

## Annual pasture legume growth on acid soils II the root growth of seedling subterranean clover (*Trifolium Subterraneum* cv *june*) and barrel medic (*Medicago truncatula* cv. *Paraggio*) on an acid soil following deep tillage and deep lime placement

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A knowledge of top and root growth characteristics on limed and unlimed field profiles is important in understanding the limitations to lime responsiveness and the effectiveness of deep placement of lime for both acid sensitive and acid tolerant species. The root growth of two legume pastures was investigated on a deep acid soil near Wagga Wagga, NSW.

### Methods

Measurements were made on part of a large field experiment at Borambola 40 km east of Wagga Wagga, NSW (see paper 1). Selected lime and deep tillage treatments on subterranean clover (SC) and barrel medic (BM) plots were sampled. There were four replicates of the following treatments: control (LO); lime 3 t ha (L3); lime 1 t ha (L1); lime 3 t ha plus deep tillage (L3 + DT); lime 3 t ha plus deep tillage plus deep lime at 3 t ha (L3 + DT + DL) and control plus deep tillage plus deep lime at 3 t ha (LO + DT + DL). Deep tillage to a depth of 30 cm and deep lime treatments were made with an Agrowplow with 32 cm tine spacings. In the DL treatments lime was injected through four evenly spaced nozzles 10-30 cm below the surface. Bulk density and pH (0.01 M CaCl<sub>2</sub>) were measured in 10 cm increments to 90 cm for all plots. Root length was measured by the method of Tennant(1), plant weight was determined following hand washing and drying and maximum rooting depth by the method of Hamblin(2).

### Results and discussion

**Table 1. Plant weight, root length and maximum rooting depth of barrel medic and subterranean clover**

Sampling Date	4.8.87		4.8.87		25.9.87	
	Plant weight (mg) (Mean of 40 plants)		Root length (cm/cm) (Mean of 20 plants)		Maximum rooting depth (cm) Mean of 4 cores	
Treatment	SC (SD)	BM (SD)	SC (SD)	BM (SD)	SC (SD)	BM (SD)
LO	331 (60)	207 (30)	14.1	6.6	28.0 (15)	9.6(12)
LO + DT + DL	313 (50)	225 (40)	10.1	6.8		
L3	347 (50)	293 (50)	11.3	8.8	32.3 (13)	9.5(11)
L3 + DT	359 (50)	304 (40)	10.8	8.6	39.5 (8)	12.5(13)
L6	333 (40)	309 (40)	16.4	7.7	25.3 (12)	9.9(11)
L3 + DT + DL	348 (30)	289 (30)	9.0	5.1	47.8 (10)	15.8(9)

Although there was little effect of any of the treatments on the growth of sub clover there were some marked effects on the growth of barrel medic. BM roots were confined either to the limed surface or limed slots. Where BM roots extended to depth (35.8 cm) they did so along the lime injection slots. Sampling of the plot cross-section showed that pH change extended laterally only 2 cm. This was the zone to which the roots were confined. Lime application up to 3 t ha also increased top growth. The effects of sub surface acidity described could influence nutrient uptake and water use of the seedling and adult plant and limit the potential responses for both surface and deep-placed lime.

1. Tennant, D. (1976). *J.Ecol.* 63:995-1103.

2. Hamblin, A.P. and Hamblin, S. (1985). *Aust.J.Agric.Res.* 36:63-72.

