

LETICIA DAS GRAÇAS ROSIGNOLI DE OLIVEIRA

**SENNA MILL. (LEGUMINOSAE-CAESALPINIOIDEAE)
NO ESTADO DE MINAS GERAIS, BRASIL**

Dissertação apresentada à Universidade Federal de Viçosa, como parte das exigências do Programa de Pós-Graduação em Botânica, para obtenção do título de *Magister Scientiae*.

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APROVADA: 22 de Fevereiro de 2017.



Roseli Lopes da Costa Bortoluzzi



Rita Maria de Carvalho Okano



Flávia Cristina Pinto Garcia
(Orientadora)

**Dedico mais este trabalho realizado a minha mãe (*in memoriam*),
com muito amor.**

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*“Nunca se afaste de seus sonhos. Porque se eles forem,
você continuará vivendo, mas terá deixado de existir”*

Mark Twain

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BIOGRAFIA

Letícia das Graças Rosignoli de Oliveira, filha de Alcina Rosignoli de Oliveira e Euler de Oliveira, nasceu em 4 de setembro de 1992, na cidade de Ubá, Minas Gerais.

Ingressou no Curso de Licenciatura em Ciências Biológicas em 2011, na Universidade do Estado de Minas Gerais, campus Ubá e graduou-se em 2014.

Iniciou o Mestrado no programa de Pós-graduação em Botânica da Universidade Federal de Viçosa em Março de 2015, concluindo em Fevereiro de 2017.

ABSTRACT

ROSIGNOLI-OLIVEIRA, Leticia das Graças, M.Sc., Universidade Federal de Viçosa, February, 2017. ***Senna* Mill. (Leguminosae-Caesalpinioideae) in Minas Gerais State, Brazil.** Adviser: Flávia Cristina Pinto Garcia

Senna Mill. is a genus characterized by pinnate leaves, the absence of bracteoles, pentamerous flowers and in general, yellow, and heteromorphic androecium. It was segregated from *Cassia* L. and actually has 295-350 species worldwide, 80 from Brazil. In Minas Gerais a preliminary survey indicated the occurrence of 75 species names, 351 unidentified specimens and 39 species were identified in Flora do Brasil. This study aims to update the identifications of the collections and delimit the circumscription of *Senna* species found in the State of Minas Gerais. This research was based on the morphological analysis of about 2350 specimens from both herbaria and field collections. The collected materials were deposited in the Herbarium VIC and the identification of the materials was performed by taxonomic literature for the genus. The occurrence and distribution data of this species was collected in the labels of specimens deposited in herbaria and taxonomic studies. The ArcGis software was used for the maps of the geographical distribution. It was recognized 36 species were recognized, being 34 native, 2 cultivated and 28 varieties. *Chamaefistula* (Collad.) Irwin & Barneby is the section more represented in the State, with 10 series and 28 species, followed by sect. *Peiranisia* (Raf.) Irwin & Barneby with 2 series and 5 species and *S.* sect. *Senna* Mill with 2 series and 3 species. Among the species cited in the literature as occurring in Minas Gerais, in this study, *Senna acuruensis* (Benth.) Irwin & Barneby was included and 4 species were excluded of the list: *Senna spinigera* (Rizzini) Irwin & Barneby, *Senna bacillaris* (Lf) Irwin & Barneby, *Senna chrysocarpa* (Desv.) Irwin & Barneby and *Senna trachypus* (Benth.) Irwin & Barneby. About *Senna spinigera*, specimens collected in the State were not indicated. The materials identified as *Senna bacillaris* (L.f) Irwin & Barneby were reidentified as *Senna affinis*. Five specimens identified by *Senna chrysocarpa* (Desv.) Irwin & Barneby were reidentified as *Senna velutina* (Irwin & Barneby), *Senna rugosa* (G.Don) Irwin & Barneby and *Senna reniformis* (G. Don) Irwin & Barneby and the identified materials As *Senna trachypus* were reidentified as *Senna oblongifolia* (Vogel) Irwin & Barneby. After updating these specimens, no other specimens of these species were found for the State. *Senna pilifera* (Vogel) Irwin & Barneby var. *tubata* Irwin & Barneby is a new registry for the state of Minas Gerais, the occurrence of *Senna acuruensis* (Benth.) Irwin & Barneby in the

State is confirmed in this study, where its occurrence was considered a possibility in the review study about the genus. *Senna hirsuta* (L.) Irwin & Barneby var. *acuminata* (Benth.) Irwin & Barneby is endemic to the state. Among the species and varieties found in this study, 36% are endemic to Brazil, 26% occur in up to three States, 48% in up to 10 States, and 26% are cited for more than 11 Brazilian States. *Senna* has great diversity in the biomes occurring in Minas Gerais, with 28 spp in the Cerrado, 26 spp in the Atlantic Forest and 20 spp in the Caatinga. The Atlantic Forest has 8 taxa that are considered restricted to its area of occurrence: *Senna angulata* (Vogel) Irwin & Barneby var. *miscadenia* (Vogel) Irwin & Barneby, *Senna itatiaiae* Irwin & Barneby, *S. neglecta* (Vogel) Irwin & Barneby var. *neglecta* and *S. neglecta* (Vogel) Irwin & Barneby var. *oligophylla* (Benth.) Irwin & Barneby, *Senna organensis* (Harms) Irwin & Barneby var. *organensis*, *Senna pneumatica* Irwin & Barneby, *Senna tenuifolia* (Vogel) Irwin & Barneby and *Senna tropica* (Vell.) Irwin & Barneby. For the Cerrado, *S. hirsuta* var. *acuminata* and *S. rostrata* (Mart.) Irwin & Barneby are considered of restricted occurrence to this Biome and, for the Caatinga, only *S. acuruensis* was found. *Senna pentagonia* (Mill.) Irwin & Barneby var. *pentagonia* had its occurrence extended to the Atlantic Forest Biome, since it was mentioned in the literature only for the Caatinga and the Cerrado. The data demonstrates the richness of the flora of State and the importance of its conservation. Identification key, descriptions, illustrations, taxonomic comments and geographical distribution are provided for this species.

RESUMO

ROSIGNOLI-OLIVEIRA, Letícia das Graças, M.Sc., Universidade Federal de Viçosa, fevereiro de 2017. ***Senna* Mill. (Leguminosae-Caesalpinioideae) no Estado de Minas Gerais, Brasil.** Orientadora: Flávia Cristina Pinto Garcia.

Senna Mill. é um gênero caracterizado pela presença de folhas pinadas, ausência de bractéolas, flores pentâmeras e, em geral amarelas, e androceu heteromórfico. Foi segregado de *Cassia* L. e, atualmente, possui entre 295-350 espécies em todo o mundo, sendo 80 no Brasil. Em Minas Gerais um levantamento preliminar indicou a ocorrência de 75 nomes de espécies, 351 espécimes não identificados e, na Flora do Brasil, foram indicadas 39 espécies. Este trabalho visa atualizar as identificações dos acervos e delimitar a circunscrição das espécies de *Senna* encontradas no estado de Minas Gerais. O estudo foi realizado com base na análise morfológica de cerca de 2350 espécimes depositados em herbários e de trabalhos de campo. Os materiais coletados foram depositados no Herbário VIC e a identificação foi realizada através da literatura taxonômica para o gênero. Os dados de ocorrência e distribuição das espécies foram obtidos nas etiquetas dos espécimes depositados em herbários e dos estudos taxonômicos publicados para estas espécies. Para os mapas de distribuição geográfica foi utilizado o software ArcGis. Foram reconhecidas 36 espécies, sendo 34 nativas, duas cultivadas e 28 variedades. *Chamaefistula* (Collad.) Irwin & Barneby é a seção mais representada no Estado, com 10 séries e 28 espécies, seguida por sect. *Peiranisia* (Raf.) Irwin & Barneby com 2 séries e 5 espécies e sect. *Senna* Mill com 2 séries e 3 espécies. Dentre as espécies citadas na literatura como ocorrentes em Minas Gerais, neste estudo foi incluída *Senna acuruensis* (Benth.) Irwin & Barneby e 4 espécies foram excluídas da listagem produzida: *Senna spinigera* (Rizzini) Irwin & Barneby, *Senna bacillaris* (L.f.) Irwin & Barneby, *Senna chrysocarpa* (Desv.) Irwin & Barneby e *Senna trachypus* (Benth.) Irwin & Barneby. Para *Senna spinigera* não foram indicados espécimes coletados no Estado. Os materiais identificados como *Senna bacillaris* (L.f.) Irwin & Barneby foram reidentificados como *Senna affinis*. Cinco espécimes identificados como *Senna chrysocarpa* (Desv.) Irwin & Barneby foram reidentificados como *Senna velutina* (Vogel) Irwin & Barneby, *Senna rugosa* (G.Don) Irwin & Barneby e *Senna reniformis* (G. Don) Irwin & Barneby, e os materiais identificados como *Senna trachypus* foram reidentificados como *Senna oblongifolia* (Vogel) Irwin & Barneby. Após a atualização desses espécimes examinados não foram encontrados outros materiais dessas espécies para o Estado. *Senna pilifera* (Vogel) Irwin & Barneby var.

tubata Irwin & Barneby é um novo registro para Minas Gerais. A ocorrência de *Senna acuruensis* (Benth.) Irwin & Barneby no Estado é confirmada neste estudo, onde foi considerada uma possibilidade no estudo de revisão do gênero. *Senna hirsuta* (L.) Irwin & Barneby var. *acuminata* (Benth.) Irwin & Barneby é endêmica do Estado. Dentre as espécies e variedades encontradas neste trabalho, 36% são endêmicas do Brasil, 26% ocorrem em até três Estados, 48% em até 10 Estados e 26% são citadas para mais de 11 Estados Brasileiros. O gênero *Senna* tem grande diversidade nos biomas ocorrentes em Minas Gerais, com 28 spp no Cerrado, 26 spp na Mata Atlântica e 20 spp na Caatinga. A Mata Atlântica possui 8 táxons que são considerados restritos a sua área de ocorrência: *Senna angulata* (Vogel) Irwin & Barneby var. *miscadenia* (Vogel) Irwin & Barneby, *Senna itatiaiae* Irwin & Barneby, *S. neglecta* (Vogel) Irwin & Barneby var. *neglecta* and *S. neglecta* (Vogel) Irwin & Barneby var. *oligophylla* (Benth.) Irwin & Barneby, *Senna organensis* (Harms) Irwin & Barneby var. *organensis*, *Senna pneumatica* Irwin & Barneby, *Senna tenuifolia* (Vogel) Irwin & Barneby e *Senna tropica* (Vell.) Irwin & Barneby. Para o Cerrado, são consideradas de ocorrência restrita ao Bioma *S. hirsuta* var. *acuminata* e *S. rostrata* (Mart.) Irwin & Barneby e, para a Caatinga, foi encontrada apenas *S. acuruensis*. *Senna pentagonia* (Mill.) Irwin & Barneby var. *pentagonia* teve sua ocorrência ampliada para a Mata Atlântica, visto que era citada na literatura apenas para a Caatinga e para o Cerrado. Os dados demonstram a riqueza da Flora de Minas Gerais e a importância de sua conservação. São fornecidos para as espécies chave de identificação, descrições, ilustrações, comentários taxonômicos e sobre a distribuição geográfica.

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1. Introduction

The description of *Senna* was performed by Miller (1754) using *Senna alexandrina* Mill. and the author mentioned that some species commonly known as *Senna* were positioned in *Cassia* (L.). However, in following taxonomic studies, the authors did not recognize the genus *Senna* and several classifications were proposed at the level sections in the following publications: Persoon (1805); Collad. (1816); De Candolle (1825); Vogel (1837); Benth. (1870, 1871) and Irwin & Barneby (1967, 1977).

However, Irwin & Barneby (1981) proposed the segregation of *Cassia* in three genera: *Cassia* L. *sensu strictu*, *Chamaecrista* Moench and *Senna* Mill., and they became part of Cassieae subtrib. *Cassiinae* Irwin & Barneby. Based on morphological characters, these authors worked in a revision of the subtribe for American Continent (Irwin & Barneby 1982). Years later, the segregation of *Cassia* L. was confirmed by molecular studies (Tripathi & Goswami 2011; Acharya *et al.*, 2011).

Senna is the largest genus of the *Cassiinae* Irwin & Barneby, with 295-350 species worldwide (Stevens 2012) and a significant representation in the American Continent with 202 species registered by Irwin & Barneby (1982). The species can be recognized by the pinnate leaves, the presence of nectary is common in almost all species, located in the petiole, rachis or pedicel, pentamerous flowers, in general, yellow, absence of bracteoles, androecium with 3 adaxial staminodes and 6-7 fertile stamens, free and heteromorphic.

Irwin & Barneby (1982) proposed an infrageneric classification in 6 sections and 35 series, whose phylogenetic relation was tested by Marazzi *et al.* (2006). In their study, 87 *Senna* spp were analyzed and the results showed that only the section *Psilorhegma* (Vogel) H. S. Irwin & Barneby is monophyletic; the sections *Chamaefistula* (Collad.) H. S. Irwin & Barneby, *Peiranisia* (Rafinesque) H. S. Irwin & Barneby and *Senna* P. Mill. are paraphyletic, while *Astroites* H. S. Irwin & Barneby and *Paradictyon* Irwin & Barneby are included in the sections *Senna* and *Chamaefistula*, respectively.

In Brazil, 80 species of *Senna* were registered (BFG 2015). In floristics studies, 40 spp were recognized for the State of Bahia (Lewis 1987); 25 spp for Pernambuco (Lima 1999); 19 spp in Rio Grande do Sul (Rodriguez *et al.* 2004); 17 spp in Santa Catarina (Bortoluzzi *et al.* 2011); in Central region: 26 spp in Mato Grosso, 25 spp in Goiás 23 in Mato Grosso do Sul and 18 in Federal District (Santos 2013) and 24 spp in São Paulo (Romão & Souza 2016). For Minas Gerais, BFG (2015) has cited about 39

species occurring in state, nearly half the number of species cited from Brazil and, it is considered the second most diverse State of this genus, behind only Bahia State, with 49 spp currently cited (BFG 2015).

Preliminar surveys in herbaria collections by specieslink, indicated 75 names and 351 specimens without identification, making the taxonomic study relevant in order to know the diversity of the genus in Minas Gerais, which is the fourth largest state of Brazil with its territory covered by the Atlantic Forest, Caatinga and Cerrado regions, resulting in a great diversity of landscapes and flora richness (Drummond *et al.* 2005).

This study aims to achieve a taxonomic study of *Senna* species occurring in Minas Gerais. Identification keys, descriptions, illustrations, geographic distribution and taxonomic comments for the species are presented, providing information for the knowledge of the flora of the State and contributing to the elaboration of the Flora of Brazil Online 2020 project.

2. Material and methods

2.1 Area of study

Minas Gerais occupies an area of 588.384 km² and is located in the southeastern region of Brazil, bordering the States of Bahia, Espírito Santo, Goiás, Federal District, Mato Grosso do Sul, Rio de Janeiro and São Paulo. Its territorial extension in addition to the water availability with five river basins, the rugged relief and the climate, allowed for the existence of a rich vegetation cover, distributed in the Caatinga, Cerrado and Atlantic Forest Biomes (Fig. 1) (Drummond *et al.* 2005). Rock fields also occur at altitudes generally above 900 m (Biota Minas 2009).

The Atlantic Forest resides in the eastern region of Minas Gerais, and occupies about 41% of the territory (Drummond *et al.* 2005), but currently its area was reduced to about 4% of the original cover (Biota Minas 2009). The Cerrado, located in the central-west region of the state, occupies an area of about 57% (Biota Minas 2009) and between 2002-2008 its deforested area in State is about 6% (MMA 2009). The Caatinga, located to the north, occupies a relatively small area, representing about 2% of the territory (Biota Minas 2009) with deforest area of 0,04% between 2002-2008 (MMA 2010).

The geographical distribution of the species in the Biomes occurring in Minas Gerais for the maps and comments about species was performed IBGE (2004).

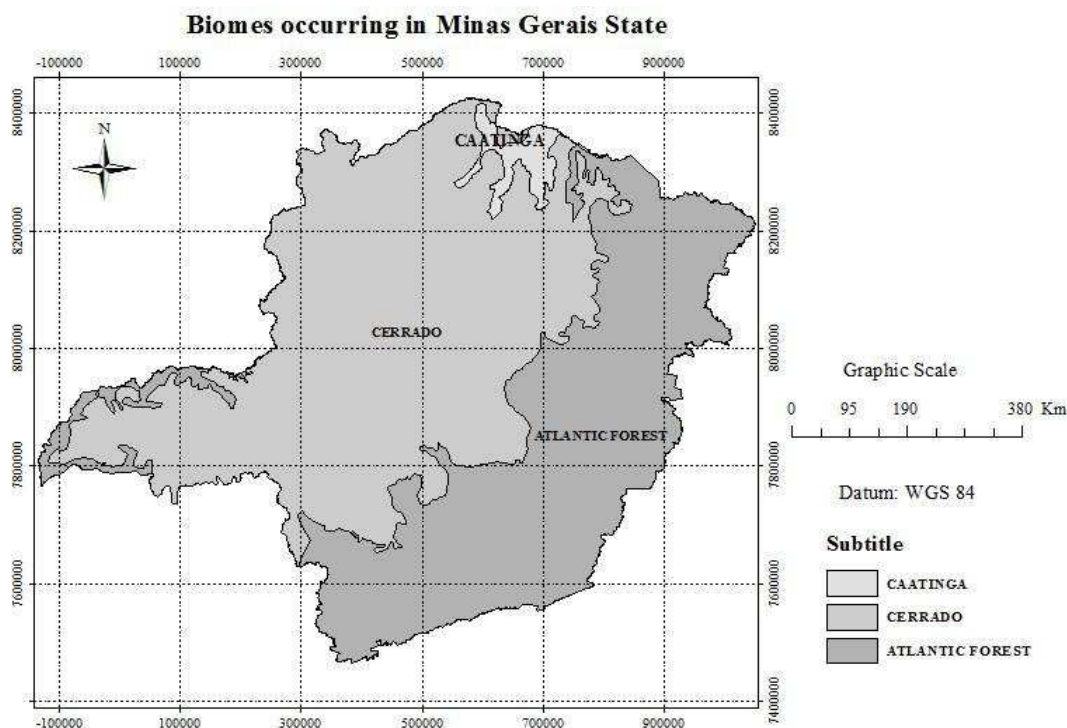


Fig. 1: Biomes occurring in Minas Gerais state. Font: IBGE (2004)

2.2 Taxonomic study

The taxonomic study of the species was based on morphological analysis of *Senna* specimens, occurring in the State of Minas Gerais, deposited in collections of 19 national and 1 foreign herbaria (Table 1), being 11 herbaria was visited, 7 herbaria was received specimens by loans and the specimens deposited at NY was observed only virtually. The typus observed virtually in specieslink and Re flora site were included in examined specimens with the symbol “!”.

In total, about 2.348 specimens of *Senna* from Minas Gerais were observed, not counting the specimens from other States analyzed during the separation of materials in herbaria.

Table 1: Herbaria consulted to complete this study. Acronyms according to *Index Herbariorum* (Holmgren & Holmgren 2009). “*” in the acronyms means herbaria visited.

Acronymy	Herbaria of Institution	Locality
BHCB*	Universidade Federal de Minas Gerais-UFGM	Belo Horizonte-MG, Brazil
CEN	EMBRAPA Recursos Geneticos e Biotecnologia	Brasília-DF, Brazil
CESJ*	Universidade Federal de Juiz de Fora	Juiz de Fora-MG, Brazil

Acronymy	Herbaria of Institution	Locality
DIAM*	Universidade Federal dos Vales do Jequitinhonha e Mucuri-UFVJM	Diamantina-MG, Brazil
ESA*	Escola Superior de Agricultura Luiz de Queiroz da Universidade de São Paulo-Esalq	Piracicaba-SP, Brazil
FLOR	Universidade Federal de Santa Catarina-UFSC	Florianópolis-RS, Brazil
FUEL	Universidade Estadual de Londrina-UDEL	Londrina-PR, Brazil
HUEFS	Universidade Estadual de Feira de Santana-UEFS	Feira de Santana- BA, Brazil
HUFU*	Herbário Uberlandense-UFU	Uberlândia, MG, Brazil
IBT*	Instituto de Botânica	São Paulo-SP, Brazil
IPA	Empresa Pernambucana de Pesquisa Agropecuária	Recife-PE, Brazil
MBM	Museu Botânico de Curitiba-MBM	Curitiba-PR, Brazil
NY	New York Botanical Garden-NYBG	New York, EUA
OUPR*	Universidade Federal de Ouro Preto-UFOP	Ouro Preto-MG, Brazil
R	Museu Nacional, Universidade Federal do Rio de Janeiro-UFRJ	Rio de Janeiro-RJ, , Brazil
RB*	Jardim Botânico do Rio de Janeiro- JBRJ	Rio de Janeiro-RJ, Brazil
SPF*	Universidade de São Paulo-USP	São Paulo-SP, Brazil
UB	Universidade de Brasília-UNB	Brasília-DF, Brazil
UEC*	Universidade Estadual de Campinas-UNICAMP	Campinas- SP, Brazil
VIC*	Universidade Federal de Viçosa- UFV	Viçosa-MG, Brazil

Expeditions were conducted to complement and update the collections of this group (Table 2)

Table 2: Collection points in Minas Gerais state. Font: ICMBIO, IEF, Google Maps

Collection point	Ecosystems	Approximate coordinate
Caparaó National Park: Between Minas and Espírito Santo State. In Minas includes: Alto Caparaó, Alto Jequitibá, Divino, Espera Feliz, Lajinha Manhuaçu, and Presidente Soares	Atlantic Forest	20 °19' -20 °37' S, 41 °43' -41 °53' W
Serra do Cipó National Park: includes: Itambé do Mato Dentro, Jaboticatubas, Morro do Pilar and Santana do Riacho	Cerrado, Rock Field	19° 12' - 19° 34' S, 43° 27' - 43° 38' W

Collection point	Biome	Approximate coordinate
Biribiri State Park: Diamantina.	Cerrado, Rock Field and Galery Forest	18°14' S, 43°37' W
Serra do Cabral State Park: Buenopolis and Joaquim Felício.	Cerrado and Vereda	17° 35' S, 44° 35' W
Conceição do Ibitipoca	Atlantic Forest	21°43' S, 43°55' W
Senador Firmino	Atlantic Forest	20°54' S, 43°06' W
Ubá	Atlantic Forest	21°04' S, 42°58' W
Viçosa	Atlantic Forest	20°45' S, 42°52' W

The collected materials were herborized according to Bridson & Forman (1999) and deposited in the collection of the VIC Herbarium, Department of Plant Biology, Federal University of Viçosa (UFV).

The species identification of the materials was accomplished through the taxonomic literature for the genus (Irwin & Barneby 1982; Rodrigues *et al.* 2004; Bortoluzzi *et al.* 2011; Dantas & Silva 2013; Santos 2013; Kuntz 2014).

The terminology for morphological descriptions followed Radford *et al.* (1974), except staminodios that also Marazzi (2007). Measurements of structures were performed based on herborized specimens after rehydration. The identification key for species was based on the vegetative and reproductive characteristics of the observed material and the illustrations were made with the support of a camera lucida attached to a Zeiss stereomicroscope and included the general appearance of the branches, the reproductive part and details of the important structures for the recognition of the species and the varieties.

Information about geographical distribution of the species was collected during the expeditions and the consulted specimens labels were deposited in herbaria and taxonomic studies of this group (Irwin & Barneby 1982; BFG 2015). For the labels without the information, the geographic coordinates were obtained by GoogleEarth, using the point summoned by the municipality. The ArcGIS software was used to make geographic distribution maps.

3. Results and Discussion

3.1 Taxonomy treatment

Senna Mill., Gard. Dict. Abr. ed. 4, vol. 3. 1754.

Trees, shrubs, sub-shrubs, scandent shrubs or lianas. Branches cylindrical, angular or sulcate, glabrous, sparse tomentose, sparse pubescent, tomentose or hirsute. Leaves petiolate; nectary can be present or absent in petiole and rachis. Stipules filiform, linear, triangular, ovate, reniform, falciform or lanceolate, deciduous or persistent. Leaflets pinnate, glabrous or with variable indument. Racemes: typic, umbellate, corimbiform or paniculas, axillary and/or terminal. Bracts persistent or deciduous; pedicel with nectary or not. bracteoles absent. Sepals 5, free, heteromorphic, rare similar size. Corolla zigomorphic or asymmetric; petals 5, free, yellow. Flowers hermaphrodite. Androecium with 3 adaxial staminodes, 6–7 stamens fertile, free and heteromorphic: 4 adaxial stamens, 1 centric abaxial stamen and 2 abaxial stamens, anthers with dehiscence poricida apical. Ovary sessil or stipitate. Legume dehiscent or indehiscent, cylindrical, linear, oblong, flat-compressed, or quadrangular. Seeds 1 or 2-seriate.

In this taxonomy study, 36 species of *Senna* were confirmed to occur in Minas Gerais, of which 4 represented the only variety of a species and another 10 species having two or more varieties and, in this case, 28 varieties. Most are native and only two cultivated species were recognized: *Senna corymbosa* (Lam.) Irwin & Barneby, whose material was analyzed, confirmed and included in the identification key, and *Senna reticulata* (Willd.) Irwin & Barneby, represented in the State by only the specimen *H. S. Irwin 2020* (NY) and identified by H. S. Irwin and R. C. Barneby. This specimen was analyzed virtually but has no fertile material, which assists in the confirmation of the distinction of *S. alata* (L.) Roxb, similar specie, and thus it were not included in the identification key.

Irwin & Barneby (1982) recognized 6 sections for *Senna* and 35 series. In Minas Gerais occur 3 sections (Table 3): *S. sect. Chamaefistula* (Collad.) Irwin & Barneby represented by 10 series and 28 species; *S. sect. Peiranisia* (Rafinesque) Irwin & Barneby represented by 2 series and 5 species and *S. sect. Senna* Mill with 2 series and 3 species occurring in the State.

Table 3: Section and Series of *Senna*, with some characteristics and species occurring in Minas Gerais, according Irwin & Barbeny (1982)

SECTION	SERIE	SPECIES
<i>Chamaefistula</i> Corolla zygomorphic; two long abaxial stamens incurved opposed to the centric-adaxial petal.	<i>Bacillaris</i> Nectary present at rachis, between proximal pair and can be occurs in distal pair. Leaves 2 pairs of leaflets. Raceme or panicula. Pod turgid	<i>S. affinis</i> (Benth.) Irwin & Barneby <i>S. angulata</i> (Vogel) Irwin & Barneby <i>S. macranthera</i> (Collad.) Irwin & Barneby <i>S. rugosa</i> (G.Don) Irwin & Barneby <i>S. splendida</i> (Vogel) Irwin & Barneby <i>S. tenuifolia</i> (Vogel) Irwin & Barneby
	<i>Basiglandulosae</i> Nectary present at base of petiole. Leaves 3-8 pairs of leaflets. Raceme. Pod flat-compressed or turgidly compressed	<i>S. cernua</i> (Balb.) Irwin & Barneby <i>S. hirsuta</i> (L.) Irwin & Barneby <i>S. neglecta</i> (Vogel) Irwin & Barneby <i>S. occidentalis</i> (L.) Link
	<i>Coluteoideae</i> Nectary present between the proximal pair, can be occurs between all pairs and in <i>Senna oblongifolia</i> occurs in petiole. Leaves 2-11 pairs of leaflets. Raceme. Pod cylindrical or laterally compressed	<i>S. corymbosa</i> (Lam.) Irwin & Barneby <i>S. itatiaiae</i> Irwin & Barneby <i>S. oblongifolia</i> (Vogel) Irwin & Barneby <i>S. pendula</i> (Willd.) Irwin & Barneby <i>S. tropica</i> (Vell) Irwin & Barneby
	<i>Coriaceae</i> Nectary present between all leaflets pair. Stipules dilated. Raceme. Pod flat-compressed	<i>S. corifolia</i> (Benth.) Irwin & Barneby <i>S. reniformis</i> (G. Don) Irwin & Barneby
	<i>Confertae</i> Nectary present between 2-4 pairs. Leaves 3-5 pairs of leaflets. Racemes. Pod compressed	<i>S. uniflora</i> (Mill.) Irwin & Barneby
	<i>Floridae</i> Nectary absent. Leaves 5-20 pairs of leaflets. Panicula. Pod flat-compressed	<i>S. siamea</i> (Lam.) Irwin & Barneby
	<i>Laxiflorae</i> Nectary present between all leaflets pair and in pedicel. Stipules commonly but not always dilated. Raceme. Pod compressed	<i>S. cana</i> (Ness & Mart.) Irwin & Barneby <i>S. velutina</i> (Vogel) Irwin & Barneby
	<i>Sapindifolieae</i> Nectary absent. Leaves (3-)4-13 pairs of leaflets. Panicula or subcorymbose raceme. Pod plano-compressed	<i>S. silvestris</i> (Vell) Irwin & Barneby
	<i>Stipulaceae</i> Nectary present, between proximal pair, sometimes between the distal pairs. Leaves (2-)3-14(-16) pairs of leaflets. Pod flat-compressed	<i>S. organensis</i> (Harms) Irwin & Barneby <i>S. pneumatica</i> Irwin & Barneby
	<i>Trigonelloideae</i> Nectary always between the proximal pair, sometimes between others leaflets. Leaves 1-3 pairs of leaflets. Raceme. Pod compressed.	<i>S. mucronifera</i> (Benth.) Irwin & Barneby <i>S. obtusifolia</i> (L.) Irwin & Barneby <i>S. pilifera</i> (Vogel) Irwin & Barneby <i>S. pentagonia</i> (Mill.) Irwin & Barneby

SECTION	SERIE	SPECIES
<p>Peirania</p> <p>Flowers with corolla strong asymmetrical, one abaxial petal modified in shape, texture or both and opposed to the lateral pistil</p>	<p>Excelsa</p> <p>Nectary absent. Leaves (8-)11-20 pairs of leaflets. Panicula. Pod turgid</p>	<p><i>S. spectabilis</i> (DC.) Irwin & Barneby</p>
	<p>Interglandulosae</p> <p>Nectary present, always between proximal pairs and sometimes occur in other pairs of leaflets. Leaves 2-63 pairs of leaflets. Racemes subumbellately. Pod flat-compressed</p>	<p><i>S. acuruensis</i> (Benth.) Irwin & Barneby <i>S. aristeguietae</i> Irwin & Barneby <i>S. rostrata</i> (Mart.) Irwin & Barneby <i>S. multijuga</i> (Rich.) Irwin & Barneby</p>
<p>Senna</p> <p>Two long abaxial stamens arranged in a horizontal plane to the axis of floral symmetry, anthers curved like the arms of tongs</p>	<p>Aculeata</p> <p>Resembles <i>Senna pictae</i> in form of inflorescence, floral morphology and pod, but serie <i>Aculeata</i> has prinkles</p>	<p><i>S. aculeata</i> (Pohl ex Benth.) Irwin & Barneby</p>
	<p>Pictae</p> <p>Leaves 4-30 pairs of leaflets; Raceme. Pod usually flat-compressed, in <i>S. alata</i> has valves</p>	<p><i>S. alata</i> (L.) Roxb <i>S. reticulata</i> (Willd.) Irwin & Barneby</p>

Preliminary surveys using the specieslink site, presented 75 species names cited for Minas Gerais. After the analysis of these names it was possible to conclude that there were some mistakes in the denominations. Some specimens were outdated, with reference to the synonyms. Another form of invalid nomenclature was the use of *Senna* as the epithet for the *Chamaecrista*'s species or for varieties of *Senna*'s species. Moreover, in the analysis of the specimens, it was possible to find several incorrect identifications. After filtering and analyzing materials, we reached the number of 36 confirmed species occurring in Minas Gerais.

In BFG (2015) the occurrence of 39 species is reported for Minas Gerais, but the number found in this study was lower. *Senna spinigera* (Rizzini) Irwin & Barneby, *Senna bacillaris* (L.f.) Irwin & Barneby, *Senna chrysocarpa* (Desv.) Irwin & Barneby and *Senna trachypus* (Benth.) Irwin & Barneby were excluded from the list produced here.

Senna spinigera (Rizzini) Irwin & Barneby was cited in BFG (2015), however no specimens collected in the State was indicated. The materials identified as *Senna bacillaris* (L.f.) Irwin & Barneby were reidentified as *Senna affinis* (Benth.) Irwin & Barneby, its similar specie.

Five specimens identified by *Senna chrysocarpa* (Desv.) Irwin & Barneby were found and examined, but were reidentified: *E. P. Heringer 18480* (IBT; VIC) as *S. velutina* (Vogel) Irwin & Barneby; *L. Krieger* (CESJ 8287) and *L. Krieger & U. C. Camara* (CESJ 8823) as *S. rugosa* (G. Don) Irwin & Barneby and *L. Krieger* (CESJ 10689) as *Senna reniformis* (G. Don) Irwin & Barneby. *Senna trachypus* (Benth.) Irwin & Barneby represented by materials *J. Badini s.n* (OUPR 19661; 19662; 19663 and 19664) was reidentified as *Senna oblongifolia* (Vogel) Irwin & Barneby. After the update these examined specimens, no other specimens of these species were found for the State.

Senna pilifera (Vogel) Irwin & Barneby var. *tubata* Irwin & Barneby is a new record for the State.

In this study, the occurrence of *Senna acuruensis* (Benth.) Irwin & Barneby was confirmed, which Irwin & Barneby (1982) considered a possibility in the State and which wasn't cited in the BFG (2015).

In the following section, I present the taxonomic treatment of the *Senna* species

3.2 Key to species of *Senna* Mill. occurring in Minas Gerais

1. Nectary absent
 2. Prinkles present.....1. *S. aculeata*
 - 2'. Prinkles absent
 3. Racemes typic; legume cylindrical
 4. Stipule filiform; leaflets distal pair 3.5–4.5 × 1.5–2 cm, corolla asymmetrical; legume not winged.....29.*S. spectabilis* var. *excelsa*
 - 4'. Stipule triangular; leaflets distal pair 9.5–13 × 6.5–8 cm; corolla zygomorphic; legume winged.....4.*S. alata*
 - 3'. Racemes corimbiform; legume flat-compressed
 5. Leaflets apex acute or cuspidate, but rare retuse or obtuse in some leaflets; corolla yellow and orange base of the petals; legume 9–16 cm long, straight, vinaceous when mature.....28.*S. silvestris*
 - 5'. Leaflets apex predominantly retuse; corolla yellow; Legume 20–23cm, undulate, brown when mature.....27.*S. siamea*
- 1'. Nectary present

6. Nectary present in petiole
7. Nectary present in the upper half of the petiole.....**16.S. oblongifolia**
- 7'. Nectary present in the lower half of the petiole
8. Apex cuspidate or acuminate
9. Leaflets glabrous; pod light color on the margins.....**18.S. occidentalis**
- 9'. Leaflets hirsutulous or strigulose; pod all light brown when mature.....**10.S. hirsuta**
- 8' Apex acute or obtuse
10. Rachis 11.5–17(18.5) cm long; pod 19–24 (-29.5) × 0.3-0.5 cm...**8.S. cernua**
- 10'. Rachis (3–)4–6 cm long; pod 8.8–14 × 0.7–1 cm.....**15.S. neglecta**
- 6'. Nectary absent in petiole, present in leaf rachis and present or absent in pedicel
11. Leaflets 2 pairs
12. Branches hirsute.....**22.S. pilifera**
- 12'. Branches not hirsute
13. Bracts 6-12 x 2-5 mm; late deciduous.....**5.S. angulata**
- 13'. Bracts 1-4 x 0.5-1 mm, they can be 5-6 mm long, but ca. 0.5 mm wide in *S. splendida* and 1-2 mm wide in *S. tenuifolia*, deciduous
14. Nectary conical, pisiform or ovate,
15. Leaflets coriaceous; nectary always between leaflets of two pairs, veins patent; legume 7.5–15 × 1–1.5 cm, black when mature.....
-**26.S. rugosa**
- 15'. Leaflets cartaceous; nectary between leaflets of proximal pairs, can be occurs between second pair also in *S. macranthera*; veins tenuous, can be patente in *S. affinis*; legume 19–37 (-40) × 0.5–1 cm, brown when mature
16. Branches cylindrical, anther of abaxial stamens 8–12 mm long.; legume externally depressed between seed locules.....**12.S. macranthera**
- 16' Branche angular, rare cylindrical, anther of abaxial stamens 5–6 mm long; legume externally smooth.....**3.S. affinis**
- 14'. Nectary narrowly elliptic, falciform or cravate
17. Leaflets glabrous, apex retuse or acute; sepals glabrous.....
-**30.S. splendida**

- 17'. Leaflets sparse tomentose, apex cuspidate; sepals pubescent.....**31.S. tenuifolia**
- 11'. Leaflets more than 2 pairs
18. Nectary present in leaf rachis and in pedicel, but can be deciduous in pedicel of *S.uniflora* and in some specimens of *S.cana*
19. Stipules linear or filiform
20. Leaflets glabrous; nectary between the proximal pair; legume sparse tomentose.....**25.S. rostrata**
- 20'. Leaflets velutinous; nectary between 4-proximal pairs; legume velutinous.....**33.S. uniflora**
- 19'. Stipules reniform, falciform sometimes in *S. cana*
21. Leaflets lanose, villous or velutinous
22. Abaxial surface of leaflets lanose or villous; legume slightly compressed.....**7. S. cana**
- 22'. Abaxial surface of leaflets velutinous; legume subquadrangular...
.....**34.S. velutina**
- 21'. Leaflets glabrous
23. Leaflets coriaceous, veins patent, apex retuse, stipules apex rounded
.....**9 .S. corifolia var. caesia**
- 23'. Leaflets cartaceous, veins tenuous, apex cuspidate; stipules apex acute.....**24.S. reniformis**
- 18'. Nectary present in leaf rachis and absent in pedicel
24. Leaflets 3-7 pairs, 2 can be occurs in *S. corymbosa* and *S. tropica*
25. Branches sulcate
26. Stipules ovate; legume subcylindrical, turgid.....**11.S. itatiaiae**
- 26'. Stipules linear-falciform; legume oblong, flat-compressed.....
.....**19.S.organensis var. organensis**
- 25'. Branches not sulcate
27. Apex acute of leaflets, cuspidate in *S. tropica*
28. Corolla asymmetrical.....**13.S. mucronifera**
- 28'. Corolla zygomorphic
29. Leaflets pairs 2-3, distal pair 0.6-0.8 cm wide; nectary between the proximal pair of leaflets.....**S. corymbosa*** (cultivated)

- 29'. Leaflets pairs (2-) 3-4, distal pair 1.5-2.5 cm wide; nectary between leaflets of all pairs, sometimes absent on the last pair.....**32.S. tropica**
- 27'. Leaflets apex rounded or obtuse
30. Legume linear, flat-compressed
31. Leaflets 3 pairs; stipule linear-falciform; sepals sparse tomentose**17. S. obtusifolia**
- 31'. Leaflets 7-9 pairs; stipule ovate; sepals hirsute.....
.....**23.S. pneumatica**
- 30'. Legume not linear and not compressed
32. Leaflets 3 pairs; latero-abaxial stamens filaments 1-2 mm long; legume winged.....**21. S. pentagonia var. pentagonia**
- 32'. Leaflets 4-5(-6) pairs; latero-abaxial stamen filaments 15-25 mm long; legume subcylindrical.....**20.S. pendula**
- 24'. Leaflets 10-37 pairs
33. Trees; branches and rachis sparse or densely tomentose.....
.....**14.S. multijuga**
- 33'. Shrubs; branches and rachis viscidulus
34. Branches sparse tomentose and hispidulous; petal centric adaxial ca. 20 × 8 mm.....**6.S. aristeguietae**
- 34'. Branches sparse tomentose; petal centric adaxial ca. 7 × 3 mm
.....**2.S. acuruensis**

3.3 Synopsis of the *Senna* species in Minas Gerais state

1. *Senna aculeata* (Pohl ex Benth.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 478. 1982. Fig. 2: A-D; Map: Fig. 4
Cassia aculeata Pohl ex Benth in Mart., Fl. Bras. 15(2): 128, t. 39. 1870.

Shrubs, 1–1.8 m alt. Branches cylindrical, prickly and trichomes capitate. Leaves 11–12 pairs of leaflets; stipules 35–45(-50) × 10–20 mm, ovate, base cordate, apex acute, persistent; petiole 2–3 cm long.; nectary absent; leaf rachis (7-)14–18 cm long., prickly; leaflets narrowly elliptic, apex acute, mucronate, both sides glabrous, veins tenuous, cartaceous, margin glabrous, proximal pair 3.5–5 × 0.8–1.5 cm, distal pair 4–6 × 0.5–1.6 cm. Racemes terminal, with flowers united at apex; peduncle ca. 7 cm long.; inflorescence rachis ca. 2.5 cm long. Bracts 25–30 × 15 mm, elliptic-acuminate, deciduous; pedicel ca. 7 mm long., nectary absent. Sepals ca. 10 × 10 mm, similar size, circular or elliptic, apex rounded or obtuse, dorsal surface with capitate trichome. Corolla zygomorphic; petals glabrous, yellow, centric adaxial petal 10–12 × 5–6 mm, ovate, apex rounded, latero-adaxial and latero-abaxial petals ovate or elliptic, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina arrowlike, medium stamens filaments ca. 2 mm long., anther ca. 3 mm long., centric abaxial stamen filament ca. 5 mm long., anther ca. 3 mm long., latero-abaxial stamens filaments ca. 4 mm long., straight, anther ca. 8 mm long, rostro oblique, ca. 1 mm long. Ovary glabrous, style ca. 1.5 cm long., with capitate trichomes. Legume 9–12.5 × 1.7–2 cm, oblong, flat-compressed, externally slightly depressed between seed locules, straight, glabrous, brown when mature, indehiscent. Seeds ca. 6 × 3 mm, 1-seriate, oblong.

This specie is the only representative of serie *Aculeata* (Table 3) found in Minas Gerais and it is easily recognized by the presence of prickles on the branches and in leaf rachis (Fig. 2A). Besides that, it has large stipules (Fig. 2 B) and bracts, flowers united at apex of inflorescence and flat-compressed legume (Fig. 2C,D).

Senna aculeata is distributed throughout the American continent, from Cuba to Paraguay (Irwin & Barneby 1982). In Brazil, it occurs in Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Piauí and Tocantins, as well as in Caatinga, Cerrado and Pantanal (Table 4). It occurs in flooded places, lagoon margins, pastures and disturbed areas (Irwin & Barneby 1982).

There are few records of this species in Minas Gerais, but in bordering States of the eastern region of Brazil it is more abundant (Santos 2013). The only material examined was collected in the eastern of the state (Fig. 4), in a region closer to the Goiás State. Collected near river. It was found with flower and fruit in November.

Examined specimens: BRAZIL. MINAS GERAIS: Entre Sagarana e Riachinho do Rio Urucuia 16°10' S, 46°4', elev. 544m, 27.XI.2000, fl. e fr., *C. Proença et al.* 2343 (FUEL, MBM)

2. *Senna acuruensis* (Benth.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 506. 1982. Fig. 2: E-I; Map: Fig. 4

Cassia acuruensis Benth. in Mart., Fl. Bras. 15(2): 122. 1870

Shrubs, ca. 3 m alt. Branches cylindrical, viscidulous and sparse tomentose. Leaves 12–17 pairs of leaflets; stipules ca. 5×0.1 mm, setiform, base truncate, apex acuminate, deciduous; petiole 1–1.3 cm long; nectary piriform-acuminate, stipitate, present at rachis between the first and the second pair of leaflets, sometimes between the third and fourth pairs; leaf rachis 4–5 cm long., viscidulous and sparse tomentose; leaflets narrowly elliptic or obovate, apex rounded or obtuse, mucronulate, adaxial surface sparse tomentose and abaxial surface tomentose, veins tenuous, chartaceous, margin ciliolate, proximal pair $0.9\text{--}1.2 \times 0.4\text{--}0.5$ cm, distal pair $0.5\text{--}1 \times 0.3\text{--}0.5$ cm. Racemes axillary; peduncle 2–3.8 cm long.; inflorescence rachis 0.5–1.5 cm long. Bracts $1\text{--}3 \times 0.5\text{--}1$ mm, setiform, deciduous; pedicel 20–25 mm long., nectary absent. Sepals 5–6 \times 3–4 mm, different size, elliptic or ovate, apex rounded or acute, sepals glabrous or sparse tomentose; corolla asymmetric, petals sparse tomentose at veins, yellow, centric adaxial petal ca. 7×3 mm, elliptic, apex obtuse, latero–adaxial petals elliptic and latero–abaxial petals ovate and sub-reniform, apex obtuse. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina twisted, medium stamen filaments ca. 1 mm long., anther 5–7 mm long., centric–abaxial stamen filament ca. 2 mm long., anther ca. 5 mm long., latero–abaxial stamens filaments 4–5 mm long., straight, anther 5–7 mm long, rostro straight, 2–3 mm long. Ovary sparse tomentose, style 1.5–2 cm long., sparse tomentose. Legume dehiscent, ca. 5.5×1 cm, oblong, flat–compressed, externally slightly depressed between seed locules, slightly curved, finely tomentose, brown when mature. Seeds ca. 6×1 mm, 1-seriate, oblong.

The viscidulous rachis, the several small leaflets (Fig. 2E), the asymmetric corolla with the size and form of adaxial and abaxial petals unequal (Fig. 2 G) and the flat-compressed legume (Fig. 2H, I), allow the easy recognized of *Senna acuruensis*. Among the species of serie *Interglandulosae* (Table 3), it is more similar to *S. aristeguietae* Irwin & Barneby, but *Senna aristeguietae* has corolla with large centric-adaxial petal, ca. 20 mm long; and *S. acuruensis* has corolla with small centric adaxial petal, ca. 7 mm long.

Irwin & Barneby (1982) reduced *Cassia catinga* Harms to a variety of *Senna acuruensis*, then considering three varieties: var. *acuruensis*, var. *interjecta* and var. *catingae*. These taxons have adaxial petals with unequal size from abaxial petals. However, Queiroz (2009) based on vegetative characteristics, considered two different taxons: *Senna acuruensis* and *Senna catingae* (Harms) Queiroz.

Senna acuruensis has viscidulous and sparse tomentose branches and several small leaflets, 12-17 pairs, distal pair 0.5–1 × 0.3-0.5 cm (Fig. 2E); while *Senna catingae* has glabrous branches with some glandular trichomes only at base of petiole and smaller number of leaflets, which are larger in size: 6-7 pairs of leaflets, distal pair ca. 3 × 1.5 cm. This specie was not found in Minas Gerais.

Senna acuruensis is endemic to Brazil and in the BFG (2015), it was cited to occur in the States of Alagoas, Bahia, Pernambuco and Sergipe. Irwin & Barneby (1982) considered was possible the occurrence of *Senna acuruensis* in Minas Gerais. They analyzed materials collected by Mart. in Grão Mogol, but according to these authors, the specimens needed confirmation. In this study, the occurrence of this variety in the State is confirmed.

Specie common in the Caatinga woodland (Irwin & Barneby 1982) (Fig. 4), collected in Minas Gerais in Carrascal, near a river and on the roadside. It was found with flowers and fruits in May.

Examined specimens: BRAZIL. MINAS GERAIS: Capitão Eneas, rodovia BR-365, 10-15 Km ao Norte do trevo, 3.IV.1992, G. Hatschbach et al. 56511 (MBM!); São João das Missões, 15° 00' S, 44° 00' W, 16.V.2010, fl. e fr., C. Vidal 815 (BHCB)

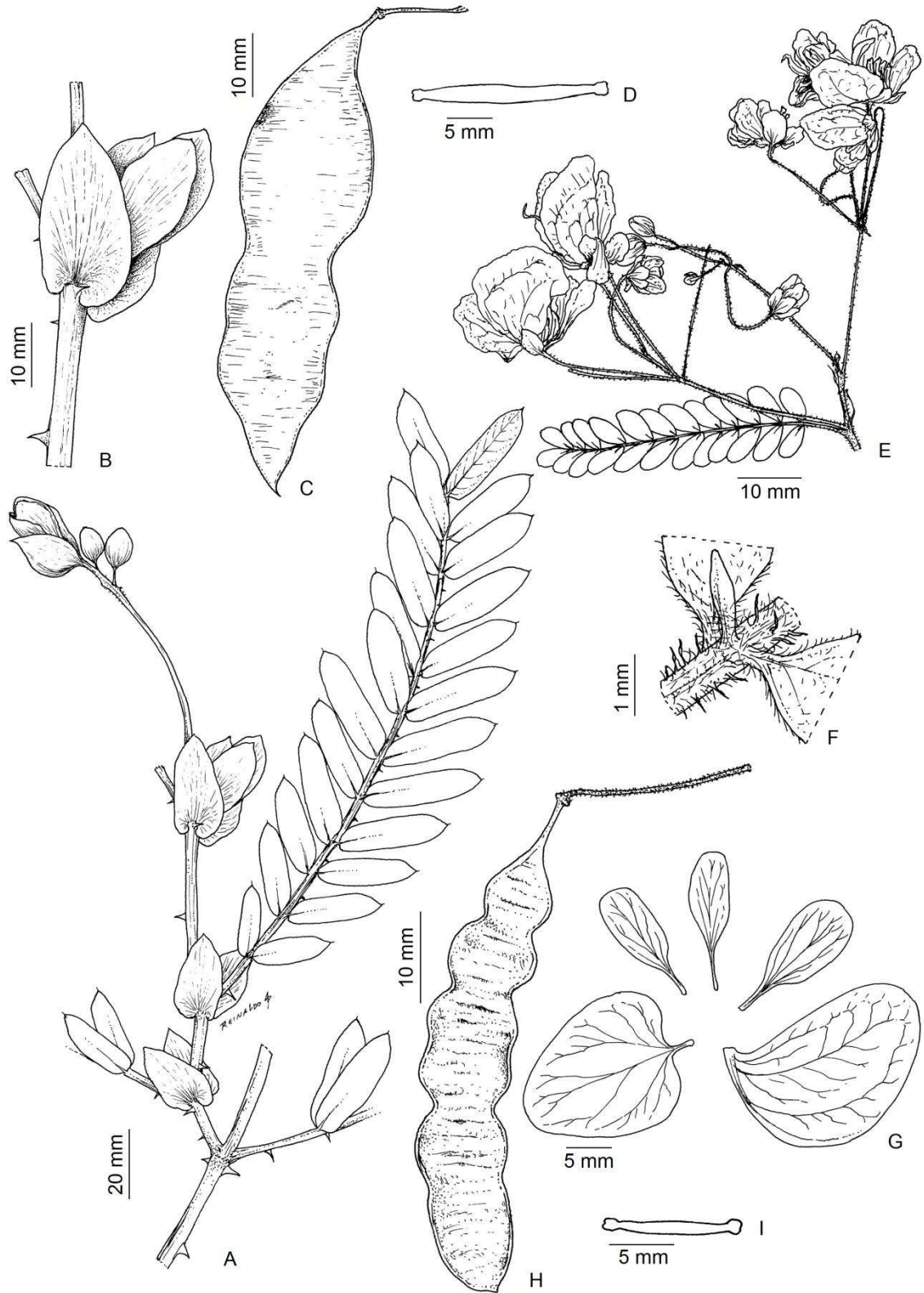


Fig. 2: *Senna aculeata* (Pohl ex Benth.) Irwin & Barneby: **A.** Branche with leaves and inflorescence. **B.** Stipule. **C.** Pod. **D.** Transversal section of pod; *S. acuriensis* (Benth.) Irwin & Barneby. **E.** Branche with leaves and inflorescence. **F.** Nectary between leaflets of proximal pair. **G.** Corolla. **H.** Pod. **I.** Transversal section of pod (**A-D:** *C. Proença et al.* 2343-MBM; **E-I:** *C. Vidal* 815-BHCB).

3. *Senna affinis* (Benth.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 123. 1982.

Fig. 3: A-H; Map: Fig. 4

Cassia affinis Benth. in Mart., Fl. Bras. 15(2): 98. 1870

Shrubs or small trees, 1.5–3 m alt. Branches angular, but can be occurs cylindrical, glabrous or sparse pubescent. Leaves 2 pairs of leaflets; stipules ca. 4(-17) x 0.5-1 mm, linear, curved or spiral when long, deciduous; petiole 4–8 cm long; nectary between the proximal pairs, conical or ovate, sessile; leaf rachis 1.8–4 cm, glabrous or with some sparse crooked trichomes; leaflets elliptic or obovate, apex acute, mucronulate, rare retuse, adaxial surface sparse pubescent and abaxial surface pubescent or tomentose, veins patente, cartaceous, margin glabrous or sparse pubescent, proximal pair 8–8.5(-11) x 4–5(-7) cm, distal pair 9–17 x 4–8 cm. Racemes axillary and panicle terminal; peduncle 2–2.5 cm long; inflorescence rachis 1.3–3 cm long. Bracts 3–4 x 0.5–1 mm, cymbiform, deciduous; pedicel 18–25 mm long., nectary absent. Sepals 6–10 x 3–5 mm, different size, ovate or elliptic, apex rounded or obtuse, sepals glabrous or sparse tomentose. Corolla zygomorphic; petals sparse tomentose in dorsal surface, yellow, centric adaxial petal 10–18 x 6–8 mm, elliptic or obovate, apex emarginated, latero–adaxial and latero–abaxial petals elliptic or obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina elliptic, medium stamen filaments 2–3 mm long., anther 4–5 mm long., centric–abaxial stamen filament 3–4 mm long., anther 4–6 mm long., latero–abaxial stamens filaments 4–5 mm long., straight, anther 5–6 mm long, rostro geniculate, 0.5–1 mm long. Ovary velutinous, style 1–2 cm long., velutinous. Legume 19–20 x 0.5–1 cm, cylindrical, externally smooth, slightly curved, sparse tomentose, brown when mature, indehiscent. Seeds ca. 4 x 2 mm, 2-seriate, elliptic.

This specie is included in serie *Bacillaris* (Table 3) and can be recognized by generally angular branches (Fig. 4B) and two pairs of large leaflets (Fig. 4A), conical or ovate nectary between the first pair of leaflets (Fig. 4C), zygomorphic flowers (Fig. 4E) and cylindrical legume, externally smooth (Fig. 4G, H).

Some exsicates were identified as *Senna bacillaris* (L. f.) Irwin & Barneby. These species are really similar and the characteristics presented in revision by Irwin & Barneby (1982) coincide. However, there is a geographical separation between them: *Senna bacillaris* occurs in Ecuador, Guyana, Venezuela and Brazil, in the Amazonas

and Roraima State; while *Senna affinis* occurs in Brazil, in the States of Bahia, Minas Gerais and Rio de Janeiro (Irwin & Barneby 1982). Therefore, all materials from Minas Gerais with the group of characteristics mentioned above were identified as *Senna affinis*. However, due to the similar morphology, a taxonomic revision that encompasses materials from different regions is necessary, in order to try to understand the relationship between these species.

The stipules are early deciduous, but the material collected in Aiuruoca by *L. Krieger & M. Brugger 24489* is the only one with large stipules, 12-17 mm long.

Senna affinis is cited for Bahia, Espírito Santo, Minas Gerais and Rio de Janeiro (BFG 2015), occurring in the Cerrado and Atlantic Forest (Table 4). It can be found in virgin and disturbed or second-growth woodland, less than 850 m in altitude, and along the coast or headwaters (Irwin & Barneby 1982).

In Minas Gerais, *Senna affinis* was often collected in the southeast region of the State (Fig. 4), in gallery forest, near creeks and rivers, steeply sloping brejo, adjacent campo, middle slopes, and roadsides. It was found with flowers in January, February, March and April and fruits in March, May, June and July.

Examined specimens: BRAZIL. MINAS GERAIS: Aiuruoca, na mata, beira da estrada, 13.III.1989, fl. e fr., *L. Krieger & M. Brugger 24489* (CESJ); Descoberto, Reserva Biológica da Represa do Grama, 02.III.2002, fl., *R. C. Forzza et al. 2076* (CESJ); Caratinga, Fazenda Montes Claros, 23.III.1991, fl., *C. V. Mendonça Filho 1991* (MBM); Juiz de Fora, Jardim Botânico UFJF, Mata do Krambeck, na trilha ao redor do lago, 29.II.2012, fl., *C.N. Silva et al. 179* (CESJ); Lima Duarte, estrada para Moreiras, 02.II.2012, fl., *A. S. M. Valente et al. 138* (CESJ); Marliéria, estrada do Aníbal, P. E. Rio Doce, 24.III.1999, fl., *R.L.C. Bortoluzzi et al. 552* (VIC); estrada do Aníbal, P. E. Rio Doce, 06.IV.1999, fl., *R.L.C. & A.P. Gonçalves 614* (VIC); P.E. Rio Doce, estrada que corta o Parque, entre t.Campolina e t.Lagoa do Meio, 23K0761007, UTM7819544, 15.V.2003, fr., *L.B. Bosquetti et al. 143* (VIC); trilha da Lagoa do Meio, 23K0759178, UTM7819044, 27.VI.2003, fr., *L.B. Bosquetti et al. 166* (VIC); trilha da Lagoa do Meio, 23K0759178, UTM7819044, 30.VII.2003, fr., *L. B. Bosquetti et al. 176* (VIC); Serra do Cabral, ca. 2 km W. of Cantoni, elev. ca. 850 m, 8.III.1970, fl., *H. S. Irwin et al. 27187* (SPF); Viçosa, 13.I.1931, fl., sem coletor (VIC 422)

4. *Senna alata* (L.) Roxb., Fl. indica 2: 349. 1824.

Fig. 3: I-N; Map: Fig. 4

Cassia alata L., Sp. Pl. 378. 1753

Shrubs or small trees, 2–4 m alt. Branches angular or cylindrical, pubescent. Leaves 7–14 pairs of leaflets; stipules 10–15 × 5–7 mm, triangular, base straight, apex acuminate, deciduous late; petiole 1–3 cm long.; nectary absent; leaf rachis 25–44 cm long., pubescent; leaflets narrowly elliptic, obovate or oblanceolate, apex rounded or retuse, mucronulate, both sides glabrous or pubescent at veins, veins tenuous, cartaceous, margin ciliolate, proximal pair 3–7 × 1–4 cm, distal pair 9.5–13 × 6.5–8 cm. Racemes terminal with flowers united at apex; peduncle 10–14 cm long.; inflorescence rachis 4–34 cm long. Bracts 20–25 × 8–10 mm, elliptic, deciduous; pedicel 10–12 mm long, nectary absent. Sepals 10–12 × 2–3 mm, similar size, elliptic or obovate, apex rounded, pubescent. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal 11–15 × 7–9 mm, very widely obovate, apex emarginated, latero-adaxial and latero-abaxial petals elliptic or very widely obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina twisted, medium stamens filaments ca. 2 mm long., anther 3–4 mm long., centric abaxial stamen filament ca. 5 mm long., anther 3–4 mm long., latero-abaxial stamens filaments ca. 3 mm long., straight, anther 9–10 mm long., rostro oblique, ca. 0.5 mm long. Ovary hirsute, style 1–1.5 cm long., hirsute. Legume 10–14.5 × 1–1.5 cm, turgid, externally with wings by the sutures, straight, glabrous, dark brown, dehiscent. Seeds ca. 7 × 6 mm, 1-seriate, ovate.

Senna alata is easily recognized by the presence of triangular stipules (Fig. 3J), several narrowly elliptic, obovate or oblanceolate leaflets (Fig. 3I), racemes with flowers united at apex (Fig. 3I), long bracts (Fig. 3K) and legume winged (Fig. 3M, N). It is similar to other species of serie *Pictae* (Table 3), *Senna reticulata* (Willd.) Irwin & Barneby in habit and form of leaflets, but the legume is flat and not winged.

Senna alata is native to America, distributed in Brazil, Colombia, Guianas, Mexico and Venezuela (Irwin & Barneby 1982). In Brazil, it occurs in almost all States, in Biomes of the Amazon, Atlantic Forest, Caatinga, Cerrado and Pantanal (Table 4). It can be found on riverbanks, disturbed woodland and pastures (Irwin & Barneby 1982).

In Minas Gerais, the species was collected in the central and western region of the State (Fig. 4), on the roadside in the Cerrado, as well as in outcrops and the forest

margin. It was collected with flowers in February, March, April, May and June; and with fruits with January, March, May, June and September.

Examined specimens: BRAZIL. MINAS GERAIS: Araguari, Funil I, 13.IV.2005, fl., *G. M. Araujo s.n* (UFU 43200); Belo Horizonte, MG FZB.BH, área de visitaç o do Jardim Bot nico, 08.VI.2005, fr., *L. A. Echternacht et al. 1029* (RB); Carm sia, 8 km ap s Carm sia, na estrada Carm sia. Morro do Pilar, 21.V.1982, fr., *E.F. Almeida 209* (UB); Entre Rios, Fazenda Pedra Branca, 29.I.1977, fr., *M.P. Coons et al. 77-376* (VIC); Marli ria, estrada entre Ponte Alta e PERD- P. E. Rio Doce, 06.IV.1999, fl., *R.L.C. Bortoluzzi & A P. Santos-Gonalves 616* (VIC); Serra do Cip , estrada para Morro do Pilar, perto da empresa Vellozia, 19  16'48.8"S, 43 35'21.0" W, 20.IX.2016, fr., *L.G. Rosignoli-Oliveira 20* (VIC); Santana do Riacho, acesso pela fazenda Inhame, afloramento de calc rio explorado, entre Inhame e Coberto, 18 55'59" S, 43 48'54" W, 685 m, 16.III.2009, fl. e fr., *D.C. Zappi et al. 2206* (RB); Uberl ndia, Campus Umuarama, atr s Bloco 2 D, 13.V.1998, fl. e fr., *A. A. Arantes 812* (HUFU); bacia do Rio Uberabinha, sugest o 29, 18 39'37" S, 48 33'16" W, 2.V.2014, fl.e fr., *F. S. Freitas & L. S. Albuquerque 779* (HUFU); Viosa, campus da UFV, Dendrologia, 06.II.1984, fl., *M.V.B. Garcia s.n* (VIC 8524); UFV, Fund o, Horta Velha, 16.VI.1982, fl. e fr., *L. Moura s.n* (VIC 7502).

5. *Senna angulata* (Vogel) Irwin & Barneby, Mem. New York Bot. Gard. 35: 177. 1982. Fig. 5: A-H; Map: Fig. 4

Cassia angulata Vogel, Syn. Gen. Cass. 16 & Linnae 11:658, descry. Ampliat. 1837

Shrubs or liana. Branches angular, puberulent or tomentose. Leaves 2 pairs of leaflets; stipules 10–12 × 0.5 mm, linear, base straight, apex acuminate, persistent or deciduous late; petiole 2.2–2.5 (–3.5) cm long.; nectary between the proximal pair of leaflets, elliptic, conical or fusiform, sessile or stipitate; leaf rachis 0.5–0.8 cm long., sparse tomentose or tomentose; leaflets narrowly elliptic or oblanceolate, apex acute, rare retuse, mucronulate, both sides tomentose or puberulent, veins tenuous, membranaceous, margin ciliolate, proximal pair 2–3.1(–5.5) × 1.4–2(–3) cm, distal pair 5–8 × 2.2–2.3(–3) cm. Racemes axillary; peduncle 1–4 cm long.; inflorescence rachis 1–1.5 cm long. Bracts 6–12 × 2–5 mm, cymbiform or ovate-acuminate, deciduous late; pedicel 20–35 mm long., nectary absent. Sepals 10–15 × 6–7 mm, different size, elliptic

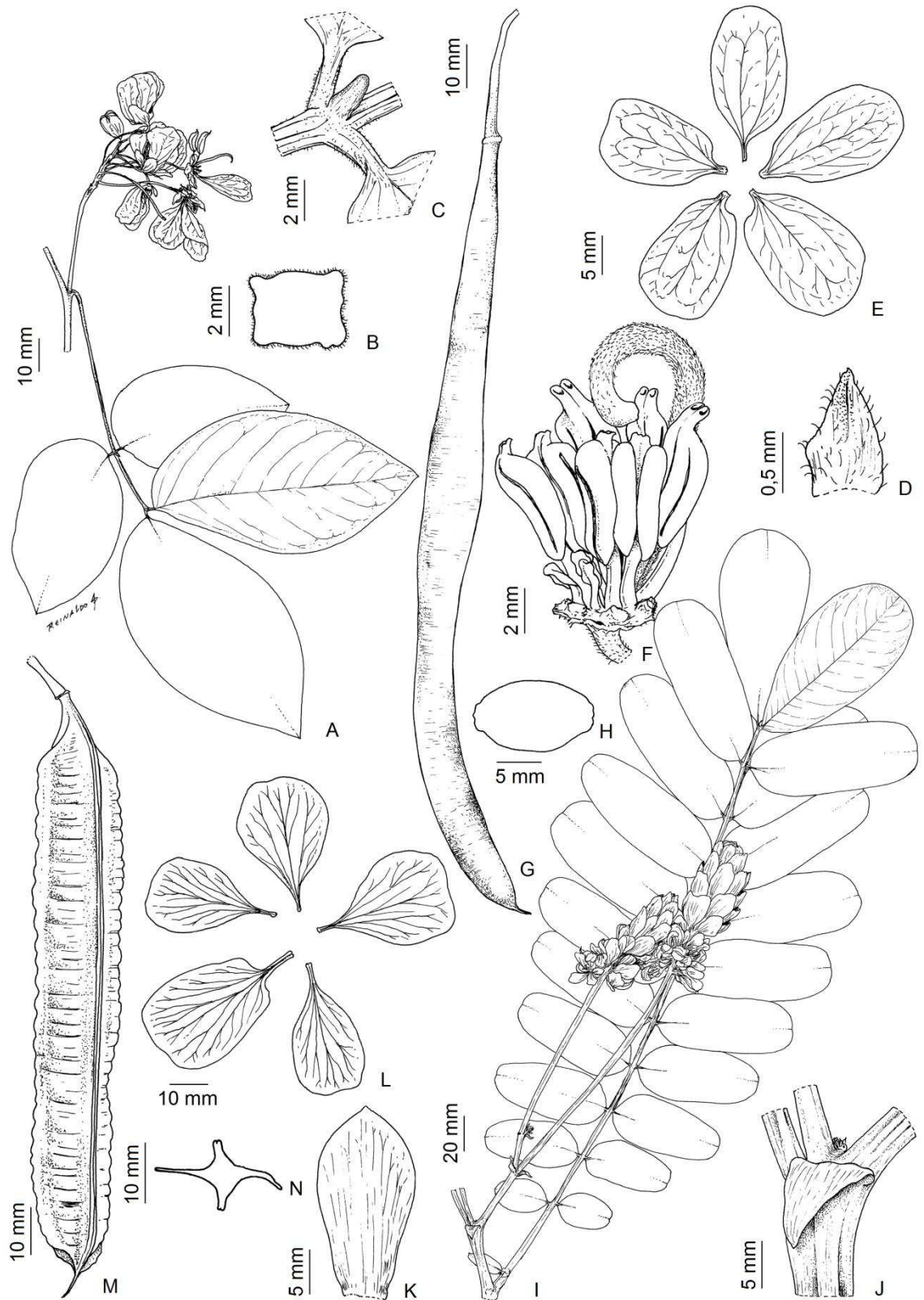


Fig. 3: *Senna affinis* (Benth.) Irwin & Barneby. **A.** Branche with leaves and inflorescence. **B.** Transversal section of branche. **C.** Nectary between leaflets of proximal pair. **D.** Bract. **E.** Corolla. **F.** Androecium and pistil. **G.** Pod. **H.** Transversal section of pod. *S. alata* (L.) Roxb.; **I.** Branche with leaves and inflorescence. **J.** Stipule. **K.** Bract. **L.** Corolla. **M.** Pod. **N.** Transversal section of pod. (A, C-F: R. L.C Bortoluzzi et al. 552-VIC; B: A. S. M. Valente et al. 138 -CESJ; G-H: L. B. Bosquetti et al. 166- VIC; I-L: R. L. C Bortoluzzi & A. P. Gonçalves 616 -VIC; M-N. L.A. Echternacht et al. 1029 -RB)

or obovate, apex obtuse, glabrous or with sparse curved trichomes. Corolla zygomorphic, petals sparse pubescent at veins, yellow, centric adaxial petal 11–40 × 10–31 mm, circular or very widely obovate, apex emarginated, latero–adaxial and latero–abaxial petals elliptic or obovate, apex oblique. Androecium with 3 staminodes and 7 stamens fertile, filaments sparse tomentose, staminodes lamina spatulate, medium stamen filaments ca. 2 mm long., anther 6–9 mm long., centric–abaxial stamen filament ca. 4 mm long., anther 9–11 mm long., latero–abaxial stamens filaments ca. 4 mm long., straight, anther 9–13 mm long, rostro geniculate, 0.5–1 mm long. Ovary velutinous, style 1.3–2 cm long., velutinous. Legume 9–20 × 1–1.5 cm, cylindrical, externally slightly depressed between seed locules, straight, sparse tomentose, light brown when mature, dehiscent. Seeds ca. 10 × 5 mm, 2–seriate, ovate.

Senna angulata is similar to *Senna tenuifolia* (Vogel) Irwin & Barneby and both are included serie *Bacillaris* (Table 3). This species have 2 pairs of leaflets (Fig. 5 A; Fig. 22 J), nectary between the proximal pair (Fig. 5D; Fig. 22 K) and cylindrical pod (Fig. 5 F,G; Fig. 22 H,I). However, *Senna angulata* has angular branches (Fig. 5B), rachis less than 1cm and large bracts, 6–12 mm long (Fig. 5H). *S. tenuifolia* has cylindrical branches, rachis 1–2 cm long (Fig. 22 J) and small bracts, 1–3 mm long (Fig. 22 L).

Irwin & Barneby (1982) recognized two varieties for *Senna angulata*, which can be distinguished by the indument on the branches and by geographic distribution. According to these authors, the var. *angulata* occurs in the Central of Minas Gerais, in an altitude between 750–1800 m; and var. *miscadenia* occurs at the coastal plain, in altitude less than 500 m.

Key to varieties of *Senna angulata* in Minas Gerais

- 1. Branches and leaflets tomentose.....**5.1** var. *angulata*
- 1'. Branches and leaflets puberulent.....**5.2** var. *miscadenia*

5.1 *S. angulata* (Vogel) Irwin & Barneby var. *angulata*, Mem. New. York Bot. Gard., 35(2)178.1982

Fig. 5: A-G; Map: Fig. 4

This variety differs from *S. angulata* var. *miscadenia* by the indument. It is more abundant and perceptible in var. *angulata*.

Endemic to Brazil, distributed in Minas Gerais and Rio de Janeiro, occurring in the Cerrado and Atlantic Forest (BFG 2015). In Minas Gerais, it was registered in the central and southern regions (Fig. 4) and can be found in open woods, near rivers (Irwin & Barneby 1982). It was found with flowers in March and May and with fruits in August.

Examined specimens: BRAZIL. MINAS GERAIS: Belo Horizonte, Campus da UFMG, próximo a prefeitura, 10.VIII.1995, fr., *J.A. Lombard & L.G. Temponi 917* (BHCB); Itamonte, Fazenda Campo Redondo e Dois Irmãos, 22°14' 25"S, 44°39' 09" W, alt. 1380 m, 09.III.2001, fl., *F.B. Pereira 3678* (RB); Paraopeba, margem da rodovia Brasília, 12 km além de Paraopeba, 6.V.1960, fl., *E. P. Heringer 7497* (IBT,SPF); Serra do Córrego, 26.III.1957, fl., *E. Pereira 2653* (RB)

5.2 *S. angulata* (Vogel) Irwin & Barneby var. *miscadenia* (Vogel) Irwin & Barneby, Mem. New. York Bot. Gard., 35(2)178. 1982. Fig. 5: H; Map:

Fig. 4

Cassia angulata miscadenia Vogel, Syn. Gen. *Cassia*. 16 & *Linnaea* 11: 659. 1837

According Irwin & Barneby (1982), *S. angulata* var. *miscadenia* has branches glabrate or puberulent. Indument puberulent was observed in examined materials, with sparse distributed trichomes.

Endemic to Brazil, distributed in States of Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, Paraná and Santa Catarina in Atlantic Forest and Cerrado (Table 4). It can be found in forest margins and capoeira (Irwin & Barney 1982). In Minas Gerais, was collected to the southeast and West of the state (fig. 4). Collected with flowers in April and fruit in September.

Examined specimens: BRAZIL. MINAS GERAIS: Alto Caparaó, P. N. Caparaó, estrada entre o alojamento e Vale Verde, 01.IX.1996, fr., *V.C. Souza et al. 12099* (ESA); Caratinga, estação biológica, 26.IV.1984, fl., *M.A. Lopes & P.M. Andrade 379* (BHCB); Uberlândia, Água Limpa, Fazenda, 10.IV.2007, fl., *N. Bordon & W. Reu J. s.n.* (HUFU 50173); estação Ecológica do Panga, Trilha Mourões-Vereda do Fundo, 09.IV.2010, fl., *G.P.E. Rocha et al. 103* (HUFU)

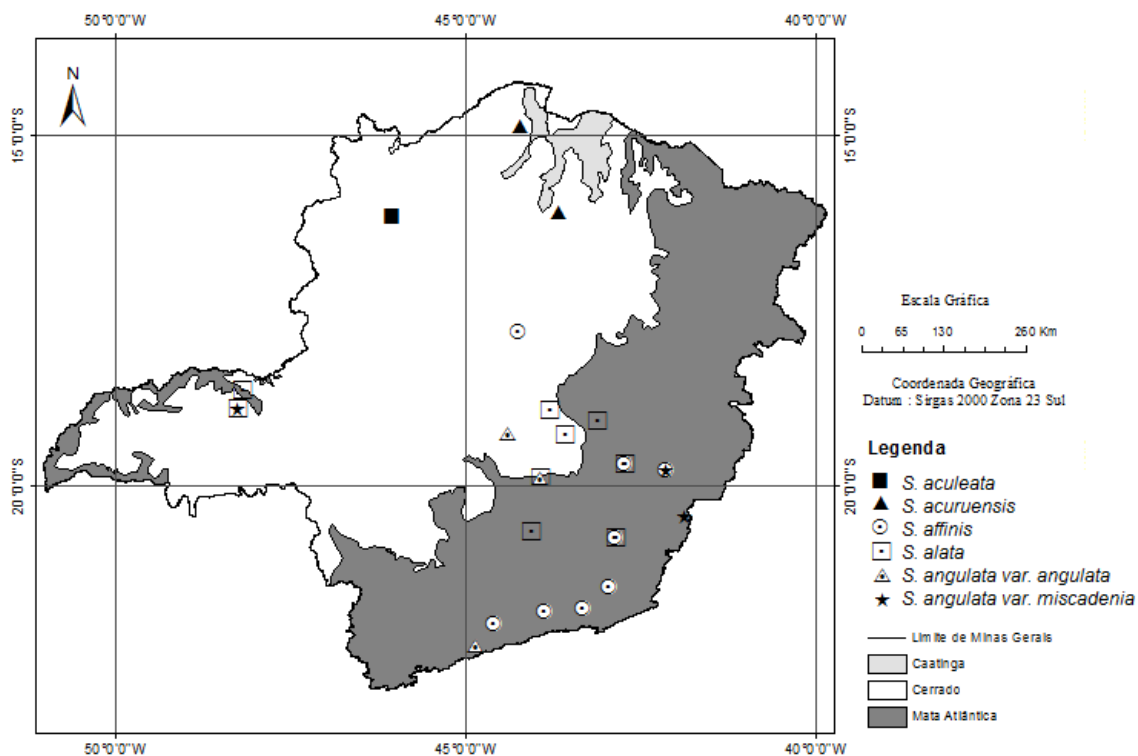


Fig. 4: Geographical distribution of *Senna aculeata*, *S. acuruensis*, *S. affinis*, *S. alata* and *S. angulata* and its varieties in Minas Gerais state.

6. *Senna aristeguietae* Irwin & Barneby, Mem. New York Bot. Gard. 35: 502. 1982.

Fig. 5: I-N; Map: Fig. 6

Shrubs, 1.5–3 m alt. Branches cylindrical, sparse tomentose, viscidulous and hispidulous. Leaves 10–11 pairs of leaflets; stipules 7–10 × 0.5 mm, filiform, base straight, apex acuminate, deciduous late; petiole ca. 1 cm long.; nectary present between the proximal pair and often between the next second or third pairs of leaflets, narrowly oblong or fusiform, stipitate; leaf rachis 6.5–8.5 cm long, viscidulous, tomentose, hispidulous and strigose; leaflets narrowly elliptic, elliptic, oblanceolate, apex acute, both sides sparse tomentose, rare glabrous, veins tenuous, chartaceous, margin ciliolate, proximal pair 1.4–1.7 × 0.5–0.7 cm, distal pair 1.7–2 × 0.5 cm. Racemes umbellate, axillary and terminal; peduncle 2.5–3.7 cm long., inflorescence rachis absent. Bracts not seen, deciduous; pedicel 22–30 mm long., nectary absent. Sepals 5–10 × 3–4 mm, different size, elliptic or obovate, apex rounded, sparse tomentose. Corolla asymmetric, petals sparse tomentose at veins, yellow, centric adaxial petal 16–20 × 7–8 mm, obovate, apex oblique, latero-adaxial petals elliptic, apex rounded, latero-abaxial petals elliptic and one is obovate-falciform, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous or hispidulous, staminodes lamina elliptic, medium

stamens filaments ca. 2 mm long., anther 6–7 mm long., centric abaxial stamen filament ca. 2 mm long., anther ca. 8 mm long., latero-abaxial stamens filaments ca. 7 mm long., straight, anther ca. 5 mm long., rostrum curved or straight, 3–4 mm long. Ovary hirsute, style 1.5–2.2 cm long., hirsute. Legume ca. 8 × 1 cm, oblong, flat-compressed, externally depressed between seed locules, straight or slightly curved, tomentose and hispid, green, indehiscent. Seeds not seen.

Senna aristeguietae has sparse tomentose and hispidulous branches, rachis, sepals and fruit. It has 10-11 pairs of small leaflets (Fig. 5I), with nectary between the proximal pair (Fig. 5J), the flowers are asymmetric (Fig. 5K), with one falciform petal, the anther of abaxial stamen with an elongate rostrum (Fig. 5L) and the pod is flat-compressed (Fig. 5M, N). It is similar to *S. acuruensis* in habit, the presence of many leaflets (Fig. 2E), with viscidulous trichomes at rachis, as explained in taxonomic comments of *Senna acuruensis*.

Species restricted to South American, residing in Venezuela and Brazil (Irwin & Barneby 1982). In Brazil it occurs in the States of Bahia and in Minas Gerais in the Atlantic Forest, Caatinga and Cerrado (Table 4). It can be found in thickets, disturbed woodland (Irwin & Barneby 1982) and on the roadside. In Minas Gerais, it was collected to the north and northeast of the State (Fig. 6). It was collected with flowers in May, June and December and with fruit in May.

Examined specimens: BRAZIL. MINAS GERAIS: Entre Araçuaí e Itaobim, 05.X.1961, fl., *Andrade-Lima 3916* (IPA); Itaobim, Pasmado, 14.VI.1986, fl., *G. Hatschbach & F.J. Zelma 50403* (RB); Macambinho, rodovia Jaíba- Porto da Balsa (Mun. Jaíba), 12.VI.2004, fl., *G. Hatschbach et al. 77785* (UB, MBM); Manga, 02.V.1991, fl. e fr., *L.V. Costa s.n* (BHCB 22277).

7. *Senna cana* (Nees & Mart.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 226. 1982. Fig. 7: A-J; Map: Fig. 6

Cassia cana Nees & Mart., Nov. Acta Phys.-Med. Acad. Caes. Leopold.-Carol. 12:34. 1825

Shrubs or small trees, 1.7–4 m alt. Branches cylindrical or angular, tomentose or villous. Leaves (4-)5–6(-7) leaflets; stipules 7–10 × 4–10 mm, reniform or falciform,

base straight, apex cuspidate, persistent or deciduous; petiole (0.7–)1.3–1.5 cm long.; nectary between median pairs of leaflets, rare between the proximal pair and sometimes present between the distal pairs, where can be occur two nectaries, fusiform, narrowly elliptic or ovate, sessile or stipitate; leaf rachis (6.5–)8–10 cm long., tomentose or villous; leaflets narrowly elliptic, lanceolate, ovate, elliptic or obovate apex acuminate, acute, rounded or obtuse, rare retuse, mucronulate, adaxial surface glabrous or sparse tomentose and in general lustrous, abaxial surface lanose or villous, veins patente in abaxial surface, coriaceous, margin ciliolate, proximal pair 1.3–3(–3.5) × 0.6–1.5 cm, distal pair (3.5–) 4.5–5.5 x 0.8–2 cm. Racemes terminal; peduncle 1.7–3 cm long; inflorescence rachis 2.2–4 cm long. Bracts 2-5 (-16) × 1–2 (-5) mm, lanceolate-acuminate or elliptic-acuminate, deciduous; pedicel 1–3 mm long., nectary at base, fusiform, can be deciduous in some materials. Sepals 5–11 × 4–9 mm, different size, elliptic or obovate, apex rounded or obtuse, dorsal surface glabrous. Corolla zygomorphic, petals sparse or densely velutinous in dorsal surface, yellow, centric adaxial petal 12–22 × 6–11 mm, obovate or elliptic, apex emarginated, latero-adaxial petals elliptic, apex rounded and latero–abaxial petals obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina ovate, medium stamen filaments ca. 2 mm long., anther ca. 4 mm long., centric-abaxial stamen filament ca. 5 mm long., anther 6–7 mm long., latero–abaxial stamens filaments 4–6 mm long., straight, anther 10–12 mm long, rostro oblique or geniculate, ca. 1 mm long. Ovary velutinous, style ca. 1 cm long. velutinous.. Legume 12–15 × 0.3–0.5 cm, linear, slightly compressed, externally depressed between seed locules, straight or curved, glabrous or sparse tomentose, brown, dehiscent. Seeds ca. 2 × 3 mm, 1-seriate, oblong.

Specie similar to *Senna velutina* (Vogel) Irwin & Barneby, both included in serie *Laxiflorae* (Table 3), with the presence of reniform stipule (Fig. 7C; Fig. 24G), pilose leaflets and nectary present in rachis (Fig. 7D; Fig. 24H) and in pedicel (Fig. 7E; Fig. 24I). But *Senna velutina* has an abaxial surface of leaflets velutinous and subquadrangular pod (Fig. 24 J,K); and in *Senna cana* the stipule can be falciform also (Fig. 7B) and it has an abaxial surface of leaflets lanose or villous and slightly compressed pod (Fig. 7F; G).

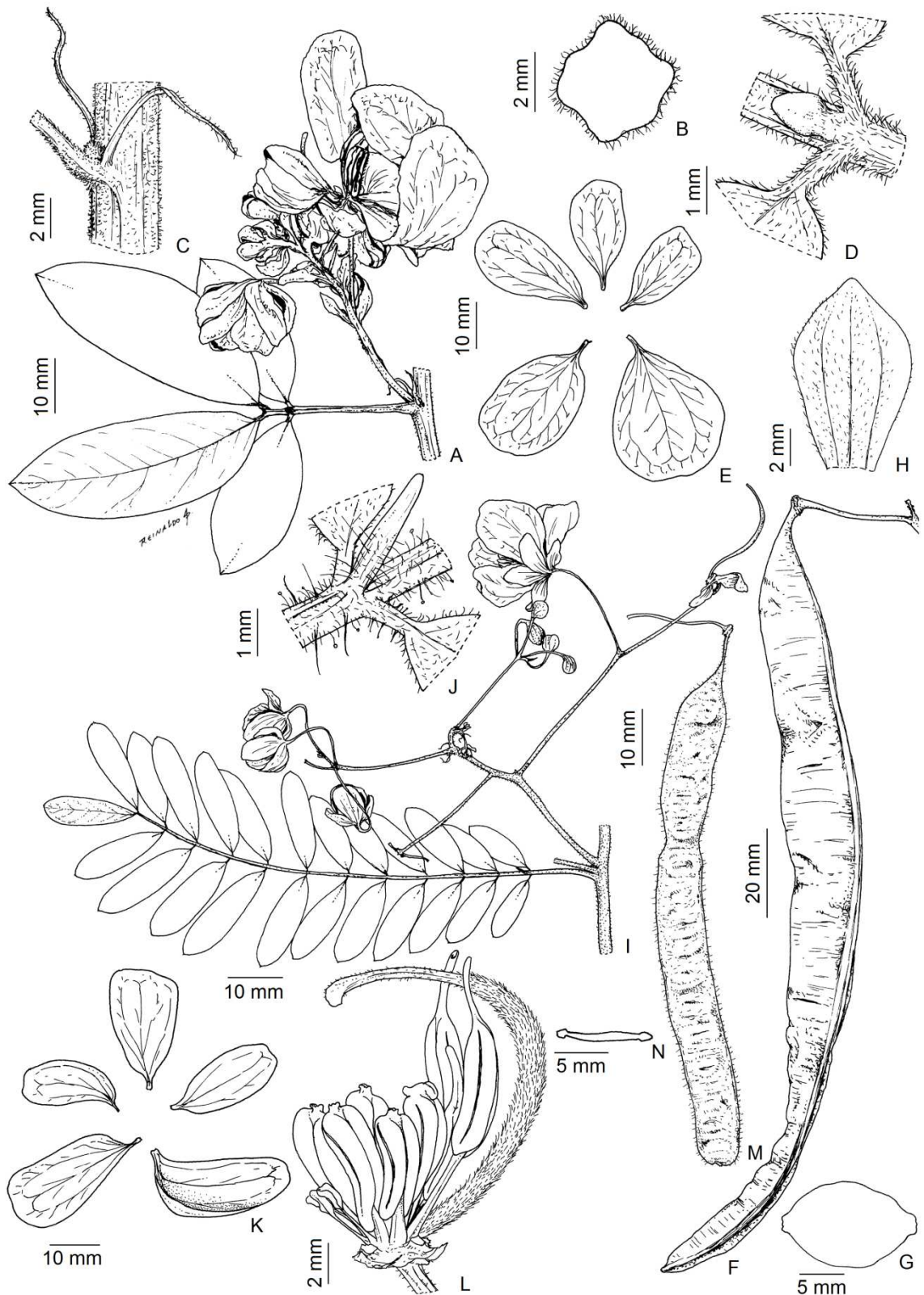


Fig. 5: *Senna angulata* (Vogel) Irwin & Barneby var. *angulata*: **A.** Branche with leaves and inflorescence. **B.** Transversal section of branche. **C.** Stipule. **D.** Nectary between leaflets of proximal pair. **E.** Corolla. **F.** Pod. **G.** Transversal section of pod; *S. angulata* (Vogel) Irwin & Barneby var. *miscadenia* (Vogel) Irwin & Barneby: **H.** Bract. *S. aristeguietae* Irwin & Barneby: **I.** Branche with leaves and inflorescence: **J.** Nectary between leaflets of proximal pair. **K.** Corolla. **L.** Androecium and pistil. **M.** Pod. **N.** Transversal section of pod. (**A, C-E:** *E. Pereira* 2653-RB; **B, F, G:** *J. A. Lombardi* & *L. G. Temponi* 917-BHCB; **H:** *M. A. Lopes* & *P. M Andrade* 379-BHCB; **I-N:** *G. Hatschbach et al.* 77785)

The specie is native and not endemic to Brazil (BFG 2015), but Irwin & Barneby (1982) did not cite the occurrence in other countries. It has five varieties: var. *calva*, var. *cana*, var. *hypoleuca*, var. *phyllostegia* and var. *pilosula*, but only three were recognized in examined specimens.

Key to varieties of *Senna cana* in Minas Gerais

1. Bracts elliptic-acuminate, long persistent, 12-16 mm long.....**7.2.var. *phyllostegia***
- 1'. Bracts lanceolate-caudate, deciduous, 2-6 mm long
 2. Leaflets lanceolate, ovate or elliptic; apex acuminate or acute; abaxial surface of leaflets lannose or villous.....**7.1.var. *cana***
 - 2'. Leaflets predominantly elliptic or obovate; apex rounded or obtuse; abaxial surface of leaflets always villous.....**7.3.var. *pilosula***

7.1 *Senna cana* (Ness & Mart.) Irwin & Barneby var. *cana*, Mem. New York Bot. Gard. 35: 229. 1982 Fig. 7: A-G; Map: Fig. 6

Senna cana var. *cana* presented large phenotypic plasticity about indument and form of leaflets and stipules. The stipules are reniforms (Fig. 7C), but can be falciform (Fig. 7B) and there are intermediate forms between these.

It occurs in Bahia, Distrito Federal, Goiás, Minas Gerais, Pará and Pernambuco, as in the Amazon Forest, Caatinga and Cerrado, in thickets or headwaters (Irwin & Barneby 1982). In Minas Gerais it is frequent in the central-north of the state (Fig. 6), found in rocky fields, disturbed areas, “carrasco” and on the roadside in the Cerrado region. It was collected with flowers in January, February, March, April and May; and with fruits in March, May, June and November.

Examined specimens: BRAZIL. MINAS GERAIS: André Fernandes, estrada Salinas.P. Azul, a 10 km da BR-116, 25.V.1978, fl., *H. F. leitão et al. s. n.* (UEC 6319); Arinos, RPPN Arara Vermelha, estrada para Chapada Gaúcha, proprietário Miguel Ângelo Guella, alt. 760 m, 15° 26' 28.9" S, 45° 48' 56.2" W, 26.V.2004, fr., *M. L. Fonseca et al. 5441* (UB); Carbonita, AcelorMittal Florestas Ltda, Estiva, Centro de Educação Ambiental (CEAM), 17° 28' 21.5" S, 43° 4' 52.3 " W, alt. 847 m, 28.V.2008, fr., *G. E Valente et al. 2280* (VIC); Diamantina, próximo ao distrito de Conselheiro Mata, 18° 17' 2400" S, 43° 58' 44.983 W, elev. 1018 m, 22.I.2012, fl., M. M. T. Cota et

al. 285 (DIAM); Francisco Sá, ca. 30 km NE of Francisco Sá, road to Salinas, elev. 1100 m, 10.II.1969, fl., *H. S. Irwin et al. 22980* (UB); Grão Mogol, Rio Itacambiruçu, ca. 15 km North of Grão Mogol, elev. 950 m, 18.II.1969, fl., Irwin et al. 23499 (UB); estrada Grão Mogol-Salinas, sentido a Fazenda Cancela, ca. 1 km de Grão Mogol, 16° 33'28" S, 42° 52'48" W, alt. 959 m, 14.IV.2004, fl., *A. S. Conceição 811* (HUEFS); Januária, Vale do rio Peruaçu, cerrado do Judas, 21.VII.1997, fr., *A. Salino 3286* (BHCB, SPF); Itacambira, Serra de Itacambira, a 45 km de Juramento, 18° 04' S, 43° 20' W, elev. 1200 m, 14.II.1988, fl., *J. R. Pirani et al. 2231* (SPF); Juramento, Montes Claros a Itacambira, rodovia, Serra do Catuni, 17.III.1997, fl., *G. Hatschbach et al. 66371* (BHCB, MBM); Montes Claros para Pirapora, 52 km de Montes Claros, 30.I.1965, fl., *R. P. Belém & J. M. Mendes 398* (UB); Montes Claros, 32 km West of Montes Claros Road to Água Boa, elev. 1000 m, 23.II.1969, fl., *H. S. Irwin et al. 23745* (UB); Nova Porteirinha, torre da CEMIG, 14.IV.2007, fl., *J. M. Silva & O. S. Ribas 5651* (RB); Rio Pardo de Minas, 15° 29' 39" S, 42° 28' 9" W, alt. 960 m, 03.XI.2006, fr., *A. C. Sevilha et al. 4642* (CEN); P. E. Serra Nova, 7.III.2008, fl., *J. M. Fernandes & V. F. Dutra 708* (VIC); 7.III.2008, fr., *J. M. Fernandes & V. F. Dutra 722* (VIC); final da trilha da areinha-açude, 20.III.2012, fl., *D. Araújo 2024* (HUEFS); São Gonçalo do Abaeté, Rod. BR-365, 10-15 km, próximo ao trevo com a Rod. BR-040, 11.III.1995, fl., *G. Hatschbach et al. 61763* (UB)

7.2 *Senna cana* (Ness & Mart.) Irwin & Barneby var. *phyllostegia* Irwin & Barneby, Mem. New York Bot. Gard. 35: 231. 1982 Fig. 7: J; Map: Fig: 6

Few materials in Minas Gerais were found for this variety, but the large bracts (Fig. 7J) allow for easy recognition of *S. cana* var. *phyllostegia*.

Endemic to Brazil occurs in Bahia and Minas Gerais States, occurring in the Atlantic Forest, Caatinga and Cerrado (Table 4), in areas of disturbed woodland and rocky slopes along rivers (Irwin & Barneby 1982). In Minas Gerais, it was collected in the north and the northeast (Fig. 6). It was found with flower in January.

Examined specimens: BRAZIL. MINAS GERAIS: Itaobim, BR 4, 18.I.1965, fl., *A. P. Duarte 8751* (RB); Itacambira, estrada para Montes Claros, 9.I.1986, fl., *I. Cordeiro et al. s.n* (SPF 41245).

7.3 *Senna cana* (Nees & Mart.) Irwin & Barneby var. *pilosula* Irwin & Barneby, Mem. New York Bot. Gard. 35: 230. 1982

Fig. 7: H-I; Map: Fig. 6

According to Irwin & Barneby (1982), this variety can be distinguished from others by the indument of leaflets, which is pilose, but never lanose or tomentose. In the examined materials, they are villous.

Endemic to Brazil, occurring in Bahia, Espírito Santo, Minas Gerais and Rio de Janeiro, in Caatinga and the Atlantic Forest (Table 4). It occurs in Caatinga thickets, rock outcrops or around valleys (Irwin & Barneby 1982). Collected in the northeast to Minas Gerais (Fig. 6). It was found with flower in March.

Examined specimens: BRAZIL. MINAS GERAIS: Águas Vermelhas, 30. III. 1959, fl. e fr., M. Magalhães 15263 (UB 2383); Medina, 5 km S. de Águas Vermelhas, capoeira seca, 31.III.1959, fl., M. Magalhães 15263 (UB 2383)

8. *Senna cernua* (Balb.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 419: 1982.

Fig. 7: K-O; Map: Fig. 6

Cassia cernua Balb. Cat. Stirp. Hort. Bot. Taur. 22. 1813

Shrubs, 0.6–2 m alt. Branches cylindrical, sparse tomentose. Leaves (6-)7(-9) pairs of leaflets; stipules 3–4 × 0.5–1 mm, lanceolate, base truncate, apex acuminate, deciduous; petiole 5–5.5(-7.5) cm long., nectary at base of petiole, piriform or conical, sessil; leaf rachis 11.5–17(18.5) cm, sparse tomentose; leaflets elliptic, ovate, obovate, apex acute, mucronulate, adaxial surface glabrous, abaxial surface sparse tomentose, veins tenuous, membranaceous, margin ciliolate, proximal pair 2.5–3.6 × 1.5–2.5 cm, distal pair 4.5–6.5 × 1.5–2 cm. Racemes axillary and terminal; peduncle 1–1.5 cm long; inflorescence rachis 3.5–4 cm long. Bracts 3–4 × 0.5 mm, lanceolate, deciduous; pedicel 13–20 mm long., nectary absent. Sepals 6–8 × 3–4 mm, not strongly different size, obovate, apex obtuse, dorsal surface sparse tomentose. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal 12–14 × 10–12 mm, obovate, apex emarginated, latero-adaxial petals and latero-abaxial petals obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina spatulate, medium stamen filaments ca. 2 mm long., anther 4–5 mm long., centric-abaxial stamen filament 2 mm long., anther 2–3 mm long., latero-abaxial stamens filaments 10–13 mm long., straight,

anther 6-7 mm long, rostro transversely oblique, 1–2 mm long. Ovary velutinous, style 1.3–1.5 cm long., velutinous. Legume 19–24 (-29.5) × 0.3–0.5 cm, linear, compressed, externally slightly depressed between seed locules, slightly curved, sparse tomentose, light brown on the margins, indehiscent. Seeds observed not mature, ca. 2 × 1 mm, 1-seriate, oblong.

Among the species of serie *Basiglandulosae* (Table 3), *Senna cernua* is more similar to *S. neglecta* (Vogel) Irwin & Barneby by the presence of nectary at the base of the petiole (Fig. 7P; Fig. 11I) and some forms of leaflets (Fig. 7N; Fig. 11L). Besides that, these species have vinaceous branches when are on the field. But, *Senna cernua* has 7 stamens fertile and narrowly and long legume (Fig. 7Q, R, S), 19–24 (-29.5) × 0.3-0.5 cm, and *S. neglecta* has 6 stamens fertile (Fig. 11 K) and short and flat-compressed legume, 8.8–14 × 0.7–1 cm.

Senna cernua occurs in Paraguay and Brazil (Irwin & Barneby 1982), where it was collected in Bahia, Distrito Federal, Espírito Santo, Goiás, Minas Gerais, Rio de Janeiro, São Paulo and Paraná, in the Atlantic Forest and Cerrado (Table 4). It is distributed in disturbed woodland, along roads and pastures (Irwin & Barneby 1982).

In Minas Gerais, this specie occurred frequently in the centrals southeast, south and west regions of the state (Fig. 6), found near rivers, thickets, uplands, adjacent rocky slopes and gallery forest. It was found with flowers in January, February, March, April, May, November and December; and with fruit in January, February, March, April and September.

Examined specimens: BRAZIL. MINAS GERAIS: Araguari, Bosque John Kennedy, 16.III.1993, fl., *G. B. Araújo* 976 (UB); Diamantina, ca. 7 km N. E. of Diamantina, road to Mandanha, elev. 1300 m, 29.I.1969, fl. e fr., *H. S. Irwin et al.*, 22824 (UB); Joaquim Felício, ca. 2 km N. of Joaquim Felício, elev. 650 m, 10.III.1970, fl., *H. S. Irwin et al.* 27338 (UB); Serra da Piedade, ca. 35 km E. of Belo Horizonte, near BR-31, elev. 1800-2000 m, 13.I.1971, fl., *H. S. Irwin et al.* 30202 (UB); Juiz de Fora, 21.III.1963, fl., *E. Pereira* 7161 (RB); Lavras, 09.XII.1980, fl., *H. F. Leitão et al.* s.n (VIC 7298); Mariana, 3 km N. de Mariana, Serra do Espinhaço, 2.II.1971, fl., *H. S. Irwin et al.* 77569 (UB); Ouro Branco, estrada para Ouro Preto, km 169, 19.II.2002, fl. e fr., *V. C. Souza et al.* 28025 (ESA); Ouro Preto, Saramenha, beira da estrada, 22.III.1979, fl., *J. Badini* s.n (OUPR 19608); Paraisópolis, 15.IV.1927, fl. e fr., *F. C. Hoehne* s. n (IBT

20202); Santana do Riacho, rodovia Belo Horizonte-Conceição do Mato Dentro, perto do córrego chapéu do sol, próximo a pensão, 11.I.1988, fl., J. R. Pirani *et al.* s.n (ESA 102526); P. N. Serra do Cipó, próximo ao alojamento, alto do Palácio, 07.II.2008, fl. e fr., J. M. Fernandes & V. F. Dutra 627 (VIC); próximo ao Morro do Pilar, beira da estrada, 19° 13' 52.9" S, 43° 23' 06.7" W, 21.IX.2016, fr., L. G. Rosignoli-Oliveira 24 (VIC); Santa Rita do Sapucaí, Timburé, 26.II.2001, fl., O. S. Ribas & A. M. S. Ponchon 3310 (ESA); São João da Chapada, ca. 15 km N. of São João da Chapada, elev. 975 m, 23.III.1970, fr., H. S. Irwin *et al.* 28132 (UB); São Miguel, 4 km E. of São Miguel do Anta, 18.XI.1958, fl., H. S. Irwin 2106 (VIC); Serra da Caraça, base of Serra da Caraça, elev. ca. 1500- 1750 m, 26.I.1971, fr., H. S. Irwin *et al.* 29184 (UB); Ubá, estrada em direção a Ubari, 2.III.2016, fl. e fr., L. G. Rosignoli-Oliveira 19 (VIC); Uberlândia, reserva de Miranda, ca. De 20 km do centro de Uberlândia, 17.II.2004, fl., A. P. M. Santos *et al.* 278 (HUFU); Viçosa, campus da Universidade, pastagem da Zootecnia, 20.V.1997, fl., M. G. Bovini *et al.* s.n (VIC 22940); UFV, Vila Gianetti, Grupo Entre Folhas, 02.II.2001, fl. e fr., A. F. Carvalho 771 (VIC).

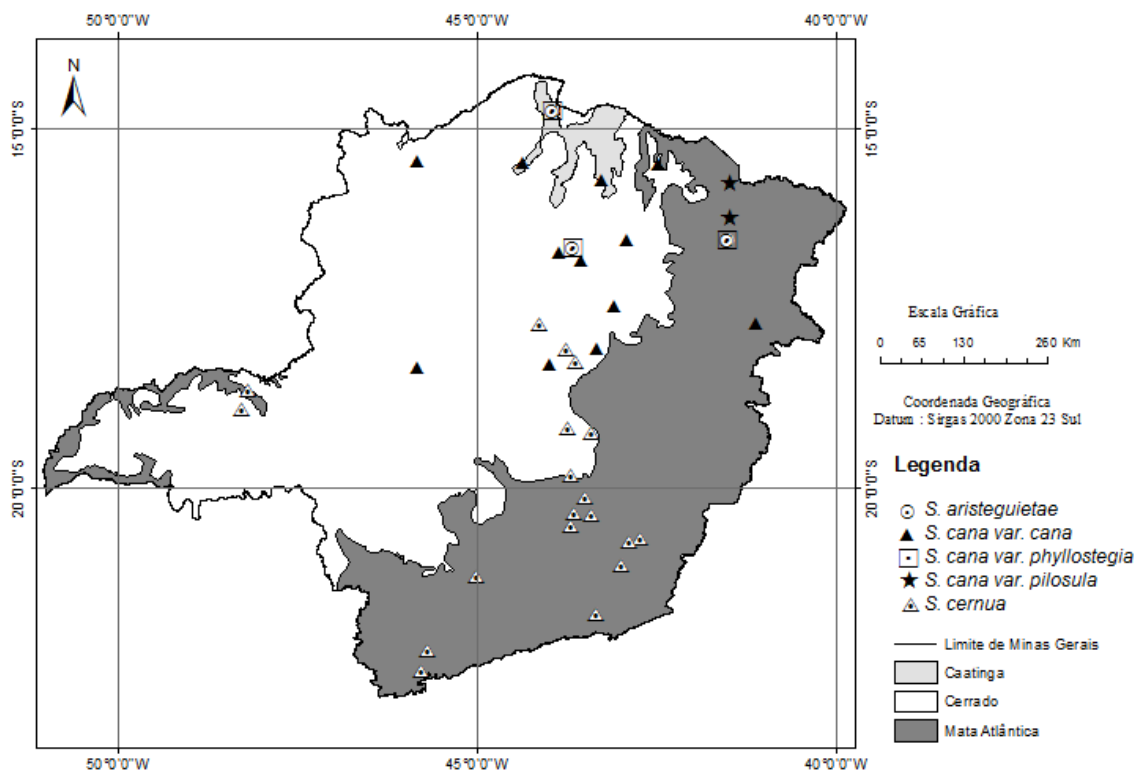


Fig. 6: Geographical distribution of *Senna aristeguietae*, *S. cana* and its varieties and *S. cernua* in Minas Gerais state.

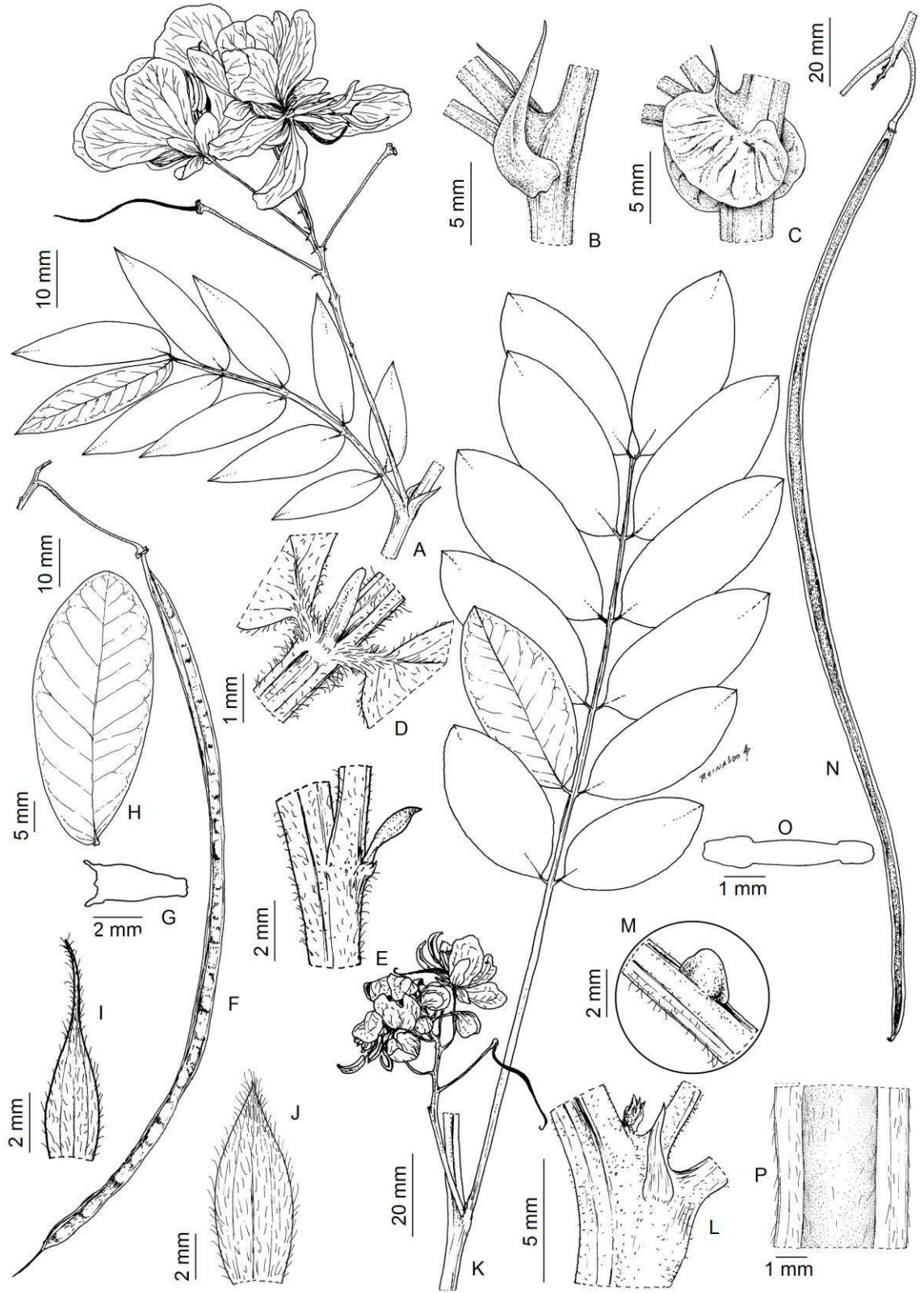


Fig. 7: *Senna cana* (Ness & Mart.) Irwin & Barneby var. *cana*: **A.** Branche with leaves and inflorescence. **B** and **C:** Stipule variations. **D.** Nectary present in rachis. **E.** Nectary in pedicel. **F.** Pod. **G.** Transversal section of pod; *S. cana* (Ness & Mart.) Irwin & Barneby var. *pilosula* Irwin & Barneby: **H.** Distal leaflet detail. **I.** Bract; *S. cana* (Ness & Mart.) Irwin & Barneby var. *phylostegia* Irwin & Barneby: **J.** Bract; *S. cernua* (Balb.) Irwin & Barneby: **K.** Branche with leaves and inflorescence. **L.** Stipule. **M.** Petiolar nectary. **N.** Pod. **O.** Transversal section of pod. **P.** Margins of pod detail (**A-B:** G. Hatschbach et al. 66371-MBM; **C-E:** H. S. Irwin et al. 23745-UB; **F-G:** G. E. Valente et al. 2280-VIC; **H, I:** M. Magalhães 15263-UB; **J:** A. P. Duarte 8751- VIC; **K-M:** H. S. Irwin et al. 29184-UB; **N-P:** OUPR 19608)

9. *Senna corifolia* (Benth.) Irwin & Barneby var. *caesia* (Taub. ex Harms) Irwin & Barneby, Mem. New York Bot. Gard. 35: 222. 1982. Fig. 8: A-F; Map: Fig. 9
Cassia caesia Taub. Ex Harms, Feddes Repert. 24: 123. 1924.

Shrubs, 1–2 m alt. Branches cylindrical, glabrous. Leaves (3–)4 pairs of leaflets; stipules (25–)30–40 × 35–55 mm, reniform, base reniform, apex rounded, persistent; petiole 2–3.5(-4) cm long.; nectary between leaflets of all pairs, piriform or ovate, sessil; leaf rachis 4.5–9 cm long., glabrous or sparse pubescent; leaflets elliptic, narrowly elliptic, apex retuse, both sides glabrous, veins patente, coriaceous, margin glabrous, proximal pair 3.2–4(-5.5) × 2–3.5 cm, distal pair (4.5–)5.8–6.5 × 2.5–3.5 cm. Racemes axillary and panicle terminal; peduncle 3.5–6.5 cm long.; inflorescence rachis (4.5–)6.5–14.5 cm long. Bracts 4–10 × 6–8 mm, reniform, deciduous; pedicel (15–)20–28 mm long., nectary at medium region, ovate or falciform, stipitate. Sepals 6–15(-18) × 6–15 mm, different size, obovate, apex obtuse, dorsal surface glabrous. Corolla zygomorphic; petals pubescent at veins, yellow, centric adaxial petal 17–20 × 8–9 mm, obovate, apex rounded, latero-adaxial and latero-abaxial petals obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina elliptic, medium stamens filaments 1–2 mm long., anther 5–6 mm long., centric abaxial stamen filament 4–6 mm long., anther 5–6 mm long., latero-abaxial stamens filaments 7–13 mm long., straight, anther 7–11 mm long, rostro transversely truncate, ca. 1 mm. Ovary pubescent, style 1.8–2.5 cm long., pubescent. Legume 9–15 × 1.1–1.3 cm long., oblong, flat-compressed, externally depressed between seed locules, slightly curved, glabrous, dark brown when mature, dehiscent late. Seeds observed not mature, ca. 5 × 1 mm, 1-seriate, oblong

Senna corifolia and *S. reniformis* (G. Don) Irwin & Barneby are included in serie *Coriaceae* (Table 3). They have in common the presence of stipules reniforms (Fig.8B; Fig. 19 B), glabrous leaflets and nectary in pedicel (Fig.8D; Fig. 19C), flat-compressed pod (Fig. 8 E, F; Fig. 19 D, E) but *S. corifolia* can be easily recognized by coriaceous leaflets with apex retuse, patent veins (Fig.8C) and rounded apex of stipules (Fig.8B), while *S. reniformis* has chartaceous leaflets with cuspidate or acuminate apex (Fig. 19 A), tenuous veins and apex acute stipules (Fig. 19B).

Irwin & Barneby (1982) recognized two varieties from *S. corifolia*, distinguished by the number and width of typical leaflets. The var. *caesia* has 3–5 pairs

of leaflets and a width less than 4 mm, while the var. *corifolia* has 2 pairs of leaflets and a width 4-7 mm. This last variety was not recognized in materials from Minas Gerais.

Senna corifolia is endemic to Brazil and occurs in Goiás, Minas Gerais and in Espírito Santo in the Cerrado and Atlantic Forest (Table 4). It is common in quartzite outcrops (Irwin & Barneby 1982) and was found in dense Cerrado, rock field, wet sandy and adjacent gallery forest and transition Cerrado and gallery forest. In Minas Gerais, it was collected in the central and northern regions (Fig. 9). It was collected with flowers in February, March, April, May, June and July; and with fruits in June, July and November.

Examined specimens: BRAZIL. MINAS GERAIS: Campos Tristes, PARNA Sempre Vivas, alt. 1281 m, 18.VI.2010, fl. e fr., *M.R. Santos 16* (VIC); Diamantina, 25 km by road NE of Diamantina, a 2 km W of Rio Jequití, elev. 790 m, 09.IV.1973, fl., *W. R. Anderson 8370* (UB); 16 km de Diamantina em direção a Medanha, 6.VII.1996, fl. e fr., *V. C. Souza et al. 11930* (ESA); córrego do soberbo, próximo a UFVJM, 18°11'02.7"S, 43°34'1.7"W, 22.IX.2016, fr., *L.G. Rosignoli-Oliveira 26* (VIC); P. E. Biribiri, ponto 5, Trilha das Cachoeiras, 18° 11' 97" S, 43° 37' 06" W, elev. 1175 m, ca. 3 km da portaria, 18.V.2011, fl., *R. Romero et al. 8492* (HUFU); Couto de Magalhães, Comunidade Abóboras, 22.VI.2002, fr., *F. N. Costa et al. 553* (DIAM); Gouveia, Fazenda do Sr. Everaldo, estrada de terra, 14.IV.1987, fl., *J. Prado et al. s.n* (SPF 47233); Grão Mogol, arredores, 20.IV.1978, fl., *R. Barneby 79* (UEC); Rio Itacambiruçu, 15.V.1988, fl., *G. Hatschbach et al. 52014* (MBM); Ribeirão, 11.VI.1999, fl., *G. Hatschbach et al. 54196* (MBM); Córrego sourona, próximo à estrada, 16° 35' S, 42° 57" W, elev. 750-800 m, 26.V.1988, fl., *A. Bidá et al. s.n* (SPF 66032); Joaquim Felício, Serra do Cabral, 16.V.2001, fl., *G. Hatschbach et al. 72029* (ESA); Santana de Pirapama, Reservatório, PCH Quartel III, 18° 37' 51,9" S, 43° 56' 10,8" W, 07.VI.2007, fl., *D. T. Souza et al. 188* (BHCB, ESA); São Gonçalo do Rio Preto, P. E. Rio Preto, 18° 05' S, 43° 20' W, 11.VI.1999, fr., *J. A. Lombardi 2941* (BHCB); P. E. Rio Preto, 12.IV.2006, fl., *J. A. Meira-Neto s.n* (VIC 32212); São João da Chapada, Road to Inhaí, elev. 1150 m, 29.III.1970, fl., *H. S. Irwin & Barneby et al. 28595* (UB); São José da Cachoeira, Serra do Cipó, Serra da Lapa, estrada Santana do Riacho-Santana do Pirapama, trilha do cruzeiro, 21.II.2007, fl., *V. C. Souza et al. 32933* (ESA)

10. *Senna hirsuta* (L.) Irwin & Barneby, *Phytologia* 44 (7): 425. 1979

Cassia hirsuta L., Sp. Pl. 378. 1753.

Fig.8: G-K; Map: Fig. 9

Shrubs or sub-shrubs, 0.8–2 m alt. Branches cylindrical or angular, glabrous or hirsutulous. Leaves 4(–5) pairs of leaflets; stipules 5–9 × 1 mm, linear, base truncate, apex acuminate, deciduous; petiole 3–12 cm long., nectary at base of petiole, discoid or depressed conical, sessile or stipitate and can be present between leaflets of distal pair, pyriform or fusiform, sessile; leaf rachis 5.5–14(–20) cm, hirsutulous; leaflets lanceolate, ovate or elliptic, apex acuminate or cuspidate, adaxial surface hirsutulous or glabrous, abaxial surface hirsutulous or strigulose, veins tenuous, membranaceous, margin ciliate, proximal pair 2.5–3.5 (–7) × 1.8–3 cm, distal pair 5.5–10 × 2–3.2 cm. Racemes axillary; peduncle ca. 0.5 cm long.; inflorescence rachis 0.3–0.4 cm long. Bracts ca. 6 × 0.5 mm, linear, deciduous; pedicel 10–15 mm long., nectary absent. Sepals 7–10 × 3–4 mm, different size, obovate, apex rounded, dorsal surface hirsute. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal 15–20 × 10 mm, obovate, apex emarginated, latero–adaxial and latero–abaxial petals obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina oblate, medium stamen filaments ca. 2 mm long., anther 4–5 mm long., centric–abaxial stamen filament ca. 3 mm long., anther ca. 4 mm long., latero–abaxial stamens filaments 7–8 mm long., straight, anther 6–7 mm long, rostro transversely oblique, ca. 1 mm long. Ovary velutinous, style 1–1.2 cm long., velutinous. Legume 13.5–15(–18) × 0.1–0.2(–0.6) cm, linear, compressed, externally smooth, slightly curved, hirsutulous or sparse tomentose, green, dehiscent late. Seeds not seen.

Among the species of serie *Basiglandulosae* (Table 3), *Senna hirsuta* is more similar to *Senna occidentalis* by the presence of nectary on the petiole (Fig.8I; Fig. 14B) and lanceolate leaflets (Fig.8G. Fig. 14A), but *S. hirsuta* var. *acuminata* has hirsutulous leaflets and *S. hirsuta* var. *leptocarpa* has leaflets strigulose in abaxial surface, while *S. occidentalis* has glabrous leaflets. Some materials of *S. hirsuta* has nectary between leaflets of distal pair of leaflets and pod all light brown when mature (Fig.8H) and *S. occidentalis* has nectary only in petiole and pod with light color on the margins (Fig. 14D).

The specie has seven varieties: var. *acuminata*, var. *glaberrima*, var. *leptocarpa*, var. *hirsuta*, var. *hirta*, var. *puberula*, var. *streptocarpa*, but only two varieties were recognized in Minas Gerais.

Key to varieties of *Senna hirsuta* in Minas Gerais

1. Branches, rachis, leaflet and pod hirsutulous.....**10.1.** var. *acuminata*
2. Branches, rachis and adaxial surface of leaflets glabrous, abaxial surface and pod strigulose**10.2.**var. *leptocarpa*

10.1 *Senna hirsuta* (L.) Irwin & Barneby var. *acuminata* (Benth.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 431. 1982. Fig. 8: G-H; Map: Fig. 9
Cassia neglecta var. *acuminate* Benth. In Mart., Fl. Bras. 15(2): 111. 1870

This variety is easily recognized by the hirsutulous indument (Fig.8H) in branches, leaflets and pod, it is observable.

Endemic to Minas Gerais, occurring in the Atlantic Forest and the Cerrado (Table 4) in the southeast of the state (Fig. 9). It was found with flowers in January, February, March and April, and with fruits in February, March and April.

Examined specimens: BRAZIL. MINAS GERAIS: Araguari, Funil I, Capim Branco I, 26.I.2007, fl., *P. O. Rosa et al.* 340 (HUFU); 02.III.2007, fl. e fr., *P. O. Rosa et al.* 462 (HUFU); Belo Horizonte, Campus da UFMG, 19°52' S, 43°58' W, 19.IV.1999, fl. e fr., *J. A. Lombardi & P. O. Morais* 2784 (BHCB); Mariana, Distrito de Mosenhor Horta, próximo à Lagoa Ponte das Crioulas, estrada, próximo a curso d'água, 20°18'08.8"S, 43°18'59.4"W, elev. 621 m, 25.II.2003, fl. e fr., *F. F.Mazine et al.* 866 (ESA)

10.2 *Senna hirsuta* (L.) Irwin & Barneby var. *leptocarpa* (Benth.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 431. 1982. Fig. 8: I-K; Map: 9
Cassia leptocarpa Benth. Linnaea 22: 528. 1849

This variety is very similar to *S. occidentalis*, because its leaflets are apparently glabrous, but, with stereomicroscope it is possible to observe that the abaxial surface is strigulose and it has nectary between leaflets of distal pair, different than *S. occidentalis* as explained above.

Senna hirsuta var. *leptocarpa* was confirmed in material collected by Ynes Mexia in 1930 in Viçosa, but in the expeditions carried out in the region, no specimen was found. Irwin & Barneby (1982) considered as an apparently uncommon plant, however, the recent record in State was confirmed in Araponga, collected in 2013 by *Siqueira* 849.

Endemic to Brazil, it occurs in Minas Gerais and Rio de Janeiro, in the Atlantic Forest and the Cerrado (Table 4). It was found in disturbed woodlands (Irwin & Barneby 1982), in the central region of Minas Gerais (Fig. 9). It was found only with fruits, in April and June.

Examined specimen: BRAZIL. MINAS GERAIS: Araponga, Parque Estadual da Serra do Brigadeiro, próximo a casa de hóspedes, sede do PESB, 20 42'59.9" S, 42 28' 50.5" W, elev. 1351 m, 11.VI.20013, fr., *L. C. Siqueira* 849 (VIC); Viçosa, Agricultural College lands: Cha-Cha valley; near boundary, elev. 600 m, 14.III.1930, fr., *Y. Mexia* 4161 (NYBG)

11. *Senna itatiaiae* Irwin & Barneby, Mem. New York Bot. Gard. 35: 349. 1982.

Fig. 10: A-D; Map: Fig 9

Shrubs, 2–5 m alt. Branches sulcate, glabrous. Leaves 6–7 pairs of leaflets; stipules ca. 8×4 mm, ovate, base truncate, apex cuspidate, deciduous; petiole 3.5–4.5 cm long.; nectary between the first and second proximal pairs or between three median pairs, narrowly elliptic or fusiform, stipitate or sessile; leaf rachis 7–8 cm long., glabrous; leaflets elliptic or obovate, apex obtuse, mucronulate, both sides glabrous, veins tenuous, membranaceous, margin ciliolate, proximal pair $2-3 \times 1-1.2$ cm, distal pair $3-3.5 \times 1.3-1.5$ cm. Racemes axillary; peduncle 3-4 cm long.; inflorescence rachis 0.5-2.5 cm long. Bracts 7-9 \times 1 mm, ovate-acuminate, deciduous late; pedicel 12–19 mm long., nectary absent. Sepals 5–6 \times 2–5 mm, different size, elliptic or obovate, apex obtuse, dorsal surface finely pubescent or glabrous. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal ca. 11×7 mm, elliptic, apex obtuse, latero-adaxial and latero-abaxial petals elliptic or obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina obovate, medium stamen filaments ca. 2 mm long., anther ca. 3 mm long., centric-abaxial stamen filament ca. 4 mm long., anther ca. 4 mm long., latero-abaxial stamens filaments ca. 4

mm long., straight, anther 4-5 mm long, rostro truncate, ca. 0.5 mm long. Ovary glabrous, style ca. 0.4 cm long., glabrous. Legume 4.5–5 × 0.9–1 cm, sub-cylindrical, externally smooth, straight, glabrous, brownish, indehiscent. Seeds ca. 4 × 3 mm, 2-seriate, obovate.

Among the species of serie *Coluteoideae* (Table 3), *Senna itatiaiae* is more similar to *S. oblongifolia* (Vogel) Irwin & Barneby in appearance and form of leaflets. But these species are easy distinguished because *S. oblongifolia* has nectary in petiole (Fig. 13B), bracts cymbiform, legume linear (Fig. 13J, K) and *S. itatiaia* has nectary only at rachis, bracts ovate (Fig. 10B) and subcylindrical pod (Fig. 10C,D)

The specimens found, collected in Minas Gerais and deposited in herbaria, had only legumes and and the material from the State of Rio de Janeiro was used for description *Mello-Silva et al. 12* (SPF, VIC).

Senna itatiaiae is endemic to Brazil and occurs in Rio de Janeiro and Minas Gerais, common in Itatiaia State Park, in the south of state (Fig. 9), an area of the Atlantic Forest, in disturbed humid forest, thickets and on roadsides (Irwin & Barneby 1982). In Minas Gerais it was collected at altitude of 1974-2350 m. It was found with flower in January and fruits from May and June.

Examined specimens: BRAZIL. MINAS GERAIS: Itamonte, P. N. Itatiaia, 22°22'12" S, 44° 42' 34" W, elev. 2350 m, 29.VI.2013, fr., *D.M. Neves et al. 1368* (HUEFS); Passa Quatro, Serra Fina, Capim Amarelo (Médio), 1974-2037 msm, 22°26'31.4"S, 44°53'35.6" W, Campo de Nifelina, 5.V.2006, fr., *L. D. Meireles & J. A. Nunes 2306* (RB)

Additional Examined specimens: BRAZIL. RIO DE JANEIRO: Itatiaia, estrada para as Prateleiras, 24.I.1987, fl., *R. Mello-Silva et al. 12* (SPF, VIC)

12. *Senna macranthera* (Collad.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 181. 1982. Fig. 10: E-M; Map: Fig 9
Cassia macranthera DeCand. ex Collad., Hist. Casses 99. 1816

Shrubs or trees, 2–9 m alt. Branches cylindrical, sparse tomentose or tomentose. Leaves 2 pairs of leaflets; stipules 10-12 × 0.5-1 mm, linear-falciform, base truncate, apex acuminate, deciduous; petiole 2–3.5 (-6) cm long.; nectary between the first pair of

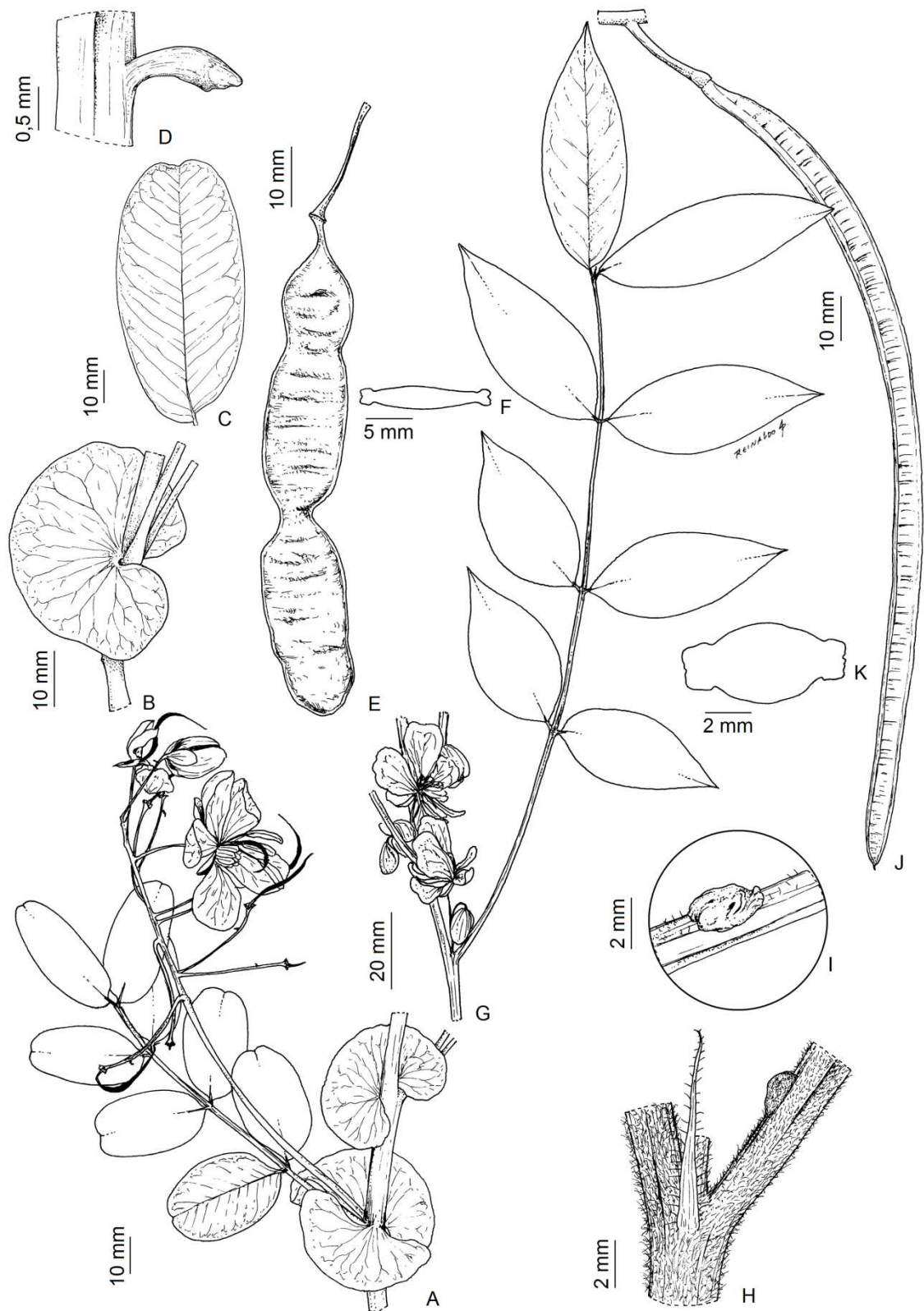


Fig. 8- *Senna corifolia* (Benth.) Irwin & Barneby var. *caesia* (Taub. ex Harms) Irwin & Barneby: **A.** Branche with leaves and inflorescence. **B.** Stipule. **C.** Veins of leaflet. **D.** Nectary in pedicel. **E.** Pod. **F.** Transversal section of pod; *S. hirsuta* (L.) Irwin & Barneby var. *acuminata* (Benth.) Irwin & Barneby: **G.** Branche with leaves and inflorescence. **H.** Petiolar nectary and stipule; *S. hirsuta* (L.) Irwin & Barneby var. *leptocarpa* (Benth.) Irwin & Barneby: **I.** Petiolar nectary and indument detail. **J.** Pod. **K.** Transversal section of pod (**A-B:** M. R. Santos 16-VIC; **C-F:** L. G. Rosignoli-Oliveira 26-VIC; **G-H:** P. O. Rosa et al. 340-HUFU; **I-K:** L. C. Siqueira 849-VIC)

leaflets, sometimes between the second pair also or in a rachis' extension, conical, ovate, sessile; leaf rachis 1–3(–4.5) cm long., sparse tomentose or tomentose leaflets narrowly elliptic, elliptic or ovate, common strongly asymmetric, apex acute, acuminate, rare cuspidate, not mucronate, concolor or discolor, adaxial surface strigillose or tomentose adaxial surface strigillose, pubescent or tomentose, veins tenuous or patente, cartaceous, margin ciliolate, proximal pair (3–)5–9 × (1.5)2 –3.5 (–4.2) cm, distal pair 6.5–9.7 (–14) × 2.2–4 (4.5) cm. Racemes axillary and panícula terminal; peduncle 1.3–2 (–4.5) cm long.; inflorescence rachis 0.5–3 cm long. Bracts ca. 1–3 × 0.5–1 mm, ovate-acuminate or cymbiform, deciduous; pedicel (20–)35–40(–45) mm long., nectary absent. Sepals 3–7(–16) × 1–4(–9) mm, different size, narrowly elliptic or ovate, apex rounded, dorsal surface pubescent or tomentose. Corolla asymmetrical; petals pubescent, yellow, centric adaxial petal 21–30 × 10–15 mm, elliptic, apex rounded, latero–adaxial petals elliptic, apex rounded, latero–abaxial petals elliptic and one is slight falciform, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments tomentose, staminodes lamina obovate, medium stamen filaments 1–2 mm long., anther 7–8 mm long., centric–abaxial stamen filament ca. 3 mm long., anther 7–9 mm long., latero–abaxial stamens filaments 3–5 mm long., straight, anther 8–12 mm long, rostro geniculate, 0.5–1 mm long. Ovary velutinous, style 2–3 cm long., velutinous. Legume 23–37 (–40) × 0.7–1 cm, cylindrical, externally depressed between seed locules, slightly curved, pubescent, green, indehiscent. Seeds 5–6 × 4–5 mm, 1–seriate, elliptic.

Senna macranthera shares the characteristic two pairs of leaflets (Fig. 10E) and the presence of nectary between the proximal pair (Fig. 10F) with other species of serie *Bacillaris* (Table 3), but they can be distinguish by the following traits:

- S. macranthera* has anther of abaxial stamens 8–12 mm long and an externally depressed pod between seed locules (Fig. 10I), while *S. affinis* has anther of abaxial stamens 5–6 mm long (Fig. 3F) and pod externally smooth (Fig. 3G);
- S. macranthera* has cylindrical branches (Fig. 10E) and bracts 1–3 mm long and *S. angulata* has angular branches (Fig. 5B) and bracts 6–12 mm long (Fig. 5H);
- S. macranthera* has chartaceous leaflets and a pod 23–37 (–40) cm long (Fig. 10H) and it is brown in color, while *S. rugosa* (G.Don) Irwin & Barneby has coriaceous leaflets and a pod 7.5–15 cm long (Fig. 19P) and is black when mature;
- S. macranthera* has conical, pisiform or ovate nectary (Fig. 10F), a rostro of abaxial stamens' anther geniculate and an externally depressed pod (Fig. 10H) and *S. tenuifolia*

(Vogel) Irwin & Barneby has narrowly elliptic or fusiform nectary (Fig. 22K), a straight rostrum of abaxial stamens' anther and externally smooth pod.

-*S. macranthera* has conical, pisiform or ovate nectary (Fig. 10F) and leaflets strongly asymmetrical (Fig. 10E) and *S. splendida* (Vogel) Irwin & Barneby has narrowly elliptic, cravat or falciform nectary (Fig. 22B) and leaflets symmetrical (Fig. 22A).

The species has eight varieties: var. *andina*, var. *lindeni*, var. *macranthera*, var. *micans*, var. *nervosa*, var. *pudibunda*, var. *quadri-lobulata* and var. *striata*, but only three were recognized to be from Minas Gerais in this study. *Senna macranthera* occurs in Brazil, Colombia, Ecuador, Peru and Venezuela (Irwin & Barneby 1982).

The characteristic color of leaflets was used in this species because it was important for to try identify the subspecies varieties.

Key to the varieties of *Senna macranthera* in Minas Gerais

1. Tree; longest sepal 3–6 x 2–4 mm
 2. Leaflets strigillose, rough surface.....**12.1**.var. *macranthera*
 - 2'. Leaflets tomentose, soft surface.....**12.2** .var. *nervosa*
2. Shrubs; longest sepal 8–16 x 4–9 mm
 3. Leaflets strigillose, rough surface, concolor.....**12.4**.var. *striata*
 - 3'. Leaflets tomentose, soft surface, discolor.....**12.3**.var. *pudibunda*

12.1 *Senna macranthera* (Collad.) Irwin & Barneby var. *macranthera*, Mem. New York Bot. Gard. 35: 183. 1982. Fig. 10: E-I; Map: Fig. 9

This variety has many specimens deposited in herbaria and it is easily recognized by the habit and indument, which can be observed in the stereomicroscope or sensed when touching the leaflets, because it feels a strigillose surface.

It occurs in Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo and Paraná, in areas of the Atlantic Forest and the Cerrado (Table 4). It can be found in gallery forest and “chapadão, capoeiras, serras” and cultivated in a garden and street (Irwin & Barneby 1982).

In Minas Gerais, the species is common in the central and southeast regions of the state (Fig. 9) and it was collected near a river, inside a forest, forest margin, on the

roadside and in pastures. It was collected with flowers in January, February, March, April and November; and with fruits in November.

Examined specimens: BRAZIL. MINAS GERAIS: Araguari, Bosque John Kennedy, 26.II.1993, fl., *G. M. Araujo s.n* (UB 4155); Brumadinho, 20° 8' S, 44° 13' W, Serra da Calçada, Serra da Moeda, retiro das pedras, elev. 1400 m, 4.XI.1989, fl., *L. A. Martens 142* (SPF); Carangola, Prox. ao leito do Rio Carangola, 18. II. 1989, fl., *L. S. Leoni 657* (RB); Diamantina, ca. 7 km W. of Diamantina, km 299 on MG 259, elev. 1350, 2.II.1972, fl., *W. R. Anderson et al. 35152* (UB); Divino, along Rio–Salvador highway, 16.4 km North of boundary between Municípios of Divino e Caracópolis, 1.2 km south of turnoff Road to Orizânia, 10.III.1970, fl., *G. Eiken & L. T. Eiten 10897* (UB); Juiz de Fora, III.1970, fl., *L. Krieger 8219* (MBM); Lima Duarte, P. E. Ibitipoca, elev. 1300 m, mata ciliar, junto a prainha do rio do salto, 20.III.1995, fl., *A. E. Luchi et al. 427* (IBT); Mariana, P. E. Itacolomi, entre Serrinha e Cibrão, 29.III.2004, fl., *V. F. Dutra et al. 211* (VIC); Ouro Preto, Falcão, 28.I.1942, fl., *M. Magalhães 1383* (UB); Mariana, 9.I.1973, fl., *J. Badini s.n* (OUPR 18652); P.E.Itacolomi, estrada para Cibrão, 17.II.2005, fl., *L.C.P. Lima et al. 305* (VIC); Pico de Itambé, elev. 950 m, about 5 km directly West and North of Santo Antonio de Itambé, 9.II.1972, fl., *W. R. Anderson et al. 35701* (UB); Serra do Caraça, near riacho, ca. 10 km W. of Barão de Cocais, ca. 1400 m elev., 22.I.1971, fl., *H. S. Irwin et al. 28878* (UB); Serra do Cipó, elev. ca. 1200 m, 17.II.1972, fl., *W. R. Anderson et al. 36121* (UB); Santana do Riacho, estrada MG 010, ca. 400 m antes da bifurcação entre Morro do Pilar e Conceição do Mato Dentro, 4.IV.1994, fl., *M. T. V. A. Campos & J. M. Arcanjo s.n* (SPF 106606, IBT 293274); Viçosa, campus UFV, 9.III.2012, fl., *R. Luciana s.n* (VIC 35664); estação de Pesquisa, Treinamento e Educação Ambiental Mata do Paraíso, 9.IV.2012, fl., *M. V. R. C. Simão 42* (VIC 40034); campus da UFV, em frente ao Departamento de Dança, 21. XI.2015, fr., *L.G Rosignoli–Oliveira 1* (VIC)

12.2 *Senna macranthera* (Collad.) Irwin & Barneby var. *nervosa* (Vogel) Irwin & Barneby, Mem. New York Bot. Gard. 35: 184. 1982. Fig. 10: J-K; Map: Fig. 9
Cassia nervosa Vogel, Syn. Gen. Cass. 39 & Linnaea 11: 682

As well as *S. macranthera* var. *macranthera*, the var. *nervosa* also has many collected materials in herbaria and is also easily recognized by the density of trichomes

in the leaflets or by the simple touch, its surface feels very soft.

The variety occurs in Bahia, Goiás, Distrito Federal, Mato Grosso, Minas Gerais, Rio de Janeiro, São Paulo, in regions of the Atlantic Forest and the Cerrado (BFG 2015). It can be found in gallery forest, thickets, chapadão, outcrops in cerrado and is used as for decorative street tree (Irwin & Barneby 1982).

The variety has a geographical distribution spread with in the regions of Minas Gerais (Fig. 9), where it was collected in regions of transition forest-cerrado, disturbed cerrado, in the gallery margin and on rocky slopes. It was found with flowers in January, February and March and with fruits in March, April, May, July, August and November.

Examined specimens: BRAZIL. MINAS GERAIS: Alfenas, Fazenda Mundo Novo, 12.II.1986, fl., *M. C. W. Vieira* 868 (SPF); estrada Alfenas-Guaxupe, 04.VII.1991, fr., *H. Lorenzi s.n* (IBT 262142); Corinto, ca. 12 km W. of Corinto, elev. 600 m, 4.III.1970, fl., *H.S. Irwin et al.* 26900 (UB); Curvelo a Diamantina, estrada, Gouveia, próximo ao trevo, mata de galeria, 18° 28' 19.2" S, 43° 45' 32.9 W, 999 m, 16.I.2008, fl., *V. F. Dutra & J.M. Fernandes* 411 (VIC); Diamantina, ca. 23 km S. W. of Diamantina, road to Gouveia, elev. 1250 m, 18.I.1969, fl., *H. S. Irwin et al.* 22214 (UB, SPF); ca. 20 km E. of Diamantina, Rio Jequití, elev. 790 m, 13.III.1970, fl., *H. S. Irwin et al.* 27412 (UB); ca. 23 km E. of Diamantina, elev. 900 m, 17.III.1970, fr., *H. S. Irwin et al.* 27732 (UB); ca. 15 km E. of Diamantina, elev. 1100 m, 20.III.1970, fl., *H. S. Irwin et al.* 27965 (UB); Guarapuava, 16°2'S, 46°18' W, alt. 551 m. s. m., 26.XI.2000, fr., *L.C. Milhomens et al.* 64 (UB); Governador Valadares, ca. 10 km of the Rio Doce, 28.III.1976, fl., *G. Davidse & W.G. D'Arcy* 11458 (IBT); Ibiá, MG 230, distante 2 km da BR 262, 19° 34' 51" S, 46° 29' 47" W, 2.III.1989, fl., *B. M.T. Walter et al.* 63 (UB); Joaquim Felício, entre Várzea da Palma e Joaquim Felício, 31 km E do Rio das Velhas, elev. 650 m, 17° 35' S, 44° 35' W, 12.II.1988, fl., *J. R. Pirani et al.* 2142 (SPF); Mariana, 3.VII.1997, fr., *E. Tameirão Neto* 2626 (BHCB); Marliéria, P. E. Rio Doce, 20.III.1997, fl., *W. Paula Lopes* 110 (VIC); PERD, campo de pouso, 20.II.2001, fl., *S. R. D. F. Silva Nunes et al.* 24 (VIC); PERD, Trilha Campo de Pouso, 19.V.2001, fr., *S. R. D. F. da Silva Nunes et al.* 63 (VIC); Montes Claros, ca. 32 km West of Montes Claros, road to Água Boa, elev. 1000 m, 23.II.1969, fl., *H. S. Irwin et al.* 23744 (UB); Patrocínio, Serra do Salitre, Lagoa Campestre, 22.VIII.1994, fr., *G. Ceccantini et al.* 444 (SPF); Paraopeba, Ginásio Padre Augusto, 12.V.1954, fl., *E. P. Heringer* 3380

(UB); 10.V.1959, fl., *E. P. Heringer s.n* (UB 7248); Rio Pardo de Minas, P. E. Serra Nova, trilha caminho das gerais, 7.III.2008, fl., *J. M. Fernandes & V. F. Dutra 716* (VIC); Santana do Riacho, ao longo da rodovia Belo Horizonte-Conceição do Mato Dentro, mata de galeria, ca. 4 km da cidade, elev. 1000 m, 18.II.1982, fl., *C. F. Muniz et al. s.n* (IBT 179114); São João da Chapada, road to Inhaí, elev. 1150 m, 30.III.1970, fr., *H. S. Irwin et al. 28629* (UB); Serra do Cipó, elev. ca. 1200 m, 17.II.1972, fl., *W. R. Anderson et al. 36158* (UB)

12.3 *Senna macranthera* (Collad.) Irwin & Barneby var. ***pudibunda*** (Benth.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 186. 1982. Fig. 10: L; Map: Fig. 9
Cassia pudibunda Mart. ex Benth. in Mart., Fl. Bras. 15(2):102. 1870.

The varieties *nervosa* and *pudibunda* have pilosulous leaflets and can be distinguished by habit and by the size of their sepal. In material deposited in herbaria, it is common to observe that the leaflets are discolor, with vinaceous adaxial surface.

It occurs in Alagoas, Bahia, Ceará, Minas Gerais, Paraíba, Pernambuco, Piauí and Rio Grande do Norte, occurring in areas of the Caatinga and Cerrado (Table 4). It was collected in Minas Gerais in the central region (Fig. 9), in the gallery margin. It was found with flower in January and April.

Examined specimens: BRAZIL. MINAS GERAIS: Diamantina, ca. 17 km N.E of Diamantina, elev. 1300m, 26.I.1969, fl., *H. S. Irwin et al. 22644* (UB); Divisa Bahia-Minas Gerais, 20.I.1965, fl., *E. P. Heringer 10280* (UB); Estrada paa Conselheiro Mata, 500m do asfalto, 27. I. 1986, fl., *I CFCR Cordeiro et al. 9278* (SPF); Serra do Cipó, Lagoa Santa, Km 01, 2.IV.1983, fl., *A. F. da Silva et al. 469* (VIC)

12.4 *Senna macranthera* (Collad.) Irwin & Barneby var. ***striata*** (Vogel) Irwin & Barneby, Mem. New York Bot. Gard. 35: 185. 1982. Fig. 10: M; Map: Fig. 9
Cassia striata Vogel Syn. Gen.. Cass. 39 & Linnaeae 11:648.1837.

Three materials deposited in herbaria were found as *Senna macranthera* var. *striata*, which were observed virtually. The specimen *I. C. Cordeiro 9278* (SPF) was re-identified as *S. macranthera* var. *pudibunda* and the specimen *L. S. Leoni 657* (RB) was reidentified as *Senna macranthera* var. *macranthera*.

The material *G. Hatschbach* 71315 (MBM) can not be confirmed because the material needs to be analyzed on the stereomicroscope. It is possible to observe that the sepal is large, but the nectary does not have the typical format of the species *S. macranthera*. The material loan was requested recently, but he did not arrive in time to enter the information in this dissertation.

The material *K. Ferreira* s.n (RB 480801) identified only at the species level was found. This was confirmed to be *S. macranthera* var. *striata* due to strigilous indument and very large sepals, 15-16 x 9-10 mm.

The specie is endemic of Brazil and occurs in Bahia, Goias, Minas Gerais, Pernambuco and Tocantis, occurring in Caatinga and Cerrado (Table 4). In Minas Gerais it was collected in the South of the state (Fig. 12). It was found with flowers and fruit in February.

Examined specimens: BRAZIL. MINAS GERAIS: Lavras, estrada do madeira, 03.II.2006, fl. e fr., *K. Ferreira* s.n (RB 480801)

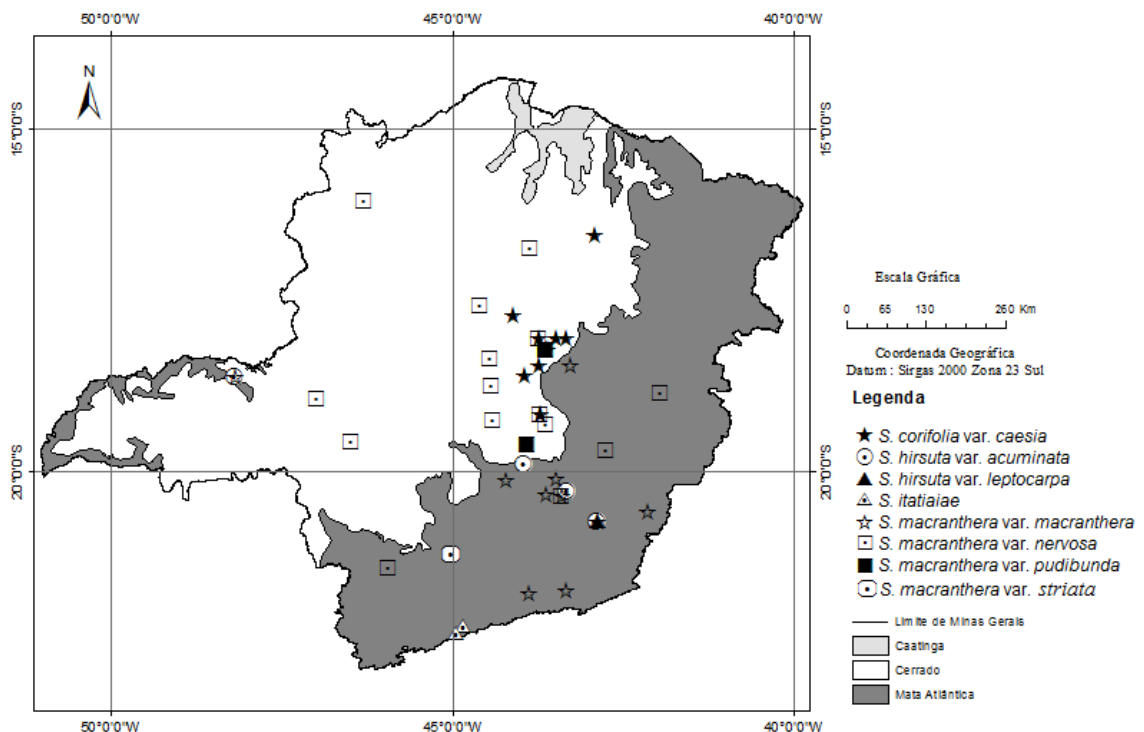


Fig. 9: Geographical distribution of *Senna corifolia*, *S. hisuta* and its varieties, *S. itatiaiae* and *S. macranthera* and its varieties in Minas Gerais state.

13. *Senna mucronifera* (Benth.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 247. 1982. Fig. 10: N-Q; Map: Fig. 12

Cassia mucronifera Mart. ex Benth. in Mart., Fl. Bras. 15(2): 116

Shrubs, 0.9–1.5 m alt. Branches cylindrical or angular, densely pubescent. Leaves 3 pairs of leaflets; stipules not seen, deciduous; petiole 1–2 cm long.; nectary between all pairs or only between the first and the second proximal pairs, linear or piriform, stipitate; leaf rachis 1.5–2.5 cm long., densely pubescent.; leaflets elliptic or obovate, apex acute, mucronulate, both sides tomentose, veins patente in abaxial surface, membranaceous, margin ciliolate, proximal pair 2.5–4 × 1.3–1.6 cm, distal pair 4–4.5 × 1.5–1.8 cm. Racemes umbellate, terminal; peduncle ca. 0.5 cm long.; inflorescence rachis absent. Bracts 5–8 × 0.5 mm, lanceolate, deciduous; pedicel 16–20 mm long., nectary absent. Sepals 5–20 × 4–10 mm, different size, elliptic or obovate, apex rounded, dorsal surface sparse tomentose. Corolla asymmetrical; petals sparse tomentose, yellow, centric adaxial petal 20–28 × 9–12 mm, obovate, apex emarginated latero–adaxial petals obovate, apex rounded, latero–adaxial petals obovate and one is falciform, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina obovate, medium stamen filaments ca. 2 mm long., anther 6–8 mm long., centric–abaxial stamen filament ca. 10 mm long., anther 10–15 mm long., latero–abaxial stamens filaments ca. 10 mm long., straight, anther 10–12 mm long, rostro straight, ca. 2 mm long. Ovary velutinous, style 1.5–2 cm long., velutinous. Legume ca. 7.6 × 0.5 cm, linear, externally smooth, curved, brown when mature, indehiscent. Seeds not seen.

Senna mucronifera can be recognized by the presence of 3 pairs of obovate or elliptic leaflets with mucronulate apex (Fig.10N), longer pedicel, large sepals, asymmetric flowers (Fig. 10P) and a long rostro in abaxial stamens' anthers (Fig.10Q). It is similar to other species of serie *Trigonelloideae* (Table 3): *Senna obtusifolia* (L.) Irwin & Barneby and *Senna pentagonia* (Mill.) Irwin & Barneby in the number and form of leaflets. They can be distinguished by *S. mucronifera* has nectary between all pairs of leaflets or between the first and second proximal pairs (Fig.10O) and asymmetric flowers (Fig.10P), while *S. obtusifolia* has nectary only between the proximal pair (Fig. 13B) and zygomorphic flowers (Fig. 13H). The flowers of *S. mucronifera* are large, with a centric adaxial petal 20–28 × 9–12 mm (Fig. 10P) and pod

without wings, while *S. pentagonia* (Fig. 16 J), has smaller centric adaxial petal 6–11 × 4 mm and pod with wings (Fig. 16L,M).

The specie occurs in Bolivia, Brazil and Paraguay (Irwin & Barneby 1982), where it was collected in all the following States: Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, São Paulo and Tocantins, occurring in the Amazon Forest, the Atlantic Forest and the Cerrado (Table 4). It is found in campo, disturbed woodland and headwaters (Irwin & Barneby 1982). In Minas Gerais it was collected in the northwest of state (Fig. 12) in disturbed campo. It was found with flowers in March and May and fruit in May and August.

Examined specimens: BRAZIL. MINAS GERAIS: Buriti, Fazenda Furquilha Novo, 23.VIII.1964, fr., *H.S. Irwin et al. 5511* (NYBG); Cabeceira Grande, mata acima da ponte que liga Palmital a BR 251, margem esquerda, 16°11'07"S, 47°20'28"W, 16.V.2002, fl. e fr., *A.A. Santos et al. 1214* (CEN); Unai, cerca de 500 m a Oeste do portão Central da UHE Queimado, campo sujo em topo de morro, 16° 12'56" S, 47° 19'32" W, alt. 850 m, 25.III.2002, fl., *G. Pereira-Silva et al. 6206* (CEN)

14. *Senna multijuga* (Rich.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 492. 1982. Fig. 11: A-G; Map: Fig. 12

Cassia multijuga Rich., Actes Soc. Hist. Nat. Paris 1:108. 1782

Trees, (3–)6–20 m alt. Branches cylindrical, sparse or densely tomentose. Leaves 19–23(–37) pairs of leaflets; stipules 5–7 × 0.5–1 mm, linear, linear–falciform or filiform, base truncate, apex acute, deciduous; petiole 1–2.5 cm long.; nectary between the first pair of leaflets, sometimes in other proximal pairs or distal pairs also, falciform, fusiform, rare ovate-acuminate or cylindrical, sessile or stipitate; leaf rachis 14–18(–21) cm long., tomentose and can be yellow or rusty; leaflets oblong, apex obtuse, mucronulate, adaxial surface finely sparse tomentose and abaxial surface sparse tomentose or sparse velutinous, rare both sides glabrous, veins tenuous, membranaceous, margin ciliolate, proximal pair 0.6–3 × 0.5–0.8, median pair 1.2–4 × 0.3–1 cm, distal pair (1.2) 1.5–3 × 0.4–0.9 cm. Raceme or panicle axillary and panicle terminal; peduncle 2.5–4.5 cm long; inflorescence rachis 1–7 cm long. Bracts ca. 3–4 × 1 mm, lanceolate, deciduous; pedicel 15–20 mm long., nectary absent. Sepals 2–5 × 1–3 mm, different size, elliptic or ovate, apex rounded, dorsal surface glabrous or sparse

tomentose. Corolla asymmetric; petals glabrous or sparse tomentose, yellow, centric adaxial petal 8–10 × 3–6 mm, obovate, apex rounded or emarginated, latero–adaxial petals elliptic, apex rounded, latero–abaxial petals obovate and one is falciform, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina twisted, medium stamen filaments 0.5–1 mm long., anther 4–5 mm long., centric–abaxial stamen filament 1–2 mm long., anther 4–5 mm long., latero–abaxial stamens filaments 4–6 mm long., straight, anther 5–6 mm long, rostro curved, ca. 1 mm long. Ovary tomentose, style 1–1.4 cm long., tomentose. Legume 9–15 × 1.5–2 cm, oblong, flat-compressed, externally with depression between seed locules, slightly curved, glabrous, brown when mature, dehiscent. Seeds ca. 7 × 2 mm, 1-seriate, oblong.

Senna multijuga is included in serie *Interglandulosae* (Table 3) and can be easily recognized by the presence of several oblong small leaflets (Fig. 11A), inflorescence in panicle (Fig. 11A), asymmetric flowers (Fig. 11D) and a flat-compressed legume (Fig. 11F, G). It occurs in Bolivia, Brazil, Colombia, Costa Rica, Guianas, Panamá and Venezuela (Irwin & Barneby 1982).

Irwin & Barneby (1982) considered that *Senna multijuga* has three subspecies and four varieties: subsp. *doyle*, that occurs in México; subsp. *multijuga*, with the var. *multijuga* and var. *verrucosa*; and subsp. *peregrinatrix* with var. *lindleyana* and var. *peregrinatrix*.

In order to recognize the subspecies, Irwin & Barneby (1982) used the form of stipules, but this structure is deciduous in most all examined specimens and thus it is difficult to identify the materials. When the stipule was present, it showed linear or filiform (Fig. 11 B) and this characteristic is similar to the author's proposal recognized the subsp. *lindleyana*. Thus, the materials found in Minas Gerais were considered *S. multijuga* subsp. *lindleyana*.

To distinguish the varieties, Irwin & Barneby (1982) used the observation of the size of the large leaflets (Fig. 11C,E). In this species, the large leaflets is the median pairs and so, only in *S. multijuga*, the measures of the median pairs were added to also try to separate the varieties. It is important to search the mature leaves to measure.

The examined specimens of *Senna multijuga* from Minas Gerais have many variations in their indument and the form of nectary present in leaf rachis. The presence of yellow or rusty trichomes is common in *S. multijuga* var. *lindleyana*, but it can also

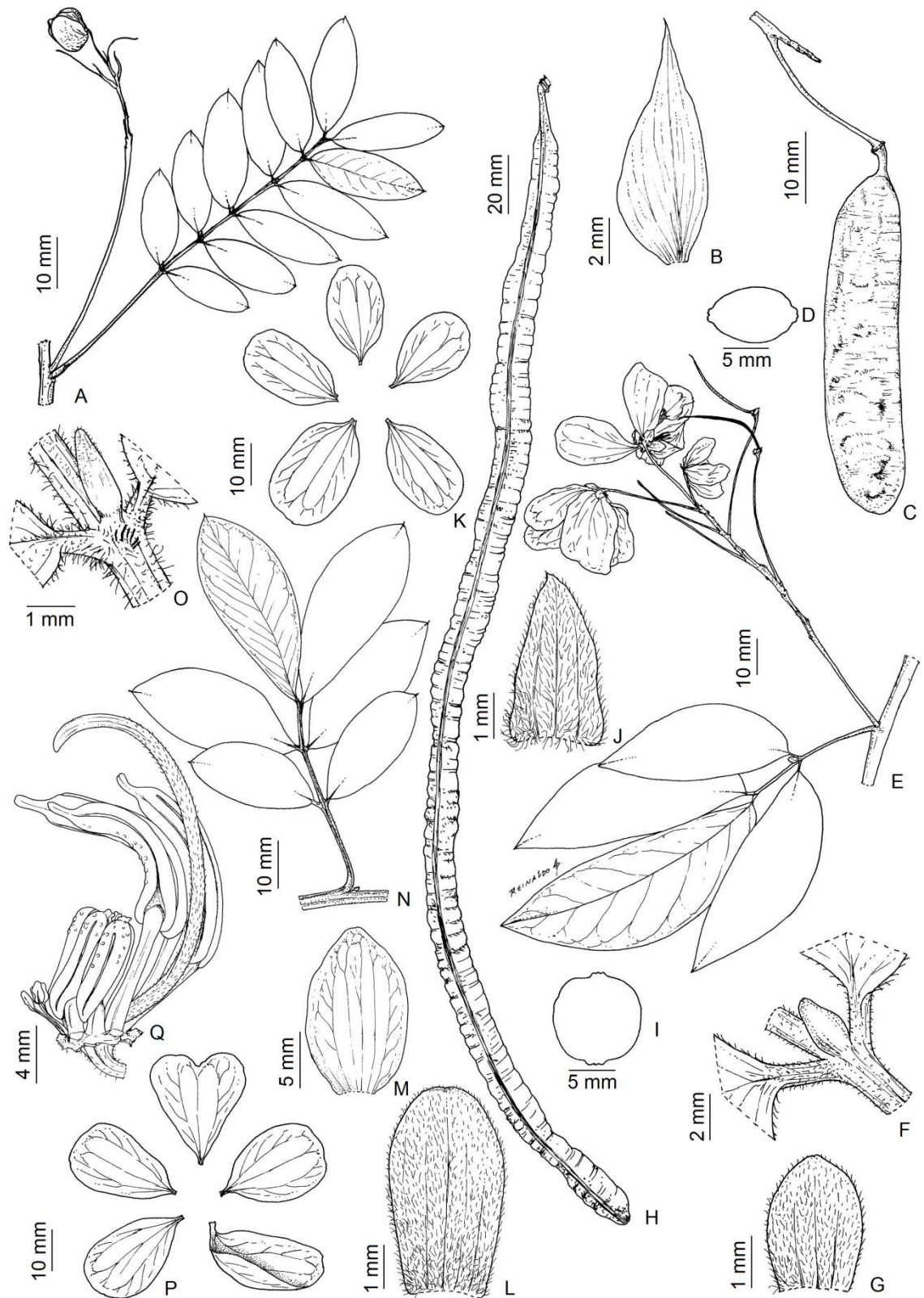


Fig. 10: *Senna itatiaiae* Irwin & Barneby. **A.** Branche, leaves and inflorescence. **B.** Stipule. **C.** Pod. **D.** Transversal section of pod. *S. macranthera* (Collad.) Irwin & Barneby var. *macranthera*. **E.** Branche, leaves and inflorescence. **F.** Nectary between leaflets of proximal pair. **G.** Sepals detail. **H.** Pod. **I.** Transversal section of pod; *S. macranthera* var. *nervosa* (Vogel) Irwin & Barneby: **J.** Sepal. **K.** Corolla; *S. macranthera* var. *pubibunda* (Benth.) Irwin & Barneby: **L.** Sepal; *Senna macranthera* var. *striata* (Vogel) Irwin & Barneby: **M.** Sepal. *S. mucronifera* (Benth.) Irwin & Barneby. **N.** Leaf. **O.** Nectary between leaflets of proximal pair. **P.** Corolla. **Q.** Androecium and pistil. (**A:** R. Mello-Silva et al. 12-VIC; **B-D:** L. D. Meireles & J. A. Nunes 230-RB; **E-G:** L. C. P. Lima et al. 305- VIC; **H-I:** E. Tameirão Neto 2626-BHCB; **J-K:** H. S. Irwin et al. 22214 - UB; **L:** H. S. Irwin et al. 22644-UB; **M:** K. Ferreira s.n (RB 480801) **N-Q:** G. Pereira-Silva et al. 6206-CEN)

occur in some materials of *S. multijuga* var. *peregrinatrix*. Due to that, it was difficult to find other characteristics to complete the size of leaflets in identification key of varieties. It is important for the taxonomy revision to include collections from different places so to try to understand the variations in this specie, as cited by Bortoluzzi et al. (2011), by using taxonomy methods and field observations.

Key to varieties of *Senna multijuga* subsp. *lindleyana* in Minas Gerais

- 1. Leaflets' median pairs longer and common large, 2–4 × 0.5–1 cm.....
.....**14.1** var. *lindleyana*
- 1'. Leaflets' median pairs smaller and narrow, 1.2–1.8 × 0.3–0.4 cm.....
.....**14. 2** var. *peregrinatrix*

14.1 *Senna multijuga* (Rich.) Irwin & Barneby subsp. *lindleyana* (Gard.) Irwin var. *lindleyana* Irwin & Barneby, Mem. New York Bot. Gard. 35: 498. 1982.

Fig. 11: A-D; Map: Fig. 12

Cassia lindleyana Gard., London J. Bot. 2: 341. 1843

Bortoluzzi *et al.* (2011), studying *Senna* species in the Santa Catarina State, observed that, besides the leaflets measurements, the form of the nectary and the absence of glanduliform trichomes in pedicel could assist in the recognition of var. *lindleyana*. However, in the material collected in Minas Gerais, these characteristics did not assist in the segregation, because the form of the nectary is a characteristic that overlaps with the forms presented in var. *peregrinatrix* and, in addition, glanduliform trichomes are present in some examined materials.

It occurs in Colombia, Venezuela and Brazil where it is distributed along the Atlantic coast, between Bahia and Santa Catarina (Irwin & Barneby 1982). In BFG (2015), the distribution had information about the subspecie including that the *S. multijuga* subsp. *lindleyana* occurs in Bahia, Espírito Santo, Goias, Minas Gerais, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina and São Paulo (Table 4).

The var. *lindleyana* can be found in forest clearings, in the margin of humid woodland, gallery forest and Serras in the Atlantic Forest and the Cerrado (Irwin & Barneby 1982). In Minas Gerais, it is frequent in the central and southeastern regions of the state, and is also found in the northwest (Fig. 12), near rivers, on roadsides and

campo in Cerrado. It was collected with flowers in January, February, March, April, May and December; and with fruits in January, April and October.

Examined specimens: BRAZIL. MINAS GERAIS: Antônio Carlos, Inst. Miss., 7.I.1972, fl., *P. L. Krieger 11450* (SPF, UB); Belo Horizonte, Fazenda do Sobrado-onça, 21.IV.1934, fr., M. Barreto 5908 (UB); Carandaí, Pedra do Sino Hotel Fazenda, BR 040, km 6, trilha da matinha, 20°52'49.5" S, 43°49' 02.8"W, elev. 1000-1050 m, 30.IV.2005, fr., *N. F. O. Mota & P. L. Viana 164* (HUEFS); Catas Altas, 12 km S. of Catas Altas on Road to Santa Rita Durão, 22.I.1959, fl., *H. S. Irwin 2511* (R); Descoberto, Reserva Biológica da Represa do Grama, 02.III.2002, fl., R. C. Forzza et al. 2074 (UB); Ouro Preto, P.E.Itacolomi, trilha do Custódio, 20.X.2005, fr., *L. C. P. Lima & M. P. Andrade 394* (VIC); entrada principal, próximo à portaria do Parque Estadual do Itacolomi, 21.I.2005, fr., *L. C. P. Lima et al. 329* (VIC); entrada principal, próximo à portaria do Parque Estadual do Itacolomi, 21.I.2005, fl., *L. C. P. Lima et al. 283* (VIC); Paraopeba, Horto Florestal, 25.IV.1954, fl., E. P. Heringer 3379 (UB); 3k de Paraopeba, Fazenda do Funil, 28.V.1959, fl., *E. P. Heringer s. n* (UB 7139); Poços de Caldas, Retiro Branco, 3.II.1965, fl., *O. Roppa & O. Leoncini 552* (IPA); Rosário da Limeira, córrego Limeira, em frente a venda do Zé Pedrinho, 28.XII.2004, fl., *E. Guarçoni 794* (VIC); Santa Bárbara, 12.IV.1933, fl., *M. Barreto 5897* (UB); Serra do Espinhaço, Lower cut-over slopes of Serra da Caraça, near riacho, ca. 10 km w. of Barão de Cocais, elev. ca. 1400 m, 22.I.1971, fl., *H. S. Irwin et al. 28868* (R); south-eastern draining to Pico de Itambé, about 5 km directly West and North of Santo Antônio de Itambé, elev. ca. 950 m, 9.II.1972, fl., W. R. Anderson et al. 35737(UB); Viçosa, 5.I.1931, fl., *Y. Mexia 4218* (VIC); campus da UFV, Belvedere, perto da sombrinha, 26.III.1989, fl., G. L. Rodrigues s.n (VIC 10654); estação de pesquisa, treinamento de educação ambiental Mata do Paraíso, 26.IV.2012, fr., M. V. R. C. Simão 69 (VIC)

14.2 *Senna multijuga* (Rich.) Irwin & Barneby subsp. *lindleyana* (Gard.) Irwin & Barneby var. *peregrinatrix* Irwin & Barneby, Mem. New York Bot. Gard. 35: 499. 1982.

Fig. 11: E-G; Map: Fig. 12

As explained in comments about the *S. multijuga* var. *lindleyana*, Bortoluzzi et al. (2011) used the measurements of leaflets so as to distinguish the varieties, the form

of nectary and the presence of trichomes glanduliform in pedicel. However for material collected in Minas Gerais, these characteristics did not assist to expand the characteristics that could be used to separate the varieties, because the form of nectary is highly variable and the glanduliform trichomes was observed in a several materials recognized as var. *peregrinatrix*, but it was observed in some materials of var. *lindleyana* as well. Therefore, to recognize these varieties, in this study, only the measures of medium pairs were used, finding that the var. *peregrinatrix* has smaller leaflets.

It occurs in Colombia, Venezuela and Brazil, where it is present in coastal ranges from Rio de Janeiro to Santa Catarina (Irwin & Barneby 1982). For the distribution across the Brazilian States, in BFG (2015), this information is about the subspecies, as commented in *S. multijuga* var. *lindleyana*.

The var. *peregrinatrix* occurs in humid forests in the Atlantic Forest and in savanna woodland (Irwin & Barneby 1982). In Minas Gerais, it is common in the Southeast region of the state, and it is also found in the Northwest (Fig. 14), near rivers and lagoons and in roadsides in semideciduous Forest. It was found with flowers in February, March, April and June, and with fruits in May, June, September and October.

Examined specimens: BRAZIL. MINAS GERAIS: Arinos, km 21 da rodovia Arinos-Unaí, aproximadamente 600 m de altitude, entre 15° 30' e 16° 10' S, 46° 10' e 47° 30' W, 02.V.1996, fl., B. A. S. Pereira & D. Alvarenga 3056 (UB); Marliéria, P.E. Riodoce, estrada do Restaurante, 12.III.1998, fl., R.L.C.Bortoluzzi et al. 1(VIC); estrada do Aníbal, trilha de acesso à Lagoa do Aníbal, 28.X.1998, fr., R. L. C. Bortoluzzi et al. 321 (VIC); ao longo da estrada que corta o parque- P. E. Rio Doce, 24.II.1999, fl., R. L. C. Bortoluzzi et al. 491 (VIC); trilha estrada do salão dourado, 19.II.2001, fl., S. R. D. F. Silva Nunes et al. 17 (VIC); trilha da Estrada Portaria/área de camping, 15.III.2001, fl., S.R.D.F.da S. Silva Nunes et al. 43 (VIC); trilha da estrada, portaria a área de camping, 19.V.2001, fr., S. R. D. F. Silva Nunes et al. 66 (VIC); trilha Lagoa do Meio, 21.V.2001, fl., S. R. D. F. da Silva Nunes 69 (VIC); trilha Lagoa Águas Claras, 30.VI.2001, fr., S. R. D. F. da S. Silva Nunes et al. 74 (VIC); Monte Belo, Fazenda lagoa, 23.VI.1985, fr., M. C. W. Vieira 965 (RB); Serra do Cipó, estrada para Morro do Pilar, beira da rodovia, 21.IX.2016, fr., L. G. Rosignoli-Oliveira 25 (VIC); Paraopeba, Estação Florestal de Experimentação (EFLEX), 14.IV.2001, fl., G. E. Valente et al. 715 (VIC); Paula Cândido, 7.V.2001, fl., E. Teixeira s.n (VIC 26835); Santa Maria de

Itabira, 19° 21' S, 43° 04' W, 20.V.1982, fl., *H. P. Bautista 584* (RB); Viçosa, zona rural do Cascalho, sítio Vai e volta do Sr. Milton, a 30 m do curral, beira brejo, 9.IV.1999, fl., *L. A. Basílio & E. Miranda s.n* (VIC); Viçosa; laboratório de tecnologia da madeira, 26.IV.2012, fl., *M. V. R. C. Simão 39* (VIC).

15. *Senna neglecta* (Vogel) Irwin & Barneby, Mem. New York Bot. Gard. 35: 421. 1982. Fig. 11: H-O; Map: Fig. 12

Cassia neglecta Vogel, Linnaea 10(5): 594. 1836

Shrubs or small trees, 1.5–2.5 m alt. Branches cylindrical, pubescent or sparse tomentose. Leaves 4–5 (–6) pairs of leaflets; stipules ca. 5 × 1 mm, lanceolate, base truncate, apex acuminate, deciduous; petiole 1.5–2.5(–2.8) cm long; nectary present in the lower half of the petiole, conical or globose, sessil; leaf rachis (3–)4–6 cm long., pubescent or sparse tomentose; leaflets narrowly elliptic or elliptic, rare obovate, apex acute or obtuse, mucronulate, adaxial surface glabrous or sparse pubescent, abaxial surface glabrous, but can be pubescent at base or velutinous overall, veins tenuous or patente, cartaceous, margin glabrous or ciliolate, proximal pair 2–3.5 × 1.1–1.3 cm, distal pair 4–6.5 × 1.5–2 cm. Racemes axillary and panicles terminal; peduncle 0.5–1 cm long.; inflorescence rachis ca. 3 cm long. Bracts ca. 4 × 2 mm, lanceolate, deciduous; pedicel 1.5–2 mm long., nectary absent. Sepals 5–11 × 2–4 mm, similar size, elliptic or obovate, apex rounded, dorsal surface pubescent. Corolla zygomorphic, petals pubescent in dorsal surface, yellow, centric adaxial petal 8–14 × 2–5 mm, obovate, apex emarginated, latero–adaxial and latero–abaxial petals obovate, apex rounded. Androecium with 3 staminodes and 6 stamens fertile, filaments glabrous, staminodes lamina obovate, medium stamen filaments ca. 1 mm long., anther 3–5 mm long., centric–abaxial stamen not fertile, filament 3–6 mm, lamina 0.5(–4) mm, latero–abaxial stamens filaments 5–9 mm long., straight, anther 4–7 mm long, rostro transversely oblique, ca. 1 mm long. Ovary velutinous, style 1–1.5 cm long., velutinous on the margins. Legume 8.8–14 × 0.7–1 cm, linear, flat-compressed, externally depressed between seed locules, curved, glabrous, brown when mature, indehiscent. Seeds not seen.

Senna neglecta can be recognized by the presence of the following characteristic: nectary in the lower half of petiole (Fig.11I), it has, in general, narrowly

elliptic or elliptic leaflets (Fig. 11H), zygomorphic flowers with narrowly petals (Fig. 11J), six fertile stamens (Fig. 11K) and flat-compressed legume. It is included in serie *Basiglandulosae* (Table 3) and is similar to *S. cernua* as explained in taxonomy comments of this specie.

Senna neglecta occurs in Brazil and Irwin & Barneby (1982) do not comment on the occurrence in other countries, but for BFG (2015) it is not endemic to Brazil because of its likely occurrence in Argentina (Souza & Bortoluzzi 2014 *apud* Kuntz 2014).

The specie has four varieties: var. *furnicola*, var. *grandiflora*, var. *neglecta* and var. *oligophylla*, but only three were recognized.

Key to varieties of *Senna neglecta* in Minas Gerais

- 1. Abaxial surface glabrous, it can be pubescent at base.....**15.3** var. *oligophylla*
- 1. Abaxial surface of leaflets velutinous overall
 - 2. Leaflets' apex obtuse; veins patente in adaxial surface; Sepals longer 8.5–11 mm long.....**15.1** var. *grandiflora*
 - 2. Leaflets' apex acute; veins tenuous; Sepals longer 5–7.5(–8) mm long.....**15.2** var. *neglecta*

15.1 *S. neglecta* (Vogel) Irwin & Barneby var. *grandiflora* Irwin & Barneby, Mem. New York Bot. Gard. 35: 423. 1982. Fig. 11: L-M; Map: Fig. 12

According to Irwin & Barneby (1982) *Senna neglecta* var. *grandiflora* has long centric-adaxial petal, being 14-19 mm long, but in examined specimens this structure has 12-14 mm. However, few specimens of this varietie were found from Minas Gerais and thus, this characteristic was not used in the identification key.

In the specimen collected by *R. P. Belem* (R!, NYBG!) the exact place where the plant was collected was not identifiend on the labels, but, according to Irwin & Barneby (1982), the collected specimen was between the valleys of the Jequitinhonha and Mucuri rivers, ca. 16-17 °30'S. From this information, the collection was probably in the Itaobim region. This point is near Medina, the city where it was collected as well, in the northeast of Minas Gerais (Fig. 12).

This variety is endemic to Brazil and occurs in Bahia, Goiás and Minas Gerais in the Atlantic Forest, Caatinga and Cerrado Biomes (Table 4), occurring between rivers

valleys (Irwin & Barneby 1982). In Minas Gerais it is found in rock wall. It was found with flower in January, May and June, and fruits in June.

Examined specimens: BRAZIL. MINAS GERAIS: Ao lado da rodovia BR 4, km 777, 22.VI.1968, fl. e fr., *R. P. Belem* (Isotype R 139127!; Holotype NYBG 00004860!); Medina, Rod. BR-116, 13.V.1983, fl., *G. Hatschbach 46317* (MBM, RB); Perdizes, fazenda Cambucá, 935 m.s., margens da estrada de acesso, 19°20'S, 47°16'W, 26. I.1994, fl., *L. A. Martens s.n* (SPF 86161)

15.2 *S. neglecta* (Vogel) Irwin & Barneby var. *neglecta*, Mem. New York Bot. Gard. 35: 423. 1982. Fig. 11: N-O; Map: Fig. 12

The acute apex of leaflets (Fig. 11N), tenuous veins (Fig. 11N) and the smaller sepals of var. *neglecta* (Fig. 11O), allow for the easy distinction of the other pilosulous variety.

Endemic to Brazil, it occurs in Espírito Santo, Minas Gerais, Paraná, Rio Grande do Sul, São Paulo and Santa Catarina in Atlantic Forest (Table 4). It can be found in disturbed woodland and waste places (Irwin & Barneby 1982). In Minas Gerais, it was collected in the south and southeast of state (Fig. 12). Collected with flower in March and August.

Examined specimens: BRAZIL. MINAS GERAIS: Alto Caparaó, P. N. Caraparaó, estrada entre vale Verde e Tronqueira, 20° 24' 68,4" S, 41° 50'966" W, elev. 1487m, 27.VIII.2015, fl., *J. Kuntz & G. D. Colleta 813* (ESA); idem, Estrada que dá acesso a Tronqueira, P. N. Caparaó, 20.III.2012, fl., *J. Kuntz et al. 450* (ESA); Extrema, Serra do Lopo, 5.III.2003, fl., *L. F. Yamamoto 1168* (UEC)

15.3 *S. neglecta* (Vogel) Irwin & Barneby var. *oligophylla* (Benth.), Mem. New York Bot. Gard. 35: 424. 1982. Fig. 11: H-K; Map: Fig. 12
Cassia oblongifolia var. *oligophylla* Benth. in Mart., Fl. Bras. 15(2): 111. 1870.

This variety is easily recognized by the glabrous leaflets, pubescent only at base.

According to Irwin & Barneby (1982), this variety occurs in Rio de Janeiro and Minas Gerais. However, it is not possible to say that it is endemic to Brazil, because the distribution is unknown (BFG 2015). It occurs in the Atlantic Forest (BFG 2015), in the opening in humid forest, rock outcrops and in “serras” (Irwin & Barneby 1982). In Minas Gerais, it is common in the southeast (Fig. 14), in pastures, forest margins, near lagoons and rock fields. It was collected with flowers in January, February, March and April; and with fruits in January and March.

Examined specimens: BRAZIL. MINAS GERAIS: Conceição de Ibitipoca, P. E. Ibitipoca, 3.II.1993, fl., *M. Eiterer 129* (CESJ); Lima Duarte, P. E. Ibitipoca, 22.III.1988, fl. e fr., *P. Andrade 1126* (BHCB); P. E. Ibitipoca, próximo da casa da polícia florestal, 21° 42'33" S, 43° 53'46" W, 4.II.2004, fl., *R. C. Forzza et al. 2636* (SPF); P. E. Ibitipoca, 09.III.2006, fl., *F. M. Ferreira et al. s.n* (CESJ 46899); P. E. Ibitipoca, 03.III.2007, fl. e fr., *F. M. Ferreira et al. 1024* (RB); Ouro Preto, P. E. Itacolomi, lagoa seca, próximo a gruta, 30.I.2006, fl. e fr., *M. C. T. B. Messias 1003* (OUPR); Santa Bárbara, Serra do Caraça, Trilha do Pico do Carapuça, 23.IV.1997, fl., *A. Rapini et al. 299* (IBT,SPF); São Francisco do Prata, Serra das Flores, Fazenda Cachoeirinha, BR 267- KM 183, 9.II.1992, fl., *R. F. Novelino et al. s. n* (CESJ 26394); Tiradentes, caminho para a Serra de São José, 21° 05'14"S, 44° 09'90" W, elev.1080 m.s.m., 16.I.1994, fl., *A. M. Giuliatti et al. s.n* (SPF 92589)

16. *Senna oblongifolia* (Vogel) Irwin & Barneby, Mem. New York Bot. Gard. 35: 374. 1982. Fig. 13: A-E; Map: Fig. 12

Cassia oblongifolia Vogel, Syn. Gen. Cass. 23 & Linnaea 11: 666, 1837.

Trees, 3–7 m alt. Branches cylindrical, pubescent. Leaves (6-)7(-8) pairs of leaflets; stipules 3–10 × 0.5–1 mm, linear-acuminate, base truncate, apex acuminate, deciduous; petiole 3(-3.5) cm long, nectary in upper half of the petiole, fusiform or ovate, stipitate; leaf rachis 5.5–7(-11) cm long., densely pubescent; leaflets oblanceolate or narrowly elliptic, apex retuse, sometimes obtuse, both sides glabrous or sparse tomentose, veins tenuous, cartaceous, margin ciliolate, proximal pair 2–2.5 × 0.6–1 cm, distal pair 3.5–4 × 1–1.7 cm. Racemes axillary; peduncle 2.5–5 cm long.; rachis 0.3–4.5 cm long. Bracts ca. 3 × 1 mm, cymbiform, deciduous; pedicel 15–25 mm long, nectary absent. Sepals 4–7 × 2–3 mm, different size, elliptic or narrowly elliptic, apex obtuse, sparse tomentose.

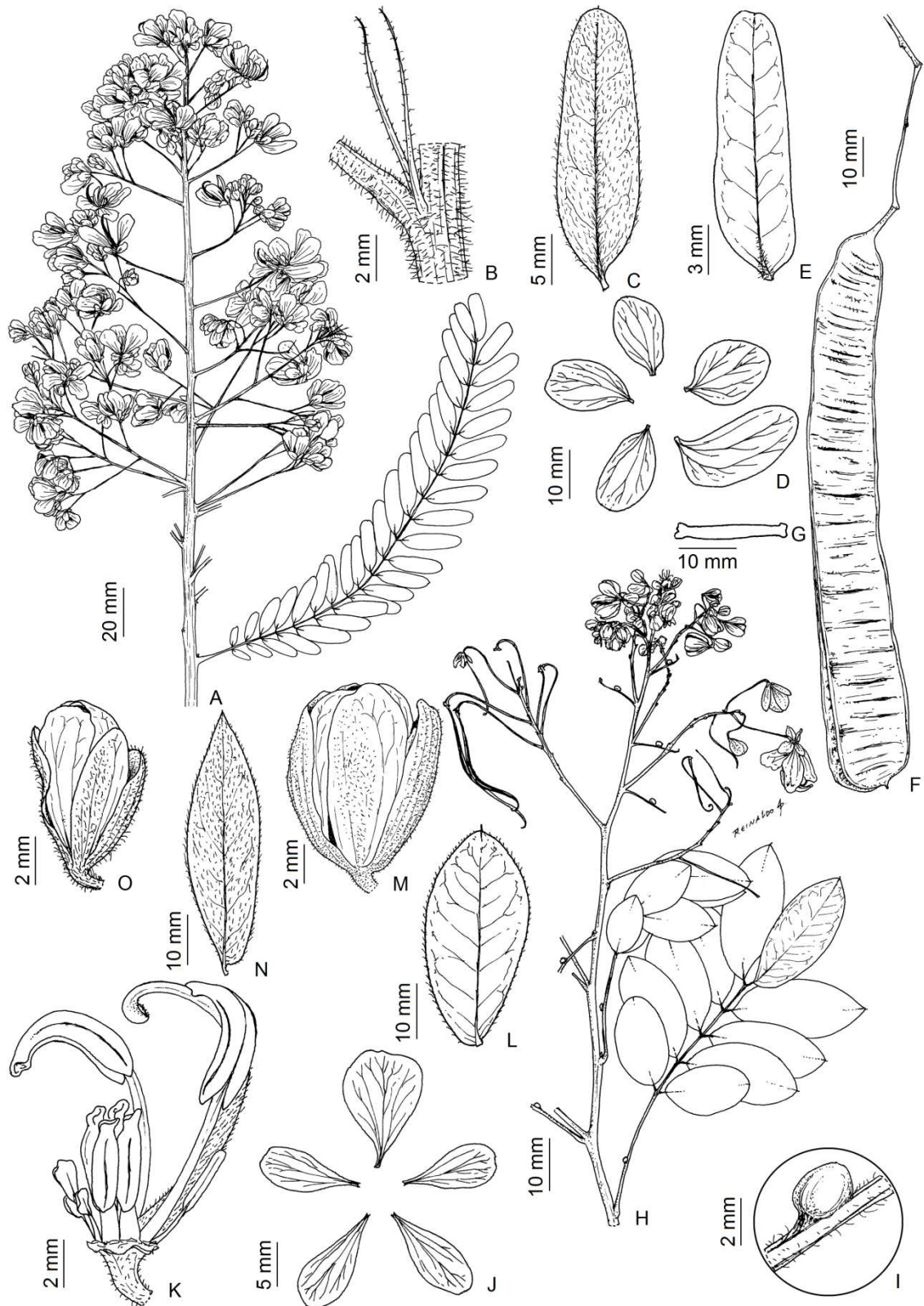


Fig. 11: *Senna multijuga* (Rich.) Irwin & Barneby subsp. *lindleyana* (Gard.) Irwin & Barneby var. *lindleyana* Irwin & Barneby. **A.** Branch. **B.** Stipule. **C.** Median leaflet detail. **D.** Corolla; *S. multijuga* (Rich.) Irwin & Barneby subsp. *lindleyana* (Gard.) Irwin & Barneby var. *peregrinatrix* Irwin & Barneby: **E.** Median leaflet detail. **F.** Pod. **G.** Transversal section of pod. *S. neglecta* (Vogel) var. *oligophylla* (Benth.) Irwin & Barneby: **H.** Branche with leaves and inflorescence. **I.** Petiolar nectary. **J.** Corolla. **K.** Androecium and pistil. *S. neglecta* (Vogel) var. *grandiflora* Irwin & Barneby: **L.** Leaflet detail. **M.** Sepal.; *S. neglecta* (Vogel) Irwin & Barneby var. *neglecta*: **N.** Leaflet detail. **O.** Sepal detail (**A, C-D:** *O. Roppa* & *O. Leoncini* 552-IPA; **B:** *L. C. P. Lima* & *M. P. Andrade* 394-VIC; **E-G:** *L. G. Rosignoli-Oliveira* 25; **H-K:** *M. C. T. B Messias* 1003-OUPR; **L:** *L. F. Yamamoto* 1168-VIC; **N, O:** *G. Hatschbach* 46317-MBM)

Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal 8–11 × 5–6 mm, obovate, apex emarginated, latero–adaxial petals obovate, apex emarginated, latero–abaxial petals oblanceolate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina obovate, medium stamen filaments 1–2 mm long., anther ca. 4 mm long., centric–abaxial stamen filament 3–4 mm long., anther 4–5 mm long., latero–abaxial stamens filaments 4–5 mm long., curved, anther 4–6 mm long, rostro truncate, ca. 0.5 mm long. Ovary tomentose, style ca. 1 cm long., tomentose. Legume 8–9 × 0.8–1 cm, linear, flat-compressed, externally depressed between seed locules, curved, glabrous, green, dehiscent. Seeds 5–6 × 5 mm, 1–seriate, circular.

Senna oblongifolia can be confused with *S. itatiaiae*, both included in serie *Coluteoideae* (Table 3), by form of leaflets, but they can be easily distinguished observing the position of nectary: *S. oblongifolia* is the only specie found in this study with nectary in the upper half of the petiole (Fig. 13A,B), while *S. itatiaiae* does not have nectary in petiole, but rather, between the pairs of leaflets (Fig. 10L).

The specie occurs in Argentina and Brazil (Irwin & Barneby 1982), where it was collected in the Amazonas, Distrito Federal, Minas Gerais, Rio de Janeiro, Paraíba, Paraná, Rio Grande do Sul, Santa Catarina and Tocantins, occurring in the Amazon Forest, Cerrado and Atlantic Forest regions (Table 4). It can be found in stony field, disturbed woodland, and thickets (Irwin & Barneby 1982). In Minas Gerais, it was collected in the southeast region (Fig. 12), in forests and on the roadsides. It was found with flower in September and October and with fruits in January, March and October.

Examined specimens: BRAZIL. MINAS GERAIS: Alto Caparaó, PARNA Caparaó, Tronqueira, floresta, 20.III.2006, fr., *B.V. Tinti et al. 152* (ESA); estrada da Tronqueira, 20.III.2014, fr., *J. Kuntz 752* (ESA); estrada que dá acesso à Tronqueira, P. N. Caparaó, 30.III.2012, fr., *J. Kuntz et al. 448* (ESA); id, estrada entre Vale Verde e Tronqueira, 20° 24'68,4" S, 41° 50'966" W, elev.1487 m, 10.I.2013, fr., *J. Kuntz & G. D. Colleta 815* (ESA); Conceição do Ibitipoca, caminho para pousadas das Hortências, 8.X.2016, fl.e fr., *L. G. Rosignoli-Oliveira 30* (VIC); Serra de Ibitipoca, 1400 s.m, 27.IX.1970, fl., *L. Krieger 9263* (SPF); Ouro Preto, Feixo do Funil, 24.IX.1974, fl., *J. Badini s.n* (OUPR 19662. 19663); fazenda da cachoeira, entre rochas de dolomita, 6.X.1979, fl., *J. Badini s.n* (OUPR 19661; 19664);

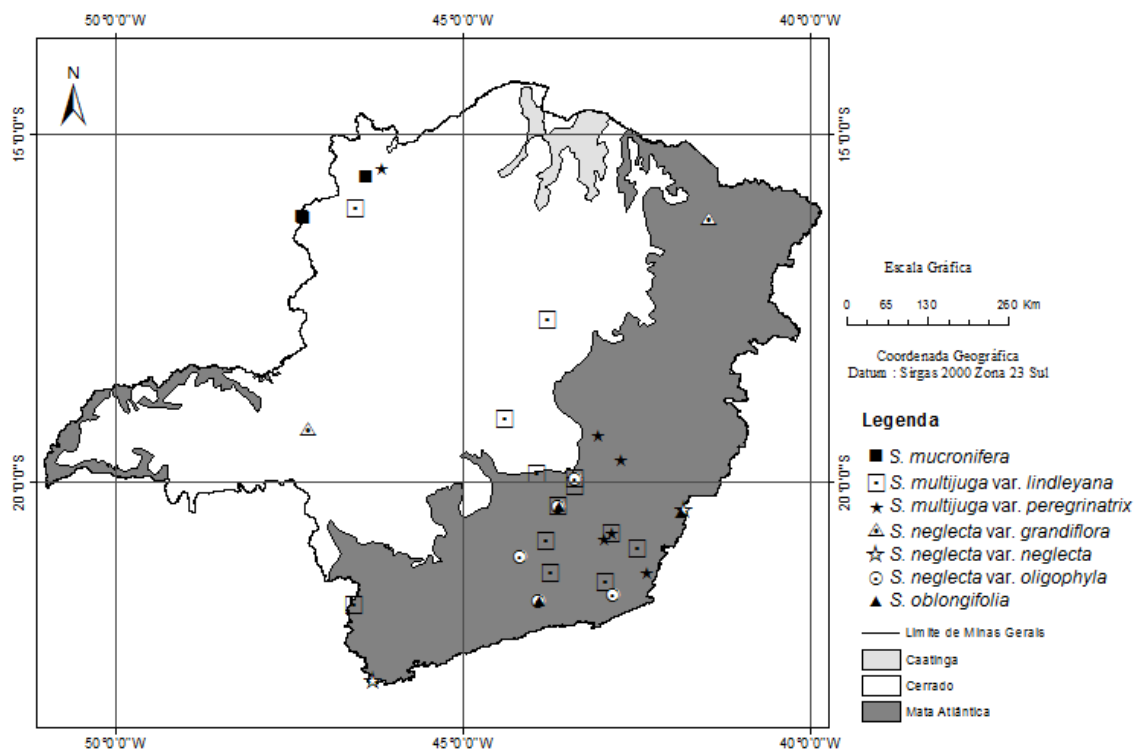


Fig. 12: Geographical distribution of *Senna mucronifera*, *S. neglecta* and its varieties, *S. multijuga* and its varieties and *S. oblongifolia* in Minas Gerais state.

17. *Senna obtusifolia* (L.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 252. 1982. Fig. 13: F-K; Map: Fig. 15

Cassia obtusifolia L., Sp. Pl. 377. 1753

Cassia tora var. *obtusifolia* (L.) Haines, Bot. Bihar & Orissa 304. 1922

Shrubs, 0.7–2 m alt. Branches cylindrical or angular, sparse tomentose. Leaves 3 pairs of leaflets; stipules 12–17 × 1 mm, linear-falciform, base truncate, apex acuminate, deciduous late; petiole (1.5-)2.5–4.2 cm long.; nectary between the proximal pair of leaflets, linear, stipitate; leaf rachis (1.3–)2.5–3.4 cm long, sparse tomentose; leaflets obovate, apex acute, mucronulate, adaxial surface glabrous or sparse velutinous, abaxial surface sparse velutinous, veins tenuous, membranaceous, margin ciliolate, proximal pair 2.5–4.5 × 1.5–2.6 cm, distal pair 3–6 × 1.2–3 cm. Racemes umbellate, axillary and terminal; peduncle 0.2-0.5 cm long; inflorescence rachis absent. Bracts 4–5 × 0.5 mm, linear-falciform, deciduous; pedicel 15–25 mm long., nectary absent. Sepals 5–8 × 2–3 mm, similar size, elliptic, apex obtuse, dorsal surface sparse tomentose. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal 8-11 × 5-6 mm, obovate, apex emarginated, latero–adaxial and latero–abaxial petals obovate, apex rounded.

Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina obovate, medium stamens filaments ca. 1 mm long., anther 2-3 mm long., centric-abaxial stamen filament ca. 2 mm long., anther ca. 4 mm long., latero-abaxial stamens filaments 2-3 mm long., straight, anther 3-5 mm long, rostro oblique, ca. 0.5 mm long. Ovary velutinous, style 1-1.2 cm long., velutinous. Legume 13-16 × 0.1-0.3 cm, linear, compressed, externally slightly depressed between seed locules, curved, sparse tomentose, green, indehiscent. Seeds ca. 5 × 3 mm, 1-seriate, obovate

Bortoluzzi *et al.* (2011) found materials of *Senna obtusifolia* with 2 pairs of leaflets in Santa Catarina state and Santos (2013) found with until 4 pairs in Goiás state, but in material from Minas Gerais, was observed always 3 pairs of leaflets.

In Minas Gerais, *Senna obtusifolia* is similar to other species of serie *Trigonelloideae* (Table 3) *S. mucronifera* and *S. pentagonia* (Mill.) Irwin & Barneby, by the presence of 3 pairs of leaflets and form of leaflets (Fig. 13F). They can be distinguished as explained in taxonomy comments of *Senna mucronifera*.

The specie occurs in the American Continent in Argentina, Brazil, Colombia and Mexico (Irwin & Barneby 1982). In Brazil, it was collected in almost all of the States of the country occurring in the Amazon Forest, Caatinga, Cerrado, Atlantic Forest and Pantanal regions (Table 4). It occurs near rivers, pastures, plantations and roadsides (Irwin & Barneby 1982).

In Minas Gerais, the specie is common in the central and southeastern regions, but also collected to the north and west of the state (Fig. 15), on roadsides, near rivers, gallery forests and margins of forest. It was found with flowers in January, February, March, April, July, October and November; and with fruits in January, February, March, April, October and November.

Examined specimens: BRAZIL. MINAS GERAIS: Belo Horizonte, 24.VII.1921, fl. e fr., Gehrt 122 (IBT); Coronel Pacheco, estrada, 30.X.1940, fl. e fr., Y. Paul *s. n* (VIC 12508); Ituiutaba, Serra do Corpo Seco, 19° 01' 59" 80" S, 49° 28' 0.40" W, alt. 680 m, 05.IV.2012, fl., A. R. Rezende & V. M. Teodoro 695 (HUFU); Grão Mogol, Estrada Grão Mogol-Virgem da Lapa, 15.IV.1981, fl. e fr., I. Cordeiro *et al. s.n* (SPF 22930); Lagoa Santa, margem da lagoa, 21.XI.1933, fl., M. Barreto 5929 (IBT); Mariana, Distrito de Monsenhor Horta, próximo a Lagoa Ponte das Crioulas (estrada), 20° 18' 08.8" S, 43° 18' 59.4" W, 621 m, 25.II.2003, fl.e fr., F. F. Mazine *et al.* 866 (RB); São

João Nepomuceno, Serra dos Núcleos, Fazenda Primavera, 17.II.2003, fl. e fr., *D. S. Pifano et al. 498* (CESJ); São Miguel do Anta, 5 km E. of São Miguel do Anta, 18.XI.1958, fl. e fr., *H. S. Irwin 2107* (VIC); Uberlândia, Fazenda Buriti, 03.III.1995, fr., *G. M. Araujo et al. 1162* (HUFU); Viçosa, Cart road to São Miguel, near first fazenda, road-side, elev. 675 m, 31.III.1930, fl. e fr., *Y. Mexia 4542* (SPF); 07.I.1931, fl. e fr., *sem coletor* (VIC 327); escola, 9.III.1935, fl. e fr., *J. Y. Kuhlman s. n* (VIC 2206)

18. *Senna occidentalis* (L.) Link, Mem. New York Bot. Gard. 35: 436. 1982.

Fig. 14: A-E; Map: Fig. 15

Cassia occidentalis L., Sp. Pl., 377. 1753

Shrubs or sub-shrubs, 0.5–1 m alt. Branches cylindrical, glabrous. Leaves 4-5 pairs of leaflets; stipules ca. 5 × 1 mm, triangular, base truncate, apex acuminate, deciduous; petiole 2.5–3.5 cm long., nectary at base, conical or pisiform, sessil; leaf rachis 6–11 cm long., glabrous, nectary absent; leaflets lanceolate, apex acuminate or cuspidate, both sides glabrous, veins tenuous, membranaceous, margin ciliolate, proximal pair 3–3.5(-4) × 1-2 cm, distal pair 5–7.5 × 1.7–2 (-3) cm. Racemes axillary and terminal; peduncle 2–3.4 cm long; rachis 1.5–2.5 cm long. Bracts 6-11 × 1-2 mm, triangular, deciduous; pedicel 5–12 mm long., nectary absent. Sepals 5–8 × 3–5 mm, similar size, elliptic, apex obtuse, dorsal surface glabrous. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal ca 15 × 5 mm, obovate, apex rounded, latero adaxial and latero-abaxial petals obovate, apex rounded. Androecium with 3 staminodes and 6-7 stamens fertile, filaments glabrous, staminodes lamina twisted or sub-quadrangular, medium stamens filaments 3–5 mm long., anther 5–6 mm long., centric abaxial stamen, filament ca. 6 mm long., anther ca. 5 mm long. when fertile or lamina lanceolate, latero-abaxial stamens filaments ca. 5 mm long., straight, anther 5–9 mm long., rostro transversely oblique, ca. 1 mm long. Ovary velutinous; style 1–1.5 cm long., velutinous. Legume – 23 × 0.6–0.9 cm, oblong, compressed, externally slightly depressed between seed locules, slightly curved, sparse tomentose, vinaceous, brown when mature with light color on the margins, dehiscent. Seeds 5–4 mm, 1-seriate, elliptic

Senna occidentalis can be easily recognized by a group of characteristics: nectary at the base of the petiole (Fig. 14B), 4–5 pairs of lanceolate and glabrous leaflets (Fig. 14A), 6-7 fertile stamens (Fig.14C) and an oblong legume, with light color

on the margins (Fig. 14D, E). Among the species of serie *Basiglandulosae*, the specie is more similar to *S. hirsuta* by the lanceolate leaflets, and can be distinguished by the indument: *S. occidentalis* has glabrous leaflets while *S. hirsuta* var. *acuminata* has hirsutullous leaflets and *S. hirsuta* var. *leptocarpa* has strigulose leaflets.

Senna occidentalis is distributed from Mexico to Brazil (Irwin & Barneby 1982). The specie occurs in all States of Brazil, in the Amazon Forest, Atlantic Forest, Caatinga, Cerrado and Pantanal regions (Table 4), in disturbed and waste places, savanna, pastures and roadsides (Irwin & Barneby 1982). In Minas Gerais, it has a distribution spread throughout the regions of the state (Fig. 15). It was collected on roadsides, river banks and disturbed areas. It was collected with flowers in February, March, May, June, October, November and December; and with fruits in February, March, April, June, July, October, November and December.

Examined specimens: BRAZIL. MINAS GERAIS: Araponga, P. E. Serra do Brigadeiro, próximo à casa de hóspedes, sede do PESB, 20°42'59.9" S, 42°28'50.5" W, 11.VI.2013, fr., *L. C. Siqueira 849* (VIC); Caratinga, Fazenda Montes Claros, Beira da estrada, mata do Jaó, 20.II.1992, fl. e fr., *C. V. Mendonça s.n* (BHCB 19.572); Jaboticatubas, São José de Almeida, Fazenda Barreiro D'Antas, 08.XI.1998, fl. e fr., *A. F. Silva s.n* (VIC 20635); Joaquim Felício, ca. 2 km N. of Joaquim Felício, 650 m, 10.III.1970, fr., *H. S. Irwin & Barneby et al. 27.339* (UB); Juiz de Fora, Mata do Poço Danta, 10.III.1977, fl. e fr., *J. A. Silva 14904* (CESJ); Mocambinho, Leito dono, Br, 30.X.1996, fl. e fr., *Projeto Jaíba 194* (VIC); Paracatu, ca. 5 km N. of Paracatu, 800 m., 5.V.1970, fl., *H. S. Irwin & Barneby et al. 26.110* (UB); Paraopeba, Horto Floresta, 08.III.1956, fl. e fr., *E. P. Heringer 5.088* (UB); Prata, estrada para o aeroporto, 20.III.1963, fl. e fr., *G. M. Felipe 145* (IBT); Santa Cruz de Minas, Serra de São José, 24.II.2005, fl. e fr., *M. Quimelato s.n* (RB 420.803); São João Nepomuceno, Serra dos Núcleos, 20.II.2003, fl., *R. M. de Castro et al. 869* (CESJ); Santana do Riacho, próximo a Cachoeira grande, 09.IV.1995, fr., *A. A. Grillo et al. s.n* (SPF 112924); Ubá, estrada em direção a Ubari, 2.III.2016, fl. e fr., *L. G. Rosignoli-Oliveira 18* (VIC); Uberlândia, Rod. Udi. Cruzeiro dos Peixotos, 17. XII.1996, fl. e fr., *R. C. Vieira 66* (UB); Vazante, Fazenda Bom Sucesso, 18.VII.2008, fl. e fr., *Leanel & Vasconcelos s. n* (HUFU 55958)

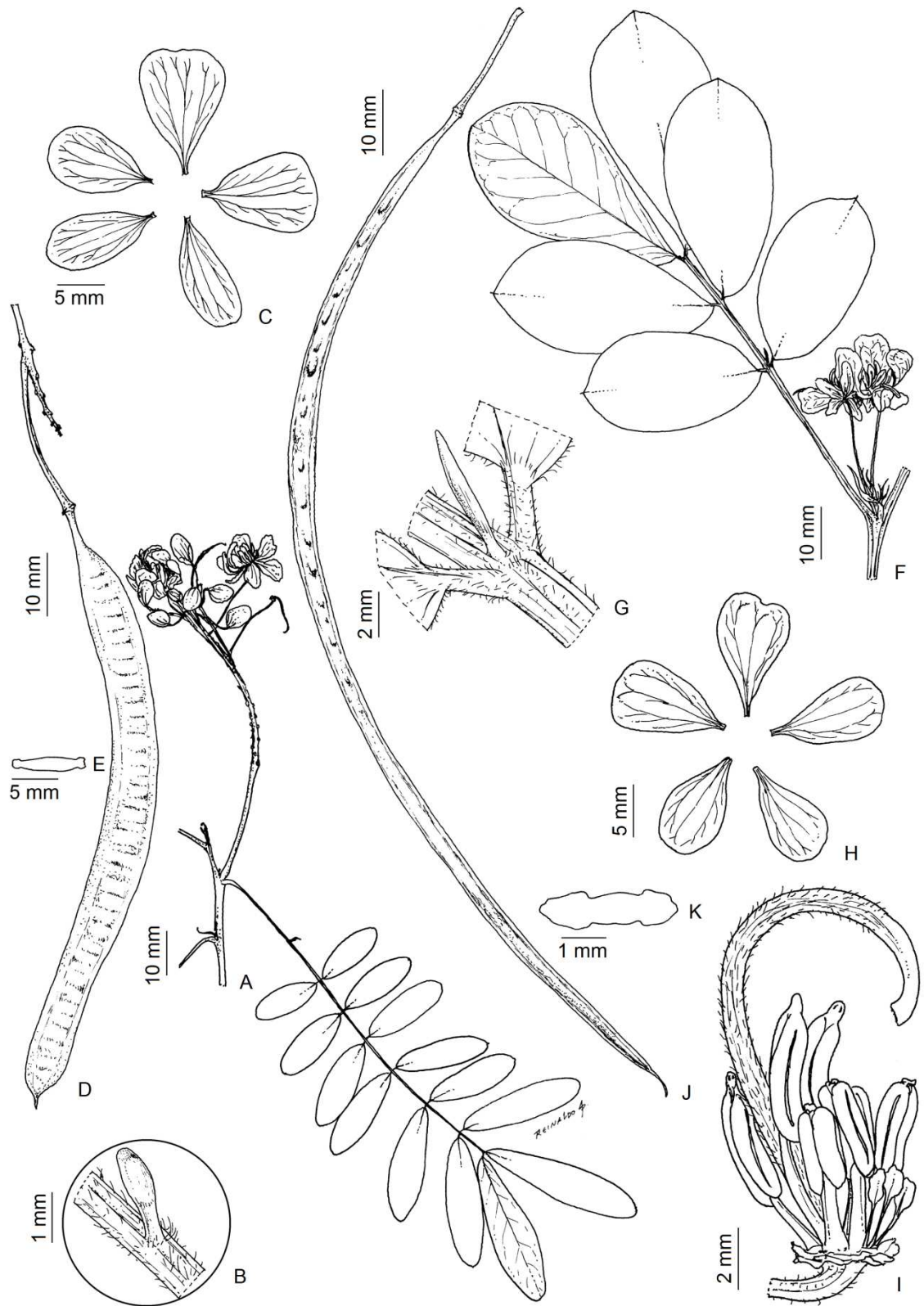


Fig. 13: *Senna oblongifolia* (Vogel) Irwin & Barneby: **A.** Branche with leaves and inflorescence. **B.** Nectary in the upper half of the petiole. **C.** Corolla. **D.** Pod. **E.** Transversal section of pod; *S. obtusifolia* (L.) Irwin & Barneby: **F.** Branche with leaves and inflorescence. **G.** Nectary between the leaflets of the proximal pair. **H.** Corolla. **I.** Androecium and pistil. **J.** Pod. **K.** Transversal section of pod. (**A-D:** *L. G. Rosignoli-Oliveira* 30-VIC; **G-I:** VIC 2206; **J-K:** *F.F. Mazine et al.* 866-RB)

19. *Senna organensis* (Harms) Irwin & Barneby var. *organensis*, Mem. New York Bot. Gard. 35: 326. 1982 . Fig. 14: F-K; Map: Fig. 15

Cassia organensis Glaziou ex Harms, Feddes Repert. Sp. Nov. 24: 123. 1924

Shurbs, 0.2–2.5 m alt. Branches sulcate, sparse tomentose. Leaves (5-)6–7 pairs of leaflets; stipules 7–10 × 5 mm, linear-falciform, base truncate, apex acuminate, deciduous late; petiole 1.5–2 cm long.; nectary in general between leaflets of all pairs, but it can be absent between some leaflets, botuliform, ovate, fusiform or falciform, sessile or stipitate; leaf rachis 3.5–4.5 cm, sparse tomentose; leaflets elliptic or obovate, apex retuse, both sides glabrous, veins tenuous, cartaceous, margin ciliolate, proximal pair (0.8-)1–1.2 × 0.5–1 cm, distal pair 1.5–3 × 0.7–1.4 cm. Racemes axillary; peduncle 3.5–6.3 cm long.; inflorescence rachis 1.2–1.5 cm long. Bracts 5–8 mm, lanceolate, persistent; pedicel 13–16 mm long., nectary absent. Sepals 5–7 × 3–4 mm, similar size, elliptic, apex obtuse, dorsal surface glabrous. Corolla zygomorphic; petals glabrous, yellow, centric adaxial petal 9–10 × 6–7 mm, obovate, apex emarginated, latero-adaxial and latero-abaxial petals obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments tomentose, staminodes lamina elliptic, medium stamen filaments 1–2 mm long., anther 2–4 mm long., centric-abaxial stamen filament ca. 2 mm long., anther ca. 3 mm long., latero-abaxial stamens filaments 2–3 mm long., straight, anther 3–4 mm long, rostro truncate, ca. 0.5 mm. Ovary velutinous, style 0.4 cm long, velutinous. Legume 4.3–7 × 1–1.5 cm, oblong, flat-compressed, externally depressed between seed locules, straight, glabrous, green, dehiscent. Seeds ca. 0.6 × 0.4 cm, 1-seriate, oblong.

Senna organensis var. *organensis* has (5-)6–7 pairs of elliptic leaflets (Fig. 14F), falciforme stipule (Fig. 14 G), zigomorphic flowers (Fig. 14 H), small anthers (Fig. 14I) and plano-compressed pod (Fig. 14 J, K). This specie, together *S. pneumatica* Irwin & Barneby, is included in serie *Stipulaceae*. *Senna pneumatica* differs from *S. organensis* by the ovate stipules (Fig. 17M) and hirsute bracts (Fig. 17O)

S. organensis has four varieties: var. *extratropica*, var. *friburguensis*, var. *heterandra* and var. *organensis*, but only the last one occurs in Minas Gerais. This variety is recognized by filaments of 3 abaxial stamens 2–3 mm, anthers 3–4 mm, 4–8 pairs of leaflets and nectary between the first and other pairs of leaflets (Irwin & Barneby 1982).

The specie is endemic to Brazil. The variety *organensis* occurs in Espírito Santo, Rio de Janeiro and Minas Gerais in the Atlantic Forest (Table) and can be found in open rocky places, montane camp, 1200-1600 m, common in Serra do Caparaó, where it was collected at an altitude of 2100 -2713 m, in the southeast of the state (Fig. 15). It was found with flowers in March, April, June, August and November; and with fruits in March, July and August.

Examined specimens: BRAZIL. MINAS GERAIS: P. N. Caparaó, Campos Altos, 19.XI.1988, fl., *L. Krieger et al. s. n* (CESJ 24006); Campos Altos, elev. 2000 m, 1.IV.1989, fl., *L. Krieger et al. s.n* (CESJ 23592); caminho ao pico da Bandeira, 15.VI.1991, fl., *G. Hatschbach et al. 55524* (MBM); trilha da base tronqueira para a base terreirão, 20 48' 854" S, 41 49' 582" W, elev. 2106 m, 15.XI.2011, fl., *R. F. Almeida et al. 422* (IBT); 20° 25' 50" S, 41° 40' 0" W, elev. 2713 m, 02.VII.2013, fr., *D. M. Neves & K. G. Dexter 1403* (RB); trilha para o pico da bandeira, 21.III.2012, fl. e fr., *J. Kuntz et al. 585* (RB); trilha para o pico da bandeira, 15.VIII.2016, fr., *L. G. Rosignoli-Oliveira 5*(VIC); trilha para o pico da bandeira, 15.VIII.2016, fr., *L. G. Rosignoli-Oliveira 7* (VIC); trilha para o pico da bandeira, 15.VIII.2016, fl. e fr., *L. G. Rosignoli-Oliveira 13* (VIC); Serra do Caparaó, eleve. 2400 m, 13.IX.1941, fl., *A. C. Brade 16930* (RB); 19.III.1968, fl., *R. F. Novelino et al. 39* (CESJ); sem data, fl., *Brade 16930* (IPA).

20. *Senna pendula* (Willd.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 378. 1982
Fig. 16: A-F; Map: Fig. 15
Cassia pendula Humb. & Bonplad ex Willd., Enum. Pl. Hort. Berol. 440. 1809

Shrubs, 2–3 m alt. Branches cylindrical, glabrous, sparse or densely pubescent. Leaves 5-6 pairs of leaflets; stipules ca. 6 × 1 mm, linear-falciform, base truncate, apex acute, deciduous; petiole 2–3 cm long; nectary between the first pair of leaflets, rare on the second pair elliptic, conical, fusiform or falciform, sessile or stipitate; leaf rachis 2.5–5 cm long., glabrous or pubescent, leaflets elliptic or obovate, apex obtuse or retuse, mucronate, adaxial surface glabros and abaxial surface glabrous, sometimes pubescent at base, or sparse tomentose overall, veins tenuous, membranaceous, margin ciliolate, proximal pair 0.9–1.5 × 0.5–1.3 cm, distal pair 1.6–4.5 × 0.8–1.5 cm. Racemes axillary; peduncle 3.5–4.5 cm long; rachis 3.5–4.5 cm long. Bracts ca. 2-3 × 0.5-1 mm, linear or lanceolate, deciduous; pedicel 15–30 mm long, nectary absent. Sepals 12–18 × 5–8 mm,

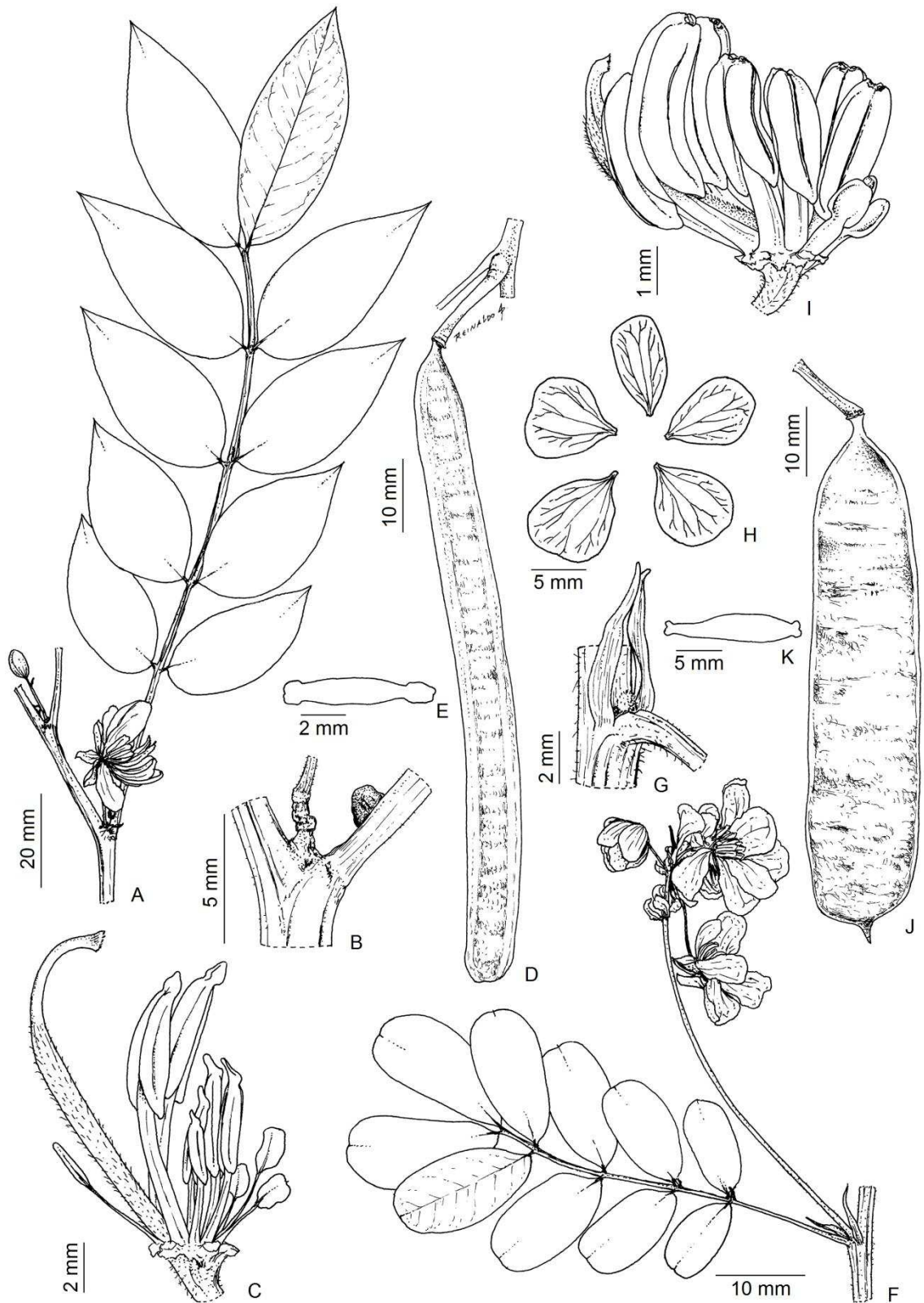


Fig. 14: *Senna occidentalis* (L.) Link: **A.** Branche with leaves and inflorescence. **B.** Petiolar nectary. **C.** Androecium and pistil. **D.** Pod. **E.** Transversal section of pod. *S. organensis* (Harms) Irwin & Barneby var. *organensis*: **F.** Branche with leaves and inflorescence. **G.** Stipule. **H.** Corolla. **I.** Androecium and pistil. **J.** Pod. **K.** Transversal pod section (**A-D:** VIC 20635; **F-I:** L. G. Krieger et al. 24006-CESJ; **J-K:** L.G. Rosignoli-Oliveira 5-VIC)

diferent size, elliptic or ovate, apex obtuse, dorsal surface glabrous. Corola zygomorphic, petals glabrous, yellow, centric adaxial petal 15–25 × 13–18 mm, obovate, apex emarginated; latero-adaxial petals obovate, apex emarginated, latero-abaxial petals narrowly elliptic, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina twisted, obovate or quadrangular, medium stamens filaments 3 mm long., anther 5–6 mm long., centric abaxial stamen filament 3–7 mm long., anther 7–10 mm long., latero- abaxial stamens filaments 15–25 mm long., curved, anther 7.5-10 mm long., rostro oblique, ca. 1 mm long. Ovary pubescent; style 1.5–2.5 cm long., densely pubescent on the margins. Legume 11–18 × 1–1.5 cm, subcylindrical, externally smooth, straight, sparse pubescent, yellow to black when mature, dehiscent late. Seeds ca. 5 × 3 mm, 2-seriate, ovate.

Senna pendula is included in serie *Coluteoideae* (Table 3) and can be recognized by the following characteristics: 4-6 pairs of obovate or elliptic leaflets (Fig. 16A), zygomorphic corolla (Fig. 16C), long and curved abaxial stamens filaments (Fig.16D), and sub-cylindrical legume (Fig.16E, F).

Several specimens deposited in herbaria were identified as *Senna bicapsularis* (L.) Roxb., but this is not a specie cited for Brazil (BGF 2015). The morphology of these species is really similar, but, according to Irwin & Barneby (1982), they can be distinguished by observing the size of the pedicel after the flower anthesis and the geographic distribution. *Senna pendula* has a pedicel with 8-33 (-37) mm and occurs from North to South America; while *S. bicapsularis* has a pedicel with 1- 3.5 mm and occurs between the Caribbean and the Andes.

Irwin & Barneby (1982) established 20 varieties for *S. pendula* and they have wide geographical distribution in America. For Minas Gerais, only two varieties were recognized in examined material.

Key to varieties of *Senna pendula* in Minas Gerais

1. Abaxial stamen's anther 13-14 mm long.....**20.1**.var. *dolichandra*
1. Abaxial stamen's anther 7.5- 10 mm long.....**20.2** var. *glabrata*

20.1 *Senna pendula* (Willd.) Irwin & Barneby var. *dolichandra* Irwin & Barneby,
Mem. New York Bot. Gard. 35: 387. 1982 Map: Fig. 15

This variety can be recognized by the presence of long anthers of abaxial stamens, but it is probably rare in the state, because all the examined materials have anthers with a size less than 10 mm. The holotype was collected in Pedra Azul, in Minas Gerais and it was observed virtually.

It is endemic to Brazil, occurring in Bahia, Minas Gerais and Paraíba, in the Atlantic Forest, Caatinga and Cerrado regions (Table 4). In Minas Gerais, it was collected in the northeast of the state (Fig. 15) and can be found in weedy thickets or edge of woodland (Irwin & Barneby 1982). It found with flower in April.

Examined specimens: BRAZIL. MINAS GERAIS: Pedra Azul, caminho do aeroporto, 20.IV.1964, fl. Z. A. *Trinta 801* (Holotypus, NY!)

20.2 *Senna pendula* (Willd.) Irwin & Barneby var. *glabrata* (Vogel) Irwin & Barneby,
Mem. New York Bot. Gard. 35: 382. 1982 . Fig. 16: A-F; Map: Fig. 15
Cassia indecora var. *glabrata* Vogel, Syn. Gen. Cass. 19. 1837

According to Irwin & Barneby (1982), this variety can be distinguished of other 19 varieties of this specie by the occurrence in South America, the subcylindrical pod and the 2-seriate seeds.

It occurs in Argentina, Bolivia, Brazil, Paraguay and Peru (Irwin & Barneby 1982). It was collected in Brazil in Distrito Federal, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Rio de Janeiro, Santa Catarina, São Paulo, Pará and Paraná, occurring in the Amazon Forest, Caatinga, Cerrado and Atlantic Forest (Table 4). It can be found in disturbed cerrado, margin of gallery forest, rocky field and disturbed woodland (Irwin & Barneby 1982). In Minas Gerais, it was collected in central, southeast and east regions of the state (Fig. 15), in rocky fields, outcrops, roadsides and gallery forest. It was collected with flowers in January, February, March, April, May and November; and fruits in February, May, July and September.

Examined specimens: BRAZIL. MINAS GERAIS: Araguari, Fazenda Campo Alegre, 2.II.2017, fl., fr., C. I. *Silva 181* (HUFU, SPF VIC); Belo Horizonte, 31.I.1933, fl., M.

Barreto 5924 (IBT); Datas, estrada Datas-Serro, povoado Trindade Réis, 19.IV.1987, fl., *J. Prado et al. s.n* (SPF 47410); Gouveia, 10km a Norte, 1320 m, 11.IV.1973, fl., *W. R. Anderson* 8671 (UB); Juiz de Fora, Reserva biológica Poço D'Anta, 26.IV.1985, fl., *F.R.S.P et al. 20584* (CESJ); Ouro Preto, 16.IV.1974, fl., *J. Badini s.n* (OUPR 18672); Ouro Preto, 03.XI.2011, fl., *V. F. Dutra s.n* (OUPR 3420); Patrocínio, Coromandeli, 28.II.1989, fr., *R.C.Mendonça et al. 1237* (UB); Poços de Caldas, 11.III.1920, fl., *F. C. Hoehne s.n* (IBT 3759); São Roque de Minas, P. N. Serra da Canastra, estrada Sacramento-São Roque de Minas, próximo ao Rio de Peixe, 7.VII.1999, fr., *M. A. Farinaccio et al. 332* (HUFU); Serra do Cipó, Santana do Riacho, estrada MG 010, Belo Horizonte-Conceição do Mato Dentro, distante ca. 10 km do Chapéu do Sol, 04.IX.1995, fr., *P. Hevencio et. al. 25* (SPF); Serra do Cipó, jardim do alojamento Alto Palácio, uma das casas de apoio do IBAMA, 19° 19' 04,3 " S, 043° 36' 26,5" W, 31.VII.2012, fr., *I. A. C. Coutinho et al. 26* (VIC); Uberlândia, Fazenda Buriti, 21.IV.1995, fl., *G. M. Araújo et al., 1124* (HUFU, UB); Uberlandia, Estação Ecológica do Panga, 22.V.1992, fl., fr., *F. E. E. P 161* (HUFU); Viçosa, UFV, Mata do Paraíso, aceiro, final da última ladeira, 08.V.2003, fl., *M. M. M. Lopes et al. 192* (VIC)

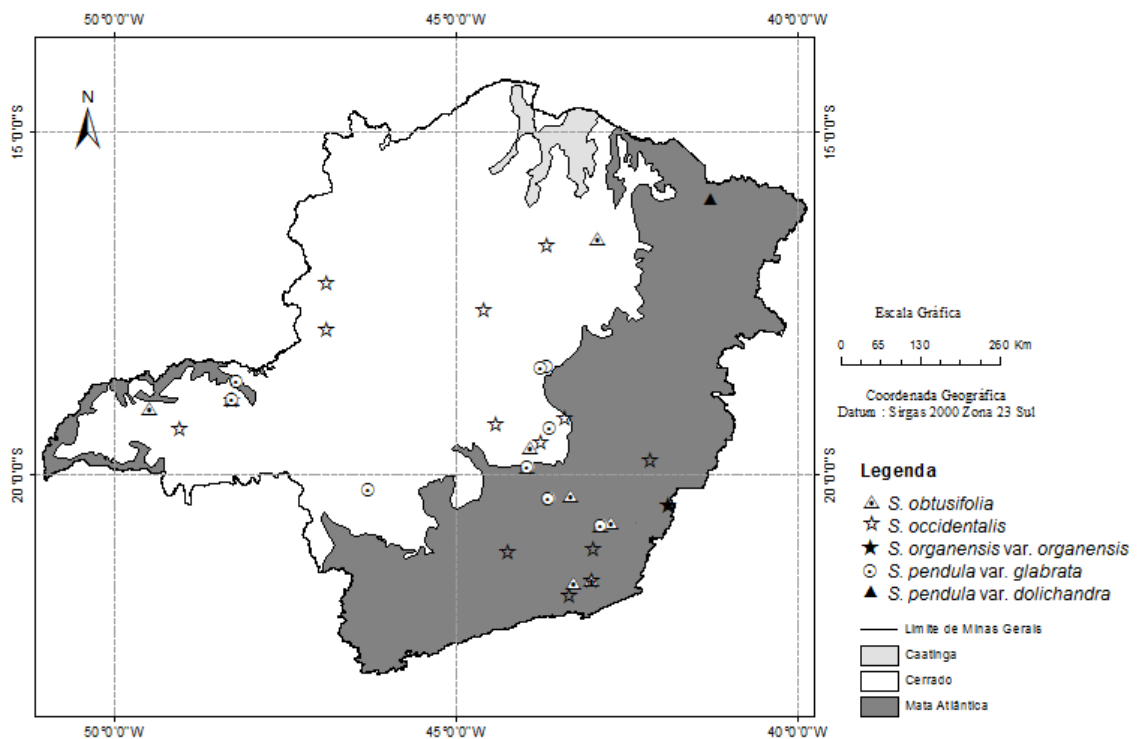


Fig. 15: Geographical distribution of *Senna obtusifolia*, *S. occidentalis*, *S. organensis*, *S. pendula* and its varieties in Minas Gerais state.

21. *Senna pentagonia* (Mill.) Irwin & Barneby var. *pentagonia*, Mem. New York Bot. Gard. 35: 256. 1982. Fig. 16: G-M; Map: Fig. 18

Cassia pentagonia P. Mill., Gard. Dict. Ed. 8, Cassia no. 18. 1768

Shrubs, ca. 0.5 m alt. Branches cylindrical, glabrous. Leaves 3 pairs of leaflets; stipules ca. 11–15 × 1 mm, lanceolate, base truncate, apex acuminate, deciduous late; petiole 3–4 cm long.; nectary between the first pair of leaflets, sometimes in second pair, linear or fusiform, stipitate; leaf rachis 1.5–2 cm, sparse tomentose, leaflets obovate, apex obtuse, mucronulate, both sides glabrous, veins tenuous, membranaceous, margin ciliolate, proximal pair 2–3 × 1.5–2 cm, distal pair 2.7–3.7 × 1.5–2.2 cm. Racemes axillary; peduncle ca. 1 cm long; rachis ca 1 cm long. Bracts 3–7 × 0.5–1 mm, lanceolate, deciduous; pedicel 10–15 mm long., nectary absent. Sepals 4–7 × 2–5 mm, not strongly different size, ovate, apex acuminate, dorsal surface glabrous. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal 6–11 × ca. 4 mm, obovate, apex rounded, latero-adaxial and abaxial petals obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina obovate, medium stamen filaments ca. 1 mm long., anther ca. 3 mm long., centric-abaxial stamen filament ca. 1 mm long., anther ca. 3 mm long., latero-abaxial stamens filaments ca. 1–2 mm long., straight, anther ca. 3.5 mm long, rostro straight, ca. 1 mm long. Ovary velutinous, style ca 0.8 cm long., velutinous. Legume ca. 18.5 × 1 cm, cylindrical, externally with wings, slightly curved, glabrous, light brown, dehiscent. Seeds ca. 3 × 3 mm, 1-seriate, elliptic.

Senna pentagonia shares with the other species of serie *Trigonelloideae* (Table 3) *S. mucronifera* and *S. obtusifolia*, the characteristics of 3 pairs of leaflets (Fig.16G) and its forms, as discussed in the taxonomy comments of *S. mucronifera*. The particular characteristic of *S. pentagonia* is its legume with wings (Fig. 16L, M).

The specie has two varieties: var. *pentagonia* and var. *valens* and both occur in Brazil. The examined specimens collected in Minas Gerais are similar to the description of *S. pentagonia* var. *pentagonia*, because, according to Irwin & Barneby (1982), in this variety the size of the sepals have less than 9 mm long, the petals are less than 15 mm long and the rostro of abaxial anthers are 1-2 mm long. In the other variety (Fig. 16K), var. *valens*, the measures are larger: the sepals are 13-15 mm long, the petals are 21-30 mm long and the rostro of abaxial anthers are 4-5 mm long.

It occurs in Brazil, Honduras and Mexico (Irwin & Barneby 1982). The variety *pentagonia* occurs in Bahia, Maranhão, Minas Gerais and São Paulo, in the Caatinga and Cerrado regions (BFG 2015), but in Minas Gerais it was also found in the Atlantic Forest region (Fig. 18). According to Irwin & Barneby, this variety occurs in disturbed thickets, pastures, on roadsides and around lakes. It was observed with flowers in April and June, and with fruits in January, April, May and July.

Examined specimens: BRAZIL. MINAS GERAIS: Araponga, distrito de Viçosa, 20.IV.1935, fl. e fr., *J. F. Kuhlmann 31* (UFV); Bicas, 13.VI.1970, fl. e fr., *L. Krieger & U.C. Camara s.n* (CESJ 8730); Lavras, 22.I.1939, fr., *E. P. Heringer s.n* (IBT 40374); São João Del Rei, Bengo, 30.V.1989, fr., *L. Krieger & M. Brugger s.n* (CESJ 24955); Paraisópolis, 14.IV.1927, fl. e fr., *F. C. Hoehne s.n* (IBT 20042)

22. *Senna pilifera* (Vogel) Irwin & Barneby, Mem. New York Bot. Gard. 35: 241. 1982

Fig. 17: A-K; Map: Fig. 18

Cassia pilifera Vogel, Syn. Gen. Cass. 23. 1837

Shurbs or sub-shurbs, 0.5–1.5 m alt. Branches cylindrical or angular, sparse tomentose and hirsute. Leaves 2 pairs of leaflets; stipules ca. 6–15 × 0.5 mm, filiform, base truncate, apex acuminate, deciduous; petiole 1.5–3(-3.5) cm long.; nectary between all pairs of leaflets, narrowly elliptic, ovate-acuminate, falciform, stipitate; leaf rachis 0.3–0.9 cm long., hirsute, tomentose; leaflets elliptic or obovate, apex acute, mucronulate, both side glabrous or sparse pubescent, veins tenuous, membranaceous, margin ciliolate, proximal pair 2–4(-4.5) × 1.3–2(-2.5) cm, distal pair 2.5–4.5(-6) × 1.3–2.5(-3) cm. Racemes umbellate, axillary; peduncle 9–11 mm long.; inflorescence rachis absent. Bracts 1-2 × 0.5 mm, cymbiform, deciduous; pedicel 12–14 mm long., nectary absent. Sepals 3–11 × 3-4 mm, different size, narrowly elliptic or elliptic, apex rounded, dorsal surface sparse pubescent or hirsute. Corolla asymmetric, petals sparse pubescent, yellow, centric adaxial petal ca 10-20 × 4-7 mm, obovate or elliptic, apex emarginatedd or rounded, latero-adaxial petals elliptic or obovate, apex rounded, latero-abaxial petals obovate and one is falciform with one smaller than other, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina twisted, medium stamens filaments ca. 2 mm long., anther 2–4 mm long., centric abaxial stamen filament ca. 3 mm long., anther 4–6 mm long., latero-abaxial stamens filaments ca 4mm

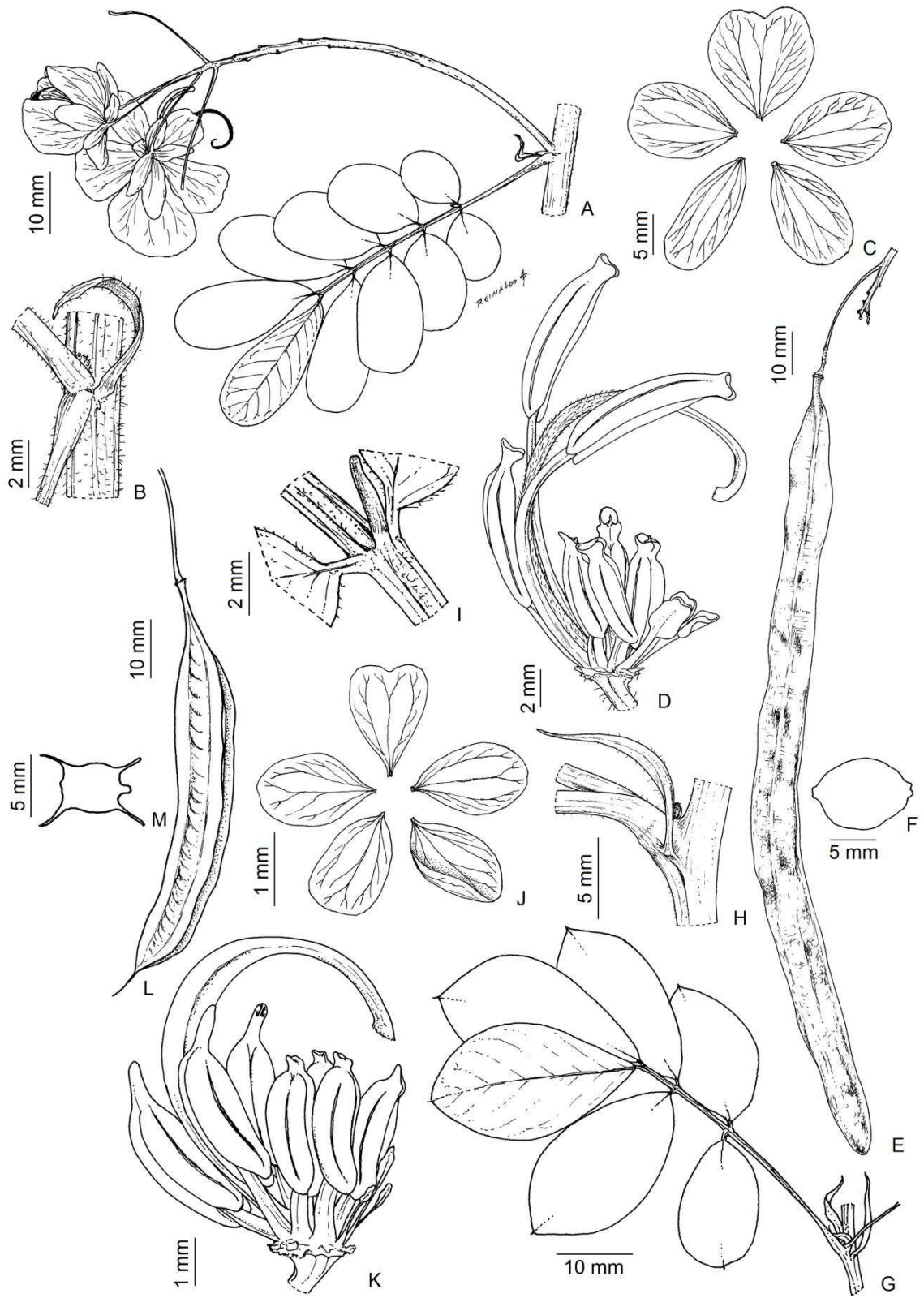


Fig. 16: *Senna pendula* (Willd.) Irwin & Barneby var. *glabrata* (Vogel) Irwin & Barneby: **A.** Branche with leaves and inflorescence. **B.** Stipule. **C.** Corolla. **D.** Androecium and pistil. **E.** Pod. **F.** Transversal section of pod. *S. pentagonia* (Mill.) Irwin & Barneby var. *pentagonia*: **G.** Branche with leaves and inflorescence. **H.** Stipule. **I.** Nectary between leaflets of proximal pair. **J.** Corolla. **K.** Androecium and pistil. **L.** Pod. **M.** Transversal section of pod. (A-D: OUPR 18672; E-F: I.A.Coutinho et al. 26-VIC; G, I-K: CESJ 8730; H, L-M: CESJ 24955)

long., straight, anther 4–13(-16) mm long., rostro curved, ca. 0.5 mm long. Ovary velutinous; style 1–2 cm long., velutinous. Legume 13–18 x 0.1 cm, linear, compressed, externally smooth, curved, sparse tomentose or hirsute, light brown, dehiscent. Seeds ca. 4 × 1 mm, 1-seriate, elliptic.

Senna pilifera can be distinguished from other species of the serie *Trigonelloideae* (Table 3) and from the other species found in Minas Gerais by the presence of hirsute trichomes on the branches (Fig. 17A), rachis, pedicel and sepals. Besides that, the characteristics of two pairs of leaflets (Fig. 17A), linear stipules (Fig. 17B), nectary between leaflets of proximal pairs (Fig. 17C), assymmetrical flowers and linear and curved legumes (Fig. 17F), also assist in its recognition.

Irwin & Barneby (1982) considered 3 varieties for the specie and all were recognized in this study.

Key to varieties of *S. pilifera* in Minas Gerais

1. Leaflets rachis 0.7–0.9 cm; the longest sepal 8–11 mm; anthers of 3 abaxial stamens 10–13(-16) mm..... **22.1** var. ***pilifera***
- 1'. Leaflets rachis 0.3–0.6(-8) cm; the longest sepal 3–7.5 mm; anthers of 3 abaxial stamens 4–10 mm
 2. leaflets both sides sparse pubescent; anthers of 3 abaxial stamens 6.5–10 mm.....**22.2** var. ***subglabra***
 - 2'. leaflets both sides glabrous; anthers of 3 abaxial stamens 4.5–5.5 mm.....**22.3** var. ***tubata***

22.1 *Senna pilifera* (Vogel) Irwin & Barneby var. ***pilifera***, Mem. New York Bot. Gard. 35: 243. 1982. Fig. 17: J-K; Map: Fig. 18
Cassia pilifera Vogel, l.c. & Linnaea 11: 668, 1837

This variety has the largest rachis, sepals (Fig. 17 J) and anthers (Fig. 17K) than any other varieties, and with the measures of this structure, it is easily recognized. The best specimen of this variety e found for illustration was *H. S. Irwin & Barneby* 2539, municipality of Goiás located on the border with Minas Gerais.

The variety occurs in Argentina, Bolivia, Brazil and Paraguay (Irwin & Barneby 1982). In Brazil, it occurs in Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais,

Paraná, Rio Grande do Sul and São Paulo, occurring in the Atlantic Forest, the Cerrado and the Pantanal (Table 4), in campos, pastures, disturbed Cerrado, along roadsides and in regenerating woodland (Irwin & Barneby 1982). In Minas Gerais, it was collected on the west region of state (Fig. 18). It was collected with flowers in November and December and with fruits in December.

Examined specimens: BRAZIL. MINAS GERAIS: Ituiutaba, Serra do Corpo Seco, 19° 01' 59.80" S, 49° 28' 0.40" W, alt. 680 m, 5.XI.2012, fl., A. R. Rezende & V. M. Teodoro 694 (HUFU); 17.XI.2012, fl., A. R. Rezende & V. M. Teodoro 1033 (HUFU); 02.XII.2012, fl., A. R. Rezende & J. F. Lima 45 (HUFU); fazenda Bitiuva 18° 54' 16.40" S, 47° 32' 54" W, alt. 622 m, 26.XII.2010, fl. e fr., A. R. Rezende & V. M. Teodoro 193 (HUFU)

Material additional examined: GOIAS: Itumbiara, 27 Km N. W. of Itumbiara on road to Rio Verde, 2.II.1959, fl., H. S. Irwin 2539 (VIC)

22.2 *Senna pilifera* (Vogel) Irwin & Barneby var. *subglabra* (S. Moore) Irwin & Barneby, Mem. New York Bot. Gard. 35: 243.1982 Fig. 17: A-G; Map: Fig. 18
Cassia pilifera var. *subglabra* S. Moore, Trans. Linn. Soc. London II, 4: 346. 1895

This variety has sparse tomentose leaflets like *S. pilifera* var. *pilifera*, but the size of its rachis, sepals (Fig. 17D) and anthers (Fig. 17E) are smaller.

The variety occurs in Colombia, Cuba, Mexico, Panamá, Peru, Venezuela and Brazil (Irwin & Barneby 1982), where it occurs in Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraná and São Paulo, occurring in the Amazon Forest, Cerrado, Atlantic Forest and Pantanal regions (BFG 2015). It occurs in thickets, open or disturbed woodland, gallery margins and pastures (Irwin & Barneby 1982). In Minas Gerais, it was found in the central and northeast regions (Fig. 18), collected in humid area closer campo and forest margin. It was found with flowers in February, March, April; and with fruits in February and March.

Examined specimens: BRAZIL. MINAS GERAIS: Belo Horizonte, campo Córrego do Leitão, 13.II.1919, fl., A. Gehrt 112 (IBT); id, Herv. Jard. Bot. De Belo Horizonte, 7.IV.1933, fl., M. Barreto 4194 (IBT); id, Barreiro, Reserva da Copasa, 11.III.1999, fl. e fr., G. Souza 368 (BHCB); Cabeceira Grande, estrada para o túnel de fuga, cerca de

500 m a nordeste do portão secundário, 16°22'22" S, 47°12'22" S, 850 m, 28.III.2002, fl. e fr., *G. P. Silva et al. 6373* (CEN); Cantoni, ca. 2 km of Cantoni, elev. 850 m, 08.III.1970, fl., *H. S. Irwin & Barneby et al. 27.153* (MBM); Entre Rios de Minas, 00.II.1970, fl., e fr., *Pe. L. Krieger 8314* (RB)

22.3 *Senna pilifera* (Vogel) Irwin & Barneby var. *tubata* Irwin & Barneby, Mem. New York Bot. Gard. 35: 245. 1982. Fig. 17: H-I; Map: Fig. 18

This variety can be recognized by the glabrous leaflets and the sepal (Fig. 17 H) and the abaxial stamen's anther (Fig. 17I) are small. It is a new registry from Minas Gerais and was several collections were found in the State.

It occurs in Bolivia, Paraguay and Brazil (Irwin & Barneby 1982), where it was collected in Mato Grosso, Mato Grosso do Sul, Minas Gerais, Paraná and São Paulo, in Cerrado and Atlantic Forest (Table 4). In Minas Gerais, it is more common in the central region (Fig. 20), where it was collected in gallery forest. It was found with flowers in February, March, April and May; and with fruits in April.

Examined specimens: BRAZIL. MINAS GERAIS: Araguari, Fazenda Furna, Trevo da rodovia BR-050 eixo Araguari-Caldas Novas, 18° 36' 23" S, 48° 18' 13" W, 3.IV.2009, fl. e fr., *G. P. E. Rocha & Nogueira-Ferreira 1* (HUFU); fazenda Furna, 20 km depois de Araguari na rodovia MG 413, primeira estrada a 500 m depois do posto policial, à esquerda, 18° 36' 41" S, 48° 18' 17" W O, 08.IV.2010, fl., *A. O. R. Santos & B. F. Bartelli 11* (HUFU); Paraopeba, Horto Florestal, 27.IV.1957, fl. e fr., *E. P. Heringer 5597* (UB, IBT); Pratápolis, Estrada entre Passos e Fortaleza de Minas, 20° 49' 841", 46° 46' 662", elev.. 944 m, 06.V.2003, fl., *A.M.G.A. Tozzi et al.* (UEC 95349); Santo Hipólito, estrada Santo Hipólito-Conselheiro Mata, ca. 5 km Santo Hipólito, 18° 17' 0.8" S, 44° 11' 11.8" W, elev. 550 m, 21.II.2002, fl., *V. C. Souza et al. 28129* (SPF); Serra do Cipó, Santana do Pirapama, acesso pela fazenda Inhame, povoado De Inhame, margem do rio Cipó, mata de galeria, 18° 57'38" S, 43° 47' 42" W, elev. 670 m, 6.III.2009, fl., *D. C. Zappi 1805* (SPF); Sete Lagoas, Belo Horizonte, 30.IV. 1955, fl., e fr., *E. P. Heringer 7107* (UB)

23. *Senna pneumatica* Irwin & Barneby, Mem. New York Bot. Gard. 35: 329. 1982.

Fig. 17: L-Q; Map: Fig. 18

Shrubs or sub-shrubs, 1.5–1.6 m alt. Branches cylindrical, glabrous or with some crooked trichomes. Leaves 7–9 pairs of leaflets; stipules 6–7 × 5–6 mm, ovate, base oblique, apex cuspidate, deciduous; petiole (1.5–)2–3 cm long.; nectary between the proximal pair of leaflets, falciform, stipitate; leaf rachis 5.5–7 cm long., glabrous or with some crooked trichomes; leaflets obovate, apex obtuse, mucronulate, both sides glabrous, veins tenuous, membranaceous, margin ciliolate, proximal pair 1–1.5 × 0.5–0.7 cm, distal pair 2.2–3 × 0.7–1 cm. Racemes axillary; peduncle 2–3.5 cm long.; rachis 0.9–1 cm long. Bracts 5–10 × 2–3 mm, ovate, deciduous; pedicel 10–11 mm long., nectary absent. Sepals 6–8 × 2–3 mm, similar size, elliptic, apex obtuse, dorsal surface hirsute. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal ca. 7–14 × 4–8 mm, elliptic, apex emarginated, latero–adaxial petals obovate, apex rounded, latero–abaxial petals narrowly elliptic, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments pilose, staminodes lamina elliptic, medium stamen filaments ca. 2 mm long., anther ca. 4 mm long., centric–abaxial stamen filament ca. 1 mm long., anther ca. 4 mm long., latero–abaxial stamens filaments ca. 2 mm long., straight, anther 5–6 mm long, rostro oblique, ca. 0.5 mm long. Ovary pubescent, style 0.5–0.7 cm long., pubescent. Legume 9–10.5 × 0.8–1 cm, linear, flat-compressed, externally smooth, slightly curved, glabrous, brown when mature, dehiscent. Seeds 6–7 × 3–4 mm, 1-seriate, widely oblong.

Senna pneumatica has 7–9 pairs of leaflets (Fig. 17L), ovate sepal (Fig. 17M), nectary falciform between the proximal pair (Fig. 17N), bracts hirsute (Fig. 17O) and flat-compressed pod (Fig. 17P, Q). It is similar to *Senna organensis* and both are included in serie *Stipulaceae* (Table 3). They can be distinguished as explained in taxonomy comments of *S. organensis* var. *organensis*.

Endemic to Brazil, it is common in Serra do Caparaó, between the States of Minas Gerais and Espírito Santo, and in Ouro Preto, both regions of the Atlantic Forest (Fig. 18). It can be found in stony fields or outcrops, near an altitude of 2200 m (Irwin & Barneby 1982). Flowers and fruits: November–June.

Examined specimens: BRAZIL. MINAS GERAIS: Espera Feliz, P. N. Caparaó, em direção a macieira, 11-II-2009, fl. e fr., *F. Marcolino 55* (ESA); Ouro Preto, Trilha da Mata do Baú, P. E. Itacolomi, 07.VI.2005, fr., *V. F. Dutra et al. 181* (VIC); 07.VI.2005, fr., *L. C. P. Lima et al. 208* (VIC); 07.VI.2005, fl. e fr., *L. C. P. Lima & S. da C. Ferreira 293* (VIC); Serra do Caparaó, elev. 2200 m, 30.IX.1941, fr., *A. C. Brade 17052* (holotype RB!; Isotype NYBG!)

24. *Senna reniformis* (G. Don) Irwin & Barneby, Mem. New York Bot. Gard. 35(1): 223. 1982. Fig. 19: A-E; Map: Fig. 18

Cassia reniformis G. Don, Gen. Hist. Dichl. Pl. 2: 440. 1832

Shurbs or small trees, 2–3 m alt. Branches cylindrical, sparse tomentose. Leaves (3-)4(-5) pairs of leaflets; stipules 10–25(-40) × 10–20(-40) mm, reniform, base sagittate, apex acute, persistent; petiole 2–4 cm long.; nectary between all pairs of leaflets, piriform or ovate, sessile or stipitate; leaf rachis 4.5–10 cm long., sparse tomentose.; leaflets elliptic, apex cuspidate, rare acuminate, both sides glabrous but can be sparse tomentose at veins in abaxial surface, veins tenuous, cartaceous, margin ciliolate, proximal pair 3.5–6 (-9) × 2–4(-4.5) cm, distal pair 5.5–10.5(-16) × 2.8–3.5(-5.5) cm. Racemes axillary and terminal; peduncle 4.5–10 cm long; rachis 3.5–16 cm long. Bracts ca. 5 × 2 mm, lanceolate, deciduous; pedicel 20–30 mm long, nectary at medium region, ca. 2 × 0.5 mm, ovate or falciform, stipitate. Sepals 5–13 × 6–15 mm, different size, ovate, apex obtuse, dorsal surface glabrous. Corolla zygomorphic; petals glabrous, yellow, centric adaxial petal 20–22 × 10–13 mm, obovate, apex obtuse, latero-adaxial and latero-abaxial petals obovate, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina narrowly elliptic, medium stamens filaments 2–3 mm long., anther 5–7 mm long., centric abaxial stamen filament 5–6 mm long., anther 8–10 mm long., latero-abaxial stamens filaments 8–10 mm long., straight, anther 10–11 mm long., rostro transversely oblique or truncate, ca. 0.5 mm long. Ovary sparse tomentose, style 2–3.5 cm long., sparse tomentose. Legume 8–18 × 0.9–1.3 cm, oblong, compressed, externally depressed between seed locules, curved, glabrous, dark brown, dehiscent. Seeds ca. 5 × 3 mm, oblong

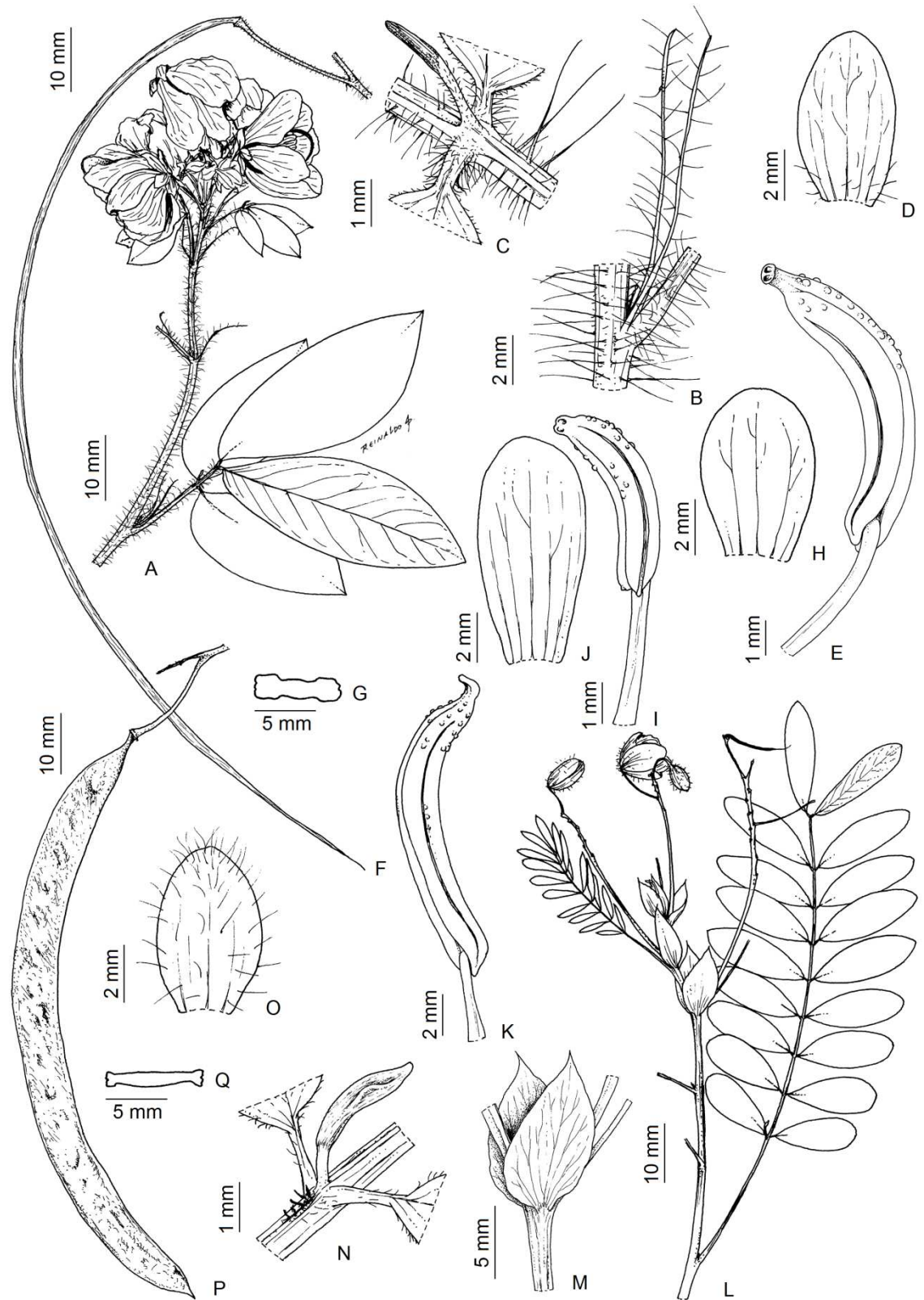


Fig. 17: *Senna pilifera* (Vogel) Irwin & Barneby var. *subglabra* (S. Moore) Irwin & Barneby: **A:** Branche with leaves and inflorescence. **B:** Stipule. **C:** Nectary between proximal pair of leaflets. **D:** Sepal. **E:** Anther of abaxial stamen. **F:** Pod. **G:** Transversal section of pod. *S. pilifera* (Vogel) Irwin & Barneby var. *tubata* Irwin & Barneby: **H:** Sepal. **I:** Anther of abaxial stamen. *S. pilifera* (Vogel) Irwin & Barneby var. *pilifera*: **J:** Sepal. **K:** Anther of abaxial stamen. *Senna pneumatica* Irwin & Barneby: **L:** Branche with leaves and inflorescence. **M:** Sepal. **N:** Nectary between leaflets of proximal pair. **O:** Sepal. **P:** Pod. **Q:** Transversal section of pod (**A-F:** G. Sousa 368-BHCB; **H-I:** UEC 25349; **J-K:** H. S. Irwin 2539-VIC; **L-Q:** L.C.P.Lima 293-VIC)

Senna reniformis is included in serie *Coriaceae* together *S. corifolia* and both have reniform stipule (Fig. 19B; Fig. 8B), glabrous leaflets and nectary in pedicel (Fig. 19C; Fig. 8D) and these species are easily distinguishable, as explained in the taxonomy comments in *S. corifolia*. Although, *Senna reniformis* shares the form of stipules and presence of nectary in petiole with *S. cana* also, but *S. cana* has coriaceous leaflets and indument lanose, villous or velutinous and linear pod, while *S. reniformis* has chartaceous and glabrous leaflets and oblong pod (Fig. 19 D, E).

Senna reniformis is endemic to Brazil and was collected in Bahia, Minas Gerais, São Paulo and Sergipe, occurring in the Atlantic Forest, Caatinga and Cerrado regions (Table 4), in forest gallery margins, thickets, brejo and rock outcrops (Irwin & Barneby 1982).

In Minas Gerais, the specie is frequent in the central region (Fig. 18), in gallery forest, forest margin and rocky field. It was found with flowers in January, March, April, May, June, October and November; and with fruits in February, March, June, September, November and December.

Examined specimens: BRAZIL. MINAS GERAIS: Caeté, Serra da Piedade, 20. III.2013, fl. e fr., *C. P. Schlindwein s.n* (BHCB 178209); Congonhas do Norte, Alves, elev. 700 m, 19.V.1989, fl., *G. Hatschbach et al.* 52951 (IBT); Diamantina, ca. 25 km E. of, Rio Jequití, elev. 790 m, 21.III.1970, fl. e fr., *H. S. Irwin et al.* 28002 (UB); Biribiri, Cristais, à beira do Córrego Soberbo, Capoeira, 15.IV.2005, fl., *E. H. Silva & C. V. Mendonça* 270 (DIAM); estrada que liga Diamantina a Curalino, 18° 16'29.3" S, 43° 32' 24.7", 25.III.2014, fl., *I. A. C. Coutinho et al.*, 457 (VIC); estrada de Diamantina-Mendanha, 10.XII.1992, fr., *H. F. Leitão Filho et al.* 27765 (UEC); Diamantina, Copasa, Pau-de-fruta, 18° 15'48.6" S, 43° 38' 28.8", elev. 1.376 m, 09.IV.2010, fl., *M. M. T. Cota et al.* 10 (DIAM); Itabirito, 10.VI.1971, fl., *L. Krieger* 10689 (CESJ); João Pinheiro, Três Marias, 19.VI.1964, fl., *J. M. Pires* 58014 (UB); Mariana, estrada Samitri, 27.VI.2013, fl., *S. M. Faria & J. Bibiano* 2091 (RB); but along boundary with mun. Ouro Preto, 6 km due SE city of Ouro Preto, on top (planalto) of the mountain, "Itacolomi", alt. 1600 m, by altimeter 1700 m on map, 20° 26' S & 43° 27 1.2' W, 30.XI.1965, fl. e fr., *G. Eiten* 7039 (UB); Nova Lima, RPPN Mata Samuel de Paula, 20° 00' 0452,8" S, 043° 51' 48,7" W, 900 m de altitude, na trilha principal que corta a mata, 13.IV.2005, fl., *A. Salino & P. H. A. de Melo* 10360 (BHCB); Santana do Riacho, Serra do Cipó, base da cachoeira da farofa, 19° 22' 49" S, 43° 44' 37" W, 1010 m,

06.VII.2001, fr., *V. C. Souza et al.* 25254 (HUFU); rodovia para Morro do Pilar, trilha paralela à estrada que leva a um córrego, 20.IX.2016, fr., *L. G. Rosignoli-Oliveira* 22 (VIC); estrada próximo a APA Morro do Pilar, 19° 13' 52.9" S, 43° 23' 06.7" W, 20.IX.2016, fr., *L. G. Rosignoli-Oliveira* 23 (VIC); São João da Chapada, ca. 4 km N. of, elev. 1200 m, 23.III.1970, fl. e fr., *H. S. Irwin et al.* 28170 (UB); id. 7 km N, Road to Inhaí, elev. 1150, 30.III.1970, fl. e fr., *H. S. Irwin & Barneby et al.*, 28631 (UB); São Roque de Minas, P. N. Serra da Canastra, trilha para a parte de baixo da cachoeira Casca D'Anta, 20.IV.1997, fl., *J. N. Nakajima et al.* 2417 (HUFU); São Roque de Minas, 3.IV.2008, fl., *V. F. Dutra* 603 (VIC); Serra do Caraça, sandstone summit, elev. ca. 1750-1950 m, 25.I.1971, fl., *H. S. Irwin et al.* 29111 (UB); Santa Bárbara, trilha na mata de encosta, com *Vanillosmopsis*, em direção ao Campo de Fora, 20° 06' 18" S, 43°29'40" W, elev. 1350-1500 m, 22.V.1997, fl., *R. Mello-Silva et al.* 1337 (IBT); Serra do Espinhaço, Congonhas, RPPN da Ferteco (Compainha Vale do Rio Doce), 18.X.2003, fl., *M. A. Sartori et al* 660 (VIC); Serra do Itabirito, ca. 45 km SE of Belo Horizonte, elev. 1500 m, 07.II.1968, fr., *H. S. Irwin et al.* 19518 (UB)

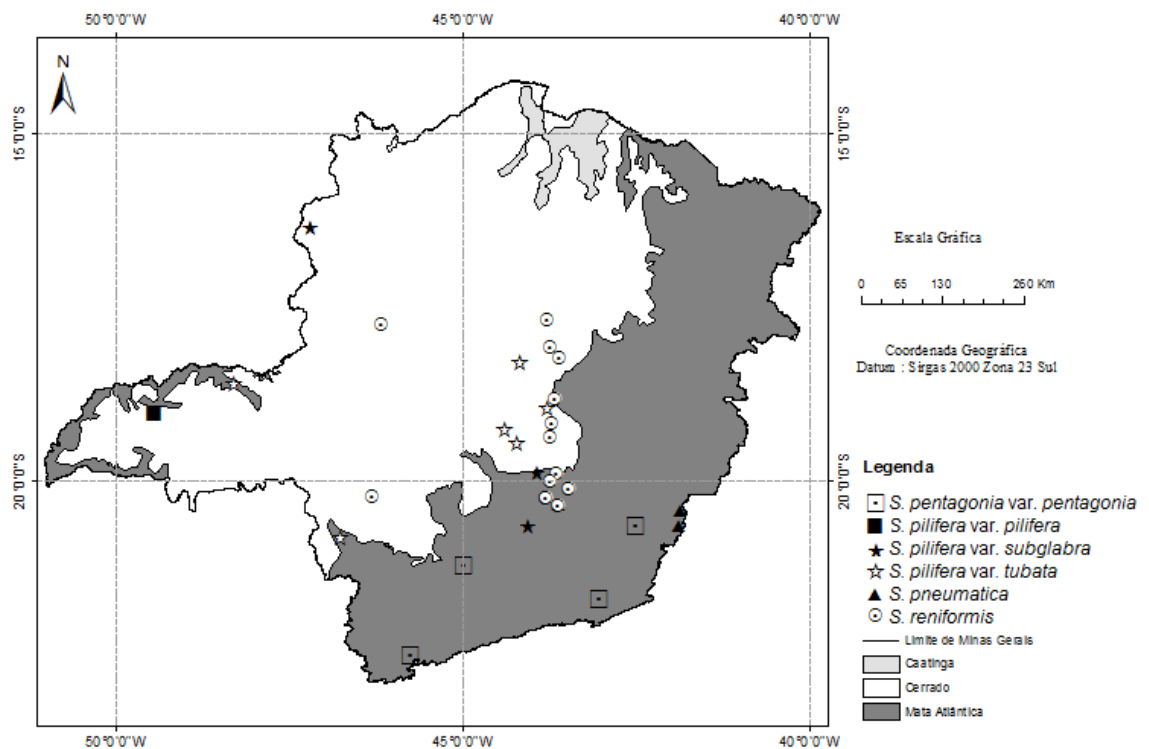


Fig. 18: Geographical distribution of *Senna pentagonia*, *S. pneumatica*, *S. pilifera* and its varieties and *S. reniformis* in Minas Gerais state.

25. *Senna rostrata* (Mart.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 528. 1982. Fig. 19: f-k; Map: Fig. 20

Cassia rostrata Mart., Verhandl. Vereins Beford. Garternbaues Konigl. Preuss. Staaten 3: 99, t.7. 1827

Shrubs, sub-shrubs or small trees, 0.5–4 m alt. Branches cylindrical, glabrous or sparse tomentose. Leaves 6–7(-9) pairs of leaflets; stipules 3–6 × 0.5 mm, linear, base truncate, apex acuminate, deciduous; petiole 2–2.5 cm long.; nectary between the proximal pair of leaflets, cravate or capitate, stipitate; leaf rachis 4–6.5 cm long., glabrous or sparse tomentose; leaflets elliptic or obovate, apex obtuse, mucronulate, both sides glabrous, veins tenuous, membranaceous, margin glabrous, proximal pair 2–2.5 × 0.8–1.2 cm, distal pair 2.5–3 × 1.1–1.3 cm. Racemes umbellate, axillary; peduncle 1.5–2 cm long; rachis absent. Bracts ca. 2 × 0.5 mm, cymbiform, deciduous; pedicel 25–35 mm long., nectary present at base of pedicel, ca. 2 × 1 mm, botuliform or fusiform, sessil or stipitate. Sepals 5–10 × 2–10 mm, different size, obovate, apex obtuse, dorsal surface glabrous. Corolla asymmetric, petals with some hairs at base of dorsal surface, yellow, centric adaxial petal 20–25 × 8–9 mm, obovate, apex rounded, latero-adaxial petals obovate, apex rounded, latero-abaxial petals obovate and one is falciform, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina arrowlike, medium stamens filaments 2 mm long., anther 5–7 mm long., centric-abaxial stamen filament 5–9 mm long., anther 7–8 mm long., latero-abaxial stamens filaments 9–10 mm long., straight, anther 7–8 mm long, rostro curved, 3–5 mm long. Ovary velutinous, style 1–2 cm long., velutinous. Legume 9.5–11 × 0.5–0.8 cm, oblong, flat-compressed, externally depressed between seed locules, straight, sparse tomentose, dark brown, dehiscent. Seeds 3–4 × 1–2 mm, 1-seriate, oblong.

This specie is distinguishable from other species analyzed in this study by the presence of cravate nectary between the proximal pair of leaflets (Fig. 19h) and by the presence of nectary at base of pedicel (Fig. 19I). Besides that, it has umbeliform racemes (Fig. 19F), asymmetric flowers with one falciform petal, large rostro of abaxial stamens' anther and flat-compressed legume (Fig. 19 J, K). Among the species of serie *Interglandulosae* (Table 3), it's more similar to *Senna aversiflora* (Herb.) Irwin & Barneby, but this specie was not found in Minas Gerais, only observed in herbaria from other States. They can be distinguished by observing that *S. rostrata* has glabrous or

pilose branches and legumes externally depressed between seed locules; while *S. aversiflora* has hirsute branches and legume with projections in the form of X.

It occurs in Paraguay and Brazil (Irwin & Barneby 1982), where it was collected in Bahia, Goiás, Minas Gerais and São Paulo, occurring in the Atlantic Forest and Cerrado regions (Table 4). It can be found around humid places, woodland margins, disturbed cerrado, pastures and thickets (Irwin & Barneby 1982).

In Minas Gerais, the specie was found from the central to north and in west regions (Fig. 20), in forests, disturbed fields and on roadsides. It was collected with flowers in April, May, June, July and September; and with fruits in July, August and September.

Examined specimens: BRAZIL. MINAS GERAIS: Araguari, Funil I, 10.V.2005, fl., *G. M. Araujo s.n* (HUFU 43198); funil I, Capim Branco, 23.IV.2007, fl., *E. K. O. Hattori et al. 703* (HUFU); Belo Horizonte, rodovia Belo Horizonte-Curvelo, 80 km de Curvelo, 29.VII.1976, fl. e fr., *P. Davis et al. s.n.* (UEC 6278); Buenópolis, Ligação da Rodovia BR 135 ao projeto Curamataí, km 25, fl., 19.V.2001, *G. Hatschbach et al. 72207* (ESA); Curimataí, Rio Preto, 21.IX.2005, fl. e fr., *G. Hatschbach & E. Barbosa 79401* (RB); Buritizeiro, Cachoeira da Mantega, 4 Km, elev. 700m, 12.V.2001, fl., *G. Hatschbach et al. 71966* (ESA); Curimataí, arredores, 9.VI.2004, fl., *G. Hatschbach et al. 77658* (MBM, FUEL); Montes Claros, Mirabela, ca. Km 45, 14.V.1977, fl., *P. E. Gibas et al. s.n* (IBT 153398, UEC 6279); Uberlândia, Fazenda São José, 18.V.2010, fl., *B. C. Vargas & G. M. Araújo 117* (HUFU) sem indicação de local, 23.VIII.1964, fr., *H. S. Irwin & Barneby 5504* (UB)

26. *Senna rugosa* (G. Don) Irwin & Barneby, *Mem. New York Bot. Gard.* 35:188, 1982

Fig. 19: L-P; Map: Fig. 20

Cassia rugosa G. Don, *Gen. Hist. Dichl. Pl.* 2: 440. 1832

Shrubs, 0.5–2 m alt. Branches cylindrical, sparse tomentosen and hispidulous. Leaves 2 pairs of leaflets; stipules 4-7 × 1 mm, linear, base truncate, apex acuminate, deciduous; petiole 0.5–1.7 cm long.; nectary between all leaflets' pairs, conical or pisiform, sessile or sub-sessil; leaf rachis 1–1.5(-2) cm long., sparse tomentose and hispidulous; leaflets elliptic, narrowly elliptic or obovate, apex obtuse, acute, retuse obcordate or slightly retuse, mucronulate, adaxial surface glabrous or with some sparse trichomes, abaxial

surface tomentose, rare glabrous, veins patente, coriaceous, margin ciliolate, proximal pair 3.5–8 × 2–3.5 cm, distal pair 5–9 × 2–3. Racemes axillary and terminal; peduncle 3.5–4 cm long.; inflorescence rachis 2.5–3 cm long. Bracts ca. 3 × 1 mm, cymbiform, deciduous. pedicel 25–40 mm long., nectary absent. Sepals 5–8 × 3–5 mm, different size, ovate or obovate, apex obtuse, dorsal surface tomentose. Corolla zygomorphic, petals sparse tomentose, yellow, centric adaxial petal ca. 15–22 × 13–20 mm, elliptic, apex rounded, latero-adaxial and latero-abaxial petals elliptic, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments puberulent, staminodes lamina arrowlike, medium stamens filaments 2–3 mm long., anther 5–7 mm long., centric abaxial stamen filament ca. 4 mm long, anther 6–8 mm, latero-abaxial stamens filaments 6–8 mm long., straight, anther 10–11 mm long., rostro geniculate, ca. 1 mm long. Ovary velutinous, style 1.5–2.5(-3) cm, velutinous. Legume 7.5–15 × 1–1.5 cm, cylindrical, externally depressed between seed locules, straight, sparse tomentose, black when mature with brown suture region, indehiscent. Seeds ca. 6 × 3 mm, 2-seriate, obovate.

Senna rugosa has 2 pairs of leaflets (Fig. 19L) with leaflets coriaceous and with veins patente (Fig. 19 N), nectary between all pairs (Fig. 19M) and cylindrical pod (Fig. 19P,Q), black when mature. Some materials of *Senna rugosa* were identified as *S. macranthera* in specimens deposited in herbaria. These species are included in serie *Bacillaris* (Table 3) and are really similar, but they can be easily distinguished as explained in taxonomy comments of *S. macranthera*.

In *Senna rugosa* the forms of leaflets observed in the examined material were elliptic, narrowly elliptic or obovate and the apex is varied greatly from obtuse, acute, retuse obcordate or slightly retuse. However, the presence of two pairs of leaflets (Fig. 19L), nectary between all pairs (Fig. 19M), tomentose leaflets in abaxial surface and appearance and the pod's appearance (Fig. 19P), allow the easy recognition of this specie.

Senna rugosa is distributed from Paraguay to Bolivia (Irwin & Barneby 1982). In Brazil, it occurs in Bahia, Ceará, Distrito Federal, Goiás, Maranhão, Minas Gerais, Mato Grosso do Sul, Mato Grosso, Pará, Paraná, Pernambuco, Piauí, Rondônia, São Paulo and Tocantins in Amazon Forest, Atlantic Forest, Caatinga and Cerrado regions (Table 4), in woodland margins, disturbed cerrado and cerradão, pastures, thickets and on roadsides (Irwin & Barneby 1982). In Minas Gerais, it was collected in the central

and west regions (Fig. 20), in grassy field, gallery forests, valleys, outcrops and rocky fields. It was collected with flowers in February, March, April and July; and with fruits in July, September and August.

Examined specimens: BRASIL. MINAS GERAIS: Belo Horizonte, Acaba mundo, 8.III.1934, fl., *M. Barreto* 5889 (UB); Diamantina, beira da estrada, 18° 10' 07.8" S, 43° 30' 23.4" W, 23.IX.2016, fr., *L. G. Rosignoli-Oliveira* 27 (VIC); Entre Rios de Minas, 0.IV.1970, fl., *L. Krieger* 8287 (CESJ); Gouvêia, Estrada Gouveia- Congonhas do Norte, ca. 6 km da estrada Gouveia-Curvelo, 14.III.1999, fl., *V.C.Souza & J.P. Souza* 22.290 (RB); 30 km by road SW of Gouvêia, at Km 60 on road to Curvelo, 1150 m, 11.IV.1973, fl., *W. R. Anderson* 8612 (UB); Itabirito, Serra do Itabirito, ca. 45 km S. E. of Belo Horizonte, 1500 m, 8.II.1968, fl., *H. S. Irwin et al.* 19577 (UB); Lagoa Santa, 26.II.1933, fl., *M. Barreto* 5884 (IBT); Paraopeba, Horto Florestal, 04.IV.1965, fl., *J. E. de Paula* 29 (UB, IBT); 18.III.2008, fl., *G. E. Valente e J. A. A. Meira Neto* 2118 (VIC); Patrocínio, Fazenda Grão de Ouro, 18° 48'31"S 46° 58'00", 28.II.1989, fl., *M. Pereira Neto et al.* 180 (UB); Serra do Cipó, P. N. Caparaó, Borda da Trilha das Lagoas, 19° 21' 00.8" S, 43° 36' 47.9" W, 19.IX.2016, fr., *L. G. Rosignoli-Oliveira* 20 (VIC); Santa de Pirapama, Balsamo, 13.VII.1970, fr., *L. Krieger & U. C. Camara s.n.* (CESJ 8823); Santana do Riacho, P. N. Serra do Cipó, Trilha do Capão, 03.VII.1993, fl., *V. C. Souza et al.* 38076 (RB); São João da Chapada, ca 10 km N. of São João da Chapada, road to Inhaí, 1050 m, 22.III.1970, fl., *H.S. Irwin et al.* 28074 (UB); São João Del Rei, 26.III.1970, fl., *L. Krieger* 8225 (CESJ); Uberlândia, on righway BR-106, 1 km east of Uberlandia, 30.VII.1967, fr., *R. Goodland* 3602 (UB); 5km north of Uberlandia on highway BR-106, 5.VIII.1967, fr., *R. Goodland* 3698 (UB).

27. *Senna siamea* (Lam.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 98. 1982 .

Fig. 21: A-D; Map: Fig. 20

Cassia siamea Lam., Encycl. Meth. Bot. 1(2): 648. 1785

Trees, 5–7 m alt. Branches cylindrical, sparse pubescent. Leaves (4-)6(-7) pairs of leaflets; stipules not seen; petiole 2–2.5 cm long., nectary absent; leaf rachis 7.5–9 cm long., sparse tomentose; leaflets elliptic, apex retuse, mucronulate, adaxial surface glabrous and abaxial surface sparse pubescent, veins tenuous, membranaceous, margin glabrous, proximal pair 2.5-3.5 × 1.5-1.8 cm, distal pair 4–6.5 × 1.5–2.2. Racemes

corimbiform axillary and paniculas terminal; peduncle 1-2 cm long, rachis 3–3.5 cm long. Bracts ca. 4 × 1 mm, ovate-cuspidate, deciduous pedicel 24–27 mm long., nectary absent. Sepals 5–8 × 4–8 mm, different size, elliptic, apex rounded, dorsal surface sparse pubescent. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal 10-15 × 5-6 mm, elliptic, circular or sub-quadrangular, apex slight truncate, latero-adaxial petals circular or obovate, apex rounded and latero-abaxial petals obovate and one can be is slightly smaller than other, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina arrowlike, medium stamens filaments 2–4 mm long, anther 5–6 mm long, centric abaxial stamen filament 3-5 mm long, anther 5–6 mm, latero-abaxial stamens filaments 6–9 mm long, slightly curved, anther 6–7 mm long., rostro triangular, ca. 0.5 mm long. Ovary velutinous, style 1–2 cm long., velutinous. Legume 20–23 × 1.5 cm, oblong, flat-compressed, externally plano-ondulated, depressed between seed locules, straight or slightly curved, sparse pubescent, brown when mature, indehiscent. Seeds observed not mature, ca. 6 × 3 mm, 1-seriate, oblong.

Senna siamea is the only representative specie of serie *Floridade* (Table 3) found in Minas Gerais. This specie shares with *Senna silvestris* (Vell) Irwin & Barneby the arboreal habit, the absence of nectary, corimbiform raceme (Fig. 21 A and E) and a flat-compressed legume (Fig. 21 C, D and H, I). But, *S. siamea* has the apex of leaflets predominantly retuse (Fig. 21A), a completely yellow petal, and a long, ondulate and brown legume (Fig. 21C, D). *S. silvestris* has an apex of leaflets, in general, acute or cuspidate (Fig. 21 E), in the fresh material it is possible to observe that the base of the petal is orange and the pods are smaller, straight and vinaceous (Fig. 21H, I).

This specie occurs in Mexico, Central America, Colombia, Venezuela and Brazil, where it was recorded to Alagoas, Amazonas, Bahia, Ceará, Distrito Federal, Goiás, Maranhão, Minas Gerais, Pará, Paraíba, Pernambuco, Piauí, Rondônia, Rio de Janeiro, Rio Grande do Sul, Santa Catarina and São Paulo. It occurs in the Amazon Forest, Atlantic Forest, Caatinga and Cerrado regions (Table 4). It can be found in forests or forest margins (Irwin & Barneby 1982). In Minas Gerais, it is common in the central and the southeast regions of the state (Fig. 20), on roadside and near lagoons. It was found with flowers in March, April, June and October, and with fruits in April and June.

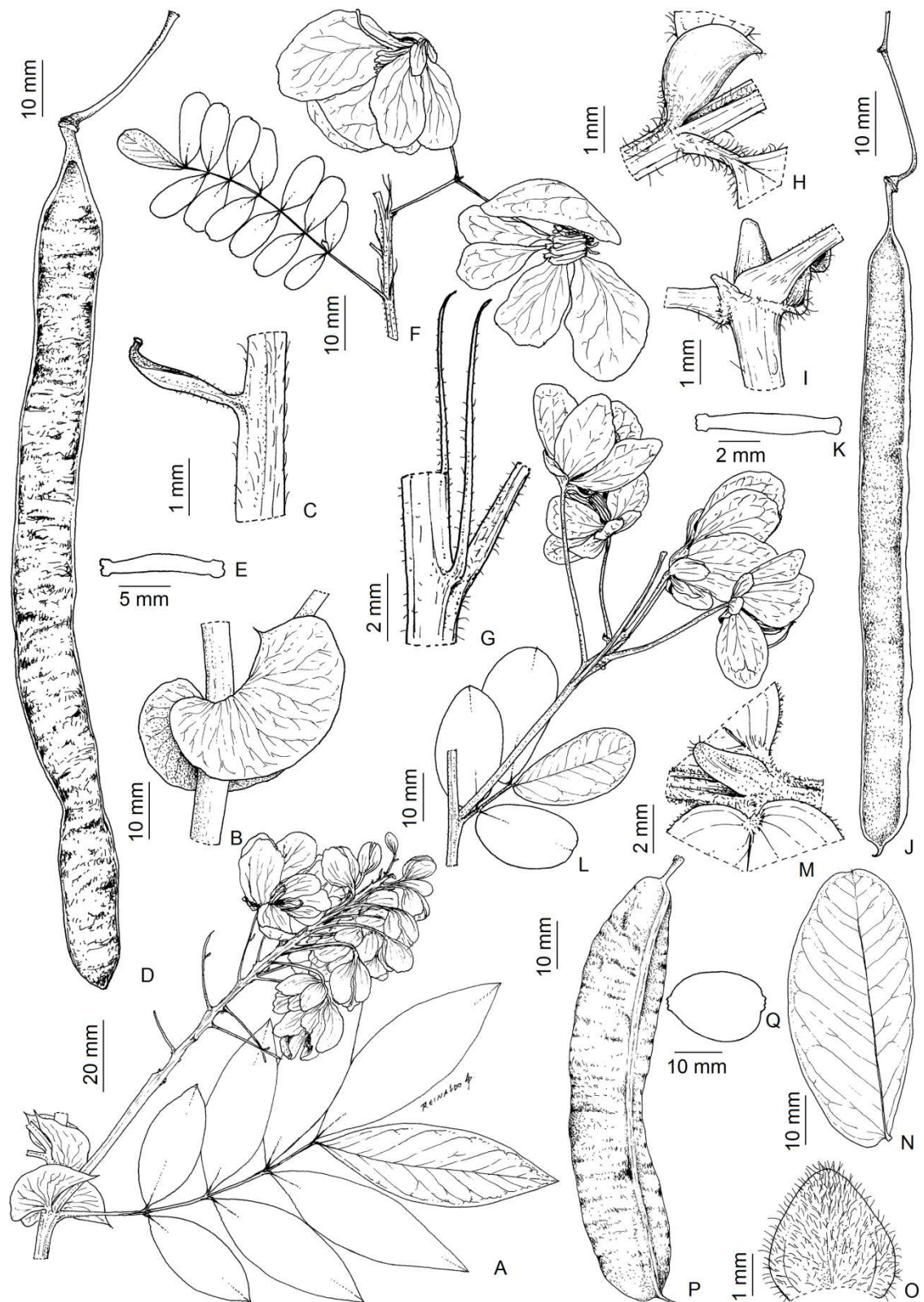


Fig. 19: *Senna reniformis* (G. Don) Irwin & Barneby: **A.** Branche with leaves and inflorescence. **B.** Stipule. **C.** Nectary in pedicel. **D.** Pod. **E.** Transversal section of pod. *S. rostrata* (Mart.) Irwin & Barneby: **F.** Branche with leaves and inflorescence. **G.** Stipule. **H.** Nectary between leaflets of proximal pair. **I.** Nectary in pedicel. **J.** Pod. **K.** Transversal section of pod. *S. rugosa* (G. Don) H.S. Irwin & Barneby: **L.** Branche with leaves and inflorescence. **M.** Nectary between the proximal pair of leaflets. **N.** Distal leaflet and vein detail. **O.** Bract. **P.** Pod. **Q.** Transversal section of pod (**A-C:** V. F. Dutra 603-VIC; **D-E:** L. G. Rosignoli-Oliveira 22-VIC; **F-I:** P. E. Gibis et al. 5109-UEC; **J-K:** H. S. Irwin & T. R. Soderstrom 5504-UB; **L-O:** G. E. Valente & J. A. A. Meira Neto 2118-VIC; **P-Q:** L. G. Rosignoli-Oliveira 20-VIC)

Examined specimens: BRAZIL. MINAS GERAIS: Belo Horizonte, cultiv. Do Inst. Agronomico, 20.VI.1952, fl., *Cornelio s.n* (IPA 41.741); Córrego Novo, Lagoa das Piabas, 19° 50' 28" S, 42° 30' 21" W, alt. 244 m, 05. VI.2003, fl. e fr., *G. S. França 354* (BHCB); Lavras, campus UFLA, 15.IV.2006, fl. e fr., *K. Ferreira s.n* (RB 424.462); Santana do Riacho, Km 133, ao longo da rodovia Belo Horizonte - Conceição do Mato Dentro, 02.III.1981, fl., *M. C. Amaral et al., s.n* (UEC 31344); sem indicação de cidade e data, fl. e fr., *V. Gomes & E. P. Heringer s.n* (UB s.n); Ubá, bairro Tanquinho, beira da estrada, 30.X.2016, fl., *L.G. Rosignoli-Oliveira 34* (VIC)

28. *Senna silvestris* (Vell.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 87. 1982.

Fig. 21: E-I; Map: Fig. 20

Cassia silvestris Vell. Fl. Flum. 169, 1825.

Shrubs or small trees, 0.5–5.5 m alt. Branches cylindrical, tomentose. Leaves (6–)7–9(–11) pairs of leaflets; stipules 6–7 × ca. 0.5 mm, linear-falciform, base truncate, apex acuminate, deciduous; petiole 2.5–4(–5) cm long.; nectary absent; leaf rachis 9–13.5(–20) cm long., tomentose; leaflets lanceolate or ovate, apex acuminate or cuspidate, rare but can be occurs retuse or obtuse in some leaflets, mucronulate, adaxial surface glabrous, pubescent or sparse tomentose and abaxial surface sparse pubescent or tomentose, veins tenuous, cartaceous, margin finely ciliolate or glabrous, proximal pair 3.5–6.5(–7.5) × 1.5–2(–2.5) cm, distal pair 5.5–8(–10) × 1.5–3.5(–4.5) cm; Racemes corimbiform axillary and panícula terminal; peduncle 2.2–3 cm long; rachis 3–4 cm long. Bracts ca. 2 × 1 mm, cymbirform, deciduous; pedicel 15–20 mm long., nectary absent. Sepals 4–8 × 2–4 mm, different size, ovate or elliptic, apex obtuse, dorsal surface glabrous or tomentose. Corolla zygomorphic, petals glabrous, yellow and is possible to observe in field the collar orange at base, centric adaxial petal 12–15 × 6–7 mm, obovate, apex slightly emarginated, latero–adaxial and latero–abaxial petals obovate, apex rounded or slightly emarginated. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina like a anther., medium stamen filaments 1–2 mm long., anther ca. 4 mm long., centric–abaxial stamen filament 4–5 mm long., anther ca. 2 mm long., latero–abaxial stamens filaments 4–5 mm long., straight, anther 5–6 mm long, rostro transversely oblique, 0.5 mm long. Ovary glabrous, style 0.8–1 cm long., glabrous or pubescent on the margins. Legume 9–16 × 1.5–2.5 cm, oblong, flat-compressed, externally smooth or with some printing, straight, glabrous, in

the field is green and vinaceous, indehiscent. Seeds ca. 5 × 3 mm, 1 or 2-seriate, oblong

Senna silvestris is the only representative specie of serie *Sapindifolieae* (Table 3) found in Minas Gerais and shares the characteristics of the tree habit, the absence of nectary, the corimbiform raceme (Fig. 21E) and flat-compressed legume (Fig. 21H,I) with *Senna siamea*. They are distinguished as explained in the taxonomy comments of this latter specie.

Senna silvestris occurs in South American in Bolivia, Paraguay and Brazil and has two subspecies: *silvestris* and *bifaria*, and six varieties. In subspecie *silvestris*: var. *guaranitica*, var. *sapindifolia* and var. *silvestris*. In subsp. *bifaria*: var. *bifaria*, var. *unifaria* and var. *velutina*. Among these, only two occurs in Minas Gerais.

Key to the subspecies and varieties of *Senna silvestris* in Minas Gerais

1. Leaflets' adaxial surface glabrous and abaxial surface pubescent.....**28.2** subsp. *silvestris*, var. *silvestris*
1'. Leaflets' adaxial surface pubescent or sparse tomentose, abaxial surface tomentose.....**28.1** subsp. *bifaria*, var. *bifaria*

28.1 *Senna silvestris* (Vell.) Irwin & Barneby subsp. *bifaria* var. *bifaria* Irwin & Barneby, Mem. New York Bot. Gard. 35: 94. 1982. Fig. 21: H-I; Map: Fig. 20

This variety has many collected materials deposited in herbaria and is easily distinguished from other variety of *S. silvestris* found in Minas Gerais by the indument, because in var. *bifaria* the leaflets have a soft surface.

It occurs in Paraguay and Brazil, where it was recorded to be found in Goiás, Mato Grosso, Minas Gerais and São Paulo, occurring in areas within the Atlantic Forest and the Cerrado (Table 4), in gallery margins and disturbed woodland (Irwin & Barneby 1982).

In Minas Gerais, this variety is common in Central and North regions and was also collected in the northeast and west (Fig. 20), found in gallery forest, rocky slopes, riparian forest and on the roadside in Cerrado. It was collected with flowers in January, February, March, April and May; and with fruits in February, March, April and May.

Examined specimens: BRAZIL. MINAS GERAIS: Agua Boa, 3 Km SW of Água Boa, Road to Jequitaiá, elev. 950 m, 25.II.1969, fl. e fr., *H. S. Irwin et al.* 23915 (UB); Araçuí, 14.IV.1959, fr., *M. Magalhães* 15260 (UB); Belo Horizonte, Gorduras, 2.V.1936, fl., *M. Barreto* 6029 (UB); Bocaiúva, 26.III.1993, fl. e fr., *L. V. Costa s. n.* (BHCB 27630); Bonfinópolis de Minas, 16° 43' S, 45° 4' W, alt. 790 m, 3.III.2001, fl. e fr., *L. H. Soares e Silva et al.* 835 (UB); Buritizeiro, Distrito de Paredão de Minas, Fazenda Lago Vermelho, 22.IV.2007, fl. e fr., *J. M. Silva & O. S. Ribas* 5828 (FUEL); Corinto, ca. 5 km W of Corinto, elev. 725 m, 4.IV.1970, fl., *H. S. Irwin et al.* 26934 (UB); Diamantina, ca. 20 km E. of Diamantina, elev. 900 m, 22.III.1970, fl., *H. S. Irwin et al.* 28059 (UB); estrada Curvelo-Diamantina, Gouveia, próximo ao trevo, 18° 27' 55.7" S, 43° 45' 29.6" W, 1022 m, 16.I.2008, fl., *V. F. Dutra & J. M. Fernandes* 415 (VIC); Grão Mogol, ca. 8 km West of Grão Mogol, elev. 950 m, 15.II.1969, fl. e fr., *H.S. Irwin et al.* 23311 (UB); Jaboticatubas, Serra do Cipó, 19° 18' S, 43° 37' W, elev. 880 m, 22.III.2014, fl., *I. A. C. Coutinho et al.* 385 (VIC); Januária, about 1 km E of Rio Pandeiros, near Road to Januária, elev. 520 m, 18.IV.1973, fr., *W. R. Anderson* 9121 (UB); Joquim Felício, ca. 3 km S. of Joquim Felício, at E. base, elev. ca. 650 m, 6.III.1970, fl. e fr., *H. S. Irwin et al.* 27071 (UB); Lagoa Santa, estrada Lagoa Santa-Grutas (Lapinha), 12.I.1965, fl., *W. Handro* 67 (IBT); Pará de Minas, ca. 18 km W of Pará de Minas along highway 262 to Uberaba, 28.II.1976, fl., *G. Davidse & W. G. D'Arcy* 10818 (IBT); Paraopeba, FLONA, 19° 16' 24" S, 44° 24' 0.7" W, alt. 722 m, 5.V.2008, fr., *G. E. Valente & A. A. Azevedo* 2213 (VIC); Paracatu, BR 40, entre Paracatu e João Pinheiro, 17° 17' S, 46° 46' W, 4.III.1989, fl. e fr., *R. C. Mendonça et al.* 1269 (UB); Patrocínio, BR 365, Fazenda Chalé, 18° 55' 57" S, 47° 8' 26" W, 01.III.1989, fl. e fr., *R. C. Medonça et al.* 1257 (UB); Santana do Riacho, Km 87,5 ao longo da rodovia Belo Horizonte-Conceição do Mato Dentro, 25.III.1977, fl. e fr., *M. Graças & L. Wanderley* 51 (IBT); em direção à Rio de Pedra, 19° 2' 16.8 " S, 43° 45' 19.7" W, 759 m, 24.IV.2013, fr., *I. A. Coutinho & T. A. R. Pereira* 173 (VIC); Uberlândia, Fazenda Dona Lourdes, Capim Branco II, 25.I.2007, fl., *P. O. Rosa et al.* 289 (UB)

28.1 *Senna silvestris* (Vell.) Irwin & Barneby susp. *silvestris* var. *silvestris*, Mem. New York Bot. Gard. 35: 89. 1982. Fig. 21: E-G; Map: Fig. 20

Cassia silvestris Vell. 1825, l.c. & Icones 4: t. 78. 1835

This variety has many collected materials deposited in herbaria also and can be distinguished from the var. *bifaria* by the indument. In this case, it is glabrous, but can be sparse pubescent and the surface is not soft.

It occurs in Bolivia, Colombia, Paraguay, Brazil and Venezuela (Irwin & Barneby 1982). In Brazil, it is distributed in Bahia, Minas Gerais and on the coast range of Rio de Janeiro from Santa Catarina; occurring in the Atlantic Forest, Caatinga and Cerrado regions (Table 4). This variety can be found in forest margins, along riverbanks, varzea, disturbed woodland, savanna and thickets (Irwin & Barneby 1982).

In Minas Gerais, the variety is common in central region, but was found also in west and North regions (Fig. 20), in wooded valleys, gallery forests, humid fields, rock field and forest margins. It was found with flowers in January, February, March and November, and with fruits in January and April.

Examined specimens: BRAZIL. MINAS GERAIS: Caeté, 3 km E. of Caeté on Road to Santa Bárbara, 6.I.1959, fr., *H. S. Irwin 2387* (R); Divisa entre os municípios de Espinosa e Montezuma, a 35 km da Serra do Pau D'Árco, 15° 04' 55" S, 42° 38' 27" W, elev. 1300-1400 m, 15.III.1994, fl., *C. M. Sakuragui et al. s.n* (SPF 97045); Delfinópolis, estrada para Sacramento, ca. 14 km de Delfinópolis, 20° 16' 50.4" S, 46° 54' 01.5" W, 630 m alt., mata ciliar, 09.I.1996, fl., *V. C. Souza et al. 9874* (DIAM); Mariana, 43 km Northeast of Mariana on road Catas Altas, 21.I.1959, fl., *H. S. Irwin 2507* (IBT); Ouro Preto, APA Estadual Cachoeira das Andorinhas, 24.II.2000, fl., *J. L. Silva s.n* (OUPR 9598); Serra do Caraça, ca. 9 km W. of Barão de Cocais, at base of Serra, elev. ca. 1400 m, 21.I.1971, fl., *H. S. Irwin et al. 28986* (SPF); base, ca. 1500-1750 m elev., 26.I.1971, fr., *H. S. Irwin et al. 29186* (R); Serra do Espinhaço at Lapinha, ca. 21 km N. of Serro on Road to Diamantina, elev. 1200 m, 25.II.1968, fl., *H. S. Irwin et al. 20857* (UB); Serro, Pedro Lessa, 21.XI.1997, fl., *G. Hatschbach et al. 67381* (FLOR); Uberlândia, Capim Branco I, 17.IV.2005, fr., *V. H. P. Rodrigues & R. Kilca s.n* (HUFU 43189)

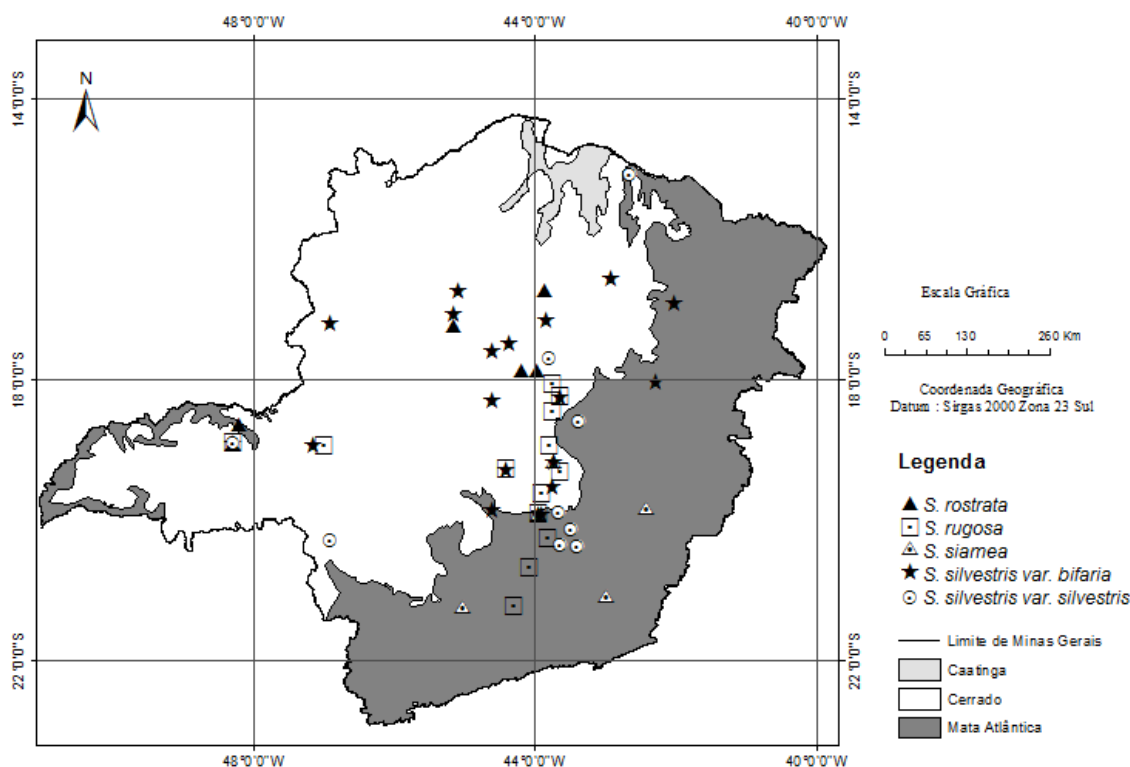


Fig. 20: Geographical distribution of *Senna rostrata*, *S. rugosa*, *S. siamea*, *S. silvestris* and its varieties in Minas Gerais state.

29. *Senna spectabilis* (DC.) Irwin & Barneby var. *excelsa* (Schrad.) Irwin & Barneby,
 Mem. New York Bot. Gard. 35: 604. 1982 .

Fig. 21: J-N; Map: Fig. 23

Cassia excelsa Schrad., Gotting Gelehrte Anz. 1(72): 717. 1821

Shrubs or trees, 2–6 m alt. Branches cylindrical, sparse tomentose. Leaves 7–8 pairs of leaflets; stipules 7×0.5 mm, filiform, base truncate, apex acuminate, deciduous; petiole 2.5–3(-5) cm long.; nectary absent; leaf rachis 12.5–17.5 cm long., sparse tomentose; leaflets elliptic or narrowly elliptic, apex obtuse or acute, both sides, veins tenuous, membranaceous, margin ciliolate, proximal pair $2.1\text{--}3 \times 1\text{--}3$ cm, distal pair $3.5\text{--}4.5 \times 1.5\text{--}2$ cm; Racemes axillary and paniculas terminal; peduncle 2.5–4 cm; rachis 2–3 cm long. Bracts 3×1 mm, lanceolate, deciduous; pedicel 20–25 mm long., nectary absent. Sepals $6\text{--}8 \times 4\text{--}6$ mm, different size, elliptic or obovate, apex rounded, dorsal surface sparse tomentose. Corolla asymmetric, petals glabrous, yellow, centric adaxial petal $22\text{--}25 \times 11\text{--}15$ mm, obovate, apex rounded, latero-adaxial petals obovate, apex rounded, latero-adaxial petals obovate and one petal is falciform, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, staminodes lamina reniform, medium stamens filaments 2–3 m long, anther 5–6 mm long, centric abaxial stamen filament 2–4 mm

long., anther 5–6 mm long., latero-abaxial stamens filaments ca. 3 mm long, straight, anther 6–7 mm long., rostro twisted, ca. 0.5 mm long. Ovary glabrous, style 20–24 mm long., glabrous. Legume (9-) 14–25 × 1 cm, cylindrical, externally slightly depressed between seed locules, straight or slightly curved, glabrous, black when mature, dehiscent. Seeds ca. 6 × 4 mm, 1- seriate.

Senna spectabilis var. *excelsa* is the only representative specie of serie *Excelsa* (Table 3) found in Minas Gerais. It is recognized amongst other species found in this study by the following characteristics: tree habit, linear stipules (Fig. 21 K), absence of nectary, 7-8 pairs of leaflets (Fig. 21J), asymmetric flowers with falciform adaxial petal (Fig. 21L) and a cylindrical legume (Fig. 21M, N).

The specie has two varieties and they are distinguishable by the size of leaflets and the distribution and phenology: *S. spectabilis* var. *spectabilis* has leaflets (4.5) 5-9.5 x 1.5-2.5 cm in size and is South American, occurring in the Amazonas, Andes, Argentina, Bolívia and Paraguay, while variety *S. spectabilis* var. *excelsa* has leaflets (2.6-) 3–5.5 x 1-2 cm in size and occurs in Brazil (Irwin & Barneby 1982) in Goiás, Mato Grosso, Mato Grosso do Sul and Minas Gerais (Table 4).

Senna spectabilis var. *excelsa* occurs in Equador and Brazil (Irwin & Barneby 1982), where it was collected in Alagoas, Bahia, Ceará, Distrito Federal, Goiás, Maranhão, Mato Grosso do Sul, Minas Gerais, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe and Tocantins, in the Atlantic Forest, Caatinga and Cerrado areas (Table 4). It can be found in disturbed woodland, pastures and thickets (Irwin & Barneby 1982).

In Minas Gerais, this variety was collected in central, north and northeast regions of the state (Fig. 23), in outcrops and steep rocky slopes, gallery forest and inside of the forest. It was collected with flowers in February, March and April and fruits in March, April and December.

Examined specimens: BRAZIL. MINAS GERAIS: Bonfinópolis de Minas, 16°35' S 46°1' W, alt. 860 m, 03.III.2001, fl. e fr., *L. H. Soares e Silva et al.* 833 (CESJ, HUFU, UB); Corinto, estrada Corinto–Santo Hipólito, ca. 9 km de Santo Hipólito, 18°18' 31,1" S, 44° 17' 05.4" W, 21.II.2002, fl., *V. C. Souza et al* 28118 (RB); Francisco Sá, ca. 30 km N. E. of, elev. 1100 m, 10.II.1969, fl., *H. S. Irwin & Barneby et al.* 23003 (UB); Jacinto, 5-10 km L, 19.II.1989, fl., *G. Hatschbach & J. Cordeiro* 52719 (RB); Januária,

13 km by Road W of Januária on Road to Serra das Araras, elev. 575 m, 19.IV.1973, fl., W. R. Anderson 9146 (UB); Medina, 11 km N of Medina, along highway BR-116, 30.III.1976, fl., G. Davidse & W. G. D'Arcy 11576 (IBT); Mocambinho, Projeto Jaíba, 22.II.1997, fl., O. A. Filho et al s.n (VIC 17150); estrada do canal em frente a colônia, lado esquerdo, frente 2, 15.X.1996, fr., O. A. Filho et al s.n (VIC 16871); Serra do Cipó, Santana do Pirapama, Capela de São José, Sede da Fazenda Toucan, 18°59' 24" S, 43° 46' 31" W, elev. 637 m, 3.III.2010, fl., J. G. Rando 930 (IBT, SPF); Santo Hipólito, estrada Corinto-Conselheiro Mata, a 6 km de Santo Hipólito, 18°17'S, 44°11' W, elev. 550 m, 4.IV.1996, fl. e fr., J. R. Pirani et al. 3774 (SPF)

30. *Senna splendida* (Vogel) Irwin & Barneby, Mem. New York Bot. Gard. 35: 190. 1982 Fig. 22: A-I; Map: Fig. 23
Cassia splendida Vogel, Syn. Gen. Cass. 17. 1837

Shrubs or trees, 2–3 m alt. Branches cylindrical, glabrous. Leaves 2 pairs of leaflets; stipules 5–11 × 1–3 mm, lanceolate, base truncate, apex acute or cuspidate, deciduous; petiole 1.5–2.5 cm long.; nectary between proximal pair, narrowly elliptic, falciform or cravate, stipitate; leaf rachis 0.5–1.3 cm long., glabrous; leaflets ovate, narrowly elliptic, elliptic, apex retuse or acute, mucronulate or not, both side glabrous, veins tenuous, cartaceous, margin glabrous, proximal pair 4.6–5.2 × (1-)1.5–2.5 cm, distal pair 5–6.7 × 1.3–2.3 cm. Racemes corimbiform axillary; peduncle 2–3.3 cm long.; inflorescence rachis 0.4–0.5 mm. Bracts 5–6 × ca. 0.5 mm, lanceolate, deciduous; pedicel 25–30(-40) mm long., nectary absent. Sepals 10–28 × 8–13 mm, different or similar size, narrowly elliptic or elliptic, apex rounded or acuminate, dorsal surface glabrous. Corolla asymmetric, petals glabrous, yellow, centric adaxial petal 26–40 × 15–28 mm, elliptic or obovate, apex emarginated, latero-adaxial petals elliptic, apex rounded, latero-abaxial petals elliptic, but with different size, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina narrowly elliptic, medium stamens filaments 2–3 mm long., anther 5–8 mm long., centric-abaxial stamen filament 3–5 mm long., anther 3–7 mm long., latero-abaxial stamens filaments 4–10 cm long., straight, anther 9–15 mm long., rostro geniculate, 0.5–2 mm long. Ovary pubescent, style 2–3 cm long, pubescent. Legume 22–25 × 0.5–10 cm, cylindrical, externally smooth, straight, glabrous, brown when mature, indehiscent. Seeds ca. 3 × 2 mm, 1-seriate, oblong.

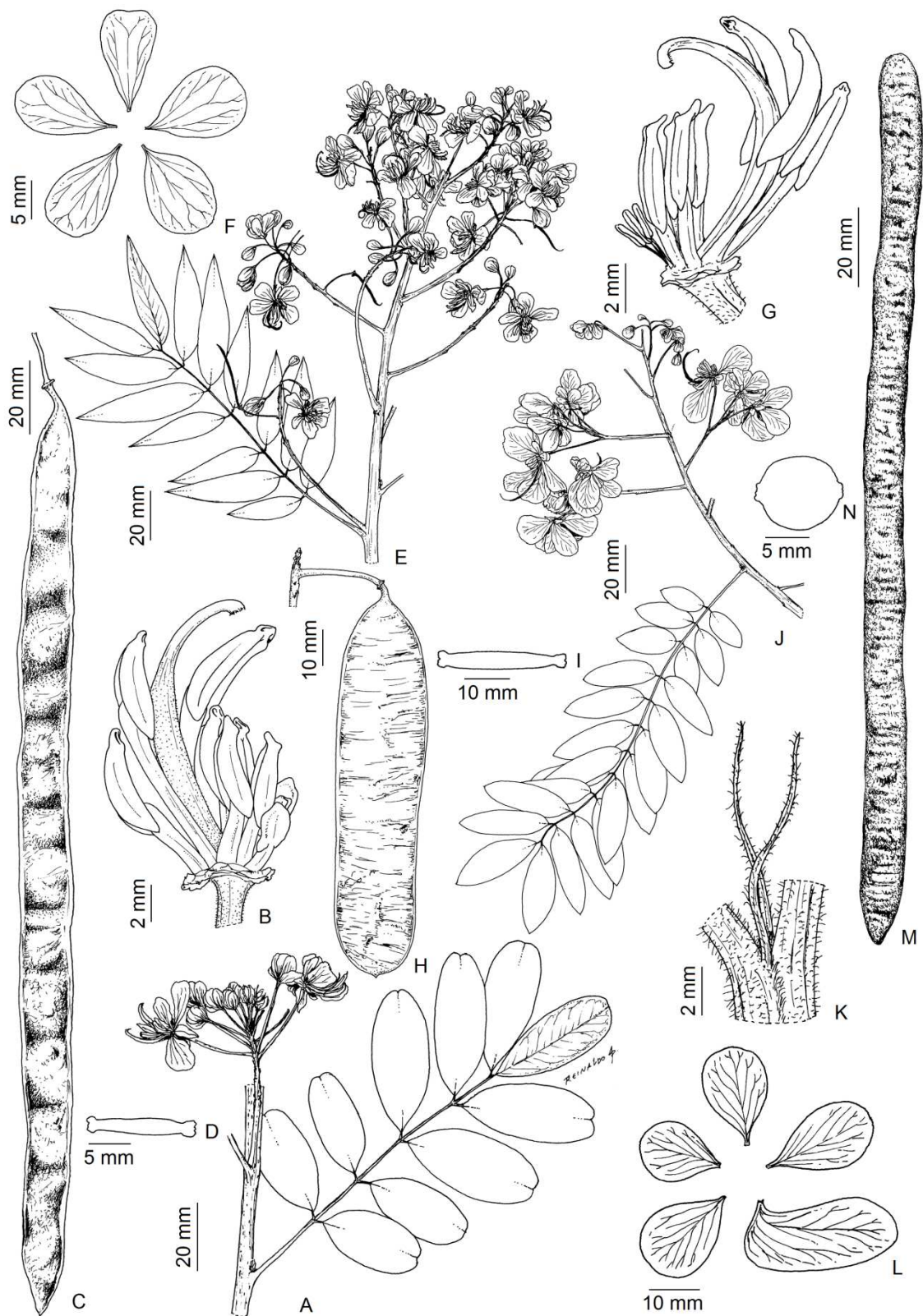


Fig. 21: *Senna siamea* (Lam.) Irwin & Barneby: **A.** Branche with leaves and inflorescence. **B.** Androecium and pistil. **C.** Pod. **D.** Transversal section of pod. *S. silvestris* var. *silvestris*: **E.** Branche with leaves and inflorescence. **F.** Corolla. **G.** Androecium and pistil; *S. silvestris* var. *bifaria* Irwin & Barneby. **H.** Pod. **I.** Transversal section of pod. *S. spectabilis* (DC.) Irwin & Barneby var. *excelsa* (Schrad.) Irwin & Barneby: **J.** Branche with leaves and inflorescence. **K.** Stipule. **L.** Corolla. **M.** Pod. **N.** Transversal section of pod (**A-B:** L.G. Rosignoli-Oliveira 34-VIC; **C-D:** G. S. França 354-BHCB; **E-G:** OUPR 9598; **H-I:** G. E. Valente & A. A. Azevedo 2213-VIC; **J, L:** VIC 17150; **K, M-N:** VIC 16871)

Among the species of serie *Bacillaris* (Table 3), *Senna splendida* is more similar to *S. tenuifolia* by the forms of the nectary between the proximal pair. But *S. splendida* has glabrous leaves and sepals, and a retuse or acute apex of leaflets (Fig. 22A), while *S. tenuifolia* has pubescent leaves and sepals and cuspidate apex of leaflets (Fig. 22 J).

The size and the form of sepals are the characteristics used by Irwin & Barneby (1982) in order to distinguish the two varieties of *Senna splendida* and all occur in Minas Gerais.

Key to varieties of *Senna splendida* in Minas Gerais

1. Sepals with different size, apex rounded or obtuse, 5–15 mm long.....
**30.2** var. *splendida*
 1'. Sepals not strongly different size, apex acuminate, 16–18(28) mm
 long.....**30.1** var. *gloriosa*

30.1 *Senna splendida* (Vogel) Irwin & Barneby var. *gloriosa* Irwin & Barneby, Mem. New York Bot. Gard. 35: 190. 1982. Fig. 22: F-G; Map: Fig. 23

This variety is easy recognize observing the sepals. They are large, with similar size and have apex acuminate (Fig. 22 F, G)

Endemic to Brazil, occurring in the States of Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Rio Grande do Norte and in Minas Gerais, in the Caatinga and Cerrado regions (Table 4). It occurs in thickets and savanna woodlands (Irwin & Barneby 1982).

In Minas Gerais, the variety has a wide spread distribution in the regions of State (Fig. 23) and was collected in disturbed areas, near rivers and forest margins. It was collected with flowers in March, April, May, June, September and November; and with fruits in May, June, September and December.

Examined specimens: BRAZIL. MINAS GERAIS: Alfenas, 25 km W of Alfenas on Road to Ariado, 21° 22' S 46° 10' W, 800 m, 07.IX.1987, fl. e fr., A. Gentry et al. 59127 (UEC); Araguari, Funil I, 13.IV.2005, fl., G. M. Araujo & J. P. Souza s. n (UFU 43199); Itacarambi, Rio São Francisco, Porto da Balsa, 19.VI.2002, fl., G. Hatschbach et al. 78009 (FUEL. IBT); Januária, 13 km by Road W of Januaria on Road to Serra das Araras; elev. 575 m, 19.IV.1973, fl., W. R. Anderson 9148 (UB); 22 km by Road W of

Januária on road to Serra das Araras, elev. 610 m, 19.IV.1973, fl., *W. R. Anderson* 9207 (UB); Pedralva, Serra da Pedra Branca, 05.VI.2004, fr., *J. P. Braga* 221 (CESJ); Ouro Preto, S. Julião, 03.XI.2001, fl. e fr., *J. Badini & M. A. Zurlo s.n* (OUPR); Parada das Batistas, ca. 5 km E. of, MG-1, elev. 625 m, 11.III.1970, fl., *H. S. Irwin & Barneby* 27387 (UB); Uberlândia, Água Limpa, fazenda, 31.V.2006, fl. e fr., *N. Baden & W. Rei. J. s. n.* (HUFU 50172)

30.2 *Senna splendida* (Vogel) Irwin & Barneby var. *splendida*, Mem. New York Bot. Gard. 35: 191. 1982 .

Fig. 22: A-E; Map: Fig. 23

Cassia splendida Vogel, Syn. Gen. Cass. 17 & Linnaea 11:660

In this variety, the sepals are strongly different in size and have a rounded or obtuse apex (Fig. 22 D, E). These characteristics are easy to observe.

It occurs in Paraguay, Uruguay and Brazil (Irwin & Barneby 1982), where it occurs in Bahia, Ceará, Espírito Santo, Mato Grosso do Sul, Minas Gerais, Paraná, Piauí, São Paulo and Sergipe, in the Atlantic Forest, Caatinga and Cerrado regions (Table 4). It can be found in margins of dense forest, disturbed woodland and capoeira (Irwin & Barneby 1982).

In Minas Gerais, this variety has a wide spread distribution in the regions of the state (Fig. 23) and was collected in gallery forest and forest margins. It was found with flowers in February, March, May, April and November and with fruits in April.

Examined specimens: BRAZIL. MINAS GERAIS: Águas Vermelhas, Povoado de Maristela, 18.V.1994, fl., *P. Frigo s.n* (VIC 20007); Belo Horizonte, Estação Experimental, 27.XI.1941, fl., *J. E. Oliveira* 633 (SPF); Camanducaia, Monte Verde, 1716 m, 22° 52' 32,8'' S, 46° 01' 30,4 W'', 26.IV.2012, fl., *L. S. Kinoshita et al.* 12 (UEC); Entre Rios de Minas, .IV.1970, fl., *L. G. Krieger s.n* (CESJ 8255); Grão Mogol, rodovia para Cristália, 22.IV.1978, fl. e fr., *G. Hatschbach* 41382 (SPF); Lagoa Santa, 26.II.1933, fl., *M. Barreto* 5875 (IBT); São João Del Rei, 0.III.1970, fl., *L. Krieger* 8336 (HUFU); Serra do Cabral, ca. 5 km E. of Parada das Batistas, MG-1, elev. 625 m, 11.III.1970, fl., *H. S. Irwin et al.* 27387 (SPF); Pains, Fazenda Amargoso, MG 439, Km 16, 20°22'51.8''-20° 23'18.7''S, 45° 39' 04.5''-45°39'01.5'', alt. ca. 670 m, 08.V.2004, fl., *P. H. A. Melo et al.* 1205 (RB); Perdizes, 19° 20' S, 47° 16' W, Retiro do Itambém, de Fernando Afonso, 950 m, campo próximo à divisas sul, 14.IV.1990, fl., *L. A. Martens*

s.n (SPF 87457); id, fazenda Cambuá, de Suzana Afonso da Fonseca, mata de galeria, 19° 20' S, 47° 16' W, elev. 935 m, 23.IV.1993, fl., *L. A. Martens s.n* (SPF 79459); Uberlândia, Fazenda do Irara, 27.IV.2010, fl., *B. C. Vargas & G. M. Araújo 75* (HUFU)

31. *Senna tenuifolia* (Vogel) Irwin & Barneby, Mem. New York Bot. Gard. 35: 179. 1982. Fig. 22: J-M; Map: Fig. 23

Cassia tenuifolia Vogel, Syn. Gen. Cass. 16 & Linnaea 11: 657, 1837

Shrubs, 1–2 m alt. Branches cylindrical, tomentose. Leaves 2 pairs of leaflets; stipules 5–6 × 0.5 mm, filiform or linear, base truncate, apex acute, deciduous late; petiole (1.8–)2–3.3 cm long.; nectary between the first pair of leaflets, narrowly elliptic or falciform, stipitate; leaf rachis 1–2 cm long., tomentose, leaflets elliptic, apex cuspidate, both sides sparse tomentose, veins tenuous, membranaceous, margin ciliolate, proximal pair 3–4 × 1.5–1.9 cm, distal pair 5.3–7 × 2–2.5 cm;. Racemes axillary; peduncle 0.7–1.5 cm long; inflorescence rachis ca. 1 cm long. Bracts 1–3 × 1–2 mm, cymbiform, deciduous; pedicel 15–20 mm long., nectary absent. Sepals (5–)8–10 × 2–6 mm, different size, obovate or narrowly elliptic, apex obtuse, dorsal surface pubescent. Corolla zygomorphic, petals pubescent, yellow, centric adaxial petal 17–20(–25) × 12–15(–19) mm, obovate, apex rounded, latero–adaxial petals elliptic or obovate, apex rounded and latero–abaxial petals narrowly elliptic, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments finely tomentose, staminodes lamina spatulate, medium stamen filaments ca. 2 mm long., anther ca. 5 mm long., centric–abaxial stamen filament 2–4 mm long., anther 6–7 mm long., latero–abaxial stamens filaments 6–7 mm long., straight, anther 7–8 mm long, rostro straight, ca. 1 mm long. Ovary velutinous, style ca. 1.5 cm long., velutinous. Legume observed not mature 7 × 0.4–1.3 cm, cylindrical, externally smooth, slightly curved, sparse pubescent, green, indehiscent. Seeds ca. 6 × 4 mm, 1–seriate, obovate

Among the species of serie *Bacillaris* (Table 3), *Senna tenuifolia* was distinguished from *S. splendida* and *S. macranthera*, as explained in the taxonomy comments of these species. However, *S. tenuifolia* is similar to *S. angulata* in form and indument of leaflets. Therefore, they can be distinguish by the following: *Senna angulata* has angular branches (Fig. 5B), rachis less than 1 cm long and longer bracts,

6–12 mm long (Fig. 5H) while *S. tenuifolia* has cylindrical branches (Fig. 22J), leaf rachis more than 1 cm long and smaller bracts, 1–3 mm long (Fig. 22L).

Endemic to Brazil, the specie was collected in Minas Gerais, Rio de Janeiro and Paraná, occurring in the Atlantic Forest (Table 4). In Minas Gerais, it was found in the central and southeast regions of the state (Fig. 23). It was collected with flowers in February, August and September and with fruits in September.

Examined specimens: BRAZIL. MINAS GERAIS: Alto Caparaó, P. N. Caparaó, estrada entre o alojamento e Vale Verde, 1.IX.1996, fl. e fr., *V. C. Souza et al.* 12100 (CESJ); P. N. Caparaó, estrada principal para o terreirão, 20° 25' 4.3" S, 41° 51' 5.4" W, 16.VIII.2015, fl., *L. G. Rosignoli-Oliveira* 15 (VIC); Realeza, arredores, 15.10.1983, fl., *G. Hatschbach & O. Guimarães* 46858 (MBM); Santana do Pirapama, Serra do Cipó, Fazenda Toucan Cipó, estrada para a captação, 19° 0' 18" S, 43° 46' 6" W, elev. 683 m, 15.II.2007, fl., *D. C. Zappi* 275 (ESA)

32. *Senna tropica* (Vell.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 368. 1982

Fig. 22: N-S; Map: Fig. 23

Cassia tropica Vell. Fl. Flum. 166. 1825 & Ic. 4: t.64, 1835

Shrubs, 1.5–3 m alt. Branches cylindrical, glabrous or sparse tomentose. Leaves (2–)3–4 pairs of leaflets; stipules 6–7 × 0.5–1 mm, lanceolate, base truncate, apex acute, deciduous; petiole (2–)3–4 cm long.; nectary between all pairs of leaflets or absent only in last pair, ovate, pyriform, sessile or stipitate; leaf rachis (1.5–)3–7 cm long., glabrous or sparse tomentose; leaflets narrowly elliptic or lanceolate, apex cuspidate, sometimes acute, mucronulate, adaxial surface glabrous, abaxial surface glabrous or sparse tomentose, veins tenuous, membranaceous, margin glabrous or finely ciliolate, proximal pair 3–4(–4.5) × 0.8–1.8 cm, distal pair (4.5–)6–9 × 1.5–2.5 cm. Racemes corimbiform axillary and panicle terminal; peduncle 2–3.8 cm long.; inflorescence rachis 1.5–3.5 mm long. Bracts ca. 5 × 1 mm, lanceolate, deciduous; pedicel 15–20 mm long., nectary absent. Sepals 3–8 × 2–3 mm, different size, narrowly elliptic or obovate, apex rounded, dorsal surface glabrous. Corolla zygomorphic, petals glabrous, yellow, centric adaxial petal 9–15 × 7–8 mm, obovate, apex emarginatedd, latero–adaxial petals elliptic or obovate, apex rounded and latero–abaxial petals elliptic-falciform, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, staminodes lamina elliptic,

reniform or twisted, medium stamen filaments ca. 1 mm long., anther 3–4 mm long., centric–abaxial stamen filament ca. 2 mm long., anther 4–5 mm long., latero–abaxial stamens filaments 8–10 mm long., curved, anther 5–6 mm long, rostro oblique, ca. 1 mm long. Ovary glabrous, style ca. 1 cm long., sparse tomentose. Legume 6–10 × 0.7–1 cm, cylindrical, externally smooth, straight, glabrous, green, indehiscent. Seeds ca. 5 × 2 mm, 2–seriate, obovate.

Senna tropica has large variation in the size of its leaflets, but can be recognized by the following group of characteristics: (2-)3-4 glabrous and narrowly elliptic or lanceolate leaflets (Fig. 22N), with a cuspidate apex, nectary between leaflets of all pairs (Fig. 22O), sometimes absent in the last pair, zygomorphic flowers (Fig. 22P) and a cylindrical legume (Fig. 22R) with 2-seriate seeds (Fig. 22S). It is very similar to other species of serie *Coluteoideae*, but not found in Minas Gerais: *Senna araucarietorum* Irwin & Barneby and *S. septemtrionalis* (Viv.) Irwin & Barneby, in number and form of leaflets and cylindrical pod. *Senna araucarietorum* has a 1-seriate seeds, it is endemic of Brasil as well, but occurs in the South region of Brazil (BFG 2015).

Senna septemtrionalis is more difficult to distinguish because the rostro of abaxial stamens' anther and distribution were used. According Irwin & Barneby (1982) and Bortoluzzi et al. (2011), *S. tropica* has protuberance projection facing the interior of the flower (Fig. 22Q) and is endemic to Brazil; and in *S. septemtrionalis* this protuberance is absent and it is native to Central America and Mexico, cultivated and naturalized in other contries. In Brazil is cited from Distrito Federal and Santa Catarina (BFG 2015).

Senna tropica is endemic to Brazil and it occurs in Espírito Santo, Minas Gerais, Paraná, Rio de Janeiro, São Paulo and Santa Catarina, in Atlantic Forest (Table 4), in thickets and disturbed woodland (Irwin & Barneby 1982). In Minas Gerais it is common in south and southeast regions (Fig. 23), where it was collected in the forest margin and humid environments. It was collected with flowers in February, July, September, October, November and December, and with fruits in January, February, March, September, October and November.

Examined specimens: BRAZIL. MINAS GERAIS: Água Limpa, Fazenda Experimental, XI.1969, fl. e fr., *L. Krieger* 7622 (CESJ, MBM); Camanducaia, Monte

Verde, Serra da Mantiqueira, 12.XII.2001, fl., *L. D. Meireles & R. Belinello* 789 (UEC); mata do Sr. Altair Rezende de Souza, 20/IX/2001, fl. e fr., *J. R. Stehmann* 2986 (MBM, BHCB); estrada para Gonçalves, próximo ao sítio do Sr. José Maria, alt. 1700 m, 23/X/2001, fl., *J. R. Stehmann & I. B. Castro* 3006 (MBM); Cajurí, Fazenda Dumaron, próximo à casa grande, 01.XI.1997, fl. e fr., *A. P. Reis s.n* (VIC 19126); Estrada Curvelo - Diamantina, Datas, próximo ao KM 63, 18° 23' 42.2" S, 43° 40' 44" W, alt. 1347 m, 16.I.2008, fr., *V. F. Dutra & J. M. Fernandes* 427 (VIC); Extrema, Serra do Lopo, 5.III.2003, fr., *L. F. Yamamoto* 1162 (UEC); Juiz de Fora, 0.X.1969, fl., *L. Krieger* 7307 (CESJ); Ouro Preto, Antônio Pereira, 23.XI.1977, fl. e fr., *J. Badini s. n* (OUPR 19654); Santa Luzia, Lagoa Santa, 20.XI.1933, fl., *M. Barreto* 5933 (IPA); Santos Dumond, Fazenda Jacutinga, 14.VII.1996, fl., *R. Mello-Silva* 1223 (CESJ, SPF); São João do Manhuaçu, margem da estrada Rio-Bahia, 11.II.1961, fl., *A. Lima* 61-3721 (IPA); Serra do Cipó, base, 13.II.1963, fr., *A. P. Duarte* 7721 (RB); Senador Firmino, estrada, 30.X.2016, fl., *L.G.Rosignoli-Oliveira* 31 (VIC); após o bar da cachoeira, 30.X.2016, fl. e fr., *L. G. Rosignoli-Oliveira* 32 (VIC); após o bar da cachoeira, 30.X.2016, fl. e fr., *L. G. Rosignoli-Oliveira* 33 (VIC) Viçosa, Conceição, 19.X.1941, fl., *O. A. D. P. Alvim s.n* (VIC 3326); cultivada na Vila Gianetti, 2.X.1980, fl., *A. Julio Filho s.n* (VIC 6906); UFV, Horta Nova, próximo às casas, 23. IX.1983, fl., *L. S. de Moura & M.F.Vieira* 512 (VIC)

33. *Senna uniflora* (Mill.) Irwin & Barneby, Mem. New York Bot. Gard. 35: 258. 1982

Fig. 24: A-E; Map: Fig. 23

Cassia uniflora P. Mill., Gard. Dict. Ed. 8, Cassia n 5. 1768

Shrubs, ca. 1 m alt. Branches cylindrical, sparse velutinous or velutinous. Leaves 5(-6) pairs of leaflets; stipules 10–20 × 1 mm, linear or filiform, base truncate, apex acuminate, persistent; petiole 1.7–2.5 cm long.; nectary between 4- proximal pairs of leaflets, fusiform; leaf rachis 3.5–5.5 cm long, velutinous; leaflets elliptic or obovate, apex acute, mucronulate, both sides velutinous, veins tenuous, membranaceous, margin ciliate, proximal pair 2.2–3.5 × 1–1.5 cm, distal pair 3.5–4 × 1.5–2 cm. Racemes axillary, peduncle ca. 0.5 cm long; inflorescence rachis ca. 0.5 cm. Bracts 5–6 × 0.5 mm, triangular or filiform, persistent; pedicel 4–5 mm long., nectary at median region, fusiform, sessile, but can be deciduous. Sepals 2–4 × 1–2 mm, similar size, elliptic, apex rounded, dorsal surface velutinous. Corolla zygomorphic, petals glabrous, yellow,

centric adaxial petal ca. 4 × 3 mm, elliptic or sub-quadrangular, apex rounded or emarginated, latero-adaxial and latero-abaxial petals elliptic, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments glabrous, staminodes lamina arrowlike, medium stamens filaments ca. 1 mm long., anther ca. 1 mm long., centric-abaxial stamen filament ca. 1 mm long., anther ca. 1 mm long., latero-abaxial stamens filaments ca. 2 mm long., straight, anther ca. 2 mm, rostro truncate, ca. 0.5 mm long. Ovary tomentose, style ca. 0.4 cm long., tomentose. Legume 2.5–3.5(-4) × 0.4, oblong, compressed, externally impressed-sulcate, straight, velutinous, green-brownish, dehiscent. Seeds ca. 4 × 3 mm, 1-seriate, rhombic

Senna uniflora is the only representative specie of serie *Confertae* (Table 3) found in Minas Gerais. It is a shrub and it is easily distinguishable from other species for its velutinous branches (Fig. 24 B), rachis (Fig. 24 C) and leaflets, small flowers and sulcate and velutinous legumes (Fig. 24D, E).

The specie occurs in Brazil, Central America, Ecuador, Mexico, and Venezuela (Irwin & Barneby 1982). In Brazil, it was collected in Alagoas, Bahia, Ceará, Goiás, Maranhão, Minas Gerais, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Roraima, São Paulo and Sergipe in the Amazon Forest, Caatinga and Cerrado regions (Table 4). It occurs in disturbed woodlands, savannas, shores and pastures (Irwin & Barneby 1982). In Minas Gerais, it was collected in the north of the State (Fig. 23), in gallery and adjacent cut-over cerrado and serras, at an altitude of 575-650 m. It was found with flowers and fruits in March and April.

Examined specimens: BRAZIL. MINAS GERAIS: Januária, Vale do Rio Peruaçu, 20.III.2003, fl. e fr., *L.V. Costa & J.C. Amado 162* (BHCB); 13 Km by Road W of Januária on Road to Serra das Araras, elev. 575 m, 19.IV.1973, fl. e fr., *W.R. Anderson 9141* (UB); Joaquim Felício, ca. 2 km N. of Joaquim Felício, elev. 650 m, 10.III.1970, fl. e fr., *H.S. Irwin & Barneby et al. 27344* (RB, SPF).



Fig. 22: *Senna splendida* (Vogel) Irwin & Barneby var. *splendida*: **A.** Branche with leaves and inflorescence. **B.** Nectary between leaflets of the proximal pair. **C.** Bract. **D.** Sepa outside **E.** Sepal inside; *S. splendida* (Vogel) Irwin & Barneby var. *gloriosa* Irwin & Barneby: **F.** Sepal outside. **G.** Sepal inside. **H.** Pod. **I.** Transversal section of pod. *S. tenuifolia* (Vogel) Irwin & Barneby: **J.** Branche with leaves and inflorescence. **K.** Nectary between leaflets of proximal pair. **L.** Bract. **M.** Corolla. *S. tropica* (Vell) Irwin & Barneby: **N.** Branche with leaves and inflorescence. **O.** Nectary in rachis. **P.** Corolla. **Q.** Androecium and pistil. **R.** Pod. **S.** Transversal section of pod, showing 2-series of seed. (A-C: L. S. Kinishita et al. 12-UEC; D-E: W. R. Anderson 9207-UB; F-G: J. P. Braga 221-CESJ; J-L: L. G. Rosignoli-Oliveira 15-VIC; M-S: L. G. Rosignoli-Oliveira 33-VIC)

34. *Senna velutina* (Vogel) Irwin & Barneby, Mem. New York Bot. Gard. 35: 232. 1982. Fig. 24: F-K; Map: Fig. 23

Cassia velutina Vogel, Syn. Gen. Cass. 24 & Linnaea 11: 670, 1837

Shrubs or small trees, 1–3 m alt. Branches cylindrical or slightly angulose, tomentose. Leaves 4–5 pairs of leaflets; stipules (5–)10–25 × 10–15 mm, reniform, base asymmetric, apex cuspidate, persistent or deciduous late; petiole 2–4 cm long.; nectary between all pairs of leaflets, ovate or conical, stipitate or sessile; leaf rachis 5.2–8 cm long., tomentose; leaflets elliptic, narrowly elliptic or obovate, apex obtuse, mucronulate, adaxial surface tomentose, velutinous, sometimes sparse tomentose, abaxial surface always tomentose or densely velutinous, veins tenuous, cartaceous, margin ciliolate, proximal pair 3.5–5 × 1.7–3 cm, distal pair 4.5–7.5 × 2–4.3 cm. Racemes axillary and terminal; peduncle 2–4 cm long.; inflorescence rachis 8.5–10 cm long. Bracts 5–8 × 3–4 mm, ovate-cuspidate or lanceolate-acuminate, deciduous; pedicel 20–25 mm long, nectary at base, ovate or falciform, stipitate or sessile. Sepals 8–19 × 5–10 mm, different size, ovate or elliptic, apex obtuse, dorsal surface velutinous. Corolla asymmetric, petals velutinous in adaxial surface, yellow, centric adaxial petal 15–20 × 9–15 mm, obovate, apex emarginated, latero-adaxial petals obovate, apex rounded, latero-adaxial petals obovate and one is falciform, apex rounded. Androecium with 3 staminodes and 7 stamens fertile, filaments with a tomentose line or with sparse hairs, staminodes lamina twisted, medium stamens filaments ca. 3 mm long., anther 4–8 mm long., centric abaxial stamen filament ca. 5 mm long, anther 7–10 mm long., latero-abaxial stamens filaments 8–9 mm long., straight, anther (8–)11–14 mm long., rostrum transversely oblique, ca. 0.5 mm long. Ovary velutinous, style 1–1.5 cm long, velutinous. Legume 11–25 × 0.5 cm, sub-quadrangular, externally slightly depressed between seed locules and patente margins, curved, velutinous, brownish, dehiscent. Seeds ca. 4 × 3 mm, 1- seriate, rhombic.

Senna velutina has elliptic, narrowly elliptic or obovate leaflets (Fig. 24 F), nectary between all pairs (Fig. 24H) and in pedicel (Fig. 24I). It is similar to *S. cana*, as explained in taxonomy comments of this specie, and similar to *S. appendiculata* (Vogel) Wiersema also, but this specie was not found in Minas Gerais. They are included in serie *Laxiflorae* (Table 3).

According to Irwin & Barneby (1982), *S. velutina* and *S. appendiculata* are separated by ecology and distribution: *S. velutina* occurs in South America, principally in the Cerrado areas; while *S. appendiculata*, which is endemic to Brazil, occurs in coastal areas, in restinga.

Morphologically, these species can be distinguished by observing the leaflets, which are large obovate in *S. appendiculata* and the adaxial surface is glabrous or sparse tomentose. The sepals, petals and stamens' filaments observed in materials of *S. appendiculata* were glabrous; and, in *S. velutina*, the leaflets are elliptic, narrowly elliptic or obovate (Fig. 24F), a tomentose adaxial surface, velutinous sepals and petals and the stamens' filaments are tomentose.

Senna velutina occurs in Bolívia, Guiana, Paraguay, Venezuela and in Brazil, where it was collected in the States of Bahia, Ceará, Goiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Piauí, São Paulo and Tocantins, occurring in the Amazon Forest, Caatinga and Cerrado regions (Table 4). It can be found in areas of the Cerrado, usually in red sandy soils, disturbed environments, thickets and along roadsides (Irwin & Barneby 1982).

In Minas Gerais, the specie is frequent in the west and northwest regions, but also collected in the central and southeast regions (Fig. 23), on roadside, in very open xeromorphic savanna scrub, outcrops and inselbergue. It was found with flowers in February, March, April and May; and with fruits in April, May and July.

Examined specimens: BRAZIL. MINAS GERAIS: Ituiutaba, 18 km W. of Ituiutaba on righway BR-71, 18.VII.1967, fr., *R. Goodland 3424* (UB); Lagoa da Prata, Arcos, Cerrado, estrada rodagem Garças, 30.V.1950, fl., *M. Magalhães 6100* (IPA); Monte Alegre, 18 km de Monte Alegre, 21.V.1963, fl., *M. Magalhães 18998* (SPF); Monte Alegre de Minas, Fazenda Represa, 07.III.2005, fl., *P. P. Damasco & J. N. Nakajima 45* (HUFU); São Roque, estrada Lajinha-Mutum, afloramento na propriedade do Sr. Vitalino, 19° 56' 25" S, 41° 29' 42" W, elev. 289 m, 09.II.2011, fl., *R.C. Forzza et al. 6056* (ESA); Paracatu, ca. 2km N. of Paracatu, 700 m, 03.II.1970, fl., *H. S. Irwin et al. 25941* (UB); BR 40, entre Paracatu-João Pinheiro, 04.III.1989, fl., *R.C. Mendonça et al. 1270* (RB); Uberlândia, Km 6 de rodovia para Goiânia BR 365, 06.III.1981, fl., *R.C. Vieira 130* (RB); clube Caça e Pesca Itororó, 29.II.1996, fl., *E. O. Leenza & A.A.A. Barbosa 282* (HUFU); clube caça e pesca Itororó, 10.V.1996, fr., *E. O. Leenza & A.A.A. Barbosa 438* (HUFU); Vazante, Fazenda Bom Sucesso, 08.IV.2008, fr., *Leonel &*

Vasconcelos s. n (HUFU 53955); Vila Dom Bosco, 16° 45' S 46° 23' W, 543 m, 03.III.2001, fl., *L. H. Soares et al.* 839 (UB). Unai, 18.II.1984, fl., *E. P. Heringer* 18480 (IBT; VIC)

Additional Examined specimens: *Senna appendiculata*. BRAZIL. ESPÍRITO SANTO: Setiba, P. E. Paulo César Vinha, limite norte do Parque, 05.III.1997, fl., *A.F. da Silva et al.* 2012 (VIC). RIO DE JANEIRO: Maricá, Itaipuaçu, 08.IV.1977, fl., fr., *P.L. Krieger et al.* 14799 (VIC).

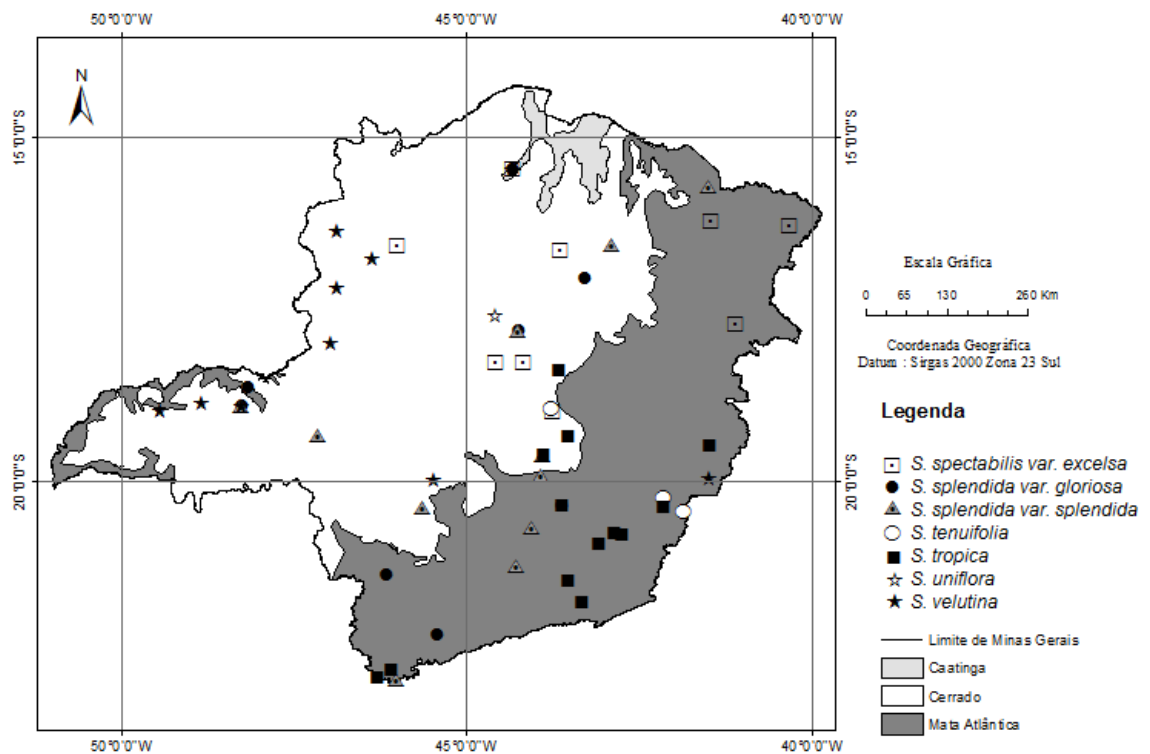


Fig. 23: Geographical distribution of *Senna spectabilis* var. *excelsa*, *S. splendida* and its varieties, *S. tenuifolia*, *S. tropica*, *S. uniflora* and *S. velutina* in Minas Gerais state.

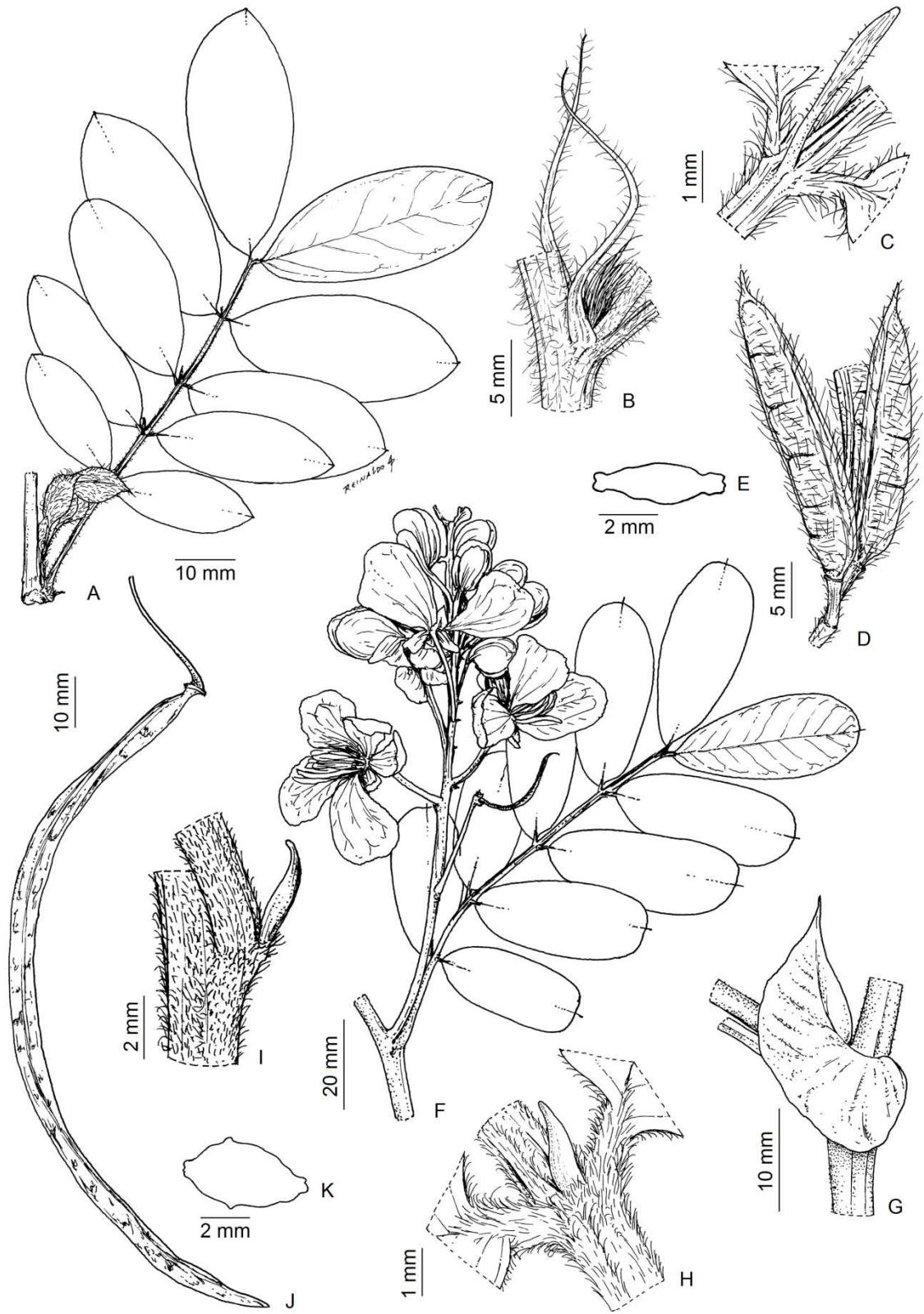


Fig. 24: *Senna uniflora* (Mill.) Irwin & Barneby: **A.** Branche with leaves and inflorescence. **B.** Stipule. **C.** Nectary in rachis. **D.** Pod. **E.** Transversal section of pod. *S. velutina* (Vogel) Irwin & Barneby: **F.** Branche with leaves and inflorescence. **G.** Stipule. **H.** Nectary between leaflets of the proximal pair. **I.** Nectary in pedicel. **J.** Pod. **K.** Pod section (**A-E:** L. V. Costa & J. C. Amado 162- BHCB; **F, I:** R. C. Vieira 130-RB; **G-H, J-K:** R. Goodland 3424-RB)

3. 3 Geographical distribution of species

Senna hirsuta var. *acuminata* is endemic to Minas Gerais and, among the taxons of *Senna* occurring in the State, the endemism in Brazil represents about ca. 36 %. Further more, ca. 26% occurs in at least three States of Brazil, 48% at least 10 States and ca. 26% have a greater distribution and were cited for more than 11 States in the country (Table 4).

Senna has great diversity in the biomes occurring in Minas Gerais, with 28 spp in the Cerrado, 26 spp in the Atlantic Forest and 20 spp in the Caatinga. For the Atlantic Forest, 8 taxons has occurrence restrict to this Biome, being the following species: *Senna itatiaiae*, *Senna pneumatica*, *Senna tenuifolia* and *Senna tropica* and the varieties: *Senna angulata* var. *miscadenia*, *S. neglecta* var. *neglecta*, *S. neglecta* var. *oligophylla* and *Senna organensis* var. *organensis*. For the Cerrado Biome, the specie *S. rostrata* and the variety *S. hirsuta* var. *acuminata* have restrict occurrence and, for the Caatinga, was found the specie *S. acuruensis*.

Senna pentagonia var. *pentagonia* had the occurrence extended in this study, because this varietie was cited in the literature (BFG 2015; Irwin & Barneby 1982) for Caatinga and Cerrado and was collected also in Atlantic Forest Biome in Minas Gerais.

Among the native species occurring in the State, 14 species occur also in the Amazon Biome and 5 in Pantanal and about 72 % occur in at least one of the dry biomes (Caatinga or Cerrado) and at least one of the humid Biomes (Amazon Forest, Atlantic Forest or Pantanal) occurring in Brazil.

Some species occurring in Minas Gerais presented few specimens in the herbarium collections, which may be due to few collections in their area of occurrence or because they have restricted occurrence.

Senna aculeata, the observed specimen was collected at a point northwest of the State, in the region closest to Goiás, Mato Grosso and Mato Grosso do Sul, where it is more abundant (Santos 2013). Likewise, the varieties *Senna cana* var. *pilosula* and *Senna cana* var. *phyllostegia* were seldomly recognized, but found in the North and Northeast of Minas Gerais, with a closer proximity to the State of Bahia, Espírito Santo and São Paulo, where the varieties seem to be more common as well (BFG 2015; specieslink).

Senna acuruensis is restricted to the Caatinga Biome (Irwin & Barneby 1982). It has few collections in Minas Gerais and can be found in North region, closer Bahia, where occurs as well (Queiroz 2009).

Senna hirsuta var. *leptocarpa* is considered a uncommon variety (Irwin & Barneby 1982), having been collected in Minas Gerais in Viçosa, in 1930. However, it was confirmed in recent material collected in 2013 in Araponga, bordering municipality of Viçosa.

Senna neglecta var. *grandiflora* had few recognized materials among the materials found for the specie. The holotype has incomplete information, only “BR 4 km, 777”, but according to Irwin & Barneby (1982), the collection was found between the valleys of the Jequitinhinha and Mucuri rivers, at approximately 16°-17°30'S. Researching about this information, the collection point is probably in the Itaobim region, northeast of Minas Gerais and their coordinates were used in the distribution map (Fig. 11). In Goiás, this variety was considered rare, with only an old collection of *E. P. Heringer et al.* in 1998 (Santos 2013).

Only the holotype *Senna pendula* var. *dolichandra* was observed for this variety, collected in the city of Pedra Azul and is apparently rare in the state (Irwin & Barneby 1982). In the BFG (2015) it was also recognized in Bahia and Paraíba.

In this study, were examined materials collected in different regions of the state of Minas Gerais and deposited in the herbaria collections. Although *Senna* is a representative genus in most all herbaria, it is possible to observe that there are few materials from the Caatinga regions that occur in the State.

Table 4: Species of *Senna* found in Minas Gerais, habits, state and biome distribution in Brazil, respectively. Legend: Sh: shrubs, Lia: lianas; AC: Acre, AL: Alagoas, AP: Amapá, AM: Amazonas, BA: Bahia, CE: Ceará, DF: Distrito Federal, ES: Espírito Santo, GO: Goiás, MA: Maranhão, MT: Mato Grosso, MS: Mato Grosso do Sul, MG: Minas Gerais, PA: Pará, PB: Paraíba, PR: Paraná, PE: Pernambuco, PI: Piauí, RJ: Rio de Janeiro, RN: Rio Grande do Norte, RS: Rio Grande do Sul, RO: Rondônia, RR: Roraima, SC: Santa Catarina, SP: São Paulo, SE: Sergipe, TO: Tocantins, Am: Amazon Forest, At F: Atlantic Forest, Ca: Caatinga, Ce: Cerrado, Pa: Pantanal, Pam: Pampa “*” means endemic to Brazil.

Number spp	Species/ varieties occurring in Minas Gerais		Habitat	State distribution	Biome distribution
1	<i>Senna aculeata</i> (Pohl ex Benth.) Irwin & Barneby		Sh	GO, MS, MT, MG, PI, TO	Ca, Ce, Pa
2	<i>Senna acuruensis</i> (Benth.) Irwin & Barneby		Sh	AL, BA, MG, PE, SE	Ca
3	<i>Senna affinis</i> (Benth.) Irwin & Barneby		Sh, Tree	BA, ES, MG, RJ	At F, Ce
4	<i>Senna alata</i> (L.) Roxb		Sh, Tree	AC, AL, AM, AP, BA, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RS, SC, SP, TO	Am, At F, Ca, Ce, Pa
5	<i>Senna angulata</i> (Vogel) Irwin & Barneby	var. <i>angulata</i> *	Sh, Lia	MG, RJ	At F, Ce
-		var. <i>miscadenia</i> (Vogel) Irwin & Barneby*	Sh, Lia	BA, ES, MG, RJ, PR, SC	At F
6	<i>Senna aristeguietae</i> Irwin & Barneby		Sh	BA, MG	Ca, Ce
7	<i>Senna cana</i> (Ness & Mart.) Irwin & Barneby	var. <i>cana</i>	Sh, Tree	BA, DF, GO, MG, PA, PE	Am, Ca, Ce
-		var. <i>phyllostegia</i> Irwin & Barneby *	Sh, Tree	BA, MG	Ca, Ce
-		var. <i>pilosula</i> Irwin & Barneby *	Sh, Tree	BA, ES, MG, RJ	At F, Ca
8	<i>Senna cernua</i> (Balb.) Irwin & Barneby		Sh	BA, DF, ES, GO, MG, RJ, PR, SP	At F, Ce
9	<i>Senna corifolia</i> (Benth.) Irwin & Barneby	var. <i>caesia</i> (Taub. ex Harms) Irwin & Barneby *	Sh	ES, GO, MG	At F, Ce
10	<i>Senna corymbosa</i>		Sh	MS, MG, RJ, SC, SP, RS	At F, Ce, Pam
11	<i>Senna hirsuta</i> (L.) Irwin & Barneby	var. <i>acuminata</i> (Benth.) Irwin & Barneby*	Sh	MG	Ce
-		var. <i>leptocarpa</i> (Benth.) Irwin & Barneby	Sh	MG, RJ	At F, Ce
12	<i>Senna itatiaiae</i> Irwin & Barneby *		Sh	MG, RJ	At F

Number spp	Species/ varieties occurring in Minas Gerais		Habitat	State distribution	Biome distribution
13	<i>Senna macranthera</i> (Collad.) Irwin & Barneby	<i>var. macranthera</i>	Tree	BA, ES, DF, MG, RJ, PR, SP	At F, Ce
-		<i>var. nervosa</i> (Vogel) Irwin & Barneby *	Tree	BA, GO, DF, MG, MT, RJ, SP	At F, Ce
-		<i>var. pudibunda</i> (Benth.) Irwin & Barneby	Sh	AL, BA, CE, MG, PB, PE, PI, RN	Ca, Ce
-		<i>var. striata</i> (Vogel) Irwin & Barneby *	Sh	BA, GO, MG, PE, TO	Ca, Ce
14	<i>Senna mucronifera</i> (Benth.) Irwin & Barneby		Sh	BA, GO, MG, MT, MS, SP, TO	Am, At F, Ce
15	<i>Senna multijuga</i> (Rich.) subsp. <i>lindleyana</i> (Gard.) Irwin & Barneby	<i>var. lindleyana</i> <i>var. peregrinatrix</i>	Tree	AC, AL, AM, AP, BA, DF, ES, GO, MA, MG, MS, MT, PA, PR, RN, RO, RR, RS, RJ, SC, SP, TO	Am, At F, Ca, Ce,
16	<i>Senna neglecta</i> (Vogel)	<i>var. grandiflora</i> Irwin & Barneby *	Sh,Tree	BA, GO, MG	At F, Ca, Ce
-		<i>var. neglecta</i> *	Sh	ES, MG, PR, RS, SC, SP	At F
-		<i>var. oligophylla</i> (Benth.) Irwin & Barneby	Sh,Tree	MG, RJ	At F
17	<i>Senna oblongifolia</i> (Vogel) Irwin & Barneby		Tree	AM, DF, MG, RJ, PB, PR, RS, SC, TO	Am, At F, Ce
18	<i>Senna obtusifolia</i> (L.) Irwin & Barneby		Sh	AC, AL, AM, BA, CE, DF, GO, MA, MG, MS, MT, RJ, RN, PA, PB, PE, PI, PR, RO, RR, SP, TO	Am, At F, Ca, Ce, Pa
19	<i>Senna occidentalis</i> (L.) Link		Sh	AC, AL, AM, AP, BA, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RR, RS, SC, SE, SP, TO	Am, At F, Ca, Ce, Pa
20	<i>Senna organensis</i> (Harms) Irwin & Barneby	<i>var. organensis</i> *	Sh	ES, MG, RJ	At F
21	<i>Senna pendula</i> (Willd.) Irwin & Barneby	<i>var. dolichandra</i> Irwin & Barneby *	Sh	BA, MG, PB	Ca, Ce
-		<i>var. glabrata</i> (Vogel) Irwin & Barneby	Sh	DF, GO, MG, MT, MS, RJ, SC, SP, PA, PR	Am, At F, Ca, Ce
22	<i>Senna pentagonia</i> (Mill.) Irwin & Barneby	<i>var. pentagonia</i>	Sh	BA, MA, MG, SP	At F, Ca, Ce
23	<i>Senna pilifera</i> (Vogel) Irwin & Barneby	<i>var. pilifera</i>	Sh	GO, MG, MS, MT, PR, RS, SP	At F, Ce, Pa
-		<i>var. subglabra</i> (S. Moore) Irwin & Barneby	Sh	GO, MA, MG, MS, MT, PA, PR, SP	Am, At F, Ce, Pa
-		<i>var. tubata</i> Irwin & Barneby	Sh	MG, MS, MT, PR, SP	At F, Ce

Number spp	Species/ varieties occurring in Minas Gerais		Habitat	State distribution	Biome distribution
24	<i>Senna pneumatica</i> Irwin & Barneby *		Sh	ES, MG	At F
25	<i>Senna reniformis</i> (G. Don) Irwin & Barneby *		Sh,Tree	BA, MG, SP, SE	Ca, Ce
26	<i>Senna reticulata</i>		Sh	AC, AM, AP, BA, CE, GO, MA, MG, MT, PA, PE, PI, RO, SP	Am, Ca, Ce
27	<i>Senna rostrata</i> (Mart.) Irwin & Barneby		Sh	BA, GO, MG, SP	Ce
28	<i>Senna rugosa</i> (G.Don) Irwin & Barneby		Sh	BA, CE, DF, GO, MA, MG, MS, MT, PA, PE, PI, PR, RO, SP, TO	Am, At F, Ca, Ce
29	<i>Senna siamea</i> (Lam.) Irwin & Barneby		Tree	AL, AM, BA, CE, DF, GO, MA, MG, PA, PB, PE, PI, RO, RJ, RS, SC, SP	Am, At F, Ca, Ce,
30	<i>Senna silvestris</i> (Vell) Irwin & Barneby	subsp. <i>bifaria</i> var. <i>bifaria</i> Irwin & Barneby	Sh,Tree	BA, DF, GO, MA, MG, MS, MT, PA, SO, TO	Am, Ca, Ce
-		susp. <i>silvestris</i> var. <i>silvestris</i>	Sh, Tree	AC, AM, AP, BA, CE, ES, GO, MA, MS, MT, MG, PA, PR, RO, RR, RJ, SP, SC, TO	Am, At F, Ca, Ce,
31	<i>Senna spectabilis</i> (DC.) Irwin & Barneby	var. <i>excelsa</i> (Schrader) Irwin & Barneby	Sh,Tree	AL, BA, CE, DF, GO, MA, MS, MG, PB, PE, PI, RN, SE, TO	At F, Ca, Ce
32	<i>Senna splendida</i> (Vogel) Irwin & Barneby	var. <i>gloriosa</i> Irwin & Barneby *	Sh,Tree	AL, BA, CE, MG, PB, PE, RN	Ca, Ce
-		var. <i>splendida</i>	Sh, Tree	BA, CE, ES, MG, MS, PI, PR, SE, SP	At F, Ca, Ce,
33	<i>Senna tenuifolia</i> (Vogel) Irwin & Barneby *		Sh	MG, RJ, PR	At F
34	<i>Senna tropica</i> (Vell) Irwin & Barneby *		Sh	ES, MG, PR, RJ, SC, SP	At F
35	<i>Senna uniflora</i> (Mill.) Irwin & Barneby		Sh	AL, BA, CE, GO, MA, MG, PB, PE, PI, RN, RR, SE, SP	Am, Ca, Ce
36	<i>Senna velutina</i> (Vogel) Irwin & Barneby		Sh,Tree	BA, CE, GO, MA, MG, MS, MT, PI, SP, TO	Am, Ca, Ce

4. Conclusions

This study increased the knowledge about *Senna* species in Minas Gerais, which is the second most diverse State for the genus in Brazil. In total, 36 species and 28 varieties were listed, being 34 native and 2 cultivated species. Three sections of the genus occur in Minas Gerais, being sect. *Chamaefistula* the most representative with 10 series and 28 species.

In BFG (2015), 39 species of *Senna* for Minas Gerais were listed, but in this research, *S. acuruensis* was included and 4 species were excluded: *Senna bacillaris*, *S. chrysocarpa*, *S. spinigera* and *S. trachypus*.

Senna pilifera var. *tubata* is the new record for Minas Gerais and *Senna hirsuta* var. *acuminata* is endemic to the State.

The Atlantic Forest has the largest number of species with restricted occurrence, being 4 species and 4 varieties; however, it is a Biome with a high rate of degradation, having its area reduced to about 4% of the original area. Therefore, one more reason for its preservation is to avoid extinction of the restricted species.

Senna pentagonia var. *pentagonia* had its extended occurrence for the Atlantic Forest. This variety was cited only from Caatinga and Cerrado.

The most of species, about 70%, occur in Amazon Forest, Atlantic Forest or Pantanal and in Caatinga or Cerrado, showing that the *Senna* species are distributed in dry and humid Biomes.

Senna pendula var. *dolichandra* need special attention because it has not been recorded in recent years and may be threatened to extinct in the State.

The Caatinga, with 20 species, showed a high diversity because it occupies an area of 2% in the North of the State. However, it is the Biome occurring in Minas Gerais with fewer herbarium specimens, which demonstrates the need for more collection expeditions in the Northern Region of the State to increase herbarium collections, contributing to future taxonomic studies and expanding knowledge about species occurring in this Biome.

5. References

- Acharya, L.; Mukherjee, A.K.; Panda, P.C. 2011. Separation of the genera in the subtribe Cassiinae (Leguminosae: Caesalpinioideae) using molecular markers. *Acta Botanica* 25: 223-233.
- Benth., G. 1871. Revision of the genus *Cassia*. *Transactions of the Linnean Society of London* 27: 503-591.
- Biota Minas. 2009. Diagnóstico do conhecimento sobre a biodiversidade no Estado de Minas Gerais – subsídio ao Programa Biota Minas. Fundação Biodiversitas, Belo Horizonte.
- Bortoluzzi, R. L. C.; Miotto, S. T. S.; Reis, A. 2011. Leguminosas Cesalpinioideas: tribo Cassieae - gêneros: *Cassia*, *Chamaecrista* e *Senna*. 1ª. ed. Herbário Barbosa Rodrigues, Itajaí.
- Bridson & Forman. 1999. *The Herbarium Handbook*. Royal Botanic Gardens Kew. 334p.
- BGF: Brazilian Flora Group. 2015. Growing knowledge: an overview of Seed Plant diversity in Brazil. *Rodriguésia* 66: 1085-1113. doi: 10.1590/2175-7860201566411
- Bruneau, A.; Forest, F.; Herendeen, P.S.; Klitgaard, B. B.; Lewis, G. P. 2001. Phylogenetic relationships in the Caesalpinioideae (Leguminosae) as inferred from chloroplast trnL intron sequences. *Systematic Botany* 26: 487–514.
- Dantas, M. M.; Silva, M. J. 2013. O gênero *Senna* Mill. (Leguminosae, Caesalpinioideae, Cassieae) no Parque Estadual da Serra Dourada, GO, Brasil. *Hoehnea* 40: 99-113.
- Drummond, G. M.; Martins, C.S.; Machado, A. B. M.; Sebaio, F.A.; Antonini, Y. 2005. *Biodiversidade em Minas Gerais: um atlas para sua conservação*. Belo Horizonte, Fundação Biodiversitas.

- Holmgren, P. K.; Holmgren, N.H. & Barnett, L. C. 1990. Index Herbariorum. Part.1: The herbaria of the world, 8 ed. New York Botanical Garden, New York.
- IBGE. 2004. Mapa de Biomas do Brasil. Disponível em: >
<http://www.ibge.gov.br/home/presidencia/noticias/21052004biomashtml.shtm><
Acesso em 4 mar. 2016
- Irwin, H. S.; Rogers, D. J. 1967. Monographic Studies in *Cassia* (Leguminosae: Caesalpinioideae) II: A Taximetric Study of Section *Apoucouita*. Memoirs of the New York Bot Gard, New York, vol 35.
- Irwin, H. S.; Barneby, R. C. 1977. Monographic studies in *Cassia* (Leguminosae - Caesalpinioideae) III. Section *Absus* and *Grimaldia*. Memoirs of the New York Bot Gard, New York, vol 30.
- Irwin, H. S.; Barneby, R. C. 1981. Tribo Cassiae Bron. In: Polhill RM, Raven PH (eds) Advances in Legume Systematics. Royal Botanic Garden, Kew. 2: 97-106.
- Irwin, H. S.; Barneby, R. C.; 1982. American Cassiinae: A Synoptical Revision Leguminosae, Tribe Cassieae, subtribe *Cassiinae* in New World. Memoirs of the New York Bot Gard, New York, New York, 35: 1-918.
- Kuntz, J. 2014. Estudo Taxonômico de Leguminosae-“Caesalpinioideae” do Parque Nacional do Caparaó, Espírito Santo, Minas Gerais, Brasil. Dissertation of Escola Superior de Agricultura “Luiz de Queiroz- ESALQ”.
- Lewis, G. P. 1987. Legumes of Bahia. Royal Botanical Garden, Kew, pp 25-64.
- Linnaeus, C. 1753. *Species Plantarum*. Stockholm: Laurentii Salvii.
- Lima, J. E. G. 1999. Os gêneros *Cassia* L. e *Senna* Mill. (Leguminosae: Caesapinoideae: Cassieae) no Estado de Pernambuco-Brasil Dissertation, Rural Federal University of Pernambuco.

- Marazzi, B.; Endress, P. K.; Queiroz, L. P.; Conti, E. 2006. Phylogenetic relationships within *Senna* (Leguminosae, *Cassiinae*) based on three chloroplast DNA regions: patterns in the evolution of floral symmetry and extrafloral nectarines. *American Journal of Botany* 93: 288-303.
- Marazzi, B.; Conti, E.; Endress, P. K. 2007. Diversity in anthers and stigmas in the Buzz-Pollinated Genus *Senna* (Leguminosae-Cassiinae). *International Journal of Plant Sciences* 168(4):371-191.
- MMA: Ministério do Meio Ambiente. 2009. Plano de Ação para Prevenção e Controle do Desmatamento e das Queimadas no Cerrado – PPCerrado. Brasília, 152p.
- MMA: Ministério do Meio Ambiente. 2010. Subsídios para a Elaboração do Plano de Ação para a Prevenção e Controle do Desmatamento na Caatinga. Brasília, 127p.
- Miller, P. 1754. *The Gardeners' Dictionary*. Ed. 4, England.
- Moench, C. 1794. *Methodus plantas horti botanici et agri Marburgensis: a staminum situ describendi*. pp 272.
- Queiroz, L.P. de. 2009. *Leguminosas da caatinga*. Feira de Santana: Universidade Estadual de Feira de Santana, 467p.
- Rodrigues, R. S.; Flores, A. S.; Miotto, S.T.S.; Baptista, L. R. M. 2004. O gênero *Senna* (Leguminosae-Caesalpinioideae) no Rio Grande do Sul, Brasil. *Acta Botanica* 19:1-16.
- Radford, A. E.; Dickison, W. C.; Massey, J. R.; Bell, C. R. 1974. *Vascular plant systematics*. Harper & Row, New York.
- Santos, J. P. 2013. O gênero *Senna* Mill. (Leguminosae, Caesalpinioideae, Cassieae) na região Centro-Oeste do Brasil, com ênfase nas espécies ocorrentes no estado de Goiás. *Dissertation of Federal University of Goiás*.

Specieslink 2016. Website > <http://splink.cria.org.br/> < Accessed 9 Dez 2016.

Stevens, P. F. 2012. Angiosperm Phylogeny Websitet><http://www.mobot.org/MOBOT/research/APweb/>< Accessed 16 dez 2015.

Tripathi, V.; Goswami, S. 2011. Generic relationship among *Cassia* L., *Senna* Mill. and *Chamaecrista* Moench using RAPD markers. International Journal Biodiversity and Conservation 3: 92-100.