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Bladder clover

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Introduction

Bladder clover (*Trifolium spumosum*) is a self-regenerating annual legume. It is native to Mediterranean areas of Eurasia. In its native environment it grows in well drained soils ranging in texture from sandy loam to clay with pH ranging from moderately acidic to mildly alkaline.

Germplasm of this species was initially collected by Dr C. Francis, D. Drousiotis and A. Della near Melini, Cyprus in 1987. This material underwent development in the National Annual Pasture Legume Improvement Program (NAPLIP) resulting in the release of the world's first commercially available cultivar of bladder clover in 2007.

Adaptation

As bladder clover has only been commercially available since 2008, its range of adaptation in New South Wales has yet to be well defined.

Comprehensive germplasm collection made in the Greek Islands (Nutt *et al.* 1996), found that bladder clover grew in areas ranging in altitude from 0–500 m above sea level and where rainfall varied from 350–800 mm per annum.

In NSW, bladder clover has been successfully grown in regions with long-term average rainfall ranging from 400–650 mm.

Bladder clover has been grown in soils with pH(CaCl₂) ranging from 4.8 to 6.0 in NSW. In its native range bladder clover grows in soils with pH

up to 8.0. Bladder clover is not well adapted to saline soils or soils prone to waterlogging.

Bladder clover can be used as a component of a permanent pasture mix in low, medium and high rainfall areas of NSW. In Western Australia it has been used successfully in 1:1 cropping rotations (one year crop, one year pasture). Its high levels of hard seed mean that it is very well suited to this role, as seed softens in the cropping year and seedlings establish to provide high quality pasture and input of nitrogen in the subsequent pasture year. It is expected that bladder clover will be well suited to this role in cropping areas of NSW.

Description

Bladder clover is a semi-erect annual legume that can grow up to 50 cm tall. It has trifoliate leaves and produces light pink flower heads. Each flower head can contain up to 150 seeds. Seeds are yellow to light brown and weigh approximately 2 mg each (500,000 seeds/kg).

Varieties

AGWEST® Bartolo is the only variety of bladder clover currently available. It is an early to mid season maturing clover which, in Perth, flowers approximately 105 days after sowing, making it similar in maturity to Dalkeith subterranean clover.

Figure 1. Bladder clover leaves and flower head.



Establishment and management

Sowing

Paddocks in which bladder clover is to be sown should be managed in preceding years to minimise weed and insect burdens. This strategy is not specific to bladder clover and should be used when considering sowing any pasture species. Bladder clover can be sown into a conventional seed bed or direct drilled for good establishment.

Bladder clover should be sown at rates of 2–4 kg/ha when used in mixtures with other legumes and grasses. If sowing as a monoculture, rates of 5–10 kg/ha should be used.

Seed should be sown no deeper than 15 mm into a moist seed bed. The optimum sowing time is mid to late autumn. If weed problems are anticipated, sowing should be delayed for several weeks following the autumn break to allow weeds to germinate and then be controlled with a 'knockdown' herbicide prior to sowing bladder clover.

Inoculum

Bladder clover requires Group C rhizobium (WSM 1325) for successful nodulation.

Fertiliser

Adequate phosphorus (P) is required to optimise the growth of legumes. At least 10 kg P/ha should



Figure 2. Bladder clover seed. Photo courtesy Department of Agriculture and Food Western Australia – Pasture Science Group

be used when sowing bladder clover. Added sulphur (S) and trace elements such as molybdenum (Mo) may be required in some areas. On light textured sandy soils additional potassium (K) may be required. Consult your local agronomist for further information.

Grazing

Care should be taken to avoid grazing bladder clover too heavily during flowering and seed set in the first year of sowing. This will allow bladder clover to set large amounts of seed for regeneration in subsequent years.

In regenerating bladder clover pastures, grazing can be maintained at moderate levels throughout the flowering and seed set period.

Bladder clover stubble should be grazed over summer to achieve good regeneration in the following autumn. As bladder clover seed is relatively small, a large proportion will survive ingestion by grazing animals.

Hard seed

Research in Western Australia (A. Loi, pers. comm.) have found very high levels of hard seed in AGWEST Bartolo immediately post-harvest (97%). By late autumn to early winter this had declined to 56%. In comparison, Dalkeith sub clover had post-harvest hard seed of 88%, which had declined to 14% by late autumn to early winter. The relatively high level of hard seed of AGWEST Bartolo mean that it is relatively well protected from false breaks in comparison to some traditionally grown annual legume species.

Pests and disease

Bladder clover is susceptible to attack by red-legged earth mite, particularly at the early seedling stage. Practices to reduce the number of eggs laid by this pest in the years leading up to sowing should be followed where possible. Monitor pastures for signs of activity and control if necessary.

Bladder clover is also susceptible to attack by blue-green aphid, cowpea aphid and lucerne flea. Monitor pastures for signs of damage due to these pests and control if necessary.

Results from Western Australia indicate that bladder clover has good tolerance to clover scorch disease. Pseudopeziza leaf spot has been observed sporadically in some high rainfall areas of Western Australia.

Seed production

Bladder clover is an aerial seeding legume capable of producing large quantities of seed when grown as a monoculture (Figure 3a). In commercial seed production situations in Western Australia, bladder clover yields range between 0.5 and 1.0 t/ha. Even under conditions of extreme competition, bladder clover has been found to produce large quantities of viable seed in comparison to other species. This is shown in Figure 3b where bladder clover and sub clover were sown at 4 kg/ha under a cover crop of wheat sown at 15 kg/ha at two sites in NSW. Moisture conditions at Peak Hill during this experiment were good with rainfall in the critical spring period being higher than average. In contrast, moisture conditions at Junee Reefs were poor throughout the entire growing season. Past research (Dear *et al* 2008) has identified that sub clover needs to produce

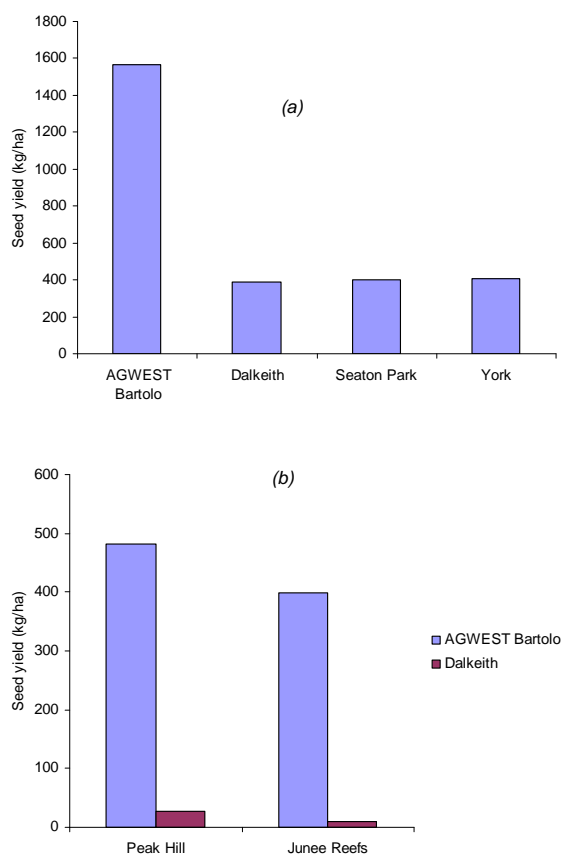


Figure 3. Seed yield (kg/ha) of AGWEST Bartolo bladder clover, Dalkeith, Seaton Park and York sub clover when sown as a monoculture at Wagga Wagga in 1998 (a) and when sown under a 15 kg/ha cover crop of wheat at Peak Hill and Junee Reefs in 2008 (b).

approximately 150 kg seed/ha in the year of establishment in order for adequate regeneration in subsequent years. Under conditions of high competition for moisture, light and nutrients as experienced in cover cropping it is evident that bladder clover is more successful at setting seed than sub clover.

Bladder clover is easily harvested using a conventional header. If crops are short, windrowing may be necessary prior to harvest. The seed coat of bladder clover is very thick, requiring aggressive scarification for high germination.

Herbage production and nutritional quality

Herbage production

Bladder clover is capable of moderate to high levels of herbage production. In an experiment at Rand NSW in 2003, a third year stand of bladder clover produced 7.1 t DM/ha. In Western Australia, peak spring yields of 4–7 t DM/ha have been recorded depending on seasonal conditions and location.

Herbage nutritional quality

Bladder clover is a high quality forage plant. Results of Western Australian studies (Loi and Nutt 2009) have found digestibility levels of up to 82% with 22% crude protein which is similar to high quality sub clover pastures. Feed quality will decline as the plant begins to senesce.

As with other clover species, animals should be monitored carefully when introduced to pastures containing lush bladder clover as bloat may occur. Oestrogen levels in bladder clover are very low and as such infertility problems in grazing livestock would not be expected.

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References and further reading

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Warnings

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or advisor when planning pasture improvement.

Legislation covering conservation of native vegetation may regulate some pasture improvement practices where existing pasture contains native species. Inquire through your office of the Department of Environment, Climate Change and Water for further information.

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