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Burgundy bean—a new summer growing legume

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Commercial burgundy bean stand at Manilla, NSW
Photo: Jeff Esdaile

Burgundy bean (*Macroptilium bracteatum*) is a native of South America, occurring throughout Argentina, Bolivia, Brazil, Paraguay, Peru and Venezuela where the rainfall varies from 400 to 1600 mm. It is a summer growing, drought-tolerant, non-bloating legume capable of producing up to 10 tonnes of dry matter per hectare.

Burgundy bean is a twining and trailing perennial that can grow to 80 cm high, with hairy leaves giving it drought tolerance, but not affecting palatability. It commences growth in September and grows until frosted in late autumn. It is capable of growth at lower temperatures than most other tropical and subtropical legumes, giving it a longer growing season.

Burgundy bean consists of two cultivars, Cadarga and Juanita, both collected in Brazil. Cadarga is an upright, highly productive, short-lived variety with good seed production. Juanita is a more prostrate, longer lived variety with bean mosaic virus resistance. Mixing these two lines together gives the benefits of good seedling regeneration and plant persistence. It is a herbaceous perennial with trifoliate leaves. The two lateral leaflets have a single lobe and each leaflet is 3–6 cm long and 3–4 cm wide.

Soils

Burgundy bean has been collected from soils ranging from sandy loam to clay loam, and from slightly acid to alkaline. However, in Australia it has been selected for adaptability to the heavier textured, alkaline soils commonly found in northern NSW and southern and central Queensland. It has performed well on a range of soil types from Dubbo to central Queensland, but will not tolerate waterlogged soils.

It is very drought tolerant and should suit environments which have a summer-dominant rainfall between 600 and 1000 mm. Burgundy bean has persisted for at least 3 years on shallow clay soils with extreme mid-season droughts. It has the ability to germinate and grow at lower temperatures than many other summer legumes, and this is one of its big advantages. It is also tolerant of high summer temperatures. Top growth will be killed by frosts, but plants will regrow the following spring.

Sowing

Burgundy bean has approximately 160,000 seeds/kg and should be sown at 3–5 kg/ha of pelleted seed, 1–2 cm deep, into a prepared seed bed with at least 60 cm of stored soil moisture. It can be sown from October to January—the earlier sowings are preferred as it allows time for establishment before very hot weather arrives and also allows a longer period of production. Also, earlier establishment ensures seed set which is important for long-term persistence and to maintain density of the stand.

As burgundy bean seed is about three times the size of lucerne seed, it can be put through a small seed box and covered with harrows in a prepared seed bed; if it is being drilled in rows,

then use row spacings of no more than 0.5 metres. Wider row spacing will result in the crop taking longer to provide ground cover and will therefore allow more time for weeds to establish. It is important to achieve rapid ground cover at this time of the year to reduce the opportunity for soil loss due to high-intensity summer storms.

Seeds are generally hard when freshly harvested, but this hardseededness breaks down by sowing time, giving good establishment. This also means that seeds will not continue to germinate in crops following the removal of the burgundy bean crop. Seed should be inoculated with the correct inoculum, currently CB 1717, to ensure adequate nitrogen (N) fixation.

The size of burgundy bean seed (left) compared with lucerne seed

There are currently no herbicides registered for use in burgundy bean crops, and so weeds need to be eliminated before sowing. Soil should be treated with a pre-emergent herbicide to control weeds. Some summer grasses such as Liverseed grass (*Urochloa panicoides*) can seriously reduce burgundy bean establishment if not controlled.

As with all legumes grown on soils that have a long cropping history, fertiliser should be applied to correct any nutrient deficiencies. A phosphorus (P) application of 10–20 kg P/ha should normally be used along with sulfur (S), but no nitrogen.

Flowering and harvesting

Burgundy bean normally starts flowering in February, producing dark red or burgundy coloured flowers, which gives the plant its name. Drought conditions will accelerate and increase flowering, occurring from 50 to 90 days after sowing. In regenerating pastures, burgundy bean can start flowering in November and produce significant seed yields at this time of year, as well as in late autumn if later rains are received.

Burgundy bean flowers and pods

About 9–17 almost cylindrical, light brown to dark reddish-brown mottled seeds, approximately 3 mm long, are formed in 5–10 cm long, thin, slightly curved pods. Similar to most tropical legumes, burgundy bean sheds its seed from the pod by dehiscence, which means the pod splits and twists, throwing the seeds up to 8 metres. This makes it very difficult to harvest large quantities of seed as the pod maturity is not uniform. In NSW, flowering and seed set will occur—harvesting in NSW is risky because of the likelihood of rain before harvest. In northern Queensland, seeds are vacuum harvested off the ground during the dry winter period. Seed production is approximately 1 t/ha, harvested 6–8 months after sowing.

Burgundy bean pods

Burgundy bean is not covered by Plant Breeder's Rights (PBR) but Heritage Seeds has the rights to market the seed, which is sold pre-inoculated and pelleted.

Use and management

Burgundy bean was selected for use as a short-term pasture legume in crop rotations to build up organic matter and increase soil fertility, and on heavier soils as a replacement for lucerne, which can cause bloat in livestock and be more difficult to remove at the end of its phase. It is capable of producing up to 10 tonnes of dry matter per hectare in ungrazed trial plots. It is also more adaptable than butterfly pea, which is more suited to the tropical areas further north, and it has greater persistence than the annual lablabs. The perennial lablab Endurance, while more productive in the first year, will not persist as long because it does not set seed in northern NSW due to the onset of frosts, and therefore cannot maintain stand density.

Burgundy bean is very palatable to stock and tends to be preferentially grazed, so is unlikely to escape and become a weed. However, its high palatability means it must be carefully managed, especially in a mixed pasture, to prevent it being selectively grazed out. It has rapid early growth and should be able to be grazed 10–12 weeks after sowing. This first grazing should not be too severe, removing mainly the leaves and leaving most of the stem. This will result in rapid regrowth as new shoots emerge from leaf buds along the stems.

Future grazing will depend on rainfall and stage of crop growth. Because seedling recruitment is vital to long-term persistence, it is advisable to allow the stand to flower and set seed at some stage. Lenient grazing will be required during this period if long-term persistence is the goal.

A grazed burgundy bean crop

Protein levels from 12% to 20% have been recorded at various growth stages. In Queensland, weight gains of 0.6 to 0.9 kg/hd/day have been measured in steers grazing burgundy bean over 70 days, and about 0.7 kg/hd/day in steers grazing burgundy bean / grass mixtures for 120 days.

While burgundy bean forms good pastures with grasses, it can be difficult to maintain due to its high palatability, which leads to it being selectively grazed out. It may be necessary to graze the pasture down in early spring to allow the recruitment of legume seedlings.

Burgundy bean can also be successfully used to improve soil fertility in crop rotations. It has the ability to provide large inputs of N, which can amount to approximately 125 kg N/ha/year based on average yields. In Queensland trials (Whitbread et al. 2005), it was found that following 3 years of burgundy bean, soil nitrate levels increased by over 100 kg/ha compared with continuous wheat, and this raised the protein content in the following wheat crop from 12.6% to 14.1%. Wheat yields were slightly depressed, however, due to there being less available soil water at sowing. In another trial comparing the effects of 3 years of lablab, butterfly pea and burgundy bean on the following wheat crop, burgundy bean resulted in the highest wheat grain yield from the following wheat crop, with a protein content of 16.5%. These trials were carried out between November 1997 and April 2001, which were not ideal years for legume growth.

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