

## Spineless burr medic

### Scientific name(s)

*Medicago polymorpha* var. *brevispina*

### Strengths

- Annual pasture legume, palatable at all growth stages including senesced dry matter and seedpods over summer.
- High nutritive value with high protein content.
- Fixes atmospheric nitrogen when effectively nodulated, benefiting cereal crops grown in rotation.
- More acid tolerant than barrel and strand medics. Optimal pH<sub>Ca</sub> range is 4.8-8.5 (pH<sub>water</sub> 5.6-9). Greater tolerance of acidity in loamy soils.
- As a grass-free pasture in rotation with cereals it is a disease break for various cereal pathogens including cereal cyst nematode (*Heterodera avenae*), 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).
- Hardseeded and once established will maintain a bank of seed reserves in the soil and will self-regenerate from that soil-seed bank. Some tolerance of false breaks of season as seed softening tends to occur later in the summer/autumn period. Hardseeded cultivars will perform well in intensive (year in, year out) cropping systems.
- More productive and persistent in low rainfall areas than subclover.
- Relatively tolerant of transient waterlogging and moderate salinity compared to other medic species.
- Outstanding complementary legume component for summer growing grass pastures in the subtropics.

### Limitations

- Relatively small seeded and so must be sown quite shallow (1-2cm) 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 productive on deep sandy soils with pH<sub>water</sub> < 5.6 (pH<sub>Ca</sub> < 4.8).
- Sensitive as seedlings to redlegged earth mite (*Halotydeus destructor*). Sensitive as mature plants to lucerne flea (*Sminthurus viridus*), spotted alfalfa aphid (*Therioaphis trifolii*) and cowpea aphid (*Aphis craccivora*).
- Sensitive to boron toxicity.
- Herbicide options for broadleaf weed control are limited.
- Harvest of seed generally requires specialist vacuum harvesting machinery.

### Plant description

**Plant:** semi-prostrate annual, 15-40 cm high, with multiple lateral branching from near the base.

**Stems:** prostrate to ascending, hairless, mostly green, sometimes partially tinged red.

**Leaflets:** (trifoliate) wedge to heart-shaped, green, hairless and slightly toothed on the end margin. The central leaflet stalk is longest (a feature distinguishing medics from most *Trifolium* spp.)

**Leaflet markings:** may vary from absent; slight purple flecking to pale green basal

"watermarks", sometimes flushed or rimmed with purple-red. Stalks and underside mid-ribs sometimes purple-red.

**Flowers:** yellow, pea-like and typically in clusters of 2-5.

**Pods:** discoid to barrel shaped, 3-7 mm long, hardening at maturity, 2-5 coils, anti-clockwise, spines very short or absent in commercial varieties (nb naturalised ecotypes can have long, thin slightly hooked spines) and 4-10 seeds (typically 5-6) per pod.

**Seeds:** small, kidney-shaped, glossy yellow, 250-280/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 late spring. Typically used in dryland cereal/livestock zones in southern Australia in rotation with winter cereals, grain legumes and canola, and in association with grass in permanent pastures 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 300-700 mm (growing season rainfall 175-350 mm). Maturity of cultivar should match rainfall.

### Soils

Adapted to a range of soil types from sandy loams to clays of moderate fertility. Prefers mildly acid to alkaline soils (pH<sub>water</sub> > 5.6, pH<sub>Ca</sub> > 4.8). Tolerant of transient waterlogging and/or moderate salinity (EC<sub>e</sub> up to 8 dS/m).

### Temperature

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 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 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 AM.

### Fertiliser

Phosphorous is generally the single most limiting macronutrient for burr 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 Cu, Zn, Mo and Co), some of which are directly involved in nitrogen fixation.

## Management

### Maintenance fertiliser

Generally 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 and potassium. 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 also 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. 4-6 leaves, 2-3cm height, >700 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 although it is possible to direct harvest pods with a grain harvester.

### Ability to spread

Colonises well from seed reserves. Some spread by seed in livestock faeces, pods adhering to sheep/wool 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. More prevalent in disturbed sites.

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 legume crops.

### Major pests

Redlegged earth mite, lucerne flea, bluegreen aphid, spotted alfalfa aphid, cowpea aphid, spotted alfalfa aphid (*Therioaphis trifolii*) and sitona weevil (*Sitona discoideus*).

### Major diseases

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

*Pratylenchus neglectus* root lesion nematode (nb may not build up nematode numbers significantly but productivity is reduced in their presence)

## Herbicide susceptibility

Tolerant of Group A grass-selective herbicides.  
Some herbicides available for selective control of certain broadleaf weeds.  
Spray-grazing and spray-topping techniques using less selective herbicides also useful.  
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, (equates to metabolisable energy of 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 green feed for growing and finishing livestock.  
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 (levels tend to be higher under phosphorus deficiency and Phoma infection).

## Cultivars

Group	Cultivar	Seed source/Information
Early	Serena	Australian Herbage Plant Cultivars
Early/mid	Santiago	Australian Herbage Plant Cultivars Seedmark
	Scimitar 	Seedmark WA Dept. of Agriculture Farmnote - No. 83/2004
Mid	Circle Valley	Australian Herbage Plant Cultivars
	Cavalier 	WA Dept. of Agriculture Farmnote - No. 83/2004

In the subtropics, the minimum winter rainfall requirement is >175 mm for all cultivars. All are adapted to loam - clay soils.

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

## Further information

[http://www.sardi.sa.gov.au/pdfserve/pastures/images/scim\\_cav.pdf](http://www.sardi.sa.gov.au/pdfserve/pastures/images/scim_cav.pdf)  
<http://www2.dpi.qld.gov.au/pastures/3625.html#5>  
Department of Agriculture and Food WA Farmnote 83/2004  
[http://www.agric.wa.gov.au/content/past/pl/med/burr\\_medic\\_farmnote.pdf](http://www.agric.wa.gov.au/content/past/pl/med/burr_medic_farmnote.pdf)

## Acknowledgements

Information has been adapted from  
'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 (DPI&F Qld), Bruce Pengelly (CSIRO)

Sustainable Ecosystems), Michael Wurst (Rural Solutions SA).

DPI&F Qld website - Annual Medics

### **Author and date**

Jake Howie, SARDI (08) 8303 9407

David Lloyd, Qld Dept of Primary Industries (07) 4688 1261

Dr Clinton Revell, WA Department of Agriculture (08) 9368-3596

August 2007