

Lucerne

Best Summer Performer and Really Responsive to Summer Rain

"One sow-down lasts ten years. The crop (lucerne) may be cut four or six times a year ... A jugerum¹ of it is abundantly sufficient for three horses all the year ... It may be given to cattle, but...sparingly, because it bloats up the cattle." (Opus Agriculturae by Rutilius Taurus Aemilianus Palladius, Roman writer, 4th Century AD)

Lucerne (*Medicago sativa*) is one of the oldest fodder crops on the planet. Today it is cultivated all over the world and used for grazing, hay, and silage, as well as a green manure and cover crop. The legume seems to have originated in south-central Asia. It was first cultivated in ancient Iran and was introduced to Greece in about 490 BC when the Persians invaded Greek territory.

Our Resilient Farms Agronomist, Jade Killoran, says:

“Lucerne is often called the queen of fodder. It is a highly palatable perennial legume which is traditionally active in spring and summer. Under irrigation, or with high summer rainfall, it can be very productive and provide excellent quality fodder. Lucerne has a very deep taproot and is quite drought hardy once established.



Pl. 75. Luzerne cultivée. *Medicago sativa* L.

Image (Google commons)

There are different activity levels of lucerne available, with traditional grazing varieties active for 4-6 months of the year, and more active varieties suited for specialist fodder production active for 7-11 months of the year. The latter may be less persistent than the more traditional varieties, due to the focus on production and subsequent frequency of harvest reducing the time available for the plant to replenish its reserves.

Lucerne also has an auto-toxic effect that becomes stronger over time. If the existing lucerne stand is over 2 years old, it will inhibit oversown lucerne from establishing.

Lucerne is very picky about soil type, seed bed preparation and soil acidity. It is best suited to lighter soils with good drainage and shouldn't theoretically be sown on heavier soils. In southern Victoria, where our soils can be both heavy and acidic, I would treat lucerne similarly to a clover in a multispecies mix- an important component, but a relatively low sowing rate compared to grasses and brassicas. Treating it as a part of a mix rather than the main fodder producing plant will help to keep the cost lower per ha, as lucerne seed can be relatively expensive. This also reduces the risk of relying on the lucerne as a key component

¹ *A jugerum is a Roman measurement of area equating to about 71×35½ metres.



if the soil conditions in the paddock aren't conducive to its long term (+2 years) survival. If lucerne is sown at approximately 3 kg/ha in a mix, it may provide valuable summer grazing and N fixation to supplement autumn/winter active clover."

What's in a name?

Medicago sativa goes by the common name of lucerne in Australia, New Zealand, South Africa and the UK, but in America it is called alfalfa. In answer to last week's teaser, I have searched high and low, but there seems to be no connection between this plant and the Swiss city of Lucerne.

Vital statistics (From DPI, WA website)

Dry matter yield - A rain-fed lucerne pasture produces between 4-8 tonnes (t) of dry matter per hectare per year (DM/ha/yr)

Rain requirements - Lucerne has the ability to respond quickly to significant summer rainfall (>10 millimetres) but requires 20-25 millimetres (mm) to produce substantial growth. Once established, lucerne has good drought tolerance and is well suited to irregular rainfall patterns, but it will appear to go dormant during extended dry periods. It grows in areas receiving as little as 325mm annual rainfall but also provides good summer production in areas up to 700mm rainfall.

Nutrition - Lucerne is high energy fodder with digestibility of 65-72%, metabolisable energy of 8-11 megajoules per kilogram (MJ/kg) DM and high protein (12-24%). The quality of feed remains relatively constant throughout the year while it is active. Lucerne is also a source of calcium, magnesium, phosphorus and vitamins A and D.

Nitrogen - Lucerne fixes between 10 and 20kg/ha of nitrogen for every tonne of dry matter produced, increasing soil nitrogen levels for subsequent crops.

Weeds - Once established, it can help manage herbicide resistant weeds with its competitiveness and tolerance of some broad-spectrum herbicides.



Lucerne bales (Google commons)



Close Cousin of Clover

Lucerne not only resembles its cousin clover, especially when young, but shares many of its advantages and disadvantages. Lucerne, red clover and arrowleaf clover all grow well through spring and summer and respond rapidly to summer rain. Like clover, it is a known source of phytoestrogens, including spinasterol, coumestrol, and coumestan, which can reduce fertility in grazing stock.

According to Wikipedia: “Coumestrol levels in alfalfa have been shown to be elevated by fungal infection, but not significantly under drought stress or aphid infestation. Grazing management can be utilised to mitigate the effects of coumestrol on ewe reproductive performance, with full recovery after removal from alfalfa. Coumestrol levels in unirrigated crops can be predicted practically using weather variables.”

Lucerne fixes nitrogen at a similar rate to red clover and is more drought tolerant. Although lucerne has more protein than red clover, polyphenol oxidase, an enzyme that enables animals to use the protein more efficiently, is absent (unlike in red clover).

Insect Nursery

Like some clover, lucerne is considered an insectary plant, a place where beneficial insects are reared. Thus, its presence can be helpful to other crops, such as cotton. If the two are interplanted, the predatory and parasitic insects protect the other crop.

Not all insects raised on lucerne are helpful of course. The spotted alfalfa aphid (*Therioaphis trifolii*), which arrived in Australia in 1977, not only sucks sap but injects salivary toxins into the leaves, ultimately killing the plant. Spotted alfalfa aphids also transmit some important plant viruses. However, the aphid is only active in autumn and although widespread is considered a “minor pest of lucerne and clover pastures” by research company, Cesar Australia.



Spotted alfalfa aphid (Google commons)



Bees bypass bonk on the Bonce

Lucerne seed production requires pollinators. **European honey bees** (*Apis mellifera*) are most commonly used but are only effective when young. When a bee settles on a lucerne flower to feed on its nectar, the pollen-carrying keel of the flower strikes the bee on the head. This design is to maximise the uptake of pollen by the bee, but these bees do not like being hit on the head repeatedly. They learn to avoid the strike by drawing nectar from the



side of the flower, so no pollen is brushed off on them. Therefore, young bees that have not yet learned the trick of robbing the flower without tripping the head-knocking keel must be used. Today, the alfalfa leafcutter bee (*Megachile rotundata*) is increasingly used to circumvent these problems.

European honeybee on lucerne flower
(Google commons)

Where does lucerne seed come from?

During the early 2000s, lucerne was the most cultivated forage legume in the world. Worldwide production was around 436 million tons in 2006. In 2009, lucerne was grown on approximately 30 million hectares (74 million acres) worldwide. Of this North America produced 41% (11.9 million hectares; 29 million acres), Europe produced 25% (7.12 million hectares; 17.6 million acres), South America produced 23% (7 million hectares; 17 million acres), Asia produced 8% (2.23 million hectares; 5.5 million acres), and Africa and Oceania produced the remainder.

In Australia, 83% of total lucerne seed production occurs around Keith, Naracoorte, Tintinara and Bordertown in South Australia, this area encompassing more than 16,000 hectares of both irrigated and dryland production.



According to Lucerne Australia:
“Between 2005 and 2010, Australia exported a total of 69,220 tonnes of lucerne planting seed to 67 countries across nine global regions. Of the total seed exported about 95 per cent was exported to 16 countries. During 2015, Australia exported a total of 13,600 tonnes of lucerne planting seed to 33 countries, with 11 countries representing 95 per cent of all the seed exported.”

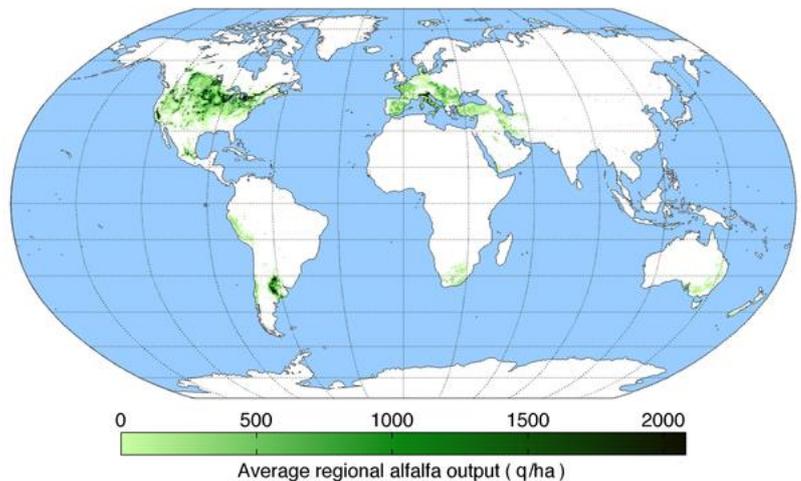


Image (Google commons)

Lucid Lucerne Concerns

Yellow Yolks - In poultry diets, dehydrated lucerne and lucerne leaf concentrates are used for pigmenting eggs and meat, because of their high content in carotenoids, which are efficient for colouring egg yolk and body lipids.

Doctor Lucerne – The same phytoestrogens which can be problematic for breeding stock, can be helpful to menopausal women. The effects of lucerne on menopausal symptoms have not been extensively researched, but there is some evidence to support its use in reducing hot flashes. It may also be helpful with other hormone conditions, pregnancy, breast feeding, birth control pills and diabetes, but all sources suggest using lucerne supplements with care. US NIH warns:

“Alfalfa leaves are POSSIBLY SAFE for most adults. However, taking alfalfa seeds long-term is LIKELY UNSAFE. Alfalfa seed products may cause reactions that are similar to the autoimmune disease called lupus erythematosus. Alfalfa might also cause some people's skin to become extra sensitive to the sun.”

Lucerne for Lunch? – Lucerne sprouts, marketed as alfalfa sprouts in shops here, have all kinds of health benefits for humans. They are, for instance, rich in vitamin K, vitamin C, fibre, folate, copper and manganese. However raw, unsprouted alfalfa can also be toxic so if you are eating homegrown sprouts make sure they have sprouted properly.

GM Lucerne - In the US, Roundup Ready alfalfa, a genetically modified variety, was released by Forage Genetics International in 2005. This was developed through the insertion of a gene owned by Monsanto Company that confers resistance to Roundup. This enables growers to spray fields of Roundup Ready alfalfa with the glyphosate herbicide and kill the weeds without harming the alfalfa crop. As with all GM crops it has incited much controversy. **Currently, GM lucerne/alfalfa is not approved for growing in Australia.**

