

Growing and using lucerne in southern Australia



Lucerne provides quality forage over spring, summer and autumn
Photos: Gill Fry

Actions summary

- ▶ **Lucerne provides quality forage for livestock over spring, summer and autumn and uses soil water, helping to reduce soil salinity and acidity**
- ▶ **Lucerne suits well drained, alkaline to mildly acidic soils**
- ▶ **Lucerne must be rotationally grazed with a 6 week spell between grazing**
- ▶ **Managed correctly, lucerne can persist for more than 10 years**

Lucerne – the plant

Lucerne is a temperate, perennial legume with peak production in spring and early summer. It will rapidly respond to significant rainfall events (more than 10 mm) throughout summer and autumn.

Established lucerne can withstand long dry periods and is well suited to irregular rainfall patterns. It grows in areas receiving as little as 250 mm annual rainfall but also provides good summer production in areas of up to 700 mm rainfall.

Lucerne provides forage with high energy (digestibility 65–72%, metabolisable energy 8–11 MJ/kg DM) and protein (12–24%). It is also an excellent source of calcium, magnesium, phosphorus and vitamins A and D.

The quality forage of lucerne in summer, compared with senescent pastures, is well suited to spring lambing enterprises enabling higher lambing percentages and out of season lamb growth.

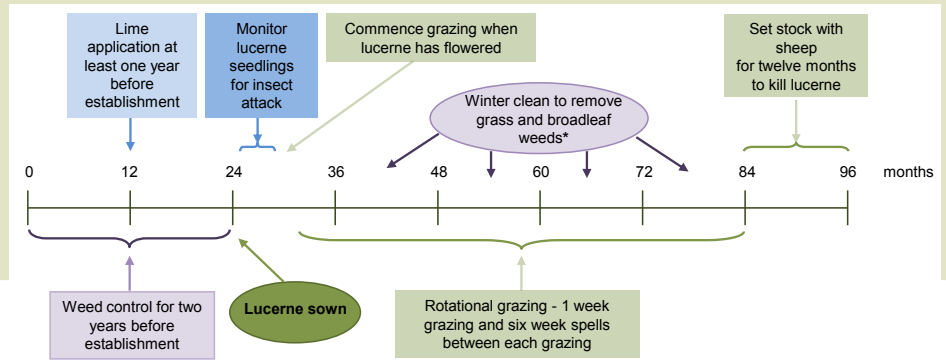
Its summer production also reduces supplementary feeding requirements.

Preliminary results from the EverGraze project suggest that lucerne can be used to flush ewes to increase ovulation and lambing percentages.

Lucerne roots can grow to 3m deep, drying the soil profile to greater depth than all annual and most perennial species. Consequently, it uses a greater amount of rainfall, reducing accessions to groundwater and associated salinisation.

Lucerne fixes between 15 and 20 kg/ha of nitrogen for every tonne of dry matter produced, increasing soil nitrogen levels for subsequent crops.





Does lucerne suit my farm?

Which paddocks?

Rotational grazing is mandatory for lucerne survival. Perhaps sow two or more paddocks to lucerne and rotate livestock between these and other paddocks; or subdivide one lucerne paddock so stock can be moved from area to area. Paddocks with good weed control, eg at the end of a cropping phase or pastures that have been spray-topped, are ideal for lucerne. Paddocks with heavy infestations of couch grass and hogweed, which cannot be easily controlled in established lucerne, should not be sown to lucerne.

Which soils?

Lucerne is not suited to saline soils or soils prone to waterlogging. If a 2WD utility can be driven across the paddock in the middle of winter without getting bogged, then the paddock is suitable for lucerne. The recent series of dry years means more paddocks may be suitable for lucerne but be careful of sowing lucerne in paddocks that used to get waterlogged. If soil pH is below 5.0 (CaCl₂), large quantities of aluminium enter the soil solution making it toxic to lucerne. If soil exchangeable aluminium exceeds 100 mg/kg (in KCl) or 5 mg/kg (in CaCl) don't sow lucerne. Where topsoil pH is marginal (5.0–5.5 in CaCl₂) an acidic subsurface layer may exist. Collect soil samples from at least two depth intervals (0–10 and 10–30 cm) to determine pH down the soil profile. Lucerne is not suited to paddocks with acidic subsoil as lime incorporation to depth is not feasible to correct soil pH. Use alternative species such as chicory or cocksfoot on these soils.

Cultivar selection

Lucerne varieties are rated 1 to 10 based on growth from autumn to early spring. While each activity/dormancy group has a different pattern of seasonal production, total annual production is similar.

Winter-dormant varieties (1–3) are dormant in winter, stimulated by shortening day length. They produce less feed over autumn–winter and are generally not grown for grazing in dryland areas.

Semi winter-dormant varieties (4–5) have a shorter dormancy period mid winter and tend to produce more over autumn–winter than winter-dormant varieties.

The crowns of winter and semi winter-dormant varieties are submerged in the topsoil and less prone to grazing and cutting damage than winter-active varieties, resulting in greater persistence. These varieties should only be sown in spring and with good management can last 7–10 years.

Winter-active varieties (6–7) combine the persistence of winter and semi winter-dormant varieties with improved seedling vigour. They do not have a dormancy period and produce more feed in winter. They can be sown autumn or spring and with good management can last 5–8 years.

Highly winter-active varieties (8–9) have high seedling vigour, produce more winter growth and are suited to autumn or spring sowing. They can persist for 3–5 years.

Very highly winter-active varieties (10) are very productive over autumn–winter but only persist for 2–4 years and require careful grazing management. The crowns of highly and very highly winter-active varieties form on top of the soil surface and are susceptible to grazing damage.

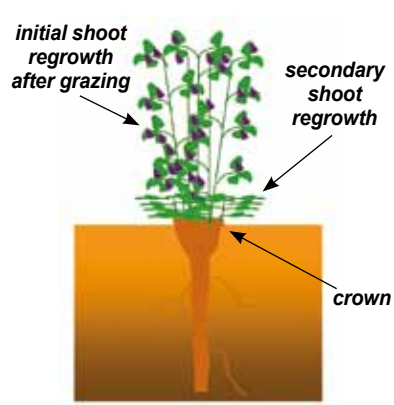
Establishment

Managing paddocks ahead of sowing lucerne

Thorough weed control in the years prior to sowing is essential for successful establishment. When establishing lucerne after a cropping phase, avoid using suphonylurea herbicides (eg Glean) in the final crop. Lucerne is sensitive to Group B herbicides and compliance with plant-back directions is essential. When direct drilling into plant residue, broad-spectrum knockdown herbicide (eg glyphosate) should be applied 3–6 weeks before sowing, to reduce disease carryover to lucerne seedlings. Soil incorporated herbicide (for example; trifluralin) before sowing can effectively control difficult weeds such as hogweed. Lime should be applied and incorporated to acidic topsoil at least one year before sowing. Gypsum should be applied to surface crusting dispersive soils to create a more friable seedbed, which allows water to enter the soil profile.

Sowing

In low rainfall areas (less than 500 mm) lucerne should be sown in autumn. In high rainfall areas, sow



Secondary shoot regrowth about six weeks after grazing

in late winter to early spring to avoid seedling losses from wet topsoils. Direct drill or sow into a prepared seedbed at 6–10 kg/ha, as shallow as possible (less than 1.5 cm) and always into moisture. Rolling improves seed-soil contact in cultivated seedbeds. Lucerne seed should be lime coated with viable rhizobia immediately prior to sowing. Seed dressings protect against insect attack, improving seedling survival. Phosphorus and sulphur should be applied, 10–20 kg/ha for each nutrient, depending on soil requirements. Molybdenum fertiliser can enhance nitrogen fixation. MAP is suitable as a sowing fertiliser but DAP and potassium fertilisers should not be used as they can reduce establishment. Newly sown stands must be monitored for red-legged earth mite, lucerne flea and aphids, and treated immediately – even if only one or two insects per seedling are present.

Grazing

Newly established lucerne plants should not be grazed until after flowering, giving the new stand time to accumulate carbohydrates in the roots, which is essential for future persistence. Only graze before flowering in the establishment year if the plants are water stressed to remove leaf material and reduce symptoms of wilting. Monitor closely and ensure young crowns are not damaged.

Companion species

In high rainfall areas, companion species increase winter production, fill gaps in the pasture, reduce invasion by broadleaf weeds and provide a more balanced diet for stock. The competition of the companion species with establishing lucerne and its persistence in a lucerne stand should be considered. Perennial ryegrass is a vigorous seedling, will reduce lucerne establishment and will struggle to persist as the lucerne dries the soil profile so should not be sown with lucerne. Phalaris and cocksfoot are more suitable companion species but should be sown at low rates (0.5–1 kg/ha) to ensure they do not dominate the stand. Lucerne monocultures often have low ground cover and this can lead to wind and water erosion depending on soil type and topography. Use of companion perennial grass species can provide higher ground cover. In northern NSW, current research suggests that using either temperate (phalaris, fescue) or

sub-tropical grasses (premier digit) with lucerne will significantly increase ground cover. Recommended companion species to reduce wind erosion on sandy soils in WA are winter active tall fescue or panic. Problems can arise when establishing these companion species. Current work in NSW is testing options such as sowing different perennials at different times of the year or sowing them in alternate rows. Further results of these technologies will be published by EverGraze over the next 2–3 years or can be obtained from Suzanne Boschma (suzanne.boschma@industry.nsw.gov.au)

Over-sowing lucerne

Well established lucerne stands at least two years old can be over-sown with cereals or annual ryegrass to increase winter production. Heavily graze the lucerne in autumn and apply herbicide (paraquat/diquat) after rain to desiccate remaining lucerne and reduce germinating weeds. Sowing rates need to be 10–20% heavier than if the seed was being sown alone, to compete against the lucerne. Suggested rates for cereals are 80–100 kg/ha, and annual ryegrass 20–25 kg/ha. Sow at less than 8 km/h to minimise damage to existing lucerne plants.

Management of lucerne

Grazing management

Lucerne requires rotational grazing with a six week spell between grazing periods. For 2–3 weeks after defoliation, lucerne regrowth depends on carbohydrates stored in the crown and tap root. A further 2–3 weeks is required to replenish the depleted reserves. New shoots forming from the crown after 5–6 weeks indicate sufficient root reserves for future regrowth, and lucerne is ready for another grazing. The grazing period needs to be kept short (7–10 days) so that new shoots at the base of the plant are not consumed. Paddock and mob size need to be appropriate to allow the herbage available to be consumed in this period. For example, assuming a pre-grazing feed on offer (FOO) is 2000 kg/ha and residual FOO is 1000 kg/ha, 1000 kg/ha of forage is available. To consume this forage in 7–10 days will require about 100 DSE/ha (stock eat ~1 kg/DSE/day).

Nutrient management

Annual fertiliser applications are recommended to maintain soil phosphorus levels at 15–25 mg/kg (Olsen



Lucerne over-sown with cereals to increase winter production

P) and soil potassium levels around 200 mg/kg (Colwell K). Sulphur levels above 10 mg/kg are recommended. Sulphur deficiencies often occur on acidic soils in high rainfall environments. Depending on soils and rainfall, trace elements such as Boron and Molybdenum may be required at regular intervals. Use tissue tests and seek local agronomic advice to determine requirements.

Weed control

Weeds can be minimised with healthy, competitive lucerne plants, which are promoted by rotational grazing and fertiliser application. Companion species that occupy spaces between lucerne plants also help suppress weeds. Winter-cleaning removes annual grasses and broadleaf weeds by the application of paraquat/diquat with diuron herbicide in mid winter, to stands more than one year old. This strategy is not recommended if companion species are present. Specific weeds can be controlled by selective herbicides but this is difficult in mixed lucerne pastures. Seedling recruitment does not occur in lucerne and it is not possible to over-sow with lucerne to thicken up stands due to either a lack of moisture or release of toxins from existing lucerne plants.

Disease and pest management

Lucerne varieties are available that are resistant to root and crown diseases, like Anthracnose and Phytophthora root rot. Most modern lucerne varieties are resistant to blue-green and spotted alfalfa aphids. However, it is best to have a break of two years between lucerne stands. In mature stands, consider spraying insecticide when aphid populations exceed 100/sweep and lucerne flea exceeds 50/sweep.

Terminating lucerne pastures

The most successful method to kill lucerne is to set stock with sheep for 6–12 months. Alternatively, apply glyphosphate herbicide in the spring when there is adequate soil moisture and lucerne is actively growing. Best results are achieved 2-3 weeks after grazing when carbohydrates are moving downwards and herbicide will be concentrated in the roots. Wait at least two years before re-sowing lucerne pasture.

Trialling lucerne on farm

- Identify if your property is suitable for lucerne.
 - Is lucerne appropriate for your soil types?
 - What animals would best use the feed?
 - Do you need spring and summer feed?
 - Can you strictly rotationally graze?
- Select a small paddock that can be easily managed and where no serious weed problems occur.
- Soil test to determine nutrient and lime requirements and implement weed seed control two years before establishment
- Seek agronomic advice on appropriate cultivars, companion species and sowing times.
- Don't skimp on seeding and fertiliser rates.

Author

Rob Harris, Research Agronomist,
Department of Primary Industries, PB 105, Hamilton, Victoria
rob.harris@dpi.vic.gov.au

Further information

"Success with Lucerne" (2002) Mark Stanley, Ross Britton and Raymond Christinat. Primary Industries and Resources South Australia (PIRSA), South Australia.

EverGraze on line: www.evergraze.com.au

For further details of EverGraze and to find out about activities in your area go to www.evergraze.com.au or write to Geoffrey Saul, National EverGraze Coordinator, 98 Leura Lane, Hamilton, VIC 3300.

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