

Competitive abilities of lucerne and sorrel growing in acid soils

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Sorrel (Rumex anglocarpus) is a weed that often invades lucerne stands in North Eastern Victoria.

In the autumn of 1973 an experiment was established at Lima East near Benalla to compare the effects of various rates of lime (48% CaO) on the establishment and growth of lucerne cv. Hunter River. The lime was broadcast at 0, 0.6, 1.3, 3.5, 5 and 10 t ha⁻¹ and incorporated into the topsoil (0-15 cm) 24 weeks prior to sowing the lucerne. The pH (1:5 Soil : Water) in the plots at sowing time ranged from 4.5 to 6.3. The initial germination was even but by midsummer 1973-74 the lucerne density on individual plots ranged from 0 to 430,000 plants ha⁻¹. In 1974 sorrel invaded the plots to varying degrees and at the spring harvest of that year representative sub-samples were collected and sorted into the component species. These samples were then dried and the dry weights of the sorrel and lucerne were obtained.

The relationship between percentage sorrel, soil pH and percentage lucerne was examined using a model of the following form:

$$Y = a + bP + cL + dP^2 + eL^2 + fPL.$$

where Y = percentage sorrel in plot, P = pH in topsoil and L = per cent lucerne in the plots. A stepwise (backward) analysis examined the significance ($P < 0.05$) of each coefficient.

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$$Y = 75.6 - 9.40 \sqrt{L}$$

$$(100R^2 = 86\%)$$

The inverse relationship between percentage lucerne and sorrel at this site indicates that productive lucerne is effective in preventing invasion by sorrel.

The fact that pH was rejected as a significant factor in this model may be explained by the results of another study which showed that on acid soils lucerne production was related to the concentration of the metal cations aluminium and manganese in the soil rather than pH.

In acid soils sorrel can be prevented from invading lucerne stands at any stage providing management practices are carried out which ensure that the lucerne establishes well, persists and remains productive.