Caliph

Barrel Medic

Medicago truncatula

DOMESTIC

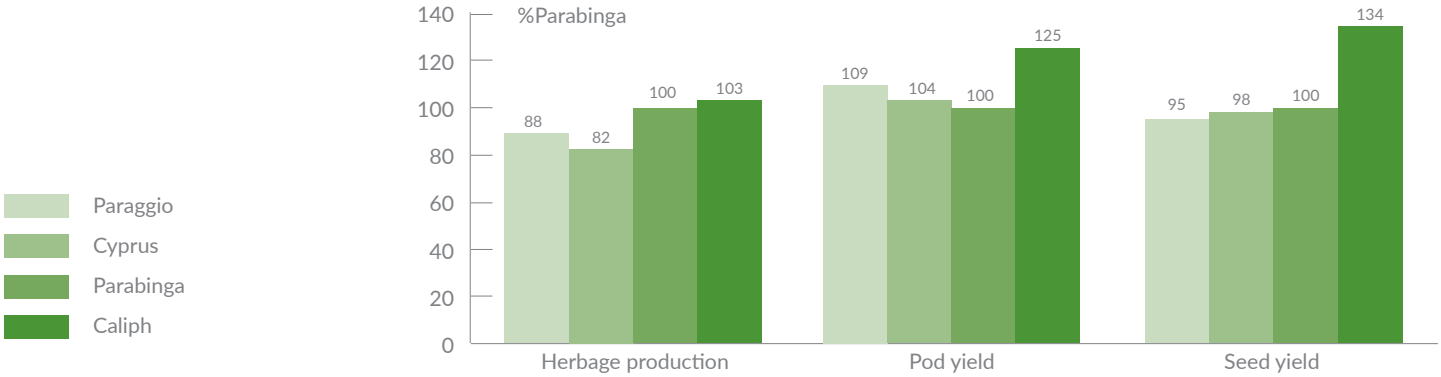
KEY FEATURES

- Earliest maturing, aphid-resistant barrel medic
- 80 days to flowering
- Good seedling and early vigour
- Moderate tolerance of soil boron toxicity
- Resistant to spotted alfalfa aphid & blue-green aphid
- High hard seed levels
- Suited to areas with as little as 250mm annual rainfall

CALIPH is an aphid-tolerant variety bred from Cyprus. It is early-mid maturing and generally begins flowering 80 days after germination, up to five days earlier than Parabinga. CALIPH is semi-prostrate in habit, has leaflets with a slight purple fleck on the underside and produces clockwise coiling pods. CALIPH has a boron toxicity tolerance superior to that of all other medic cultivars. CALIPH is recommended for neutral to alkaline soil types ranging from sandy loams to clays, in the medium to low rainfall zones.

Caliph was selected from a backcrossing program designed to produce a barrel medic with similar field performance to Cyprus but with good resistance to BGA (Cyprus and Caliph are both resistant to spotted alfalfa aphid). This was achieved by using Cyprus as the recurrent parent and backcrossing genes for BGA resistance from a donor barrel medic into it. Three non-segregating lines were isolated from the second backcross and field tested against a range of early flowering barrel medics, including aphid resistant hybrids and cultivars. Measurements were taken of herbage, pod and seed production in the year of sowing and compared to Parabinga in 29 trials across SA, NSW and WA over four years. These are summarised in the graph below (Fig. I.).

Figure 1, production of Caliph and three other barrel medic cultivars expressed as an average percentage of Parabinga.



In selecting Caliph, emphasis was placed on seed yield because of its major impact on the persistence and productivity of pastures in low rainfall areas. Caliph's outstanding seed production capacity is underscored by the fact that it outyielded Parabinga at 27 of the 29 sites for which data are available.

Growing Conditions

Soil Type:
Barrel medic is adapted to a wide range of at least moderately fertile soils, from sandy loams to clays. It prefers neutral to alkaline soils (pH(water) > 6.5), not prone to waterlogging or salinity

Sowing Rate:
Mixes 3 - 5kg/ha
Pure 6 - 10kg/ha Dryland

Rainfall:
250mm+

pH:
6.0 - 8.5 ($CaCl_2$)

Inoculant:
Group AM Rhizobium

Insect Pest Resistance and Boron Tolerance

Varieties and Cultivars	Aphids			Red-legged Earth Mite	Lucerne Flea	Boron Tolerance
	Blue Green Aphid	Spotted Alfalfa Aphid	Cow-pea Aphid			
Caliph – Barrel	**MR**	**R**	**S**	**S**	**S**	**MT**
Parabinga - Barrel	MR	LR	S	S	S	LT
Sephi - Barrel	MR	S	S	LR	S	S
Paraggio - Barrel	MR	LR	S	S	S	LT
Mogul - Barrel	MR	MR	S	S	S	S

** No information.*
Moderately resistant varieties would only be significantly damaged by the pest in very rare circumstances. On the other hand, tolerant varieties can be severely damaged by the pest, but will survive better and for longer than an intolerant variety. So, where possible, moderately resistant, or resistant varieties, should be grown where insects are likely to be a problem.
L = Low M = Moderate H = High VS = Very Susceptible S = Susceptible LT = Low Tolerance MT = Moderate Tolerance T= Tolerant

Barrel Medic Agronomic Information

Scientific name(s) *Medicago truncatula*

Strengths

- Palatable at all growth stages, including dead leaves and stems, and seedpods over summer
- High nutritive value with high protein content
- Fixes atmospheric nitrogen, 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, root lesion nematode, take-all and crown rot
- Provides non-selective weed control options for reducing risk of herbicide resistant weeds in cropping phases (e.g. grazing, green manuring, hay production, spray-topping)
- Hard seeded and once established will maintain a soil bank of seed reserves and will self-regenerate from that seed bank
- More productive and persistent in low rainfall areas than sub clover
- Outstanding complementary legume component for summer growing grass pastures in the subtropics

Limitations

- Must not be sown too deeply
- Winter production can be slow if autumn rains are late
- Not well adapted to soils with pH(water) < 6.5, deep sands, waterlogged or moderately saline areas
- Herbicide options for broadleaf weed control are limited
- Seed harvest requires specialist vacuum harvesting machinery
- Lush and/or pure stands can cause animal health problems

Plant characteristics

Plant: semi-prostrate annual legume, 15-30 cm high, with side branches from near the base.

Stems: prostrate to ascending, green and hairy.

Leaves: made up of three wedge-shaped leaflets, matt green, hairy on both sides and toothed on the end margin. The central leaflet stalk is longer than the other two, while in most clovers (Trifolium spp.) they are all of similar length.

Leaflet markings: may vary from none to slight purple flecking, pale green "watermarks" edged in brown or large dark blotches.

Flowers: yellow, pea-like and in small clusters of 2-4.

Pods: barrel shaped, 6-12mm long, hardening when ripe, 3-8 coils, spines of variable length and 6-12 seeds per pod.

Seeds: pale yellow to light brown, kidney shaped, 200,000 - 320,000/kg.

Pasture type and use

Used as a self-regenerating autumn-to-spring growing annual legume 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 hard seededness allows it to regenerate from a seed bank after short cropping phases of typically 1-3 years.

Where it grows

Rainfall

Barrel medic requires an annual rainfall of 250-700 mm, with a growing season rainfall of 150-300 mm.
Early flowering varieties are suited to lower rainfall zones.

Soils

Barrel medic is adapted to a wide range of at least moderately fertile soils, from sandy loams to clays.
It prefers neutral to alkaline soils (pH(water) > 6.5), not prone to waterlogging or salinity.

Temperature

It is an autumn-to-spring growing annual, best-suited to areas with mild growing seasons (15-25°C). However, it will tolerate higher and lower temperatures.

Establishment

Companion species

Grasses: annual ryegrass, volunteer cereals or sown cereals for grass/legume hay production, and with a range of summer growing grasses in the subtropics.

Legumes: other annual medics (Medicago spp.), sub clover, lucerne.

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)

Undersowing with cereal grain or forage crops is an excellent management option for establishing barrel 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 under sowing.

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 barrel medics; sulphur may be required on some soils in the subtropics. Some soils, particularly infertile sands, may also be deficient in important trace elements (e.g., Cu, Zn, Mo and Co), some of which are directly involved in nitrogen fixation.

Management

Maintenance fertiliser

Generally barrel 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 sown 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 (e.g., 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. 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 overly ‘bulky’ pastures in early spring.

Reduce grazing pressure if possible whilst medic are 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.

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 readily grazing preference. 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

Red-legged earth mite, lucerne flea, blue-green aphid, spotted alfalfa aphid, cowpea aphid, sitona weevil.

Major diseases

Phoma black-stem, rhizoctonia bare-patch, root lesion nematode and powdery mildew.

Herbicide susceptibility

Tolerant of grass-selective herbicides. Some herbicides available for selective control of certain broadleaf weeds. Spray-grazing and spray-topping techniques using 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

High levels of crude protein (17-23%), metabolizable energy (8-10 MJ/kg ME) and digestibility (55-75% DMD), with higher levels in young growth.

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

Barrel medic can cause photosensitisation in horses, occasionally red gut in sheep, and bloat in cattle. While phytoestrogens in barrel medic potentially could have negative effects on the reproduction of grazing livestock, this is rarely reported.

Source : Pastures Australia and S&W Seedco

Australian Government
Rural Industries Research and Development Corporation
RIRDC www.rirdc.gov.au

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