# Comparative pasture growth and soil profile dryness of a lucerne and an annual legume pasture

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## Abstract

The pasture growth and soil profile dryness of a lucerne and an annual legume pasture were measured at 2 sites in the Great Southern wheat-belt of Western Australia. The lucerne produced more biomass and achieved a drier soil profile than the annual pasture.

*Key words: Pastures, lucerne, water-use, biomass*

A dryland lucerne (*Medicago sativa*) production system is being evaluated in the wheat-belt of Western Australia as an alternative to annual pasture leys. This is supported by the need to increase water-use to arrest rising water tables and associated land salinisation.

Historically, sowing lucerne in Western Australia has been restricted by the acidic soils and the Mediterranean climate. However, the identification of more effective rhizobial inoculants has improved lucerne productivity and persistence on acidic soils (2).

## Materials and methods

The experiments were conducted at Borden on a sand over gravel with pH 5.0 ($CaCl_2$) and at Pingrup on a grey clay soil with pH 5.8 ($CaCl_2$). The experiments were sown to lucerne and subclover (Borden) and lucerne and annual medic (Pingrup) in June 1995. Plots were randomised in 6 blocks.

Commencing on 22 July 1996 comparative pasture growth rates were measured each 6 weeks. Plots were then mowed to 2 cm height. Plots were not grazed for the duration of study. Soil water assessments, with a neutron moisture meter, were collected each month, from September 1996 to January 1997 at both sites. The volumetric content of free water was calculated using soil bulk density and gravimetric soil water measure-ments.

## Results

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Table 1. Monthly and total annual rain (mm) at Borden and Pingrup from May to December 1996

| | May | June | July | August | Sept | Oct | Nov | Dec | Total |
|---|---|---|---|---|---|---|---|---|---|
| Borden | 19 | 47 | 77 | 51 | 78 | 37 | 24 | 0 | 341 |
| Pingrup | 26 | 42 | 85 | 32 | 42 | 20 | 21 | 0 | 295 |

Annual rain at Borden and Pingrup was approximate-ly 10% below long-term averages. Significant rain did not fall before May at either site.

Mean plant densities at Borden were 32 plants/ $m^2$ of lucerne with 50 subclover plants/$m^2$ in the lucerne treat-ment and 515 subclover plants/$m^2$ in the annual pasture treatment. Both treatments had less than 100 plants/$m^2$ of volunteer annual grass. At Pingrup there were 55 lucerne plants/$m^2$ in the lucerne treatment and 50 *Medicago polymorpha* plants/$m^2$ plus 200 plants/$m^2$ of volunteer annual grass in both treatments. The proportion of lucerne as a percentage of the total pasture biomass was 61% at Borden and 20% at Pingrup on 26 September.

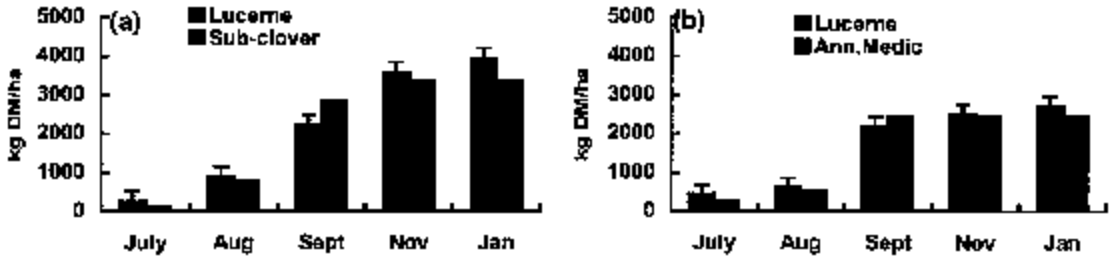


Figure 1. Cumulative pasture production (kg DM/ha) at Borden (a) and Pingrup (b) in 1996

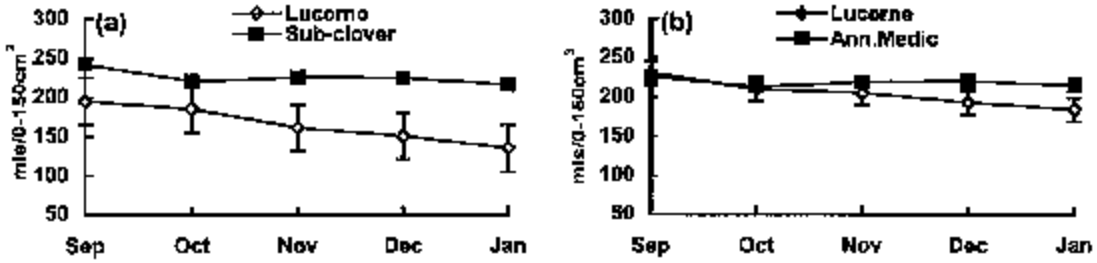


Figure 2. Effect of lucerne and annual pasture on soil water storage (mls/0-150 cm) at Borden (a) and Pingrup (b) in 1996. Error bar I, l.s.d. ($P$=0.05).

At both sites over 1 growing season the lucerne treat-ment increased the biomass production (Fig.1a and b) and reduced water stored in the 0-150 cm soil profile (Fig. 2a and b) at the completion of the season.

## Conclusions

Victorian studies including: Clifton and Schroder (1) and Whitfield *et al.*(4) found that lucerne reduced soil water content by extending the growing season into the late spring and summer. Crawford and Macfarlane (2) also found that lucerne rotationally grazed at a high stocking rate, increased pasture production. These comparisons were made with an annual pasture.

The preliminary results from this study suggest similar agronomic and environmental benefits may be achievable in Western Australia.

## Acknowledgments

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