Macroptilium lathyroides

Scientific name

Macroptilium lathyroides (L.) Urb.

Synonyms

Macroptilium lathyroides (L.) Urb. var. lathyroides
Macroptilium lathyroides (L.) Urb. var. semierectum (L.) Urb.
Phaseolus crotalaroides Mart. ex Benth.
Phaseolus lathyroides L.
Phaseolus semierectus L.
Phaseolus semierectus L. var. angustifolius Benth.

Family/tribe


Common names

feijão-dos-arrozais, feijão-de-rola (Brazil); phasey bean, phasemy-bean, wild bean, wild bush bean, one-leaf clover (English); quail bean (Florida); phasemybohne (German); habichuela parada, frijolito de los arrozales, pico de aura (Spanish); pini (Tonga); pois-poison, pois-zombi(e) (Lesser Antilles); wild dolly (Cayman Islands); frijol de monte (Venezuela); frijol de los arrozales (Colombia); wild pea bean (Hawaii); kacang batang (Indonesia); thua-phi (Thailand).

Morphological description

Herbaceous annual or short-lived perennial, erectly branching, 0.6-1 m tall, sometimes trailing, or twining to 1.5 m (especially in shade), becoming somewhat woody with age towards the base. Stems sparsely to densely appressed pubescent. Leaves trifoliolate; leaflets mostly entire, ovate to lanceolate, or narrowly elliptic, 3-8 cm long; 1-3.5 cm wide, upper surface glabrous, lower surface adpressed hairy, petioles 1-5 cm long, stipules lanceolate, 5-6 mm long lateral leaflets sometimes slightly lobed towards the base. Inflorescence a semi-erect, spicate raceme, about 15 cm long borne on axillary peduncles to about 30 cm long. Flowers papilionate on very short pedicels; calyx campanulate, 4-6 mm long; standard red to red-purple (rarely white or pink), roundish 13 mm, wing and keel petals tinged green, red, or white; keel spirally twisted. Pods linear, sub-cylindrical, 5.5-12 cm long, 2.5-3 mm wide, straight or slightly curved, glabrous or pubescent, the valves becoming strongly twisted on dehiscence (pods shatter readily on maturity), each pod containing up to 20 (-30) seeds. Seeds obliquely oblong , slightly compressed, about 3 mm long, mottled light and dark grey-brown or black; 88,000-154,000 seeds/kg.

Distribution

Native to: North America: Mexico.
Mesoamerica: Belize, Costa Rica, Guatemala, Nicaragua, Panama.
Caribbean: Antigua and Barbuda - Antigua, Bahamas, Barbados, Cayman Islands, Cuba, Dominica, Grenada, Guadeloupe, Jamaica, Martinique, Puerto Rico, St. Kitts and Nevis - St. Kitts, St. Lucia, St. Vincent and Grenadines.
South America: Argentina, Bolivia, Colombia, Ecuador, French Guiana, Guyana, Paraguay, Peru, Suriname, Venezuela.

Uses/applications

Mainly used as a pioneer forage, but can also be conserved as hay or as silage when mixed with a grass. Care must be taken to minimise leaf drop during hay making and handling. It fixes nitrogen very effectively, and can be used as a green manure or cover crop in rotations.

Ecology

Soil requirements

Adapted to a wide range of well to poorly drained soils, from deep sands to heavy clays, and with pH from (5.0-) 6.0-7.0 (-8.0). It can tolerate moderate salinity, but is susceptible to higher levels of available soil manganese and aluminium, responding to lime to reduce available levels.

Moisture

Found in areas with rainfall from (400-) 750-2,000 (-3,500) mm, usually in drainage lines and other wet places in lower rainfall environments. Although moderately drought tolerant, it avoids the effects of severe drought through its free-seeding annual habit. It grows on seasonally flooded soils, but not in permanent water.

Temperature
Natural distribution extends from 25ºN in Mexico to 30ºS in Argentina, and from the low altitude subtropics to low (0 m asl, Panama) and high (2,000 m asl, Ecuador) altitude tropics. It is susceptible to frost, but has usually seeded well ahead of them. It can survive light frost, and although killed by heavy frost, has usually set seed before they occur.

**Light**
Tolerant of light to moderate shade, although seedlings may suffer from shading. Its twining ability, once mature, enables it to compete for light with tall grasses.

**Reproductive development**
It is day-neutral, flowering through most of the growing season. However, undefoliated plants generally do not flower until they reach about 30 cm tall.

**Defoliation**
*M. lathyroides* only persists for one or two years under continuous grazing. It should be lightly (at least 10-15 cm of legume growth in the pasture) or rotationally grazed, and/or rested for 6-8 weeks later in the growing season to facilitate seed set and encourage persistence. A light cultivation helps annual regeneration.

**Fire**
Plants do not survive fire, but soil seed germinates when conditions are suitable.

**Agronomy**
Guidelines for the establishment and management of sown pastures.

**Establishment**
Percentage of hard seed is generally fairly low, but to break dormancy in small samples, seed can be manually scarified or treated with concentrated sulphuric acid (sg. gr. 1.8) for 20 minutes. Acid-treated seed should be washed and dried thoroughly after treatment. It is fairly promiscuous, mostly nodulating freely with rhizobia already in the soil. If in doubt, seed can be inoculated with cowpea strain *Bradyrhizobium*, such as CB 756 (Australia) and C 5 or C 95 (Argentina). For best establishment, seed should drilled (1-1.5 cm) or broadcast onto a well-prepared seedbed and lightly covered. It can be sown at any time during spring and summer when moisture is adequate, using (1-) 3 (-10) kg/ha seed. It has a vigorous seedling, emerging and developing more quickly than *Desmodium heterocarpon* cv. Florida or *Aeschynomene americana*, and can be co-planted with these legumes to provide early summer grazing.

**Fertiliser**
*M. lathyroides* grows best on fertile alluvial soils or heavy clays, where it rarely requires fertiliser. On less fertile (usually more acid) soils, it may require addition of 250 kg/ha molybdenised superphosphate and possibly other nutrients if indicated by soil analysis. If required, Mo is normally reapplied at 100 g/ha every 3 or 4 years. If plant tissue analysis is <0.20% P, additional P may be required. Lime is sometimes necessary to reduce levels of available Al and Mn in more acid soils.

**Compatibility (with other species)**
Once established, it combines well with more open grasses, particularly under fertile, moist conditions. Although free-seeding, seedling regeneration in pastures only occurs under favourable conditions, and is usually poor after the second year.

**Companion species**

**Pests and diseases**
Late-sown seedlings in particular are severely attacked by bean fly (*Ophiomyia* (*Melanagromyzà*) *phaseoli*, Diptera: Agromyidae). Coating seed with carbofuran or carbosulfan before sowing protects plants against attack for two to three weeks, as can banding systemic insecticides, such as phorate and carbofuran along the seeds at sowing. Weekly spraying of monocrotophos, dimethoate or omethoate during the first four weeks gives effective control. Adults of rough brown weevil (*Baryopadus corrugatus*, Coleoptera: Curculionidae) feed on the foliage, while larvae can severely damage roots. *M. lathyroides* is an alternative host for silverleaf whitefly (*Bemisia argentifolii*, Homoptera: Aleyrodidae), a serious pest of a number of crop plants. Nematodes attack the roots in lighter textured soils, the main species being *Meloidogyne incognita* and *M. javanica*. It shows field resistance to little-leaf phytoplasma, but is infected by a multitude of viruses, few of which are of any consequence in the field.

**Ability to spread**
It spreads readily from seed under moist conditions, providing competition is not too severe. Seed can be ejected several metres by virtue of the violent shattering mechanism on ripening.

**Weed potential**
Although widely naturalised, it is rarely considered a serious weed.

**Feeding value**

**Nutritive value**

CP values range from about 7% in old stemmy material to 25% in young vegetative growth, and IVDMD from 40-70%. NDF has been measured at 52 and 62%, compared with ADF of 40 and 46%, and IVDMD of 71 and 76% in different accessions. Leaf:stem ratio averages about 0.3 compared with 0.6 for *Aeschynomene americana*.

**Palatability/acceptability**

*M. lathyroides* is claimed to be less palatable to stock when young and more palatable after seed set, although this may largely reflect a change in relative palatability of associated grasses.

**Toxicity**

No record of problems with ruminants, and although suspected of causing poisoning with horses, other evidence suggests to the contrary. It does not produce milk taint.

**Production potential**

**Dry matter**

DM yields depend on grass competition and growing conditions, and range from 500 kg/ha when grown with grass in the subhumid subtropics, up to 13 t/ha in pure sward under ideal conditions.

**Animal production**

Published performance results are largely confounded by the presence of other species.

**Genetics/breeding**

Closely self-pollinated; 2n = 22.

**Seed production**

As with some other *Macroptilium* spp., flowering appears to be at least partly induced by a drying environment, although vigorous pollen germination and pollen tube growth are favoured by humidity. Pods mature throughout the growing season, with high levels of seed being produced. The absence of a synchronous crop and the shattering habit of the pods make machine harvest difficult and only a proportion of the crop produced is harvested. It can be direct-headed when a fair percentage of the pods are ripe to ripening and the material subsequently dried where seed from dehiscing pods will not be lost. Seed can then be threshed in a follow-up operation. Machine harvest can yield 30-150 kg/ha seed, and hand harvest about 250 kg/ha.

**Herbicide effects**

Susceptible to pre-emergence application of azafenidin. Moderate tolerance of 2,4-D amine. Controlled by mixture of glyphosate and 2,4-D.

**Strengths**

- Widely adapted (including heavy clay soils).
- Adapted to wet conditions.
- Rapid early growth (good pioneer species).
- Good nitrogen fixation.
- Seeds heavily.

**Limitations**

- Poor persistence.
- Susceptible to bean-fly.
- Susceptible to root-knot nematode.
- Difficult to harvest.

**Selected references**


Foliage, flowers and immature pods.

Variation - also flowers, pods and seeds.

A short-lived, free-seeding, erectly branching perennial.

Ev. Murray.

Three ecotypes with differing leaf shapes (see insets).

High-yielding seedcrop.