

## Developing new forage plants for acid soils

G.D. Li, B.S. Dear and R.C. Hayes

NSW Department of Primary Industries, Wagga Wagga NSW 2650  
CRC for Plant-based Management of Dryland Salinity

Deep rooted perennial plants such as lucerne (*Medicago sativa*), phalaris (*Phalaris aquatica*) and cocksfoot (*Dactylis glomerata*) use more water than annual pastures and crops and are effective for reducing deep drainage. Many soils, however, are too acidic for these species to grow successfully and a greater range of perennial options are required by landholders. The current project is screening different plants to identify perennial legumes or herbs that may be useful alternatives for acid soils. The project is part of a national program run by the CRC for Plant-based Management of Dryland Salinity to find new pasture plants for landholders to fight dryland salinity.

### Methods

The experiment is located at Wallendbeen, NSW. The soil pH (CaCl<sub>2</sub>) is 4.4 at 0-10 cm and 4.2 at 10-20 cm. Exchangeable aluminium is 10% at 0-10 cm and 34% at 10-20 cm. The experiment was sown in autumn 2003. Thirty-two different legumes and herbs were sown including lucerne, chicory

(*Cichorium intybus*), lotus (*Lotus* spp.) and hairy canary clover (*Dorycnium hirsutum*). Persistence and herbage production were measured over 2 years. This experiment will be monitored for another 1-2 years.

### Results and discussion

Chicory produced more than double the herbage mass of lucerne (24.2 vs 10.6 t/ha) over two years (2003-2004). The basal cover and frequency of chicory was similar to lucerne. Chicory has clearly demonstrated its potential for incorporation into cropping-grazing systems in higher rainfall regions and its area of use could be further expanded if more grazing and drought tolerant lines could be selected.

Three lotus lines were ranked 4<sup>th</sup> (*L. cytisoides*), 6<sup>th</sup> (*L. glaber*) and 7<sup>th</sup> (*L. maroccanus*) in terms of herbage mass production. It should be noted that *L. maroccanus* is an annual species. The next best performing group was 3 hairy canary clover lines. In general, this group had better persistence, but

Table 1 Performance of top 10 legumes and herbs in 2003-2004 at Wallendbeen, NSW

Rank	Species	Cultivar	Basal cover <sup>a</sup> (%)	Frequency <sup>a</sup> (%)	Herbage mass <sup>b</sup> (t/ha)
1	<i>Cichorium intybus</i>	Grasslands Puna	15	62	24.2
2	<i>Medicago sativa</i>	Sceptre	21	75	10.6
3	<i>Galega officinalis</i>	*	2	14	7.8
4	<i>Lotus cytisoides</i>	*	9	43	7.8
5	<i>Dorycnium hirsutum</i>	*	11	53	6.8
6	<i>Lotus glaber</i>	*	3	16	6.6
7	<i>Lotus maroccanus</i>	*	2	14	5.4
8	<i>Medicago sativa caerulea</i>	*	6	40	4.9
9	<i>Dorycnium hirsutum</i>	*	5	37	4.8
10	<i>Dorycnium hirsutum</i>	*	5	32	4.4
19	<i>Trifolium uniflorum</i>	*	22	76	1.4

<sup>a</sup>Basal cover and frequency measured in its second autumn

<sup>b</sup>Herbage mass: total herbage mass in years 1 and 2

lower yield than lotus group. Further work is needed in agronomy and grazing management.

*Medicago sativa* subsp *caerulea* is a prostrate species belonging to the lucerne family. It is reputed to have a high tolerance to grazing but its persistence under heavy grazing conditions needs to be further evaluated. *Trifolium uniflorum* had the highest basal cover and frequency of the perennial species evaluated and was the most effective at reducing

ingression of weeds. It is a very prostrate species and is a good ground cover species. It may have potential as a companion species with lucerne or chicory, however, the productivity of this species was very low and it is likely that seed costs of this species may be very high due to difficulty of harvesting seed as a result of its prostrate growth habit.