Effects of grass suppression on legume abundance in a naturalised pasture

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Introduction Low abundance and poor persistence of legumes is a generalised problem in hill country pastures in New Zealand, even at adequate soil phosphorus levels (Woodfield & Caradus, 1996). Likely causes of low legume contents in swards include lack of soil moisture, high temperatures (Barker *et al*., 1993), frequency and intensity of defoliation (Suckling, 1975; (Lambert *et al.,* 1982) and increased grass competition due to increasing fixed nitrogen in the soil (Lambert *et al.*, 1982). On this later point there is anecdotal evidence that suppression of the grass component with herbicide will boost clover content, colloquially called 'chemical topping'.

Materials and methods Plots of resident pasture (H0) were maintained or treated with the herbicide haloxyfop at a rate of 9.0 g ai/10 *l* water in autumn 2000 (H1) to suppress existing grass species. In year 2, grass suppression treatments were H0, H1 (from the previous year) and H2 (resident pasture herbicide treated in autumn 2001), so that short-term and residual effects on swards could be compared. Live standing biomass, botanical composition and white clover growing point density (GPD) were determined on 24 sward cores per replicate at each harvest. Swards were sampled five times in 2000 (July-Dec.) and seven times in 2001 (July-March), at approximately monthly intervals. After sampling, plots were cut using a rotary mower (25–30 mm height). Phosphorus was applied to a target of 30 Olsen P using triple superphosphate.

Results In 2000/01 suppressing grass with herbicide more than doubled the average legume content of the standing biomass (7.1% *v* 27.6%, Figure 1). In the following season the average white clover content increased from 24.5% in H0 to 86.2% in H2, with the residual herbicide effect maintaining 37.9% in H1. The grass suppression did not affect yield in the year of spraying but provided a significant response the following year (Table 1). The general increase in legume content in the sward with grass suppression was probably connected to an early removal of grass competition. This generated open spaces that could in turn be colonised by the spread of white clover stolons reflected in the increase in white clover growing points (Table1).

Table 1 Total yield and growing point density in 2001/02

	Total annual yield (kg DM/ha)	Growing point density white clover (/m^2)
H0	8404	580
H1	9818	3065
H2	7715	473
SEM	520	157

Conclusions Legume abundance in naturalised pasture in New Zealand is strongly affected by competition from the resident grass component of the sward. 'Chemical topping' is an effective, if expensive, way of increasing the density of the white clover component.

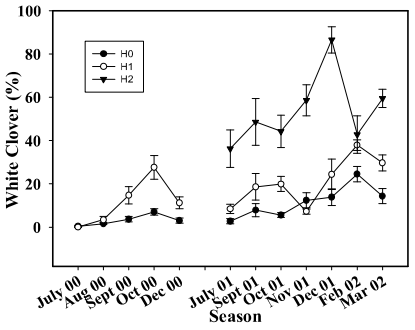

Figure 1 The response of white clover to the herbicide suppression of grass (% DM)

References

Barker, D.J., J.A. Lancashire, S.C. Moloney, N. Dymock, D.R. Stevens, J.D. Turner, D. Scott & W.J. Archie (1993). Introduction, production, and persistence of five grass species in dry hill country. 8. Summary and conclusions. *New Zealand Journal of Agricultural Research*, 36, 61-66.

Lambert, M.G., P.C. Luscombe & D.A. Clark (1982). Soil fertility and hill country production. *Proceedings of the New Zealand Grassland Association*, 43, 153-160.

Suckling, F.E.T. (1975). Pasture management trials on unploughable hill country at Te Awa. III. Results for 1959-69. *New Zealand Journal of Experimental Agriculture*, 3, 351-436.

Woodfield, D.R. & M.C. Caradus (1996). Factors affecting white clover persistence in New Zealand pastures. *Proceedings of the New Zealand Grassland Association*, 58, 229-235.