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 receivals 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.

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. |
|---------------------------------|----------|----------|----------|----------|
| Wheat                          | Paraquat | Diquat   | Glyphosate | Sharpen® |
| Barley                         | X        | ✓        | ✓        | ✓        |
| Canola                         | ✓        | ✓        | ✓        | 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.

**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 windrowing or swathing operations.

**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.

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**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: Parquat/diquat products, for example SpraySeed® are not registered for pre-harvest weed control or desiccation).

<table>
<thead>
<tr>
<th>Crop</th>
<th>Parquat</th>
<th>Diquat</th>
<th>Glyphosate</th>
<th>Sharpen®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>Parquat is not registered for:</td>
<td>Pre-harvest weed control</td>
<td>Not all glyphosate formulations are registered for this use</td>
<td>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).</td>
</tr>
<tr>
<td></td>
<td>- in-crop spray topping, - pre-harvest crop desiccation, - pre-harvest weed control.</td>
<td>- in-crop spray topping, - pre-harvest crop desiccation, - pre-harvest weed control.</td>
<td>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. DO NOT use on crops intended for seed or sprouting. 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. WHP: DO NOT harvest within 7 days of application. Certain glyphosate formulations can now be applied at higher-use label rates in wheat with a 5-day harvest withholding period (see Table 2).</td>
<td>WHP: NOT required when used as directed.</td>
</tr>
<tr>
<td></td>
<td>These use patterns are unregistered. DO NOT USE PARQUAT PRODUCTS FOR THESE USE PATTERNS</td>
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<td>These use patterns are unregistered. DO NOT USE Glyphosate PRODUCTS FOR THESE USE PATTERNS</td>
<td>These use patterns are unregistered. DO NOT USE. Sharpen® is highly damaging to canola and is not registered for any use patterns. DO NOT USE.</td>
</tr>
<tr>
<td>Barley</td>
<td>Parquat is not registered for:</td>
<td>Pre-harvest weed control</td>
<td>Certain glyphosate formulations are registered for pre-harvest use in canola (see table 2).</td>
<td>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). In order to guarantee good coverage, it is recommended to apply at minimum 100 L/ha volume. ALWAYS apply with 1% v/v Hasten® Spray Adjuvant or high quality methylated seed oil (MSO). WHP: NOT required when used as directed.</td>
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<td>- in-crop spray topping, - pre-harvest crop desiccation, - pre-harvest weed control.</td>
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<td>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 seeds are dense and/or where faster desiccation is required. DO NOT use on crops intended for seed Withholding periods may apply. Refer to the label. DO NOT overspray windrows DO NOT apply to standing crops and again at the time of windrowing. Refer to the complete label and critical comments section.</td>
<td>WHP: NOT required when used as directed.</td>
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<td>Canola</td>
<td>Parquat is not registered for:</td>
<td>Pre-harvest crop desiccation</td>
<td>Not all glyphosate formulations are registered for these uses.</td>
<td>Desiccation timing Faba bean: Hilum black in the pods at the top of the canopy (30-80% of pods ripe and dark) Field pea: 30% seed moisture or when lower 75% of pods are brown with firm seeds and leathery pods Chickpeas: 80-85% of pods within crop have turned yellow-brown Lentil: just after crop starts to yellow (or senescence) Narrow leaf lupin: at 80% leaf drop. Apply to direct harvested lupins only. Application prior to windrowing will result in severe loss of grain yield. Early applications other than described above may result in grain yield penalties. In order to guarantee good coverage, it is recommended to apply at minimum 100 L/ha volume. May have a negative effect on lentil germination. DO not use on lentil crops for seed production. ALWAYS apply Sharpen® with 1% v/v Hasten® spray adjuvant or high quality methylated seed oil (MSO). WHP: DO NOT harvest for 7 days after application.</td>
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<td>- in-crop spray topping, - pre-harvest crop desiccation, - pre-harvest weed control.</td>
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<td>Field peas/Faba beans: Pre-harvest application to reduce viable seed set of annual ryegrass. Adzuki beans*/Chickpeas*/Cowpeas*/Faba beans*/Field peas*/Lentils*/Mungbeans*/ Soybeans*: Pre-harvest application to desiccate a crop as a harvest aid and weed control – annual weeds. Chickpeas*: Glyphosate + metulfuron tank mix for pre-harvest application as harvest aid and weed control – annual weeds. The higher recommended rates are: field peas 280 g a.i./ha, lentils 140 g a.i./ha, mungbeans 280 g a.i./ha, soybeans 700 g a.i./ha.</td>
<td>These use patterns are unregistered. Do not use on crops intended for seed or sprouting. May have a negative effect on lentil germination. DO not use on lentil crops for seed production. WHP: NOT required when used as directed.</td>
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% Parquat 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 fallowing 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.