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& DEVELOPMENT
CORPORATION

FABA BEAN

SECTION 11

CROP DESICCATION/ SPRAY OUT

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

Crop desiccation/spray out

Key messages

- Early desiccation should be avoided because it will result in yield and quality losses.
- Windrowing faba bean crops encourages uniform maturity in paddocks that are ripening unevenly.
- Crop-topping can limit weed seed-set from survivors of normal in-crop weed control.

11.1 Desiccation

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

Pulses can be desiccated pre-harvest to enable earlier harvest and to dry out green weeds. Desiccation is an aid to a timely harvest, particularly where uneven ripening occurs across a paddock, and helps to avoid weather damage. Timing is based on crop physiological maturity.

In faba beans, desiccation may be initiated 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, and the lowest pods have seeds with a completely black hilum.¹

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

Desiccants are applied 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, resulting in 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.

The 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. Premature desiccation may cause staining of the seed coat, an excessive number of green cotyledons in the sample, or small or wrinkled seed, all of which can decrease marketability.

Crop damage from ground rigs can also be an issue, particularly in tall crops. Tramlining may help, and this should be considered at sowing time if crop desiccation is likely to be used.²

¹ Pulse Breeding Australia (2013) Southern/Western Faba & Broad Bean—Best Management Practices Training Course. Module 8—Desiccation, Harvest & Storage.

² Pulse Breeding Australia (2013) Southern/Western Faba & Broad Bean—Best Management Practices Training Course. Module 8—Desiccation, Harvest & Storage.

11.1.1 Timing of desiccation

The optimal stage to desiccate the crop is when 90–95% of seeds have reached physiological maturity. 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).

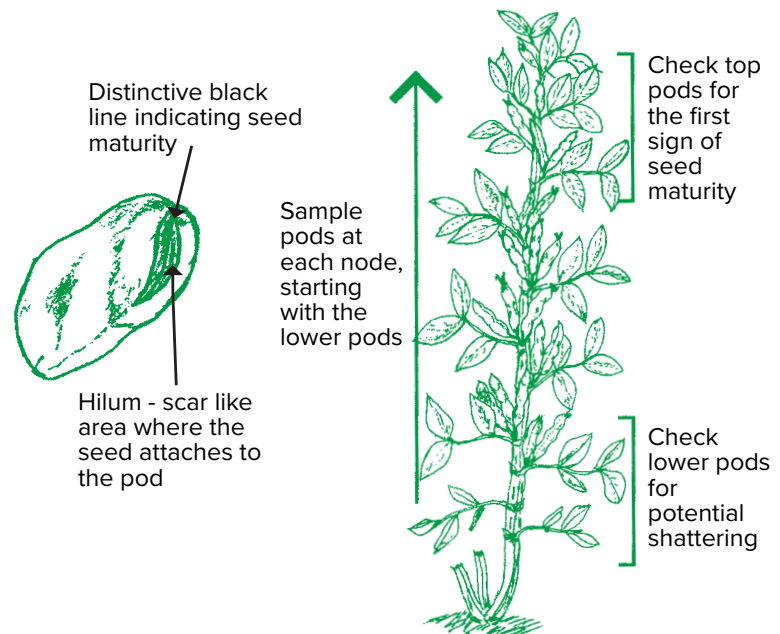


Figure 1: Assessing correct timing of desiccation.

Source: Gordon Cumming

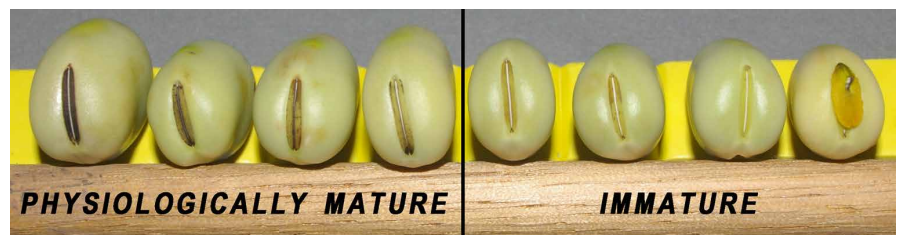


Photo 1: Assessing correct timing of desiccation.

Photo: Grain Legume Handbook 2008

11.1.2 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 (an increase in dead or abnormal seeds)

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 the crop has matured.

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

11.1.3 Products registered for the desiccation of faba bean

Extracts from the product labels of Reglone® and Roundup PowerMax® are presented in Table 2.³

Table 2: Products registered for desiccation of faba bean.

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. <i>Do not</i> 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. <i>Do not</i> harvest within 7 days of application

Note: always read the label supplied with the product before each use.

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

MORE INFORMATION

[Pulse Australia \(2015\) Desiccation and croptopping in pulses.](#)

[Australian Pesticides and Veterinary Medicines Authority.](#)

[DAFWA \(2014\) Weed control in mature crops and pre-harvest desiccation. Fact sheet.](#)

11.2 Crop-topping

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

Crop-topping is the late application of herbicides to prevent weed seed-set from survivors of normal in-crop weed control without substantially affecting crop yield and grain quality. It can be used to control 'escapes' from other weed-management treatments, as a late post-emergent salvage treatment, or for managing herbicide resistance.⁴

Crop-topping can deliver a number of benefits in addition to reducing weed seedset, including:

³ Pulse Breeding Australia (2013) Southern/Western Faba & Broad Bean—Best Management Practices Training Course. Module 8—Desiccation, Harvest & Storage.

⁴ DAFWA (2016) Crop-topping pulse crops. Department of Agriculture and Food Western Australia, <https://www.agric.wa.gov.au/lupins/crop-topping-pulse-crops>

SECTION 11 FABA BEANS

TABLE OF CONTENTS

FEEDBACK

- improved harvest due to even maturity of crops (particularly pulses)
- improved harvest, grain quality and storage by desiccating late weed growth in seasons with late rain ⁵

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 damage.

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

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

Crop-topping prematurely can potentially lead to a loss of grain quality, particularly if it occurs just before a significant rainfall event. Also some of the smaller pods near the top of the plant are more exposed to direct contact by the desiccant spray. Seeds in these less mature pods are not at physiological maturity (black-hilum stage) when they dry down.

The rate of product application or desiccant product choice can also influence speed of dry-down. ⁶



Photo 2: *Faba bean crop mature enough for crop-topping.*

Photo: W. Hawthorne, Pulse Australia

⁵ GRDC (2014) Integrated Weed Management Hub Section 5: Stopping weed seed set. <https://grdc.com.au/Resources/IWMhub/Section-5-Stopping-weed-seed-set#desiccation>

⁶ Pulse Breeding Australia (2013) Southern/Western Faba & Broad Bean—Best Management Practices Training Course. Module 8—Desiccation, Harvest & Storage.



Photo 3: A faba bean crop that has been crop-topped, and shows leaves that are drying down.

Photo: W. Hawthorne, Pulse Australia

i MORE INFORMATION

R Barr (2016) Paraquat preferred for crop-topping pulses. GRDC Ground Cover Issue 124.

11.2.1 Glyphosate and paraquat

Both glyphosate and paraquat are registered for crop-topping pulses, however, growers should consider choosing paraquat rather than glyphosate where possible to minimise resistance development.

A key tactic of integrated weed management (IWM) is to rotate modes of action as much as possible. While glyphosate is heavily relied upon in grain growing, paraquat can be a sensible choice for crop-topping pulses to avoid the overuse of glyphosate.

Paraquat can be applied up until the soft dough stage of ryegrass, whereas effective control with glyphosate needs to be at the milky dough stage. This means growers using paraquat can wait a little longer to allow the crop to mature and minimise yield losses.⁷

11.3 Seed and pod development

The 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 growers is how to optimise the timing of the desiccant spray when there are various stages of seed maturity on individual plants, as well as across the paddock.

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

Inspection of commercial crops nearing desiccation point often reveals that while the lower 30% of pods have dried to <15% seed moisture (seeds have detached from the pod), the upper 25% of pods on each fruiting branch are still at 30–40% moisture content and at varying stages of maturity.⁸

⁷ R Barr (2016) Paraquat preferred for crop-topping pulses. GRDC Ground Cover Issue 124, September-October 2016. <https://grdc.com.au/Media-Centre/Ground-Cover/Ground-Cover-Issue-124-SeptemberOctober-2016/Paraquat-preferred-for-croptopping-pulses>

⁸ Pulse Breeding Australia (2013) Southern/Western Faba & Broad Bean—Best Management Practices Training Course. Module 8—Desiccation, Harvest & Storage.

11.4 Windrowing

Windrowing of faba beans 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 the harvest date forward, uniformly ripen the crop, and protect the crop from shattering when harvest is to be delayed. It can also be a part of general management to reduce seed-set of weeds.

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, and 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 should only be used if direct-heading of the faba bean crop is likely to 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 shrivelled seed will result from the drying down of immature seed.
- 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.

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 (Photos 4 and 5).

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 for harvesting windrows. However, crop lifters placed close together on open fronts have also been used with some success.⁹

9 Pulse Breeding Australia (2013) Southern/Western Faba & Broad Bean—Best Management Practices Training Course. Module 8—Desiccation, Harvest & Storage.

SECTION 11 FABA BEANS

TABLE OF CONTENTS

FEEDBACK



Photo 4: *Faba bean windrows.*

Photo: W. Hawthorne, Pulse Australia



Photo 5: *Inside an opened windrow of faba bean.*

Photo: W. Hawthorne, Pulse Australia

i MORE INFORMATION

[DAFWA \(2012\) Burning windrows for weed control—video](#)

[GRDC \(2010\) Stewardship for late season application of herbicides in winter crops. Fact sheet.](#)