

Gama medic

Scientific name(s)

Medicago rugosa

Strengths

- Annual pasture legume adapted to neutral to alkaline, loam to clay soils.
- High quality livestock feed at all growth stages including senesced dry matter and seedpods over summer, with high protein content.
- Larger seeds than most other annual medics with good seedling vigour.
- More tolerant of redlegged earth mite (*Halotydeus destructor*), lucerne flea (*Sminthurus viridus*) than most other annual medics at the seedling stage.
- Moderately resistant to bluegreen aphid (BGA, *Acyrtosiphon kondoi*). Moderately resistant to spotted alfalfa aphid (SAA, *Therioaphis trifolii*) at the seedling stage.
- Semi-erect to erect, suitable for stand-alone hay production or when sown with cereals.
- 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*).
- Provides non-selective weed control options for reducing risk of herbicide resistant weeds in cropping phases (eg grazing, green manuring, hay production, spray-topping).

Limitations

- 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} <7 (pH_{Ca} <6.3), waterlogged or moderately saline areas.
- Sensitive to soil Boron.
- Increasingly susceptible to SAA as plants mature.
- Upright plant with relatively large pods and seed, susceptible to overgrazing by sheep during growing season and over summer.
- Herbicide options for broadleaf weed control are limited.
- Harvest of seed generally requires specialist vacuum harvesting machinery.

Plant description

Plant: semi-erect to erect annual, 20-40 cm high with sparse lateral branching from near the base.

Stems: semi-erect to erect, green and hairy; stipules toothed.

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

Leaflet markings - varies from absent to prominent purple flecking, most evident at low temperatures.

Flowers: small, yellow, pea-like, on stalks shorter than adjacent leaf stalk and in clusters of 2-5.

Pods: flat, discoid, distinct radiating veins, initially light straw colour, spineless, 7-10 mm diameter, 3-5 coils, anti-clockwise, typically with 1 seed per coil.

Seeds - large, dark yellow, curved, almost hooked, 80-160/g.

Pasture type and use

As a relatively upright medic, can be used for hay production.

Can also be 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 in dryland cereal/livestock zones in southern Australia in rotations with winter cereals. Once established, its hardseededness allows it to regenerate from a soil-seed bank after short cropping phases of typically 1-2 years.

Where it grows

Rainfall

Adapted to Mediterranean and Temperate Zones of southern Australia.
Annual rainfall of 350-650 mm (growing season rainfall >225 mm).

Soils

Adapted to neutral to alkaline, loams to clay soils (pH_{water} > 6.5, pH_{Ca} > 5.8).

Temperature

Gama medics are autumn-to-spring growing annuals 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 grasses including annual ryegrass, volunteer cereals or sown cereals for grass/legume hay production or other annual *Medicago* spp.

Sowing/planting rates as single species

8-15 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 AM.

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 and anchored (approx. 6 leaves, 2-3cm height, >1000 kg/ha dry matter). Set stock to control upright grasses and 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.

*NB Gama medics tend to be more upright with larger pods and seeds than most other medic spp., making grazing management more important.

Seed production

Can produce over 800 kg/ha under dryland conditions with average commercial dryland seed production approximately 400 kg/ha. Generally requires specialised vacuum harvesting machinery.

Ability to spread

Colonises well from seed reserves. Some limited spread by seed in livestock faeces and some 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 options in grain legumes crops.

Major pests

Spotted alfalfa aphid (mature plants) and sitona weevil (*Sitona discoideus*). NB Sitona adults can damage leaves and their larvae feed on root 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 but moderately resistant (i.e. productivity is reduced in their presence but nematode numbers should not build up).

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
Paraponto	Erect, early/mid maturing variety, prominent purple flecking of leaflets, large seeds, high seedling vigour. http://www.pi.csiro.au/ahpc/legumes/pdf/paraponto.pdf
Sapo	Mid maturing variety, 2 weeks later than Paraponto, less erect, no purple flecking, useful tolerance to adult sitona weevil. http://www.pi.csiro.au/ahpc/legumes/pdf/sapo.pdf

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

Further information

http://www.sardi.sa.gov.au/pastures/annual_pastures/medics

<http://www.dpi.nsw.gov.au/agriculture/field/pastures>

<http://pbr.ipaustralia.plantbreeders.gov.au/>

Acknowledgements

Information has been adapted from a variety of sources including:
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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.

<http://www.pi.csiro.au/ahpc/legumes/legumes.htm>

Author and date

Jake Howie, SARDI (08) 8303 9407
Reviewed by Chris Butler and Geoff Auricht
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