

Stylos in Queensland



An identification
and suitability guide
for graziers and advisers

DAF1110 03/21



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Please cite this publication as:

Walker, LK, Peck, GA, Mace, G & Buck, S 2022, *Stylos in Queensland: an identification and suitability guide for graziers and advisers*, Queensland Government, Brisbane.

Acknowledgements

The authors wish to acknowledge the significant contribution made by Queensland Government and Meat and Livestock Australia for their contribution towards this publication. We especially appreciate the edits and photo contributions from:

- Trevor Hall
- Kendrick Cox
- Joe Rolfe
- Bob Shepherd
- Jessica Gorman
- Melissah Dayman

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Overview



Stylos are a highly variable group of legumes of the genus *Stylosanthes* and are used in grazed pastures across northern Australia. To maximise the benefit from stylos, you need to understand the differences between the species and how to identify them in the field.

This guide will help you to identify stylo species and determine which stylos are best suited to different properties and management systems. It provides information on the benefits of growing stylos and how to distinguish between species used commercially in Queensland.

Cattle grazing shrubby stylo in native black speargrass pastures

How legumes improve pasture and livestock production

Nitrogen is essential for good pasture growth. The availability of nitrogen in soil is low under grass-only pastures (due to tie-up in organic matter) and low nitrogen limits pasture growth in almost all pasture paddocks in Queensland. Legumes can fix their own nitrogen; therefore, most paddocks in Queensland would benefit from sowing a legume.

Legumes are able to fix nitrogen from the atmosphere through a symbiotic relationship with rhizobia bacteria in nodules on their roots. Nitrogen fixation creates higher protein levels in legumes than in grasses thereby providing better feed quality for cattle. When a pasture legume is grazed or parts of the plant die or break off, it begins to breakdown and the nitrogen from that plant matter is mineralised by soil microbes and becomes available to nearby grasses, leading to better grass growth.

Legumes that are fixing nitrogen benefit grazing systems in two ways:

1. They **directly improve diet quality**. Pasture legumes have higher protein and digestibility for a longer period of the year than grass-only pastures. This leads to better liveweight gains and reproductive performance.
2. They **increase the amount of nitrogen available to companion grasses**, resulting in higher yields and better quality grass. The increased pasture growth can support increased stocking rates or faster growth rates at current stocking rates.

These two factors combine to significantly improve liveweight gains per hectare.



Rhizobia bacteria form nodules on the roots of legumes which fix nitrogen and benefit the pasture

Stylos as pasture legumes for northern Australia

Stylos are the most widely sown and naturalised pasture legumes in northern Australia. They can grow well with native or sown pastures but are most widely used with native pastures on lighter textured soils. These types of pastures generally have lower pasture productivity due to having low fertility and low water-holding capacity soil.

Stylos persist well under grazing, making them good long-term pasture options. The stylo species grown commercially in Australia are typically hardy plants that are moderately palatable and grazing tolerant.

They produce large amounts of seed, making them a persistent legume option for permanent pastures. Stylos have been persistent and productive in native and sown grass pastures for more than 20 years.

The stylo cultivars that are commercially used are of moderate to high feed value and are non-toxic to livestock. Protein and phosphorus levels in stylos are high compared to those of companion grasses, especially late in the growing season when grass feed quality declines. For example, crude protein can range from 10% to 24% and phosphorus from 0.06% to 0.34%, depending on the stylo species, seasonal conditions and soil fertility. Studies have shown that liveweight gains from stylo-and-grass pastures are significantly greater (between 30 and 140 kilograms per head per year) than those from grass-only pastures.

Differences between stylo species

The different stylo species and cultivars are adapted to different soils and climate zones (rainfall and temperature). Planting the cultivar that matches the soil and climate leads to improved production, sustainability and profit. Therefore, it is important to select the right species and cultivar when sowing stylos.

Knowing which stylos are already growing on a property will help you make informed decisions and recommendations. For example:

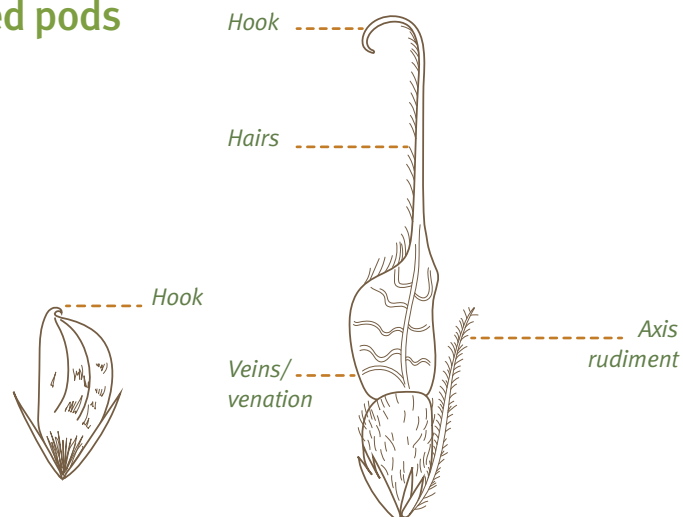
- It can help you identify which species establishes first or best after sowing. This is useful because commercial stylo seed can be contaminated by other species and is often sold as part of a blend.
- It can help you to decide which stylo to sow in the future.
- It allows you to change management to suit the requirements of the species growing in the paddock. This could be by adjusting the timing and intensity of grazing to optimise stylo content of the pasture.

Identification of stylos

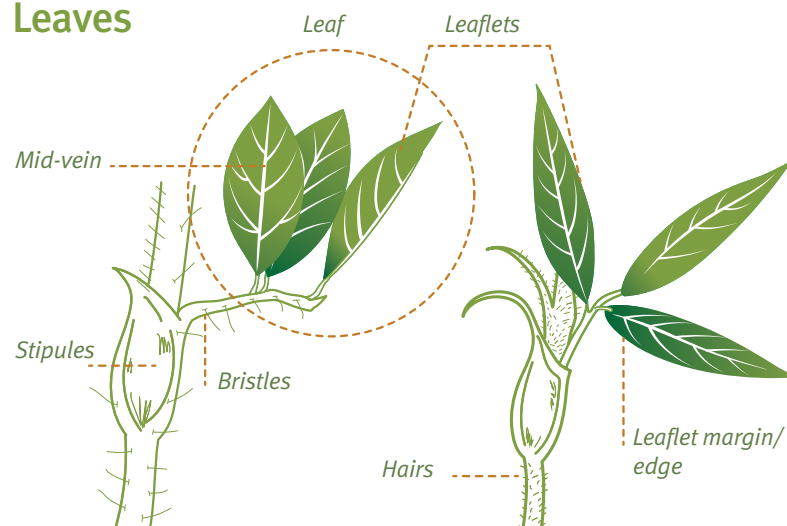
Botanical terms for identification

This guide uses some botanical terms to describe stylo seeds, leaves and other features. The diagrams below explain these features.

Seed pods


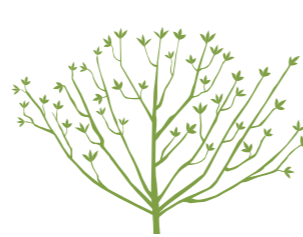

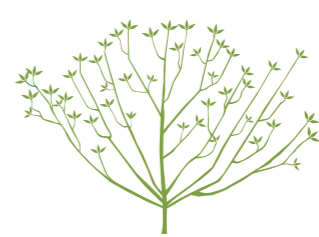








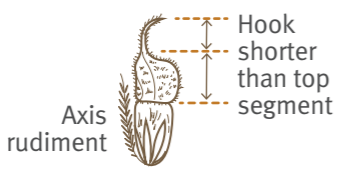
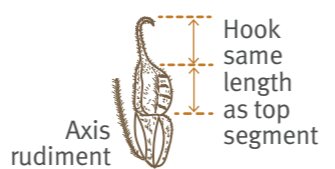
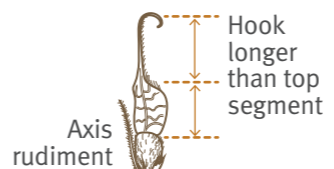




Leaves



Identification of stylos (continued)...

Table 1. Key features for identifying stylos (*Stylosanthes*) species available in Queensland

Common name	Shrubby stylo		Caatinga stylo	Caribbean stylo	Common stylo	Fine stem stylo
Scientific name	<i>S. scabra</i>		<i>S. seabrana</i>	<i>S. hamata</i>	<i>S. guianensis</i> var. <i>guianensis</i>	<i>S. guianensis</i> var. <i>intermedia</i>
Cultivars	Seca Siran		Primar Unica	Verano Amiga	Nina Temprano	Oxley
Growth habit ^A	Woody frame					Herbaceous
						
	Woody base and main branches	Woody base and main branches		Stems neither woody nor fine	Stems neither woody nor fine	Herbaceous; fine stems that do not support their own weight
Height ^A	50–150 cm		30–100 cm	20–50 cm	30–100 cm	10–30 cm
Stem	Short, fine hairs all around the stems and stipules		Short, fine hairs on one side of the stems Bristles on the stipules and on the stems near the stipules	Short, fine hairs on one side of the stems Bristles on the tips of the stipules	With or without bristles on the stems Bristles and short hairs on the stipules	Sparse, long bristles (3 mm) all over the stems
Leaf	 Broad, roundish and sometimes pointed at the tip	 Variable shape but normally broad with a pointed tip		 Narrow and pointy		 Small, narrow and pointy
	Fine hairs on top and underneath Occasionally bristles on the leaflet margin underneath	No hairs on the top side Bristles underneath on the main-vein and leaflet margins Prominent, white veins underneath		No bristles and appears hairless Prominent, white veins underneath	Fine hairs on top and underneath Bristles along the main-vein underneath Occasionally hairless	
Flower	Small (3–5 mm) yellow pea flowers, normally in clusters			Located mostly at the tips of branches and on shorter lateral branches		
Seed	 Two seeds in a two-segment pod			 Two seeds in a two-segment pod	 One seed in a one-segment pod	
	 Axis rudiment Hook shorter than top segment	 Axis rudiment Hook same length as top segment		 Axis rudiment Hook longer than top segment	 No axis rudiment Small hook	 No axis rudiment Small hook
				Smoother seedpod than Fine Stem	Strongly veined seedpod	

^A Plant height and growth habit varies with growing conditions and grazing. Heavily grazed stylo plants tend to be shorter with more branches close to the ground than ungrazed plants. Plant heights and growth habit diagrams are indicative of growth potential in grazed pastures.

Tips for growing stylos

Climate and soil suitability for stylo species

Select the best suited species to gain the most from planting stylos on your property. Table 2 outlines the best growing conditions for and tolerances of each of the stylo species in terms of rainfall, climate and soil type.

Table 2. Best growing conditions for and tolerances of different stylo species

Common name	Shrubby stylo	Caatinga stylo	Caribbean stylo	Common stylo	Fine stem stylo
Cultivars	Seca Siran	Primar Unica	Verano Amiga	Nina Temprano	Oxley
Soil type and texture	Sand to loam	Loam to clay	Sand to loam	Sand to loam	Sand, free draining
Annual average rainfall (mm)^A	NQ > 600	NQ > 600	NQ > 750		
	CQ > 500	CQ > 550	CQ > 600	> 900	> 700
	SQ limited by cool climate	SQ > 550	SQ limited by cool climate		
Climate tolerance	Low frost tolerance	Moderate frost tolerance	No frost tolerance	No frost tolerance	Moderate frost tolerance
	High drought tolerance	High drought tolerance	Tropical (warm) climate	Tropical (warm) climate	Subtropical climate

^A NQ = Northern Queensland (north of Mount Isa – Townsville)
 CQ = Central Queensland
 SQ = Southern Queensland (south of Taroom – Gayndah – Bundaberg)

Rhizobia needed for nitrogen fixation

Rhizobia are bacteria that live in the soil, on plant roots and in legume nodules. Nitrogen fixation by rhizobia occurs within nodules on the roots of legumes. The plant provides energy and nutrients to the rhizobia to enable it to convert nitrogen gas from the atmosphere into a form the plant can use.

Legumes need large amounts of the correct rhizobia strain to form the most effective nodules and support good plant growth. However, the naturally occurring rhizobia population in the soil varies between locations. There is currently no test to determine whether the soil contains a sufficient population of the correct rhizobia before sowing. Legumes that cannot form effective nodules with the naturally occurring rhizobia have to take the nitrogen they need from the soil, therefore competing with the nearby grasses for the same nitrogen. To overcome this, inoculants that contain living rhizobia bacteria should be added at planting time to introduce the correct rhizobia to ensure good nodulation and high pasture productivity.

The correct rhizobia inoculant strain needs to be used for the stylo species being sown (see Table 3). Inoculation is not always necessary for some stylo species, as they are able to form effective nodules in most soils, but other stylo species have highly specific requirements and require inoculating in all soils.

Shrubby, Caribbean and common stylos are able to form effective nodules with naturally occurring rhizobia in most soils. However, inoculation with the correct rhizobia is still recommended because it is inexpensive, and it improves growth and competitiveness of legumes in soils that do not have an adequate native rhizobia population.

Fine stem stylo is moderately specific and will respond to inoculation in most soils.

Caatinga stylo has a highly specific rhizobia requirement and when tested in trials responded to inoculation in all situations.



Adding rhizobia at sowing time improves legume growth, such as in these young shrubby stylo seedlings – rhizobia added to the pot on the left; none added to the pot on the right

Tips for growing stylos (continued)...

Table 3. Inoculation strains for the different stylo species

Common name	Shrubby stylo	Caatinga stylo	Caribbean stylo	Common stylo	Fine stem stylo
Cultivars	Seca Siran	Primar Unica	Verano Amiga	Nina Temprano	Oxley
Rhizobia inoculant strain ^A	Stylo—all other stylo (CB82)	Stylo—Caatinga (CB3481)	Stylo—Caribbean (CB1650)	Stylo—all other stylo (CB82)	Stylo—all other stylo (CB82)

^A Inoculant strain numbers were correct at the time of publishing. Check with suppliers for the latest information

For more information on inoculating legumes, download the free booklet *Inoculating legumes: a practical guide* from the Grains Research & Development Corporation.

Anthracnose disease

Anthracnose is a plant disease caused by the *Colletotrichum gloeosporioides* fungus. It reduces plant growth and can eventually kill a whole plant.

Some cultivars of stylos released in the past were susceptible to the disease and were eliminated within a few years of the disease appearing in Australia. Susceptible cultivars such as Fitzroy shrubby stylo and Townsville stylo cultivars are no longer commercially available because of the impact of the disease. Anthracnose is still prevalent in the environment, and it is possible that more cultivars could become susceptible to the disease in the future.

Anthracnose affects leaves, stems and seed heads. Symptoms include lesions with a defined dark margin but a light-coloured centre. Lesions can girdle and ‘ringbark’ stems, resulting in death of branches.

Townsville stylo seed is no longer sold in Australia due to its susceptibility to anthracnose. However, Townsville stylo is briefly covered in this guide since it is still occasionally found in paddocks where it previously grew despite its susceptibility to the disease. The other stylo species covered in this guide have commercially available cultivars that are currently resistant to anthracnose.



Anthracnose lesions on leaves of shrubby stylo cultivar Fitzroy



Anthracnose lesions with a defined dark margin but a light-coloured centre



Stylo species in Queensland

Six species of stylo have been released commercially in Queensland: some have become common in some districts, and others have succumbed to disease and are no longer prevalent.

Species are described in the following section, each with identifying features and ideal growing conditions.

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Shrubby stylo

Stylosanthes scabra

Shrubby stylo is a perennial legume that is well adapted to the infertile, acidic and sometimes hard-setting soils of the eastern and northern parts of Queensland and northern Australia. It tends to be slow to establish in the first season but is very persistent under grazing, particularly when grass competition is low.



Shrubby stylo growth habit



A popular choice in native pastures, shrubby stylo and black speargrass

Growing conditions and tolerances

- **Sandy and loam soils or hard-setting or gravelly/rocky.** Tolerant to acidic soils. Will survive in very low phosphorus soils (as low as 3 milligrams per kilogram Colwell P) but responds strongly to phosphorus fertiliser application to produce a higher yield and better diet quality; also responds to sulfur application in soils with low plant-available sulfur (as low as 5 milligrams per kilogram from an MCP-S soil test).
- **Plants susceptible to fire**, but the population normally re-establishes from seed in the soil.
- **Low tolerance to frost**, but very drought-hardy.
- **Rhizobium requirement:** Can form effective nodules with native rhizobia in most soils, but inoculation is recommended, especially when sown into prepared seedbeds where it has not previously been grown.
- **Companion grasses:** Mainly native pasture but can also be used with sown grasses.

Cultivars

- **Seca:** Released in 1977. A tall-growing, erect plant often with reddish stems. Moderate resistance to anthracnose.
- **Siran:** Released in 1990. A combination of three lines bred for improved anthracnose resistance. Similar to Seca in appearance and climate adaptation.
- **Fitzroy:** No longer available because it is susceptible to anthracnose.



Shrubby stylo fine hairs on leaves and stem, alongside the flower clusters and seed pods



Typical shrubby stylo leaves and stem showing fine hairs over leaflets and stems (left) and reddish stems with fine hairs

Key distinguishing features

- Woodiest and most erect of the stylos
- Fine hairs over the leaflets and around green stems
- Broader and more rounded leaflets than other species



Caatinga stylo

Stylosanthes seabrana

Caatinga stylo differs from the other commercially available stylos in that it grows well on clay and loam soils. It is perennial and can be slow to establish in the first season but is particularly persistent and hardy with sown grasses including buffel grass.



Caatinga stylo established and persisting in buffel pastures in southern Queensland



Caatinga stylo growth habit

Growing conditions and tolerances

- **Loam and clay soils.** Tolerant of slightly acidic to slightly alkaline soils. Will survive in low phosphorus levels (as low as 6 milligrams per kilogram Colwell P) but responds well to phosphorus and sulfur fertiliser for higher yield and better diet quality.
- **Moderate frost and drought tolerance.** Can grow across a wide range of land types in Queensland and northern Australia, and possibly in New South Wales.
- **Rhizobium requirement:** Recommended to inoculate in all soils.
- **Companion grasses:** Both native and sown grass pastures.

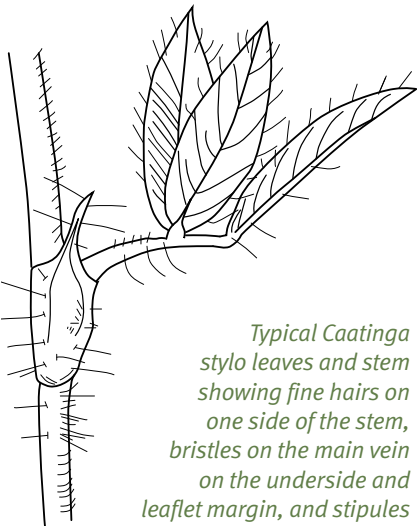
Cultivars

- **Primar:** Released in 1996. Produces reddish stems and leaves when maturing in autumn and is earlier flowering and maturing than Unica. Flowers 2–4 weeks earlier in the first growing season after sowing. Better suited to the subtropical climates than Unica.
- **Unica:** Released in 1996. Stays greener for longer than Primar, especially during autumn. More tolerant of anthracnose and better suited to tropical environments than Primar.

At the time of publication, Primar and Unica were sold together as a blend.



Caatinga stylo cultivars: Primar (left) turns reddish in autumn, and Unica (right) stays greener for longer



Typical *Caatinga stylo* leaves and stem showing fine hairs on one side of the stem, bristles on the main vein on the underside and leaflet margin, and stipules



Fresh *Caatinga stylo* seedpods showing the hook and axis rudiment



Key distinguishing features

- Intermediate in features between shrubby and Caribbean stylos:
 - woody, like shrubby stylo (although less erect and woody)
 - fine hairs on one side of green stem, like Caribbean stylo
 - leaflet shape intermediate between the rounder shrubby and the pointier Caribbean stylos
- Bristles (coarser hairs) on the leaflet margin and main vein on the underside
- Persists on clay and loam soils



Caribbean stylo

Stylosanthes hamata

Caribbean stylo is a productive legume for the tropics of Queensland and northern Australia. It grows mostly as an annual plant, regenerating from seed each year, but can survive as a short-lived perennial in wetter years or locations.



Caribbean stylo growth habit (can grow taller in suitable conditions)



Caribbean stylo seed – starts out in two segments with a long, curled hook on the top segment, and will often break into two

Growing conditions and tolerances

- **Sand and loam soils.** Grows on acidic to slightly alkaline soils. Grows on soils of moderate phosphorus levels but higher levels (greater than 10 milligrams per kilogram Colwell P) produce greater yields. Will respond to sulfur fertiliser in soils of low plant-available sulfur.
- **Intolerant of temporary waterlogging and shade**, including shade from tall pastures. Not tolerant of frost.
- **Rhizobium requirement:** Can form effective nodules with native rhizobia in most soils, but inoculation is recommended, especially when sown into prepared seedbeds where it has not previously been grown.
- **Companion grasses:** Mainly with native pasture but can also be used with sown grasses.

Cultivars

- **Verano:** Released in 1973. An anthracnose-tolerant pasture legume for dry tropical areas.
- **Amiga:** Released in 1988. Similar to Verano but produces more biomass and growth in slightly cooler and drier climates.



Caribbean stylo leaflets – long and thin, without bristles and appear hairless



Typical Caribbean stylo leaves and stem showing fine hairs on one side of the stem only



White veins on the underside of the leaflets

Key distinguishing features

- Low-growing habit (to 0.5 metres)
- Fine hairs on one side of green stems
- Narrow, pointy leaflets
- Prominent white veins on the underside of leaflets



Common stylo

Stylosanthes guianensis var. *guianensis*

Common stylo is suited to the high-rainfall areas of eastern and northern Queensland, where it can be used for grazing or hay production. Common stylo is a perennial plant but requires careful management and timely grazing to prevent plant death.



Common stylo with fine, green stems occasionally with hairs and bristles, and with fine hairs on the stipules

Growing conditions and tolerances

- **Sandy and loam soils with high rainfall** (more than 900 millimetres average annual rainfall). Grows well in soils with moderate acidity but can also tolerate slightly alkaline soils. Moderately tolerant of high aluminium and manganese but not tolerant to salt (salinity). Will survive in low-phosphorus soils, but responds to phosphorus and sulfur fertiliser when soils have low levels of these nutrients.
- **Not very tolerant of shading or frost.** Plants can become tall if not grazed.
- **Rhizobium requirement:** Can form effective nodules with native rhizobia in most soils, but inoculation is recommended, especially when sown into prepared seedbeds where it has not previously been grown.
- **Companion grasses:** Sown and native grasses.

Cultivars

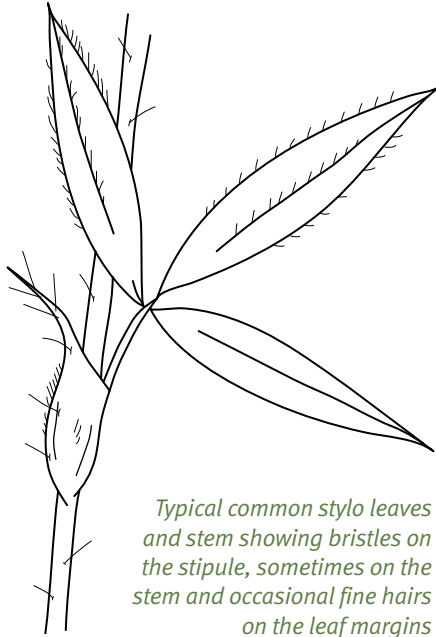
- **Nina:** Released in 2003. Selected for its resistance to anthracnose.
- **Temprano:** Released in 2003. Selected for resistance to anthracnose. Flowers earlier than Nina and has a more open growth habit.

Nina and Temprano are rarely sold under their cultivar names. Instead, they are marketed under trademarked names such as Beefmaker™, Beefbuilder™, V8™ and Stylhay™.

Cultivars Graham, Cook, Endeavour and Schofield are no longer available because they are susceptible to anthracnose.



Common stylo seed—a one-segment pod with a very small hook and discreet, almost smooth veins on the surface



Typical common stylo leaves and stem showing bristles on the stipule, sometimes on the stem and occasional fine hairs on the leaf margins

Key distinguishing features

- Fine, green stem
- Smooth, one-seed pod with a small hook
- Narrow, pointy leaflets, often with short hairs on both sides
- Late (autumn) flowering
- Persists in high-rainfall zones



Common stylo leaflets—long and thin, usually with fine hairs on both the top and underneath



Growth habit of common stylo



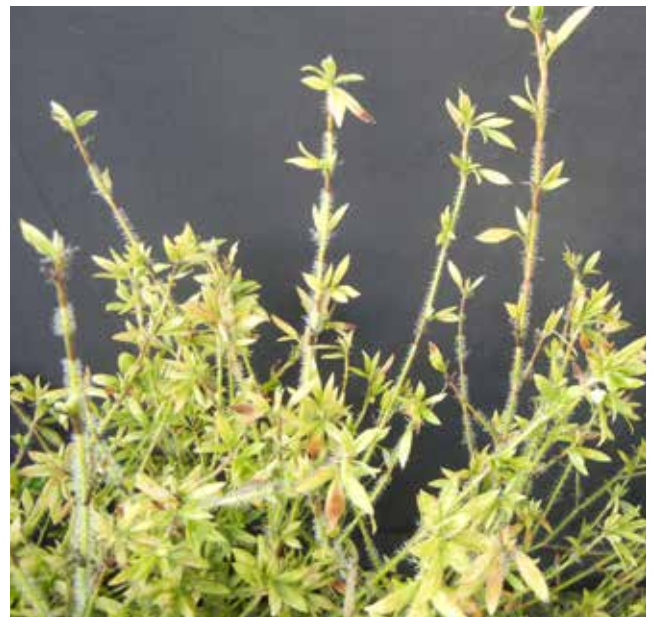
Fine stem stylo

Stylosanthes guianensis var. *intermedia*

Fine stem stylo is suited to sandy soils with moderate rainfall in south-eastern Queensland. It is perennial and summer-growing, with moderate frost tolerance.



Fine stem stylo growing in the paddock, sized up next to a hat



Fine stem stylo growing low to the ground but shooting stems up in good growing conditions

Growing conditions and tolerances

- **Sandy, free-draining soils.** Tolerates slightly acidic soils but grows best on neutral soils. Will survive in low-fertility soils but responds well to phosphorus fertiliser.
- **Moderate frost tolerance,** but does not tolerate flooding or waterlogging.
- **Rhizobium requirement:** Moderately specific, so inoculation is recommended as growth is improved in many soils.
- **Companion grasses:** Primarily native pastures. Struggles to compete with aggressive high-biomass grass pastures (such as sown grasses on fertile soils).

Cultivars

- **Oxley:** Registered in 1969. Selected for its productivity and persistence on sandier soils in subtropical climates.

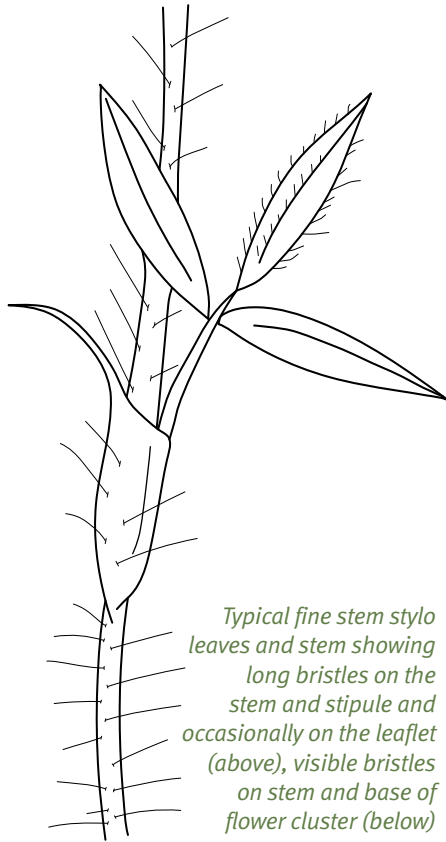
Fine stem stylo seed is often not available.



Fine stem stylo one-segment pod showing a very short hook and visible veins



Fine stem stylo flower cluster with seed pods



Typical fine stem stylo leaves and stem showing long bristles on the stem and stipule and occasionally on the leaflet (above), visible bristles on stem and base of flower cluster (below)

Key distinguishing features

- Fine stems with small leaflets
- Sprawling, ground-hugging, low-growing
- Stems with sparse, coarse hairs
- One seed per pod
- Seed pod with prominent veins



Townsville stylo

Stylosanthes humilis

Townsville stylo is no longer used commercially in Australia because the species and cultivars are susceptible to anthracnose. Despite this, naturalised populations occur in favourable environments of northern and central Queensland.



Townsville stylo growth habit
—low-growing, sometimes erect



Townsville stylo leaflets—narrow
and pointy without any hairs



Townsville stylo seed, stem and leaves
(usually pointed leaves, not round)



Typical Townsville stylo
showing hairs on
one side of stem,
hairless leaflets,
and bristles on stipule



Townsville stylo two-seeded pod—hairy, with a much
smaller bottom segment, a long, curly hook
and no axis rudiment



Townsville stylo growth habit

Key distinguishing features

- Short, white hairs along one side of the stem
- On some plants, roots develop on stems that come into contact with the soil
- Narrow, pointy leaflets usually without any hairs, but with some bristles on the stipules
- Hairy seed in two segments – bottom segment usually sterile and sometimes much smaller than the top segment
- Hook longer than the top segment, and without an axis rudiment

Townsville stylo grows across a range of soils but prefers sands and sandy loams. It does not grow well in salty conditions or in regions with low rainfall. It is an annual plant, growing from seed each year, and grows up to 0.5 metres tall in favourable conditions.



*Beef production can be increased with the inclusion of a stylo to pastures.
Caatinga stylo and buffel grass near Moura, Queensland*

References and further reading

Helpful references

Stylos for better beef provides information to graziers on the selection, establishment and management of stylos. Out of print, but available online:

Partridge, I, Middleton, C & Shaw, K 1996, *Stylos for better beef*, Queensland Department of Primary Industries, Brisbane, https://futurebeef.com.au/wp-content/uploads/stylos_for_better_beef-LR.pdf.

Pasture legumes for subtropical grain and pastoral systems: the ute guide provides information for graziers on the selection, identification and management of a range of pasture legumes in the sub-tropics:

Lloyd, D, O'Brien, S, Johnson, B & Pengelly, B 2006, *Pasture legumes for subtropical grain and pastoral systems: the ute guide*, Primary Industries and Resources South Australia, Adelaide.

Tropical forages is an online tool with tropical pasture species information from around the world:

Cook, BG, Pengelly, BC, Brown, SD, Donnelly, JL, Eagles, DA, Franco, MA, Hanson, J, Mullen, BF, Partridge, IJ, Peters, M & Schultze-Kraft, R 2005, *Tropical forages: an interactive selection tool*, CSIRO, Queensland Department of Primary Industries & Fisheries, CIAT & ILRI, Brisbane, www.tropicalforages.info.

Further reading

The Queensland Department of Agriculture and Fisheries has information and services for the agriculture industry. Visit daf.qld.gov.au or call 13 25 23.

FutureBeef is a collaborative program for the northern Australia beef industry, sharing the latest practical tools, scientific insights and relevant, timely advice. Visit futurebeef.com.au.

For information on inoculating legumes, download the free booklet *Inoculating legumes: a practical guide* from the Grains Research & Development Corporation <https://grdc.com.au/GRDC-Booklet-InoculatingLegumes>

Alternatively, type 'GRDC inoculating legumes booklet' into an internet search engine.





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