

Effect of sowing depth on emergence of burgundy bean (*Macroptilium bracteatum*)

G.J. Crocker

NSW Department of Primary Industries, Tamworth Agricultural Institute,
4 Marsden Park Road, Calala NSW 2340
<graham.crocker@dpi.nsw.gov.au>

Abstract. The emergence of burgundy bean (*Macroptilium bracteatum*) was not affected when sown between 1 and 4 cm deep on a self-mulching black earth, but emergence was reduced when sown on the surface or deeper than 4 cm. Seedling emergence was generally less at all sowing depths from a loam soil which tended to set hard on the surface.

Introduction

Burgundy bean (*Macroptilium bracteatum*) is a deep-rooted, drought tolerant, short-lived perennial subtropical legume that became available in Australia in 2004. It is native to South America and in Australia is adapted to a wide range of soils from sandy loams to heavy clay self-mulching soils ranging in pH (CaCl₂) from 5 to over 7 receiving average annual rainfall between 550 and 1,000 mm (Crocker 2005). The plant is

in spring. Burgundy bean is extremely palatable and one of the problems experienced, is grazing management of the pasture to maintain the legume component in a grass/legume mixture. It has high quality with up to 20% protein and live-weight gain of 0.6 to 0.9 kg/head/day have been recorded from steers grazing burgundy bean for over 70 days.

Burgundy bean can also be used to increase soil fertility in short-term rotations. Whitbread *et al.* (2005), showed that soil nitrate levels increased by over 100 kg N/ha following three years of burgundy bean compared to continuous wheat. It raised the protein content of the following wheat crop from 12.6% to 14.1%.

Because subtropical legumes are sown in late spring to early summer, planting depth is an important consideration. Seed is often sown at depth into moisture to avoid the soil drying out prior to germination. While this is not a problem for large seed species like lablab and cowpeas, the sowing depth of burgundy bean with smaller seed (ca. 150,000 seeds/kg) becomes more crucial.

Methods

A glasshouse experiment with four replications examined the effect of sowing burgundy bean at 0 (surface), 1, 2, 4 and 6 cm depths in two distinct soil types. Ten seeds (94% germination rate) were placed in 24 cm diameter pots in both a self-mulching black earth and a sandy-loam soil. Seeds were placed at the predetermined depth and covered with soil and watered from the bottom of the pots. Surface sown seed was kept moist by spraying with water daily. Records of plant emergence were made for up to 28 days.

Results and discussion

Burgundy bean had greater emergence from the black earth than the loam soil at all depths (Figure 1). No seedlings emerged from 6 cm in the loam compared to 38% seedling emergence in the black earth. This difference in emergence between the two soils could be due to the loam soil having higher bulk density than the self-mulching clay which reduced the force needed for the seedlings to emerge. The lower seedling emergence of seeds sown on the surface could be due to the drying out of the surface soil or water spray being insufficient for seed germination, especially under the glasshouse conditions (without temperature control) that applied in this experiment. The greater emergence of seedlings on the surface of the black soil is most likely due to the greater water-holding capacity of the black soil, and increase in the amount of time the seeds had to imbibe and germinate.

a trailing, twining type that can grow to 80 cm high and has large leaves that give good ground-cover in summer, the period when heavy eroding rains can occur.

Burgundy bean is non-bloating and tolerates cooler conditions better than most other tropical legumes. In Australia, it grows from September until frosts commence in autumn, but regrowth will occur in spring. The plant flowers in about 90 days and seeds mature about six weeks later, giving good regeneration

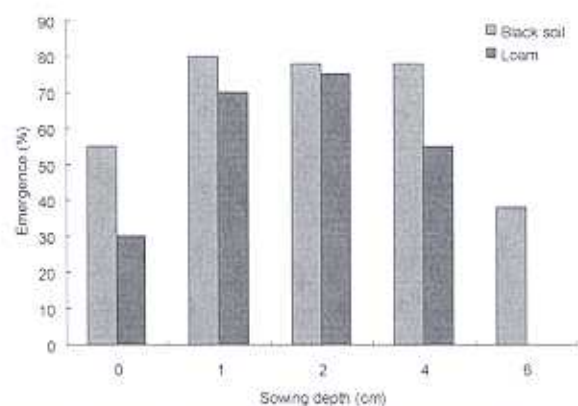


Figure 1. Effect of sowing depth on the emergence (%) of burgundy bean on a self-mulching black earth and sandy-loam.

Speed of emergence was also affected by sowing depth, with seedlings emerging after 3 days when sown on the surface and at 1 cm depth in both soils, and 2 cm in the black soil. Seedlings took 6.5 days to emerge from 4 cm on both soils, and 8.5 days from 6 cm in the black soil. While 95 per cent of total emergence had occurred within 14 days, another 5 per cent of seedlings emerged over the next 14 days, probably due to continued watering breaking hard seed. Several germinations have also been observed in the field, especially from self-sown seed in later years.

Conclusions

While plants germinated successfully from self-sown seed on the soil surface, emergence was greater when seeds were sown at 1 to 4 cm depth. Seeds should not be sown deeper than 4 cm especially on soils which are prone to be surface-sealing or hard-setting.

Acknowledgments

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References

- Crocker GJ (2005) Burgundy bean – a new summer growing legume. NSW Department of Primary Industries, Primefact No. 100, Orange, NSW.
- Whitbread AM, Pengelly BC, Smith BR (2005) An evaluation of three tropical ley legumes for use in mixed farming systems on clay soils in southern Queensland, Australia. *Tropical Grasslands* 39, 9–21.