



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

Disc medic

Scientific name(s)

Medicago tornata

Strengths

- Annual pasture legume adapted to neutral to alkaline sandy soils (well drained).
- Palatable at all growth stages including senesced dry matter and seed pods over summer.
- High nutritive value with high protein content.
- Fixes atmospheric nitrogen when effectively nodulated, benefiting cereal crops grown in rotation.
- Produces hardseeds that contribute to a long term soil-seed bank.
- Can self-regenerate in intensive pasture/crop rotations (e.g. 1:1 rotation)
- Allows non-selective weed control options to manage herbicide resistant weeds in cropping phases (eg grazing, green manuring, hay production, spray-topping).
- As a grass-free pasture in rotation with cereals it is a disease break for various cereal pathogens including cereal cyst nematode (*Heterodera avenae*), root lesion nematode (*Pratylenchus neglectus* and *P. thornei*), take-all (*Gaeumannomyces graminis* var. *tritici*) and crown rot (*Fusarium pseudograminearum*).

Limitations

- Not well adapted to soils with pH_{water} < 6.5 (pH_{Ca} < 5.8), waterlogged or moderately saline areas.
- Sensitive to redlegged earth mite (*Halotydeus destructor*), lucerne flea (*Sminthurus viridus*) and pasture aphids.
- Winter production can be slow if autumn rains are late and insufficient leaf area is produced before soil and air temperatures fall.
- Herbicide options for broadleaf weed control are limited.
- Harvest of seed generally requires specialist vacuum harvesting machinery.

Plant description

Plant: semi-prostrate annual, 30-70 cm across, 15-30 cm high with multiple lateral branching from near the base.

Stems: prostrate to ascending, green and sparsely hairy; stipules toothed.

Leaflets: trifoliolate, rounded wedge shaped with toothed upper margin, sparsely hairy on both sides. The central leaflet stalk is longest (a feature distinguishing medics from most *Trifolium* spp.).

Leaflet markings - varies from absent to some white and purple flecking on young leaflets, most evident at low temperatures.

Flowers: up to 8 mm long, bright yellow, pea-like, on stalks much longer than leaf stalks and in pronounced clusters of 5-15 (distinctive for this species).

Pods: discoid to cylindrical, spineless, 5-10 mm diameter, 2-6 coils with 1-2 seeds per coil.

Seeds: pale yellow to light brown, kidney shaped, 200-250/g.

Pasture type and use

Used as a self-regenerating autumn-to-spring growing annual pasture, germinating after autumn rains, flowering in spring and setting seed in mid spring. Typically used in dryland cereal/livestock zones in southern Australia in rotation with winter cereals, grain legumes and canola. Once established, its hardseededness allows it to regenerate from a soil-seed bank

after short cropping phases of typically 1-3 years.

Where it grows

Rainfall

Adapted to Mediterranean and Temperate Zones of southern Australia.
Annual rainfall of 375-600 mm (growing season rainfall >250 mm).

Soils

Adapted to neutral to alkaline sandy soils (pH_{water} > 6.5, pH_{Ca} > 5.8) (eg the sandy rises of southern Australian mallee dune/swale land systems).

Temperature

Disc medic is autumn-to-spring growing annuals suited to areas with mild growing seasons (15-25°C) but will tolerate higher and lower temperatures. Seed production may be reduced by severe frost during flowering.

Establishment

Companion species

Can be grown in mixtures with other annual *Medicago* spp. or grasses including annual ryegrass, volunteer cereals or sown cereals for grass/legume hay production.

Sowing/planting rates as single species

7-15 kg/ha.

Sowing/planting rates in mixtures

3-5 kg/ha

Sowing time

Sown April-June. Typically dry sown into the previous year's cereal stubble before the opening rains or into a moist, weed-free seedbed soon after the break. Shallow sowing (1-2 cm) is essential with press wheels, harrows or prickle chains to improve soil-seed contact and establishment.

Inoculation

Commercial Group AL.

Fertiliser

Phosphorous is generally the single most limiting macronutrient for annual medics.
Sulphur and/or potassium may be required on some soils (especially sandy loams and/or in the subtropics).
Some soils, particularly infertile sands, may also be deficient in important trace elements (eg Zn, Cu, Mo and Co), some of which are directly involved in nitrogen fixation.

Management

Maintenance fertiliser

Generally annual medics are grown in fairly close rotation with other crops which, if adequately fertilised, provide enough residual nutrients to maintain general soil fertility and medic growth. However, when medics are used in extended pasture phases on infertile soils in both southern Australia and the subtropics, they are likely to require topdressing with superphosphate at least. Soil testing is required to determine the need, timing and appropriate application rates. The trend towards high analysis fertilisers (eg DAP, MAP) in broadacre farming has resulted in zinc deficiencies becoming more common on some soil types. Plant tissue testing is a more sensitive test for micronutrient deficiencies, some of which can be addressed in the short term with foliar sprays.

Grazing/cutting

Establishment - defer grazing in the first year until plants are well established and anchored (approx. 6 leaves, 2-3cm height, >1000 kg/ha dry matter) and then only graze lightly until flowering. To maximise seed production for subsequent regeneration, remove stock until medic

has finished flowering and producing pods. Paddocks should not be "crash" grazed or cut for hay in the first year if the stand is expected to regenerate.

Regeneration - in crop/medic rotation systems, it is best to defer grazing at the break of the season until the ground is covered and/or medics are well established (approx. 6 leaves, 2-3cm height, >1000 kg/ha dry matter). Set stock to control upright grasses, weeds and to encourage prostrate growth, increasing grazing pressure as necessary to prevent 'bulky' pastures in early spring. Reduce grazing pressure if possible whilst medic is flowering to maximise pod and seed-set.

Summer grazing (southern Australia) - carefully monitor grazing of dried residues over summer, as over-grazing of pods, especially in the first year, will reduce future pasture regeneration.

Seed production

Can produce over 800 kg/ha under dryland conditions with average commercial dryland seed production being about 375 kg/ha. Generally requires specialised vacuum harvesting machinery.

Ability to spread

Colonises well from seed reserves. Some spread by seed in livestock faeces or by movement of hay.

Weed potential

Low environmental weed potential due to its preference for moderately fertile soils, and because of its specific rhizobial requirements, high palatability and grazing preference by livestock.

As a self-regenerating plant it can be a weed of crops in crop/pasture rotations but easily controlled in cereals with a range of inexpensive broadleaf weed herbicides. Fewer selective herbicide options exist for control in grain legume crops.

Major pests

Seedlings: Redlegged earth mite, lucerne flea, sitona weevil.

Mature plants: lucerne flea, bluegreen aphid (*Acyrtosiphon kondoi*), spotted alfalfa aphid (*Therioaphis trifolii*), cowpea aphid (*Aphis craccivora*) and sitona weevil. Adult sitona weevil (*Sitona discoideus*) can damage leaves and their larvae feed on nodules, potentially reducing N fixation.

Major diseases

Phoma black-stem (*Phoma medicaginis*), rhizoctonia bare-patch (*Rhizoctonia solani*) and powdery mildew (*Erysiphe trifolii*).

Intolerant of *Pratylenchus neglectus* root lesion nematode (nematode numbers should not build up but productivity is reduced in their presence).

Herbicide susceptibility

Tolerant of grass-selective herbicides.

Some herbicides available for selective control of certain broadleaf weeds.

Spray-grazing and spray-topping techniques using sub-lethal doses of non-selective herbicides also available.

Intolerant of some herbicide residues from cropping phase, particularly sulfonylurea herbicide residues in low rainfall areas with alkaline soils.

Animal production

Feeding value

Has high levels of crude protein and digestibility.

Digestibility ranges from 55-75% DMD, metabolisable energy from 8-10 MJ/kg DM and crude protein from 17-23% depending on growth stage.

Palatability

Readily consumed by livestock, either as green or dry feed, including mature seed pods.

Production potential

Excellent feed for growing and finishing livestock when in growing phase.

Dry residues and seed pods provide useful adjunct for maintenance of sheep grazing crop stubbles.

In general animals can be expected to make better live weight gain and wool production on legumes than grasses, as a result of higher intake and more efficient utilisation of high protein, high energy feed.

Livestock disorders/toxicity

Photosensitisation in horses, occasionally red gut in sheep, bloat in cattle.
Phytoestrogens/coumestrols potentially can have negative effects on the reproduction of grazing livestock but this is rarely reported in annual medics.

Cultivars

Maturity	Cultivar	Seed source/Information
Mid	Tornafield	Susceptible to bluegreen aphid (BGA), moderately susceptible to spotted alfalfa aphid (SAA). Pods like flat discs, 2-3 coils, anti-clockwise pod coil. Australian Herbage Plant Cultivars
Mid to Late	Rivoli	Moderately susceptible to bluegreen aphid (BGA), susceptible to spotted alfalfa aphid (SAA). Pods plumper than Tornafield, 4-6 coils, predominantly anti-clockwise. Australian Herbage Plant Cultivars
Tornata disc medic		See Rivoli above. Seed Distributors

 Denotes that this variety is protected by Plant Breeder's Rights Australia

Further information

Weblinks:

SARDI Pastures - Medics

NSWDPI - Pastures & Rangelands

Plant Breeders Rights Australia

Acknowledgements

Information has been adapted from a variety of sources including:

Heyn, C.C., (1963). "The Annual Species of Medicago". Scripta Hierosolymitana Vol 12. Hebrew University.

Lesins, K.A. & Lesins, I., (1979). "Genus Medicago: (Leguminosae): a taxogenetic study".

"Pasture Legumes for Temperate Farming Systems - The Ute Guide", Principal Author Michael Wurst, Rural Solutions SA, Primary Industries and Resources South Australia.

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