

Regions characterised by warm sunny summers with little or no summer rain are ideal for production of lucerne seed.

Such a climate encourages the flowering of lucerne and provides favourable conditions for bee pollination and ripening of the seed, which must occur under dry conditions to prevent it becoming discoloured.

Successful lucerne seed production is influenced by the following factors, among others:

- Efficient pollination
- Thorough insect control
- Correct irrigation during the flowering periods

With the exception of weather conditions, the producer has a reasonable degree of control over factors influencing seed production.

In South Africa most lucerne seed is produced in the lower Orange River, Little Karoo and Calvinia districts.

Producers of certified seed must register with the Directorate Plant and Quality Control (Dept Agric) according to the Plant Improvement Act.

Information about this matter will be provided by the company with which you sign a contract.

Choice of soil and preparation for seed production

Well-drained soil with few soluble salts and the potential for roots to grow to 1.5 m or more, is

ideal for production of lucerne seed under irrigation.

Deep clay soil, clayey loam or sandy clay soil with a high water retention capacity is preferable to sandy soil.

Soil with hard stony layers or shallow clay layers near the surface should be avoided.

Uniform soil texture will reduce the differences in development between plants.

Problems with weeds and the cost of combating them can be reduced by well-planned rotation systems and cultivation.

Land infested with perennial grass weeds such as Bermuda grass/kweek (*Cynodon dactylon*), Johnson grass (*Sorghum* sp.), etc., should be avoided, or else the weeds brought under control before sowing time.

Planting date

In most lucerne seed producing areas, lucerne is sown in the autumn. This gives the maximum seed yield in the first year of production.

Planting method

Everywhere in the world lucerne planted for seed is sown in rows, as this gives the highest seed production. The low seed production in dense stands can be partially attributed to low production of nectar, lack of attraction for pollinators and increased abortion of flowers.

Other advantages for row sowing are:

- Plants grow more erect and are therefore more accessible to pollinators, there is more light, and soil a
 - Flowering time is about 10 days earlier.
 - There is less lodging of plants and the lower humidity reduces the incidence of leaf diseases and the a
 - There is less loss of flowers and seeds.
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- It facilitates spraying against insects and weeds.
 - There is greater flexibility in the management of irrigation.
 - Less seed is needed to sow the same area.

The following spacing is recommended for single rows:

Sandy soil 20-150 cm

Loamy soil 75-100 cm

Heavy loam to clay 60-90 cm

It is recommended that the wider spacings should rather be used.

Sowing density

Most producers use 1-1.5 kg seed per ha with the aim of getting 3-7 plants per 300 mm in a row. A sowing density of 300 g/ha has, however, been used with great success.

Soil fertility

Fertilisation will mainly depend on the fertility of the soil and the soil analysis. Small quantities of nitrogen and phosphate (15-20 kg/ha) can be applied at or before planting time to encourage growth and development of the young plants, which are not yet at a stage where they can fix sufficient N for themselves.

This is recommended only for lucerne intended for seed production, with a limited lifespan, not for hay or grazing. Most hair roots occur in the upper 15-30 cm of soil, and these are responsible for 85% of the nutrient uptake of the plant. Foliar feeding has a relatively small influence on seed production.

Isolation

The land must be surrounded by an isolation area which:

- If it is intended to produce basic seed, must be at least 200 m wide where the area intended for production is 2 ha or less, and at least 100 m wide where the area intended is more than 2 ha, and
- If it is intended to produce certified seed, must be at least 100 m wide where the area intended for production is 2 ha or less, and at least 50 m wide where the intended area is more than 2 ha

Such an isolation area must be free of any plants of any lucerne cultivar or any species of Medicago which flowers at the same time as the plants on the piece of land concerned, unless:

In the case of planned production of basic seed, these plants have been established from breeders seed of the same cultivar, and

In the case of planned production of certified seed, these plants have been established from basic seed of the same cultivar.

Management of Established Stands

- Irrigation

Whether lucerne intended for seed production should be irrigated is determined by soil texture and depth, rainfall, evaporation, temperature, length of growing period and cultivation practices. The highest production is obtained when irrigation practices prevent stress and encourage slow but sustained growth throughout the growing period without excessive stimulation of vegetative growth.

There must be sufficient water through the spring and summer to prevent stress while the flowers are being pollinated and the seed is ripening.

The seed producer must know the water-holding capacity of his soil and its fertility potential.

Heavy soil with a good water-holding capacity will give a good seed yield with a single irrigation just before flowering, while lighter soil will need a second irrigation during flowering.

The flowering stage is critical and it is here that moisture can determine the harvest.

Factors such as pollination, abortion of flowers and seed weight are directly linked to correct irrigation management.

Lucerne plants draw their water from a soil depth of 1.2 m, but the best results in seed production are obtained when water absorption up to 0.5 m is well controlled.

Overhead irrigation can be used successfully in seed production, especially on sandy soil where specific volumes of water must be given.

Seed producers must irrigate lucerne till before flowering, and again after pollination is complete. If used during flowering time, overhead irrigation can so reduce pollination that losses of up to 15% may result.

After seed has set there is need to guard against too high a moisture content in the air, which may result in seed damage. Once seed is nearly ripe, irrigation should be completely stopped.

Because there may be more than one cycle of flowering and seed formation, it is best to use soil that can provide sufficient water for an entire growing season.

- **Weed control**

Weeds reduce the stand and the yield, complicate harvesting, increase cost of cleaning and may contaminate successive crops.

It is simpler to control weeds when lucerne is still at the seedling stage.

The presence of weeds may result in downgrading and consequent financial loss. The most important weeds to note are dodder (*Cuscuta*), tongblaar (*Plantago*), wild oats (*Avena*), ryegrass (*Lolium*), hondebos (*Chenopodium*), misbredie (*Amaranthus*), kiesieblaar (*Malva*), predikantsluis (*Bromus*) and stinkblaar (*Datura*).

- **Insect control**

The most common insects found on lucerne are the lucerne caterpillar, the American bollworm, sand mite, earth flea and various types of aphids.

- **Pollination**

Good pollination comes before a good harvest.

Honey bees are the only insects in South Africa which can successfully pollinate the lucerne flower with its trigger mechanism.

Only about 2% of pollination is the accidental result of other insects.

The timing of placement of the hives in the lands is very important because early placement may result in the bees searching for other sources of food. Too late, and many flowers will wither before they can be visited.

After the lucerne is cut in the spring, the regrowth will begin flowering within 30-40 days, depending on cultivar.

The first hive of bees (or + one third) must already be in the land by the time 25-40% of the lucerne is in flower.

The next third can be placed out later and the final third when about 100% of the lucerne is in flower.

This is usually 20-30 days after the first swarm is placed out. Some producers put the hives out only in two lots, but then use more hives per ha.

Rapid, complete pollination must be the ideal. A guideline is 7-8 hives of bees per ha, with the hives spread out in the land.

Bees work best up to a radius of 90 m of the hive, so that hives can be placed on the boundaries of small lands, but on larger lands they should also be placed inside the planting about 160 m from each other.

It is a good practice occasionally to move the hives. Hives must also be regularly replaced with new colonies, as honeybees become injured by the action of the lucerne flower style and become reluctant to pollinate lucerne actively.

New colonies are much more active than old ones. Insecticides must be used with care as they may kill the bees.

A water source nearby the hives prevents bees flying too far for water and increases their willingness to work lucerne, as it prevents them finding new sources of nectar.

Shelter from the sun will keep hives cool and this is important because a large part of the bees' energy is used up in keeping the hive cool on hot days.

The planting itself must be kept attractive to the bees, as too dry or too damp conditions may negatively affect the quantity or quality of nectar produced as well as the production of pollen.

- **Inspection requirements**

Plants must be inspected 14 days before flowering and again during flowering.

The seed producer must inform the inspectors at least 21 days before the date on which he expects the flowers to begin blooming.

- **Harvest of seed**



Harvesting can begin when 66% to 75% of the pods have turned dark brown.

Losses can be prevented by working during the dew or high-humidity periods. Pod-losses can be as high as 50% if material is handled when too dry.

The three best known harvesting methods are:

- Cut and stack.
- Cut in windrows and pick up immediately
- Direct stripping and de-leafing.

The method using windrows is recommended especially where climatic conditions result in considerable green regrowth. The material is more easily dried and the seed is given a good after-ripening period.

During any stripping or threshing care must be taken that seed is as little damaged by the mechanical process as possible.

If there is doubt whether a machine is causing seedpod damage, it can be easily tested for. Take a sample of the seed and put it into Indian ink for 20-30 seconds. Rinse off with clean water. Wherever there are cracks or scrape-marks on the seed, the ink will remain. The cracks also show up clearly during the process to remove dodder seed, as the iron filings stick in any cracks.

- **Seed yield**

In South Africa, the average seed yield is 70-350 kg/ha. The seed must have a germination of at least 80%, must be free of declared weed seed, and may not contain more than 0.2% other seed and 2% other material (sticks, stones, leaf material, etc.).

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