. 1/2 the length of the expanded portion of the tube, lobes elliptic to oblong, apex emarginate, reflexed, twisted; stamens exserted, didynamous; ovary ovoid glabrous, stigma exserted; **capsules** narrowly elliptic to narrowly oblong, glabrous, seeds 10–16, suborbicular, ciliate with hygroscopic trichomes (Fig. 1 E–G).

Distribution, habitat and phenology – *Ruellia amplexicaulis* was only reported to Brazil, occurring in the states of Mato Grosso, Mato Grosso do Sul, Goiás, Distrito Federal and Minas Gerais, growing in semideciduous, deciduous, and riparian forests and cerrado vegetation. It was collected fertile from June to October. In the study area, *R. amplexicaulis* was collected in central northern and southwestern region of Goiás and in Distrito Federal (Fig. 3).

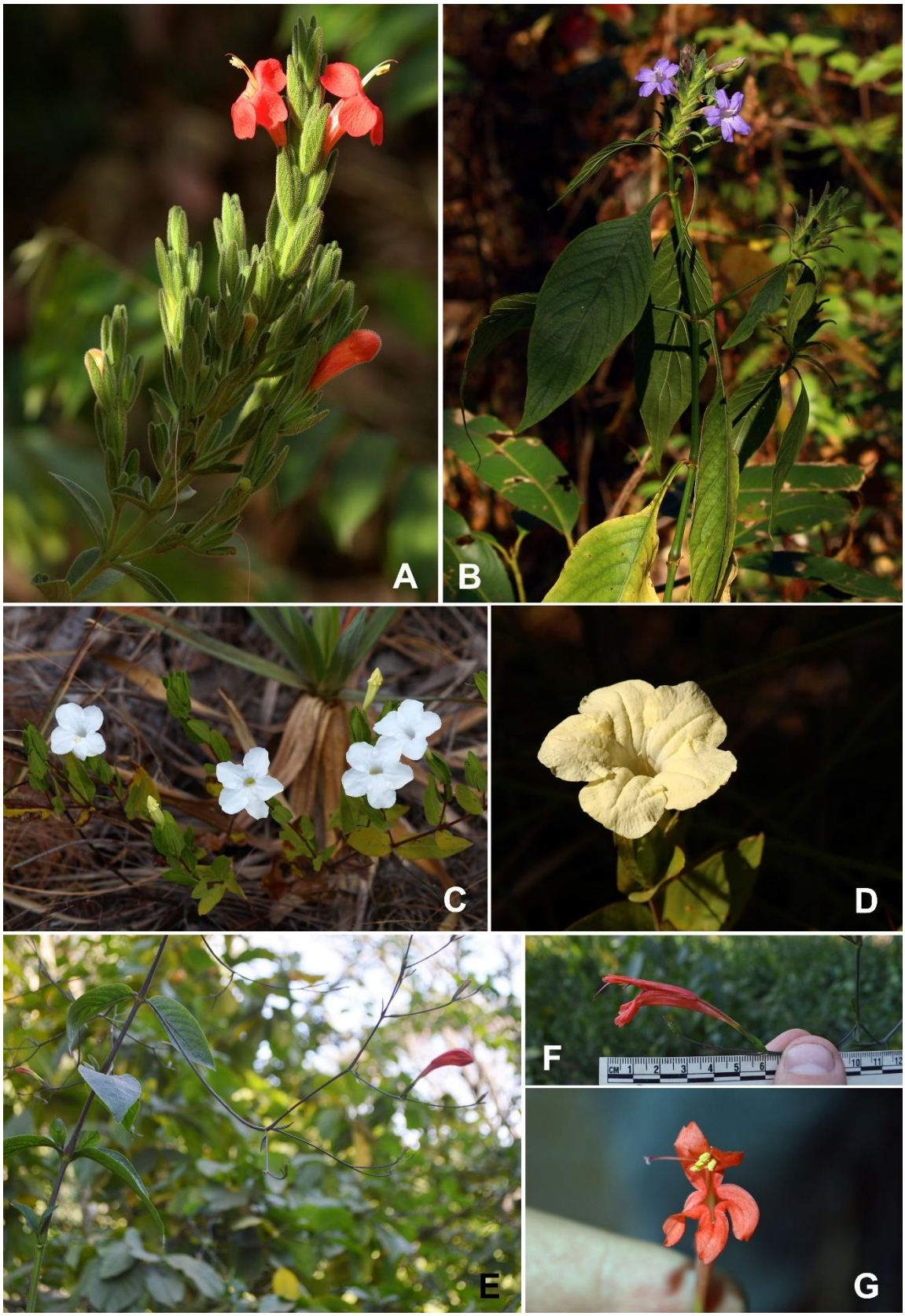

Figure 1. ***Ruellia adenocalyx***: A – Inflorescence with side view of the flowers and bracts; ***Ruellia adenostachya***: B – Stem with apical spiciform racemes; ***Ruellia altoparadisiensis***: C – Habit, with a fron view of white corollas; D – Detail of a pale yellow corolla; ***Ruellia amplexicaulis***: E – Branch with axillary dichasia; F – Detail in the flower in a side view; G – Detail in a front view of the corolla. (Images: A–D: Rodolph Delfino Sartin).

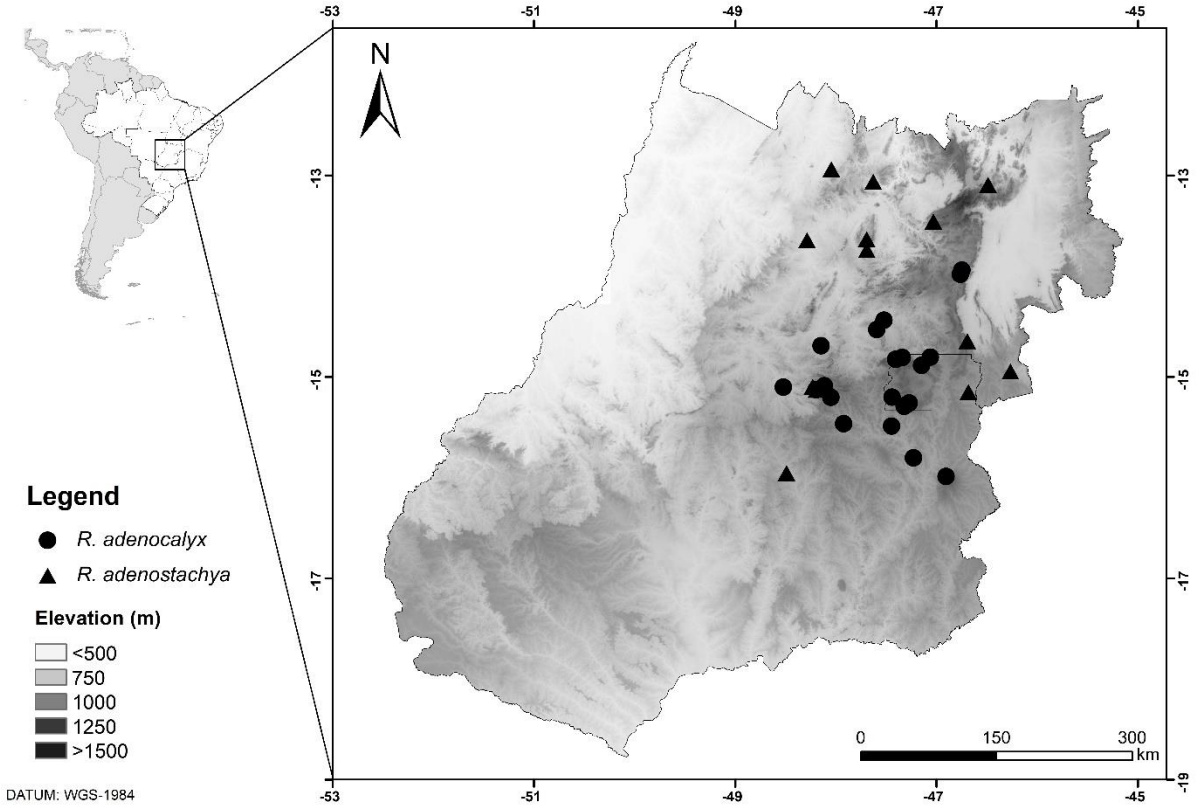

Figure 2. Distribution map of *Ruellia adenocalyx* and *R. adenostachya*.

Comments – *Ruellia amplexicaulis* can be recognized by the sessile leaves, rounded to subcordade at the base, frequently amplexicaulis and dichasia with red corollas flowers. This species is morphologically similar to *R. angustiflora* (Nees) Lindau ex Rambo, differing in leaves (vs. petiolate, cuneate to decurrent at the base) and the twisted lobes of the corolla (vs. patent or erect).

Selected specimens examined – Brazil, Distrito Federal, Brasília, Sobradinho, Fercal. APA da Caduringa, a 38 km do CENARGEN, Cerrado, solo pedregoso, 09 Aug 1990, *T.B. Cavalcanti et al. 607* (SP, CEN, SPF); ibid., em mata e na margem. Área onde a mata decídua encontra campo cerrado. Esse do córrego Bananal norte do Ribeirão Buraco e DF 2, Em mata e na margem. Área onde a mata decídua encontra campo cerrado. Esse do córrego Bananal norte do Ribeirão Buraco e DF 2, 15º35'S, 47º54'W, 920 m, 17 Jul 1980, *M.C.G. Kirkbride J.H.*

Kirkbride Jr. 1304 (UB, UFG, HRCB, SPF, SP); Goiás, Portelândia, Rodovia GO-194, Portelândia-Ponte Branca, ca. 10 km do Povoado Formiga, Rio Mantrinchã, Carrado, formação de "Morrotes" e baixadas com regatos. Interior da mata., Rodovia GO-194, Portelândia-Ponte Branca, ca. 10 km do Povoado Formiga, Rio Mantrinchã, Carrado, formação de "Morrotes" e baixadas com regatos. Interior da mata., 17º22'S, 52º39'W, 05 Jul 1996, *M.R.P. Silva et al. 3290* (MBM, SJRP); Santa Rita do Novo Destino, Margem da BR-080, entre Barro Alto e a BR-153, ca. De 20 km antes do rio das Almas, 14º53'20"S, 48º58'39"W, 565 m, 01 Aug 2014, *J.E.Q. Faria 4057* (SP, UB, HUEG).

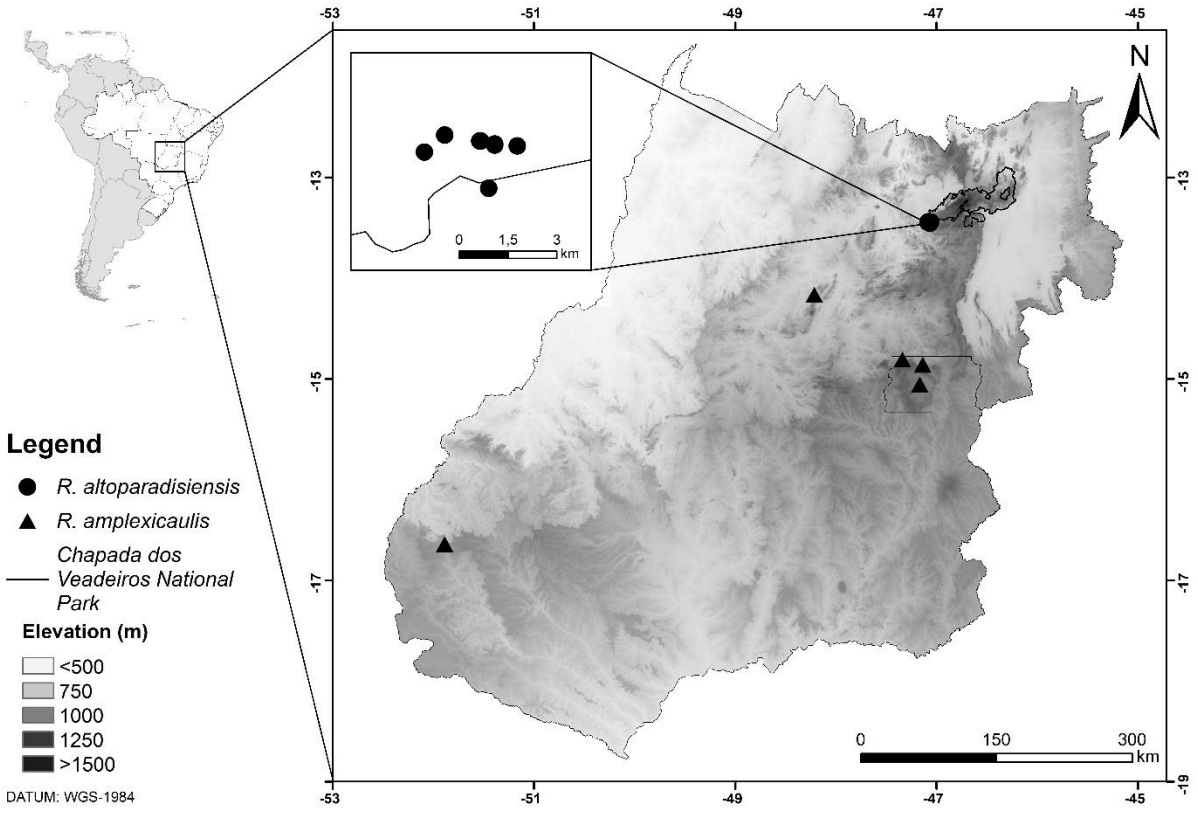

Figure 3. Distribution map of *Ruellia altoparadisiensis* and *R. amplexicaulis*.

5. ***Ruellia angustior* (Nees) Lindau** in Bot. Jahrb. Syst. 25(3, Beibl. 60): 46. 1898 ≡ *Stemonacanthus angustior* Nees in Fl. Bras. 9: 54. 1847 —**Lectotype (to be designated):** Brazil, "prov. Goyazanae" [Goiás], [Cavalcante] "ad S. Felis prope Rio Trahiras fluvium", s.d., *J.B.E. Pohl 1907* (W0004599 image!; isolectotypes: W0004600 image!, GZU000250536 image!).

= *Stemonacanthus angustior* var *microphyllus* Nees in Fl. Bras. 9: 54. 1847 —**Lectotype (to be designated):** Brazil, "prov. Goyaz" [Goiás], without specific location, "in campos", Apr 1840, *G. Gardner 3957* (K000534190 image!; isolectotype BM000624572 image!, NY00278281 image!, NY00278280 image!, K000534191 image!, GH00094209 image!, SP000633!, P00650159 image!, P00650160 image!, P00650161 image!, P00650162 image!, W0006401 image!, W111614 image!).

= *Ruellia salviifolia* (Nees) Profice in Rodriguésia 61(Sup): S80. 2010 ≡ *Stemonacanthus salviaefolius* Nees in Fl. Bras. 9: 54. 1847— **Lectotype (to be designated):** Brazil, "prov. Goyazanae" [Goiás], [Cavalcante] "In M. Serra de S. Felis prope fluv. Trahiras" "Oreas", s.d., *J.B.E. Pohl 1930* (W0049889 image!; isolectotypes: GZU000250534 image!, F872811 image!).

=*Stemonacanthus hirsutus* Nees in Fl. Bras. 9: 53. 1847— **Lectotype (to be designated):** Brazil, "prov. Goyazanae" [Goiás], "prope Rio Trahiras" [Cavalcante], "In M. Serra de S. Felis" "Oreas", s.d., *J.B.E. Pohl 2237* (W0049886 image!; isolectotypes: GZU000250538 image!, M-0186650 image!).

= *Stemonacanthus multiflorus* Nees in Fl. Bras. 9: 53. 1847— **Lectotype (to be designated):** Brazil, Tocantins, "Serra do Tocantins", without specific place, s.d., *J.B.E. Pohl 1918* (W0049887 image!; isolectotypes: GZU000250537 image!, M-0186628 image!).

= *Dipteracanthus tomentosus* Nees in Fl. Bras. 9: 38. 1847—**Lectotype (to be designated):** Brazil, “in prov. Goyazana” [Goiás], [São Luiz do Norte] “Ad Cap Vicente ad Lavrinhas”, s.d., *Pohl 1812* (W0004513 image!; isolectotypes: W0004512 image!, GZU000249499 image!, BR 000000694296 image!).

Diagnosis – Shrubs, erect to prostrate, 0.20–4 m tall, subterraneous system woody**; younger stems** quadrangular to subquadrangular, pubescent, hirsute, villose or tomentose with eglandular trichomes and subcapitate glandular trichomes, densely on the nodes, mature stems subquadrangular to terete, pubescent, hirsute, villose, tomentose or glabrescent with eglandular trichomes and subcapitate glandular trichomes, becoming woody; **leaves** opposite decussate to 3 whorled, subsessile to petiolate, blades discolored with the abaxial surface light green and adaxial surface dark green to olive, always darker than the abaxial surface, chartaceous to membranaceous, ovate, lanceolate, elliptic or obovate, 2–14.5×0.5–5.5 cm, base decurrent, cuneate, sometimes rounded, margins entire to slightly repand, apex acute, acuminate to rounded, pubescent, villose or tomentose with eglandular trichomes and with subcapitate glands on both surfaces; **inflorescence** apical or axillar racemes to panicles, lax or congest, with subsessile bracts obovate, oblanceolate, spathulate to linear, apex acute to rounded, densely glandular pubescent, sometimes only with eglandular trichomes, and with subcapitate glandular trichomes; **flowers** solitary to geminate in the axils of the bracts, bracteoles absent, pedicellate; calyx segments equal to subequal, linear triangular, apex slightly rounded, densely glandular pubescent with subcapitate glandular trichomes; corollas red to orangish red, 29–45 mm long, pubescent with glandular trichomes, the unexpanded portion of the tube shorter than the expanded, lobes elliptic to oblong, apex emarginate, truncate or rounded, reflexed; stamens exserted, didynamous, the two interior longer; ovary ovoid, densely glandular pubescent or hirsutulous to velutinous only with eglandular trichomes, stigma exserted; **capsules** obovoid,

glandular pubescent or only with eglandular trichomes, seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 4 A–G).

Distribution, habitat and phenology – This species was only reported to the states of Goiás and Tocantins, growing in campos sujos, cerrado sensu stricto open and dense, semideciduous and deciduous forests and in the border of riparian forests. It was found with flowers and fruits mainly during the dry season. In the study area, *R. angustior* occurs mainly in northern Goiás, with a few registers for the central western portion of the state, in highlands of Serra dos Pireneus area (Fig. 5).

Comments – *Ruellia angustior* is a complex species with a wide morphological variation in habit, indumentum, leaves and the inflorescence. Some of this variation can be found in other species of *Ruellia* [e.g. *Ruellia incomta* (Nees) Lindau]. Nees (1847a) described four species in the genus *Stemonacanthus* and one species in the genus *Dipteracanthus* to accommodate these morphological variations. The structure of the inflorescence is conservative in this species, a spiciform raceme to panicle with obovate, spathulate to linear, glandular pubescent bracts, calyx segments are linear triangular, slightly rounded at the apex, and corollas are red to orangish red with exserted stamens and fruits has 4 seeds.

Selected specimens examined – Brazil, Goiás, Água Fria de Goiás, Rod. GO-118, subida para a Torre Repetidora de Roncador. Campo rupestre, entre rochas, 8 May 2000, *G. Hatschbach et al. 70655* (MBM); Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros, trilha de retorno da Cachoeira do Garimpão (Cachoeira dos 80m), em mata de galeria, ambiente sombreado, solo arenoso, 14°09'54"S, 47°50'46"W, , 755 m, 1 Jul 2017, *U.G. Fernandes et al. 219* (SP); Cavalcante, Estrada sentido Colinas do Sul, borda de mata de galeria, ambiente parcialmente sombreado e úmido, 13°49'31"S, 47°27'28"W, , 803 m, *U.G. Fernandes et al. 255* (SP); ibid., Balsa do rio Tocantins (Serra Branca), para Serra Branca km 2, Cerrado. Área de

Influência da futura Hidrelétrica de Cana Brava, influência indireta., 13°34'26"S, 48°05'48"W, 410 m, 23 May 2001, *G. Pereira-Silva et al. 5080* (CEN, SP); Colinas do Sul, 3-4 km N, campo cerrado, 15 Jun 1993, *G. Hatschbach et al. 59556* (MBM); Cristalina, 30 km N de Cristalina, BR-040, cerrado do lado direito da pista, May 2002, *S.I. Elias et al. 619* (ESA, RB); Goiás, Serra Dourada, 1969, *J.A. Rizzo 4252* (RB); Guarani de Goiás, Rodovia BR 020 (Brasília-Salvador), 15 km ao norte do entroncamento para Posse, Cerrado em solo arenoso com afloramentos rochosos., 46°13'39"W, 14°01'11"S, 950 m, 29 Jul 2000, *C. Kameyama et al. 132* (SP, SPF); Monte Alegre de Goiás, Rod. GO-118, próximo a Brejo, caatinga, 600 m, 9 May 2000, *G. Hatschbach et al. 70753* (MBM); Mossâmedes, Estrada que segue do córrego Piçarrão até a Reserva Ecológica Professor José Ângelo Rizzo, área de cerrado, 16°06'04.7"S, 50°15'13.6"W, 12 Jun 2010, *R.D. Sartin et al. 60* (UFG, UB); Niquelândia, Nas margens do Rio Tocantinzinho, cerrado pedregoso, relevo ondulado, 13°59'S , 48°18'W , 450 m, 22 Jul 2000, *T.B. Cavalcanti et al. 1609* (CEN, UEC); Nova Roma, Serra do Morcego, cerrado rupestre, 13°43'38"S, 46°53'45"W, 816 m, 21 Apr 2013, *M.L. Brotto et al. 1149* (MBM); Pirenópolis, Rio Maranhão, 27 Jul 1952, *A. Macedo 3681* (RB, SP); São Domingos, Serra Geral de Goiás, 700 m, 13 May 2000, *G. Hatschbach et al. 71041* (MBM); São João d'Aliança, 3,2 km GO 118, Torre repetidora da Telebrasília (Roncador), cerrado, relevo ondulado, solo areno-pedregoso, 14°53'35"S, 47°33'12"W, 1200 m, 24 May 1996, *W.L. Werneck 839* (CEN, SP); Teresina de Goiás, Rodovia Go-118, km 205, ca. 41 km ao norte de Alto Paraíso de Goiás, Campo rupestre, 13°54'05"S, 47°21'35"W, 1330 m, 31 jul 2000, *C. Kameyama et al. 141* (SP, SPF); Uruaçu, Estrada Uruaçu-Niquelândia (GO 237), 77 km de Niquelândia, Cerrado, 14°32'58"S, 49°03'07"W, 489 m, 21 Jul 2007, *R.C. Forzza et al. 4577* (RB, SP).

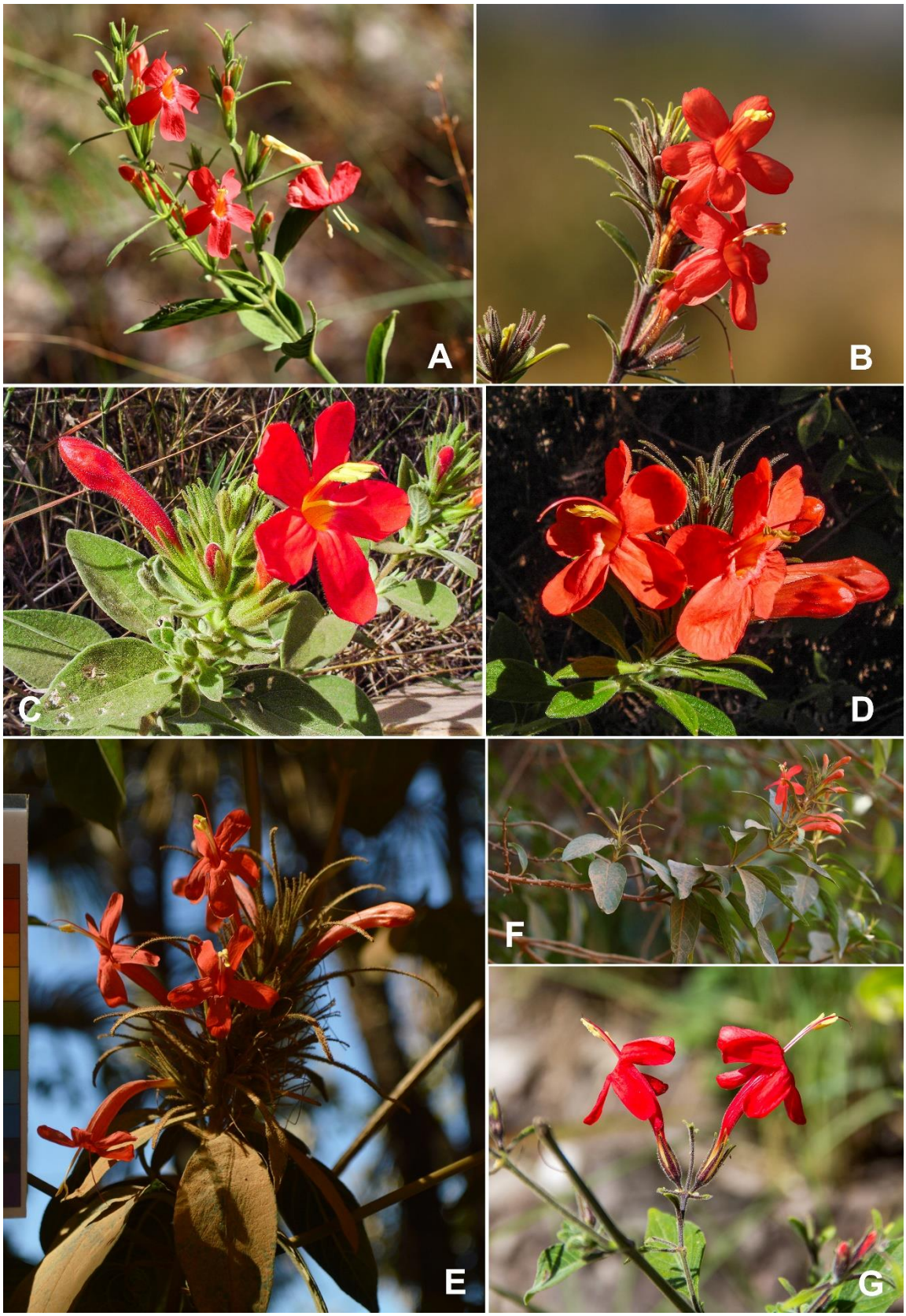

Figure 4. Morphological variation of ***Ruellia angustior***. A – Detail of a lax inflorescence with spathulate bracts; B – congest inflorescence of a plant growing in campo sujo; C – Detail of a congest inflorescence; D, E and F – Detail of plants with long leaves and congest inflorescences, growing in the border of forest; G: Detail of a lax inflorescence. (Images: A, B, F: Rodolph Delfino Sartin; C, D, G: Suzana Ehlin Martins)

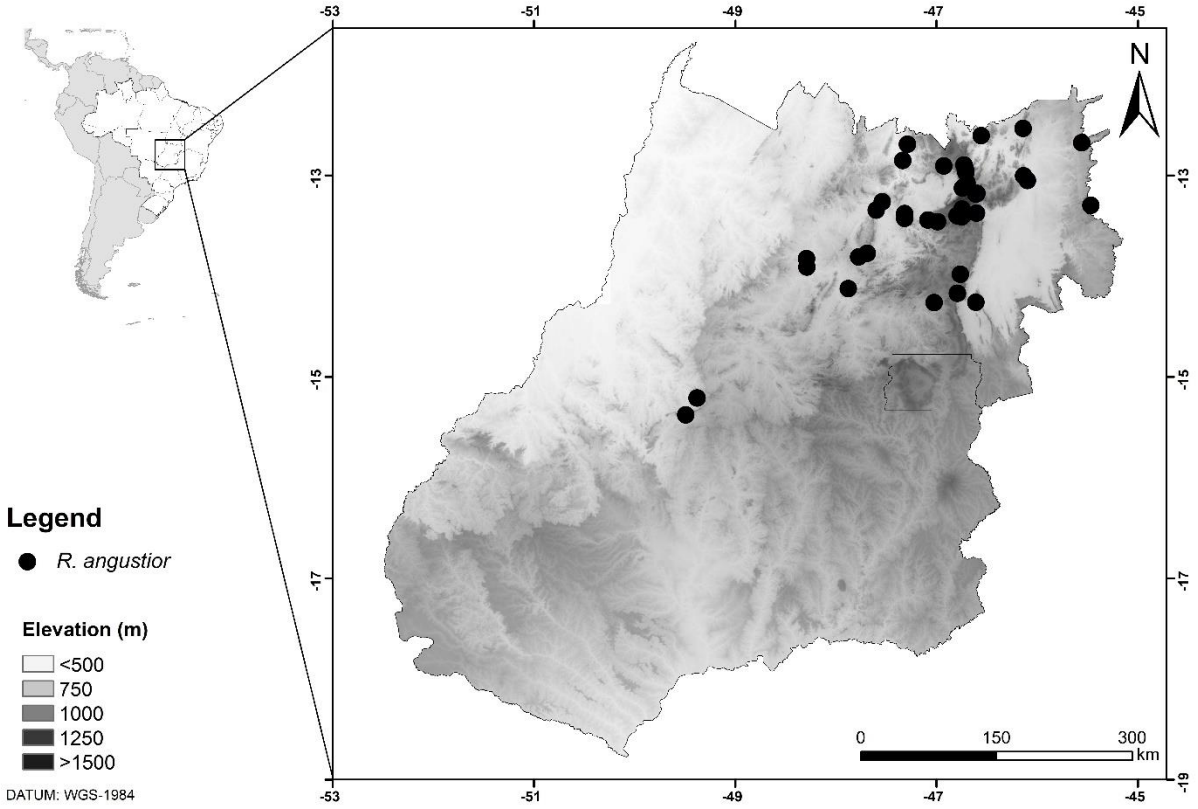

Figure 5. Distribution map of *Ruellia angustior*.

6. ***Ruellia blechum*** **L.** in Syst. Nat., ed. 10. 2: 1120. 1759 — **Lectotype:** designated by Wasshausen, 2006: illustration in Sloane, Voy. Jamaica: t. 109, f. 1. 1707.

(For synonymy and commentaries about the types see Tripp et al. 2009).

Diagnosis –Subshrubs, erect to prostrate, 20–70 cm tall, subterraneous system axial; **younger stems** quadrangular, frequently sulcate, pubescent with eglandular trichomes and sparse subcapitate glandular trichomes, densely on the nodes and grooves, mature stems subquadrangular to terete, with only eglandular trichomes; **leaves** opposite, decussate, subsessile to petiolate, blades slightly discolored with the abaxial surface light green and adaxial surface dark green, membranaceous, ovate to elliptic, 1.8–8×0.6–4.5 cm, base decurrent to cuneate, margins entire, slightly repand or slightly cuneate, apex acute, pubescent, eglandular trichomes on both surfaces, mainly over the veins, glabrescent; **inflorescence** apical spikes or

congest thyrses with 2 or 3 flowered cymes, with subsessile bracts deltoid to ovate, apex acute to slightly rounded, pubescent with eglandular trichomes mainly on margins and veins; bracteoles lanceolate, narrowly elliptic to linear, apex acute to slightly rounded, sparsely glandular pubescent; **flowers** subsessile, calyx segments equal, linear triangular, apex acute, pubescent with eglandular trichomes; corollas white to pale lilac, 10–15 mm long, densely pubescent with eglandular trichomes, the unexpanded portion longer than or the same length as the expanded portion of the tube, lobes orbicular to suborbicular, emarginate, truncate or rounded at the apex, patent; stamens didynamous, included; ovary ovoid, only with eglandular trichomes only at the apex, stigma subexserted; **capsules** obovoid to ellipsoid, the septa and placenta breaking away from capsule walls at the dehiscence, pubescent with eglandular trichomes, seeds 10–14, suborbicular, ciliate with hygroscopic trichomes (Fig. 6–A).

Illustration in Wasshausen & Wood (2004:22).

Distribution, habitat and phenology –Ruellia blechum is a pantropical species, native to the Neotropics and became naturalized in other warm to tropical portions of the world including eastern Asia and several Pacific islands (Tripp et al. 2009, Tripp & Luján 2018). In the study area, this species was reported only in the state of Goiás, growing in disturbed and anthropized areas, and border of riparian forests, fertile in July (Fig. 7). In other regions of Brazil this species is fertile year-round.

Comments – Ruellia blechum can be recognized by the apical congested spikes or thyrses, with foliaceous, deltoid to ovate, green bracts, with small whitish corollas, flowers are frequently cleistogamic, and the capsule fracturing placenta (Tripp 2007, Tripp & Luján 2018).

Selected specimens examined – Brazil, Goiás, Alto Paraíso de Goiás, Povoado do Moinho, coletada na estrada próxima ao Rio São Bartolomeu., 14°04'01"S; 47º27'54"W, 916 m, 06 Jul 2017, *U.G. Fernandes & F.S. Petrongari 275* (SP).

7. ***Ruellia brevifolia*** **(Pohl) C. Ezcurra** in Darwiniana 29(1–4): 278. 1989— **Syntypes:** Brazil, Rio de Janeiro, habitat inter frutices in umbrosis, s.d., *Schott s.n.* (W not seen; GZU000250695 image!).

(For synonymy and commentaries about the types see Ezcurra 1993).

Diagnosis – Shrubs, erect to prostrate, 30–90 cm tall, subterraneous system axial; **stems** quadrangular to subquadrangular, sparsely puberulent to glabrescent; **leaves** opposite, petiolate to subsessile, membranaceous, ovate to elliptic, base decurrent to cuneate, margins entire, slightly repand or slightly serreate, apex acute to acuminate, sparsely puberulent to glabrescent with eglandular trichomes, mainly on the veins and margin, on both surfaces; **inflorescences** axillary cymes, peduncles sparsely puberulent, with subsessile to sessile bracts lanceolate, ovate, elliptic to oblanceolate, apex acute, puberulent to glabrescent; **flowers** pedicelate, bracteoles linear to linear triangular, acute at the apex, puberulent to glabrescent; calyx segments equal, linear triangular, puberulent with eglandular trichomes; corollas ventricose, red, 18–27 mm long, glandular pubescent, the unexpanded portion of the tube shorter than the expanded portion, lobes elliptic to oblong, emarginate at the apex, the two superiors sometimes more united, erect to slightly patent; stamens subexserted, didynamous; ovary ovoid, glandular puberulent, stigma subexserted; **capsules** clavate to oblanceoloid, glandular puberulent, seeds 10–14, suborbicular, ciliate with hygroscopic trichomes. (Fig. 6–B).

Illustrations in Ezcurra (1993:803).

Distribution, habitat and phenology –Ruellia brevifolia occurs in Argentina, Bolivia, Brazil, Peru and Paraguay (Ezcurra 1989, 1993, Wasshausen & Wood 2004), growing in semideciduous forests and rainforests. It is also widely cultivated as an ornamental plant. In the study area, *R. brevifolia* was collected in nature in southern Goiás, but it is also cultivated in

several parts of the state and in Distrito Federal (Fig. 7) (U.G. Fernandes pers. obs.). It was collected fertile from July to May.

Comments – *Ruellia brevifolia* can be recognized by the red, rarely yellow, ventricose corollas on dichasia. Itis morphologically similar to *R. angustiflora* but differs mainly in shape of corolla (vs. non-ventricose).

Selected specimens examined – Brazil, Goiás, Aporé, Margem do Rio Itumirim, 20 Mar 2006, *L.F. Souza & E.S. Nascimento 3243* (HJ); Catalão, no Parque Municipal no Setor Santa Cruz, ocorrência em Mata Seca Semidecídua., 18°09'40.0"S, 47°55'29.0"W, 885 m, 2 Feb 2013, *R.M. Silva 8* (UFG); Jataí, Balsamo, beira do córrego, 21 Jul 1951, *A. Mattos 3348* (RB); Lagoa Santa, Rio Aporé, Fazenda São Francisco., 19º18'19"S, 51º6'42"W, 15 Nov 2004, *A. Pott et al. 12339* (CGMS); Morrinhos, Parque Ecológico Jatobá Centenário, Floresta Estaciona Semidecídua, 17º43'44"S, 49º7'53"W, 22 May 2005, *T.M. Moura & H.N. Barbosa 138* (UEG, CEN); Perolândia, Assentamento Três Pontes, 17º27‘1"S, 52º8'27"W, 30 Nov 2013, *L.F. Souza 5958* (HJ).

8. ***Ruellia bulbifera*** **Lindau** in Nat. Pflanzenfam. 4, Abt. 3b: 311. 1895 = *Dipteracanthus tuberosus* Nees in Fl. Bras. 9: 42. 1847, not *Ruellia tuberosa* L. — **Lectotype (to be designated):** Brazil. *s.l., s.d., Sellow s.n.,* (GZU000249896 image!; isolectotype: B [probably destroyed]).

= *Ruellia loefgrenii* Lindau in Bull. Herb. Boissier v. 654. 1897 — **Lectotype (to be designated):** Brazil, in civitate S. Paulo [São Paulo] Est. Visconde do Rio Claro, Feijão. 1 Oct 1888, *A. Löfgren 997* (SP000628!; isolectotype: B [probably destroyed] image: 5933!).

Diagnosis – Subshrubs, erect to prostrate, 20–60 cm tall, subterraneous system woody; **younger stems**, quadrangular, mature stems subquadrangular, pubescent to glabrescent with eglandular trichomes; **leaves** opposite, sessile to subsessile, blades slightly discolored, adaxial surface darker than the abaxial surface, chartaceous, ovate, elliptic or obovate, 1.5–8×0.5–2.8 cm, base cuneate to decurrent, margins entire to slightly repand, apex acute to rounded, sparsely pubescent with eglandular trichomes and subcapitate glandular trichomes or ciliate at the margins and veins or only covered by subcapitate glandular trichomes, mainly on abaxial surface, lustrous on adaxial surface; **flowers** in the axils of the upper leaves, subsessile, bracteoles absent; calyx segments equal, linear triangular, apex acute, glabrous to ciliate; corollas lilac, ca. 35 mm long, the unexpanded portion of the tube shorter than the expanded, the lower part inside the expanded portion pubescent with eglandular trichomes, lobes orbicular to elliptic, apex emarginate, patent; stamens included, didynamous; ovary ovoid, glandular pubescent, stigma included; **capsules** obovoid, glandular puberulent, seeds 4, suborbicular, totally pubescent with hygroscopic trichomes. (Fig 6–C).

Illustration in Ezcurra (1993:831).

Distribution, habitat and phenology – Ruellia bulbifera occurs in eastern Bolivia, northeastern Argentina, and Brazil (Ezcurra, 1993) in Centralwest region, in Southeast states of São Paulo and Minas Gerais, and in South region, growing in grasslands, cerrado grasslands and shrub grasslands. In the study area, it was collected in southern Goiás and there is a single register to southern Distrito Federal (Fig. 8). This species was collected fertile from October to April, during the rainy season.

Comments – Ruellia bulbifera can be recognized by the chartaceous leaves, lustrous on adaxial surface, sparsely pubescent, ciliate or only covered by subcapitate glandular trichomes, and flowers with calyx segments glabrous to ciliate and lilac corollas. It is morphologically similar

to *R. geminiflora* Kunth and *R. magniflora* C. Ezcurra, in habit and lilac subsessile flowers without bracteoles in the axils of the upper leaves, but it differs from *R. geminiflora* in the leaves glabrous to sparsely pubescent (vs. densely pubescent to hirsute), and from *R. magniflora* in the ovate, elliptic or obovate leaves (vs. lanceolate, narrowly elliptic or linear) and calyx segments glabrous to ciliate (vs. pubescent with eglandular trichomes).

Selected specimens examined – Brazil, Distrito Federal, Brasília, Perto da DF-020, no campo cerrado., 16º01'S, 48º09'W, 1040 m, 22 Nov 1982, *C. Proença 278* (UB); Goiás, Caiapônia, Among cerrado grasses, ca. 60 km S. of Caiaponia on road to Jataí, 17º12'S, 51º47'W, 800-1000 m, 29 Oct 1964, *H.S. Irwin & T.R. Soderstrom 7519* (SP, UB); Chapadão do Céu/ Mineiros, Parque Nacional das Emas. Em cerrado "sensu stricto". Próxima ao ponto Z3., 17º49'-18º28'S; 52º39'-52º10'W, 09 Mar 1999, *M.A. Batalha 3077* (SP); Jataí, Queixada, 08 Dec 1949, *A. Macedo 1443* (RB).

9. ***Ruellia cataractae*** **U.G. Fern., Kameyama & E. Tripp.** unpublish. (see Chapter II) — Holotype: Brazil, Goiás, Alto Paraíso de Goiás, Coletada na margem direita do rio do Segredo sentido cachoeira, próximo à Cachoeira do Segredo, entre as fendas das rochas, em mata ciliar, ambiente úmido e sombreado, solo úmido e rochoso. 14°15’22.97”S, 47°50’39.74”W, 675 m elev., 7 Jul 2017 *U. G. Fernandes & F. S. Petrongari 294* (SP! [not included]; isotypes: RB!, COLO!).

Diagnosis – Erect to prostrate shrubs, 0.35–1.6 m tall, subterraneous system woody; **younger stems**, quadrangular to subquadrangular, sparsely pubescent with eglandular trichomes and subcapitate glandular trichomes, densely on the nodes and grooves frequently sulcate, mature stems subquadrangular to terete, glabrous or glabrescent with eglandular trichomes and subcapitate glandular trichomes, becoming woody; **leaves** 3–4 whorled, rarely opposite

decussate, sessile, blades discolored with the abaxial surface light green and adaxial surface dark green, membranaceous, linear, narrowly elliptic to oblanceolate, (0.6–)1–4.5(–4.8)×0.4–2.5 cm, base decurrent, margins entire to slightly repand, apex acute to acuminatecovered only with subcapitate glandular trichomes on both surfaces; **inflorescence** apical racemes, bracts subsessile, linear to oblanceolate, apex acute to slightly rounded, glandular pubescent, with subcapitate glandular trichomes; **flowers** solitary to geminate in the axils of the bracts, bracteoles absent, pedicelate; calyx segments equal, linear triangular, glandular pubescent; corollas red to pale red, 45–55 mm long, pubescent with glandular trichomes, the unexpanded portion of the tube shorter than the expanded portion, lobes elliptic to oblong, apex emarginate, reflexed, sometimes twisted; stamens exserted, didynamous; ovary ovoid, glandular pubescent, stigma exserted; **capsules** obovoid, glandular pubescent, seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 6–D).

Illustration in Chapter II.

Distribution, habitat and phenology – Ruellia cataractae occurs in riparian forests associated to waterfalls of the Chapada dos Veadeiros region, growing between rocks, and in rocky sandy soils at the margins of rivers and in rocky islands (Fig. 8). *Ruellia cataractae* was collected fertile from February to October [Fernandes et al. unpublish.(see Chapter II)].

Comments – Ruellia cataractae can be recognized by the whorled, frequently, linear leaves covered by subcapitate glandular trichomes, rarely opposite and decussate, apical racemes, with bracts, pedicels and calyces glandular pubescent, vivid red corollas, rarely pale red. *Ruellia cataractae* is morphologically similar to *R. angustior* (Nees) Lindau in the red corollas with exserted stamens and the apical racemose inflorescence, differing in the glabrous linear to narrow elliptic leaves (vs. hirsute to pubescent ovate to elliptic) [Fernandes et al. unpublish.(see Chapter II)].

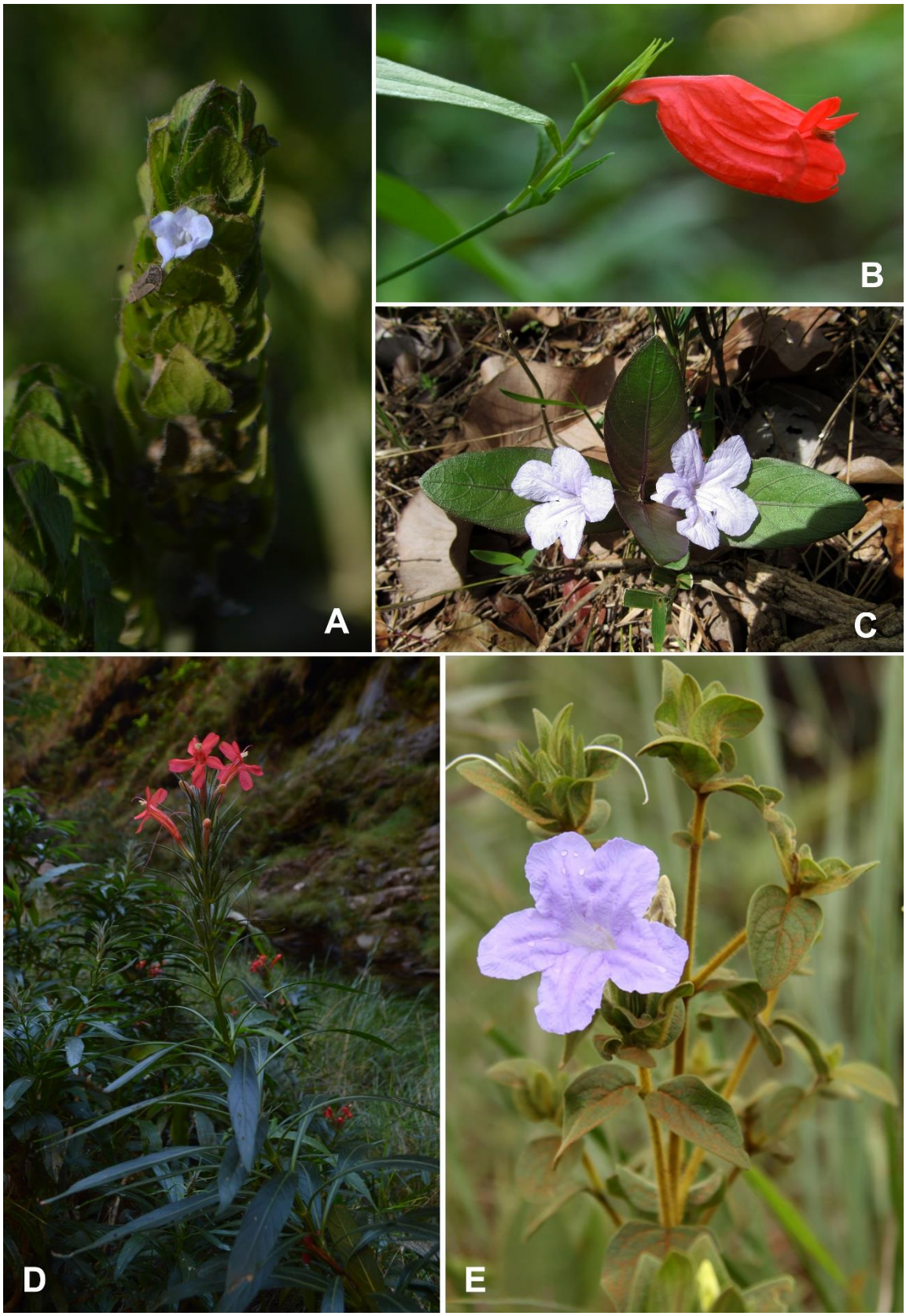

Figure 6. ***Ruellia blechum***: A – Detail of the inflorescence and a corolla in a front view; ***R. brevifolia***: B – Detail in a side view of the flower; ***R. bulbifera***: C – Habit; ***R. cataractae*** D – Habit; ***R. ceciliae***: – Branch with detail a front view fo the flower. (Images: C: Isa Lúcia Morais; E: Maria Rosa Vargas Zanatta)

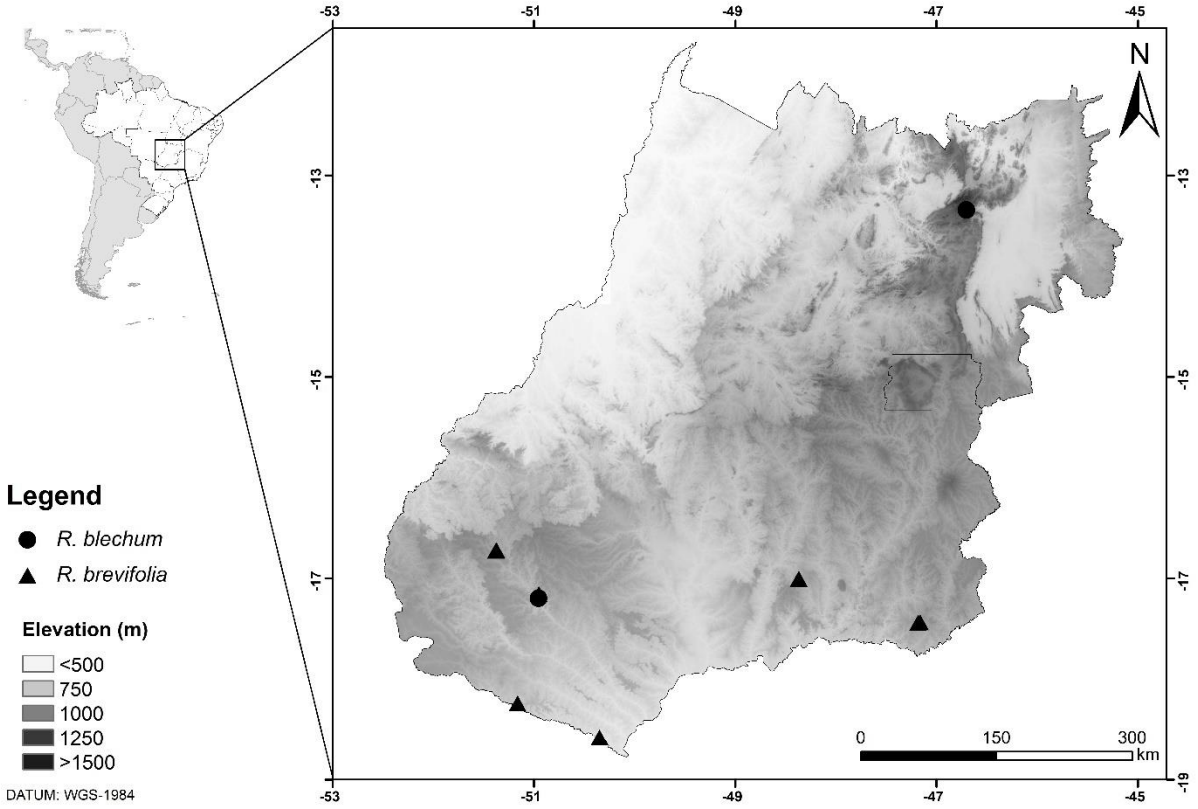

Figure 7. Distribution map of *Ruellia blechum* and *R. brevifolia*.

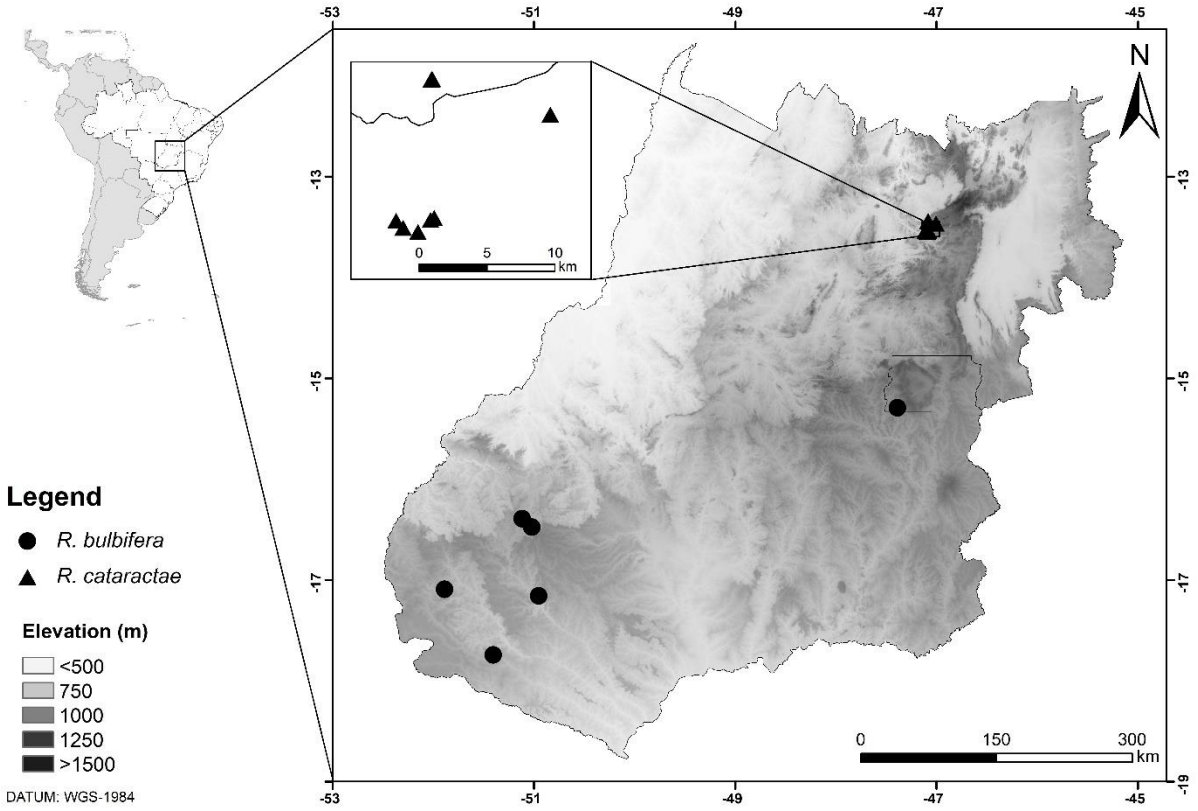

Figure 8. Distribution map of *Ruellia bulbifera* and *R. cataractae.*

Selected specimens examined – Brazil, Goiás, Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros, trail from entrance of park to waterfalls 120 and 80, 13 Aug 2016, *E. Tripp & C. Kameyama 5937* (SP, COLO, RSA); ibid. Chapada dos Veadeiros, Rio Preto, 19 Oct 1990, *G. Hatschbach et al. 54762* (MBM!); ibid., Parque Nacional da Chapada dos Veadeiros. Próximo da Cachoeira do Rio Preto, perto do povoado São Jorge. Cerrado de Chapada com solo pedregoso e mata ciliar, 06 Feb 1987, *J.R. Pirani et al. 1674* (SPF, SP, K); ibid., Chapada dos Veadeiros, cachoeira do Poço Preto-Rio Preto, 16 May 1986, *S. Romaniuc Neto et al. 466* (SP; SPF); ibid., coletada na margem esquerda do rio do Segredo, próximo a estrada sentido Cachoeira do Segredo, 14°15'30"S, 47°52'11"W, 604 m, 7 Jul 2017, U.G. *Fernandes & F.S. Petrongari 282* (SP); ibid., margem esquerda do Rio do Segredo sentido Cachoeira do Segredo, na última passagem pelo rio, antes de chegar na entrada da Cachoeira do Segredo, 14°15'47"S, 47°51'54"W, 617 m, 7 Jul 2017, *U.G. Fernandes & F.S. Petrongari 283* (SP); ibid., Cachoeira do Segredo, margem esquerda do rio do Segredo, entre as rochas, 14°15'57"S, 47°51'19"W, 631 m, 7 Jul 2017, *U.G. Fernandes & F.S. Petrongari 290* (SP, SPF); ibid., Cachoeira do Segredo, coletada na trilha próxima ao rio do Segredo, 14°15' 23"S, 47°50'40"W, 657 m, 7 Jul 2017, *U.G. Fernandes & F.S. Petrongari 293* (SP).

10. *Ruellia ceciliae* U.G. Fern. & Kameyama, unpublish. (see Chapter II) — Holotype: Brazil, Goiás, Alto Paraíso de Goiás, Chapada dos Veadeiros, Rodovia GO-118, a ca. 25 km ao sul do centro de Alto Paraíso, Cerrado com afloramentos rochosos nas margens da estrada, 14°20’42,24”S, 47°31’10,53”W, 1077 m elev., 12 Mar 2015, *C.M. Siniscalchi 582* (SP!; isotype SPF!).

Diagnosis – Subshrubs erect to prostrate, 30–70 cm tall, subterraneous system woody; **stems** reddish, younger stems subquadrangular, hirsute to pubescent with yellow eglandular

trichomes, and subcapitate glandular trichomes, densely on the nodes, mature stems subquadrangular to terete, glabrescent; **leaves** opposite, subsessile to petiolate, blades chartaceous, discoroled, abaxial surface light green, adaxial surface olive to dark green, ovate, base cuneate, rounded, truncate or subcordate, margin entire to slightly repand, apex acute, obtuse to rounded, tomentose, hirsute to pubescent with eglandular, frequently yellow trichomes, and subcapitate glandular trichomes, mainly on the veins, and subcapitate glandular trichomes on abaxial surface, adaxial surface hirsute to pubescent with, yellow eglandular trichomes and subcapitate glandular trichomes, mainly on the veins; **flowers** solitary, rarely geminate, in the axils of the upper leaves, subsessile, bracteoles 2, obovate, oblanceolate, spathulate, rarely lanceolate; calyx segments equal to subequal, sometimes the posterior longer, lanceolate to narrowy elliptic, apex acute, tomentose, hirsute to densely pubescent with eglandular trichomes, and subcapitate glandular trichomes; corollas lilac, 35–60mm long, densely glandular pubescent, the unexpanded portion of the tube shorter, rarely of the same size of the expanded, lobes orbicular to suborbicular, apex emarginate to rounded, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous, stigma included; **capsules** ellipsoid, densely pubescent, seeds 8, suborbicular, totally pubescent with hygroscopic trichomes. (Fig 6–E).

Illustration in Chapter II.

Distribution, habitat and phenology – Ruellia ceciliae was collected in Chapada dos Veadeiros region and Distrito Federal (Fig. 9). It grows in campos rupestres, campos limpos, campos sujos and cerrado sensu stricto, on rocky and sandy soils or sandy-clay soils, always in open vegetations. It was collected fertile during the rainy season, from October to May.

Comments – Ruellia ceciliae is morphologically similar to *R. hapalotricha*, in the large flowers in the axils of the upper leaves, and calyx segments lanceolate, differing in the stems, leaves,

bracteoles and calyx covered by yellowish eglandular trichomes (vs. whitish eglandular trichomes) and the flowering period, *R. ceciliae* flowers during the rainy season (from October to May) and *R. hapalotricha* mainly during the dry season (from March to August) [Fernandes et al. unpublish.(Chapter II)].

Selected specimens examined – Brazil, Distrito Federal, Brasília, APA de Cafuringa. Sítio Águia, 27 Jan 1994, *M. Aparecida da Silva et al. 1873* (IBGE, SPF, SP); ibid., Cerrado, Sobradinho, 5 Jan 1966, *H.S. Irwin et al. 11390* (UB, UEC, NY); Goiás, Alto Paraíso de Goiás, Chapada dos Veadeiros, Campo rupestre y cerrado, 14°06'57.3"S, 47°39'57.3"W, 1200 m, 04 Feb 1990, *M.M. Arbo et al. 3608* (HRCB, CTES); Corumbá de Goiás, ca. 15 km N of Corumbá de Goiás, north slope of ridge, forest and adjacent cerrado, 15 May 1973, *W.R. Anderson et al. 10317* (NY, UB); Niquelândia, Roadside. Cerrado ca. 14 km S. of Niquelândia, 1000 m, 21 Jan 1972, *H.S. Irwin et al. 34696* (SP, NY, UB, IAN, MO, P); São Gabriel de Goiás, GO-12, campo, solo úmido, 18 Feb 1975, *G. Hatschbach et al. 36240* (MBM, SP, NY); São João d'Aliança, Corrente. Campo cerrado, solo rochoso, 20 Feb 2000, *G. Hatschbach et al. 70438* (MBM, SPF).

11. *Ruellia chapadensis* U.G. Fern., Kameyama & E. Tripp, unpublish (see Chapter II) — Holotype: Brazil. Goiás: Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros. Trilha atrás da sede do Parque Nacional da Chapada dos Veadeiros, em cerrado sensu stricto, em solo arenoso e pedregoso, área parcialmente sombreada, 14°10’28”S, 47°49’29”W, 981 m elev., 1 Jul 2017, *U. G. Fernandes et al. 206* (SP! [not included]; isotypes: COLO!, MBM!, RB!, UB!).

Diagnosis – Subshrubs erect to prostrate, 20–40 cm tall, subterraneous system woody; **younger stems** quadrangular to subquadrangular, hirsute to densely pubescent with eglandular trichomes, mature stems subquadrangular to terete, glabrescent; **leaves** opposite, rarely 3

whorled, sessile, chartaceous, obovate to elliptic, 2.7–8.5×1.3–3 cm, base cuneate to subcordate, margins entire, apex acute, obtuse or rounded, hirsute to densely pubescent with many subcapitate glands on both surfaces; **inflorescence** apical or axillary racemes with sessile imbricate bracts narrowly elliptic to oblanceolate, apex, rounded, densely glandular pubescent and with subcapitate glandular trichomes; **flowers** in the axils of the bracts, subsessile, bracteoles narrowly elliptic to oblanceolate, apex acute to rounded; calyx segments subequal, the posterior segment longer, linear, acute to slightly rounded at the apex, glandular pubescent to hirsute with subcapitate glandular trichomes; corollas white, sometimes with a pinkish line and macula inside of the expanded portion, 30–35 mm long, glandular pubescent, the unexpanded portion of the tube shorter than the expanded, lobes orbicular to subobicular, emarginate to rounded at the apex, patent; stamens included, slightly didynamous; ovary ovoid densely glandular pubescent to tomentose, stigma included to subexserted; **capsules** ellipsoid, glandular pubescent, seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig 10–A).

Illustration in Chapter II.

Distribution, habitat and phenology – Ruellia chapadensis was only found inside the limits of Chapada dos Veadeiros National Park, in northeastern (Fig. 9), with only one collection near to the limit, growing in cerrado sensu stricto, on rocky and sandy soils. It was collected fertile from April to September [Fernandes et al. unpublish.(See Chapter II)].

Comments – Ruellia chapadensis can be recognized by the obovate to elliptic hirsute leaves, the inflorescence with markedly glandular pubescence on the bracts, bracteoles and calyx, and white corollas, sometimes with a pinkish line and macula inside the expanded portion of the tube [Fernandes et al. unpublish.(See Chapter II)].

Selected specimens examined – Brazil, Goiás, Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros, limite do parque, cerrado, encosta, 3 Abr 2001, *E. A. Anunciação & L. X. Almeida 1015* (SP); ibid., Parque Nacional da Chapada dos Veadeiros, trail from entrance of park to waterfalls, relatively close to trailhead, mata ciliar, °, -14.166081°, -47.820443ca. 1000 m, 13 Aug 2016, *E. Tripp & C. Kameyama 5940* (SP, COLO); ibid., Parque Nacional da Chapada dos Veadeiros, trilha para os cânions e Sete Quedas, 12 Sep 2014, *R.D. Sartin & C. Siniscalchi 642* (SPF, SP); ibid., Parque Nacional da Chapada dos Veadeiros, borda da Trilha dos Saltos em cerrado sensu stricto, em solo pedregoso-arenoso, 14°09'51"S, 47°49'54"W, 933 m, 1 jul 2017, *U. G. Fernandes et al. 216* (SP); ibid., Povoado de São Jorge, campo sujo, em solo pedregoso, na beira da estrada sentido Mirante/Abismo, 14°10'40"S, 47°49'42"W, 1025 m, 7 Jul 2017, *U. G. Fernandes & F. S. Petrongari 276* (SP, MBM); ibid., ca. de 1 km antes de São Jorge na estrada Alto Paraíso – Colinas do Sul. Divisas com o Parque Nacional da Chapada dos Veadeiros, 3 VI 1999, *R. Mello-Silva & T. B. Cavalcanti 1662* (SPF, CEN, SP); ibid., 3-5 km O de São Jorge, campo rupestre, solo rochoso, 14 Jun 1993, *G. Hatschbach et al. 59524* (MBM).

12. Ruellia *costata* (Nees) Hiern in Warming Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn: 76. 1877-1878 ≡ *Arrhostoxylum costatum* Nees in Fl. Bras. 9: 59. 1847. — **Lectotype (to be designated):** Brazil, "provinciis Piauhi et Goyaz" [Goiás] s.d. *Gardner 3420* (000000694281 BR image!; isolectotypes: BM000624580 image!, K000534167 image!, K000534166 image!).

= *Arrhostoxylum costatum* var. *salicifolium* Nees in Fl. Bras. 9: 59. 1847— **Lectotype (to be designated):** Brazil, [Goiás], "Serra das Caldas Velhas" s. d. *J.B.E. Pohl 2845* (000000694314 BR image!; isolectotype: W (n.v.).

Illustration in Vilar et al. (2010:49).

Diagnosis – Subshrubs erect to prostrate, 0.20–1.2 cm tall, subterraneous system axial; **younger stems** quadrangular to subquadrangular, frequently sulcate, sparsely pubescent with eglandular trichomes and/or only covered by subcapitate glandular trichomes, densely on the nodes and grooves, mature stems subquadrangular to terete, glabrous to glabrescent with eglandular trichomes and subcapitate glandular trichomes; **leaves** opposite, petiolate, membranaceous to chartaceous, ovate, lanceolate, elliptic, narrowly elliptic or linear, 4.8–19.5×0.8–3.9 cm, base decurrent, margins entire to slightly repand, apex acute to atenuate, glabrous to glabrescent with eglandular trichomes, mainly on the veins, petioles and margin of young leaves; **inflorescence** axillary racemes to panicles with sessile to subsessile bracts, lancelolate, narrowly elliptic to linear, apex acute, glandular pubescent to sparsely pubescent with eglandular trichomes; **flowers** subsessile, bracteoles linear triangular, apex acute; calyx segments equal, linear triangular, apex acute, glandular pubescent; corollas lilac, sometimes with a whitish macula and lilac punctuations inside of the expanded portion, 45–65 mm, glandular pubescent, the unexpanded portion of the tube ca. 3–4× longer than the expanded, lobes orbicular to suborbicular, apex emarginate to rounded, patent; stamens included, slightly didynamous; ovary ovoid, glandular pubescent, stigma subexserted; **capsules** clavate to oblanceolate, glandular pubescent, seeds 12–18, suborbicular, ciliate with hygroscopic trichomes (Fig. 10 B–C).

Illustration in Vilar et al. 2010.

Distribution, habitat and phenology – Ruellia costata is endemic to Brazil, occurring in semideciduous and riparian forests in the states of Minas Gerais, Goiás, Distrito Federal, Mato Grosso, Tocantins and Maranhão. In the study area, it was collected from southern to northern Goias and in Distrito Federal, it was not found in western Goiás (Fig. 11). It grows in organic-

clay soils, sandy-clay soils and rocky and sandy soils associated to rivers. Is was collected fertile from January to October.

Comments – *Ruellia costata* is morphologically similar to *R. simplex* C. Wright, in the glabrous to glabrescent stems and leaves, but differs in the inflorescences racemoses to panicles (vs. cymose inflorescences) and the calyces densely glandular pubescent (vs. glabrous to sparsely glandular pubescent with subcapitate glandular trichomes) and the corollas with the unexpanded portion 3–4× longer than the expanded (vs the unexpanded portion shorter than the expanded portion of the tube).

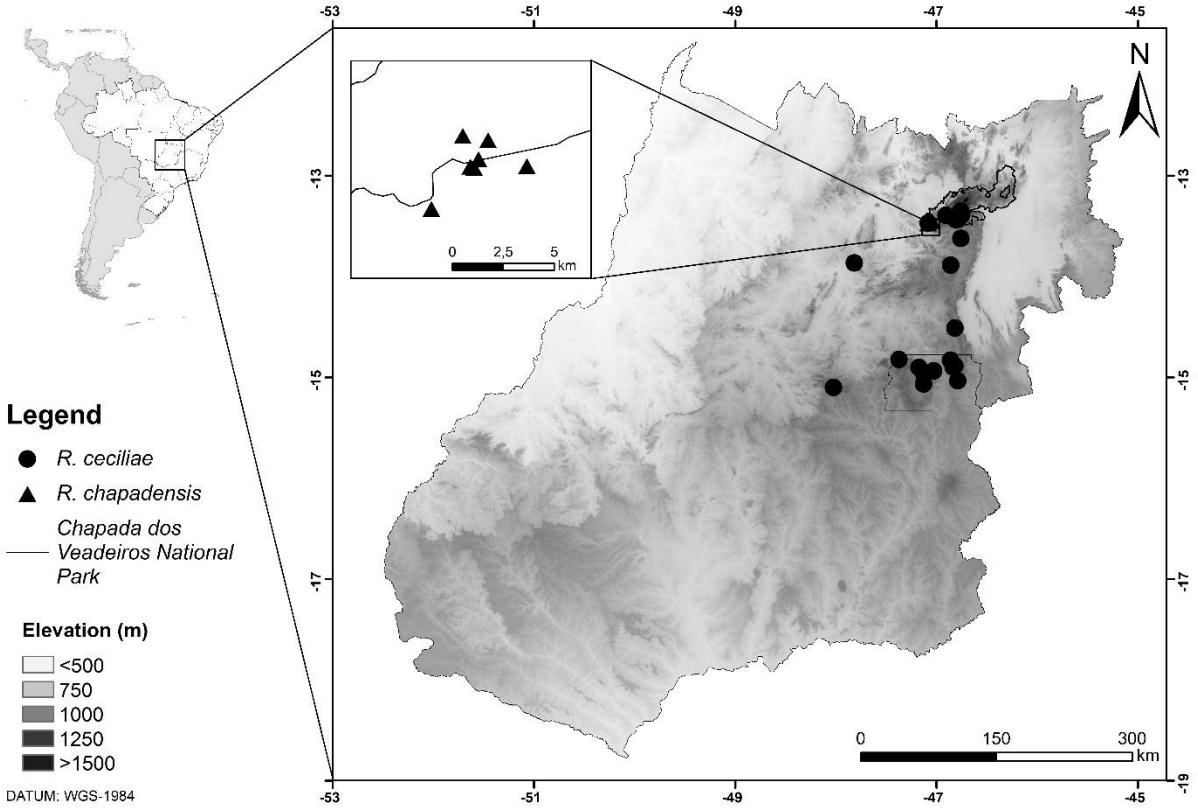

Figure 9. Distribution map of *Ruellia ceciliae* and *R. chapadensis*.

Selected specimens examined – Brazil, Distrito Federal, Brasília, Área de Proteção Ambiental (APA) do Rio São Bartolomeu; Rio São Bartolomeu, próximo à barra do Rio Paranoá, solo úmido, 17 Feb 1987, *R.C. Mendonça 784* (IBGE; UB); ibid., Chapada da Contagem. Campo

limpo. Inclinado, 15º34'31"S, 47º54'07"W, 1025 m, 3 Apr 2004, *J.F.B. Pastore 931* (CEN, SP); Goiás, Alto Horizonte, Região da Sururuca, fazenda Cajás, proprietário Sr. Jair Eustáquio. Mata de galeria., 14º11'54"S, 49º17'32", 404 m, 03 Jul 2015, *J.E.Q. Faria 4799* (UB, SP, HEPH, HUEFS, K, RB); Alto Paraíso de Goiás, Chapada dos Veadeiros, Cachoeira do Segredo, coletada na trilha para a Cachoeira do Segredo, 14º15'57"S, 47º51'19"W, 629 m, 07 July 2017, *U.G. Fernandes & F.S. Petrongari 289* (SP); Alvorada, Fazenda Angical. Avenida Ana Maria de Jesus, 975, Mata Ciliar, substrato humoso, relevo plano, 12º05'S, 49º02'W, 300 m, 9 Apr 1988, *L.A. Skorupa 379* (CEN!); Cavalcante, RPPN Serra do Tombador, trilha da Mata do Borá. Floresta Estacional Semidecidual, 13º42'21"S, 47º45'14"W, 922 m, 17 Apr 2013, *E. Barboza et al. 3673* (MBM, UFG, BHCB, HUEFS); Goiânia, Bosque August Saint Hilaire, Campus II-UFG, 30 Apr 1980, *J.A. Rizzo 10125* (UFG); Goiás Velho, Serra Dourada, Floresta de Galeria, 700 m, 21 Jan 1966, *H.S. Irwin 11919* (UB, NY); Luziânia, Mata de Galeria, cerca de 2 km a montante da obra (UHE Corumbá IV) mata do Sr. João. Solo argiloso, 16º16'03"S, 48º11'11"W, 849 m, 28 Feb 2005, *A.A. Santos 2557* (CEN, SP); Minaçu, Reserva da Cana Brava, Margem do Ribeirão Bonito, Mata de Galeria Perturbada, 13º33'16"S, 48º14'54", 800 m, 09 Jun 1995, *R.C. Martins 116* (UB, UFG); Monte Alegre de Goiás, Fazenda São Benedito próximo à balsa do rio Paranã, em direção à Nova Roma, 13º15'a 13º44' S, 46º52' a 46º54' W, 13 Apr 2000, *M. Aparecida da Silva 4393* (IBGE, CEN); Niquelândia, Estrada para Colinas, vereda, 14°11'22.5"S, 48°07'05.6"W, 17 Sep 1998, *E.L. Jacques 794* (SP); Pirenópolis, Vicinity of the town, Reserva Natural Vagafogo, trail from station to the forest. Intact semi-evergreen forest., -15.49360°, 48.59697°, 778 m, 14 Aug 2016, *E. Tripp & Kameyama 5945* (SP, COLO); Posse, Rio da Prata, 800 m, 09 Apr 1966, *H.S. Irwin 14524* (UB, NY); São João D'Aliança, Córrego das Brancas, próximo a Barra do Jacaré, Interior da Mata de galeria, 09 Feb 1994, *G. Hatschbach 60191* (MBM); Teresina de Goiás, Chapada dos Veadeiros, 1000 m, 18 Mar 1983, *W.H. Anderson et al. 7413* (UB, NY).

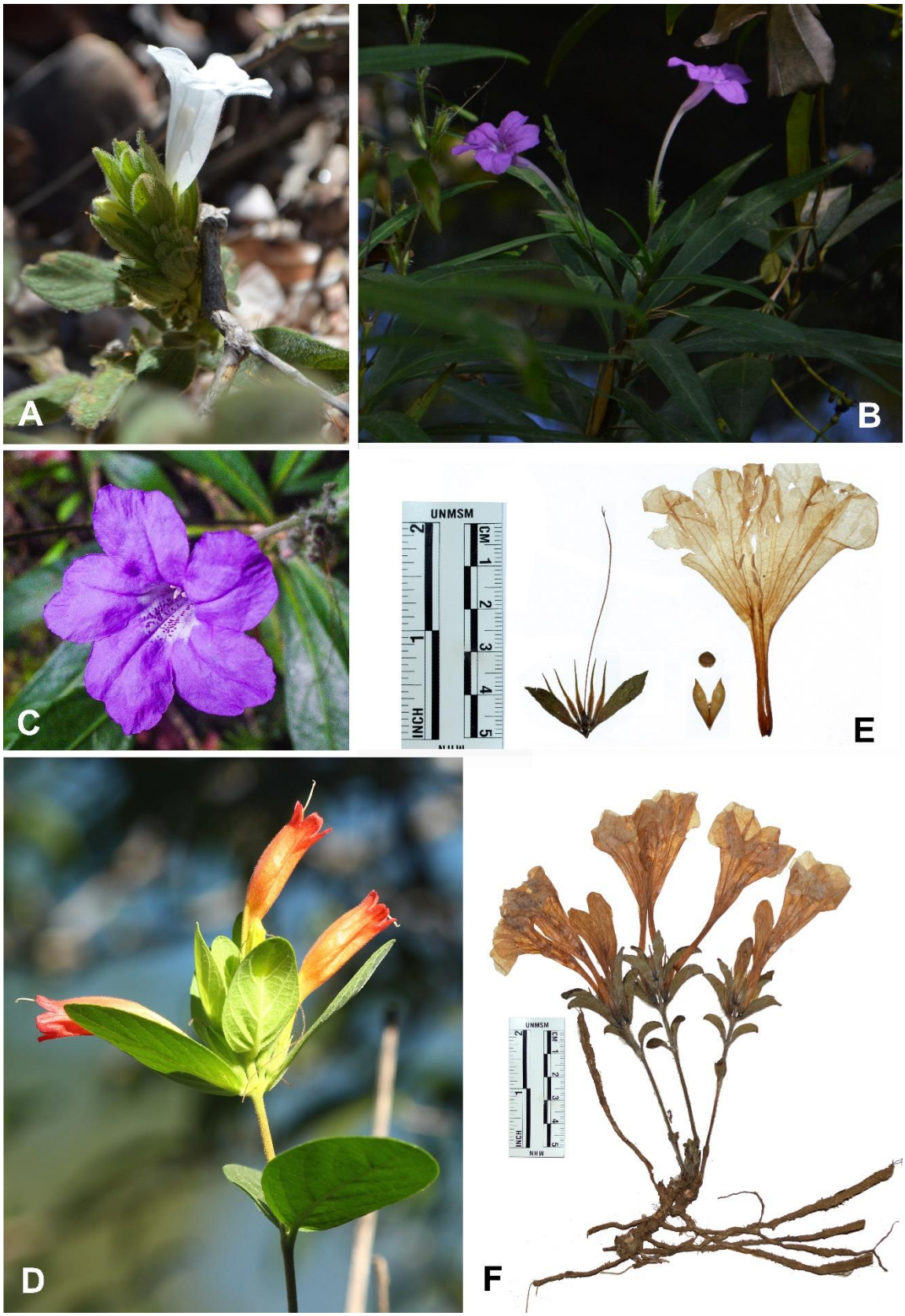

Figure 10. ***Ruellia chapadensis***: A – Detail in a side view of inflorescence; ***R. costata***: B – Detail of a branch with secundiflorous inflorescence; C – Detail of the front view of corolla, with emphasis on the white macula and puntuations; ***R. densa* subsp. *villicalyx***: Detail of a flowering branch with a side view of the flowers; ***R. dissitifolia***: E: Detail of a dissected calyx with bracteoles, dissected corolla, capsule and seed; F: Habit, also showing the fusiform roots (Images: C: Suzana Ehlin Martins; D: Rodolph Delfino Sartin).

13. *Ruellia densa* (Nees) Hiern in Warming Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn: 76. 1877-1878 ≡ *Siphonacanthus densus* Nees in Fl. Bras. 9: 47. 1847. Tab 1. — **Lectotype (to be designated):** Brazil, "prov. Goyazana" [Goiás], without specific location, "Rio d'Andrade", without date, *Pohl 6035* (W0049883 image!; isolectotypes: GZU000250709 image!, M-0186668 image!, NY 869929 image!).

= *Ruellia villosa* (Pohl ex Nees) Lindau in Nat. Pflanzenfam. 4, Abt. 3b: 311. 1895 ≡ *Siphonacanthus villosus* Pohl ex Nees in Fl. Bras. 9: 46. 1847 — **Lectotype (to be designated):** Brazil, "in prov. Minarum", "inter Calumbi et Barreiras", without date, *Pohl 3204* (W0004616 image!; isolectotypes: W0004617 image!, BR000000695141 image!, F 869240 image!).

= *Ruellia diffusa* (Nees) Lindau in Nat. Pflanzenfam. 4, Abt. 3b: 311. 1895 ≡ *Siphonacanthus diffusus* Nees in Fl. Bras. 9: 46. 1847— **Lectotype (to be designated):** Brazil, "prov. Goyazana" [Goiás] "Ribeiro Catinga", without date, *J.B.E. Pohl 5040* (GZU000250708 image!; isolectotype W not seen).

= *Ruellia rubiginosa* (Nees) Lindau in Nat. Pflanzenfam. 4, Abt. 3b: 311. 1895 ≡ *Siphonacanthus rubiginosus* Nees in Fl. Bras. 9: 46. 1847— **Lectotype (to be designated):** Brazil, "prov. Minarum" [Minas Gerais] "ad Parauna" [Paraúna], without date, *Sellow s.n.* (GZU000250707 image!), B probably destroyed!).

= *Siphonacanthus pubens* Nees in Fl. Bras. 9: 46. 1847— **Lectotype (to be designated):** Brazil, "in prov. Minarum" [Minas Gerais], Barbacena, "in umbrosis subhumidis", without date, *Pohl s.n.* (GZU000250713 image!, BR000000695207 image!).

Key to the subspecies or *Ruellia densa*

1. Calyx segments linear to spathulate, rounded at the apex, glandular pubescent .....

.....*Ruellia densa* subsp. *densa*

– Calyx segments linear triangular, acute at the apex, densely pubescent to villose with eglandular trichomes and subcapitate glandular trichomes. .....*Ruellia densa* subsp. *villicalyx*

***Ruellia densa* (Nees) Hiern subsp. *villicalyx* U.G. Fern. & Kameyama**, subsp. nov., Holotype: Brazil, Goiás, Cristalina, Estrada Paracatu-Cristalina, Campo limpo associado a afloramentos rochosos, 47°36'W, 16°45'S, 15 Jun 1998, *R. Romero et al. 5484* (UEC!; isotype: HUFU00000300 image!; CAS n.s.).

Diagnosis – Subshrubs to shrubs erect to prostrate, 0.3–1.5 m tall, subterraneous system not seen; **stems** reddish, younger stems subquadrangular, densely pubescent to villose with eglandular trichomes, and subcapitate glandular trichomes, mature stems subquadrangular to terete, glabrescent; **leaves** opposite, subsessile to peciolate, blades discolored, abaxial surface light green, adaxial surface olive to dark green, chartaceous, ovate to elliptic, base rounded, cuneate or decurrent, rarely truncate, margins entire to slightly repand, apex obtuse, rounded or acute, densely pubescent to villose with eglandular trichomes, mainly on the veins, and subcapitate glands on both surfaces; **flowers** solitary to geminate, in the axils of the upper leaves, subsessile, bracteoles absent; calyx segments equal to subequal, linear triangular, apex acute, pubescent to villose and subcapitate glandular trichomes; red to orangish red, rarely yellowish, glandular pubescent, the unexpanded portion of the tube longer than or the same size as the expanded, lobes orbicular to suborbicular, apex emarginate to truncate, erect to slightly patent; stamens subexserted to exserted, slightly didynamous; ovary ovoid, velutinous to

hirsutulous, stigma subexserted to exserted; **capsules** ellipsoid, densely pubescent; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 10 D).

Distribution, habitat and phenology – Ruellia densa subsp. *villicalyx* was collected in central eastern Goiás and Distrito Federal (Fig. 11), growing in campos sujos, campos rupestres and cerrado sensu stricto, on rocky soils and in rocky-clay soils. It was collected fertile from February to August.

Comments – Ruellia densa subsp. *villicalyx* differs from *R. densa* subsp. *densa* in the linear triangular calyx segments, acute at the apex, villose, covered by eglandular trichomes and subcapitate glandular trichomes (vs. linear to spathulate segments, rounded at the apex, glandular pubescent, and with subcapitate glandular trichomes). Nees (1847a) described 5 species in the genus *Siphonacanthus* to accommodate the wide morphological variations that occur in this species. Ruellia *densa* subsp. *densa* occur in the state of Bahia and Minas Gerais, with a wide morphological variation in habit, indumentum, leaf shape and corolla size, frequently associated with edaphic and environmental conditions.

Selected specimens examined – Brazil, Distrito Federal, Brasília, Planaltina, 1 km a oeste da DF-130; próximo ao córrego Saco dos Pilões. Afluente do São Bartolomeu, Mata de galeria bastante antropizada, Solo areno-argiloso, relevo ondulado., 15º44'S, 47º41'W, 1100 m, 20 May 1992, *T.A.B. Dias et al. 141* (CEN); ibid., Escola Fazendária, mata, 19 Aug 1980, *L. Fiedler 26* (MBM, UB); ibid., Bacia do Rio São Bartolomeu, mata., 07 Jul 1980, *E.P. Heringer et al. 5175* (IBGE, UEC); ibid., Jardim Botânico de Brasília, Cerrado, 15º52'S, 47º51'W, 26 Jun 2007, *V.F. Paiva 408* (HEPH, SP); Goiás, Anápolis, Rodovia Anápolis-Brasília., 16 Feb 1965, *E.P. Heringer 10483* (UB); Cristalina, BR-040. 5 km da cidade em direção a Brasília DF. Solo arenoso, vegetação: Campo rupestre, 16º46'S, 47º33'W, 1035 m, 14 Aug 2013, *M. Aparecida da Silva 7984* (IBGE, SP); ibid., Lado esquerdo da BR-040 em direção a Brasília. Afloramento

rochoso, 16º47'13"S, 47º34'25"W, 1100 m, 24 May 2010, *M.G. Bovini et al. 3179* (RB, SP); ibid., 30 km N de Cristalina, BR-040, cerrado do lado direito da pista, May 2002, *S.I. Elias et al., 607* (ESA, SP, CEN, UFG, HTO); ibid., Linda Serra dos Topázios, campo úmido, 15º45'S, 47º40'W, 03 Jun 1999, *S.M. Jacinto 1* (UB); Topázio, 30 Jun 1985, *A.C.M. Rodrigues 12* (UB).

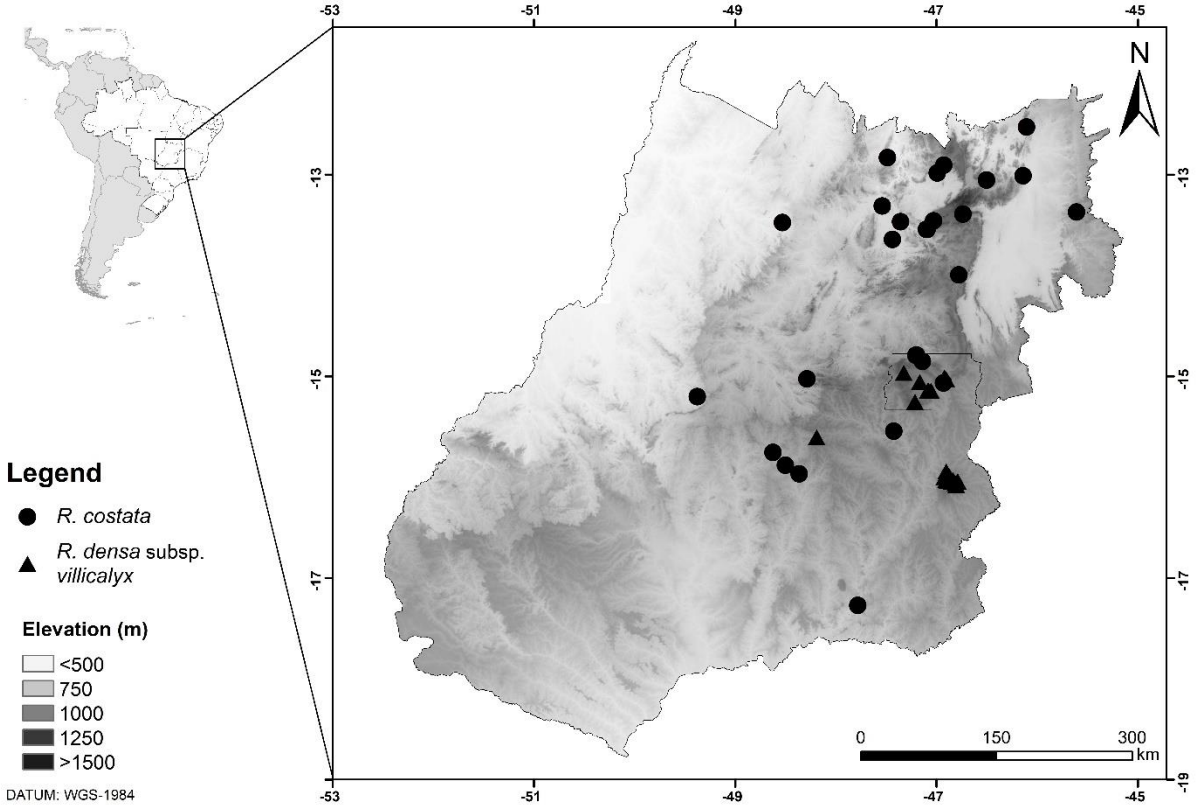

Figure 11. Distribution map of *Ruellia costata* and *R. densa* subsp. *villicalyx*.

14. *Ruellia dissitifolia* (Nees) Hiern in Warming Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn: 73. 1877-1878 ≡ *Dipteracanthus dissitifolius* Nees in Fl. Bras. 9: 33. 1847— **Lectotype (to be designated):** Brazil, "in prov. Minarum" [Minas Gerais], Patrocínio, s.d., *Pohl 635* (GZU000249519 image!; isolectotypes M-0186666 image!, SI000707 image!, W not seen).

= *Dipteracanthus dissitifolius* var. *humilior* Nees in Fl. Bras. 9: 33. 1847— **Lectotype (to be designated):** Brazil, “prov. Minarum” [Minas Gerais], “ad Cachoeira do Campo”, s.d., *Claussen 232* (P00650107 image!; isolectotype: GZU000249520 image!).

= *Dipteracanthus dissitifolius* var. *nanus* Nees in Fl. Bras. 9: 33. 1847— **Lectotype (to be designated):** Brazil, “Minarum” [Minas Gerais], “in umbrosis Borda do Campo”, s.d., *Riedel s.n.* (GZU000249518 image!; isolectotype: LE not seen).

= *Ruellia brachysiphon* (Nees) Hiern in Warming Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn: 73. 1877-1878 ≡ *Dipteracanthus brachysiphon* Nees in Fl. Bras. 9: 34. 1847— **Lectotype (to be designated):** Brazil, “prov. Rio Grande do Sul” [Rio Grande do Sul], “ad Alacriportus” [Porto Alegre], in campis, s.d., *Sellow s.n.* (K000534174 image!; isolectotypes: K000534173 image!, GZU000249508 image!, B [probably destroyed] photo!: 5911).

Diagnosis – Subshrubs erect or prostrate, 15–50 cm tall, subterraneous system woody with fusiform roots; **stems** quadrangular to subquadrangular, tomentose, villose to densely pubescent with eglandular trichomes, and subcapitate glandular trichomes, mature stems glabrescent; **leaves** opposite, subsessile to petiolate, blades discolored with the abaxial surface light green and adaxial surface olive to dark green, chartaceous, elliptic to obovate, rarely ovate, 0,8–4,2×1–5,3 cm, base cuneate to decurrent, margins entire to slightly crenulate, apex acute, truncate, obtuse or rounded, tomentose, villose to densely pubescent with eglandular trichomes, mainly on the veins, and subcapitate glands abaxial surface; **flowers** solitary, in the axils of the upper leaves, subsessile, bracteoles obovate to spathulate, rarely lanceolate; calyx segments equal to subequal, linear triangular, lanceolate or narrowly elliptic, apex acute, densely pubescent and with subcapitate glandular trichomes; corollas lilac, 35–50 mm long, pubescent with eglandular trichomes, the unexpanded portion of the tube shorter than the expanded, lobes orbicular to suborbicular, emarginate to truncate at the apex, patents; stamens included,

didynamous; ovary ovoid, glabrous, stigma included; **capsules** obovoid to ellipsoid, glabrous; seeds not seen (Fig. 10 E–F).

Distribution, habitat and phenology – Ruellia dissitifolia occur in eastern Bolivia, northeastern Argentina, and Brazil (Ezcurra, 1993) in Centralwest region, in Southeast states of São Paulo and Minas Gerais, and in South region, growing in southern grasslands, campo limpo and campo sujo. In the study area, *R. dissitifolia* was reported to southwestern, eastern and northern Goias, and Distrito Federal (Fig. 12), fertile from October to April, during the most part of the rainy season.

Comments – Ruellia dissitifolia is similar to *R. brevicaulis* in the habit, bracteoles and flowers with lilac corollas, but differs in the indumentum of the leaves tomentose, villose to densely pubescent with eglandular trichomes (vs. pubescent glabrescent with eglandular trichomes) and the proportions of the unexpanded and expanded portion of the corolla, in *R. brevicaulis* has a very short unexpanded portion ca. ¼ of the length of the expanded portion. *Ruellia dissitifolia* was treated by Ezcurra (1993) as a different species from *R. brachysyphon* because of the distribution area, *R. dissitifolia* restricted to the central Brazil region and *R. brachysiphon* to southern South America.

Selected specimens examined – Brazil, Distrito Federal, Brasília, APA Gama-Cabeça de Veado. ARIE do Córrego do Cedro-R.A. do Núcleo Bandeirante. SMPW Q.26 conj.3. Próximo à A.E.E. (Embrapa) Latossolo vermelho, cerrado queimado., 15°54'49"S, 47º57'50"W, 1050 m, 25 Nov 2002, *M.L. Fonseca D. Alvarenga 3811* (IBGE), ibid., Parque Nacional de Brasília. Coletada no entorno da antiga pista de ultraleve. Solo latossolo, 20 Nov 2004, *C.R. Martins 509* (CEN); ibid., Fazenda Água Limpa, divisa com o Cristo Redentor (JB de Brasília) e o IBGE, na mata de galeria do córrego Taquara, campo sujo, 10 Oct 2000, *C. Munhoz et al. 2076* (IBGE); ibid., Parque Boca da Mata, campo sujo de cerrado, solo argiloso cinzento alaranjado, relevo

plano, 03 Nov 1995, *J.M. Rezende 189* (CEN, SPF); ibid., EEJBB - Área do Cristo Redentor., 15º52'50"S, 47º52'52"W, 1010 m, Nov 2002, *R. Rodrigues-da-Silva & A.P.P.G. Melo 698* (RB, HEPH); Goiás, Alto Paraíso de Goiás, Fazenda da Toca a 26 km de Alto Paraíso, próximo BR 118, km 141., 23 Nov 1994, *F.C.A. Oliveira 210* (UBGE, US); ibid., Cabeceiras, Serra do Rio Preto, Cerrado and thin woods bordering seasonal creek, ca. 8 km E. of Cabeceiras, 16ºS, 47ºW, 1000 m, 18 Nov 1965, *H.S. Irwin et al. 10451* (UB, NY); Caiaponia, Serra do Caiapó. Among cerrado grasses, ca. 30 km N of Jataí on road to Caiapônia., 17º12'S, 51º47', 24 Oct 1964, *H.S. Irwin & T.R. Soderstrom 7315* (UB).

15. *Ruellia elegans* Poir. Encycl. Suppl. 4: 727. 1816. — **Holotype**: Illustrated in Andr. Bot. Repos. 10: tab. 610. 1810

Diagnosis – Shrubs, erect or prostrate, 0.4–1.5 m tall, subterraneous system not seen; **young stems** quadrangular, hirsute to pubescent with eglandular trichomes, mature stems glabrescent; **leaves** opposite, subsessile to peciolate, blades discolored, abaxial surface light green and adaxial surface dark green, membranaceous, ovate to elliptic, 6–21×2.5–8 cm, base decurrent, margins entire to crenulate, apex acute to acuminate, hirsute to pubescent or glabrescent, with eglandular trichomes, mainly on the veins on both surfaces; **inflorescences** in lateral dichasia, peduncle glandular pubescent, with sessile bracts obovate, spathulate to linear, frequently caducous, glandular pubescent on abaxial surface, adaxial surface glabrous, rarely sparsely glandular pubescent; **flowers** pedicelate, bracteoles frequently caducous, linear to spathulate, apex slightly rounded, glandular pubescent on abaxial surface, adaxial surface glabrous, rarely sparsely glandular pubescent; calyx segments equal to subequal, linear to spathulate, apex slightly rounded, glandular pubescent; corollas red, 25–35 mm long, glandular pubescent, the unexpanded portion of the tube restrict to the base of the calyx, the expanded portion obconic,

lobes elliptic to oblong, emarginate at the apex, reflexed; stamens exserted, didynamous; ovary ovoid glandular puberulent, stigma exserted; **capsules** ellipsoid to obovoid, glandular pubescent, seeds 6–10, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 12).

Illustration in Ezcurra 1993.

Distribution, habitat and phenology – *Ruellia elegans* is a Brazilian species, occurring in southeastern and central Brazil (Ezcurra, 1993), growing in semideciduous and riparian forests or in dense cerrado sensu stricto. In the study area, *R. elegans* occur only in southeasthern Goiás and there is one register to central Goiás (Fig. 13). It can be found fertile from June to January.

Comments – *Ruellia elegans* is recognized by the flowers on dichasia, with calyx segments linear or spathulate rounded at the apex and red corollas with reflexed lobes, and exserted stamens. *Ruellia elegans* is morphologically variable in indumentum and leaf size, frequently associated with environmental conditions. In the state of Goias most of collected specimens have hirsute to densely pubescent stems and leaves, rarely glabrescent.

Selected specimens examined – Brazil, Goiás, Goiânia, Morro do Mendanha, nas proximidades da estrada para Trindade, 02 Sep 1968, *J.A. Rizzo 2019* (UFG); Caldas Novas, Córrego Balsamo (Próximo a S.O.4), beira de córrego, solo pedregoso, relevo acidentado, 27 Jul 1993, *H.G.P. Santos et al. 156* (CEN); Corumbaíba, Margem esquerda do Rio Corumba, próximo ao eixo da barragem, ecótono mata-cerrado, solo arenoso com deposiçõa de matéria orgânica, relevo levemente acidentado, 25 Jun 1993, *H.G.P. Santos et al. 137* (CEN); Ipameri, Rio Corumbá, mata de galeria, 05 Oct 1976, *G. Hatschbach 38955* (MBM); ibid., Rio Corumbá, mata nas margens do Rio, 11 Jul 1976, *G. Hatschbach 38820* (MBM).

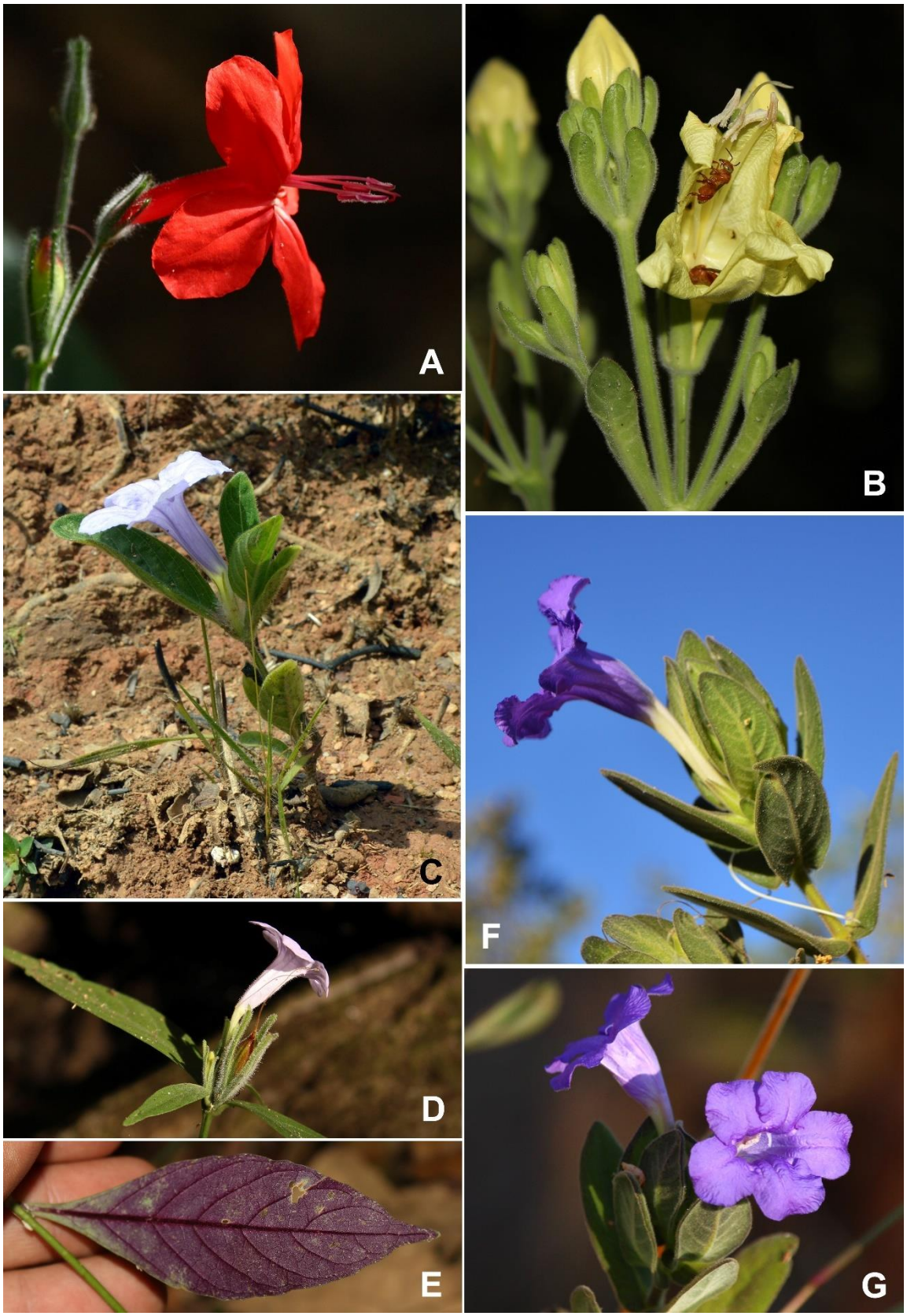

Figure 12. ***Ruellia elegans***: A – Detail in a side view of corolla; ***R. eurycodon***: B – Detail of the flower, with a front view of corolla; ***R. geminiflora***: C– Habit and a side view of the flower; ***R. glandulicalyx***: D – Detail in the flower and capsule in a side view; E – Detail in the abaxial surface of a leaf; ***R. glandulifolia***: F – Detail of the flower in a side view; G – Detail in a front view of the corolla. (Images: A and G: Rodolph Delfino Sartin).

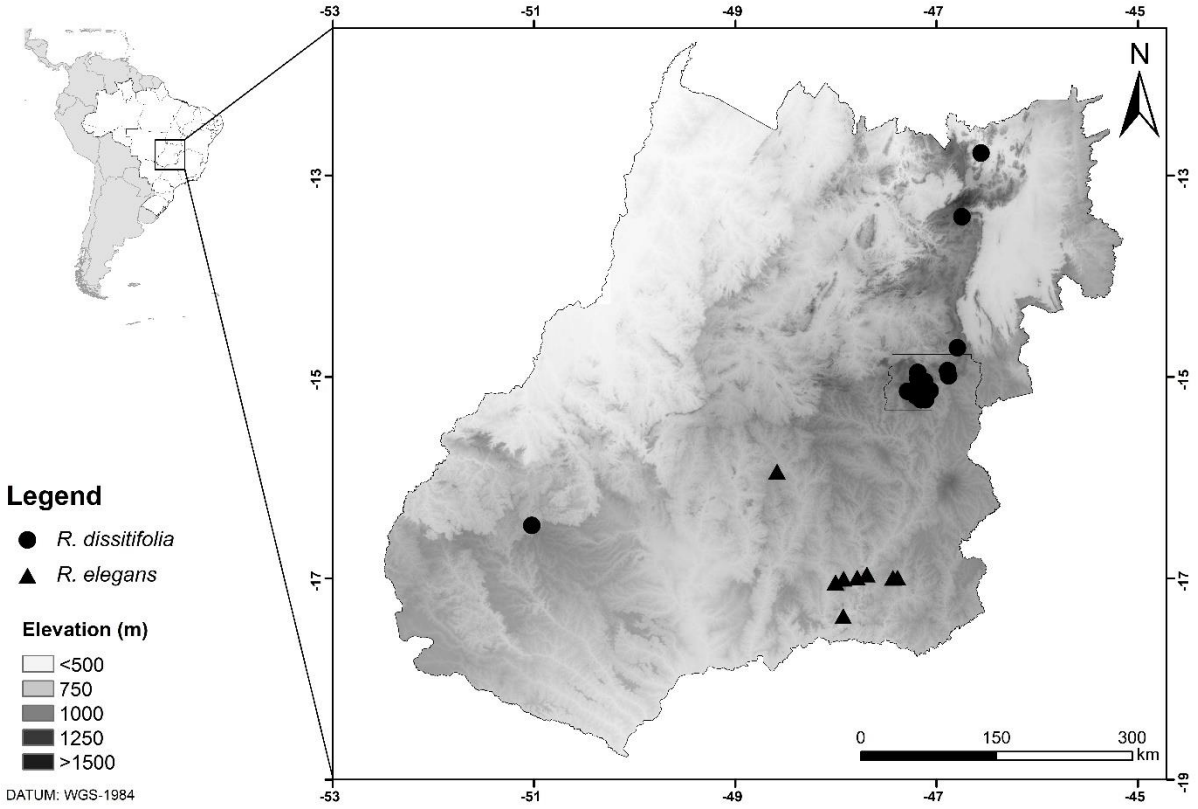

Figure 13. Distribution map of *Ruellia elegans* and *R. dissitifolia*.

16. *Ruellia eurycodon* Lindau in Bot. Jahrb. Syst. 25(3, Beibl. 60): 45. 1898 — **Lectotype (to be designated):** Brazil, "civ. Goyaz" [Goiás], inter Forquilha et Fornos in sylvis", 31 Aug 1894, *Glaziou 21868* (P00650148 image!; isolectotypes: BR 000000528018 image!, G00236483 image!, K000534159 image!)

= *Stephanophysum flavum* Nees in Fl. Bras. 9: 51. 1847. Non Ruellia flava Pers. 1806. — **Lectotype (to be designated):** Brazil, Goyaz [Goiás], "in sylvis (capão) prope Capellinha", Aug 1834, *Riedel 2517* (GZU000250700 image!; isolectotypes NY00278300 image!, R000011600!, LE [n. v.])

Diagnosis – Shrubs, erect to prostrate 1–3 m tall, subterraneous system not seen; **stems** quadrangular to subquadrangular, frequently sulcate, hirsute with only glandular trichomes or densely glandular pubescent; **leaves** opposite, petiolate, blades discolored, abaxial surface light

green and adaxial surface olive to dark green, membranaceous, ovate to elliptic, (6–)9–36×(2.6–) 4.2–18 cm, base decurrent, cuneate, rounded or truncate, margins slightly repand to crenulate, apex acute to acuminate, villose, hirsute with glandular trichomes to densely glandular pubescent on abaxial surface, villose, densely pubescent to glabrescent with eglandular trichomes, mainly on the veins on adaxial surface; **inflorescences** in lateral dichasia, with sessile bracts, spathulate, oblanceolate to oblong, villose only with glandular trichomes or densely glandular pubescent; **flowers** pedicelate, bracteoles spathulate, oblanceolate to linear, acute to slightly rounded at the apex, villose with glandular trichomes tor densely glandular pubescent; calyx segments equal, narrowly oblong to elliptic, apex obtuse to rounded, villose with glandular trichomes tor densely glandular pubescent; corollas pale yellow, 25–38 mm long, glandular pubescent, the unexpanded portion of the tube ca. 1/2 the length of the expanded portion, lobes, the two posterior more united, ovate to elliptic, obtuse, rounded or emarginate at the apex, slightly and irregularly reflexed; stamens exserted, slightly didynamous; ovary ovoid glandular puberulent, stigma exserted; **capsules** narrowly elliptic to narrowly oblong, glandular puberulent, seeds 10–16, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 12–B).

Distribution, habitat and phenology – Ruellia eurycodon occurs in central eastern Goiás, Distrito Federal (Fig. 14) and Western Minas Gerais, in semideciduous forests and riparian forests, collected fertile from July to October.

Comments – Ruellia eurycodon can be easily recognized in the habit, a shrub erect to prostrate with long membranaceous leaves and corollas pale yellow on dichasia.

Selected specimens examined – Brazil, Distrito Federal, Brasília, Na margem de estrada, ca. 1 km W do Rio das Salinas. Mata semidecídua, 15º31'S, 47º58'W, 840 m, 13 Aug 1981, *J.H. Kirkbride Jr. 4338* (MBM, UB); ibid., Córrego na encosta sul do Morro da Canastra. Mata ciliar

seca, 15º35'S, 47º54'W, 920 m, 19 Out 1983, *J.H. Kirkbride Jr. 5429* (UB, HRCB); ibid., APA da Cafuringa, próximo ao Morro da Pedreira (Urubu), 14 Jul 2012., *M.R.V. Zanatta & J.E.Q. Faria 1388* (UB); Goiás, Cristalina, Cerca de 300 m do vertedouro, a jusante da barragem, mata ciliar de encosta, relevo altamente acidentado, solo argilo-arenoso com afloramento calcáreo, Área de influência do AHE Queimado; influência direta, 13 Aug 2002, *A.A. Santos et al. 1373* (CEN, S!); Formosa, Cachoeira do Tiquira[Itiquira], mata logo abaixo da queda da cachoeira., 08 Aug 1976, *E.P. Heringer 15932* (IBGE, UB, MO, NY, UEC); Niquelândia, Companhia de Níquel Tocantins-CNT; cerca de 5 km da mina de níquel (à direita); mata de galeria seca de encosta, com solo areno-argiloso, rico em matéria orgânica; relevo indulado, 14º23'32"S, 48º25'10"W, 1010 m, 12 Jul 1997, *R.C. Mendonça et al. 3013* (IBGE, SP); Pirenópolis, Santuário da Vida Silvestre Vagafogo, Coletada na borda da mata, próximo à ponte de madeira., 15º49'17"S, 48º59'45"W, 807 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 333* (SP); Pirenópolis, Vicinity of the town, Reserva Natural Vagafogo, trail from station to the forest. Intact semi-evergreen forest., -15.49360°, -48.59697°, 778 m, 14 Aug 2016, *E. Tripp & C. Kameyama 5942* (SP, COLO, RSA, CAS, RB, US, UB); Pirenópolis, Serra dos Pirineus, 15, km norte de Corumbá; encosta norte de cume, 15 May 1973, *W.R. Anderson 10323* (IAC, NY, UB); ibid., Margem da estrada chegando no morro da Pedreira, 14 Jul 2012, *J.E.Q. Faria et al. 2736* (UB, UEG).

17. *Ruellia geminiflora* Kunth, Nov. Gen. Sp. 2: 240. 1818. — Holotype: Colombia, Ibague, ” Crescit locis temperatis, siccis prope Santa Ana et Ibague Novo-Granaensium”, 500-700 m elev, without date, *A.J.A Bonpland & F.W.H.A. Humboldt 1801* (P006700760 image!).

Diagnosis – Subshrub to shrubs erect to prostrate, 0.10–1 m tall, subterraneous system woody with fusiform roots; **younger stems** quadrangular, villose, hirsute to densely pubescent with

eglandular trichomes, and subcapitate glandular trichomes, densely on the nodes, mature stems subquadrangular to terete, pubescent to glabrescent with eglandular trichomes, and subcapitate glandular trichomes; **leaves** opposite, subsessile, membranaceous to chartaceous, ovate, lanceolate, elliptic narrowly elliptic, narrowly oblong, rarely obovate or oblanceolate, 1.5–10×0.5–3 cm, base cuneate to decurrent, margin entire to slightly repand, apex acute, obtuse or rounded, hirsute, villose or pubescent with eglandular trichomes, mainly on the veins, and subcapitate glandular trichomes on the abaxial surface, adaxial surface hirsute, villose, densely pubescent to sparsely pubescent with eglandular trichomes, mainly on the veins; **flowers** solitary to geminate, in the axils of the upper leaves, subsessile, bracteoles absent; calyx segments equal, linear triangular, apex acute, hirsute to pubescent with eglandular trichomes and subcapitate glandular trichomes; corollas lilac to whitish lilac, 15–40 mm long, pubescent with eglandular trichomes, the unexpanded portion of the tube shorter than the expanded, lobes orbicular to suborbicular, apex emarginate to rounded , patent; stamens included, didynamous; ovary ovoid, densely pubescent to hirsutulous with subcapitate glandular trichomes, stigma included; **capsules** ellipsoid, densely glandular puberulent, seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig 12–C).

Illustration in Ezcurra (1993:832).

Distribution, habitat and phenology – Ruellia geminiflora is a widespread species in the Neotropics. Populations of this species are known from Argentina to Mexico (Tripp & Luján 2018). In the study area, it is commonly found in campos limpos, campos sujos e campos rupestres, growing in rocky soils, sandy soils and sandy clay soils (Fig. 14), fertile from August to February, mainly on the rainy season.

Comments – Ruellia geminiflora is morphologically diverse, in leaf shape and size, indumentum and corolla size. It can be recognized by the flowers, frequently geminate, in the

axils of the upper leaves, with the lilac to pale lilac with the unexpanded portion of corolla always shorter than the expanded portion of the tube.

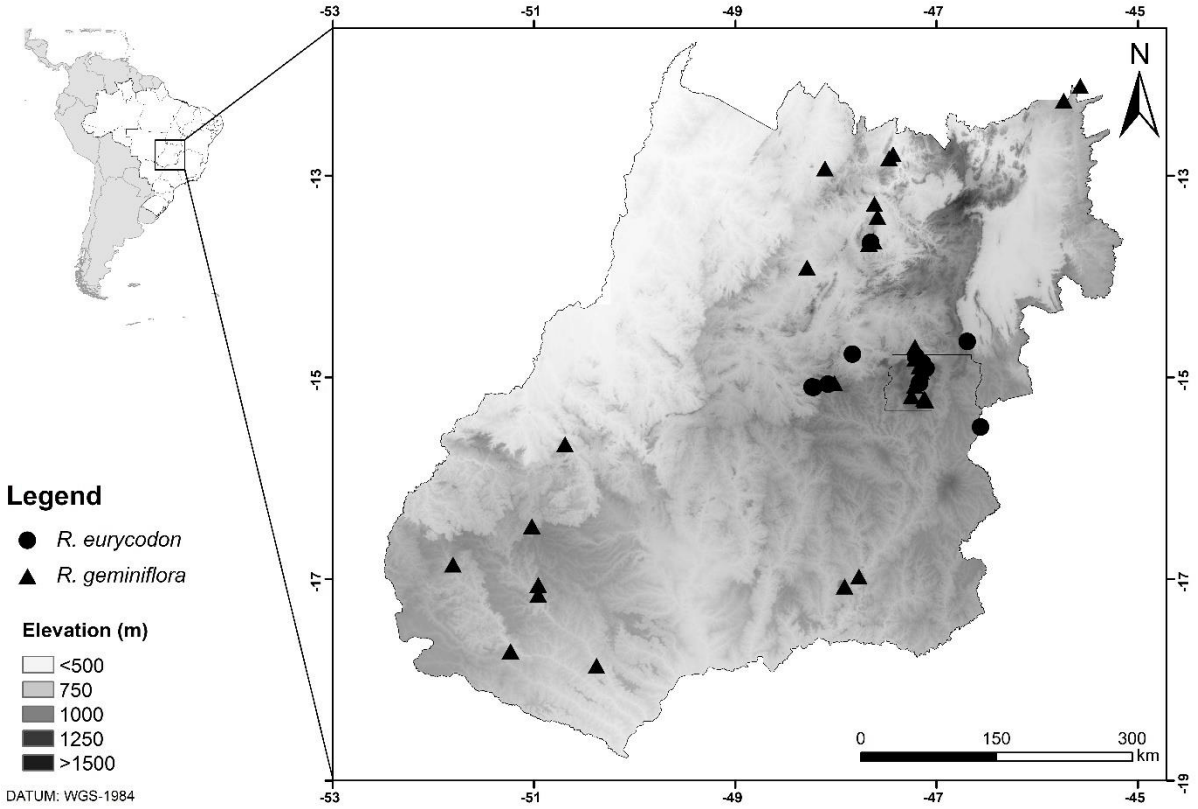

Figure 14. Distribution map of *Ruellia eurycodon* and *R. geminiflora.*

Selected specimens examined – Brazil, Distrito Federal, Brasília, Sobradinho, Fercal. APA da Cafuringa a 38km do CENARGEN. Cerrado, solo pedregoso, relevo ondulado, 15º32'12"S, 47º58'25"W, 910m, 09 Aug 1990, *T.B. Cavalcanti et al. 619* (SPF); ibid., Chapada da Contagem, Cerrado. Gallery forest and adjacent burned-over cerrado, Córego Urubu, wet slopes of Chapada da Contagem, ca. 10km E. of Brasília, 15º34'31"S,47º54'07"W, 1000 m, 14 Sep 1965, *H.S. Irwin et al. 8306* (UB, NY, K); ibid., Reserva Ecológica do Guará. Campo de murundus. Relevo plano. Solo argiloso., 47º58'44"W, 15º48'29"S, 1000 m, 04 Oct 2014, *G. Pereira-Silva 16617* (SP); ibid., Fazenda Sucupira, mata Riacho Fundo, próximo dos experimentos do SPSB, perto das residências. Ambiente antropizado. Solo cascalhento, 28 Sep

2000, *A.A. Amaral et al. 765* (CEN); ibid., Parque Nacional de Brasília. Borda da estrada em frente a Cascalheira do Exército. Solo compactado, vegetação ruderal., 11 Nov 2017, *C.R. Martins 2795* (CEN); Goiás, Arenópolis, Bacia do Rio Caiapó, próximo à Hidrelétrica de Mosquitão, ponto 50. Cerrado em encosta pedregosa., 16º23'08"S, 51º27'17"W , 440m, 15 Oct 2007, *M. Aparecida-da-Silva et al. 6408* (IBGE); Campos Belos, Fazenda Mundo Novo, próximo ao povoado de Pouso Alto. Relevo ondulado. Cerrado arenoso queimado recentemente, 12º58'43"S, 46º29'53"W, 685 m, 15 Oct 2007, *M. Aparecida-da-Silva et al. 4634* (SP, CEN); Caçu, UHE Salto/ Salto do Rio Verdinho, 23 Oct 2008, *F.A.G. Guilherme et al. 1341* (HJ); Caiaponia, Serra do Caiapó, Among grasses on cerrado slope, ca. 20km S. of Caiaponia on road to Jataí., 17º12'S, 51º47'W, 800-1000m, 31 Oct. 1964, *H.S. Irwin 7602* (SP); Caldas Novas, Parque estadual Serra Caldas Novas. Cerrado, 24 Oct 2007, *D.I. Junqueira et al. 23* (CEN); Uruaçu, Faz. Baião. Local próximo a antiga moradia dentro da fazenda; a norte da sede; 23km da cidade de Uruaçu. Cerrado sensu stricto, antropizado, pastos nativos p/ gado. Latossolo vermelho-amerelo; muitas rochas e cascalho. Relevo Plano a ondulado/acidentado., 14º38'S, 49º03'W, 450m, 03 Aug 1992, *B.M.T. Walter et al. 1763* (CEN); Minaçu, Margem direira do rio Bonito, fazenda do Sr. Zezinho do Açougue. Mata de Galeria. Relevo ondulado. Solo arenoso. Área de influência da futura Hidrelétrica de Cana Brava. Influência direta (lago)., 13º30'34"S, 48º11'39"W, 320m, 16 Oct 2001, *G. Pereira-Silva et al. 5588* (SP); Serranópolis, RPPN Pousada das Araras, 28 Sep 2005, *L.F. Souza 2622* (HJ); Niquelândia, Usina de Níquel Tocantins, a 5km da mina, a céu aberto, na estrada para Niquelândia. Solo laterítico; relevo plano; vegetação floresta de galeria degradada., 14º22'14"S, 48º23'15"W, 880m, 20 Oct 1996, *R. Marquete et al. 2704* (IBGE); Minaçu, GO-060, Minaçu-Santa Tereza (em frente ao motel). Área de influência indireta de Uhe-Serra da Mesa. Cerrado arbóreo; relevo ondulado, 13º33'S, 48º14'W, 550 m, 09 Oct 1991, *T.B. Cavalcanti et al. 880* (CEN); Cocalzinho de Goiás, Marco 9 do Parque Estadual dos Pireneus, Cerrado, 15 Nov 2014, *L.C. Honório T.M. Mendes 7*

(HUFU); Jataí, Bálsamo, Campestre, 1 Nov 1950, *A. Macedo 2697* (SP); Gurupi, south edge of city of Gurupi, a few hundred meters west of Belém-Brasília highway (BR-14) e ca. 1km north of brook that lines south edge of city., 11º43'S, 49º4'W, 350-400m , 14 Sep 1963, *G. Eiten & L.T. Eiten 5539* (SP); Formoso, Formoso para Campinaçu. Alto da Serra Grande. Cerrado. Ocorre um córrego., 14 Nov 1971, *J.A. Rizzo 7190* (SPF); Mineiros, Pilões, Cerrado, 28 Sep 2005, *L.F. Souza 275* (HJ).

18. *Ruellia glandulicalyx* U.G. Fern., Kameyama & E. Tripp, unpublish (see Chapter II) — Holotype: Brazil, Goiás, Alto Paraíso de Goiás, Cachoeira do Segredo, coletada na mata ciliar, na margem direita do Rio do Segredo sentido cachoeira, em ambiente úmido e sombreado, solo arenoso-argiloso, com serapilheira. 14°15'56 S, 47°51'36"W, 636 m elev., 7 Jun 2017, *U.G. Fernandes & F.S. Petrongari 287* (SP!; isotypes: COLO!, RB!, UB!, US!).

Diagnosis – Herbs to subshrubs erect to prostrate, 15–80 cm tall, roots axial; **younger stems** quadrangular to subquadrangular, frequently sulcate, sparsely pubescent with eglandular trichomes and/or only covered with subcapitate glandular trichomes, pubescent at the nodes, the mature subquadrangular to terete; **leaves** opposite, subsessile to peciolate, discolored with the abaxial surface light green to vinaceous, the adaxial surface dark green, membranaceous, ovate to elliptic, (1.5–)2.8–10.5(–11.5)×(0.3–)0.5–4.2 cm, base cuneate to decurrent, margins entire to slightly repand, apex acute to attenuate, sparsely pubescent with eglandular trichomes on theveins and margin, rarely on the blade, and subcapitate glandular trichomes on both surfaces, densely on abaxial surface; **flowers** solitary, rarely geminate, in the axils of the upper leaves, subsessile, bracteoles absent; calyx with the segments equal, linear, apex slightly rounded, densely glandular pubescent with subcapitate glandular trichomes; corollas lilac to white, (16–)20–25mm long, glandular pubescent, the unexpanded portion longer than the

expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, densely glandular puberulent, stigma included; **capsules** oblanceolate to ellipsoid, densely glandular puberulent, seeds 8–12, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 12 D–E).

Illustration in Chapter II.

Distribution, habitat and phenology – Ruellia glandulicalyx, hirtetho has been found only in the state of Goiás and Distrito Federal (Fig. 15), occuring in the understory of semideciduous and riparian forests, always in shaded places. It was collected fertile from May to August (Fernandes et al. unpublish. [see Chapter II]).

Comments – Ruellia glandulicalyx can be recognized by the subsessile flowers in the axil of the upper leaves, with a glandular pubescent calyx apex rounded and white or pale lilac corollas. This species is morphologically similar to *R. epallocaulos* Leonard ex C. Ezcurra & Wassh., differing in the glandular pubescent calyx (vs. pubescent with eglandular trichomes) (Fernandes et al. unpublish. [see Chapter II]).

Selected specimens examined –Brazil, Distrito Federal, Brasília, Reserva IBAMA-SEMATEC. CIPLAN, 15º50' S; 48º01'W, 25 Jun 1992, *T.A.B Dias 234* (CEN); ibid., Mata semidecídua na margem de estrada, ca. 1 km W do Rio das Salinas, 15º31'S; 47º58'W, 840 m, 13 Ago 1981, *J.H. Kirkbride Jr. 4339* (CEN, UB); Goiás, Alto Paraíso de Goiás, Cachoeira do Segredo, 14º15'56 S; 47º51'38" W, 638 m, 07 Jul 2017, *U.G. Fernandes & F.S. Petrongari 285* (SP); Cristalina, 15 May 2002, *A.A. Santos 1181* (CEN); Niquelândia, Fazenda Engenho. Ca. De 11 km de Niquelândia/Dois Irmãos. Solo Pedregoso/argiloso. Relevo ondulado. Mata ciliar, 14°41'54"S, 48º25'24"W, 580 m, 27 Jan 1997, *M.L. Fonseca et al. 1481* (IBGE); Pirenópolis, Santuário de Vida Silvestre Vagafogo, coletada na trilha de madeira, solo arenoso-humoso, 15°49'09, 48°59'48", 803 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 332* (SP); ibid.,

RPPN Vagafogo, -15.49360°; -49.59697°, 778 m, 14 Ago 2016, *E. Tripp & Kameyama 5944* (SP, COLO, RSA, CAS).

19. *Ruellia glandulifolia* U.G. Fern., Kameyama & E. Tripp, unpublish. (see Chapter II) — Holotype: Brazil, Goiás, Cavalcante, coletada na borda de cerrado sensu stricto, na beira da estrada de terra, continuação da GO-241, sentido sul, a ca. 3 km de Araí, em solo arenoso-pedregoso, 13°36'00"S, 47°38'49"W, 1083 m elev., 5 Jul 2017, *U.G. Fernandes et al. 270* (SP!; isotype: RB!, SPF!, UB!).

Diagnosis – Subshrubs to shrubs erect to prostrate, 0.3–1 m tall, subterraneous system woody; **stems** subquadrangular to terete, reddish, villose to densely glandular pubescent and with subcapitate glandular trichomes, the mature stems glabrescent; **leaves** opposite, sessile, frequently imbricate, blades chartaceous, obovate, elliptic, oblong, ovate, lanceolate, oblanceolate, 1.2–6.2×0.4–3.8 cm, base cuneate to subcordate, frequently amplexicaule, margins entire, frequently revolute, apex acute, obtuse to rounded, villose to densely glandular pubescent with subcapitate glandular trichomes on both surfaces; **flowers** solitary to geminate, in the axils of the upper leaves, subsessile, bracteoles 1 or 2, rarely absent, oblanceolate, spatulate, linear, rarely ovate, glandular pubescent with subcapitate glandular trichomes; calyx segments equal, linear triangular, apex acute, densely glandular pubescent with subcapitate glandular trichomes; corollas lilac to pale lilac, 25–60 mm long, glandular pubescent, the unexpanded portion longer to the same size of the expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma included; **capsules** obovoid, densely puberulent with eglandular trichomes, seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 12 F-G).

Illustration in Chapter II.

Distribution, habitat and phenology –Ruellia glandulifolia up to now, has been collected only in Distrito Federal to northern Goiás (Fig. 15), growing in campos rupestres, campos sujos and cerrado sensu stricto, on rocky and sandy soils or sandy-clay soils.It was collected fertile from May to September.

Comments – Ruellia glandulifolia is commonly misidentified in herbaria as *Ruellia nitens* (Nees) Wassh and *R. helianthemum* (Nees) Profice, because of the similarities in habit and lilac corollas. *Ruellia glandulifolia* has sessile leaves, frequently amplexicaulis and base subcordate (vs. petiolate, cuneate to rounded at the base), glandular pubescent (vs. glabrous to minutely pubescent in *R. nitens* and hirsute to pubescent with subcapitate glandular trichomes in *R. helianthemum*).

Selected specimens examined –Brazil, Distrito Federal, Brasília, DF-170; a 7 km do entroncamento com DF-001 - Chapada da Contagem, Cerrado, solo areno-pedregosos, relevo ondulado, 12 Jul 1990, *T.B. Cavalcanti et al. 542* (CEN, SPF); ibid., Na DF-100 a 99,7 km do CENARGEN/EMBRAPA a esquerda da estrada, campo sujo, latossolo amarelo, areno argiloso, 15º33'S, 47º23'W, 05 May 1992, *T.A.B. Dias et al. 79* (CEN, SPF); ibid., Córrego Fazendinha, Campo cerrado, campo sujo, vale, 15º47'S, 47º43'W, 1000 m, 22 May 1984, *C.F. Neri 7* (UB, SPF); ibid., Parque da Erminia Dom Bosco, cerrado sensu stricto, relevo levemente acidentado, substrato pedregoso, *C. Sinigaglia et al. 10* (CEN, SP); ibid., Reserva Biológica da Contagem (REBIO), entreda pelo Ecoresort Jesusalém, no Lago Oeste. Mata seca semi-decídua, 15°37'36"S, 47°53'21"W, 1186 m, 19 Jun 2012, *M.R.V. Zanatta & T.R.B. Mello 1373* (UB, SPF); Goiás, Alto Paraíso de Goiás, Estrada sentido Cachoeira do Segredo, em cerrado sensu stricto, ambiente aberto, solo arenoso-rochoso, 14°13'38"S, 47°53'36"W, 703 m, 07 Jul 2017, *U.G. Fernandes & F.S. Petrongari 280* (SP); Cavalcante, Coletada em cerrado sensu stricto,

próximo à estrada sentido Serra do Tombador, ambiente aberto, solo arenoso-rochoso., 13º36'19"S, 47º38'44"W, 1079 m, 05 Jul 2017, *U.G. Fernandes et al. 272* (SP); ibid., RPPN Serra do Tombador, 6 km a SW da reserva, em direção a Minaçu. Cerrado aberto, relevo plano, solo arenoso com cascalho de quartzo e arenito, 13º40'23"S, 47º50'47"W, 714 m, 25 Jul 2014, *M.F. Simon & L.M. Borges 2478* (CEN, SP); Goiânia, Alexamia - Rio Descoberto, 13 Jul 1964, *A.P. Duarte & A. Mattos 8198* (RB, SP); Niquelândia, Coletada em cerrado sensu stricto, na beira da estrada Colinas do Sul-Niquelândia (GO-132), ambiente aberto, solo rochoso-arenoso., 14°20'11"S, 48°07'40"S, 481 m, 07 Jul 2017, *U.G. Fernandes & F.S. Petrongari 298* (SP).

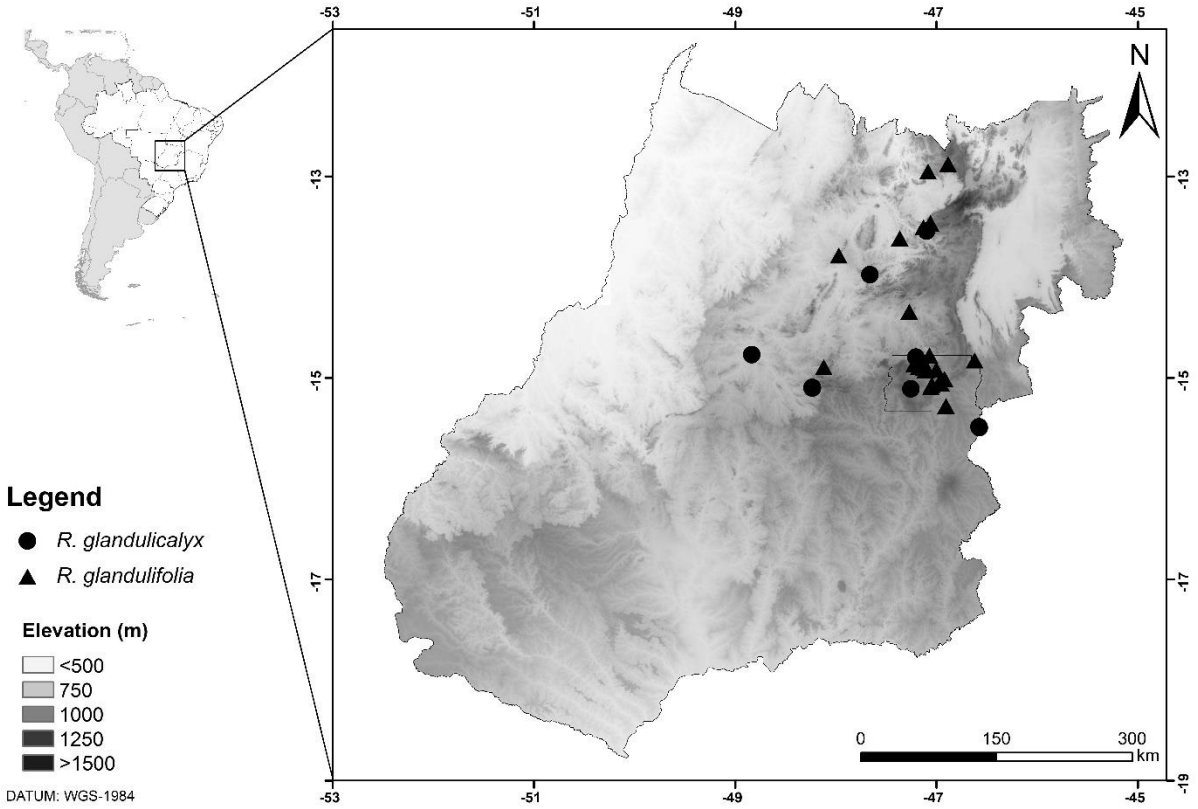

Figure 15. Distribution map of *Ruellia glandulicalyx* and *R. glandulifolia*.

20. *Ruellia glaziovii* U.G. Fern. & Kameyama, unpublish. (see Chapter II) — Holotype: Brazil, Distrito Federal, Reserva Ecológica do IBGE. Área de campo sujo próximo ao Córrego Taquaral, local queimado a 32 dias. 1015 m elev., 1 Sep 1999, *M.L. Fonseca & D. Alvarenga 2054* (SPF!; isotype: IBGE!, US!).

Diagnosis – Subshrubs erect to prostrate, 5–30 cm tall, subterraneous system woody with fusiform roots; **stems** subquadrangular to subquadrangular, younger stems villose to densely pubescent and with subcapitate glandular trichomes, mature stems glabrescent becoming woody; **leaves** opposite, subsessile to petiolate, discolored with the abaxial surface light green and the adaxial surface olive, blades chartaceous, obovate, elliptic, oblong, ovate, lanceolate, oblanceolate, narrowly oblong, 0.5–13×0.2–3.6 cm, base cuneate to decurrent, margins entire to slightly repand, apex acute to rounded, younger leaves tomentose to hirsute, mature leaves hirsute to densely pubescent with subcapitate glandular trichomes on abaxial surface and densely pubescent with eglandular trichomes on adaxial surface; **flowers** in unifloral cymes, solitary to geminate, in the axils of the terminal leaves, bracteoles absent; calyx segments equal, linear triangular, apex acute, densely pubescent with eglandular tricomes and with subcapitate glandular trichomes; corollas lilac, 25–40(–45) mm long, pubescent with eglandular trichomes, the unexpanded portion shorter than the expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, hirsutulous to velutinous with eglandular trichomes and with sparse subcapitate glandular trichomes, stigma included; **capsules** obovoid, velutinous to hirsutulous with eglandular trichomes and with subcapitate glandular trichomes, seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 16 A).

Distribution, habitat and phenology –Ruellia glaziovii is a Brazilian species occurring from eastern Goiás to Tocantins, and Distrito Federal (Fig. 17), growing in campos limpos and campos sujos. It was collected fertile from April to November.

Comments – *Ruellia glaziovii* can be easily recognized by the lilac flower on uniforal cymes, with a purplish green peduncle. Most of the collections of this species was collected just after fires, with a small vegetative part and many flowers (Fernandes et al. unpublish. [see Chapter II]).

Selected specimens examined –Brazil, Distrito Federal, Brasília, Fazenda Água Limpa/ UnB, Campo sujo em borda de floresta de galeria, 15º55'35" a 15º56'40"S, 47º54'20" a 47º54'21"W, 1050 m, 10 Apr 2007, *A.G. Amaral 1230* (IBGE); ibid., Jardim Botânico de Brasília, Área do Cristo Redentor, entre o córrego Tapera e Taperinha, Campo sujo queimado a 22 dias, 15º52'S, 47º51'W, 1100 m, 28 Jul 2011, *M. Aparecida da Silva 7383* (IBGE; RB; UFG); ibid., PARNA de Brasília, coletada em cerrado queimado a ca. 1 mês, na base do cupinzeiro., 15º38'37"S, 48º00'39"W, 1184 m, 13 Jul 2017, *U.G. Fernandes & F.S. Petrongari 319* (SP); ibid, Reserva Ecológica do IBGE, Área de Campo sujo, próximo ao Córrego Taquara, 15º55'55"S, 47º38'18"W, 1015 m, 01 Sep 1999, *M.L. Fonseca 2054* (IBGE, SPF, US); Goiás, Alto Paraíso de Goiás, 03 Sep 1995, *H.D. Ferreira 3094* (UFG); Cristalina, Fazenda Lopo Botelho, Campo Queimado, 07 Jul 1963, *J.M. Pires & A. Mattos 9855* (UB, NY); Niquelândia, Macedo, Morro Queimado, próx. Ao clube dos engenheiros, 14º21'34"S, 48º26'27"W, 15 Aug 1996, *M.L. Fonseca 1118* (IBGE, RB).

21. *Ruellia hapalotricha* Lindau, Bot. Jahrb. Syst. 25(3, Beibl. 60): 44. 1898 — **Lectotype (to be designated):** Brazil, "civ. Goyaz" [Goiás], "Cabeceira do Rio Gama", s.d., *Glaziou 21882* (K000534097 image!; isolectotypes: C10005120 image!, MPU018193 image!,BR0000013222017 image!, R000011205!, S nº09-8292 image!, F 976928 image! (Holotype: B [probably destroyed] photo: 5928!).

Diagnosis – Subshrubs to shrubs erect to prostrate, 0.5–1.8 m tall, subterraneous system woody; **younger stems** quadrangular to subquadrangular, villose to densely pubescent with eglandular trichomes and subcapitate glandular trichomes, mature stems terete, glabrescent; **leaves** opposite, subsessile to peciolate, blades discolored with the abaxial surface light green and adaxial surface olive to dark green, chartaceous, ovate, 2–8×0.5–3.5 cm, base cuneate, rounded, truncate or subcordate, margins entire to slightly repand, apex acute, rarely rounded, hirsute to densely pubescent with eglandular trichomes, mainly on the veins, and subcapitate glandular trichomes on both surfaces, mainly on abaxial surface; **flowers** solitary, rarely geminate, in the axils of the upper leaves, subsessile, bracteoles 2 spathulate, oblanceolate or linear, pubescent and with subcapitate glandular trichomes; calyx segments equal to subequal, lanceolate, narrowly elliptic, apex acute, densely pubescent to villose and with subcapitate glandular trichomes; corollas lilac, 35–65 mm long, densely pubescent with glandular trichomes, the unexpanded portion of the tube of the same size as expanded, rarely shorter, lobes orbicular to suborbicular, emarginate to truncate at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma subexserted; **capsules** obovoid, hirsutulous with eglandular trichomes; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 16 B).

Illustration in Vilar et al. (2010:49).

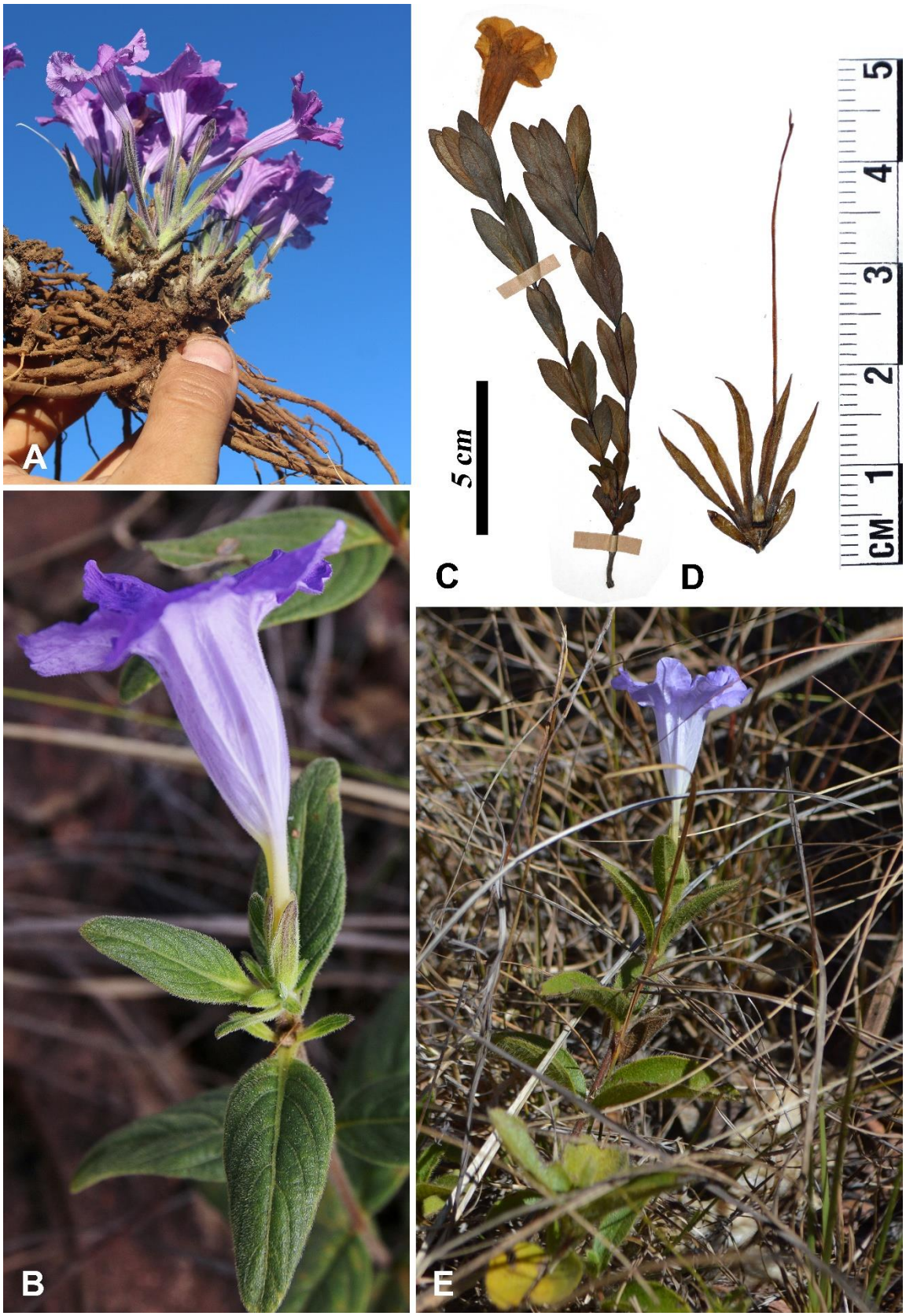

Figure 16. ***Ruellia glaziovii***: A – Detail of the entire plant with subterranous system; ***R. hapalotricha***: B – Detail in a flowering branch, with a side view of the flower; ***R. hatschbachii***: C – Detail in the habit; D – Detail in a dissected calyx with bracteoles; ***R. helianthemum***: E – Habit with a a side view of the flower. (Images: B: Maurício Mercadante)

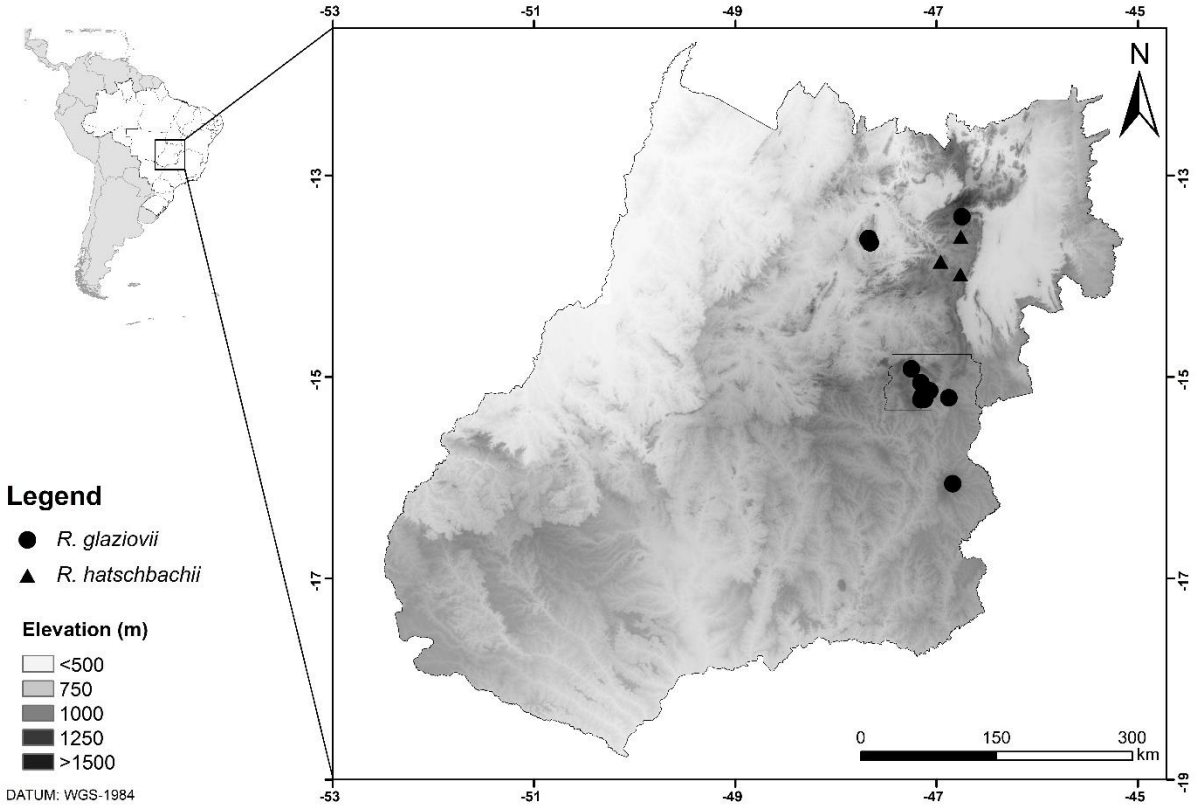

Figure 17. Distribution map fo *Ruellia glaziovii* and *R. hatschbachii*.

Distribution, habitat and phenology – Ruellia hapalotricha was only collected in central eastern Goiás and Distrito Federal (Fig. 18), growing in campos limpos, campos sujos, campos rupestres and open cerrado sensu stricto, on rocky and sandy soils or sandy-clay soils, fertile from January to August.

Comments – Ruellia hapalotricha can be recognized by the chartaceous, ovate, discolored, leaves, densely covered by eglandular trichomes on both surfaces, calyx with lanceolate to narrowly elliptic segments and lilac corollas. It is morphologically similar to *R. ceciliae*, differing mainly in the whitish indumentum of the stems, leaves, bracteoles and calyx (vs. yellowish), and flowering period occurring mainly in dry season (vs. rainy season).

Selected specimens examined – Brazil, Distrito Federal, Brasília, Estação Florestal Cabeça de Veado. Ca de 20 km a SE de Brasília. Borda mata galeria, local perturbado, 1025-1150 m, 16

Mar 1983, *M. Aparecida Alves 39* (CEN); ibid., Parque Nacional de Brasília, cerrado sensu stricto., 15º40'16"S,47º57'06"W, 1080 m, 13 Jul 2017, *U.G. Fernandes & F.S. Petrongari 320* (SP); ibid., Brazlândia. Chácara Hilztizar - lado de fora da cerca, em Grota, Latossolo amarelo., 15º38'S, 48º10'W, 24 Apr 1996, *S.M. Gomes & M.P. Mamão 28* (CEN, SP); ibid., Estação Florestal Cabeça de Veado. Cerrado seco, arborizado, solo vermelho sujeito ao fogo anualmente, 01 Ago 1975, *E.P. Heringer 14790* (UEC, UB); ibid., Campos de Murundus sobre os murundus. Cabeceira comprida, 15º37'S, 48º04'W, 1250 m, 25 Apr 1983, *J.H. Kirkbride Jr. 5267* (UB, MBM); ibid., Fazenda Água Limpa, Próximo a cachoeira do capitinga. Cerrado sentido restrito, relevo levemente ondulado, latossolo amarelo (lateria), 15º57'38"S, 47º56'41"W, 1082 m, 27 May 2015, *G.F. Souza et al. 37* (UB, SP, HEPH); ibid., Granja do Torto, 29 May 1965, *D. Sucre 359* (UB); ibid., Ermida dom Bosco. Cerrado sensu stricto, 15 May 2008, *T.S. Vilar & E.B.A. Dias 16* (CEN); ibid., Fazenda Sucupira (EMBRAPA/CENARGEN). Região entre o Recanto das Emas e o Riacho Fundo. Cabeceira da mata de galeria do Córrego Açudinho. Relevo Ondulado. Solo areno-argiloso com muita serrapilheira, 15º55', 48º01', 1060 m, 26 Mar 1997, *B.M.T. Walter et al. 3740* (CEN, SP); Goiás, Formosa, Rio Tiquiri, 25 May 1967, *E.P. Heringer 11524* (UB); Padre Bernardo, Chapada da Vargem Grande; a mais ou menos 30 km de Brazlandia, 15º33'S, 48º15'W, 1020 m, 07 May 1991, *R.F. Vieira & J.B. Pereira 737* (CEN); Pirenópolis, Serra dos Pirineus, Fazenda Arruda. Campo rupestre, 1270 m, 09 Jun 2000, *D. Wilberg 121* (MBM); Planaltina, Em cerrado do CPAC-EMBRAPA, May 1977, *J.F. Ribeiro 9833* (UEC).

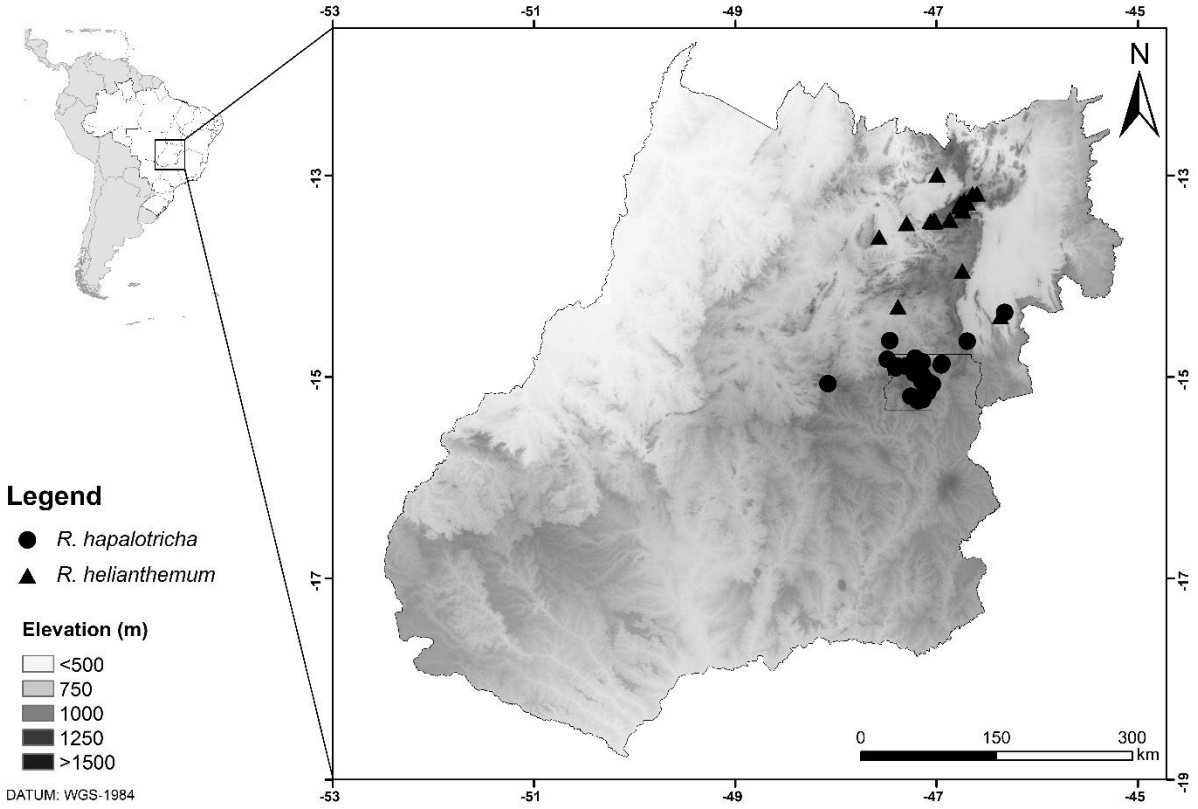

Figure 18. Distribution map of *Ruellia hapalotricha* and *R. helianthemum*.

22. *Ruellia hatschbachii* U.G. Fern. & Kameyama, unpublish (see Chapter II) — Holotype: Brazil, Goiás, São João da Aliança, estrada para Vãozinho, 1150 m elev., 9 Feb 1994, *G. Hatschbach et al. 60227* (holotype: MBM!; isotype: SPF!, US! [barcode: 02861448], US! [barcode: 02863048]).

Diagnosis – Subshrubs erect to prostrate, 30–60 cm tall, subterraneous system woody; **stems** quadrangular to subquadrangular, reddish, glabrous to glabrescent with eglandular trichomes, mainly on the nodes; **leaves** opposite, imbricate, blades chartaceous, obovate to elliptic, (0.7–)1–4.6×(0.2–)0.5–1.5 cm, base cuneate, rounded, truncate or subcordate, margins entire, repand to slightly crenulate, apex acute to rounded, brochidodromous, only with sparsely subcapitate glandular trichomes on both surfaces; **flowers** solitary in the axils of the upper leaves, subsessile, bracteoles 2 oblanceolate, narrowly elliptic to linear, only with subcapitate glandular

trichomes; calyx segments equal to subequal, oblanceolate, narrowly elliptic to linear, apex acute, ciliate at the margins with simple trichomes, and subcapitate glandular trichomes; corollas lilac, 40–50 mm long, densely pubescent with glandular trichomes, the unexpanded portion of the tube shorter than the expanded, lobes orbicular to suborbicular, emarginate to truncate at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma included; **capsules** ellipsoid, densely pubescent to hirsutulous; seeds 6, suborbicular, mature seeds not seen (Fig. 16 C-D).

Illustrations in Chapter II.

Distribution, habitat and phenology – Ruellia hatschbachii has been collected hitherto only in the municipalities of São João d'Aliança and Alto Paraíso de Goiás, state of Goiás (Fig. 17), growing in campo sujo, on rocky and sandy soils (Fernandes et al., unpublish.[see Chapter II]).

Comments – Ruellia hatschbachii is morphologically similar to *R. pohlii* in the imbricate leaves but differs in the bracteoles covered only with subcapitate glandular trichomes (vs. glandular pubescent with subcapitate glandular trichomes), and the calyx with the segments oblanceolate, narrowly elliptic to linear, ciliate with eglandular hairs (vs. linear triangular, glandular pubescent) (Fernandes et al., unpublish. [see Chapter II]).

Selected specimens examined – Brazil, Goiás, Alto Paraíso de Goiás, 20 km S, campo arenoso, 18 Feb 1975, *G. Hatschbach et al. 36306* (MBM, US); São João d'Aliança, Corrente, Campo cerrado, solo rochoso, 20 Feb 2000, *G. Hatschbach et al. 70481* (MBM, US).

23. *Ruellia helianthemum* (Nees) Profice in Rodriguésia 61(Sup): S87. 2010 ≡ *Dipteracanthus helianthemum* Nees in Fl. Bras. 9: 51. 1847 — **Lectotype (to be designated):** Brazil, [Goiás], "Rio Preto", s. d., *J.B.E. Pohl 1998* (W0004510 image!; isolectotypes: GZU000249505 image!).

Diagnosis – Subshrubs erect to prostrate, 20–50 m tall, subterraneous system woody; **younger stems** quadrangular to subquadrangular, densely pubescent to hirsute with eglandular trichomes and subcapitate glandular trichomes, densely on the nodes, mature stems subquadrangular to terete, glabrescent; **leaves** opposite, sessile to subsessile, blades chartaceous, ovate, elliptic, lanceolate to obovate, (1.4–)2–7.2×(0.4–)0.5–2.6 cm, base cuneate, margins entire to slightly repand, apex acute, rarely rounded, hirsute to densely pubescent with eglandular trichomes, mainly on the veins, and subcapitate glandular trichomes on abaxial surface, densely pubescent to hirsute with eglandular trichomes on adaxial surface, texture slightly scabrous on adaxial surface; **flowers** solitary, rarely geminate, in the axils of the upper leaves, subsessile, bracteoles absent, 1 or 2, spathulate, oblanceolate or linear, hirsute to pubescent with subcapitate glandular trichomes; calyx segments equal, rarely subequal, linear triangular, apex acute, densely pubescent to villose and subcapitate glandular trichomes; corollas lilac, (30–)38–55(–60) mm long, densely pubescent with glandular trichomes, the unexpanded portion of the tube of same length of the expanded, lobes orbicular to suborbicular, emarginate to truncate at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma subexserted; **capsules** ellipsoid, densely pubescent to hirsutulous; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 16 E).

Distribution, habitat and phenology –Ruellia helianthemum occur in northern Goiás (Fig. 18) and Bahia, growing in cerrado sensu stricto, campos rupestres, campos sujos, campos limpos and campos úmidos.

Comments –*Ruellia helianthemum* can be recognized by the lustrous and slightly scabrous adaxial surface of the leaves, densely pubescent to hirsute with eglandular trichomes, and large lilac corolla in the axils of the terminal leaves. It is similar to *R. nitens* and *R. hapalotricha*, in the habit, differing from *R. nitens* by the leaves and stems indumentum (vs. glabrous to puberulent), and from *R. hapalotricha* by the scabrous texture on the adaxial surface of the leaves (vs. velutinous) and calyx segments linear triangular (vs. lanceolate to narrowly oblong).

Selected specimens examined –Brazil, Goiás, Alto Paraíso de Goiás, Campo sujo na beira da estrada sentido Cachoeira da Água Fria, próximo à Rod. GO-118, área aberta, solo arenoso-rochoso., 14°04'06"S, 47°30'12"W, 1364 m, 02 Jun 2017, *U.G. Fernandes et al. 225* (SP); ibid., Parque Nacional da Chapada dos Veadeiros, próximo ao acesso pela GO-118, em campo limpo., 14°01'36", 47°31' 47", 1518 m, 02 Jul 2017, *U.G. Fernandes et al. 226* (SP); Cavalcante, RPPN Serra do Tombador, estrada para a sede (partindo por Cavalcante), antes da 2° ponte. Campo sujo e cerrado à esquerda, 25 Jul 2014, *R.D. Sartin et al. 591* (SP); Colinas do Sul, RPPN Cachoeira das Pedras Bonitas. Proprietário: Oswaldo Ferreira da Silva. Relevo: inclinado. Vegetação cerrado. Solo pedregoso/cambissolo., E 0817.427 m N 8.428.609 (22L), 540 m, 25 Jun 2004, *R.C. Mendonça et al. 5632* (IBGE); Mimoso de Goiás, Estrada entre Mimoso de Goiás e Mato Seco, entrada a direita para uma Fazenda. Cerrado alto, relevo ondulado, solo com textura pedregosa., 15°01'32"S, 48° 08'43"W, 725 m, 13 Jun 2002, *R.C. Mendonça et al. 4830* (IBGE, SP, UB); Niquelândia, km 35 da estrada Niquelândia/Colinas do Sul, Cerrado em solo arenoso, pobre, Cerrado ralo, 14°20', 48°20', 02 Jul 1996, *B.A.S. Pereira & D. Alvarenga 3100* (IBGE, US, SPF, RB, HRB); São João d'Aliança, Cerrado aberto, solo areno-pedregoso, relevo ondulado, DF-345 - 72 km do entroncamento da BR - 020/DF – 345, 15 Aug 1990, *T.B. Cavalcanti et al. 658* (SP, CEN); Teresina de Goiás, Rodovia GO-118, km 205, ca. 41 km ao norte de Alto Paraíso de Goiás, Campo rupestre, 13°54'05", 47°21'35", 1330 m, 31 Jul 2000, *C. Kameyama et al. 143* (SP, SPF).

24. *Ruellia incomta* (Nees) Lindau in Nat. Pflanzenfam. 4, Abt. 3b: 311. 1895 ≡ *Dipteracanthus incomtus* Nees in Fl. Bras. 9: 44. 1847 — **Lectotype (to be designated):** Brazil, “prov. Bahiensis” [Bahia], “ad Caxoeiras et Maracas”, “In sylvis Catinga”, s.d., *Martius s.n.* (GZU000249544 image!; isolectotypes M-0186647 image!, M-0186648 image!).

Diagnosis – Subshrubs to shrubs erect to prostrate, 0.2–1.2 m tall, subterraneous system woody; **younger stems** quadrangular to subquadrangular, hirsute to densely pubescent, with eglandular trichomes on different sizes and subcapitate glandular trichomes, densely on the nodes, mature stems subquadrangular to terete, glabrescent; **leaves** opposite, petiolate, blades chartaceous, ovate, elliptic, obovate to spathulate, 3.5–10×1.4–3.6 cm, base cuneate to decurrent, margins entire to slightly repand, apex acute, obtuse to rounded, densely pubescent to glabrescent with eglandular trichomes, mainly on the veins, and subcapitate glandular trichomes on both surfaces; **Inflorescencein** axillary to apical dichasia, bracts oblanceolate to spathulate, densely glandular pubescent and with subcapitate glandular trichomes, bracteoles oblanceolate, spathulate to linear, densely glandular pubescent and with subcapitate glandular trichomes; calyx segments equal, linear, apex rounded, densely glandular pubescent and subcapitate glandular trichomes; corollas lilac to white with a purple macula inside of the expanded portion, 35–53 mm long, densely pubescent with glandular trichomes, the unexpanded portion of the tube shorter than the expanded, lobes orbicular to suborbicular, emarginate to truncate at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, and with subcapitate glandular trichomes, stigma included; **capsules** obovoid, densely glandular pubescent; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 19 A).

Illustration in Vilar et al. (2010:49).

Distribution, habitat and phenology –Ruellia incomta is a Brazilian species occurring in Goiás, Distrito Federal, Tocantins, Mato Grosso, Mato Grosso do Sul, Bahia and Minas Gerais, in cerrado vegetation. In the study area, *R. incomta* is a common species in the Distrito Federal and in Goiás, except the northwestern portion of the state (Fig. 20). It was collected growing in campos sujos, campos rupestres and cerrado sensu stricto, fertile from May to August, with only one register in December.

Comments – Ruellia incomta can be easily recognized by the lilac to whitish corollas on dichasia, that can be lax to congested totally glandular pubescent, with a characteristic smell when fresh and sometimes on dry material (U.G. Fernandes, pers. obs.).

Selected specimens examined –Brazil, Distrito Federal, Brasília, Planaltina, CPAC, Bloco E do Exp. 112 área chapada, campo limpo, substrato LVA., 1100 m, 14 Aug 1979, *S.P. Almeida 89* (CEN); ibid., Fazenda Água Limpa, borda de mata de galeria, campo sujo., 15º55'35,4" a 15º56'04,1"S e 47º54'20,8" a 47º54'21,9"W, 1050 m, 19 Jun 2017, *A.G. Amaral & C.U.O. Eugenio 1645* (SP); ibid., Área experimental Roncador IBGE. Cerradão., 15º5'S; 47º5'W, 31 Jul 1990, *A.L. Brochado & F.H. Muniz 51* (IBGE, RB); ibid., Chapada da Contagem, 27 km N of the television tower in Brasília, 15º40'S, 47º54'W, 1240 m, 20 Jun 1982, *T.B. Croat 53602* (UB, MO); ibid., Reserva Biológica do IBGE, coletada em cerrado sensu stricto, na beira da estrada., 15º56'52"S, 47º53'06"W, 1084 m, 12 Jul 2017, *U.G. Fernandes & F.S. Petrongari 315* (SP); ibid., Parque Nacional de Brasília, coletada em cerrado sensu stricto, na beira da estrada., 15º43'36"S, 47º55'50"W, 1025 m, 13 Jul 2017, *U.G. Fernandes & F.S. Petrongari 316* (SP); ibid., Centro Olímpico da UnB, coletada em cerrado sensu stricto, 15º46'01"S, 47º51'19"W, 1004 m, 14 Jul 2017, *U.G. Fernandes et al. 321* (SP); Goiás, Anápolis, BR 153, 10 km O de Anápolis. Campo cerrado, 22 May 1975, *G. Hatschbach 36679* (MBM); Campo Alegre, Rod. BR-050, 5-8 km S do trevo para Ipameri. Campo cerrado, 11 Jun 1993, *G. Hatschbach et al. 59264* (MBM); Cocalzinho de Goiás, Coletada na estrada sentido Pirenópolis, em campo sujo

com murundus, em solo pedregoso, 15º47'46"S, 48º48'47"W, 1184 m, 15 Jul 2017, *U.G. Fernandes & F.S. Petrongari 323* (SP); Corumbá, 09 Jul 1951, *A. Macedo 3292* (SP, RB); Guarani de Goiás, Rodovia BR 020 (Brasília-Salvador), 15 km ao norte do entroncamento para Posse. Cerrado em solo arenoso com afloramentos rochosos., 14º01'11"S, 46º13'39"W, 950 m, 29 Jul 2000, *C. Kameyama et al. 129* (SP, SPF); Luziania, Borda Norte da Chapada, Faz. Do Sr. Azarias, nascente do córrego Capão da Anta, Cerrado (campo sujo), relevo suave ondulado, latossolo vermelho-amarelo. Área de influência indireta, 16º20'52"S, 48º12'08"W, 940 m, 10 Apr 2003, *G. Pereira-Silva et al. 7524* (CEN, SP); Mineiros, Parque Nacional das Emas, coletada no Mirante, em área de cerrado queimado, 17º55'08"S, 52º58'08"W, 832 m, 20 Jul 2017, *U.G. Fernandes & F.S. Petrongari 347* (SP); Morrinhos, Marcelona. Campo pedregoso, 08 Jul 1976, *G. Hatschbach 38731* (MBM); Planaltina, Bacia do Rio Maranhão, Campo cerrado, relevo plano no local, solo argilo-arenoso, 16 Jun 1999, *K. Calago 174* (CEN, SP).

25. *Ruellia jussieuoides* Schltdl. & Cham. in Linnaea 6(2): 370. 1831 — **Lectotype (to be designated):** Mexico, Veracruz: "ad ripas fluminis Misantlensis prope Misantlam", Mar 1829, *F. Deppe & C.J.W. Schiede 1164* (HAL0098540 image!; isolectotypes: W 0015424 image!)

For synonyms see Tripp & McDade (2012).

Diagnosis – Subshrubs to shrubs erect to prostrate, 0.3–1.2 m tall, subterraneous system axial; **younger stems** quadrangular to subquadrangular, pubescent, rarely tomentose, with eglandular trichomes, densely on the nodes, the mature subquadrangular to terete, glabrescent; **leaves** opposite, petiolate, blades slightly discolored with the abaxial surface light green and adaxial surface dark green or olive, membranaceous to chartaceous, ovate to elliptic, (2.5–)3.5–21×(0.4–)0.5–6.5 cm, base cuneate to decurrent, margins entire to slightly serreate, apex acute

to attenuate, pubescent to glabrescent with eglandular trichomes, mainly on the veins on both surfaces; **flowers** solitary to geminate, in the axils of the upper leaves, subsessile to pedicelate, bracteoles 2 spathulate, lanceolate, narrowly oblong or oblanceolate, pubescent with eglandular trichomes; calyx segments equal, linear triangular, apex acute, pubescent with eglandular trichomes; corollas lilac, 35–50 mm long, glandular pubescent, the unexpanded portion of the tube at least. 2× longer than the expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent to slightly revolute; stamens included, didynamous; ovary ovoid, densely puberulent and with subcapitate glandular trichomes, stigma included to exserted; **capsules** clavate oblanceolate, pubescent; seeds 10–14, suborbicular, ciliate with hygroscopic trichomes (Fig. 19 B).

Illustration in Kameyama (1995:189)

Distribution, habitat and phenology – Ruellia jussieuoides occurs from Brazil to Mexico (Tripp & McDade 2012), growing in rainforests, semideciduous and riparian forests and cerrado vegetation. In the study area, it was collected in Distrito Federal and in Goiás, except the northwestern portion of the state (Fig. 21), fertile from March to January

Comments – Ruellia jussieuoides can be recognized by the lilac corollas with the unexpanded portion, at least 2× longer than the expanded portion of the tube. It is similar to *R. costata*, differing by the subsessile to pedicellate flowers (vs. racemes to panicles).

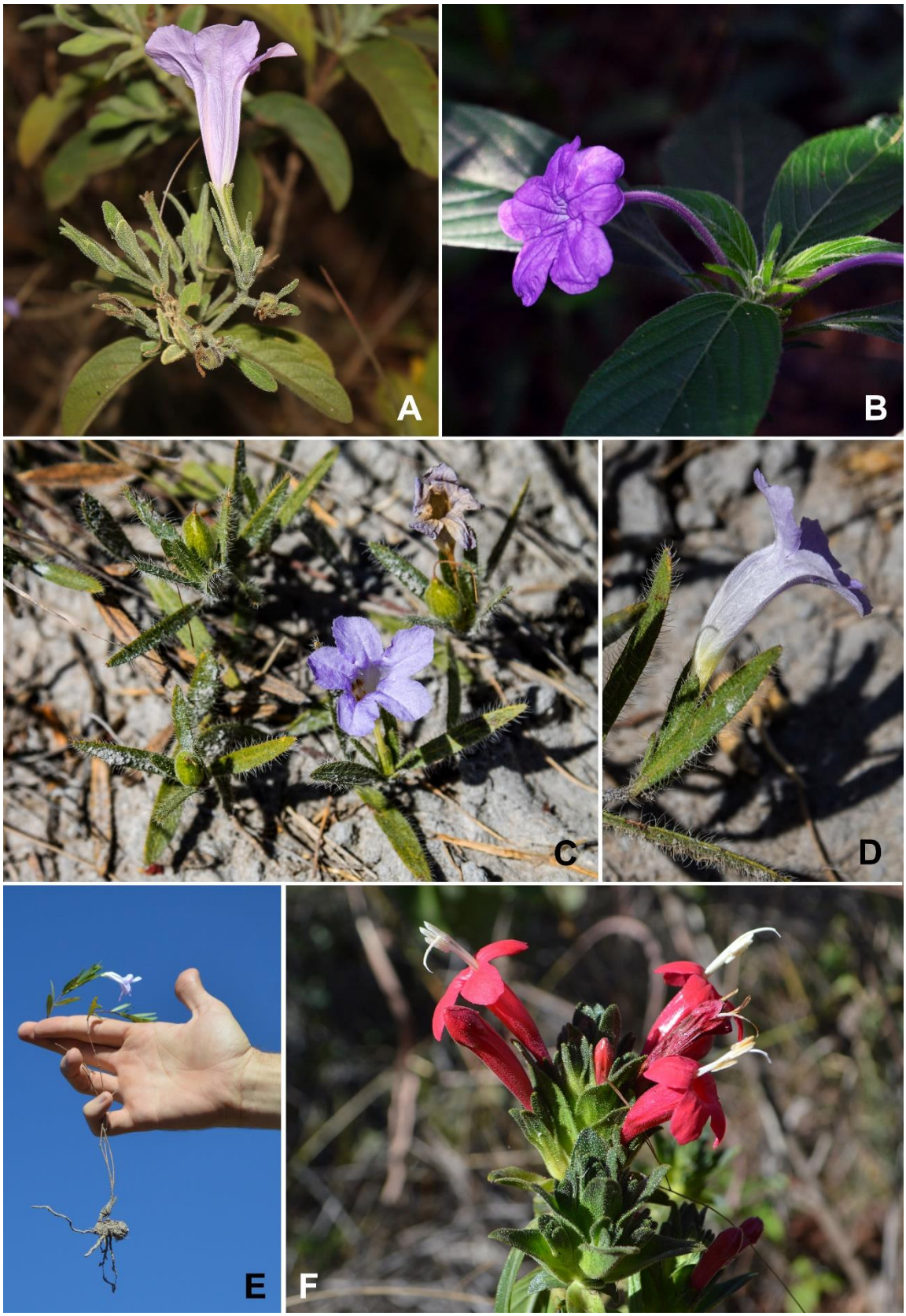

Figure 19. ***Ruellia incomta***: A – Inflorescence with a side view of the flower; ***R. jussieuoides***: B – Detail in a flowering branch; ***R. lucindae***: C – Habit; D – Detail in a side view of the flower; E – Detail in the entire plant with subterraneous system; ***R. macedoana***: E – Detail in the inflorescence.

Selected specimens examined –Brazil, Distrito Federal, Brasília, Bacia do Rio São Bartolomeu, Mata ciliar, 17 Mar 1980, *E.P. Heringer et al. 3803* (IBGE, MBM); ibid., Parque Nacional de Brasília, Mata ciliar próximo do portão de entrada (ca. 1km), 3 Jul 1992, *M. Barros et al. 2355* (HRCB, UB); Goiás, Alto Paraíso de Goiás, Floresta Estacional Semidecídua, na trilha à direita do estacionamento do Vale da Lua, ca. de 300 m de distância do estacionamento, em ambiente sombreado., 14º10'57"S, 47º47'30"W, 965 m, 03 Jul 2017, *U.G. Fernandes et al. 243* (SP); Cavalcante, RPPN Serra do Tombador, estrada principal, mata ciliar, 13º38'41"S, 47º49'29"W, 735 m, 18 Apr 2013, *M.L. Brotto et al. 1089* (MBM, UFG, BHCH, HUEFS); Niquelândia, Margem direita do Córrego Siliveiras; próximo à ponte, 14º23'38"S, 48º36'19"W, 518 m, 08 Jul 2017, *U.G. Fernandes & F.S. Petrongari 307* (SP); Perolândia, Assentamento Três Pontes, próximo ao Córrego Jenipapo, 4 Apr 2014, *L.F. Souza 5947* (HJ); Morrinhos, Parque Ecológico Jatobá Centenário, segunda ponte, trilha do lado direito., 17°43'43"S, 49°07'56"W, 820 m, 4 May 2005, *T.M. Moura 117* (HUEG); Aparecida do Rio Doce, PCH Irara, Cerrado, mata ciliar alterada, 5 Mar 2007, *F.A.G. Guilherme 465* (HJ); Jataí, Mata do Açude, Cerrado, Mata mesofítica, 17°51'33"S,51°43'32"W, 776 m, 03 Apr 2008, *T.F. Silva J.F. Ribeiro 128* (HJ); Corumbaíba, Margem esquerda do Rio Corumbá no Córrego Gameleira., 22 Jun 1993, *S.P Cordovil et al. 346* (CEN); Paraúna, Ponte de Pedra, Parque Estadual de Paraúna, Mata de Galeria, borda de cachoeira, 17°10'22"S, 50°50'08"W, 703 m, 1 Jan 2013, *J.E.Q. Faria et al. 3790* (UB, RB, HUEG).

26. *Ruellia lucindae* U.G. Fern., Kameyama, & E. Tripp, unpublish. (see Chapter II) —

Holotype: Brazil, Goiás, Alto Paraíso de Goiás, Parque Nacional Chapada dos Veadeiros, trail from entrance of park to waterfalls. Open savanna on white sands. 14.166081°S, 47.820443°W, 1000 m elev., 13 Ago 2016, *E. Tripp & C. Kameyama 5939* (SP!; isotype: COLO!, RSA!, RB!, US!, UB!).

Diagnosis – Subshrubs erect to prostrate, 20–40 cm tall, subterraneous system woody; **stems** reddish, younger stems quadrangular to subquadrangular, pubescent with eglandular trichomes and subcapitate glandular trichomes, mature stems subquadrangular to terete, glabrescent; **leaves** opposite, sessile, frequently imbricate, blades chartaceous, lanceolate, ovate, elliptic, narrowly elliptic, linear, narrowly oblong, base cuneate, margins entire, slightly repand to slightly crenate, apex acute to slightly rounded, brochidodromous, sparsely pubescent with eglandular trichomes or only ciliate at the margins and/or only with subcapitate glandular trichomes on both surfaces; **flowers** solitary to geminate, in the axils of the upper leaves, subsessile, bracteoles absent, rarely 1 or 2, oblanceolate to linear, apex rounded, glabrous to glabrescent with eglandular trichomes and subcapitate glandular trichomes; calyx segments equal, linear triangular, apex acute, pubescent with eglandular trichomes and subcapitate glandular trichomes; corollas lilac to white, 25–35mm long, densely pubescent, the unexpanded portion of the tube shorter or same length as the expanded portion of the tube, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma included; **capsules** obovoid, densely pubescent; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 19 C-E).

Illustration in Chapter II.

Distribution, habitat and phenology – Ruellia lucindae occur in campos úmidos and campos rupestres of Chapada dos Veadeiros region (Fig. 20), growing on sandy soils and organic soils (Fernandes et al. unpublish. [see Chapter II]), it was collected fertile from July to September.

Comments – Ruellia lucindae is similar to *R. trachyphylla* but differs in brochydodromous leaves (vs. eucamptodromous), glabrous to sparsely pubescent with long eglandular trichomes (vs. puberulent with short eglandular trichomes).

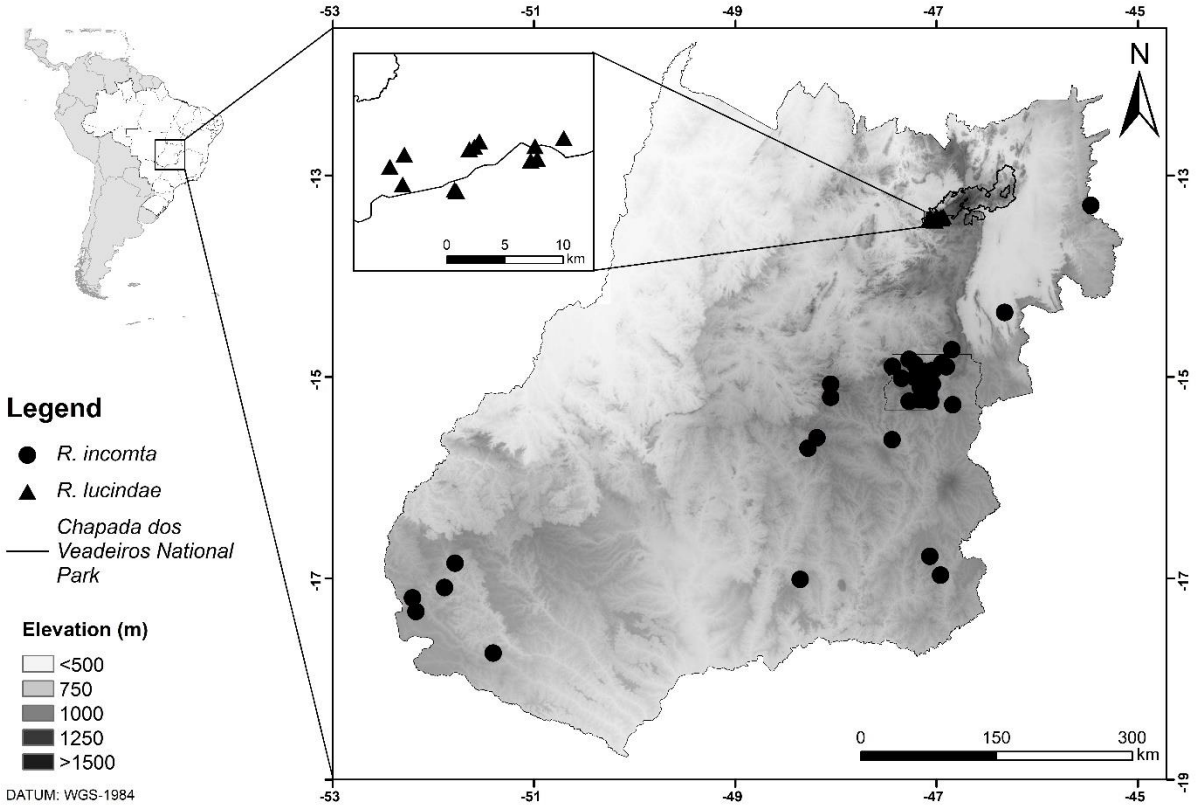

Figure 20. Distribution map of *Ruellia incomta* and *R. lucindae*.

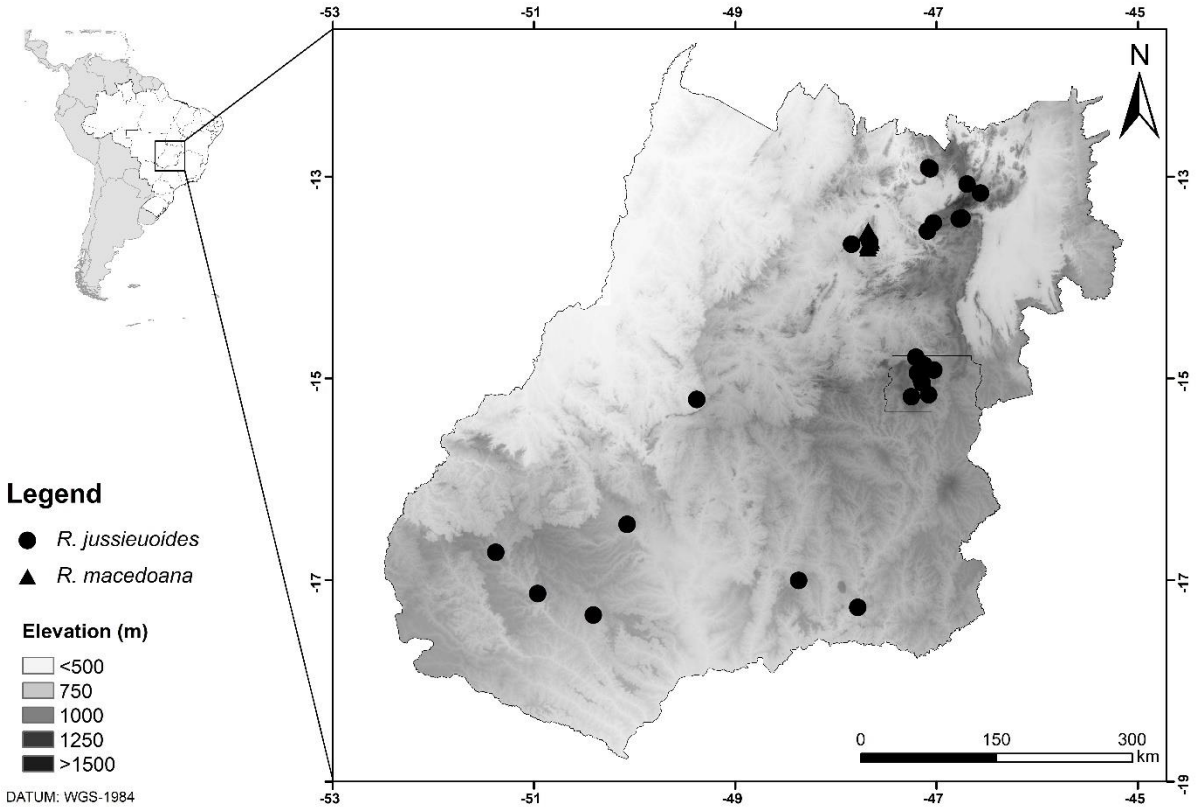

Figure 21. Distribution map of *R. jussieuoides* and *R. macedoana*.

Selected specimens examined –Brazil, Goiás, Alto Paraíso de Goiás, Chapada dos Veadeiros, Faz. Matão. Campo, 19 Sep 1981, *T.S.P. Caldas 14* (IBGE); ibid., São Jorge, rodovia GO-239, próximo a São Jorge, Campo rupestre na beira da estrada 14°08'12.3"S, 47°43'05.5"W, 1190 m, 17 Jul 2006, *M.F. Calió et al. 107* (SPF); ibid., Estrada Alto Paraíso - Colinas do Sul, 23 km da GO 118, campo limpo com afloramento rochoso, relevo ondulado, solo arenoso, 14°07'49"S, 47°41'45"W, 1220 m, 29 Aug 2004, *T.B. Cavalcanti et al. 3505* (CEN, SP); ibid., campo limpo úmido, ao lado direito da estrada sentido Vale da Lua, ambiente aberto, solo úmido, arenoso 14°10'17"S, 47°46'44"W, 1005m, 3 Jul 2017, *U.G Fernandes et al. 234* (SP); ibid., campo limpo úmido, próximo à vereda, ao lado direito da estrada sentido Vale da Lua, ambiente aberto, solo úmido, arenoso 14°10'13"S, 47°46'49"W, 1001 m, 3 Jul 2017, *U.G Fernandes et al. 236* (SP); ibid., Parque Nacional da Chapada dos Veadeiros, campo úmido do lado esquerdo da estrada após o alojamento do PNCV, próximo à uma vereda, ambiente aberto, solo arenoso e úmido 14°08'13"S, 47°45'54"W, 1096 m, 3 Jul 2017, *U.G Fernandes et al. 251* (SP); ibid., Parque Nacional da Chapada dos Veadeiros, subindo o morro após a vereda no Córrego dos Ingleses, solo arenoso/pedregoso, relevo ondulado, campo sujo, 23 Out 1996, *R. Marquete et al. 2767* (IBGE, US); ibid., trilha para as cariocas e canion (Cachoeiras) do rio Preto, solo concrecionário, afloramentos rochosos, relevo levemente 14°08'35"S,47°49'09"W, 1050 m, 12 Sep 1996, *R.C. Mendonça et al. 2723* (IBGE, US); ibid., Parque Nacional Chapada dos Veadeiros, Córrego dos Ingleses, solo hidromórfico, relevo plano, Campo sujo, 14°08'20"S, 47°46'08"W, 1050 m, 12 Sep 1996, *R.C. Mendonça et al. 2785* (IBGE); ibid., Reserva Particular do Patrimônio Natural (RPPN), Mata Funda, propriedade Sr. Ângelo/Solange; solo pedregoso, relevo ondulado, campo sobre morro cascalhento, 14°08'52"S, 47°43'17"W, 1165 m, 5 Jul 1998, *R.C. Mendonça et al. 3537* (IBGE, US); ibid. Reserva Particular do Patrimônio Natural (RPPN), Mata Funda, propriedade Sr. Ângelo/Solange; solo pedregoso, relevo ondulado, campo limpo na base dos morros, próximo a uma "ilha" de cerrado, 14°08'47"S, 47°42'59"W,

1140 m, *R.C. Mendonça et al. 3567* (IBGE, US); ibid., Parque Nacional da Chapada dos Veadeiros. Margem do rio Preto, entre as Corredeiras e as Cariocas. Campo limpo úmido, 14°09'09"S, 47°49'49"W, 11 Sep 2014, *R.D. Sartin & C. Siniscalchi 636* (SPF, SP).

27. *Ruellia macedoana* R.D. Sartin & Kameyama unpublish. = *Ruellia capitata* Rizzini in Dusenia 7: 301. 1956, nom. illeg. — **Holotype:** Brazil, Goiás, Niquelândia, Macedo, 26 Jul 1952, *A. Macedo 3677* (RB00533912!, isotypes: US00478765 image!, S09-8233 image!, NY00930506 image!, SP! nº84553).

Diagnosis – Subshrubs to shrubs erect to prostrate, 0.5–1.2 m tall, subterraneous system woody; **younger stems** subquadrangular, glabrous, only with eglandular trichomes on the nodes, mature stems terete; **leaves** opposite, sessile, blades membranaceous to chartaceous, elliptic, ovate or lanceolate, base decurrent, margin entire to slightly repand, apex acute, pubescent to glabrescent with eglandular trichomes on both surfaces and with subcapitate glandular trichomes on abaxial surface; **Inflorescence** apical spiciform raceme with foliaceous bracts, squarrosae, deltoid, ovate to elliptic, acute at the apex, glandular pubescent; **flowers** subsessile, in the axils or the bracts, bracteoles 2, unequal, the external one longer and larger than the internal, obovate, apex rounded, densely glandular pubescent, calyx segments subequal, the posterior larger and of the same length of the 2 anterior, the 2 laterals longer and narrower, linear, lanceolate to narrowly elliptic, apex slightly rounded, densely glandular pubescent; corollas pinkish red, densely pubescent with glandular trichomes, the unexpanded portion of the tube shorter or the same length of the expanded, lobes elliptic to suborbicular, emarginate to rounded at the apex, reflexed, stamens exserted, didynamous, the two interior longer; ovary ovoid, velutinous to hirsutulous with eglandular trichomes mainly at the apex, stigma exserted;

capsules ellipsoid, hirsutulous; seeds 8, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 19 F).

Distribution, habitat and phenology – Ruellia macedoana is an endemic species to the municipality of Niquelândia, Goiás (Fig. 21), occurring in semideciduous forests and cerrado sensu stricto. It was collected fertile from July to September.

Comments – Ruellia macedoana can be recognized by the reddish pink corollas with reflexed lobes, and exserted stamens, on an apical spiciform raceme with foliaceous ,deltoid, ovate to elliptic bracts,. It is similar to *R. adenostachya* in the habit and apical spiciform raceme, differing in the bracts shape (vs. lanceolate) and the corolla shape and color (lilac with patent lobes).

Selected specimens examined –Brazil, Goiás, Niquelândia, junto a cidade, Morro do Cristo, brejo, 14º17'08"S, 48º27'26"W, 19 Sep 1996, *M. Aparecida da Silva & C.C.S. Ferreira 3145* (IBGE, US); ibid., Coletada em cerrado degradado, 14º24'16"S, 48º26'55"W, 869 m, 08 Jun 2017, *U.G. Fernandes & F.S. Petrongari 301* (SP); ibid., borda de cerrado sensu stricto, ao lado direito da estrada sentido povoado de Macedo, 14º24'32"S, 48º26'14"W, 892 m, 08 Jul 2017, *U.G. Fernandes & F.S. Petrongari 300* (SP); ibid., Macedo, ca. 18 km de Niquelândia, campo, 24 Aug 1994, *T.S. Filgueiras 2964* (IBGE); ibid., ca. 2 km da estrada para Macedo Velho, 09 Aug 1995, *M.L. Fonseca et al. 431* (IBGE, RB, US); ibid., Macedo, ca. 2 km à direita da mina de níquel, solo pedregoso, entrada de mata mesofítica., 14º23'03"S, 48º24'57" W, 1000 m, 12 Aug 1997, *M.L. Fonseca et al. 1505* (IBGE, RB); ibid., Rodovia Niquelândia - Votorantim Metais (BR 535), cerca de 3,4 km do trevo de Niquelândia, Margens da rodovia, Cerrado em solo pedregoso e restos de mata ciliar., 14º26'08"S, 48º26'34" W, 818 m, 7 Sep 2013, *J.R. Pirani et al. 6494* (SPF, RB); ibid., Rodovia Niquelândia - Votorantim Metais (BR 535), cerca de 3,4

km do trevo de Niquelândia, Margens da rodovia, Cerrado em solo pedregoso e restos de mata ciliar., 14º26'08"S, 48º26'34" W, 818 m, 7 Sep 2013, *R. Mello-Silva et al. 3638* (SPF, SP).

28. a. ***Ruellia macrantha*** **(Mart. ex Nees) Hiern** in Warming Vidensk. Meddel. Naturhist. Foren. Kjøbenhavn: 76. 1877-1878 ≡ *Dipteracanthus macranthus* Mart. ex Nees in Fl. Bras. 9: 37. 1847 — **Lectotype (to be designated):** Brazil, "in prov. Minarum" [Minas Gerais], without specific location, 1841, *Gardner 5132* (K000534079 image!; isolectotypes: K000534081 [the left specimen] image!, BM000624586 image!).

=*Dipteracanthus macranthus* Mart. ex Nees var. *magnificus* Nees in Fl. Bras. 9: 37. 1847 — **Lectotype (to be designated):** Brazil, "prov. Minarum" [Minas Gerais], "in montibus prope Villa Rica", Aug-April 1840, *Claussen s.n.* (K000534080 [the right specimen] image!; isolectotype: K000534085 image!).

Diagnosis – Shrubs erect to prostrate, 0.5–1.5 m tall, subterraneous system not seen; **younger stems** quadrangular to subquadrangular, frequently sulcate, densely glandular pubescent, only with eglandular trichomes on the nodes, mature stems terete glabrescent with sparse eglandular tricomes and glandular trichomes; **leaves** opposite, petiolate, blades membranaceous, ovate to elliptic, 6.5–19.5×2.2–7 cm, base cuneate to decurrent, margins entire to slightly repand or slightly serreate, apex acute to acuminate, pubescent to glabrescent on both surfaces, mainly on the nodes and with sparse subcapitate glandular trichomes on abaxial surface; **Inflorescence** apical spike with foliaceous bracts, bracts ovate, elliptic to obovate, acute, obtuse to rounded at the apex, glandular pubescent; **flowers** sessile, in the axils or the bracts, bracteoles 2, narrowly oblong to linear, apex rounded, densely glandular pubescent, calyx segments equal, linear, lanceolate to narrowly elliptic, apex acute, densely glandular pubescent; corollas pink to lilac, 46–80 mm long, pubescent with eglandular trichomes, the unexpanded portion of the tube

resupinate twisted in 180°, shorter than the expanded portion of the tube, lobes ovate to suborbicular, emarginate at the apex, patent, stamens exserted, didynamous, ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma exserted; **capsules** oblongiform to narrowly ellipsoid, densely pubescent; seeds 10–14, suborbicular, ciliate with hygroscopic trichomes (Fig. 22A–B).

Illustration in Kameyama (1995:189).

Distribution, habitat and phenology – Ruellia macrantha is a Brazilian species that occur in southern Espinhaço range and Mantiqueira montain range in the state of Minas Gerais (Kameyama, 1995) and São Paulo, southern Goiás (Fig. 23) and southern Mato Grosso, on semideciduous forests and gallery forests.

Comments – Ruellia macrantha var. *macrantha* can be recognized by the corollas resupinate, twisted in 180° on the unexpanded portion of the corolla. The color of corollas can be vivid pink, pale pink to lilac, always with a pale yellow to white macula inside the expanded portion of corolla. *Ruellia macrantha* var. *macrantha* used to be recognized as a different species of *R. macrantha* var. *neesiana* in color of corolla, density of indumentum and by the believed allopatry among them (i.e. *R. macrantha* var. *macrantha* restricted to Minas Gerais and São Paulo and *R. macrantha* var. *neesiana* restricted to the state of Goiás). After analizing a large set of herbarium specimens and field work, we concluded that *R. macrantha* var. *macrantha* also occurs in southern Goiás and southern Mato Grosso, in sympatry with *R. macrantha* var. *neesiana*. The specimens analyzed collected in southern Goiás and southern Mato Grosso resemble to the typical plants that occur in the state of Minas Gerais and São Paulo. Thus, according to Stuessy (1990), seems to be plausible to give an infraspecific status for central and southern Goiás specimens, considering the few morphological differences and the overlap among the populations in southern Goiás.

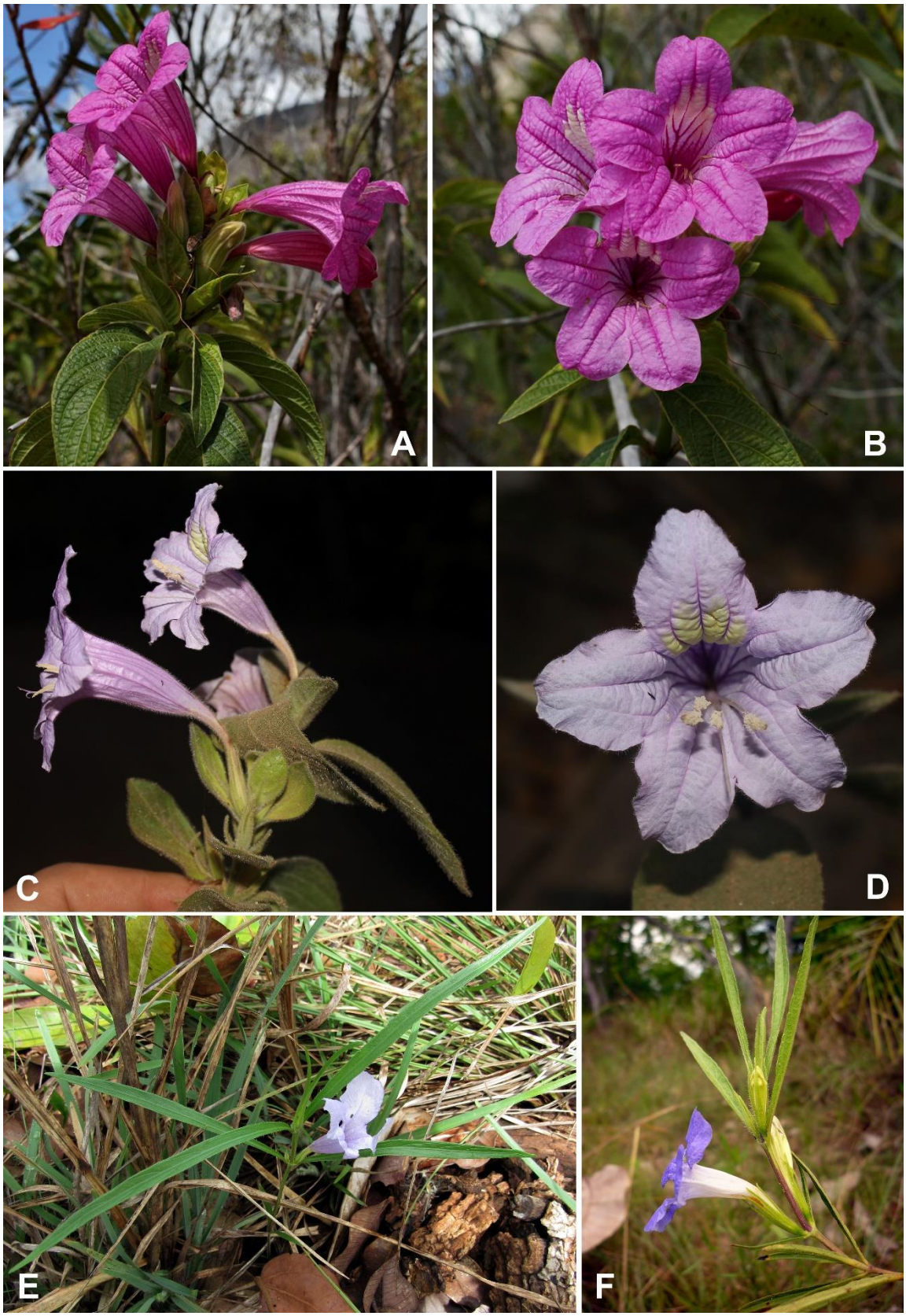

Figure 22. ***Ruellia macranta* var. *macrantha***: A – Detail in the inflorescence with a side view of the flowers; B – Detail in the inflorescence with a front view of the flowers; ***R. macrantha* var. *neesiana***: C – Detail in the inflorescence with a side view of the flowers; D – Detail in the inflorescence with a front view of the flowers; ***R. magniflora***: E – Habit; F – Flowering branch with detail in a side view of the flower.

Selected specimens examined –Brazil, Goiás, Caldas Novas, Margem direita do Rio Corumbá, 2 km da Barragem, a montante. Próximo ao canteiro de obras. Bacia de inundação, mata de galeria. Relevo ondulado, solo arenoso, 11 Jun 1996, *T.B. Cavalcanti et al. 1976* (CEN); ibid., Pousada do Rio Quente, vegetação com árvores e arbustos esparsos, solo arenoso pedregoso, escarpado, 13 May 1980, *E.P. Heringer 17791* (IBGE, US); ibid., Parque Estadual da Serra de Caldas Novas (PESCaN), 17º46'15"S, 48º39'36"W, 04 Jun 2018, *P. Renon 298* (HUEG,SP); ibid., Córrego Bálsamo (próximo a S.O.4), mata estacional em ambiente perturbado, solo arenoso com deposição de 108atéria orgânica, relevo acidentado, 17 Jul 1993, *H.G.P. Santos 152* (CEN).

Key to the varieties of *Ruellia macrantha*

1. Leaves pubescent to glabrescent on both surfaces, corollas bright pink to lilac .... ***R. macrantha* var. *macrantha***

– Leaves tomentose, hirsute to pubescent with eglandular trichomes on both surfaces, corollas pale lilac to pale pink ..... ***R. macrantha* var. *neesiana***

28. b. *Ruellia macrantha* (Mart. ex Nees) Hiern var. *neesiana* U.G. Fern. & Kameyama stat. nov. ≡ *Ruellia neesiana* (Mart. ex Nees) Lindau nom. illeg. in Nat. Pflanzenfam. 4, Abt. 3b: 311. 1895, non *Ruellia neesiana* Wall. ≡ *Dipteracanthus neesianus* Mart ex Nees in Fl. Bras. 9: 37. 1847 — **Lectotype (to be designated):** Brazil, "In prov. Goyazana" [Goiás], [Goiás] "Villa Boa, Gamba Uba, without date, *Pohl 2038* (W0004492 image!; isolectotype W0004493 image!, W0004494 image!, GZU000249609 image!).

Diagnosis – Shrubs erect to prostrate, 0.5–3 m tall, subterraneous system axial; **younger stems** quadrangular to subquadrangular, frequently sulcate, tomentose to hirsute to densely glandular pubescent, or only with eglandular trichomes, mature stems subquadrangular to terete glabrescent with sparse eglandular tricomes and glandular trichomes; **leaves** opposite, subsessile to petiolate, blades membranaceous to chartaceous, ovate to elliptic, 8–21×3.2–8.2 cm, base cuneate, obtuse or rounded, margins entire to slightly serreate, apex acute to acuminate, tomentose, hirstute to densely pubescent with eglandular trichomes on both surfaces, mainly on the veins; **Inflorescence in** apical spike with foliaceous bracts, rarely solitary flowers in the axils of the upper leaves, bracts ovate, elliptic to obovate, acute, obtuse to rounded at the apex, densely glandular pubescent; **flowers** sessile, in the axils of the bracts, bracteoles 2, oblanceolate, narrowly oblong to linear, apex acute to rounded, densely glandular pubescent, calyx segments equal, linear, lanceolate to narrowly elliptic, apex acute, densely glandular pubescent; corollas pale lilac with a yellow macula inside the expanded portion, 48–65 mm long, densely pubescent to tomentose with eglandular trichomes, the unexpanded portion of the tube resupinate twisted in 180°, shorter than the expanded, lobes ovate to suborbicular, emarginate at the apex, patent, stamens exserted, didynamous, ovary ovoid, hirsute, stigma exserted; **capsules** oblongiform to narrowly ellipsoid, velutinous to hirsutulous with eglandular trichomes; seeds 12–14, suborbicular, ciliate with hygroscopic trichomes (Fig. 22 C–D).

Distribution, habitat and phenology – Ruellia macrantha var. *neesiana* occurs only from southeaster to central western Goiás (Fig. 23) growing in cerrado sensu stricto, cerradão, semideciduous and gallery forestes.

Comments –Ruellia macrantha var. *neesiana* is different of *R. macrantha* var. *macrantha* mainly in the indumentum tomentose, hirstute to densely pubescent with eglandular trichomes, on stems and leaves (vs. pubescent to glabrescent).

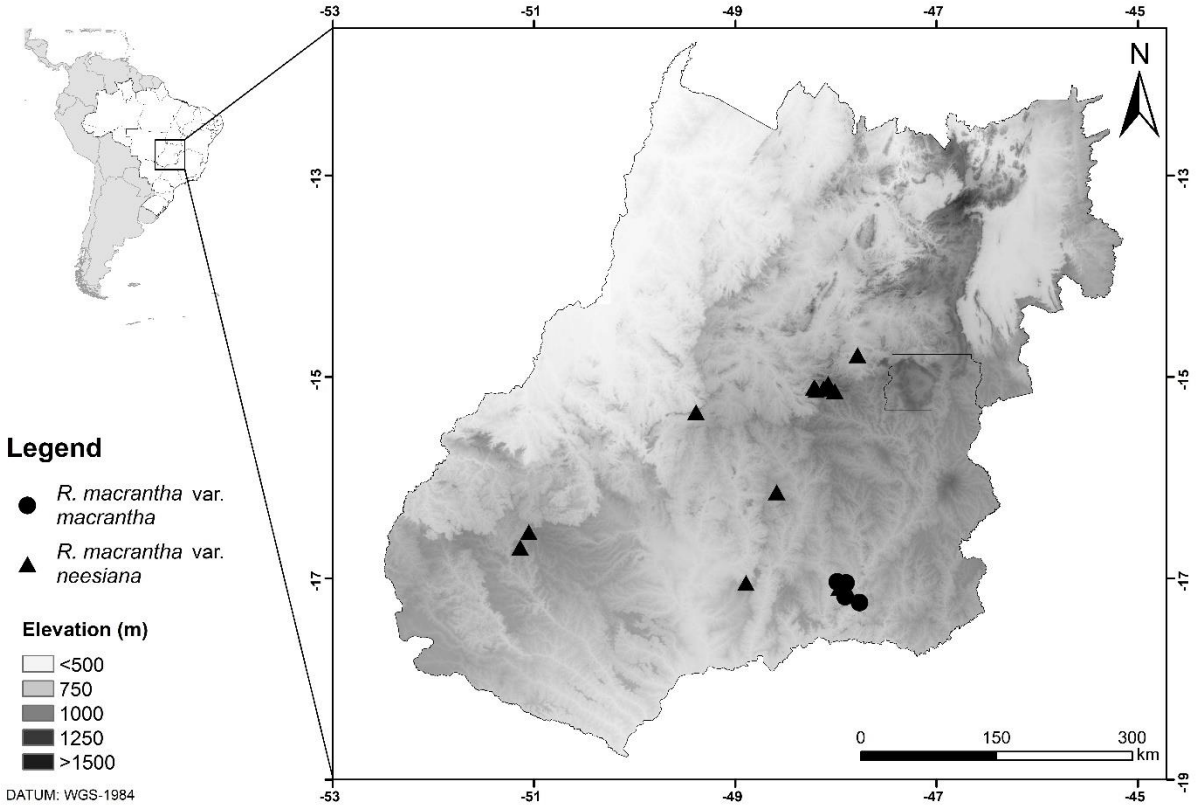

Figure 23. Distribution map of *Ruellia macrantha* var. *macrantha* and *R. macrantha* var. *neesiana*.

Selected specimens examined–Brazil, Goiás, Caiapônia, Serra do Caiapó, ca. 30 km (straight line) S of Caiapônia; cerrado on steep rocky hillside and at top and base of hill., 950-1200 m, 29 Apr 1973, *W.R. Anderson 9392* (UB, NY); ibid., Serra do Caiapó. Cerrado, summit and upper slopes, ca. 50 km S of Caiapônia, road to Jataí, 1000 m, 27 Jun 1966, *H.S. Irwin et al. 17820* (UB, NY); Goiás Velho, Serra Dourada, ca. 15 km (straight line) S of Goiás Velho. Quartzite rock outcrops and sandy soil, with cerrado, 1000 m, 10 May 1973, *W.R. Anderson 9979* (UB, NY);Pirenópolis, Coletada na borda da mata, próximo à estrada, 15º49'56"S, 48º58'27"W, 886 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 341* (SP); ibid., Coletada próximo à placa da estrada real, em borda de mata seca., 15º50'00"S, 48º58'55"W, 810 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 337* (SP); ibid., Aparecida de Goiânia, Serra das

Areias, borda da estrada, transição de mata com área de cerrado s.s. ao lado de um morro perto do haras, 05 Jul 2014, *R.D. Sartin et al. 538* (SP).

29. *Ruellia magniflora* C. Ezcurra in Ann. Missouri Bot. Gard. 80: 835. 1993 — **Holotype:** Paraguay, Central, Villa Elisa, sandy fields, T.M. Pedersen 6522 (LP not seen; isotypes:F nº22861845 image!, CTES0028847 image!, C10005127 image!).

Diagnosis – Subshrubs erect to prostrate, 20–50 cm tall, subterraneous system woody with fusiform roots; **younger stems** quadrangular to subquadrangular, frequently sulcate, pubescent with eglandular trichomes, mature stems glabrescent; leaves opposite, sessile to subsessile, blades membranaceous to chartaceous, lanceolate, narrowly oblong or linear, 1.5–10.5×0.3–0.7 cm, base decurrent, margins entire to slightly repand, apex acute to slightly rounded, pubescent to glabrescent with eglandular trichomes on both surfaces; **flowers** solitary to geminate, in the axils of the upper leaves, subsessile, bracteoles absent; calyx segments subequal, the posterior shorter, linear triangular, apex acute, pubescent with eglandular trichomes, mainly on the margin; corollas lilac to white, 25–35 mm long, densely pubescent, the unexpanded portion of the tube shorter than the expanded , lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, densely pubescent, stigma included; capsules obovoid, densely pubescent; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 22 E–F).

Illustration in Ezcurra (1993:835)

Distribution, habitat and phenology– Ruellia magniflora is common on sandy savannas of eastern Paraguay, and northeastern Argentina and southwestern Brazil (Ezcurra, 1993), In Brazil it occurs in Goiás, Mato Grosso, Mato Grosso do Sul and Minas Gerais. In the study area

it occurs from centralwestern to southwestern portion of Goiás (Fig. 24), fertile from September to November, during the rainy season.

Comments–Ruellia magniflora can be recognized by the linear, lanceolate or narrowly oblong leaves, it is morphologically similar to *R. geminiflora*, but differs in leaf shape (vs. ovate, elliptic to obovate), and the calyx with the segments frequently unequal, with the posterior segment shorter (vs. segments equal).

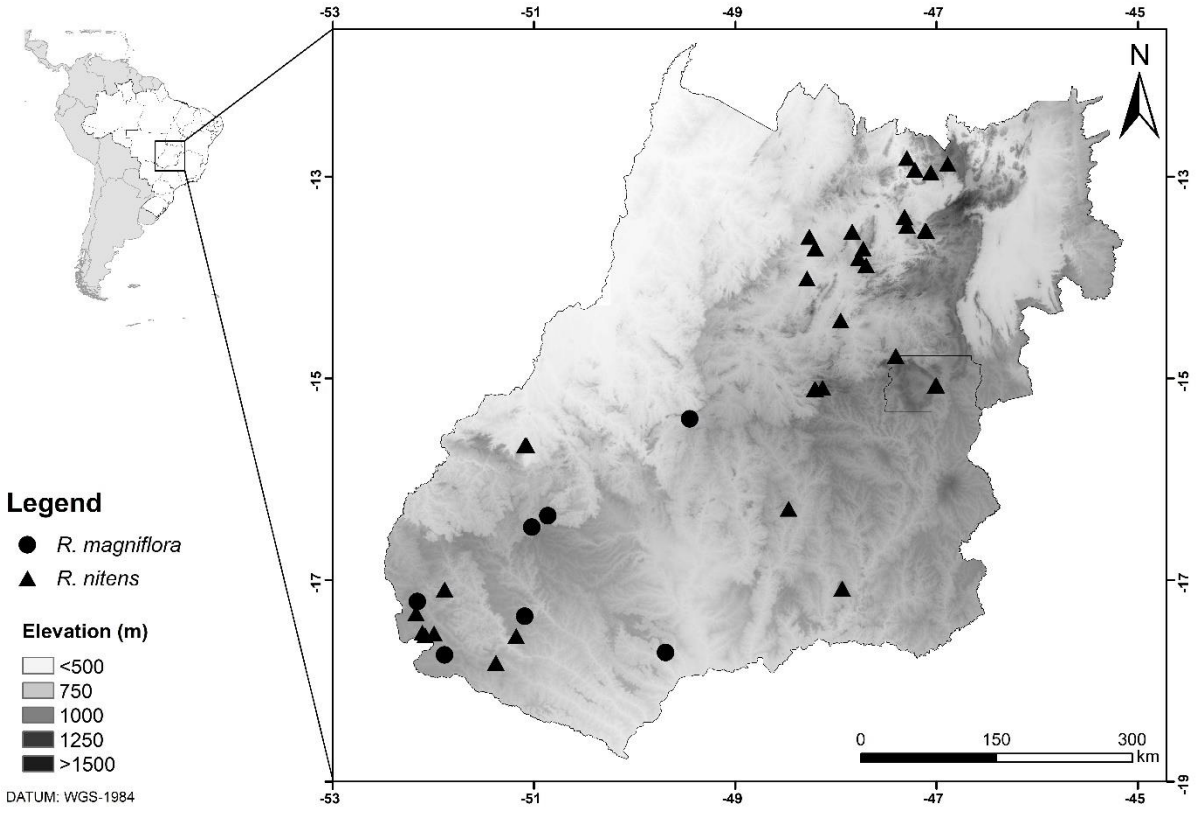

Figure 24. Distribution map of *Ruellia magniflora* and *R. nitens*.

Selected specimens examined–Brazil, Goiás, Caiapônia, Bacia do Rio Caiapó, Cerrado ralo., 17º05'13"S, 51º37'26"W, 710 m, 17 Nov 2007, *S. Sousa Silva et al. 478* (IBGE); Chapadão do Ceu/Mineiros, Parque Nacional das Emas. Em campo queimado. Próxima ao ponto X., 17º49'-18º28'S, 52º39'-52º10'W, 07 Out 1999, *M.A. Batalha 3983* (SP); Jataí, Estrada de Jataí para Serranópolis, a 20 km de Ribeirão da Ariranha, campo., 10 XI 1972, *J.A. Rizzo 8592* (UFG);

Mineiros, Parque Nacional das Emas. Cerrado, Campo sujo, 22 Nov 1991, *H.D. Ferreira 2058* (UFG).

30. *Ruellia multifolia* (Nees) Lindau var. *multifolia* in Nat. Pflanzenfam. 4, Abt. 3b: 310. 1895 ≡ *Dipteracanthus multifolius* Nees in Fl. Bras. 9: 33. 1847 — **Lectotype (to be designated):** Brazil, without specific location, without date, *Sellow s.n.* (GZU000249521; isolectotype: K000534069).

Diagnosis – Subshrubs erect to prostrate, 30–70 cm tall, subterraneous system woody with fusiform roots; **younger stems** quadrangular to subquadrangular, pubescent with eglandular trichomes, mature stems subquadrangular to terete, glabrescent, becoming woody; leaves opposite, subsessile, blades membranaceous to chartaceous, ovate to elliptic, 3–4×0.7–2.8 cm, base cuneate to rounded, margins entire to slightly serreate or slightly denteate, apex acute, obtuse or rounded, hirsute to pubescent with eglandular trichomes and subcapitate glandular trichomes on abaxial surface and pubescent to hirsute with eglandular trichomes on adaxial surface; **flowers** solitary to geminate, in the axils of the upper leaves, subsessile, bracteoles 2, spathulate, oblanceolate, narrowly oblong or linear, pubescent with eglandular trichomes and subcapitate glandular trichomes; calyx segments equal, linear triangular, rarelylanceolate, apex acute, pubescent with eglandular trichomes and subcapitate glandular trichomes; corollas lilac, 40–52 mm long, densely glandular pubescent, the unexpanded portion of the tube with the same size as the expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma included; capsules ellipsoid, hirsutulous; seeds 4–6, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 25 A).

Illustration in Ezcurra (1993:827).

Distribution, habitat and phenology–Ruellia multifolia var. *multifolia* occurs in eastern Paraguay, northeastern Argentina, Central and southern Brazil (Ezcurra, 1993), in the states of Paraná, Santa Catarina, São Paulo, Minas Gerais and Goiás. In the study area, it was collected in southwestern and central eastern Goiás (Fig. 26), growing in campos sujos and campos limpos, fertile from July to October.

Comments– *Ruellia multifolia* var. *multifolia* is morphologically similar to *R. ceciliae* in the habit and large flowers with lilac corollas in the axils of terminal leaves, differing in the, pubescent with whitish eglandular trichomes leaves (vs. yellow eglandular trichomes), and calyx segments linear triangular to narrowly lanceolate, pubescent (vs. always lanceolate, hirsute to tomentose).

Selected specimens examined–Brazil, Goiás, Água Fria de Goiás, na cidade, aos fundos da torre da TELEBRASILIA. Cerrado antropizado, relevo ondulado, solo arenoso pedregoso., 14º58'59"S, 47º47'10"W, 870 m, 29 Ago 2004, *T.B. Cavalcanti et al. 3497* (CEN, SP); Chapadão do Céu, Parque Nacional das Emas, Cerrado queimado recentemente. 17 km da sede em Chapadão do Céu, 11 Out 2006, *J. Paula-Souza et al. 8248* (SPF); Cocalzinho de Goiás, Coletada em campo sujo, em solo pedregoso, próximo a rodovia DF-Pirenópolis., 15º46'01"S, 48º43'15"W, 1156 m, 15 Jul 2017, *U.G. Fernandes & F.S. Petrongari 322* (SP).

Key to the varieties of *Ruellia multifolia*

1. Leaves hirsute to pubescent with eglandular trichomes on both surfaces, capsules pubescent ..... ***R. multifolia* var. *multifolia***

– Leaves glandular pubescent on both surfaces, capsules glabrous .... ***R. multifolia* var. *viscosissima***

30. b. *Ruellia multifolia* (Nees) Lindau var. *viscosissima* (Nees) C. Ezcurra in Ann. Missouri Bot. Gard. 80: 828. 1993 ≡ *Ruellia viscosissima* (Nees) Lindau in Nat. Pflanzenfam. 4, Abt. 3b: 310. 1895 ≡ *Dipteracanthus viscosissimus* Nees in Fl. Bras. 9: 34. 1847 — **Lectotype (to be designated):** Brazil, s.l, s.d., *Sellow s.n.* (GZU000249512; isolectotype: K000534070, B [probably destroyed] photo!: 5960).

= *Ruellia glanduloso-punctata* (Nees) Lindau in Nat. Pflanzenfam. 4, Abt. 3b: 310. 1895 ≡ *Dipteracanthus glanduloso-punctatus* Nees in Fl. Bras. 9: 34. 1847 — **Lectotype (to be designated):** Brazil, Rio Grande do Sul, "prope S. Ignacio" [Santo Inácio], s.d., *Sellow s.n.* (GZU000249514, B [probably destroyed] photo!: 5924).

Diagnosis – Subshrubs erect to prostrate, 10–40 cm tall, subterraneous system woody with fusiform roots; **younger stems** quadrangular to subquadrangular, glandular pubescent and with subcapitate glandular trichomes, mature stems subquadrangular to terete, glabrescent, becoming woody; leaves opposite, subsessile, blades membranaceous to chartaceous, ovate to elliptic, 1.8–4×1.2–4.5 cm, base cuneate, margins entire to slightly serreate or slightly denteate, apex acute, glandular pubescent on both surfaces and with subcapitate glandular trichomes on abaxial surface; **flowers** solitary to geminate, in the axils of the upper leaves, subsessile, bracteoles 2, elliptic to oblanceolate, glandular pubescent and subcapitate glandular trichomes; calyx segments equal, linear triangular to lanceolate, apex acute, glandular pubescent and with subcapitate glandular trichomes; corollas lilac, 50–60 mm, densely pubescent with eglandular trichomes, the unexpanded portion of the tube with the same size of the expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, glabrous, stigma included; capsules ellipsoid, glabrous; seeds 4–6, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 25 B).

Illustration in Ezcurra (1993:827).

Distribution, habitat and phenology – *Ruellia multifolia* var. *viscosissima* occurs in southeastern Paraguay and limiting areas of northeastern Argentina and Brazil (Ezcurra, 1993), in the study area, it was only reported to Jataí, Goiás, in southwestern portion of the state (Fig. 26), growing in campo limpo.

Comments – *Ruellia multifolia* var. *viscosissima* is similar to *R. multifolia* var. *multifolia*, differing in the indumentum glandular pubescent (vs. pubescent to hirsute with eglandular trichomes and subcapitate glandular trichomes).

Selected specimens examined –Brazil, Goiás, Jataí, Queixada, 07 Jul 1949, *A. Macedo 1429* (RB); ibid., Queixada, 08 Jul 1949, *A. Macedo 1443* (RB).

Figure 25. ***Ruellia multifolia* var. *multifolia***: A – Detail in a flowering branch with a side view of flowers; ***R. multifolia* var. *viscosissima***: B – Flowering branch with detail in the glandular pubescent indumentum of the leaves (scale: 1 mm); ***R. nitens***: C – Flowering branch, with flowers in a side view; ***R. paniculata***: D – Detail of an inflorescent brancht with a side view of the flower; E – Detail in a front view of the corolla. (Images: A: Suzana Ehlin Martins; D: Fernanda Satori Petrongari; E: Eduardo Damasceno Lozano).

31. *Ruellia nitens* (Nees) Wassh. in Kew Bulletin,Vol. 48, No. 1, 1993 ≡ *Dipteracanthus nitens* Nees in Fl. Bras. 9: 41. 1847 — **Lectotype designated by Wasshausen (1993):** Brazil, "Prov. Goyazanae"[Goiás], "ad Pilar" [Pilar de Goiás], 1839, *J.B.E. Pohl 1861* (W [not seen] isotypes: BR 000000694325 [the right specimen] image!; BM000624849 image!; GZU000249530)[right and up specimens] image!).

= *Ruellia goyazensis* Lindau in Bot. Jahrb. Syst. 25: Beibl. 60: 45, 1898 — **Lectotype (to be designated):** Brazil, "Goyaz" [Goiás], [Pirenópolis]"Forro do Frota", 5 Sep 1894, .(K000534253 image!; isolectotype: G00236481 image!, R000011206!, B [probably destroyed] photo!: 5926).

Diagnosis – Subshrubs to shrubs erect to prostrate, 0.30–1.8 m tall, subterraneous system woody; **stems** reddish, younger stems quadrangular to subquadrangular, short pubescent with eglandular trichomes and/or only with subcapitate glandular trichomes, mature stems subquadrangular to terete, glabrescent to glabrous, becoming woody; leaves opposite, sessile to subsessile, younger leaves frequently imbricate, blades membranaceous to chartaceous, ovate to elliptic, rarely lanceolate, 2–10×0.8–4.2 cm, base cuneate, obtuse or rounded, margins entire to slightly repand, apex acute, obtuse or rounded, short pubescent with eglandular trichomes and/or only with subcapitate glandular trichomes on both surfaces, mainly on the veins and margin; **flowers** solitary or geminate, in the axils of the upper leaves, subsessile, bracteoles absent; calyx segments equal, linear triangular, apex acute, villose to pubescent with eglandular trichomes and subcapitate glandular trichomes; corollas lilac, 30–50 mm, densely glandular pubescent, the unexpanded portion of the tube shorter than or the same size as the expanded, lobes orbicular to suborbicular, rarely oblong, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma included; capsules ellipsoid, densely short pubescent; seeds 8, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 25 C).

Illustration in Vilar et al. (2010:49).

Distribution, habitat and phenology – Ruellia nitens was recorded, up to now, only in Brazil, in the states of Bahia, Distrito Federal, Goiás, Mato Grosso and Minas Gerais. In the study area, *R. nitens* is a common species, except in northwestern Goiás (Fig. 24). It grows in cerrado sensu strito, campos rupestres, campos sujos, campos limpos and in the border of semideciduous and gallery forests, fertile from April to September.

Comments – Ruellia nitens can be recognized by the reddish stems, covered by subcapitate glandular trichomes, rarely short pubescent with eglandular trichomes, leaves covered only with subcapitate glandular trichomes or short pubescent with eglandular trichomes and subcapitate glandular trichomes, lustrous on adaxial surface, and large flowers with lilac to purple corollas in the axils of the upper leaves. Is morphologically similar to *Ruellia helianthemum* differing in the indumentum of the stems and leaves (vs. densely pubescent to hirsute).

Selected specimens examined –Brazil, Distrito Federal, Brasília, Perto da ponte de São Bartolomeu, cerrado, 17 Jun 1965, *D. Sucre & E.P. Heringer 536* (UB); ibid., Rio São Bartolomeu, Área de Inundação da Barragem, área desmatada que se comunica com o Rio São Bartolomeu, 09 Apr 1979, *E.P. Heringer et al. 1137* (IBGE, NY); Goiás, Alto Paraíso de Goiás, Borda da mata, na estrada sentido cachoeira do Segredo, 14°15'24"S, 47°52'18"W, 611 m, 7 Jul 2017, *U.G. Fernandes & F.S. Petrongari 281* (SP); Aporé, Rodovia entre Itumirim e Chapadão do Céu., 700 m, 30 Jun 2013, *L.F. Souza 5744* (HJ); Aragarças, Cerrado, ca. 78 km S.E. of Aragarças Goiás, road to Piranhas, 21 Jun 1966, *H.S. Irwin et al. 17503* (UB, NY); Barro Alto, Fazenda Buritizinho, cerca de 7 km da GO - 342, em local pr ximo ao córrego Pombal no rio das Almas, margem direita., 14°44', 49°03', 470 m, 6 Jul 1992, *B.M.T. Walter et al. 1700* (CEN); Caiaponia, Caiaponia-Aragarças road, about 75 km. From Aragarças. Cerrado, 21 Jun 1966, *D.R. Hunt & J.F. Ramos 6099* (UB, K, SP); Caldas Novas, Serra de Caldas, matinha de

galeria, 9 Jun 1976, *G. Hatschbach 38755* (MBM); Cavalcante, borda da mata, na beira da estrada sentido Serra do Tombador, 13°35'51"S, 47°39'06"W, 5 Jul 2017, *U.G. Fernandes et al. 269* (SP); Chapadão do Céu e Mineiros, Parque Nacional das Emas, em campo cerrado, próxima ao ponto Z1, 17°49'-18°28'S e 52°39'-53°10W, 02 May 1999, *M.A. Batalha 3338* (SP); Colinas do Sul, Margens do rio Tocantinzinho, Cachoeira das Pedras Bonitas. Estrada vicinal ao sul da rodovia Colinas do Sul - Niquelândia (GO 132), a cerca de 4 km de Colinas do Sul e cerca de 1,5 km antes da ponte sobre o rio Tocantinzinho. Cerda de 4 km na estrada vicinal. cerrado pedregoso nas encostas do rio., 14°12'37.5"S, 48°03'17.5"W, 488 m, 6 Sep 2013, *R. Mello-Silva et al. 3633* (SPF, SP); Hidrolândia, Fazenda Barreirão, cerca de 5 km a sudeste da sede do município (entrada da fazenda), cerrado típico (em platô na encosta alta dos morros no local), relevo acidentado, solo areno-argiloso com cascalho superficial., 17°01'S, 49°14', 850 m, 18 Jul 2004, *B.M.T. Walter & D.M.R. Cruz 5231* (CEN, SP); Mineiros, Parque Nacional das Emas, em cerrado sensu stricto, 18°14'47"S, 52°52'21"W ,824 m, 19 Jul 2017, *U.G. Fernandes & F.S. Petrongari 342* (SP); Mineiros, Parque Nacional das Emas, área recentemente queimada, próxima à Lagoa da Capivara, 18°16'20"S, 52°50'36"W, 780 m, 20 Jul 2019, *U.G. Fernandes & F.S. Petrongari 346* (SP); Niquelândia, Região da Faz. São João, margem esquerda do rio Triras, a 3 km da ponte sobre o rio próxima a Indaianápolis, cerrado sensu stricto, região acima da mata do córrego "Val"m latossolo v. amarelo, muito cascalho, locais arenosos, 14°16'S, 48°36'W, 10 jun 1992, *B.M.T. Walter et al. 1587* (CEN, SPF); Padre Bernardo, Rodovia Brazlândia/Padre Bernardo, próximo a Toaboquinha a +ou- 35 km de Brazlândia, cerrado, Latossolo Vermelho Amarelo, relevo plano, 15°30'S, 48°10'W, 31 Aug 1990, *R.F. Vieira & F.L. Coelho 437* (CEN, SPF); Pirenópolis, Cerrado na borda da estrada sentido Serra dos Pirineus, 15°49'02"S, 48°53'41"W, 1175 m, 15 Jul 2017, *U.G. Fernandes & F.S. Petrongari 324* (SP); Uruaçu, ca. 48km de Uruaçú/Campinorte. Fazenda Bela Vista (Sr. Sergio Barros).

Folha SD-22-Z-B(Uruaçú). Cerradão., 14°19'02"S, 49°01'38"W, 435 m, 23 Jun 1998, *D. Alvarenga 1205* (RB).

32. *Ruellia paniculata* L. in Sp. Pl. 2: 635. 1753 1898 — **Lectotype (to be designated):** Jamaica. s.l., s.d., Sloane s.n. (BM 000589553 image!).

Diagnosis – Subshrubs to shrubs erect to prostrate, 0.30–2 m tall, subterraneous system not seen; **younger stems** quadrangular to subquadrangular, frequently sulcate, glandular pubescent, mature stems subquadrangular to terete, glabrescent to glabrous, becoming woody; leaves opposite, petiolate, blades membranaceous, ovate to elliptic, 3.2–10×0.8–3.5 cm, base decurrent to cuneate, margins entire to slightly repand, apex acute to atenuate, sometimes obtuse or rounded, glandular pubescent on both surfaces, glabrescent in older leaves; **inflorescence** in axillary dichasia congest or lax, bracts elliptic, obovate or linear, densely glandular pubescent; **flowers** subsessile to pedicellate, bracteoles 2, linear, oblanceolate or spathulate, densely glandular pubescent; calyx segments subequal, the posterior longer, linear triangular, apex acute, glandular pubescent; corollas lilac, 17–21 mm, densely pubescent, the unexpanded portion of the tube longer or with the same size of the expanded, lobes orbicular to suborbicular, apex emarginate to rounded, patent; stamens included to subexserted, didynamous; ovary ovoid, velutinous with eglandular trichomes, stigma subexserted; capsules narrow ellipsoid to narrowly oblongiform, glabrous to sparsely puberulent with eglandular trichomes; seeds 12, suborbicular, ciliate with hygroscopic trichomes (Fig 25 D–E).

Illustration in Pontes & Agra (2001:56).

Distribution, habitat and phenology – R. paniculata is a wide-ranging species in the Neotropics, occurring in dry habitats (Tripp & Luján 2018), In the study area it occurs in central, northern

and northeastern Goiás (Fig. 26), growing in semideciduous and deciduous forests, and disturbed areas. This species was collected fertile in July.

Comments–Ruellia paniculata is characteristic by the small flowers with lilac corollas on glandular pubescent dichasia, and capsules fusiform to oblongiform 12-seeded . It is similar to *Ruellia* sp. in the habit, and inflorescence, differing in the calyx segments linear triangular with the posterior segment longer (vs. calyx with the segments linear with the posterior longer and larger), and the capsule (vs. claviform, 4-seeded).

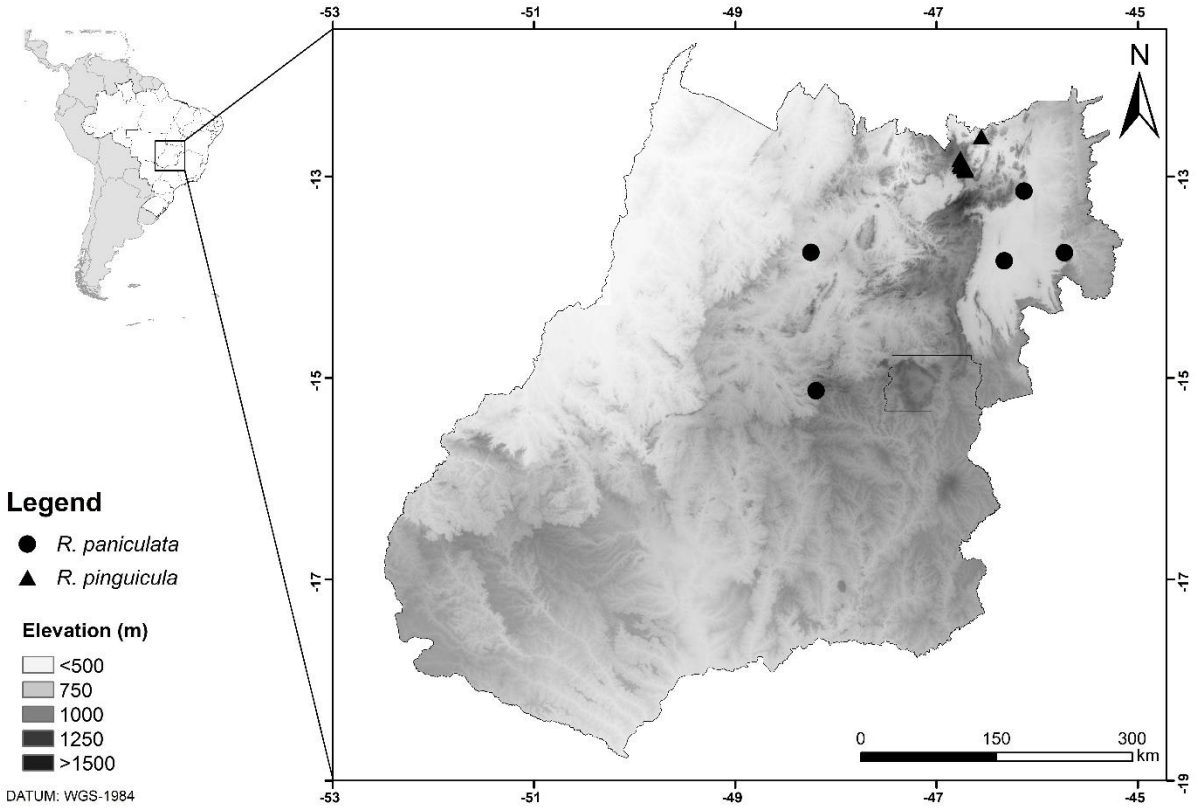

Figure 26. Distribution map of *Ruellia paniculata* and *R. pinguicula*.

Selected specimens examined – Brazil, Goiás, Pirenópolis, Rio Maranhão, da beira do Rio, 22 Jul 1952, *A. Macedo 3614* (RB); Alvorada do Norte, 229 km de Brasília para Fortaleza, 02 Jul 1964, *J.M. Pires 58108* (UB); Flores de Goiás, Rio Paraim, margens de rio, 11 Jul 1979, *G. Hatschbach & O. Guimarães 42259* (MBM); Niquelândia, Estrada paralela ao rio Tocantins.

Entre o Rio Tocantins e Serra Negra. Cerrado e mata, substrado areno-pedregoso, relevo ondulado, 24 Jul 1995, *T.B. Cavalcanti et al. 1656* (CEN); Nova Roma, Rodovia Iaciara-Nova Roma, ca. 86 km de Possa. Mata Seca Perturbada, 13°52'10"S, 46°53'29"W, 510 m, 30 Jul 2000, *C. Kameyama et al. 138* (SPF; SP).

33. *Ruellia pinguicula* U.G. Fern., Kameyama & E. Tripp, unpublish. (see Chapter II). — **Holotype:** Brazil, Goiás, Cavalcante, coletada ao lado direito da GO-241, sentido Vão do Moleque, em campo sujo e em cerrado sensu stricto aberto, solo arenoso-pedregoso. 13°39'31"S, 47°28'32"W, 1115 m elev., 5 Jul 2017, *U.G. Fernandes et al. 263* (SP!; isotypes: CEN!, COLO!, IBGE!, MBM!, RB!, SPF!, UB!).

Diagnosis – Subshrubs erect to prostrate, 0.20–1.2 m tall, subterraneous system woody; **stems** reddish, younger stems quadrangular to subquadrangular, densely pubescent to villose with subcapitate glandular trichomes, mature stems subquadrangular to terete, glabrescent, becoming woody; leaves opposite, sessile, blades chartaceous, linear, lanceolate, narrowly elliptic to elliptic, 1–5×0.2–1.4 cm, base cuneate, margins entire, apex acute to slightly rounded, pubescent only proximally on the main vein, laminae with many subcapitate glandular trichomes on both surfaces; **inflorescence** congest spiciform raceme with foliaceous bracts, rarely flowers subsessile on the axils of the upper leaves, bracts rhombic, elliptic, ovate, trulate or depressed ovate, densely glandular pubescent with subcapitate glandular trichomes; **flowers** subsessile, bracteoles 2, rarely absent, equal to unequal in size and shape, elliptic, obovate, linear, oblanceolate or spathulate, densely glandular pubescent and with subcapitate glandular trichomes; calyx segments equal, linear triangular, apex acute to slightly rounded, densely glandular pubescent with subcapitate glandular trichomes; corollas lilac to violet, 30–45 mm long, glandular pubescent, the unexpanded portion the tube shorter or with the same size of the

expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma subexserted; capsules obovoid, hirsutulous pubescent with eglandular trichomes; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 27 A).

Distribution, habitat and phenology–Ruellia pinguicula was, up to now, reported only to Cavalcante, in northern Goiás (Fig. 26), growing in campos sujos and open cerrado sensu stricto, on rocky and sandy soils, collected fertile from May to August. (Fernandes et al. unpublish.[see Chapter II]).

Comments– Ruellia pinguicula can be easily recognized by the chartaceous narrowly elliptic to linear leaves and spiciform racemes with glandular pubescent bracts. It is morphologically similar to *R. rosmarinus* in the habit and leaves but differs in the apical congest inflorescence with bracts and bracteoles (vs. subsessile flowers in the axils of the upper leaves without bracteoles) (Fernandes et al. unpublish. [see Chapter II]).

Selected specimens examined–Brazil, Goiás, Cavalcante, caminho para Vão do Moleque, 21 May 2011, *J.B. Bringel & J.F.B. Pastore 790* (UB, HUEFS); ibid., em campo sujo, ao lado esquerdo da estrada sentido Serra do Tombador, 13º39'31"S, 47º28'32", 1132 m, 5 Jul 2017, *U.G. Fernandes et al. 264* (SP); ibid., coletada em campo sujo, estrada para a Serra do Tombador, 13°36'58.95"S, 47°30'47.39"W, 1179 m, 5 Jul 2017, *U.G. Fernandes et al. 267* (SP); ibid., Coletada na estrada sentido Vão do Moleque, em campo sujo, 13º32'51"S, 47º31'37", 1211 m, *U.G. Fernandes et al. 268* (SP); ibid., GO 241, estrada de terra para o "Vão do Moleque". Cerrado com afloramentos rochosos à direita da estrada, 13º35'56"S, 47º31'26", 1186 m, *R.D. Sartin et al. 588* (SP); ibid., 33.4 km from start of dirt road that leaves Cavalcante going W towards Serra do Tombador, -13.32775°, -47.31634°, 1206 m, *E. Tripp & C. Kameyama 5930* (SP, COLO, RSA).

34. *Ruellia pohlii* (Nees) U.G. Fern., Kameyama & E. Tripp, unpublish. (see Chapter II).

For synonyms and types see Chapter II.

Diagnosis – Subshrubs erect, 20–40 cm tall, subterraneous system woody; **stems** reddish, younger stems quadrangular to subquadrangular, densely pubescent with eglandular trichomes, mature stems subquadrangular to terete, glabrescent; leaves opposite, sessile, imbricate, blades chartaceous, ovate, elliptic, narrowly elliptic or narrowly oblong, 1.1–6.5×0.2–1.8 cm, base cuneate, margins entire, slightly repand or slightly crenate, apex acute, only with glandular subcapitate trichomes and ciliate at the margin with eglandular trichomes; **flowers** subsessile in the axils of the upper leaves, bracteoles 2, linear to linear triangular, glandular pubescent with subcapitate glandular trichomes; calyx segments equal, linear triangular, apex acute, densely glandular pubescent with subcapitate glandular trichomes; corollas lilac, 35–50 mm long, glandular pubescent, the unexpanded portion of the tube longer or with the same size of the expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma included; capsules ellipsoid to obovoid, densely puberulent to hirsutulous with eglandular trichomes; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 27 B–C).

Distribution, habitat and phenology – *Ruellia pohlii* was, hirtetho, collected only in the municipality of Cavalcante, Goiás (Fig. 28), growing in campo limpo on rocky and sandy soils. *Ruellia pohlii* specimens were collected with flowers in July and with fruits in August.

Comments –*Ruellia pohlii* can be easily recognized in the imbricate and apparently distichous leaves, due to the twisted petiole of alternate leaves pairs, laminae ovate to elliptic with a slightly crenate margin, acute at the apex, brochidodromous, covered only by subcapitate glandular trichomes. *Ruellia pohlii* is morphologically similar to *R. hatschbachii* in habit and

leaves position, but differs in leaf shape (vs. frequently obovate) and the glandular pubescent, linear triangular calyx segments, (vs. ciliate, narrowly elliptic to linear)

Selected specimens examined –Brazil, Goiás, Cavalcante, Coletada na borda de campo sujo, na beira da estrada de terra, continuação da GO-241, sentido sul, a ca. 4 km de Araí, em solo arenoso-pedregoso., 13º36'08"S, 47º38'44"W, 893 m, 05 Jul 2017, *U.G. Fernandes et al. 271* (SP); ibid., Estrada em direção a RPPN S. do Tombador, após o povoado de São Domingos. Campo sujo à direita da estrada., 13º36'13"S, 47º38'42"W, 25 Jul 2014, *R.D. Sartin et al. 589* (SP); ibid., 60,6km from start of dirt road that leaves Cavalcante going W towards Serra do Tombador, -13.13467°S, 47.38799°W, 12 Aug 2016, *E. Tripp & C. Kameyama 5933* (SP, COLO, CAS, RSA, RB, US, K, UB).

35. *Ruellia rizzoi* U.G. Fern., Kameyama & E. Tripp, unpublish (see Chapter II) — **Holotype:** Brazil, Goiás, Cavalcante, Vila Veneno, rio São Félix km 4. Campo sujo, relevo suave ondulado, solo arenoso com presença de cascalho solto, Área de influência da futura Hidrelétrica de Cana Brava, influência indireta. 13°32’10”S, 48°03’25”W, 350 m elev., 27 Jun 2001, *G. Pereira-Silva & M. Carvalho-Silva 5201* (SP!); isotypes: CEN!, COLO!, HUEFS image!)

Diagnosis – Subshrubs erect to prostrate, 40–60 cm tall, subterraneous system woody; **stems** reddish, younger stems quadrangular to subquadrangular, pubescent with subcapitate glandular trichomes, mature stems subquadrangular to terete, glabrescent to glabrous, becoming woody; leaves opposite, petiolate, mature leaves frequently caducous, blades chartaceous, ovate to elliptic, 1.8–7×0.5–3.2 cm, base cuneate to attenuate, margins entire to slightly repand, apex acute, glabrescent with eglandular trichomes mainly over the main vein and over the margin, and subcapitate glandular trichomes on both surfaces; **inflorescence** in terminal spiciform

raceme with imbricate foliaceous bracts, bracts ovate, rarely elliptic, pubescent with eglandular trichomes and with subcapitate glandular trichomes; **flowers** subsessile, bracteoles absent; calyx segments equal, linear triangular, apex acute, densely pubescent and with subcapitate glandular trichomes; corollas white to yellowish, 27–35 mm long, pubescent with eglandular trichomes, the unexpanded portion of the tube longer or with the same size of the expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma subexserted; capsules ellipsoid, densely puberulent to hirsutulous with eglandular trichomes; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 27 D).

Illustration in Chapter II.

Distribution, habitat and phenology – Ruellia rizzoi occurs in Serra Negra, Serra da Mesa lake and Cana Brava lake area in northern Goiás (Fig. 28), growing in cerrado sensu stricto, on rocky and sandy soils and sandy-clay soils, fertile during the dry season from May to August (Fernandes et al. unpublish.[see Chapter II]).

Comments – Ruellia rizzoi is can be easily recognized by the white to yellowish flowers on spiciform racemes with foliaceous imbricate bracts, pubescent with subcapitate glandular trichomes. Is morpholically similar to *R. adenostachya* in the flowers on apical spiciform racemes and caducous old leaves, differing in shape and indumentum of the bractsbracts, (vs. squarrose, glandular pubescent bracts), and the color of corolla (vs. lilac).

Selected specimens examined –Brazil, Goiás, Cavalcante, Balsa do rio Tocantins (Serra Branca), para Serra Branca, km 2, Cerrado com relevo acidentado, solo arenoso com afloramento de quartzo leitoso, Área de influência da futura Hidrelétrica de Cana Brava, Influência direta, 13º34'26"S, 48º05'48"W, 410 m., 23 May 2001, *G. Pereira-Silva et al. 5074* (CEN, SP); ibid. Ponte sobre o Rio Tocantins - Cavalcante, km 15, Cerrado aberto antropizado,

solo arenoso, 13º22'40"S, 48º02'58"W, 450 m, 30 Aug 2004, *T.B. Cavalcanti et al. 3511* (CEN, SP, RB); Niquelândia, Estrada de acesso a barra do Rio Bagagem c/o Rio Tocantinzinho. Cerrado denso com árvores e arbustos, latossolo, relevo ondulado, 14º01'S, 48º17'W, 450 m, 20 Jul 1995, *T.B. Cavalcanti et al. 1488* (CEN, SPF); ibid., Faz. Serra Negra (Niqueltocantins) - Serra Negra; P/O lado do Bagagem. Ao lado da linha de transmissão (ELET.), Cerradão com elementos de mata seca e também cerrado s.s., 14º02', 48º19W, 430 m, 11 Jun 1992, *B.M.T. Walter et al. 1613* (CEN, SPF); ibid., Próx. a Serra Negra, 30 Jul 1987, *H.D. Ferreira & Naura 388* (UFG); ibid., Próx. a Serra Negra, 1 Aug 1987, *H.D. Ferreira & Naura 413* (UFG).

36. *Ruellia rosmarinus* (Nees) U.G. Fern. & Kameyama, unpublish. (see Chapter II).

For synonyms and types see Chapter II.

Diagnosis – Subshrubs erect to prostrate, 0.30–1 m tall, subterraneous system woody; **stems** subquadrangular to terete, reddish, younger stems densely pubescent with eglandular trichomes and subcapitate glandular trichomes, mature stems glabrescent; leaves opposite, congest in young stems, sessile, blades chartaceous, linear, lanceolate, narrowly elliptic, 0.5–4.2×0.1–1 cm, base cuneate, margins entire, apex acute to slightly rounded, pubescent with eglandular trichomes mainly on the veins and margin, and subcapitate glandular trichomes on both surfaces; **flowers** subsessile, bracteoles absent; calyx segments equal, linear triangular, apex acute, densely pubescent with subcapitate glandular trichomes; corollas lilac, 34–47 mm long, pubescent with glandular trichomes, the unexpanded portion of the tube longer or the same size of the expanded portion of the tube, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma subexserted; capsules ellipsoid to obovoid, densely puberulent

with eglandular trichomes; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes. (Fig. 27 E).

Distribution, habitat and phenology –Ruellia rosmarinus occurs in Bahia, Tocantins and northeastern Goiás (Fig. 29), growing in cerrado sensu stricto, campos sujos and campos rupestres, on rocky and sandy soils, fertile from May to August.

Comments – Ruellia rosmarinus can be recognized by the linear to lanceolate leaves, congest in the new stems, resembling *Rosmarinus officinalis* L. (rosmary).

Selected specimens examined –Brazil, Goiás, Guarani de Goiás, Rodovia BR 020 (Brasília-Salvador), 15 km ao norte do entroncamento para Posse. Cerrado em solo arenoso com afloramentos rochosos., 14º01'11"S, 46º13'39"W, 950 m, 29 Jul 2000, *C. Kameyama et al. 131* (SP, SPF); Posse, Estrada secundária para Zona Rural de Jaborandi, cerca de 7 km (leste) da BR-020, cerrado rupestre, 14º08'37"S, 46º15'35"W, 725 m, 12 Aug 2013, *G. Felitto et al. 690* (MBM, HUEFS); ibid., Rod. BR-020, 15 km N de Posse. Cerrado na borda da chapada., 950 m, 12 Jul 1979, *G. Hatschbach & O. Guimarães 42270* (MBM, SP, RB, US).

37. *Ruellia rufipila* Rizzini in Dusenia 7: 301. 1956. — **Holotype:** Brazil, Goiás, Niquelândia, 24 Jul 1952, *A. Macedo 3635* (RB00533915!; isotypes: US00478764 image!, S09-8225 image!, NY 00930330 image!).

Diagnosis – Subshrubs erect to prostrate, 0.40–1 m tall, subterraneous system not seen; **younger stems** quadrangular to subquadrangular, densely pubescent with subcapitate glandular trichomes, mature stems subquadrangular to terete, glabrescent, becoming woody; leaves opposite, sessile, blades chartaceous, ovate to elliptic, 1.1–3.6×0.5–1.6 cm, base cuneate to decurrent, margins entire to slightly repand, apex acute, pubescent with eglandular trichomes

on both surfaces, mainly on the veins, and subcapitate glandular trichomes on abaxial surface; **flowers** subsessile, bracteoles absent; calyx segments equal to subequal, sometimes, the posterior longer, linear triangular, apex acute, densely pubescent with subcapitate glandular trichomes; corollas white, 44–45 mm long, glandular pubescent, the unexpanded portion of the tube shorter or the same size as the expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma subexserted; capsules not seen (Fig. 27 F–G).

Distribution, habitat and phenology –Ruellia rufipila is only reported to the municipality of Niquelandia, Goiás (Fig. 29), growing in campos limpos and campos sujos, on clay and sandy soils. It was collected fertile during the dry season, from in June and July).

Comments – Ruellia rufipila is morphologically similar to *R. trachyphylla*, being frequently misidentified in herbaria, differing in the, pubescent with eglandular trichome and subcapitate glandular trichomes leaves (vs. puberulent).

Selected specimens examined –Brazil, Goiás, Niquelândia, South Hill. Southernmost ultramafic outcrop of the Tocantins Complex about 3 km from Niquelândia. Approx half way up hill, 14º27'S, 48º26'W, 800 m, 13 Jun 1990, *R.R. Brooks et al. 504* (UFG); ibid., Macedo ca. De 6 km a esquerda da mina de níquel; solo pedregoso/argloso, relevo ondulado, campo limpo, 14º19'S, 48º23'W, 990 m, 25 Jun 1997, *F.C.A. Oliveira et al. 746* (SPF, IBGE).

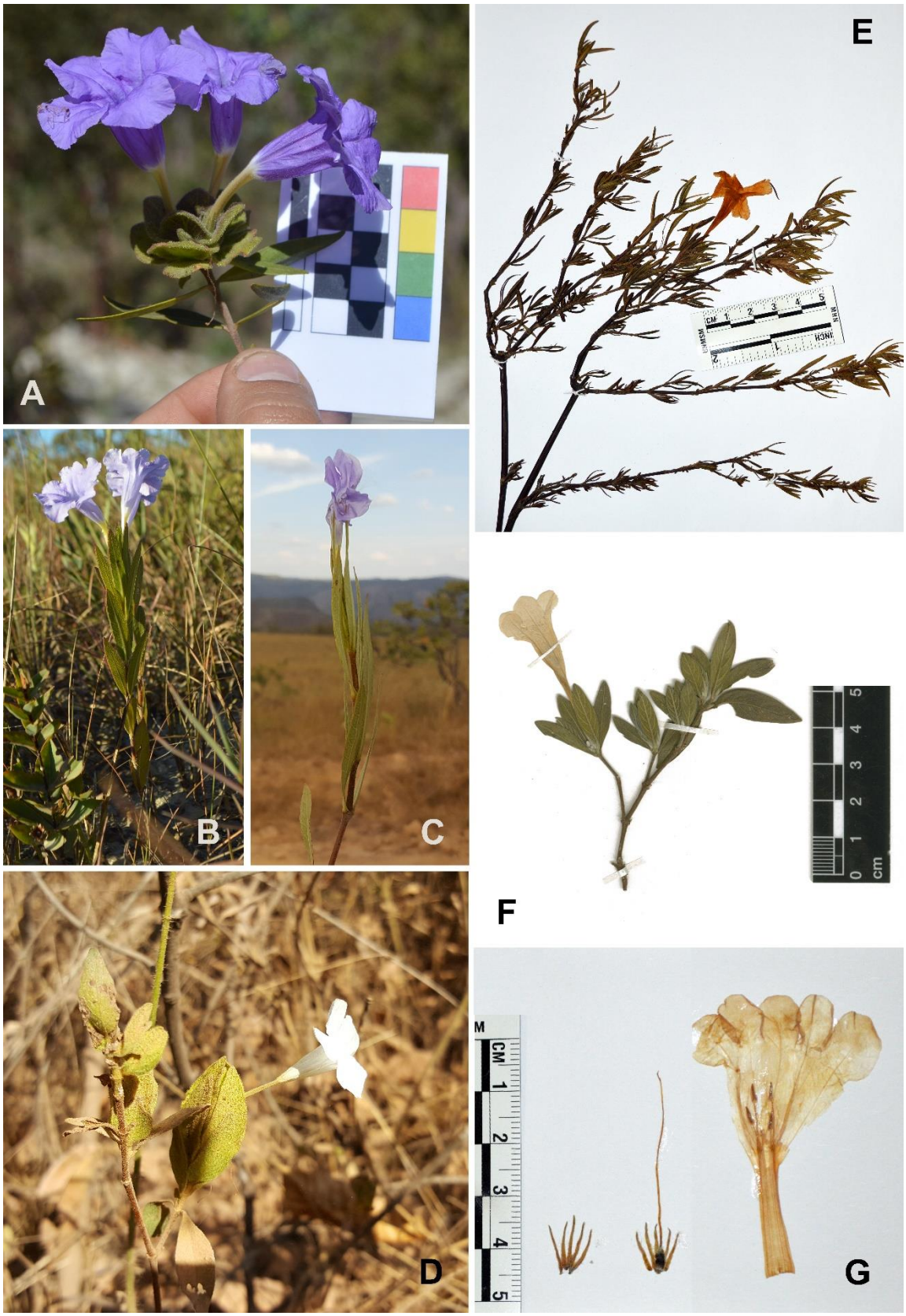

Figure 27. ***Ruellia piguicula***: A – Detail in the inflorescence with bracts and flowers; ***R. pohlii***: B – Habit; C – Detail of the plant in a side view; ***R. rizzoi***: D – Detail in the inflorescence with a side view of corolla; ***R. rosmarinus***: E – Detail in a stem with new congested leaves; ***R. rufipila***: F – Stem with a side view of corolla; G – Detail on the dissected calyces and corolla.

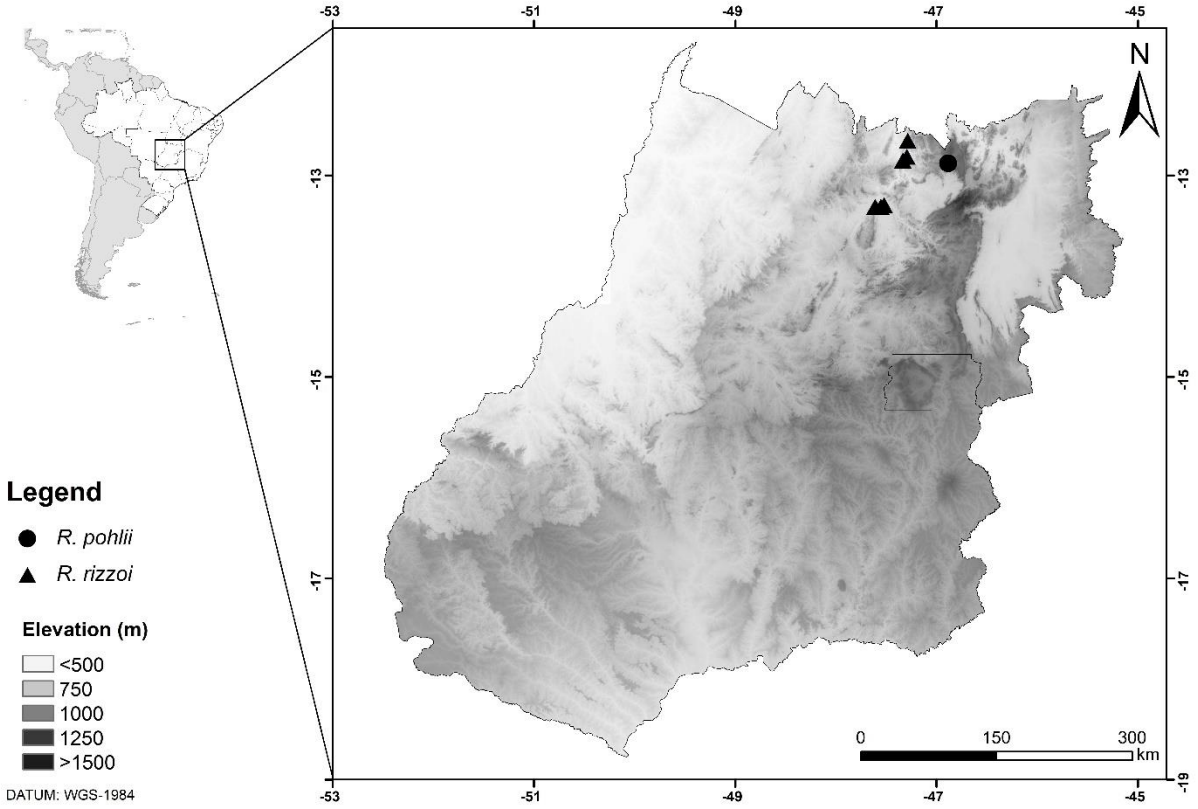

Figure 28. Distribution map of *Ruellia pohlii* and *R. rizzoi*.

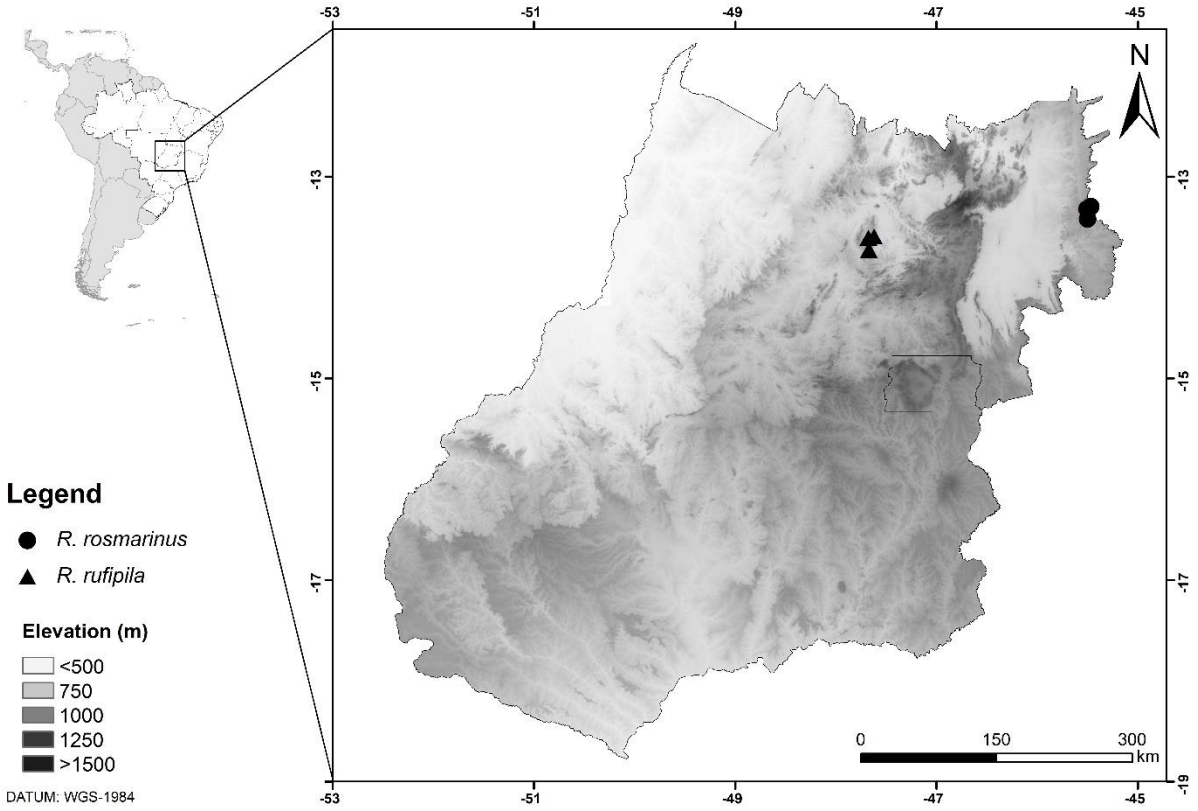

Figure 29. Distribution map of *Ruellia rosmarinus* and *R. rufipila*.

38. *Ruellia simplex* C. Wright in An. Acad. Ciencias Med. Fis. Nat. La Habana 6: 321. 1870. — **Holotype:** Cuba, Plantae Cubenses Wrightianae, en sabanas bajas y fangosas cerca del hato El Salado jurisdicción de San Cristóbal y Palacios, sine data, *Wright 3642* (NY!).

For types and synonyms see Ezcurra & Daniel 2007.

Diagnosis – Subshrubs or shrubs erect to prostrate, 0.20–1.2 m tall, arrising from a, rhizomatose subterraneous system; **stems** green to vinaceous, younger stems quadrangular to subquadrangular, glabrous, only with eglandular trichomes on the nodes, mature stems subquadrangular to terete; leaves opposite, petiolate, blades membranaceous, linear, lanceolate to narrowly elliptic, 5.3–16.4×0.4–1.3 cm, base cuneate to decurrent, margins entire to slightly repand, apex acute to acuminate, glabrous or sparsely pubescent on the margin and veins on abaxial surface and with subcapitate glandular trichomes on both surfaces; **inflorescence in** axillary dichasia, bracts lanceolate to linear, glabrous; **flowers** subsessile, bracteoles 2, linear triangular, glabrous; calyx segments equal, linear triangular, apex acute, glabrous to sparsely glandular pubescent with subcapitate glandular trichomes; corollas lilac to violet, 39–42 mm long, densely pubescent, the unexpanded portion of the tube shorter than the expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, glabrous, stigma included; capsules narrowly ellipsoid, glabrous; seeds 18–24, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 30 A–B).

Illustration in Ezcurra (1993:813).

Distribution, habitat and phenology –Ruellia simplex is a wide ranging Neotropical, the study area, it was only collected from cultivated plants (Fig. 31), fertile from July to November.

Comments –Ruellia simplex can be easily recognized by the linear, lanceolate to narrowly elliptic leaves glabrous or sparsely pubescent, flowers with lilac to violet corollas on cymes.

Selected specimens examined –Brazil, Distrito Federal, Brasília, Jardim Botânico de Brasília, mansões California, 23 Nov 2017, *M.F. Simon 3186* (CEN); ibid., Área urbana, QI 4 do Lago Norte., 23 Nov 2017, *M.F. Simon 3185* (CEN); Goiás, Jataí, Zona Urbana, Jardim alterado, cultivado, 11 Jul 2008, *F.S. Gielf 5* (HJ); ibid., Zona urbana, quintal, cultivado, 26 Nov 2008, *L.F. Souza 3962* (HJ); Morrinhos, Perímetro Urbano, Próximo a praça W.A., 22 May 2008, *T.A. Moura 115* (UEG, CEN).

39. *Ruellia trachyphylla* Lindau in Bot. Jahrb. Syst. 25(3, Beibl. 60): 46. 1898. — **Lectotype (to be designated):** Brazil, "Goyaz" [Goiás], "valle de Rio Corumba", 23 Sep 1894, *Glaziou 21872* (P00650115 image!; isolectotypes: R000011203!, C10005142 image!, BR0000013222062 image!).

Diagnosis – Subshrubs erect to prostrate, 15–40 cm tall, subterraneous system woody; **stems** frequently reddish, younger stems quadrangular to subquadrangular, densely pubescent with subcapitate glandular trichomes, mature stems subquadrangular to terete, glabrescent; leaves opposite, sessile to subsessile, blades chartaceous, lanceolate to narrowly elliptic, rarely ovate, 1.9–3.5×0.2–1 cm, base cuneate, margin entire, apex acute, pubescent with subcapitate glandular trichomes on both surfaces; **flowers** subsessile in the axils of the upper leaves, bracteoles 2, oblanceolate or spathulate, densely pubescent with eglandular trichomes and with subcapitate glandular trichomes; calyx segments equal, linear triangular, apex acute, densely pubescent to hirsute with subcapitate glandular trichomes; corollas lilac, 21–30 mm long, glandular pubescent, the unexpanded portion of the tube shorter than expanded, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens included, didynamous; ovary ovoid, velutinous to hirsutulous with eglandular trichomes, stigma included; capsules obovoid, densely puberulent to hirsutulous; seeds not seen (Fig 30 C).

Distribution, habitat and phenology – Ruellia trachyphilla was only collected in the central region of Goiás and Distrito Federal (Fig. 31), growing in campos limpos and campos rupestres, in rocky and sandy soils, fertile in September.

Comments –Ruellia trachyphylla is a morphologically complex species, being frequently misidentified as *R. magniflora* because of the linear to narrowly elliptic leaves, but differs in the equal calyx segments (vs. subequal with the posterior segment shorter).

Selected specimens examined –Brazil, Distrito Federal, Brasília, Reserva Biológica da Contagem (RBC), Campo limpo rupestre, úmido em alguns locais, relevo levemente inclinado, 15°38'58", 47°52'28", 1220 m, 2 Sep 2011, *M.R.V. Zanatta et al. 770* (UB); Goiás, Pirenópolis, Alto da Serra dos Pireneus, na base dos Três Picos, campo rupestre, ocorre mata ciliar, 4 Sep 1971, *J.A. Rizzo 6703* (UFG).

40. *Ruellia verbasciformis* (Nees) C. Ezcurra & Zappi in Kew Bulletin, Vol. 51, No. 4, 1996, pp 819-820— **Lectotype:** designated by Ezcurra & Zappi, 1996: Brazil, Goiás, Traíras, Rio Bagagem, *Pohl s.n.*(W!)

For types and synonyms see Ezcurra & Zappi 1996.

Diagnosis – Shrubs erect, 1–3.5 m tall, subterraneous system woody; **younger stems** quadrangular to subquadrangular, sulcate, tomentose, villose, hirsute to densely pubescent with eglandular trichomes, mature stems subquadrangular to terete, glabrescent, becoming woody; leaves 3–4 whorled to opposite, sessile, blades chartaceous, discolored with abaxial surface light green and adaxial surface olive, ovate to elliptic, 4.2–11×2–5.2 cm, base rounded, truncate or subcordate, sometimes amplexicaulis, margins entire to slightly repand, apex acute, slightly attenuate to slightly rounded, tomentose with eglandular trichomes and subcapitate glandular

trichomes on abaxial surface, hirsute to densely pubescent with subcapitate eglandular tricomes on adaxial surface; **inflorescence** raceme to panicle with foliaceous bracts, ovate to deltoid, rarely oblong, densely glandular pubescent to hirsute, with subcapitate glandular trichomes; **flowers** pedicellate, bracteoles 2, ovate, elliptic, oblong, rarely oblanceolate, densely glandular pubescent to hirsute and with subcapitate glandular trichomes; calyx segments equal to subequal, sometimes the posterior and the two anteriors longer, lanceolate to narrowly oblong, apex slightly rounded to acute, densely glandular pubescent to hirsute with subcapitate glandular trichomes; corollas pale yellow, (30–)40–56 mm long, glandular pubescent, the unexpanded portion of the tube shorter than the expanded portion of the tube, lobes shallowly ovate, elliptic to suborbicular, emarginate, obtuse to rounded at the apex, reflexed; stamens exserted, didynamous; ovary ovoid, hirsute with eglandular trichomes, stigma exserted; capsules ellipsoid, densely hirsute; seeds 4, suborbicular, totally pubescent with hygroscopic trichomes (Fig. 30 D–E).

Illustration in Nees (1847a: Tab.3).

Distribution, habitat and phenology –Ruellia verbasciformis was collected in northern Goiás (Fig. 32), growing in cerrado sensu stricto, campos sujos and campos rupestres, in rocky and sandy soils or sandy clay soils, collected fertile from May to October.

Comments –Ruellia verbasciformis can be easly recognized by the habit, a tall shrub few branched, with sessile whorled leaves, rarely opposite decussate, tomentose to hirsute, the inflorescences totally glandular pubescent oily and viscous, flowers with big pale-yellow corollas, with a characteristic sweet smell at night (U.G. Fernandes pers. obs.). It is very different from its congeners that occur in the state of Goiás and Distrito Federal.

Selected specimens examined –Brazil, Goiás, Alto Paraíso de Goiás, Coletada na beira da rodovia Alto Paraíso de Goiás-São Jorge, do lado direito., 14º08'42"S, 47º44'32"W, 1095 m, 03

Jul 2017, *U.G. Fernandes et al. 232* (SP); ibid., Povoado de São Jorge, Coletada na beira da estrada do mirante em solo arenoso e pedregoso, 14º10'41"S, 47º49'29"W, 1013 m, 06 Jul 2017, *U.G. Fernandes & F.S. Petrongari 279* (SP); ibid., Fazenda Mato Fundo, Campo rupestre, solo rochoso., 1200 m, 16 Oct 1990, *G. Hatschbach & J.M. Silva 54665* (MBM);ibid., Jardim de Maytrea (nome místico do buriti). Rodovia Alto Paraíso de Goiás-Niquelândia (GO 239), 25 km do trevo Sul de Alto Paraíso de Goiás em direção a São Jorge. Campo brejoso seco, recentemente queimado., 14º07'50.3"S, 47º41'14.4"W, 1231 m, 04 Sep 2013, *J.R. Pirani et al. 6433* (SPF, RB, SP); Niquelândia, Cerrado, Montanhoso, Solo areno-pedregoso, 14º00'00"S, 48º26'00"W, m, 05 Oct 1995, *T.B. Cavalcanti et al. 1772* (CEN, SP!); ibid., Coletada em cerrado sensu stricto, na beira da estrada Colinas do Sul-Niquelândia, 14º20'11"S, 48º07'40"W, m, 07 Jul 2017, *U.G. Fernandes & F.S. Petrongari 299* (SP); ibid., Serra Negra. Estrada paralela ao rio Bagagem entre Serra Negra e este (margem direita). Campo sujo na encosta da serra negra, solo areno-argiloso c/ cascalho superficial e pedra solta. Relevo acidentado. Área de influência do AHE Serra da Mesa, 13º59'S, 48º21'W, 600 m, 25 Jul 1995, *B.M.T. Walter et al. 2498* (CEN, RB).

41. *Ruellia* sp.

Diagnosis – Subshrubs to shrubs erect to prostrate, 0.30–1 m tall, subterraneous system not seen; **younger stems** quadrangular, pubescent with subcapitate glandular trichomes, mature stems subquadrangular to terete, glabrescent, becoming woody; leaves opposite, peciolate, blades membranaceous, ovate to elliptic, 1.8–12.8×0.6–6.2 cm, base decurrent, obtuse to rounded, margins entire to slightly serreate, apex acute, the young leaves densely glandular pubescent on both surfaces, the older leaves pubescent to glabrescent only with eglandular trichomes; **inflorescence** in axillary dichasia, rarely flowers subpedicelate on the axils of the

upper leaves, obovate, oblanceolate, narrowly elliptic or linear, densely glandular pubescent; **flowers** subsessile, bracteoles 2, ovate, elliptic, obovate, linear, densely glandular pubescent; calyx segments subequal, the posterior longer and larger, the two laterals shorter, the two anterior longer than the laterals, linear, apex acute to slightly rounded, densely glandular pubescent; corollas lilac 13–18 mm long, pubescent, the unexpanded portion of the tube longer than the expanded portion of the tube, lobes orbicular to suborbicular, emarginate to rounded at the apex, patent; stamens subexserted, didynamous; ovary ovoid, glabrous, stigma subexserted; capsules claviform, glabrous; seeds 4, suborbicular, ciliate with hygroscopic trichomes at the margin (Fig. 30 F–G).

Distribution, habitat and phenology – *Ruellia* sp. is reported to Bahia, Minas Gerais and northeastern Goiás (Fig. 32), growing in Cerradão, semideciduous and deciduous forests, on sandy-clay soils and rocky soils.

Comments – *Ruellia* sp. is similar to *R. paniculata* in habit, inflorescence, and flowers with lilac corollas. The differences are in the unequal with the posterior longer and larger calyx segments (vs. subequal with the posterior segment longer) and in the calvate 4-seeded capsule (vs. narrowly ellipsoid to oblongiform, 12-seeded capsules).

Selected specimens examined – Brazil, Goiás, Campos Belos, Fazenda Santa Maria, próximo a Mandassaia. Cerradão, 12 May 2000, *G. Hatschbach et al. 70969* (MBM, UB); ibid., Estrada entre Campos Belos e Pouso Alto, mata estacional semidecidual, bem próximo a Pouso Alto; solo argilo-arenoso, com afloramento calcário, 13º01'02"S, 46º22'19"W, 24 Apr 2001, *R.C. Mendonça et al. 4169* (IBGE, SP); Monte Alegre, Fazenda Nica. Proprietário Sr. Cordeirinho. Relevo ondulado. Vegetação: mata mesofítica., 13º09'12"S, 46º39'48"W, 540 m, 14 Jun 2000, *M.L. Fonseca et al. 2286* (IBGE, US, RB).

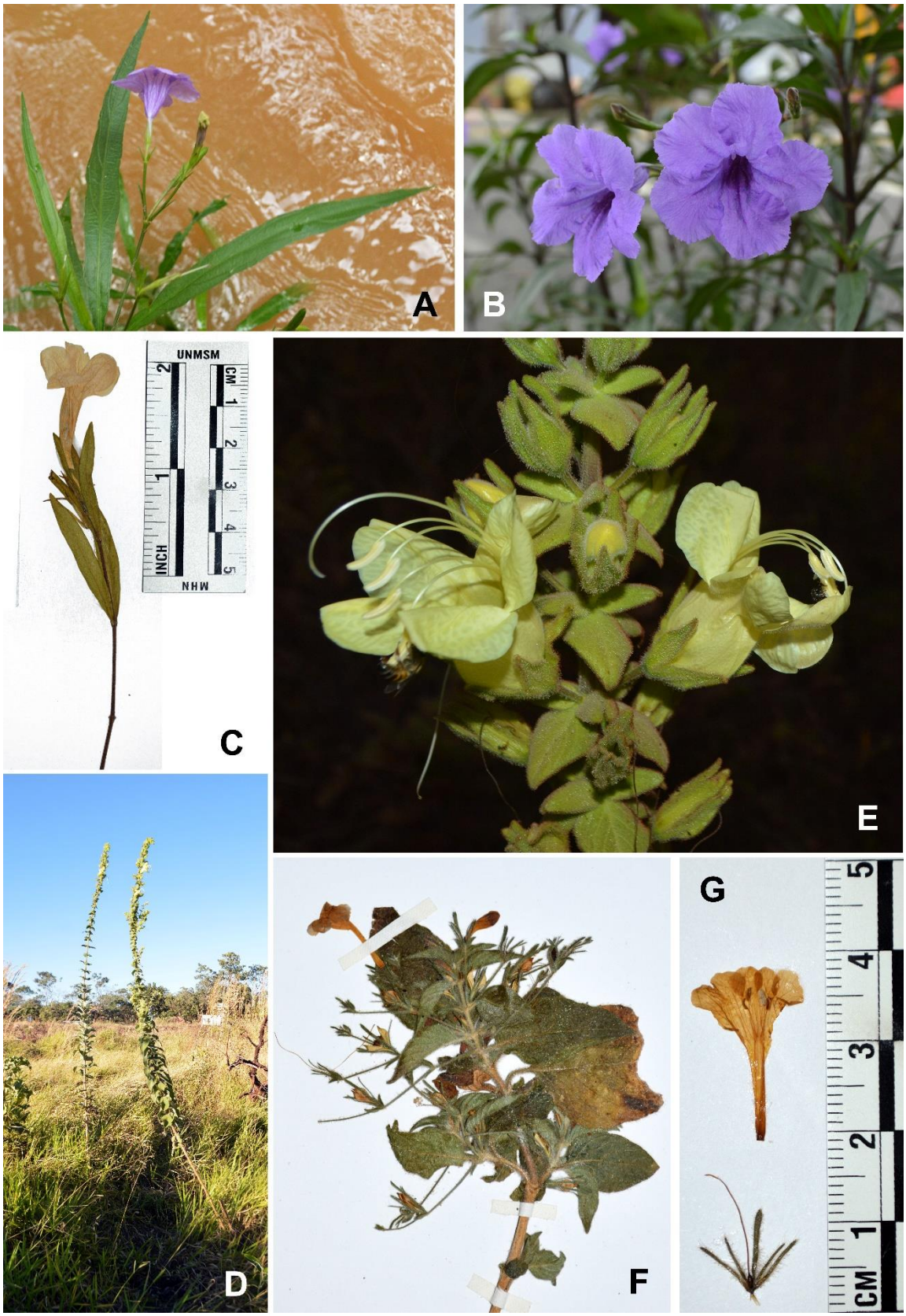

Figure 30. ***Ruellia simplex***: A – Detail of an inflorescence branch, with a side view of a flower; B – Detail o a front view of a corolla; ***R. trachyphylla***: C – Detail of a flowering branch; ***R. verbasciformis***: D – Habit.; E – Detail in a side view of flowers.; ***Ruellia* sp.**: F – Detail of a flowering branch; G – Detail of a dissected calyx and corolla.

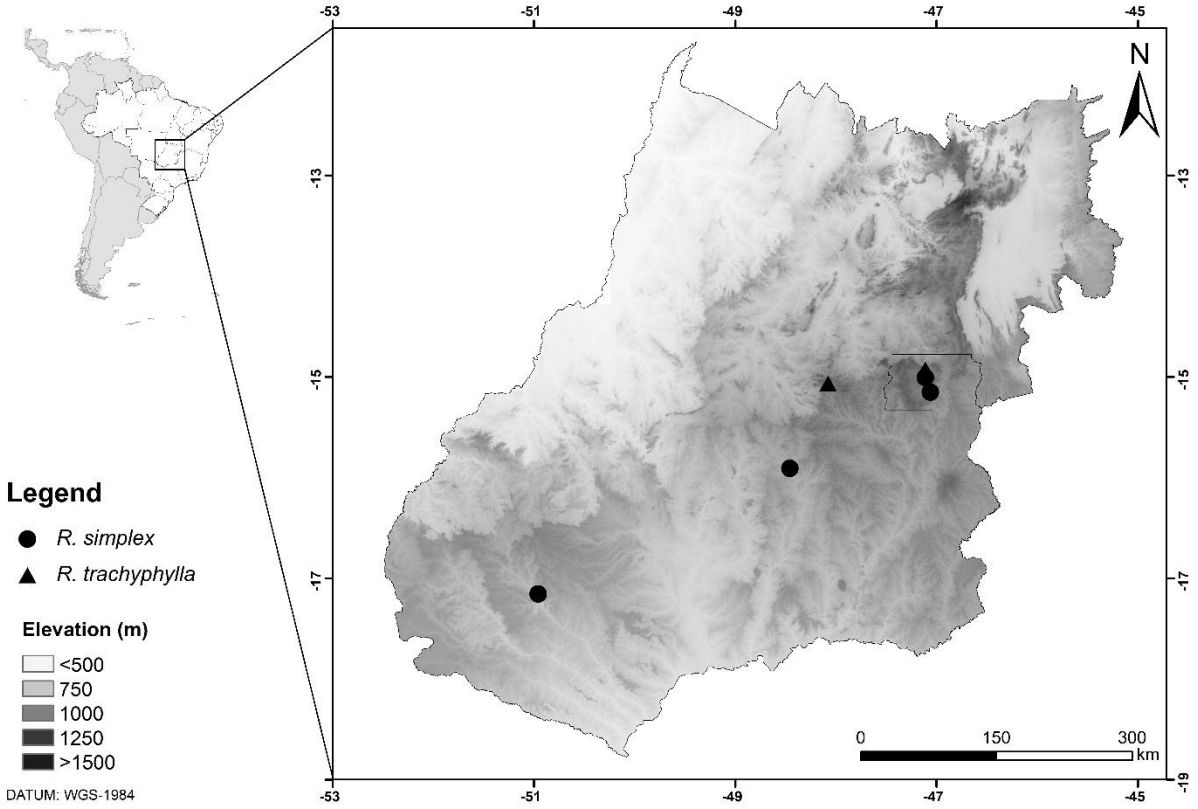

Figure 31. Distribution map of *Ruellia simplex* and *R. trachyphylla*.

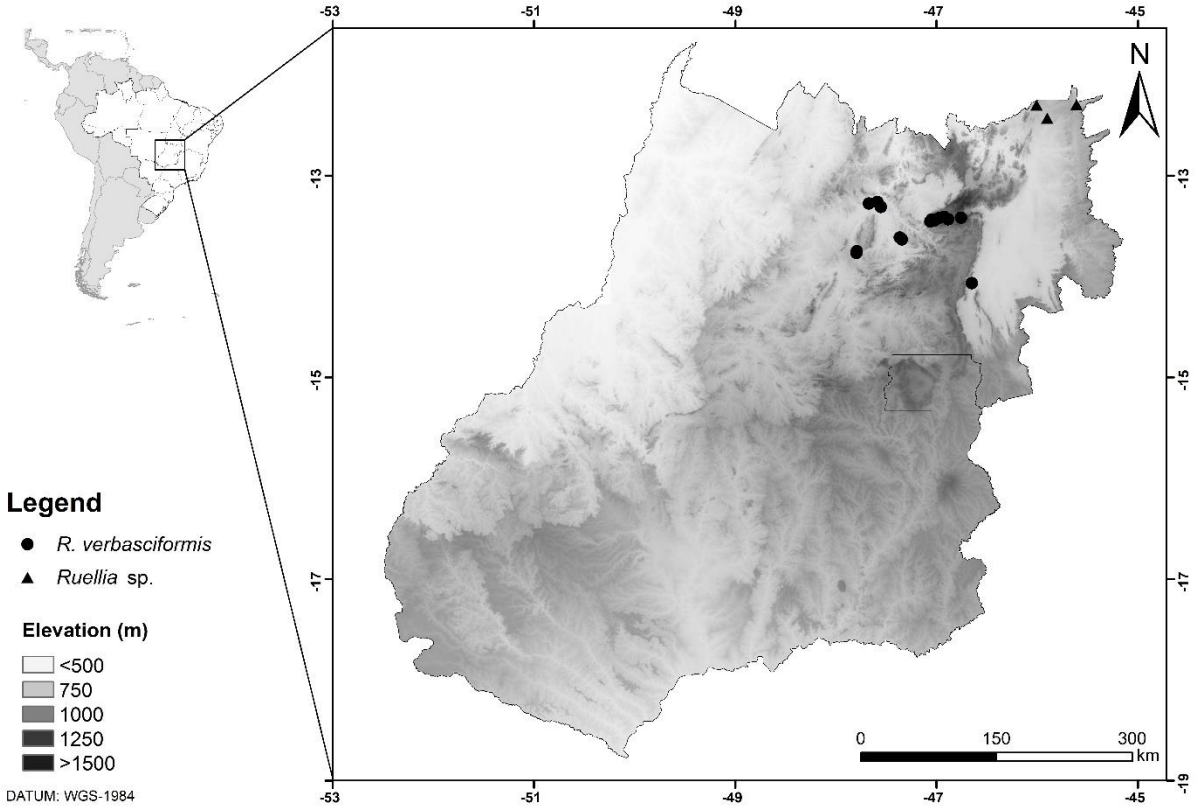

Figure 32. Distribution map of *Ruellia verbasciformis* and *Ruellia* sp.

Acknowledgements

The authors would like to thank CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) for a M.Sc scholarship to the first author, the Instituto de Botânica for the infrastructure. We thank the Curators of all consulted herbaria, The Chico Mendes Institute for Biodiversity Conservation (ICMBio) and the directors of the conservation units visited for the permits. Adriana H. Hayashi for the help on the venation and trichomes analyzes. We also thank Rodolph Delfino Sartin and Fernanda Satori Petrongari for the support during the collection expeditions. We thank Klei Sousa for the illustrations, and Erin A. Tripp, Isa Lúcia Morais, Maria Rosa Vargas Zanatta, Rodolph Delfino Sartin and Suzana Ehlin Martins for the photographs.

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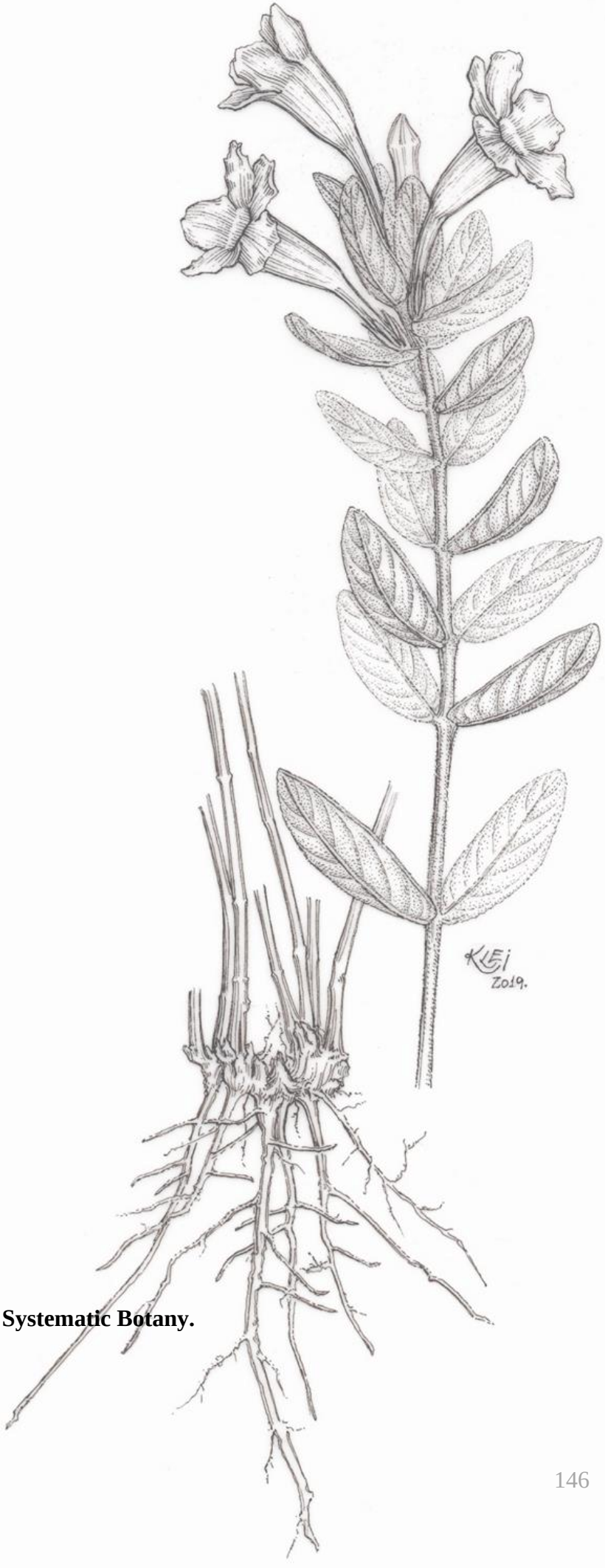
CAPÍTULO II



Manuscrito a ser submetido à Systematic Botany.

Novelties in Ruellia L. (Acanthaceae) for Central Brazil

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Abstract—Brazil is known as a center of diversity for several plant families. Among these, the Acanthaceae are especially diverse in the Cerrado, which is home to ca. 150 species, many of which are endemic. Recent field and herbarium studies of *Ruellia* of the Cerrado in Goiás and Distrito Federal have led to the discovery of 11 species new to science, which we formally describe and illustrate here (**R. altoparadisensis**, **R. cataractae, R. ceciliae, R. chapadensis, R. glandulicalyx, R. glandulifolia**, **R. glaziovii**, **R. hatschbachii**, **R. lucindae, R. pinguicula, R. rizzoi**). We additionaly propose two new combinations (**R. pohlii** and **R. rosmarinus**) and one lectotypification.

Keywords—*Ruellieae*, taxonomy, flora, Cerrado vegetation, riparian forest, semideciduous forest, new species, new combination, lectotypification.

Comprising 221 genera and ca. 4000 species, Acanthaceae Juss. (Lamiales) is distributed worldwide, and found commonly in tropical and subtropical regions (Scotland & Vollesen 2000; McDade et al. 2008). Brazil is home to 39 genera and ca. 450 species, the majority of which occur in the Atlantic rainforest, semideciduous forests, and Cerrado (savanna vegetation) in central and southeastern Brazil (Flora of Brazil 2020, under construction).

Ruellia L., with ca. 400 species distributed in tropical, subtropical and temperate areas of the world (Tripp & Tsai 2017), is the second most species-rich genus of Acanthaceae and the most diverse genus in the tribe Ruellieae, (Tripp 2007; Tripp et al. 2013). In the Neotropics, there are ca. 300 spp., particularly in Mexico, Brazil, and western South America (Tripp & Manos 2008, Tripp & Tsai 2017). Eighty-five species occur in Brazil, of which 40 grow in Cerrado Biome. (Flora of Brazil 2020, under construction).

The Brazilian Cerrado biome is home to approximately 150 species of Acanthaceae, but few recently published local floras treating this family exist. These include: flora of Serra do Cipó (Kameyama 1995) and flora of Grão-Mogol (Kameyama 2003), both in the state of Minas Gerais; flora of Pico das Almas in the state of Bahia (Harvey & Wasshausen 1995), and flora of Distrito Federal (Vilar et al. 2010). Likewise, few revisionary studies that include Acanthaceae of the Central Brazilian Cerrado exist (but see *Thyrsacanthus* [Côrtez et al. 2010] and *Staurogyne* [Braz & Monteiro 2017]). As such, given exceptional diversity of the family both in Brazil and specifically in the Cerrado, it is not surprising that several undescribed species of Acanthaceae are being actively discovered in this area.

Ruellia is a monophyletic genus, with species united by the presence of spherical, triporate pollen grains with reticulate exine sculpturing and chromosome numbers of *n = 17* (Tripp 2007; Tripp et al. 2013). Species of *Ruellia* can be distinguished from other Acanthaceae by the combination of the following characters: calyces with five lobes united only at (and rarely beyond) the base; calyx lobes equal to unequal; zygomorphic corollas that are tubular, infundibular, funnelform, or salverform, with a narrow unexpanded portion at the base followed by a more distal expanded portion; four, didynamous stamens, the filaments of which are fused in part and form a protusion or a membrane termed "filament curtain"; anthers that are bithechous and unappandaged; stigmas that are filiform and bilobed, with the anterior lobes frequently reduced in length; seeds that bear hygroscopic-mucilaginous trichomes covering the entire seed coat or restricted to the margins (Ezcurra & Wasshausen 1992; Ezcurra 1993; Manktelow 2000; Wasshausen & Wood 2004; Tripp 2007; Tripp et al. 2013; Azevedo & Braz 2018; Azevedo & Moraes 2019; Tripp & Luján 2018).

During studies of taxonomic diversity of *Ruellia* for the state of Goiás and Distrito Federal, eleven species new to science were discovered and are here formally described and

illustrated. We additionally propose two new combinations and one lectotypification in *Ruellia*.

MATERIALS AND METHODS

For this study the following herbaria were consulted in person: CEN, ESA, HPL, HJ, IAC, IBGE, MBM, R, RB, SP, SPF, UB, UEC, UFG. Online images of specimens from the follow herbaria were additionally examined: B, C, G, GZU, HEPH, HUEFS, HUFU, K, MO,NY, P, US, W. Herbarium acronyms following Thiers (2019, continuously updated).

Field campaigns were launched in the state of Goiás and Distrito Federal to collect new materials as well as garner new knowledge about the ecologies and habitat preferences of *Ruellia* from the Cerrado.

Morphological descriptions utilized terminology in Harris and Harris (2001), and Radford et al. (1976) for general shapes; Tripp (2010) for inflorescence and corolla morphology; Ellis et al. (2009) for leaf venation; and Payne (1978) as well as Harris and Harris (2001) for indumentum.

The physiognomies of Cerrado vegetation follow Ribeiro and Walter (2008): campo limpo (grasslands with a few scattered shrubs and without tress); campo úmido (wet grasslands, similar to 'campo limpo' but with a wet, poorly drained sandy and/or organic soil, generally surrounding riparian forests or water springs); campo sujo (grasslands with shrubs and some scattered small trees); campo rupestre (grasslands with scaterred shrubs growing on rocky and sandy soils, and between the rocky outcrops); cerrado *sensu stricto* (savannah-like vegetation with tortuous sparse trees and shrubs); and cerradão (forest physiognomy of cerrado vegetation, with trees reaching up to 15 m)]

The conservation status of each species was evaluated using the IUCN Red List Categories and Criteria (IUCN 2017). The extent of occurrence (EOO) and area of occupancy (AOO) was calculated using GeoCAT (Bachman et al. 2011).

Distribution maps were generated using ArcGIS v. 10.5 (ESRI 2016).

TAXONOMIC TREATMENT

1. **Ruellia altoparadisiensis** U.G. Fern., Kameyama & E. Tripp, sp. nov. TYPE: BRAZIL. Goiás: Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros, coletada próximo à trilha sentido cachoeiras dos Saltos, em cerrado *sensu stricto*, em solo pedregoso arenoso, área parcialmente sombreada. [-47.846111°, -14.167778°], 965 m, 01 Jul 2017, *U.G. Fernandes, R.D. Sartin & F.S. Petrongari 217* (holotype: SP!; isotypes: SPF!, RB!)

Erect or prostrate subshrubs, 20—70 cm tall, arising from a woody subterraneous system. **Younger stems** subquadrangular to terete, reddish brown, villose, with eglandular multi-cellular trichomes of different lenghts, the longer ±0.5 mm long, 4—6 cells, the shorter ±0.25 mm long, 2—3 cells, more densely on the nodes, and subsessile glandular trichomes, older stems glabrescent. **Leaves** opposite, decussate, sessile to subsessile, petioles up to 1 mm, subterete, villose, the younger leaves frequently imbricate, blades chartaceous, ovate, lanceolate or elliptic, rarely oblong or narrowly oblong, (0.6—)1—4.5(—4.8)×0.4—2.5 cm, bases rounded to subcordate, margins entire, apices acute, venation eucamptodromous becoming brochidodromous distally, veins prominent on both surfaces, villose with eglandular trichomes on the veins and margins, rarely on the blades, and subsessile glandular trichomes on the abaxial surface, villose to glabrescent with eglandular trichomes on adaxial

surface, mainly on the veins and margins, and sparse subsessile glandular trichomes, lustrous on adaxial surface. **Flowers** solitary rarely two (i.e. reduced dichasia), in the axils of upper leaves, subsessile, pedicels 1(—2) mm long, densely villose with eglandular trichomes and subsessile glandular trichomes, bracts absent; calyx 10—13 mm long, not accrescent in fruit, fused portion 2—3 mm long, segments equal, 7—10×1—1.5 mm, linear-triangular, apices acute, villose with eglandular trichomes and subsessile glandular trichomes; corolla white or pale yellow, bent-infundibular, 35—52 mm long, pubescent with glandular trichomes, the narrow unexpanded portion of tube pale yellow, 20—25(—30)×2 mm, opening abruptly to the expanded portion, obconic, 20—25×8—13 mm, lobes patent, orbicular to suborbicular, 13—20×13—18 mm, apices emarginated to rounded, ciliate with glandular trichomes; stamens included, didynamous, with the free portion of the filaments 7—10 mm long (longer pair), 3—4 mm long (shorter pair), glabrous, filament curtain glabrous, anthers 4 mm long, connective sparsely ciliate; ovary ovoid, ± 3 mm long, hirsutulous with eglandular trichomes, style 35—40 mm long, sparsely hirsutulous, stigma bilobed, included to subexserted, the anterior lobe erect, ±0.5mm long, the posterior lobe patent, ± 2mm long. **Capsule** obovoid to ellipsoid, 12—15×5—6 mm, with a solid base 2—3 mm long, the surface hirsutulous, retinaculae 4—5 mm long; seeds 4—8, suborbicular, 4—5 mm diam., light-brown, hygroscopic trichomes on the entire surface. Figures 1 and 2 A-C.

Distribution and Habitat— All collections of *R. altoparadisiensis* derive from the municipality of Alto Paraíso de Goiás, northern Goiás (Fig. 3), inside or near to the limits of Chapada dos Veadeiros National Park. Plants have been collected growing in open cerrado *sensu stricto* and campos sujos, on rocky and sandy soils.

Etymology—The specific epithet refers to the municipality of Alto Paraíso de Goiás.

Phenology—*Ruellia altoparadisiensis* specimens have been collected with flowers in

July and with fruits in August, during the dry season.

Conservation status— *Ruellia altoparadisiensis* has a small extent of occurence (EOO) of 2.387 km² and an area of occupancy (AOO) of 16.000 km²; all collection localities are proximal enough to be considered a single location. During fieldwork, only a few individuals per population were seen. All collections hitherto derived from inside Chapada dos Veadeiros National Park or neighbouring areas, which should bolster protection of the habitat and survival of this species. However, specific regions inside the National Park in which *R. altoparadisiensis* were found are popular touristic atractions near Park borders, which increases risks of trampling. Furthermore, the National Park itself is threatened by small-scale agriculture, livestock raising, and extraction of charcoal and flowers of Cerrado (Felfili et al. 2007, Souza & Felfili 2006). These anthropogenic activities increase the frequency of fires inside the limits of the National Park (Fiedler et al. 2006) and the invasion of exotic plants species (Souza & Felfili 2006). Hence, we categorize the species as Critically Endangered (CR) (B1ab iii, iv+B2ab iii, iv) according to IUCN criteria (IUCN 2017).

Taxonomic notes—*Ruellia altoparadisiensis* is morphologically similar to *Ruellia nitens* (Nees) Wassh., with which it is frequently misidentified in herbaria. *Ruellia altoparadisiensis* has villose stems with eglandular trichomes and subsessile glandular trichomes (vs. puberulent with eglandular trichomes and subsessile glandular trichomes or only with subsessile glandular trichomes), white to pale yellow corollas (vs. lilac to purple), 4- to 8-seeded fruits (vs. only 4-seeded), and occurs only in Chapada dos Veadeiros area (vs. widespread in Cerrado vegetation of Goiás, Mato Grosso, Bahia, and Minas Gerais).

Additional Specimens Examined (Paratypes)— **Brazil.**—GOIÁS: Alto Paraíso de Goiás, Chapada dos Veadeiros, próximo ao Rio Preto, 28 Jul 1985, *S. Romaniuc Neto & M. G. Majo 374* (SP!, SPF!); ibid., Parque Nacional da Chapada dos Veadeiros, cerrado *sensu*

stricto, em solo pedregoso-arenoso, [-47.826667°, -14.165556°], 964 m, 1 Jul 2017, *U. G. Fernandes et al. 211* (SP!); ibid., Parque Nacional da Chapada dos Veadeiros, cerrado *sensu stricto*, em solo rochoso, dentro de buraco de garimpo de cristais de quartzo, [-47.830833°, -14.164722°], 944 m, 1 Jul 2017, *U. G. Fernandes et al. 213* (SP!); ibid., Parque Nacional da Chapada dos Veadeiros, em cerrado *sensu stricto* ao lado direito da trilha dos Saltos sentido cachoeiras, ambiente parcialmente sombreado, solo rochoso-arenoso, [-47.830556°, -14.164722°], 944 m, 1 Jul 2017, *U. G. Fernandes et al. 214* (SP!);ibid., Parque Nacional da Chapada dos Veadeiros, trilha a caminho do mirante, em cerrado *sensu stricto*, em solo pedregoso, [-47.826667°, -14.165833°], 748 m, 1 Jul 2017, *U. G. Fernandes et al. 209*(SP!); ibid., Povoado de São Jorge, ao lado direito da trilha sentido mirante da janela, em cerrado *sensu stricto*, ambiente aberto, em solo pedregoso, [-47.828333°, -14.177778°], 1025 m, 6 Jul 2017, *U. G. Fernandes & F. S. Petrongari 277* (SP!, CEN!); ibid., Parque Nacional da Chapada dos Veadeiros, trail from entrance of park to waterfalls 120 and 80, -14.166081°, -47.820443°, 832 m, 13 Aug 2016, *E. Tripp et al. 5941* (SP!).

2. **Ruellia cataractae** U.G. Fern., Kameyama & E. Tripp, sp nov. TYPE: BRAZIL. Goiás: Alto Paraíso de Goiás. Coletada na margem direita do rio do Segredo sentido cachoeira, próximo à Cachoeira do Segredo, entre as fendas das rochas, em mata ciliar, ambiente úmido e sombreado, solo úmido e rochoso. [-47.844444°, -14.256389°], 675 m, 7 Jul 2017, *U. G. Fernandes & F. S. Petrongari 294* (holotype: SP!; isotypes: RB!, SPF!)

Erect or prostrate shrubs, to 1.6 m tall, arising from a woody subterraneous system. **Younger stems** quadrangular to subquadrangular, frequently sulcate, glabrous to sparsely pubescent with eglandular trichomes, densely on the nodes and grooves, and subsessile

glandular trichomes, older stems subquadrangular to terete, glabrous to glabrescent with eglandular trichomes and subsessile glandular trichomes, becoming woody. **Leaves** 3—4 whorled, rarely opposite, decussate, sessile, blades discolored with the abaxial surface light green and adaxial surface dark green, membranaceous, linear, narrowly elliptic to oblanceolate, (0.6—)1—4.5(—4.8)×0.4—2.5 cm, bases decurrent, margins entire to repand, apices acute, venation eucamptodromous becoming brochidodromous distally, veins prominent on both surfaces, the main vein sulcate on adaxial surface, totally covered by subsessile glandular trichomes on both surfaces; Inflorescence terminal, of solitary or two flowers (i.e. reduced dichasia) in the axils of 3-4 verticilate bracts (rarely 2 opposite), the central axis never developing into a flower; peduncle 5—15mm long, densely glandular-pubescent and with subsessile glandular trichomes; central axis densely glandular-pubescent and with subsessile glandular trichomes; bracts linear to oblanceolate, 17—50(—55)×1—2 mm, densely glandular-pubescent with subsessile glandular trichomes. **Flowers** solitary or geminate in the axil of the bracts, pedicelate, pedicels 1—3 mm long, glandular-pubescent, bracteoles abscent; calyx 15—2(—25) mm long, not accrescent in fruit, fused portion 2—3 mm long, segments equal, 13—20(—23)×2 mm, linear-triangular, apices slightly rounded, glandular-pubescent and with subsessile glandular trichomes; corolla bent-infundibular, 45—55 mm long, pubescent with glandular trichomes, the narrow unexpanded portion of the tube 10—15×3 mm, opening smoothly to the expanded portion, tubulose, 33—45×6—10 mm, the lobes patent to revolute, sometimes twisted, elliptic to oblong, 7—15×7—11 mm, apices emarginated to rounded; stamens exserted, didynamous, the two interior longer with the free portion of the filaments 35—40 mm long, the shorter pair 30—32 mm long, sparsely puberulent with eglandular trichomes becoming glabrous distally, united by a filament curtain sparsely puberulent, anthers 4—5 mm long, connective glabrous; ovary ovoid, 3—5 mm long, villose with eglandular trichomes and with subsessile glandular trichomes, style 50—65 mm

long, sparsely pubescent with eglandular trichomes becoming glabrous distally, portion exserted of the style totally glabrous, stigma bilobed, exserted, the anterior lobe, ± 2mm long, the posterior lobe erect, ±0.5mm long; **Capsule** obovoid, 13—15×5—7 mm, with a solid base 2—3 mm long, the surface densely glandular-pubescent, retinaculae 5—6 mm long; seeds 4, suborbicular, 5—6 mm diam., brownish, with hygroscopic trichomes covering the entire surface. Figures 2 D-H and 4.

Distribution and Habitat—*Ruellia cataractae* occurs in riparian forests associated with waterfalls of the Chapada dos Veadeiros region (Fig. 3), where it has been collected growing between rocks.

Etymology—The specific epithet refers to the habitat where this species grows.

Phenology—*Ruellia cataractae* has been collected with flowers from February to October and with fruits from May to October.

Conservation status—*Ruellia cataractae* has an extent of occurence (EOO) of 58.779 km², an area of occupancy (AOO) of 16.000 km², and is so far known from three localities. In all three localities, plants were growing adjacent to waterfalls and in associated riparian forests, primarily in protected areas, but these partially threatened by touristic activities. Populations are numerous, and each individual produce an abundance of flowers and fruits. Therefore, *R. cataractae* here is classified as Endangered (EN) (B1ab iii, iv+B2ab iii, iv), according to IUCN criteria (IUCN 2017).

Taxonomic notes—*Ruellia cataractae* can be recognized by its pedunculate apical racemes, its bracts, pedicels, and calyces with glandular pubescence, its vivid (rarely pale) red corollas, and its linear, frequently whorled leaves. *Ruellia cataractae* is morphologically similar to *R. angustior* (Nees) Lindau on account of its red corollas with didynamous, exserted stamens and its apical racemose inflorescences, but differs in its linear to narrow

elliptic leaves covered entirely by subsessile glandular trichomes (vs. ovate to elliptic leaves and tomentose pubescence with eglandular trichomes and subsessile glandular trichomes). Ecologically, *R. cataractae* differs from *R. angustior* in habitat, occurring in riparian forests and adjacent to waterfalls (vs. growing in campos sujos and cerrado *sensu stricto*, along borders of semideciduous and gallery forests).

Additional Specimens Examined (Paratypes)— **Brazil**—GOIÁS: Mun. Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros, trail from entrance of park to waterfalls 120 and 80, 13 Aug 2016, *.E. Tripp et al. 5937* (SP!, COLO!, RSA!); ibid. Chapada dos Veadeiros, Rio Preto, 19 Oct 1990, *G. Hatschbach et al. 54762* (MBM!); ibid., Parque Nacional da Chapada dos Veadeiros. Próximo da Cachoeira do Rio Preto, perto do povoado São Jorge. Cerrado de Chapada com solo pedregoso e mata ciliar, 06 Feb 1987, *J.R. Pirani et al. 1674* (SPF!, SP!, K!); ibid., Chapada dos Veadeiros, cachoeira do Poço Preto-Rio Preto, 16 May 1986, *S. Romaniuc Neto et al. 466* (SP!; SPF!); ibid., coletada na margem esquerda do rio do Segredo, próximo a estrada sentido Cachoeira do Segredo, [-47.869722°, -14.258333°], 604 m, 7 Jul 2017, *U.G. Fernandes & F.S. Petrongari 282* (SP!); ibid., margem esquerda do Rio do Segredo sentido Cachoeira do Segredo, na última passagem pelo rio, antes de chegar na entrada da Cachoeira do Segredo, [-47.865000°, -14.263056°], 617 m, 7 Jul 2017, *U.G. Fernandes & F.S. Petrongari 283* (SP!); ibid., Cachoeira do Segredo, margem esquerda do rio do Segredo, entre as rochas, [-47.855278°, -14.265833°], 631 m, 7 Jul 2017, *U.G. Fernandes & F.S. Petrongari 290* (SP!, SPF!); ibid., Cachoeira do Segredo, coletada na trilha próxima ao rio do Segredo, [-47.846944°, -14.257778°], 657 m, 7 Jul 2017, *U.G. Fernandes & F.S. Petrongari 293* (SP!)

3. **Ruellia ceciliae** U.G. Fern. & Kameyama, sp nov. TYPE: BRAZIL. Goiás: Alto Paraíso de Goiás, Chapada dos Veadeiros. Rodovia GO-118, a ca. 25 km ao sul do centro de Alto Paraíso. Cerrado com afloramentos rochosos nas margens da estrada [-47.519592°, -14.345067°], 1077 m elev., 12 Mar 2015, *C.M. Siniscalchi 582* (holotype: SP!; isotype: SPF!)

Erect to prostrate subshrubs 30—50 cm tall, arising from a woody subterraneous system. **Stems** reddish brown, younger stems quadrangular to subquadrangular, tomentose to villose with eglandular multi-cellular yellow trichomes of different lenghts, the longer ±2mm long, 6—8 cells, the shorter ±0.25 mm long, 3—5 cells, densely on the nodes, and subsessile glandular trichomes, older stems subquadrangular to terete, glabrescent. **Leaves** opposite, decussate, subsessile, petioles 1—6 mm, subterete, villose to tomentose, blades chartaceous, ovate, 1.5—5.9× 0.9—4.2 cm, bases cuneate, rounded, truncate or subcordate, margins entire to slightly repand, apices acute, obtuse or rounded, venation eucamptodromous becoming brochidodromous distally, veins prominent on both surfaces, tomentose to villose, sometimes holosericeous with eglandular trichomes, frequently yellow, and subsessile glandular trichomes on abaxial surface, villose with eglandular trichomes, frequently yellow, on different lenghts, the longer ±2mm long, the shorter ±0.25 mm long and subsessile glandular trichomes on adaxial surface, mainly on the veins. **Flowers** solitary, rarely two (i.e. reduced dichasia), in the axils of upper leaves, subsessile, pedicels 1—2 mm long, tomentose to villose, first order bracts 2 oblanceolate, spathulate, linear, rarely lanceolate, 6—16×2—5 mm, apices rounded, rarely acute, tomentose to villose with eglandular trichomes and subsessile glandular trichomes; calyx 18—27 mm long not accrescent in fruit, fused portion 2—3 mm long, segments equal to subequal, 16—25×4—7 mm, lanceolate to narrowly elliptic, apices acute, tomentose to villose with eglandular trichomes, frequently yellow, with

subsessile glandular trichomes; corolla lilac, bent-infundibular, 35—60 mm long, glandular-pubescent, the narrow unexpanded portion of tube pale yellow, 15—25(—30)×2.5—3mm, opening abruptly to the expanded portion, obconic, 25—30×13—18 mm, lobes, patent, orbicular to suborbicular, 16—23×17—25 mm, apices emarginated to rounded, ciliate with glandular trichomes; stamens included, didynamous, with the free portion of the filaments 8—11 mm long (longer pair), 3—5 mm long (shorter pair), glabrous, united by a filament curtain sparsely puberulent externally, anthers 4—5 mm long, connective sparsely ciliate with eglandular trichomes; ovary ovoid, ± 3 mm long, hirsute to villose with eglandular trichomes, style 38—50 mm long, hirsute becoming glabrescent distally, stigma bilobed included, the anterior lobe erect, ±0.5mm long, the posterior lobe patent, ± 2mm long. **Capsule** ellipsoid, 12—15×5—6 mm, with a solid base 3 mm long, the surface densely pubescent to velutinous, retinaculae 3—4 mm long; seeds 4—8, suborbicular, 4 mm diam., dark-brown, with hygroscopic trichomes covering the entire surface. Figures 2 I-J and 5.

Distribution and Habitat—Most collections made of *Ruellia ceciliae* have derived from Chapada dos Veadeiros region and Distrito Federal (Fig. 6). This species grows in campos rupestres, campos limpos, campos sujos and cerrado *sensu stricto*, on rocky and sandy soils or sandy-clay soils, always in open areas.

Etymology—The specific epithet honors Cecília Ezcurra, who has made great contributions to knowledge of South American Acanthaceae.

Phenology—*Ruellia ceciliae* has been collected with flowers from October to May and with fruits from December to February, in the rainy season.

Conservation status— *Ruellia ceciliae* has an extent of occurency (EOO) of 20,030.023 km² and an area of occupancy (AOO) of 84.000 km², based on 17 localities. Although the AOO is small, this species is rather frequent in both undisturbed and disturbed

vegetation, and occurs inside of protected areas. Thus, we consider *R. ceciliae* as Near Threatened according to IUCN criteria (IUCN 2017).

Taxonomic notes—*Ruellia ceciliae* is similar to *R. hapalotricha* by its large flowers in the axils of the upper leaves and its lanceolate calyx segments. However, it differs by its yellow, eglandular trichomes on the stems, leaves, bracteoles, and calyces (vs. white eglandular trichomes) as well as its flowering period (*R. ceciliae* during the rainy season [October to May] and *R. hapalotricha* during the dry season [March to August]).

Additional Specimens Examined (Paratypes)— **Brazil**— DISTRITO FEDERAL: Brasília, Reserva Biológica Águas Emendadas. Cerrado. Ca de 40 km a NE de Brasília, 1000-1150 m elev., 18 Feb 1983, *Alba & Ramos 201* (CEN!, HEPH!); ibid., APA de Cafuringa. Sítio Águia, 27 Jan 1994, *M. Aparecida da Silva et al. 1873* (IBGE!, SPF!, SP!), ibid., DF 205, entre Sobradinho y Corrego d'Ouro, 15 km W de Sobradinho. Cerrado [-47.883333°, -15.700000°], 22 Feb 1992, *T.S. Filgueiras 2098* (IBGE!); ibid., Rod. DF-345, 5km do trevo com a Rod. BR-020, Planaltina. Campo cerrado, 7 Feb 1994, *G. Hatschbach et al. 59911* (MBM!); ibid., Rod. DF-345, 5-10km próx. Planaltina, 11 Feb 1990, *G. Hatschbach & V. Nicolack 53801* (MBM!); ibid., Rodovia 15, cerrado seco, aberto, sujeito ao fogo, 30 Jun 1975, *E.P. Heringer 14450* (UB!, UEC!); ibid., Cerrado, chapada da Contagem, ca. 10 km E. of Brasília, 1000 m elev., 17 Dec 1965, *H.S. Irwin et al. 11361* (UB!, NY); ibid., Sobradinho, Cerrado, 1100 m elev., 5 Jan 1966, *H.S. Irwin et al. 11390* (UB!, UEC!, NY); ibid., Rodovia Planaltina-São João da Aliança - GO 116 km 5. Reserva de Águas Emendadas. Cerrado, 20 Feb 1985, *J.R. Pirani & M.J. Sajo 1385* (SPF!, SP!); ibid., Fazenda Cooperbrás. Núcleo Rural do Rio Preto. Planaltina. Cerrado *sensu stricto* (típico), relevo plano, latossolo vermelho escuro profundo, [-47.550833°, -15.756667°], 990m elev., *B.M.T. Walter et al. 6159* (CEN!, SP!); GOIÁS: Alto Paraíso de Goiás, Chapada dos Veadeiros, Campo rupestre y cerrado, 1200 m elev., 4 Feb 1990, *M.M. Arbo et al. 3608* (HRCB!, CTES); ibid., 5 km E of Alto Paraíso,

Chapada dos Veadeiros, Rocky Campo, Sandy soil, 1500 m elev., *Gates & Estabrook 24* (RB!, SP!, NY); ibid., Rod. GO-327, km 2-5 a Oeste de Alto Paraíso. Campo rupestre, solo arenoso, 15 Oct 1990, *G. Hatschbach et al. 54595* (MBM!); ibid., Arredores, Campo cerrado, 1 Dec 1990, *G. Hatschbach et al. 58336* (MBM!); ibid., 56km de Alto Paraíso de Goiás, Solo arenoso, 1000 m elev., 30 Nov 1988, *R. Kral et al. 75749* (SP!); ibid., Arredores da estação de tratamento de água. Cerca de 3 km da entrada lateral ao porto na margem da GO-118. Campo com Murundu, [-47.538056°, -14.136667°], 1150 m elev., 22 Jan 2005, *J. Paula-Souza et al. 4389* (RB!, SP!); ibid., Estrada Alto Paraíso a Campo Belo, km. 8. Campo rupestre, 28 Feb 1976, *G.J. Shepherd et al.* (UEC!, MBM!, NY); ibid., burned-over campo, ca. 7 km W of Veadeiros, 950 m elev., 15 Feb 1966, *H.S. Irwin et al. 12872* (UB!, MBM!, NY);Niquelândia, roadside. Cerrado ca. 14 km S. of Niquelândia, 1000 m elev., 21 Jan 1972, *H.S. Irwin et al., 34696* (SP! NY; UB!; IAN, MO, P); São Gabriel de Goiás, GO-12, São Gabriel de Goiás, campo, solo úmido, 18 Feb 1975, *G. Hatschbach et al. 36240* (MBM!, SP!, NY!); São João d' Aliança, Corrente. Campo cerrado, solo rochoso, 20 Feb 2000, *G. Hatschbach et al. 70438* (MBM!, SPF!); Corumbá de Goiás, ca. 15 km N of Corumbá de Goiás, north slope of ridge, forest and adjacent cerrado. , 15 May 1973, *W.R. Anderson et al. 10317* (NY, UB!)

4. **Ruellia chapadensis** U.G. Fern., Kameyama & E. Tripp, sp nov. TYPE: BRAZIL. Goiás: Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros. Trilha atrás da sede do Parque Nacional da Chapada dos Veadeiros, em cerrado *sensu stricto*, em solo arenoso e pedregoso, área parcialmente sombreada, [-47.824722°, -14.174444°], 981 m, 1 Jul 2017, *U. G. Fernandes, R. D. Sartin & F. S. Petrongari 206* (holotype: SP!; isotypes: COLO!, MBM!, RB!, UB!)

Erect to prostrate subshrubs, up to 40 cm tall, arising from a woody subterraneous system. **Younger stems** quadrangular to subquadrangular, tomentose to villosewith eglandular multi-cellular trichomes on different lenghts, the longer ±2mm long, 5—8 cells, the shorter ±0.5 mm long, 3—5 cells, older stems subquadrangular to terete, becoming woody, glabrescent. **Leaves** opposite, decussate, sessile, blades chartaceous, obovate to elliptic, 2.7—8.5×1.3—3 cm, bases cuneate to subcordate, margins entire, apices acute, obtuse or rounded, venation eucamptodromous becoming brochidodromous distally, veins prominent on abaxial surface, tomentose to villose, with many subsessile glandular trichomes on both surfaces. **Inflorescence** terminal or axilary, of solitary flowers (i.e. reduced dichasia) in the axils of first order bracts, the central axis never developing into a flower; peduncle up to 5 mm long, densely glandular-pubescent and with subsessile glandular trichomes; central axis densely glandular-pubescent and with subsessile glandular trichomes; first order bracts opposite, decussate, sessile, narrowly elliptic to oblanceolate, 6—23(—25)×2—7(—10) mm, margins entire, apices acute to rounded, densely glandular-pubescent and subsessile glandular trichomes, oleous; second order bracts 2, sessile, narrowly elliptic to oblanceolate, 13—21×2,5—6 mm, margins entire, apices acute to rounded, densely glandular-pubescent and subsessile glandular trichomes. **Flowers** short pedicellate, pedicels 1—1.5 mm long, densely glandular-pubescent,; calyx 16—18 mm long in flower, 18—20 mm long in fruit, fused portion 2 mm long, segments subequal, the posterior ca. 1 mm longer, 14—17×1—1.5 mm linear, apices acute to slightly rounded, glandular-pubescent to tomentose with subsessile glandular trichomes; corolla white, bent-infundibular, 30—35 mm long, densely glandular-pubescent, the narrow unexpanded portion of tube pale yellow, 11—14×1.5—3 mm, opening abruptly to the expanded portion, obconic, 18—22×8—11 mm, somewhat with a pinkish line and macula inside of the expanded portion, lobes, patent, orbicular to suborbicular, 10—23×8—23 mm, 8—12×10—11 mm, apices emarginated to rounded, ciliate with

glandular trichomes; stamens included, slightly didynamous, with the free portion of the filaments 15—16 mm, glabrous, filament curtain glabrous to sparsely puberulent externally, anthers 4 mm long, connective glabrous; ovary ovoid, ± 3 mm long, villose with eglandular trichomes and with subsessile glandular trichomes, style subexserted, ±35 mm long, sparsely pubescent becoming glabrescent distally, stigma bilobed, subexserted, the anterior lobe erect, ±0.5mm long, the posterior lobe patent, ± 2mm long; **Capsule** ellipsoid, 11—15×6—7mm, with a solid base 2—3 mm long, the surface densely glandular-pubescent, retinaculae 5—6 mm long; seeds 4, suborbicular, 5—6 mm diam., dark brown, with hygroscopic trichomes covering the entire surface. Figures 7 and 8 A-D.

Distribution and Habitat—*Ruellia chapadensis* has been collected inside and nearby Chapada dos Veadeiros National Park (Fig. 9). This species occurs in cerrado *sensu stricto*, growing on rocky and sandy soils.

Etymology—The specific epithet refers to the location where this species was collected, Chapada dos Veadeiros National Park.

Phenology—*Ruellia chapadensis* has been collected with flowers from April to July and with fruits in July.

Conservation status— *Ruellia chapadensis* has an extent of occurence (EOO) of 7.170 km² and an area of occupancy (AOO) of 20.000 km². It has been collected on five occaisions, each of these instances geographically proximal to one another inside and near the border of the National Park. As such, we consider these to represent a single location, under the same threats mentioned above for *R. altoparadisiensis*. As such, we rank *R. chapadensis* as Critically Endangered (B1 ab ii,iii+B2 ab ii,iii) according to IUCN criteria (IUCN 2017).

Taxonomic notes—*Ruellia chapadensis* can be easily recognized by its obovate to elliptic, tomentose sessile leaves, its sticky, oily glandular indumentum on the bracts,

bracteoles, and calyx, which yields a characteristic smell *in vivo* (U.G. Fernandes pers. obs.), and its white corollas (more rarely with pale light-pink lines inside the expanded portion of the tube).

Additional Specimens Examined (Paratypes)— **Brazil.**—GOIÁS: Mun. Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros, limite do parque, cerrado, encosta, 3 Abr 2001, *E. A. Anunciação & L. X. Almeida 1015* (SP!); ibid., Parque Nacional da Chapada dos Veadeiros, trail from entrance of park to waterfalls, relatively close to trailhead, mata ciliar, -47.820443°, -14.166081°, ca. 1000 m, 13 Aug 2016, *E. Tripp et al. 5940* (SP!, COLO!); ibid., Parque Nacional da Chapada dos Veadeiros, trilha para os cânions e Sete Quedas, 12 Sep 2014, *R.D. Sartin & C. Siniscalchi 642* (SPF!, SP!); ibid., Parque Nacional da Chapada dos Veadeiros, borda da Trilha dos Saltos em cerrado *sensu stricto*, em solo pedregoso-arenoso, [-47.831667°, -14.164167°], 933 m, 1 jul 2017 *U. G. Fernandes et al. 216* (SP!); Povoado de São Jorge, campo sujo, em solo pedregoso, na beira da estrada sentido Mirante/Abismo, [-47.828333°, -14.177778°], 1025 m, 6 Jul 2017 *U. G. Fernandes & F. S. Petrongari 276* (SP!, MBM!); ca. de 1 km antes de São Jorge na estrada Alto Paraíso – Colinas do Sul. Divisas com o Parque Nacional da Chapada dos Veadeiros, 3 VI 1999, *R. Mello-Silva & T. B. Cavalcanti 1662* (SPF!, CEN!, SP!); ibid., 3-5 km O de São Jorge, campo rupestre, solo rochoso, 14 Jun 1993 *G. Hatschbach et al. 59524* (MBM!).

5. **Ruellia glandulicalyx** U.G. Fern., Kameyama & E. Tripp, sp. nov. TYPE: BRAZIL. Goiás: Alto Paraíso de Goiás, Cachoeira do Segredo, coletada na mata ciliar, na margem direita do Rio do Segredo sentido cachoeira, em ambiente úmido e sombreado, solo arenoso-argiloso, com serapilheira. [-47.860000°, -14.265556°], 636 m, 7 Jun 2017, *U.G. Fernandes & F.S. Petrongari 287* (holotype: SP!; isotypes: COLO!, RB!, UB!, US!)

Erect to prostrate subshrubs, 15 to 80 cm tall, frequently rooting at the nodes. **Younger stems** quadrangular to subquadrangular, frequently sulcate, glabrous to glabrescent with eglandular trichomes and subsessile glandular trichomes, villose on the nodes, older stems subquadrangular to terete, glabrescent to glabrous. **Leaves** opposite, decussate, petiolate, petioles 1—7 mm, subterete to sulcate, sparsely puberulent to villose, blades membranaceous, discolored with the abaxial surface light green to vinaceous, the adaxial surface dark green, ovate to elliptic, (1.5—)2.8—10.5(—11.5)×(0.3—)0.5—4.2 cm, bases attenuate to decurrent, margins entire to slightly repand, apices acute to attenuate, venation eucamptodromous, veins prominent on both surfaces, puberulent to sparsely puberulent with eglandular trichomes on the nervures and margins, rarely on the blade, and subsessile glandular trichomes on both surfaces, densely on abaxial surface; **Flowers** solitary, rarely two (i.e. reduced dichasia), in the axils of upper leaves, subsessile, pedicels 1—2 mm long, densely glandular-pubescent, bracts absent; calyx 9—15 mm long in flower, 15—18 mm long in fruit, fused portion 1—2 mm long, segments equal, 7—12(—15)×1mm, linear, apices slightly rounded, densely glandular-pubescent with subsessile glandular trichomes; corolla pale lilac to white, bent-infundibular, (16—)20—25mm long, pubescent with glandular trichomes, the narrow unexpanded portion of tube pale yellow or white, 10—15×1.5—2mm, opening abruptly to the expanded portion, obconic, 8—13×5—6 mm, lobes, patent, orbicular to suborbicular, 5—7×4—6 mm, apices emarginated to rounded; stamens included, didynamous, with the free portion of the filaments 5—7 mm long (longer pair), 3—4 mm long (shorter pair), glabrescent with eglandular trichomes, united by a filament curtain sparsely puberulent, anthers 2.5—3 mm long, connective glabrous; ovary ovoid, ± 3 mm long, densely glandular-pubescent, style 18—22 mm long, sparsely pubescent, stigma bilobed, included, the anterior lobe erect, ±0.25mm long, the posterior lobe patent, ± 1.5mm long;

Capsule oblanceolated to ellipsoid, (11—)13—17×4 mm, with a solid base 3—4 mm long, the surface densely glandular-pubescent, retinaculae 3 mm long; seeds 8—12, suborbicular, 3—3.5 mm diam., light-brown, with hygroscopic trichomes covering the entire surface. Figures 8 and 10 E-H.

Distribution and Habitat—*Ruellia glandulicalyx* has been collected in shaded understories of semideciduous forests and riparian forests, in northeastern Goiás and Distrito Federal (Fig. 6).

Etymology— The specific epithet refers to the remarkable glandular-pubescent indumentum covering the calyx of this species.

Phenology— *Ruellia glandulicalyx* has been collected with flowers and fruits from May to August.

Conservation status— *Ruellia glandulicalyx* occurs in seven localities, of which only three are in protected areas. This species has an extent of occurence (EOO) of 25,940.777 km² and an area of occupancy (AOO) of 28.000 km². Although the EOO is large, the small AOO and few localities, which are inside a protected area, are characterized by intense touristic activities. As such, we rank this species as Vulnerable (B2 ab i,ii,iii) following to IUCN criteria (IUCN 2017).

Taxonomic notes—*Ruellia glandulicalyx* can be recognized by its subsessile flowers in the axils of the upper leaves, its glandular-pubescent calyces with lobe apices that are slightly rounded, and its white to pale lilac corollas. This species is morphologically similar to *R. epallocaulos* Leonard ex C. Ezcurra & Wassh. but differs in the absence of bracteoles (vs. bracteoles lanceolate), in its glandular-pubescent calyx segments (vs. pubescent with eglandular trichomes), and in distribution (restrict to the state of Goiás and Distrito Federal vs. eastern Paraguay, northeastern Argentina and southern Brazil [Ezcurra 1993]).

Additional Specimens Examined (Paratypes)— **Brazil.**—DISTRITO FEDERAL: Brasília, mata semidecídua, ca. 1 km W do Rio das Salinas, [-47.966667°, -15.516667°], 840 m., 13 Aug 1981, *J.H. Kirkbride Jr. 4339* (UB!; CEN!); ibid., Reserva IBAMA-SEMATEC. CIPLAN (Cimentos Planalto), DF-205, 58 km CENARGEN e 43 km da CIPAN, mata ciliar perturbada, cambissolo, [-48.016667°, -15.833333°], 25 Jun 1992, *T.A.B. Dias et al. 234* (CEN!, SPF?); GOIÁS: Cristalina, mata a esquerda da ponte (margem direita) que dá acesso à guarita da saída para Palmital, [-47.340000°, -16.209722°], 15 May 2002, *A.A. Santos et al. 1181* (CEN!); ibid., mata a esquerda da área de empréstimo localizada a frente do clube ASCEB, [-47.336667°, -16.218333°], 24 Jun 2002, *A.A. Santos et al. 1250* (CEN!, SP!); Niquelândia, Fazenda Engenho. Ca. De 11 km de Niquelândia/Dois Irmãos. Solo Pedregoso/argiloso. Relevo ondulado. Mata ciliar, 580 m, 27 Jan 1997, *M.L. Fonseca et al. 1481* (IBGE!); Pirenópolis, Santuário de Vida Silvestre Vagafogo, fim da trilha principal, perto de nascente. Em mata de encosta semi-decídua, em terreno de declive até o rio a 10 m. Perto da árvore 92, -15.4908°, -48.5950°, 2 Jul 2002, *C.W. Fagg et al. 1201* (IBGE!, SPF!, UB!, US); ibid., Santuário de Vida Silvestre Vagafogo, Floresta de encosta e de galeria a margem do rio Vagafogo, com copa de 25-35m, [-48.995000°, -15.824167°], 900m, 9 Jul 2006, *P.G. Delprete et al. 9877* (UFG!, RB!); ibid., [-48.995000°, -15.824167°], 900m, 9 Jul 2006, *P.G. Delprete et al. 9893* (UFG!, RB!); ibid., Santuário de Vida Silvestre Vagafogo, coletada em borda de mata, [-48.994722°, -15.822500°], 808 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 327* (SP!); ibid., Santuário de Vida Silvestre Vagafogo, subosque de mata de galeria, ao lado da ponte de madeira, área sombreada, bastante úmida, solo humoso-arenoso, [-48.996111°, -15.821389°], 799 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 329* (SP!); ibid. coletada na mata, [-48.996667°, -15.821389°], 791 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 331* (SP!); ibid., Santuário de Vida Silvestre Vagafogo, coletada na trilha de madeira, solo arenoso-humoso, [-48.996667°, -15.819444°], 803 m, 16 Jul 2017,

U.G. Fernandes & F.S. Petrongari 332 (SP!); ibid., Santuário de Vida Silvestre Vagafogo, coletada em borda de mata, na trilha para o cerrado, solo úmoso-argiloso, [-48.996944°, -15.824722°], 786 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 335* (SP!); ibid., Santuário de Vida Silvestre Vagafogo, Trilha para o circuito de aventuras, subosque de floresta estacional semidecidual, ambiente sombreado, solo argiloso-humoso, [-48.994444°, -15.821389°], 834 m, 16 Jul 2017, *U.G. Fernandes & F.S. Petrongari 336* (SP!); ibid., Reserva Natural Vagafogo, vinicity of the town, trail from station to the forest., -48.59697°, -15.49360°, 778 m, 14 Aug 2016, *E. Tripp et al. 5944* (SP!, COLO!, RSA!, CAS!)

6. **Ruellia glandulifolia** U.G. Fern., Kameyama & E. Tripp, sp nov. TYPE: BRAZIL. Goiás: Cavalcante, coletada na borda de cerrado *sensu stricto*, na beira da estrada de terra, continuação da GO-241, sentido sul, a ca. 3 km de Araí, em solo arenoso-pedregoso, [-47.646944°, -13.600000°], 1083 m, 5 Jul 2017, *U.G. Fernandes, R.D. Sartin & F.S. Petrongari 270* (holotype: SP!; isotype: RB!, SPF!, UB!)

Erect or prostrate subshrubs, up to 1 m tall, arising from a woody subterraneous system. **Stems** subquadrangular to terete, reddish brown, younger stems densely glandular-pubescent, with eglandular and glandular multi-cellular trichomes of different lenghts, the longer ±1 mm long, 4—5 cells, the shorter ± 0.5 mm long, 2—4 cells, and subsessile glandular trichomes, older stems glabrescent. **Leaves** opposite, decussate, sessile, frequently imbricate, blades chartaceous, obovate, elliptic, oblong, ovate, lanceolate, oblanceolate, narrowly oblong 1.2—6.2×0.4—3.8 cm, bases subcordate, frequently amplexicaulis, margins entire, ciliate, frequently revolute, apices acute, obtuse to rounded, venation eucamptodromous becoming brochidodromous distally, veins prominent on both surfaces,

tomentose to densely glandular-pubescent with subsessile glandular trichomes on both surfaces, rarely without glandular trichomes, sticky with a characteristic smell when fresh, dry material with a soft texture. **Flowers** solitary or two (i.e. reduced dichasia), in the axils of upper leaves, subsessile, pedicels 1(—2) mm long, densely glandular-pubescent, first order bracts 1 or 2, rarely abscent, oblanceolate, spatulate, linear, rarely ovate 3—7×1—3mm, apices rounded, densely glandular-pubescent with subsessile glandular trichomes; calyx 9—13 mm long, not accrescent in fruit, fused portion 2—3 mm long, segments equal, 7—11×1 mm, linear-triangular, apices acute, densely pubescent with subsessile glandular trichomes and some glandular trichomes sparse; corolla lilac to pale lilac, bent-infundibular, 25—60 mm long, glandular-pubescent, the narrow unexpanded portion of tube white to pale yellow, 15—35×2—3 mm, opening abruptly to the expanded portion, obconic, 14—25×6—20 mm, lobes, patent, orbicular to suborbicular, 5—15×5—18 mm, apices emarginated to rounded, ciliate with eglandular and glandular trichomes; stamens included, didynamous, free portion of the filaments 6—12 mm long (longer pair), 2—5 mm long (shorter pair), sparsely pubescent with eglandular trichomes, filament curtain puberulent externally, anthers 3—4.5 mm long, connective ciliate with eglandular trichomes; ovary ovoid, 3—4 mm long, velutinous with eglandular trichomes, style included, 25—42 mm long, pubescent becoming glabrescent distally, stigma bilobed, included to subexserted, the anterior lobe erect, 0.25—0.5 (—4)mm long, the posterior lobe patent, 2—2.5(—6) mm long. **Capsule** obovoid, 14—15×6—7 mm, with a solid base 2 mm long, the surface velutinous with eglandular trichomes, retinaculae 4—5 mm long; seeds 4, suborbicular, 5—6 mm diam., dark brown, with hygroscopic trichomes covering the entire surface. Figures 11 and 12 A-B.

Distribution and Habitat—*Ruellia glandulifolia* has been collected only in Distrito Federal and northern Goiás (Fig. 13) where it was found growing in campos rupestres, campos sujos, and cerrado *sensu stricto*, on rocky and sandy soils or sandy-clay soils.

Etymology— The specific epithet refers to the remarkable sticky glandular-pubescent indumentum of the leaves.

Phenology—*Ruellia glandulifolia* has been collected with flowers and fruits from May to September.

Conservation status—*Ruellia glandulifolia* has an extent of occurence (EOO) of 33,343.305 km² and an area of occupancy (AOO) of 96.000 km². It has been collected in 20 locations. Although the AOO is small, this species is rather frequent in undisturbed and disturbed vegetation. As such, we rank *R. glandulifolia* as Not Threatened according to IUCN criteria (IUCN 2017).

Taxonomic notes— *Ruellia glandulifolia* is commonly misidentified in herbaria as *Ruellia nitens* (Nees) Wassh and *R. helianthemum* (Nees) Profice owing to similarities in habit and corolla color. *Ruellia glandulifolia*, however, has sessile, frequently clasping leaves with subcordate bases (vs. petiolate, cuneate to rounded), glandular-pubescent indumentum (vs. glabrous to minutely pubescent in *R. nitens* and pilose, pubescent to villose with subsessile glandular trichomes in *R. helianthemum*).

Additional Specimens Examined (Paratypes)— **Brazil.**—DISTRITO FEDERAL: Brasília, DF-170, a 7 km do entroncamento com DF-001 - Chapada da Contagem, Cerrado, solo areno-pedregosos, relevo ondulado.20 km S, campo arenoso, 12 Jul 1990, *T.B. Cavalcanti et al. 542* (CEN!, SPF!); ibid., Cerrado próximo ao CPAC, sentido Sobradinho - Planaltina, cerrado *sensu stricto*, solo cascalho-arenoso, relevo ondulado, 3 Jul 1981, *L. Coradin* et al. 4256 (SP!, CEN!); ibid., edge of Chapada da Contagem, 18 km N of Brazilia television tower, [-48.883333°, -15.616667°], 1200 m, 22 Jun 1982, *T.B. Croat 53647* (UB!); ibid., cerrado sujo, solo areno-argiloso, relevo ondulado, 1 km a oeste da DF-130, próximo ao corrego Saco dos Pilões, afluente do São Bartolomeu, [-47.683333°, -15.733333°], 1100 m,

20 May 1992, *T.A.B. Dias et al. 148* (CEN!, SPF!); ibid., na DF-100 a 99,7 km do CENARGEN/EMBRAPA a esquerda da estrada, campo sujo, latossolo amarelo, areno argiloso, [-47.383333°, -15.550000°], 5 May 1992, *T.A.B. Dias et al. 79* (CEN!, SPF!); ibid., campo cerrado pouco limpo, [-47.733333°, -15.766667°], 1050 m, 18 May 1982, *C.D. Goés Jr. 21* (CEN!, UB!, SPF!); ibid., córrego Fazendinha, campo sujo, [-47.716667°, -15.783333°], 1000 m, 22 May 1984, *N.A. Hakme 14* (UB!, SPF); ibid., Chapada da Contagem, ca. 25 km. N.E. of Brasília. Recently burned-over campo, 1000 m, 7 Sep 1965, *H.S. Irwin et al. 8050* (UB!, NY!); ibid., steep campo slope bordering gallery forest, Chapada da Contagem, ca. 20 km E. of Brasília, 700-1000m, 19 Sep 1964, *H.S. Irwin & T.R. Soderstrom 6247* (SP!, NY!, UB); ibid., Região da Palma. Cerrado distrófico, [-48.033333°, -15.066667°], 1200 m, 20 Sep 1983, *J.R.S. Mendes 7* (UB, SPF!); ibid., córrego Fazendinha, Campo cerrado, campo sujo, vale. [-47.716667°, -15.783333°], 1000 m alt., 22 May 1984, *C.F. Neri 7* (UB, SPF!); ibid., Campo cerrado um pouco aberto, próximo de uma Estrada [-47.833333°, -15.500000°], 1032m, 18 May 1982, *E.M. Pereira 15* (UB, SPF); ibid., Córrego Fazendinha, Campo cerrado. [-47.716667°, -15.783333°], 1000 m, *N.A.B. Pereira 31* (UB!, SPF!); ibid., Campo cerrado pouco aberto, [-47.733333°, -15.766667°], 1052 m, 18 May 1982, *R.L.M. Pinto 20* (UB!, SPF!); ibid., Campo cerrado pouco aberto, [-47.733333°, -15.766667°], 18 May 1982, 1052 m, *R.H. Santos 40* (CEN!, UB!, SPF!); ibid., Córrego Fazendinha, campo sujo com alguma interferência humana, [-47.716667°, -15.783333°], 1000 m, 1984, M.N. Sato 7 (UB!, SPF!); São Sebastião. Fazenda Santarém, Campo limpo, relevo acidentado, 13 May 1984, *C. Sinigaglia et al. 4* (CEN!, SP!) ;ibid., Parque da Erminia Dom Bosco, cerrado *sensu stricto*, relevo levemente acidentado, substrato pedregoso, 28 Jul 2004, *C. Sinigaglia et al. 10* (CEN!, RB!, SP!); ibid., córrego Fazendinha, campo sujo, [-47.716667°, -15.783333°], 1000 m, 22 Abr 1984, *I.M. Teixeira 13* (UB!, SPF!); ibid., campo cerrado limpo na região da Palma. Acesso por via que parte de Sobradinho-DF em direção ao

Parque Nacional de Brasília, 9 Jun 1981, *U.U.A. Vilela 41* (SPF, UB); ibid., QI 28 - Lago Sul. Áreas savânicas e campestres abaixo da Mata do Parque das Copaíbas, descendo na direção do Lago Paranoá, Cerrado sentido restrito com manchas de campo, [-47.816667°, -15.816667°], 1050 m, *B.M.T. Walter et al. 5197* (CEN; SP); ibid., Reserva Biológica da Contagem (REBIO), entrada pelo Ecoresort Jesusalém, no Lago Oeste. Mata seca semi-decídua, [-47.889167°, -15.626667°], 1186 m, 19 Jun 2012, *M.R.V. Zanatta & T.R.B. Mello* 1373 (UB!, SPF!); ibid., Reserva Biológica da Contagem (REBIO). Campo limpo rupestre, [-47.874167°, -15.648611°], 1220 m, 19 Jul 2012, *M.R.V. Zanatta & T.R.B. Mello 1403* (UB!, SPF!); GOIÁS: Alto Paraíso de Goiás, estrada saindo da Fazenda Oréades para São Jorge, cerrado típico, 1 Jul 2011, *J.R.N. Vidal et al. 86* (HEPH!, SP!); ibid., estrada sentido Cachoeira do Segredo, em cerrado *sensu stricto*, ambiente aberto, solo arenoso-rochoso, [-47.893333°, -14.227222°], 703 m, 7 Jul 2017, *U.G. Fernandes & F.S. Petrongari 280* (SP!); ibid., rodovia para Colinas do Sul, 3-5 km O de São Jorge, campo cerrado, transição para rupestre, solo rochoso, 14 Jul 1993, *G. Hatschbach et al. 59553* (MBM!, US!); Cavalcante, ibid., coletada na borda de cerrado *sensu stricto*, na beira da estrada de terra, continuação da GO-241, sentido sul, a ca. 4 km de Araí, em solo arenoso-pedregoso, [-47.645556°, -13.605278°], 1079 m, 5 Jul 2017, *U.G. Fernandes et al. 272* (SP!); RPPN Serra do Tombador, 6 km a SW da reserva, em direção a Minaçu. Cerrado aberto, relevo plano, solo arenoso com cascalho de quartzo e arenito [-47.846389°, -13.673056°], 714 m, 25 Jul 2014, *M.F. Simon & L. Borges 2478* (CEN!, SP!); 60.6 km from start of dirt road that leaves Cavalcante going W towards Serra do Tombador. Beautiful and intact cerrado with mixed patches of campos rupestres, on sandy soil, -47.38799°, -1313467°, 1094m, 12 Aug 2016, *E. Tripp et al. 5932* (SP!; COLO!; US!; RSA!; RB!); Goiânia, Alexamia - Rio Descoberto, 13 Jul 1964, *A.P. Duarte & A. Mattos 8189* (RB!, SP!); Niquelândia, cerrado *sensu stricto*, na beira da estrada Colinas do Sul-Niquelândia, [-48.127778°, -14.336389°], 481m, 7 Jul 2017,

U.G. Fernandes & F.S. Petrongari 298 (SP!); ibid., estrada que sai da Rodovia Uruaçu-Niquelândia (cerca de 60 km de Uruaçu), 15 Jul 2000, *V.C. Souza et al. 23947* (ESA!).

7. **Ruellia glaziovii** U.G. Fern. & Kameyama, sp nov. TYPE: BRAZIL. Distrito Federal: Reserva Ecológica do IBGE. Área de campo sujo próximo ao Córrego Taquaral, local queimado a 32 dias. [-47.638333°, -15.931944°], 1015 m, 1 Sep 1999, *M.L. Fonseca & D. Alvarenga* (holotype: SPF!; isotype: IBGE!, US!)

Erect or prostrate subshrubs, up to 30 cm tall, arising from a woody subterraneous system. **Stems** quadrangular to subquadrangular, younger stems villose to tomentose, with eglandular multi-cellular trichomes of different lenghts, the longer ± 2 mm long, 6—8 cell, the shorter ± 1 mm long, 3—5 cells, and subsessile glandular trichomes, older stems villose, glabrescent, becoming woody. **Leaves** opposite, decussate, sessile to petiolate, petioles 1—7mm, sulcate, tomentose to villose with eglandular trichomes, blades chartaceous, discolored, abaxial surface light green and adaxial surface ovile green, obovate, elliptic, oblong, ovate, lanceolate, oblanceolate, narrowly oblong 0.5—13×0.2—3.6 cm, bases sessile to decurrent, margins entire to slightly repand, apices acute to rounded, venation eucamptodromous becoming brochidodromous distally, veins prominent on both surfaces, the main vein sulcate on adaxial surface, younger leaves tomentose, older leaves villose to tomentose with eglandular trichomes and subsessile glandular trichomes on abaxial surface and villose with eglandular trichomes on adaxial surface. **Inflorescence** of solitary or two flowers (i.e. reduced dichasia), in the axils of upper leaves peduncules 5—50 mm long, purplish green, tomentose to villose with subsessile glandular trichomes, bracts abscent; **Flowers** sessile, calyx (7—)11—21 mm long, not accrescent in fruit, fused portion 1.5—2

mm long, segments equal, (5—)9—18×1—1.5 mm, linear-triangular, apices acute, tomentose to villose, with eglandular trichomes and subsessile glandular trichomes; corolla lilac, bent-infundibular, 25—40(—45) mm long, villose with eglandular trichomes, the narrow unexpanded portion of tube pale lilac to pale yellow, 10—19×2—2.5 mm, opening abruptly to the expanded portion, obconic, 16—30×7—11 mm, lobes, patent, orbicular to suborbicular, (7—)11—15×11—19 mm, apices emarginated to rounded; stamens included, didynamous, free portion of the filaments 9—11 mm long (longer pair), 5—6 mm long (shorter pair), glabrous, filament curtain pubescent externally, anthers 3—4.5mm long, connective ciliate with eglandular trichomes; ovary ovoid, 2—3 mm long, velutinous to hirsutulous with eglandular trichomes, style included, 23—35 mm long, hirsutulous becoming glabrescent distally, stigma bilobed, included to subexserted, the anterior lobe erect, ±0.5mm long, the posterior lobe patent, ±2 mm long; **Capsule** obovoid, 9—11×6—8 mm, with a solid base 2 mm long, the surface vellutionous with eglandular trichomes and sparse short-pedunculate glandular trichomes, retinaculae 4—5 mm long; seeds 4, suborbicular, 4—5 mm diam., brown, with hygroscopic trichomes covering the entire surface. Figures 12 C-D, 14.

Distribution and Habitat—*Ruellia glaziovii* occurs in campos limpos and campos sujos, from Distrito Federal to northern Goiás (Fig. 13).

Etymology— The specific epithet honors Auguste François Marie Glaziou, a French botanist who collected in Brazil between 1861 and 1895.

Phenology—*Ruellia glaziovii* has been collected with flowers from April to November and fruits in September and October.

Conservation status—*Ruellia glaziovii* has an extent of occurence (EOO) of 15,119.635 km² and an area of occupancy (AOO) of 68.000 km². To date, it has been collected in nine localilties. The Brazilian Cerrado, which is a biodiversity hostpot (Myers et

al. 2000), has lost 46% of its native vegetation cover, and as little as 19.8% remains undisturbed (Strassburg et al. 2017). The deforestation is associated with human activities (e.g. the expansion of monoculture and pastures, urban occupation), and increase of atypical fires. Considering these threats, we categorize this species as Vulnerable (VU) (B1 ab i,iii,iv), according to IUCN criteria (IUCN 2017).

Taxonomic notes—*Ruellia glaziovii* can be recognized by its lilac flowers arranged in uniflorous cymes and its long purplish-green peduncules in the axils of the upper leaves. Most of the collections of this species were made immediately after wildfires, when it frequently flowers.

This species was firstly described together with the name *Ruellia eriocalyx* as a doubtful new species by Glaziou in his notebook, published in *Plantae Brasiliae centralis a Glaziou lectae. Liste des plantes du Brésil Central recueillies en 1861-1895* (1905-1911). This work is listed in "Opera utique oppressa", Appendix I of the Shenzhen Code (Turland et al. 2018), and according to the Article 34.1 "*New names at specified ranks included in publications listed as suppressed works (opera utique oppressa; App. I) are not validly published and no nomenclatural act within the work associated with any name at the specified ranks is effective*."

Additional Specimens Examined (Paratypes)— **Brazil.**— DISTRITO FEDERAL: Brasília, Fazenda Água Limpa (UnB), Campo sujo em borda de floresta de galeria, [-47.905556°, -15.926389° to -47.905833°, -15.944444°], 1050 m, 10 Apr 2007, *A.G. Amaral 1230* (IBGE); ibid., Campo sujo em borda de floresta de galeria, [-47.905556°, -15.926389° to -47.905833°, -15.944444°], 1050 m, 1 Jun 2007, *A.G. Amaral & C.U.O. Eugenio 1540* (IBGE); ibid., Jardim Botânico de Brasília, Área do Cristo Redentor, entre o córrego Tapera e Taperinha, solo claro, argiloso, arenoso, pedregoso. Campo sujo queimado a 22 dias, [-

47.850000°, -15.866667°], 1100 m, 28 Jul 2011, *M. Aparecida da Silva & D. Alvarenga 7387* (IBGE, RB, UFG); ibid., Parque Nacional de Brasília, em cerrado sujo queimado a ca. 1 mês, ambiente aberto, solo argiloso-arenoso, [-48.011667°, -15.643333°], 1185 m, 13 Jul 2017, *U.G. Fernandes & F.S. Petrongari 318* (SP); ibid., Parque Nacional de Brasília, em cerrado sujo queimado a ca. 1 mês, ambiente aberto, solo argiloso-arenoso, [-48.010833°, -15.643611°], 1187 m, 13 Jul 2017, *U.G. Fernandes & F.S. Petrongari 319* (SP); ibid., Fundação Zoobotânica, cerrado, 19 Sep 1961, *E.P Heringer 8704* (SP, RB, NY, UB); ibid., Bacia do Rio São Bartolomeu, 9 Jun 1980, *E.P Heringer 5044* (IBGE, MO); ibid., burned-over cerrado, immediately northwest of Brasília, 10 Sep 1965, *H.S. Irwin et al. 8164* (UB, NY); ibid., without precision location, Aug 1961, *W. Macedo 78* (RB); ibid., Jardim Botânico de Brasília, Campo limpo Área do Cristo Redentor, 4 Oct 2005, *K.R.S. Moreira 126* (HEPH), ibid., Reserva Ecológica do IBGE, Cerrado entre uma área de emprestimo (cascalheira) próximo à estação agriclimatilógica e o viveiro, 19 Oct 1994, *F.C.A. Oliveira & D. Alvarenga* (IBGE, RB); ibid., APA Gama-Cabeça de Veado. Abrigo Cristo Redentor, [-47.850000°, -15.866667°], 1025-1150m, 5 Sep 1994, *A.E. Ramos 902* (HEPH); ibid., Jardim Botânico de Brasília, Área do Cristo Redentor, [-47.881111°, -15.913889°], 1025-1150m, 6 Nov 2002, *R. Rodrigues da Silva 625* (HEPH); ibid., Estação Ecológica do JB de Brasília, Campo limpo recém queimado, [-47.904167°, -15.916111°], 1043m, 5 Sep 2003, *R. Rodrigues da Silva 846* (HEPH); ibid., Estação Ecológica do JB de Brasília, Área do Cristo Redentor, Cerrado típico, 26 Aug 2014, *A.C.A. Soares 292* (HEPH); ibid., Estação Ecológica do JB de Brasília, Área do Cristo Redentor, Área queimada a 2 semanas, 28 Jul 2011, *J.R.B. Vidal 169* (HEPH); ibid., Fazenda Água Limpa/ UnB, Capo sujo ao lado da margem esquerda da porção central da Mata de Galeria do Córrego da Onça, [-47.916667°, -15.950000°], 21 Oct 1994, *B.M.T. Walter 2262* (CEN); GOIÁS: Alto Paraíso de Goiás, without especific location, 3 Sep 1995, *H.D. Ferreira 3094* (UFG); Niquelândia, 0,5 km Minas de Níquel, Próximo ao Povoado de

Macedo, cerrado queimado recentemente, [-48.419444°, -14.392222°], 17 Sep 1996, *M. Aparecida da Silva 3096* (IBGE, RB, US); ibid., Usina de Níquel Tocantins, 18 Oct 1996, *R. Marquete 2658* (IBGE, RB, US); without specific location, "As Antas et Pedro Sardinha, dans le campos queimados", 30 Aug 1894, *Glaziou 21877a* (P [barcode: P00650149], K [barcode K000534162]).

8. **Ruellia hatschbachii** U.G. Fern. & Kameyama, sp nov. TYPE: BRAZIL. Goiás: São João da Aliança, estrada para Vãozinho, 1150 m elev., 9 Feb 1994, *G. Hatschbach, M. Hatschbach & J.M. Silva 60227* (holotype: MBM!; isotype: SPF!, US! [barcode: 02861448], US! [barcode: 02863048])

Erect or prostrate subshrubs, up to 60 cm tall, arising from a woody subterraneous system. **Stems** quadrangular to subquadrangular, glabrous to glabrescent with eglandular trichomes, mainly on the nodes, reddish brown. **Leaves** opposite, sessile, imbricate, blades chartaceous, obovate to elliptic, (0.7—)1—4.6×(0.2-)0.5—1.5 cm, bases cuneate, margins entire, repand to slightly crenate, apices acute to rounded, brochidodromous, veins prominent on both surfaces, only with sparsely subsessile glandular trichomes on both surfaces. **Flowers** solitary or two (i.e. reduced dichasia), in the axils of upper leaves, subsessile, pedicels 2—4 mm long, glabrous to sparsely puberulent with eglandular trichomes, ± 0.1 mm long, first order bracts 2, oblanceolate, narrowly elliptic to linear, 6—13×1—3mm, apices acute, glabrous with subsessile glandular trichomes; calyx (13—)15—25 mm long, not accrescent in fruit, fused portion 2—3 mm long, segments equal to subequal, (10—)18—22×1—2 mm, oblanceolate, narrowly elliptic to linear, apices acute, ciliate at the margins with eglandular trichomes, and subsessile glandular trichomes; corolla lilac, bent-infundibular, 40—50 mm,

velutinous with glandular trichomes, the narrow unexpanded portion of tube, 15—18×2 mm, opening abruptly to the expanded portion, 28—30×10—13 mm, lobes, patent, orbicular to suborbicular, 11—14×11—18 mm, apices emarginated to rounded, ciliate with glandular trichomes; stamens included, didynamous, with the free portion of the filaments 8—10 mm long (longer pair), 3—4 mm long (shorter pair), glabrous, filament curtain sparsely puberulent externally, anthers 4—5 mm long, connective ciliate with eglandular trichomes; ovary ovoid, 3 mm long, velutinous with eglandular trichomes, style included, 30—38 mm long, pubescent becoming glabrescent distally, stigma bilobed, included to subexserted, the anterior lobe erect, ±0.5 mm long, the posterior lobe patent, 1—1.5 mm long. **Capsule** ellipsoid, 13—15×5—6 mm, with a solid base 2 mm long, the surface densely puberulent to hirsutulous; seeds 6, suborbicular, mature seeds not seen. Figures 12 E-H and 15.

Distribution and Habitat—*Ruellia hatschbachii* has been collected hitherto only in the municipalities of São João d'Aliança and Alto Paraíso de Goiás (Fig. 16), growing in campos sujos, on rocky and sandy soils.

Etymology— The specific epithet honors Gerdt G. Hatschbach, a great Brazilian collector and botanist from Museu Botânico de Curitiba. He collected more than 80,000 specimens, including the type of this new species, thus vastly improving knowledge of Brazilian flora.

Phenology—*Ruellia hatschbachii* has been collected with flowers and fruits in February, during the rainy season.

Conservation status—*Ruellia hatschbachii* has an extent of occurence (EOO) of 444.008km² and an area of occupancy (AOO) of 12.000 km² and is known from only three collections in non-protected areas. Thus, we categorize *R. hatschbachii* as Endangered (B1 ab ii,iii+B2 ab ii,iii), according to IUCN criteria (IUCN 2017).

Taxonomic notes—*Ruellia hatschbachii* is morphologically similar to *R. pohlii* by its imbricate leaves, but differs in having bracteoles only with subsessile glandular trichomes (vs. glandular-pubescent with subsessile glandular trichomes) and calyx segments that are oblanceolate, narrowly elliptic, or linear, and ciliate with eglandular trichomes (vs. linear-triangular and glandular-pubescent).

Additional Specimens Examined (Paratypes)— **Brazil.**—GOIÁS: Alto Paraíso de Goiás, 20 km S, campo arenoso, 18 Feb 1975, *G. Hatschbach et al. 36306* (MBM!, US!); São João d'Aliança, Corrente, Campo cerrado, solo rochoso, 20 Feb 2000, *G. Hatschbach et al. 70481* (MBM!, US!)

9. Ruellia lucindae U.G. Fern., Kameyama, & E. Tripp, sp nov. TYPE: BRAZIL. Goiás: Alto Paraíso de Goiás, Parque Nacional Chapada dos Veadeiros, trail from entrance of park to waterfalls. Open savanna on white sands, -14.166081°, -47.820443°, 1000 m, 13 Ago 2016, *E. Tripp et al. 5939* (holotype: SP!; isotype: COLO!, RSA!, RB!, US!, UB!)

Erect or prostrate subshrubs, 20—40 cm tall, arising from a woody subterraneous system. **Stems** reddish brown, younger stems quadrangular to subquadrangular, villose with eglandular trichomes and with subsessile glandular trichomes, older stems subquadrangular to terete, glabrescent. **Leaves** opposite, decussate, sessile, frequently imbricate, blades chartaceous, lanceolate, ovate, elliptic, narrowly elliptic, linear, narrowly oblong 0.9—3.7×0.2—0.7 cm, bases cuneate, margins entire, slightly repand, to slightly crenate, apices acute to slightly rounded, brochidodromous, veins prominent on both surfaces, sparsely pubescent with eglandular trichomes, ±2 mm long., or only at the margins or only with subsessile glandular trichomes on both surfaces. **Flowers** solitary or two (i.e. reduced

dichasia), in the axils of upper, subsessile, pedicels 1 mm long, villose with eglandular trichomes, first order bracts abscent, rarely 1 or 2, oblanceolate to linear, 1—3.5×0.5 mm, apices rounded, only with subsessile glandular trichomes; calyx 4—8 mm long, not accrescent in fruit, fused portion ±1 mm long, segments equal 3.5—7×0.5—1 mm, linear-triangular, apices acute, villose with eglandular trichomes and subsessile glandular trichomes; corolla lilac, bent-infundibular, 25—35 mm, densely pubescent to velutinous with eglandular trichomes, the narrow unexpanded portion of tube pale yellow, 8—18×1—1.5 mm, opening abruptly to the expanded portion, obconic, 12—19×4—9 mm, lobes, patent, orbicular to suborbicular, 6—10×5—10 mm, apices emarginated to rounded; stamens included, didynamous, with the free portion of the filaments ±8 mm long (longer pair), 3—4 mm long (shorter pair), glabrous, filament curtain puberulent externally, anthers 2—3 mm long, connective glabrous; ovary ovoid, 2—3 mm long, villose with eglandular trichomes, style included, 20—26 mm long, pubescent becoming glabrescent distally, stigma bilobed, included, the anterior lobe erect, ±0.25 mm long, the posterior lobe patent, 1—1.5 mm long; **Capsule** obovoid, 10—13×4—6 mm, with a solid base 2 mm long, the surface velutionous with eglandular trichomes, retinaculae 3 mm long; seeds 4, suborbicular, 3—3.5 mm diam., dark brown, with hygroscopic trichomes covering the entire surface. Figures 17 and 18 A-C.

Distribution and Habitat—*Ruellia lucindae* occurs in campos limpos and campos úmidos of the Chapada dos Veadeiros region (Fig. 9), where it grows on sandy soils as well as organic soils.

Etymology—The specific epithet honors Lucinda A. McDade, renown expert in Acanthaceae systematic, for her many contributions to knowledge of the family and to systematic biology more generally.

Phenology—*Ruellia lucindae* has been collected with flowers from July to September

and with fruits on August

Conservation status—*Ruellia lucindae* has an extent of occurence (EOO) of 37.461 km² and an area of occupancy (AOO) of 40.000 km² based on three localities inside and outside the Chapada dos Veadeiros National Park, near Park borders. *Ruellia lucindae* is under similar threats as *R. altoparadisiensis* and *R. chapadensis.* As such, according to IUCN criteria (IUCN 2017), we categorize this species as Endangered (B1 ab iii+B2 ab iii).

Taxonomic notes—*Ruellia lucindae* is similar to *R. trachyphylla* but differs by its brochidodromous leaves (vs. eucamptodromous) that are glabrous to sparsely pubescent with eglandular trichomes ca. 2mm long (vs. villose with eglandular trichomes ca. 1mm long).

Additional Specimens Examined (Paratypes)— **Brazil.**— GOIÁS: Alto Paraíso de Goiás, Chapada dos Veadeiros, Faz. Matão. Campo, 19 Sep 1981, *T.S.P. Caldas 14* (IBGE!); ibid., São Jorge, rodovia GO-239, próximo a São Jorge, Campo rupestre na beira da estrada [-47.718194°, -14.136750°], 1190 m, 17 Jul 2006, *M.F. Calió et al. 107* (SPF!); ibid., Estrada Alto Paraíso - Colinas do Sul, 23 km da GO 118, campo limpo com afloramento rochoso, relevo ondulado, solo arenoso, [-47.695833°, -14.130278°], 1220 m, 29 Aug 2004, *T.B. Cavalcanti et al. 3505* (CEN!, SP!); campo limpo úmido, ao lado direito da estrada sentido Vale da Lua, ambiente aberto, solo úmido, arenoso [-47.778889°, -14.171389°], 1005m, 3 Jul 2017, *U.G Fernandes et al. 234* (SP!); campo limpo úmido, próximo à vereda, ao lado direito da estrada sentido Vale da Lua, ambiente aberto, solo úmido, arenoso [-47.780278°, -14.170278°], 1001 m, 3 Jul 2017, *U.G Fernandes et al. 236* (SP!); Parque Nacional da Chapada dos Veadeiros, campo úmido do lado esquerdo da estrada após o alojamento do PNCV, próximo à uma vereda, ambiente aberto, solo arenoso e úmido [-47.765000°, -14.136944°], 1096 m, 3 Jul 2017, *U.G Fernandes et al. 251* (SP!); Parque Nacional da Chapada dos Veadeiros, subindo o morro após a vereda no Córrego dos Ingleses, solo

arenoso/pedregoso, relevo ondulado, campo sujo, 23 Out 1996, *R. Marquete et al. 2767* (IBGE!, US!); ibid., trilha para as cariocas e canion (Cachoeiras) do rio Preto, solo concrecionário, afloramentos rochosos, relevo levemente [-47.819167°, -14.143056°], 1050 m, 12 Sep 1996, *R.C. Mendonça et al. 2723* (IBGE!, US!); Parque Nacional Chapada dos Veadeiros, Córrego dos Ingleses, solo hidromórfico, relevo plano, Campo sujo, [-47.768889°, -14.138889°], 1050 m, 12 Sep 1996, *R.C. Mendonça et al. 2785* (IBGE!); Reserva Particular do Patrimônio Natural (RPPN), Mata Funda, propriedade Sr. Ângelo/Solange; solo pedregoso, relevo ondulado, campo sobre morro cascalhento, [-47.721389°, -14.147778°], 1165 m, 5 Jul 1998, *R.C. Mendonça et al. 3537* (IBGE!, US!); ibid. Reserva Particular do Patrimônio Natural (RPPN), Mata Funda, propriedade Sr. Ângelo/Solange; solo pedregoso, relevo ondulado, campo limpo na bases dos morros, próximo a uma "ilha" de cerrado, [-47.716389°, -14.146389°], 1140 m, *R.C. Mendonça et al. 3567* (IBGE!, US!); ibid., Parque Nacional da Chapada dos Veadeiros. Margem do rio Preto, entre as Corredeiras e as Cariocas. Campo limpo úmido, [-47.830278°, -14.152500°], 11 Sep 2014, *R.D. Sartin & C. Siniscalchi 636* (SPF!, SP!).

10. Ruellia pinguicula U.G. Fern., Kameyama, & E. Tripp, sp nov. TYPE: BRAZIL. Goiás: Cavalcante, coletada ao lado direito da GO-241, sentido Vão do Moleque, em campo sujo e em cerrado *sensu stricto* aberto, solo arenoso-pedregoso. [-47.475556°, -13.658611°], 1115 m, 5 Jul 2017, *U.G. Fernandes, R.D. Sartin & F.S. Petrongari 263* (holotype: SP!; isotype:COLO!, K!, MBM!, RB!, US!, UB!)

Erect to prostrate subshrubs, 0.3—1.2 m tall, arising from a woody subterraneous system. **Stems** reddish brown to light brown, younger stems quadrangular to subquadrangular,

villose with subsessile glandular trichomes, older stems subquadrangular to terete, glabrescent, with sparse subsessile glandular trichomes. **Leaves** opposite, decussate, sessile, linear, lanceolate, narrowly elliptic to elliptic, 1—5×0.2—1.4 cm, cuneate, margins entire, apices acute to rounded, eucamptodromous becoming brochidodromous distally, villose only proximally on the main vein, laminae only with many subsessile glandular trichomes on both surfaces. **Inflorescence** terminal of solitary (i.e. reduced dichasia) in the axils of first order bracts, the central axis never developing into a flower; peduncle up to 5 mm long, densely glandular-pubescent and with subsessile glandular trichomes; central axis densely glandular-pubescent and with subsessile glandular trichomes; first order bracts opposite, decussate, sessile, rhombic, elliptic, ovate, trulate or depressed ovate, 9—2×7—23 mm, margins entire to revolute, apices rounded, rarely acute, densely glandular-pubescent with subsessile glandular trichomes, glutinose, with a characterist smell when fresh (U.G. Fernandes pers. Obs); second order bracts 2, rarely absent, sessile, equal to unequal in size and shape, sessile, elliptic to obovate, 7—12×2—5 mm, margins entire, apices rounded, densely glandular-pubescent with subsessile glandular trichomes, viscidulous. **Flowers** short pedicellate, pedicels 1 mm long, densely glandular-pubescent,; calyx 10—13 mm, not accrescent in fruit, fused portion 2 mm long, segments equal, 7—10×1—2 mm, linear-triangular, apices acute to slightly rounded, densely glandular-pubescent with subsessile glandular trichomes; corolla lilac to purple, bent-infundibular, 30—45 mm, glandular-pubescent, the narrow unexpanded portion of tube pale yellow, 15—23×2 mm, opening abruptly to the expanded portion, obconic, 20—25×12—16 mm, lobes, patent, orbicular to suborbicular, 8—14×9—15 mm, apices emarginated to rounded, stamens included, didynamous, with the free portion of the filaments 10—13 mm long (longer pair), 4—6 mm long (shorter pair), glabrous, filament curtain puberulent externally, anthers 4 mm long, connective connective citiate with eglandular trichomes, ovary ovoid, ± 3 mm long, velutinous with eglandular trichomes, style subexserted, ±30 mm long,

pubescent becoming glabrescent distally, stigma bilobed, subexserted, the anterior lobe erect, ±0.5mm long, the posterior lobe patent, ± 2mm long. **Capsule** obovoid, 12—1,5×6—7 mm, with a solid base 2 mm long, the surface velutinous with eglandular trichomes, retinaculae 4 mm long; seeds 4, suborbicular, 4 mm diam., light brown, with hygroscopic trichomes covering the entire surface. Figures 18 D-E and 19.

Distribution and Habitat—*Ruellia pinguicula* has been collected only in the municipality of Cavalcante, Goiás (Fig. 16). It occurs in campos sujos and cerrado *sensu stricto* vegetation, growing on rocky and sandy soils.

Etymology—The specific epithet refers to carnivorous plant of the genus *Pinguicula* L. (Lentibulariaceae) whose leaves are similar to the bracts of *R. pinguicula*.

Phenology—*Ruellia pinguicula* has been collected with flowers from May to August and fruits from July to August.

Conservation status—*R. pinguicula* has an extent of occurence (EOO) of 224.026 km² and an area of occupancy (AOO) of 28.000 km². It is known from four locations, all of which are in unprotected areas. Thus, according to IUCN criteria (IUCN 2017), we rank this species as Endangered (B1 ab ii,iii+B2 ab ii,iii).

Taxonomic notes—*Ruellia pinguicula* can be easily recognized by its chartaceous, narrowly elliptic to linear leaves and congested, spiciform inflorescence with glandular-pubescent bracts. It is morphologically similar to *R. rosmarinus* in its habit and leaves, but differs by its apical, congested inflorescence with bracts and bracteoles (vs. subsessile flowers in the axils of the upper leaves lacking bracteoles).

Additional Specimens Examined (Paratypes)— **Brazil.**—GOIÁS: Cavalcante, caminho para Vão do Moleque, [-47.478333°, -13.646111°], 21 May 2011, *J.B. Bringel &*

J.F.B. Pastore 790 (UB!, HUEFS [photo!]); ibid., em campo sujo, ao lado esquerdo da estrada sentido Serra do Tombador, [-47.478692°, -13.636725°], 1132 m, 5 Jul 2017, *U.G. Fernandes et al. 264* (SP!); ibid., coletada em campo sujo, estrada para a Serra do Tombador, [-47.513164°, -13.616375°], 1179 m, 5 Jul 2017, *U.G. Fernandes et al. 267* (SP!); ibid., Coletada na estrada sentido Vão do Moleque, em campo sujo, [-47.52694°, -13.547500°], 1211 m, *U.G. Fernandes et al. 268* (SP!); ibid., GO 241, estrada de terra para o "Vão do Moleque". Cerrado com afloramentos rochosos à direita da estrada, [-47.523889°, -13.598889°], 1186 m, *R.D. Sartin et al. 588* (SP!); ibid., 33.4 km from start of dirt road that leaves Cavalcante going W towards Serra do Tombador, -47.31634°, -13.32775°, 1206 m, *E. Tripp et al. 5930* (SP!, COLO!, RSA!).

11. Ruellia rizzoi U.G. Fern., Kameyama & E. Tripp, sp nov. TYPE: BRAZIL. Goiás: Cavalcante, Vila Veneno, rio São Félix km 4. Campo sujo, relevo suave ondulado, solo arenoso com presença de cascalho solto, Área de influência da futura Hidrelétrica de Cana Brava, influência indireta. [-48.056944°, -13.536111°], 350 m, 27 Jun 2001, *G. Pereira-Silva & M. Carvalho-Silva 5201* (holotype: SP!; isotypes: CEN!, HUEFS!, US!)

Erect to prostrate subshrubs, 30—60 cm tall, arising from a woody subterraneous system. **Stems** reddish brown, younger stems quadrangular to subquadrangular, villose with subsessile glandular trichomes, older stems subquadrangular to terete, glabrescent to glabrous. **Leaves** opposite, decussate, petiolate, frequently caducous; petioles 2—4 mm long, subterete to sulcate, blades chartaceous, ovate to elliptic, 1.8—7×0.5—3.2 cm, bases cuneate to atenuate, margins entire to slightly repand, apices acute, eucamptodromous becoming brochidodromous distally, glabrescent with eglandular trichomes mainly over the main nerve

and over the margins, and subsessile glandular trichomes on both surfaces. **Inflorescence** terminal spiciform racemes with imbricate foliaceous bracts; peduncles 3—7mm, villose with eglandular pale yellow trichomes and subsessile glandular trichomes; bracts opposite, decussate, sessile, ovate, rarely elliptic, 10—32×6—15mm, margins entire, apices acute, rarely rounded, sparsely villose with eglandular trichomes and subsessile glandular trichomes. **Flowers** short pedicellate, pedicels 0.5—1 mm long, villose with subsessile glandular trichomes, bracteoles absent; calyx 6—9 mm, not accrescent in fruit, fused portion 1 mm long, segments equal, 4—6×1—15 mm, linear-triangular, apices acute, villose with subsessile glandular trichomes; corolla white to pale yellow, bent-infundibular, 27—35 mm, velutinous with eglandular trichomes, the narrow unexpanded portion of tube pale yellow, 14—2×1.5—2 mm, opening abruptly to the expanded portion, obconic, 15—18×5—6 mm, lobes, patent, orbicular to suborbicular, 9—14×7—12 mm, apices emarginated to rounded; stamens included, didynamous, with the free portion of the filaments 5—7 mm long (longer pair), 2—3 mm long (shorter pair), glabrous, filament curtain glabrous, anthers 3 mm long, connective ciliate; ovary ovoid, 3—4 mm long, velutinous with eglandular trichomes, style, ±25 mm long, velutinous becoming glabrescent distally, stigma bilobed, subexserted, the anterior lobe erect, ±0.5mm long, the posterior lobe patent, ± 2mm long. **Capsule** ellipsoid, 9—12×6 mm, with a solid base 2 mm long, the surface velutionous with eglandular trichomes, retinaculae 3—4 mm long; seeds 4, suborbicular, 3.5—4 mm diam., reddish brown to brown, with hygroscopic trichomes covering the entire surface. Figures 18 F-G and 20.

Distribution and Habitat—*Ruellia rizzoi* occurs in cerrado *sensu stricto* in Serra Negra, Serra da Mesa Lake, and Cana Brava Lake region in northern Goiás (Fig. 16), growing on rocky and sandy soils and sandy-clay soils.

Etymology—The specific epithet honors Professor Ph.D. José Ângelo Rizzo, who dedicated his life to study and collection plants of the state of Goiás and Tocantins.

Phenology—*Ruellia rizzoi* has been collected with flowers during the dry season from May to August and with fruits from June to August.

Conservation status—*Ruellia rizzoi* has an extent of occurence (EOO) of 515.326 km² and an area of occupancy (AOO) of 24.000 km². It is known from six localities, of which three are now flooded by dams created by the Cana Brava and Serra da Mesa hydroelectric projects. The other localities are nearby the flooded area and are threatened by the human activities (e.g. agriculture and livestock) in habitat. Therefore, we categorize *R. rizzoi* as Endangered (B1 ab ii,iii+B2 ab ii,iii), according to IUCN criteria (IUCN 2017).

Taxonomic notes—*Ruellia rizzoi* is morphologically similar to *R. adenostachya* Lindau in its flowers on apical spiciform racemes but differs in its erect to imbricate bracts that are sparsely velutionous, with subsessile glandular trichomes (vs. squarrose, glandular-pubescent bracts), and in its white to pale yellow corollas (vs. lilac).

Additional Specimens Examined (Paratypes)— **Brazil.**—GOIÁS: Cavalcante, Balsa do rio Tocantins (Serra Branca), para Serra Branca, km 2, Cerrado com relevo acidentado, solo arenoso com afloramento de quartzo leitoso, Área de influência da futura Hidrelétrica de Cana Brava, Influência direta, [-48.096667°, -13.573889°], 410 m., 23 May 2001, *G. Pereira-Silva et al. 5074* (CEN!, SP!); ibid. Ponte sobre o Rio Tocantins - Cavalcante, km 15, Cerrado aberto antropizado, solo arenoso, [-48.049444°, -13.377778°], 450 m, 30 Aug 2004, *T.B. Cavalcanti et al. 3511* (CEN!, SP!, RB!); Niquelândia, Estrada de acesso a barra do Rio Bagagem c/o Rio Tocantinzinho. Cerrado denso com árvores e arbustos, latossolo, relevo ondulado, [-48.283333°, -14.016667°], 450 m, 20 Jul 1995, *T.B. Cavalcanti et al. 1488* (CEN!, SPF!); ibid., Faz. Serra Negra (Niqueltocantins) - Serra Negra; P/O lado do Bagagem. Ao lado da linha de transmissão (ELET.), Cerradão com elementos de mata seca e também cerrado s.s., [-48.316667°, -14.033333°], 430 m, 11 Jun 1992, *B.M.T. Walter et al. 1613*

(CEN!, SPF!); ibid., Próx. a Serra Negra, 30 Jul 1987, *H.D. Ferreira & Naura 388* (UFG!); ibid., Próx. a Serra Negra, 1 Aug 1987, *H.D. Ferreira & Naura 413* (UFG!).

12. Ruellia pohlii (Nees) U.G. Fern., Kameyama & E. Tripp, **comb. nov.** *Dipteracanthus pohlii* Nees, Fl. Bras. 9: 43. 1847. TYPE: BRAZIL. Prov. Goyazanae [Goiás]: In vertice montium de S. Felis ad S. Anna [Cavalcante], without date, *J.B.E. Pohl 1977* (lectotype, designated here: W0004509!; isolectotype: GZU000249537!)

Erect subshrubs, arising from a woody subterraneous system, 20—40 cm alt, stems reddish brown; leaves opposite, imbricate, sessile, blades chartaceous, brochidodromous, only with subsessile glandular trichomes; flowers subsessile, solitary or two (i.e. reduced dichasia), in the axils of upper leaves, calyces with the segments equal, glandular-pubescent, corollas lilac; capsules obovoid, velutionous; seeds 4, with hygroscopic trichomes covering the entire surface. Figure 21 A-B

Taxonomic notes—*Ruellia pohlii* is morphologically similar to *R. hatschbachii*, differing in size and indumentum of bracteoles and calyces. The known populations of *R. pohlii* occur only in the municipality of Cavalcante, growing in campos limpos on rocky and sandy soils. *Ruellia pohlii* specimens have been collected with flowers in July and with fruits in August.

Representative Specimens Examined—**Brazil.**—GOIÁS: Cavalcante, Coletada na borda de campo sujo, na beira da estrada de terra, continuação da GO-241, sentido sul, a ca. 4 km de Araí, em solo arenoso-pedregoso, [-47.645556°, -13.602222°], 1095 m, 5 Jul 2017, *U.G. Fernandes et al. 271* (SP!); ibid., 60,6km from start of dirt road that leaves Cavalcante

going W towards Serra do Tombador, -47.38799°, -13.13467°, 1094, 12 Aug 2016, *E. Tripp et al. 5933* (SP, COLO, CAS, RSA, RB, US, K, UB); ibid., Estrada em direção a RPPN S. do Tombador, após o povoado de São Domingos. Campo sujo à direita da estrada, [-47.645000°, -13.603611°], 25 Jul 2014, *R.D. Sartin et al. 589* (SP!)

13. Ruellia rosmarinus (Nees) U.G. Fern. & Kameyama, **comb. nov.** *Dipteracanthus rosmarinus* Nees, Prodr. 11: 139. 1847. TYPE: BRAZIL. Pernambuco [Bahia]: Prov. Rio Preto, Serra do Matto Grosso, Sep 1839, *G. Gardner 2920* (holotype: K-000534243!; isotype: GZU-000249538!)

Erect to prostrate subshrubs arising from a woody subterraneous system, up to 1 m alt, stems reddish brown; leaves opposite, very congested at the new stems, sessile, blades chartaceous, linear to lanceolate, villose with eglandular trichomes and with subsessile glandular trichomes on both surfaces; flowers subsessiles, solitary or two (i.e. reduced dichasia), in the axils of upper leaves, calyces with the segments equal, villose with subsessile glandular trichomes, corollas lilac; capsule obovoid, velutionous; seeds 4, with hygroscopic trichomes covering the entire surface. Figure 21 C-D

Taxonomic notes—*Ruellia rosmarinus* can be recognized by its sessile linear to lanceolate leaves, these congested in the young stems, giving an appearance similar to rosemary, vegetatively.

This species is morphologically similar to *R. pinguicula* in its habit and leaves, but differs in its subsessile flowers (i.e. reduced dichasia), in the axils of upper leaves and in lacking bracts (vs. flowers in apical inflorescence congest with bracts).

***Representative Specimens Examined*—Brazil.**—BAHIA: Barreiras, Rod. BR-020, 10 km O de Roda Velha, Cerrado, 12 Jul 1979, *G. Hatschbach 42288* (MBM!, US!), ibid. Estrada para Povoamento Poção. Cerrado [-44.826667°, -12.186944°], 582 m, 8 Aug 2013, *G. Felitto et al. 632* (MBM); Cocos, Fazenda Trinjunção; Cerrado sobre encosta com afloramentos de "tapiocanga"; local muito próximo ao Marco "VT Paredão" do IBGE, nas divisas dos estados Bahia, Minas Gerais e Goiás. Solo com textura arenosa, relevo inclinado, [-46.046667°, -14.880556°], 840 m, 15 May 2001, *R.C. Mendonça et al. 4249* (IBGE! US!); ibid., Fazenda Trinjunção. Área da antiga Fazenda Santa Luzia, estrada que dá acesso a Fazenda Olhos d'água. Vegetação: carrasco; Relevo: levemente inclinado; Solo arenoso com pouca argila, [-46.872222°, -14.890556°], 830 m, 6 Jul 2001, *R.C. Mendonça et al. 4424* (IBGE!); ibid., assentamento Thainá, ca. 40 km da BA-465. Transição Cerrado-Mata de Galeria. Solo arenoso, [-44.859444°, -12.616944°], 707 m, 16 Jul 2009, *M.M. Saavedra et al. 991* (RB!, SP!); GOIÁS: Posse, Rodovia BR 020 (Brasília-Salvador), 15 km ao norte do entroncamento para Posse. Cerrado em solo arenoso com afloramentos rochosos [-46.227500°, -14.019722°], ca. 950 m, 29 Jul 2000, *C. Kameyama et al. 131* (SP!, SPF!); ibid., Estrada secundária para Zona Rural de Jaborandi, cerca de 7 km (leste) da BR-020, cerrado rupestre, [-46.259722°, -14.143611°], 725 m, 12 Aug 2013, *G. Felitto et al. 690* (MBM!, HUEFS!); ibid., Rod. BR-020, 15 km N de Posse. Cerrado na borda da chapada, 950 m, 12 Jul 1979, *G. Hatschbach & O. Guimarães 42270* (MBM!, RB!); TOCANTINS: Novo Jardim, Estrada para Placas, ca. De 2 km da divisa com a Bahia (Rodovia TO-280). Afloramento rochoso em área de carrado, [-46.362222°, -11.821389°], 20 Jul 2000, *V.C. Souza et al*. 24244.

ACKNOWLEDGEMENTS

The authors would like to thank CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) for a M.Sc scholarship to the first author. We thank the Curators of all consulted herbaria, The Chico Mendes Institute for Biodiversity Conservation (ICMBio) and the directors of the conservation units visited for the permits. We thank Adriana Hissae Hayashi for the help on the venation and trichomes analyzes. We thank Fernanda Sartori Petrongari, Lucinda McDade, Nicolás Medina, and Rodolph Delfino Sartin for the support during collection trips. We thank Klei Sousa for the illustrations. We also thank Maria Rosa Vargas Zanatta, Rodolph Delfino Sartin and Suzana Ehlin Martins for the photographs. EAT acknowledges funding from the United States National Science Foundation (NSF-DEB Award #1354963 to Erin Tripp and Lucinda Mcdade).

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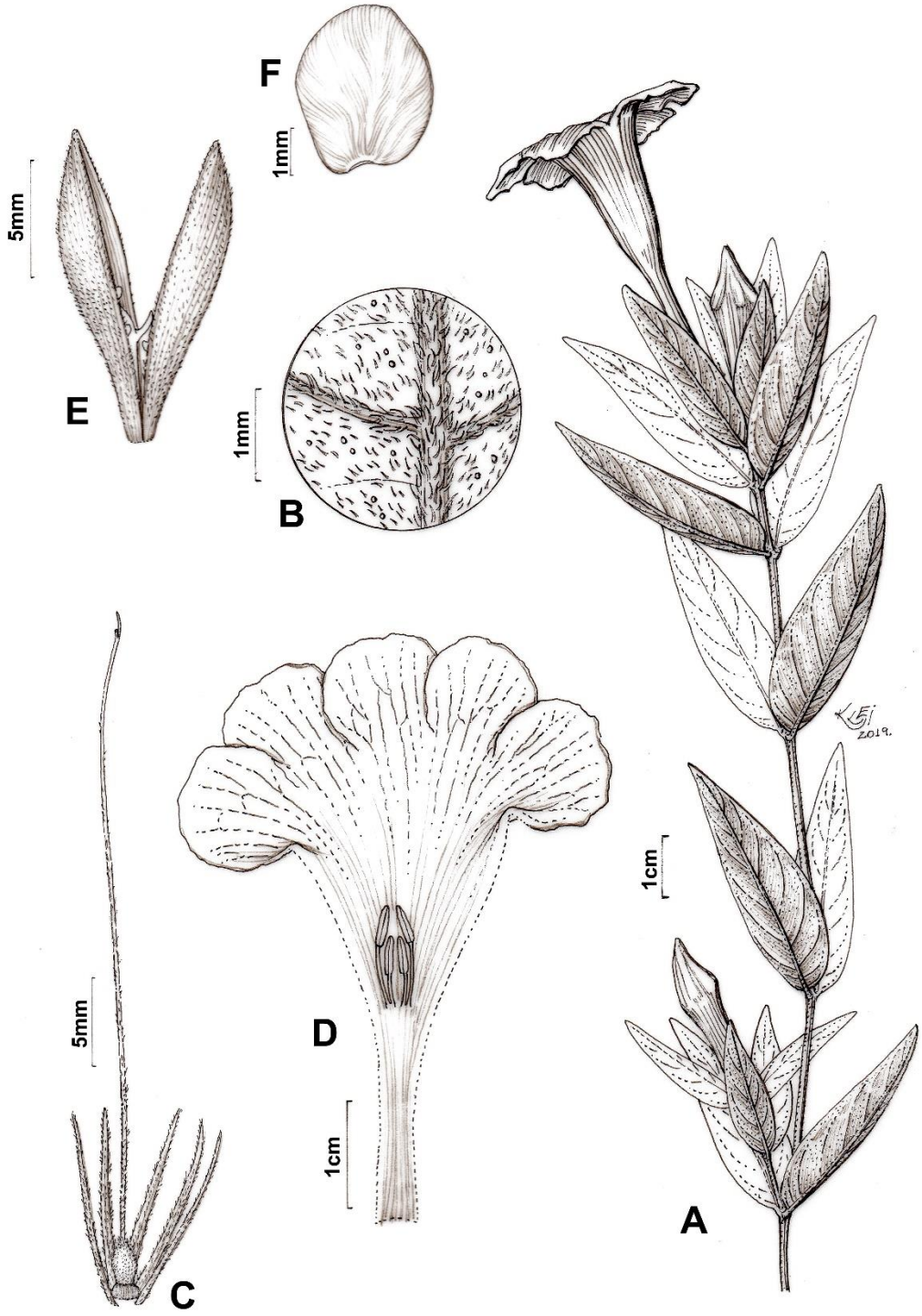

FIG. 1. *Ruellia altoparadisiensis.* A. Branch; B. Detail of the abaxial surface of the leaves; C. Detail of the dissected calyx with gynoecium; D. Dissected corolla; E. Capsule; F. Seed. (Fernandes et al. 217).

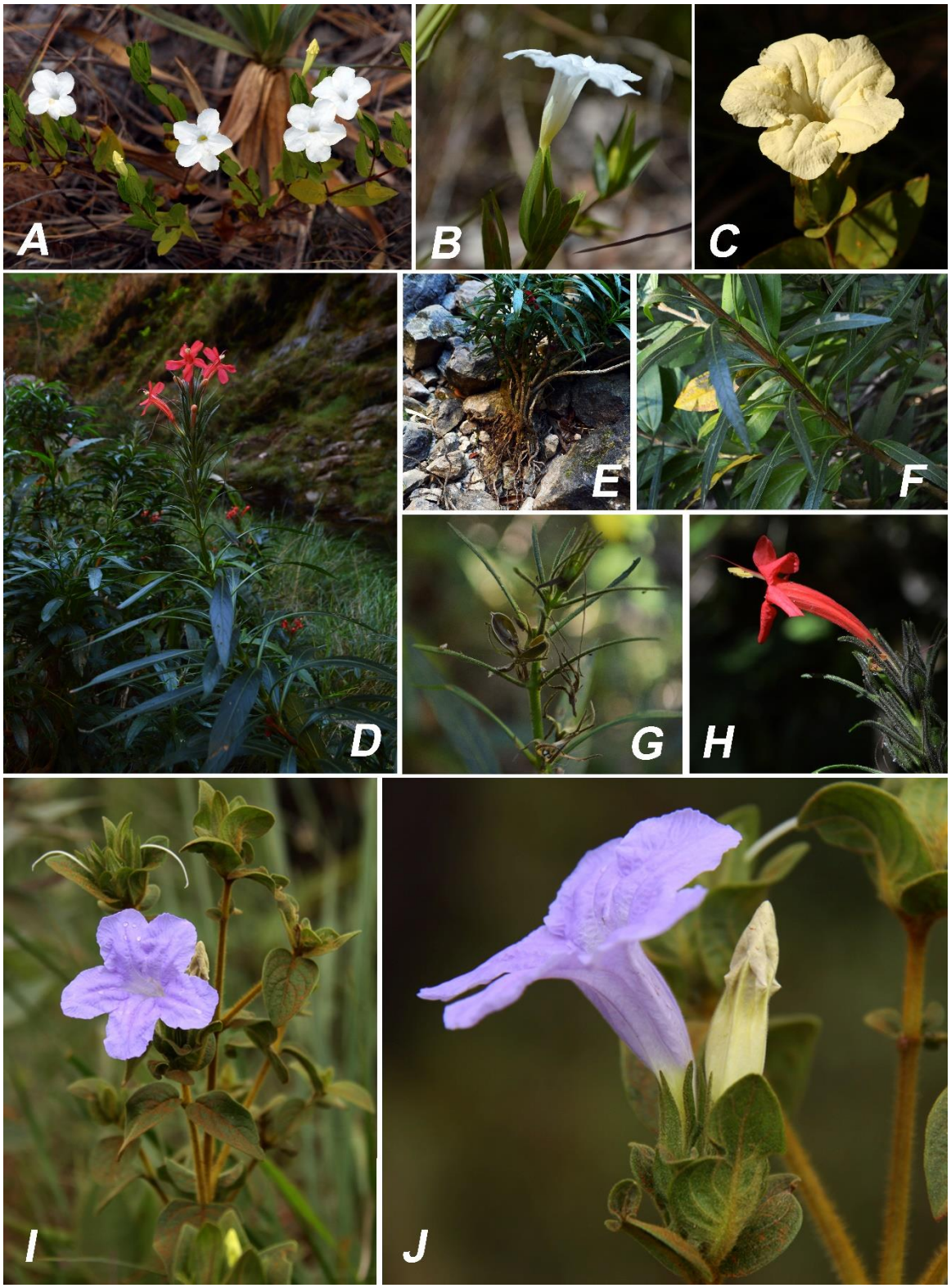

FIG. 2. A-C. *Ruellia altoparadisiensis*: A. Habit; B. lateral view of the white corolla flower; C. pale yellow corolla. D-H. *R. cataractae*: D. Habit, E. subterraneous system, F. leaves and phyllotaxy, G. opened capsule, H. lateral view of the corolla. I-J. *R. ceciliae*: I. Branch, J. lateral view of the flower. (Images: A and C: Rodolph Delfino Sartin; I and J: Maria Rosa Zanatta).

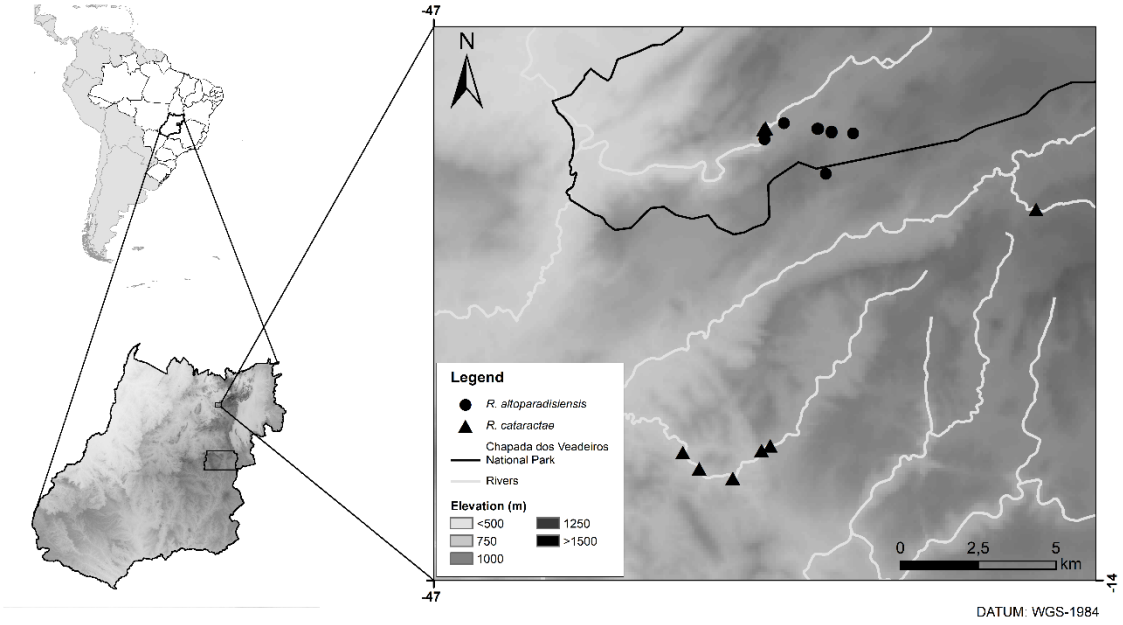

FIG. 3. Distribution map of *Ruellia altoparadisiensis* and *R. cataractae*, both endemic to Chapada dos Veadeiros area.

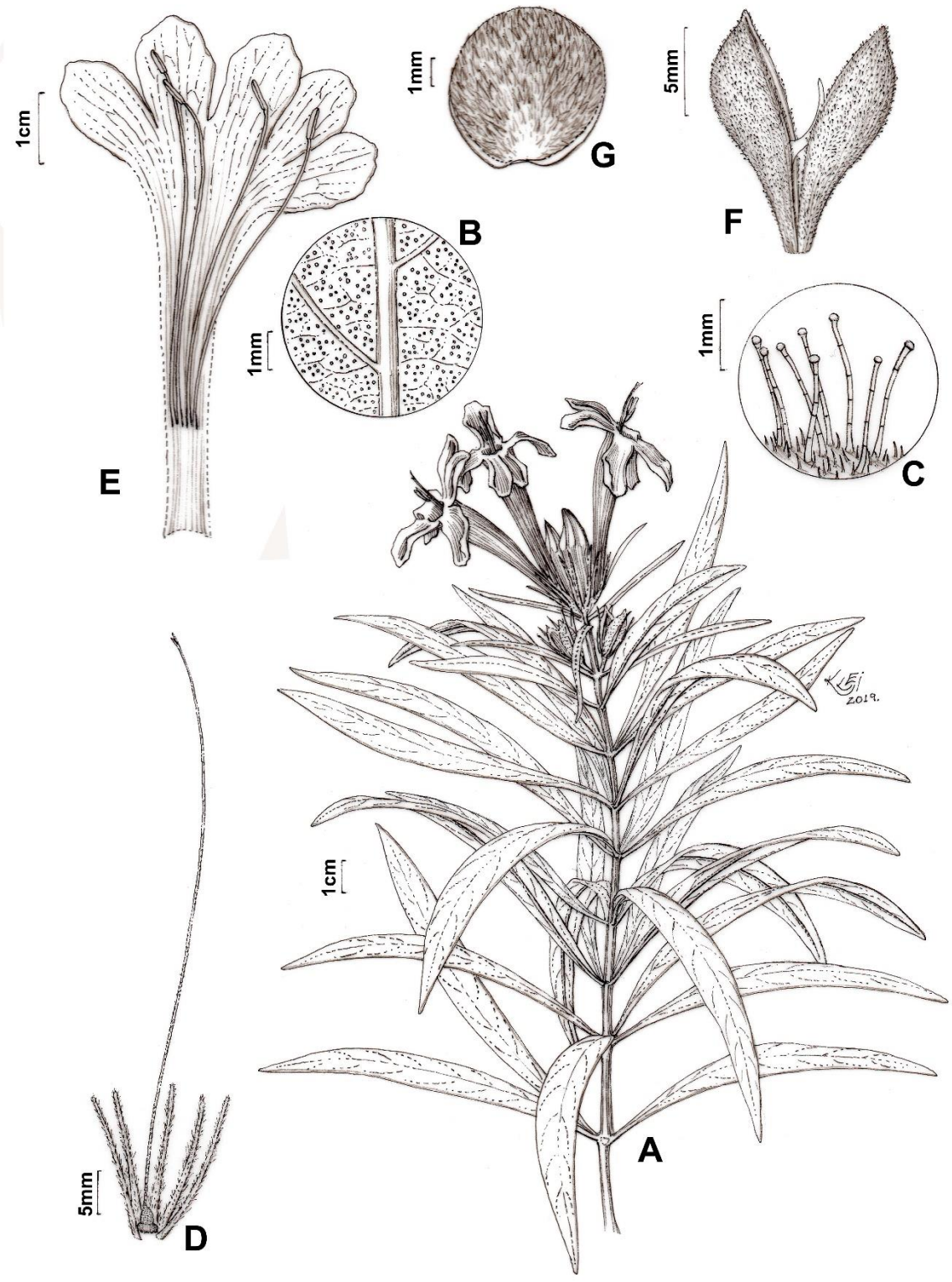

FIG. 4. *Ruellia cataractae*. A. Branch; B. Detail of leaves indumentum; C. Detail of bracts indumentum . D. Detail of dissected calyx with gynoecium. E. Dissected corolla. F. Capsule. G. Seed (Fernandes & Petrongari 294).

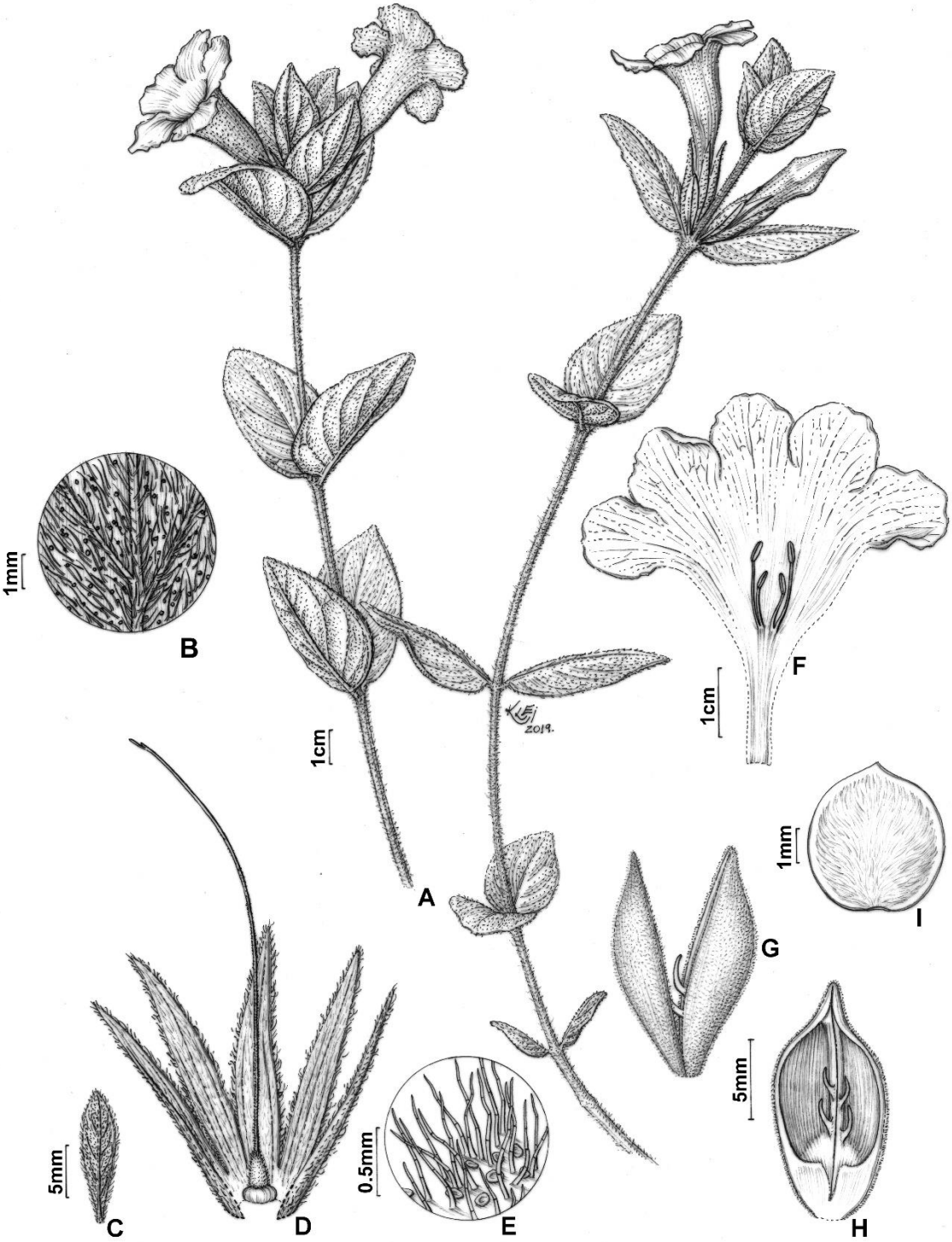

FIG. 5. *Ruellia ceciliae*. A. Branches; B. Detail of leaves indumentum ; C. Bracteole; D. Detail of the dissected calyx with gynoecium; E. Detail of calyx indumentum; F. Dissected corolla; G. Capsule; H. Front view of one valve of the capsule; I. Seed. (Siniscalchi 582)

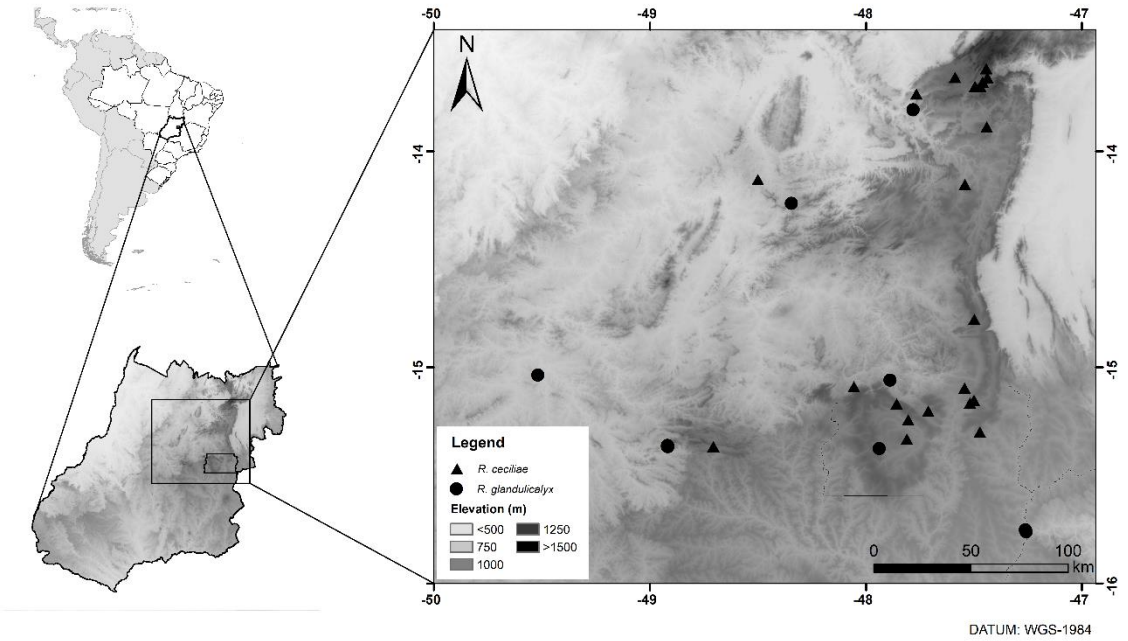

FIG. 6. Distribution map of *Ruellia ceciliae* and *R. glandulicalyx*.

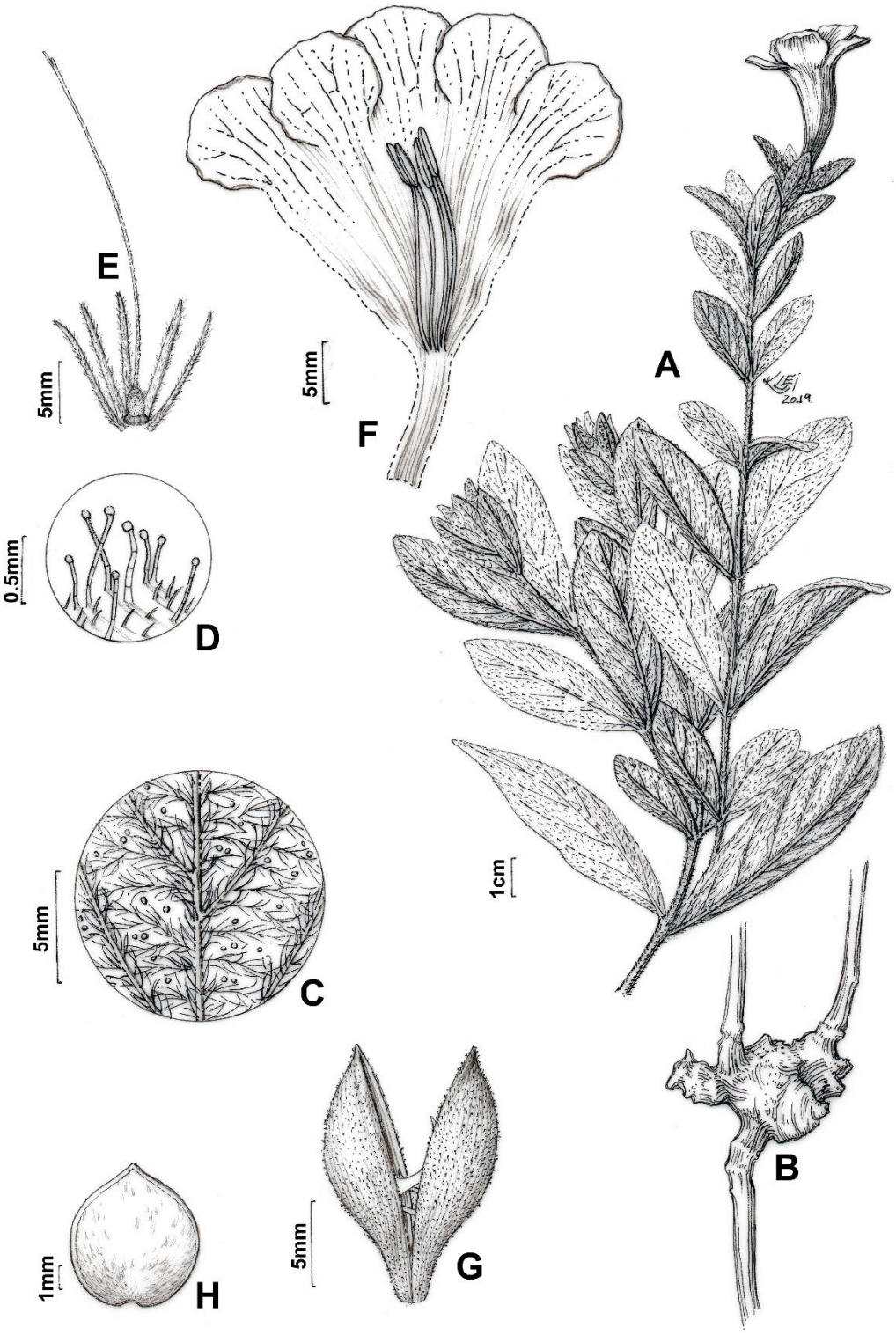

FIG. 7. *Ruellia chapadensis*. A. Branch; B. Subterraneous system; C. Detail of leaves abaxial surface indumentum; D. Detail of bracts indumentum ; E. Detail of the dissected calyx with gynoecium; F. Dissected corolla; G. Capsule; H. Seed. (Fernandes et al. 206).

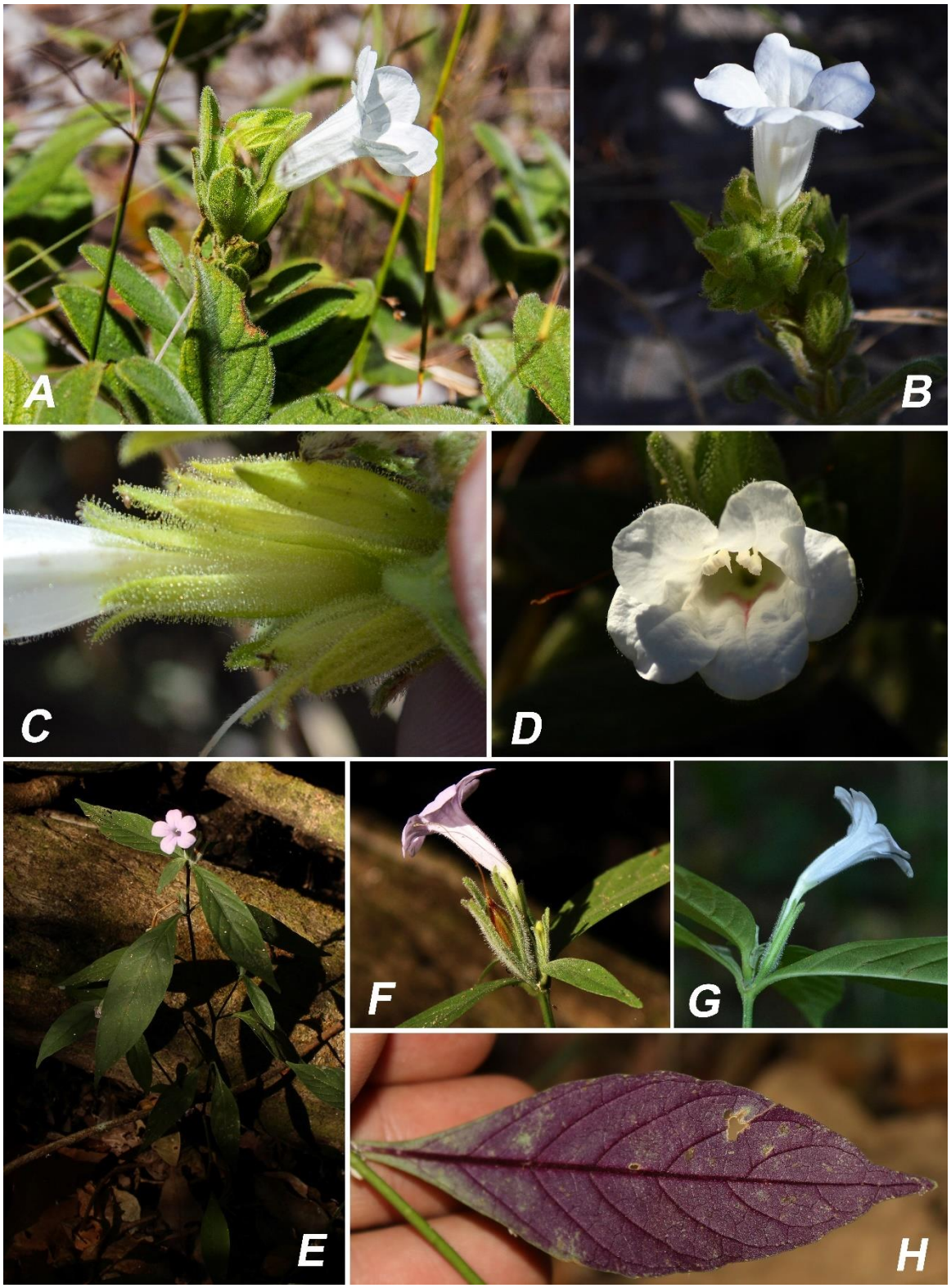

FIG. 8. A-D: *Ruellia chapadensis*: A. Habit with a side view of the flower; B. Inflorescence with flower and fruits; C. Bracteoles and calyx; D. Corolla front view, showing the pinkish macula and line. E-H. *R. glandulicalyx*: E. Habit; F. Fruit and flower with lilac corolla; G. Flower with whitish corolla; H. Leaf Abaxial surface . (Photos A by S. E. Martins; B–H by U. G. Fernandes)

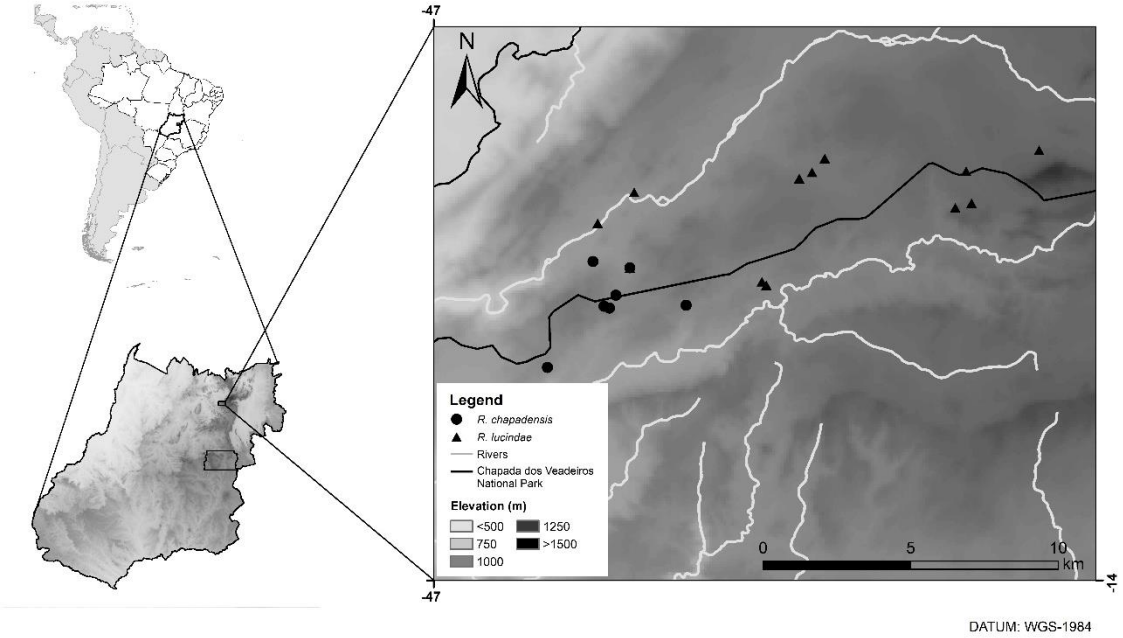

FIG. 9. Distribution map of *Ruellia chapadensis* and *R. lucindae*, both endemic to Chapada dos Veadeiros area.

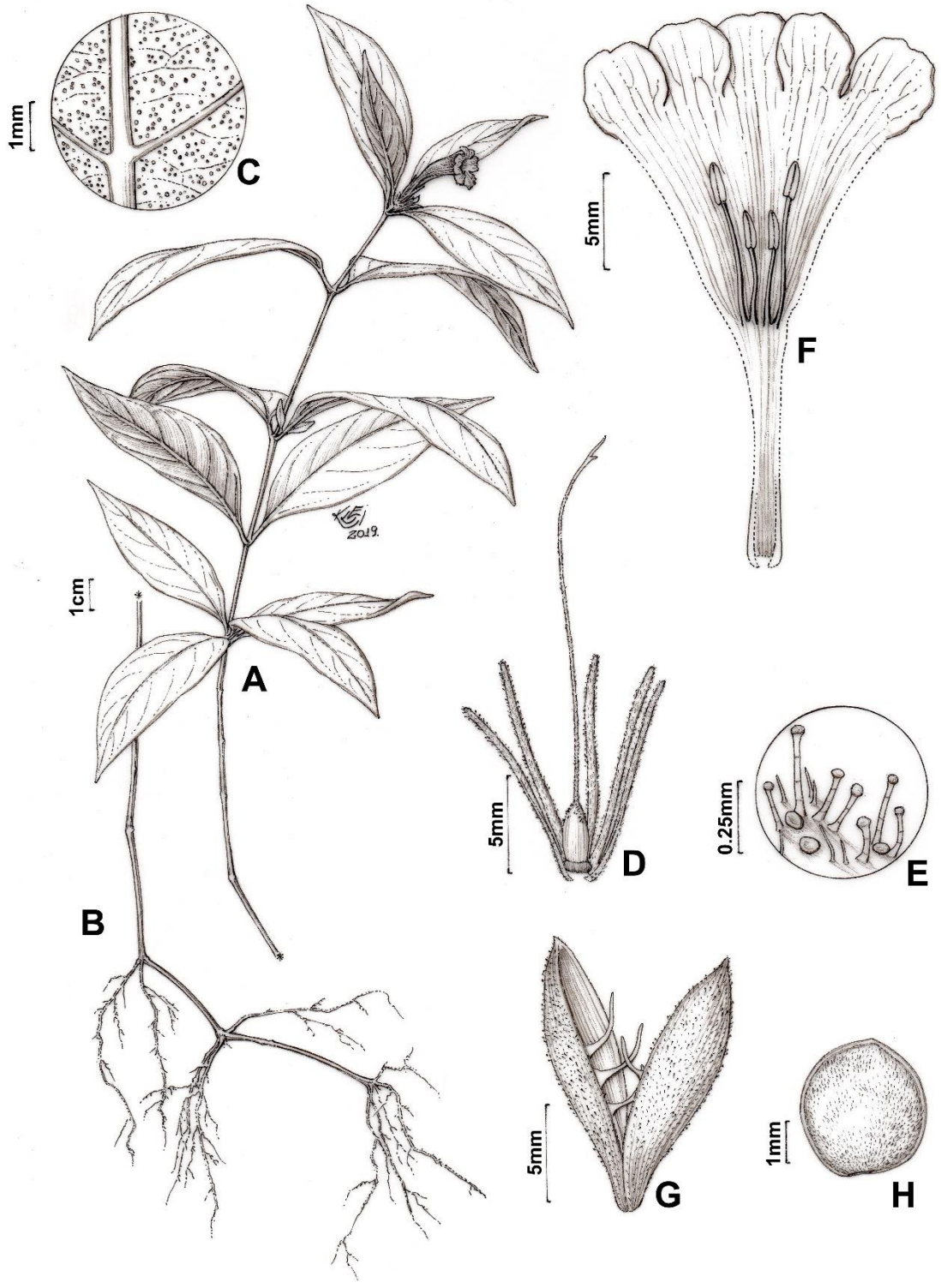

FIG. 10. *Ruellia glandulicalyx*. A. Habit; B. Subterraneous system; C. Detail of leaves abaxial surface indumentum ; D. Detail of the dissected calyx with gynoecium; E. Detail of calyx indumentum; F. Dissected corolla; G. Capsule; H. Seed. (Fernandes & Petrongari 287)

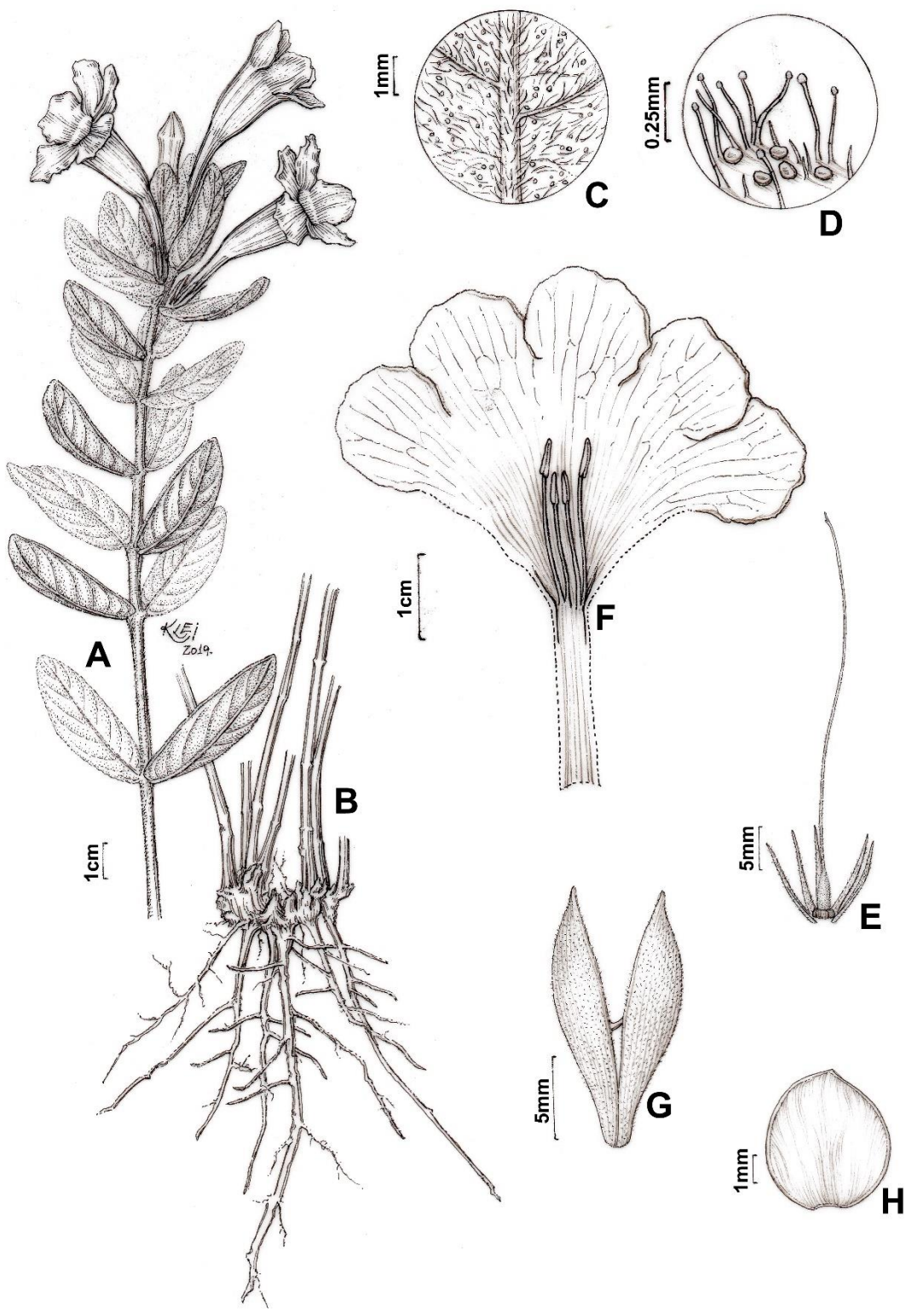

FIG.11. *Ruellia glandulifolia*. A. Branch; B. Subterraneous system; C. Detail of leaves abaxial surface indumentum; D. Leaves indumentum magnified detail; E. Dissected calyx with gynoecium; F. Dissected corolla; G. Capsule; H. Seed. (Fernandes et al 270).

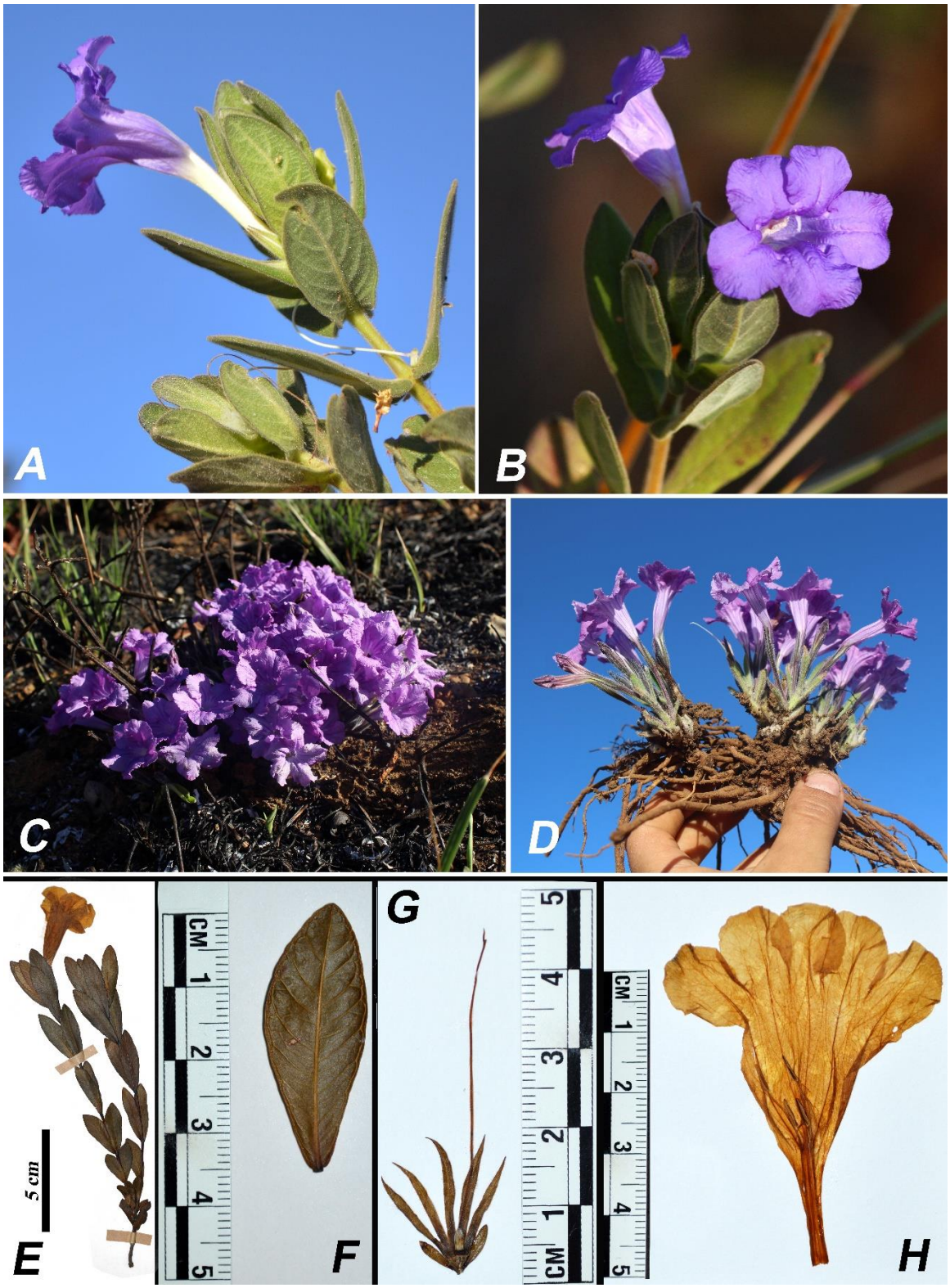

FIG. 12. A-B: *Ruellia glandulifolia*: A. Branch with flower (side view); B. Branch with flowers (front view). C-D. *R. glaziovii*: C. Habit after fire; D. Side view of habit with subterraneous system and flowers. after fire E-H. *R. hatschbachii*: E. Habit, F. Leaf, G. Dissected calyx with gynoecium, H. Dissected corolla. (Images: B: Rodolph Delfino Sartin)

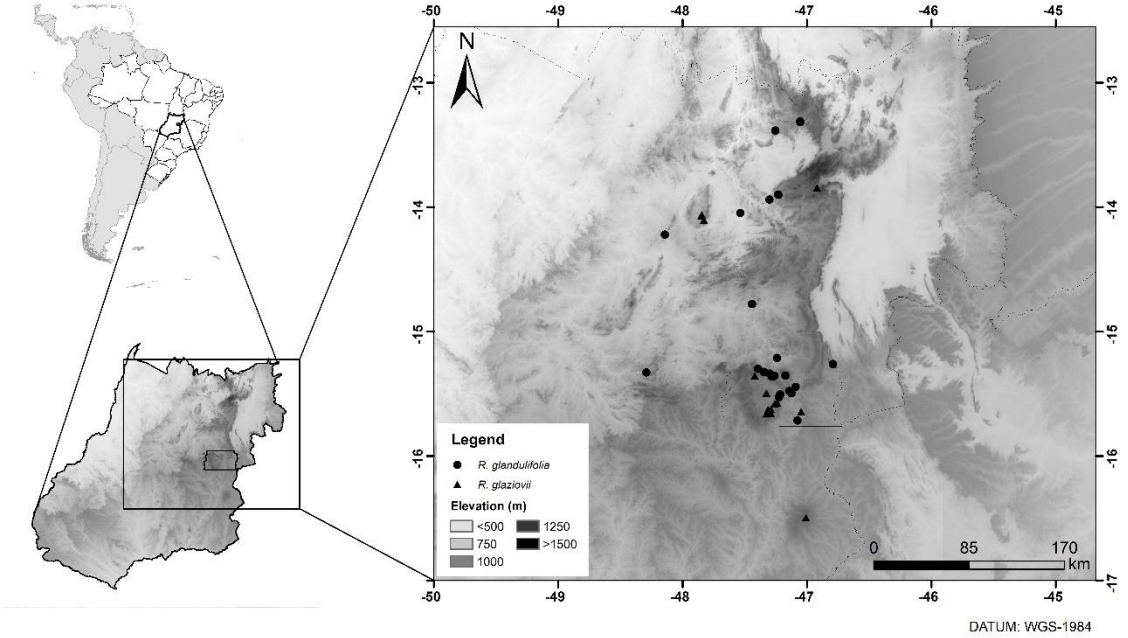

FIG. 13. Distribution map of *Ruellia glandulifolia* and *R. glaziovii*.

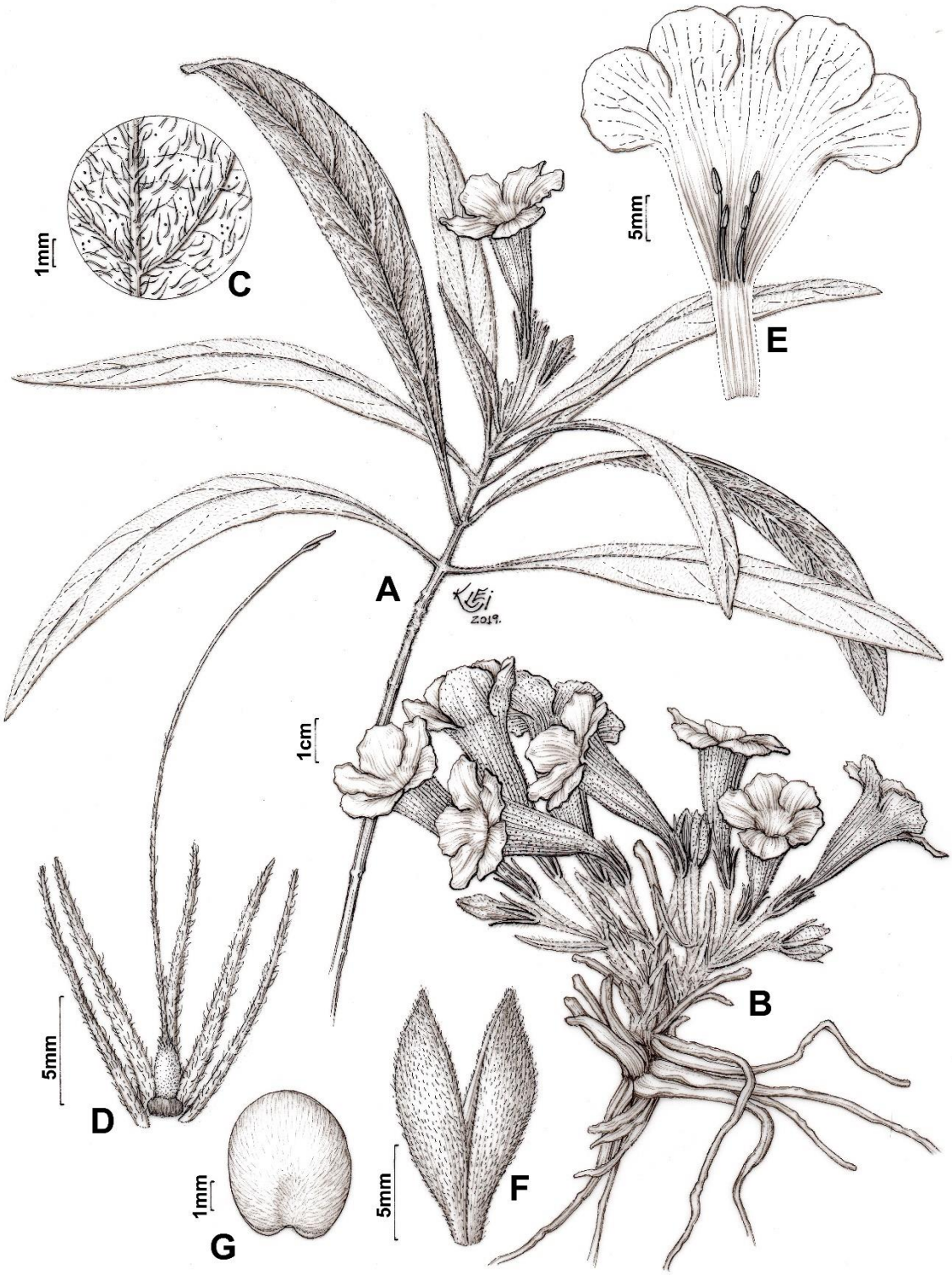

FIG. 14. *Ruellia glaziovii*. A. Branch; B. Habit of a specimen that flowered after fire; C. Detail of leaves abaxial surface indumentum; D. Dissected calyx with gynoecium; E. Dissected corolla; F. Capsule; G. Seed.(Amaral 1230 and Fernandes & Petrongari 319).

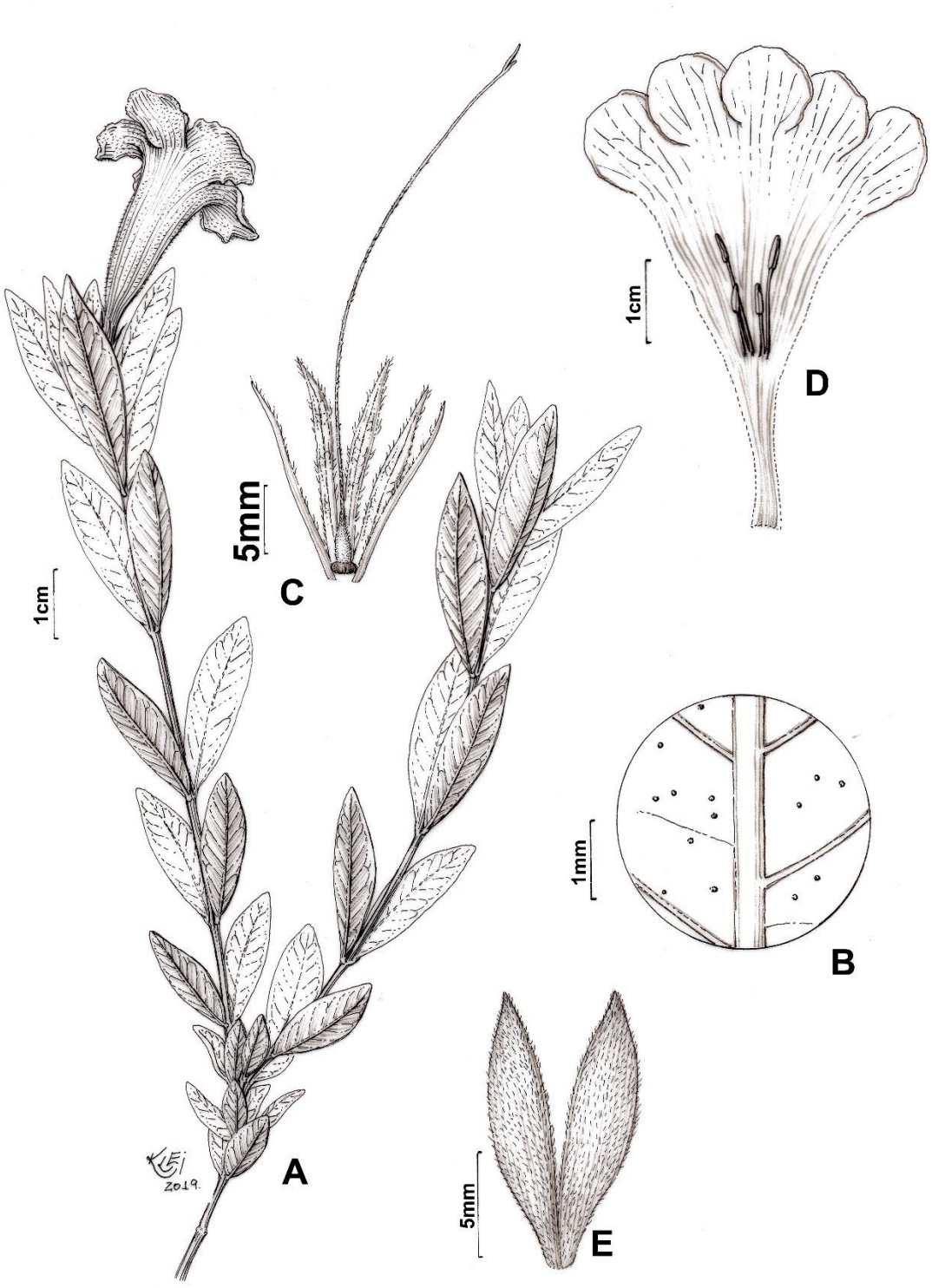

FIG. 15. *Ruellia hatschbachii*. A. Branch; B. Detail of leaf abaxial surface; C. Dissected calyx with gynoecium; D. Dissected corolla; E. Capsule. (Hatschbach et al. 60227).

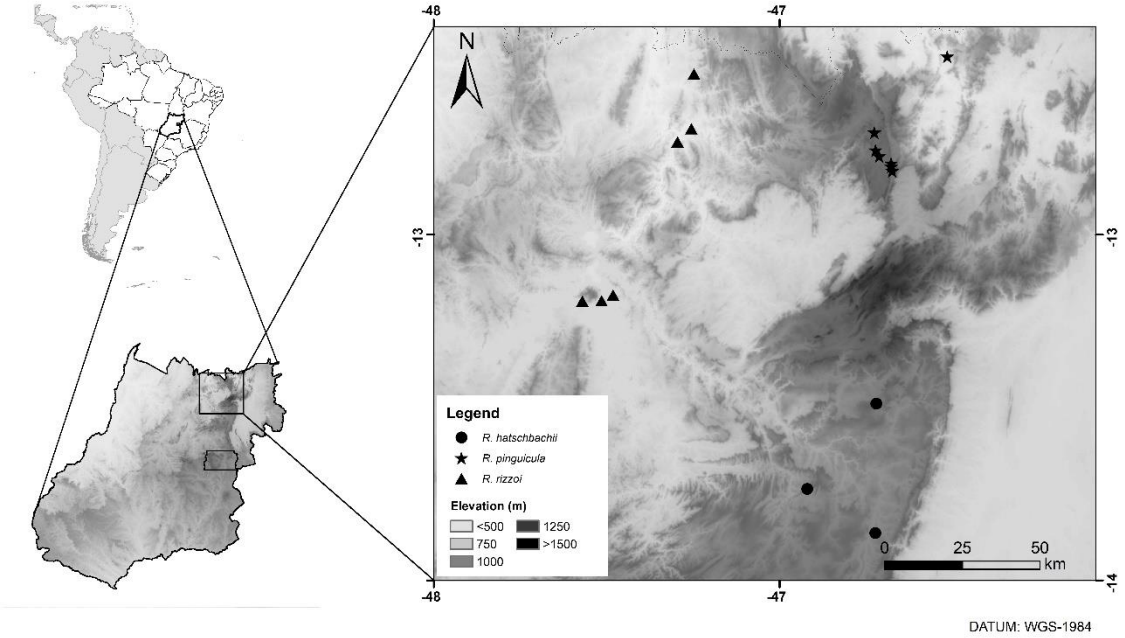

FIG. 16. Distribution map of *Ruellia hatschbachii*, *R. pinguicula* and *R. rizzoi*.

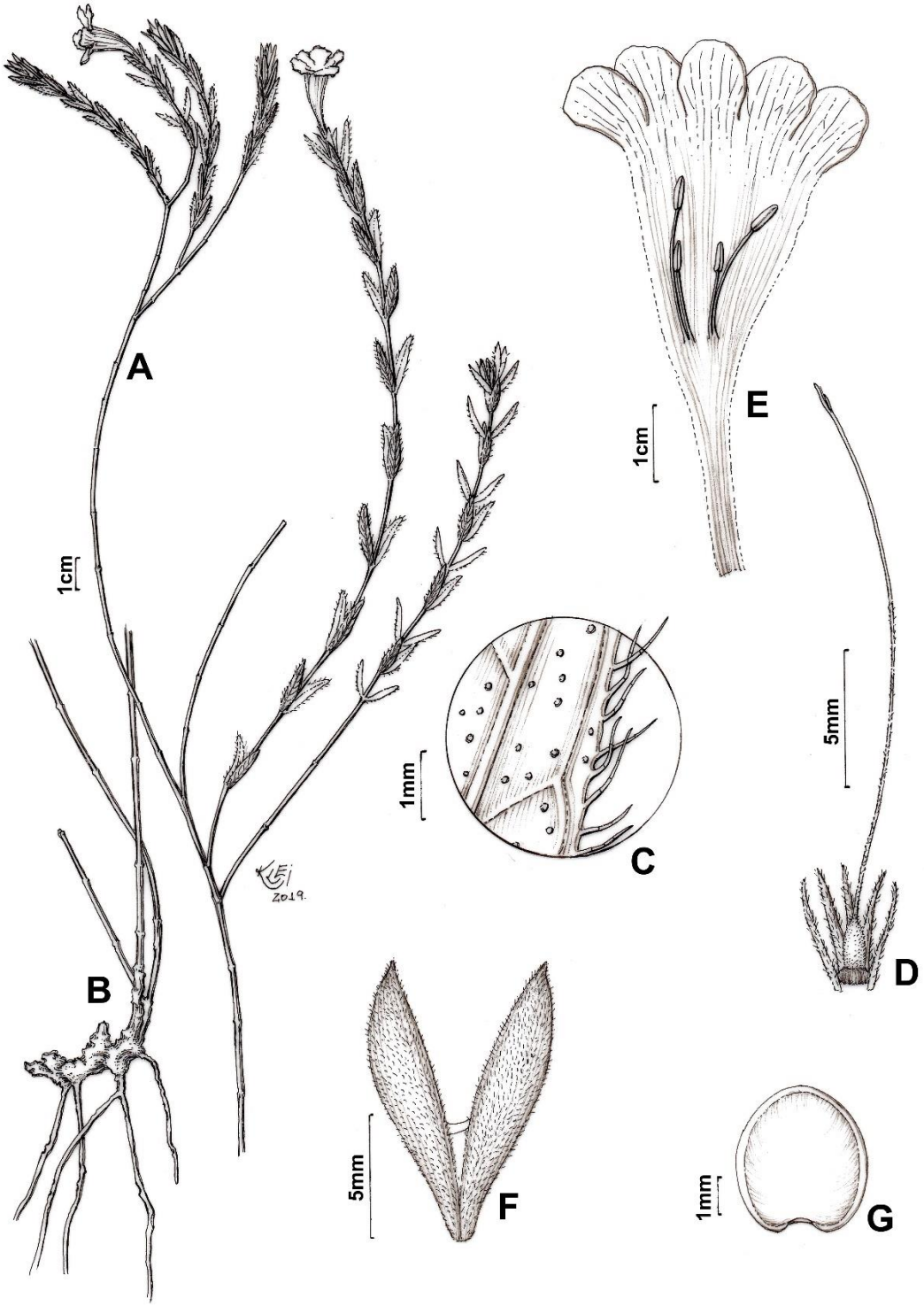

FIG. 17. *Ruellia lucindae*. A. Habit; B. Subterraneous system; C. Detail of a ciliate leaf indumentum; D. Dissected calyx with gynoecium; E. Dissected corolla; F. Capsule; G. Seed. (Tripp & Kameyama 5939).

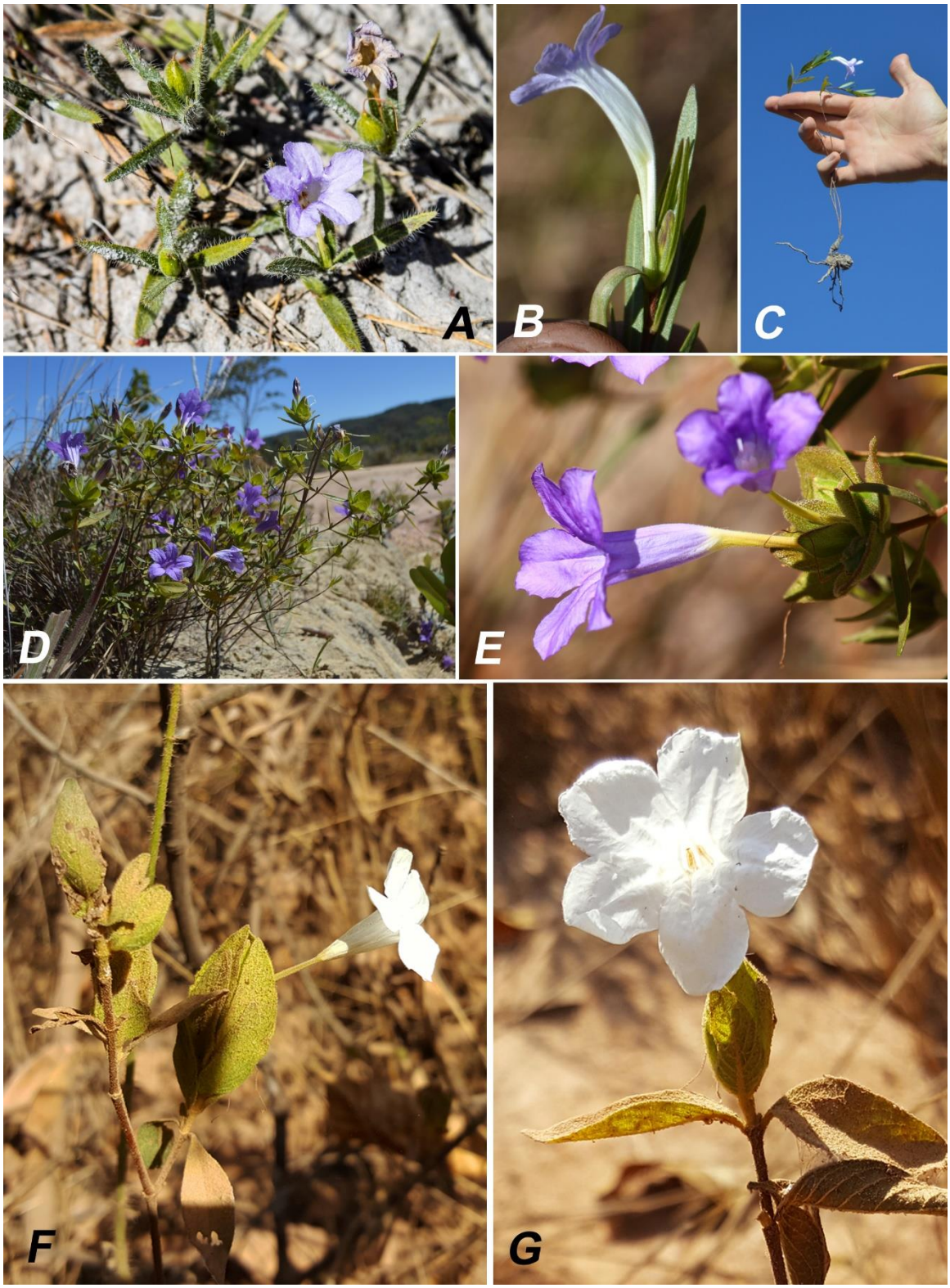

FIG. 18. A-C: *Ruellia lucindae*: A. Habit; B. Side view of the flower; C. Entire plant with the subterraneous system. D-E. *R. pinguicula*: D. Habit; E. Inflorescence with flowers. F-G: *Ruellia rizzoi*. F. Habit with a side view of the inflorescence; G. Front view of the flower. (Images: A: Suzana Ehlin Martins; E: Rodolph Delfino Sartin; F-G: Erin A. Tripp).

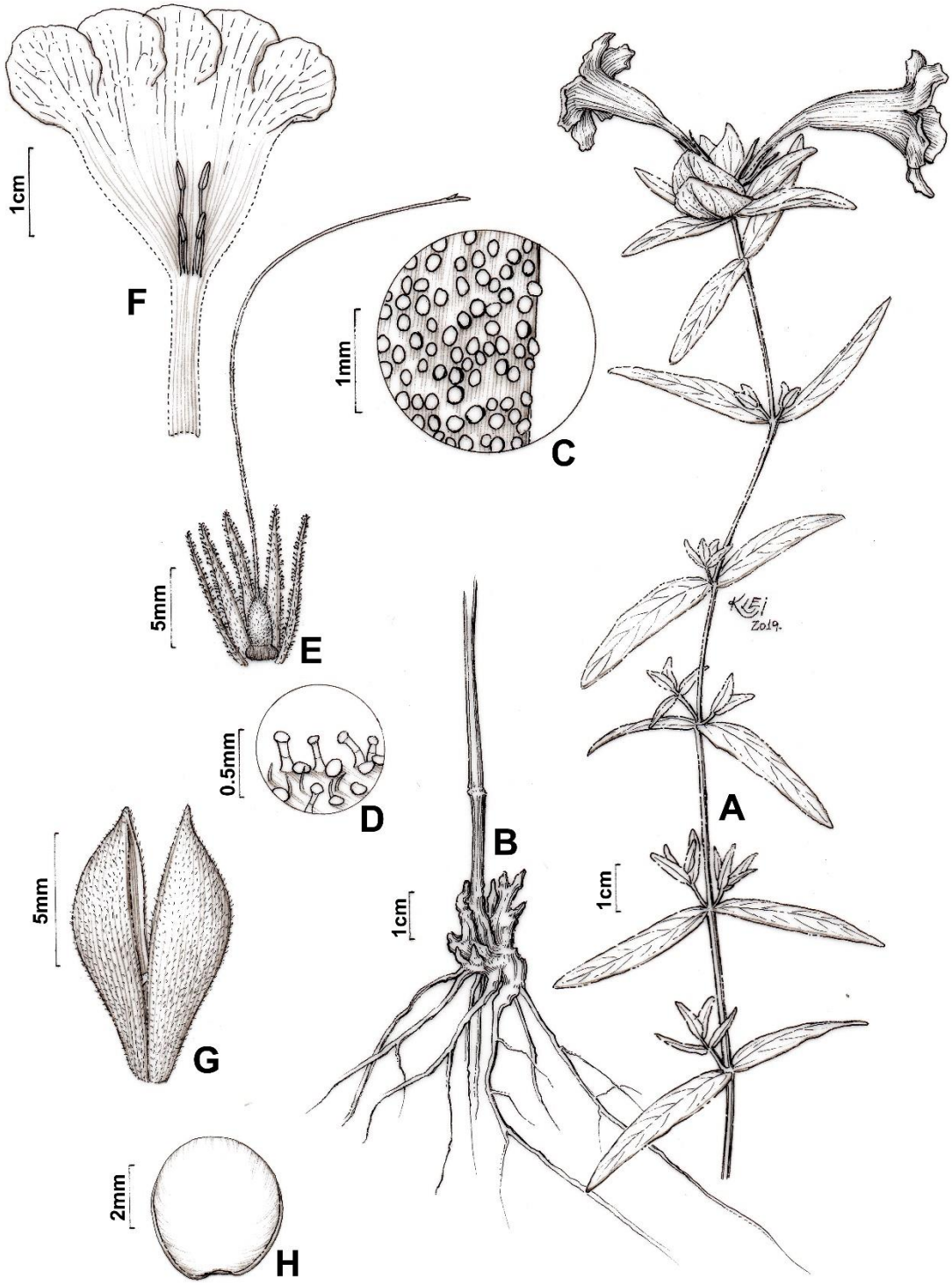

FIG. 19. *Ruellia pinguicula*. A. Branch; B. Subterraneous system; C. Detail of leaf indumentum; D. Detail of bract indumentum; E. Dissected calyx with gynoecium; F. Dissected corolla; G. Capsule; H. Seed. (Fernandes et al. 263).

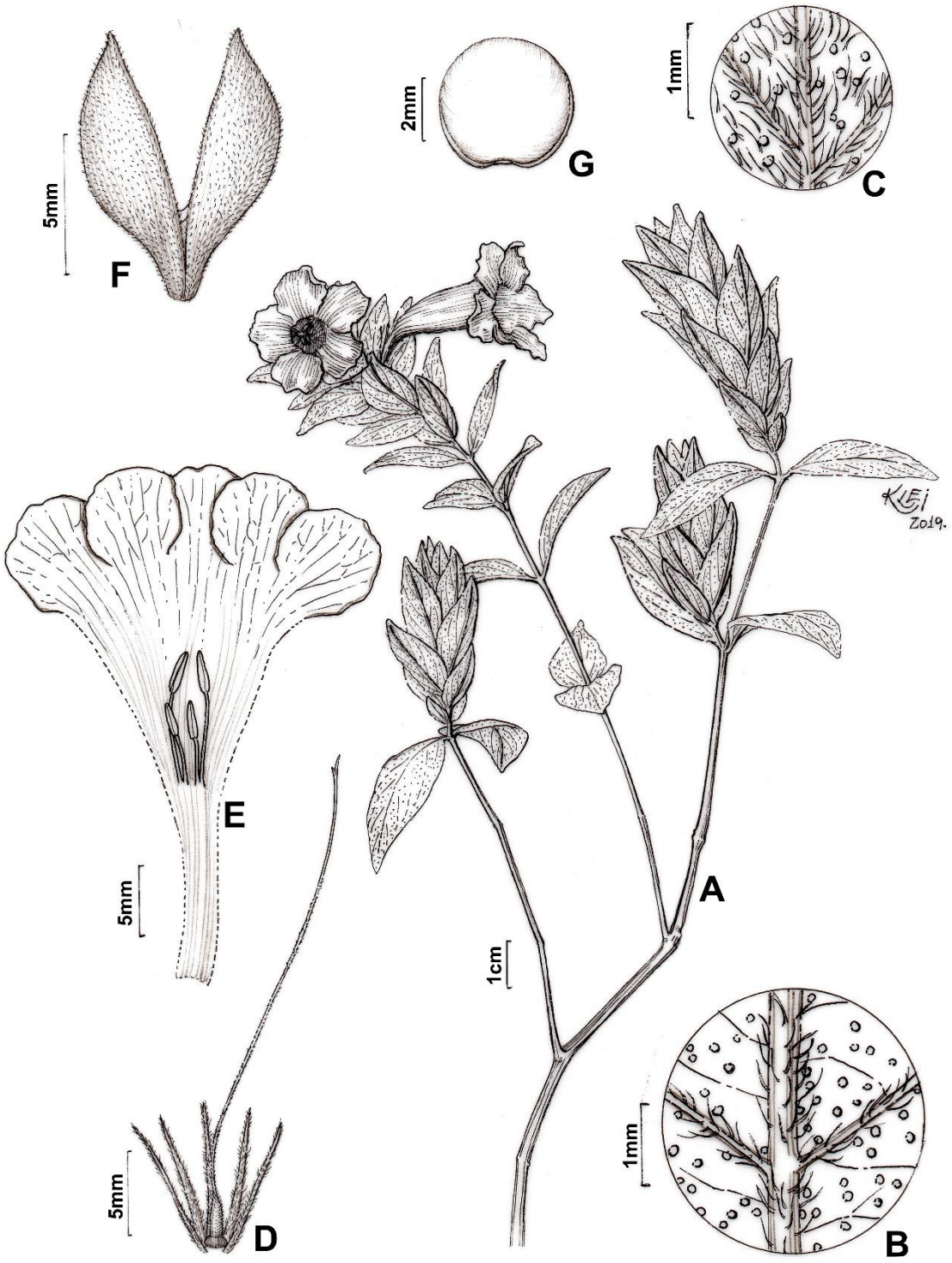

FIG. 20. *Ruellia rizzoi*. A. Branch; B. Detail of leaf abaxial surface indumentum; C. Detail of bracts indumentum; D. Dissected calyx with gynoecium; E. Dissected corolla; F. Capsule; G. Seed. (G. Pereira-Silva & M. Carvalho-Silva 5201).

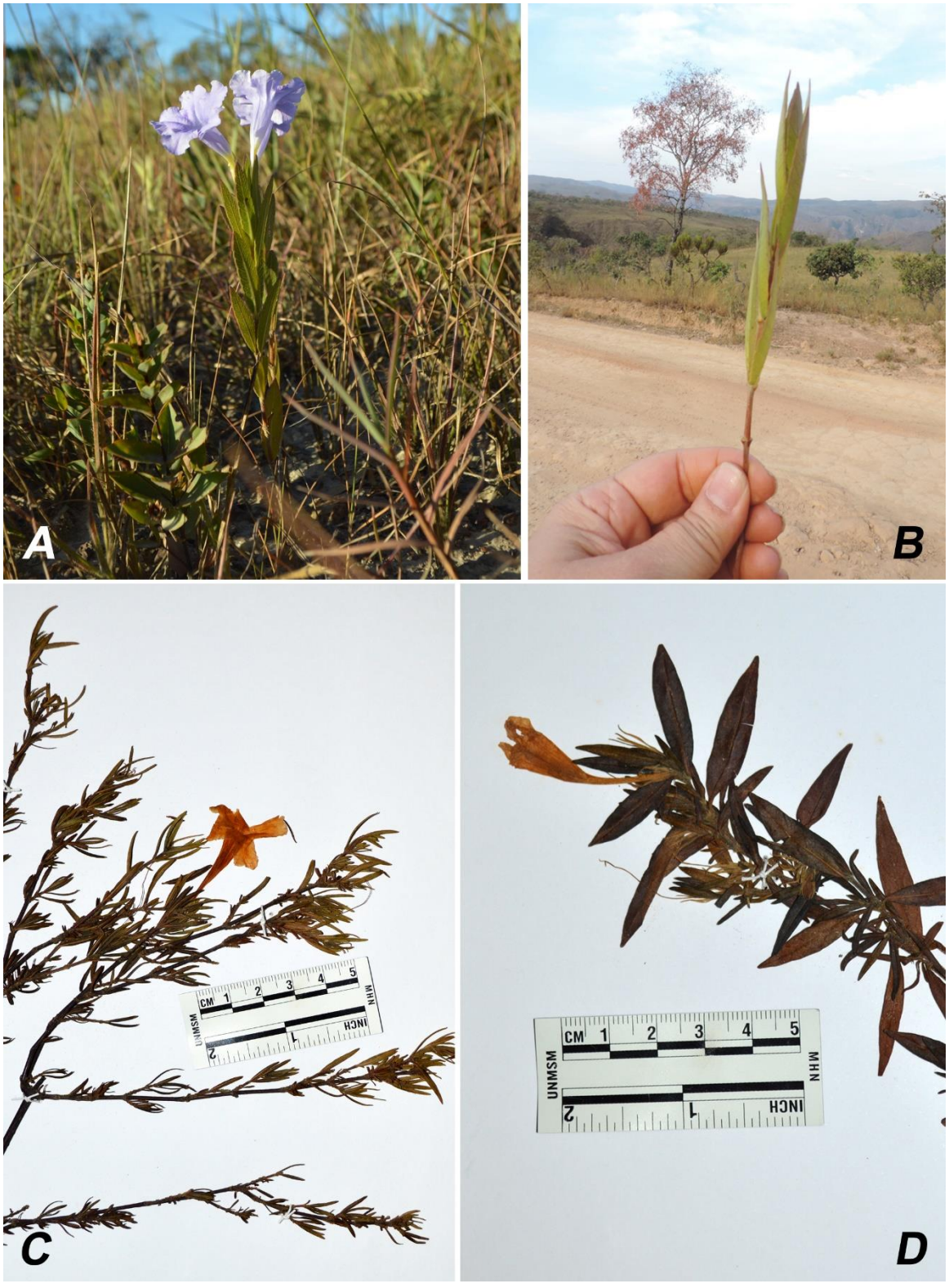

FIG. 21. A-B: *Ruellia pohlii*: A. Habit; B. Side view of the plant. C-D. *R. rosmarinus*: C. Habit with young stems with congest linear leaves; D. Stem with young leaves and mature leaves.