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GRAINS RESEARCH & DEVELOPMENT CORPORATION

CHICKPEA

SECTION 11

CROP DESICCATION/ SPRAY OUT

SEED AND POD DEVELOPMENT | TIMING OF DESICCATION | EFFECT OF DESICCANTS ON GREEN IMMATURE SEEDS | PRODUCTS REGISTERED FOR THE DESICCATION OF CHICKPEA | WINDROWING | CROP-TOPPING

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SECTION 11

Crop desiccation and spray out

More information

http://www.grdc.com.au/Research-and-Development/GRDC-Update-Papers/2013/02/Developing-a-plan-for-chickpeas-2013

http://www.daf.qld.gov.au/plants/field-crops-and-pastures/broadacre-field-crops/chickpeas/harvesting-and-storage

Pulses can be desiccated pre-harvest to enable earlier harvest and to dry out green weeds. It is becoming common practice, particularly in chickpeas, field peas and lentils. Timing is based on crop stage, and is similar to, or later than, that for windrowing.

The danger of premature desiccation lies in having excessive green cotyledons in the sample, staining of the seed coat or small seed all of which create marketability problems.

In chickpeas, desiccation can occur when fewer than 20% of pods are green and 90% of seed is changing from a green colour.

Desiccation is a valuable management tool especially under the following conditions:

- If there is a problem with green weeds at harvest.
- For improved harvest efficiency. 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.
- Where 'early' summer rain causes reshooting and re-flowering of chickpeas.
- Where there are problems of patchy or delayed crop maturity on heavy clay soils.
- Where 'early harvest management' is being adopted. [1]

11.1 Seed and pod development

Chickpea plants are indeterminate and the period of flowering can extend from 20 to 50 days depending on levels of flower abortion and the impact of moisture stress on the plant.

Causes of flower abortion and poor podset have been discussed previously and they include:

- low mean daily temperature (below 15°C)
- frost
- Botrytis grey mould
- extended periods of overcast weather

Flowering commences on the main stem and basal branches, and proceeds upward at intervals of about 2 days between successive nodes on each fruiting branch.

Under favorable conditions, the time taken from flowering to the visual appearance of the pod (podset) is about 6 days. After podset, the pod wall grows rapidly for the next 10–15 days to assume full pod size.

[1] Pulse Australia (2013) Northern chickpea best management practices training course manual—2013. Pulse Australia Limited.

The seeds start to develop at about the same time as the growth of the pod wall ceases. Seed growth occurs over the next 20 days.

Pod and seed maturation is also very staggered along each fruiting branch, although it is generally more compressed and of shorter duration than flowering owing to the effects of higher temperatures and varying degrees of moisture stress on the plant.

The problem faced by agronomists in a commercial paddock situation 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 compounded by variation in soil type or paddock micro-relief adding to the problem of uneven crop maturity. Some agronomists use a rule of thumb that when 90% of the field is 90% mature they will advise growers to spray it out. Alternatively, when larger areas are involved, they may split soil types and test them separately for desiccation timing.

Often, inspection of commercial crops nearing desiccation reveals that while the lower 30% of pods have dried to below 15% seed moisture (seeds detached from pod and rattle when shaken), the upper 30% of pods on each fruiting branch are still at 30–40% moisture content and in varying stages approaching physiological maturity. [2]

11.2 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).

The best guide at present is to base this on a visual inspection of the seeds in the top 25% of uppermost pods on each main fruiting branch (Figure 1).

Seeds are considered physiologically mature when the green seed colour begins to lighten (Figure 2).

The Western Australian recommendation of physiological maturity is ‘when the pod wall begins to yellow’ (Figure 3).

More investigation is required to define more clearly when physiological maturity is occurring based on a visual inspection of seeds and pods in the field.

However, until there is a more precise recommendation, the advice is to desiccate when 80–85% of pods within the crop have turned yellow–brown (Figure 4). [3]

More information

http://thebeatsheet.com.au/chickpeas/managing-helicoverpa-larvae-in-chickpea-crops-close-to-dessication-and-harvest

[2] Pulse Australia (2013) Northern chickpea best management practices training course manual—2013. Pulse Australia Limited.

[3] Pulse Australia (2013) Northern chickpea best management practices training course manual—2013. Pulse Australia Limited.

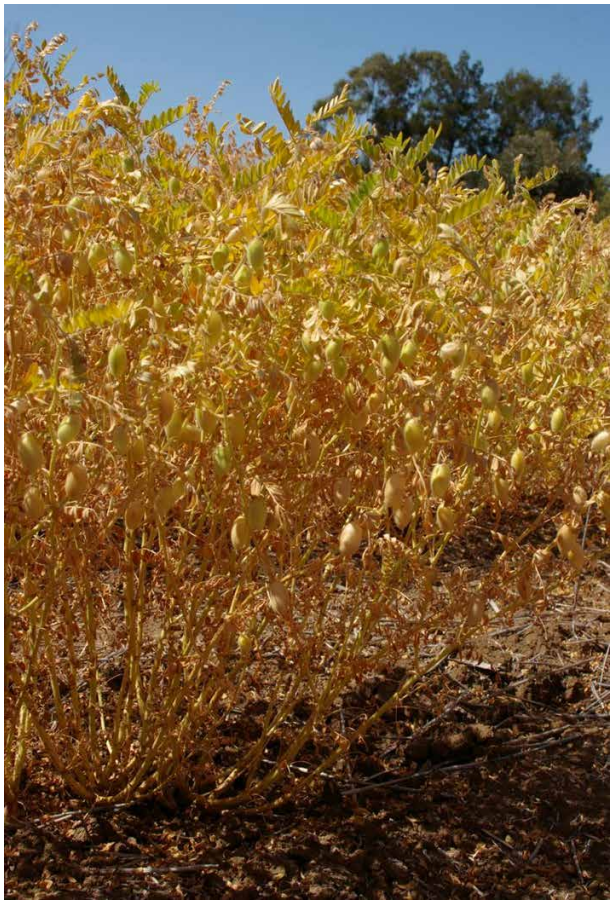

Figure 1: Correct desiccation timing based on inspection of uppermost pods of each fruiting branch.

Figure 2: Pods in the top 25% of the canopy should mainly be in the final stages of grain-fill, where the yellow colouring is moving from the 'beak' down through the seed.

Figure 3: The bottom 75% of pods should have reached maturity. Seeds have turned yellow and the pod has been bleached to a very light, green–yellow.

Figure 4: Full maturity, known as 'rattle pod', where the seed has detached from the pod wall and will rattle when shaken.
(Photos: G. Cumming, Pulse Australia)

11.3 Effect of desiccants on green immature seeds

Applying 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) (Table 1) [4]

[4] Pulse Australia Northern (2013) Chickpea best management practices training course manual—2013. Pulse Australia Limited.

Table 1: Effects of desiccation timing on seed viability

Treatment	Crop stage	% Normal seed	% Abnormal seed	% Dead seed
Site: Dalby				
None	Mature pods	87	9	4
Ally® & Roundup®	Mature pods	85	13	2
Roundup®	Mature pods	84	14	2
Site: Cambooya				
Ally® & Roundup®	Mature pods	76	20	4
Ally® & Roundup®	70% Green pods	15	63	22
Ally® & Roundup®	All Green pods	22	60	18

Source: Qld DPI (1999).

11.4 Products registered for the desiccation of chickpea

Table 2 provides details of the products registered for use as desiccants.

Table 2: Active ingredients and trade names of chemicals used as desiccants, with critical comment extracts from the Reglone® and Roundup PowerMax® product labels [5]

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 3 days after application
Glyphosate	Roundup PowerMax® (540 g/L)	0.68–1.8 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
Glyphosate plus metsulfuron	Roundup PowerMax® (540 g/L) plus Ally® herbicide (600 g/kg)	0.5–1.1 L/ha plus 5 g/ha	Apply when chickpeas are physiologically mature and less than 15% of green pods are present. Use higher rates where crops or weeds are dense and where faster desiccations is required. DO NOT harvest within 7 days of application

11.5 Windrowing

Windrowing of chickpeas is possible, but not widely used because there is little or no stubble for the windrow to sit on as there is, for example, with canola. Losses at harvest may be greater, and more dirt may enter the grain sample. Light windrows can be blown away in strong winds.

[5] Pulse Australia Northern (2013) Chickpea best management practices training course manual—2013. Pulse Australia Limited.

Despite this, provided the windrows are large enough and compacted, then windrowing is possible. It may also be possible to place two swathes into the one windrow and compact it with a cotton reel roller when windrowing. Harvesting time can therefore be improved.

In chickpeas, windrowing or desiccation can occur when <20% of pods are green and 90% of seed is changing from a green colour.

The main advantages of windrowing are earlier harvest, reduced seed damage and less shattering or pod loss, particularly if harvest is delayed. Pod loss and shatter are reduced because windrowers allow unhindered passage onto the canvas due to the absence of platform augers. Lower harvesting heights may also be possible.

Windrowing also helps to dry out green broadleaf weeds, such as radish, which can cause major problems at harvest.

Windrowing also reduces damage to headers. Use of headers in rougher country can damage knife fingers and sections, retractable fingers and other components, because of sticks and stones. Pick-up fronts leave most of these on the ground.

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; otherwise, there will be lumps in the windrow. Windrows should be dense and tightly knit for best results.

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

Pick-up fronts are the most common type used for harvesting windrows. However, crop lifters used close together on open fronts have been used with some success. [6]

11.6 Crop-topping

Crop-topping is timed to prevent weed seed-set, not by the crop growth stage. Hence, crop-topping is generally not possible in chickpea, as they are too late in maturing.

Crop-topping chickpeas can result in discoloured cotyledons (kernel) and seed coats, leading to rejection at delivery and/or severe downgrading. 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.

Genesis™ 079 is the earliest maturing chickpea variety, but in most cases, it will not mature early enough to enable efficient crop-topping without grain quality impacts.

Evidence of the lack of suitability of crop-topping in chickpea is provided in Table 3, from a South Australian Research and Development Institute crop-topping trial at Melton, South Australia, in 2009. Visual grain quality data are not presented, but in this trial:

- Many responses to crop-topping treatments may have been masked by rapid senescence from a rapid, early seasonal finish (e.g. Almaz® and Genesis™114).
- When crop-topped at the recommended stage, yields were 69–86% of the untreated control (31–14% yield loss). When crop-topped 2 weeks after the optimum stage for ryegrass, yields were 92–114% of the untreated control. When crop-topping was 3 weeks ahead of the recommended ryegrass stage, yields were 17–48% of the untreated control (83–52% yield loss). [7]

More information

Late season herbicide use, Fact sheet (2012)

[6] Pulse Australia (2013) Northern chickpea best management practices training course manual—2013. Pulse Australia Limited.

[7] Pulse Australia (2013) Northern chickpea best management practices training course manual—2013. Pulse Australia Limited.