

LUCERNE SEEDLING RESPONSES TO RESIDUAL HERBICIDES USED IN GRAIN FARMING SYSTEMS

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Lucerne (*Medicago sativa*) is potentially an important component of farming systems in the northern grain region. It enhances soil fertility, improves grain yield and quality of following crops, and provides grazing and hay production options. However, weeds pose a major constraint in the increased adoption of a lucerne ley pasture phase. One weed issue is the sensitivity of lucerne to herbicide residues used in the previous cropping phase.

The aim of this study is to determine the plantback periods for the major residual herbicides for the soils and climates of this region. This is being done by measuring shoot dry matter (SDM) production of lucerne in both glasshouse and field situations after applications of chlorsulfuron, metsulfuron-methyl, triasulfuron, and atrazine. Herbicides were applied at recommended and double rates at 7 sites across southern Queensland. Undisturbed soil cores were taken from each site at 11-12 months after application of sulfonylurea herbicides and 16 months following application of atrazine. These cores were sown with lucerne cv. Trifecta, and SDM was measured at 70 days after sowing. Lucerne was also sown at 3 field sites approximately 12 months after application of sulfonylurea herbicides.

Seedling SDM production in the soil cores was reduced for 6 of the 7 sites, but the degree of reduction varied with herbicide, rate and soil type (Table 1). The greatest reduction (27-70%) in SDM for all herbicides and rates was in the sodosol soil. However at recommended application rates in the vertosols, chlorsulfuron reduced SDM by 6-35%, triasulfuron reduced SDM production by 3-8%, and metsulfuron-methyl caused a reduction in SDM of 0-17%. Loss in lucerne production was greater at the double rates. Atrazine (1, 2 and 4 kg/ha) reduced SDM between 26-33%. In the field residues of all herbicide treatments caused some stunting and yellowing of seedlings, particularly at the double application rates. However, there was no effect on SDM at the vertosol sites from two cuts taken at 6-9 months after sowing. The sodosol site was drought effected, and was not cut for yield, but did exhibit marked herbicide damage.

Table 1. Shoot dry matter (% of untreated) of seedling lucerne grown in undisturbed soil cores sampled from sites following application of sulfonylurea herbicides at recommended and double rates.

Site	Soil type	pH	Plant-back (months)	Chlorsulfuron		Triasulfuron		Metsulfuron	
				15 g/ha	30 g/ha	25 g/ha	50 g/ha	4.2 g/ha	8.4 g/ha
<i>1997</i>									
1	Vertosol	7.1	11.8	94	90	97	84	99	87
2	Vertosol	8.4	11.6	89	70*	96	104	90	98
3	Vertosol	8.0	11.8	65*	35*	93	70*	83*	65*
4	Sodosol	7.9	11.3	39*	30*	52*	33*	73*	64*
<i>1998</i>									
5	Vertosol	7.8	11.7	78*	89	92	94	85	74*
6	Vertosol	8.4	11.0	70*	68*	93	81*	88	89
7	Vertosol	8.4	11.5	80*	32*	94	88	100	90

* significantly less than untreated controls (P = 0.05).

The results from these studies indicate that lucerne sensitivity to herbicide residues differed between major soil types, and this should be taken into account plantback recommendations. There appears to be more flexibility in sowing lucerne following sulfonylurea herbicides in vertosols than in the current plantback recommendations. Research is continuing on these and other residual herbicides in relation to plantback periods.