Stylosanthes guianensis var. guianensis

Scientific name

Stylosanthes guianensis (Aubl.) Sw. var. *guianensis*

Synonyms

Stylosanthes gracilis H.B.K.
Stylosanthes gracilis Kunth.
Stylosanthes guyanensis (Aublet) Sw.

Family/tribe

Family: *Fabaceae* (alt. *Leguminosae*) subfamily: *Faboideae* tribe: *Aeschynomeneae* subtribe: *Stylosanthinae*. Also placed in: *Papilionaceae*.

Common names

Brazilian stylo, brazilian lucerne, common stylo, stylo, (English); luzerne brésilienne, luzerne du Brésil, luzerne tropicale (French); brasilianische Luzerne (German); alfalfa-do-nordeste, trifolio, mangericão do compo, saca-estrepe (Portuguese (Brazil)); alfalfa de Brasil, lengua de rana, tarbardillo (Spanish).

Morphological description

A robust, erect to semi-erect, short-lived perennial herb or sub-shrub growing to 1.2 m (rarely to 2.5 m). Leaves and young stems glabrous to densely pilose, or with scattered bristles. Leaves trifoliolate with lanceolate leaflets, 0.5-4.5 cm long and 0.2-2 cm wide. Flowers yellow to orange, with standard 4-8 mm x 3-5 mm; borne in clusters on a capitate spike . Seeds mostly pale brown (varying from yellow to almost black) in single-seeded pods; 260,000-400,000 seed-in-hull/kg.

Distribution

Native to:
Mesoamerica: Belize, Costa Rica (north-east), Guatemala, Honduras, Mexico (south), Nicaragua (east), Panama.
South America: Bolivia (north), Brazil, Colombia, French Guiana, Guyana, Peru, Suriname, Venezuela.

Naturalised in:
Many parts of the tropics and subtropics.

Uses/applications

Long and short term pasture (grazed or cut and carry), intercropping in

Long and short-term pasture (grazed or cut and carry), intercropping in rice, ground cover (erosion control) in orchards, green manure, hay for leaf meal and pellets.

Ecology

Soil requirements

Prefers well-drained, open-textured soils from sands to light clays (e.g. tropical latosols, gleys, loams and sandy podzolic soils); poor on heavy montmorillonitic clays. Found on soils with pH from 4.0-8.3, adaptation varying with ecotype. Moderately tolerant of high Al and Mn but not of high salinity. Late-flowering (Tardío) types are more tolerant of high levels of Al and Mn than are the common types. Can extract P very efficiently from low P soils, but still responds to applications of P, as well as K, S, Ca, and Cu in soils with low levels of these nutrients. Needs lower levels of Mo than many other tropical legumes.

Moisture

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Occurs in areas with rainfall from 700-5,000 mm/year, but mostly from 1,000-2,500 mm/year. Although cultivars survive in lower rainfall areas and can survive long dry periods, they are generally best adapted to regions with >1,500 mm average annual rainfall. Tolerance of flooding and short term waterlogging vary with ecotype.

Temperature

Occurs from about 20ºN in Mexico to 32ºS in Argentina, and from near sea level to 2,200 m asl. This equates to a range in average annual temperatures from about 23-27ºC, but down to 19ºC. Primarily adapted to the hot, humid tropics, although some ecotypes grow satisfactorily in the humid subtropics as well. Tops burnt by frost, but plants generally survive. Mostly to 1,000 m asl , although in some parts of the tropics to 2,000 m.

Light

Considered as having no, or at best fair, shade tolerance.

Reproductive development

Mostly a short-day flowering response with critical photoperiod between 11.5-14 hours, depending on ecotype, although some ecotypes may require exposure to long days prior to short days for floral initiation. Flowering response is not related simply to latitude or altitude of origin of ecotype. With a particular ecotype, floral initiation occurs earlier with increasing latitude from 4º to 28º, but there is no difference between 28º and 35º. Ecotypes therefore vary in their ability to seed under different day lengths e.g. CIAT 10136 and CIAT 1959 give the highest seed yields at 28º lat. and CIAT 1283 produced the most seed at 4º and 16º lat. Tardío (late flowering) types have better anthracnose tolerance than common types but seed yields are lower due to limited growing season .

Defoliation

Defoliation

Cutting or grazing once plants become tall and woody can kill the plant, since there are few growing points close to the ground on mature plants. Best to stimulate lower branching early by grazing or cutting to 10-20 cm in the first few months. Constant heavy grazing is detrimental. Grazing on a 1 week on and four to eight weeks off rotation, or cutting at 2-3 month intervals appears to favour the legume .

Fire

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Intolerant of fire. Plants are severely set back by any fire, and killed by "hot" fires, particularly if the soil is dry. With seeds remaining viable in the soil for up to 3 years, significant seed reserves can develop from which stands can recover after fire. Seed dormancy is broken by fire, stimulating seedling development.

Agronomy

Guidelines for the establishment and management of sown pastures.

Establishment

Can be planted from seed or vegetatively. Freshly harvested seed may have >70% hard seed. Seed can be scarified to reduce this level of hard seed by soaking in water at 55℃ for 25 minutes, 70℃ for 10 minutes or at 85℃ for 2 minutes. Alternatively, it can be mechanically scarified with an abrasive disc or rice polisher, or treated with concentrated sulphuric acid for 10 minutes (important to wash seed thoroughly after acid treatment). Mechanical harvesting normally has a scarifying effect on the seed. Fairly promiscuous in its rhizobium requirements, often nodulating adequately on native rhizobium . Commercial inoculant in Australia based on CB 82 strain *Bradyrhizobium*, although CB 756 also effective; MG 5013 recommended in Malawi. Pelleting is not necessary unless to protect rhizobia from fertilisers. Seed sown at 2-5 kg/ha.
Where seed is scarce, about 80% strike has been achieved with cuttings. Cuttings 15-20 cm long, with lower leaves removed are taken in the wet season, and >1/2 the stem buried horizontally to 3-5 cm.

Fertiliser

Stylo responds well to improved soil fertility, particularly P, but can grow on infertile soil (partly due to endotrophic mycorrhiza found in roots). In deficient soils, 10-20 kg/ha P is recommended as well as other nutrients as indicated by soil analysis.

Compatibility (with other species)

Can be shaded out by taller grasses such as *Panicum maximum* . Suppresses weeds under correct management. Dies out under excessive cutting or grazing allowing weed to ingress. Has had an apparently allelopathic effect on succeeding cotton (*Gossypium* spp.) and sisal (*Agave* spp.) crops when used as a green manure .

Companion species

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Grasses: *Andropogon gayanus* , *Chloris gayana* , *Digitaria eriantha* , *Heteropogon contortus* , *Hyparrhenia rufa*, *Melinis minutiflora* , *Panicum maximum* , *Pennisetum purpureum* , *Setaria sphacelata* , *Brachiaria brizantha* , *B. decumbens* , *B. ruziziensis* .
Legumes: Normally not grown with other legumes but has similar tolerances to those of *Chamaecrista rotundifolia* and in more humid environments, *Aeschynomene americana* . If the pasture is relatively short, it is compatible with *Centrosema molle* (*pubescens*), *Macroptilium atropurpureum* , and *Pueraria phaseoloides* .

Pests and diseases

The main diseases are anthracnose caused by *Colletotrichum gloeosporioides*, and head blight caused by *Botrytis cinerea*. The former causes "tar spots" on leaves and stems and ultimately kills susceptible varieties. The best control is selection of resistant varieties. *Colletotrichum dematium* causes similar lesions but is less severe. Botrytis head blight becomes a problem in seed crops during damp weather. While a number of lines tested in Zimbabwe proved resistant to root knot nematode, *Meloidogyne javanica*, there is record of it and *M. arenaria* on *S. guianensis* in Australia. Stem galls caused by *Sphaeropsis tumefaciens* have been recorded once on 'Mineirão'.
Stemborers, *Caloptilia* sp. (Lepidoptera) and *Platyomopsis pedicornis* (Coleoptera) are a problem in many ecotypes in South America (Brazil, Colombia) and Australia (Queensland) respectively.

Ability to spread

Spreads by seed, by virtue of surface water movement or following ingestion by livestock.

Weed potential

Listed as a weed in the Global Compendium of Weeds, but appears to pose little threat in most situations.

Feeding value

Nutritive value

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12-20% CP, 52-60 % IVDMD , 0.2-0.6% P, 0.6-1.6% Ca.

Palatability/acceptability

Not readily eaten by cattle early in the growing season but becomes relatively more palatable than associated grasses later into the dry or cool season. It is also of value for small ruminants. With rotational grazing, animals graze the leaves first, successively taking more stem, ultimately damaging the woody main stem. Also fed to pigs. Has some value as foggage /standover since leaf retained at least in early dry season.

Toxicity

No record of adverse effects.

Production potential

Dry matter

Commonly 5-10 t/ha DM depending on cultivar, growing conditions and management, and as high as 20 t.

Animal production

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From 250-600 g/hd/day and from 300-500 kg/ha/yr.

Genetics/breeding

Largely self-pollinating with a small percentage of outcrossing. Chromosome number 2*n* = 20.

Seed production

For cultivars, maximum measured seed production ranges from about 700 to 1,350 kg/ha, although machine harvest recovery is only 50-60% of this amount since pods shed on maturity. Mechanically harvested commercial crops mostly range between about 100 and 300 kg/ha seed. Late flowering (Tardío) varieties in areas with pronounced dry season require irrigation to complete the reproductive cycle e.g. 'Mineirão' produced 333 kg/ha seed under irrigation, compared with 82 kg/ha dryland.

In the upland tropics of Australia, 'Nina' (ATF 3308) commences flowering in March with a peak in April/ May; harvest yielding 260 kg/ha clean dry seed in late June. In the seasonally dry tropics of Thailand, flowering commences September/October and peaks in November and December. By late January, 80-90% of the seed has fallen. Seed remaining in seed heads is dislodged by beating the crop with bamboo sticks. Seed is then swept up and cleaned, yielding over 1 t/ha on occasions.

Herbicide effects

Tolerant of 2,4-D; from about 6 weeks of age, at 1.65 kg a.e./ha. Also tolerant of 2,4-DB, acifluorfen, and bentazone, but moderately susceptible to fluazifop-butyl. Most legumes are susceptible to metsulfuron-methyl.

Strengths

- Adapted to acid infertile soils.
- Low P demand.
- Tolerant of Al and Mn.
- Easily established from seed or cutting.
- Good growth habit for cut and carry .
- Does not twine.
- Leaf stays green into dry season.

Limitations

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- Will not stand heavy grazing.
- Frost susceptible.
- Can reduce the yield of subsequent crops.
- Seed tends to shatter on ripening, thus reducing yields.

Other comments

Selected references

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Internet links

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Cultivars

Cultivars	Country/date released	Details
'Cook' (CPI 38754, CPI 40368, PI 208547, Q 11075)	Australia (1971)	From near Villavicencio, Colombia (4ºN, 410 m asl, 4,000 mm annual rainfall), flowering mid-season, 8 weeks earlier than 'Schofield', at 17ºS. Useful on areas of more restricted summer rainfall and shorter growing seasons due to early flowering habit. Vigorous, aggressive, and high yielding at all stages growing well with a range of stoloniferous and tufted grasses. Succumbed to anthracnose.
'Endeavour'	Australia	From southwest Guatemala (14ºN,

(Q 8558)	(1971)	1,860 m asl, 2,160 mm annual rainfall). Flowers 2-4 weeks earlier than 'Schofield' at 17ºS, with a longer period of vigorous growth. Lower winter-spring production than 'Cook'. Rapid establishment, early vigour, suited mainly to the high-rainfall coastal areas. Succumbed to type B races 1, 2 and 3 anthracnose.
'Graham' (CPI 40255)	Australia (1980)	From near Santa Cruz, Bolivia (17ºS., 440 m asl, 1,350 mm annual rainfall). Flowers earlier than 'Schofield', 'Cook' and 'Endeavour'. High soil seed reserves, seedling density, and plant survival. Succumbed to type B race 3 anthracnose.
'Schofield' (CPI 5630 and others)	Australia (pre-1971)	Derived from several introductions from Brazil in the 1930s. Good initial performance but succumbed to anthracnose type B race of anthracnose.
'Mineirão' (CIAT 2950, CIAT 10882, CPI 92833, BRA-017817, CNPGC-0984, DFC-1, CPAC-1230, ILRI 15557)	Brazil (1993)	Tall "tardío" variety to 2.5 m. Sticky leaves. Recommended in areas up to 1,200 m asl with an annual rainfall above 1,800 mm. Good drought and cold tolerance and resistance to anthracnose.
'CIAT 184' (CPI 133548, ILCA-00164, ATF 493, ATF 2755)	Colombia	From Valle del Cauca in Colombia (3°18'N, 960 m asl, rainfall 1,840 mm/yr). Erect to semi-erect, to about 1 m tall. Adopted widely in South America, southern China and southeast Asia. It is better adapted to low altitudes (< 850 m), on soils that are acid (to pH < 5.0), have OM contents of less than 3.4%, are moderately sandy (18-56% sand) and have rainfall accumulated in 12 weeks more than 800 mm. At higher altitudes (> 1,000 m), it appears to respond to higher OM levels. Grows to about 1 m tall. Single gene resistance to anthracnose.
'Pucallpa'	Peru (1985)	

Pucallpa (see 'CIAT 184')	Peru (1985)	
'Reyan No 2' ('Bihuadou' ('Zhuhuacao'), 'Pi Hua Dou 184') (see 'CIAT 184')	China (1991)	Grown in citrus and lychee orchards, and cut 2-3 times/year, with large benefits to tree growth, fruit yield and soil conservation . Produced 5t/ha DM and over 160 kg/ha seed.
'Reyan 5'	China (2000)	Selected from 'CIAT 184'. Earier flowering, better seed production, anthracnose resistance, and cold tolerance than 'CIAT 184'. Commonly referred to as 'black seed stylo'.
'Reyan 7' (CIAT 136, CPI 133549, ILCA 00163)	China (2000)	From near Villavicencio, Colombia (4º 16'N, 73º 34'W, 480 m asl, rainfall 3,530 mm/yr). Selected for dry matter yield and anthracnose resistance. Similar yield to 'Reyan 2' and 'Reyan 5', and good winter survival.
'Reyan 10' (CIAT 1283, CNPGC-1191, ILCA-00165)	China (2001)	From Brazil. Selected for anthracnose resistance and long growing period. Better anthracnose resistance, higher yielding and higher CP content than 'Reyan 2' or 'Reyan 5'. Although late flowering, produces higher seed yields than 'Reyan 2'. Good cold and drought tolerance, growing at altitude and with rainfall down to 500 mm/yr.
'Bandeirante' (CIAT 2243, CPI 105921, CPAC-0135)	Brazil (1983)	Semi-erect, with average height of 0.65 m. Stems and leaves finely pilose and viscous. Late flowering. Well adapted to poor soils, producing 80% of its maximum yield, under 60% aluminum saturation and very low P. Recommended in Amazônia Occidental, and humid regions with annual rainfall from 900-3,500 mm. Drought tolerant and moderate tolerance to shade and fire.
'Nina' (ATF 3308, GC 1585)	Australia (2003)	Bred by CIAT to provide multiple gene resistance to anthracnose, and selected in Brazil, the centre of origin/diversity of host and pathogen. Disease resistance

		pathogen. Disease resistance confirmed in Costa Rica, Thailand and tropical Australia. Similar in habit and flowering time to 'CIAT 184'. (See 'Seed production'.)
'Temprano' (ATF 3309, GC 1586, composite of GC 1576 +GC 1524)	Australia (2003)	Bred by CIAT to provide multiple gene resistance to anthracnose, and selected in Brazil, the centre of origin/diversity of host and pathogen. In the upland tropics of Australia, flowers about 1 month earlier than 'Nina'; early June harvest yielding 330 kg/ha clean dry seed. Less erect growth habit than 'Nina'.

Promising accessions

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Promising accessions	Country	Details
GC 1578, GC 1576	China (Hainan)	Early flowering, good vigour and seed production, high anthracnose resistance.
CIAT 136, CIAT 184, FM parcela 9405-6	China (Hainan)	More resistant to anthracnose than FM parcela 9405-1, GC 1578 and 'Reyan 5'. CIAT 184 used widely in China.
CIAT 136, FM parcela 9405-2, FM parcela 9405-3	China (Hainan)	High DMY (5-6 t/ha), although CIAT 136 suffers frost damage at CATAS.
FM parcela 9405-3	China (Hainan, Yunnan)	Produced higher seed yield than GC 1681 and 'Mineirão'.
ILRI 11737, ILRI 11776	Ethiopia	Higher yields than existing commercial cultivars.
CIAT-1095, CIAT-1297, CIAT-2245	Brazil (Vilhena)	High yields at 12ºS, 601 m asl .

Flowers, seed clusters, and seeds - seeds can vary from yellow to black.

Close window

Foliage and flowers.

Close window

Densely branched sub-shrub with many inflorescences/seedpods.

Close window

Young plants of ‘CIAT 184’ - weedmat not only controls weeds, but also facilitates collection of dropped seed.

Close window