

Keys to successful lucerne establishment

Dr Malcolm McCaskill, Department of Primary Industries, Hamilton, Victoria

There is currently a high level of interest in lucerne as forage for sheep and cattle in south-west Victoria.

A contributing factor is that a major project in the region – EverGraze - *more livestock from perennials*, has demonstrated excellent production following summer rainfall/ Another factor is the winter production of pastures sown to newer winter active lucerne varieties is almost as high as perennial ryegrass.

EverGraze is using perennials in grazing systems with sheep and cattle to increase profits by 50% while simultaneously improving farm environments through improved water management, ground cover, biodiversity and soil health.

This article describes our experiences in establishing lucerne on the Hamilton EverGraze Proof site, some of the problems we faced and how we would do it again.

First Establishment

Everyone, including scientists, learn by making mistakes. While we enjoy telling others of our successes, there are also failures along the way that help to highlight the practical issues often faced by industry. Our learning story started in 2004 when we attempted to rush the sowing of lucerne as part of developing the EverGraze Proof site. An area, previously cropped to wheat in 2003, was allocated to us in autumn 2004.

The following winter had above average rainfall (318mm compared with a long-term average of 233mm), making it impossible to drive on the area until early spring. At the end of September we sprayed with knockdown herbicides (2 l/ha Roundup and 500 ml/ha Kamba) to control self-sown wheat and other volunteer annuals.

Lime was applied to the soil surface at 2.5 tonne/ha in early October, but it could not be worked in to the topsoil while the herbicide was still acting on the volunteer growth.

In mid October, we direct-drilled lucerne, fearful that the spring would turn dry. The lucerne seed was lime-coated and inoculated and sown at 9 kg/ha.

Our efforts were rewarded by areas of stunted growth, a patchy seedling density and white blotches on the leaves of the poorly-performing lucerne seedlings. Soil tests revealed a layer of highly acid soil between 5 and 10 cm depth that had not yet been corrected by lime applied to the surface, nor the lime coating on the seed.

Acid layers like this are quite common on hilltop sheep camps, and it's generally the hilltops that are the most suitable for growing lucerne. In one poorly performing patch, the pH in calcium chloride within this acid layer was 3.9, whereas a pH of at least 5.1 is recommended for lucerne.

Lime moves through the soil quite slowly (about 10cm per year), and our only mistake was not to incorporate the lime prior to sowing. As lucerne is susceptible to high aluminium levels in acid soils, it will often reveal problems that are hidden by more acid-tolerant plants such as triticale or perennial ryegrass.

We were left with half a lucerne stand, which in some ways was worse than no lucerne, because we couldn't easily cultivate the lime into the acid soil layer. Furthermore, resowing could be problematic because mature lucerne plants suppress the germination of newly-sown lucerne seedlings.

Resolving the problem

A further 2.5 tonnes/ha of lime were added to increase the change in pH within the top soil. The area was chisel ploughed to a depth of 16 cm in April 2005 in an attempt to create tongues of neutral soil through the layer of acid soil. The weakest areas of lucerne were also ripped and chain-harrowed in August 2005.

Most of the lucerne plants survived this treatment. To suppress the growth of these lucerne plants and control weeds in preparation for a second sowing, the area was sprayed with a knockdown herbicide (2.2 l/ha Sprayseed 250) in late August 2005.

Sowing occurred in late August 2005, a few days after the knockdown spray. Inoculated lime-coated lucerne seed was direct-drilled at 5 kg/ha, with a starter fertiliser of 100 kg/ha of single superphosphate.

By the end of October, the lucerne stand had excellent density and growth (see photo). Its first grazing was not until December, to ensure that plants were well anchored.

Over the following four years the lucerne paddocks have been rotationally grazed by sheep, and annual production has been between 8 and 13 tonnes dry matter per ha. Its persistence has been excellent with only small reductions in plant numbers over the last few years despite quite difficult seasons.

How would we do it again?

Successful establishment of lucerne requires good planning and a lead time of one to two years to ensure that soil acidity is corrected and potential weeds are controlled.

If soil acidity is an issue, lime should be incorporated through cultivation prior to sowing. Alternatively if pastures are to be direct drilled the lime should be surface-applied at least one to two years before sowing in order to allow the lime to move down the soil profile and increase the soil pH in the topsoil.

Cropping prior to sowing lucerne works well, because it reduces the weed burden. Residual herbicides in crops can greatly reduce many of the weeds that could subsequently be a problem in a lucerne stand, such as onion grass, barley grass, thistles and capeweed.

Sowing in late winter or early spring also worked well, because it avoided many of the weeds associated with autumn sowing, and allowed the new lucerne pasture a full profile of soil moisture in its establishment year.

Control of red-legged earth-mites by a spraying prior to sowing is important where these are a problem.

Sufficient soil P was another ingredient for success. Our target Olsen P is 15 mg P/kg, and this requires a maintenance rate 18 kg P/ha.

A companion non-legume, such as chicory or cocksfoot, could also be considered where grazing (rather than lucerne hay production) is the main purpose of the pasture. The companion non-legume would use nitrogen fixed by the lucerne and reduce the broadleaf weeds in winter.

For further information, a fact sheet on lucerne is available on the EverGraze website (www.evergraze.com.au), or contact Malcolm McCaskill at DPI Hamilton on 5573 0900.

EverGraze is a Future Farm Industries CRC, Meat and Livestock Australia and Australian Wool Innovation research and delivery partnership.