

Introduction

A.1 Crop overview

A.1.1 The role of pulses in farming systems

In WA, faba beans is a niche crop and production currently stands at around 6,000 tonnes (DAFWA). *Vicia faba* minor is grown under broadscale farming conditions in WA.

In modern farming systems pulses have a role that is far greater than the traditional ones of 'nitrogen fixation' and 'disease break'. They can be a cash crop in their own right, and also a valuable part of the whole farming system, especially for weed control within crop rotations.

A diversity of crops in a rotation is important for continuous cropping systems:

- to handle herbicide-resistant weeds or delay the onset of herbicide resistance by varying herbicide options and timings for weed control
- to control disease of all crops in the rotation
- to spread the timing of farm operations
- to spread risks across commodities
- to minimise the impact of increasing costs of fertiliser nitrogen (N) and fuel.¹

It is usual practice to deep-sow legumes, because they have great ability to emerge from depth (Photo 1). Faba bean seed inoculated with rhizobium (Group F) should be planted into moist soil, and can be planted to 15–20 cm depth.²



Photo 1: *Faba beans have the ability to emerge from sowing of up to 20 cm deep.*

Photo: Drew Penberthy, Penagcon

Pulses can be sown in wide rows if required, enabling non-selective weed control between the rows by using hooded shields. Sowing the pulse crop between the standing rows of cereal stubble is beneficial and can be done with GPS guidance and

¹ GRDC (2008) *Grain Legume Handbook*. GRDC.

² Pers comms G Onus. Fababean Growing Program. Landmark Moree.

auto-steer sowing systems.³ This enables the cereal crop in the following season to be planted down the legume row to separate it from the previous cereal stubble and reduce the crop's exposure to crown rot fungus.

Planting faba beans with the cereal stubble standing also helps to protect the seedling faba beans from aphid infestations, which in turn can reduce the incidence of viruses in the crop.⁴ Figure 1 shows the areas of WA that are suitable for growing faba beans.

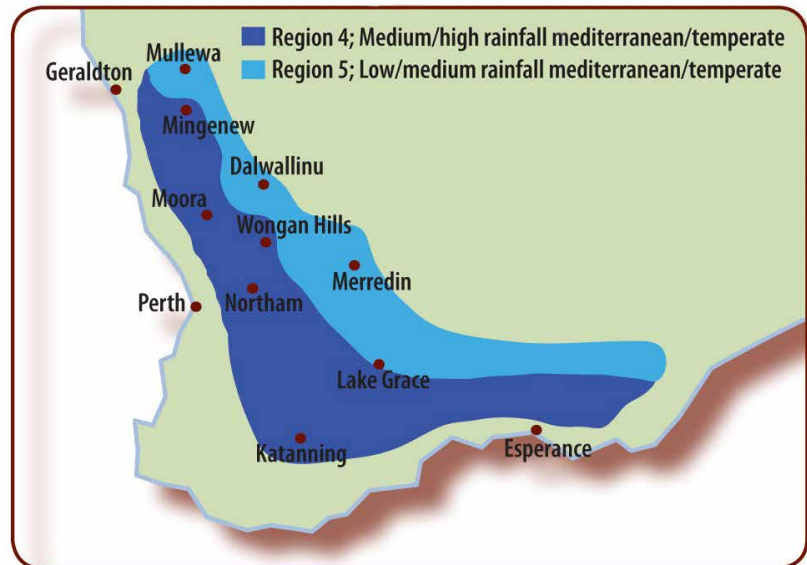


Figure 1: WA areas suitable for growing faba beans.

Source: Pulse Breeding Australia

A.1.2 About faba bean

Faba beans were first grown commercially for grain in northern New South Wales in the early 1980s, and are now grown in all Australian grain production regions, particularly in Victoria, New South Wales and Western Australia. Small areas are cultivated in Tasmania and southern Queensland. It is a cool-season crop in Australia, planted in autumn and harvested in late spring–early summer, and is a valuable crop for livestock nutrition and crop rotation.⁵ The Australian faba bean industry has grown steadily to be the world's number one exporter, on average more than 307,000 tonnes per year over the last five years.

This large-seeded bean is well adapted to higher-rainfall areas because of its higher yield potential, better disease and waterlogging tolerance, and virtue of being able to attract higher prices.⁶

Growing faba beans

The faba bean plant is tall: it may grow a height of 2 m at maturity under optimum conditions, although plants in Australian crops are usually <1.5 m tall. It is erect and multi-stemmed from basal branches. The leaves are compound, having 2–7 leaflets. The first leaves have only two leaflets, but there are seven in the last-formed leaves. It has a well-developed taproot, which bears a profusion of fibrous roots in the top

³ GRDC (2008) *Grain Legume Handbook*. GRDC.

⁴ G Onus. Fababean Growing Program. Landmark Moree.

⁵ P Matthews and H Marcellos (2003) Faba bean. Agfact P4.2.7. 2nd edn. NSW Department of Primary Industries. http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/157729/faba-bean-pt1.pdf

⁶ Pulse Australia (2016) Faba bean production: southern and western region. <http://www.pulseaus.com.au/growing-pulses/bmp/faba-and-broad-bean/southern-guide#australian-industry>

30 cm of soil. Plants will flower profusely and under cool, moist conditions may flower over a five to ten week period.

Flowering in early varieties begins from about the 5th to 7th leaf-bearing stem node (joint), and up to the 15th or higher node in late varieties. Flowers are borne in clusters (inflorescences) comprising 3–8 flowers (depending on variety) in the angle between leaf and stem (axil) at each node (Photo 2). Inflorescences form in succession up the stem as each new node is produced, over a period of six to ten weeks, or at ~15 flowering nodes.⁷



Photo 2: *Faba bean flowering. Like many legumes, excess flowers are produced and <15% will develop to produce pods.*

Photo: Gordon Cumming, Pulse Australia

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 once the maximum average weekly temperatures reach >25°C and/or moisture becomes limited, after which an extra few leaf-bearing nodes are produced.

Pods in a well-grown crop are borne from ~20 cm above ground to ~30 cm below crop height (Photo 3). Each pod contains 2–6 seeds. As pods mature, they turn black, as do the stems and leaves of the plant.

⁷ P Matthews and H Marcellos (2003) Faba bean, Agfact P4.2.7. 2nd edn. NSW Department of Primary Industries, http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/157729/faba-bean-pt1.pdf



Photo 3: *Podded faba bean plant.*

Photo: Pulse Australia

Seeds vary in size depending on the variety, from large flattened beans (also known as broad beans) through medium sizes to smaller, rounded seeds that are like field peas (Photo 4). Varieties with medium-sized seed are the main types grown in Australia, whereas the smaller-seeded types are common in Europe.



Photo 4: *Faba bean seeds come in different colours and sizes.*

Photo: Pulse Australia

A.1.3 Suitable environments

Faba beans are not well suited to lower-rainfall areas. If moisture is limited, the plants do not grow to full height and the pods set close to the ground. They do not tolerate hot conditions during flowering, which can result in poor podset and premature termination of flowering. Hot and dry conditions during flowering usually result in a severe reduction in yield. However, stubble retention and planting in wider rows can ameliorate these limitations a little, and enable faba beans to be grown in lower-rainfall areas and seasons.

Faba beans prefer well-drained loam to clay soils with a pH in the range of 6–9. They will not grow as well in light or acidic soils.

Under WA conditions, faba beans do well in less windy areas and in heavier soils. Pulse crops tend to be grown in the medium to low rainfall (350–250 millimetres (mm)) environments with chickpea sown at the start of the growing season in May and field peas towards the end of the planting season in June.

They are known for being the pulse that is most tolerant of waterlogging; however, to survive prolonged waterlogged conditions the plants must be well nodulated and foliar diseases must be controlled. Waterlogging will still attenuate crop growth, so although the plants will grow and set seed, they are likely to be stunted and will yield less than plants growing in well-drained soil.

Faba beans and broad beans are moderately susceptible to hostile sub-soils, and boron toxicity, sodicity and salinity can cause patchiness in affected paddocks. Faba beans do not tolerate exchangeable aluminium in soil.⁸

A.2 Products and uses

All seed types are used as dry beans for human consumption or for livestock feed. Value-adding in the form of canning, splitting, and preparation as snack foods services niche markets. For example, in China, faba beans are used to make extruded starch products (e.g. vermicelli) and sauces.⁹

Faba beans are sometimes used as a green manure crop, as they are capable of producing a large amount of N-rich biomass.

A.3 Market

The market for WA-produced faba beans is largely restricted to the Middle East, principally Egypt.

World production of faba beans now exceeds 4 million tonnes annually, but only about 2% of this production is traded internationally. The major exporting countries are Australia, France, and the United Kingdom. China was a major exporter of faba beans but has recently become an importer.

All faba beans grown in Australia are targeted at human-consumption markets. Countries in the Middle East, specifically Egypt, Saudi Arabia, and the United Arab Emirates, are the major buyers of faba beans. Faba beans are generally consumed whole, canned, or split, or milled into flour.

Producing a high-quality product with continuity of supply is important for current access to world faba bean markets, and to increase Australia's market share.

International trade in food-quality faba beans is dominated by Egypt as the major importer, with several other countries importing smaller but still significant amounts. In addition, several countries are significant importers of faba beans for livestock feed.

Suppliers of faba beans to Egypt include the United Kingdom and the European Union (predominantly France), both of which have a geographical advantage over Australia in shipping. Additionally, the harvest of European faba beans is completed by September, giving Europeans a three to four month advantage before the Australian harvest is ready for export.

Markets prefer the green seed-coat colour of new-crop faba beans. It is critical Australia produces a high-quality product with excellent colour and uniformity of size. As the seed coat oxidises and browns, buyer acceptance declines, along with the price. Storage facilities with a controlled temperature can increase the time before oxidation starts to occur. The European faba beans can be of lesser

⁸ Pulse Australia (2016) Faba bean production: southern and western region. Website, <http://www.pulseaus.com.au/growing-pulses/bmp/faba-and-broad-bean/southern-guide#austrian-industry>

⁹ Pulse Breeding Australia (2013) Southern/Western Faba & Broad Bean—Best Management Practices Training Course.

quality, often because of bruchid damage (a similar effect as pea weevil in Australian field peas).

Faba beans that have a minor seed-coat blemish (e.g. wrinkling, staining or darkening with age) can be split to produce a quality product if the defect does not damage the kernel. There is, however, a more limited market for these seeds.

Factors which should influence Australian farmers to grow faba beans include:

- forecasted planting intentions of European farmers, particularly in France and UK
- Egyptian imports from the previous season
- export activity from Australia and potential carryover stocks.

The outlook for Australian faba beans is influenced by:

- the crop harvest in Egypt, UK and France (before the Australian harvest)
- the prospects of Chinese exports (before and at the Australian harvest).¹⁰

A.4 Faba bean research

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

Pulse Breeding Australia (PBA) runs a world-class, Australian breeding program for chickpeas, field peas, faba beans, lentils and lupins.

PBA is developing a number of improved varieties for Australian growers that achieve higher yields, have resistance to major diseases and stresses, and have grain qualities that enhance Australia's market competitiveness. PBA is an unincorporated joint venture between:

- Grains Research and Development Corporation (GRDC)
- Department of Agriculture and Food Western Australia (DAFWA)
- Department of Primary Industries, Victoria (DPI Vic)
- South Australian Research and Development Institute (SARDI)
- Department of Agriculture, Fisheries and Forestry, Queensland (DAFF Qld)
- New South Wales Department of Primary Industries (NSW DPI)
- University of Adelaide
- University of Sydney
- Pulse Australia

MORE INFORMATION

[GRDC Final Reports: Australian Faba Bean Breeding Program](#)

[Pulse Australia: Faba Bean Production: Southern and Western Region](#)

¹⁰ Pulse Australia (2015) Pulses: Understanding global markets. Australian Pulse Bulletin, <http://www.pulseaus.com.au/growing-pulses/publications/marketing-pulses#faba-beans>