A survey of lucerne establishment in southern NSW

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The majority of pastures in the wheat belt of Southern NSW are established by undersowing the pasture species into a cereal cover crop. A number of farmer groups formed under the auspices of the GRDC project, "Pastures Pay", identified poor lucerne establishment as a major problem limiting the adoption of lucerne in crop/pasture rotations. Lucerne is able to benefit farm profitability in a number of ways. These include, the improvement of soil fertility through an increase in nitrogen fixation, the reduction of soil erosion and waterlogging, and the production of more herbage mass than annual species (Bowcher and Virgona, 1997).

This project aimed to survey cover-cropping management practices and to relate these to lucerne field establishment. This will assist in the development of benchmarks to assess lucerne establishment.

Methods

Surveys of lucerne establishment occurred over 2 seasons, using crops sown in 1995 and 1996. Two districts were sampled, Cootamundra (555 to 700 mm mean annual rainfall across the district) and Temora (475 mm to 550 mm). Measurements of lucerne population were taken from paddocks with a range of different cover crops and paddock management practices. The paddock history and current season husbandry were recorded and entered into a database. Each paddock was monitored 4 times with observations taken shortly after emergence, in late spring, mid-summer and at the break of season in the following year. Ten measurements per paddock were undertaken on each sampling occasion to determine mean lucerne density. A randomly-placed 0.2 m^2 quadrat was used.

Results and discussion

The majority of paddocks measured in 1996 were from farms which were also surveyed in 1995. In the Cootamundra district 22 paddocks were monitored in 1995 and 29 in 1996, whereas in Temora 35 were monitored in 1995 and 27 in 1996. Farmers in both districts have adopted a range of machinery to produce a level seed bed including belts, coil packers, harrows, mesh and trailing rollers. Table 1 summarises management factors likely to influence cover-cropping outcomes.

In Temora, the growing season rainfall for 1995 was 502 mm (April - November), with a further 133 mm falling between December 1995 and March 1996. In the 1996 growing season, rainfall was 399 mm, with 79 mm falling over the summer months. In Cootamundra, 1995 growing season rainfall was 627 mm with a further 238 mm falling between December 1995 and March 1996. In 1996, the growing season rainfall was 552 mm with 103 mm falling over summer.

Initial analysis of the data shows that there is a positive association between the sowing rate of lucerne and the density of plants established. Furthermore, results indicated that it was difficult to establish a viable lucerne stand with lucerne sowing rates less than 2 kg/ha. It was considered that the pasture establishment phase was completed by the fourth observation, *ie.* the break-of-season in the year following sowing. In both years greater densi-

Table 1: Variation in cover-crop row spacing, sowing rate of cover-crop and sowing rate of associated undersown lucerne on farms surveyed in the Temora and Cootamundra districts.

	Percentage of paddocks surveyed			
	Temora		Cootamundra	
Cover Crop Row Spacing				
Year of Sowing	Conventional	Alternate	Conventional	Alternate
1995	66	34	32	68
1996	80	20	35	55
Cover Crop Sowing Rate	(kg/ha)			
	Range	Mean	Range	Mean
1995	27-100	43	14-70	32.5
1996	20-65	44	15-45	28.5
Lucerne Sowing rate	(kg/ha)			
1995	1.25 - 4	2	2 - 7	3.5
1996	0.75 - 4	2	1.5 - 5.5	3

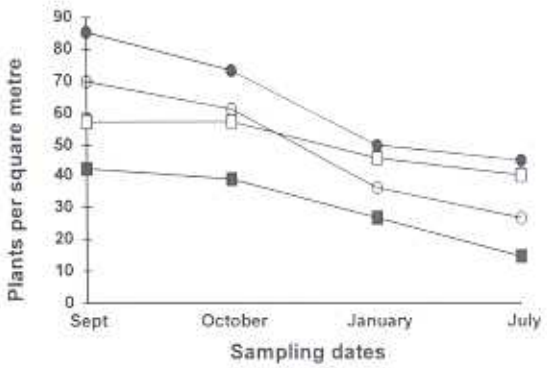

Figure 1: The change in mean lucerne density over time as observed in a range of farmers paddocks in the Cootamundra district in 1995 and 1996 sown crops. Results from a similar survey in the Temora district for 1995and 1996 sown crops are also presented.

ties of established plants were attained in the higher rainfall Cootamundra district. The establish-ed lucerne population densities for the Temora district were 40 and 15 plants/m^2 in 1995 and 1996 sown crops respectively, whereas in the Cootamundra district the corresponding densities were 45 and 27 plants/m^2 for the 2 years. Lucerne densities in the 1995 and 1996 sowing's in Cootamundra de-clined markedly over the following summers, both of which received lower than normal rainfall. It could be expected that a dry summer during the establishment phase might lead to a greater populat-ion decline where the initial plant densities were high. In contrast, the lower initial lucerne densities in the Temora district over both years resulted in only moderate reductions in established lucerne populations even though similar seasonal conditions to Cootamundra were experienced .

A downward trend in the sowing rate of cover-crops seems to be evident, presumably due to the superior lucerne establishment under these lower rates. It was not clear from the data whether lucerne establishment was more successful with conventional or alternate row spacing of the cover-crop. The majority of farmers in both districts used a seed treatment against fungal pathogens, inoculated the lucerne with rhizobium spp. and sprayed insecticides for protection against insect and mite pests.

We suggest that a benchmark where 20 % of total seed sown leads to established pasture plants in a sward is appropriate for southern NSW. In the 2 seasons surveyed, 55% of paddocks in the Temora district and 69% in Cootamundra either achieved or surpassed this benchmark. The higher and more reliable rainfall and the greater adoption of lower cover-crop sowing rates in the Cootamundra district are probably the major reasons for the difference between the 2 districts.

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References

Bowcher, A.J. and Virgona, J.M. (1997). Pasture Composition Survey of Southern NSW. In: Proc. Twelfth Ann. Conf. Grassld. Soc. NSW. Edited by A.M. Bowman and D.L. Michalk. pp. 121.