

FABA BEANS - FOR QUALITY MARKETS

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Producing faba beans for human consumption can now be achieved consistently through a management package that focuses on choosing the right variety, strategic use of fungicides, windrowing and attention to header settings.

Variety choice affects market acceptability and influences susceptibility to external factors that downgrade grain quality. Disease resistance assists greatly now. Small beans like the old variety Fiord are less acceptable in major export markets now. Medium-small beans (eg Nura, Farah) are sought because of their size and light colour. Our medium sized beans (eg Manafest) and broad, large beans (eg Aquadulce) remain acceptable also because of their size and colour.

While seed size and colour are factors influencing quality, and these are largely determined by genetics, sound management from seeding to delivery can certainly affect quality factors caused by shrivelling, seed discolouration, breakage and insect damage. Discoloured and small, shrivelled faba beans may not only result in seed being down-graded from human consumption but may also result in poor emergence and vigour for next year's crop.

Causes of seed discolouration and downgrading

Seed staining in beans is caused by:

- Genetics - natural aging, and high tannin grains are more likely to discolour
- Late rain on maturing or mature crops
- Ascochyta blight – susceptible varieties are more prone to discolouration
- Exposure due to pod splitting - commonly caused by Chocolate Spot infection
- Frost
- Other diseases - Pea Seed-borne Mosaic Virus (PSbMV) and Broad Bean Stain Virus (BBSV)
- Poor storage conditions, including high moisture or exposure to sunlight

Fungicides

Ascochyta blight is the main cause of seed discolouration in faba beans. Ascochyta resistant varieties such as Nura and Farah produce minimal seed staining. However, susceptible varieties such as Fiesta and Manafest will require strategic use of fungicides from before flowering until crop maturity to prevent fungal damage of seed.

Fungicide applications late in the season, just prior to the crop drying down and prior to a rainfall event, can reduce the spread of the ascochyta fungus onto the seed pod and into the seed.

Seed could be dressed with seed treatment like thiabendazole and thiram (eg P-pickle T[®]) to minimise seed-borne transmission of disease, but this is not often used. However, commonly a protectant fungicide such as mancozeb or chlorothalonil is first used six to eight weeks after sowing. If weather conditions are conducive to disease development, applications should be repeated at seven to 21 day intervals until flowering is completed. Early control alone may not prevent seed staining occurring later in the season.

Seed staining can also be caused by chocolate spot infection, either directly or through pods splitting. Chocolate spot needs to be controlled from commencement of flowering until after flowering is completed in susceptible varieties. Cercospora can also infect pods and seeds if it is severe and present late in the season. It is best controlled from very early in the season, starting five to eight weeks post-sowing.

Harvest Management

As guidelines to improve management of faba bean quality at harvest, it is recommended that growers:

- Know the delivery standards they need achieve
- Monitor seed moisture (harvest just under 14% if possible)
- Consider windrowing for early harvest and to dry down the crop uniformly
- Ensure a correct header set-up
- Minimise handling of grain
- Maintain correct storage conditions.

Delivery Standards

The maximum level of poor colour (discoloured) beans is usually three per cent by weight, and the maximum level of defective seeds is usually five per cent. Poor colour beans are those with disease or weathering blemishes. Defective seeds include all seeds with cracks, splits, damaged seed coats, as well as any insect damage. See www.pulseaus.com.au/standards.

Monitor Seed Moisture

Harvest should commence when seed moisture reaches 13-15 per cent. At least 20 plants should be sampled at a minimum of six sites across the paddock. The first seed harvested should be kept for seed, as it has the highest moisture content and as such is less prone to harvest damage and should have a better germination percentage if stored and handled correctly.

Consider Windrowing

Uniform maturity assists timeliness and ease of harvest. When paddocks are ripening unevenly, windrowing can help protect the early maturing parts of the paddock from weather damage whilst allowing the remainder of the paddock to mature. Windrow at physiological maturity of the beans.

Windrowing should particularly be considered when direct heading problems are anticipated, ie

- crop is too tall or badly lodged
- crop contains late maturing weeds
- crop is heavily infested with snails
- crop is too short, and header comb height is greater than the windrower height

Salvage weed management - seed set on late weeds can be reduced with timely windrowing. This may help reduce the risk of seed staining, quality downgrading and storage problems caused by green weed contamination. A knockdown herbicide may be necessary to control any regrowth.

A lower cutter height - windrowers can often cut lower than headers, allowing very low pods to be harvested.

Reduced shattering in tall crops - with tall plants the reel can push tall plants forward leading to grain loss as the cutter bar vibrates and causes pod shattering in front of the header. Header efficiency - many growers have found that the increase in harvest speeds in windrowed faba beans compared to direct heading covers the cost of windrowing.

Correct timing of windrowing is essential: too early and there is a risk of losing seed weight or seeds shrivelling; too late and pod shatter may occur. Once seeds in the top pods have reached physiological maturity, seed weight cannot be increased and it is safe to windrow. A seed is physiologically mature when the hilum can be seen as a black line - the scar-like area on the seed where it attaches to the pod. As the pod continues to dry down, the line of the hilum will become more obvious and eventually the whole hilum will turn black. This occurs when the pod is still green and there are still leaves present.

Consider Desiccation or Crop-topping

Desiccation or crop-topping might also assist bean harvest. Desiccation is to ensure uniform ripening of the beans or if the crop contains late maturing weeds. Timing is at a crop stage similar to windrowing. Crop-topping is targeted at preventing weed seed set, so is done earlier than desiccation or windrowing, with some potential loss of yield or quality. Some later forming bean seeds will not be physiologically mature at the time of application, so could be more wrinkled, shrivelled or greyish in colour as a result of crop-topping. In practice crop-topping is also a form of early crop desiccation since it does hasten crop maturity. The major differences between desiccation and crop-topping are that:

- Application timing is different and initiated by different criteria;
- Both can cause reduced grain quality and yield if applied at the wrong stage of maturity of the crop;
- Chemicals and rates for desiccation are higher than that required for crop-topping;
- Crop-topping will hasten maturity and harvest timing.

Glyphosate is not registered for seed crops and should not be used in pulses intended for seed production or sprouting.

Ensure the correct header set-up

The Grain Legume Handbook (SA Pea Growers Co-Op) and Harvester manuals provide a range of information to faba bean growers including information on header set-up. Due to the larger size of bean seed, header settings for beans are very different from wheat or peas. Bean seed sizes also differ between years and varieties. Adjust settings for the conditions of the day. Settings are suggested in Table 1.

Table 1: correct header set-up

<i>Reel speed</i>	Slow,
<i>Spiral clearance</i>	High,
<i>Thresher speed</i>	400-600rpm
<i>Concave clearance</i>	15-35mm
<i>Fan speed</i>	High
<i>Top sieve</i>	32-38mm
<i>Bottom sieve</i>	16-19mm
<i>Rotor speed (rotary machines only)</i>	700-900rpm

Minimise Handling

Belt shifters are the recommended method of handling faba beans as they can be damaged by auger flights. If an auger is used it should be run full and at a slower speed than for cereals. Augers with a gap between the flight and the barrel are less likely to jam.

Maintain correct storage conditions

The seedcoat of most faba beans will darken over time, however the extent of this darkening will vary depending on the original seed colour and storage conditions. Bean seeds darken faster when stored in warm, moist conditions compared to cool, dry conditions. Under typical farm storage conditions, significant darkening of faba bean seed can be expected within nine months of harvest. Beans become unacceptable to fresh human consumption markets if significantly darkened with age. Marketing must be by mid August unless the grain goes to a splitter or as stockfeed. Beans also darken very quickly if exposed to sunlight.

Beans are best not stored in bunkers or in 'sausage bags' for any length of time as pockets of moisture can quickly lead to black, mouldy grain which can contaminate the remainder of product. Black, mouldy grain can also taint the sample with a most unpleasant odour, rendering it unacceptable for consumption.

Further Reading:

"Grain Legume Handbook" – 2008 Updates and CD (SA Pea Growers Coop)

"Faba beans in South Australia and Victoria" 2007 – Pulse Australia fact sheet

"Faba bean variety sowing guide 2008", Jim Egan, Joanne Crouch and Wayne Hawthorne –SARDI Fact Sheet 16/00/08.

"Faba beans", Victorian Winter Crop Summary 2008

"Nura faba bean Variety Management Package", Pulse Australia

"Farah faba bean Variety Management Package", Pulse Australia

"Fiesta faba bean Variety Management Package", Pulse Australia

"Faba bean disease management strategy for the Southern region GRDC 2004", Pulse Australia Brochure and subsequent update tables.

For further information also contact:

Pulse Australia www.pulseaus.com.au

South Australian Research and Development Institute www.sardi.sa.gov.au

NSW Department of Primary Industries www.agric.nsw.gov.au

Department of Agriculture and Food Western Australia www.agric.wa.gov.au/content/FCP/LP/WAPULSES.HTM

Department of Primary Industries Victoria <http://www.dpi.vic.gov.au>

GRDC www.grdc.com.au

Acknowledgements

This is an updated and expanded version of the original GRDC bulletin "Faba beans for quality markets", Research Information for Farm Advisors Advice, December 2000 edited by Jon Lamb.

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