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TAXONOMIA E DISTRIBUIÇÃO DE EUPATORIEAE (ASTERACEAE) NO CEARÁ,
NORDESTE DO BRASIL

FORTALEZA

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NATANAEL COSTA REBOUÇAS

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Dissertação apresentada ao Programa de Pós-Graduação em Sistemática, Uso e Conservação da Biodiversidade da Universidade Federal do Ceará, como requisito parcial à obtenção do título de Mestre em Sistemática, Uso e Conservação da Biodiversidade. Área de concentração: Taxonomia, Sistemática e Evolução Biológica.

Orientadora: Profa. Dra. Mariana de Oliveira Bünger

Coorientadora: Profa. Dra. Nádia Roque

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“Se os nomes são desconhecidos, o conhecimento das coisas perece”

(LINNAEUS, 1783, p. 210)

RESUMO

A tribo Eupatorieae compreende aproximadamente 2.200 espécies, pertencentes a 182 gêneros em 19 subtribos, distribuídas principalmente na região Neotropical. No Brasil, estão registrados 615 espécies e 86 gêneros em todas as regiões e domínios fitogeográficos. As espécies de Eupatorieae são reconhecidas pelos capítulos discoides, flores bissexuais, corola nunca amarela, estilete com apêndices estéreis longos, papilosos e cipselas enegrecidas com fitomelanina. O presente estudo teve como objetivo realizar o levantamento e o tratamento taxonômico das espécies de Eupatorieae no Ceará, Nordeste do Brasil. O estado do Ceará compreende uma área com diversos tipos vegetacionais variando de acordo com os fatores pluviométricos e altitudinais. Foram realizadas quatro expedições de campo e os espécimes coletados foram herborizados segundo a metodologia usual em taxonomia e depositados no Herbário EAC. Foram realizadas visitas aos herbários nacionais ALCB, EAC e IPA, solicitado empréstimo de material das coleções HST, HVASF, PEUFR, TANG e TEPB, e consulta de imagens virtuais dos espécimes depositados em sítios especializados. As identificações foram checadas com base em bibliografias especializadas, materiais-tipo e protólogos. Como resultados, foram confirmadas 33 espécies e 18 gêneros para o território cearense, sendo um novo registro para região Nordeste (*Chromolaena mucronata*), sete novos registros no Ceará (*Barrosoa betoniciformis*, *Chromolaena maximilianii*, *Chromolaena myriocephala*, *Koanophyllon tinctorium*, *Mikania glomerata*, *Mikania jeffreyi* e *Mikania trinervis*) e uma espécie é reiterada como endêmica do estado (*Piqueriella brasiliensis*). Os gêneros mais representativos no estado são *Chromolaena* (5 spp.) e *Mikania* (10 spp.). No Ceará, 88% das Eupatorieae foram registradas principalmente nas áreas serranas, de clima úmido a subúmido, com elevada altitude (700–1.200 m) e pluviometria chegando até 1.200 mm, sobretudo em vegetação de Floresta Ombrófila Densa.

Palavras-chave: *Chromolaena*. Compositae. Flora do Ceará. Floresta Ombrófila Densa. *Mikania*.

ABSTRACT

The Eupatorieae tribe comprises approximately 2,200 species, belonging to 182 genera in 19 subtribes, distributed mainly in the Neotropical region. In Brazil, 615 species and 86 genera are registered in all regions and phytogeographic domains. Eupatorieae species are recognized by capitulum discoid, flowers bisexual, corolla never yellow, style branches with long sterile appendage, papillose and cypselae blackened with phytomelanin. This present study had as objective to carry out the survey and taxonomic treatment of Eupatorieae species in Ceará, Northeast Brazil. The state of Ceará comprises an area with different vegetation types, varying according to rainfall and altitudinal factors. Four field expeditions were carried out. The specimens were collected and herborized according to the usual methodology in taxonomy and deposited at the EAC Herbarium. Visits were made to the national herbaria ALCB, EAC and IPA, and borrowed material from the collections HST, HVASF, PEUFR, TANG and TEPB, and consultation of virtual images of the specimens deposited on specialized sites. The identifications were checked based on specialized bibliographies, type materials and protologues. As a result, 33 species and 18 genera were confirmed for the territory of Ceará, with a new record for the Northeast region (*Chromolaena mucronata*), seven new records in Ceará (*Barrosoa betoniciformis*, *Chromolaena maximiliani*, *Chromolaena myriocephala*, *Koanophyllon tinctorium*, *Mikania glomerata*, *Mikania jeffreyi* and *Mikania trinervis*) and one species is reiterated as endemic to the state (*Piqueriella brasiliensis*). The most representative genera in the state are *Chromolaena* (5 spp.) and *Mikania* (10 spp.). In Ceará, 88% of Eupatorieae were registered mainly in mountainous areas, from humid to sub-humid climate, with high altitude (700–1,200 m) and rainfall reaching up to 1,200 mm, preferably in vegetation of Dense Ombrophylous Forest.

Keywords: *Chromolaena*. Compositae. Dense Ombrophylous Forest. Flora of Ceará. *Mikania*.

LISTA DE FIGURAS

Figura 1	– Tipos vegetacionais do Ceará, Nordeste do Brasil	18
Figura 2	– Diversidade de Eupatorieae no Ceará, Nordeste do Brazil	93
Figura 3	– Tipos vegetacionais do Ceará, Nordeste do Brasil. A-B. Floresta Ombrófila Densa. C. Floresta Sazonal Semidecidual. D. Floresta Sazonal Semidecidual (afloramentos rochosos - lajedo). E. Savana Estépica Arbórea. F. Savana Estépica. G. Savana. H. Complexo Vegetacional da Zona Costeira. Imagens A, C-H por N.C. Rebouças e B por T.C. Santos	94
Figura 4	– Eupatorieae no Ceará, Nordeste do Brasil. A-B. <i>Ageratum conyzoides</i> – A. Superfície adaxial da lâmina foliar, B. Capitulescência. C-D. <i>Brickellia diffusa</i> – C. Habitat, D. Superfície adaxial da lâmina foliar. E-F. <i>Conocliniopsis prasiifolia</i> – E. Folhas, F. Capitulescência. G. <i>Fleschmannia microstemon</i> var. <i>paniculata</i> – G. Habitat. H-I. <i>Mikania micrantha</i> – H. Folhas, I. Capitulescência. Imagens A-G por N.C. Rebouças e H-I por V.S. Sampaio	95
Figura 5	– Eupatorieae no Ceará, Nordeste do Brasil. A-C. <i>Piqueriella brasiliensis</i> – A. Habitat, B. Folhas e Capitulescência. C. Capitulescência. D-E. <i>Praxelis clematidea</i> – D. Folhas e Capitulescência, E. Capitulescência. F. <i>Praxelis diffusa</i> – F. Capitulescência. Imagens A-F por N.C. Rebouças	96
Figura 6	– Distribuição Geográfica de <i>Acritopappus confertus</i> , <i>Ageratum conyzoides</i> , <i>Ayapana amygdalina</i> e <i>Barrosoa betoniciformis</i> no Ceará, Nordeste do Brasil	97
Figura 7	– Distribuição Geográfica de <i>Brickellia diffusa</i> , <i>Chromolaena laevigata</i> , <i>Chromolaena maximilianii</i> , <i>Chromolaena mucronata</i> , <i>Chromolaena myriocephala</i> e <i>Chromolaena squalida</i> no Ceará, Nordeste do Brasil	98
Figura 8	– Distribuição Geográfica de <i>Conocliniopsis prasiifolia</i> , <i>Diacranthera ulei</i> , <i>Dissothrix imbricata</i> e <i>Fleschmannia microstemon</i> var. <i>paniculata</i> no Ceará, Nordeste do Brasil	99
Figura 9	– Distribuição Geográfica de <i>Isocarpha megacephala</i> , <i>Koanophyllon</i>	

<i>tinctorium</i> , <i>Mikania congesta</i> , <i>Mikania cordifolia</i> e <i>Mikania elliptica paniculata</i> no Ceará, Nordeste do Brasil	100
Figura 10 – Distribuição Geográfica de <i>Mikania glomerata</i> , <i>Mikania jeffreyi</i> , <i>Mikania micrantha</i> , <i>Mikania ternata</i> e <i>Mikania trinervis</i> no Ceará, Nordeste do Brasil	101
Figura 11 – Distribuição Geográfica de <i>Piqueriella brasiliensis</i> , <i>Praxelis clematidea</i> e <i>Praxelis diffusa</i> no Ceará, Nordeste do Brasil	102
Figura 12 – Distribuição Geográfica de <i>Sphaeupatorium scandens</i> , <i>Trichogonia eupatorioides</i> , <i>Trichogonia salviifolia</i> e <i>Trichogoniopsis adenantha</i> no Ceará, Nordeste do Brasil	103
Figura 13 – A. <i>Isocarpha sp. nov.</i> localidade-tipo (seta). B. População. C. Habitat. D. Folha. E. Capitulescência. Imagens A-E por M.I.B. Loiola & M.A. Loiola.	116
Figura 14 – Distribuição Geográfica de <i>Isocarpha sp. nov.</i> in Brazil. AF = Floresta Atlântica, AL = Estado de Alagoas, BA = Estado de Bahia, CE = Estado de Ceará, PB = Estado de Paraíba, PE = Estado de Pernambuco, PI = Estado de Piauí, RN = Estado de Rio Grande do Norte.	117

LISTA DE TABELAS

Tabela 1 – Espécies de Eupatorieae nos tipos vegetacionais no Ceará, Nordeste do Brasil	104
Tabela 2 – Comparação dos caracteres morfológicos de <i>Isocarpha sp. nov.</i> com as outras espécies de <i>Isocarpha</i>	118

SUMÁRIO

1	INTRODUÇÃO GERAL	14
2	CAPÍTULO I: TAXONOMY AND DISTRIBUTION OF EUPATORIEAE (ASTERACEAE) IN A SEMIARID REGION OF BRAZIL	20
2.1	Abstract	21
2.2	Introduction	21
2.3	Materials and Methods	22
2.4	Results and Discussion	23
	References	87
2.5	List of examined exsiccats	105
3	CAPÍTULO II: <i>ISOCARPHA</i> SP. NOV. (ASTERACEAE: EUPATORIEAE): NEW SPECIES REGISTERED NORTHEAST OF BRAZIL	107
3.1	Abstract	108
3.2	Introduction	108
3.3	Materials and Methods	109
3.4	Taxonomic Treatment	109
3.5	Distribution, Habitat and Ecology	110
3.6	Phenology	111
3.7	Preliminary Conservation Status	111
3.8	Etymology	111
3.9	Taxonomic Notes	111
3.10	Additional Specimens Examined (paratypes)	112
3.11	Identification key for <i>Isocarpha</i>	112
3.12	Acknowledgments	113

3.13	Author Contributions	113
	References	114
4	CONSIDERAÇÕES FINAIS	119
	REFERÊNCIAS	121
	ANEXO A – ISOCARPHA SP. NOV. A. HABIT. B. LEAVE. C. CAPITULUM IN CYME. D. CAPITULUM INTERNALLY WITH LONG CONICAL RECEPTACLE. E. INVOLUCRAL BRACT. F. PALEA. G. FLOWER (DETAIL PILOSE AT THE BASE, SESSILE GLANDULAR TRICHOMES AT THE BASE AND LOBES). H. STAMEN. I. STYLE WITH STYLOPODIUM AT THE BASE. J. CYPSELAE	131

1 INTRODUÇÃO GERAL

Asteraceae compreende mais de 1.600 gêneros com 24.000 a 32.581 espécies, possuindo distribuição cosmopolita (exceto na Antártida), principalmente nas regiões temperadas e semiáridas dos trópicos e subtropicais (APG IV, 2016; FUNK *et al.*, 2009; MANDEL *et al.*, 2014; ROQUE; TELES; NAKAJIMA, 2017). A família é típica de formações abertas como o Cerrado, além de ser bem adaptada em formações florestais e campos de altitude (FUNK *et al.*, 2009; ROQUE; TELES; NAKAJIMA, 2017). A América do Sul é considerada o centro de diversidade do grupo com mais de 6.320 espécies registradas (PANERO & CRUZIER, 2016).

Os representantes da família possuem hábito herbáceo, arbustivo, lianescente, ou menos frequentemente arbóreo, usualmente terrestre e raramente aquático (FUNK *et al.*, 2009; TIPPERY *et al.*, 2014). As espécies são reconhecidas pela inflorescência do tipo capítulo, flores séssis inseridas em um receptáculo único envolvido por brácteas involucrais, flores bissexuais, unissexuais ou neutras, gamopétala e pentâmera, androceu isostêmone, cinco estames epipétalos, sinânteros, deiscência introrsa, ovário ínfero, bicarpelar, unilocular com apenas um óvulo de placentação basal e reta, fruto do tipo cipsela que, juntamente com o pápus, constitui a unidade de dispersão (BREMER, 1994; ANDERBERG *et al.*, 2007; FUNK *et al.*, 2009; ROQUE; TELES; NAKAJIMA, 2017).

Asteraceae é uma das maiores famílias das angiospermas e é considerada monofilética com base em dados moleculares e vários caracteres morfológicos, tais como, presença do oligossacarídeo inulina (carboidrato de reserva), inflorescência do tipo capítulo, anteras sinânteras, ovário bicarpelar ínfero, óvulo com placentação basal e reta (BREMER; GUSTAFSSON, 1997; FUNK *et al.*, 2009; APG IV 2016; ROQUE; TELES; NAKAJIMA, 2017).

Quanto à classificação inicial, Asteraceae foi dividida em três subfamílias, Barnadesioideae, Cichorioideae, Asteroideae e 17 tribos, baseados em dados morfológicos e moleculares (BREMER, 1994). Em estudos mais recentes 13 subfamílias e 44 tribos foram propostas, utilizando diversos marcadores moleculares, que reconheceram esse novo rearranjo, tendo a monofilia de 13 tribos tradicionais e a segregação completa das tribos Mutisieae (*sensu* CABRERA, 1977) e Heliantheae *s.l.* (FUNK *et al.*, 2009; PANERO; FUNK, 2002, 2008; PANERO *et al.*, 2014).

A família apresenta elevado potencial econômico, sendo amplamente utilizada no cultivo de culturas alimentícias como a alface (*Lactuca sativa* L.), alcachofra (*Cynara*

scolymus L.) e girassol (*Helianthus annuus* L.); espécies medicinais como carqueja (*Baccharis genistelloides* (Lam). Pers.), camomila (*Matricaria recutita* L.) e estévia (*Stevia rebaudiana* (Bertoni) Bertoni); representantes ornamentais como a margarida (*Leucanthemum vulgare*), gazania (*Gazania rigens* (L.) Gaertn.) e zínia (*Zinnia elegans* Jacq.); além de espécies invasoras como a vassourinha (*Baccharis dracunculifolia* DC.) e o pincel (*Emilia fosbergii* Nicolson) (SIMPSON, 2009; SOUZA; LORENZI, 2012).

A tribo Eupatorieae, inclusa na subfamília Asteroideae, é considerada uma das tribos mais derivadas e diversas de Asteraceae com 182 gêneros e 2.200 espécies, dividida em 19 subtribos, essencialmente na região Neotropical, e poucas espécies no Velho Mundo (KING; ROBINSON, 1987; BREMER, 1994; HIND; ROBINSON, 2007; ROBINSON; SCHILLING; PANERO, 2009; PANERO; CROZIER, 2016).

A tribo Eupatorieae foi alvo de vários estudos, que resultou em mudanças na circunscrição de muitos gêneros a partir de *Eupatorium* L., tendo este ficado restrito a América do Norte, Ásia e Europa (KING; ROBINSON, 1987; BREMER, 1994). Entretanto, estudos com espécies brasileiras, como os de Cabrera e Klein (1989) e Barroso (1991), continuaram a utilizar o conceito tradicional de *Eupatorium* (*sensu* BAKER, 1876) devido à complexidade da circunscrição proposta na época. Pesquisas posteriores aderiram à classificação proposta por King e Robinson (1987), que restringiu a distribuição de *Eupatorium* ao Hemisfério Norte, sem ocorrência para o Brasil (ESTEVEVES, 2001; CONTRO; NAKAJIMA, 2017; ROQUE; TELES; NAKAJIMA, 2017; LOPES, 2018).

Atualmente é reconhecido o monofiletismo da tribo, pertencendo ao clado da Aliança Heliantheae, sendo este o mais derivado dentro de Asteraceae, com aproximadamente 5.500 espécies, distribuídas principalmente na América (HIND; ROBINSON, 2007; PANERO; FUNK, 2008). No entanto, estudos mais recentes, com base em marcadores moleculares, utilizando as espécies de Eupatorieae brasileiras revelaram o parafiletismo entre gêneros e subtribos, indicando futuras mudanças na classificação da tribo (RIVERA *et al.*, 2016).

No Brasil, Eupatorieae é a tribo com maior riqueza representada por 608 espécies em 85 gêneros, possuindo muitos gêneros e espécies endêmicas, distribuída em todo território brasileiro, principalmente nas regiões Centro-Oeste, Sudeste e Sul, em todos os domínios fitogeográficos, tendo destaque para o Cerrado com maior representatividade de espécies (NAKAJIMA, 2000; PACHECO, 2014; FLORA DO BRASIL, 2020).

O domínio fitogeográfico Mata Atlântica apresenta elevada taxa de diversidade e endemismo em Asteraceae, bem como para Eupatorieae, principalmente nos gêneros *Mikania*

Willd. e *Baccharis* L. (TELES *et al.*, 2009; RIVERA *et al.*, 2016). A baixa expressividade de táxons para as regiões Norte e Nordeste pode ser justificada pela lacuna de estudos e carência de coleta nos estados que compõem essas áreas territoriais brasileiras.

A tribo distingue-se pela filotaxia oposta, raramente alterna, capítulos homógamos e discoides; involúcro campanulado a cilíndrico; brácteas involucrais persistentes a totalmente decíduas; flores hermafroditas, tubulosas, nunca amarelas, normalmente alvas a lilás; ramos do estilete com apêndices estéreis alongados, obtusos ou lineares a clavados, coloridos, sem pilosidade abaixo do ponto de bifurcação; cipselas 4-10 costas, enegrecidas com fitomelanina, presença do carpopódio mais claro do que a cipsela; pápus uni ou bisseriado, às vezes ausente ou reduzido (KING & ROBINSON, 1987; NAKAJIMA, 2000; HIND; ROBINSON, 2007; ROBINSON; SCHILLING; PANERO, 2009; CONTRO & NAKAJIMA, 2017; ROQUE; TELES; NAKAJIMA, 2017).

Trabalhos taxonômicos clássicos de Eupatorieae, incluindo representantes brasileiros, foram propostos por Barroso (1950, 1957, 1958) e King e Robinson (1971, 1978, 1980, 1987). Posteriormente, as espécies brasileiras foram alvos de vários estudos taxonômico-florísticos nas regiões Centro-Oeste (RIBEIRO; TELES, 2015; RIBEIRO, 2017), Sudeste (ESTEVES, 2001; QUARESMA, 2013; CASTRO, 2017; CONTRO; NAKAJIMA, 2017) e Sul (RITTER; MIOTTO, 2005; CHRIST; RITTER, 2019), utilizando a classificação de King e Robinson (1987).

A tribo também foi escopo de trabalhos sistemáticos e filogenéticos mais abrangentes, propondo a revisão de alguns gêneros como *Acritopappus* R.M.King & H.Rob., *Fleischmannia* Sch.Bip., *Heterocondylus* R.M.King & H.Rob., *Mikania* Willd., subtribo Gyptidinae R.M.King & H.Rob., *Trichogonia* (DC.) Gardner e subtribo Disynaphiinae R.M.King & H.Rob. (BAUTISTA, 2000; FERREIRA, 2010; ROQUE, BAUTISTA & MOTA 2012; HATTORI, 2013; FERNANDES, 2014; OLIVEIRA, 2015; ROBINSON, 2015).

No âmbito do estado do Ceará, dentro de Eupatorieae, somente *Mikania*, gênero mais representativo de Eupatorieae no mundo, com cerca de 450 espécies (ROBINSON; SCHILLING; PANERO, 2009; RITTER *et al.*, 2020), foi estudado até o momento, sendo o gênero representado por oito espécies no estado, distribuído principalmente na formação vegetacional Floresta Ombrófila Densa (Mata Úmida), menos frequente na Savana Estépica (Caatinga) e no Complexo Vegetacional da Zona Litorânea (Mata de Tabuleiro) (HONNÓRIO *et al.*, 2019).

Com base na listagem da Flora do Brasil (2020), Asteraceae está representada no Ceará por 79 gêneros e 123 espécies, sendo que a tribo Eupatorieae está representada por 26

espécies em 14 gêneros (*Acritopappus* R.M.King & H.Rob., *Ageratum* L., *Ayapana* Spach, *Brickellia* Elliott, *Chromolaena* DC., *Conocliniopsis* R.M.King & H.Rob., *Diacranthera* R.M.King & H.Rob., *Dissothrix* A. Gray, *Fleischmannia* Sch. Bip., *Koanophyllon* Arruda, *Mikania* Willd., *Piqueriella* Cav., *Praxelis* Cass., *Trichogonia* Gardner e *Trichogoniopsis* R.M.King & H.Rob.). Esses números revelam que apenas *Mikania* dos 14 gêneros de Eupatorieae recebeu atenção nos trabalhos sobre as floras do Estado.

O Ceará, apesar de sua grande diversidade florística com ca. 1.068 gêneros e 2.891 espécies de angiospermas, segundo a Flora do Brasil (2020), poucos estudos tem sido desenvolvidos, tendo recebido maior destaque nesta última década, onde deram início aos primeiros trabalhos florísticos no estado abrangendo as famílias Alismataceae, Cactaceae, Combretaceae e Capparaceae (MATIAS; SOUSA, 2011; MENEZES *et al.*, 2013; SOARES NETO; CORDEIRO; LOIOLA, 2014; SOARES NETO *et al.*, 2014).

Além disso, o Ceará possui uma vasta extensão territorial (148.894,757 km²), com uma grande diversidade de solos e relevos, além de distinções de continentalidade e maritimidade (FREITAS; MATIAS, 2010; IPECE, 2014). Devido a essas diferenças geomorfológicas, climáticas e ambientais, vários tipos de formações vegetacionais podem ser encontrados no estado, que de forma consequente, faz o Ceará abrigar um enorme número de espécies vegetais, inclusive espécies endêmicas (SUDENE, 1973; ARAÚJO *et al.*, 1998; MORO *et al.*, 2015).

O estado destaca-se por possuir 70% de seu território ocupado pela Depressão Sertaneja, na qual a unidade fitoecológica vegetacional caatinga do cristalino está localizada (MORO *et al.*, 2015). Apesar dessa expressiva constituição fitogeográfica que a Depressão Sertaneja possui sobre o estado, como já citado, o mesmo também apresenta outros variados tipos vegetacionais. Por exemplo, os Maciços Residuais do Cristalino e as Superfícies Sedimentares (Mata Úmida do Cristalino, Mata Seca do Cristalino, Mata Úmida do Sedimentar, Mata Seca do Sedimentar, Caatinga do Sedimentar, Cerrado e Cerradão), onde apresentam as maiores altitudes do estado (MORO *et al.*, 2015).

No entanto, apesar de toda essa formação vegetacional peculiar que o Ceará possui, com os tipos vegetacionais Complexo Vegetacional da Zona Litorânea, Floresta Sazonal Semidecidual, Floresta Ombrófila Densa, Savana, Savana Arbórea, Savana Estépica, Savana Estépica Arbórea e Vegetação sob Influência Fluvial e/ou Lacustre (IBGE, 2012; REBOUÇAS *et al.*, 2020) (Figura 1). Além disso, o estado foi via de rotas migratórias biogeográficas na expansão e contração de grupos e formações vegetacionais em eras passadas da história da Terra (BORJES-NOJOSA; CARAMASCHI, 2003; LOPES *et al.*,

2003), o que potencializa a importância das pesquisas no estado; o território cearense apresenta uma enorme carência de coleta e estudos sobre a flora do Ceará.

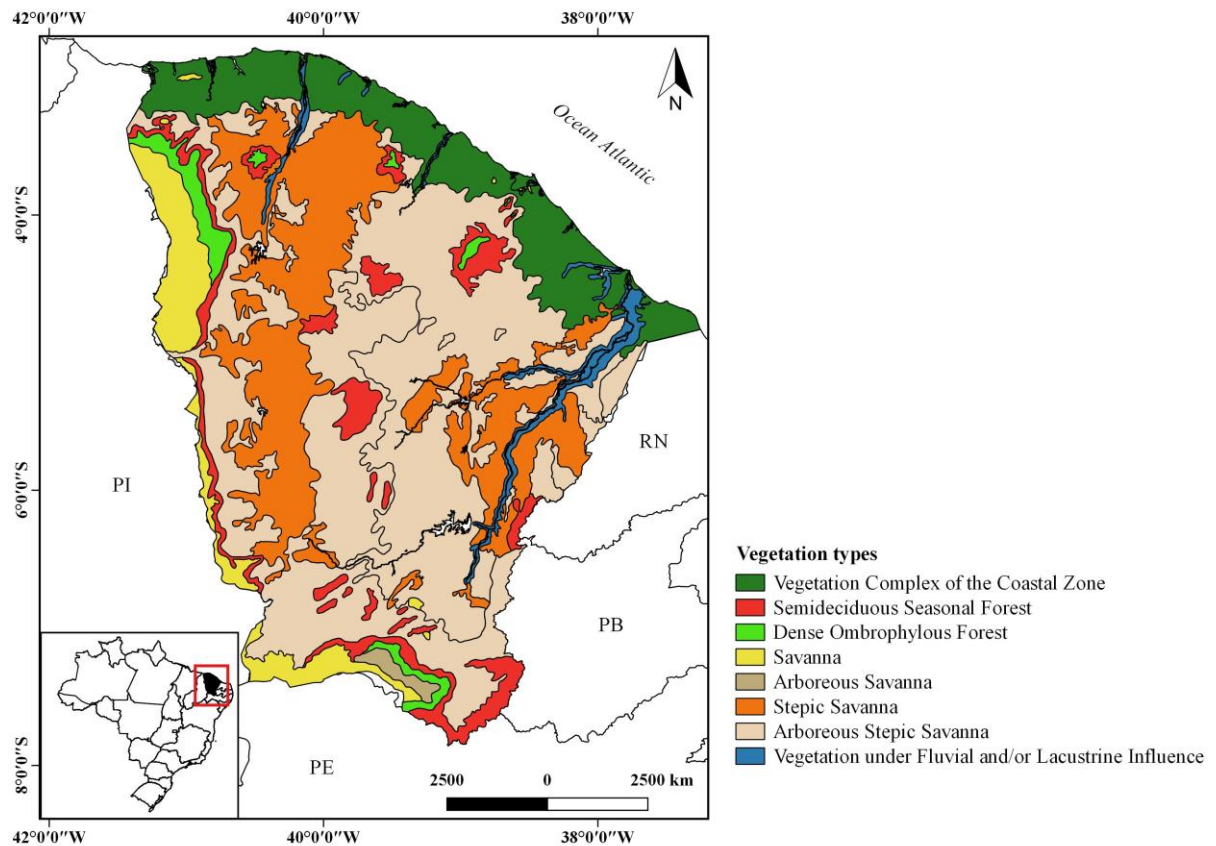


Figura 1. Tipos vegetacionais do Ceará, Nordeste do Brasil.

Nesse contexto, Eupatorieae mostrou-se um grupo promissor para a condução de estudos florísticos e de distribuição no estado, principalmente por tratar-se de uma das maiores tribos de Asteraceae, cujos táxons são bem representativos na flora cearense e com lacuna de estudos para a região Nordeste. Ressalta-se que o tratamento taxonômico de Eupatorieae aqui desenvolvido é o primeiro realizado exclusivamente para os táxons ocorrentes em território cearense e na região Nordeste e possui por objetivo contribuir para o avanço dos conhecimentos taxonômicos da tribo e auxiliando no reconhecimento das espécies.

O trabalho encontra-se dividido em dois manuscritos, cada manuscrito sendo organizado conforme as normas das respectivas revistas que serão submetidos.

O Capítulo 1, intitulado “**Taxonomy and distribution of Eupatorieae (Asteraceae) in a semiarid region of Brazil**”, que consiste no tratamento taxonômico de Eupatorieae no Ceará, incluindo 33 espécies em 18 gêneros, sendo um novo registro para a região Nordeste e sete novas ocorrências para o estado. Também são ainda apontados a

distribuição geográfica dos táxons, tipos vegetacionais de ocorrência e áreas de diversidade de Eupatorieae no Ceará.

O Capítulo 2, titulado “*Isocarpha* sp. nov. (Asteraceae: Eupatorieae): New Species Registered Northeast of Brazil”, que compreende uma nova espécie de *Isocarpha* para o Nordeste do Brasil (Ceará e Rio Grande do Norte) no domínio da Caatinga. As características diagnósticas da espécie incluem caracteres vegetativos e reprodutivos. São apresentados descrição, ilustração, mapa de distribuição e chave de identificação taxonômica para todos os taxa do gênero. Além disso, a nova espécie de *Isocarapha* é posicionada quanto a classificação infragênica de seção.

2 CAPÍTULO I

TAXONOMY AND DISTRIBUTION OF EUPATORIEAE (ASTERACEAE) IN A SEMIARID REGION OF BRAZIL

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2.1 Abstract

Eupatorieae (Asteraceae) has ca. 2,200 species, included in 182 genera and 19 subtribes. In Brazil it is the tribe with the largest number of taxa, many endemics, with 86 genera and 615 species distributed in all regions and phytogeographic domains, mainly in the Cerrado and the Atlantic Forest. This study had as objective to carry out the floristic survey and the taxonomic study of the species of Eupatorieae in Ceará State, Brazil. Comparative analyzes of the morphological characters of specimens deposited in herbaria, specialized bibliographies and images of collection-type were carried out. In addition to visits to national herbaria (ALCB, EAC, IPA) and field collections in some municipalities in the state. In Ceará, 33 species were registered in 18 genera, with a new occurrence in the Northeast, seven new records in Ceará and an endemic species in the state. *Chromolaena* (5 spp.) and *Mikania* (10 spp.) are the most representative genera in Ceará State. The tribe occurs preferentially in the mountain tops, in the vegetation type Dense Ombrophylous Forest. We present an identification key, descriptions of all species, taxonomic comments and geographic distribution.

Keywords. Compositae, Conservation, Flora of Ceará, Mountain tops, *Mikania*.

2.2 Introduction

Eupatorieae includes 182 genera and about 2,200 species, divided into 19 subtribes, essentially in the Neotropical region and with few species in the Old World (Robinson *et al.* 2009; Panero & Crozier 2016).

Eupatorieae is one of the most diverse tribes in the Asteraceae family and is characterized by discoid capitulum, bisexual flowers, corolla never yellow, style branches with long sterile appendage and papillose and cypselae blackened with phytomelanin (King & Robinson 1987).

Throughout the 20th century, Eupatorieae was the target of divers taxonomic studies that resulted in changes in the circumscription of many of its genera. The main modifications that occurred was the recircumscription of *Eupatorium* L., which currently includes 42 species restricted to North America, Asia and Europe (King & Robinson 1987; Bremer 1994).

In Brazil, Eupatorieae is the tribe with the greatest more represented by 608 species in 85 genera, having many genera and species endemic, distributed throughout Brazilian territory, mainly in the Midwest, Southeast and South regions, in all phytogeographic domains, highlighted in the Cerrado with greater number of species (Nakajima 2000; Pacheco 2014; Roque *et al.* 2017; Flora do Brasil 2020).

Brazilian species were the target of several taxonomic-floristic studies in the Midwest regions (Ribeiro & Teles 2015; Ribeiro 2017), Southeast (Esteves 2001; Quaresma 2013; Castro 2017; Contro & Nakajima 2017) and South (Ritter & Miotto 2005; Christ & Ritter 2019). For the Northeast region, few studies have been carried out with the Eupatorieae tribe, only in the state of Bahia, in the municipality of Morro do Chapéu (Staudt & Roque 2020) and the treatment of *Mikania* Willd. (Gandara & Roque 2020). In the state of Ceará, only *Mikania* was studied (Honório *et al.* 2019).

In this context, the present work had as objective to carry out the floristic survey and taxonomic study of the species of Eupatorieae (Asteraceae) in the Ceará state, increasing the knowledge of the tribe and Flora of Ceará.

2.3 Materials and methods

Study area

The state of Ceará, with an area of 148,894,757 km², is located in the Northeast region, between the latitudes of 2°46'S and 7°52'S and the longitudes of 41°24'W and 37°14'W, having as neighboring territories Piauí to the West, Rio Grande do Norte and Paraíba to the East, Pernambuco to the South and the Atlantic Ocean to the North (IPECE 2016; IBGE 2019).

The Ceará is classified as one of the driest states in the country, due to the dominant climatic conditions, semi-arid climate, with annual precipitation ranging between 600–1,200 mm, with the rains concentrated from January to June (Zanella 2005; Santos *et al.* 2009). However, due to the proximity to the Brazilian coast and the presence of mountainous areas, with higher altitudes, and rain levels reaching up to 1,500 mm, Ceará also presents humid and sub-humid areas, providing a different landscape variety from those found in the most of the state, interior of Ceará hinterland, and thus allowing the observation of several vegetation types (Nimer 1972; SUDENE 1999; Silva & Cavalcante 2004).

In this study, the classification of vegetation proposed by the Technical Manual of Brazilian Vegetation was considered (IBGE 2012) and species distribution maps followed Rebouças *et al.* (2020), demonstrating the occurrence of representatives by vegetation types registered in Ceará.

Collection and processing of data

Four field expeditions were carried out between 2019–2020, three in the rainy season and one in the dry season. The herbaria ALCB, EAC, IPA were visited and specimens from HST, HVASF, PEUFR, TANG, TEPB (Thiers 2021, continuously updated) were borrowed. Additionally, more than 400 specimens available in online databases CRIA (2021),

GBIF (2021) and JABOT (2021) were analysed

The identifications were carried out with specialized bibliographies (King & Robinson 1987; Ritter & Miotto 2005; Roque *et al.* 2012; Robinson 2015; Gandara & Roque 2020) and confirmed through analysis of images available on the platforms REFLORA Virtual Herbarium (2021+) (<http://www.herbariovirtualreflora.jbrj.gov.br>) and Global Plants on JSTOR (2021+) (<https://plants.jstor.org>). The names of the authors are in accordance with IPNI (2021). The descriptions of the genera and the tribe were based on King & Robinson (1987) and Flora do Brasil (2020). The species were considered as a new record when the name was not included in the Flora do Brasil (2020) and Loiola *et al.* (2020).

The terminology used for vegetative and reproductive structures was based on Radford *et al.* (1974) and Roque & Bautista (2008). Data such as form of growth, habitat (habit), flowering and fruiting period and popular names were obtained from the labels of the specimens. When the samples collected in Ceará were insufficient for the description, additional specimens from other states were used to complement the descriptions. The images of the species were obtained with the aid of a photographic camera and a Nikon SMZ 1500 stereomicroscope. The field figures was created with GIMP 2.8 software and a species distribution map with QGIS 2.18.

Abbreviations

Fig. = Figure

s.d. = no data

s.loc. = no location

s.n. = no collection number

Tab. = Table

2.4 Results and Discussion

In Ceará, 33 species belonging to 18 genera were registered. *Chromolaena* DC. and *Mikania* Willd. are the most representative genera in the state, with five spp. and 10 spp., respectively. We found new records for the region, for example: *Chromolaena mucronata* (Gardner) R.M. King & H. Rob. is reported for the first time for the Northeast region.; *Barrosoa betoniciformis* (DC.) R.M. King & H. Rob., *Chromolaena maximilianii* (Schrader ex DC.) R.M. King & H. Rob., *Chromolaena myriocephala* (Gardner) R.M. King & H. Rob., *Koanophyllon tinctorium* Arruda, *Mikania glomerata* Spreng., *Mikania jeffreyi* DJN Hind and *Mikania trinervis* Hook. & Arn. constitute new occurrences for the state of Ceará and *Piqueriella brasiliensis* R.M. King & H. Rob. is reiterated as endemic to the state (Tab. 1).

The diversity of Eupatorieae in the Ceará territory is preferably associated in the

mountains with 29 species, 21 of which are exclusive to these environments, between 700–1,150 m. They occur in the Dense Ombrophylous Forest, Savanna and Semideciduous Seasonal Forest, areas of humid to sub-humid climate, with an average annual rainfall of 1,200 mm (Fig. 1; Fig. 2 A-D, G; Tab. 1), with emphasis on *Mikania* with six species preferably occurring in these conditions. Despite the preference for open and non-forested vegetation, typically from the Asteraceae family (Funk *et al.* 2009; Roque *et al.* 2017), there are genera, as *Mikania*, that are well adapted in forested areas (Holmes 1995; Teles *et al.* 2009). The species were also registered in drier regions of the state, at low altitudes, with annual precipitation of around 500–800 mm, in shallow, sandy or stony soils, related to the phytogeographic domain of the Caatinga, in the vegetation Arboreous Stepic Savanna and Stepic Savanna, but in a smaller number (9 spp.) (Fig. 2; Fig. 3 E-F; Tab. 1). In addition, in vegetation close to the coast of Ceará and in anthropized areas (Fig. 3 H).

Class Magnoliopsida Brongn.

Order Asterales Link

Family Asteraceae Bercht. & J.Presl.

Subfamily Asteroideae Lindl.

Tribe Eupatorieae Cass.

Description

Plant perennial or annual, herb, subshrub to shrub, tree, or vine, erect or scrambling, branches fistulose or not, cylindrical or angular, striate, pubescent, strigose, sericeous, villous, tomentose, stipitate-glandular, glabrescent or glabrous, punctuation glandular trichomes or not. **Leaves** opposite or alternate, sessile or petiolate; pseudo-stipule present or not; blades, entire, lobed, or pinnatisect, concolor or discolor, adaxial surface glabrous, tector and/or punctuation glandular trichomes, abaxial surface glabrous, tector and/or punctuation glandular or stipitate-glandular trichomes, brochidodromous or actinodromous venation. **Leafy bracts** present. **Bracteole** and **subinvolucral bract** present. **Capitulescence** corymbiform, glomeriform, racemiform, paniculiform, rhipidium, thyrsoid or paniculate-thyrsoid, rare solitary; capitulum homogamous, discoid, involucre subimbricate or eximbricate, uniseriate, pauciseriate, or multiseriate, cylindrical, pyriform, or campanulate, receptacle flat, convex, concave or conical, paleaceous or not, glabrous; sessile to pedunculate. **Involucral bracts** 4–61, persistent or sometimes deciduous, abaxial surface with tector and/or punctuation glandular or stipitate-glandular trichomes or glabrous. **Flowers** 4–300, corolla usually distinct in tube and limb, tube smaller, equal or almost equal or larger

than limb with tector and/or capitate glandular, stipitate-glandular, or glabrous, limb campanulate, infundibuliform, cylindrical, fusiform, tector and/or capitate glandular or stipitate-glandular trichomes, or glabrous, lobes triangular, deltate or ovate, papillose, glabrous, tector and/or capitate glandular or stipitate-glandular trichomes. **Stamens** 5, inserted in different regions of the corolla, anther connective appendage wider than long, longer than wide or as long as wide, anther collar conical or cylindrical. **Style** base enlarged or cylindrical, glabrous or pilose, stylopodium present or not, style branches cylindrical, lanceolate or linear. **Cypselae** 3–10-ribbed, prominent, setuliferous or not, prismatic, obconic, or cylindrical, tector and/or capitate glandular or stipitate-glandular trichomes, or glabrous; carpodium annuliform, decurrent, asymmetric, or inconspicuous; pappus bristly, barbellate, plumose, aristate, or paleaceous-aristate, uniseriate, equal, subequal, or unequal in size, whitish, yellowish, reddish or rare ferruginous.

Distribution

Eupatorieae grows in all the Neotropical region, and with few representatives in North America, Europe, Africa and Asia (Robinson *et al.* 2009; Panero & Crozier 2016). In Brazil, it occurs in all phytogeographic regions and domains, however, with an expressive number of taxa for the Midwest and Southeast regions, in the Cerrado and in the Atlantic Forest (Flora do Brasil 2020).

Habitat

In the State of Ceará, Eupatorieae is more representative in mountainous areas (29 spp.), with high altitude, humid and sub-humid environments, in forested vegetation and open fields (Dense Ombrophylous Forest, Savanna and Semideciduous Seasonal Forest) (Fig. 3 A-C, G), unlike the dry areas predominated by the Caatinga (Arboreous Stepic Savanna and Stepic Savanna) (Fig. 3 E-F), where exist only nine species.

Identification Key for the Eupatorieae in the Ceará, Northeast Brazil.

1. Capitulum with equal number of flowers and involucre bracts (4) 2
 - Capitulum with different number of flowers and involucre bracts 11
2. Leaves blade pinnatisect, 3-parted *Mikania ternata*
 - Leaves blade entire or lobed 3
3. Capitulescence racemiform *Mikania psilostachya*
 - Capitulescence corymbiform, glomeriform, thyrsoid or paniculiform to thyrsoid 4
4. Leaves blade carnose to coriaceous and capitulum sessile *Mikania glomerata*
 - Leaves blades membranaceous or chartaceous and capitulum subsessile to pedunculate (1–

- 10 mm long) 5
5. Leaves blade 90–105 × 82–85 mm, wide deltate *Mikania vitifolia*
- Leaves blade 26–80 × 10–60 mm, ovate, elliptic or triangular 6
6. Capitulescence glomeriform, corolla with stipitate-glandular trichome, cypselae c. 1.2 mm long and pappus 2–2.3 mm long *Mikania congesta*
- Capitulescence corymbiform, thyrsoïd or paniculiform to thyrsoïd, corolla glabrous or capitate glandular trichomes, sparse villous, cypselae 1.8–4 mm long and pappus 2.8–5.5 mm long 7
7. Leaves blade elliptic, chartaceous, brochidodromous venation and anther collar cylindrical *Mikania elliptica*
- Leaves blade ovate or triangular, membranaceous, actinodromous venation and anther collar conical 8
8. Leaves blade triangular and Both foliar surfaces lepidote *Mikania jeffreyi*
- Leaves blade ovate and both foliar surfaces strigose, villous, tomentose, sericeous, glabrescent or glabrous 9
9. Leaves base cuneate to obtuse, pseudo-stipule absent, capitulescence paniculiform to thyrsoïd and subinvolucral bracts along the peduncle *Mikania trinervis*
- Leaves base cordate, pseudo-stipule present, capitulescence corymbiform and subinvolucral bracts at the base of the capitulum 10
10. Subinvolucral bract foliaceous, corolla 5–5.3 mm long, cypselae 3–4 × 0.9–1.2 mm, carpodium decurrent and pappus 4.5–5.5 mm long *Mikania cordifolia*
- Subinvolucral bract lanceolate, corolla 3.8–4 mm long, cypselae 2–2.5 × 0.3–0.6 mm, carpodium annuliform and pappus 3.5–4 mm long *Mikania micrantha* (Fig. 4, H-I)
11. Receptacle paleaceous 12
- Receptacle epaleaceous 13
12. Shrub to tree, brochidodromous venation, receptacle flat, flowers 10–12 and pappus aristate *Acritopappus confertus*
- Herb, actinodromous venation, receptacle conical, flowers 250–300 and pappus absent *Isocarpha megacephala*
13. Style base enlarged 14
- Style base cylindrical 17
14. Cypselae 10-ribbed *Brickellia diffusa* (Fig. 4, C-D)
- Cypselae 5-ribbed 15
15. Herb, 8–60 cm tall, leaves blade with actinodromous venation, capitulescence rhipidium,

- capitulum with flowers 7–9 and pappus unequal *Dissothrix imbricata*
 – Subshrub to shrub, 80–150 cm tall, leaves blade with brochidromous venation, capitulescence corymbiform, capitulum with flowers 21–51 and pappus subequal 16
16. Leaves blade coriaceous, involucre 6–7-seriate, flowers c. 21, corolla tube and limb indistinct and style c. 4.5 mm long *Ayapana amygdalina*
 – Leaves blade chartaceous, involucre 2-seriate, flowers 44–51, corolla tube and limb distinct and style 5.5–6.5 mm long *Diacranthera ulei*
17. Capitulescence glomeriform and capitulum sessile *Sphaereupatorium scandens*
 – Capitulescence cyme, corymbiform, paniculiform, or solitary and capitulum subsessile to pedunculate (1–40 mm) 18
18. Capitulescence paniculiform 19
 – Capitulescence cyme, corymbiform or solitary 21
19. Involucral bracts with margin denticulate, pappus absent and carpopodium lateral *Piqueriella brasiliensis* (Fig. 5, A-C)
 – Involucral bracts with margin entire or ciliate, pappus present and carpopodium annuliform or inconspicuous 20
20. Herb, leaves blade 20–50 mm long, deltate, capitulum 3.5–4 × c. 2 mm, flowers 15–27, corolla tube and limb distinct and cypselae setuliferous
 *Fleischmannia microstemon var. paniculata* (Fig. 4, G)
 – Subshrub, leaves blade 50–95 mm long, ovate, ovate-lanceolate, capitulum 8–10 × c. 2 mm, flowers 8–9, corolla tube and limb indistinct and cypselae pilose and stipitate-glandular
 *Koanophyllon tinctorium*
21. Pappus plumose 22
 – Pappus paleaceous-aristate or bristly 24
22. Corolla lobes with capitate glandular trichomes *Trichogoniopsis adenantha*
 – Corolla lobes pubescent 23
23. Receptacle flat, flowers 41–50 and pappus defective (absent at least in the marginal cypselae) *Trichogonia eupatorioides*
 – Receptacle convex, flowers 26–34 and pappus regular (present in all cypselae)
 *Trichogonia salviifolia*
24. Flowers 75–82 and pappus paleaceous-aristate *Ageratum conyzoides* (Fig. 4, A-B)
 – Flowers 17–70 and pappus bristly 25
25. Involucre subimbricate or eximbricate, 2-seriate..... 26

- Involucre imbricate, 3–8-seriate 27
26. Leaves opposite, blade base cordate, margin crenate, basal 5–7-nerved, corolla tube and limb indistinct, cypselae prismatic with base curved and carpodium subquadrangular *Barrosoa betoniciformis*
- Leaves alternate, blade base cuneate, margin serrate, basal 3-nerved, corolla tube and limb distinct, cypselae obconic with base straight and carpodium asymmetric *Conocliniopsis prasiifolia* (Fig. 4, E-F)
27. Involucre 3–4-seriate and receptacle conical 28
- Involucre 5–9-seriate and receptacle flat, convex or concave 29
28. Capitulescence corymbiform and style 6.2–6.5 mm long *Praxelis clematidea* (Fig. 5, D-E)
- Capitulescence cyme or solitary and style 4–4.5 mm long *Praxelis diffusa* (Fig. 5, F)
29. Leaves blade glabrous *Chromolaena laevigata*
- Leaves blade sparse strigose to strigose, scabrous or dense velutinous 30
30. Leaves blade scabrous, capitulum pedunculate 17–35 mm long and flowers 57–61 *Chromolaena mucronata*
- Leaves blade sparse strigose to strigose or dense velutinous, capitulum pedunculate 3–15 mm long and flowers 21–27 31
31. Subshrub scrambling, corolla tube and limb indistinct and cypselae 3(-4)-ribbed *Chromolaena maximilianii*
- Subshrub to shrub erect, corolla tube and limb distinct and cypselae 5-ribbed 32
32. Leaf blade concolor, strigose on abaxial surface and involucre 5–6-seriate *Chromolaena myriocephala*
- Leaf blade discolor, velutinous on abaxial surface and involucre 7–8-seriate *Chromolaena squalida*

Acritopappus confertus (Gardner) R.M. King & H. Rob.

Fig. 3 C, E, G.; Fig. 6.

Phytologia 24: 402 (R.M. King & H. Rob. 1972).

Material examined

BRASIL – Ceará • S.loc.; s.d.; F.F. Allemão & M. Cysneiros 843; R • Brejo Santo, Chapada do Araripe, área de torres de TV, 982 m, 7°44'38"S, 39°06'88"W; 11 Jan. 2010; A.P. Fontana et al. 6265; HVASF, IPA • Brejo Santo, Povoado de São Felipe, 950 m; 05 Jun. 2012; V.M. Catorelli 1781; HVASF • Cariri, Crato, Chapada do Araripe; 18 Jan. 2009; M.A.P. Silva et al.

s.n.; HCDAL[4330] • Cariri, Crato, estrada Crato-Exú, 929; 22 Mar. 2007; *E.N.C. Seixas et al. s.n.*; HCDAL[3287] • Cariri, Crato, estrada do Cajueiro; 03 Mar. 2009; *A.C.A. Morais & A.L. Jorge 156*; HCDAL • Chapada do Araripe; 17 Aug. 1948; *A. Duarte & Ivone 1433*; US • Chapada do Araripe; 25 Feb. 1958; *T.N. Guedes 522*; IAN, NY, UB • Crato, após Belmonte, 28 Feb. 1978; *A. Fernandes s.n.*; EAC[4246] • Crato, Barreiro Grande, 800 m; 23 Jan. 1998; *M.A.P. Silva et al. s.n.*; EAC[26191], HCDAL[1225], HST[17478] • Crato, Cabelo Grosso; 10 Dec. 1965; *J.S. Sobrinho 199*; PEUFR • Crato, Chapada do Araripe, Belmonte; 11 Oct. 2006; *M.A.P. Silva 1518*; HCDAL • Crato, Chapada do Araripe, Serra dos Prazeres; 28 Mar. 2000; *E.B. Souza et al. 450*; ALCB, EAC • Crato, Chapada do Araripe-Belmonte; 02 Apr. 1995; *E. Silveira s.n.*; EAC[22102] • Crato, estrada Exú, 928 m, 7°28'89"S, 39°54'01"W; 12 Jan. 2007; *E.N.C. Seixas et al. s.n.*; HCDAL[3570] • Crato, estrada Exú, Barreiro Novo, 989 m; 21 Dec. 2006; *M.A.P. Silva et al. s.n.*; HCDAL [2862] • Crato, estrada velha Minguiriba, 919 m, 7°29'27"S, 39°54'16"W; 22 2011; *E.B. Souza et al. 2106*; HUEFS • Crato, Floresta Nacional do Araripe-Apodi – FLONA; 25 May. 1999; *A.M. Miranda & D. Lima 3426*; HST, HUEFS, FLOR • Crato, Floresta Nacional do Araripe-Apodi – FLONA; 26 Mar. 1999; *L.W. Lima-Verde 1326*; EAC • Crato, Floresta Nacional do Araripe-Apodi – FLONA; 28 Apr. 1999; *L.W. Lima-Verde 1333*; EAC, HUEFS • Crato, subida da Chapada do Araripe, estrada do Lameiro; 10 Jul. 1990; *E. Nunes s.n.*; EAC[16571, 27599] • Ipueiras, Planalto da Ibiapaba, Buriti; 22 Jul. 2009; *A.S.F. Castro 2203*; EAC • Poranga, Buriti; 21 Jul. 1979; *S.J. Filho 57*; IPA.

Description

Shrub to tree, erect, 1–3 m tall, branches solid, cylindrical, striate, glabrescent, punctuation glandular trichomes. **Leaves** opposite, petiolate 11–20 mm long, glabrescent; blades 50–130 × 16–37 mm, entire, papiraceous to coriaceous, discolor, lanceolate, rare elliptic, base attenuate, apex long-acuminate, margin entire to slightly serrate, plane, adaxial surface glabrous, lustrous, punctuation glandular trichome absent, abaxial surface glabrous, lustrous, punctuation glandular trichomes present, brochidodromous venation. **Leafy bracts** 25–90 × 5–30 mm, lanceolate, apex long-acuminate. **Bracteole** 7–20 × 1–2 mm, linear, apex acute, margin entire, strigose and punctuation glandular trichomes. **Capitulescence** corymbiform; capitulum 3–4 × c. 2 mm, involucre eximbricate, 3-seriate, cylindrical, receptacle flat, paleaceous; sessile to subsessile, 1–2 mm long, tomentose, glabrescent. **Involucral bracts** c. 9, persistent, **outer involucral bracts** 2.8–3.5 × 1–1.3 mm, 3-nerved, subcoriaceous, elliptic, lanceolate, apex acute, margin erose, ciliate, glabrescent with punctuation glandular trichomes; **inner involucral bracts** 3–3.7 × 0.4–1 mm, 3-nerved, subcoriaceous, lanceolate, apex acute, margin erose, ciliate, glabrescent with punctuation

glandular trichomes, **palea** 3.4–4 × 0.3–0.5 mm, linear, apex acute. **Flowers** 10–12, **corolla** 3.1–3.3 mm long, corolla tube and limb indistinct, limb cylindrical, pubescent, capitate glandular, lobes 0.3–0.4 × c. 0.2 mm, triangular, papillose. **Stamens** 1.7–1.8 mm long, inserted in the middle of the corolla, not exceeding limb height, anther 1.3–1.4 mm long, base sagittate, anther connective appendage c. 0.3 × 0.2 mm, longer than wide, ovate, apex rounded, anther collar cylindrical. **Style** 5.5–6 mm long, base cylindrical, glabrous, stylopodium c. 0.4 mm long, pubescent, style branches 3.5–4 mm long, clavate. **Cypselae** 2–2.3 × 0.7–0.9 mm, 5-ribbed, setuliferous, prismatic, pubescent, glabrescent; carpodium cylindrical; pappus 0.3–0.7 mm long, aristate, uniseriate, unequal, yellowish.

Distribution

The species is endemic to Brazil, in the phytogeographic domain of the Cerrado and Caatinga, occurring in the Northeast (Bahia, Ceará, Pernambuco, Sergipe) and Southeast (Minas Gerais) regions, in coastal vegetation and in forested areas (Bautista 2000; Nakajima & Bautista 2020).

Habitat and phenology

In Ceará, it occurs in Chapada do Araripe and Ibiapaba Plateau, in municipalities located at 800–1000 m altitude, growing in the Seasonal Semideciduous Forest, Savanna and Arboreal Stepic Savanna (Fig. 3 C, E, G; Fig. 6). Registered with flowering from January to August and November and December.

Conservation data

It has a restricted distribution in the state and is registered in an only Conservation Unit in Ceará, in the Araripe-Apodi National Forest - FLONA.

Note

Acritopappus confertus is distinguished from other species registered in Ceará by shrub to tree habit, large leaves blade 50–130 × 16–37 mm, glabrous, lustrous, brochidodromous venation, receptacle flat and pappus aristate.

Ageratum conyzoides L.

Fig. 3 A-C, E-F, H; Fig. 4 A-B; Fig. 6.

Species Plantarum 2: 839. (L. 1753).

Material examined

BRASIL – **Ceará** • Acarape, Garapa; 15 Feb. 2002; *E. Silveira s.n.*; EAC[31614] • Aiuaba, Estação Ecológica de Aiuaba; 28 May. 1980; *A. Fernandes & P. Bezerra s.n.*; EAC[8736] • Aiuaba, Estação Ecológica de Aiuaba, Boqueirão; 30 May. 1984; *E. Nunes s.n.*; EAC[12624] • Aiuaba, Estação Ecológica de Aiuaba; 25 Apr. 1996; *M.A. Figueiredo et al.* 586; EAC, IPA,

MOSS, • Aiuaba, Estação Ecológica de Aiuaba; 06 Apr. 1997; *E.O. Barros et al.* 62; EAC • Alcantara, área de Mata Úmida muito degradada, 840 m, 3°58'69"S, 40°49'43"W; 11 Jun. 2008; *E.B. Souza* 1602; HUEFS • Aquiraz, Tribo Jenipapo Canindé; 08 Aug. 2003; *S. Macêdo s.n.*; EAC[32657] • Aurora, Sítio Santa Helena, 327 m, 7°09'63"S, 39°06'75"W; 20 Aug. 2014; *L.B. Pimental* 249; HUEFS • Crato, Barreiro Grande; 26 May. 1997; *F.S. Cavalcanti s.n.*; EAC[24970], HUEFS[138592] • Crato, Chapada do Araripe, Floresta Nacional do Araripe-Apodi – FLONA; 13 Jun. 2000; *E. Nunes & F.S. Cavalcanti s.n.*; EAC[29786] • Crato, Chapada do Araripe; 16 May. 1995; *F.S. Cavalcanti* 16; EAC • Fortaleza; 04 Aug. 1935; *F.E. Drouet* 2166; US • Fortaleza, Barra do Ceará; 06 Jul. 1960; *L. Almeida s.n.*; EAC[2013], HUEFS[138591] • Fortaleza, Bom Jardim, Rio Siqueira; 26 May. 2001; *S. César* 23; EAC • Fortaleza, Horto de Plantas Mediciniais – UFC; Jul. 1994; *R. Veloso s.n.*; EAC[21282], HUEFS[138590] • Fortaleza, Horto de Plantas Mediciniais – UFC; 29 Nov. 1995; *F.J.A. Matos s.n.*; EAC[23401, 23402], HUEFS[138593] • Graça, Sítio Santa Clara, 3°96'22"S, 49°81'86"W; 25 Jun. 2017; *F.F. Araújo* 271; ALCB, EAC • Guaramiranga; 17 Jul. 1908; *A.M.G. Ducke* 1308; UB • Guaramiranga; 24 Jul. 1984; *F.S. Cavalcanti s.n.*; EAC[12765], MBM[101628] • Guaramiranga, Área de Proteção Ambiental da Serra de Baturité – APA, Pico Alto, 1010 m, 4°20'77"S, 38°97'19"W; 11 May. 2019; *N.C. Rebouças et al.* 103; EAC • Ipaumirim, povoado Serra de Areia, 362 m, 6°90'47"S, 38°76'91"W; 24 May. 2012; *E.V.R. Ferreira* 683; HVASF • Itapajé, Maritataca; 23 Oct. 1985; *E. Nunes s.n.*; EAC[13861] • Madalena, Riacho Teotônio, 4°75'53"S, 39°69'91"W; 11 Jun. 2018; *E.D. Lozano et al.* 4210; MBM • Meruoca, Serra da Meruoca, Sítio Lajes; 15 Jul. 1957; *A. Fernandes s.n.*; EAC[1639], HUEFS[138595] • Meruoca, Serra da Meruoca, Sítio Santo Antônio dos Fernandes; 26 Jun. 1987; *A. Fernandes s.n.*; EAC[15374] • Meruoca, Serra da Meruoca, Sítio Santo Antônio dos Fernandes; 01 May. 1994; *A. Fernandes & F.J.A. Matos s.n.*; EAC[21228] • Meruoca, Sítio Santo Inácio; 26 Jan. 2014; *J.E.M. Nascimento* 236; ALCB • Milagres, 370 m, 7°29'77"S, 38°94'07"W; 10 Apr. 2012; *C.G. Silva* 160; CSTR • Monsenhor Tabosa, no caminho para o Pico da Serra Branca, 710 m, 4°80'16"S, 40°16'54"W; 19 Apr. 2019; *N.C. Rebouças et al.* 14; EAC • Mulungu, Sítio Professor Heliomar; 28 Aug. 1995; *F.S. Cavalcanti s.n.*; EAC[23083] • Mulungu, Sítio Professor Heliomar; 30 Mar. 1997; *T.L.G. Lemos s.n.*; EAC[24939] • Pacatuba, Serra da Aratanha, Sítio São João; 04 Oct. 1979; *A.J. Castro & P. Martins s.n.*; EAC[7060] • Pacoti, Área de Proteção Ambiental da Serra de Baturité – APA; 23 Sep. 1981; *F.S. Cavalcanti & F. Bruno s.n.*; EAC[10816] • Pacoti, Área de Proteção Ambiental da Serra de Baturité – APA, Sítio Pau D'valho; 04 Feb. 1984; *F.S. Cavalcanti s.n.*; EAC[12320] • Pacoti, Sítio Pau D'valho; 30 Nov. 1983; *F. Simões s.n.*; EAC[12267] • Pereiro, solos com

afloramentos rochosos, 6°11'99"S, 38°52'00"W; 13 Dec. 2013; *A.E.S. Ferreira 103*; EAC • Porteiras, Sítio Massapê, Nascente de água potável, 812 m; 06 Nov. 2018; *A.P. Fontana 10345*; HUEFES • Ubajara, Parque Nacional de Ubajara – PARNA; 01 Jul. 1978; *A. Fernandes & F.J.A. Matos s.n.*; EAC[3940] • Ubajara, próximo ao Escritório ICMBIO – Horto, 872 m, 3°84'19"S, 40°94'30"W; 25 Apr. 2012; *M.I.B. Loiola et al. 1510*; EAC • Várzea Alegre, Fazenda Baraúna, 06 Jun. 1999; *P.G.B. Freitas 15*; MOSS • Viçosa do Ceará; 05 Jun. 1982; *F. Bruno s.n.*; EAC[11521].

Description

Herb to subshrub, erect, 40–60 cm tall, branches fistulose, cylindrical, striate, villous, glabrescent. **Leaves** opposite, petiolate 6–42 mm long, villous; blades 50–55 × 15–60 mm, entire, membranaceous, discolor, ovate to wide ovate, base rounded, apex acute, margin crenate-serrate, plane, adaxial surface sericeous, abaxial surface glabrous, punctuation glandular trichomes present, actinodromous venation (basal 3-nerved). **Leafy bracts** 15–21 × 4–18 mm, ovate, apex acute. **Bracteole** 2.1–3 × 1–1.5 mm, linear-lanceolate, apex acute, margin ciliate, sericeous. **Capitulescence** corymbiform; capitulum 3.3–5.6 × 3.5–4.4 mm, involucre eximbricate, 2-seriate, campanulate, receptacle convex, epaleaceous; pedunculate, 2.8–8 mm long, villous, glabrescent. **Involucral bracts** 20–30, persistent, **outer involucral bracts** 3.3–3.5 × c. 0.5 mm, 2-nerved, chartaceous, oblong, apex acuminate, cuspidate, margin ciliate, villous, glabrescent; **inner involucral bracts** 3.8–4 × 0.5–0.6 mm, 2-nerved, chartaceous, oblong, apex acuminate, margin ciliate, villous, glabrescent. **Flowers** 75–82, **corolla** 1.8–2.1 mm long, corolla tube and limb distinct, tube 1–1.3 mm long, capitate to stipitate-glandular trichomes, limb 0.8–0.9 mm long, campanulate, glabrous, lobes 0.3–0.4 × 0.2–0.4 mm, ovate. **Stamens** 1–1.2 mm long, inserted in the half of the tube, not exceeding limb height, anther 0.5–0.6 mm long, base rounded, anther connective appendage 0.2–0.25 × 0.15–0.2 mm, longer than wide or as long as wide, apex acute, anther collar cylindrical. **Style** 2.3–2.7 mm long, base cylindrical, glabrous, stylopodium absent, style branches 1.5–1.6 mm long, clavate. **Cypselae** 1.2–1.8 × 0.5 mm, 5-ribbed, setuliferous prismatic, glabrescent; carpodium inconspicuous; pappus 1.8–2.2 mm long, uniseriate, paleaceous-aristate, subequal, yellowish.

Distribution

Ageratum conyzoides has distribution in North and South America (Hind & Robinson 2007). In Brazil, it occurs in all phytogeographic regions and domains, being recorded in anthropized environments (Rivera 2020).

Habitat and phenology

In Ceará, *Ageratum conyzoides* has a wide distribution, being registered in 23 municipalities in the state, occurring in the Arboreous Stepic Savanna, Dense Ombrophylous Forest, Semideciduous Seasonal Forest, Stepic Savanna and Vegetation Complex of the Coastal Zone (Fig. 3 A-C, E-F, H; Fig. 4 A-B; Fig. 6) and in anthropized environments. Flowering throughout the year.

Conservation data

The species is widespread in Ceará and was collected in four conservation units of Ceará territory (Serra de Baturité Environmental Protection Area - EPA, Aiuaba Ecological Station, Araripe-Apodi National Forest - FLONA, Ubajara National Park - PARNA).

Note

Ageratum conyzoides differs from other taxa by herbaceous and subshrub habit, leaves blade ovate, margin crenate-serrate, large number of flowers in the capitulum (75–82) and pappus paleaceous-aristate. The species is popularly known as “mentrasto”.

Ayapana amygdalina (Lam.) R.M. King & H. Rob.

Fig. 3 A-B; Fig. 6.

Phytologia 20(3): 211 (R.M. King & H. Rob. 1970).

Material examined

BRASIL – Ceará • Guaraciaba do Norte; 18 Sep. 1988; A. Fernandes et al. s.n.; EAC[16622] • Chapada do Araripe; Sep. 1938; G. Gardner 1734; HUEFS • Chapada do Araripe; 17 Aug. 1948; A.P. Duarte 1442; US.

Description

Subshrub to Shrub, erect, c. 80 cm tall, branches solid, cylindrical, striate, strigose, with punctuation glandular trichomes. **Leaves** opposite, petiolate 4–7 mm long, strigose; blades 15–80 × 10–15 mm, entire, coriaceous, concolor, narrow elliptic, base cuneate, apex acute, margin entire to slightly serrate, ciliate, plane, strigose, glabrescent, punctuation glandular trichomes on abaxial surface, brochidodromous venation. **Leafy bracts** 3–8 × 1–2 mm, narrow elliptic, lanceolate, apex acute, obtuse. **Bracteole** 8–10 × c. 3 mm, ovate, apex acute, margin ciliate, dense strigose, with punctuation glandular trichomes. **Capitulescence** corymbiform; capitulum 5–6 × 3–4 mm, involucre subimbricate, 6–7-seriate, campanulate, receptacle flat, epaleaceous; pedunculate, 2–11 mm long, strigose. **Involucral bracts** c. 38, persistent, **outer involucral bracts** 1–2 × c. 1 mm, 3-nerved, chartaceous, ovate, oblanceolate, **inner involucral bracts** 4–6 × 0.7–1 mm, 3-nerved, chartaceous, oblanceolate, linear, apex acute, margin erose, margins ciliate, surfaces strigose, glabrescent, punctuation glandular trichomes present or not. **Flowers** c. 21, **corolla** c. 5 mm long, corolla tube and limb

indistinct, limb cylindrical, glabrous, lobes c. 0.6×0.2 mm, triangular, papillose, with capitate glandular trichomes. **Stamens** c. 2 mm long, inserted near the middle of the corolla, not exceeding limb height, anther c. 1.4 mm long, base sagittate, anther connective appendage c. 0.3×0.1 mm, longer than wide, narrow triangular, apex acute, anther collar cylindrical. **Style** c. 4.5 mm long, base enlarged, glabrous, stylopodium c. 0.5 mm long, glabrous, style branches c. 2.3 mm long, cylindrical. **Cypselae** $1-1.6 \times c. 0.4$ mm, 5-ribbed, setuliferous, prismatic, glabrescent; carpodium annuliform; pappus 3.5–4 mm long, bristly to subplumose, uniseriate, subequal, whitish.

Distribution

The species has distribution in Central and South America (King & Robinson 1987; Roque *et al.* 2016). In the Brazilian territory, it is distributed in the North, Northeast, Southeast and Midwest regions, in the phytogeographic domains of the Amazon, Caatinga, Cerrado and Atlantic Forest (Grossi & Vieira Barreto 2020).

Habitat and phenology

In Ceará, *Ayapana amygdalina* has a restricted distribution in areas of high altitudes, above 900 m, in Chapada do Araripe and Ibiapaba Plateau, in vegetation of Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 6). Flowering in August and September.

Conservation data

With restricted distribution and registration in only one Conservation Unit in the state of Ceará (Araripe-Apodi National Forest - FLONA).

Note

The species is characterized by leave blade coriaceous, involucre 6–7-seriate, capitulum with flowers c. 21, corolla tube and limb indistinct and style c. 4.5 mm long.

Barrosoa betoniciformis (DC.) R.M. King & H. Rob.

Fig. 3 A-B; Fig. 6.

Phytologia 21: 27 (R.M. King & H. Rob. 1971).

Material examined

BRASIL – Ceará • Tianguá, entrada para o Sítio do Bosco, $3^{\circ}65'52''S$, $40^{\circ}98'83''W$; 27 Feb. 2012; *M.I.B. Loiola et al.* 1613; EAC • Ubajara, Cachoeira do Boi Morto; 18 Dec. 1979; *E. Nunes & P. Martins s.n.*; EAC[7851].

Description

Subshrub to Shrub, erect, 60–80 cm tall, branches solid, cylindrical, striate, velutinous, with punctuation glandular trichomes. **Leaves** opposite, petiolate 10–18 mm long, velutinous; blades $25-62 \times 10-42$ mm, entire, membranaceous, concolor, deltate, triangular,

base cordate, apex acute, margin crenate, plane, velutinous to tomentose, with sparse punctuation glandular trichomes, actinodromous venation, straight (basal 5–7-nerved). **Leafy bracts** 14–33 × 6–17 mm, deltate, triangular, apex acuminate. **Bracteole** 4–5 × 1–1.5 mm, lanceolate, apex acute, margin ciliate, velutinous, with punctuation glandular trichomes. **Capitulescence** corymbiform; capitulum 5–6 × 4–5 mm, involucre eximbricate, 2-seriate, campanulate, receptacle convex to conical, epaleaceous; sessile to subsessile, 1–2 mm long, velutinous. **Involucral bracts** 16–17, persistent, **outer involucral bracts** 3.5–4 × 1.2–1.3 mm, 3–5-nerved, chartaceous, elliptic, obovate, apex acute, mucronate; **inner involucral bracts** 4–4.2 × 1–1.2 mm, 1–3-nerved, chartaceous, lanceolate, oblanceolate, apex mucronate, margins ciliate, surfaces velutinous with punctuation glandular trichomes. **Flowers** 32–38, **corolla** c. 3.3 mm long, with capitate glandular trichomes, corolla tube and limb indistinct, limb cylindrical, lobes c. 0.4 × 0.3 mm, ovate, papillose with capitate glandular trichomes. **Stamens** 1.8–2 mm long, inserted in the middle of the corolla, not exceeding limb height, anther c. 1.2 mm long, base truncate, anther connective appendage 0.3–0.4 × c. 0.2 mm, longer than wide, narrow triangular, apex acute, anther collar long cylindrical. **Style** 6–6.5 mm long, base cylindrical, glabrous, stylopodium c. 0.5 mm long, glabrous, style branches 3–3.3 mm long, linear. **Cypselae** 1.3–1.9 × 0.5–0.7 mm, 5-ribbed, setuliferous, prismatic with base curved, capitate glandular trichomes mainly at the apex; carpodium subquadrangular; pappus 2.5–3.2 mm long, bristly, uniseriate, subequal, whitish.

Distribution

Barrosoa betoniciformis occurs in Argentina, Bolivia, Brazil, Colombia, Uruguay and Venezuela (King & Robinson 1987; Esteves 2001). In Brazil, the species occurs in the Southeast and South, and Northeast for the State of Bahia, in the Cerrado and Atlantic Forest (Nakajima 2020a).

Habitat and phenology

Barrosoa betoniciformis is reported for the first time to the State of Ceará. The species was registered in only two municipalities on the Ibiapaba Plateau, at high altitude (775–850 m), humid environment in vegetation of Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 6). The species showed flowers in February and December.

Conservation data

In Ceará, it has restricted distribution and is registered only for the Ubajara National Park Conservation Unit - PARNA.

Note

Barrosoa betoniciformis distinguished by leaves opposite, base cordate, margin

crenate, basal 5–7-nerved; corolla tube and limb indistinct; cypselae prismatic with base curved and carpodium subquadrangular. The species can be easily confused in the collections with *Conocliniopsis prasiifolia* by the subshrub habit, leave blade membranaceous and involucre 2-seriate. However, it differs from this by leaves opposite, blade base cordate with 5–7-nerved (*vs.* alternate, cuneate, 3-nerved) and cypselae prismatic with base curved and carpodium subquadrangular (*vs.* obconic with base straight, asymmetric). Popularly known in the state for “cidreira de cacho”.

Brickellia diffusa (Vahl) A. Gray

Fig. 3 A-C; Fig. 4 C-D, Fig. 7.

Smithsonian Contributions to Knowledge 3(5): 86 (A. Gray 1852).

Material examined

BRASIL – Ceará • S.loc.; 1861; fl.; *F.F. Allemão & M. Cysneiros* 894; R • S.loc.; 22 Feb. 1922; *D. Rocha* 72; SP • Maranguape; 15 Aug. 1935; *F.E. Drouet* 2269; US • Maranguape, Serra de Maranguape; 04 Oct. 1975; *H. Monteiro s.n.*; RBR[17409] • Maranguape, Serra de Maranguape, estrada Pirapora a Castelo; 29 Jun. 1981; *E. Nunes & P. Martins s.n.*; EAC[10504], HUEFS[138605] • Maranguape, Serra de Maranguape, 600 m, 3°53'27"S, 38°41'07"W; 08 Aug. 2020; *N.C. Rebouças et al.* 104; EAC • Meruoca, Serra da Meruoca, Sítio Lages; 26 Jul. 1956; *A. Fernandes s.n.*; EAC[1672] • Meruoca, Serra da Meruoca, Sítio Inácio; 13 Apr. 2012; *J.E.M. Nascimento* 161; ALCB • Pacatuba, Serra da Pacatuba, Sítio Pitaguari; 29 Jul. 1979; *J.E. Paula* 1287; NY • Pacatuba, Serra da Pacatuba, Sítio Pitaguari; 01 Oct. 1979; *P. Martins & A.J. Castro s.n.*; EAC[6990] • Serra de Baturité; Sep. 1910; fl.; *E.H. Ule* 9122; US • Serra de Baturité; 14 Oct. 1975; *A. Fernandes s.n.*; EAC[2599] • Sobral, Serra da Meruoca, margem da CE-440; 22 Sep. 2000; *E.B. Souza* 529; EAC • Sobral, Serra do Rosário; 29 Sep. 2015; *R.C. Duarte* 64; ALCB, HUVA • Sobral, Sítio Santa Cruz, Trilha do Delta, 600 m, 3°63'25"S, 40°40'66"W; 22 Jul. 2015; *E.B. Souza et al.* 3652; ALCB, HUVA • Tianguá, Serra Grande, 3°65'52"S, 40°98'83"W; *M.L. Guedes* 19225; ALCB, EAC • Ubajara, Parque Nacional de Ubajara – PARNA; 06 Jul. 1978; *A. Fernandes & F.J.A. Matos s.n.*; EAC[4008], HCDAL[401], HUEFS[138606].

Description

Herb to subshrub, erect, 30–160 cm tall, branches solid, cylindrical, striate, strigose, glabrescent, sparse punctuation glandular trichomes. **Leaves** opposite at the base, alternate at the apex, petiolate 5–30 mm long, strigose; blades 17–60 × 14–50 mm, entire, membranaceous, concolor, ovate, base cuneate, attenuate, subcordate, apex acuminate, cuspidate, margin serrate to dentate, plane, adaxial surface strigose, glabrescent, abaxial

surface strigose, with punctuation glandular trichomes, actinodromous venation (basal 3-nerved). **Leafy bracts** 8–25 × 1–6 mm, linear to lanceolate, apex acuminate. **Bracteole** 1–3 × c. 1 mm, lanceolate, apex acute, margin entire, strigose. **Capitulescence** paniculiform; capitulum 6–7 × 1–2 mm, subimbricate, narrow funnelform, receptacle flat, epaleaceous; pedunculate, 11–18 mm long, glabrous. **Involucral bracts** 17–18, persistent, **outer involucral bracts** 2–4 × c. 1 mm, 2-nerved, chartaceous, lanceolate, apex acute, margin entire, glabrous; **inner involucral bracts** 6–7.5 × c. 1 mm, 2-nerved, chartaceous, linear to lanceolate, apex acute, margin entire, glabrous. **Flowers** 10–12, **corolla** 4.5–5 mm long, corolla tube and limb indistinct, limb narrow cylindrical, glabrous, lobes 0.2–0.3 × c. 0.2 mm, triangular, papillose with capitate glandular trichomes. **Stamens** 1.9–2.1 mm long, inserted near the middle of the corolla, not exceeding limb height, anther 1–1.1 mm long, base cuneate, anther connective appendage c. 0.2 × 0.1 mm, longer than wide, elliptic, apex obtuse, anther collar long cylindrical. **Style** 4.5–6 mm long, base enlarged, pilose, stylopodium c. 0.6 mm long, glabrous, style branches c. 1 mm long, clavate. **Cypselae** 2–2.1 × 0.4–0.5 mm, 10-ribbed, setuliferous, prismatic, glabrescent; carpodium annuliform; pappus 4–4.5 mm long, bristly, uniseriate, equal, hyaline-whitish.

Distribution

The species has distribution in the American continents, being registered from Mexico to South Argentina and Paraguay (Pruski *et al.* 2016). In the Brazilian territory, *Brickellia diffusa* occurs in the North (Tocantins), Northeast (Bahia, Ceará), Center-West (Federal District, Goiás, Mato Grosso do Sul) and Southeast (Minas Gerais) regions, in the Cerrado phytogeographic domain (Nakajima 2020b).

Habitat and phenology

In Ceará, the species was collected in the wet mountain areas, called Brejos de Altitude, in Dense Ombrophylous Forest and Semideciduous Seasonal Forest (Fig. 3 A-C; Fig. 4 C-D, Fig. 7). The species flowering between the months of April to October.

Conservation data

Brickellia diffusa it occurs in two Conservation Units in Ceará (Serra de Baturité Environmental Protection Area - EPA, Ubajara National Park - PARNA).

Note

Brickellia diffusa can be recognized by style base enlarged and pilose and because it is the only species of Eupatorieae in Ceará that has 10-ribbed cypselae. In collections, in general, specimens of this species are collected only with young apical branches, and these are mistakenly identified as *Fleischmannia microstemon* due to the morphological similarity

of their leafy bracts, capitulescence paniculiform and capitulum narrow. However, *Brickellia diffusa* differs from this by capitulum 6–7 mm long, style base enlarged and pilose, cypselae with 10-ribbed and pappus 4–4.5 mm long (vs. capitulum 3.5–4 mm long, style base cylindrical and glabrous, cypselae 5-ribbed and pappus 2 mm long).

***Chromolaena* DC.**

Fig. 3 A-B, G, H; Fig. 7.

Prodromus Systematis Naturalis Regni Vegetabilis 5: 133 (DC. 1836).

Description

Subshrub, shrub, erect or rare scrambling, branches solid, cylindrical, striate, villous, strigose, velutinous, glabrescent, or glabrous, presence of punctuation glandular trichomes or not. **Leaves** opposite, subsessile to petiolate; blades entire, chartaceous to coriaceous, concolor or discolor, ovate, ovate-rhomboid, elliptic or lanceolate, base cuneate, attenuate or rounded, apex acute, acuminate or cuspidate, margin entire to serrate, crenate-serrate, revolute or not, presence of tector and/or punctuation glandular trichomes or glabrous, actinodromous venation. **Leafy bracts** present. **Bracteole** elliptic, lanceolate, triangular or rhombic, apex acute, short-cuspidate, margin entire, ciliate, villous, velutinous, glabrescent, glabrous, with punctuation glandular trichomes. **Capitulescence** corymbiform or cyme; involucre imbricate, 5–8-seriate, cylindrical or campanulate, receptacle flat, convex or concave, epaleaceous; pedunculate, glabrous. **Involucral bracts** 22–61, dehiscent or not, **outer involucral bracts** 3–6-nerved, chartaceous, ovate, elliptic, oblong, orbicular, rare triangular, apex acute, obtuse, rounded, margin entire, ciliate, pilose, strigose, or glabrous, with punctuation glandular trichomes; **inner involucral bracts** 1–5-nerved, chartaceous, elliptic, oblong, linear, apex acute, rounded, margin entire, ciliate, pilose or glabrous, with punctuation glandular trichomes or not. **Flowers** 17–70, **corolla** tube and limb distinct or not, tube size larger or smaller than limb, tube stipitate-glandular or glabrous, limb with stipitate-glandular trichomes or glabrous, lobes narrow triangular to triangular, papillose. **Stamens** inserted in the half of the tube or at the base of the limb, not exceeding limb height or rarely, anther base truncate, retuse, sagittate, anther connective appendage longer than wide, ovate, oblong, lanceolate or narrow triangular, apex acuminate, obtuse or rounded, anther collar cylindrical. **Style** base cylindrical, glabrous, stylopodium present, glabrous, pilose or villous, style branches cylindrical or clavate. **Cypselae** 3–5-ribbed, setuliferous, prismatic, linear, short-stipitate or not, pilose, glabrescent or glabrous; carpodium annuliform or decurrent; pappus barbellate or bristly with apex barbellate, uniseriate, subequal, yellowish.

Distribution

With more than 160 species, *Chromolaena* is considered one of the largest genera within Eupatorieae (King & Robinson 1987). It has distribution from the South of the United States to the lower extreme portion of South America (King & Robinson 1987; Christ & Ritter 2019). In Brazil, one of the centers of diversity of the genus, *Chromolaena* species are widespread and occurs in all phytogeographic domains (Amazon, Caatinga, Cerrado, Atlantic Forest, Pampa, Pantanal) mostly in the Cerrado and the Atlantic Forest (Christ & Rebouças 2020).

Habitat

In Ceará, *Chromolaena* occurs mainly in high altitude environments (700–1000 m), in vegetation types Dense Ombrophylous Forest, Savanna and Vegetation under Fluvial and/or Lacustrine Influence (Fig. 3 A-B, G, H; Fig. 7).

Note

Taxon characterized by capitulum with strongly imbricate involucre bracts, with apex obtuse or rounded (King & Robinson 1987; Christ & Rebouças 2020).

Chromolaena laevigata (Lam.) R.M. King & H. Rob.

Fig. 3 A-B; Fig. 7.

Phytologia 20(3): 202 (R.M. King & H. Rob. 1970).

Material examined

BRASIL – Ceará • Guaraciaba do Norte, Planalto da Ibiapaba; 15 Jun. 1979; A. *Fernandes et al. s.n.*; EAC[6521].

Description

Subshrub, erect, c. 2 m tall, glabrous with punctuation glandular trichomes. **Leaves** opposite, petiolate 5–10 mm long, glabrous; blades 20–100 × 10–40 mm, entire, subcoriaceous, concolor, ovate, elliptic, base attenuate, apex acute, margin entire to serrate, plane, glabrous. **Leafy bracts** 10–21 × 5–6 mm, ovate, apex acute. **Bracteole** c. 2 × 1 mm, triangular, apex acute, margin entire, ciliate at the apex, glabrous with punctuation glandular trichomes. **Capitulescence** cyme, corymbiform; capitulum 9–12 × 2–3 mm, involucre 5–6-seriate, cylindrical, receptacle flat; pedunculate, 12–17 mm long, glabrous. **Involucre bracts** c. 31, persistent, **outer involucre bracts** 2–5 × 1.5–2 mm, 3–5-nerved, elliptic, oblong, apex acute to obtuse, margin entire, ciliate at the apex, glabrous, punctuation glandular trichomes at the apex in the outer and inner; **inner involucre bracts** 6–9 × 1.5–2 mm, 2–4-nerved, narrow oblong, linear, apex acute, margin entire, ciliate at the apex. **Flowers** c. 17, **corolla** c. 5.3 mm long, corolla tube and limb distinct, tube c. 3 mm long, glabrous, limb c. 2.3 mm long,

cylindrical, glabrous, lobes c. 0.5×0.4 mm, triangular. **Stamens** c. 2.5 mm long, inserted in the half of the tube, rarely exceeding limb height, anther c. 1.4 mm long, base truncate, anther connective appendage c. 0.5×0.3 mm, ovate, apex rounded. **Style** 6–10 mm long, stylopodium c. 0.5 mm long, glabrous, style branches 4–5 mm long, clavate. **Cypselae** c. 3.5×0.4 mm, 5-ribbed, setuliferous, prismatic, glabrous; carpodium annuliform; pappus 4–5 mm long, bristly barbellate.

Distribution

The species is widely distributed, occurring from the South of the United States to the North of Argentina (Esteves 2001). In Brazil, *Chromolaena laevigata* is one of the most common taxa of the genus, growing in all regions and phytogeographic domains of Brazil (Christ & Rebouças 2020).

Habitat and phenology

In the State of Ceará, the species is once collected, in the Ibiapaba Plateau, with an altitude of 950 m, in vegetation of Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 7). It was collected with flowering in June.

Conservation data

In Ceará, it has a restricted distribution and there is no record for a protected area.

Note

Chromolaena laevigata is easily recognized by branches glabrous, large leave blade $20\text{--}100 \times 10\text{--}40$ mm and mainly by the adaxial and abaxial glabrous surfaces.

Chromolaena maximilianii (Schrader ex DC.) R.M. King & H. Rob.

Fig. 3 A-B; Fig. 7.

Phytologia 49: 4 (R.M. King & H. Rob. 1981).

Material examined

BRASIL – Ceará • Graça, Sítio Santa Clara, $3^{\circ}96'24''\text{S}$, $40^{\circ}81'87''\text{W}$; 25 Jan. 2017; F.F. Araújo 256; EAC, HUEFS • Ubajara, Parque Nacional de Ubajara – PARNA, pé da serra; 05 Jul. 1978; A. Fernandes & F.J.A. Matos s.n.; EAC[3985] • Ubajara, Parque Nacional de Ubajara – PARNA, caminho para Araticum; 06 Jul. 1978; A. Fernandes & F.J.A. Matos s.n.; EAC[3994] • Viçosa do Ceará, Sítio Pará; 14 Jun. 1979; A. Fernandes et al. s.n.; EAC[6498], UEC [96597].

Description

Subshrub or scrambling, erect, c. 2 m tall, glabrous to strigose, rare with punctuation glandular trichomes. **Leaves** opposite, petiolate 3–10 mm long, strigose; blades $34\text{--}100 \times 10\text{--}50$ mm, entire, chartaceous, discolor, ovate, base attenuate, rare rounded, apex

acuminate, acute, margin entire to loosely serrate, plane, strigose. **Leafy bracts** 15–30 × 6–11 mm, ovate, apex acute. **Bracteole** 4–6 × 1.5–2 mm, rhombic, apex short-cuspidate, margin entire, ciliate at the apex, glabrous with punctuation glandular trichomes. **Capitulescence** corymbiform; capitulum 10–11 × 2–3 mm, involucre 7–8-seriate, cylindrical, receptacle flat; pedunculate, 12–15 mm long, glabrous. **Involucral bracts** 22–32, persistent, **outer involucral bracts** 1–4 × 1–2 mm, 4–6-nerved, elliptic, orbicular, apex rounded, rare cuspidate, margin entire to ciliate, strigose with punctuation glandular trichomes; **inner involucral bracts** 3.5–8 × 1.2–1.7 mm, 1–5-nerved, narrow oblong, linear, apex rounded, margin entire, ciliate at the apex, glabrous, pilose at the apex. **Flowers** 24–27, **corolla** 4.5–5 mm long, corolla tube and limb indistinct, glabrous, limb cylindrical, lobes 0.5–0.9 × c. 0.3 mm, narrow triangular. **Stamens** 3.1–3.5 mm long, inserted near the middle of the corolla, not exceeding limb height, anther 1.9–2.3 mm long, base truncate, anther connective appendage 0.5–0.6 × c. 0.2 mm, oblong, apex obtuse. **Style** 7–8 mm long, stylopodium c. 0.5 mm long, glabrous, style branches 3.7–4 mm long, cylindrical or clavate. **Cypselae** 3.5–4.2 × 0.2–0.3 mm, 3(-4)-ribbed, setuliferous, cylindrical, glabrescent; carpodium annuliform; pappus 4.5–5 mm long, bristly barbellate.

Distribution

The species is distributed in South America, with records for Brazil, French Guiana and Venezuela (King & Robinson 1987; Funk *et al.* 2007). In Brazil, *Chromolaena maximilianii* occurs in the Northeast (Bahia), Midwest (Federal District, Goiás, Mato Grosso do Sul, Mato Grosso), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) and South (Paraná), in the phytogeographic domains Amazon, Cerrado and Atlantic Forest (Christ & Rebouças 2020). The species is commonly registered in “restinga” vegetation and in anthropized areas (Esteves 2001).

Habitat and phenology

In Ceará, the species is registered in an altitude of more than 700 m, on the Ibiapaba Plateau, in Dense Ombrophylous Forest vegetation (Fig. 3 A-B; Fig. 7). Flowering in January, June and July.

Conservation data

In the State of Ceará, *Chromolaena maximilianii* has a restricted distribution and was registered in a single Conservation Unit in the Ubajara National Park - PARNA.

Note

Chromolaena maximilianii is similar to *C. odorata* (L.) R.M.King & H.Rob. and the morphological characteristics that differentiated them are not clear (Esteves 2001; Christ

& Rebouças 2020), a fact founded in the collections deposited in the herbaria, where these two taxa are misidentified. The species is a new occurrence for Ceará, and is distinguished from the other taxa of the genus registered in the State by the habit subshrub scrambling; corolla tube and limb indistinct and cypselae 3(-4)-ribbed.

Chromolaena mucronata (Gardner) R.M. King & H. Rob.

Fig. 3 A-B; Fig. 7.

Phytologia 37: 457 (R.M. King & H. Rob. 1977).

Material examined

BRASIL – Ceará • Crato, Chapada do Araripe, Belmonte; 21 Jun. 2007; E. Silveira s.n.; EAC[40400] • Crato, Chapada do Araripe, Belmonte; 14 Jun. 2000; E. Nunes & F.S. Cavalcanti s.n.; EAC[29530].

Description

Subshrub, erect, c. 150 cm tall, villous, glabrescent, with sparse punctuation glandular trichomes. **Leaves** opposite, petiolate 3–7 mm long, villous; blades 39–80 × 20–45 mm, entire, chartaceous, discolor, ovate, base rounded, apex acuminate, cuspidate, margin serrate in the central portion of the blade, plane, scabrous, punctuation glandular trichomes on abaxial surface. **Leafy bracts** 20–24 × 7–9 mm, ovate, apex acute. **Bracteole** 4–5 × 1.5–2 mm, rhombic, apex acute, margin ciliate, glabrous with punctuation glandular trichomes. **Capitulescence** cyme or solitary; capitulum 12–13 × 5–6 mm, involucre 7–9-seriate, campanulate, receptacle convex; pedunculate, 17–35 mm long, villous. **Involucral bracts** 57–61, persistent, **outer involucral bracts** 2.1–4.5 × 2.5–3 mm, 5–7-nerved, elliptic, oblong, ovate, apex obtuse, rare acute, margin entire, ciliate at the apex, glabrous with punctuation glandular trichomes at the apex; **inner involucral bracts** 6–9 × 1.5–2 mm, 2–4-nerved, narrow oblong, linear, apex acute, margin ciliate, glabrous. **Flowers** 60–70, **corolla** 5.1–5.3 mm long, corolla tube and limb indistinct, glabrous, limb cylindrical, lobes 0.5–0.6 × c. 0.3 mm, triangular. **Stamens** 3.2–3.5 mm long, inserted near the middle of the corolla, not exceeding limb height, anther 2.3–2.5 mm long, base truncate, anther connective appendage 0.3–0.4 × 0.2 mm, ovate, apex rounded. **Style** 5.5–6.7 mm long, stylopodium c. 0.4 mm long, glabrous, style branches 4–4.2 mm long, cylindrical or clavate. **Cypselae** 3–4 × 0.6–0.8 mm, 4(-5)-ribbed, setuliferous, prismatic with base curved, glabrescent; carpodium annuliform; pappus 5–5.1 mm long, barbellate.

Distribution

The species is endemic to Brazil with distribution to the North (Amazonas, Pará) and Midwest (Federal District, Goiás, Mato Grosso) regions, occurring in the Cerrado

phytogeographic domain (King & Robinson 1987; Christ & Rebouças 2020).

Habitat and phenology

Chromolaena mucronata it is reported for the first time for the Northeast region, as well as for Ceará. In the State, the species was registered for Chapada do Araripe, at an altitude of 950 m, in vegetation of Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 7). The species blooms in June.

Conservation data

It has a restricted distribution in the state, being registered only for the Conservation Unit of Ceará in the Araripe-Apodi National Forest - FLONA.

Note

Chromolaena mucronata can be easily recognized by leave blade scabrous, capitulum pedunculate 17–35 mm long and flowers 57–61.

Chromolaena myriocephala (Gardner) R.M. King & H. Rob.

Fig. 7

Phytologia 20: 203 (R.M. King & H. Rob. 1970).

Material examined

BRASIL – Ceará • Acaraú, perímetro irrigado do Baixo-Acaraú Marco; 10 Jun. 2009; L.A. Oliveira 2; TANG.

Description

Subshrub, erect, c. 1.3 m tall, dense strigose with punctuation glandular trichomes. **Leaves** opposite, petiolate 3–5 mm long, dense strigose; blades 23–60 × 4–18 mm, entire, chartaceous, concolor, lanceolate, ovate, base attenuate, apex acuminate, apiculate, margin serrate, revolute, adaxial surface sparse strigose, glabrescent, abaxial surface strigose with dense punctuation glandular trichomes. **Leafy bracts** 7–15 × 2–4 mm, lanceolate, ovate, apex acuminate, apiculate. **Bracteole** 1.9–2 × 0.1–0.2 mm, lanceolate, apex acute, margin ciliate, villous, glabrescent. **Capitulescence** corymbiform; capitulum 7–10 × c. 2 mm, involucre 5–6-seriate, cylindrical, receptacle convex; pedunculate, 7–11 mm long, dense strigose. **Involucral bracts** c. 28, persistent, **outer involucral bracts** 1.5–3 × 1–1.2 mm, 3–6-nerved, elliptic, ovate, rare triangular, apex acute, rounded, margin ciliate, glabrous, rare pilose at the apex, rare punctuation glandular trichomes in the outer and inner; **inner involucral bracts** 3–6 × 1–1.5 mm, 2–5-nerved, elliptic, oblong, linear, apex acute, rounded, margin ciliate. **Flowers** c. 22, **corolla** c. 4.5 mm long, with stipitate-glandular trichomes, corolla tube and limb distinct, tube 1–1.5 mm long, limb 2.1–3 mm long, cylindrical, lobes c. 0.5 × 0.4 mm, triangular. **Stamens** 3.4–3.5 mm long, inserted in the base of the limb, not

exceeding limb height, anther c. 2 mm long, base retuse, anther connective appendage c. 0.4×0.2 mm, narrow triangular, apex acute. **Style** c. 7 mm long, stylopodium c. 0.5 mm long, villous, style branches c. 3 mm long, cylindrical or clavate. **Cypselae** $2.8\text{--}3 \times c. 0.3$ mm, 5-ribbed, sparse setuliferous, linear, glabrous with stipitate glandular trichomes; carpodium decurrent; pappus 4.2–4.5 mm long, bristly barbellate.

Distribution

Chromolaena myriocephala is exclusive from Brazil and has distribution to the Northeast (Piauí), Midwest (Goiás, Mato Grosso) and Southeast (Minas Gerais), in the Cerrado phytogeographic domain (King & Robinson 1987; Christ & Rebouças 2020).

Habitat and phenology

The species is a new occurrence for the territory of Ceará, being recorded in one municipality, associated with the Vegetation under Fluvial and/or Lacustrine Influence (Fig. 7). Collected with flowering June.

Conservation data

In Ceará, the species has a restricted distribution, with no records for Conservation Units.

Note

Chromolaena myriocephala differs from other genera representatives in the state by leave blade concolor, strigose on abaxial surface and involucre 5–6-seriate. It resembles *C. squalida* by habit subshrub, leave blade ovate and capitulum pedunculate, however, it differs from this by the typical characters mentioned above (vs. discolor, dense velutinous, 7–8-seriate).

Chromolaena squalida (DC.) R.M. King & H. Rob.

Fig. 3 A-B, G; Fig. 7.

Phytologia 20: 206 (R.M. King & H. Rob. 1970).

Material examined

BRASIL – **Ceará** • Crato, estrada da Velha Minguiriba, 919 m, $7^{\circ}29'27''\text{S}$, $39^{\circ}64'16''\text{W}$; 22 May. 2011; *E. Melo* 9702; HUEFS • Crato, Floresta Nacional do Araripe-Apodi – FLONA; 22 May. 1999; *A.M. Miranda & D. Lima* 3898; FLOR, HST • Guaraciaba do Norte, Planalto da Ibiapaba; 18 Jul. 1982; *A. Fernandes & F.J.A. Matos s.n.*; EAC[20286] • Guaramiranga, Serra de Baturité, Sítio Venezuela; 13 Aug. 1976; *A. Fernandes & F.J.A. Matos s.n.*; EAC[2851].

Description

Subshrub to shrub, erect, c. 1.5 cm tall, dense velutinous with punctuation glandular trichomes. **Leaves** opposite, subsessile to petiolate 1–7 mm long, dense velutinous;

blades 20–62 × 9–27 mm, entire, chartaceous, discolor, ovate, ovate-rhomboid, base cuneate, cuneate, rounded, apex acute, margin entire to serrate, crenate, plane, adaxial surface sparse strigose with punctuation glandular trichomes or not, abaxial surface velutinous, with dense punctuation glandular trichomes. **Leafy bracts** 5–18 × 2–8 mm, ovate, apex acute, cuspidate. **Bracteole** 1.1–2 × 0.6–1.2 mm, elliptic, triangular, apex acute, margin ciliate, dense velutinous with punctuation glandular trichomes. **Capitulescence** cyme, corymbiform; capitulum 8–12 × 2–4 mm, involucre 7–8-seriate, cylindrical, receptacle convex to concave; pedunculate, 3–14 mm long, dense velutinous. **Involucral bracts** 29–36, outer dehiscent, **outer involucral bracts** 1–3 × 1–2 mm, 3–6-nerved, elliptic, oblong, wide ovate, orbicular, rare triangular, apex acute, obtuse, rounded, margin ciliate, glabrous, rare pilose at the apex, rare punctuation glandular trichomes; **inner involucral bracts** 3.5–7.5 × 0.9–2 mm, 1–6-nerved, elliptic, oblong, obovate, linear, apex acute, rounded, margin ciliate, glabrous, rare pilose at the apex, rare punctuation glandular trichomes. **Flowers** 21–27, **corolla** 4.3–5.2 mm long, with stipitate-glandular trichomes, corolla tube and limb distinct, tube c. 1.2 mm long, limb 2.8–3 mm long, cylindrical, lobes 0.4–0.5 × c. 0.3 mm, triangular. **Stamens** 3–3.6 mm long, inserted in the base of the limb, not exceeding limb height, anther 1.8–2.1 mm long, base retuse or short-sagittate, anther connective appendage 0.3–0.5 × 0.1–0.2 mm, lanceolate, narrow triangular, apex acuminate. **Style** 6–9.5 mm long, stylopodium c. 0.7 mm long, villous, style branches 3–4.5 mm long, cylindrical or clavate. **Cypselae** 3–4.2 × 0.6–1 mm, 5-ribbed, setuliferous, prismatic, pilose, glabrescent; carpodium annuliform or decurrent; pappus 4.5–5 mm long, bristly barbellate.

Distribution

Chromolaena squalida has wide distribution in South America (King & Robinson 1987; Christ & Rebouças 2020). In Brazil, the species is distributed in all regions, North (Amazonas, Pará, Tocantins), Northeast (Bahia, Ceará, Maranhão), Midwest (Federal District, Goiás, Mato Grosso do Sul, Mato Grosso), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) and South (Paraná), growing in areas of vegetation in the Amazon, Caatinga, Cerrado and Atlantic Forest (Christ & Rebouças 2020).

Habitat and phenology

In Ceará, *Chromolaena squalida* occurs in the mountain tops of the state, 900–1000 m altitude, in Chapada do Araripe, Ibiapaba Plateau and Serra de Baturité, in the Dense Ombrophylous Forest and Savanna (Fig. 3 A-B, G; Fig. 7). Flowering in May and August.

Conservation data

It has a restricted distribution in the state and registered in two Conservation Units

in Ceará (Serra de Baturité Environmental Protection Area - EPA, Araripe-Apodi National Forest - FLONA).

Note

Chromolaena squalida has a wide phenotypic plasticity and, historically, it is characterized as a species complex *C. barbacensis* (Hieron.) R.M.King & H.Rob., *C. cylindrocephala* (Sch.Bip. ex Baker) R.M.King & H.Rob., *C. ferruginea* R.M.King & H.Rob., *C. multiflosculosa* (DC.) R.M.King & H.Rob., *C. oxylepis* (DC.) R.M.King & H.Rob. and *C. pungens* (Gardner) R.M.King & H.Rob. (Christ & Rebouças 2020). Its morphological characters are very closely to many species of the genus, making a lot of misidentification in the herbaria (Christ & Rebouças 2020). It is necessary to carry out new systematic studies with this species complex to clarify the taxonomy of the genus. In Ceará, the species is recognized by leaf blade discolor, dense velutinous on abaxial surface and involucre 7–8-seriate. In the state of Ceará, can be confused with *C. myriocephala* and the characters that separate them are presented in the comments of it.

Conocliniopsis prasiifolia (DC.) R.M. King & H. Rob.

Fig. 3 A-C, E-G; Fig. 4 E-F; Fig. 8.

Phytologia 23(3): 308 (R.M. King & H. Rob. 1972).

Material examined

BRASIL – Ceará • Aiuaba, Barra, Sítio Êrmo, 6°43'80"S, 40°19'32"W; 04 Sep. 1996; *M.I. Loiola 1844*; EAC • Aiuaba, Estação Ecológica de Aiuaba, 6°43'41"S, 40°19'16"W; 05 Feb. 1997; *L.W. Lima-Verde 395*; EAC • Alcântara, Serra da Meruoca; 30 Mar. 1999; *E.B. Souza & M.R.J.R. Albuquerque s.n.*; EAC[27646] • Alcântara, Serra da Meruoca, Sítio Algodões; 30 Jun. 2014; *E.B. Souza 3107*; EAC, HUVA • Carnaubal, Planalto da Ibiapaba, 4°10'00"S, 40°55'30"W; 30 Apr. 2010; *E.B. Souza 1844*; EAC, HUVA • Crateús, Serra das Almas, Sítio Crateús; 08 Feb. 2002; *E. Silveira s.n.*; EAC[41830] • Crateús, Sertão de Crateús; 07 May. 1997; *M.A. Figueiredo & J. Augusto s.n.*; EAC[25658] • Crateús, Sertão de Crateús; 20 May. 1997; *L.W. Lima-Verde s.n.*; EAC[26602] • Crato, Barreiro Grande; 01 Apr. 1992; *F.S. Cavalcanti s.n.*; EAC[19653] • Crato, Barreiro Grande; 01 Aug. 1988; *F.S. Cavalcanti 54*; EAC, MO • Crato, Chapada do Araripe, Floresta Nacional do Araripe – FLONA; 13 Nov. 1985; *A. Gentry 50051A*; EAC • Guaraciaba do Norte, Planalto da Ibiapaba; 03 Jan. 1998; *A.S.F. Castro s.n.*; EAC[26026] • Guaraciaba do Norte, Planalto da Ibiapaba; 26 May. 1981; *A. Fernandes & P. Bezerra s.n.*; EAC[10343] • Itatira, Serra do Céu; 03 Aug. 1984; *A. Fernandes et al s.n.*; EAC[12771] • Meruoca, Serra da Meruoca, Sítio Antônio dos Fernandes; 21 Feb. 1981; *A. Fernandes & P. Bezerra s.n.*; EAC[27646] • Monsenhor Tabosa, no caminho

para o Pico da Serra Branca, 710 m, 4°80'16"S, 40°16'54"W; 19 Apr. 2019; *N.C. Rebouças et al.* 108; EAC • Pereiro, Serra do Pereiro, Fazenda Campos; 06 Aug. 1988; *E. Nunes s.n.*; EAC[15479] • Santa Quitéria, Serra do Pajé; 07 May. 1997; *M.A. Figueiredo s.n.*; EAC[25579] • Tianguá, Planalto da Ibiapaba; 09 Apr. 1996; *E. Silveira s.n.*; EAC[23960] • Tianguá, Planalto da Ibiapaba; 30 Apr. 1987; *A. Fernandes et al. s.n.*; EAC[15109] • Tianguá, Planalto da Ibiapaba; 08 Nov. 1979; *E. Nunes & P. Martins s.n.*; EAC[7188] • Ubajara, Planalto da Ibiapaba; 14 Oct. 1998; *A. Fernandes et al. s.n.*; EAC[27646] • Ubajara, Planalto da Ibiapaba, Jaburuna Sul; 25 Jul. 2007; *F.S. Araújo 1139*; EAC, UEC • Viçosa do Ceará, Sítio Pará; 14 Jun. 1979; *A. Fernandes et al. s.n.*; EAC[6493].

Description

Subshrub to shrub, erect, 30–180 cm tall, branches solid, cylindrical, striate, villous, punctuation glandular. **Leaves** alternate, petiolate 3.5–14 mm long, villous; blades 7.5–39 × 5–26 mm, entire, membranaceous, discolor, ovate, triangular, base cuneate, apex acute, margin serrate, plane, adaxial surface strigose, abaxial surface dense strigose, with punctuation glandular trichomes, actinodromous venation (basal 3-nerved). **Leafy bracts** 6.5–20 × 3.6–8 mm, narrow ovate to ovate, apex acute. **Bracteole** 3.6–7 × c. 1 mm, lanceolate, apex acute, margin ciliate, villous with punctuation glandular trichomes. **Capitulescence** corymbiform; capitulum 3.7–5 × 2–3 mm, involucre subimbricate, 2-seriate, campanulate, receptacle conical, epaleaceous; pedunculate, 18–40 mm long, villous to tomentose. **Involucral bracts** 14–15, persistent, **outer involucral bracts** 3.5–4 × 1–1.5 mm, 5–6-nerved, membranaceous, obovate, elliptic, apex acute, margin ciliate, dense villous with punctuation glandular trichomes; **inner involucral bracts** 4–5 × 1.5–2 mm, 3-nerved, membranaceous, linear to lanceolate, apex acute, margin ciliate, dense villous with punctuation glandular trichomes. **Flowers** 22–31, **corolla** 3–3.5 mm long with capitate glandular trichomes, corolla tube and limb distinct, tube 1.5–2 mm long, limb 0.9–1 mm long, infundibuliform, lobes 0.6–0.5 × 0.4–0.5 mm, triangular, papillose with capitate glandular trichomes. **Stamens** 2.4–2.5 mm long, inserted near the apex of the tube, not exceeding limb height, anther 1.4–1.6 mm long, base obtuse, anther connective appendage c. 0.3 × 0.2 mm, longer than wide, ovate, apex obtuse, anther collar cylindrical. **Style** 5–6 mm long, base cylindrical, glabrous, stylopodium c. 0.5 mm long, glabrous, style branches 3.4–3.5 mm long, clavate. **Cypselae** 2–2.8 × 0.4–0.6 mm, 5-ribbed, setuliferous, obconic, with base straight, sericeous with capitate glandular trichomes; carpodium asymmetric; pappus 2–2.8 mm long, bristly, uniseriate, subequal, hyaline-whitish.

Distribution

Conocliniopsis prasiifolia occurs in three countries in South America (Brazil, Colombia and Venezuela) (King & Robinson 1987). In Brazil, it is restricted to the Northeast region (Alagoas, Bahia, Pernambuco), in the Caatinga and Cerrado phytogeographic domains (Nakajima 2020c).

Habitat and phenology

Conocliniopsis prasiifolia was recently cited as a new record for Ceará (Loiola *et al.* 2020) and occurs mainly in mountainous areas, with an altitude between 700–1000 m, such as Chapada do Araripe and the Ibiapaba Plateau, in Arboreous Stepic Savanna, Dense Ombrophylous Forest, Savanna, Semideciduous Seasonal Forest and Stepic Savanna (Fig. 3 A-C, E-G; Fig. 4 E-F; Fig. 8). The species flowering throughout the year.

Conservation data

The species is widespread in Ceará, being registered for three conservation units in Ceará (Ecological Station of Aiuaba, Araripe-Apodi National Forest - FLONA, Ubajara National Park - PARNA).

Note

Conocliniopsis prasiifolia has as diagnostic characters the leaves alternate; blade base cuneate, margin serrate, basal 3-nerved; corolla tube and limb distinct; cypselae obconic with base straight and carpodium asymmetric. It has morphological similarities with *Barrosoa betoniciformis*, what could leave to misidentification. The characters that differ are shown in the comments of the latter. Popularly known in the state for “cidreira brava” or “cidreira de cacho”.

Diacranthera ulei R.M. King & H. Rob.

Fig. 2 B-C; Fig. 8.

Phytologia 24: 193 (R.M. King & H. Rob. 1972).

Material examined

BRASIL – Ceará • Caucaia, Serra do Juá, 3°76'66"S, 38°76'66"W; 21 Nov. 2014; V.S. Sampaio *et al.* 117; EAC • Guaramiranga; 06 Jul. 2007; E. Silveira *s.n.*; EAC[40401] • Guaramiranga, Sítio Arvoredo, 935 m; 09 Feb. 2004; V. Gomes *et al.* 9021; EAC • Guaramiranga, Sítio Arvoredo, 935 m; 10 Nov. 2011; V. Gomes *et al.* 1001; EAC • Maranguape, encosta da Serra de Maranguape, meia sombra; 22 Nov. 1955; Andrade-Lima 55-2311; IPA • Maranguape, Serra de Maranguape; Oct. 1910; E.H. Ule 9119; holotype: US, isotype: HUEFS • Maranguape, Serra de Maranguape; 22 Sep. 1992; L.P. Félix 5296; EAC • Maranguape, Serra da Aratanha, Espírito Santo; 26 Jun. 2016; A.S.F. Castro 2956; EAC • Maranguape, topo da Serra de Maranguape, 800 m; 17 Jul. 1997; A.S.F. Castro 413; EAC • Maranguape, Trilha da

Pirapora, 3°88'55"S, 38°71'44"W; 25 Nov. 2016; *M.I.B. Loiola et al.* 2488; EAC • Pacatuba, Serra da Aratanha, Sítio Pitaguari; 02 Oct. 1979; *A.J. Castro & P. Martins s.n.*; EAC[7004] • Pacoti, Serra de Baturité, Sítio Arvoredo; 01 Dec. 1990; *M.A. Figueiredo s.n.*; EAC[19811] • Pacoti, Serra de Baturité, Sítio Arvoredo; 03 Nov. 2011; *M.A. Figueiredo s.n.*; EAC[19796] • Serra da Aratanha; 1859; *F.F. Allemão s.n.*; R[48836] • Serra da Aratanha; s.d.; *F.F. Allemão s.n.*; R[48736].

Description

Shrub, erect, 1–1.5 cm tall, branches solid, cylindrical, striate, ferruginous, dense strigose, punctuation glandular trichomes present or not. **Leaves** opposite, petiolate 6–20 mm long, strigose; blades 35–185 × 18–70 mm, entire, chartaceous, discolor, elliptic, base attenuate, apex acute, margin loosely serrulate, slightly revolute, adaxial surface ferruginous, strigose, abaxial surface strigose with punctuation glandular trichomes, brochidodromous venation. **Leafy bracts** 10–40 × 5–10 mm, elliptic, apex acute. **Bracteole** 2.7–2.8 × 0.4–0.5 mm, narrow lanceolate, apex acute, margin entire, strigose. **Capitulescence** corymbiform; capitulum 6–8 × 4–6 mm, involucre eximbricate, 2-seriate, campanulate, receptacle convex, epaleaceous; pedunculate, 5–20 mm long, dense strigose. **Involucral bracts** 20–24, persistent, **outer involucral bracts** 3–5 × 1.2–1.5 mm, 4–5-nerved, subcarnose, ovate, apex acute, cirrhose, margin ciliate, dense strigose with punctuation glandular trichomes; **inner involucral bracts** 4–5 × 0.5–1 mm, 1–5-nerved, subcarnose, lanceolate, ovate, oblanceolate, apex acute, cirrhose, margin ciliate, strigose, glabrescent with punctuation glandular trichomes. **Flowers** 44–51, **corolla** 3.2–3.6 mm long, corolla tube and limb distinct, tube 2–2.1 mm long, glabrous, limb 1.4–1.5 mm long, infundibuliform, glabrous, lobes 0.6–0.8 × 0.3–0.4 mm, triangular, papillose, pilose. **Stamens** 1.5–1.7 mm long, inserted at the apex of the tube, not exceeding limb height, anther 1–1.2 mm long, base short-sagittate, anther connective appendage c. 0.1 × 0.2 mm, wider than long, lobate, apex bilobate, anther collar cylindrical. **Style** 5.5–6.5 mm long, base enlarged, pilose, stylopodium c. 0.6 mm long, glabrous, style branches 3.5–3.7 mm long, cylindrical. **Cypselae** 1.5–2 × 0.4–0.6 mm, 5-ribbed, prismatic, glabrous; carpodium decurrent; pappus 3.2–4 mm long, bristly barbellate, uniseriate, subequal, hyaline-whitish.

Distribution

Diacranthera ulei is endemic to Brazil and the Northeast region (Bahia and Ceará), in the phytogeographic domain of the Atlantic Forest (King & Robinson 1987; Nakajima *et al.* 2020a).

Habitat and phenology

In Ceará, the species occurs on the tops of Brejos de Altitude, Serra da Aratanha, Serra de Baturité, Serra do Juá and Serra de Maranguape, humid habitats with altitudes between 860–1000 m, in Dense Ombrophylous Forest and Semideciduous Seasonal Forest (Fig. 2 B-C; Fig. 8). Flowering in February and from June to December.

Conservation data

In the state, it grows in a single Conservation Unit, in the Environmental Protection Area of Serra de Baturité - EPA.

Note

Diacranthera ulei differs from the other taxa registered by the shrub habit, leave blade chartaceous; involucre 2-seriate; flowers 44–51, corolla tube and limb distinct and style 5.5–6.5 mm long of base enlarged and pilose. By shrub habit, long leave blade, elliptic and margin serrate, *D. ulei* is commonly identified as *D. crenata*, but it differs by corolla lobes with pilose outer surface and anther connective appendage wider than long (*vs.* grabrous, as long as wide).

Dissothrix imbricata (Gardner) B.L. Rob.

Fig. 3 C-E; Fig. 8.

Proceedings of the American Academy of Arts and Sciences 42: 35 (B.L. Rob. 1906).

Material examined

BRASIL – Ceará • Crateús, Reserva do Patrimônio Particular Natural Serra das Almas – RRPN, 700 m; 18 May. 2002; *F.S. Araújo & L.C. Girão 1467*; EAC, HUEFS • Graça, Sítio Santa Clara, 3°96'22"S, 40°81'86"W; 25 Jun. 2017; *F.F. Araújo 259*; ALCB, HUVA • Ipueriras, Planalto da Ibiapaba; 22 Jul. 2009; *A.S.F. Castro 2197*; EAC • Reriutaba, Juré; 25 May. 1981; *A. Fernandes & P. Martins s.n.* EAC[10324] • Sobral, Taparuaba, Fazenda Macapá; 23 Jun. 1988; *A. Fernandes s.n.* EAC[15253] • Sobral, Taparuaba, Fazenda Macapá; 20 May. 1989; *A. Fernandes s.n.* EAC[16648].

Description

Herb, erect, 8–60 cm tall, branches fistulose, cylindrical, striate, strigose with punctuation glandular trichomes. **Leaves** opposite, subsessile to petiolate 1–8 mm long, strigose; blades 15–47 × 5–22 mm, entire, membranaceous, discolor, lanceolate, ovate, base cuneate, apex acute, margin loosely serrate, slightly revolute, strigose, glabrescent, sparse punctuation glandular trichomes, actinodromous venation (basal 3-nerved). **Leafy bracts** 20–35 × 5–10 mm, lanceolate to narrow ovate, apex acute. **Bracteole** 2.5–3.5 × 0.5–1 mm, linear-lanceolate, apex acute, margin entire, strigose with punctuation glandular trichomes. **Capitulescence** rhipidium; capitulum 6–9 mm long, c. 3 mm diam., involucre subimbricate,

3-seriate, cylindrical, receptacle subconvex, epaleaceous; pedunculate, 3–8 mm long, strigose. **Involucral bracts** c. 11, persistent, **outer involucral bracts** 2–4.5 × 1–1.5 mm, 2–3-nerved, chartaceous, ovate, apex acute, mucronate, margin entire, serrate at the apex, glabrous, strigose at the apex; **inner involucral bracts** 5.5–7.5 × 1–1.5 mm, 2-nerved, chartaceous, linear, narrow elliptic, apex acute, mucronate, margin entire, serrate at the apex, strigose at the apex. **Flowers** 7–9, **corolla** 4–4.5 mm long, corolla tube and limb indistinct, limb fusiform, glabrous, lobes c. 0.3 × 0.2 mm, ovate, papillose with capitate glandular trichomes. **Stamens** 1.2–2.3 mm long, inserted near the middle of the corolla, not exceeding limb height, anther 0.4–0.8 mm long, base acute, anther connective appendage 0.1–0.2 × 0.1 mm, longer than wide or as long as wide, ovate or rounded, apex rounded, anther collar cylindrical. **Style** 3–3.3 mm long, base enlarged, pilose, stylopodium c. 0.4 mm long, glabrous, style branches 1.3–1.5 mm long, clavate. **Cypselae** 2.2–3 × 0.5–0.7 mm, 5-ribbed, setuliferous, prismatic, short-stipitate glandular trichomes, strigose; carpodium annuliform or decurrent; pappus 2–5.5 mm long, bristly scabrous, uniseriate, unequal, yellowish and blackish.

Distribution

Dissothrix imbricata is endemic to Brazil and the Northeast region (Ceará, Piauí) and it only occurs in the phytogeographic domain of the Caatinga (King & Robinson 1987; Nakajima *et al.* 2020a).

Habitat and phenology

In Ceará, the species is distributed in areas of lower altitude (70 m) to higher regions, as in the Ibiapaba Plateau, with an altitude of 550 m, in the vegetation types Arboreous Stepic Savanna and Semideciduous Seasonal Forest (Fig. 3 C-E; Fig. 8). Flowering from May to July.

Conservation data

Collected only in a private Conservation Unit of the state (Serra das Almas Private Reserve Natural Patrimony - PRNP).

Note

Dissothrix imbricata is recognized for being a herb, 8–60 cm tall; leaf blade with actinodromous venation; capitulescence rhipidium, capitulum with flowers 7–9 and pappus unequal. According to information obtained from the labels of specimens, the species was registered on sandy substrate and on rocks, therefore, with rupicolous habit.

Fleischmannia microstemon var. *paniculata* H. Rob.

Fig. 3 B-C; Fig. 8.

PhytoKeys 57: 72–74, f. 4. (H. Rob. 2015).

PhytoKeys 57: 72–74, f. 4. 2015.

Material examined

BRASIL – **Ceará** • Baturité, Serra de Baturité; 15 Jul. 1989; *A. Fernandes s.n.*; EAC[16689] • Guaramiranga, Pico Alto; 20 Jul. 2004; *E. Silveira s.n.*; EAC[34292] • Guaramiranga, Sítio São Salvador; 13 Sep. 1998; *A.S.F. Castro 602*; EAC • Maranguape, Serra de Maranguape, base da Serra; 24 Nov. 1955; *Andrade-Lima 2418*; IPA • Maranguape, Serra de Maranguape, 500 m, 3°88'86"S, 38°71'75"W; 08 Aug. 2020; *N.C. Rebouças et al. 105*; EAC • Pacoti, Serra de Baturité, Sítio Germinal; 31 Jul. 1941; *P. Martins 314*; EAC • Serra de Baturité; 01 Sep. 1910; *E.H.G. Ule 9124*; L • Sobral, Universidade Estadual Vale do Acaraú – UVA; 18 Oct. 2000; *E.B. Souza 529*; EAC.

Description

Herb, erect, 30–70 cm tall, branches fistulose, cylindrical, striate, stipitate-glandular trichomes, glabrescent with punctuation glandular trichomes. **Leaves** opposite, petiolate 15–39 mm long, stipitate-glandular trichomes; blades 20–50 × 12–47 mm, entire, membranaceous, discolor, deltate, base attenuate, apex acute, margin serrate, plane, adaxial surface punctuation and stipitate-glandular trichomes, glabrescent, abaxial surface villous with punctuation glandular trichomes, actinodromous venation (basal 3-nerved). **Leafy bracts** 6–13 × 3–9 mm, triangular, apex acute. **Bracteole** 1–1.5 × c. 0.5 mm, linear, apex acute, margin entire, pilose, glabrescent, punctuation glandular trichomes. **Capitulescence** paniculiform; capitulum 3.5–4 × c. 2 mm, involucre subimbricate, 2-seriate, campanulate, receptacle flat or convex, epaleaceous; pedunculate, 4–9 mm long, villous. **Involucral bracts** 16–18, persistent, **outer involucral bracts** 2–2.2 × 0.6–0.8 mm, 3-nerved, membranaceous, ovate, apex acute, mucronate, margin entire, pilose, glabrescent, punctuation glandular trichomes; **inner involucral bracts** 3–3.8 × 0.6–1 mm, 3-nerved, membranaceous, oblanceolate, apex acute, mucronate, margin entire, pilose, glabrescent, punctuation glandular trichomes. **Flowers** 15–27, **corolla** 2–2.2 mm long, corolla tube and limb distinct, tube 0.3–0.4 mm long, glabrous, limb 1.7–1.8 mm long, cylindrical, glabrous, lobes 0.3–0.4 × 0.2–0.3 mm, ovate. **Stamens** 1.1–1.2 mm long, inserted at the base of the limb, not exceeding limb height, anther 0.5–0.6 mm long, base cuneate, anther connective appendage 0.4–0.5 × c. 0.3 mm, longer than wide, narrow elliptic, apex acute, anther collar narrow cylindrical. **Style** 2–2.2 mm long, base cylindrical, glabrous, stylopodium c. 0.3 mm long, glabrous, style branches 0.9–1.1 mm long, lanceolate. **Cypselae** 1–1.6 × 0.2–0.3 mm, 5-ribbed, setuliferous, prismatic, sericeous; carpodium annuliform; pappus c. 2 mm long, bristly barbellate, uniseriate, equal, hyaline-lustrous.

Distribution

Fleischmannia microstemon occurs in Mexico, in Central and South America (King & Robinson 1987). In Brazil, it is registered in the Northeast (Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Piauí), Midwest (Federal District, Goiás, Mato Grosso), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) and South (Paraná, Santa Catarina), in the phytogeographic domain of the Atlantic Forest (Nakajima *et al.* 2020b).

Habitat and phenology

In Ceará, the species was collected mainly in the humid mountainous areas (Serra de Baturité and Serra de Maranguape), in Brejos de Altitude, but also occurring in drier regions of the state, in Dense Ombrophylous Forest and Semideciduous Seasonal Forest (Fig. 3 B-C; Fig. 8). Collected with flowering from July to November.

Conservation data

In the state, the species was registered in a single Conservation Unit in Ceará (Serra de Baturité Environmental Protection Area - EPA).

Note

Fleischmannia microstemon is characterized by the habit herb, leaf blade 20–50 mm long, deltate, capitulum 3.5–4 × c. 2 mm, flowers 15–27, corolla tube and limb distinct and cypselae setuliferous. As previously mentioned, it shares some characters with *Brickellia diffusa* and the distinctions between the two taxa have already been presented in the comments of that species. In Brazil, two varieties are recognized, *Fleischmannia microstemon* var. *microstemon*, that has leaf blade base obtuse and peduncle puberulous and occurs in practically all Brazilian regions (Robinson 2015; Nakajima *et al.* 2020b), and *F. microstemon* var. *paniculata* H. Rob., that has leaf blade base attenuate and peduncle with stipitate-glandular thichomes, occurring strictly in areas close to the coast of the Northeast region, in the state of Bahia (Robinson 2015; Nakajima *et al.* 2020b). Considering the characters described above, *F. microstemon* var. *paniculata* is the variety observed in Ceará, and represents a new record for the state.

Isocarpha megacephala Mattf.

Fig. 3 C, E; Fig. 9.

Notizblatt des Botanischen Gartens und Museums zu Berlin-Dahlem 9: 385 (Mattf. 1925).

Material examined

BRASIL – Ceará • S.loc.; s.d.; *F.F. Allemão s.n.*; P[2560049] • Aiuaba, Margem do Rio Umbuzeiro, 415 m, 6°61'66"S, 40°16'66"W; 03 Jul. 1996; *L.W. Lima-Verde et al.* 295; EAC •

Aiuaba, Estação Ecológica de Aiuaba, Riacho do Caldeirão, 420 m, 6°65'60"S, 40°28'33"W; 03 Jul. 1996; *L.W. Lima-Verde et al.* 298; EAC • Aiuaba, Estação Ecológica de Aiuaba, 400 m, 6°60'02"S, 40°12'83"W; 01 Jul. 2004; *J.R. Lemos et al.* 239; EAC, IPA • Milagres, povoado de Rosário, Riacho dos Porcos, 330 m, 7°30'18"S, 38°98'42"W; 06 Jun. 2012; *V.M. Catorelli* 1812; HVASF.

Description

Herb, erect, 30–60 cm tall, branches fistulose, cylindrical, striate, glabrous. **Leaves** opposite, sessile; blades 25–70 × 5–21 mm, entire, membranaceous, concolor, narrow elliptic, base cuneate, apex acute, margin entire to slightly serrate, plane, glabrous with punctuation glandular trichomes, actinodromous venation (basal 3-nerved). **Leafy bracts** 7–27 × 2–6 mm, narrow elliptic, obovate, apex acute. **Bracteole** 3.5–3.7 × c. 1 mm, lanceolate, apex acute, margin slightly serrate, ciliate at the base, glabrous. **Capitulescence** cyme or capitulum solitary; capitulum 9–11 × 7–8 mm, involucre eximbricate, 2-seriate, ovoid, receptacle conical, paleaceous, palea subtending each flower; pedunculate, 7–11 mm long, glabrous. **Involucral bracts** 7–10, persistent, **outer involucral bracts** 3.5–3.8 × 1.6–1.8 mm, 3-nerved, membranaceous, obovate, oblong, apex acute, margin erose, ciliate, glabrous; **inner involucral bracts** 3.8–4 × c. 1.5 mm, 3-nerved, membranaceous, lanceolate, apex acute, margin erose, ciliate, glabrous, **palea** 4–5 × 0.6–1 mm, linear, oblanceolate, apex acute. **Flowers** 250–300, **corolla** 3–3.1 mm long, corolla tube and limb indistinct, limb cylindrical, glabrous, lobes c. 1 × 0.5 mm, ovate, papillose, glabrous. **Stamens** 2–2.2 mm long, inserted in the base of the corolla, not exceeding limb height, anther 1–1.2 mm long, base truncate, anther connective appendage 0.2 × 0.1 mm, longer than wide or as long as wide, ovate, apex rounded, anther collar cylindrical. **Style** 3.7–4 mm long, base cylindrical, glabrous, stylopodium c. 0.2 mm long, glabrous, style branches 2.5–2.7 mm long, linear-cylindrical. **Cypselae** 2.1–2.2 × 0.4–0.5 mm, 5-ribbed, prismatic, glabrous with short-stipitate trichomes; carpodium asymmetric; pappus absent.

Distribution

The species is endemic to Brazil and from the Northeast region (Bahia, Paraíba, Pernambuco), exclusive to the Caatinga phytogeographic domain (Keil & Stuessy 1981; King & Robinson 1987; Rivera & Fernandes 2020).

Habitat and phenology

Isocarpha megacephala was recently reported as a new record for Ceará (Loiola *et al.* 2020). In the state, the species occurs in dry to sub-humid climates, in vegetation of Arboreous Stepic Savanna and Semideciduous Seasonal Forest (Fig. 3 C, E; Fig. 9), and next

to the banks of rivers and lakes, as already mentioned by Keil & Stuessy (1987), for the state of Bahia, in areas flooded by rivers. It is flowering in June and July.

Conservation data

It is registered in a single Conservation Unit (Ecological Station of Aiuaba).

Note

Isocarpha megacephala is easily differentiated from other species because it is an herb, sessile leave, actinodromous venation, capitulum with receptacle conical, paleaceous, flowers 250–300 and pappus absent and can be associated with aquatic environments.

Koanophyllon tinctorium Arruda

Fig. 3 A-B; Fig. 9.

Travels in Brazil 495–496 (Arruda 1816).

Material examined

BRASIL – **Ceará** • S.loc.; s.d.; *F.F. Allemão* 890; R • Maranguape, Serra de Maranguape; 24 Nov. 1955; *Andrade-Lima et al.* 2400; IPA • Maranguape, Serra de Maranguape; 26 Nov. 1955; *A. Fernandes s.n.*; EAC[1538].

Description

Subshrub, erect, c. 80 cm tall, branches solid, cylindrical, striate, villous, glabrescent. **Leaves** opposite, petiolate 6–7 mm long, villous; blades 50–95 × 17–30 mm, entire, membranaceous, discolor, ovate, ovate-lanceolate, base rounded, apex acuminate, margin slightly serrate, plane, villous, glabrescent, actinodromous venation (basal 3–5-nerved), subparallel. **Leafy bracts** c. 35 × 10 mm, ovate-lanceolate, apex acuminate. **Bracteole** c. 4 × 1 mm, lanceolate, apex acute, margin ciliate, villous. **Capitulescence** paniculiform; capitulum 8–10 × c. 2 mm, involucre subimbricate, 2–3-seriate, cylindrical, receptacle flat, epaleaceous; pedunculate, 7–8 mm long, villous. **Involucral bracts** c. 9, persistent, **outer involucral bracts** 3–3.5 × c. 0.8 mm, 3-nerved, chartaceous, lanceolate, apex acute, mucronate, margin ciliate, glabrescent; **inner involucral bracts** 5–5.2 × c. 1 mm, 3–4-nerved, chartaceous, lanceolate, apex acute, mucronate, margin ciliate, glabrescent. **Flowers** 8–9, **corolla** c. 4.1 mm long, corolla lobe and limb indistinct, limb cylindrical, glabrous, lobes c. 0.5 × 0.4 mm, triangular, papillose with capitate glandular trichomes. **Stamens** c. 2 mm long, inserted in the middle of the corolla, not exceeding limb height, anther c. 1.2 mm long, base truncate, anther connective appendage c. 0.2 × 0.3 mm, wider than long, triangular, apex retuse, anther collar short-cylindrical. **Style** c. 7.2 mm long, base not enlarged, glabrous, stylopodium c. 0.5 mm long, capitate glandular, style branches c. 4.2 mm long, cylindrical to clavate. **Cypselae** 2.5–2.8 × 0.6 mm, 5-ribbed, prismatic, pilose and

stipitate-glandular trichomes; carpopodium annuliform or inconspicuous; pappus c. 4.3 mm long, bristly barbellate, uniseriate, subequal, whitish.

Distribution

Koanophyllon tinctorium occurs in Brazil and Bolivia in South America (King & Robinson 1987; Jørgensen *et al.* 2014). In Brazil, the taxon is distributed in the Northeast (Bahia), Midwest (Goiás, Mato Grosso do Sul), Southeast (Minas Gerais, Rio de Janeiro) and South (Paraná, Santa Catarina) regions, in the phytogeographic domains Cerrado and Atlantic Forest (Nakajima *et al.* 2020c).

Habitat and phenology

In Ceará, the species constitutes a new occurrence, being registered in the Serra de Maranguape, a mountainous region with a humid tropical climate, in Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 9). Flowering in November.

Conservation data

In Ceará, the species is only from Serra de Maranguape, which is not a Conservation Units.

Note

Koanophyllon tinctorium characterized by habit subshrub, leave blade 50–95 mm long, ovate, ovate-lanceolate, capitulum 8–10 × c. 2 mm, flowers 8–9, corolla tube and limb indistinct and cypselae pilose and stipitate-glandular.

Mikania Willd.

Fig. 3 A-C, E-F, H.

Species Plantarum. Editio quarta 3(3): 1742 (Willd. 1803).

Description

Plants perennial, erect, vine, branches fistulose or not, cylindrical or angular, striate, pubescent, strigose, sericeous, villous, tomentose, glabrescent or glabrous, with punctuation glandular trichomes or not. **Leaves** opposite, petiolate; pseudo-stipule present or not; blades, entire, lobed or pinnatisect, membranaceous, chartaceous, carnose-coriaceous or coriaceous, concolor or discolor, ovate, elliptic, triangular or wide deltate, base attenuate, cuneate, obtuse, rounded, cordate, hastate or sagittate, apex acute, acuminate, cuspidate or mucronate, margin entire, serrate or dentate, revolute or not, indumentum and punctuation glandular trichomes present, brochidodromous or actinodromous venation (basal 3–5-nerved). **Leafy bracts** present. **Subinvolucral bract** narrow elliptic, elliptic, ovate, lanceolate or linear, apex acute, acuminate, cuspidate or rare cirrhose, margin entire or ciliate, tector and/or punctuation glandular trichomes, at the base of the capitulum or peduncle or along the

peduncle, foliaceous or not, persistent. **Capitulescence** corymbiform, glomeriform, racemiform, thyrsoïd or paniculate-thyrsoïd, axillary; involucre eximbricate, 2-seriate, campanulate, receptacle flat, epaleaceous, glabrous; sessile to pedunculate. **Involucral bracts** (4), persistent, **outer involucral bracts** 3–7-nerved or inconspicuous, chartaceous, subcarnose-coriaceous, carnose-coriaceous or coriaceous, narrow elliptic, elliptic, obovate, oblong, lanceolate, oblanceolate or linear, apex acute, acuminate or cuspidate, margin entire or/to ciliate, tector and/or punctuation glandular trichomes; **inner involucral bracts** 3–6-nerved or inconspicuous, chartaceous, subcarnose-coriaceous, carnose-coriaceous or coriaceous, elliptic, obovate, oblong, apex acute, acuminate, lanceolate, oblanceolate or linear, margin entire or/to ciliate, tector and/or punctuation glandular trichomes. Flowers (4), **corolla** tube and limb distinct or not, tube smaller, equal or almost equal or larger than limb, tube glabrous, villous, stipitate-glandular or capitate glandular trichomes, limb campanulate, infundibuliform or not extended, glabrous or with stipitate-glandular trichomes, lobes triangular, ovate, papillose, pubescent, pilose, glabrous, with stipitate and capitate glandular trichomes. **Stamens** inserted at the base of the limb, exceeding limb height or not, anther base obtuse, sagittate or truncate, anther connective appendage longer than wide or as long as wide, narrow triangular, triangular or elliptic, apex obtuse, acute, acuminate or rounded, anther collar conical or cylindrical. **Style** base enlarged or not, glabrous, stylopodium present, glabrous, style branches linear or clavate. **Cypselae** 5-ribbed, rare 6-10 ribbed, setuliferous or not, prismatic, obconic or cylindrical, glabrous, pubescent, pilose, sericeous, villous, tomentose, usually with stipitate or capitate glandular trichomes; carpodium annuliform to/or decurrent, or inconspicuous; pappus bristly barbellate, uniseriate, subequal, whitish, yellowish, reddish or rare ferruginous.

Distribution

Mikania has more than 400 species with Pantropical distribution, presenting a centre of diversity in South America (King & Robinson 1987; Holmes 1995). In Brazil, the genus is represented by 199 species occurring in all regions and phytogeographic domains (King & Robinson 1987; Holmes 1995; Ritter *et al.* 2020). It grows in all vegetation types, being apparently restricted to forested vegetation, from more conserved areas to anthropized environments (King & Robinson 1987; Holmes 1995; Ritter *et al.* 2020).

Habitat

In Ceará, species occur in Arboreous Savanna, Dense Ombrophylous Forest, Semideciduous Seasonal Forest, Stepic Savanna and Vegetation Complex of the Coastal Zone (Fig. 3 A-C, E-F, H).

Note

Mikania is the largest genus with scandent representatives inside Asteraceae, and the most diverse in Eupatorieae (King & Robinson 1987; Robinson *et al.* 2009). The species are characterized by being perennial plants, in general, vines, rare erect or decumbent, capitulum with four involucre bracts and the same number of flowers (Ritter & Mioto 2005).

Mikania congesta DC.

Fig. 3 C; Fig. 9.

Prodromus Systematis Naturalis Regni Vegetabilis 5: 197 (DC. 1836).

Material examined

BRASIL – Ceará • S.loc.; s.d.; F.F. Allemão & M. Cysneiros 853; P, R • S.loc.; 1840; G. Gardner 1725; GH, HUEFS, NY, P, US • Redenção, estrada para Serrinha, 360 m; 10 Oct. 1980; E. Nunes & P. Martins s.n.; EAC[8988].

Description

Vine, branches solid, cylindrical, sericeous, glabrescent with punctuation glandular trichomes. **Leaves** petiolate 15–40 mm long, densely sericeous; pseudo-stipule present, 2–2.5 mm long; blades 40–70 × 20–50 mm, entire, membranaceous, discolor, ovate, base cordate to sagittate, apex acuminate, margin loosely dentate, plane, pilose with punctuation glandular trichomes, glabrescent, actinodromous venation (basal 3–5-nerved). **Leafy bracts** 25–28 × 8–10 mm, narrow triangular, apex acute, rare mucronate. **Subinvolucre bract** 2.5–3 × 0.7–0.8 mm, lanceolate, apex acuminate, margin ciliate, villous with punctuation glandular, at the base of the capitulum, not foliaceous. **Capitulescence** glomeriform; capitulum 2–3 × 1–1.5 mm; sessile to pedunculate, 1–3 mm long, densely sericeous. **Outer involucre bracts** c. 2 × 1.1 mm, 3-nerved, chartaceous, elliptic, apex acute to acuminate, margin ciliate, villous, glabrescent with punctuation glandular trichomes; **inner involucre bracts** 2–2.1 × 1–1.1 mm, 3-nerved, chartaceous, elliptic, apex acute to acuminate, margin ciliate, villous, glabrescent, with punctuation glandular trichomes. **Corolla** 2.5–2.9 mm long, with stipitate-glandular trichomes, corolla tube and limb distinct, tube 1.3–1.5 mm long, limb 1.2–1.5 mm long, campanulate, lobes c. 0.5 × 0.4 mm, triangular, papillose. **Stamens** c. 2 mm long, exceeding limb height, anther c. 1 mm long, base sagittate, anther connective appendage c. 0.4 × 0.2 mm, longer than wide, narrow triangular, apex acute, anther collar conical. **Style** 5–5.5 mm long, base cylindrical, stylopodium c. 0.5 mm long, style branches 2–2.5 mm long, lanceolate. **Cypselae** c. 1.2 × 0.4 mm, 5-ribbed, setuliferous, obconic with stipitate-glandular trichomes; carpodium annuliform; pappus 2–2.3 mm long, yellowish.

Distribution

Mikania congesta occurs from the Caribbean region to the lower portion of South America (Argentina, Bolivia, Brazil, Colombia, Cuba, Ecuador, Guyana, Haiti, Jamaica, Peru, Dominican Republic) (Oliveira 2015). In Brazil, the species is distributed in North (Amazonas, Pará, Rondônia, Roraima), Northeast (Alagoas, Ceará, Paraíba) and Midwest (Mato Grosso do Sul), in the phytogeographic domains Amazon, Caatinga and Pantanal (Ritter *et al.* 2020).

Habitat and phenology

In Ceará, *Mikania congesta* has few records in dry climate environments, in the vegetation type Semideciduous Seasonal Forest (Fig. 3 C; Fig. 9). Collected with flowering in October.

Conservation data

In Ceará, the species has a restricted distribution and there is not registered growing inside a conservation unit in the state.

Note

Mikania congesta is distinguished from other species of the genus in the state by capitulescence glomeriform, corolla stipitate-glandular trichomes, cypselae c. 1.2 mm long and pappus 2–2.3 mm long. In the collections, the species can be mistakenly identified as *M. micrantha*. Taxons resemble each other by leaf blade ovate and capitulum subsessile to pedunculate, however, *M. congesta* differs by the characters already mentioned above (*vs.* capitulescence corymbiform, cypselae 2–2.5 mm long and pappus 3.5–4 mm long).

Mikania cordifolia (L. f.) Willd.

Fig. 3 A-C, F; Fig. 9.

Species Plantarum. Editio quarta 3(3): 1746 (Willd. 1803).

Material examined

BRASIL – Ceará • Aiuaba; 06 Aug. 1996t; *E.L. Paula-Zárete et al.* 266; EAC • Aiuaba, Estação Ecológica de Aiuaba; 21 Jun. 1991; *E.B. Souza et al.* 519; EAC, IPA • Alcantara, Bom Fim, Serra da Meruoca; 31 May. 2000; *E.B. Souza s.n.*; EAC[29455], IPA[85431] • Barbalha, Floresta Nacional do Araripe-Apodi – FLONA, Trilha para a nascente dos Cocos; 04 Aug. 2011; *E.V.R. Ferreira et al.* 270; HUNEB, HVASF, IPA • Baturité, Raposa; 27 Aug. 2001; *A.S.F. Castro s.n.*; EAC[30884] • Caucaia, Iparana; 05 Jul. 1964; *M.M. Barros s.n.*; EAC[5388], RB[493011] • Crateús, Tucuns, 590 m, 5°14'18"S, 40°55'30"W; 28 Jul. 2005; *J.R. Lemos* 323; HUEFS • Crateús, Tucuns, 590 m, 5°14'18"S, 40°55'30"W; 28 Jul. 2005; *J.R.*

Lemos 483; HUEFS • Crato; 30 Jul. 1997; *L.P. Felix et al. s.n.*; ALCB[32033], EAC[53821], HST[6949], IPA[87550] • Crato, na estrada para Santana do Cariri; 01 Jun. 1996; *F.S. Cavalcanti s.n.*; EAC[23836] • Graça; 15 May. 2008; *F.C.A. Eufrásio 25*; HUEFS • Graça; 15 May. 2008; *F.A.M. Ponte Filho 88*; HUEFS, HUVA • Graça, Sítio Santa Clara, 3°96'83"S, 40°81'25"W; 14 May. 2017; *F.F. Araújo 215*; ALCB, EAC • Ibiapaba, Serra Grande, Sítio Santa Maria, 3°52'00"S, 40°57'00"W; 10 Nov. 2016; *M.L. Guedes 25284*; ALCB, EAC • Meruoca, Sítio do Meio, Santo Antônio dos Fernandes; 27 Jun. 1983; *A. Fernandes s.n.*; EAC[12074] • Meruoca, Sítio do Meio, Santo Antônio dos Fernandes; 26 Jun. 1987; *A. Fernandes s.n.*; EAC[15375], IPA[85462] • Maranguape, Serra de Maranguape; 26 Jun. 1981; *P. Martins & E. Nunes s.n.*; EAC[10481] • Santana do Cariri; 28 May. 1996; *M.A.P. Silva 47*; EAC, HCDAL.

Description

Vine, branches solid, cylindrical to angular, villous, glabrescent with punctuation glandular trichomes. **Leaves** petiolate 10–52 mm long, densely villous; pseudo-stipule present, 2–3 mm long; blades 30–65 × 20–60 mm, entire, membranaceous, discolor, ovate, base cordate, apex acute, rare mucronate, margin entire to slightly dentate, plane, adaxial surface strigose with punctuation glandular trichomes, abaxial surface villous to tomentose with punctuation glandular trichomes, actinodromous venation (basal 5-nerved). **Leafy bracts** 5–16 × 4–11 mm, ovate, apex acute, cuneate. **Subinvolucral bract** 4–7 × 1–3 mm, elliptic, apex acuminate, cuspidate, rare cirrhose, margin ciliate, sericeous to tomentose with punctuation glandular trichomes, at the base of the capitulum, foliaceous. **Capitulescence** corymbiform; capitulum 5–7 × 2–3 mm; pedunculate, 2–5 mm long, villous. **Outer involucral bracts** 5–7 × 2–2.5 mm, 6–7-nerved, chartaceous, elliptic, apex acute, cuspidate, acuminate, margin ciliate, sericeous, villous, sparse punctuation glandular trichomes; **inner involucral bracts** 5.5–7.7 × 2–2.1 mm, 4–5-nerved, chartaceous, elliptic, apex acute, cuspidate, acuminate, margin ciliate, pubescent, glabrescent, rare punctuation glandular trichomes. **Corolla** 5–5.3 mm long, corolla tube and limb distinct, tube 1.8–2.5 mm long, glabrous, limb 2.5–3.2 mm long, infundibuliform, glabrous, lobes 1.2–1.5 × 0.8–1 mm, triangular, papillose with capitate glandular. **Stamens** 3–3.8 mm long, exceeding limb height, anther 1.8–2 mm long, base sagittate, anther connective appendage c. 0.6 × 0.3 mm, longer than wide, triangular, apex acuminate, anther collar conical. **Style** 6–10 mm long, base cylindrical, stylopodium 1–1.2 mm long, style branches 3.5–4.5 mm long, linear. **Cypselae** 3–4 × 0.9–1.2 mm, 5-ribbed, prismatic, glabrous to rare pubescent, rare capitate glandular trichomes at the apex; carpodium decurrent; pappus 4.5–5.5 mm long, reddish.

Distribution

Mikania cordifolia it is widely distributed in the Americas, from the United States to Argentina (Oliveira 2015). In Brazil, the species has extensive occurrence throughout the territory and phytogeographic domains, except for the states of Acre and Roraima (Ritter *et al.* 2020).

Habitat and phenology

In Ceará, *Mikania cordifolia* occurs in dry and humid environments, in areas of low altitude to the highest regions of the state, in Chapada do Araripe, Serra de Baturité, Serra de Maranguape, Serra da Meruoca and Ibiapaba Plateau. Recorded in vegetation of Arboreous Savanna, Dense Ombrophylous Forest, Semideciduous Seasonal Forest and Stepic Savanna (Fig. 3 A-C, F; Fig. 9). Flowering from May to August and November.

Conservation data

In Ceará, it is widespread. It occurs in three Conservation Units in Ceará (Serra de Baturité Environmental Protection Area - EPA, Aiuaba Ecological Station, Araripe-Apodi National Forest - FLONA).

Note

Mikania cordifolia is characterized by the presence of subinvolucral bract foliaceous (large resembling a leaf); corolla 5–5.3 mm long; cypselae 3–4 × 0.9–1.2 mm; carpodium decurrent and pappus 4.5–5.5 mm long. The species has a wide phenotypic plasticity, which makes it resemble several representatives of *Mikania*, making it difficult to identify the collections. Many specimens were named for *M. micrantha*, a closely species related to the leave blade ovate with cordate base, pseudo-stipule presente and corymbiform capitulescence, but it differs by the diagnostic characters mentioned previously (*vs.* subinvolucral bract lanceolate, corolla 3.8–4 mm long, cypselae 2–2.5 × 0.3–0.6 mm; carpodium annuliform and pappus 3.5–4 mm long.).

Mikania elliptica DC.

Fig. 3 A-B; Fig. 9.

Prodromus Systematis Naturalis Regni Vegetabilis 7(1): 270–271 (DC. 1838).

Material examined

BRASIL – Ceará • Guaramiranga, Pico Alto, 1009 m, 4°20'85"S, 38°97'44"W; 07 Aug. 2015; C.M. Siniscalchi 605; SPF • Pacoti, Pico Alto; 17 Sep. 1991; E. Silveira s.n.; EAC[17837].

Description

Vine, branches solid, cylindrical, villous, glabrescent, rare punctuation glandular trichomes. **Leaves** petiolate 8–10 mm long, villous; pseudo-stipule absent; blades 33–65 ×

17–33 mm, entire, chartaceous, discolor, elliptic, base cuneate, obtuse, apex acute, margin entire, revolute, adaxial surface glabrescent, abaxial surface pubescent, glabrescent, rare punctuation glandular trichomes, brochidodromous venation. **Leafy bracts** 14–15 × 4–5 mm, narrow elliptic, apex acute. **Subinvolucral bract** c. 2.2 × 1 mm, lanceolate, apex acute, acuminate, margin ciliate, villous, at the base of the peduncle, not foliaceous. **Capitulescence** thyrsoïd; capitulum 3–4 × c. 2 mm; subsessile to pedunculate, 1–3 mm long, ferruginous, villous. **Outer involucral bracts** c. 3.5 × 1.3 mm, 5-nerved, subcarnose-coriaceous, oblong, apex acute, margin ciliate, villous, glabrescent; **inner involucral bracts** 3.5–4 × 1.8 mm, 6-nerved, subcarnose-coriaceous, oblong, apex acute, margin ciliate, villous, glabrescent. **Corolla** 4.5–4.7 mm long, corolla tube and limb distinct, tube 1.7–2 mm long, glabrous, limb 2.5–2.7 mm long, infundibuliform, glabrous, lobes c. 1.1 × 1 mm, triangular, papillose. **Stamens** c. 3.2 mm long, exceeding limb height, anther 1.1 mm long, base truncate, anther connective appendage c. 0.4 × 0.2 mm, longer than wide, elliptic, apex rounded, anther collar cylindrical. **Style** c. 8 mm long, slightly enlarged at base, stylopodium c. 0.5 mm long, style branches c. 3 mm long, cylindrical. **Cypselae** 2.8–3 × 0.8–1 mm, 5-ribbed, prismatic, villous to tomentose at the apex; carpopodium annuliform; pappus 4–4.5 mm long, yellowish.

Distribution

Mikania elliptica is endemic from Brazil in the Northeast region (Bahia, Ceará), in the phytogeographic domains of the Caatinga and Cerrado (Oliveira 2015; Ritter *et al.* 2020).

Habitat and phenology

In Ceará, the species was registered only for the top of Serra de Baturité, a humid climate environment, in vegetation of Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 9). Flowering in August and September.

Conservation data

The species only occurs in the Conservation Unit of Ceará Environmental Protection Area of Serra de Baturité - EPA.

Note

Mikania elliptica is easily recognized among other species of genera by leaf blade elliptic, chartaceous, glabrescent, brochidodromous venation and anther collar cylindrical.

Mikania glomerata Spreng.

Fig. 3 A-B; Fig. 10.

Systema Vegetabilium, editio decima sexta 3: 421 (Spreng. 1826).

Material examined

BRASIL – Ceará • Maranguape, Espírito Santo, Serra da Aratanha; 26 Jun. 2016; A.S.F. Castro *et al.* 2951; EAC • Pacoti, Serra de Baturité, Sítio Cação; 17 Jan. 1989; M.A. Figueiredo *s.n.*; EAC[16642], IPA[85403].

Description

Vine, branches fistulose, angular, glabrescent, not punctuation glandular. **Leaves** petiolate 12–22 mm long, glabrescent; pseudo-stipule absent; blades 30–55 × 15–40 mm, 3-5-lobed, carnose to coriaceous, concolor, ovate, base rounded, apex acuminate, rare cuspidate, margin entire, slightly revolute, glabrous, actinodromous venation (basal 5-nerved). **Leafy bracts** 10–30 × 6–15 mm, ovate, apex acute. **Subinvolucral bract** 2.2–2.5 × c. 1 mm, ovate, lanceolate, apex acute, margin ciliate, villous, glabrescent, at the base of the capitulum, not foliaceous. **Capitulescence** paniculate to glomeriform; capitulum 2–4 × c. 2 mm; sessile. **Outer involucral bracts** 4–4.2 × 1–1.2 mm, inconspicuous nerved, carnose-coriaceous, narrow elliptic, apex acute, margin ciliate, pubescent at the apex; **inner involucral bracts** 4–4.2 × 1–1.2 mm, inconspicuous nerved, carnose-coriaceous, narrow elliptic, apex cuneate, margin ciliate, pubescent at the apex. **Corolla** 5.5–6 mm long, corolla tube and limb distinct, tube 1.8–2 mm long, glabrous, limb 3.7–4 mm long, cylindrical, glabrous, lobes 0.9–1 × 0.5–0.6 mm, ovate, triangular, papillose, pubescent, rare with capitate glandular trichomes. **Stamens** 4–4.5 mm long, not exceeding limb height, anther 1.8–1.9 mm long, base truncate, anther connective appendage 0.25–0.3 × 0.25 mm, as long as wide, triangular, apex acute, anther collar cylindrical. **Style** 6.7–7 mm long, enlarged at base, stylopodium c. 0.5 mm long, style branches 3–3.3 mm long, cylindrical. **Cypselae** 2.5–3 × 0.6–0.7 mm, 5-ribbed, prismatic, glabrous; carpodium annuliform; pappus 4.8–5 mm long, yellowish.

Distributivos

Mikania glomerata occurs in three countries in South America, in Argentina, Brazil and Paraguay (Oliveira 2015). In Brazil, it has records for the Northeast (Bahia), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) and South (Paraná, Rio Grande do Sul, Santa Catarina) regions, in the Cerrado, Atlantic Forest and Pampa (Ritter *et al.* 2020).

Habitat and phenology

In Ceará, *Mikania glomerata* is reported for the first time, occurring in Brejos de Altitude, Serra de Baturité and Serra de Maranguape, with an elevation between 800–1000 m, in the vegetation type Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 10). Flowering in January and June.

Conservation data

The species was collected in the Environmental Protection Area of Serra de Baturité - EPA, Ceará.

Note

Mikania glomerata is characterized by leave blade carnose to coriaceous and capitulum sessile. The specimens collected in Ceará were identified as *M. laevigata*, a frequently mistake founded in the herbaria specimens. According to Ritter & Miotto (2005), in general, the terminal branches of individuals are collected, where the foliate bract of these two species is very similar, ovate-lanceolate, besides paniculiform capitulescence. However, *M. glomerata* has leave blade 3–5-lobed and actinodromous venation (vs. entire, brochidodromous).

Mikania jeffreyi DJN Hind

Fig. 3 A-B; Fig. 10.

Kew Bulletin 48 (2): 271 (DJN Hind 1993).

Material examined

BRASIL – Ceará • Crato, Chapada do Araripe, Sítio Caianas, 800 m, 7°26'66"S, 39°43'33"W; 31 Jan. 2008; *M. Oliveira et al.* 3324; EAC, HCDAL, IPA.

Description

Vine, branches solid, cylindrical, pubescent, villous, glabrescent. **Leaves** petiolate 12–18 mm long, pubescent, glabrescent; pseudo-stipule present, c. 1.5 mm long; blades 30–44 × 10–26 mm, entire, membranaceous, concolor, triangular, base hastate, sagittate, apex acuminate, margin entire, slightly sinuate, adaxial surface lepidote, abaxial surface lepidote with punctuation glandular trichomes, actinodromous venation (basal 5-nerved). **Leafy bracts** c. 12 × 5 mm, narrow triangular, lanceolate, apex acuminate. **Subinvolucral bract** 2.2–2.5 × 0.2–0.5 mm, linear, narrow elliptic, apex acute, margin entire, pubescent, glabrescent, at the base of the capitulum, not foliaceous. **Capitulescence** corymbiform; capitulum 4–4.5 × c. 2 mm; pedunculate, 2.5–3 mm long, glabrescent. **Outer involucral bracts** 3.3–3.5 × c. 1.5 mm, 3–4-nerved, chartaceous, narrow elliptic to elliptic, apex acute, margin entire, pubescent, glabrescent; **inner involucral bracts** 4–4.2 × c. 1.2 mm, 3-nerved, chartaceous, narrow elliptic, apex acute, margin entire, pubescent, glabrescent. **Corolla** 3.5–3.8 mm long, corolla tube and limb distinct, tube 1.9–2 mm long, with capitate glandular trichomes, limb 1.5–1.8 mm long, campanulate, glabrous, lobes 1.1–1.2 × c. 0.8 mm, ovate, papillose, rare pubescent, with capitate glandular trichomes. **Stamens** c. 2.7 mm long, not exceeding limb height, anther c. 1.8 mm long, base sagittate, anther connective appendage c. 0.4 × 0.3 mm, longer than

wide, triangular, apex acuminate, anther collar conical. **Style** c. 6 mm long, cylindrical base, stylopodium c. 1 mm long, style branches c. 2.5 mm long, cylindrical. **Cypselae** 1.8–2 × 0.4–0.5 mm, 5-ribbed, prismatic, with scattered capitate glandular trichomes; carpodium annuliform to decurrent; pappus 2.8–3.2 mm long, whitish.

Distribution

Mikania jeffreysi is endemic from Brazil, occurring in the states of Bahia, Minas Gerais and Goiás, in the phytogeographic domains of the Caatinga and Cerrado (Oliveira 2015; Gandara & Roque 2020; Ritter *et al.* 2020).

Habitat and phenology

In Ceará, the species is a new record in vegetation of Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 10), in Chapada do Araripe, at an altitude of 800 m, with preference for elevated regions, as described by Hind (1993). Registered with flowering in January.

Conservation data

The species is registered in a State Conservation Unit, Araripe-Apodi National Forest - FLONA.

Note

Mikania jeffreysi is characterized and distinguished from the other species by the leave blade triangular, base hastate to sagittate, with adaxial and abaxial surface lepidote.

***Mikania micrantha* Kunth**

Fig. 3 H; Fig. 4 H-I; Fig. 10.

Nova Genera et Species Plantarum (folio ed.) 4: 105 (Kunth 1820).

Material examined

BRASIL – Ceará • Aquiraz, Área de Preservação Ambiental do Rio Pacoti – APA, próximo a foz do rio, 3°83'17"S, 38°40'08"W; 28 Aug. 2018; *S.T. Rabelo et al.* 95; EAC • Caucaia, Lagoa do Cauípe; 01 Feb. 1998; *E.B. Souza s.n.*; EAC[26377] • Caucaia, Parque Botânico de Caucaia; 17 Apr. 1998; *L.Q. Matias s.n.*; EAC[27000] • Fortaleza, as margens do rio Cocó, 24 Oct. 1964; *M.M. Barros s.n.*; EAC[5400] • Fortaleza, Campus do Itaperi UECE, 3°47'55"S, 38°33'37"W; 12 Apr. 2019; *E.M.P. Lucena et al.* 498; EAC • Fortaleza, Campus do Pici, 14 Aug. 1985; *M.F. Mata s.n.*; EAC[15514] • Fortaleza, Campus do Pici, Açude Santo Anastácio, 12 May. 1939; *P. Bezerra s.n.*; EAC[68] • Fortaleza, Lagoa da Maraponga, 3°47'28"S, 38°34'15"W; 07 Jun. 2018; *V.S. Sampaio et al.* 410; EAC • Pentecoste, Fazenda Vale do Curu, próximo ao rio, 3°49'08"S, 39°20'16"W; 19 Apr. 2012; *M.I.B. Loiola* 1452; EAC • São Gonçalo do Amarante, Jardim Botânico de São Gonçalo do Amarante, 3°34'15"S, 38°53'20"W; 05 Apr. 2018; *V.S. Sampaio & L.F. Pinheiro* 260; EAC • São Gonçalo do Amarante, próximo à

linha férrea; 28 Jul. 2010; A.S.F. Castro & M. Moro 2335; EAC.

Description

Vine, branches fistulose or not, cylindrical, pubescent, glabrescent with punctuation glandular trichomes. **Leaves** petiolate 10–55 mm long, pubescent; pseudo-stipule present, c. 0.5 mm long; blades 26–80 × 20–55 mm, entire, membranaceous, discolor, ovate, base cordate, apex cuspidate, acuminate, mucronate, margin entire to dentate, rare crenate, plane, adaxial surface strigose, glabrescent, abaxial surface strigose, punctuation glandular trichomes on both surfaces, actinodromous venation (basal 3–5-nerved). **Leafy bracts** 13–20 × 8–15 mm, ovate, apex cuspidate, mucronate. **Subinvolucral bract** 3–5 × 0.5–1 mm, lanceolate, apex acuminate, margin ciliate, villous with punctuation glandular trichomes, at the base of the capitulum, not foliaceous. **Capitulescence** corymbiform; capitulum 4–6 × 1–1.5 mm; pedunculate, 2–4 mm long, pubescent to villous, glabrescent. **Outer involucral bracts** 5–6 × 1–1.3 mm, 3–4-nerved, chartaceous, narrow elliptic, obovate, apex mucronate, rare acuminate, margin ciliate, villous, glabrescent with punctuation glandular trichomes; **inner involucral bracts** 5.2–6.3 × 1–1.3 mm, 3-nerved, chartaceous, narrow elliptic, obovate, apex mucronate, rare acuminate, margin ciliate, villous, glabrescent with sparse punctuation glandular trichomes. **Corolla** 3.8–4 mm long, with capitate glandular trichomes, corolla tube and limb distinct, tube 2–2.2 mm long, limb 1.8–2 mm long, campanulate, lobes 0.8–1 × 0.6–0.8 mm, ovate, papillose. **Stamens** 2.1–2.4 mm long, exceeding limb height, anther 1.2–1.4 mm long, base short-sagittate, anther connective appendage 0.3–0.4 × 0.15–0.2 mm, longer than wide, narrow triangular, apex acute, anther collar conical. **Style** 6–7 mm long, cylindrical base, stylopodium c. 1 mm long, style branches 2.5–3 mm long, cylindrical. **Cypselae** 2–2.5 × 0.3–0.6 mm, 5-ribbed, setuliferous, prismatic, with capitate glandular trichomes; carpodium annuliform; pappus 3.5–4 mm long, white-yellowish.

Distribution

Mikania micrantha occurs in Central and South America and in the Old World (Oliveira 2015). China, Australia, French Polynesia and other Pacific islands have reported the presence of the taxon as an invasive species (Chen *et al.* 2009; Day *et al.* 2016). In Brazil, it is distributed in all regions and phytogeographic domains (Ritter *et al.* 2020).

Habitat and phenology

In Ceará, the species is distributed in forest areas next to the coastal region, mainly associated with flooded areas such as rivers and lakes in the state, in the Vegetation Complex of the Coastal Zone (Fig. 3 H; Fig. 4 H-I; Fig. 10). Flowering from February to October.

Conservation data

The species occurs strictly in vegetation near the coast of Ceará. It is registered in the Environmental Preservation Area of the Pacoti River - EPA, Conservation Unit of Ceará, and in the Botanical Garden of São Gonçalo do Amarante and Botanical Park of Caucaia.

Note

Mikania micrantha is differentiated by subinvolucral bract lanceolate; corolla 3.8–4 mm long; cypselae 2–2.5 × 0.3–0.6 mm; carpopodium annuliform and pappus 3.5–4 mm long. It resembles *M. cordifolia* and the characters that differ are shown in the comments of this species.

Mikania psilostachya DC.

Prodromus Systematis Naturalis Regni Vegetabilis 5: 190 (DC. 1836).

Material examined

BRASIL – Ceará • S.loc.; s.d.; F.F. Allemão 857; P, R.

Additional material examined

BRASIL – Pernambuco • Rio Formoso, Engenho Terra D'água; 21 Feb. 1995; A.M. Miranda 2072; EAC, HCDAL, HST, HUEFS, IPA.

Description

Vine, branches solid, cylindrical, ferruginous, dense villous, with punctuation glandular trichomes. **Leaves** petiolate c. 13 mm long, ferruginous, tomentose; pseudo-stipule absent; blades 77–79 × 30–35 mm, entire, coriaceous, discolor, ovate, base obtuse, apex acuminate, margin entire, slightly revolute, adaxial surface strigose, abaxial surface tomentose, with dense punctuation glandular trichomes, brochidodromous venation. **Leafy bracts** 20–23 × 8–10 mm, ovate, apex acuminate. **Subinvolucral bract** c. 2 × 1 mm, lanceolate, apex acute, margin ciliate, ferruginous, dense villous with punctuation glandular trichomes, at the base of the peduncle, not foliaceous. **Capitulescence** racemiform; capitulum c. 5 × c. 2 mm; pedunculate, c. 2 mm long, ferruginous villous. **Outer involucral bracts** c. 5 × 1 mm, 5-nerved, coriaceous, oblong, apex acuminate, margin entire to ciliate, ferruginous villous with punctuation glandular trichomes; **inner involucral bracts** c. 5.2 × 1.2 mm, 3–5-nerved, coriaceous, oblong, apex acuminate, margin entire to ciliate, ferruginous villous with punctuation glandular trichomes. **Corolla** c. 5 mm long, with capitate glandular trichome, corolla tube and limb distinct, tube c. 1 mm long, limb c. 4 mm long, cylindrical, lobes c. 1 × 0.4 mm, narrow triangular, papillose, sparse pubescent. **Stamens** c. 4.5 mm long, not exceeding limb height, anther c. 1.3 mm long, base short-sagittate, anther connective appendage c. 0.3 × 0.2 mm, longer than wide, triangular, apex acute, anther collar cylindrical.

Style 7.5–8 mm long, cylindrical base, stylopodium c. 0.5 mm long, style branches 3–3.5 mm long, lanceolate. **Cypselae** 2.8–3 × 0.2–0.3 mm, 5-ribbed, cylindrical, densely with capitate glandular trichomes; carpodium annuliform; pappus 6.7–7 mm long, yellowish.

Distribution

Mikania psilostachya grows in Bolivia, Brazil, Colombia, Ecuador, Guyana, Panama, Peru, Suriname and Venezuela (Oliveira 2015). In Brazil, the species is registered in the North (Acre, Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins), Northeast (Bahia, Ceará, Maranhão, Pernambuco), Midwest (Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso) and Southeast (Minas Gerais, Rio de Janeiro, São Paulo), in the Amazon, Caatinga, Cerrado and Atlantic Forest (Ritter *et al.* 2020).

Habitat and phenology

In Ceará, the species has a single collection made by Francisco Freire Allemão, in the 19th century, during the first documented scientific collections for the state. The label of the herbaria specimen does not have additional information about when and where the species was collected. We do not recollect *Mikania psilostachya* during the fieldworks and because of this we have deficient data about this species.

Conservation data

Absent data.

Note

Mikania psilostachya is easily recognized among the other species, as it is the only one with racemiform capitulescence (*vs.* corymbiform, glomeriform, thyrsoid or paniculate to thyrsoid).

Mikania ternata (Vell.) B.L. Rob.

Fig. 3 A-B; Fig. 10

Proceedings of the American Academy of Arts and Sciences 47: 198 (B.L. Rob. 1911).

Material examined

BRASIL – **Ceará** • S.loc.; s.d.; *F.F. Allemão* 852; P, R • Guaramiranga, Serra de Baturité, Sítio Guaramiranga, 860 m; 19 Jun. 1989; *M.A. Figueiredo s.n.*; EAC[16723] • Maranguape, Serra de Maranguape; 13 Jul. 2007; *A.S.F. Castro* 411; EAC • Maranguape, Serra de Maranguape; 01 Dec. 2014; *M.I.B. Loiola* 2463; EAC • Pacoti, Serra de Baturité, Pico Alto; 27 Aug. 1989; *A. Fernandes et al. s.n.*; EAC[16029].

Description

Vine, branches fistulose, cylindrical, pilose, rare villous, glabrescent. **Leaves** petiolate 30–60 mm long, pilose, glabrescent; pseudo-stipule present, 1.5–2.5 mm long;

blades 20–70 × 10–40 mm, pinnatisect, 3-parted, membranaceous, discolor, elliptic, base attenuate, apex mucronate, margin entire, ciliate, plane, adaxial surface sparse sericeous, glabrescent, abaxial surface glabrescent, brochidodromous venation. **Leafy bracts** 10–20 × 5–10 mm, ovate, apex mucronate. **Subinvolucral bract** 6–6.2 × 1–2 mm, lanceolate, apex acuminate to cirrhose, margin ciliate, glabrescent, at the base of the peduncle, not foliaceous. **Capitulescence** thyrsoïd; capitulum 7–12 × 2–5 mm; pedunculate, 4–10 mm long, villous, glabrescent. **Outer involucral bracts** 8–10 × 2–3 mm, 3–4-nerved, chartaceous, lanceolate, narrow elliptic, apex acuminate to cirrhose, margin entire, glabrescent; **inner involucral bracts** 8.5–11 × 1.7–2 mm, 3–4-nerved, chartaceous, lanceolate, narrow elliptic, apex acuminate to cirrhose, margin entire, pubescent. **Corolla** 5.8–6 mm long, glabrous, corolla tube and limb distinct, tube 2–2.4 mm long, limb 3.6–3.8 mm long, infundibuliform, lobes 1.2–1.8 × 1–1.2 mm, triangular, papillose. **Stamens** 4–4.5 mm long, not exceeding limb height, anther 2.5–3 mm long, base short-sagittate, anther connective appendage c. 0.6 × 0.3 mm, longer than wide, triangular, apex acute, anther collar cylindrical. **Style** 9.8–10.5 mm long, cylindrical at base, stylopodium c. 0.5 mm long, style branches 4–5 mm long, cylindrical. **Cypselae** 4.5–5.1 × 1–1.2 mm, 5-ribbed, setuliferous, prismatic, sparse sericeous; carpodium annuliform; pappus 6–7 mm long, ferruginous to reddish.

Distribution

Mikania ternata occurs in South America (Bolivia, Brazil, Paraguay, Peru). In Brazil, it is registered for the states Bahia, Ceará, Espírito Santo, Minas Gerais, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo and Paraná, in the phytogeographic domains of the Cerrado, Atlantic Forest and Pampa (Ritter *et al.* 2020).

Habitat and phenology

In Ceará, the species occurs in Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 10), in areas of high altitude (Serra de Baturité, Serra Maranguape) with humid tropical climate. Flowering from June to August and December.

Conservation data

The species has a single record in a conservation unit in Ceará (Serra de Baturité Environmental Preservation Area - EPA).

Note

Mikania ternata has diagnostic characters are the leave pinnatisect, 3-parted, exclusive features among the representatives of *Mikania* in Ceará (*vs.* entire, lobed).

Mikania trinervis Hook. & Arn.

Fig. 3 A-B; Fig. 10

Companion to the Botanical Magazine 1: 244 (Hook. & Arn. 1835).

Material examined

BRASIL – Ceará • Maranguape, Topo da Serra de Maranguape; 28 Jun. 1981; *E. Nunes & P. Martins s.n.*; EAC[10558] • Maranguape, Trilha do Gavião, Próximo ao Pico da Pedra da Rajada, 900 m, 3°90'33"S, 38°71'88"W; 24 Apr. 2013; *J.L. Costa-Lima et al.* 926; ALCB, UFP.

Description

Vine, branches fistulose, cylindrical, sericeous, glabrescent. **Leaves** petiolate 8–25 mm long, sericeous; pseudo-stipule absent; blades 35–65 × 17–40 mm, entire, membranaceous, discolor, ovate, base cuneate to obtuse, apex acuminate, cuspidate, margin entire, revolute, adaxial surface glabrous, abaxial surface sparse sericeous, glabrescent, actinodromous venation (basal 5-nerved). **Leafy bracts** 25–30 × c. 12 mm, ovate, elliptic, apex acute, acuminate. **Subinvolucral bract** 2.5–2.8 × 1–1.1 mm, elliptic, apex acute, margin entire, glabrous, rare punctuation glandular trichomes, along the peduncle, not foliaceous. **Capitulescence** paniculate to thyrsoïd; capitulum 4–4.5 × 2–3 mm; pedunculate, 3–5 mm long, ferruginous dense villous. **Outer involucral bracts** c. 4.2 × 1.3 mm, inconspicuous nerved, subcarnose-coriaceous, oblong, apex cuneate, margin entire, glabrous, pubescent at the apex, rare punctuation glandular or not; **inner involucral bracts** c. 5 × 1.1 mm, inconspicuous nerved, subcarnose-coriaceous, oblong, apex cuneate, margin entire, glabrous, pubescent at the apex, rare punctuation glandular trichomes. **Corolla** 3.7–3.9 mm long, corolla tube and limb distinct, tube 1.8–2 mm long, sparse villous, limb 1.7–1.9 mm long, campanulate, glabrous, lobes 1.3–1.5 × c. 0.7 mm, triangular, papillose, pilose, glabrescent at the apex. **Stamens** 3.2–3.8 mm long, exceeding limb height, anther 1.8–2 mm long, base truncate, anther connective appendage c. 0.3 × 0.2 mm, longer than wide, triangular, apex acute, anther collar conical. **Style** 6–7 mm long, cylindrical base, stylopodium c. 0.6 mm long, style branches c. 3 mm long, lanceolate. **Cypselae** c. 3 × 0.9 mm, 5-ribbed, prismatic, sparse villous; carpodium decurrent; pappus 3.8–4 mm long, yellowish.

Distribution

Mikania trinervis is endemic to Brazil, occurring in the states of Bahia (Northeast), Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo (Southeast), Paraná, Rio Grande do Sul and Santa Catarina (South), in the phytogeographic domain of the Atlantic Forest (Oliveira 2015; Ritter *et al.* 2020).

Habitat and phenology

The species is a new record for Ceará, with record for the top of the Serra de

Maranguape, 900 m of altitude, in Dense Ombrophylous Forest (Fig. 3 A-B; Fig. 10). Flowering in April and June.

Conservation data

The species is not registered growing inside a conservation unit in the state.

Note

Mikania trinervis is characterized by leaves base cuneate to obtuse, pseudo-stipule absent, capitulescence paniculate to thyrsoid and subinvolucral bracts along the peduncle. In the herbaria specimens, they were identified as *M. biformis* DC., however, it can be distinguished by the leaf blade entire, base cuneate or obtuse and actinodromous venation (*vs.* leaf blade lobed, base hastate, sagittate and brochidodromous venation).

Mikania vitifolia DC.

Prodromus Systematis Naturalis Regni Vegetabilis 5: 202 (DC. 1836).

Material examined

BRASIL – Ceará • S.loc.; 1859; *F.F. Allemão & M. Cysneiros 854*; R.

Additional material examined

BRASIL – Rio Grande do Sul • Osório, Próximo a Lagoa das Traíras, 29°86'97"S, 50°18'52"W; 23 Apr. 2015; *F. Gozzanati et al. 1893*; ALCB.

Description

Vine, branches solid, cylindrical, pilose, glabrescent. **Leaves** petiolate 44–46 mm long, pilose, glabrescent; pseudo-stipule absent; blades 90–105 × 82–85 mm, entire, chartaceous, discolor, wide deltate, base cordate, apex cuspidate, margin slightly serrate, plane, glabrescent, with punctuation glandular trichomes on abaxial surface, actinodromous venation (basal 5-nerved). **Leafy bracts** 10–20 × c. 10 mm, triangular, apex cuspidate. **Subinvolucral bract** 2–2.2 × c. 1 mm, linear, apex acute, margin entire, glabrescent with punctuation glandular trichomes, at the base of the peduncle, not foliaceous. **Capitulescence** paniculiform, capitulum 4–5 × c. 2 mm; pedunculate, 2–3 mm long, glabrescent. **Outer involucral bracts** 4–5 × c. 1 mm, 3-nerved, chartaceous, linear to oblong, apex obtuse, margin entire, pubescent, glabrescent with punctuation glandular trichomes; **inner involucral bracts** c. 5 × 1 mm, 3-nerved, chartaceous, linear to oblong, apex obtuse, margin entire, pubescent, glabrescent with punctuation glandular trichomes. **Corolla** 4.7–5.5 mm long, corolla tube and limb distinct, tube 2.5–3 mm long, with capitate glandular trichomes, limb 2.2–2.5 mm long, campanulate, glabrous, lobes 1–1.5 × c. 1 mm, triangular, papillose, with capitate glandular trichomes. **Stamens** c. 2.5 mm long, not exceeding limb height, anther c. 1.3 mm long, base obtuse, anther connective appendage c. 0.3 × 0.3 mm, as long as wide,

triangular, apex obtuse, anther collar conical. **Style** 6.5–7 mm long, cylindrical base, stylopodium c. 0.4 mm long, style branches 3–3.5 mm long, cylindrical. **Cypselae** 3.5–4.5 × c. 0.5 mm, 5-ribbed, setuliferous, cylindrical, sparse pilose with capitate glandular trichomes; carpodium inconspicuous; pappus 4–4.5 mm long, yellowish.

Distribution

Mikania vitifolia occurs in Mexico and extends throughout South America (Oliveira 2015). In Brazil, the species is registered in the North (Amazonas), Midwest (Goiás, Mato Grosso do Sul), Southeast (Espírito Santo, Rio de Janeiro, São Paulo) and South (Paraná, Rio Grande do Sul, Santa Catarina), and with disjunct distribution in the state of Ceará (Northeast), in the phytogeographic domains Amazon, Cerrado and Atlantic Forest (Ritter *et al.* 2020).

Habitat and phenology

In Ceará, *Mikania vitifolia* is reported by a single record from the 19th century, data on its distribution are not present on the label of the specimen. Also we do not found this species during the fieldwork, being impossible to cite its phenology.

Conservation data

Absent data.

Note

Mikania vitifolia is recognized by the extensive leaf blade size 90–105 × 82–85 mm, wide deltate, in length and width, when compared among *Mikania* representatives registered in Ceará.

Piqueriella brasiliensis R.M. King & H. Rob.

Fig. 3 A-D; Fig. 5 A-C; Fig. 11.

Phytologia 29: 264 (R.M. King & H. Rob. 1974).

Material examined

BRASIL – Ceará • Baturité, Serra de Baturité, Pico Alto; 21 Apr. 1990; A. Fernandes *et al.* *s.n.*; EAC[16342], IPA[85409] • Guaramiranga, Serra de Baturité, Pico Alto, 1.010 m, 4°20'77"S, 38°97'19"W; 11 May. 2019; N.C. Rebouças *et al.* 100; EAC • Meruoca, Serra da Meruoca, Sítio dos Fernandes; 27 May. 2003; A. Fernandes *s.n.*; EAC[32539] • Meruoca, Serra da Meuoca, Sítio Santo Inácio; 11 May. 2015; F.D.S. Santos 286; ALCB, HUVA • Monsenhor Tabosa, Serra Branca, Pico Alto do Ceará; 1.154 m, 4°78'19"S, 40°13'19"W; 20 Apr. 2019; N.C. Rebouças *et al.* 73; EAC • Pacoti, Serra de Baturité, Pico Alto; 27 Aug. 1989; A. Fernandes *et al.* *s.n.*; EAC[16025] • Pacoti, Pico Alto, 09 Sep. 2005; E. Silveira *s.n.*; EAC[39428] • Serra de Baturité, Pico Alto; 17 Aug. 1908; A. Ducke *s.n.*; holotype:

US[2583859].

Description

Herb to subshrub, erect, 35–80 cm tall, branches solid, cylindrical, striate, with stipitate-glandular trichomes. **Leaves** opposite, petiolate 6–15 mm long, stipitate-glandular trichomes; blades 20–55 × 10–25 mm, entire, membranaceous, discolor, ovate, base cuneate, rare asymmetric, apex acute, margin serrate, slightly revolute, adaxial surface glabrescent, abaxial surface villous, glabrescent, with punctuation glandular, actinodromous venation (basal 3-nerved). **Leafy bracts** 5–20 × 2–10 mm, lanceolate, ovate, apex acute. **Bracteole** 1.3–2 × c. 1 mm, linear, lanceolate, apex acute, margin entire, glabrous, with punctuation glandular trichomes. **Capitulescence** paniculiform; capitulum 1–3 × 1–2 mm, involucre eximbricate, 2-seriate, campanulate, receptacle conical, epaleaceous; pedunculate, 2–7 mm long, with stipitate-glandular trichomes. **Involucral bracts** 7–12, persistent, **outer involucral bracts** 1.8–2.2 × 1–1.5 mm, 3-nerved, membranaceous, obovate, spatulate, apex truncate, margin denticulate, ciliate at the apex, glabrous, sparse punctuation glandular trichomes; **inner involucral bracts** 2–2.1 × 0.5–0.8 mm, 3-nerved, membranaceous, obovate, spatulate, apex acute, truncate, margin denticulate, ciliate at the apex, glabrous, sparse punctuation glandular trichomes. **Flowers** 8–11, **corolla** 1.4–1.8 mm long, corolla tube and limb distinct, tube 0.4–0.5 mm long, with capitate glandular trichomes, limb 0.9–1.3 mm long, campanulate, glabrous, lobes 0.4–0.5 × c. 0.3 mm, ovate, papillose. **Stamens** 0.9–1.1 mm long, inserted at the base of the limb, not exceeding limb height, anther 0.5–0.8 mm long, base short-sagittate, anther connective appendage c. 0.1 × 0.3 mm, wider than long, transversely oblong, apex truncate, anther collar short-cylindrical. **Style** 1.8–2.2 mm long, base cylindrical, glabrous, stylopodium c. 0.2 mm long, glabrous, style branches 1.1–1.3 mm long, clavate. **Cypselae** 1.6–2 × 0.4–0.8 mm, 5-ribbed, prismatic, glabrous; carpodium asymmetric, lateral; pappus absent.

Distribution

Piqueriella brasiliensis is endemic to Brazil and restricted to the state of Ceará, Northeastern region of the country, in Caatinga vegetation (King & Robinson 1987; Viera Barreto & Grossi 2020).

Habitat and phenology

In Ceará, the species occurs, mainly, restricted to mountain tops, Brejos de Altitude (Serra de Baturité and Serra da Meruoca), humid areas of the state. It was recorded at the highest peak in the state, Pico da Serra Branca, at 1,154 m above sea level, and at the base of the mountain in a slab area, drier environment, in vegetation types Dense Ombrophylous

Forest and Semideciduous Seasonal Forest (Fig. 3 A-D; Fig. 5 A-C; Fig. 11). In both environments, the taxon presents a rupicolous habit. Flowering in April and May.

Conservation data

The species was collected only at the Conservation Unit, Environmental Preservation Area of Serra de Baturité - EPA.

Note

Piqueriella brasiliensis is a species from a monospecific genus and can be characterized by involucre bracts with margin denticulate, receptacle conical, paleaceous, flowers 8–11, pappus absent and carpodium lateral.

Praxelis Cass.

Fig. 3 A-D, H.

Dictionnaire des Sciences Naturelles, ed. 2 43: 261 (Cass. 1826).

Description

Herb to subshrub, erect, branches fistulose or not, cylindrical, striate, villous. **Leaves** opposite, petiolate, villous; blades entire, membranaceous, discolor, elliptic, ovate, ovate-lanceolate, base obtuse, rare cuneate, apex acute, margin serrate, ciliate, plane, pubescent, villous, glabrescent, sparse punctuation glandular trichomes, actinodromous venation. **Leafy bracts** ovate, lanceolate, apex acute. **Bracteole** lanceolate, rare ovate, apex acute, margin entire, villous. **Capitulescence** cyme, corymbiform, or solitary; involucre imbricate, 3–4-seriate, campanulate, receptacle conical, epaleaceous; pedunculate, villous. **Involucre bracts** 18–21, dehiscent in capitulum mature, **outer involucre bracts** 3–5-nerved, chartaceous, ovate, elliptic, apex mucronate, margin entire or/to erose, glabrous to rare villous at the apex; **inner involucre bracts** 3–5-nerved, chartaceous, oblong, oblanceolate, linear, apex acute, mucronate, margin entire or/to erose, glabrous. **Flowers** 25–36, **corolla** tube and limb indistinct or not, cylindrical, glabrous, lobes ovate, papillose, with capitate glandular trichomes. **Stamens** inserted near the middle of the corolla, not exceeding limb height, anther base short-sagittate, anther connective appendage longer than wide, oblong, ovate-elliptic, apex truncate, subrounded to rounded, anther collar cylindrical. **Style** cylindrical at base, glabrous, stylopodium present, glabrous, style branches clavate. **Cypselae** 4-ribbed, setuliferous, prismatic, glabrescent; carpodium inconspicuous; pappus bristly barbellate, uniseriate, subequal, white-yellowish.

Distribution

Praxelis comprises 17 species distributed mainly in Brazil (16 spp.), with some

species occurring in Paraguay, Northern Argentina and eastern Bolivia (Hind & Robinson 2007; Abreu 2015). In Brazil, the genus occurs in all states except for Amapá and Rondônia and in all phytogeographic domains, with a predominance of the Cerrado in a rupestrian field area (Abreu 2020).

Habitat

In Ceará, the genus is mainly related to anthropized environments, but with occurrence for country depression, in dry environments, in vegetation associated with the domain of the Caatinga (Dense Ombrophylous Forest, Semideciduous Seasonal Forest, Vegetation Complex of the Coastal Zone) (Fig. 3 A-D, H).

Note

Praxelis is recognized by the totally deciduous involucre bracts in mature capitulum, involucre 3–4-seriate and receptacle conical.

Praxelis clematidea R.M. King & H. Rob.

Fig. 3 H; Fig. 5 D-E; Fig. 11.

Phytologia 20(3): 194 (R.M. King & H. Rob. 1970).

Material examined

BRASIL – Ceará • Caucaia, Parque Botânico do Ceará, 9 m, 3°71'11"S, 38°64'56"W; 10 Aug. 2018; V.S. Sampaio *et al.* 652; EAC • Crato, Floresta Nacional do Araripe-Apodi – FLONA; 28 Mar. 2000; L.W. Lima-Verde *et al.* 2016; EAC • Crato, Floresta Nacional do Araripe-Apodi – FLONA, 900 m; 03 Apr. 2001; I.R. Costa 221; UEC • Fortaleza, Campus do Pici – UFC, Laboratório de Sementes; 02 Feb. 1994; L.C.M. Frota *s.n.*; EAC[21834] • Fortaleza, Campus do Pici – UFC; 17 May. 2002; E. Silveira *s.n.*; EAC[31615] • Fortaleza, Campus do Pici – UFC; 17 Jun. 2002; E. Silveira *s.n.*; EAC[31711] • Fortaleza, Campus do Pici – UFC; 07 May. 2003; O.D.L.P. Cavalcante *s.n.*; EAC[32430] • Fortaleza, Campus do Pici – UFC; 08 Sep. 2005; A.V. Vieira *s.n.*; EAC[37723] • Fortaleza, Campus do Pici – UFC; 11 Dec. 2013; G.S. Pinto 154; EAC[37723] • Fortaleza, Campus do Pici – UFC, na rotatória próximo ao bloco 906 da Biologia; 3°74'36"S, 38°57'36"W; 15 Dec. 2020; N.C. Rebouças 106; EAC • Fortaleza, Campus do Pici – UFC, próximo ao Núcleo Regional de Ofiologia do Ceará – NUROF; 03 Jun. 2009; A.S.F. Castro 2165; EAC, HCDAL.

Description

Herb to subshrub, 19–60 cm tall, branches fistulose or not, villous. **Leaves** petiolate 3–40 mm long, villous; blades 18–100 × 10–85 mm, entire, ovate, ovate-lanceolate, base obtuse, apex acute, margin serrate, ciliate, plane, adaxial surface villous, abaxial surface villous, villous, with punctuation glandular, actinodromous venation (basal 3-nerved). **Leafy**

bracts 17–45 × 8–25 mm, ovate, lanceolate, apex acute, abaxial surface villous, with sparse punctuation glandular trichomes. **Bracteole** 3–6 × 2–3 mm, lanceolate, rare ovate, apex acute, margin entire, villous. **Capitulescence** corymbiform; capitulum 6–9 × 3–6 mm, involucre 3–4-seriate; pedunculate, 2–10 mm long, villous. **Involucral bracts** 18–21. **Outer involucral bracts** 1.5–3.1 × 1–1.2 mm, 3–5-nerved, ovate, elliptic, apex mucronate, margin entire to erose at the apex, glabrous to rare villous at the apex; **inner involucral bracts** 5–7 × 0.8–1.5 mm, 3–5-nerved, oblong, oblanceolate, linear, apex acute, mucronate, margin entire to erose at the apex, glabrous. **Flowers** 25–34, **corolla** 4–5.2 mm long, corolla tube and limb indistinct, lobes 0.5–1 × 0.6–1 mm. **Stamens** 2.3–2.7 mm long, anther 1.3–2.7 mm long, anther connective appendage 0.3–0.5 × c. 0.2 mm, oblong, apex truncate. **Style** 6.2–6.5 mm long, stylopodium c. 0.5 mm long, style branches 3.2–4 mm long. **Cypselae** 2.2–2.7 × 0.6–1 mm, 4-ribbed, setuliferous, prismatic, glabrescent; carpodium inconspicuous; pappus 3.8–4.7 mm long, white-yellowish.

Distribution

Praxelis clematidea occurs in Argentina, Bolivia, Brazil and Paraguay (King & Robinson 1987). In Brazil, the species is widely distributed with the exception of the states of Amapá, Amazonas, Pará and Rondônia, occurring in all phytogeographic domains and anthropized environments (Abreu 2020).

Habitat and phenology

In Ceará, *Praxelis clematidea* occurs commonly in anthropized areas, as well as in elevated areas in Chapada do Araripe, in the vegetation types Vegetation Complex of the Coastal Zone (Fig. 3 H; Fig. 5 D-E; Fig. 11). Flowering throughout the year.

Conservation data

The species has a wide distribution in anthropized environments and is restricted to forested areas. There is a single record in Araripe-Apodi National Forest - FLONA, Ceará Conservation Unit.

Note

Praxelis clematidea resembles to *P. diffusa* as to habit herbaceous, branches villous, leaves blade ovate, but it is distinguished by capitulescence corymbiform and style 6.2–6.5 mm long (vs. cyme or solitary, 4–4.5 mm long).

Praxelis diffusa (Rich.) Pruski

Fig. 3 A-C, E, H; Fig. 5 F; Fig. 11.

Brittonia 50(4): 475, f. 2 (Pruski 1998).

Material examined

BRASIL – Ceará • S.loc.; 1840; *G. Gardner 1722*; US, NY • Crato, Rio dos Coqueiros; 05 Aug. 1934; *P. Luetzelburg 26340*; IPA • Crato, Rio dos Coqueiros; 25 Mar. 1936; *P. Luetzelburg 26240*; IPA • Graça, Sítio Santa Clara, 3°96'83"S, 40°81'25"W; 14 May. 2017; *F.F. Araújo 198*; ALCB, HUVA • Granja, Santa Terezinha, localidade São Miguel, 98 m, 3°35'86"S, 41°02'13"W; 03 Jun 2016; *E.B. Souza et al. 4103*; ALCB, HUVA • Granja, Santa Terezinha, localidade São Miguel, 98 m, 3°35'86"S, 41°02'13"W; 21 Jun 2018; *E.B. Souza et al. 5346*; ALCB, HUVA • Granja, Itacolomy; 15 Apr. 2001; *A.S.F. Castro 959*; EAC • Jaguaribe, Campo Grande; 12 May. 1934; *J.R. Swallen 4567*; US • São Gonçalo do Amarante, Jardim Botânico de São Gonçalo do Amarante, Parque Botânico do Ceará, 22 m, 3°57'45"S, 38°88'69"W; 20 Apr. 2018; *E.M.P. Lucena et al. 34*; EAC.

Description

Herb, 10–43 cm tall, branches solid, villous. **Leaves** petiolate 3–10 mm long, villous; blades 7–40 × 9–20 mm, entire, ovate, elliptic, base obtuse, rare cuneate, apex acute, margin serrate, ciliate, plane, adaxial surface villous, abaxial surface villous, with sparse punctuation glandular trichomes, actinodromous venation (basal 3-nerved). **Leafy bracts** 10–31 × 5–15 mm, ovate, apex acute. **Bracteole** 3.5–5 × c. 1 mm, lanceolate, apex acute, margin entire, villous. **Capitulescence** cyme or solitary; capitulum 4–7 × 3–5 mm, involucre 3–4-seriate; pedunculate, 9–30 mm long, villous. **Involucral bracts** c. 21, **outer involucral bracts** 2.5–3 × c. 1.4 mm, 3–4-nerved, ovate, apex mucronate, margin entire, glabrous; **inner involucral bracts** 4.5–6 × c. 1.2 mm, 3–5-nerved, oblong, oblanceolate, linear, apex acute, acute, mucronate, margin entire, glabrous. **Flowers** c. 36, **corolla** 3.7–4 mm long, corolla tube and limb indistinct, lobes c. 0.6 × 0.5 mm. **Stamens** c. 2.3 mm long, anther c. 1.3 mm long, anther connective appendage c. 0.3 × 0.2 mm, ovate-elliptic, apex subrounded. **Style** 4–4.5 mm long, stylopodium c. 0.3 mm long, style branches c. 1.8 mm long. **Cypselae** c. 2.1 × 0.7 mm, 4-ribbed, setuliferous, prismatic, glabrescent; carpodium inconspicuous; pappus c. 4 mm long, white-yellowish.

Distribution

Praxelis diffusa occurs in Brazil, Colombia, Guyana, Peru and Venezuela (King & Robinson 1987). In Brazil, it is distributed in the states of Amazonas, Bahia, Federal District, Goiás, Maranhão, Mato Grosso do Sul, Minas Gerais, Pará, Paraná, Paraíba, Rio Grande do Sul, Rio de Janeiro, Santa Catarina and São Paulo, in anthropized environments and in the phytogeographic domain of the Cerrado (Abreu 2020).

Habitat and phenology

In Ceará, the species is distributed in Dense Ombrophylous Forest, Semideciduous Seasonal Forest, Vegetation Complex of the Coastal Zone and Vegetation under Fluvial and/or Lacustrine Influence (Fig. 3 A-C, E, H; Fig. 5 F; Fig. 11), associated with the Caatinga domain and mountainous areas, in Chapada do Araripe, in addition to registration for anthropized areas. Registered with flowering from April to June and August.

Conservation data

The species was collected in only one Conservation Unit in Ceará (Araripe-Apodi National Forest - FLONA).

Note

Praxelis diffusa characterized by capitulescence cyme or solitary capitulum and style 4–4.5 mm long. The species can be easily confused with *P. clematidea*. The characters that separate them are shown in the comments of the latter species.

Sphaereupatorium scandens (Gardner) R.M. King & H. Rob.

Fig. 3 A-C; Fig. 12.

Phytologia 53: 392 (R.M. King & H. Rob. 1983).

Material examined

BRASIL – Ceará • S.loc.; s.d.; *F.F. Allemão* 893; R • Aratuba, Sítio Jacarandá, 15 May. 1980; *E. Nunes & P. Martins s.n.*; EAC[8630] • Guaramiranga; 15 Jul. 1908; *A.H.G. Ducke* 1267; INPA, UB • Guaramiranga, na subida para o Pico Alto, 800 m, 4°20'77"S, 38°97'19"W; 11 May. 2019; *N.C. Rebouças et al.* 101; EAC • Guaramiranga, Serra de Baturité, margem da estrada; 12 Feb. 1981; *A. Fernandes & F.J.A. Matos s.n.*; EAC[9644] • Guaramiranga, Serra de Baturité; 20 Mar. 2009; *E. Silveira & O.D.L. Pessoa s.n.*; EAC[45016] • Maranguape, Serra de Maranguape, 600 m, 3°53'27"S, 38°41'07"W; 08 Aug. 2020; *N.C. Rebouças et al.* 107; EAC • Mulungu, depois de Aratuba; 19 Dec. 1978; *A. Fernandes s.n.*; EAC[4137] • Pacoti, Serra de Baturité, Serra de Baturité; 05 Apr. 2007; *E. Silveira s.n.*; EAC[39842] • Pacoti, Serra de Baturité, 4°21'36"S, 38°97'91"W; 12 Aug. 2011; *F.S. Gomes et al.* 977; ALCB • Pacoti, Santana, 681 m, 4°23'53"S, 38°88'55"W; 25 Jun. 2016; *J.C.M.S.M. Sobczak* 237; EAC.

Description

Subshrub to shrub scandent, 100–120 cm tall, branches solid, cylindrical, striate, villous, glabrescent. **Leaves** opposite, petiolate 6–42 mm long, villous; blades 34–70 × 18–73 mm, entire, membranaceous, discolor, ovate, base cordiform, truncate, apex acute, acuminate, rare cuspidate, margin serrate to dentate, ciliate, plane, villous, with punctuation glandular, actinodromous venation (basal 3–5-nerved). **Leafy bracts** 27–40 × 15–30 mm,

ovate, apex acuminate, cuspidate. **Bracteole** 1.6–6 × 0.6–1 mm, ovate, lanceolate, apex acute, margin ciliate, villous, with punctuation glandular trichomes. **Capitulescence** glomeriform; capitulum 4–7 × 2–3 mm, involucre eximbricate, 2-seriate, campanulate, receptacle convex, epaleaceous; sessile. **Involucral bracts** 11–18, persistent, **outer involucral bracts** 3.4–4.8 × 1–1.2 mm, 3–4-nerved, membranaceous, ovate, narrow elliptic, apex acuminate, margin ciliate, villous, with punctuation glandular trichomes; **inner involucral bracts** 4–5 × 0.4–0.6 mm, 2–3-nerved, membranaceous, linear, oblong, apex acuminate, margin ciliate, villous, with punctuation glandular trichomes. **Flowers** 18–39, **corolla** 2.7–3 mm long, corolla tube and limb indistinct, limb cylindrical, glabrous, lobes 0.5–0.6 × 0.2–0.3 mm, triangular, papillose, with capitate glandular trichomes. **Stamens** 1.8–2.1 mm long, inserted near the middle of the corolla, not exceeding limb height, anther 1.1–1.2 mm long, base short-sagittate, anther connective appendage 0.3–0.4 × 0.2–0.3 mm, longer than wide or as long as wide, ovate, apex subrounded or acute, anther collar short-cylindrical. **Style** 4.8–5.7 mm long, base cylindrical, glabrous, stylopodium c. 0.4 mm long, glabrous, style branches 2.8–3 mm long, cylindrical. **Cypselae** 1.5–2.7 × 0.3–0.7 mm, 5-ribbed, setuliferous, prismatic; carpodium annuliform; pappus 2.5–3 mm long, bristly barbellate, uniseriate, subequal, whitish.

Distribution

Sphaereupatorium scandens occurs in Brazil and Bolivia (King & Robinson 1987; Jørgensen *et al.* 2014). In Brazil, the species has distribution to the states of Bahia, Federal District, Goiás, Mato Grosso and Minas Gerais, in the phytogeographic domains Cerrado and Atlantic Forest (Plos 2020).

Habitat and phenology

In Ceará, *Sphaereupatorium scandens* was recently reported as a new occurrence in the state (Loiola *et al.* 2020). The species was collected in a humid region, with an altitude above 800 m, in the Serra de Baturité, in vegetation of Dense Ombrophilous Forest and Semideciduous Seasonal Forest (Fig. 3 A-C; Fig. 12). Its flowering February to August and in December.

Conservation data

The species is registered only in the Environmental Preservation Area of Serra de Baturité - EPA, among the conservation units of Ceará.

Note

Sphaereupatorium scandens is the only of its genus in the country and is distinguished by its subshrub to shrub habit with braches scandant, glomeriform

capitulescence, resembling a sphere, and sessile capitulum. Can be easily confused with *Koanophyllon conglobatum* (DC.) R.M.King & H.Rob., as seen in the collections collected in Ceará. The species share many characters in common, such as the scandent habit and leave blade ovate with truncate or cordiform base. However, some characteristics auxiliary in the separation of these species, *S. scandens* has glomeriform capitulescence, capitulum sessile and anther connective appendage longer than wide or as long as wide (*vs.* corymbiform, pedunculate, short than wide).

Trichogonia (DC.) Gardner

Fig. 3 A-C, E-F, H.

London Journal of Botany 5: 459 (Gardner 1846).

Description

Herb to subshrub, erect, branches solid, cylindrical, striate, pubescent, puberulous, tomentose, punctuation glandular or stipitate-glandular trichomes. **Leaves** opposite or alternate-spirally, petiolate, pubescent, puberulous, punctuation glandular or stipitate-glandular trichomes; blades entire, membranaceous, chartaceous, concolor or discolor, ovate, ovate-triangular, ovate-lanceolate, lanceolate, base truncate, cuneate, apex acute, margin serrate, crenate-serrate, adaxial surface pubescent, puberulous, glabrescent, abaxial surface pubescent, puberulous, tomentose, punctuation glandular, punctuation glandular or not, inconspicuous or actinodromous venation. **Leafy bracts** lanceolate, ovate-lanceolate, apex acute. **Bracteole** 3.5–4 × c. 1 mm, linear, apex acute, margin entire, ciliate, strigose. **Capitulescence** corymbiform; involucre eximbricate, 2-seriate, campanulate, receptacle flat or convex, epaleaceous; pedunculate, capitate glandular or stipitate-glandular. **Involucral bracts** 13–21, **outer involucral bracts** 3–5-nerved, membranaceous, elliptic, narrow elliptic, oblong, oblanceolate, apex acute, margin ciliate, stipitate and punctuation glandular trichomes; **inner involucral bracts** 3-nerved, membranaceous, spatulate, linear, apex acute, margin ciliate, stipitate and punctuation glandular trichomes. **Flowers** 26–50, **corolla** tube and limb distinct, tube size larger than limb, tube stipitate-glandular or glabrous, limb infundibuliform, pubescent or stipitate-glandular, lobes triangular, deltate, dense pubescent. **Stamens** inserted near the apex of the tube, not exceeding limb height, anther base short-sagittate, anther connective appendage larger than wide, triangular, ovate, apex acute, obtuse, retuse, anther collar cylindrical. **Style** cylindrical, glabrous, stylopodium absent, style branches clavate. **Cypselae** 5-ribbed, setuliferous or not, prismatic, cylindrical, or stipitate, glabrous or stipitate and capitate glandular trichomes; carpodium annuliform or rare decurrent; pappus absent and/or present, plumose, uniseriate, subequal, white.

Distribution

Trichogonia has 20 species described and distributed in South America (Brazil, Bolivia, Colombia, Paraguay and Venezuela) (Roque *et al.* 2012). Brazil is the centre of diversity of the genus, with 17 species, 14 of which are endemic. In Brazil, the species is founded in the North (Tocantins), Northeast (Bahia, Ceará, Pernambuco, Piauí), Midwest (Federal District, Goiás, Mato Grosso do Sul, Mato Grosso), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) and the South (Paraná, Rio Grande do Sul), in the Caatinga, Cerrado and Atlantic Forest (Roque 2020a).

Habitat

In Ceará, the species are distributed in regions of low altitude (20–100 m), in the dry environments, in vegetations associated with the Caatinga domain, in Arboreous Stepic Savanna, up to higher regions (600–1000 m) of the state, in Brejos de Altitude, Chapada do Apodi, Ibiapaba Plateau, Serra de Baturité, Serra de Maranguape and Serra da Meruoca, humid areas, in vegetation of Dense Ombrophylous Forest Arboreous Stepic Savanna, Semideciduous Seasonal Forest, Stepic Savanna and Vegetation Complex of the Coastal Zone (Fig. 3 A-C, E-F, H).

Note

Trichogonia differs from other taxa by pubescent dense corolla lobes and plumose pappus.

Trichogonia eupatorioides (Gardner) R.M. King & H. Rob.

Fig. 3 C, E-F; Fig. 12.

Phytologia 45: 106 (R.M. King & H. Rob. 1980).

Material examined

BRASIL – **Ceará** • S.loc.; s.d.; *Dias da Rocha 21*; SP • Meruoca, Serra da Meruoca, Fazenda Santo Antônio; 15 Sep. 1989; *A. Fernandes et al. s.n.*; EAC[16060] • Meruoca, Serra da Meruoca, Sítio Lages; 15 Jul 1957; *A. Fernandes s.n.*; EAC[1637] • Quixeré, Chapada do Apodi, Fazenda Mato Alto, 105 m, 5°20'97"S, 37°78'41"W; 17 Sep. 1996; *E.L. Paula-Zárete et al. 308*; EAC • Quixeré, Chapada do Apodi, Fazenda Mato Alto; 13 Jul. 1997; *L.M.R. Ramos & M.O. Gomes 61*; EAC • Sobral, Taperoaba, Fazenda Macapá; 15 Aug. 1986; *A. Fernandes s.n.*; EAC[14666] • Sobral, EMBRAPA Caprinos, 3°42'00"S, 40°21'00"W; 03 Jul. 2002; *M. Mamede 103*; EAC.

Description

Herb to subshrub, 30–65 cm tall, puberulous with stipitate-glandular trichomes. **Leaves** alternate-spirally, petiolate 3–15 mm long, puberulous with stipitate-glandular

trichomes; blades 10–53 × 5–35 mm, entire, discolor, ovate, ovate-lanceolate, lanceolate, base cuneate, apex acute, margin serrate, strigose, glabrescent, with punctuation glandular trichomes on abaxial surface, actinodromous venation (basal 3-nerved). **Leafy bracts** 6–12 × 1–4 mm, lanceolate, ovate-lanceolate, apex acute. **Bracteole** 3.5–4 × c. 1 mm, linear. Capitulum 4–6 × 4–5 mm, receptacle flat; pedunculate, 4–7 mm long. **Involucral bracts** 18–21, **outer involucral bracts** 4–4.3 × 0.5–1 mm, 3-nerved, oblong, oblanceolate, apex cuneate, margin ciliate, stipitate and punctuation glandular trichomes; **inner involucral bracts** 4.2–4.5 × c. 1 mm, 3-nerved, spatulate, apex acute, margin ciliate, stipitate and punctuation glandular trichomes. **Flowers** 41–50, **corolla** 3–3.2 mm long, tube 1.5–2 mm long, limb 1–1.2 mm long, lobes 0.2–0.3 × c. 0.3 mm, triangular. **Stamens** 2.2–2.4 mm long, anther 1.2–1.3 mm long, anther connective appendage 0.3–0.4 × c. 0.2 mm, triangular, apex acute. **Style** 6–6.5 mm long, style branches 2.5–3.5 mm long. **Cypselae** 1.8–2 × 0.3–0.6 mm, setuliferous or not, prismatic, short-stipitate, glabrous, not or stipitate-glandular on the outer flowers; carpodium annuliform, rare decurrent; pappus 2.2–2.8 mm long, defective, absent on the outer cypselae, white.

Distribution

The species is endemic to Brazil, occurring in the states of Bahia, Ceará, Goiás and Minas Gerais, in the phytogeographic domains of the Caatinga and Cerrado (Roque *et al.* 2012; Roque 2020a).

Habitat and phenology

In Ceará, *Trichogonia eupatorioides* occurs in vegetation types Arboreous Stepic Savanna, Semideciduous Seasonal Forest and Stepic Savanna (Fig. 3 C, E-F; Fig. 12), having distribution in low areas and high regions of the state, in Chapada do Apodi and Serra da Meruoca, between 70–700 m of altitude. Flowering from July to September.

Conservation data

In Ceará, it has a restricted distribution and is not registered growing inside in conservation units in Ceará.

Note

Trichogonia eupatorioides is recognized for receptacle flat, flowers 41–50 and pappus defective (absent at least in the marginal cypselae). Despite being similar to *T. salviifolia* by the subshrub to shrub habit and branches puberulous with stipitate-glandular trichomes, differing from this by the characters mentioned above (*vs.* receptacle convex, flowers 26–34 flores and pappus regular).

Trichogonia salviifolia Gardner

Fig. 3 A-C, E, H; Fig. 12.

London Journal of Botany 5: 460 (Gardner 1846).**Material examined**

BRASIL – Ceará • S.loc.; s.d.; *F.F. Allemão s.n.*; R[38172] • S.loc.; Feb. 1839; *G. Gardner 2419*; lectotype: HUEFS • Acarape, Garapa; 17 Feb. 2002; *E. Silveira s.n.*; EAC[31712] • Alcantara, Serra da Meruoca, 740 m, 3°56'66"S, 40°51'66"W; 04 Apr. 2001; *E.B. Souza 560*; HUEFS • Alcantara, Sítio Bom Jesus, 740 m, 3°56'66"S, 40°51'66"W; 28 Mar. 2001; *E.B. Souza 557*; HUEFS • Baturité, Serra de Baturité, Via Flávio Caracas, 4°15'24"S, 38°54'28"W; 14 Aug. 2011; *A.C. Mota 432*; HUEFS • Caucaia, Barra do Cauípe; 15 Feb. 2004; *E. Silveira & O.D.L. Pessoa s.n.*; EAC[33497] • Caucaia, Sargento Mor; 02 Apr. 2006; *A.S.F. Castro 1720*; EAC • Caucaia, Sargento Mor; 08 Mar. 2009; *A.S.F. Castro 2156*; EAC • Crateús, Reserva Particular do Patrimônio Natural Serra das Almas – RPPN, 5°14'16"S, 40°91'88"W; 18 Mar. 2014; *D. Teixeira 15*; EAC • Crateús, Reserva Particular do Patrimônio Natural Serra das Almas – RPPN, 5°14'63"S, 40°91'75"W; 08 Apr. 2014; *D. Teixeira 48*; EAC • Fortaleza, Cidade dos Funcionários; 02 Mar. 1994; *I.M.B. Sá 154*; EAC • Fortaleza, região Monguba; 1935; *B.E. Dahlgren 815*; US • Fortaleza, próxima à Avenida Perimetral; 23 Mar. 1966; *F.J.A. Matos & M.M. Barros s.n.*; EAC[5423] • Guaramiranga; 12 Feb. 2001; *A. Fernandes & F.J.A. Matos s.n.*; EAC[9662] • Guaramiranga, Pico Alto, 1010 m, 4°20'77"S, 38°97'19"W; 11 May. 2019; *N.C. Rebouças et al. 102*; EAC • Guaramiranga, Sítio Lagoa, 4°20'60"S, 38°97'00"W; 13 Mar. 2003; *A. Silveira & R. Oliveira 969*; EAC • Guaramiranga, Sotavento, Sítio Salva-Vidas, 690 m, 4°25'44"S, 38°99'20"W; 30 May. 2009; *L.W. Lima-Verde et al. 3625*; EAC • Guaramiranga, Pico Alto, 1078 m, 4°20'88"S, 38°96'88"W; 28 Mar. 2015; *M.I.B. Loiola et al. 2557*; EAC • Ipu, Várzea do Giló, Planalto da Ibiapaba, parte superior da Bica do Ipu, 4°31'66"S, 40°72'86"W; 19 Mar. 2017; *J.B.S. Nascimento & A.L.S. Sales 15*; ALCB, HUVA • Maranguape, base da Serra de Maranguape; 24 Nov. 1955; *Andrade-Lima 2415*; IPA • Meruoca, Serra da Meruoca, Sítio São Gonçalo, 700 m, 3°62'83"S, 40°46'16"W; 08 Nov. 2018; *E.B. Souza et al. 4869*; ALCB, HUVA • Meruoca, Serra da Meruoca, Sítio Inácio; 10 Feb. 2013; *J.E.M. Nascimento 19*; ALCB • Novo Oriente, Planalto da Ibiapaba, Estrondo; 15 Feb. 1991; *F.S. Araújo 283*; EAC, IPA, PEUFR • Novo Oriente, Planalto da Ibiapaba; 28 Mar. 2003; *F.S. Araújo 39*; EAC, HUEFS • Pacoti, Sítio Munguba; 19 Oct. 1979; *E. Nunes & A.J. Castro s.n.*; EAC[7169] • Pacajus, Sítio Pacoti; 18 Jan. 1998; *E.B. Souza 169*; EAC.

Description

Herb to subshrub, 40–100 cm tall, puberulous, stipitate-glandular. **Leaves**

opposite, alternate, spirally, petiolate 7–20 mm long, puberulous, stipitate-glandular trichomes; blades 15–82 × 8–38 mm, entire, concolor, ovate a triangular, base truncate, apex acute, margin crenate-serrate, adaxial surface glabrescent, punctuation glandular, abaxial surface puberulous, punctuation glandular, inconspicuous or actinodromous venation (basal 3-nerved). **Leafy bracts** 10–35 × 4–14 mm, lanceolate, apex acute. **Bracteole** 4–5 × c. 1 mm, linear to linear-lanceolate. Capitulum 5–8 × 4–5 mm, receptacle convex; pedunculate, 4–10 mm long. **Involucral bracts** 13–17, **outer involucral bracts** 5–6.7 × 1.2–1.5 mm, 3–5-nerved, elliptic, narrow elliptic, apex acute to cirrhose, margin ciliate, puberulous, stipitate and punctuation glandular trichomes; **inner involucral bracts** 6–7 × 0.8–1 mm, 3-nerved, linear, rare oblanceolate, apex acute, margin ciliate, puberulous, stipitate and punctuation glandular trichomes. **Flowers** 26–34, **corolla** 4–5 mm long, corolla tube 3–3.5 mm long with capitate glandular trichomes, limb 0.8–1 mm long, lobes 0.1–0.2 × c. 0.4 mm, deltate. **Stamens** 2.2–2.3 mm long, anther 1.3–1.8 mm long, anther connective appendage 0.3–0.4 × c. 0.2 mm, ovate, apex obtuse, retuse. **Style** 6–10 mm long, style branches 3–5 mm long. **Cypselae** 3–3.5 × 0.4–0.8 mm, setuliferous, prismatic, long-stipitate, stipitate and capitate glandular trichomes at the apex; carpodium annuliform; pappus 3–4 mm long, regular, white.

Distribution

Trichogonia salviifolia it occurs in Bolivia, Brazil, Colombia, Paraguay and Venezuela, and represents the species with the greatest distribution of the genus (Roque *et al.* 2012). In Brazil, the species occurs in the states Bahia, Ceará, Federal District, Espírito Santo, Goiás, Mato Grosso do Sul, Minas Gerais, Pernambuco, Piauí, Rio de Janeiro and São Paulo, in the Caatinga, Cerrado and Atlantic Forest (Roque 2020b).

Habitat and phenology

In Ceará, the species grows from the coastal region, passing through the hinterland depression and reaching the state's mountain tops (Ibiapaba Plateau, Serra das Almas, Serra de Baturité, Serra de Maranguape and Serra da Meruoca), in the Arboreal Stepic Savanna, Dense Ombrophylous Forest, Semideciduous Seasonal Forest Vegetation Complex of the Coastal Zone (Fig. 3 A-C, E, H; Fig. 12). Registered with flowering from January to May, and in August, October and November.

Conservation data

It is widespread and was collected in the Environmental Preservation Area of Serra de Baturité - EPA and Private Reserve Natural Patrimony Serra das Almas - PRNP, Conservation Units of Ceará.

Note

Trichogonia salviifolia characterized by having leave blade ovate to triangular, base truncate, receptacle convex, flowers 26–34 and pappus regular (present in all cypselae). In the state, it can be confused with *T. eupatorioides* and the morphological characters that differ are described in the comments of this last taxon.

Trichogoniopsis adenantha (DC.) R.M. King & H. Rob.

Fig. 3 A-B; Fig. 12.

Phytologia 24: 181 (Gardner 1972).

Material examined

BRASIL – **Ceará** • S.loc.; 1860; *F.F. Allemão & M. Cysneiros 891*; R • Chapada do Araripe; Sep. 1838; *G. Gardner 1723*; holotype: HUEFS, isotype: GH, HUEFS.

Additional material examined

BRASIL – **Bahia** • Abaíra, Arredores de Catolés; 30 Jan. 1992; *D.J.N. Hind & J.R. Pirani 52336*; ALCB • Nova Viçosa; 05 Oct. 2000; *L.A. Matos-Silva 4171*; ALCB.

Description

Subshrub, erect, 30–40 cm tall, branches solid, cylindrical, striate, villous, stipitate-glandular trichomes. **Leaves** alternate, petiolate 5–9 mm long, villous, stipitate-glandular trichomes; blades 25–55 × 13–25 mm, entire, membranaceous, discolor, ovate, base subcordiform, decurrent, apex acute, acuminate, margin crenate-serrate, plane, adaxial surface villous, glabrescent, with stipitate-glandular trichomes, abaxial surface dense villous, with dense punctuation glandular trichomes, actinodromous venation (basal 3-nerved). **Leafy bracts** 13–24 × 4–14 mm, ovate, apex acuminate. **Bracteole** 3.5–4 × c. 1 mm, ovate, lanceolate, apex acute, margin ciliate, villous, punctuation glandular trichomes. **Capitulescence** cyme; capitulum 8–9 × 5–6 mm, involucre eximbricate, involucre 2-seriate, campanulate, receptacle flat, epaleaceous; pedunculate, 10–25 mm long. **Involucral bracts** 20–22, not dehiscent, **outer involucral bracts** 6–6.7 × 0.5–10.7 mm, 3-nerved, membranaceous, lanceolate, apex acuminate, margin ciliate, with stipitate-glandular trichomes; **inner involucral bracts** 6.8–7 × 0.3–0.5 mm, 1-nerved, membranaceous, linear, apex acuminate, margin ciliate, with stipitate-glandular. **Flowers** 48–65, **corolla** 4–5 mm long, corolla tube and limb distinct, tube 2.5–3.1 mm long, glabrous, limb 1.5–1.9 mm long, campanulate, with capitate glandular trichomes, lobes 0.4–0.7 × 0.2–0.3 mm, triangular, papillose with capitate glandular trichomes. **Stamens** 1.8–2.5 mm long, inserted in the half of the tube, not exceeding limb height, anther 1–1.5 mm long, base truncate, anther connective appendage c. 0.3 × 0.2 mm, longer than wide, ovate, apex acute, anther collar cylindrical.

Style 6–9 mm long, base cylindrical, glabrous, stylopodium c. 0.6 mm long, glabrous, style branches 4.5–5 mm long, clavate. **Cypselae** 3–4 × 0.4–0.5 mm, 5-ribbed, setuliferous, prismatic, stipitate; carpodium annuliform; pappus 3–3.1 mm long, plumose, uniseriate, subequal, whitish.

Distribution

Trichogoniopsis adenantha it is endemic to the Brazilian territory and occurs in the states of Bahia, Ceará, Espírito Santo, Mato Grosso, Minas Gerais, Paraná, Rio de Janeiro and São Paulo, in the phytogeographic domains of the Cerrado and Atlantic Forest (King & Robinson 1987; Roque 2020b).

Habitat and phenology

In Ceará, the species is registered by only two collections from the 19th century, among them the typus collection. *Trichogoniopsis adenantha* was reported to Chapada do Araripe, in Dense Ombrophyllous Forest (Fig. 3 A-B; Fig. 12). Collected with flowering in September.

Conservation data

It occurs in the Araripe-Apodi National Forest - FLONA, State Conservation Unit.

Note

Trichogoniopsis adenantha, has as a diagnostic character the corolla lobes with capitate glandular trichomes (vs. dense pubescent) which is distinguished from others species from the *Trichogonia*.

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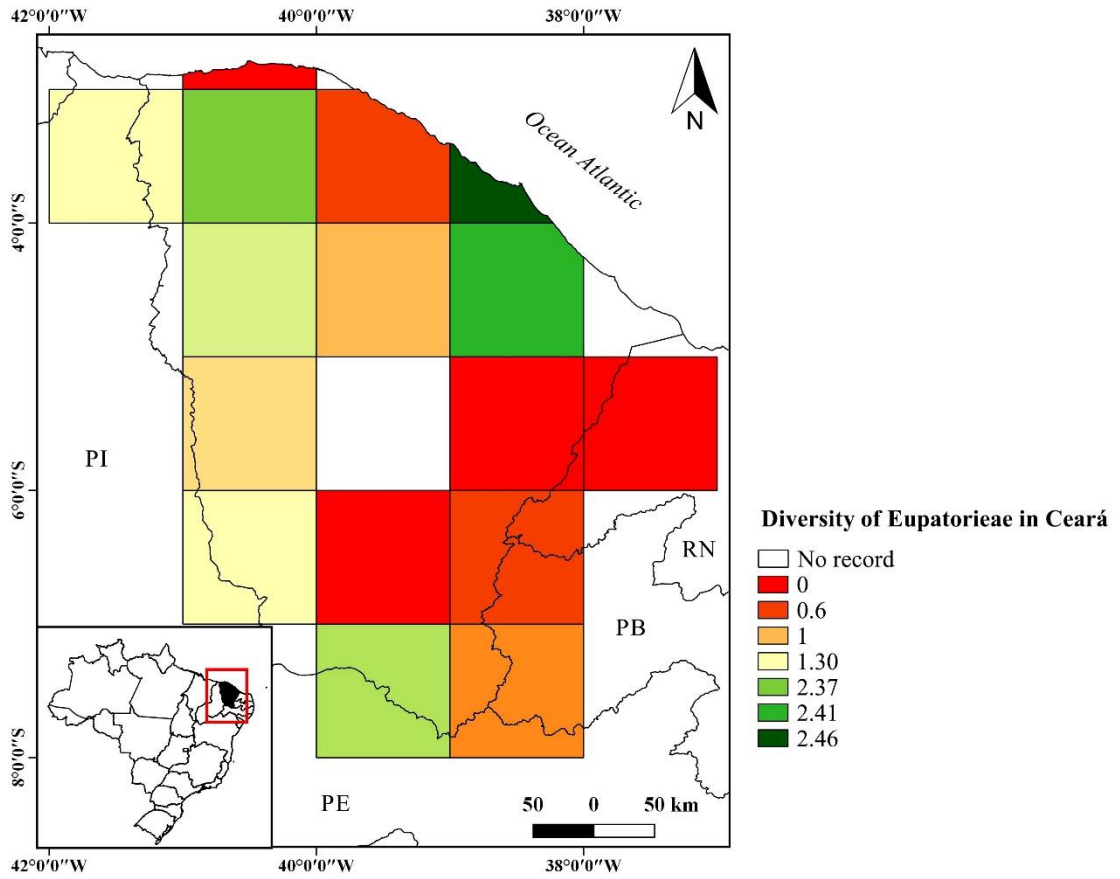


Fig. 2. Diversity of Eupatorieae in Ceará, Northeast of Brazil.

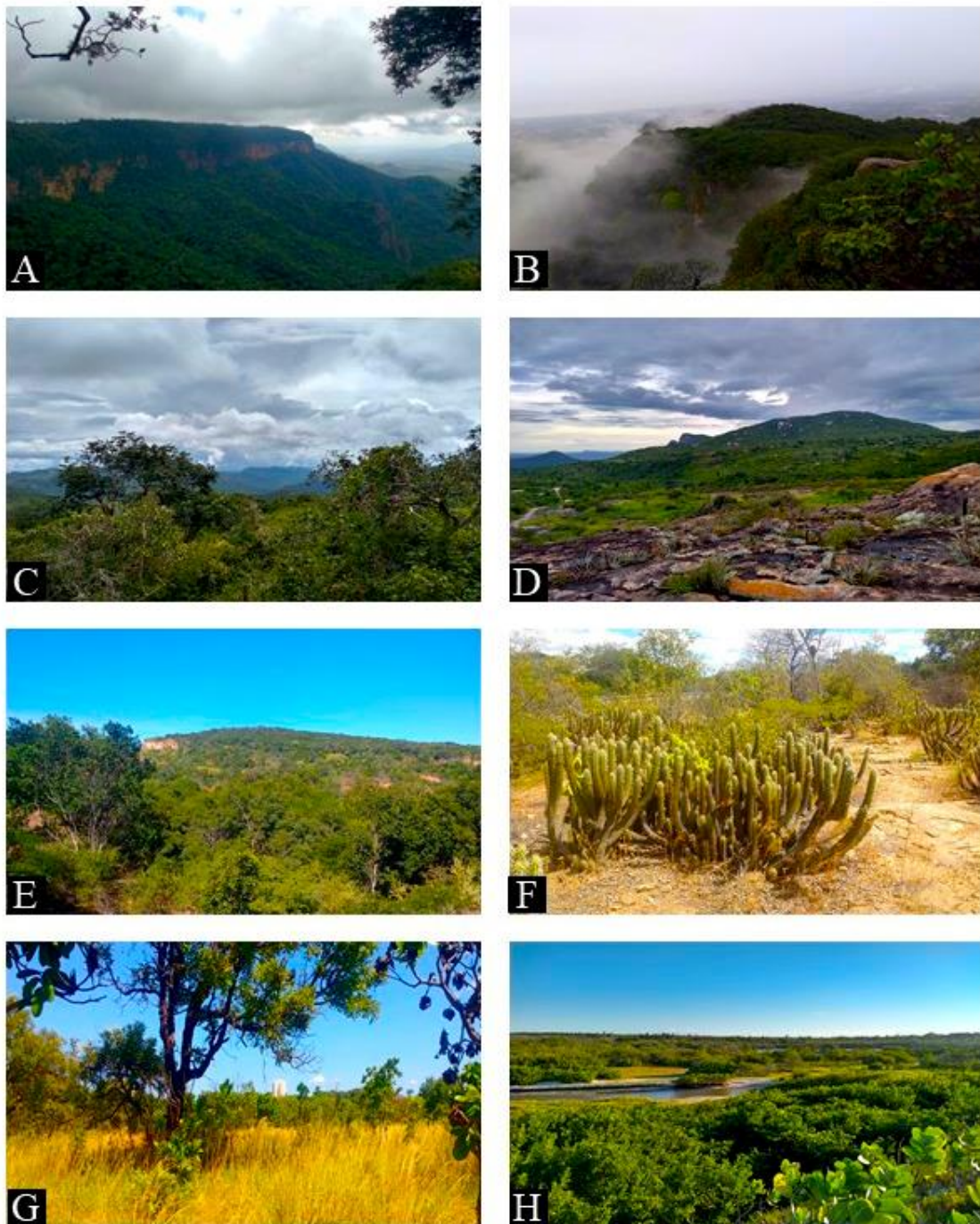


Fig. 3. Vegetation types in Ceará, Northeast Brazil. A-B. Dense Ombrophylous Forest. C. Semideciduous Seasonal Forest. D. Semideciduous Seasonal Forest (rocky outcrops - lajedo). E. Arboreous Stepic Savanna. F. Stepic Savanna. G. Savanna. H. Vegetation Complex of the Coastal Zone. Photographs A, C-H by N.C. Rebouças and B by T.C. Santos.



Fig. 4. Eupatorieae in Ceará, Northeast Brazil. A-B. *Ageratum conyzoides* – A. Leaves blade adaxial surface, B. Capitulescence. C-D. *Brickellia diffusa* – C. Habit, D. Leaves blade adaxial surface. E-F. *Conocliniopsis prasiifolia* – E. Leaves, F. Capitulescence. G. *Fleischmannia microstemon* var. *paniculata* – G. Habit. H-I. *Mikania micrantha* – H. Leaves, I. Capitulescence. Photographs A-G by N.C. Rebouças and H-I by V.S. Sampaio.

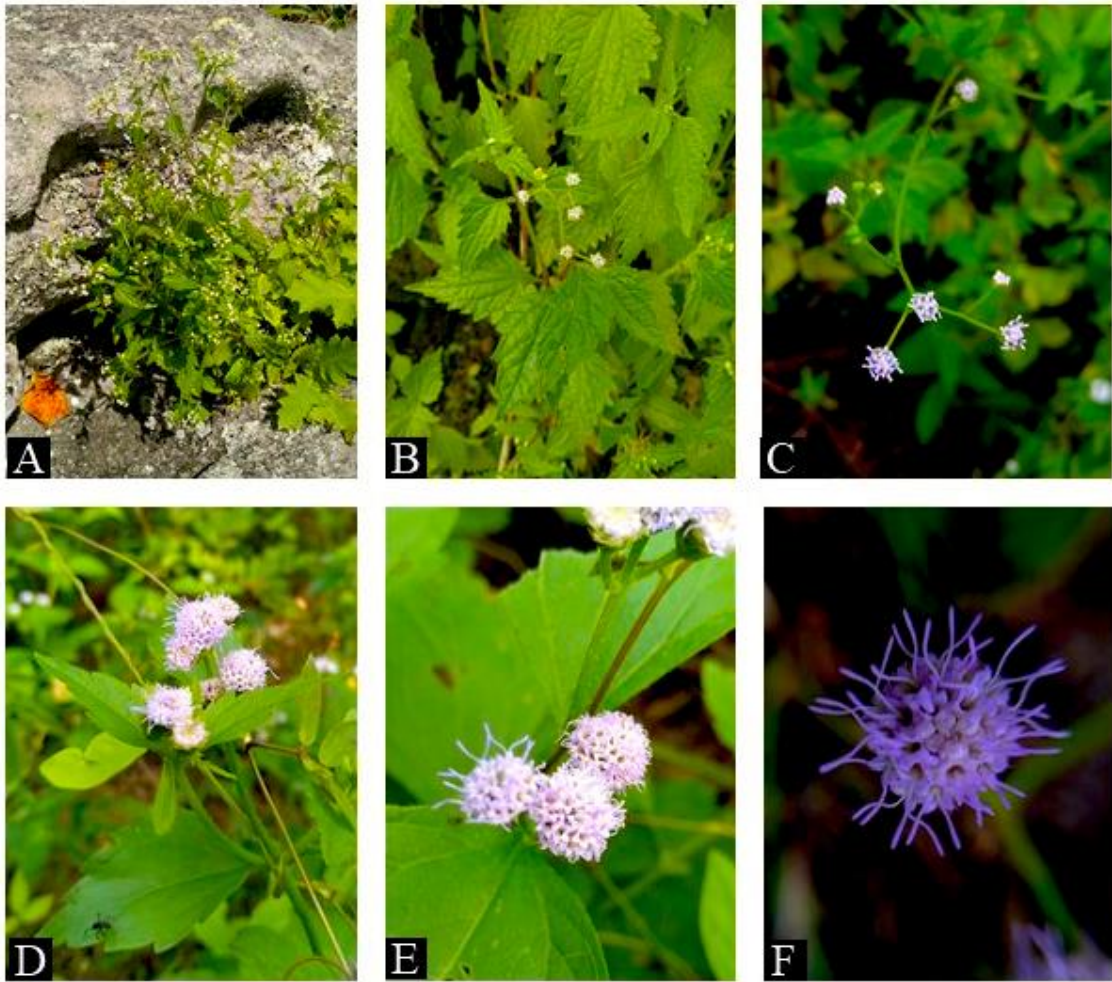


Fig. 5. Eupatorieae in Ceará, Northeast Brazil. A-C. *Piqueriella brasiliensis* – A. Habit, B. Leaves and Capitulescence. C. Capitulescence. D-E. *Praxelis clematidea* – D. Leaves and Capitulescence, E. Capitulescence. F. *Praxelis diffusa* – F. Capitulescence. Photographs A-F by N.C. Rebouças.

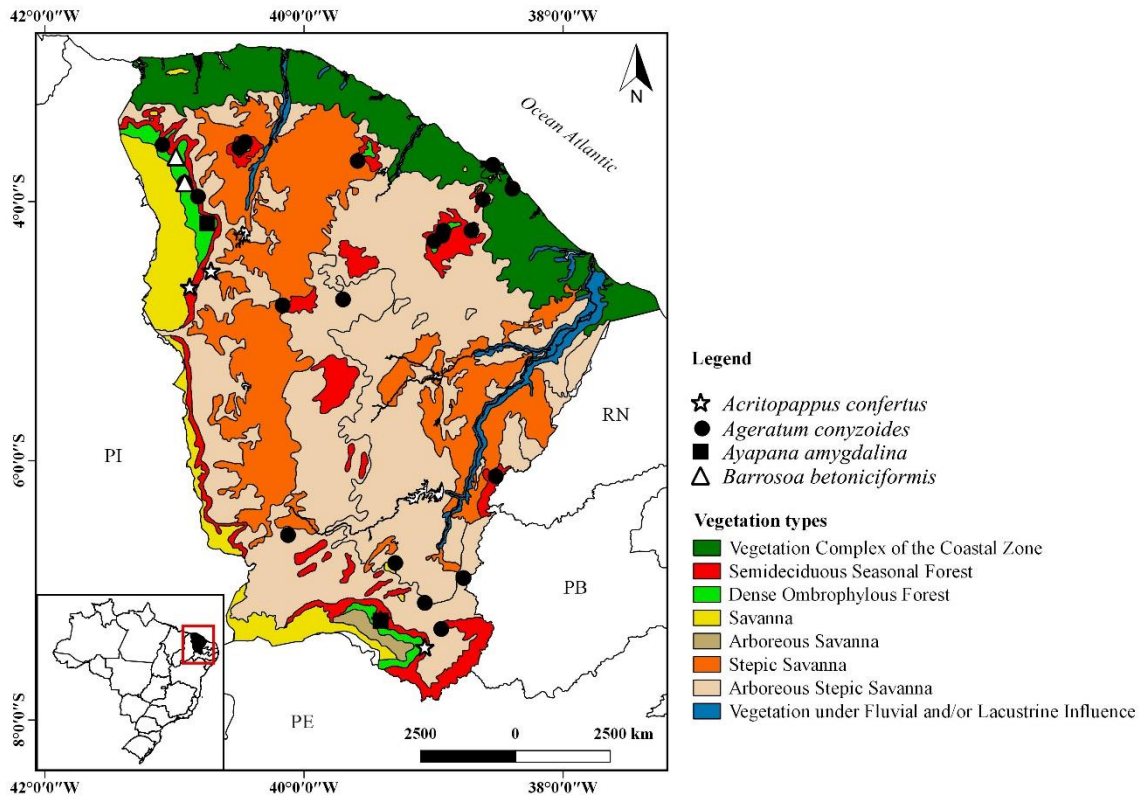


Fig. 6. Geographic distribution of *Acritopappus confertus*, *Ageratum conyzoides*, *Ayapana amygdalina* and *Barrosoa betoniciformis* in Ceará, Northeast Brazil.

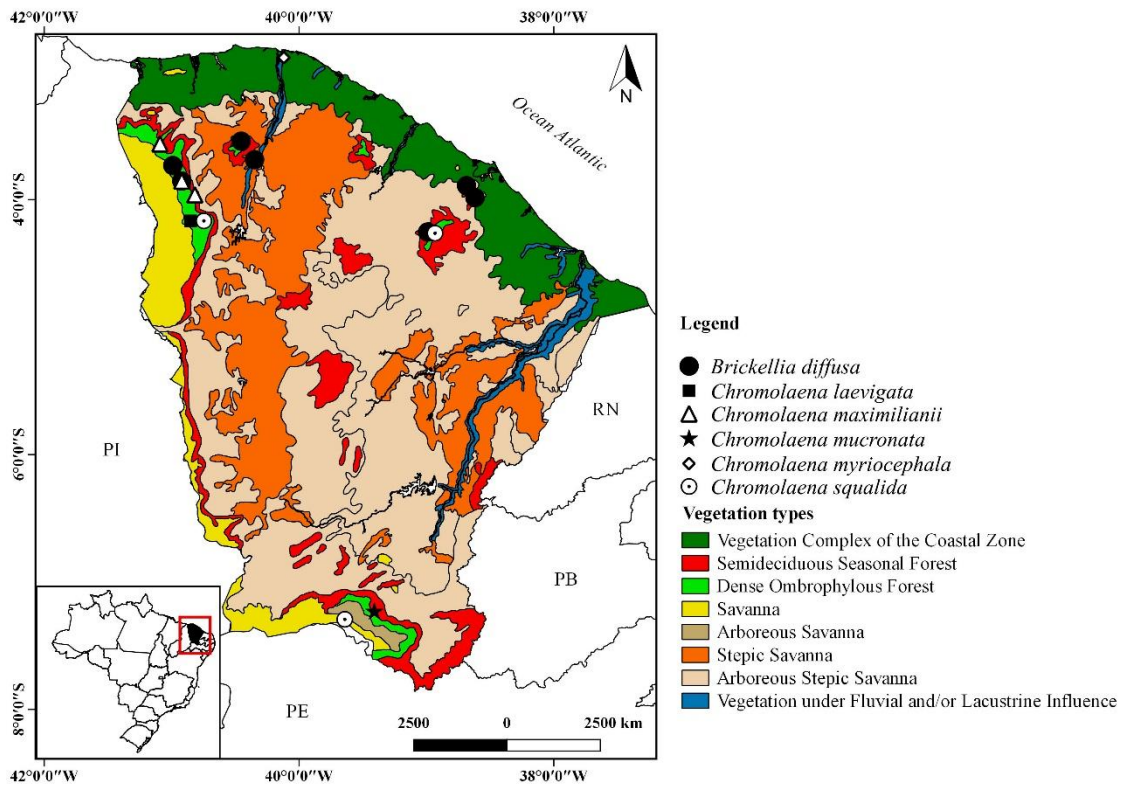


Fig. 7. Geographic distribution of *Brickellia diffusa*, *Chromolaena laevigata*, *Chromolaena maximiliani*, *Chromolaena mucronata*, *Chromolaena myriocephala* and *Chromolaena squalida* in Ceará, Northeast Brazil.

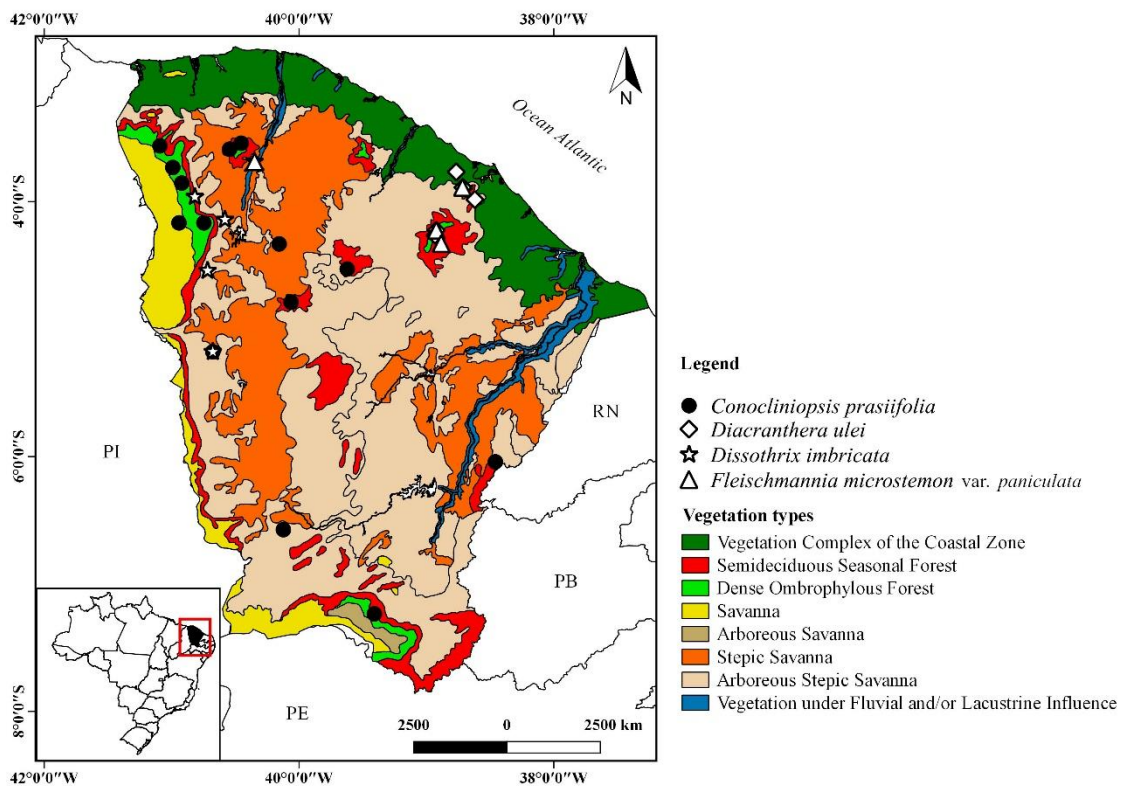


Fig. 8. Geographic distribution of *Conocliniopsis prasiifolia*, *Diacranthera ulei*, *Dissothrix imbricata* and *Fleischmannia microstemon* var. *paniculata* in Ceará, Northeast Brazil.

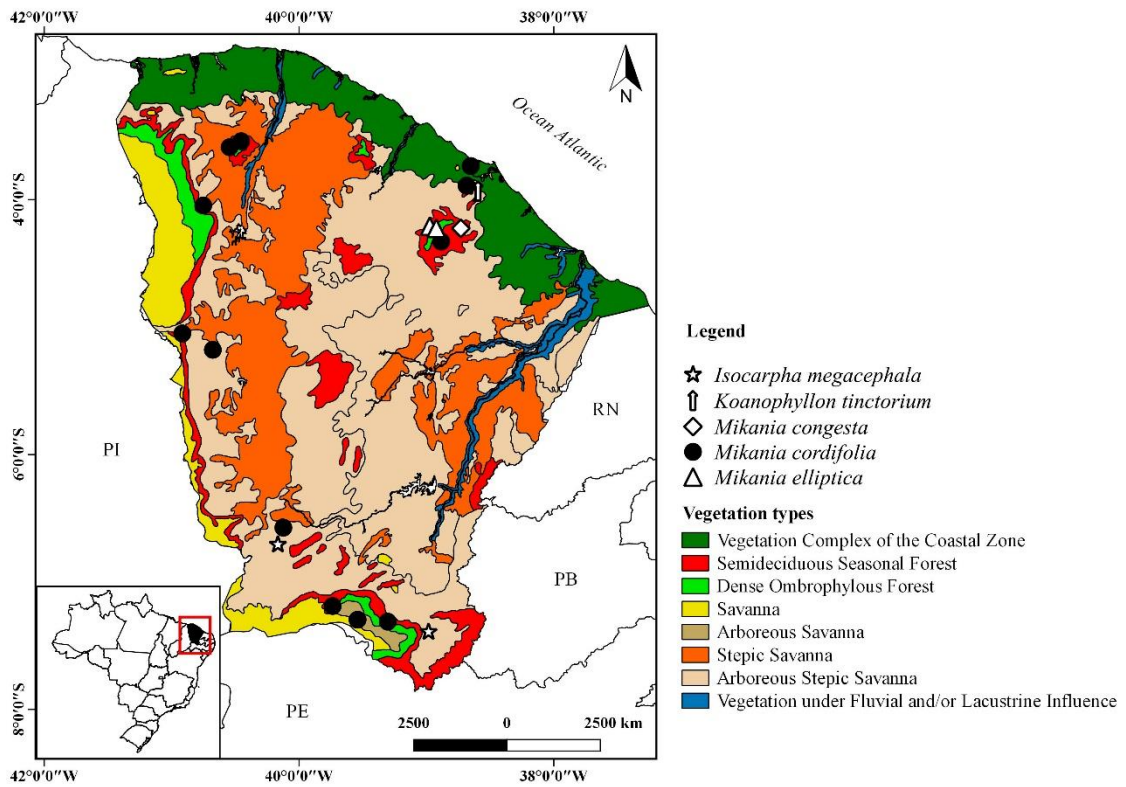


Fig. 9. Geographic distribution of *Isocarpha megacephala*, *Koanophyllon tinctorium*, *Mikania congesta*, *Mikania cordifolia* and *Mikania elliptica* in Ceará, Northeast Brazil.

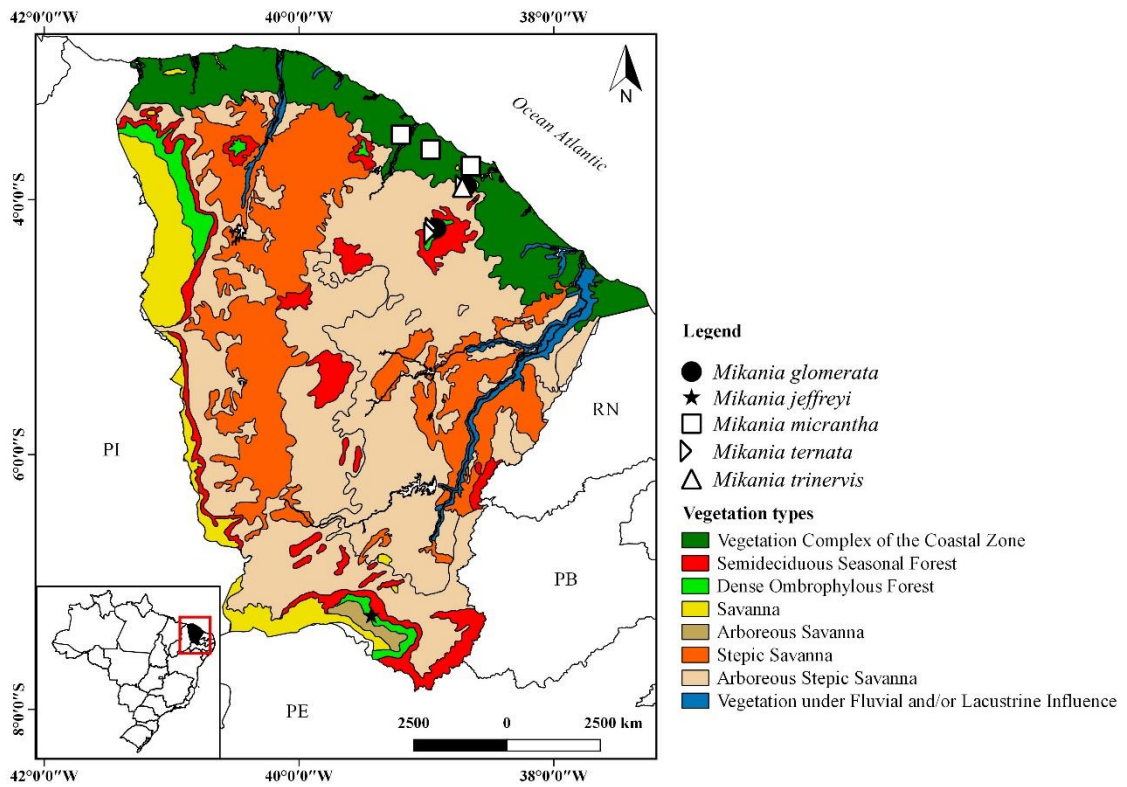


Fig. 10. Geographic distribution of *Mikania glomerata*, *Mikania jeffreyi*, *Mikania micrantha*, *Mikania ternata* and *Mikania trinervis* in Ceará, Northeast Brazil.

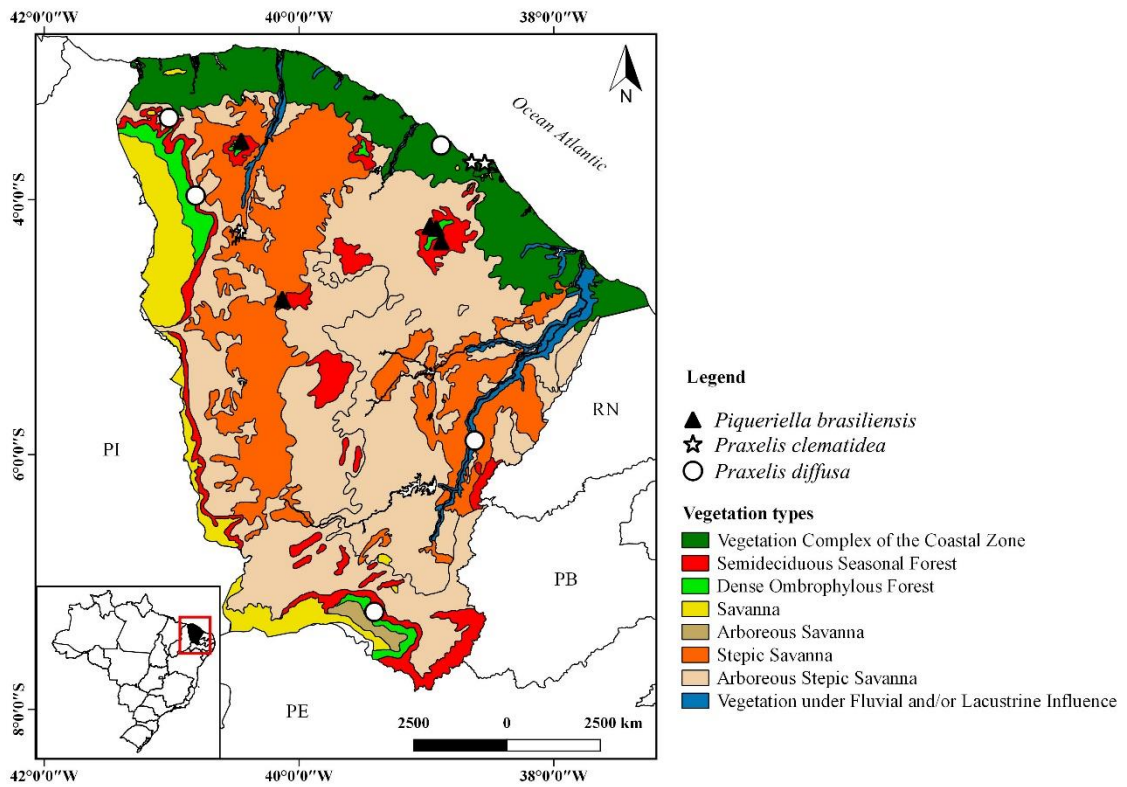


Fig. 11. Geographic distribution of *Piqueriella brasiliensis*, *Praxelis clematidea* and *Praxelis diffusa* in Ceará, Northeast Brazil.

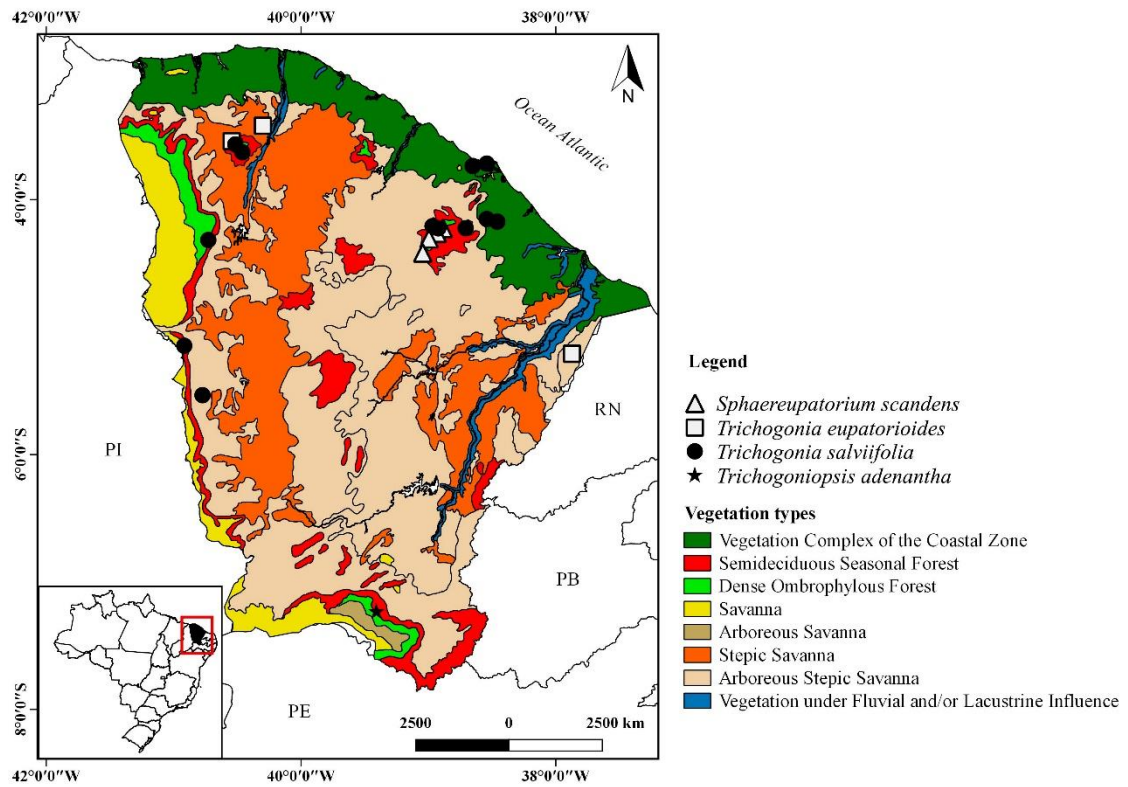


Fig. 12. Geographic distribution of *Sphaeupatorium scandens*, *Trichogonia eupatorioides*, *Trichogonia salviifolia* and *Trichogoniopsis adenantha* in Ceará, Northeast Brazil.

Table 1. Species of Eupatorieae in the vegetation type in Ceará, Brazil: AS = Arboreous Savanna, ASS = Arboreous Stepic Savanna, DOF = Dense Ombrophylous Forest, S = Savanna, SS = Stepic Savanna, SSF = Semideciduous Seasonal Forest, VCCZ = Vegetation Complex of the Coastal Zone, VUFLI = Vegetation Under Fluvial and/or Lacustrine Influence, X = occurrence, AD = absent data, * = new occurrence in Ceará, ■ = new occurrence in Northeast Brazil, Δ = endemic in Ceará.

Species	AS	ASS	DOF	S	SS	SSF	VCCZ	VUFLI
<i>Acritopappus confertus</i> (Gardner) R.M. King & H. Rob.		X				X		
<i>Ageratum conyzoides</i> L.		X	X		X	X	X	
<i>Ayapana amygdalina</i> (Lam.) R.M. King & H. Rob.			X					
<i>Barrosoa betoniciformis</i> (DC.) R.M. King & H. Rob. *			X					
<i>Brickellia diffusa</i> (Vahl) A. Gray			X			X		
<i>Chromolaena laevigata</i> (Lam.) R.M. King & H. Rob.			X					
<i>Chromolaena maximiliani</i> (Schrader ex DC.) R.M. King & H. Rob. *			X					
<i>Chromolaena mucronata</i> (Gardner) R.M. King & H. Rob. ■			X					
<i>Chromolaena myriocephala</i> (Gardner) R.M. King & H. Rob. *								X
<i>Chromolaena squalida</i> (DC.) R.M. King & H. Rob.			X	X				
<i>Conocliniopsis prasiifolia</i> (DC.) R.M. King & H. Rob.		X	X	X	X	X		
<i>Diacranthera ulei</i> R.M. King & H. Rob.			X			X		
<i>Dissothrix imbricata</i> (Gardner) B.L. Rob.		X				X		
<i>Fleischmannia microstemon</i> var. <i>paniculata</i> H. Rob.			X			X		
<i>Isocarpha megacephala</i> Mattf.		X				X		
<i>Koanophyllon tinctorium</i> Arruda *			X					
<i>Mikania congesta</i> DC.						X		
<i>Mikania cordifolia</i> (L. f.) Willd.	X		X		X	X		
<i>Mikania elliptica</i> DC.			X					
<i>Mikania glomerata</i> Spreng. *			X					
<i>Mikania jeffreyi</i> DJN Hind *			X					
<i>Mikania micrantha</i> Kunth							X	
<i>Mikania psilostachya</i> DC.	AD	AD	AD	AD	AD	AD	AD	AD
<i>Mikania ternata</i> (Vell.) B.L. Rob.			X					
<i>Mikania trinervis</i> Hook. & Arn. *			X					
<i>Mikania vitifolia</i> DC.	AD	AD	AD	AD	AD	AD	AD	AD
<i>Piqueriella brasiliensis</i> R.M. King & H. Rob. Δ			X			X		
<i>Praxelis clematidea</i> R.M. King & H. Rob.							X	
<i>Praxelis diffusa</i> (Rich.) Pruski			X			X	X	X
<i>Sphaereupatorium scandens</i> (Gardner) R.M. King & H. Rob.			X			X		
<i>Trichogonia eupatorioides</i> (Gardner) R.M. King & H. Rob.		X				X		X
<i>Trichogonia salviifolia</i> Gardner		X	X			X	X	
<i>Trichogoniopsis adenantha</i> (DC.) R.M. King & H. Rob.			X					

2.5 List of Examined Exsicats:

Allemão, F.F. 852(24), 854(26), 857(23), 890(16), 893(30), R 38172(32), R 48736(12), R 48836(12), P 2560049(15); **Allemão, F.F. & Cysneiros M.** 843(1), 853(17), 891(33), 894(5); **Almeida, L.** EAC 2013(2); **Andrade-Lima** 2415(32), 2418(14), 55-2311(12); **Andrade-Lima et al.** 2400(16); **Araújo, F.F.** 39(32), 198(29), 256(7), 259(13), 271(2), 283(32), 1139(11); **Araújo, F.S. & Girão, L.C.** 1467(13); **Barros, E.O. et al.** 62(2); **Barros, M.M.** EAC 5400(22), EAC 5388(18), RB 493011(18); **Bezerra, P.** EAC 68(22); **Bruno, F.** EAC 11521(2); **Castro, A.S.F.** 411(24), 413(12), 602(14), 959(29), 1720(32), 2156(32), 2165(28); 2197(13), 2203(1), 2951(20), EAC 26026(11), EAC 30884(18); **Castro, A.J. & Martins, P.** EAC 7004(12), EAC 7060; **Castro, A.S.F. & Moro, M.** 2335(22); **Catorelli, V.M.** 1781(1), 1812(15); **Cavalcante O.D.L.P.** EAC 32430(28); **Cavalcanti, F.S.** 16(2), 54(11), EAC 19653(11); EAC 4970(2), EAC 12320(2), EAC 12765(2), MBM 101628(2), EAC 23083(2), EAC 23836(18); **Cavalcanti, F.S. & Bruno, F.** EAC 10816(2); **Cézar, S.** 23(2); **Costa, I.R.** 221(28); **Costa-Lima, J.L. et al.** 926(25); **Dahlgren, B.E.** 815(32); **Dias da Rocha** 21(31); **Drouet, F.E.** 2166(2), 2269(5); **Duarte, A.P.** 1442; **Duarte, A. & Ivone** 1433(1); **Ducke, A.** US 2583859(27); **Ducke, A.H.G.** 1267(30); **Ducke, A.M.G.** 1308(2); **Eufrásio, F.C.A.** 25(18); **Félix, L.P.** 5296(12); **Felix, L.P. et al.** ALCB 32033(18), EAC 53821(18), HST 6949(18), IPA 87550(18); **Fernandes, A.** EAC 1538(16); EAC 1672(5), EAC 4137(30), EAC 4246(1), EAC 1639(2), EAC 2599(5); EAC 6521(6), EAC 14666(31), EAC 12074(18), EAC 15253(13); EAC 15374(2), EAC 15375(18) EAC 16622(3); EAC 16648(13), EAC 16689(14), EAC 32539(27); HUEFS 138595(2), IPA 85462(18); **Fernandes, A. & Bezerra, P.** EAC 8736(2), EAC 10343(11), EAC 27646(11); **Fernandes, A. & Martins, P.** EAC 10324(13); **Fernandes, A. & Matos, F.J.A.** EAC 2851(10); EAC 3940(2), EAC 3985(7), EAC 3994(7), EAC 9644(30), EAC 9662(32), EAC 20286(10), EAC 21228(2); **Fernandes, A. et al.** EAC(7), EAC 1637(31), EAC 6493(11), EAC 12771(11), EAC 15109(11), EAC 16025(27), EAC 16029(24); EAC 16060(31); EAC 16342(27), EAC 27646(11), IPA 85409(27), UEC 96597(7); **Ferreira, A.E.S.** 103(2); **Ferreira, E.V.R.** 270(18), 683(2); **Figueiredo, M.A.** EAC 16642(20), EAC 16723(24), EAC 25579(11), EAC 19796(12), EAC 19811(12), IPA 85403(20); **Figueiredo, M.A. & Augusto, J.** EAC 25658(11); **Figueiredo, M.A. et al.** 586(2); **Filho, S.J.** 5(1); **Fontana, A.P. et al.** 6265(1), 10345(2); **Frota, L.C.M.** EAC 21834(28); **Gardner, G.** 1722(29), 1723(33), 1725(17), 1734(3), 2419(32); **Gentry, A.** 50051A(11); **Gomes, F.S. et al.** 977; **Gomes, V. et al.** 9021(12), 1001(12); **Gozzanati, F. et al.** 1893(26); **Guedes, M.L.** 19225(5), 25284(18); **Guedes, T.N.** 522(1); **Hind, D.J.N. & Pirani, J.R.** 52336(33); **Lemos, J.R. et al.** 239(15), 323(18), 483(18); **Lemos, T.L.G.** EAC

24939(2); **Lima-Verde, L.W.** 295(15), 298(15), 395(11), 1326(1), 1333(1), EAC 26602(11); **Lima-Verde, L.W. et al.** 2016(28), 3625(32); **Loiola, M.I.B. et al.** 1452(22), 1510(2), 1613(4), 1844(11), 2463(24), 2488(12), 2557(32); **Lozano, E.D.** 4210(2); **Lucena, E.M.P. et al.** 34(29), 498(22); **Luetzelburg, P.** 26340(29); **Macêdo, S.** EAC(1); **Mamede, M.** 103(31); **Martins, P.** 314(14); **Martins, P. & Castro, A.J.** EAC 6990(5); **Martins, P. & Nunes, E.** EAC 10481(18); **Mata, M.F.** EAC 15514(22); **Matias, L.Q.** EAC 27000(22); **Matos, F.J.A.** EAC EAC 4008(5), 23401(2), 23402(2), HCDAL 401(5), HUEFS 138593(2), HUEFS 138606(5); **Matos-Silva, L.A.** 4171(33); **Matos, F.J.A. & Barros, M.M.** EAC 5423(32); **Melo, E.** 9702(10); **Miranda, A.M.** 2072(23); **Miranda, A.M. & Lima, D.** 3426(1), 3898(10); **Monteiro, H.** RBR 17409(5); **Morais, A.C.A. & Jorge, A.L.** 156(1); **Mota, A.C.** 432(32); **Nascimento, J.E.M.** 19(32), 161(5), 236(2); **Nascimento, J.B.S. & Sales, A.L.S.** 15(32); **Nunes, E.** EAC 12624(2), EAC 15479(11), EAC 13861(2), EAC 27599(1); **Nunes, E. & Castro, A.J.** EAC 7169(32); **Nunes, E. & Cavalcanti, F.S.** EAC 29786(2), EAC 29530(8); **Nunes, E. & Martins, P.** EAC 7188(11), EAC 7851(4), EAC 8630(30), EAC 8988(17), EAC 10504(5), EAC 10558(25), HUEFS 138605(5); **Paula-Zárete, E.L. et al.** 266(18), 308(31); **Paula, J.E.** 1287(5); **Oliveira, L.A.** 2(9); **Oliveira, M. et al.** 3324(21); **Pimental, L.B.** 249(2); **Pinto, G.S.** 154(28); **Rabelo, S.T. et al.** 95(22); **Ramos, L.M.R. & Gomes, M.O.** 61(31); **Rebouças, N.C. et al.** 14(2), 73(27), 100(27), 101(30), 102(32), 103(2), 104(5), 105(14), 106(28); 107(30), 108(11); **Rocha, D.** 72(5); **Sá, I.M.B.** 154(32); **Sampaio, V.S. & Pinheiro, L.F.** 260(22); **Sampaio V.S. et al.** 117(12), 410(22), 652(28); **Santos, F.D.S.** 286(27); **Seixas, E.N.C. et al.** HCDAL 3287(1); **Silva, C.G.** 160(2); **Silva, M.A.P. et al.** 47(18), 1518(1), EAC 26191(1), HCDAL 1225(1), HCDAL 2862(1); HCDAL 3570(1), HCDAL 4330(1), HST 17478(1); **Silveira, A. & Oliveira, R.** 969(32); **Silveira, E.** EAC EAC 178379(19); 22102(1), EAC 23960(11), EAC 31614(2), EAC 31615(28), EAC 31712(32), EAC 34292(14); EAC 39842(30), EAC 40400(8), EAC 41830(11); **Silveira, E. & Pessoa, O.D.L.** EAC 33497(32), EAC 45016(30); **Simões F.** EAC 12267(2); **Siniscalchi, C.M.** 605(19); **Sobczak, J.C.M.S.M.** 237(30); **Sobrinho, J.S.** 199(1); **Souza, E.B. & Albuquerque, M.R.J.R.** EAC 27646(11); **Souza, E.B.** 169(32), 529(14), 557(32), 560(32), 1844(11), 3107(11), EAC 26377(22), EAC 29455(18), IPA 85431(18); **Souza, E.B. et al.** 450(1), 519(18), 529(5), 1602(2), 2106(1), 4103(29), 4869(32), 5346(29); **Swallen, J.R.** 4567; **Teixeira, D.** 15(32), 48(32); **Ule, E.H.** 9119(12), 9122(5), 9124(14); **Veloso, R.** EAC 21282(2); **Vieira, A.V.** EAC 37723(28).

3 CAPÍTULO II

ISOCARPHA SP. NOV. (ASTERACEAE: EUPATORIEAE): NEW SPECIES REGISTERED NORTHEAST OF BRAZIL

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3.1 Abstract

Isocarpha has five species distributed in North America, Mexico, the Caribbean, Central America and South America. In Brazil, three species occur in the phytogeographic domains Caatinga and Cerrado. During the taxonomic treatment of the species of Eupatorieae, a new species of *Isocarpha* was discovered for the Northeast of Brazil, in the Caatinga domain. *Isocarpha* sp. nov. distinguished from other species of the genus by blade ovate to widely-ovate or ovate-rhombic, capitulum sessile to subsessile 1–2 mm long, palea spatulate, apex rounded, flowers 36–40 flowers, and carpopodium annuliform. Morphological description, illustration, distribution map, conservation status and an identification key for *Isocarpha* taxa are presented here.

Keywords—Caatinga, Compositae, Conservation, Ceará.

3.2 INTRODUCTION

The Caatinga, a Brazilian phytogeographic domain, located between the Northeast region and extending to the north of the Southeast region, is situated in semiarid region, and being marked by intense climatic seasonality with annual rainfall less than 1.200 mm (Särkinen et al. 2011; Fernandes et al. 2020). The Caatinga domain has a high floristic richness, with a significant number of endemism, however only 7.7% of the total area are included in conservation units (Oliveira et al. 2019).

Isocarpha R.Br. (Asteraceae: Eupatorieae) presents five described species occurring in North America, Mexico, the Caribbean, Central America and South America (Keil and Stuessy 1981). *Isocarpha* is characterized by the herbaceous to subshrub habit; leaves opposite to alternate at the apex; involucre bisseriate to multiseriate; capitulum discoid, solitary or arranged in cyme, receptacle long conical, paleaceous, palea subtending each flower; corolla usually white, glabrous to glandular; cypselae glabrous or puberulent, carpopodium asymmetric, pappus absent (Keil and Stuessy 1981; King and Robinson 1987).

In Brazil, *Isocarpha atriplicifolia* (L.) R.Br. ex DC. and *I. oppositifolia* (L.) Cass., belonging to *Isocarpha* R.Br. sect. *Isocarpha* (corolla with distinct tube and limb, style dilated at base and stylopodium deciduous), and *I. megacephala* Mattf. included in the *Isocarpha* R.Br. sect. *Cylindriflorae* Keil & Stuessy (corolla without distinction between tube and limb, style not dilated at base and stylopodium persistent), distributed in the Northeast region, in the Caatinga and Cerrado phytogeographic domains (Keil and Stuessy 1981).

During the development of a taxonomic study of Eupatorieae in the State of Ceará, in Brazil, a new species was discovered for the Brazilian Northeast. *Isocarpha* sp. nov.

is described, illustrated, and an identification key for *Isocarpha* taxa is presented.

3.3 MATERIALS AND METHODS

This study analyzed morphological characters of dry specimens deposited in the ALCB, EAC, HUVA and RB (acronyms according to Thiers 2020, onward). We have also checked collections from the online databases REFLORA Virtual Herbarium (2020, under construction), CRIA (2020) and JABOT (2020). The terminology and morphological description followed Radford et al. (1974), Keil and Stuessy (1981), King and Robinson (1987) and Roque and Bautista (2008). The identification key and comparative table of morphological characters for the species were produced by analyzing the type collections, available in online database, as well as protologues and specialized bibliography (Keil and Stuessy 1981). IUCN criteria (2017) alongside with the GeoCAT tool (Bachman *et al.* 2011) were used to infer a preliminary conservation status. GeoCAT was applied with the IUCN default values for Extent of Occurrence (EOO) and Area of Occupancy (AOO) analysis. The distribution map was produced in QGIS version 3.0.1 (QGIS Development Team 2018). In cases where herbarium specimens does not have geo-reference data, the geographic coordinates were approximated using the locality description of the specimen label.

3.3 TAXONOMIC TREATMENT

Isocarpha sp. nov. Rebouças & Roque, sp. nov. TYPE: BRAZIL. Ceará: município Aracati, distrito de Aroeiras, Fazenda Recordações, Km 25 na estrada sentido Aracati - Boqueirão do Cesário, vegetação de Caatinga, sobre solo arenoso, área alagada, próximo a um riacho, 32 m, 4°34'29"S, 37°49'09"W, 07 Jun 2020, M.I.B. *Loiola & M.A. Loiola 2851* (holotype: EAC!, isotype: ALCB!).

Isocarpha sp. nov. Is similar to *I. atriplicifolia* (L.) R.Br. ex DC. because of its herbaceous to subshrub habit and leaves blade ovate-rhombic, but differs by leaves base attenuate (*vs.* auriculate), persistent cymose, capitulum sessile to short-pedunculate 1–2 mm long (*vs.* solitary, pedunculate 20–150 mm long), palea spatulate with apex rounded (*vs.* oblong to ablancheolate, apex acute to acuminate), persistent 36–40 (*vs.* persistent 200–300), carpodium annuliform (*vs.* cylindrical or hemispherical), respectively.

Herb, 60–120 cm tall, stem fistulose, cylindrical, striate, glabrescent, punctate-glandular trichomes, greenish. **Leaves** opposite below, alternate at the apex, petiolate; petiole 15–31 mm long, strigose, punctate-glandular; blades 42.3–105 × 20.2–70 mm, membranaceous, ovate to widely ovate persistent-rhombic, base attenuate, apex acute, cuspidate, margins serrate irregularly, adaxial surface glabrescent, sparse punctate-glandular trichomes, abaxial surface glabrous, punctate-glandular, actinodromous leaf venation.

Capitulescence cymose, **capitula** 3–5, homogamous, terminal, 4.5–10 mm long, 4.2–6 mm diam., sessile to short-pedunculate, peduncle 1–2 mm long, bracteate, leafy bracts 12.7–45 × 4–18.2 mm, lanceolate to narrow-ovate, apex acute, strigose, punctate-glandular trichomes; bracteole 3–6 × 1–2 mm, lanceolate persiste, apex acute, strigose, margin ciliate; involucre campanulate, uniseriate to biseriate; receptacle long conical, paleaceous, palea subtending each flower; **involucral bracts** 36–40, 3.5–4.2 × 1.7–2 mm, obovate, apex rounded, adaxial surface glabrous, punctate-glandular trichomes, abaxial surface strigose, hyaline apical region, margins entire persiste, ciliate; **palea** 3.5–4 × 1.1–1.5 mm, spatulate, apex rounded, adaxial surface strigose, punctate-glandular trichomes, abaxial surface glabrous, margins entire persiste, ciliate. **Flowers** 36–40, persisten, corolla 2.2–2.5 × 0.4–0.6 mm, persisti, campanulate, tube and throat without distinction, pilose and capitate glandular trichomes at the base, lobes 0.5–0.6 × 0.4–0.5 mm, ovate, capitate glandular trichomes externally, densely-papillose internally; stamens 5, persisten 1.3–1.4 mm long, anthers 1–1.1 mm long, anther connective appendage 0.1–0.2 × 0.1 mm, ovate, apex rounded or truncate, longer than wide; anther base cuneate or truncate, anther persisti cylindrical, glabrous; style 3.3–4 mm long, base cylindrical, long-bifurcate, style branches papillose; stylopodium persiste, persistente. **Cypselae** 1.8–2.2 × 0.4–0.5 mm, 5-costate, prominent ribs, prismatic, blackened, glabrous; carpodium annuliform; pappus absent. Figures 13 and Attached - A.

3.5 Distribution, Habitat and Ecology

Isocarpha sp. nov. occurs in the State of Ceará (municipalities of Aracati, Caucaia, Crateús, General Sampaio, Graça, Meruoca, Monsenhor Tabosa, Quixadá and Santa Quitéria) and in the State of Rio Grande do Norte (municipality of Martins). Figure 14.

In Ceará, the species is distributed between the eastern limit of the state, at an altitude of 32 m, to the northwest region, an altitude of up to 800 m, also reaching the mesoregion of the backcountry of Ceará, at an altitude of 1.154 m (IPECE 2013). The species occurs in the phytogeographic domain of the Caatinga, in the vegetation types of Semideciduous Seasonal Forest and Vegetation Complex of the Coastal Zone (IBGE 2012). In the municipality of Aracati, the species was found in flooded area, near a stream. Keil and Stuessy (1981) also report the occurrence of *I. megacephala* Mattf. in seasonally flooded habitats.

In the territory of the State of Rio Grande do Norte, *Isocarpha sp. nov.* was also recorded in elevated regions, at 700 m altitude, in the Serra de Martins, in the Borborema Plateau. This region is surrounded by Caatinga and characterized by being an area of highland forest, with annual rainfall averages between 800 to 1.200 mm, tropical sub-humid climate,

dry winter, and rainy season starting in January and extending until July (Governo do Estado do Rio Grande do Norte 2014).

3.6 Phenology

Isocarpha sp. nov. was collected with flowers and fruits from February to August.

3.7 Preliminary Conservation Status

The extent of occurrence EOO = 64.297 km² and the area of occupation AOO = 40.000 km². *Isocarpha sp. nov.* classified with preliminary conservation status Endangered (EN), according to criteria B1, since the populations are fragmented and registered in only 10 municipalities, and D1 because the populations are very small and restricted, with a number of less than 1.000 mature individuals per population (IUCN 2017). In Ceará state, the species was registered in two private conservation units: Private Reserve of Natural Heritage Serra das Almas and Private Reserve of Natural Heritage Environmentalist Francny Nunes.

3.8 Etymology

The specific epithet refers to the shape of the palea that are spatulate, a distinguished character in the group.

3.9 Taxonomic Notes

Isocarpha sp. nov. is distinguished from all species of the genus by the capitulum sessile to short-pedunculate 1–2 mm long (*vs.* capitulum pedunculate 10–150 mm long); palea spatulate with apex rounded (*vs.* oblong, ovate, lanceolate; apex obtuse, acute, acuminate, or mucronate), flowers 36–40 (*vs.* flowers 60–300).

The new taxon has morphological affinities with *I. atriplicifolia* (L.) R.Br. ex DC. by herbaceous to subshrub habit, with leaves blade ovate-rhombic. However, differing by leaves base attenuate (*vs.* auriculate), capitulescence cymose, capitulum sessile to short-pedunculate 1–2 mm long (*vs.* solitary, pedunculate 20–150 mm long), palea spatulate with apex rounded (*vs.* oblong to abanceolate, apex acute to acuminate), flowers 36–40 (*vs.* flowers 200–300), carpodium annuliform (*vs.* cylindrical or hemispherical), restricted occurrence in Northeast of Brazil, states of Ceará and Rio Grande do Norte (*vs.* North America, Mexico, the Caribbean, Central and South America, in Colombia, Venezuela and Brazil) (Keil and Stuessy 1981). Comparative characters for the *Isocarpha* species are shown in the Table 2.

According to the herbaria material, *Isocarpha sp. nov.* was mistakenly identified as *Ageratum conyzoides* L. or *Ageratum fastigiatum* (Gardner) R.M.King & H.Robinson or *Barrosoa apiculata* (Gardner) R.M.King & H.Robinson. Despite the vegetative morphological similarities between the three genera (herbaceous to subshrub habit, involucre eximbricate and capitulum cyme), *Isocarpha* has palea subtending each flower (*vs.* absent,

absent), cypselae glabrous (*vs.* glandular and setuliferous trichomes on ribs present), and papus absent (*vs.* usually present, present), respectively.

Regarding the infrageneric classification, we propose that *Isocarpha sp. nov.* be subordinated to the section *Isocarpha* R.Br. sect. *Cylindriflorae* Keil & Stuessy for presenting the characters that delimit it corolla without distinction between tube and limb, style not dilated at base and stylopodium persistent.

3.10 Additional Specimens Examined (paratypes)

BRAZIL—CEARÁ: Aracati, distrito de Aroeiras, Fazenda Recordações, Km 25 na estrada sentido Aracati - Boqueirão do Cesário, vegetação de Caatinga, sobre solo arenoso, 32 m, 4°35'30"S, 37°59'10"W, 29 June 2019, *M.I.B. Loiola & M.A. Loiola 2845* (EAC!); *idem*, 4°34'29"S, 37°59'09"W, 07 Jun 2020, *M.I.B. Loiola & M.A. Loiola 2849*; *idem*, 4°34'29"S, 37°59'09"W, 07 Jun 2020, *M.I.B. Loiola & M.A. Loiola 2850*; Caucaia, Salgadinho, 17 July 2007, *A.S.F. Castro 1832* (EAC!); Crateús, Reserva Particular do Patrimônio Natural (RPPN) Serra das Almas, vegetação de Caatinga, 5°17'83"S, 40°67'75"W, 22 February 2000, *L.W. Lima-Verde 999* (EAC!); Graça, Sítio Santa Clara, vegetação de Caatinga, 3°96'24"S, 40°81'87"W, 25 Jun 2017, *F.F. Araújo 265* (ALCB!, EAC!); General Sampaio, Reserva Particular do Patrimônio Natural (RPPN) Francy Nunes, 31 May 2008, *M.F. Moro et al. 185* (EAC!); *idem*, 25 May 2007, *M.F. Moro et al. 135*; Meruoca, Maciço de Meruoca, Santa Maria, Trilha do Urubu-Rei, 3°63'25"S, 40°45'38"W, 13 May 2016, *E.B. Souza 4019* (ALCB!, HUVA!); Monsenhor Tabosa, Serra Branca, Pico alto Serra das Matas, 1.154 m, 4°60'19"S, 40°13'19"W, 19 April 2019, *N.C. Rebouças, V.S. Sampaio & K.S. Pereira 102* (EAC!); Quixadá, Fazenda não me deixes, 21 June 2000, *R.C. Costa s.s.* (EAC!); Santa Quitéria, Itataia, Serra do Céu, 4°33'19"S, 40°15'67"W, 03 Aug 1984, *A. Fernandes et al. s.n.* (EAC!, RB!). RIO GRANDE DO NORTE: Martins, Serra Nova, 720 m, 17 July 1991, *M.A. Figueiredo 272* (EAC!).

3.11 IDENTIFICATION KEY FOR *ISOCARPHA*

1. Leaves base auriculate *I. atriplicifolia*
1. Leaves base cuneate, obtuse or attenuate 2
2. Capitulum with 200–300 flowers and corolla glabrous *I. megacephala*
2. Capitulum with 36–150 flowers and corolla pilose, pubescent, or stipitate-glandular trichomes 3
3. Leaves blade ovate to widely ovate or ovate-rhombic, capitulum sessile to short-pedunculate, peduncle 1–2 mm long, palea spatulate, apex rounded, flowers 36–40 and

- carpopodium annuliform *I. sp. nov.*
3. Leaves blade linear, lanceolate, oblong, elliptic, capitulum pedunculate, peduncle 10–150 mm long; palea oblong or ovate, apex acute, acuminate, obtuse or mucronate, flowers 60–150 and carpopodium asymmetric to asymmetric or hemispherical 4
4. Leaves opposite and involucre bracts 3.5–5 mm long with apex mucronate . *I. oppositifolia*
4. Leaves alternate and involucre bracts 2.2–3.3 mm long with apex cuspidate 5
5. Capitula arranged in cyme, involucre bracts with apex green and corolla 1.5–1.9 mm long *I. microcephala*
5. Capitulum solitary, involucre bracts with apex vinaceous and corolla 2.3–2.8 mm long *I. fistulosa*

3.12 ACKNOWLEDGMENTS

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3.13 AUTHOR CONTRIBUTIONS

NCR elaborated the morphological description of the new species, compared the specimens with the other taxa of the genus and elaborated the identification key. NCR produced the distribution map and the organized photographic. NCR and MOB wrote the first version of the manuscript. NR confirmed the species as new, helped with the morphological description and identification key, as well as critically reading the manuscript.

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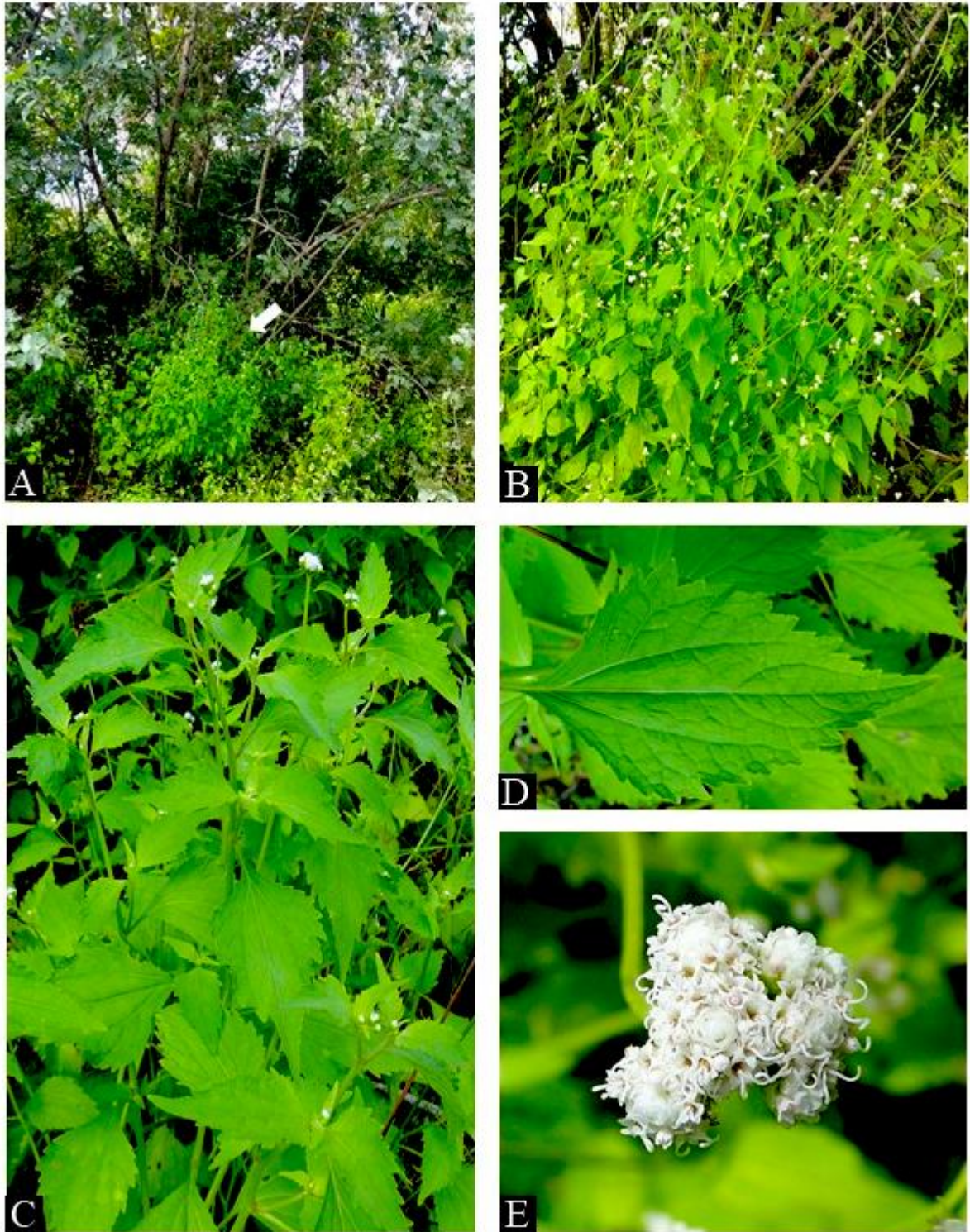


FIGURE. 13. A. *Isocarpha* sp. nov. type-locality (arrow). B. Population. C. Habit. D. Leave. E. Capitulescence. Photographs A-E by M.I.B. Loiola & M.A. Loiola.

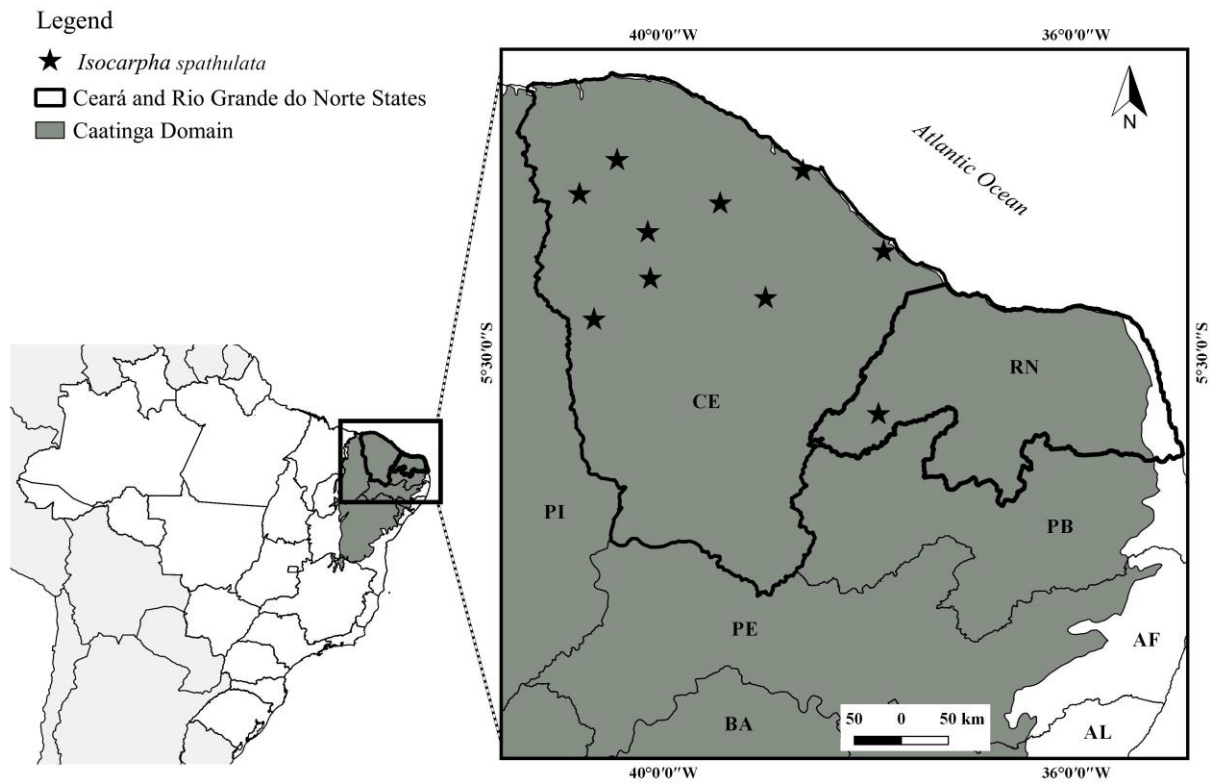


FIGURE. 14. Geographic distribution of *Isocarpha sp. nov.* in Brazil. AF = Atlantic Forest, AL = Alagoas State, BA = Bahia State, CE = Ceará State, PB = Paraíba State, PE = Pernambuco State, PI = Piauí State, RN = Rio Grande do Norte State.

TABLE 2. Comparisons of morphological characters of *Isocarpha* sp. nov. with the other *Isocarpha* species.

Character	<i>Isocarpha</i> species					
	<i>I. sp. nov.</i>	<i>I. atriplicifolia</i>	<i>I. fistulosa</i>	<i>I. megacephala</i>	<i>I. microcephala</i>	<i>I. oppositifolia</i>
Leaves blade	Widely-ovate, ovate-rhombic	Lanceolate or ovate-rhombic	Linear to oblong, or elliptic	Lanceolate or oblong	Linear to oblong, oblong or elliptic	Linear, oblong, elliptic, or lanceolate
Leaves base	Attenuate	Auriculate	Obtuse	Cuneate	Obtuse or attenuate	Cuneate or attenuate
Peduncle size (mm)	Sessile to pedunculate (1–2)	10–50	20–80	10–40	10–20	20–150
Capitulescence	Cymosa	Solitary	Solitary	Solitary	Cymosa	Solitary to cymosa
Capitulum length, diameter (mm)	4.5–10, 4.2–6	5–10, 4–7	7–10, 6–8	12–13, 8–10	5–7, 4–6	5–15, 4–8
Number series	1–2	2–7	2–4	4–7	3–5	2–4
Involucral bracts size (mm)/Palea size (mm)	3.5–4.2/3.5–4	2–3.5/2.4–3.5	2.8–3/3	5–5.5/5.3–5.5	2.2–3.3/2.7–3.3	3.5–5/3.8–5
Form Involucral bracts/ Form Palea	Obovate/Spathulate	Oblong to ovate/Oblong to oblanceolate	Oblong to ovate/Oblong to ovate	Ovate/Ovate	Oblong to obovate/Oblong to obovate	Oblong/Oblong
Apex Involucral bracts/ Apex palea	Rounded/Rounded	Acute, obtuse to acuminate, obtuse/Acute to acuminate	Acute/Acute	Acute/Acuminate	Acute to obtuse/Acute to obtuse	Mucronate/Mucronate
Margin involucral bracts/Margin palea	Entire to erose, ciliate, non-glandular	Entire, ciliate, stipitate-glandular or non-glandular	Entire, ciliate, non-glandular	Entire, ciliate, non-glandular	Erose, ciliate, non-glandular	Entire, ciliate, non-glandular
Number flower	36–40	200–300	120–150	200–300	80–140	60–150
Corolla size (mm)	2.2–2.5	1.4–2.5	2.3–2.8	2.3–3	1.5–1.9	2–3
Corolla indument	Pilose at the base, capitate glandular trichomes at the base and lobes	Puberulent to glabrous	Pubescent or glabrous and stipitate-glandular trichomes	Glabrous	Pubescent	Pubescent and stipitate-glandular trichomes
Cypselae length (mm)	1.8–2.2	0.8–1.5	1.1–1.4	1.9–2	1.1–1.3	1.2–2.2
Carpodium form	Annuliform	Cylindrical or hemispherical	Asymmetric	Asymmetric	Asymmetric or hemispherical	Asymmetric
Geographic distribution	Brazil	North America, Mexico, the Caribbean, Central and South America (Colombia, Venezuela and Brazil)	Ecuador and Peru	Brazil	Ecuador and Peru	North America, Mexico, the Caribbean, Central and South America (Colombia, Venezuela and Brasil)

4 CONSIDERAÇÕES FINAIS

O estudo de Eupatorieae (Asteraceae) no estado do Ceará foi o primeiro tratamento taxonômico da tribo para estado e para a região Nordeste do Brasil. A partir deste trabalho, um novo registro para a região Nordeste foi reportado, sete novas ocorrências para o território cearense são confirmadas, uma espécie é reiterada como endêmica para o Ceará e uma nova espécie é proposta ocorrendo no estado. Esses dados corroboram a riqueza florística que o estado possui, contudo, observa-se a ausência de coletas em grande parte das áreas do estado reflexo das coleções subamostradas nos herbários.

Estudos taxonômicos como esse salientam a lacuna de conhecimento sobre a diversidade e distribuição vegetal na região. Apesar de sua riqueza florística, poucos investimentos são direcionados a conservação dessa área. Embora a área enfrente problemas como desmatamento, desertificação, queimadas e invasão de espécies exóticas, principalmente no domínio fitogeográfico da Caatinga, seu tipo vegetacional dominante. Sem falar do número inexpressível de unidades de conservação, que intensifica a vulnerabilidade das espécies. Dessa forma, colocando em risco a permanência de espécies endêmicas e restritas que ocorrem no território nordestino. É necessário um olhar mais cuidadoso de nossos governantes e aplicação de ações políticas que visem a realização de estudos e medidas práticas para a conservação dessas espécies.

No Ceará, as espécies de Eupatorieae estão majoritariamente distribuídas nas áreas serranas do estado, com elevada altitude, ocorrendo nos tipos vegetacionais de Floresta Ombrófila Densa, Floresta Sazonal Semidecidual e Savana. Ao compararmos com os domínios fitogeográficos do Brasil, tais fisionomias são equivalentes aos domínios Caatinga, Cerrado e Floresta Atlântica, onde a tribo em outros estudos mostra possuir preferência em formações campestres como o Cerrado, e alguns gêneros, como *Mikania*, preferivelmente, por ambientes florestados, como na Floresta Atlântica.

Em relação ao erro de identificação nas coleções dos herbários, muitas vezes, é ocasionado por conta do processo de coleta das amostras, pois, em geral, os coletores coletam os ramos terminais dos indivíduos e informações foliares importantes como tipo de folha, forma e venação podem ser perdidos. As brácteas foliosas rotineiramente são confundidas com as folhas que ficam na base dos ramos e espécies dos gêneros *Brickellia*, *Fleischmannia* e *Mikania* recebem identificação incorreta, tendo em vista a plasticidade fenotípica existente entre as espécies de cada gênero.

Outra razão vem da proximidade morfológica entre os gêneros, que muitas vezes se distinguem por características micromorfológicas, difíceis de serem visualizadas. O número escasso de especialistas com o grupo no Ceará, bem como, para a região Nordeste, intensifica a ocorrência desses erros nas coleções. Portanto, salientando a importância da criação de novos cursos de pós-graduação em biodiversidade, na região, proporcionando a formação de novos estudiosos nos diversos setores da área.

Caracteres morfológicos como hábito, tipo de folha, venação, tipologia da capitulescência, número de flores por capítulo, base do estilete, morfologia do pápus e carpopódio são características diagnósticas importantes para o reconhecimento dos representantes de Eupatorieae no Ceará, bem como para a tribo, portanto, destaca-se a importância desses caracteres.

Dessa forma, os resultados obtidos com esse estudo evidenciaram a importância da realização de trabalhos com as espécies vegetais no Ceará, tendo em vista a riqueza florística existente, mas ainda tão pouco estudada. Além disso, a pesquisa abre a possibilidade de uma série de novos estudos que podem ser desenvolvidos com a tribo Eupatorieae no estado, como também para a região Nordeste.

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ANEXO A – *ISOCARPHA SP. NOV.* A. HABIT. B. LEAVE. C. CAPITULUM IN CYME. D. CAPITULUM INTERNALLY WITH LONG CONICAL RECEPTACLE. E. INVOLUCRAL BRACT. F. PALEA. G. FLOWER (DETAIL PILOSE AT THE BASE, SESSILE GLANDULAR TRICHOMES AT THE BASE AND LOBES). H. STAMEN. I. STYLE WITH STYLOPODIUM AT THE BASE. J. CYPSELAE.

