Agriculture

Growing Faba Bean

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A brief outline of the key techniques required for the successful production of faba bean relevant to potential new growers is provided. For more detailed advice potential growers should consult local agronomists.

See the Victorian Winter Crop Summary for an up to date guide to faba bean varieties and last season's yield results.

Benefits

Faba bean, being a legume, is a nitrogen-fixing plant.

It is a "break" crop which enhances cereal yield because it decreases the occurrence of take-all and cereal cyst nematode (CCN) which affect cereals.

Faba bean tolerates water logging better than other grain legumes such as chickpeas, field peas, lupins and lentils. It also tolerates acid soil types better than other grain legumes.

Many operations can be undertaken using cereal equipment.

Stubble residue is a valuable nutrition source for stock feed.

Plant requirements

Soil type

The crop is bested suited to red-brown earths, black earths, grey clays and alluvial loams.

It prefers types of soil with pH ranging from neutral to alkaline (pH of 7.0 to 9.0). However, good yields have been achieved on paddocks with pH as low as 4.6 where aluminium and manganese levels are low (aluminium below 20ug/g and/or manganese below 50ug/g).

If soil pH is below 5.0 the application of lime is strongly recommended.

Deep loams are the first choice of soils. The crop may suffer moisture stress in soils that dry quickly. Faba bean tends to have shallow roots.

Faba bean is tolerant of waterlogging.

Temperature

The optimal temperature for plant growth is 15-20°C, especially during the reproductive phases of flower and pod development. Faba bean tolerance of frost is better compared to other grain legumes.

Faba bean flowers will abort if temperatures exceed 27°C and are also particularly sensitive to hot, dry conditions during podding.

Rainfall

The crop requires an average annual rainfall of 400 mm or areas with irrigation. Faba bean has been grown in drier areas (350mm); however there are yield penalties if grown in lower rainfall areas.

Prolonged cool weather in spring is ideal for development of pods.

Seedbed preparation

The previous crop stubble should be heavily grazed, slashed or burnt in order to obtain a flat seed bed.

Rolling after seeding should be considered on stony or extremely cloddy soil, because pods set low on the plant may cause harvest difficulties.

Variety

As with all crops, choice of variety requires achieving a balance between adaptability to environment, disease reaction, agronomic performance and marketability. Local advisors are a good source of information on all aspects of growing faba bean.

See the Victorian Winter Crop Summary for an up to date guide to faba bean varieties

Time of seeding

The best time for sowing is from late April to late June. Later sowing markedly reduces yield potential. Flowers and pods abort if flowering is during a period of high temperatures. Sowing too early can promote disease development.

Plant density

Plant density requirements for faba bean vary according to variety and time of sowing. For the small seed types (Fiord and Ascot) 20-30 plants per square metre are recommended. For the medium seed size varieties (Farah and Fiesta) plant densities of 18-23 plants per square metre are more appropriate. Lower rates apply to early sowing (April-early May) and the higher rates to late sowing (late May- June).

For broad bean, the larger seed size, growers should use seed for sowing of the size which they are aiming to harvest (ie. use 90-110 grade seed for sowing if that is the size seed you are marketing).

It is best to sow 15 plants per square metre. This is equivalent to 7 seeds per metre, at a row spacing of 180 mm (7 inches).

Seeding rate

When a seed size of 55-60 g/100 seeds with a germination of 80 percent is used, sow 130 kg of seed per hectare for cultivars Fiesta, Farah, and Nura.

Seed should be weighed and germination tested before sowing.

Seeding rate (kg/ha) = Plant density (plants/m^2) x 100 seed weight (g) x 10 ÷ Germination percentage

Seeding depth

Sow the seed 20-50 mm deep.

Seed treatment

Faba and broad beans can be inoculated with either the rhizobium of the Acid Tolerance faba bean inoculum Group F or the rhizobium for field pea strain of inoculum (Group E). If sowing on areas that have not grown beans before, inoculation of seed before sowing is considered cheap insurance to maximize nodulation and therefore increase nitrogen fixation.

It is recommended to use seed from a healthy crop in preference to a fungicide to treat seed borne diseases. If seed has been inoculated it **must not** be treated with a fungicide.

Fertiliser requirement

Add 6 kg/ha of phosphorus for every tonne per hectare of grain expected to be harvested.

Weed control

Faba bean and broad bean are excellent competitors with weeds due to the vigorous early growth of both crops. Well managed crops are normally very clean at harvest time. However, beans should not be sown in paddocks with moderate-high levels of broad leaf weeds, as there are few chemical control options. Grass weeds can be readily controlled in beans.

Pollination

Faba bean have limited ability for self pollination and yields benefit from insect pollinators to maximize seed set. If native bee numbers are not high the use of bees can significantly increase yield (by up to 40 per cent). Consider introducing bee hives, at least one hive for each 2.5ha, if there is less than one bee per square metre in mid afternoon. Faba bean flowers are open in mid afternoon and close again at dusk. As days lengthen and the air temperatures increase, bees become active.

Irrigation

Faba bean responds well to irrigation as plants are not particularly susceptible to water logging. Laser levelled bays are suitable if well drained. If drainage is not good, then beds should be considered. Irrigation times should be kept as short as possible as water logging will cause temporary growth reductions and will affect yield.

Drainage is a combination of surface and internal drainage. Surface drainage can be improved with large capacity drains with good outfall, laser-levelled and smoothed bays and beds or spinner cuts. Internal drainage is related to soil structure and can be improved with gypsum where appropriate, and with pasture rotations. Minimising cultivation, particularly of dry soil, can help to preserve soil structure and internal drainage.

If drainage is less than ideal, rains following irrigation can lead to prolonged water logging and subsequently reduce yield. Pre-irrigation and sowing into moisture is a strategy successfully employed on many farms. The alternative is to rely on rainfall. Dry sowing can be successful by ensuring that the earliest rain is used to germinate the crop.

Don't leave the first spring irrigation too late as this may hasten the end of flowering and severely affect yield. The first spring irrigation will commonly coincide with the period of maximum flowering and some pod filling, so any delay will be costly. As soon as water is available, begin inspecting the soil in the root zone and plan the first irrigation to ensure that no stress occurs. Note that irrigated crops often lodge. It is not usually severe enough to affect yield but requires care in harvesting.

Pests

Red-legged earthmite (*Halotydeus destructor*) is a black-bodied mite with red legs; it damages seedlings as they emerge. Symptoms include leaves that turn silvery, then brown and shrivel.

Cowpea aphid (*Aphis craccivora*). Moisture stressed crops are susceptible to aphid infestation, especially when the atmosphere is dry and when warm weather occurs in autumn and spring. Minimal damage occurs from direct feeding of aphids. However, heavy or prolonged periods of infestation can cause stress on plants, resulting in yield loss. Aphids may also transmit viruses.

Lucerne flea (*Sminthurus viridis*) is a small (2.5 mm), wingless, light green hopping insect. It chews through leaves in layers resulting in "window-pane" like holes. The crop shrivels and becomes stunted.

Native budworm (*Helicoverpa punctigera*). The caterpillar damages maturing seed in pods. The newly hatched caterpillars are small (1-2 mm) and therefore are easily missed when crops are being inspected. When mature (40-50 mm long) they have a yellow-white stripe down each side of the body and a dark stripe down the centre of the back.

Diseases

Ascochyta blight on leaf, stem and pod is a major problem. It is caused by the fungus *Ascochyta fabae*. Grey-brown spots form on leaves. Small fruiting bodies may appear on leaves after rain. Dark coloured spots also appear on stems and pods, which may spread to the seed. Stems may collapse if symptoms are severe.

Chocolate spot is another major problem. It is caused by *Botrytis fabae*. The symptoms are reddish or chocolate brown spots on leaves and reddening of stems. The spots may enlarge and merge, forming a black mass on the leaves (blighting), which is followed by defoliation and lodging. Chocolate spot and *Ascochyta fabae* usually require a minimum of two sprays for control.

Dense crops, waterlogging and wet weather favour outbreaks of these diseases.

Rust (*Uromyces viciae-fabae*) in beans has only been an occasional problem in south-eastern Australia. It occurs late in the season during podding, resulting in premature leaf drop which may reduce seed weight and size. Humid and warm (more than 20ºC) conditions late in the season promote its spread. Rust can be identified by numerous small, orange-brown pustules, which appear on the leaves of infected plants and are surrounded by a light yellow halo. As the disease develops to an advanced stage infected leaves wither and drop off. Rust pustules on stems are similar but often larger than those on leaves. Isolated rust pustules may also appear on pods.

Cercospora (*Cercospora zonata*) This disease mainly affects leaves, but may also affect stems and pods of faba bean. Lesions (1-5mm dia.) first appear on the lower leaves early in the growing season (approximately seven weeks after sowing) and can expand rapidly to 15mm and coalesce with adjacent lesions if conditions favour disease development. The result is serve blighting of large portions of the leaf. Severe infection can result in extensive defoliation of plants.

Symptoms of this disease can be easily confused with those of ascochyta leaf spot (*Ascochyta fabae*) or chocolate spot (*Botrytis fabae*). This has been causing some confusion in accurate diagnosis by many growers and consultants in recent years, resulting in application of inappropriate fungicides. The severity of cercospora leaf spot appears to be strongly linked to close faba bean rotation. It is anticipated that resistant cultivars will be released within five years.

Alternaria (*Alternaria alternata*) causes dark brown leaf spots, which often have a zoned pattern of concentric brown rings with dark margins. Symptoms can be confused with chocolate spot. Infection often follows insect damage or other leaf spots caused by rust or chocolate spot.

Alternaria spots can be distinguished from ascochyta blight as the spots have a brown margin containing obvious concentric rings but do not produce black fruiting bodies (pycnidia) on a grey centre.

Fungicide

Fungicide application will be dictated by cultivar resistance, geographical region and season conditions. A number of fungicides are registered for the control of some of the above diseases. Growers are advised to consult variety guides and/or their local agronomists and chemical resellers for cultivar selection and disease management advice.

For further information refer to the Pulse Australia web site www.pulseaus.com.au

Harvesting

When the hilum on the seed of faba bean turns dark brown-black, the seed is at full physiological maturity. Therefore the seed will not grow any larger. For paddock management issues these crops can be prepared for windrowing in order to be harvested.

It is strongly recommended to harvest faba bean when the plant is black, the crop is mature and seed moisture content is below 12 percent to meet export specifications for grain storage.

Open front headers give the best results for harvesting of faba bean and harvest should begin while stems are still a slightly green colour.

A dense or early sown crop will have pods higher off the ground than a late sown or thin crop. If sowing time is late, quiet often seed pods are set on stems near the soil surface, therefore the harvest comb needs to be set close to the ground to avoid grain loss.

Avoid leaving harvest until beans are too dry because this will result in pod shattering. Reduce shattering by harvesting under conditions of higher humidity or mid morning.

Initial Harvester settings

Reel speed: slow

Spiral clearance: high

Thresher speed: 400-600 rpm

Concave clearance: 15-35mm

Fan speed: high

Top sieve: 32-38mm

Bottom sieve: 16-19mm

Rotor speed: 700-900 rpm (rotary machine)

Handling and storage

Faba bean grain can be damaged using an auger, particularly with the large seed size broad bean types. The auger must be run full and at a slower speed compared to cereals to minimise seed damage. Belt shifters are the recommended method of handling grain.

Faba bean may be stored in sheds, bunkers and silos. As they do not suffer from pea weevil infestations, a sealed silo is normally not necessary.

Yields

The average yield in south-eastern Australia is 1.8 – 2.0 t/ha.

Yields may range from 1 to 3 t/ha depending on spring rainfall.

Markets

Generally Australia exports 95 percent of the crop grown. The primary market is to Egypt and the Middle East for human consumption. France, Italy and Japan also use faba bean and broad bean for human consumption.

Nutritional value of faba bean

Faba bean stubble/crop residue offers significant value as a source of feed for grazing animals. A major portion of the value of stubble lies in the grain remaining after harvest and not in the dead plant (leaf and stem) material. Although the dead plant has some nutritive value, livestock select the grain first and only eat significant amounts of the plant when grain becomes scarce.

Table 1. Comparison of nutritive value of faba bean with common feedstuffs.

Feed Source	Dry Matter % (approx)	Crude Protein %	Metabolisable Energy (Mj/kg DM)
Field pea	90	23	13
Lupin	90	30	13
Faba bean	90	25	13
Wheat	90	12	13
Barley	90	11	13
Oat	90	8	11
Cereal hay	85	3-13	6-11

Further References

- DEPI's Victorian Winter Crop Summary for the latest varieties and yields.
- Pulse Australia website

Acknowledgements

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