



A collaboration between AWI, GRDC, MLA, RIRDC and Dairy Australia

Birdsfoot trefoil

Scientific name(s)

Lotus corniculatus

Strengths

- Perennial, non-bloating, adapted to acid and waterlogged soils.
- Provides bypass protein, and reduces methane output in ruminants.

Limitations

- Seed can be expensive and seedling establishment is slow.
- Needs careful grazing management over summer to maintain persistence.

Plant description

Plant: Herbaceous tap rooted perennial that can have an erect to prostrate growth habit.

Stems: Usually hairless and solid (not usually hollow), green to reddish green, up to 60 cm long, arising from the basal crown. Branches arising from the leaf axis.

Leaves: Leaves occur as five leaflets (pentafoolate), three terminal and two basal and are nearly hair-less. The widest part of the leaf is in the lower half of the basal leaflets. Leaf shape can vary (elliptic or obovate) however terminal leaves are at least 3 times longer than their width. The three terminal leaves are also removed from the basal leaf hence the Trefoil component of the common name.

Flowers: Inflorescence is umbel like. Flowers are yellow often but not always with red veins in the petals. Flowers occur in groups of 2 through to 8 (mostly 3 to 5) and are approximately 10 to 16 mm long.

Pods: Pods are usually brown, long cylindrical in shape and 15 to 40 mm in length. Pods shatter to disperse seed as they ripen. The pod arrangement off the stem is a mirror-image of a Birdsfoot, hence its common name.

Seeds: Seeds are greyish brown to black about 1 mm long (1 x 10⁶ seeds/kg).

Pasture type and use

Birdsfoot Trefoil is most successful in areas where white clover is unable to perennialize due to an extended summer drought and Lucerne is unable to be productive due to low soil pH and/or winter waterlogging.

Birdsfoot is used primarily in combination with cocksfoot on acid soils and can be used with phalaris in waterlogged soils. It is also used in native pastures of South America.

Where it grows

Rainfall

> 600 mm average annual rainfall

Soils

Suited to a wide range of soils with low pH (<5.5 in CaCl). Also tolerates waterlogging.

Temperature

Cold and frost tolerant.

Establishment

Companion species

Grasses: Cocksfoot, Phalaris, Tall fescue, Kikuyu and Paspalum.

Legumes: subterranean clover, strawberry clover and white clover.

Sowing/planting rates as single species

4 to 8 kg/ha (not commonly sown by itself)

Sowing/planting rates in mixtures

2 to 4 kg/ha

Sowing time

Autumn or spring sowing at a depth of 0.5 to 1.5 cm into a firm, level, weed free seedbed. Can also be drilled into perennial grass stands, although grazing is required to manage the green over burden.

Inoculation

Special *Lotus corniculatus* inoculant.

Fertiliser

Phosphorus and any other nutrients required to avoid deficiencies.

Management

Maintenance fertiliser

Olsen P soil test for phosphorus above 15

Grazing/cutting

Birdsfoot trefoil is suitable for hay or silage production. Hay production should be cut at 10% flowering. Cutting after 10% flowering will result in reduced feed quality while cutting before 10% flowering will result in reduced quantity. Cutting height should not be below 8 cm to facilitate re-growth.

New stands should be allowed to reach 10% flowering before grazing and subsequently rotationally grazed. Continuous grazing of birdsfoot trefoil will reduce root carbohydrate reserves, resulting in stand decline. To ensure carbohydrate reserves are not depleted to critical levels, grazing or cutting should not be below 8 cm. Any stand decline can be rectified by allowing seed set. Subsequent autumn rains will establish new seedlings, some of which will survive to become adult plants. To assist seedling survival the stand should be grazed to reduce shading. It is recommended that thickening of stands be undertaken every two to three years.

Seed production

Pods shatter dispersing seed so several important management practises need to be considered including; monitoring of peak flowering and podding, the application of a desiccant such as paraquat at 70 percent pod maturity or at 35 days after peak flowering, harvesting with a conventional header 48 hours after the desiccant application with header concave settings at 2 mm and drum speed at 1200 rpm using a very low fan speed setting for air flow.

Ability to spread

Recruits from seed if allowed to set seed.

Weed potential

Low

Major pests

Red Legged Earth-mite and Blue Green Aphids will feed on this species however it is not considered susceptible to either insect. Heliothis caterpillars attack flowers and pods.

Major diseases

Pythium root rot can impact on stands persistence.

Herbicide susceptibility

Grass selective herbicides present no phytotoxic problems, however broadleaf selective herbicides do cause varying degrees of damage, although recovery from these effects usually occurs.

Animal production

Feeding value

Dry matter digestibility 60 to 70%, crude protein 17 to 22% and metabolizable energy 10 to 13 MJ/kg DM. Milk from cows fed on Birdsfoot Trefoil hay contains more vitamins A and E than milk from cows fed Lucerne hay.

Palatability

Tannins are between 2 and 5% of dry weight. Tannin levels above 7% may impact on intake in monoculture stands.

Production potential

Dry matter production in the South East of South Australia showed a second years stand of Lotus corniculatus produced 14 t/ha while White Clover produced 3 t/ha.

Livestock disorders/toxicity

Can produce cyanogenic glucosides however levels of production are very unlikely to cause cyanide poisoning.

Cultivars

Group	Cultivar	Seed source/Information
New Zealand material	Grasslands Goldie	Contact your local seed merchant
South American material	INIA Draco	Contact your local seed merchant
-	San Gabriel	Contact your local seed merchant

Several Australia varieties have been bred for the first time and these are currently undergoing commercialisation, include material bred for high rainfall (> 800 mm) areas and material bred for lower rainfall (>600 mm). At least two varieties are expected to be released from this material.

Further information

Contact Graeme Sandral at NSW Department of Primary Industries or Daniel Real at the Department of Food & Agriculture WA.

Acknowledgements

Livestock disorders provided by Dr Chris Bouke, Principal Research Scientist, NSW Department of Primary Industries.

Author and date

Graeme Sandral, Daniel Real and Dmitry Sokoloff

January 2009