Evaluation of *Stylosanthes* species for resistance to *anthracnose* and suitability for leaf meal production

Liu Guodao, Zhuo Jiasuo, Bai Changjun and Hong Caixiang[1]

Stylosanthes species very important legumes in South China which are used for green cover, leaf meal production, and pasture improvement. New accessions of the *Stylosanthes* species have been introduced from the Centro Internacional de Agricultura Tropical (CIAT, Colombia), Commonwealth Scientific and Industrial Research Organization of Australia (CSIRO, Australia) and CIAT/IRRI (Philippines). Together with four Chinese Academy of Tropical Agriculture Sciences (CATAS) released varieties as controls, these accessions were evaluated in an experiment to determine their resistance to anthracnose and their suitability for leaf meal production.

Materials and methods

The accessions included in the experiment are listed in Table 1.

Table 1. *Stylosanthes* spp. used for leaf meal production.

Accession	Source of seed
S. capitata multiline 5	B. Grof
S. capitata/S. macrocephala GC 1580	CIAT
S. guianensis CIAT 10417	CIAT (Philippines)
S. guianensis CIAT 11833	CIAT
S. guianensis CIAT 11844	CIAT
S. guianensis CIAT 136	China (from CIAT in 1982)
S. guianensis CIAT 184	CIAT
S. guianensis CIAT 2312	CIAT
S. guianensis CPI 55848	CSIRO
S. guianensis CPI 58719	CSIRO
S. guianensis CPI 67652	CSIRO
S. guianensis CPI 87830	CISRO
S. guianensis cv. Cook	China (from Australia in the early 1980s)
S. guianensis cv. Cook (L1-82)	CSIRO
S. guianensis cv. Graham	China (from Australia in the early 1980s
S. guianensis cv. Graham (L7-84)	CSIRO
S. guianensis cv. Mineirao	CIAT
S. guianensis cv. Semilla negra	China, selected from CIAT 184
S. guianensis FM05-1	CIAT (Philippines)
S. guianensis FM05-2	CIAT (Philippines)
S. guianensis FM05-3	CIAT (Philippines)
S. guianensis FM07-2	CIAT (Philippines)
S. guianensis FM9405 Parcela 3	CIAT
S. guianensis FM9405 Parcela 5	CIAT
S. guianensis FM9405 Parcela 6	CIAT

(continued next page)

Table 1 (cont.). *Stylosanthes* spp. used for leaf meal production.

Accession	Source of seed
S. guianensis GC 1578	CIAT
S. guianensis GC 1579	CIAT
S. guianensis GC 1581	CIAT
S. scabra cv. Siran (L3-93)	CSIRO
S. scabra cv. Seca	China (from Australia in the early 1980s
S. guianensis CIAT 184	China (from CIAT in 1982)
S. hamata cv. Verano	China (from Australia in the early 1980s)
S. guianensis L8	China, selected from CIAT 184
S. guianensis E3	China, selected from CIAT 184

The experiment was designed as a randomised complete block with three replications. The experimental units were 5-m-long, single-row plots, 1.5 m apart. *Anthracnose* damage was visually estimated every month (Table 2).

All plots were cut three times a year to measure dry matter yield. Seed was harvested at the end of each season to measure seed yield.

Table 2. Anthracnose damage ratings.

Rating	Symptoms
0	no visible disease symptom
1	1-3% of tissue is necrotic
2	4-6% of tissue is necrotic
3	7-12% of tissue is necrotic
4	13-25% of tissue is necrotic
5	26-50% of tissue is necrotic
6	51-75% of tissue is necrotic
7	76-87% of tissue is necrotic
8	88-94% of tissue is necrotic
9	95-100% of tissue is necrotic

Results and discussion

Most of the accessions have no visible disease symptom or have very low anthracnose severity visual scale (Table 3). *Stylosanthes guianensis* cv. Cook (CATAS) and *S. guianensis* cv. Cook L1-82 were nearly destroyed by the disease at the seedling stage.

Stylosanthes *scabra* cv. Seca, *S. guianensis* cv. Mineiro, *S. guianensis* CIAT 11844, *S. guianensis* FM07-2, *S. guianensis* L3 98, *S. guianensis*, 58719, *S. guianensis* L8, *S. guianensis* E3, *S. guianensis* CIAT 184, *S. guianensis* cv. Semilla negra, *S. hamata* cv. Verano, *S. guianensis* CIAT 184 (CATAS), *S. guianensis* FM03-2, *S. guianensis* CIAT 10417, *S. guianensis* FM05 3, and *S. guianensis* GC1578 Parcela 3, showed very strong resistance to anthracnose, while *S. guianensis* cv. Graham L7 84 was destroyed by the disease in the second year. *S. guianensis* cv. Graham (CATAS), *S. guianensis* 87830 scored very high in the *anthracnose* severity visual scale.

[1] Tropical Pasture Research Centre, Chinese Academy of Tropical Agriculture Sciences, Hainan, P.R. China.

Table 3. Mean *anthracnose* damage rating, biomass yield and seed yield.

Accession	Mean *Anthracnose* Damage			Dry matter yield (kg/plot)	Seed yield (g/plot)
	Seedlings	Year 1	Year 2		
S. capitata / *S. macrocephala* GC 1580	0	1	0.4	0	3
S. guianensis CIAT 10417	1	1	1	0.2	0.1
S. guianensis CIAT 11833	1	1.3	1.2	4.0	0
S. guianensis CIAT 11844	0	1.2	0.3	6.4	0
S. guianensis CIAT 136	2	2	2	10.5	43
S. guianensis CIAT 184	1	1	1	5.6	113
S. guianensis CIAT 2312	0	3.9	1.8	1.6	4
S. guianensis CPI 55848	2	1.2	2.2	1.4	7
S. guianensis CPI 58719	0	0.9	0.3	1.0	0.1
S. guianensis CPI 67652	1	2.4	1.6	4.4	81
S. guianensis CPI 87830	3	4.5	3.8	3.0	0
S. guianensis cv. Cook	9	4.7	6.1	1.0	12
S. guianensis cv. Cook (L1-82)	6	7.8	6.9	1.4	3
S. guianensis cv. Graham	1	1.5	5.5	6.0	226
S. guianensis cv. Graham (L7-84)	1	1.2	6.8	2.3	18
S. guianensis cv. Mineirao	0	0.8	0.3	10.6	0
S. guianensis cv. Semilla negra	2	1.9	1	18.2	25
S. guianensis FM05-1	0	1.3	0.6	1.1	172
S. guianensis FM05-2	0	1.3	0.3	0.1	96
S. guianensis FM05-3	1	1.3	1	3.4	104
S. guianensis FM07-2	1	1.3	1	3.4	240
S. guianensis FM9405 Parcela 3	2	1.4	1.3	5.0	187
S. guianensis FM9405 Parcela 5	1	1.3	1.6	1.0	0
S. guianensis FM9405 Parcela 6	2	1.4	1.3	2.9	0
S. guianensis GC 1578	1	1.1	1	1.8	162
S. guianensis GC 1579	3	4.2	2.9	7.2	152
S. guianensis GC 1581	2	2.1	2.2	17.3	0.1
S. scabra cv. Siran (L3-93)	0	1.2	0.3	3.21	6
S. scabra cv. Seca	0	1	0	6.3	11
S. guianensis CIAT 184	1	1	1	5.6	113
S. hamata cv. Verano	1	1	1	1.4	104
S. guianensis L8	0	1.2	0.6	9.0	21
S. guianensis E3	1	1	1	5	315

In the early part and toward the end of the year, the plants showed very low disease severity visual scores (Table 4). In June, July, August, and September very high disease severity scores were noted.

Stylosanthes guianensis cv. Semilla negra, *S. guianensis* CG1581, *S. guianensis* CIAT 184 (CATAS), *S. guianensis* cv. Mineirao, *S. guianensis* CIAT 136, and *S. guianensis* L8 had very high dry matter yield. Those of *S. capitata*/*S. macrocephala* GC 1580, *S. guianensis* FM05-3, *S. guianensis* CIAT 10417 and *S. capitata* Multiline-6 had a very low yield.

Stylosanthes guianensis E3, *S. guianensis* FM03-2, *S. guianensis* cv. Semilla negra, *S. guianensis* FM9405 Parcela 3, and *S. guianensis* FM05-1 showed very high potential for seed production, while *S. guianensis* FM9405 Parcela-6, *S. guianensis* cv.

Mineirao, *S. guianensis* CIAT 11844, and *S. guianensis* 87830 cannot get seed in the second year.

Eighty percent of *S. guianensis* CIAT 11833, 50% of *S. guianensis* FM05-3 and *S. guianensis* FM9405 Parcela-6, and 40% of *S. guianensis* CIAT 11844 and *S. guianensis* FM9405 Parcela-5 died in low temperatures (<10^{o}C) in the winter.

These results point to some promising accessions (in terms of seed yield and cold resistance) that should be further evaluated in a regional evaluation.

Table 4. Monthly *anthracnose* damage rating in 1997.

Accessions	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
S. capitata / S. macrocephala GC 1580	0	0	0	0	0	0.6	1	1.3	1.3	0.3	0	0
S. guianensis CIAT 10417	1	1	1	1	1	1	1	1	1	1	1	1
S. guianensis CIAT 11833	1	1	1	1	1	1	1	2	2	1.3	1	1
S. guianensis CIAT 11844	0	0	0	0	0	0.3	1	1	0.6	0.3	0	0
S. guianensis CIAT 136	2	2	2	2	2	2	2	2	2	2	2	2
S. guianensis CIAT 184 (CIAT)	1	1	1	1	1	1	1	1	1	1	1	1
S. guianensis CIAT 2312	0	0.3	0.3	1.3	2	2.3	3.7	4	3.7	2	1.3	1
S. guianensis CPI 55848	2	2	2	2	2	2	2.3	3	3	2	2	2
S. guianensis CPI 58719	0	0	0	0	0	0	0.3	0.3	1	1	1	0
S. guianensis CPI 67652	1	1	1	1	1.3	2	2	2	3	3	2	1
S. guianensis CPI 87830	3	3	3	3.3	3.7	4	4.7	5	5	4.3	3.3	3.3
S. guianensis cv. Cook	4	4	4.3	5	5.3	7	7.7	8	8	7	5.3	5
S. guianensis cv. Cook (L1-82)	6	6	6	7	7	7	7.3	8	8	8	6	5.3
S. guianensis cv. Graham	2.3	3	3.7	4	5	6.3	6.7	7	7.7	7.7	7	6.3
S. guianensis cv. Graham (L7-84)	3	3.3	4	5.3	6.7	7.3	8.3	9	9	9	9	9
S. guianensis cv. Mineirao	0	0	0	0	0	0	0.3	1	1	0.7	0	0
S. guianensis cv. Semilla negra	1	1	1	1	1	1	1	1	1	1	1	1
S. guianensis FM05-1	0	0	0	0	0	0	0.3	1	1	2	1.7	1
S. guianensis FM05-2	0	0	0	0	0	0	0.6	1	1	1	0.3	0
S. guianensis FM05-3	1	1	1	1	1	1	1	1	1	1	1	1
S. guianensis FM07-2	1	1	1	1	1	1	1	1	1	1	1	1
S. guianensis FM9405 Parcela 3	1	1	1	1	1	1	1	1	1	1	1	1
S. guianensis FM9405 Parcela 5	1	1	1	1	1.7	1.7	2.7	2.7	2.3	1.3	1	1
S. guianensis FM9405 Parcela 6	1	1	1	1	1	1	1.7	2	2	2	1	1
S. guianensis GC 1578	1	1	1	1	1	1	1	1	1	1	1	1
S. guianensis GC 1579	3	2.3	2.3	3.7	3	3.7	3.7	4	4	3.3	3.7	2
S. guianensis GC 1581	2	2	2	2	2	2.3	2.7	3	3	2.7	1.7	1.7
S. scabra cv. Siran (L3-93)	0	0	0	0	0	0	0	0.3	1	1	0.6	0
S. scabra cv. Seca	0	0	0	0	0	0	0	0	0	0	0	0
S. guianensis CIAT 184 (CATAS)	1	1	1	1	1	1	1	1	1	1	1	1
S. hamata cv. Verano	1	1	1	1	1	1	1	1	1	1	1	1
S. guianensis L8	0	0	0	0	0.3	1	1	1	1	1	1	1
S. guianensis E3	1	1	1	1	1	1	1	1	1	1	1	1
S. capitata Multiline-6	1	1	1	1	1	1	1.7	2	2	2	1	1