

# Tropical Forages

## *Stylosanthes macrocephala*

### Scientific name



*Stylosanthes macrocephala* M.B. Ferreira & Sousa Costa

### Synonyms

None listed in GRIN.

### Family/tribe

Family: *Fabaceae* (alt. *Leguminosae*) subfamily: *Faboideae* tribe: *Dalbergieae* subtribe: *Stylosanthinae*.

### Morphological description

A perennial, fine-stemmed, many-branched, and tap-rooted sub-shrub, prostrate to semi-erect, 20–80 cm tall; stems and branches hairy-bristly. Leaves trifoliolate; petiole 1–2 mm long, villous; leaflets lanceolate, 20–55 mm long, 10–19 mm wide, pubescent or glabrous, with 7–10 pairs of veins. Inflorescence a terminal or axillary capitate spike, ovoid to almost spherical, 14–18 mm × 10–15 mm, with 10–30 flowers; often several inflorescences in a cluster; bracts imbricate, unifoliate, elliptical-ovate, 10–12 mm × 8–9 mm, pubescent, with 11–15 veins, green, mostly with some reddish colouration; flowers small, yellow (sometimes with beige toning) with obovoid, striated standard 4–6 mm long; axis rudiment and 2 inner bracteoles present. Pod 2-articulated, reticulately nerved; oth articles usually fertile; the upper one glabrous, 3–4 mm × 2.5–3 mm, with a short, straight to uncinat beak; lower article villous and smaller. Seed yellow-brown, sometimes slightly mottled, to black. 470,000–700,000 dehulled seeds per kg.

### Similar species

Distinguished from *S. capitata* by having more branched and finer stems, smaller and narrower leaflets and smaller, almost spherical inflorescences (1–2 cm vs 6–7 cm long).

### Common names

*English:* macrocephala

*Latin America:* estilosantes (Brazil)

### Distribution

#### Native:

*South America:* Brazil (Bahia, Ceará, Distrito Federal, Espírito Santo, Goiás, Mato Grosso do Sul, Minas Gerais, Pará, Pernambuco, Piauí, Rio de Janeiro, Tocantins)

### Uses/applications

#### Forage



Leaves, stems and inflorescences (ILRI 12040)



Hairy-bristly stems and branches; trifoliolate leaves with lanceolate leaflets (ILRI 12051)



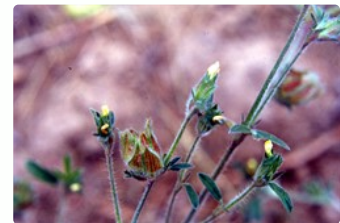
Fine-stemmed, perennial, prostrate form (ILRI 12040)



Fine-stemmed, perennial, semi-erect form



Inflorescence a terminal or axillary, capitate, ovoid to almost spherical spike (ILRI 12040)



Imbricate, elliptical-ovate bracts, reddish pigmentation; hairy-bristly stems



Reddish pigmentation weakly developed



Often several inflorescences in a cluster



Seeds and upper pod segment with short, slightly uncinat beak



Seeds and pod segments; upper with straight beak (left), lower more villous (right)

Used as forage in permanent pastures on low fertility acid soils.

## Ecology

Occurs in sub-humid and dryland savanna environments.

## Soil requirements

Mostly found on sandy soils in savannas and heavier soils in the caatinga, with pH between 4 and 5 (rarely to 6), and Bray 1 phosphorus levels of 1–3 ppm (rarely to 5 ppm). Adapted to very acid, low-fertility oxisols and ultisols.

## Moisture

Savanna collections largely come from environments with 1,000–1,700 mm rainfall/yr and a 5–6 month dry season, while Caatinga collections further north come from areas

## Temperature

Natural distribution is limited to central and eastern Brazil from about 12–20° S and 38–50° W at elevations ranging from 160 to 1,300 m asl. Annual average temperature at collection sites ranges from 21 to 25 °C. Best growth is suggested to be in hot tropical environments.

## Light

No information available, although *Stylosanthes* spp. generally have little shade tolerance.

## Reproductive development

Floral initiation varies considerably among genotypes, from early to very late. *S. macrocephala* produces abundant seed, with leaves shedding and inflorescences dislodging at maturity. Seed is retained and disseminated in the inflorescence, germinating in the next wet season.

## Defoliation

Tolerant of low and frequent defoliation.

## Fire

Being a savanna species, *S. macrocephala* is able to tolerate light fires. Furthermore, due to free-seeding habit and high levels of soil seed bank, it re-establishes readily.

## Agronomy

Guidelines for establishment and management of sown forages.

## Establishment

In many respects *S. macrocephala* is similar to *S. capitata*. Newly harvested seed may have to be treated to reduce hard-seededness. It is sown at 4–5 kg/ha. Seed set and seedling recruitment are essential for long-term persistence. Nodulates effectively with native rhizobia in Brazil, but requires inoculation with strains such as CB 2898 or CB 3055 (CIAT 170) in Australia.

## Fertilizer

Although, in general, the species has a low P requirement, responses to applications of P vary with genotype. Some give a yield response to applied P in soils of very low P status, but growth of others may be depressed by P application.

## Compatibility (with other species)

Compatible with tussock-forming grasses, if shading is reduced by regular defoliation of the grass.

## Companion species

Grasses: [Andropogon gayanus](#), [Urochloa brizantha](#), [U. decumbens](#).

Legumes: [Stylosanthes capitata](#), [Cratylia argentea](#).

## Pests and diseases

*S. macrocephala* is more anthracnose-tolerant than other *Stylosanthes* species. In Colombia, it can be seriously affected by rhizoctonia foliar blight, and less so by cercospora leafspot (*Passalora/Cercospora stylosanthis*). Budworm/pod borer/rednecked peanutworm (*Stegasta bosqueella*) may cause minor damage, but it appears resistant to stem borer (*Caloptilia* sp.) that is so damaging to other *Stylosanthes* spp.



Habit.

Scale: between points = 1 cm. (Drawn from N. Sousa Costa 3008.)



A leaf; B

bract, axis rudiment and bracteoles; C unfolded calyx; D androecium and gynoecium; E keel; F axis rudiment and first inner bracteole; G outer and second inner bracteoles; H wing; I standard; J pod; K dorsal view of upper articulation; L seed. Scale: between points = 2 mm. (Drawn from N. Sousa Costa 3008.)

## Ability to spread

[S. macrocephala](#) seeds prolifically and persists through extensive seedling recruitment. In contrast with *S. capitata*, substantial spreading beyond sown areas has, however, not been observed.

## Weed potential

No information, but due to its similarity to [S. capitata](#) in terms of its free-seeding habit and hardseededness, it probably has similar weed potential.

## Feeding value

### Nutritive value

The nutritive value of 6-week-old regrowth of [S. macrocephala](#) is higher than that of [S. capitata](#). CP concentrations in leaves range from 14 to 22% (stems: 9–11%), and leaf DM digestibility from 66 to 75% (stems: 46–61%); P concentrations are moderate to low, 0.17–0.25% in leaves and 0.13–0.25% in stems. Unlike in many other legumes, CP levels of [S. macrocephala](#) are not improved by applications of P fertilizer.

### Palatability/acceptability

The Brazilian commercial species mixture cultivar Campo Grande (80% *S. capitata*, 20% *S. macrocephala*) is reported to be medium to highly palatable.

### Toxicity

In Brazil, intestinal obstruction, caused by phytobezoars in cattle consuming in excess forage of the 'Campo Grande' and leading to mortality, has been reported.

## Production potential

### Dry matter

[S. macrocephala](#) is somewhat less productive than [S. capitata](#), during both the rainy and dry seasons. Dry matter yields are mostly in the range of 3–6 t/ha, although yields up to 14 t DM/ha are quoted.

### Animal production

The only information available refers to the composite cv. Campo Grande (20% *S. macrocephala*, 80% *S. capitata*) where in an association with *Urochloa decumbens* LWG was 617 g/animal/d and 469 kg/ha/yr in comparison with 461 g/animal/d and 349 kg/ha/yr for the grass alone, respectively.

## Genetics/breeding

$2n = 20$ . There is evidence that the tetraploid species, [S. capitata](#) ( $2n = 4x = 40$ ), may be an allotetraploid derived from [S. macrocephala](#), or *S. ingrata* as the maternal parent. Interspecific hybrids between these two species are unlikely as they differ in ploidy levels. A breeding project conducted at Embrapa Gado de Corte (Campo Grande, Brazil) aimed at producing synthetic populations by mixing anthracnose resistant [S. macrocephala](#) accessions with productive [S. capitata](#) hybrids as in the composite cultivar, 'Campo Grande'. It may be possible to transfer genes from [S. macrocephala](#) to [S. capitata](#) by crossing [S. macrocephala](#) and *S. pilosa* to synthesise allotetraploids, and then hybridizing these artificial allotetraploids with those natural [S. capitata](#) genotypes.

## Seed production

[S. macrocephala](#) seeds fairly prolifically, different ecotypes producing seed yields ranging from 340 to 650 kg/ha under comparable environmental conditions.

## Herbicide effects

No data available, but possibly similar tolerances and susceptibilities to those of the closely related [S. capitata](#): ("Tolerant of acifluorfen, bentazone, 2,4-D, 2,4-DB, fluzafop-butyl, and sethoxydim. Susceptible to metsulfuron-methyl and glufosinate.")

## Strengths

- Adapted to low fertility soils, with high levels of Al and Mn.
- Tolerant of moderately heavy grazing.
- Free seeding.
- Tolerance of anthracnose.
- Combines well with competitive bunch grasses.

## Limitations

- Potential is limited to very acid soils.
- Susceptibility to rhizoctonia foliar blight.

- Not suited to cut-and-carry.
- May invade cultivated land.
- Specific rhizobia requirements so best inoculated when outside its natural environment.
- Low yield compared with alternatives.

## Internet links

[https://uses.plantnet-project.org/en/Stylosanthes\\_macrocephala\\_\(PROSEA\)](https://uses.plantnet-project.org/en/Stylosanthes_macrocephala_(PROSEA))

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## Cultivars

'**Campo Grande**' Released in Brazil (2000). Composite of *S. capitata* and *S. macrocephala*. A mass *S. capitata* hybridization scheme of 17 Brazilian (high DM and seed yields) × Venezuelan anthracnose resistant accessions led to a desirable recombination of forage traits. Seed from the resultant hybrid is mixed 80:20 with seed of a mix of 6 genotypes of the highly anthracnose resistant *S. macrocephala*, to produce the multi-line cv. Campo Grande, which, with its diverse genetic make-up, has a wide application in acid-soil savannas.

'**Pioneiro**' (CIAT 1281, ILCA 16562, CPI 75179, IRFL 2068, CNPGC 0760, CPAC 0139). Released in Brazil (1983) for use in the Cerrados savanna region. Accession collected from Planaltina, Brazil (15°37' S, 47°40' W; 1,040 m asl; rainfall 1,500 mm). Poor dry season performance.

## Promising accessions

**CIAT 2133** (BRA 008419). Selected in Colombia based on high dry matter and very late flowering. Accession collected from Mata Atlântica region, Bahia, Brazil.

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