

# Tropical Forages

## *Macroptilium gracile*

### Scientific name

*Macroptilium gracile* (Poepp. & Benth.) Urb.



### Synonyms

Basionym: *Phaseolus gracilis* Poepp. ex Benth.;  
*Macroptilium longepedunculatum* (Mart. ex Benth.) Urb.;  
*Phaseolus campestris* Mart. ex Benth.; *Phaseolus longepedunculatus* Mart. ex Benth.

### Family/tribe

Family: *Fabaceae* (alt. *Leguminosae*) subfamily:  
Faboideae tribe: *Phaseoleae* subtribe: *Phaseolinae*.

### Morphological description

Extremely variable herbaceous species comprising annual, biennial and perennial types to 60 cm high with trailing and twining stems; vegetative parts shortly pilose; hairs of the stem retrorse to spreading. Leaves pinnately trifoliolate; stipules narrowly triangular, about 2.5 mm long, acute, persistent; petioles, petiolules, and rachis grooved above and closely ribbed, petioles 24–45 mm long; lateral leaflets 20–44 mm long, 10–31 mm wide, ovate-lanceolate to linear lanceolate, mostly with asymmetric base, sometimes slightly lobed, apex acute; terminal leaflets 25–48 mm long, 13–30 mm wide, broadly lanceolate to linear-lanceolate, sometimes slightly lobed at the base, mucronate. Inflorescence an axillary raceme on peduncle (18–) 23–33 (–42) cm long; flowers shortly pediceled, solitary or in twos and threes, arising from well-spaced, burl-like nodes; calyx tubular, about 6 mm long, sparsely pubescent; lobes about 2 mm long, posterior pair narrower than the rest; standard greyed orange to red, concave, obovate, emarginate, about 14 mm long; wings larger than the other petals, red to purple, broad-ovate, orbicular, about 24 mm long, 11 mm wide; keel petal about 15 mm long, apex curved and slightly twisted. Pod linear, cylindrical retrorsely pubescent, 35–70 mm long, 2–3 mm diameter, beaked, containing 10–18 seeds, dehiscing along both sutures. Amphicarpic fruiting can occur. Seed mottled light and dark grey, flattened ovoid to rhomboidal. About 300,000 seeds per kg.

### Common names

English, Spanish: llanos macro.

### Distribution

#### Native:

Northern America: Mexico (s.)

Caribbean: Cuba

Central America: Belize; Costa Rica; Guatemala; Nicaragua; Panama



Ovate-lanceolate leafed form (CPI 84999)



Extremely variable herbaceous species with trailing stems (CPI 84999)



Some propensity to twine (CPI 84999)



Long peduncles common (cv. Maldonado)



Linear-lanceolate leafed form (CPI 91340)



Inflorescence an axillary raceme; wings of flower light red to dark red or purple



Wings light red to dark red or purple



Inflorescence with immature pods



Seed crop



Subterranean flowers (CPI 55751)

*South America:* Bolivia; Brazil; Colombia; Ecuador; French Guiana; Guyana; Paraguay; Peru; Venezuela

**Naturalized:**

*Asia:* Taiwan

## Uses/applications

### Forage

Component of grazed mixed pastures. It can be used in mixed pastures or as a stand over feed. While it can be used to make good quality hay, hay areas may need renovating every three or four years to maintain a pure stand. It is a good pioneer legume, growing and spreading well in new pastures, and smothering weeds.



Seeds (aerial seeds)



*Macroptilium longepedunculatum* (Benth.) Urban  
1. flowering branch; 2. two types of leaves; 3. flower; 4. inflorescence; 5. seed.

Line illustration

## Ecology

### Soil requirements

*M. gracile* occurs naturally on soils with textures ranging from sand to clay and pH from 4.0 to 8.5. However, it is an extremely variable species and ecotypes may have specific adaptation to soils and climate.

### Moisture

It is found over a wide annual rainfall range from 250 mm at 23° N in Mexico to 2,200 mm at 6° N in Colombia, but has been mostly collected in areas of annual rainfall between about 900 mm and 1,200 mm. While most accessions have been collected in well-drained soils, 'Maldonado' has shown good tolerance of waterlogging.

### Temperature

*M. gracile* is a largely lowland tropical species, mostly occurring between about 23° N in Mexico and 16° S in Brazil, representing an average annual temperature range of 24–27 °C.

### Light

The species occurs in areas of forest and savannah woodland suggesting at least moderate shade tolerance.

### Reproductive development

Short day species, commencing flowering in mid to late April in the southern hemisphere tropics and from October to December in the northern tropics. There are two distinct groupings within the species in relation to fruit placement, the aerial fruiting group (including cv. Maldonado) and the amphicarpic (aerial + geocarpic) group. The amphicarpic group is perennial with ecotypes from areas with rainfall as low as 250 mm (Baja California, Mexico) to 1,600 mm (Chiapas, Mexico). Some within the amphicarpic group are predominantly geocarpic. Ecotypes from the more arid areas are earlier flowering. Seed of the aerial group is produced over an extended period, pods shattering as they mature.

### Defoliation

The aerial seeding group (annuals, biennials) depends strongly on seed set for persistence, so grazing management should be lenient prior to flowering to facilitate a good framework, and livestock removed during seeding. It should not be grazed in the year of establishment before it has set seed.

### Fire

Fire kills living plants in the annual group, but stands recover from hard seed in the soil.

## Agronomy

Guidelines for establishment and management of sown forages.

### Establishment

Seed should be sown at 2–4 kg/ha depending on seedbed preparation and proposed end use. For best results, seed should be sown 1–2 cm deep into a well-prepared seedbed. 'Maldonado' is not specific in its rhizobium requirements and does not require inoculation.

### Fertilizer

Generally, seed should be sown with 100–200 kg of superphosphate, and maintenance applications should be 50–100 kg/ha yearly. Applications of potassium, molybdenum or zinc fertilizers may be necessary on some soils.

### Compatibility (with other species)

It combines most successfully with tussock species than with vigorous stoloniferous such as *Urochloa humidicola*.

## Companion species

Grasses: *Digitaria eriantha*, *Megathyrsus maximus*, *Setaria sphacelata*, *Urochloa decumbens*, *U. humidicola*, *U. mutica*.

## Pests and diseases

After periods of wet weather, small patches of dead leaves (leaf blight) caused by the fungus, *Rhizoctonia* sp., can be found in swards. The areas involved are only small and no control measures are required. However, the condition is more serious in the subtropics and probably contributes to lack of persistence.

## Ability to spread

Spreads slowly by seed.

## Weed potential

Low. There are no records or reports of weediness.

## Feeding value

### Nutritive value

Forage quality of 'Maldonado' is similar to that of other tropical legumes. Crude protein percentages of fresh growth are 15–18%. These drop to 7–9% at the end of the dry season. IVDMD values are 65–70% during the wet season, dropping to 45–55% during the dry season.

### Palatability/acceptability

'Maldonado' is well accepted by stock as green feed, standing feed or hay.

### Toxicity

No indications of any toxicity.

## Production potential

### Dry matter

Dry matter yields up to 5–7 t/ha have been recorded in 'Maldonado' in ungrazed pastures.

### Animal production

When grazed as standover fodder in the Northern Territory in Australia, 'Maldonado' gave liveweight gains of up to 345 g/head/day over 56 days when stocked at 3 head/ha in 1987.

## Genetics/breeding

2 *n* = 22. There has been no breeding work with *M. gracile*.

## Seed production

Seed yields of 'Maldonado' of up to 240 kg/ha have been recorded in trials and from irrigated seed crops. As the seed is shed rapidly it must be suction harvested.

## Herbicide effects

No information available.

## Strengths

- Good pioneer legume.
- Good tolerance of waterlogging.
- Some flood tolerance.
- Palatable as green feed and as hay.

## Limitations

- Seed harvesting difficult.
- The released cultivar has specific climatic requirements.

## Selected references

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## Cultivars

**'Maldonado'** (CPI 62158) Released in Australia (1990). Origin Hato El Frío, Apure, Venezuela (7°45' N, 73 m asl, rainfall 1,300 mm). Collected on a clay soil but shown good growth on red and yellow earths and floodplain solodic soils, but has performed poorly on cracking clay floodplain soils. Suited to areas with reliable wet and dry seasons receiving annual rainfall of over 1,100 mm. Behaves as a biennial, with on average, 40% of plants surviving from one wet season to the next. Has shown good tolerance of waterlogging on solodic and yellow earth soils, and has survived up 3 months of flooding on solodic soils. Selected in seasonally dry tropics and proven poorly adapted to subtropics; does not set seed in wet equatorial climates. Readily accepted by cattle as green feed or as hay.

## Promising accessions

**CPI 61635** Selected in Australia. Origin Valencia, Carabobo, Venezuela. Appears identical to 'Maldonado'.

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