

## Pasture establishment on limed and unlimed soils

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MASTER (Managing Acid Soils Through Efficient Rotations) is a long-term agronomic experiment that commenced in 1992. It was designed to develop and demonstrate a sustainable agricultural system that is both economically viable and environmentally effective for managing highly acidic soils in the high rainfall (550-800 mm) region of south-eastern Australia (Li *et al.* 2001). A new 6-year cycle, started in autumn 2004, is focused on the responses of pasture and sheep to lime application. The objectives are a) to test whether applying lime is profitable for pasture and sheep production (wool and wool/meat enterprises); b) to test whether perennial pastures are less acidifying than annual pastures, and c) to evaluate effects of lime and pasture types on wool

quality. However, the paper only reports on the data of the pasture establishment.

### Methods

Two pastures (annual v. perennial pastures) were re-established in 2004. The experiment was conducted on the property 'Brooklyn', operated by the Hurstmead Pastoral Company Pty. Ltd., at Book Book (14730E, 3523S), 40 km south-east of Wagga Wagga in a 650 mm rainfall zone. The annual pastures were sown to annual ryegrass cv. Wimmera (2.0 kg/ha) and subterranean clover (*Trifolium subterraneum*) cvv. Riverina and Goulburn (4.0 kg/ha each), while the perennial pastures were sown to phalaris cvv. Australian (1.0 kg/ha) and Holdfast (1.0 kg/ha), cocksfoot (*Dactylis glomerata*) cv. Currie

(1.0 kg/ha), lucerne (*Medicago sativa*) cv. Aurora (3.0 kg/ha) and subterranean clover cvv. Riverina and Goulburn (3.0 kg/ha each). Each pasture was either without or with lime application. The initial lime rate was 3.7 t/ha which increased  $\text{pH}_{\text{Ca}}$  from 4.0 in 1992 to 5.5 in 1993. The top-up lime rate was 1.7 t/ha every 6 years to maintain  $\text{pH}_{\text{Ca}}$  around 5.5 at 0-10 cm soil. Seedling numbers of all sown species were counted in September 2004.

## Results

There were significantly more seedlings of sown species on the limed treatment than the unlimed treatment on both perennial and annual pastures (Fig. 1). With perennial pastures, lucerne seedlings were present at over 250 plants/m<sup>2</sup> on the limed treatment, but below 100 plant/m<sup>2</sup> on the unlimed treatment. For annual pastures, subterranean clover seedling density exceeded 650 plants/m<sup>2</sup> on the limed treatment, but were present at only around 200 plant/m<sup>2</sup> on the unlimed treatment.

## Discussion

The MASTER site has been regularly limed since 1992. Soil acidity has been gradually ameliorated over past 12 years (Li *et al.* 2004) as evidenced by improved pasture establishment on the limed treatments (Fig. 1). The lower number of sown species on the unlimed treatments indicated

that acidity has a negative effect on the pasture establishment.

Lucerne is a highly acid sensitive species. Lucerne disappeared after its first summer when it was sown in 1992 at the MASTER site (Li *et al.* 2003). It was observed that most of the lucerne plants survived over the first summer when it was re-sown 12 years later. However, it will be interesting to see the impact of subsurface acidity on lucerne survival over next few years.

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## References

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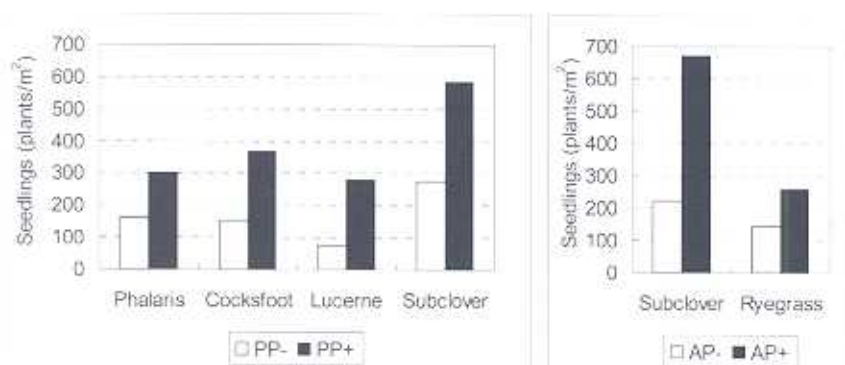


Fig. 1 Seedling numbers at establishment. PP- and PP+, unlimed and limed perennial pastures; AP- and AP+, unlimed and limed annual pastures.