

## Lucerne - an alternative forage crop

Lucerne (alfalfa) is a drought tolerant, leafy legume. It is useful for fertility building and as a forage crop. It is usually grown for silage as a pure stand or mixed with grass, but it can also be grazed or undersown to spring cereals.

### Pros and cons

There is increasing interest in lucerne because of its high drought tolerance on one hand and good resistance to lodging in heavy rain on the other, making it relatively safe bet in the context of increasingly erratic weather patterns in recent years. However, it also has several other attractive features including:

- It is a high quality forage crop (see Table 1)
- It fixes nitrogen at rates comparable to red clover
- It persists for up to 4 years
- It is well adapted to organic systems because of it has a low demand for nitrogen and is competitive against weeds once established
- It is resistant to sclerotinia, and can be used as a break from red clover

Dry Matter %	30-40
Crude Protein %	20-23
Water Soluble Carbohydrate %	3-8
ME ( MJ/kg/DM)	9-11
Fresh Yield (tonnes/ha)	42-50
DM Yield (tonnes/ha)	12-15

*Table 1 Typical analysis of lucerne silage*

However it does have some draw backs and limitations including:

- Performance is likely to be poor on shallow, heavy or acid soils.
- There is a risk of bloat when grazed by stock
- The higher protein compared to red clover is somewhat eroded by the absence of polyphenol oxidase (PPO). PPO is an enzyme that enables animals to use the protein more efficiently. Red clover has significant levels of PPO; lucerne has none.
- The leaves of lucerne have coumestans which, at high levels, are associated with infertility in stock. It is very rare that levels are high enough to affect animal performance, but levels do increase when the plant is stressed (e.g. under attack from leaf diseases and insect pests or suffering from severe moisture stress) and under these conditions the risk is higher.

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Table 2 contrasts the key characteristics of lucerne and clovers

Characteristic	Red clover	White clover/Grass	Lucerne
Soil type	All types	Not too heavy	Well drained
Ideal pH	6.0-7.5	6.0-7.0	6.0-8.5
Establishment rate	Fast	Medium	Medium
Inoculation needed	No	No	Yes
Drought Tolerance	High	Medium	Very High
Persistence	Low	High	Medium
Regrowth Rate	High	High	High
Yield	9-15 tonnes DM/ha	9-14 tonnes DM/ ha	12-15 tonnes DM/ha
Silage Quality	ME 9.8-11 MJ/kg/DM CP 14-19 % pH 4-4.5	ME 9.8-12 MJ/ kg/DM CP 14 – 18% pH 3.5 – 5.5	ME 9.0-11 MJ/ kg/DM CP 20-23% pH 4.3 – 4.4
Other Features	High PPO*		No PPO

Table 2: Characteristics of silage crops (Source: Legume Silages for Animal Production, R.J. Wilkins)

## Growing the crop

### **Soils and soil fertility**

Lucerne needs a deep, fertile, well drained soil and any problems such as compaction should be remedied before sowing. Ideal soil conditions are a pH of 6.2-8.5 down to a depth of 1.5m with P and K indices of 2. Trace elements magnesium, sulphur, molybdenum and boron are particularly important at the establishment phase. Lucerne is self sufficient in nitrogen, but 1 tonne of dry matter can remove up to 29 kg/ha potash and 7 kg/ha phosphate. It is important to return these nutrients as FYM or compost. However, excess slurry application should be avoided because this induces crown rot.

### **Seeds and varieties**

There are a range of varieties but very few are bred for the UK specifically. Varieties that are high yielding, winter hardy and disease resistant (most of which are bred in Northern Europe) are generally best suited to Welsh conditions, and you should sow more than one variety to spread risk of failure. Remember to apply for a derogation from your organic control body if organic seed is not available.

### **Establishment**

Sow into warm, weed free soils. Lucerne can either be grown as a pure stand, undersown to spring cereals or as a mix with meadow fescue, timothy or cocksfoot (grass seeds should either be shallow drilled or broadcast after the lucerne has been drilled). Seed rates vary according to the system (see Table 3). Regardless of the system, lucerne always needs to be

inoculated with a culture of live *Rhizobia meliloti*. You can either mix the inoculant with the seed just before sowing or broadcast/ drill it into the seedbed to a depth of no more than 1 cm.

System	Seed rate (kg/ Ha)	Notes
Pure stand	15 – 20	
Undersown to cereals	8 – 10	50% of pure stand rate
Mix with meadow fescue	3	Grass acts a nurse crop without competing too much
Mix with timothy or cocksfoot	1	Grass acts a nurse crop without competing too much

Table 3: Seed rates

### ***Pest, disease and weed management***

Perennial weeds should be controlled before sowing, and growing lucerne either as an understory or as part of a grass mix helps out-compete annual broad leaved weeds. Pests and disease problems include weevils, aphids, slugs, eelworm, phytophthora, verticillium wilt and crown rot.

### **Cutting and grazing**

Lucerne is primarily a silage rather than a grazing crop because it can be weakened by too frequent defoliation, and trampling by stock causes excessive wastage and may damage the crown (growing point) of the plant directly or indirectly by inducing crown rot. Also, bloat can be an issue.

### ***Cutting and ensiling***

Always leave an 8 cm stubble to avoid damage to the crown, and minimise mechanical handling to avoid leaf shatter and yield loss. Wilt to at least 25% and preferably to 30-35% DM. The timing of the cut is crucial and depends on the system and the age of the ley (Table 4).

System	Details	Cutting date
Pure stands and grass mixtures	1 <sup>st</sup> year of growth, spring sown	Mid august
	1 <sup>st</sup> year of growth, summer sown	Following spring (Allow to bud once before cutting)
	Subsequent years	Cut at first flower bud stage (April -Mid May ) and follow with up to 3 cuts during the season on a 40 day cutting cycle. Make the last cut must take place by mid September
Undersown to cereals		Cut at the milky stage of the cereal. Cut again the following spring (allow to bud once before cutting)

Table 4: Guidelines for cutting lucerne

Lucerne is more difficult to ensile than other crops because of a low content of water-soluble carbohydrates (WSC) and high buffering capacity. The latter makes it resistant to acidification, so you always need to use an additive. On the plus side, lucerne silage is more stable on exposure to air.

## **Grazing**

You can graze lucerne but it requires careful management, in particular:

- Graze rotationally with 35-40 day rest periods.
- Most of the feed value is in the leaves, which are always eaten first: priority stock classes should be grazed at the beginning of the rotation.
- Light grazing is less likely to cause damage once the crop has stopped growing in the autumn.
- The risk of bloat is greatest when it is fresh and lush, for example in the spring and in the autumn following a break. Avoid putting very hungry animals onto lucerne especially when it is wet with dew. Feed roughage (e.g. hay) ahead of grazing lucerne and/or graze lucerne alternately with pasture. Use anti-bloat agents (e.g. drenches or rumen bullets) where necessary.
- Avoid grazing diseased for 4 weeks pre and post mating because of the increased levels of coumestans.

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