



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

Hybrid disc medic

Scientific name(s)

Medicago tornata x *Medicago littoralis*

Strengths

- Good adaptation to neutral-to-alkaline, sand to clay-loam soils in low rainfall (AAR >275mm) temperate cropping zones.
- Annual pasture legume, palatable at all growth stages including senesced dry matter and seedpods for grazing over summer.
- High nutritive value with high protein content.
- Fixes atmospheric nitrogen when effectively nodulated, benefiting cereal crops grown in rotation.
- 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*).
- A very early flowering medic option for sowing in grass/legume pastures in marginal climates in the subtropics.
- Provides non-selective weed control options for reducing risk of herbicide resistant weeds in cropping phases (eg grazing, green manuring, hay production, spray-topping).
- Hardseeded and once established will maintain a bank of seed reserves in the soil and will self-regenerate from that soil-seed bank over a number of years.

Limitations

- Relatively small seeded and so must be shown shallow (1-2 cm) in year of establishment.
- Winter production can be slow if autumn rains are late and insufficient leaf area is produced before soil and air temperatures fall.
- Not well adapted to soils with pH_{water} < 6.5 (pH_{Ca} < 5.8), or waterlogged or moderately saline areas.
- Sensitive as seedlings to redlegged earth mite (*Halotydeus destructor*); as mature plants to lucerne flea (*Sminthurus viridis*) and pasture aphids (depending on cultivar).
- Herbicide options for broadleaf weed control are limited.
- Harvest of seed generally requires specialist vacuum harvesting machinery.

Plant description

Plant: semi-prostrate annual, 10-30 cm high, with multiple lateral branching from near the base, 30-60cm long.

Stems: prostrate to ascending, green, simple diffuse hairs and toothed stipules.

Leaflets: trifoliate, diamond-to-wedge shaped, light green, sparsely hairy on both sides and toothed on the end margin. The central leaflet stalk is longest (a feature distinguishing medics from most *Trifolium* spp.).

Leaflet markings - absent.

Flowers: small, yellow, pea-like and in prominent clusters of 3-7 (intermediate between *M. tornata* and *M. littoralis*).

Pods: small, disc-shaped, 2.5-4 mm long, 3-5 mm wide, hardening at maturity, anti-clockwise coil, 2-4 coils, without spines and 4-7 seeds per pod.

Seeds - small, pale yellow to light brown, kidney shaped, 500/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, and may be used with other medics in association with grass in permanent pastures in marginal climates in the subtropical grain and pastoral zone. 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 to the subtropics in northern New South Wales and southern Queensland.
Annual rainfall of 250-650 mm (growing season rainfall 175-300mm).

Soils

Adapted to a range of soil types from sands to loams and clay-loams of moderate fertility. Prefers neutral to alkaline soils (pH_{water} > 6.5, pH_{Ca} > 5.8), which are not prone to waterlogging or salinity.

Temperature

Hybrid disc medics is an autumn-to-spring growing annual suited to areas with mild growing seasons (15-25°C) but will tolerate higher and lower temperatures.

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, and with a range of summer growing grasses in the subtropics.

Sowing/planting rates as single species

6-10 kg/ha in southern Australia; 4-6 kg/ha in the subtropics.

Sowing/planting rates in mixtures

3-5 kg/ha in southern Australia; 2-3 kg/ha in the subtropics (3-4 kg/ha if undersown with crops).

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.

Undersowing with cereal grain or forage crops, is an excellent management option for establishing disc medic as a component of grass/legume pastures in the subtropics where the grass is sown after the medic sets seed. Low sowing rates of the cereal grain crop (e.g. 15 kg/ha) are essential for success with undersowing.

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 then only graze lightly until flowering. Remove stock until medic has finished flowering and producing pods, to maximise seed-set for subsequent regeneration. 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.

In grass/medic pastures in the subtropics, moderate to heavy grazing in the late summer is needed to utilise the grass and minimise the competition for light by the establishing medic. This grazing management should be applied sequentially year by year as it will not be possible or desirable to graze all paddocks in this way each year.

Summer grazing (southern Australia) - carefully monitor grazing of dried residues over summer, as over-grazing of pods, especially in the first year and on hard setting soils, 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. There are fewer options in grain legume crops.

Major pests

Redlegged earth mite, lucerne flea, bluegreen aphid, spotted alfalfa aphid and sitona weevil.

Major diseases

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

Pratylenchus neglectus root lesion nematode (nb nematode numbers should not build up but productivity is reduced in their presence, i.e. they are intolerant).

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 less-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 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

Cultivar	Seed source/Information
Toreador	Early maturing variety adapted to low rainfall (>275 mm) areas with sands to loams. Moderate-to-high resistance to bluegreen aphid (BGA), Moderately susceptible-to-moderately resistant to spotted alfalfa aphid (SAA). Tolerant of boron toxicity. Anti-clockwise pod coil. Planttech Seedmark

Further information

QDPI Note - Annual medics
SARDI - Medics

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.

"Pasture Legumes for Subtropical Grain and Pastoral Systems - the Ute Guide," Principal Authors David Lloyd, Sue O'Brien, Brian Johnson, Bruce Pengelly and Michael Wurst: (PIRSA and GRDC, 2006)

Australian Herbage Plant Cultivars - Legumes

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