Alternative perennial legumes for the high rainfall zone of SE Australia.

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Abstract

Waterlogging in winter and acid soils are factors that prevent lucerne from persisting in large areas of southern Victoria. White clover does not persist when summer rainfall is below the average of 98 mm. When production and persistence were evaluated over four seasons at Hamilton, Victoria, two *T. hybridum* (alsike clover) and two *T. fragiferum* (strawberry clover) lines showed the best overall performance out of a total of 56 perennial legumes tested. The commercial white clover cultivars Mink and Demand persisted well until Spring 2005. Lucerne declined in numbers and production throughout the experiment and made little contribution to the sward after the first year. *Lotus corniculatus* and *L. glaber* performed well in autumn suggesting they could play an important part in helping fill the late summer-autumn feed gap. Currently the best late maturing annual legume (late maturing arrowleaf clover) for the area does not grow beyond early February. Strawberry and alsike clover lines were highly productive and persistent across seasons and warrant further evaluation.

Key Words

Alternative perennial legumes, high rainfall zone, feed gaps

Introduction

Lucerne (*Medicago sativa* L.) is a widely sown perennial legume in Australia, although it suffers from several limitations. These include susceptibility to set stocking, lack of tolerance to waterlogging and sensitivity to soil acidity and high levels of soil aluminium (Lodge 1991). In particular, waterlogging in winter and acid soils prevent lucerne from persisting in the high rainfall zone (HRZ) of south-east Australia. White clover (*Trifolium repens* L.) does not persist when summer rainfall is below 100 mm. Species that might be viable alternatives to lucerne and white clover in the HRZ are strawberry clover in wet and mildly saline niches, and *Lotus* spp. in wet and acid soils (Dear *et al.* 2003). The aim of the work was to compare the productivity and persistence of perennial legume species in a high rainfall area of south-west Victoria.

Methods

Fifty-six accessions of perennial legumes were sown near Hamilton (688 mm mean annual rainfall) at a rate of 10 kg/ha on 9 August 2002. The seed was inoculated with the appropriate rhizobial strains for each species and fertiliser was applied at a rate of 250 kg/ha of single superphosphate and 150 kg/ha of KCl (potash). Accessions tested included the species *Lotus corniculatus, L. glaber, Medicago sativa, Trifolium africanum, T. burchelianum, T. fragiferum, T. hybridum, T. ochroleucon, T. panonicum, T. physodes, T. pratense, T. repens*, and *T. tumens*. In addition, the commercial cultivars Colenso red clover, Demand white clover, Mink white clover, Palestine strawberry clover and Sceptre lucerne were included as controls. The first dry matter production assessment was made on 12 August 2003. DM production cuts were then taken to represent autumn (March-May), winter (June August) and spring (September-December) production. The trial was grazed intermittently with sheep for 12 months after establishment and after each dry matter assessment. Annual rainfall for 2002, 2003, 2004 and 2005 was 561 mm, 728 mm, 728 mm and 541 mm respectively. Rainfall during summer (January-March) was 66, 40 and 19% above average in 2003, 2004 and 2005 respectively.

Results and discussion

Overall the *T. hybridum* (alsike clover) and *T*. *fragiferum* (strawberry clover) lines showed the best performance averaging more than 9 t DM/ha per year. The strawberry clover line produced more biomass than the commercial cultivar “Palestine” at all times and significantly more than the lucerne cultivar Sceptre.

Alsike clover out produced Demand, Mink, Palestine and Sceptre with 839 kg/ha in autumn and was the most productive perennial legume in spring (Figure 1c)**.** This species appears to be a prolific seed producer, which may result in seedling recruitment if the stand thins out. Alsike clover has been used in the northern hemisphere at higher latitudes than Australia. The plant has shown high digestibility and protein levels (Dynes et al. 2002). Understanding the seed/seedling dynamics in new perennial legumes should help develop the appropriate management for optimum production and persistence.

The new strawberry clover lines still performed slightly better than the commercial control “Palestine”. Lotus corniculatus, while better than Sceptre lucerne, performed poorly in Spring (Figure 1c).

Lotus corniculatus yielded more than twice that of any of the commercial cultivars in autumn (Figure 1a), suggesting it could play an important part in helping fill the late summer-autumn feed gap. The performance of *L glaber* was similar to the commercial cultivars and warrants further investigation in the high rainfall zone.

Autumn production of the best 3 lines against five commercial controls is shown in Figure 1a.

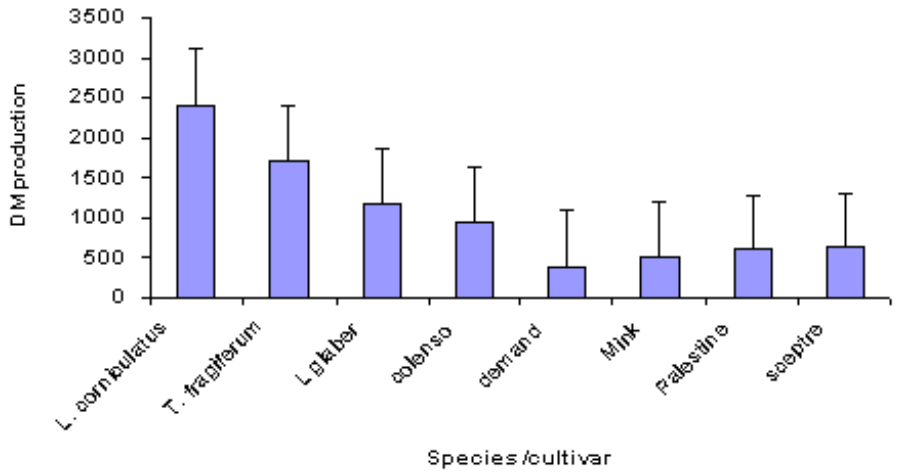

Figure 1a. Autumn production for alternative perennial legumes and controls at Hamilton (bars represent lsd at p=0.05)

Winter production

A strawberry clover and lotus line produced around 3 t/ha of dry matter. Alsike clover, considered a biennial, out-produced the biennial control Colenso. Mink and Palestine were the most productive commercial cultivars (Figure 1b).

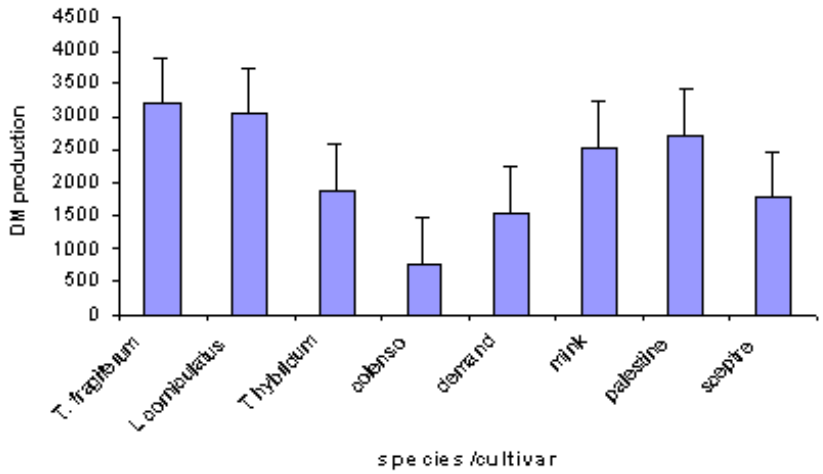

Figure 1b. Winter production for alternative perennial legumes at Hamilton (bars represent lsd at p= 0.05)

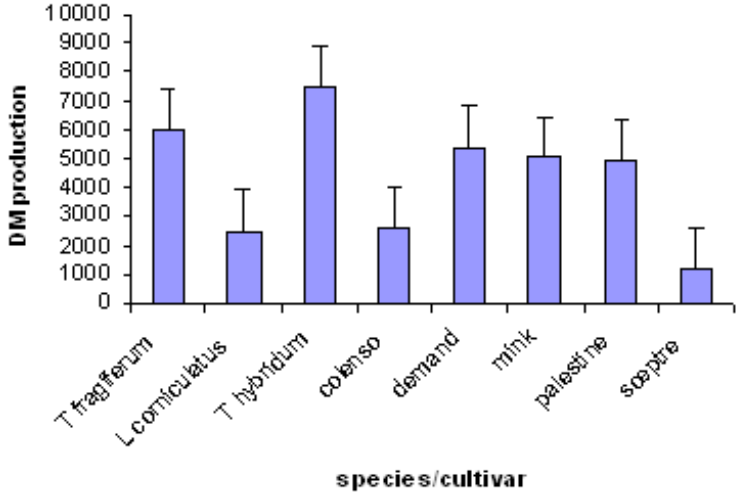

Figure 1c. Spring production for alternative perennial legumes at Hamilton (bars represent lsd at p=0.05)

References

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