pastures australia

A collaboration between AWI, GRDC, MLA, RIRDC and Dairy Australia

Lucerne

Scientific name(s)

Medicago sativa

Strengths

- Perennial, year round production
- Deep rooting, extracts water and nutrients from depth, restricts watertable recharge
- Moderate tolerance of soil salinity and sodicity
- Responds quickly to spring and summer rainfall (or irrigation)
- Dual purpose (grazing and hay)
- Highly productive
- High nutritive value

Limitations

- Short-term persistence in some regions (mainly due to disease susceptibility)
- Susceptible to waterlogging
- Needs rotational grazing
- Can cause bloat in cattle

Plant description

Plant: Deep rooted, upright, perennial legume.

Stems: Erect from 40 - 80 cm high at 10% flower.

Leaves: Comprise three smooth, slightly toothed, oval, wedge shaped to pointed leaflets, sometimes with white crescent shaped markings. Leaf veins strong, straight with little branching. Broadly triangular stipules with one or more small teeth occur at the point of leaf attachment to the stem.

Flowers: Pea flowers, mostly purple in colour, and about 8 mm across, borne in clusters up to 4 cm long at the tops of branches.

Pods: 4 - 5 coils in a spiral, spineless with a hard outer surface; produced in clusters; 1 - 5 seeds/pod.

Seeds: Small, green to yellow to light brown in colour; kidney shaped; 440,000 - 500,000 seeds/kg.

Pasture type and use

Medium term perennial (3 - 5 years); year-round production, predominantly in the spring/summer but with varying levels of winter production (winter activity).
Used for conservation, particularly hay production; as a 'ley' legume in cropping rotations (often called a 'phase' legume in such systems in southern and Western Australia); and as a medium-term legume in long term grass pastures in the subtropics.

Where it grows

Rainfall

In rain grown stands, 500 - 1200 mm/ann (subtropics); 250 - 800 mm/ann (southern and Western Australia).

Soils

Lucerne requires deep, well-drained soils (sands to moderately heavy clays) with a slightly acid to alkaline pH. It is intolerant of high levels of exchangeable aluminium and even short periods of waterlogging.

Temperature

Optimum temperatures for dry matter production range from 15 - 25ºC in the day and 10 - 20ºC during the night. However, this will vary with the winter activity level of the cultivar.

Establishment

Companion species

Lucerne is often sown as a pure sward. It is very competitive but if sown at a low rate it will grow with species such as early-flowering sub clover/annual medics, phalaris and Mediterranean types of tall fescue to boost winter production. It can be grown with chicory and a range of tropical grasses.

Sowing/planting rates as single species

2 - 12 kg/ha for dryland hay or grazing, depending on annual rainfall. 8 - 20 kg/ha for irrigated hay production. Sow into a finely worked, moist, weed-free seedbed at 1-2 cm; cover with light harrows/weldmesh. On light soils rolling is desirable to improve seed-moisture contact. Direct-drilling can work but failures occur and caution is warranted.

Sowing/planting rates in mixtures

0.25 - 1.0 kg/ha in a grass pasture, depending on the makeup of the legume component of the stand.

Sowing time

Early autumn to early winter; late April is ideal.
In southern Australia districts with an 8 month or more growing season, lucerne is best sown between late August & October, ideally on a winter fallow. Late Spring sowings are dictated by wet years.

Inoculation

Seed must be freshly inoculated with Group AL rhizobia and lime coated. Some pre-inoculated processes may be effective but caution is required.

Fertiliser

On marginal fertility soils, responses to magnesium, manganese, zinc, molybdenum, boron and copper can occur. Establishment on acid soils is often made possible following the spreading/incorporating 1-5 t lime/ha. Aluminium toxicity can occur on soils with pH of lower than 5.5 (water) or 4.7 (calcium chloride). Based on soil test, potassium (K), phosphorus (P) and sulphur (S) levels need to be maintained at the following levels:

- K: 0.3 m. equiv/100g;
- P: 25 mg/kg;
- S: 10 mg/kg.

Management

Maintenance fertliser

Maintenance fertiliser needs to be applied regularly in irrigated lucerne where large quantities of nutrient are removed in hay. Based on soil test, potassium, phosphorus and sulphur levels need to be maintained at the levels indicated above.

Grazing/cutting

Timing of grazing or cutting should be matched to the build up of carbohydrate reserves in the plant's roots. Levels in the roots are lowest about 2 weeks after grazing or cutting and reach their maximum at full bloom, somewhere between 4 - 8 weeks after the previous defoliation (dependent on time of year and winter activity level of the cultivar used).
Cutting for hay is best done at 10% flower or when the basal shoots are 3 - 5 cm in length.
It should be rotationally grazed for long-term persistence, whether grown as a pure stand or in mixed swards. It should be grazed off in 1-2 weeks followed by spelling for 4-8 week -

depending on time of year and winter activity level of the cultivar used.

Seed production

Seed production is a specialised activity. Grazing and cutting management and the timing of cessation of grazing and cutting, fertiliser management, irrigation, weed control and the availability of bees for pollination need to be controlled for optimum seed production. There can be substantial differences between cultivars in potential seed production and this can affect the usefulness of a cultivar.
Commercial seed production is concentrated in South Australia.

Ability to spread

Low. Lucerne is usually cut or grazed before seed matures.
If lucerne seed is dropped or spread by livestock, it rarely establishes effectively owing to soil and soil water constraints. In lucerne producing environments, it may be found on road verges but not in adjacent paddocks subject to grazing.

Weed potential

Low, in keeping with its inability to spread.

Major pests

Red-legged earthmite, spotted alfalfa aphid, bluegreen aphid, pea aphid, lucerne flea, jassids or leafhopper, vegetable jassid, whitefringed weevil, sitona weevil, small lucerne weevil, lucerne crownborers, lucerne leafroller, weed web moth or cotton webspinner, cutworms, wingless grasshoppers, thrips, lucerne seed web moth, native budworm, lucerne seed wasp, mirids, mites, snails.

Major diseases

Seedling disease: Damping off

Leaf and stem diseases: alfalfa mosaic virus, lucerne yellows, bacterial leaf and stem spot, witches broom, common leaf spot, Stemphylium leaf spot, Leptosphaerulina leaf spot or pepper spot, rust, downy mildew, Cercospora leaf spot, Phoma black stem, powdery mildew.

Root and crown diseases: Phytophthora root rot, Colletotrichum crown rot, Rhizoctonia canker (most significant,) violet root rot, Acrocalymma crown and root rot, Stagonospora crown and root rot (sometimes called common root rot), Fusarium wilt, bacterial wilt, Sclerotium blight and Sclerotinia rot.

Herbicide susceptibility

Herbicides can be used to take out grasses or broadleaved weeds selectively, or can be used pre-planting or post-planting to tackle weeds at different stages of crop development.
Mature lucerne is difficult to remove with herbicide. Follow agronomist recommendations and check labels for the herbicides that are registered for use in lucerne or to remove lucerne.

Animal production

Feeding value

Lucerne is highly digestible (60 - 75 %), is a good source of crude protein (15 - 25 %), and has high levels of metabolisable (8 - 11 MJ/kg DM).

Palatability

Very palatable

Production potential

Daily live weight gains for beef cattle range between 0.7 kg/head/day from stemmy lucerne to 1.5 kg/head/day from young, leafy regrowth. Live weight gains of 300 - 400 g/head/day are achievable with lambs.

Livestock disorders/toxicity

There are few problems. To avoid cattle bloat, nitrate poisioning and red gut, do not graze immature/lush lucerne, especially with hungry stock (pre-feed with dry roughage).

Cultivars

Cultivars are rated for 'winter activity' from 1 (winter dormant, negligible winter production) to 11 (highly winter active, 20 - 25% of annual production produced in the winter months). This indicates the ability of a cultivar to grow in cold temperatures and days of shorter length. Winter active cultivars (rated 7 - 11) are used for dryland farming systems in southern and Mediterranean Australia to best utilise the winter dominant rainfall, and in the subtropics to fill the winter production and protein gap. Semi winter-dormant cultivars are used more in the cooler regions as long lasting pasture.

Group	Winter Activity rating (WAR)	Information
Winter dormant	1-3	Little autumn-winter growth.
Winter semi-dormant	4-5	Suitable for long-term stands where persistence of the stand is the main priority. Have broad, low crowns. Used as a companion with annual legumes or grasses in long-term pastures. Low winter production.
Winter active	6-7	Suitable for long-term permanent pasture with long stand life. Growth slows during the winter months, but does not cease. Low crown.
Highly winter active	8-9	Have high seedling vigour and first year production. Persistent under rotational grazing, but crown is commonly narrow and more exposed to grazing.
Very highly winter active	10-11	Well suited to short rotations of 2 - 4 years. Very productive but generally have poor persistence; require careful grazing and cutting to maximise persistence. When cultivars are compared over the long term, persistence associated with grazing tolerance generally declines with increasing WAR. Selection by breeders is helping overcome this limitation.

WAR	Cultivar	Seed source/Information
1	Jindera	AusWest Seeds
4	Prime ф	AusWest Seeds
4	54Q53 ф	Seed Distributors
4	Pioneer L34HQ	AusWest Seeds
4	WL 342HQ	Wrightson Seeds
4	Cimarron	AusWest Seeds
4	WL 342HQMF	Wrightson Seeds
4.6	WL Southern Special	AusWest Seeds
5	L55	AusWest Seeds
5	L56	Seed Distributors
5	Hunter River	Plant Tech

5	Venus Φ	Plant Tech
5	SARDI five Φ	Heritage Seeds
5	Grasslands Kaituna Φ	Wrightson Seeds
6	Stamina GT6	Wrightson Seeds
6	WL 414	Wrightson Seeds
6	Aurora	Plant Tech
6	Siriver	AusWest Seeds
6	Hunterfield	Plant Tech
6	SuperAurora Φ	Seed Genetics Australia
7	Trifecta	Plant Tech
7	Genesis Φ	Plant Tech
7	UQL-1 Φ	Stephen Pasture Seeds
7	Icon	Stephen Pasture Seeds
7	Flairdale Φ	AusWest Seeds
7	SARDI seven Φ	Heritage Seeds
7	Q75 Φ	Seed Distributors
7	Quadrella Φ	AusWest Seeds
7	Pioneer 57Q75	AusWest Seeds
8	Pioneer L69	AusWest Seeds

8	Eureka Ф	AusWest Seeds
8	Hallmark Ф	AusWest Seeds
8	Aquarius Ф	Plant tech
8	Multi Foli-8	Wrightson Seeds
8	WL 525HQ	Wrightson Seeds
8	Australis	AusWest Seeds
8.5	SuperSiriver Ф	Seed Genetics Australia
8.5	Pegasis	Plant Tech
9	Saturn	Plant Tech
9	Sequel	AusWest Seeds
9	Sequel HR Ф	AusWest Seeds
9	SuperSequel Ф	Seed Genetics Australia
9	Sequence	AusWest Seeds
9	SuperSonic Ф	Seed Genetics Australia
9	Pioneer L 90	AusWest Seeds
9	SuperCuf	Seed Genetics Australia
9	CUF 101	Stephen Pasture Seeds
9	Salado Ф	AusWest Seeds
9	Sceptre Ф	AusWest Seeds

9	Blue Ace	Stephen Pasture Seeds
9	Cropper 9	AusWest Seeds
9	Sirosal	Seedmark
9	WL 612	AusWest Seeds
9	Silverado Φ	AusWest Seeds
9.2	WL 925HQ	Wrightson Seeds
9.5	Cropper 9.5	Wrightson Seeds
10	SARDI ten Φ	Heritage Seeds
10	Rippa	AusWest Seeds
10	ML 99 Φ Multileaf	Seed Distributors

Further information

AUSTRALIA
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Australian Fodder Industry Association
Australian Herbage Plant cultivars

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Acknowledgements

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Author and date

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