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GRDC GROWNOTES™

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

FABA BEAN

SECTION 11

CROP DESICCATION/ SPRAY OUT

DESICCATION | CROP-TOPPING | SEED AND POD DEVELOPMENT | TIMING OF DESICCATION | WINDROWING

MORE INFORMATION

http://www.pulseaus.com.au/growing-pulses/publications/desiccation-and-croptopping

www.apvma.gov.au

http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/157203/pulse-point-09.pdf

Crop desiccation/spray out

11.1 Desiccation

Pulses can be desiccated pre-harvest to enable earlier harvest and to dry out green weeds. This is becoming common practice, particularly for chickpeas, field peas, lentils, and faba beans. Timing is based on crop physiological maturity.

Desiccation prepares the pulse crop for harvesting by removing moisture from plants and late-maturing areas of the paddock.

Premature desiccation may cause staining of the seed coat, excessive green cotyledons in the sample or small or wrinkled seed, all of which can create marketability problems.

In faba bean, desiccation can occur when seed from the top of the plant has a black scar (hilum) and the lower 25% of pods are black. At this stage, the upper pods are still bright green but the lowest pods are starting to turn black and have seeds with a completely black hilum.

If the seed is to be retained for sowing, do not use glyphosate to desiccate beans.

Windrowing may be considered as an alternative to desiccation. The timing of windrowing is similar to that of desiccation. [1]

Desiccation is an aid to a timely harvest, particularly where uneven ripening occurs across a paddock, and is now a common practice in chickpea and mungbean. Desiccation enables a timely harvest, to avoid weather damage. Timing of application is when the grain is 75–90% mature, to avoid reducing the quality of the harvested grain.

Desiccation is a valuable management tool especially under conditions where:

- There is a problem with green weeds at harvest.
- Improved harvest efficiency is needed.
  - » Desiccation eliminates many of the problems associated with green stems and gum build-up, which cause uneven flow of material through the header, and ‘jamming’ problems.
  - » Minimising jamming enables drum speeds to be reduced in many cases, with a reduction in cracked or damaged grain.
- ‘Early’ summer rain causes reshooting and re-flowering of faba beans.
- There are problems with patchy or delayed crop maturity on heavy clay soils.
- ‘Early harvest management’ is being adopted.

Benefits from crop desiccation are similar to those from windrowing and include more uniform maturity, reduced problems associated with late weed growth, and advanced harvest date. Unlike windrowing, the crop is not placed on the ground so there is less risk of wet weather causing problems.

Timing is critical, and early desiccation should be avoided because it will result in yield and quality losses. Crop damage from ground rigs can also be an issue, particularly in tall crops. Tramlining may help and they should be considered at sowing if crop desiccation is likely to be used.

1 Southern/Western Faba and Broad Bean—Best Management Practices Training Course, 2012. Pulse Australia.

Note that desiccation does not necessarily allow earlier harvest, whereas windrowing does. [2]

11.2 Crop-topping

Crop-topping is part of an integrated weed management strategy; it should not be considered a sole strategy.

Crop-topping aims to stop the seed-set in surviving weeds without substantially affecting crop yield and grain quality. It is timed to control weed seed-set from survivors of normal in-crop weed control. Crop-topping cannot be used in all pulses.

Timing is aimed at the soft dough stage of the target grass-weed species, typically annual ryegrass, to stop seed-set. If wild radish is the target, the herbicide should be applied at the pre-embryo stage. In most crops, targeting wild radish exposes the crop to a heightened risk of crop damage.

When used correctly in the appropriate pulse species, the crop will be almost mature or fully mature, and grain quality will be unaffected.

Crop-topping faba beans can result in discoloured seed coat or cotyledons (kernel) and either rejection or severe downgrading at delivery. Even in other pulses, growers need to be aware of grain-quality defects if crop-topping is done earlier than the crop desiccation or windrowing stage.

Timing of crop-topping can be marginal in faba beans. Fiord is the earliest maturing faba bean variety, but in many cases, even Fiord will not mature early enough to enable efficient crop-topping without affecting grain quality and yield. [3]

11.3 Seed and pod development

Maturation of pods and seed is staggered up each podded branch and between branches. The effects of higher temperatures and varying degrees of moisture stress on the plant mean that maturity time is generally more compressed and of shorter duration than flowering.

A problem often confronting agronomists and farmers is how to optimise the timing of the desiccant spray when there are various stages of seed maturity present on individual plants, as well as variation across the paddock.

This can be further compounded by soil-type variation or paddock micro-relief.

Inspection of commercial crops nearing desiccation often reveals that while the lower 30% of pods have dried to <15% seed moisture (seeds detached from pod), the upper 25% of pods on each fruiting branch are still at 30–40% moisture content and at varying stages approaching physiological maturity (as indicated by black hilum appearance).

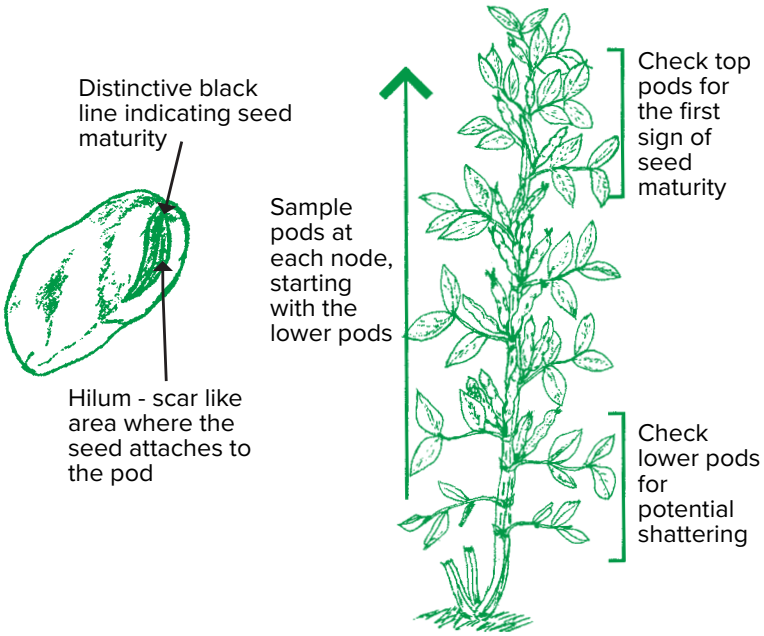
11.4 Timing of desiccation

The optimal stage to desiccate the crop is when the vast majority of seeds have reached physiological maturity, i.e. 90–95% of the crop. Our best guide presently is to base this on a visual inspection of the seeds within the top 25% of uppermost pods on each main fruiting branch (Figure 1).

Seeds are considered physiologically mature when the distinctive black hilum seed starts to show.

2 Southern/Western Faba and Broad Bean—Best Management Practices Training Course, 2012. Pulse Australia.

3 Southern/Western Faba and Broad Bean—Best Management Practices Training Course, 2012. Pulse Australia.



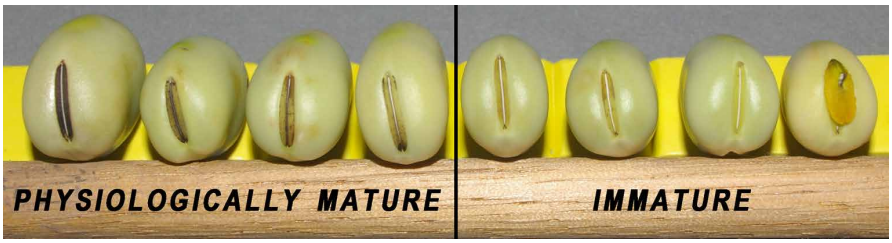


Figure 1: *Assessing correct timing of desiccation.*

Sources: diagram, Gordon Cumming, photo, Grain Legume Handbook 2008

11.4.1 Effect of desiccants on green immature seeds

Application of desiccants to seed that is still green and actively filling will result in:

- a reduction in grain size (and yield)
- an increase in a greenish discoloration of the seed coat
- a reduction in seed viability (dead or abnormal seed)

In faba bean crops intended for use as seed or for sprouting markets, glyphosate should not be used because it will affect seed germination (Table 1), even when applied after physiological maturity.

Table 1: *Effects of desiccation timing on seed viability.*

Treatment	Crop stage	% Normal seed	% Abnormal seed	% Total germinated
Nil pre-harvest treatment		92	2	94
Desiccated, glyphosate	Seed physiological maturity	27	63	90
	Seed physiological maturity plus 6 days	64	29	93
Windrowed	Seed physiological maturity	89	2	91
	Seed physiological maturity plus 6 days	85	7	92

Source: Matthews and Holding 2004.

11.4.2 Products registered for the desiccation of faba bean

Extracts from the product labels of Reglone® and Roundup PowerMax® are presented in Table 2.

Table 2: *Products registered for desiccation of faba bean (note: always read the label supplied with the product before each use).*

Active ingredient	Example trade name	Rate	Critical comments
Diquat	Reglone (200 g/L)	2–3 L/ha	Spray as soon as the crop has reached full maturity. Helps overcome slow and uneven ripening and weed problems at harvest. DO NOT harvest for 2 days after application
Glyphosate	Roundup Attack (570 g/L)	0.645–1.7 L/ha	Apply when physiologically mature and <15% green pods. Use higher rates where crops or weeds are dense and where faster desiccation is required. DO NOT harvest within 7 days of application

Warning: do not use Glyphosate to desiccate beans that are to be used for seed or sprouting as germination is affected (see Table 1)

11.5 Windrowing

Windrowing of faba bean has become common in some areas as growers try to reduce problems associated with direct-heading, uneven crop maturity or weed-seed management. It is primarily used to bring harvest date forward, uniformly ripen the crop, and protect the crop from shattering where harvest is to be delayed, or it can be a part of general management to reduce seed-set of weeds present.

Windrowing faba bean crops provides a number of benefits:

- It aids uniform maturity of the crop in paddocks that are ripening unevenly.
- Problems caused by late-maturing weeds are avoided. These include delayed harvest, which increases the risk of staining caused by the weather and disease, and storage problems from green weed contamination.
- It can advance harvest date when done as soon as the crop is mature, avoiding clashes with other crops, such as cereals.
- Weed seed is moved into a windrow that can be burnt after harvest.
- Low pods are harvested rather than being left behind, because of the lower cutting height possible with a windrower.
- Excessively tall crops can be better handled at harvest. When tall crops are direct-headed, the reel can be in the way pushing plants forward, causing problems with feeding material into the header and losses on the cutter bar. Direct-heading of very tall and lodged crops is also very slow. Windrowing can dramatically increase header efficiency.
- Windrowing reduces damage to headers. Sticks and stones can damage knife fingers and sections, retractable fingers and other components on headers working in rougher country. Pick-up fronts leave most of these on the ground.

Windrowing should only be used if direct-heading of the faba bean crop is likely to be cause problems, and should not be considered necessary every year.

There are several risks to windrowing crops:

- Windrowing too early (prior to crop maturity) can cause significant yield and quality losses. Small and shriveled seed will result from drying down of immature seed.

MORE INFORMATION

http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0018/157203/pulse-point-09.pdf

http://www.grdc.com.au/uploads/documents/GRDC_LateSeasonHerbicideUse_FS.pdf

http://www.dpi.nsw.gov.au/archive/agriculture-today-stories/ag-today-archives/march-2009/benefits,-risks-of-sowing-pulses-early

- Windrowing too late can cause shatter losses as the cutter bar hits the crop.
- The seed coat can discolour if left too long in the windrow, especially in wet conditions when mould growth and seed staining can occur.
- Summer storms after windrowing can cause moisture to be retained in the windrows, making it difficult to pick up the windrow without mud and potentially leading to quality deterioration.

Timing of windrowing is critical and should be based on seed maturity rather than measurements such as leaf colour and drop, or pod colour, as these can be misleading. Leaves can be prematurely lost and pods blemished by disease. Faba bean seed is considered physiologically mature a black line is visible on the hilum (a scar-like area on the seed where it attaches to the pod (see Figure 1).

The cutting height for windrowing should be just below the bottom pods, with the reel following the top of the crop. The reel speed should be quite slow. The delivery opening in the windrower should be large enough to prevent blockages or there will be lumps in the windrow. Windrows should be dense and tightly knit for best results (Figures 2 and 3).

Curing should take about 10–12 hot days. However, heavy infestations of wild radish and other weeds could delay drying.

Pick-up fronts are the most common type used for harvesting windrows. However, crop lifters placed close together on open fronts have been used with some success.

Figure 2: *Faba bean windrows.*

Photo: W. Hawthorne, Pulse Australia

Figure 3: *Inside an opened windrow of faba bean.*

Photo: W. Hawthorne, Pulse Australia