

# FACT SHEET

## PRE-HARVEST HERBICIDE USE

## Stewardship for pre-harvest application of herbicides in winter crops

The responsibility to avoid herbicide residues in delivered cereal, pulse and oilseed grains sits squarely with grain growers and their advisers.

### Key points

- **CORRECT USAGE:** Product labels must be followed and withholding periods adhered to for all herbicides.
- **RESIDUES:**
  - Application of herbicides close to harvest increases the possibility of detectable herbicide residues being present in harvested grain.
  - Maximum residue limits (MRLs) vary according to herbicide, crop and market. Compliance with Australian MRLs does not guarantee the grain will meet an importing country's MRL. It is important to know the destination of your grain and to check both domestic and importing countries' MRLs to determine what herbicides are permitted on that crop. Breaches of MRLs can lead to rejected grain both domestically and by the importing country.
  - Grain handlers and marketers regularly conduct surveillance on grain receipts for residues. The National Residue Survey also conducts ongoing residue testing of grain.
  - Late season herbicide use must strictly comply with the registered label to ensure Australian MRLs are not breached.
  - Growers should seek advice from their grain buyers before using late applications of herbicides. This is very important for seed that is intended for sprouting.
- **KEY REGISTRATIONS:**
  - Barley: Diquat (e.g. Reglone®) and Sharpen® are the only herbicides registered for pre-harvest weed control in barley, however a minor use permit for certain glyphosate formulations is currently available for use on feed barley only. **Growers must be aware that some barley maltsters have restrictions on all pre-harvest use of herbicides.** Consult with buyers before use.
  - Registrations for glyphosate use on cereals and canola vary across different labels (see table 2).
  - Sharpen® (saflufenacil) has been recently registered for late-season application in pulses and cereals.
- **FOOD SAFETY:** Growers and their advisers need to be aware of the implications of their herbicide applications and the role they play in ensuring food health safety and in protecting the grain industry.
- **BE RESPONSIBLE:** Stewardship must be taken seriously by all sections of the grain value chain.



Options for late season herbicide use in barley are very limited (see Table 3)

■ **Paraquat is not registered for use in cereal or canola crops.**

### PRE-HARVEST HERBICIDE USE

The application of herbicides late in the season to prevent weeds setting seed or to desiccate crops must be carried out with caution and in line with herbicide label recommendations. It is essential to check if these practices are acceptable to buyers, as in some situations markets have extremely low or even zero tolerance to some pesticide and herbicide residues.

There are three reasons to apply non-selective herbicides late in the season:

- to manage late season weeds;
- in-crop spray topping of weeds to prevent seed set; and
- for pre-harvest desiccation of the crop and weeds to accelerate or even-up ripening to assist with harvest.

Paraquat is not registered for aerial application.

Some formulations of glyphosate and diquat may be applied by air pre-harvest.

DO NOT apply treatments where drift onto sensitive crops and pastures is likely to occur.

Given the late timing of these applications, there is an increased risk that such uses may result in detectable residues in harvested crops, potentially leading to breaches of MRLs, or impacting on grain germination and seed quality.

In-crop spray-topping with paraquat or glyphosate in **pulse crops and pastures** is an effective strategy for controlling a range of annual grasses. It should be used as a tool with other integrated weed management (IWM) techniques such as cutting crops for hay, breakcrops and green and brown manuring. Timing of application and rates of product are crucial to maintaining crop yield while reducing seed set.

### PRE-HARVEST HERBICIDE USE IN CEREALS

Only certain herbicides and specific formulations are approved for use on wheat, barley or canola. See tables 2 and 3. For glyphosate, withholding periods and maximum application rates may vary across registered formulations. Always check individual labels before application.

While diquat has some activity on weeds at harvest, it is more suited to crop desiccation. **Even though diquat and Sharpen® are registered for use in all winter cereals, different barley maltsters have different policies on the acceptability of any late season herbicides. Growers are encouraged to check with their barley buyer prior to applying any late season herbicides to their malting barley crop.**

**TABLE 1 Summary of registrations for pre-harvest herbicide use by selected crop type. Always check product labels before application. See Table 2 for additional details.**

	Paraquat	Diquat	Glyphosate	Sharpen®
Wheat	X	✓	✓	✓
Barley	X	✓	X#	✓
Canola	X	✓	✓	X
Chickpeas	✓	✓	✓	✓
Lentils	✓	✓	✓	✓
Faba beans	✓	✓	✓	✓
Field peas	✓	✓	✓	✓

✓ = registered for pre-harvest use;

X = not registered for use

# = An APVMA minor use permit (PER 82594) is in place until 31 July 2019 that permits pre-harvest use of weedmaster® DST® and weedmaster® Argo® glyphosate formulations on feed barley crops. No glyphosate products are approved for use on malt barley crops.

**TABLE 2 Examples of glyphosate formulations registered for use in cereals and canola.**

Formulation	Maximum application rate	Withholding period – wheat	Withholding period – canola*
weedmaster® DST®	4.1 L/ha (1927gai/ha)	5	5
Roundup Ultra® Max	3.4 L/ha (1928gai/ha)	5	Nil. When used as directed.
Most other glyphosate formulations	Use rate varies with formulation. (Maximum registered rate is ~975gai/ha)	7	Not registered

\* applications made prior to direct heading or before/under the windrow

### WARNING:

- **Grain handlers and marketers regularly conduct surveillance on grain receivals for residues. The National Residue Survey conducts ongoing surveillance of grain.**
- **It is essential that growers seek advice from their grain buyers before using late applications of herbicides. This is especially important for seed that is intended for sprouting.**

The malting barley industry has concern over pre-harvest applications of herbicides to barley that may be sold as malt grade. Contact your buyer prior to any pre-harvest applications to malting grade barley.

### PRE-HARVEST HERBICIDE USE IN CANOLA

Diquat is registered for over-the-top pre-harvest applications in direct headed canola. **Certain glyphosate formulations are now registered for use under-the-cutter-bar spraying during windrowing or swathing operations and for use over the top to standing canola prior to direct heading or harvest (see Table 2).**

### THE HERBICIDE FACTS

Tables 1, 2 and 3 provide details on registered product options for late season weed control and desiccation in a variety of broadacre crops. Use of herbicides that are not registered for the particular use pattern is likely to be illegal (depending upon individual state law), and may result in growers and their advisers exposed to the risk that their grain contains residues above the relevant MRL. **Paraquat and Spray.Seed® (paraquat/diquat) are not registered for pre-harvest application in cereal or oilseed crops and should not be used under any circumstances including in-crop spray topping, pre-harvest canola desiccation or under-the-cutter-bar spraying during swathing or windrowing canola. These uses are illegal. Paraquat/diquat products (e.g. Spray.Seed®) are not registered for pre-harvest use in pulse crops.**

**Wheat:** Glyphosate, diquat and Sharpen® are registered.

Registrations for individual glyphosate formulations vary. Always check the label.

**Barley:** The only products currently registered for use pre-harvest in barley is diquat and Sharpen®. Consult your barley grain buyer before any pre-harvest applications. **Paraquat is not registered for use in any barley varieties and must not be used.**

An APVMA minor use permit (PER 82594) is in place until 31 July 2019 that permits pre-harvest use of weedmaster® DST® and weedmaster® Argo® glyphosate formulations on feed barley crops. No glyphosate products are approved for use on malt barley crops.

**Canola:** Diquat and certain glyphosate formulations (see table 2) are registered for use in canola.

**Pulses:** Glyphosate, diquat and paraquat are registered for late season uses in many pulse crops (Table 3). Pulse registrations and withholding periods vary between product labels.

**Sharpen® has recently been registered for pre-harvest use in a range of pulse crops, when applied in a mix with registered rates of glyphosate or paraquat.**

**TABLE 3 Product registrations for pre-harvest weed control and desiccation VARY by crop type.**

Always check product labels (NOTE: Paraquat/diquat products, for example Spray.Seed® are not registered for pre-harvest weed control or desiccation).

Crop	Paraquat	Diquat	Glyphosate	Sharpen®
Wheat	<p>Paraquat is not registered for:</p> <ul style="list-style-type: none"> <li>- in-crop spray topping;</li> <li>- pre-harvest crop desiccation;</li> <li>- pre-harvest weed control.</li> </ul> <p>These use patterns are unregistered.</p> <p><b>DO NOT USE PARAQUAT PRODUCTS FOR THESE USE PATTERNS</b></p>	<p>Winter cereals – pre-harvest weed control (all states):</p> <p>Spray as soon as the crop is mature and ready for harvesting. Under wet spring conditions crops can periodically become infested with weeds which seriously interfere with harvest operations. Diquat will control these weeds allowing for efficient harvest.</p> <p><b>WHP: NOT required when used as directed.</b></p>	<p><b>Not all glyphosate formulations are registered for this use</b></p> <p>Apply to mature crop from late dough stage (28 per cent moisture) onwards. The higher rate will be required when crops are heavy and leaf shading effects may occur.</p> <p><b>DO NOT use on crops intended for seed or sprouting.</b></p> <p>Where wheat is grown in rotation with any herbicide-tolerant crop, management should be consistent with implementation of any management plan for herbicide-tolerant crops.</p> <p><b>WHP: DO NOT harvest within 7 days of application.</b></p> <p><b>Certain glyphosate formulations can now be applied at higher-use label rates in wheat with a 5-day harvest withholding period (see Table 2).</b></p>	<p>DO NOT apply before growth stage Z71 (watery ripe where first grains have reached half their final size) and DO NOT apply after growth Z83 (early dough).</p> <p>In order to guarantee good coverage it is recommended to apply at minimum 100 L/ha volume.</p> <p><b>ALWAYS apply with 1% v/v Hasten® Spray Adjuvant or high quality methylated seed oil (MSO).</b></p> <p><b>WHP: NOT required when used as directed.</b></p>
Barley	<p>Paraquat is not registered for:</p> <ul style="list-style-type: none"> <li>- in-crop spray topping;</li> <li>- pre-harvest crop desiccation;</li> <li>- pre-harvest weed control.</li> </ul> <p>These use patterns are unregistered.</p> <p><b>DO NOT USE PARAQUAT PRODUCTS FOR THESE USE PATTERNS</b></p>	<p>Winter cereals – pre-harvest weed control (all states): Spray as soon as the crop is mature and ready for harvesting.</p> <p>Under wet spring conditions crops can periodically become infested with weeds which seriously interfere with harvest operations. Diquat will control these weeds allowing for efficient harvest.</p> <p><b>WHP: NOT required when used as directed.</b></p>	<p>Glyphosate is not registered# for use in malt barley for:</p> <ul style="list-style-type: none"> <li>- in-crop spray topping;</li> <li>- pre-harvest crop desiccation;</li> <li>- pre-harvest weed control.</li> </ul> <p>These use patterns are unregistered.</p> <p><b>DO NOT USE GLYPHOSATE PRODUCTS FOR THESE USE PATTERNS</b></p>	<p>DO NOT apply before growth stage Z71 (watery ripe where first grains have reached half their final size) and DO NOT apply after growth Z83 (early dough).</p> <p>In order to guarantee good coverage, it is recommended to apply at minimum 100 L/ha volume.</p> <p><b>ALWAYS apply with 1% v/v Hasten® Spray Adjuvant or high quality methylated seed oil (MSO).</b></p> <p><b>WHP: NOT required when used as directed.</b></p>
Canola	<p>Paraquat is not registered for:</p> <ul style="list-style-type: none"> <li>- in-crop spray topping;</li> <li>- pre-harvest crop desiccation;</li> <li>- under-the-cutter-bar spraying during swathing or windrowing activities;</li> <li>- pre-harvest weed control;</li> <li>- spraying over the top of swaths or windrows</li> </ul> <p>These use patterns are unregistered.</p> <p><b>DO NOT USE PARAQUAT PRODUCTS FOR THESE USE PATTERNS</b></p>	<p>Pre-harvest crop desiccation (all states):</p> <p>Spray when 70 per cent of the pods are yellow and the seeds are brown or bluish and pliable. Canola ripens unevenly and is prone to pod shatter and seed loss. Direct harvest 4–7 days after spraying.</p> <p><b>WHP: DO NOT harvest for at least 4 days after application.</b></p>	<p><b>Certain glyphosate formulations are registered for pre-harvest use in canola (see table 2).</b></p> <p>Apply to mature standing crop from early senescence (minimum of 20% seed colour change to a dark brown/black colour from within the crop) prior to windrowing or direct harvest. Use the higher label rate when crops or weeds are dense and/or where faster desiccation is required.</p> <p>DO NOT use on crops intended for seed</p> <p>Withholding periods may apply. Refer to the label.</p> <p>DO NOT overspray windrows</p> <p>DO NOT apply to standing crops and again at the time of windrowing</p> <p>Refer to the complete label and critical comments section.</p>	<p><b>Sharpen® is highly damaging to canola and is not registered for any use patterns. DO NOT USE.</b></p>
Chickpeas Faba beans Field peas Lentils Pigeon peas+ Lupins! Vetch% Adzuki beans^ Cowpeas^ Mungbeans~ Soybeans	<p>Spray-topping to reduce seed set – annual ryegrass.</p> <p><b>Chickpeas/Faba beans/Field peas/Lentils/Lupins/ Vetch:</b> Spray the crop when the ryegrass is at the optimum stage, that is when the last ryegrass seed heads at the bottom of the plant have emerged and the majority are at or just past flowering (with anthers present or glumes open) but before haying off is evident – usually October to November.</p> <p><b>Cowpeas^</b> Use of the higher registered rate in these crops is usually more reliable and gives a greater reduction in seed set.</p> <p><b>Mungbeans~</b> Reduction in crop yield may occur especially if the crop is less advanced relative to the ryegrass, that is if crops have a majority of green immature pods. The higher rate may also increase any yield reduction. In practice crop losses in excess of 25 per cent may occur.</p> <p><b>WHP: DO NOT harvest for 7 days after application.</b></p>	<p>Pre-harvest crop desiccation (all states):</p> <p><b>Dry beans/Dry peas/Pigeon peas/Lentils/ Chickpeas/Faba beans/Lupins:</b> Spray as soon as the crop has reached full maturity. Helps overcome slow and uneven ripening and weed problems at harvest.</p> <p><b>Soybean:</b> Spray when 80% of the pods are yellow/brown and the seeds are ripe – yellow and pliable.</p> <p><b>Mungbeans:</b> Apply when 80% to 90% of pods are black or brown.</p> <p><b>WHP: NOT required for dry beans, dry peas, mungbeans when used as directed.</b></p> <p><b>Lentils/Chickpeas/Faba beans: DO NOT harvest for 2 days after application.</b></p> <p><b>Pigeon peas, Soybeans: DO NOT harvest for 4 days after application.</b></p>	<p><b>Not all glyphosate formulations are registered for these uses.</b></p> <p><b>Field peas/Faba beans:</b> Pre-harvest application to reduce viable seed set of annual ryegrass.</p> <p><b>Adzuki beans*/Chickpeas*/Cowpeas*/Faba beans*/Field peas*/Lentils*/Mungbeans*/ Soybeans*:</b> Pre-harvest application to desiccate a crop as a harvest aid and weed control – annual weeds.</p> <p><b>Chickpeas*:</b> Glyphosate + metsulfuron tank mix for pre-harvest application as harvest aid and weed control – annual weeds (selected formulations only – check individual labels).</p> <p><b>WHP: DO NOT harvest within 7 days of application.</b></p> <p>Refer to label for specific timings.</p> <p>*Application to crops intended for seed production or for sprouting may reduce germination percentage to commercially unacceptable levels.</p>	<p>Desiccation timing:</p> <p><b>Faba bean:</b> Hilum black in the pods at the top of the canopy (30-80% of pods ripe and dark)</p> <p><b>Field pea:</b> 30% seed moisture or when lower 75% of pods are brown with firm seeds and leathery pods</p> <p><b>Chickpea:</b> 80-85 % of pods within crop have turned yellow-brown</p> <p><b>Lentil:</b> just after crop starts to yellow (or senesce)</p> <p><b>Narrow leaf lupin:</b> at 80% leaf drop.</p> <p>Apply to direct harvested lupins only. Application prior to windrowing will result in severe loss of grain yield.</p> <p>Early applications other than described above may result in grain yield penalties.</p> <p>In order to guarantee good coverage, it is recommended to apply at minimum 100 L/ha volume.</p> <p>May have a negative effect on lentil germination. Do not use on lentil crops for seed production.</p> <p><b>ALWAYS apply Sharpen® with 1% v/v Hasten® spray adjuvant or high quality methylated seed oil (MSO).</b></p> <p><b>WHP: DO NOT harvest for 7 days after application.</b></p>

% Paraquat only ^ Glyphosate only + Diquat only ~ glyphosate and diquat only ! Not glyphosate

# An APVMA minor use permit (PER 82594) is in place until 31 July 2019 that permits pre-harvest use of weedmaster® DST® and weedmaster® Argo® glyphosate formulations on feed barley crops. No glyphosate products are approved for use on malt barley crops. WHP = withholding period v/v = volume per volume

## Frequently asked questions

### If I can't effectively control ryegrass in cereals – particularly in barley – by in-crop spray-topping, what are the other options?

- Windrowing barley to control ryegrass has been partially successful with up to 60 per cent ryegrass control when carried out when the barley is at firm dough stage (kernel no longer splitting when pinched, but leaving an indent). However, windrowing usually results in some yield loss against the standing crop due to pickup inefficiency.
- Herbicides of alternative modes of action should be considered as part of a grower's IWM strategy, particularly the use of herbicides incorporated by sowing (IBS).
- Baling the crop can recover some of the costs, particularly when demand for hay is high. This can be complemented with a pre-harvest / prior to cutting application of a registered herbicide – to stop crop regrowth, improve seed-set control and weed control / regrowth.
- Spray following of areas with the heaviest infestation is another option.
- Using harvest weed seed control – such as chaff carts, integrated Hsrrington Seed Destructor (iHSD), narrow windrow burning, bale direct and chaff decks. Growers may need to investigate the use of contractors or hire of machinery for this exercise.
- Well managed burning of concentrated windrows containing seed.
- Growing a pulse or canola crop the following year to provide further options.

### What is an MRL?

- In Australia, the Australian Pesticides and Veterinary Medicines Authority (APVMA) sets maximum residue limits (MRL) for use of agricultural and veterinary chemicals in agricultural produce, particularly produce entering the food chain. These MRLs are set at levels which are not likely to be exceeded if the agricultural or veterinary chemicals are used in accordance with an approved label instruction. At the time that the MRLs are set, the APVMA undertakes a dietary exposure evaluation to ensure that the levels do not pose an undue hazard to human health. Keeping an accurate spray diary and adhering to recommended application timing and spray intervals as per the label is crucial. Note that overseas MRLs are set by the relevant country and may differ from Australian MRLs.

### What are responsibilities from agronomists in providing advice on late season herbicide use?

- This depends on where you are located. Some states have provision to share the liability with the farmer. The agronomist providing advice assumes liability for any advice given. Growers, under state laws, also assume liability as they are the actual user.

## Useful resources

#### Information about MRLs and permitted use can be found at:

[www.pestgenie.com.au](http://www.pestgenie.com.au); and  
[www.apvma.gov.au](http://www.apvma.gov.au)

#### Syngenta Australia Customer Service

1800 067 108

#### BASF Customer Service

1800 558 399

#### Bayer Customer Service

1800 804 479

#### Nufarm Customer Service

1800 997 678 / 1800 131 964

#### Dow AgroSciences Customer Service

1800 700 096

#### Spraywise

[www.spraywisedecisions.com.au](http://www.spraywisedecisions.com.au)

#### Syngenta's Agri-CAST Spray Window Forecasting Tool

[www.syngenta.com.au/weather](http://www.syngenta.com.au/weather)

#### Vendor declarations

[www.graintrade.org.au/contracts](http://www.graintrade.org.au/contracts)

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