

# The effect of surface-applied lime on seed yield of four annual legumes grown in mixtures with phalaris

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## Introduction

Perennial pastures play an increasingly important role in Australian agriculture. They are relied upon for their ability to reduce deep drainage (Dear, 2003) which they achieve through the perenniality of their root system and their deep-rooting habit. Lucerne (*Medicago sativa* L.) is capable of reducing deep drainage but is not suited to all environments, such as to acid soils, where other perennial species, such as phalaris (*Phalaris aquatica* L.) or chicory (*Chicorium intybus* L.), have a role. For these non-legume species to be effective, complimentary annual legume species are required to supply nitrogen (N) through N fixation. This study evaluates the seed yield response of a range

of annual legume species grown in the presence or absence of perennials on acid soils and their response to surface-applied lime. Only the results of the annual legume and phalaris treatments are shown below.

## Method

A field trial was established at Gerogery, New South Wales, in April 2002 as a randomised split plot, with perennial species as main plots and lime (2.9 t/ha) as split plots, with four replications. Plots were 6 m by 4 m and sown to a mixture of annual legume species. Phalaris (cv. Holdfast and cv. Landmaster) was included with the annual legume mixture in the Phalaris treatments. The annuals sown in each plot consisted of a mixture of subterranean clover

(*Trifolium subterraneum* spp. *yanninicum* L.), cv. Riverina; burr medic (*Medicago polymorpha* L.), cv. Santiago; balansa clover (*Trifolium michelianum* L.), cv. Paradana; and gland clover (*Trifolium glanduliferum* L.), cv. Prima. Annual legume seed was harvested in December 2002 by sampling two 2-m by 0.1-m strips per plot. Seed was threshed and sieved and separated according to species.

## Results and discussion

Lime had a large positive effect on the ability of balansa, gland, and burr medic to set seed but had no such effect on subterranean clover (Table 1). The presence of phalaris decreased the seed yield of all annual legume cultivars. The small-seeded species (gland and balansa) set a greater weight of seed than the two larger-seeded species. This may be due to the superior ability of the small-seeded species to fill seeds

under increased moisture stress as was experienced with the below average rainfall in 2002. The findings suggest that balansa clover, burr medic, and gland clover cultivars are likely to be more sensitive to acid soils than subterranean clover and are therefore more likely to respond to lime.

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## References

Dear, B. S. 2003. Program 3 Overview: New and better woody and herbaceous plants. Salinity CRC NSW Node Meeting, 27 February, Young, NSW.

Table 1. The effect of phalaris on weight of seed set (kg/ha) of four annual legumes species and the percentage (%) response of seed set due to lime (L).

Treatment	Subterranean Clover	%	Burr Medic	%	Balansa Clover	%	Gland Clover	%
Annual Only	15.6		2.3		50.5		17.8	
Annual Only + L	15.3	-2	13.0	+463	74.9	+48	44.0	+148
Phalaris + Annual	8.1		2.4		17.2		11	
Phalaris + Annual + L	8.6	+6	4.7	+98	35.7	+108	24.1	+120