Faba bean

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Summary of statewide best practice management for faba beans

1. ***Make faba bean part of a cropping system*** involving either wheat or barley, or cotton, sorghum or maize. Take a systems perspective and assess financial performance over several seasons. Make sure you work through the economics, and have marketing options in place before committing to the crop.
2. ***Choose the right variety.*** The main considerations are market opportunities for human consumption or stock feed, and disease risks.
3. ***Use best quality seed.*** Obtain certified or good quality home-grown seed, with high germination (80%+), and freedom from seed-borne ascochyta infection. Before considering a large-seeded variety, make sure its seed will flow through the metering mechanism of your seeding machinery.
4. ***Paddock choice and fallow management.*** Select and manage paddocks well in advance to control weeds and retain crop residues. Soils should be well structured, clay loam or heavier in texture, and pH ($CaCl_2$) 5.2 to 8. In winter cereal systems for northern areas, direct drill faba beans in rows about 50 cm apart into no-till fallows after cereal; in southern areas direct drill in rows 20-30 cm apart after harrowing, slashing or burning cereal stubble. In cotton systems, twin rows can be sown either side of cotton stalks on 1 m beds.
5. ***Establish enough plants*** to ensure that the ground is covered by the time pod filling begins. Under well-watered and irrigated conditions, as few as 20 plants/m^2 should suffice, but it is advisable to increase this to 35 plants/m^2 for rain-fed crops.
6. ***Sow on time.*** Sowing time is critical. Follow regional recommendations. Late sowing reduces yield potential by lowering crop biomass, shortening the pod-filling period and increasing risks from moisture stress and high temperatures.
7. ***Nutrition:*** Nitrogen (N) fertiliser is unnecessary. Crop needs for N will be assured by inoculating the seed at sowing with commercially available rhizobia inoculant. On phosphorus (P) deficient country, apply fertiliser at sowing, at rates similar to or slightly above those for wheat. On alkaline clay soils, fertilising with zinc may be warranted. On acid soils, molybdenum may be deficient and should be applied at or before sowing.
8. ***Faba beans respond well to irrigation.*** Furrow irrigation is successful in both southern and northern NSW. To establish the crop either pre-water and sow, or dry-sow and water-up. To maximise yield potential, crops should be watered to produce maximum biomass, and not be stressed during flowering and pod-fill.
9. ***Know the disease threats to faba beans*** in your area, and how to manage them. No varieties are resistant to all fungal and virus diseases. Rust, chocolate spot and plant viruses are the major risks in northern areas; the risks in southern NSW are ascochyta blight, chocolate spot and plant viruses. The impact of fungal diseases on yield can be diminished in most seasons through the use of fungicides. Ideally, the current crop should be sown more than 500 m from faba bean paddocks in the previous year. This will isolate it from sources of infection for fungal diseases. Volunteer faba bean plants appearing in late summer can help to carry over diseases and should be eradicated.
10. ***Insect pests must be controlled.*** Aphids may infest the crop in the early stages and in spring, infecting the plants with viruses. Heliothis caterpillars are likely to infest the crop during pod-filling, damaging pods and seed; these must be controlled to ensure quality seed for human consumption.
11. ***Harvest early, with a properly set-up header.*** Start when nearly all pods are black, but before stems become completely dry and black. Pods will thresh easily to yield clean, whole seeds with a minimum of splits and cracks provided the header settings are correct.

THE FABA BEAN

Faba bean, *Vicia faba,* is a winter growing pulse, or food legume crop. It originated in the Middle East in the pre-historic period, and has since spread throughout Europe, North Africa, and Central Asia. It spread to China over 2,000 years ago via traders along the Silk Road, to South America in the Columbian period, and more recently to Canada and Australia.

Faba bean was first grown commercially for grain in South Australia in the early 1980s, and is now cultivated in Victoria, New South Wales and Western Australia. Small areas are grown in Tasmania and southern Queensland. It is a cool season crop in Australia, planted in autumn and harvested in late spring–early summer.

AUSTRALIAN PRODUCTION

China is the largest faba bean producer, with Australia ranking about fourth. The Australian area has increased steadily since the start of the 1990s to near 180,000 ha (Figure 1).

Most of the sown area in NSW is in the northern cropping region, in rotation with cereals and cotton (Table 1).

Table 1: Areas sown to faba bean in New South Wales ('000ha)

Region	97-98	98-99	99-00	00-01	01-02
North	21.4	21.3	15.9	32.5	23.8
Central	5.7	5.1	2.7	2.8	2.9
South	5.0	4.6	3.8	9.5	11.3
State	36.1	30.9	22.4	44.8	38.1

Source: NSW Agriculture estimates

SUITABLE ENVIRONMENTS

Faba beans may be grown over much of the NSW grains region, being well suited to the eastern districts where rainfall is higher and spring temperatures are milder than western areas. They respond well to irrigation on heavy clay soils.

The crop is planted in mid to late autumn and grows slowly during early winter. It develops rapidly from July to September during its flowering and podding stages, when daytime temperatures are in the range 15–25°C. Flowering stops as temperatures approach 30°C.

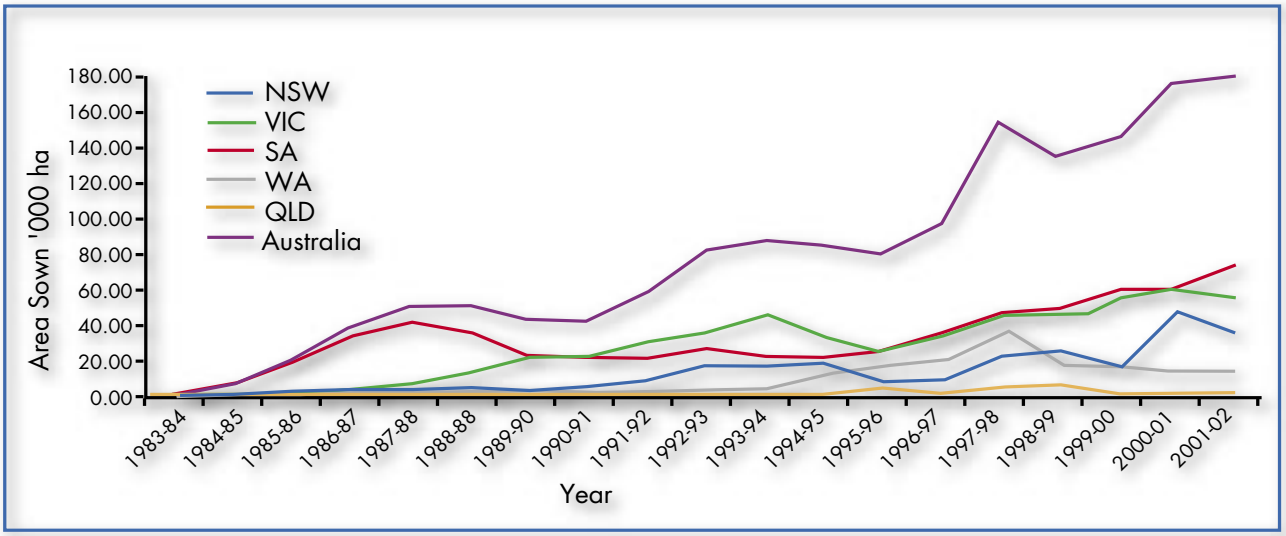
Faba bean plants can tolerate frost during vegetative stages, but severe frosts can deform and lodge stems. Frosts can also cause death of flowers and immature pods after flowering. The exact temperatures which damage flowers and pods are not known. Experience indicates that beans may tolerate temperatures which would normally damage wheat heads in their flowering stage; that is, below about -4°C. The loss of flowers due to frost may be compensated for by pod development at later flowering nodes. Pod development will be adversely affected by hot, dry periods in August and September in northern regions and during October in the south.

WHY GROW FABA BEANS?

There are three main reasons for growing this crop:

- Cash flow through marketing dry, coarse grain.
- As a component of a rotation based on winter or summer cereals or cotton.
- Green manure where soils have been degraded in organic and physical fertility.

Figure 1: Australian production of faba beans



Source: ABARE

Crop rotations which include faba bean in sequence with winter cereals and summer cereals, or cotton, are more productive and profitable than those in which legume phases are excluded. The benefits arise because:

- Yields and quality of cereal grain and cotton fibre are usually higher after faba bean.
- Nitrogen fixation in the root system of the faba bean makes more soil N available to the next crop, reducing the need for fertiliser-N, and in some cases adding to soil organic N. Up to 40% of the N in a faba bean crop is underground.
- Levels of soil-borne diseases (like crown rot) and pests (like root lesion nematode) of wheat are reduced by growing faba bean as a break crop.
- Growers claim that soil tilth is improved after faba bean.

THE PLANT

Faba bean plants may grow to a height of 2 m at maturity, but Australian crops are usually less than 1.5 m tall. The plant is erect, and produces stems from its base. Leaves are compound, having 2-7 leaflets. First leaves have only 2 leaflets, but there are 7 in the last formed leaves. The taproot bears a profusion of fibrous roots in the top 30 cm of soil.

Flowering in early varieties begins from about the 5-7th leaf bearing stem node (joint), and up to the 15th or higher node in late varieties. Flowers are borne in clusters (inflorescences) comprising 3 to 8 flowers (varying with variety) in the angle between leaf and stem (axil) at each node. Inflorescences form in succession up the stem as each new node is produced, over a period of 6–10 weeks, or about 15 flowering nodes.

Crop pollination by domestic honey bees

Peter Matthews

Harry Marcellos

Podded plant

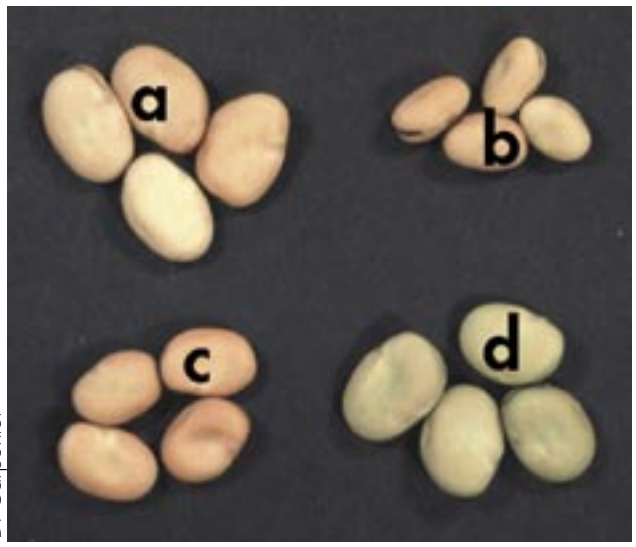
Like many legumes, excess flowers are produced and fewer than 15% will develop to produce pods.

Honeybees seek nectar from the flowers and in the process pick up pollen, transferring it between plants, and causing cross-pollination to occur at rates commonly in the range 25-30%.

Flowering finishes when daytime temperatures approach 30°C, after which an extra few leaf-bearing nodes are produced.

Pods in a well grown crop are borne from about 20 cm above ground to maybe 30 cm below crop height. Each pod contains 2 to 4 seeds. As pods mature they turn black, as eventually do the stems and leaves of the plant.

Seeds vary in size depending on variety, from large flattened beans (also known as broad beans) through medium sizes to smaller, rounded seeds like field peas. Varieties with medium sized seed are the main types grown in Australia whereas the smaller seeded types are common in Europe.



Di Carpenter

Faba bean seeds come in various sizes and colours: a. Aquadulce, b. Barkool, c. Fiesta VF, d. Icarus

All seed types are used as a dry bean for either human consumption or livestock feed. Large-seeded varieties are often used for human consumption as a green vegetable. Value adding in the form of canning, splitting, and preparation as snack foods services niche markets. In China, faba beans are used to make extruded starch products (vermicelli) and sauces. Faba bean is sometimes used as a green manure crop, as it is capable of producing a large amount of N-rich biomass.

Faba bean variety trials

Harry Marcellos

BREEDING OF FABA BEANS IN AUSTRALIA

The development of new varieties of faba bean for different regions is a high priority, supported across Australia by the Grains Research and Development Corporation (GRDC) in partnership with NSW Agriculture, the University of Adelaide and the Australian Centre for International Agricultural Research (ACIAR). Faba bean varieties have a reputation for showing a high degree of specific adaptation, which means that varieties are required for different regions. In general terms, improvements in yield and quality arising through improved specific adaptation and increased disease resistance are needed in new varieties.

All varieties released have been developed from genetic material introduced to Australia, mostly from an international genetic resources centre in Syria (known as ICARDA), with the best germplasm so far originating from the Mediterranean, southern China and South America.

Faba bean improvement for the southern half of NSW is catered for by breeding activities at the University of Adelaide, with evaluation units based at Wagga Wagga and Horsham. The varieties Fiord, Ascot VF, Icarus and Fiesta VF were developed through this program. They are adapted to environments south of Dubbo which receive more winter rainfall, and have shorter and cooler winter days than the northern half of the State. The most important diseases are chocolate spot and ascochyta blight, and significant increases in resistance to these are being incorporated in varieties under development.

In northern NSW/QLD, faba bean improvement is coordinated by NSW Agriculture with breeding activities at Narrabri and Tamworth.

The aim is to develop faba bean varieties suited to sub-tropical climates (narrower day length range, and earlier springs than southern Australia, and summer-dominant rainfall).

- The primary goal is to develop new varieties specifically adapted to the northern region with higher and more stable yield, quality and disease resistance. The breeding

Bee proof igloos are used to prevent cross pollination in seed increase plots at Narrabri

Harry Marcellos

program selects for traits that convert a crop of Mediterranean origin to one with improved adaptation to a sub-tropical environment.
- Advanced lines have been developed and are being assessed for their potential release as new varieties with improved resistance to the fungal diseases chocolate spot, ascochyta blight and rust, and to bean leaf roll virus. The first variety will be available to growers in 2004.

GROWING THE CROP

Suitable Paddocks

The best soils for faba bean are deep, neutral to alkaline, well structured soils with a high clay content. In northern NSW, grey clays, black earths and brigalow clay loams are ideal. In southern and central parts of the State, alluvial loams and heavy textured soils are preferred, but good results have been achieved on lighter textured soils on the central western slopes.

Soils to avoid are those that are shallow, acidic (less than pH 5.2 ($CaCl_2$)), or very light and sandy in texture. Growers considering growing faba beans on lower pH soils need to check for aluminium and manganese levels, as these will adversely affect plant growth. If soil pH is below 5.2, an application of lime should be considered. Avoid soils that are acid at depth (pH below 5.2 ($CaCl_2$) at 20-30 cm depth).

Soil sodicity should also be checked and soils with high exchangeable sodium percentages (ESP) avoided.

The crop can handle wet soil conditions better than other pulses, and does very well under furrow irrigation. It is common for dry seed beds to be pre-watered before sowing, or for dry-sown crops to be watered up. Strategic irrigation during flowering and pod filling is desirable to maintain high crop growth rates and to maximise pod development.

Fallow management

Paddocks for faba beans can be prepared using conventional or minimum cultivation as for other winter crops, but the use of no-till or direct-drill methods are preferred and recommended in NSW. However, some soils in southern and central NSW may require cultivation prior to sowing to remove the hardpans that reduce healthy root development.

Management of the fallow after wheat or barley should start at the time the cereal is harvested, making sure that straw is left about 30 cm in height, and kept as intact as possible by restricting access to support traffic like chaser bins. Repeated in-fallow herbicide applications should be done on tramlines to minimise damage to stubble.

Grazing of cereal stubbles is common in southern NSW. Where stubble loads are too heavy, or where the stubble has been disturbed by stock grazing and trash handling equipment is not available, harrowing, slashing or late fallow burning should be considered.

Varieties

Varieties of faba bean, unlike wheat and chickpea, are genetically variable because plants

Faba beans can be successfully sown using minimum tillage techniques–faba beans sown in north west NSW into standing wheat stubble

John Kneipp

cross-pollinate. If seed is required for next season's crop, or for sale as seed, crops should be sown in separate blocks, at least 500 m from the nearest faba bean crop, to prevent cross-pollination.

The number of varieties is limited, and none combine resistance to all diseases, high and stable yield, and quality suited for human consumption. The wider adoption of faba bean in New South Wales is dependent on the development of new varieties with improvements in these traits.

Variety choice will be influenced by:

- Marketing intentions–human consumption or stockfeed.
- The farm environment, particularly rainfall and temperature.
- Which diseases are important locally.
- Seed size, important for sowing and harvesting equipment.
- Whether the crop is for seed or green manure.

Before selecting a variety, study the most recent NSW *Winter Crop Variety Sowing Guide*. Consult your local adviser and the trader with whom you intend to market the crop. Some varieties are covered by Plant Breeder's Rights (PBR).

Sowing times

Greatest growth potential occurs with early planting, which in turn favours high yield and large amounts of N fixation. Sowing later than the recommended window results in shorter crops, lower biomass and reduced yield potential. Pods will be closer to the ground, making harvesting more difficult.

Minimum tillage and direct drilling equipment used to sow faba beans

Harry Marcellos

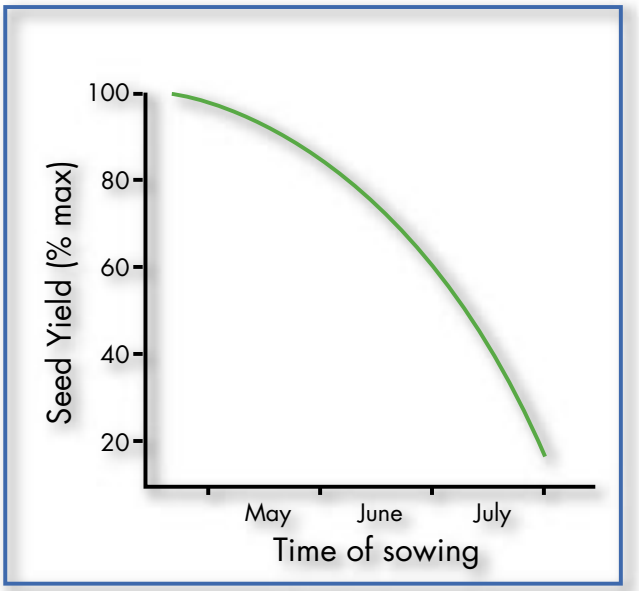


Figure 2: Influence of delay in sowing on yield of faba beans in northern NSW

Sowing of current disease-susceptible varieties later in the recommended sowing window in southern areas of the State may reduce pressure from chocolate spot, as the crop will have lower biomass, a more open canopy and be growing into warmer, drier weather than if sown earlier. Under these circumstances, any trade-off in yield potential may be offset by the likely reduction in disease risk and control costs.

Table 2: Recommended sowing times

Region	District	Month:	April				May				June			
		Week:	1	2	3	4	1	2	3	4	1	2	3	4
North	Narrabri to Boggabilla													
	Walgett to Coonamble													
	Liverpool Plains													
Central	Cowra to Forbes													
	Dubbo to Warren													
South	Temora-Wagga-Lockhart													
	Griffith to Hillston													

= Best sowing window
= Later than desirable, expect lower yield
= Much too late

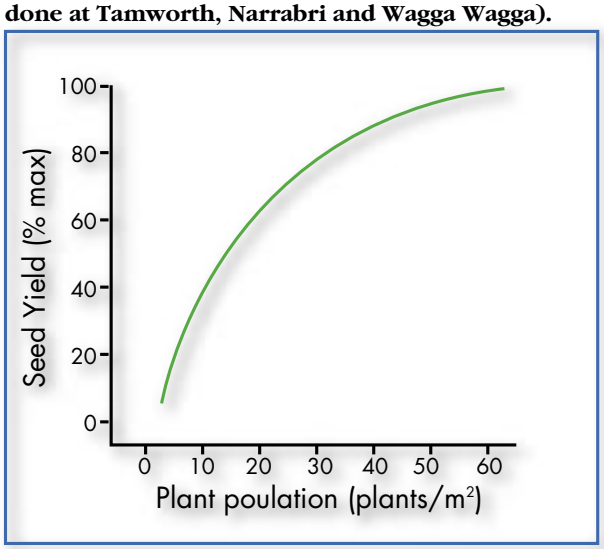
Plant population and sowing rate

Research in northern NSW with the variety Fiord and in southern NSW with Fiesta VF, under dryland conditions and narrow rows, showed that a plant population of 35–40 plants /m^2 gave near maximum yields over a wide range of conditions.

Sowing practices have shifted in line with conservation farming principles, so that sowing faba beans in wide rows, (up to 50 cm row spacing for northern NSW) into cereal residues following a no-till fallow is now recommended.

Research conducted in NSW has shown there is no yield penalty associated with these wider row spacings. Faba bean plants have a capacity to produce many stems and a large amount of biomass given abundant space and water, so that under wide rows or irrigated conditions, populations can be reduced to 20 plants/m^2.

Figure 3: Average effect of plant population on yield of Fiord under dryland conditions in NSW (trials done at Tamworth, Narrabri and Wagga Wagga).



Sowing rate formula

If the germination percentage has not been provided by the seed supplier, samples should be tested. The sowing rate of seed (kg/ha) can be worked out when the target plant population and the germination percentage of your seed are known (Table 3).

Seeders should be calibrated for sowing rate using inoculated seed, and vigilance exercised during sowing itself as large faba bean seed can 'bridge' across metering mechanisms in seed boxes, causing blockages in distributors, seed tubes and sowing boots.

Table 3: Working out your sowing rate.

Step	Procedure	Fiord	Icarus	Fiesta VF	Your seed
1	Count & weigh 100 seeds (grams)	40	70	60	
2	Target plant population (plants/m^2)	35	25	30	
3	Sowing rate at 100% establishment (= 100 seed weight x target plant population / 10) (kg/ha)	140	175	180	
4	Sowing rate at 80% establishment * (= sowing rate at 100% establishment x 100/80) (kg/ha)	175	218	225	

* Establishment % can be substituted with germination %, but growers need to be aware that not all germinating seeds will grow, so establishment losses should be taken into account.

Peter Matthews

Well-nodulated faba bean roots

Seed inoculation and dressing

It is important that the N-fixing capacity of the legume is assured by inoculating seed with rhizobia specific for faba bean. This will stimulate the production of root nodules in which N from the air is fixed into N compounds used by the legume plant. Growth and yield of crops grown on red soils in northern NSW have been increased by seed inoculation, but responses on black soils of the Liverpool Plains have been mixed. Responses in central and southern NSW have been significant, with uninoculated plants having very low biomass and yield, and increased sensitivity to disease. Trials in southern NSW have shown benefits in yield and nodulation associated with rates of inoculum 2–4 times higher than recommended.

Inoculation should be regarded as essential on all soil types. Use the commercially available faba bean inoculant. New formulations of inoculant are becoming available without peat, reducing seed bridging and blockage problems in sowing equipment. Fungicide seed dressings are not normally required for faba bean in NSW.

Seed is inoculated by coating with a slurry of inoculant, peat moss, water and methylcellulose adhesive. Coating seed can be done in various ways:

- Mixing by hand in bags or cement mixers.
- Injecting slurry through an auger
- Injecting liquid inoculant behind the sowing boot during sowing.

Faba beans being inoculated as the seed is loaded by auger into a grouper prior to sowing

Di Carpenter

Sowing depth

Faba bean seeds can be sown up to 100 mm deep, if necessary, to place them into good moisture. In northern NSW, where clay soils usually have good structure, growers practising conservation farming have had good results using 'moisture seeking' tynes. However, if it rains heavily while seed is emerging, seedling losses can occur from waterlogging.

Fertilising the crop

Fertilisation with nitrogen (N) is unnecessary as the crop can meet its N needs through biological N fixation in nodules formed on the roots.

Convention in NSW is to apply P with the seed at sowing as you would for wheat, at rates of 15-20 kg/ha of P.

On alkaline (high pH) clay soils on which crops like wheat, maize and soybeans have responded to zinc (Zn), fertilising with zinc at sowing is recommended. A minimum of 5 kg/ha of actual zinc should be applied.

Molybdenum (Mo) is likely to be needed if the paddock has a low pH. If no molybdenum has previously been applied in the rotation, 150 g/ha of sodium molybdate should be applied as an initial dose, followed 4-5 years later with 125 g/ha.

Use of bees to assist pollination

There is no strong case for bringing domestic bees into commercial crops of faba bean where feral bee (escaped domestic honey bee) populations are known to exist. Studies on the variety Fiord in northern NSW (around Tamworth and on the Liverpool Plains) have shown that almost 100% of flowers examined were pollinated either by self-pollination, or by foraging domestic honey bees or feral bees working the crop. Under these circumstances, and given that less than 15% of these flowers produce mature pods, the provision of beehives would not be expected to increase yield.

However, a study in the Riverina using bee-proof cages showed that plots of Fiord produced 24% more yield than those from which bees had been excluded. So where feral bees are absent, or scarce, as might be the case on an extensive, open plain, introducing beehives could be an advantage.

This issue will remain uncertain as new varieties of faba bean are developed without being tested for their self-fertility.

Irrigating faba beans

Furrow irrigation using bed layouts is the preferred method of growing faba beans under irrigation, although bordercheck bays are common in southern NSW. Beds have given consistently higher yields than bays, due primarily to more efficient and timely water management with less waterlogging. However, the crop can be successfully grown in bordercheck bays where slopes are steeper than 1:1200. Field drainage is a critical factor.

The crop can be sown into pre-watered beds or hills, or into a dry seed bed. Dry sown seed should be watered-up as soon as possible to maintain the viability of the inoculum applied to the seed. Once watered up, and/or given reasonable rainfall in June and July, the crop may not need watering until early spring. In relatively dry winters crops may need irrigating before spring. Faba beans need water earlier than winter cereals. Check soil moisture levels from early August and apply the first irrigation as soon as required. Crop water use increases rapidly during August. Any delays to the first spring irrigation will reduce yield potential by shortening the flowering period. Irrigate and drain within 15 hours on beds, and 8 hours on bordercheck.

The aim should be to provide the crop with ample soil water from flowering onwards (as that marks the beginning of active growth) to ensure that complete ground cover is achieved before the end of flowering. Follow-up irrigations can be scheduled to maintain adequate soil moisture until 75% of pods have turned black. Up to 4 spring irrigations may be required for high-yielding crops.

Cotton growers inspecting irrigated faba beans in northern NSW

Harry Marcellos

WEED CONTROL

Weed control in faba bean should be viewed in the context of overall weed management in the farming system. Consideration should be given to:

- residual herbicides that have been used in the crop before faba bean,
- pre- or post-emergent herbicides that will be used for the faba bean crop itself, and
- their impact on the following crop.

Effective weed management in faba beans begins with planning at least a season before sowing. Few herbicides are registered for the control of broadleaf weeds, so select a paddock with low weed burden, or utilise the preceding crop and fallow to reduce weed numbers.

For a list of registered herbicides see the annual NSW Agriculture publication *Weed Control in Winter Crops*. Consult the product label before using any herbicide.

Use of best management practices such as timely sowing, optimal plant population and adequate nutrition will greatly help weed management because faba beans compete strongly once canopy closure has occurred.

When planning weed control programs in crops and fallow prior to faba beans, be cautious about the use of herbicides with damaging residues. Many of the Group B herbicides have long plant-back periods, up to 24 months for faba beans, which are prolonged on dry soils with pH ($CaCl_2$) above 6.5.

Sulfonylurea damage on faba beans

Peter Matthews

Herbicide resistant weeds, particularly grasses, could become a major concern when growing faba beans. The number of farms which now have populations of grasses resistant to post emergent selective grass Group A herbicides has increased rapidly. As most faba bean growers rely on these herbicides for grass control, failure to be aware of resistance can lead to poor weed control and large yield losses. Grass species with populations resistant to Group A herbicides now include annual rye grass (*Lolium rigidum*), wild oats (*Avena spp.*) and paradoxa grass (*Phalaris paradoxa*).

Faba beans are generally tolerant of the residues of triazine herbicides used on prior summer cereals. Situations may arise where residues from herbicide used in a summer cereal (eg atrazine in grain sorghum) are still effective, so the crop may not need a pre-emergent residual herbicide.

DISEASE RISK AND MANAGEMENT

No current variety has resistance to all the diseases encountered in NSW, so growing faba beans involves greater risks than cereals, and requires an understanding of the main diseases and their management strategies.

The major leaf diseases caused by fungi in NSW are:

- Chocolate spot–a problem throughout NSW.
- Ascochyta blight–occurs mainly in central and southern NSW.
- Rust–a problem mainly in northern NSW, but can occur late in southern NSW.

There is also a number of virus diseases including:

- Alfalfa mosaic virus (AMV)
- Bean leafroll virus (BLRV)
- Bean yellow mosaic virus (BYMV)
- Beet western yellows virus (BWYV)
- Broad bean wilt virus (BBWV)
- Subterranean clover redleaf virus (SCRLV)
- Subterranean clover stunt virus (SCSV)

Management strategies have been developed to reduce the effects of fungal diseases, but control measures for viruses are still very restricted. Growers should inspect their crops regularly, and discuss disease management with their adviser. A number of fungicides are registered for use in NSW for the control of fungal diseases in faba beans. Current registrations and permits can be found on the Pulse Australia web-site, or consult your local agronomist.

Chocolate spot

This disease is caused by the fungus *Botrytis fabae*. It is first seen as reddish to chocolate brown, slightly flattened spots appearing on lower leaves. This is its 'non-aggressive' phase, which is thought to have little effect.

If mild, wet conditions in late winter and spring persist for several days, the disease will spread quickly and be termed 'aggressive'. The disease progresses up the canopy, with the spots rapidly expanding into large patches, which blight the leaves. Plants defoliate and lose flowers and pods. Stems can become reddish-brown and weakened, with a strong tendency to lodge. Flowers and pods may also develop lesions.

Peter Matthews

Non-aggressive chocolate spot lesions

Young leaves expanding at the top of the plant may outgrow the disease if conditions dry out; lost flowers and pods cannot be recovered. The greatest risk period is normally from late July to late September.

The frequency and severity of chocolate spot is greatest in southern NSW. Whereas chocolate spot is likely to be yield limiting in most seasons in southern NSW, the risk in northern areas is about 1 in 5 seasons.

Aggressive chocolate spot infection

Harry Marcellos

All current faba bean varieties, except Icarus and Manafest, are susceptible to chocolate spot. Through plant breeding, new lines are being developed, which, although not immune to the disease, have much higher levels of tolerance than Fiord.

Effective control of this disease is heavily dependent on the strategic use of fungicides, but attention to other management practices can reduce disease pressure:

- Crop rotation–not more than 1 faba bean crop in 4 years.
- Crop separation–500 m between faba bean crops and the stubble from faba bean crops in the previous year.
- Paddock hygiene–control volunteers and manage stubble to breakdown as quickly as possible.
- Use clean, blemish-free seed.
- Delayed sowing and wide row spacing–keep the canopy open longer.

Ascochyta blight

This disease is caused by the fungus *Ascochyta fabae* and tends to develop under cooler conditions and therefore earlier in the season than chocolate spot. It can be distinguished from aggressive chocolate spot by the presence of small, black, pepper-like bodies in the centre of the dead patches (lesions) on leaves. Lesions often have a concentric zonal appearance.

Ascochyta blight on a faba bean leaf

Harry Marcellos

Ascochyta blight is only a problem in the central and southern half of the State, where the current control strategy, based on research at Cowra, involves an early application of fungicide about 6 weeks after sowing, followed by additional sprays depending on weather conditions and disease levels. Crops should be sprayed with fungicides during pod fill to prevent pod infection and seed blemishes/staining.

In southern NSW, chocolate spot and ascochyta blight should be managed in an integrated disease control program involving fungicides and crop management practices as previously outlined for chocolate spot disease.

Rust

Faba bean rust is caused by the fungus *Uromyces viciae-fabae,* and is of most concern in the north of the State. It is first seen on leaves as small, light green spots about 1mm in diameter which erupt into red powdery (rusty) lesions. These increase in time to densely cover the leaf surface, and later to develop on the stems.

Rust occurs in most years in north-western areas of the State, and may appear from late July in western districts, and from late September in the east. In southern NSW rust does not occur every

Rust on faba bean leaves

Harry Marcellos