



## Original Paper

# *Stylosanthes* (Leguminosae-Papilionoideae-Dalbergieae) in Northeast Brazil

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### Abstract

*Stylosanthes*, with approximately 50 species, is a pantropical, economically important genus of Leguminosae, with several species having forage potential and soil improvement potential. Thirty-two species have been recorded in Brazil, with the Northeast region being one of the main centers of diversity of the genus in the country. Despite this, no taxonomic work focusing on *Stylosanthes* has been done for the region. This study presents a taxonomic treatment of *Stylosanthes* species occurring in the Northeast region of Brazil. Botanical specimens were collected in the field together with visits to the main herbaria in the Northeast (ALCB, HUEFS, HUNEB, HVASF) for specimen analysis. Online consultation of databases in virtual herbaria, analysis of regional flora accounts, assessment of types and discussions with legume experts were also undertaken. Twenty-three taxa were confirmed as occurring in NE Brazil, with six new occurrences recorded for the states of Ceará, Paraíba, Piauí, and Rio Grande do Norte. Species in the studied area are mainly differentiated by their fruit and bract morphology.

**Key words:** *campos rupestres*, Cerrado, Fabaceae, flora, plant taxonomy, semiárido.

### Resumo

*Stylosanthes*, com aproximadamente 50 espécies, é um dos gêneros mais economicamente importantes de Leguminosae, com táxons que apresentam potencial forrageiro em regiões tropicais. Trinta e duas espécies foram registradas no Brasil, sendo a Região Nordeste um dos principais centros de diversidade do gênero. Apesar disto, nenhum trabalho taxonômico focando em *Stylosanthes* foi feito para a região. Este estudo apresenta o tratamento taxonômico das espécies de *Stylosanthes* ocorrentes na Região Nordeste do Brasil. Espécimes foram coletados em campo junto com visitas às principais coleções do Nordeste (ALCB, HUEFS, HUNEB, HVASF) para análise dos táxons. Consultas *on-line* dos bancos de dados em herbários virtuais, análises das floras regionais, consultas aos tipos e discussões com especialistas em leguminosas também foram realizadas. Foram confirmados 23 táxons, sendo seis novas ocorrências registradas para os estados do Ceará, Paraíba, Piauí, e Rio Grande do Norte. As espécies encontradas nas áreas estudadas diferenciam-se principalmente pela morfologia dos frutos e brácteas.

**Palavras-chave:** campos rupestres, Cerrado, Fabaceae, flora, taxonomia vegetal, semiárido.

## Introduction

*Stylosanthes* (Leguminosae: Dalbergieae) comprises approximately 50 species distributed throughout the Americas, tropical Africa and Southeast Asia (Tarawali *et al.* 1997; Klitgaard & Lavin 2005; Costa 2006). Its main centers of

diversity are in Brazil, Mexico and the Caribbean (Klitgaard & Lavin 2005). In Brazil, 32 species have been recorded. Most of them (up to 25) are found mainly in cerrado (savanna) and campo rupestre (rock grasslands) vegetation (Costa 2006; Gissi 2020).

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*Stylosanthes* is considered an economically important genus of Leguminosae, and several species have established or potential forage value in the tropics (Humphreys 1981; Costa 2006). *Stylosanthes capitata* Vogel (1838: 70), *S. guianensis* (Aubl.) Swartz (1789: 301) and *S. macrocephala* M.B.Ferreira & Sousa Costa (1977: 102), for example, are used in conjunction with some grass species in land recovery initiatives, weed control and as part of crop rotation schemes (Mesquita *et al.* 2002; Fernandes 2003; Costa *et al.* 2008; Negreiros *et al.* 2010; Ribeiro *et al.* 2011; Fabrice *et al.* 2015). A study of anatomy in leaflets of 11 taxa of the *Stylosanthes guianensis* complex showed that many anatomical characteristics are related to the colonization of dry regions with low soil fertility (Gissi *et al.* 2022). For instance, Gissi *et al.* (2022) cited that the non-glandular trichomes found may provide defense against herbivores and offer protection against UV rays, intense temperatures, and dehydration.

*Stylosanthes* is related both morphologically and phylogenetically to the genera *Arachis* and *Chapmannia* (Lavin *et al.* 2001), differing from them in having trifoliolate leaves, amplexicaul stipules attached to the petiole, simple or compound inflorescences, with 1 or more spikes, secondary bracts similar in appearance to leaflets, 2 to 3 bracteoles per flower, fruits with one or two fertile articles and a persistent residual style of varying length and curvature.

Although the genus is easily recognized by the set of morphological characters described, there is difficulty in identifying collections at the species level, as many of them are delimited by overlapping suites of characters. *Stylosanthes* species are divided into two sections, *Stylosanthes* sect. *Stylosanthes* and *S.* sect. *Styposanthes* Vogel, differentiated mainly by the presence or absence of a plumose axis rudiment at the base of the flowers or fruits and by the number of bracteoles (Kirkbride & Kirkbride 1987; Costa 2006). In the species of *S.* sect. *Stylosanthes* the plumose axis rudiment is absent, and there are only two bracteoles per flower, one internal and the other external, while the species of *S.* sect. *Styposanthes* possess the plumose axis rudiment and three bracteoles, one external and two internal (Costa 2006).

Brazil is the country with the highest diversity of *Stylosanthes* species and the greatest endemism, especially in Central Brazil, where ca. 65 % of the Brazilian species are recorded (Gissi

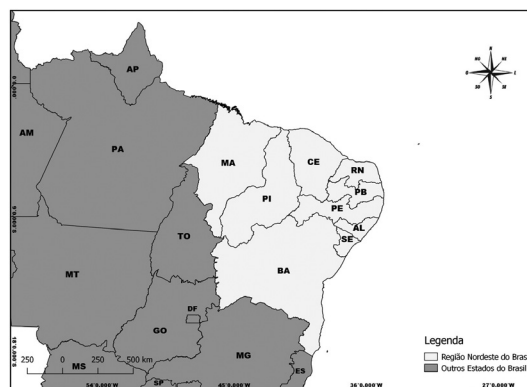
2020). Despite this, studies of the genus in Brazil are scarce, and the most important treatments are restricted to regional flora accounts (*e.g.*, Lewis 1987; Lewis & Owen 1989; Costa 2006; Córdula *et al.* 2008; Costa *et al.* 2008; Karia 2008; Queiroz 2009; Fortuna-Perez *et al.* 2011; São-Mateus *et al.* 2013; Medeiros & Flores 2014; Ferreira *et al.* 2019). In the Northeast region 23 species have been recorded, where they occur in all plant formations (Gissi 2020; BFG 2021).

The aim of this study is to present a comprehensive taxonomic account of *Stylosanthes* occurring in the Northeast region of Brazil. We present an identification key, species descriptions, illustrations and comments on geographical distribution and ecological features.

## Materials and Methods

### Study area

The Northeast (NE) region of Brazil comprises an area of 1,561,177.8 km<sup>2</sup>, representing 18.26% of the Brazilian territory, covering the states of Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, and Sergipe (IBGE 2015; Fig. 1). Based on climatic characteristics, the region is divided into three sub-regions, *zona da mata*, *agreste*, and *sertão*. The predominant vegetation is caatinga, but there is a wide range of vegetation types depending on topography and elevation, including forest (evergreen rainforest and seasonal tropical forest), cerrado (savanna), campos rupestres (rocky grasslands), dunes, and mangroves (IBGE 2015; Fig. 2).



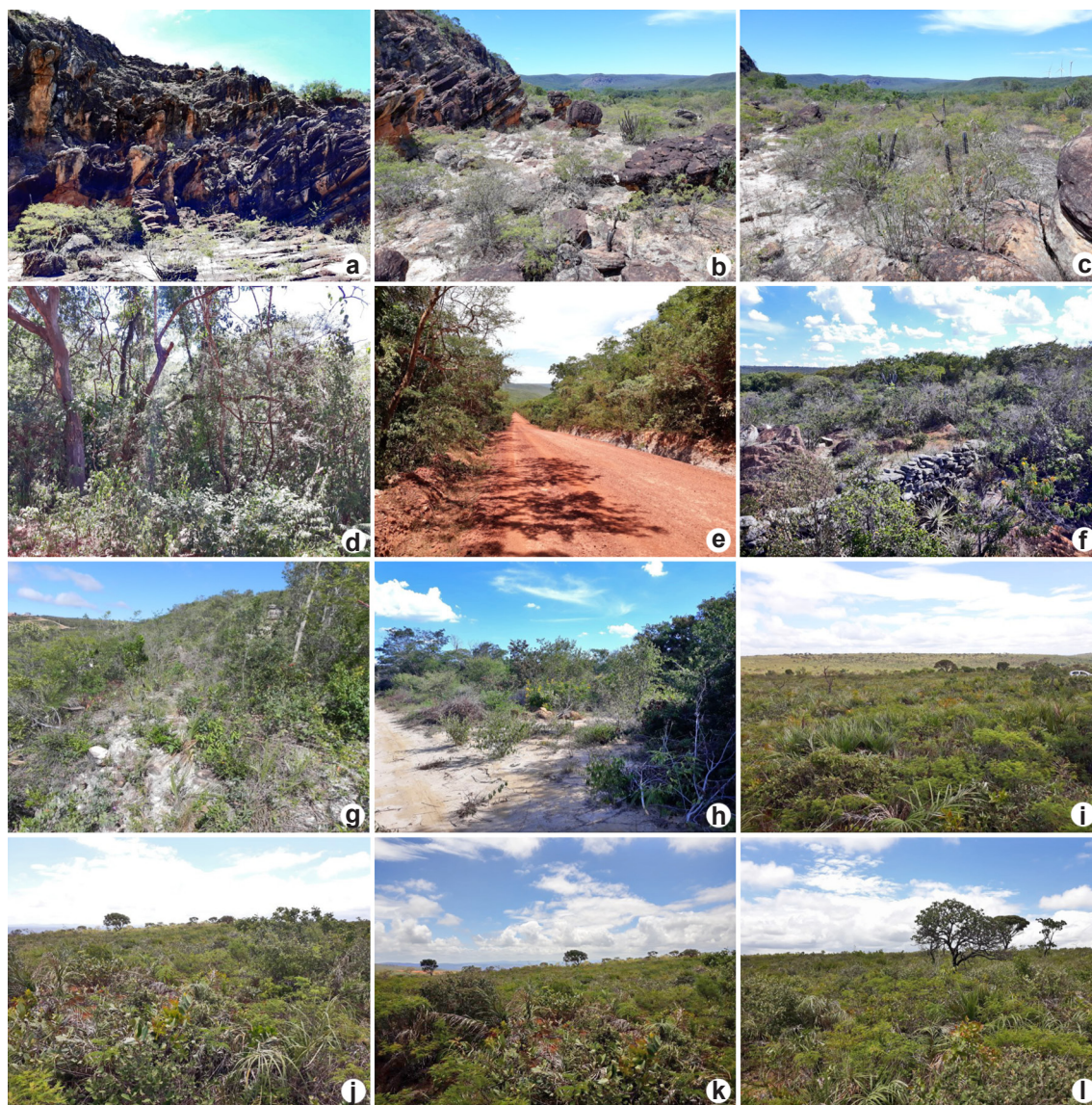
**Figure 1** – The Northeast region of Brazil. AL = Alagoas, BA = Bahia, CE = Ceará, MA = Maranhão, PB = Paraíba, PE = Pernambuco, PI = Piauí, RN = Rio Grande do Norte, SE = Sergipe.



### Field and laboratory procedures

Field collections were carried out from May 2018 to June 2019, mainly in areas of Caatinga and Cerrado domains, in the states of Bahia, Piauí, and Pernambuco, and specimen preparation followed the recommendations of Peixoto & Maia (2013). Specimens were identified using available literature, (Costa 2006; Queiroz 2009; Fortuna-Perez *et al.* 2011) or by comparison with determined herbarium

specimens in the following herbaria: ALCB, BOTU, HUEFS, HUNEB and HVASF, or on-line digitized specimens of ASE, BHCBC, CEN, CGMS, CPAP, EAC, EAN, FURB, HCDAL, HDELTA, HUESC, K, MAC, MAR, MO, NY, UB, UEC, UFP, and US. Specimens were deposited in the herbarium of the Universidade do Estado da Bahia (HUNEB, Caetité and Paulo Afonso Collections) and at the herbarium of Universidade Estadual Paulista



**Figure 2** – a-l. Vegetation types in which species of *Stylosanthes* occur in Northeast region of Brazil – a-c. “Campos rupestres” – a. Rio de Contas (BA); b-c. Brejinho das Ametistas (BA); d-e. seasonal forest bordering roads and rivers – d. Caldeiras (BA); e. Alagoinhas (BA); f-g. Caatinga – f. Petrolina (PE); g. Jeremoabo (BA); h-l. Cerrado – h. Linha - Sebastião Barros (PI); i. Caetité (BA); j. Barreiras (BA); k-l. Santa Maria da Vitória (BA). Photos: J.J.S. Ferreira.

“Júlio de Mesquita Filho”, Botucatu (BOTU). Infra-specific taxa of *Stylosanthes* are not treated, and morphological diversity was considered at specific level. Future studies will focus on better understanding infraspecific taxa and species complexes.

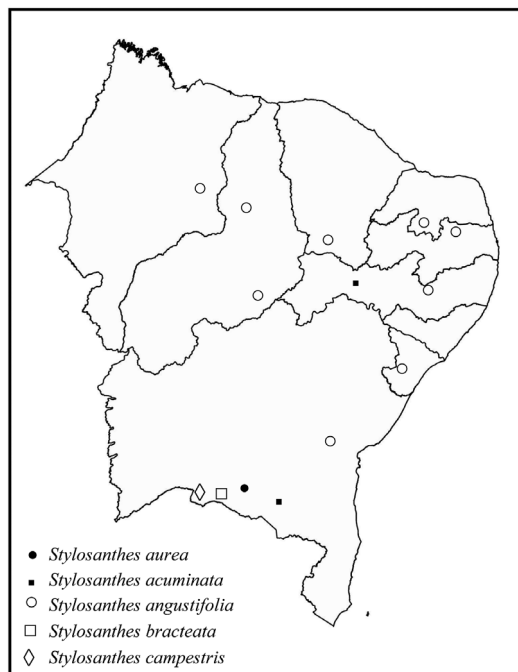
The terminology used in the description of vegetative and reproductive structures follows the recommendations contained in the literature used to identify species, or, where appropriate, is based on the recommendations of Radford *et al.* (1974) and Harris & Harris (2001).

Geographical distribution is based on the collections studied in mentioned herbaria, together with data assembled during field excursions and information published in the Flora do Brasil 2020 (<<http://floradobrasil.jbrj.gov.br/>>). Phenology data were mainly gleaned from specimen labels. Distribution maps were prepared using the software QGIS (Quantum GIS Development Team) version 2.18.0, from geographical coordinates obtained during fieldwork or from labels of historical herbarium specimens. In the species descriptions, under “material examined”, up to three collections are cited for each state, aiming to cover distribution range, habitat type and morphological variation observed for each species.

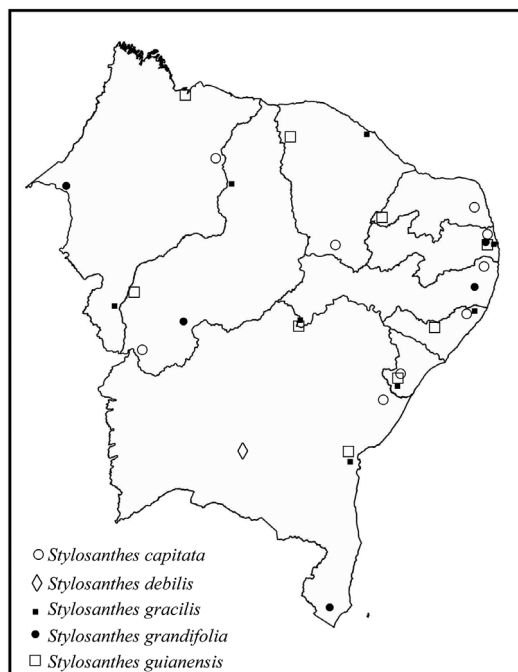
## Results and Discussion

We recorded 23 species of *Stylosanthes* distributed throughout the various vegetation types in the Northeast region of Brazil (Figs. 3-6; Tab. 1). More species belong to *Stylosanthes* sect. *Stylosanthes* (13 spp.) than to *S.* sect. *Styposanthes* (10 spp.). Of the total species found in the study area, nine are endemic to Brazil (*S. aurea* M.B. Ferreira & Sousa Costa (1977: 102), *S. campestris* M.B. Ferreira & Sousa Costa (1977: 102), *S. debilis* M.B. Ferreira & Sousa Costa (1979: 48), *S. macrocephala* M.B. Ferreira & Sousa Costa (1977: 102), *S. minima* J.J.S.Ferreira & J.Santos-Silva (2020: 161), *S. mitzii* J.J.S. Ferreira & J. Santos-Silva (2020: 162), *S. nunoii* Brandão Ferreira (1991: 5), *S. pilosa* M.B. Ferreira & Sousa Costa (1977: 102), and *S. seabrana* B.L. Maass & ‘t Mannetje (2002: 497). *Stylosanthes humilis* Kunth (1824: 506) is the only species found on the Fernando de Noronha Archipelago.

Ten species occur in protected areas. New occurrences were recorded for the state of Paraíba and Rio Grande do Norte (*S. humilis*), Piauí (*S. grandifolia* M.B.Ferreira & Sousa Costa [1977: 102]), Rio Grande do Norte (*S. hamata* [L.] Taubert

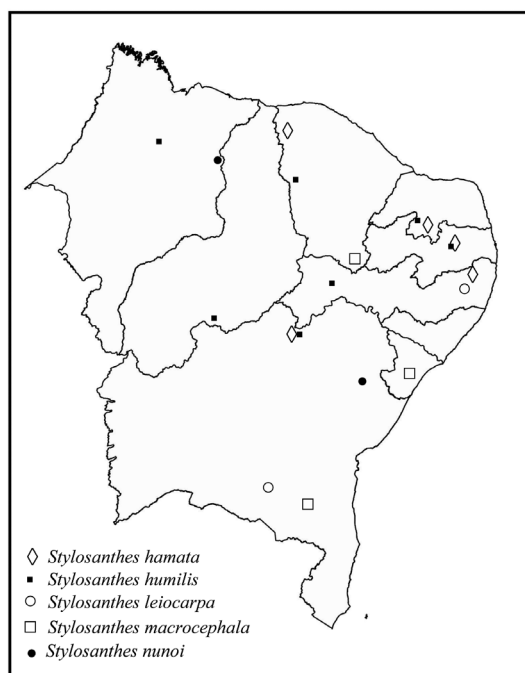


**Figure 3** – *Stylosanthes* species occurring in Northeast Brazil: *S. acuminata*, *S. angustifolia*, *S. aurea*, *S. bracteata*, and *S. campestris*.

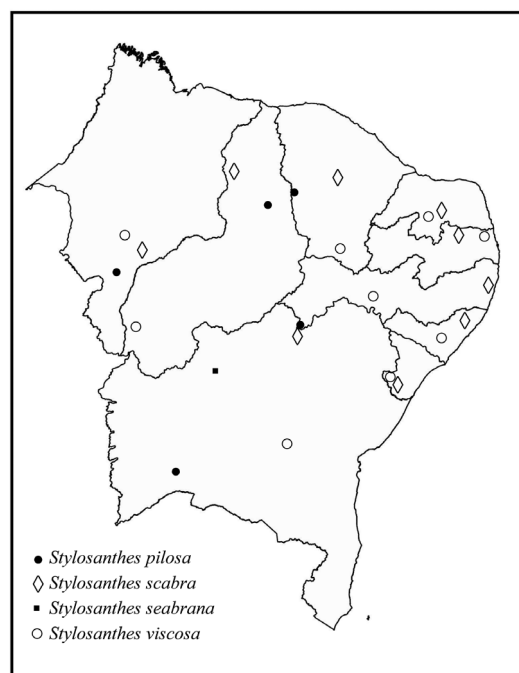


**Figure 4** – *Stylosanthes* species occurring in Northeast Brazil: *S. capitata*, *S. debilis*, *S. gracilis*, *S. grandifolia*, and *S. guianensis*.





**Figure 5** – *Stylosanthes* species occurring in Northeast Brazil: *S. hamata*, *S. humilis*, *S. leiocarpa*, *S. macrocephala*, and *S. nunoii*.



**Figure 6** – *Stylosanthes* species occurring in Northeast Brazil: *S. pilosa*, *S. scabra*, *S. seabrana*, and *S. viscosa*.

[1890: 22]) and Ceará and Rio Grande do Norte (*S. macrocephala*). The highest species richness is in the cerrado (20 spp.) and campos rupestres (15 spp.), where they grow on sandy or sandy-clay soils at elevations between 200 and 900 m. Five species occur in caatinga vegetation, eight in seasonal forest and some are associated with disturbed areas, such as roadsides, urbanized areas and pastures, on sandy or sandy-clay soils.

The state of Bahia has the highest number of species recorded in the NE region (22 spp.), of which six are only recorded in this state inside the NE region thus far (*S. aurea*, *S. campestris*, *S. debilis*, *S. minima*, *S. mitzii*, and *S. seabrana*) (Figs. 3; 4; 6). Only four species occur in all nine states of the NE region: *S. capitata*, *S. guianensis*, *S. scabra* Vogel (1838: 69), and *S. viscosa* Swartz (1788: 108) (Figs. 3; 6).

The main morphological characters that can help differentiate *Stylosanthes* species are the number of spikes per compound inflorescence, the shape and length of external bracts, and especially fruit form with differences in surface ornamentation of the articles [especially concerning the presence or absence of papillae and glandular trichomes, as well as rostrum (beak) shape] (Ferreira *et al.* 2021).

#### Taxonomic treatment

***Stylosanthes*** Sw., Prod. Veg. Ind. Occ. 108. 1788.

Subshrubs, erect or prostrate, decumbent, branched or not, glabrous or with indumentum. Leaves alternate, whorled, 3-foliolate; stipules amplexicaul or peltate; petiole articulate, leaflet venation camptodromous. Inflorescences spiciform, simple or aggregated, ovoid, oval, oblong or elliptical, axillary or terminal, pedunculate or not; external bracts of the inflorescence 1 or 3-foliolate; bracts of the flower 1-foliolate; bracteoles 2 or 3 per flower, one external and one or two internal. Flowers sessile, yellow or orange, supported or not by an axis rudiment; calyx sub-campanulate, glabrous or indumented; standard petal orbicular or obovate, claw present or absent; wings obovate, lanceolate or falciform, unguiculate, united at the apex; keel petals falciform, auriculate; androecium monadelphous, the 10 stamens dimorphic, anthers globose, oblate or oblong; ovary 2-ovulate, style filiform. Fruit a 1–2-articulate lomentum, the upper fertile article sessile, obovoid, oblong to ellipsoid, glabrous, pilose, pubescent or papillose, with 1–4 lateral veins, the secondary veins reticulate or not; seeds obovate, ovoid, ellipsoid or reniform, yellow, black, brown or mottled.

**Table 1** – *Stylosanthes* species occurring in Northeast Brazil.

Species	Habit	Vegetation	Section
<i>Stylosanthes acuminata</i>	Erect	Cerrado and Caatinga	Sect. <i>Stylosanthes</i>
<i>Stylosanthes angustifolia</i>	Erect	Atlantic forest and Cerrado	Sect. <i>Stylosanthes</i>
<i>Stylosanthes aurea</i>	Erect	Cerrado	Sect. <i>Stylosanthes</i>
<i>Stylosanthes bracteata</i>	Decumbent	Atlantic forest and Cerrado	Sect. <i>Styposanthes</i>
<i>Stylosanthes campestris</i>	Erect	Rocky grasslands	Sect. <i>Stylosanthes</i>
<i>Stylosanthes capitata</i>	Erect or decumbent	Caatinga and Gallery forest	Sect. <i>Styposanthes</i>
<i>Stylosanthes debilis</i>	Erect or decumbent	Cerrado	Sect. <i>Stylosanthes</i>
<i>Stylosanthes gracilis</i>	Erect	Atlantic forest and Cerrado	Sect. <i>Stylosanthes</i>
<i>Stylosanthes grandifolia</i>	Erect	Atlantic forest and Cerrado	Sect. <i>Stylosanthes</i>
<i>Stylosanthes guianensis</i>	Decumbent or prostrate (some varieties erect)	Caatinga, Cerrado and Atlantic forest	Sect. <i>Stylosanthes</i>
<i>Stylosanthes hamata</i>	Decumbent, prostrate or erect	Cerrado	Sect. <i>Styposanthes</i>
<i>Stylosanthes hispida</i>	Decumbent, prostrate or erect	Amazon forest and Cerrado	Sect. <i>Stylosanthes</i>
<i>Stylosanthes humilis</i>	Decumbent or prostrate	Amazon forest and Cerrado	Sect. <i>Stylosanthes</i>
<i>Stylosanthes leiocarpa</i>	Erect or decumbent	Cerrado	Sect. <i>Stylosanthes</i>
<i>Stylosanthes longicarpa</i>	Erect	Rocky grasslands	Sect. <i>Stylosanthes</i>
<i>Stylosanthes macrocephala</i>	Erect or decumbent	Cerrado and Caatinga	Sect. <i>Styposanthes</i>
<i>Stylosanthes minima</i>	Prostrate	Cerrado and Caatinga	Sect. <i>Stylosanthes</i>
<i>Stylosanthes mitzii</i>	Prostrate	Caatinga, Cerrado and Rocky grasslands	Sect. <i>Stylosanthes</i>
<i>Stylosanthes nunoi</i>	Erect or decumbent	Cerrado	Sect. <i>Stylosanthes</i>
<i>Stylosanthes pilosa</i>	Decumbent, prostrate or erect	Caatinga and Cerrado	Sect. <i>Styposanthes</i>
<i>Stylosanthes scabra</i>	Erect or decumbent	Caatinga and Cerrado	Sect. <i>Styposanthes</i>
<i>Stylosanthes seabrana</i>	Decumbent, prostrate or erect	Cerrado	Sect. <i>Styposanthes</i>
<i>Stylosanthes viscosa</i>	Decumbent or prostrate	Caatinga, Cerrado and Rocky grasslands	Sect. <i>Stylosanthes</i>

### Key to the identification of *Stylosanthes* species occurring in the Northeast Region of Brazil

1. Each flower bearing two bracteoles (1 external and 1 internal); axis rudiment absent ..... 2
2. Upper article rostrum (of lomentum) more than 3.5 mm long..... 3
  3. Plant erect; inflorescence 1–3.5 cm long, acicular; upper fruit article rostrum 5–6 mm long ..... 2. *Stylosanthes angustifolia*
  - 3'. Plant prostrate or decumbent; inflorescence 0.5–0.9 cm long, oblong; upper fruit article rostrum 4.5–5 mm long ..... 13. *Stylosanthes humilis*
- 2'. Upper article rostrum (of lomentum) less than 3.5 mm long..... 4
  4. Fruit usually with 1 fertile article (the second aborted)..... 5
    5. Leaflets with their submarginal vein complete ..... 6
      6. Bract leaflets linear; fruit with upper article obovoid; seeds yellow..... 1. *Stylosanthes acuminata*
      - 6'. Bract leaflets lanceolate; fruit with upper article ovoid; seeds black..... 8. *Stylosanthes gracilis*
    - 5'. Leaflets without a complete submarginal vein..... 7

7. Plant prostrate or decumbent; inflorescence a single simple spike ..... 10. *Stylosanthes guianensis*
- 7'. Plant erect; inflorescence comprising 2 or more spikes ..... 8
8. Leaflets oblanceolate; fruit with upper article ellipsoid ..... 9. *Stylosanthes grandifolia*
- 8'. Leaflets linear or lanceolate; fruit with upper article obovoid ..... 9
9. Leaflets tomentose, linear or lanceolate, apex mucronate, base acute ..... 19. *Stylosanthes nunoii*
- 9'. Leaflets pubescent, lanceolate, apex attenuate, base rounded ..... 10
10. Spikes ovoid; bract leaflets elliptical or oblong; fruit with upper article ovoid ..... 15. *Stylosanthes longicarpa*
- 10'. Spikes elliptical; bract leaflets acicular or lanceolate; fruit with upper article ellipsoid ..... 11
11. Bract leaflets acicular; secondary bracts oval ..... 3. *Stylosanthes aurea*
- 11'. Bract leaflets lanceolate; secondary bracts oblong ..... 5. *Stylosanthes campestris*
- 4'. Fruit usually with 2 fertile articles ..... 12
12. Inflorescence a simple single oblong spike; fruit upper article ovoid, glabrous ..... 14. *Stylosanthes leiocarpa*
- 12'. Inflorescence compound with 2–3 elliptical spikes; fruit upper article elliptical, glabrescent ..... 13
13. Upper fruit article with rostrum helicoidal, pubescent or tomentose ..... 23. *Stylosanthes viscosa*
- 13'. Upper fruit article with rostrum long-curved, glabrous or pilose ..... 7. *Stylosanthes debilis*
- 1'. Each flower bearing three bracteoles (1 external and usually 2 internal); axis rudiment present ..... 14
14. Fruit lower article aborted ..... 4. *Stylosanthes bracteata*
- 14'. Fruit lower article present ..... 15
15. Bract leaflets linear; upper article of fruit with its rostrum uncinata ..... 17. *Stylosanthes minima*
- 15'. Bract leaflets elliptical; upper article of fruit with its rostrum curved, helicoidal or uncinata ..... 16
16. Flowers 8–11 mm long; fruit upper article oblong or elliptical ..... 11. *Stylosanthes hamata*
- 16'. Flowers 7 mm long; fruit upper article ovoid ..... 17
17. Bract leaflets acicular; fruit upper article with rostrum curved (0.5–1.5 mm long) ..... 12. *Stylosanthes hispida*
- 17'. Bract leaflets lanceolate; fruit upper article with rostrum helicoidal, long-curved (1.5–3 mm long) or uncinata ..... 18
18. Leaflets obovate; secondary bracts oval; fruit upper article oblong ..... 18. *Stylosanthes mitzii*
- 18'. Leaflets elliptical or lanceolate; secondary bracts oblong; fruit upper article ellipsoid ..... 19
19. Secondary bracts oblong, paleaceous ..... 22. *Stylosanthes seabrana*
- 19'. Secondary bracts elliptical, hyaline ..... 20
20. Leaflets elliptical; spikes oblong; secondary bracts oblong ..... 20. *Stylosanthes pilosa*
- 20'. Spikes elliptical or ovoid; secondary bracts oval ..... 21
21. Spikes ovoid; bract leaflets linear, 4–5 mm long ..... 16. *Stylosanthes macrocephala*
- 21'. Spikes elliptical; bract leaflets elliptical, 5–7 mm long ..... 22

22. Branches pubescent; leaflets with apex acuminate; secondary bracts hyaline, their central vein pubescent on the internal face, pubescent on the external face ..... 6. *Stylosanthes capitata*  
 22'. Branches hispid; leaflets with apex mucronate; secondary bracts coriaceous, glabrescent on the internal face, pilose or tomentose on the external face ..... 21. *Stylosanthes scabra*

**1. *Stylosanthes acuminata*** M.B. Ferreira & Sousa Costa, Anais Soc. Bot. Brasil 28: 77-100. 1977.

Figs. 7a; 8a-d

Subshrub 0.4–0.8 m tall, erect, unbranched; branch striate, glabrous to tomentose. Stipules 0.6–1 cm long, amplexicaul, pubescent. Petiole 0.2–0.5 cm long, pubescent; leaf rachis 1.5–3 mm long; leaflets 2.5–3 × 0.5–0.7 cm, lanceolate to oblanceolate, chartaceous, discolorous, adaxial surface dark green, abaxial face light green, base attenuate, apex acuminate, pubescent, venation camptodromous, the submarginal vein complete. Inflorescences 1.5–2.5 cm long, axillary or terminal, congested, single or comprising 2–3 broadly elliptic spikes, with 7–12 flowers per spike, pubescent; secondary bracts 6–8 × 2.5–4 mm, oblong, coriaceous, pubescent on the central area inside, pilose on the outside, bract leaflets 3.5–6 mm long, linear, petiolate, pilose; bracteoles 2.3–5 mm long, linear, pubescent. Flowers 9–12 mm long, not subtended by an axis rudiment axis; calyx 1–2 mm long, sub-campanulate, lobes deltoid, pubescent; petals yellow, standard 4–6 mm long, obovate to orbicular, apex retuse to emarginate, glabrescent, claw absent; wings 3–5 mm long, obovate, glabrous; keel petals 3–4 mm long, falciform, glabrous; stamens 10, five with oblong anthers, the other five with globose anthers; gynoecium 0.6–1.1 cm long, ovary 2–3 mm long, glabrescent, stipe 0.5–1 mm long, style 6–8 mm long, straight. Fruit 3–5 × 2–3 mm, with 1 article, the lower article aborted, upper article obovoid, reticulate veined, papillose, brown, its rostrum 0.2–0.3 mm long, uncinat, papillose. Seeds 1–3 × 1–3 mm, oblong to ovoid, yellow.

**Selected specimens:** BAHIA: Jequié. Fazenda Brejo, borda de mata, 12.IV.2004, fl., G.E.L. Macedo, A.F. Souza & M.B. Ferreira 642 (HUESB). PERNAMBUCO: Petrolina, rodovia próxima à Ilha do Fogo, 17.XI.2017, fl. and fr., J.J.S. Ferreira et al. 217 (HUNEB- Coleção Caetitê).

*Stylosanthes acuminata* is distributed throughout South America, extending from Colombia to Venezuela (Ferreira & Costa 1977; Costa 2006). In Brazil it is found in cerrado and seasonal semideciduous forest in the North (TO), Central-West (DF, GO, MS, MT), South (PR), and

Southeast (MG, SP) (Costa 2006; Costa et al. 2008; BFG 2018; Gissi 2020). In NE Brazil, *Stylosanthes acuminata* is recorded for Bahia and Pernambuco [it does not occur in Maranhão contrary to Gissi (2020)] where it grows in areas of cerrado and seasonal forest, generally in sandy-clay soils, from 680 to 900 m elevation. Collected with flowers and fruits in the months of April and November.

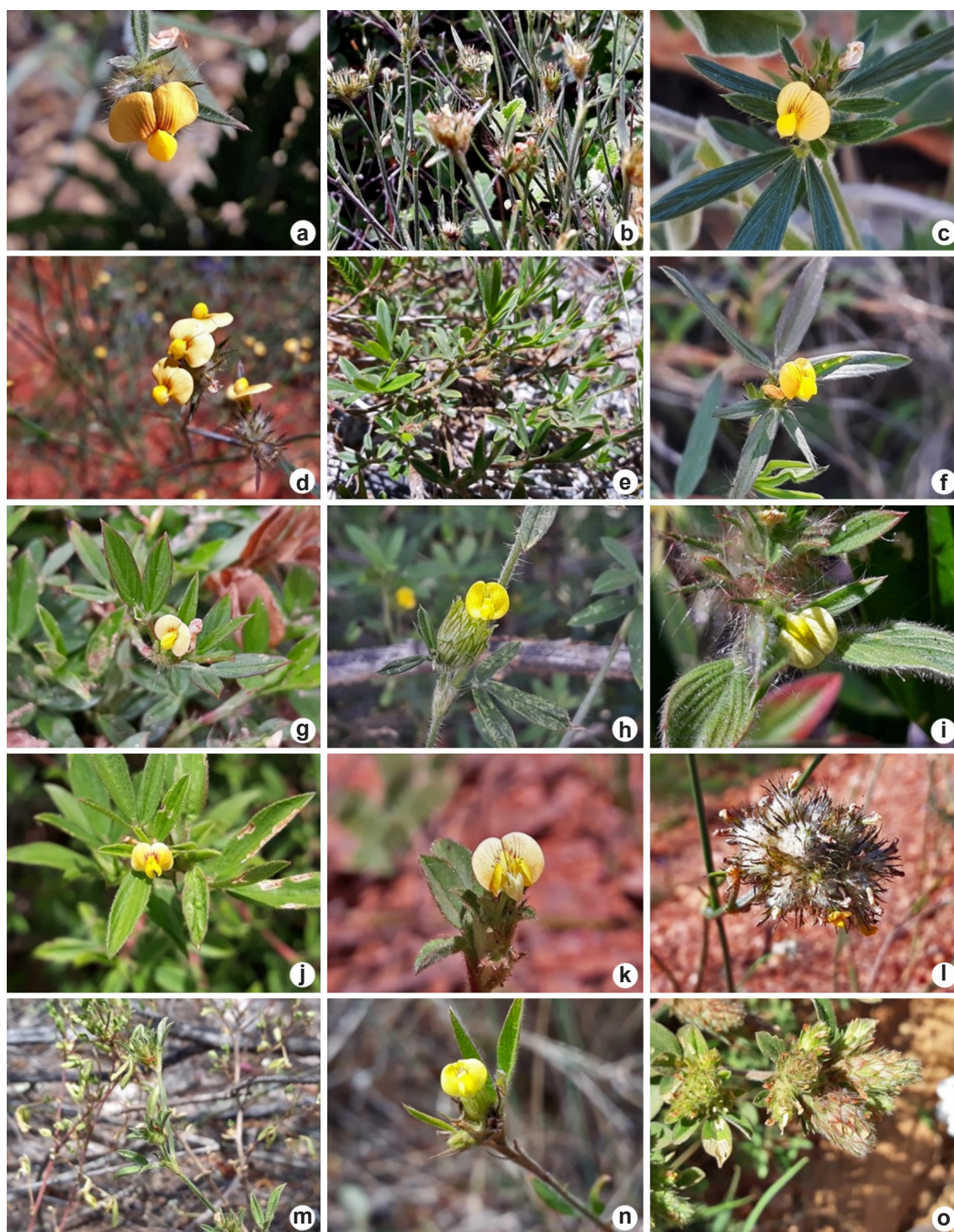
*Stylosanthes acuminata* is characterized by its erect sub-shrubby habit, lanceolate leaflets, and usually terminal congested inflorescences (these sometimes axillary). It shares with *S. campestris* the general appearance of the inflorescences and the shape of the leaflets and, thus at first sight, the two species can be confused in the field. However, *S. acuminata* has broadly elliptic spikes and papillose fruits, while *S. campestris* has elliptic spikes and fruits with only a few papillae in the rostrum region.

**2. *Stylosanthes angustifolia*** Vogel, Linnaea 12: 63. 1838.

Fig. 8e-h

Subshrub 0.3–0.7 m tall, erect, branched; branches cylindrical, pubescent. Stipules 0.5–1 cm long, amplexicaul, pubescent. Petiole 0.3–1 cm long, pubescent; leaf rachis 1–3 mm long; leaflets 1–2 × 0.3–0.5 cm, lanceolate or aciculate, chartaceous, discolorous, adaxial surface dark green, abaxial face light green, base rounded, apex attenuate, pubescent, venation camptodromous. Inflorescences 1–3.5 cm long, terminal, aciculate, lax, single, 7–15 flowers per spike, pubescent; secondary bracts 5–7 × 2.5–3 mm, elliptical, paleaceous, glabrescent on the inside, pubescent on the central vein, pubescent on the outside, bract leaflets 1.5–2 mm long, triangular, sessile, pilose; bracteoles 2, 2–5 mm long, lanceolate, pubescent. Flowers 4–5 mm long; not subtended by an axis rudiment; calyx 2–5 mm long, sub-campanulate, lobes triangular, pubescent; petals yellow, standard 3–4 mm long, orbicular, apex retuse, glabrescent, claw absent; wings 2–4 mm long, lanceolate, glabrous; keel petals 2–4 mm long, lanceolate, glabrous; stamens 10, anthers, five oblong, five globose; gynoecium 0.8–1.2 cm long, ovary 2–4 mm long, glabrescent, stipe 0.4–1 mm long, style 5–8 mm long, straight. Fruit 5–7 × ca. 4 mm, with 2 articles, lower article ellipsoid, pubescent, upper





**Figure 7** – a-o. *Stylosanthes* species occurring in Northeast Brazil – a. *S. acuminata*; b. *S. aurea*; c. *S. campestris*; d. *S. gracilis*; e. *S. guianensis*; f. *S. hamata*; g. *S. humilis*; h. *S. macrocephala*; i. *S. pilosa*; j. *S. scabra*; k. *S. viscosa*; l. *S. gracilis*; m. *S. viscosa*; n. *S. minima*; o. *S. mitzii*. Photos: J.J.S. Ferreira.



**Figure 8** – a-d. *Stylosanthes acuminata* – a. stem; b-c. secondary bracts; d. upper article of the lomentum. e-h. *Stylosanthes angustifolia* – e. part of inflorescence; f-g. secondary bracts; h. upper article of the lomentum. i-l. *Stylosanthes aurea* – i. stem; j-k. secondary bracts; l. upper article of the lomentum. m-p. *Stylosanthes capitata* – m. stem; n-o. secondary bracts; p. upper article of the lomentum. (a-d. J.J.S. Ferreira et al. 217; e-h. R.M. Harley 28467; i-l. J.J.S. Ferreira 316; m-p. J.J.S. Ferreira 19).



article oblong, reticulate-veined, glabrescent, dark brown, rostrum 5–6 mm long, helicoidal, pilose. Seeds 1–2 × 1–2 mm, ovoid, brown.

**Selected specimens:** BAHIA: Feira de Santana, *Campus* da UEFS, 16.IX.1994, fl. and fr., *L.P. Queiroz 4052* (HUEFS). Remanso, estrada para Pilão Arcado, ca. de 29 km da cidade, 16.VI.2001, fl. and fr., *T.S. Nunes 465* (HUEFS). CEARÁ: Fortaleza, Barra do Ceará, 6.VI.1960, fl. and fr., *A. Fernandes* (EAC 2008). MARANHÃO: Boqueirão, Baixada Maranhense, 9.X.2014, *G. Oliveira 55* (MAR). PARAÍBA: Baía da Traição, dunas fixas, utilizadas como pasto, 27.VII.2001, fr., *V.C. Souza & J.P. Souza 26626* (MAC). PERNAMBUCO: Petrolina, entre Caboclo e Dormente, 22.IV.1971, *E.P. Heringer et al. 275* (UB). PIAUÍ: Piracuruca, Sambaíba (7ª cidade) - Parna de sete cidades, 22.VII.1999, fl., *M.E. Alencar 713* (HUEFS). RIO GRANDE DO NORTE: Mossoró, Rodovia Grossos - Tibau, km 6, 12.VIII.1994, fl. and fr., *G.P. Silva 2474* (CEN). SERGIPE: Aracajú, BR-101, Estância, km 55, 24.VII.1980, fl. and fr., *L. Coradin 3355* (CEN).

*Stylosanthes angustifolia* is distributed across South America, extending from Bolivia to Guyana (Costa 2006; Vanni 2017). In Brazil it is found in all states of the Northeast region as well as in the states of Acre, Amazonas, Amapá, Pará, Rio de Janeiro, Rondônia, Roraima, Sergipe, and Tocantins (Gissi 2020). It grows in areas of caatinga, cerrado *s.s.* and Rocky grasslands, generally in sandy-clay soils, from 380 to 900 m elevation. Flowering and fruiting occur from June to October.

*Stylosanthes angustifolia* has lanceolate or acicular leaflets, acicular inflorescences and fruits with an elongated, pronouncedly coiled rostrum, and this suite of characters differentiates it from the other species occurring in the study area. The species can be confused with *S. hamata* with linear inflorescences, which are similar in appearance to the acicular inflorescences present in *S. angustifolia*. However, *S. angustifolia* does not have a plumose axis rudiment, while *S. hamata* does.

**3. *Stylosanthes aurea*** M.B. Ferreira & Sousa Costa, An. Soc. Bot. Brasil, XXVIII Congr. Nac. Bot. 81 (1977, publ. 1978). Figs. 7b; 8i-l

Subshrub 0.3–0.4 m tall, erect, unbranched; branch cylindrical, pilose to setose. Stipules 1–1.5 cm long, amplexicaul, pubescent. Petiole 0.5–0.7 cm long, pubescent; leaf rachis 3–5 mm long; leaflets 2.5–3 × 0.5–0.7 cm, elliptic to lanceolate, chartaceous, discolorous, adaxial surface dark

green, abaxial surface brown, base rounded, apex attenuate, pubescent, venation camptodromous. Inflorescences 4–7 × 2–4 mm, terminal, elliptic, lax, comprising 6 spikes, each with 3–18 flowers, trichomes of the indumentum golden to yellow, secondary bracts, broadly elliptic, coriaceous, glabrescent on the inside, pilose on the outside, trichomes golden or white, bract leaflets 2–3.5 mm long, aciculate, sessile, pilose; bracteoles 2, 2–5 mm long, lanceolate to elliptic, pubescent, green. Flowers 4–6 mm long; not subtended by an axis rudiment; calyx 1–3 mm long, sub-campanulate, lobes triangular, pubescent; petals yellow, standard 3–5 mm long, obovate to orbicular, apex retuse, glabrescent, claw present; wings 2–4 mm long, lanceolate to falciform, glabrous; keel petals 2–4 mm long, lanceolate to falciform, glabrous; stamens 10, anthers five globose, five oblate; gynoeceum 0.7–1.3 cm long, ovary 2–4 mm long, glabrescent, stipe 0.5–1 mm long, style 5–9 mm long, straight. Fruit 5–8 × 1–2 mm, with 2 articles, lower article ovoid, puberulous to glabrescent, upper article ellipsoid, reticulate-veined, glabrescent, brown, papillose, rostrum 0.4–0.6 mm long, uncinat, glabrous or papillose. Seeds 1–3 × 1–2 mm, reniform to ovoid, yellow.

**Selected specimens:** BAHIA: Caetité, Bosque do Jacaraci, 6.VII.2019, fl. and fr., *J.J.S. Ferreira 316* (HUNEB - Coleção Caetité); Brejinho das Ametistas, estrada para Brejinho das Ametistas, 19.I.2009, fr., *L.V. Vasconcelos et al. 131* (HUNEB - Coleção Caetité); subida para as torres de transmissão, 20.VI.2017, fl. and fr., *J.J.S. Ferreira 197* (HUNEB - Coleção Caetité).

A South American species occurring in Colombia and Venezuela (Ferreira & Costa 1977; Costa 2006) and in Brazil in the Caatinga and Cerrado domains, in the states of Goiás, Minas Gerais, and Rondônia (Gissi 2020). In Northeast region it is only known in areas of caatinga and cerrado of Bahia, growing in sandy-clay soils, at elevations ranging from 850 to 900 meters. The species flowers and fruits in January and July.

A species with an erect, not branched habit, and compound terminal spikes, covered in orange to golden trichomes. *Stylosanthes aurea* shares the sub-shrubby unbranched habit of *S. gracilis* but differs by having its fruits with a reticulate-veined surface. Furthermore, the bract leaflets are larger in *S. gracilis* (4–5 mm vs. 2–3.5 mm long) and the inner surface of the bracts in *S. aurea* is covered by orange trichomes (*vs.* white trichomes on the upper part of the inner face in *S. gracilis*).

**4. *Stylosanthes bracteata*** Vogel, *Linnaea* 12: 70.1838.

Subshrub 0.1–0.4 m tall, decumbent, branched; branches cylindrical, pilose to vilose. Stipules 0.8–1.5 cm long, amplexicaul, pilose. Petiole 0.1–0.5 cm long, pilose; leaf rachis 0.5–3 mm long; leaflets 0.7–2 × 0.3–0.6 cm, elliptic to oblanceolate, chartaceous, discolorous, adaxial surface dark green, abaxial surface light green, base cuneate to obtuse, apex mucronate, villous, venation camptodromous. Inflorescences 0.9–1 × 0.5–0.8 mm, terminal, ovoid, congested, comprising 2–5 broadly elliptic spikes, with 2–6 flowers per spike, pilose, secondary bracts ovoid, paleaceous, pilose on the inner and outer face, bract leaflets 1–3 mm long, linear, pilose, sessile; external bracteole 1, ovoid, 1–5 mm long, internal bracteoles 2, 2–5 mm long, lanceolate, pubescent. Flowers 12–14 mm long; subtended by an axis rudiment; calyx 1–4 mm long, sub-campanulate, lobes deltoid, pubescent; petals yellow, standard 5–6 mm long, obovate, apex retuse to emarginate, glabrescent, claw absent; wings 3–4 mm long, obovate, glabrous; keel petals 3–4 mm long, falciform, glabrous; stamens 10, anthers, five oblong, five globose; gynoeceium 0.5–1.1 cm long, ovary 2–4 mm long, glabrescent, stipe 0.5–1 mm long, style 5–7 mm long, straight. Fruit 3–5 × 2–3 mm, with 1 article, the lower article aborted, upper article ellipsoid, not reticulate-veined, pilose, brown, its rostrum 2–2.5 mm long, curved, pilose. Seeds 3–4 × 1–2 mm, oblong to ovoid, yellowish to brown.

**Selected specimens:** BAHIA: Alagoinhas, Reserva do Araticum, 15.X.2008, fl. and fr., *C.S. Silva-Lima 53208* (HUNEB - Coleção Alagoinhas). Mucugê, caminho a Andaraí, 20.I.1997, fl., *M.M. Arbo et al. 7579* (BOTU, HUEFS). Rio de Contas, Serra do Rio de Contas, 18.I.1972, fl., *R.M. Harley et al. 15218* (US).

*Stylosanthes bracteata* occurs in South America from Bolivia to Guyana (Costa 2006). In Brazil, it is found in the states of Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Paraná, São Paulo, and Distrito Federal (Gissi 2020). In the study area it is recorded from cerrado and seasonal semideciduous forest in the state of Bahia, in sandy-clay to stony soils, at an elevation of 350 to 900 m. Specimens with flowers and fruits have been collected in January and October.

This species has a decumbent habit, short leaflets (0.7–2 cm long), broadly elliptic spikes 1.3–3 cm long, and fruits with a hairy upper article. *Stylosanthes bracteata* can be confused

with *S. macrocephala* mainly because it shares the character of broadly elliptic inflorescences, but it differs by the fruits with the lower article aborted and the upper article hairy (*vs.* fruits with two fertile pubescent to glabrescent articles in *S. macrocephala*). Additionally, *Stylosanthes bracteata* has a distinctive subterranean system (xylopodium), which is absent in *S. macrocephala*.

**5. *Stylosanthes campestris*** M.B. Ferreira & Sousa Costa, *An. Soc. Bot. Brasil*, XXVIII Congr. Nac. Bot. 81 (1977, publ. 1978). Fig. 7c

Subshrub 0.3–0.5 m tall, erect, unbranched; branch cylindrical, hispid to glabrescent. Stipules 1–2 cm long, amplexicaul, pubescent. Petiole 0.5–0.7 cm long, glabrescent; leaf rachis 2–3 mm long; leaflets 1.5–3 × 0.5–0.8 cm, lanceolate to elliptical, chartaceous, discolorous, adaxial surface dark green, abaxial surface brown-green, base rounded, apex attenuate, pubescent, venation camptodromous. Inflorescences 1.5–2.5 cm long, terminal, fasciculate, comprising 2–4 elliptic spikes, 4–15 flowers per spike, pubescent; secondary bracts 5–6.5 × 2.5–4 mm, oblong, paleaceous, pubescent on the inside, pilose on the outside, golden trichomes present, bract leaflets 4.5–6 mm long, lanceolate, petiolate, pilose, golden trichomes present; bracteoles 2, 1–4 mm long, elliptic, glabrescent, green. Flowers 6–8 mm long, not subtended by an axis rudiment; calyx 2–3 mm long, sub-campanulate, lobes deltoid, pubescent; petals yellow, standard 5–7 mm long, obovate to orbicular, apex retuse to emarginate, glabrescent, claw absent; wings 4–5 mm long, lanceolate to falciform, glabrous; keel petals 4–5 mm long, lanceolate to falciform, glabrous; stamens 10, five anthers oblong, five obovate; gynoeceium 0.7–1.3 cm long, ovary 1–3 mm long, glabrescent, stipe 0.2–1 mm long, style 7–9 mm long, straight. Fruit 5–6 × 2–3 mm, with 1 article, the lower article aborted, upper article ellipsoid, reticulate-veined, papillose, brown, its rostrum 0.3–0.5 mm long, curved, papillose and pubescent. Seeds 1–3 × 1–3 mm, globose to reniform, black.

**Selected specimens:** BAHIA: Brejinho das Ametistas, 1.II.2019, fl. and fr., *N.A. Matos 14* (HUNEB - Coleção Caetité). Caetité, 18 km da cidade, Comunidade de Santa Luzia, 10.III.1994, fl. and fr., *V.C. Souza 5423* (HUEFS); subida do cruzeiro, 11.XII.2014, fl. and fr., *J.J.S. Ferreira 60* (HUNEB - Coleção Caetité).

*Stylosanthes campestris* occurs in Brazil, Colombia and Venezuela (Ferreira & Costa 1977; Costa 2006). In Brazil, it occurs in caatinga and



cerrado vegetation, in the Central-west (Goiás and Mato Grosso), Southeast (Minas Gerais and São Paulo), and South region (Paraná) (Gissi 2020). In Northeast region, it is recorded from Bahia, in areas of Cerrado and Caatinga, generally in sandy to clay soils, from 810 to 900 m elevation. Known to flower and fruit in the months of February, March, and December.

*Stylosanthes campestris* can be identified in the field by its erect sub-shrubby habit, its lanceolate to elliptic leaflets measuring 1.5 to 3 cm in length, its compound, terminal inflorescences, and its ellipsoid upper fruit articles. It can be morphologically confused with *S. acuminata* (see notes under that species).

**6. *Stylosanthes capitata*** Vogel, *Linnaea* 12: 70. 1838. Fig. 8m-p

Subshrub 0.4–0.5 m tall, decumbent or erect, branched; branches cylindrical, brownish, pubescent. Stipules 0.7–1.7 cm long, amplexicaul, pubescent. Petiole 2–6 mm long, pubescent; leaf rachis 1–2.2 mm long; leaflets 0.5–1.5 × 0.3–0.7 cm, elliptic, membranaceous, discolorous, adaxial surface dark green, abaxial surface light green, base attenuate, apex acuminate, pubescent, venation camptodromous. Inflorescences 1.5–5 cm long, terminal or axillary, elliptic, congested, comprising 1–5 elliptic spikes, 3–7 flowers per spike, pubescent; secondary bracts 1–1.8 × 0.6–1 cm, elliptic, hyaline, pubescent on the central vein on the inner surface, pubescent on the outside, bract leaflets 5–7 mm long, elliptic, petiolate, pilose; external bracteole 1, ovoid, internal bracteoles 2, 2–6 mm long, lanceolate to linear, pubescent. Flowers 4–6 mm long, subtended by an axis rudiment; calyx 2–3 mm long, sub-campanulate, lobes ovate, green, pubescent; petals yellow, glabrescent to glabrous, standard 3–5 mm long, broadly elliptic, apex rounded, glabrous, claw absent; wings 2–3 mm long, falcate; keel petals 2–3 mm long, falcate; stamens 10, anthers, five oblong, five obovate; gynoeceum 0.6–1.2 cm long, ovary 2–3 mm long, glabrescent, stipe 0.5–1 mm long, style 6–9 mm long, straight. Fruit 4–5 × 1–2 mm, with 2 articles, lower article ovoid, pilose, upper article ellipsoid, reticulate-veined, glabrescent, brown, its rostrum 1–2.5 mm long, curved or uncinat, pubescent or glabrous. Seeds 2–4 × 2–3 mm, globose, brownish.

**Selected specimens:** ALAGOAS: Junqueiro SE, BR-101 Aracajú-Maceió, 18.VII.1980, fl. and fr., *L. Coradin 3071* (CEN). BAHIA: Caetité, BR-430, Caetité-Igaporã,

15.IV.2017, fl. and fr., *J.J.S. Ferreira 74* (HUNEB - Coleção Caetité). Correntina, ca. 43 km de Santa Maria da Vitória, estrada para Correntina, 15.II.2000, fl. and fr., *L.P. Queiroz et al. 6042* (ALCB). CEARÁ: Crateús. RPPN Serra das Almas, 22.VI.2014, fl. and fr., *F.H.H. Nascimento & L.S. Rios 1413* (HUEFS). MARANHÃO: Balsas, Agrovila Nova de Carli, lote pivô Central, 4.VII.1998, fl. and fr., *R.C. Oliveira et al. 1170* (FURB). PARAÍBA: Mamanguape, BR-101, próximo ao km 60, 17.IX.1979, fl. and fr., *A.J. Castro et al.* (EAC 6951). PERNAMBUCO: Petrolina, estrada para Pau a Pique, ca. 11 km da BR-235, 14.VII.2009, *J.P. Souza 10037* (HVASF). PIAUÍ: Dermeval Lobão, BR-316, 25.V.1980, fl. and fr., *L. Coradin 2613* (CEN). RIO GRANDE DO NORTE: Nisia Floresta, FLONA, 4.V.2003, *M.I.B. Loiola 766* (UFP). SERGIPE: Área Branca, Serra de Itabaiana, 12.X.2007, fl., *B.S. Amorim 156* (UFP).

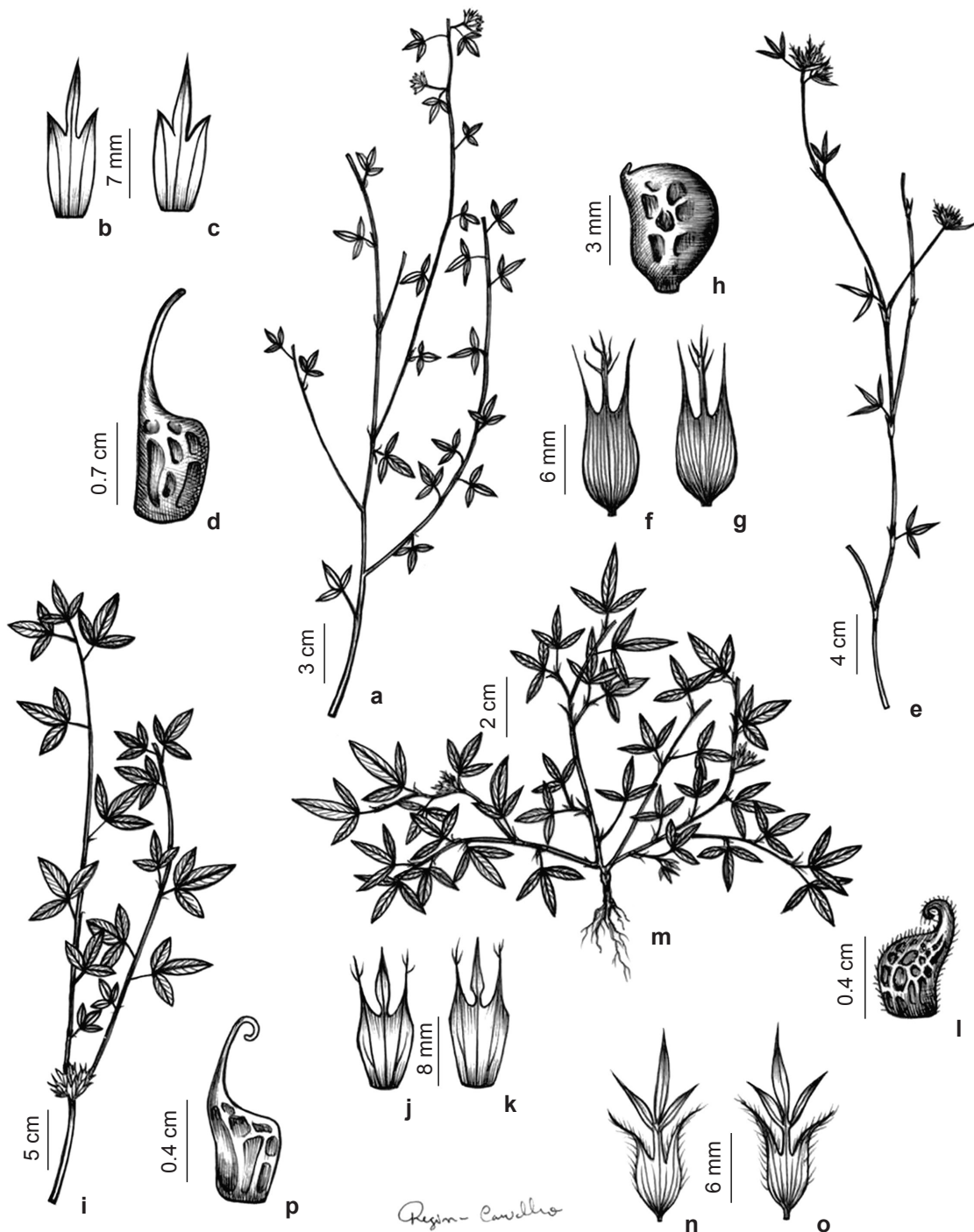
*Stylosanthes capitata* occurs in Bolivia, Brazil and Venezuela (Ferreira & Costa 1979; Costa 2006). In Brazil it is found in all regions (Gissi 2020). In Northeast it has been recorded in all states, growing in caatinga, cerrado s.s. and seasonal semideciduous forest, in sandy-clay soils, between 700 and 900 meters elevation. It flowers and fruits in February, April, June, July, and from September to October.

This species can be identified in the field mainly by its long, robust inflorescences (1.5–5 cm long) when compared to the other congeneric species in the study area (1–2 cm long). In addition, leaflets are wider than in other species occurring in Northeast region (0.5–1 cm vs. 0.2–0.5 cm); hyaline secondary bracts also characterize the species. *Stylosanthes capitata* can be morphologically confused with *S. macrocephala* because they have superficially similar inflorescences but *S. capitata* has hyaline bracts (purple in *S. macrocephala*) and elliptic spikes (vs. ovoid).

**7. *Stylosanthes debilis*** M.B. Ferreira & Sousa Costa, *Soc. Bot. Brasil Anais* 28: 48-49. 1979b.

Fig. 9a-d

Subshrub 0.3–0.4 m tall, erect or decumbent, branched; branches cylindrical, pubescent. Stipules 0.5–1 cm long, amplexicaul, pubescent. Petiole 0.5–0.8 cm long, pubescent; leaf rachis 1–3 mm long; leaflets 0.8–1.2 × 0.4–0.6 cm, elliptic, chartaceous, discolorous, adaxial surface dark green, abaxial surface light green, base rounded, apex attenuate to retuse, pubescent, venation camptodromous. Inflorescences 1–2 cm long, terminal, lax, comprising 2–3 elliptic spikes, 3–5 flowers per spike, pubescent; secondary bracts 5–7 × 2.5–3 mm, elliptic, paleaceous, glabrous on the inside, pilose on the outside, bract leaflets 2–3.5



**Figure 9**— a-d. *Stylosanthes debilis* – a. stem; b-c. secondary bracts; d. upper article of the lomentum. e-h. *Stylosanthes gracilis* – e. stem; f-g. secondary bracts; h. upper article of the lomentum. i-l. *Stylosanthes hamata* – i. stem; j-k. secondary bracts; l. upper article of the lomentum. m-p. *Stylosanthes humilis* – m. habit; n-o. secondary bracts; p. upper article of the lomentum. (a-d. J.J.S. Ferreira 235; e-h. J.J.S. Ferreira 265; i-l. J.J.S. Ferreira 222; m-p. J.J.S. Ferreira 306).

mm long, elliptic, petiolate, pilose; bracteoles 2, 3–4 mm long, lanceolate to elliptic, glabrescent, green. Flowers 4–5 mm long, not subtended by an axis rudiment; calyx 1–2 mm long, sub-campanulate, lobes deltoid, pubescent; petals yellow, standard 3–4 mm long, obovate to orbicular, apex retuse, glabrous, claw absent; wings 2–3 mm long, falciform, glabrous; keel petals 2–4 mm long, falciform, glabrous; stamens 10, anthers five oblong, five globose; gynoecium 0.5–1 cm long, ovary 2–3 mm long, glabrescent, stipe 0.5–1 mm long, style 4–7 mm long, straight. Fruit 5–7 × 1–2 mm, with 2 articles, lower article elliptic to ovoid, pubescent, upper article elliptic, inconspicuously reticulate-veined, glabrescent, brown, its rostrum 2–3 mm long, curved, glabrous or pilose. Seeds 1–2 × 0.5–2 mm, globose to reniform, yellow to brown. **Selected specimens:** BAHIA: Cirú, 10.IV.1982, fr., *G.C.P. Pinto 3182* (HUEFS). Iaçú, Ponte do Paraguaçu, 22.III.2002, fl. and fr., *C. Van den Berg 913* (HUEFS). Rio de Contas, 13.I.2019, fl. and fr., *J.J.S. Ferreira 228* (HUNEB - Coleção Caetité).

*Stylosanthes debilis* occurs in Brazil, Colombia and Venezuela (Ferreira & Costa 1977; Costa 2006). In Brazil it is found in the cerrado, caatinga and seasonal semideciduous forest in the state of Minas Gerais (Gissi 2020). In Northeast region, it only occurs in Bahia, in areas of caatinga, Rocky grasslands, cerrado *s.s.*, and seasonal forest, where it grows in sandy to clay soils, from 680 to 900 m in elevation. It flowers and fruits in January, March, May, and October.

*Stylosanthes debilis* can be recognized by its elliptic leaflets, terminal, 1–2 cm long inflorescences, fruits with an elongate, curved 2–3 mm long rostrum, and glabrous articles. This suite of characters leads to the species frequently being confused with *Stylosanthes hamata* and *S. scabra*, although *S. debilis* has longer leaflets (0.8–1.2 cm long *vs.* 0.5–1.3 cm in *S. hamata* and *S. scabra*), in addition to not having a plumose axis rudiment, and its fruits being glabrous (*vs.* a plumose axis rudiment present and the fruits with an indumentum in *S. hamata* and *S. scabra*).

**8. *Stylosanthes gracilis* Kunth, Nov. Gen. Sp. (quarto ed.) 6: 507–508, pl. 596. 1823[1824]. (Sept 1824).** Figs. 7d; 9e-h

Subshrub 0.5–0.8 m tall, erect, branched; branches cylindrical, glabrous to pubescent. Stipules 0.6–1.2 cm long, glabrous. Petiole 2–6 mm long, glabrous to pubescent; leaf rachis 1–3 cm long; leaflets 5–7 × 3–5 mm, linear, membranaceous, discolorous, adaxial surface

green, abaxial surface brownish green, base acute, apex acute, pubescent to glabrescent, venation camptodromous. Inflorescences 1–2 cm long, terminal or axillary, congested, ovoid, comprising 2–4 oval or elliptic spikes, golden trichomes present, 5–9 flowers per spike, pilose with trichomes golden and white present; secondary bracts 5–6 × 4–5.5 mm, oval or elliptic, coriaceous, pilose on the inside, white trichomes present, pilose on the outside, bract leaflets 4–5 mm long, lanceolate, pilose, petiolate; bracteoles 2, 2–4 mm long, elliptic to obovate, margin pilose, green. Flowers 5–6 mm long, not subtended by an axis rudiment; calyx 1–3 mm long, sub-campanulate, lobes broadly elliptic, pubescent, green; petals yellow, glabrous, standard 3–5 mm long, elliptic, apex rounded, claw present; wings 2–3 mm long, lanceolate; keel petals 2–3 mm long, lanceolate, glabrous; stamens 10, anthers five oblong, five globose; gynoecium 0.8–1.3 cm long, ovary 2–4 mm long, glabrescent, stipe 0.7–1 mm long, style 5–9 mm long, straight. Fruit 2–3 × ca. 1 mm, with 1 fertile article, lower article aborted, upper article ovoid, reticle discreet, papillose, the papillae pedicellate, brown, rostrum 0.4–0.5 mm long, curved or uncinat, pubescent and papillose. Seeds 2.5–3 × 1–2 mm, ovoid, black.

**Selected specimens:** ALAGOAS: Palmeira dos Índios, Ponte do Rio Alegre, 15 km da zona urbana, 17.VIII.2006, *R.P. Lyra-Lemos & M.R. Santos 9740* (MAC). BAHIA: Caetité, trilha do Riacho Jatobá, 17.III.2017, fl. and fr., *J.J.S. Ferreira 77* (HUNEB - Coleção Caetité). Candiba, Fazenda Andes e Nasca, 19.IV.2007, fl. and fr., *A.O. Soares Filho 214* (HUESB). CEARÁ: Fortaleza, Campus do Pici, 5.V.1976, fr., *A. Fernandes EAC2759* (HUEFS). MARANHÃO: Passagem Franca, entre Passagem Franca e São João dos Patos, 23.II.1980, fl. and fr., *A. Fernandes & P. Bezerra* (EAC 8012). PARAÍBA: Mamanguape, Reserva Biológica de Guaribas, 3.X.2002, fr., *S.M.C. Barbeiro 2007* (EAC). PERNAMBUCO: Arcoverde, área de tensão ecológica ao sul da localidade de Caraibas de Cima, 4.II.2014, *A.C.P. Oliveira 3305* (HVASF). RIO GRANDE DO NORTE: São Miguel, encosta da Serra São Miguel, Olho D'Água Danta, 21.VII.1991, fr., *M.A. Figueiredo et al. 281* (EAC). SERGIPE: Areia Branca, Parque Nacional da Serra de Itabaiana, na primeira mancha de areia branca após a entrada do PARNA, 30.VIII.2008, fl. and fr., *T.V.P. Dantas et al. 83* (ASE).

*Stylosanthes gracilis* occurs in Bolivia, Brazil, Colombia, French Guiana, Guyana, Panama, Paraguay, Suriname and Venezuela (Costa 2006; Calles & Schultze-Kraft 2010). In Brazil, it is found in the five regions of the country, in almost all states in the North, Central-west, Southeast and South, growing in caatinga, cerrado, deciduous seasonal forest, seasonal semideciduous forest

and Amazonian savanna (Gissi 2020). Although *S. gracilis* is recorded from all states of the Northeast region in Gissi (2020), in our study we recorded it from Alagoas, Bahia, Ceará, Maranhão, Pernambuco, and Sergipe, growing in sandy-clay soils between 250 and 900 m elevation in areas of caatinga, cerrado *s.s.* and seasonal semideciduous forest vegetation. It flowers and fruits throughout the year.

*Stylosanthes gracilis* can be recognized by its erect, branched habit, linear leaflets, and terminal to axillary compound inflorescences. In the reproductive stage it is common to find it without leaves, a striking feature of this species. In addition, it has golden trichomes on its inflorescences, a characteristic shared with *S. aurea*, which can lead to some difficulty in identification. See the notes under *S. aurea* for morphological comparison of the two species.

**9. *Stylosanthes grandifolia*** M.B.Ferreira & Sousa Costa, Anais Soc. Bot. Brasil 28: 84. 1977.

Subshrub 0.7–1.1 m tall, erect, unbranched; branch cylindrical, villous to tomentose. Stipules 0.9–2 cm long, amplexicaul, pubescent. Petiole 0.6–1 cm long, villous to setose; leaf rachis 0.5–3 mm long; leaflets 3–4 × 0.3–1.5 cm, oblanceolate, chartaceous, discolorous, adaxial surface green, abaxial surface brownish, base obtuse, apex mucronate, glabrous to pubescent, venation camptodromous. Inflorescences 1–3 cm long, terminal, congested, comprising 2–4 broadly elliptic, pilose spikes, 3–15 flowers per spike; secondary bracts 6–9 × 2–3.5 mm, oblong, paleaceous, pilose on the upper part on the inside and outside, bract leaflets 5–7 mm long, lanceolate, petiolate, pilose, golden trichomes present; bracteoles 2, 3–5 mm long, lanceolate, pubescent. Flowers 10–13 mm long; not subtended by an axis rudiment; calyx 1–3 mm long, sub-campanulate, lobes triangular, petals yellow, standard 6–9 mm long, obovate to orbicular, apex rounded, glabrescent, claw absent; wings 4–6 mm long, obovate, glabrous; keel petals 4–5 mm long, oblong to falciform, glabrous; stamens 10, anthers, five oblate, five globose; gynoecium 0.7–1 cm long, ovary 2–4 mm long, glabrescent, stipe 0.4–1 mm long, style 4–6 mm long, straight. Fruit 3–4 × 2–3 mm, with 1 fertile article, lower article aborted, upper article ellipsoid, reticulate-veined, papillose, brown, its rostrum 0.2–0.3 mm long, uncinat, papillose. Seeds 2–3 × 1–2 mm, ellipsoid, yellow, black or brown.

**Selected specimens:** BAHIA: Correntina, Cerrado ao lado da estrada entre São Manoel do Norte e Jaborandi, 8.IV.2005, fl. and fr., *E.B. Miranda 722* (HUEFS). Jaborandi, Rod. Jaborandi-Correntina, 19.IV.2001, fl. and fr., *J.G. Jardim 3682* (HUEFS). MARANHÃO: Imperatriz, “Bananal”, 15 km south of Imperatriz along Belém-Brasília highway (BR-010), Imperatriz, 29.II.1980, fl. and fr., *T. Plowman 9357* (INPA). PARAÍBA: Mamanguape, reserva biológica Guaribas, Área II - Palmeiral, 17.VIII.2002, fl. and fr., *A.C. Sevilha 2166* (CEN). PERNAMBUCO: Sairé, Fazenda Araçá, 13.X.1994, fl. and fr., *Z. Travassos 200* (IPA). PIAUÍ: Bom Jesus, Rodovia Transcapeta, km 187,9, 20.X.1987, fr., *R.F.A. Veiga 111* (CEN).

*Stylosanthes grandifolia* is distributed from Bolivia to Venezuela (Ferreira & Costa 1977; Costa 2006). The species is found in all Brazilian regions (Costa 2006; BFG 2018, 2021; Gissi 2020). In the Northeast region it is known from the states of Bahia, Maranhão, Paraíba, Pernambuco and Piauí, growing in cerrado *s.s.* and seasonal semideciduous forest, and generally occurring in sandy-clay to sandy soils, from 580 to 800 m elevation. It has been collected with flowers in April and with fruits in April and October.

This species can be recognized by its single upright stem with relatively large leaflets (3–4 × 0.3–1.5 cm), its broadly elliptic inflorescence spikes and its reticulate-veined, papillate fruits. It is easily confused morphologically with *S. acuminata* and *S. nunoii* but differs from them mainly by its evident reticulate-veined fruit surface and sparse papillae, while *S. acuminata* has densely papillate fruits and no evident venation and *S. nunoii* has its fruit surface with an inconspicuously reticulate venation and numerous papillae.

**10. *Stylosanthes guianensis*** (Aubl.) Sw., Kongl. Vetensk. Acad. Nya Handl. 10: 301.1789. Fig. 7e

Subshrub 0.4–0.7 m tall, prostrate or decumbent, branched; branches cylindrical, pubescent, with viscose, setose trichomes. Stipules 0.6–1 cm long, peltate, pubescent. Petiole 2–6 mm long, pubescent; leaf rachis 1–2.5 cm long; leaflets 0.5–1.3 × 0.1 cm, elliptic to lanceolate, papyraceous, discolours, adaxial surface green, abaxial surface light green, base rounded to attenuate, apex attenuate to rounded, mucronate, viscose, venation camptodromous. Inflorescences 0.9–1.5 cm long, axillary, oblong or elliptic, spike oblong or elliptic, 7–15-flowered, tomentose; secondary bracts 5–7 × 3–4 mm, elliptic, coriaceous, glabrescent on the inside, pubescent on the outside, bract leaflets



2.5–4 mm long, elliptic, pilose, petiolate; bracteoles 2, 1–2 mm long, linear to lanceolate, pubescent. Flowers 5–7 mm long, not subtended by an axis rudiment; calyx 3–4 mm long, sub-campanulate, lobes ovate, green, pubescent; petals yellow, glabrous, standard 4–5 mm long, broadly elliptic, apex rounded to retuse, claw absent; wings 3–4 mm long, falcate; keel petals 2–3 mm long, falcate; stamens 10, anthers five oblong, five globose; gynoeceium 0.4–0.8 cm long, ovary 2–3 mm long, glabrescent, stipe 0.5–1 mm long, style 4–5 mm long, straight. Fruit 1–2 × ca. 0.2 mm, with one fertile article, lower article aborted, upper article ellipsoid, reticulate-veined, glabrescent, brown, its rostrum 0.1–0.2 mm long, uncinat, papillose or pubescent. Seeds 2–3 × 1–2 mm, ovoid, brownish, yellow or black.

**Selected specimens:** ALAGOAS: Reserva Biológica Pedra Talhada, Quebrangulo, Alagoas, 4.X.2010, fl., *C. Mota 8751* (MAC). BAHIA: Caetitê, BR-430, Caetitê-Igaporã, 15.IV.2017, fl. and fr., *J.J.S. Ferreira 75* (HUNEB - Coleção Caetitê). Salvador, região metropolitana de Salvador, 12.VI.1980, fr., *D.A.C. Nascimento 6* (ALCB). São Desidério, Manoel de Souza, 21.VII.2007, fl. and fr., *A. Cotrim 799* (HUEFS). CEARÁ: Crato, Sítio Venha Ver, Chapada do Araripe, 5.IV.2017, fl. and fr., *N.B. Campos 59* (HCDAL). MARANHÃO: Bequimão, Baixada Maranhense, 9.X.2014, fl. and fr., *O. Gostinski 27* (MAR). PARAÍBA: Mamanguape, BR-101, próximo ao km 68, 17.IX.1979, fl. and fr., *E. Nunes EAC 6947* (HUEFS). PERNAMBUCO: Buíque, Parque Nacional do Catimbau, próximo a 1 km da Pousada Vale do Catimbau, 24.I.2012, fl. and fr., *C.R.S. Oliveira 74* (HVASF). PIAUÍ: estrada Bom Jesus à Estação Ecológica Uruçuí-Una, 18.X.1980, fr., *A. Fernandes* (HUEFS 138940). RIO GRANDE DO NORTE: Serra Negra do Norte, Estação Ecológica do Seridó, 8.VII.2006, fl. and fr., *R.T. Queiroz 1086* (EAC). SERGIPE: Pirambu, povoado Aguilhadas, 27.IX.2012, fl. and fr., *T. Carregosa 275* (ASE).

*Stylosanthes guianensis* has a wide distribution in the Neotropics (Argentina, Bolivia, Brazil, Costa Rica, Colombia, French Guiana, Guatemala, Guyana, Mexico, Nicaragua, Panama, Paraguay, Peru, and Venezuela), where it grows in a range of vegetation types (Ferreira & Costa 1979; Costa 2006; Cook *et al.* 2020). In Brazil, it occurs from north to south, being present in all states of the Central-west and Southeast regions, also occurring in the North (except Acre) and South (Gissi 2020). It is found in all states of the Northeast region, growing in caatinga, cerrado *s.s.* and seasonal semideciduous forest, in sandy-clay to sandy soils, between 250 and 900 m elevation. It flowers and fruits practically throughout the year.

*Stylosanthes guianensis* can be identified in the field by its decumbent habit (but *S. guianensis* has some varieties with an erect habit, axillary inflorescences, with a single oblong or elliptic spike, fruit with its lower article aborted and the rostrum of the upper persistent article 0.1–0.2 mm long). The species shares viscous branches and leaflets with *S. scabra* and *S. viscosa*, but the three species differ by their fruit indumentum, which is glabrescent in *S. guianensis*, tomentose in *S. viscosa* and pubescent in *S. scabra*.

**11. *Stylosanthes hamata* (L.) Taub., Verh. Bot. Vereins Prov. Brandenburg 32(1): 22. 1890.**

Figs. 7f; 9i-1

Subshrub 0.1–0.6 m tall, prostrate, decumbent, or rarely erect, branched; branches cylindrical, villose to tomentose. Stipules 0.5–0.8 cm long, amplexicaul, pubescent. Petiole 0.1–0.5 cm long, pubescent; leaf rachis 1–3 mm long; leaflets 0.6–2 × 0.3–0.6 cm, elliptic, chartaceous, discolorous, adaxial surface green, abaxial surface light green, base obtuse, apex attenuate, glabrous to pubescent, venation camptodromous. Inflorescences 0.8–1.5 cm long, terminal, fasciculate, pilose, comprising 1–3 elliptic spikes, 5–9 flowers per spike; secondary bracts 6–8 × 3.5–4 mm, oblong, paleaceous, glabrescent on the inside, pilose on the outside, bract leaflets 2.5–3.5 mm long, elliptic, glabrous or pilose, petiolate, petiole winged; external bracteole 1, elliptic, internal bracteoles 2, linear, 1–3 mm long, pubescent. Flowers 8–11 mm long, subtended by an axis rudiment; calyx 1–2 mm long, sub-campanulate, lobes ovoid, pubescent; petals yellow, standard 4–5 mm long, orbicular, apex emarginate, glabrescent, claw absent; wings 3–4 mm long, obovate, glabrous; keel petals 3–4 mm long, falciform, glabrous; stamens 10, anthers five oblong, five globose; gynoeceium 0.7–1.2 cm long, ovary 2–3 mm long, glabrescent, stipe 0.4–1 mm long, style 5–9 mm long, straight. Fruit 3–4 × 1–2 mm, with 1–2, oblong to ellipsoid, pilose, reticulate-veined articles, brown, the upper article rostrum 2–3 mm long, long-curved, pilose. Seeds 1.5–2 × 1–1.5 mm, oblong, yellow or brown.

**Selected specimens:** BAHIA: Barreiras, BR-242, km 702, Brasília-Fortaleza, beira de estrada, 28.IX.1978, fl. and fr., *L. Coradin 1172* (CEN). Ibipecta, 52 km da cidade de Ibipecta, 30.III.2006, fl. and fr., *A.C. Melo 26* (HUEFS); 2.III.2006, fl. and fr., *A.C. Melo 19* (HUEFS). Santo Amaro, Canyon do Sargi, 14.II.2007, fl. and fr., *C. Van den Berg 1063* (HUEFS). CEARÁ: Sobral, BAG - Forrageiras CNP - Caprinos, 19.VI.1979, fr., *L. Coradin*

2079 (CEN); 19.VI.1979, fr., *L. Coradin 2077* (CEN). PERNAMBUCO: Vitória de Santo Antão, margem da BR-25, 11.VII.1961, *S. Tavares 649* (US). RIO GRANDE DO NORTE: Fazenda Açude do Governo, Carnaúba dos Dantas, 21.V.2004, fl. and fr., *L.P. Félix et al. 10280* (EAN).

This species is distributed in Central America (Guatemala, Nicaragua), North America (United States), South America (Brazil, Colombia, Peru, Venezuela) and in the Caribbean region (Cook *et al.* 2020). In Brazil, it is found in the Central-west region in the the state of Mato Grosso do Sul (Gissi 2020). In the study area, it is recorded from areas of Caatinga and Cerrado, in the states of Bahia, Ceará (Gissi 2020), Maranhão, Paraíba, Pernambuco, Piauí, and Rio Grande do Norte, generally occurring in sandy-clay soils, from 200 to 880 m elevation. Flowering and fruiting of *S. hamata* occurs in February and March, and from May to October.

*Stylosanthes hamata* ranges in habit from erect to decumbent or prostrate; its branches are villous to tomentose, its leaflets elliptic, 0.6–2 cm long, and its inflorescence spikes are short, 0.8–1.5 cm long. It can be confused morphologically with *S. debilis* because elliptic spikes occasionally occur in *S. debilis*. However, *S. hamata* flowers have a plumose rudiment axis which is absent in *S. debilis*.

**12. *Stylosanthes hispida*** Rich., Actes Soc. Hist. Nat. Paris 1: 112. 1792.

Subshrub 0.4–0.6 m tall, decumbent, prostrate or erect, branched; branches cylindrical, pubescent. Stipules 0.7–1.5 cm long, amplexicaul. Petiole 0.3–0.6 cm long, pubescent; leaf rachis 2–3 mm long; leaflets 0.8–1.5 × 0.3–0.6 cm, lanceolate, chartaceous, discolorous, adaxial surface dark green, abaxial surface light green, base rounded, apex acuminate, pubescent, venation camptodromous. Inflorescences 0.5–1 cm long, terminal to axillary, congested, comprising 1–4 elliptic spikes, 2–7 flowers per spike, pubescent; secondary bracts 4–7 × 4–6 mm, oblong to elliptic, coriaceous, pubescent on the upper part on the inside, pilose on the outside, bract leaflets 3.5–5 mm long, acicular, pilose, petiolate; external bracteole 1, elliptic, internal bracteoles 2, lanceolate to elliptic, 2–3 mm long, glabrescent. Flowers 6–7 mm long; subtended by an axis rudiment; calyx 3–4 mm long, sub-campanulate, lobes triangular, pubescent; petals yellow, standard 3–5 mm long, obovate to orbicular, apex retuse to emarginate,

glabrescent, claw absent; wings 2–4 mm long, lanceolate to falcate, glabrous; keel petals 3–4 mm long, lanceolate to falcate, glabrous; stamens 10, anthers five oblong, five globose; gynoeceum 5–9 mm long, ovary 1–3 mm long, glabrescent, stipe 0.5–1 mm long, style 5–6 mm long, straight. Fruit 5–8 × 1–4 mm, with 2 fertile articles, the lower article obovate, glabrescent, the upper article ovoid, the reticulate venation discrete, glabrescent, brown, its rostrum 0.5–1.5 mm long, curved, glabrescent. Seeds 1–3 × 0.5–2 mm, globose to reniform, yellow or black.

**Selected specimens:** MARANHÃO: Caxias, Morros, 30.VI.1907, *A. Duque* (IAN 735).

*Stylosanthes hispida* is found from Colombia to Venezuela (Costa 2006). In Brazil the species occurs in *campos de várzea* and Amazonian savannas in the states of Amapá, Pará, and Mato Grosso (Costa 2006; Gissi 2020). In the Northeast region it has been recorded only from the state of Maranhão, in flooded areas of seasonal forest, in sandy-clay soils, between 300 and 670 m elevation. Flowering and fruiting is known to occur in June.

The species ranges in habit from erect to decumbent or prostrate, and is characterized by lanceolate, pubescent leaflets. Inflorescences can be terminal or axillary. *Stylosanthes hispida* can be confused morphologically with *S. pilosa* as both species have pubescent branches and inflorescences, but it differs by its lanceolate leaflets (vs. elliptic in *S. pilosa*) and its inflorescences with few trichomes (compared to the dense pilose inflorescences of *S. pilosa*).

**13. *Stylosanthes humilis*** Kunth, Nov. Gen. Sp. (quarto ed.) 6: 506, pl. 594.1823. Figs. 7g; 9m-p

Subshrub 0.2–0.3 m tall, decumbent, prostrate, branched; branches cylindrical, setose to tomentose. Stipules 0.4–0.9 cm long, amplexicaul, peltate, pubescent. Petiole 0.2–0.7 cm long, tomentose; leaf rachis 0.3–0.4 cm long, leaflets 0.5–1 × 0.3–0.6 cm, oblong, chartaceous, discolorous, base obtuse, apex mucronate, tomentose, venation camptodromous. Inflorescences 0.5–0.9 cm long, terminal, lax, comprising 1–4 oblong spikes, 4–9 flowers per spike, pubescent; secondary bracts 4–6 × 2–2.5 mm, obovate, paleaceous, glabrous on the inside and outside, bract leaflets lanceolate, pilose, sessile, 2.5–3 mm long; bracteoles 2, 2–6 mm long, oblong to linear, pubescent. Flowers 10–12 mm long; not subtended by an axis rudiment; calyx 2–5 mm long, sub-campanulate, lobes deltoid, pubescent; petals yellow, standard 4–7 mm long,

orbicular, apex emarginate, glabrescent, claw absent; wings 2–4 mm long, obovate, glabrous; keel petals 3–4 mm long, falciform, glabrous; stamens 10, anthers, five oblong, five globose; gynoeceum 0.8–1.3 cm long, ovary 2–4 mm long, glabrescent, stipe 0.5–1 mm long, style 5–7 mm long, straight. Fruit 3–4 × 1–2 mm, with 1–2 fertile articles, lower article obovoid, pubescent, upper article oblong, reticulate-veined, pubescent, brown, its rostrum 4.5–5 mm long, helicoidal, glabrous. Seeds 1–3 × 1–1.5 mm, ellipsoid, yellow or brown.

**Selected specimens:** ALAGOAS: Piranhas, Vila Sergipe, 11.V.1999, fl. and fr., *D. Moura 200* (HUEFS). BAHIA: Casa Nova, 17.XII.2012, fl. and fr., *R.S. de Oliveira 21* (HUEFS). CEARÁ: Pentecoste, Fazenda Experimental Vale do Curu, 4.VIII.1989, fr., *E. Nunes 777* (HUEFS). PARAÍBA: Esperança, 28.IX.1994, fr., *A. Fernandes & E. Nunes* (EAC 21389). PERNAMBUCO: Fernando de Noronha, próximo ao porto, 19.VI.2003, fl. and fr., *A.M. Miranda 4132* (HUEFS). Triunfo, Lagoa Nova, 23.V.1995, fl. and fr., *L.P. Félix HTS17342* (HUEFS). PIAUÍ: Palmas, 14.IV.1994, fl. and fr., *M.S.B. Nascimento 464* (HUEFS). São Paulo, 28.VI.1994, fl. and fr., *M.S.B. Nascimento 7* (HUEFS). RIO GRANDE DO NORTE: Serra Negra do Norte, Estação Ecológica do Seridó, 23.IV.2005, fr., *R.T. Queiroz 187* (EAC). SERGIPE: Areia Branca, 28.V.2014, fl. and fr., *E.S. Almeida 351* (ASE).

*Stylosanthes humilis* is distributed from USA (Arizona), the Caribbean (Cuba), Mexico to Central and South America from Bolivia to Guyana (Costa 2006). In Brazil the species occurs in the states of Amazonas and Pará in the North region, in all states of the Central-west region and in Minas Gerais and São Paulo in the Southeast (Costa 2006; Gissi 2020). In the Northeast region it has been recorded from Alagoas, Bahia, Ceará, Pernambuco, Piauí, and Sergipe (Gissi 2020), and there are new occurrences for the states of Paraíba and Rio Grande do Norte. The species grows in cerrado *s.s.* vegetation and seasonal semideciduous forest, usually on sandy-clay soils, from 200 to 780 m in elevation. Flowering and fruiting occurs in May, June, August, September, and December.

*Stylosanthes humilis* is a branched, prostrate or decumbent subshrub, with oblong leaflets, 0.3–0.6 cm long, extremely short inflorescence spikes (0.5–0.9 cm long) and fruits with a long rostrum (4.5–5 mm long). In the study area, it can be morphologically confused with *S. angustifolia* because of the similar long rostrum of the upper article of the fruit (5–6 mm in long), but its inflorescences are shorter (0.5–0.9 cm long versus 1–3.5 cm long in *S. angustifolia*).

**14. *Stylosanthes leiocarpa*** Vogel, *Linnaea* 12: 64–65. 1838.

Subshrub 0.3–0.4 m tall, erect, or decumbent, branched; branches cylindrical, pilose. Stipules 0.5–1 cm long, densely pilose. Petiole 0.2–0.5 cm long, pubescent; leaf rachis 2–3 mm long; leaflets 0.5–1 × 0.3–0.6 cm, elliptic, cartaceous, discolourous, adaxial surface dark green, abaxial face light green, base rounded, apex mucronate, pubescent, venation camptodromous. Inflorescences terminal, oblong, lax, a single pilose spike, 0.5–1.7 cm long 3–7 flowers per spike, secondary bracts 3–5 × 3–4 mm, oblong, paleaceous, pilose on the upper part inside, pilose on the outside, bract leaflets 3.5–7 mm long, elliptic or oblong, pilose, petiolate; bracteoles 2, 1–2 mm long, elliptic, glabrescent, green. Flowers 5–7 mm long, not subtended by an axis rudiment; calyx 2–3 mm long, sub-campanulate, lobes deltoid, pubescent; petals yellow, standard 4–5 mm long, orbicular, apex retuse to emarginate, glabrous, claw absent; wings 3–6 mm long, lanceolate to falciform, glabrous; keel petals 2–4 mm long, lanceolate to falciform, glabrous; stamens 10, anthers, five oblong, five obovate; gynoeceum 0.5–1 cm long, ovary 2–4 mm long, glabrescent, stipe 0.4–2 mm long, style 3–6 mm long, curved. Fruit 5–7 × 1–3 mm, with 1–2 fertile articles, lower article obovoid, glabrous, upper article ovoid, reticulate veins discrete, glabrous, brown, upper article rostrum 2.5–3 mm long, straight or curved, glabrous. Seeds 1–3 × 1–2 mm, globose or ovoid to reniform, yellowish or black.

**Selected specimens:** BAHIA: Alagoinhas, 23.XI.2005, fl. and fr., *C.S. Silva-Lima 16* (HUNEB - Coleção Alagoinhas). Barra da Estiva, estrada Barra da Estiva-Mucugê, km 31, 4.VII.1983, fr., *L. Coradin 6438* (CEN). Lençóis, rodovia Lençóis-entroncamento da BR-242, km 1, 21.VI.1987, fl. and fr., *L. Coradin 7682* (CEN). PERNAMBUCO: Moreno, Reserva biológica Guaribas, Área II - Palmeiral, 20.IV.1980, fl. and fr., *L. Coradin 2434* (CEN).

*Stylosanthes leiocarpa* extends in distribution to Colombia and Venezuela (Costa 2006). In Brazil, it occurs in cerrado and seasonal semideciduous forest, in the Central-west region (Mato Grosso do Sul), Southeast (Espírito Santo and Minas Gerais), and in the South (Paraná, Rio Grande do Sul, Santa Catarina) (Gissi 2020). In the Northeast region, it is recorded from areas of cerrado *s.s.*, *campo limpo* and atlantic forest of the states of Bahia and Pernambuco, growing in sandy to clay soils, from 200 to 900 m elevation. Flowering and fruiting occurs in March, April, June, July, and November.



*Stylosanthes leiocarpa* can be identified by its usually decumbent habit, pilose branches, pubescent leaflets, terminal inflorescences and oblong spikes. It can be morphologically confused with *S. hamata* due to their shared elliptic leaflets, however, in *S. hamata* the spikes are elliptic and the fruits have their upper article pubescent, while the spikes of *S. leiocarpa* are oblong and the upper articles are glabrous.

**15. *Stylosanthes longicarpa*** Brandão & Sousa Costa, *Daphne* 2(3): 5 1992.

Subshrub 0.5–1 m tall, erect, branched; branches cylindrical, pubescent. Stipules 0.8–1.5 cm long, pubescent. Petiole 0.5–0.8 cm long, pubescent; leaf rachis 3–5 cm long; leaflets 1.5–2.5 × 0.2–0.6 cm, lanceolate, chartaceous, discolourous, adaxial surface green, abaxial face light green, base rounded, apex attenuate, pubescent, venation camptodromous. Inflorescences 0.5–1.5 cm long, terminal or axillary, lax, pubescent, comprising 1–3 ovoid spikes, 6–9 flowers per spike; secondary bracts 3.5–7 × 3–5 mm, ovoid, paleaceous, glabrescent on the inside, pilose on the upper part on the outside, bract leaflets 4–7 mm long, elliptic or oblong, pilose, sessile; bracteoles 2, 2–4 mm long, lanceolate to elliptic, glabrescent, green. Flowers 4–5 mm long; not subtended by an axis rudiment; calyx 1–3 mm long, sub-campanulate, lobes deltoid, pubescent; petals yellow, standard 2–4 mm long, obovate to orbicular, apex retuse to emarginate, glabrescent, claw absent; wings 2–4 mm long, lanceolate to falciform, glabrous; keel petals 3–4 mm long, lanceolate to falciform, glabrous; stamens 10, anthers, five globose, five oblong; gynoeceum 0.6–1.1 cm long, ovary 1–3 mm long, glabrescent, stipe 0.8–1 mm long, style 4–8 mm long, straight. Fruit 5–9 × 1–4 mm, with 1–2 fertile articles, lower article ovoid, pubescent, upper article ovoid, the reticulate venation conspicuous or discrete, with papillae and pubescent, brown, its rostrum 0.4–0.9 mm long, uncinat, glabrous. Seeds 2–3 × 2–3 mm, globose to reniform, yellowish or black.

**Selected specimen:** BAHIA: Caetité, Brejinho das Ametistas, 20 km de Caetité para Brejinho das Ametistas, 13.III.2002, fl. and fr., *T. Ribeiro 254* (HUEFS).

*Stylosanthes longicarpa* occurs in Brazil, Colombia, and Venezuela (Brandão & Costa 1992; Costa 2006). In Brazil it is found in Cerrado, growing in the Central-west (Goiás and Mato Grosso do Sul) and in the Southeast (Minas Gerais) (Costa 2006; Gissi 2020). In the Northeast

region, it is recorded only from Bahia, in areas of Cerrado, usually on sandy-clay soils, from 850 to 900 m elevation. Flowering and fruiting have been observed in March.

This species has an erect habit, lanceolate leaflets, inflorescences with ovoid spikes, elliptic or oblong bracts and papillate fruit articles. It can be confused morphologically with *S. acuminata* because of their shared lanceolate leaflets; however, *S. longicarpa* has pubescent fruits, sometimes with sparse papillae, while *S. acuminata* has densely papillate fruits.

**16. *Stylosanthes macrocephala*** M.B. Ferreira & S. Costa, *Soc. Bot. Brasil Anais* 28 (Cong. 77): 102. 1977. Figs. 7h; 10a-e

Subshrub 0.5–0.7 m tall, erect or decumbent, branched; branches cylindrical, pubescent to glabrescent. Stipules 0.7–1 cm long, peltate, pubescent. Petiole 3–6 mm long, pubescent; leaf rachis 0.5–2 cm long; leaflets 0.5–1.5 × 0.5–1 cm, elliptic to lanceolate, papyraceous, discolorous, adaxial surface dark green, abaxial surface light green, base rounded, apex cuneate, attenuate to mucronate, pubescent, venation camptodromous. Inflorescences 1.5–2.5 cm long, terminal to axillary, lax, pilose comprising 1–3 ovoid spikes, 6–12 flowers per spike; secondary bracts 0.8–1.5 × 0.5–1 cm, broadly elliptic, paleaceous, pilose on the central part on the inside, pilose on the outside, bract leaflets 4–5 mm long, linear, pilose, sessile; external bracteole 1, elliptic, purplish, internal bracteoles 2, 2–5 mm long, lanceolate, pubescent. Flowers 5–6 mm long, subtended by an axis rudiment; calyx 3–4 mm long, sub-campanulate, lobes ovate, green, pubescent; petals yellow, glabrous, standard 4–5 mm long, orbicular to broadly elliptic, apex rounded to retuse, glabrous, claw absent; wings 3–4 mm long, lanceolate, glabrescent; keel petals 3–4 mm long, lanceolate, glabrescent; stamens 10, anthers, five oblong, five globose; gynoeceum 0.7–1.2 cm long, ovary 1–3 mm long, glabrescent, stipe 0.5–1 mm long, style 0.7–0.9 mm long, straight. Fruit 2–4 × ca. 1 mm, with 1–2 fertile articles, lower article obovoid, pubescent, upper article ellipsoid, reticulate-veined, glabrescent, brown, its rostrum 1.5–2.5 mm long, long-curved, puberulous or glabrous. Seeds 3–4 × 1–3 mm, globose to ovoid, yellowish with dark markings.

**Selected specimens:** BAHIA: Caetité, Brejinho das Ametistas, 10.I.2006, fl. and fr., *A.K.A. Santos et al. 580* (HUEFS); BR-430, Caetité-Igaporã, 15.IV.2017, fl.





**Figure 10** – a-e. *Stylosanthes macrocephala* – a. stem; b-c. secondary bracts; d. part of the inflorescence; e. upper article of the lomentum. f-j. *Stylosanthes pilosa* – f. part of the stem; g-h. secondary bracts; i. part of the inflorescence; j. upper article of the lomentum. k-o. *Stylosanthes scabra* – k. stem; l-m. secondary bracts; n. part of the inflorescence; o. upper article of the lomentum. p-t. *Stylosanthes viscosa* – p. stem; q-r. secondary bracts; s. part of the inflorescence; t. upper article of the lomentum. (a-e. J.J.S. Ferreira 26; f-j. J.J.S. Ferreira 238; l-o. J.J.S. Ferreira 211; p-t. M.S. Silva et al. 67).

and fr., *J.J.S. Ferreira 76* (HUNEB - Coleção Caetité). Feira da Mata, Médio São Francisco, a 1 km do Rio Carinhonha, 28.V.2007, fl. and fr., *M.L.S. Guedes 13518* (HUEFS). CEARÁ: Reriutaba, estrada para Guaraciaba do Norte, 25.V.1981, fl. and fr., *A. Fernandes & P. Martins* (EAC 10331). PERNAMBUCO: Serrita, entre Jardim e Cachoeira, 21.V.1996, fl. and fr., *F.S. Araújo & F.R. Martins 1186* (EAC). PIAUÍ: Caracol, Povoado de Bom Sucesso, 16.VII.2011, fl. and fr., *E. Melo 10072* (HUEFS). RIO GRANDE DO NORTE: São Gonçalo do Amarante, 9.VIII.2011, fl. and fr., *A.B. Jardim 300* (HUEFS).

In Brazil, *Stylosanthes macrocephala* occurs in the Central-west region (Distrito Federal, Goiás, and Mato Grosso do Sul) and the Southeast (Minas Gerais and São Paulo) (Costa 2006; Gissi 2020). In the study area it has been recorded from the states of Bahia, Ceará (Gissi 2020), Pernambuco and Piauí, and we record it for the first time from Rio Grande do Norte. It is found mainly in caatinga and cerrado *s.s.*, associated with sandy-clay soils, between 480 and 900 m elevation. Flowering and fruiting occurs from January to August.

*Stylosanthes macrocephala* has an erect or decumbent habit, pubescent to glabrescent branches, purplish external bracts evident throughout the inflorescences, and ovoid spikes. *S. macrocephala* can be confused morphologically with *S. bracteata* due to their similar ovoid inflorescences, however, the two species are differentiated by the pilose fruits of *S. bracteata* while in *S. macrocephala* the fruits are pubescent.

**17. *Stylosanthes minima*** J.J.S. Ferreira & J. Santos-Silva, *Phytotaxa* 456(2): 161-162. pl. 158. 2020. Fig. 7n

Subshrub, prostrate, branched; branches cylindrical, sericeous. Stipules 0.8–1 cm long, amplexicaul, peltate, sericeous. Petiole 2–5 mm long, pilose or pubescent; leaf rachis 1–2 mm long; leaflets 0.7–1.5 × 0.3–0.5 cm, elliptic, chartaceous, discolourous, adaxial surface dark green, abaxial face light green, base acute, apex mucronate, pilose, venation camptodromous. Inflorescences 0.7–1.8 cm long, axillary or terminal, lax, pilose, comprising 2–7 oblong spikes, 4–12 flowers per spike, secondary bracts 0.8–1 × 0.3–0.4 cm, obovate, paleaceous, pilose on the inner and outer face, bract leaflets 1.5–2.5 mm long, linear, sessile, pilose; bracteoles 3, 2.5–3 mm long, oblong, pubescent. Flowers 2.5–4 mm long, subtended by an axis rudiment; calyx 2–3.5 mm long, subcampanulate, lobes triangular, pubescent; petals yellow, standard 4.5–5 mm long, obovate, apex retuse, glabrous, claw absent; wings 3–4.5 mm

long, obovate, glabrous; keel petals 3–3.5 mm long, falciform, glabrous; stamens 10, anthers, five oblong, five globose; gynoeceum 0.6–1 cm long, ovary 2–3 mm long, glabrous, stipe 0.7–1 mm long, style 4–7 mm long, straight. Fruit 2–3 × 1–3 mm, with 2 articles, the lower article usually aborted, ellipsoid when present, pilose, upper article oblong, pilose or pubescent, inconspicuously reticulate-veined, dark brown, its rostrum ca. 0.5 ± 1 mm long, uncinat, pilose. Seeds 1–2 × 1–1.5 mm, ellipsoid, yellowish with red spots.

**Selected specimens:** BAHIA: Caetité, Santa Luzia, 20.VI.2018, fl. and fr., *J.J.S. Ferreira 194* (HUNEB - Coleção Caetité). Rio de Contas, próximo à estrada Rio de Contas-Livramento, 13.I.2019, fl. and fr., *J.J.S. Ferreira 225* (HUNEB - Coleção Caetité). Santa Maria da Vitória, Rod. Lapa-Santa Maria, 28.XII.2018, fl. and fr., *J.J.S. Ferreira 224* (HUNEB - Coleção Caetité).

*Stylosanthes minima* occurs in cerrado and caatinga vegetation of the Southwest and Western regions of Bahia and in the Chapada Diamantina region of Caetité, Rio de Contas and Santa Maria da Vitória, occurring in sandy, clay, sandy-clay or stony soils at elevations ranging from 500 to 850 m (Ferreira *et al.* 2020). The species has been collected with flowers from December to March, and with fruits in June.

The species has a prostrate, branched habit, sericeous branches, elliptic leaflets, and oblong, pilose spikes. *Stylosanthes minima* shares elliptic leaflets with *S. macrocephala* making identification in the field difficult. The species is differentiated mainly by its prostrate habit (*vs.* erect or decumbent in *S. macrocephala*), pilose fruits (*vs.* pubescent or glabrescent), oblong inflorescences (*vs.* ovoid), rostrum of the upper article of the fruit 0.5–1 mm, uncinat (*vs.* 1.5–2.5 mm, long-curved), and bract leaflets lanceolate (*vs.* linear).

**18. *Stylosanthes mitzii*** J.J.S. Ferreira & J. Santos-Silva, *Phytotaxa* 456(2): 162-163. pl. 159. 2020.

Fig. 7o

Subshrub, prostrate, branched; branches cylindrical, lenticellate, glabrous or pubescent, with adventitious roots along the branches. Stipules 1.5–1.7 cm long, amplexicaul, peltate, glabrescent. Petiole 1–2 cm long, pubescent; leaf rachis 1–5 mm long; leaflets 0.7–1.3 × 0.2–0.5 cm, obovate, chartaceous, discolourous, adaxial surface dark green, abaxial face light green, base acute, apex acute, pubescent, venation camptodromous. Inflorescences 2–3 cm long, terminal, lax, pilose, comprising 1–5 oblong spikes, 7–18 flowers per

spike; secondary bracts 1–1.2 × 0.4–0.5 cm, oval, hyaline, pilose on the central rib of the inner face, pilose on the outer face, bract leaflets 3–7 mm long, lanceolate, petiolate, pilose; bracteoles 3, 2–3 mm long, linear or broadly elliptic, pubescent. Flowers 3.5–4 mm long; subtended by an axis rudiment; calyx 2–2.5 mm long, sub-campanulate, lobes broadly elliptic, glabrescent; petals yellow, standard 4–4.5 mm long, orbicular, apex retuse, glabrous, claw absent; wings 3–3.5 mm long, obovate, glabrous; keel petals 2–2.5 mm long, falciform, glabrous; stamens 10, anthers five oblong, five globose; gynoecium 5–9 mm long, ovary 2–4 mm long, glabrescent, stipe 0.3–1 mm long, style 3–5 mm long, straight. Fruit 2–3 × 1–2 mm, with 2 fertile articles, the lower article broadly elliptic, pilose to glabrescent, upper article oblong, reticulate-veined, glabrous to glabrescent, brownish purple, its rostrum 0.5–1.5 mm long, uncinete, glabrous. Seeds 1–2 × 1–1.5 mm, obovate, yellow with red spots.

**Selected specimens:** BAHIA: Caetitê, loteamento UPA, 2.III.2019, fl. and fr., *J.J.S. Ferreira 301* (HUNEB - Coleção Caetitê). Igarorã, BR-430, 1.III.2019, fl. and fr., *J.J.S. Ferreira 300* (HUNEB - Coleção Caetitê). Riacho de Santana, 4.VII.2019, fl. and fr., *J.J.S. Ferreira 317* (HUNEB - Coleção Caetitê).

*Stylosanthes mitzii* occurs in cerrado, Rocky grasslands and caatinga, extending from the Serra Geral to Chapada Diamantina in the southwest and south-central region of Bahia (Ferreira *et al.* 2020). It is usually associated with disturbed areas growing on sandy-clay, sandy or stony soils at altitudes ranging from 500 to 810 m elevation. *Stylosanthes mitzii* has been collected in flower in March and July, and in ripe fruit in July.

*Stylosanthes mitzii* has a prostrate habit, obovate leaflets, oblong inflorescences and glabrous branches with lenticels. It is morphologically similar to *S. capitata* and *S. macrocephala*, but differs from these by its prostrate habit (*vs.* erect or decumbent in the other two species), smaller fruits (2–3 mm long *vs.* 4–5 mm long in *S. capitata* and 3–4 mm long in *S. macrocephala*), oblong inflorescence spikes (*vs.* elliptic in *S. capitata* and ovoid in *S. macrocephala*) and by its lanceolate bract leaflets (*vs.* elliptic in *S. capitata* and linear in *S. macrocephala*).

**19. *Stylosanthes nunoi*** Brandão, *Daphne* 2(1): 5. 1991.

Subshrub 0.4–0.6 m tall, erect or decumbent, branched; branches cylindrical, setose to

tomentose. Stipules 0.9–1.2 cm long, pubescent. Petiole 0.5–1.5 cm long, pubescent; leaf rachis 1.5–3 mm long; leaflets 1.1–2.5 × 0.6–0.7 cm, linear to lanceolate, chartaceous, discolourous, adaxial surface dark green, abaxial surface light green, base acute, apex mucronate, tomentose, venation camptodromous. Inflorescences 1.2–1.5 cm long, terminal, lax, comprising 1–3 broadly elliptic spikes, 4–11 flowers per spike, pubescent; secondary bracts 4–6 × 2.5–3 mm, broadly elliptic, coriaceous, pubescent on the inside and outside, bract leaflets 3–3.5 mm long, lanceolate, pilose, petiolate; bracteoles 2, 2–5 mm long, lanceolate, pubescent. Flowers 9–11 mm long; not subtended by an axis rudiment; calyx 1–4 mm long, sub-campanulate, lobes ovoid, glabrescent; petals yellow, standard 4–6 mm long, orbicular, glabrescent, apex emarginate, claw absent; wings 2–3 mm long, oblong, glabrous; keel petals 2–4 mm long, oblong, glabrous; stamens 10, anthers five oblong, five obovate; gynoecium 0.6–1 cm long, ovary 2–3 mm long, glabrescent, stipe 0.3–1 mm long, style 4–6 mm long, straight. Fruit 2–4 × 1–2 mm, with 2 fertile articles, lower article obovoid, reticulate-veined, pubescent to papillate, papillae, when present, sessile, upper article obovoid, reticulate-veined, papillate, brown, its rostrum 0.5–1 mm long, uncinete, papillate or glabrous. Seeds 1–2 × 1–1.5 mm, oblong, dark brown.

**Selected specimens:** BAHIA: Correntina, ca. 43 km W de Santa Maria da Vitória na estrada para Correntina, 15.II.2000, fl. and fr., *L.P. Queiroz 6040* (HUEFS). Paulo Afonso, Raso da Catarina, Cachimbo, 10.VIII.2005, fl. and fr., *E.B. Miranda 834* (HUEFS). MARANHÃO: Timon, rodovia Timon-Caxias (BR-316), 2.VII.1987, fl. and fr., *L. Coradin 7938* (CEN).

*Stylosanthes nunoi* is distributed from Bolivia to Guyana (Brandão 1991; Costa 2006). In Brazil it is found in nearly all regions, except in the North (Costa 2006; Gissi 2020). In the studied area, it has been recorded from Bahia and Maranhão, in cerrado and seasonal semideciduous forest, generally associated with sandy-clay soils at 450 to 680 m elevation. Flowers and fruits have been collected in February, July, August, and October.

It can be identified mainly by its lanceolate to linear leaflets, terminal compound inflorescences with 1–3 spikes, and papillate upper articles of the fruit. It can be confused morphologically with *S. gracilis* due to their similar linear leaflets; however, it differs by having fruits covered in sessile papillae (*vs.* fruits with pedicellate papillae in *S. gracilis*).



**20. *Stylosanthes pilosa*** M.B. Ferreira & Sousa Costa, Soc. Bot. Brasil Anais 28: 102. 1977.

Figs. 7i; 10f-j

Subshrub 0.2–0.4 m tall, prostrate, decumbent, or erect, branched; branches cylindrical, pilose. Stipules 1–1.5 cm long, pubescent. Petiole 0.3–0.5 cm long, pubescent; leaf rachis 2–3 mm long; leaflets 0.5–1.5 × 0.3–0.7 cm, elliptic, chartaceous, discolourous adaxial surface dark green, abaxial surface light green, base rounded, apex attenuate, pubescent to pilose, venation camptodromous. Inflorescences 2–4.5 cm long, terminal, congested, densely pilose, comprising 1–3 oblong spikes, 3–7 flowers per spike; secondary bracts elliptic, hyaline, pilose on the central vein on the inside, pilose on the outside, 1.5–1.8 × 0.5–0.7 cm, bract leaflets 8–8.5 mm long, elliptic, pilose, petiolate; external bracteole 1, elliptic, internal bracteoles 2, linear, pilose, 2–5 mm long. Flowers 4–5 mm long, subtended by an axis rudiment; calyx 1–2 mm long, sub-campanulate, lobes deltoid, pubescent; petals yellow, standard 3–5 mm long, obovate, apex retuse to emarginate, glabrescent, claw absent; wings 2–4 mm long, lanceolate to falciform, glabrous; keel petals 3–4 mm long, lanceolate to falciform, glabrous; stamens 10, anthers five oblong, five globose; gynoecium 5–8 mm long, ovary 2–3 mm long, glabrescent, stipe 0.6–2 mm long, style 4–5 mm long, straight. Fruit 3–4 × 1–2 mm, with 1–2 fertile articles, lower article ovoid, pubescent, upper article ellipsoid to obovoid, reticulate-veined, glabrous, brown, its rostrum 1–1.5 mm long, helicoidal, pubescent or glabrous. Seeds 1–3 × 1–2 mm, reniform, brownish.

**Selected specimens:** BAHIA: Feira de Santana, Campus Universitário, entre o 1º e 4º módulo, 7.X.1998, fr., M.E.R. *Junqueira* 8 (HUEFS). Xique-Xique, estrada Xique-Xique-Santo Inácio, km 25, 30.VI.1993, fl. and fr., L. *Coradin* 6280 (CEN). CEARÁ: Missão Velha, rodovia Juazeiro do Norte, 27.VI.1987, fl. and fr., L. *Coradin* 7833 (CEN). PERNAMBUCO: Petrolina, rodovia Petrolina-Lagoa Grande (BR-122), 26.III.1987, fl. and fr., L. *Coradin* 7737 (CEN). PIAUÍ: São Raimundo Nonato, PARNA Serra Negra, 24.V.2002, fr., R. *Barros* (HUEFS 67248). Teresina, coleção de forrageiras da UEPAE, 27.V.1980, fr., L. *Coradin* 2625 (CEN).

In Brazil, *Stylosanthes pilosa* occurs in Caatinga, Cerrado and the Amazon forest in the North region (Pará and Tocantins), Central-west (Goiás and Mato Grosso do Sul), and Southeast region (Minas Gerais) (Gissi 2020). In the Northeast region, it has been recorded from Bahia, Ceará, Maranhão, Pernambuco and Piauí in cerrado s.s., caatinga and Amazon forest, usually in sandy

to clay soils, at altitudes ranging from 300 to 600 meters in elevation. Flowers and fruits occur between March to June, and in October.

*Stylosanthes pilosa* has pilose branches, elliptic leaflets, terminal inflorescences 2–4.5 cm long, oblong, compound, and densely pilose. In the field, the species is mainly confused morphologically with *S. capitata* because of their similar hyaline bracts, but *S. capitata* has pubescent inflorescences while *S. pilosa* has densely pilose inflorescences. The two species can also be differentiated by inflorescence shape, elliptic in *S. capitata* and oblong in *S. pilosa*.

**21. *Stylosanthes scabra*** Vogel, Linnaea 12: 69-70. 1838.

Figs. 7j; 10k-o

Subshrub, 0.5–0.6 m tall, decumbent or erect, branched; branches cylindrical, hispid, glandular trichomes present, brownish. Stipules 6–9 mm long, peltate, pubescent. Petiole 2–6 mm long, pubescent; leaf rachis 1–1.7 cm long; leaflets 0.5–1.1 × ca. 0.5 cm, elliptic, papyraceous, discolourous, adaxial surface dark green, abaxial surface light green, base rounded, apex mucronate, tomentose, punctiform glands present, venation camptodromous. Inflorescences 0.7–1.3 cm long, terminal, lax to congested, tomentose, comprising 1–4 elliptic spikes, 4–7 flowers per spike, secondary bracts 6–7.5 × 3.5–5 mm, elliptic, coriaceous, tomentose, glabrescent on the inside, pilose to tomentose on the outside, bract leaflets 5–7.5 mm long, obovate, tomentose, petiolate; external bracteole 1, ovoid, internal bracteoles 2, 2–5 mm long, linear to lanceolate, glabrescent. Flowers 4–6 mm long; subtended by an axis rudiment, calyx 2–3 mm long, sub-campanulate, green, lobes ovate, pubescent; petals yellow, glabrous, standard 4–5 mm long, broadly elliptic, apex rounded, glabrous, claw absent; wings 2–3 mm long, lanceolate, glabrescent; keel petals 2–3 mm long, lanceolate to ellipsoid, glabrous; stamens 10, anthers five oblong, five globose; gynoecium 0.6–1 cm long, ovary 3–5 mm long, glabrescent, stipe 0.5–1 mm long, style 4–5 mm long, straight. Fruit 1–3 × ca. 1 mm, with 1–2 fertile articles, lower article ovoid to ellipsoid, pubescent, upper article oblong to ellipsoid, reticulate-veined, pubescent, brown, its rostrum 2–2.5 mm long, long-curved, pilose. Seeds 2–3 × 1–2 mm, globose, brownish.

**Selected specimens:** ALAGOAS: Penedo, Capela, 9.IX.1990, fl. and fr., F.B.P. *Moura* 21 (HUEFS). Pilar, unidade de produção de gás natural/campo Petrobrás, Fazenda Lamarão, 7.XI.2002, fl. and fr., R.P. *Lyra-Lemos*



7090 (HUEFS). BAHIA: Caetité, BR-430, Caetité-Igaporã, 15.XII.2018, fl. and fr., *J.J.S. Ferreira 211* (HUNEB - Coleção Caetité); BR-030, Caetité-Brumado, 16.2 km marcados da praça perto do Posto Vencedor, 20.V.2004, fl. and fr., *G.P. Silva 738* (HUEFS); Passagem da Pedra, 19.XI.2009, fl. and fr., *M.S. Silva et al. 57* (HUNEB - Coleção Caetité). Feira de Santana, Jaguará, Fazenda Bebedouro, Ponto 48, acesso 42, 11.IX.2013, fl. and fr., *R.S. de Oliveira* (HUEFS 233124). Morro do Chapéu, Piemonte da Diamantina, caminho para o Parque do Morro do Chapéu, 24.IV.2010, fl. and fr., *M.L. Guedes et al 17033* (ALCB). CEARÁ: Mulungu, Sítio Jardim, mata do Damásio, 19.IX.2007, fl. and fr., *J.R. Lima 180* (EAC). MARANHÃO: Porto Franco, Rod. Imperatriz-Porto Franco, BR-010, km 75, 4.VII.1987, fl. and fr., *L. Coradin 7995* (CEN). PARAÍBA: Serra, Teixeira, 9.VII.1994, fl. and fr., *A.M. Miranda et al. 1873* (EAC). PERNAMBUCO: Recife, bairro da Guabiraba, Santuário dos Três Reinos, 5.VIII.2014, *L.A. Silva, R.A. Chagas 94* (HURB). PIAUÍ: São Raimundo Nonato, Serra Vermelha, próximo ao Sítio de André Pessoa, nos arredores do viveiro mata branca, lagedo, 20.III.2018, fl. and fr., *J.A. Siqueira Filho 4033* (HVASF). RIO GRANDE DO NORTE: São Vicente, a 8 km de São Vicente, 22.VII.1991, fl. and fr., *M.A. Figueiredo et al. 291* (EAC). SERGIPE: Santa Luzia do Itanhi, RPPN Mata do Castro, 17.IV.2012, fl. and fr., *R.M. Deda et al. 170* (ALCB).

*Stylosanthes scabra* is found in Argentina, the Bahamas, Bolivia, Brazil, Colombia, Cuba, Ecuador, French Guiana, Guyana, the United States, Paraguay, Peru, Puerto Rico, USA and Venezuela (Costa 2006). In Brazil it occurs from North to South in different vegetation types, being present in all states of the Central-west and Southeast regions, and also recorded from Amazonas, Pará, Rondônia, Roraima and Tocantins in the North, and in Rio Grande do Sul and Paraná in the South (Gissi 2020). In the study area, it is found in all states of the region, in caatinga and cerrado, often in sandy-clay soils, at elevations up to 900 m. Flowering and fruiting occurs throughout the year.

*Stylosanthes scabra* is characterized by its hispid branches with glandular trichomes, and its tomentose, terminal inflorescences, comprising elliptic spikes. It can be confused morphologically with *S. viscosa* due to their similar glandular branches, but they differ in flower; flowers of *S. scabra* are subtended by an axis rudiment while this is lacking in *S. viscosa*.

## 22. *Stylosanthes seabrana* B.L. Maass & 't Mannetje, Novon 12(4): 497(-500) 2002.

Subshrub 0.4–0.6 m tall, decumbent, prostrate or erect, branched; branches cylindrical, pubescent. Stipules 0.8–1.5 cm long, amplexicaul, pubescent. Petiole 4–7 mm long, pubescent; leaf rachis 2–4

mm long; leaflets 0.8–1.8 × 0.3–0.6 cm, elliptic to lanceolate, chartaceous, discolourous, adaxial surface green, abaxial surface light green, base rounded, apex acuminate, pubescent, venation camptodromous. Inflorescences 1–2.5 cm long, terminal, lax, pubescent, comprising 1–3 oblong spikes, 3–7 flowers per spike; secondary bracts 5.5–7 × 2–3.5 mm, oblong, paleaceous, glabrous on the inside, glabrescent on the outside, bract leaflets 2–3.5 mm long, elliptic, glabrescent, petiolate; bracteoles 2, 3–5 mm long, lanceolate to elliptic, glabrescent, green. Flowers 4–6 mm long; subtended by an axis rudiment; calyx 1–3 mm long, sub-campanulate, lobes deltoid, pubescent; petals yellow, standard 3–5 mm long, obovate to orbicular, apex retuse, glabrescent, claw absent; wings 2–4 mm long, lanceolate to falciform, glabrous; keel petals 2–4 mm long, lanceolate to falciform, glabrous; stamens 10, anthers five oblong, five globose; gynoeceum 0.6–1.2 cm long, ovary 2–4 mm long, glabrescent, stipe 0.7–1 mm long, style 0.6–0.8 cm long, straight. Fruit 2–5 × 1–2 mm, with 1–2 fertile articles, lower article obovoid to ellipsoid, glabrous or glabrescent, upper article ellipsoid, reticulation discrete, glabrous or glabrescent, brown, its rostrum 2–3 mm long, long-curved, glabrous or pubescent. Seeds 1–3 × 1–2 mm, globose or reniform, yellow.

**Selected specimens:** BAHIA: Abaíra, subida da Forquilha da Serra, 23.XII.1991, fl. and fr., *D.J.N. Hind 50275* (HUEFS). Boninal, estrada para Piatã, 52 km sul da BR-242, 20.VIII.1981, fl. and fr., *L. Coradin 4351* (HUEFS). Rio de Contas, rodovia que liga Rio de Contas a Livramento, mirante, 13.I.2019, fl. and fr., *J.J.S. Ferreira 233* (HUNEB-Coleção Caetité).

*Stylosanthes seabrana* is endemic to Bahia (Costa 2006; Gissi 2020), where it grows in caatinga vegetation, in sandy to clay soils, from 800 to 900 m elevation. The species flowers and fruits in January, February, August, and December.

This species has elliptic to lanceolate leaflets and inflorescences 1–2.5 cm long comprised of oblong spikes. In the field, it can be confused morphologically with *S. hamata* and *S. scabra*, but these species differ from *S. seabrana* because they have fruits with a pilose or pubescent indumentum (vs. glabrous or glabrescent in *S. seabrana*).

## 23. *Stylosanthes viscosa* (L.) Sw., Prodr. 108. 1788.

Figs. 7l; 10p-t

Subshrub 0.5–0.6 m tall, decumbent or prostrate, branched; branches cylindrical, sericeous to hispid, glandular trichomes present, viscose,

brown. Stipules 0.8–1 cm long, pubescent. Petiole 0.3–0.5 cm long, pubescent; leaf rachis 1.5–3 cm long; leaflets 1.1–2 × 0.6–0.7 cm, elliptic, membranaceous, discolourous, adaxial surface dark green, abaxial surface light green, base rounded, apex attenuate, pubescent, venation camptodromous. Inflorescences 1–2.5 cm long, terminal, lax to crowded, tomentose, comprising 2–4 oblong spikes, 3–6 flowers per spike; secondary, bracts 4.5–5 × 3–3.5 mm, broadly elliptic or oblong, coriaceous, glabrescent on the inside, tomentose on the outside, bract leaflets elliptic, tomentose, petiolate, 2–2.5 mm long; bracteoles 2, 1–4 mm long, lanceolate to ovoid, pubescent. Flowers 4–5 mm long, not subtended by an axis rudiment; calyx 1–2 mm long, subcampanulate, lobes deltoid, pubescent; petals yellow, standard 3–4 mm long, obovate to orbicular, apex retuse to emarginate, glabrescent, claw absent; wings 2–3 mm long, lanceolate, glabrous; keel petals 3–4 mm long, lanceolate to ellipsoid, glabrous; stamens 10, anthers, five globose, five oblong; gynoeceium 0.5–1 cm long, ovary 1–3 mm long, glabrescent, stipe 0.5–1 mm long, style 0.5–0.7 cm long, straight. Fruit 7–8 × ca. 0.1 mm, with 1–2 fertile articles, lower article ellipsoid, pilose, tomentose, upper article obovoid, reticulate-veined, glabrescent, brown, its rostrum 0.3–0.5 mm long, helicoidal, pubescent or tomentose. Seeds 1–2 × 1–2 mm, reniform, green to brownish.

**Selected specimens:** ALAGOAS: Coruripe, Fazenda Capitã A, bloco goiabeira I, 20.I.2004, fl. and fr., *M.A.B.L. Machado 351* (EAC). BAHIA: Caetité, loteamento próximo a UPA, BR-430, Caetité-Igaporã, 16.I.2015, fl. and fr., *J.J.S. Ferreira 07* (HUNEB-Coleção Caetité). PARAÍBA: Patos, Sítio Pia, 16.V.2011, fl. and fr., *C.R.M. Torres 80* (EAC). PERNAMBUCO: Petrolândia, Lago Itaparica, 1.III.2012, *V.M. Cotarelli 1429* (HVASF). PIAUÍ: Parnaíba, Lagoa da Prata, 24.IV.2013, *A.A. Lima 119* (HDELTA). RIO GRANDE DO NORTE: Nisia Floresta, Lagoa Amarela, 30.III.2016, fl. and fr., *V.F. Souza 204* (UEC). SERGIPE: Pirambu, 12.XII.2012, fl. and fr., *T. Carregosa 322* (ASE).

*Stylosanthes viscosa* has a wide geographical distribution within the Americas, the Caribbean, and South America, occurring in Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, French Guiana, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, USA, and Venezuela (Ferreira & Costa 1979; BFG 2018, 2021; Cook *et al.* 2020). It is found from north to south in Brazil, with confirmed occurrences in the most diverse vegetation formations for almost

all states, except Tocantins in the North (Gissi 2020). In the Northeast region, it occurs in cerrado, caatinga and seasonal tropical forest, on sandy to clay soils, at elevations ranging from 200 to 900 meters. It flowers and fruits throughout the year.

This species is easily identified in the field because it has glandular trichomes that secrete viscous substances that cover the branches and leaflets. This characteristic is shared by *S. scabra*, but *S. viscosa* does not have an axis rudiment at the base of its fruits, while this structure is present in *S. scabra*.

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