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## Stop crop weed seed set

Department of Primary Industries and Regional Development, Western Australia

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# Stop crop weed seed set

## Factsheet

**Numerous options can be used to prevent weed seed set, which provides an opportunity to control weeds in the pasture, late fallow, late stubble, and in-crop phases for the next season.**

### Pasture spray-topping

Pasture spray topping is a tactic for reducing annual grasses and retaining desirable species in pastures. This tactic involves applying a non-selective herbicide at a critical time to target weed seed set, followed by heavy grazing. Both paraquat and glyphosate can be used for spray-topping. Spray-topping pasture is possible because annual grasses become much more sensitive to non-selective knockdown herbicides during flowering. Low rates of herbicide can be used to sterilise the grass seeds, with limited effect on desirable pasture legume species.

The composition of a medium-term pasture changes over time. The pasture may be legume dominant in year one but without intervention, pastures become dominated by annual weeds (generally grasses). Typical grass species include annual ryegrass, silver grass, barley grass, and brome grass.

### Benefits

- Strategically timed spray-topping significantly reduces weed seed set, reducing the weed seed bank.
- Both paraquat and glyphosate can be used for spray-topping, allowing better management of herbicide resistance development.
- Spray-topping is a very cost-effective tactic to reduce weed seed set.
- An increased proportion of legume in the pasture, improving feed value of the pasture and increased livestock production from grazing.
- Well-planned spray-topping can be used to set up pastures for high-quality forage conservation (hay or silage) during the following spring.
- Spray-topping is ideally used in the season before fallow initiation, reducing grass weeds and the risk of cereal disease carryover into the following winter crop.
- Spray-topping is very effective against barley grass (*Hordeum* spp.), reducing injuries to lambs' eyes, skin, and carcasses.

## Issues to consider

- The timing of herbicide application is critical to the success of spray-topping - it must be timed after seed heads fully emerge from the boot and before the seeds reach the dough stage (timing is slightly dependent on the herbicide used).
- Spray-topping is not an alternative to fallow spraying.
- Spray-topping alone cannot control a wide range of grass species simultaneously, because the specific timing of spray-topping varies between species (depending on when each species produces seed heads).
- Grass weed levels determine the management 'fit' of spray-topping. Monitor the pasture as grass burdens increase in response to increasing nitrogen levels.
- Winter cleaning or fallow spraying may be used to finalise the pasture phase before cropping commences.
- Spray-topping can reduce seed set in pasture legumes if the stage of development of the legume pasture coincides with the development stage of the target grass weed.

## Mechanical topping or targeted grazing

Another tactic to control weeds is mechanical topping, which refers to slashing or mowing activities late in the season to prevent development of weed seeds. It can be used as an alternative to spray-topping, particularly where resistance to knockdown herbicides is a problem. However, it is slower and more expensive than spray-topping and the plants have a greater chance of regrowing to produce seeds. Mechanical topping can alternatively be achieved by grazing, provided enough sheep are available.

**Table 1 Spray topping compared with mechanical management and targeted grazing for seed set control in pastures**

Tactic	Advantages	Disadvantages
Spray-topping using paraquat or glyphosate	<ul style="list-style-type: none"><li>• quick</li><li>• economical</li><li>• pasture can be grazed afterwards (check withholding period)</li><li>• efficacy on target weed can be greater than 90%</li></ul>	<ul style="list-style-type: none"><li>• desirable species can be affected (glyphosate can be more of a problem than paraquat) if timing is poor</li></ul>
Mechanical topping	<ul style="list-style-type: none"><li>• non-selective</li><li>• can be used on organic farms</li><li>• used in conjunction with grazing</li></ul>	<ul style="list-style-type: none"><li>• time consuming</li><li>• plants often regrow, especially if rain falls soon after cutting</li><li>• can have profound effect on species balance</li></ul>
Targeted grazing	<ul style="list-style-type: none"><li>• non-chemical option for organic farms</li><li>• small positive income stream from wool production</li></ul>	<ul style="list-style-type: none"><li>• large number of sheep needed</li><li>• difficult to treat large areas</li><li>• stock may increase density of some species (like silver grass)</li><li>• can have profound effect on species balance</li></ul>

Tactic	Advantages	Disadvantages
		<ul style="list-style-type: none"> <li>the grazing technique required to alter pasture grass composition generally involves placing a lot of stress on the sheep involved and stressed animals will exhibit reduced performance</li> <li>unless sufficient grazing pressure is applied, sheep will ignore the targeted weed species</li> </ul>

## Renovation crops and pastures

Renovation crops and pastures are those that are returned to the soil with the key aims of improving soil fertility, reducing weed burdens, and increasing soil organic matter. Crops may be returned to the soil by burial, mulching, or chemical desiccation.

### Green manuring

Green manuring incorporates green plant residue into the soil with a cultivation implement. Conducted most with an offset disc plough, cultivation aims to kill weeds and control seed set while building soil organic matter and nitrogen status. Green manuring has a very long history of managing weeds and building soil fertility in systems where herbicides are either not an option or not available, such as organic farming systems.

A problem with green manuring is that cultivation leads to losses of soil organic matter, and lighter textured soils may suffer excessive structural damage.

The number of tillage passes required by green manuring for a successful kill may be affected by soil moisture.

### Brown manuring

Brown manuring is a 'no-till' version of green manuring, using a non-selective herbicide to desiccate the crop (and weeds) at flowering, instead of using cultivation. The plant residues are left standing. This may also be a preferred option on lighter soils that are prone to erosion. The standing residues can be grazed after appropriate withholding periods have been observed.

Brown manuring impacts positively on soil organic matter and helps retain soil structure and surface cover.

### Mulching

Mulching is like brown manuring but involves mowing or slashing the crop or pasture and leaving the residue laying on the soil surface. This enables more soil contact with the crop residue and helps reduce soil moisture loss through evaporation. Residues may break down more rapidly as the pieces are likely to be smaller than in brown manuring.

## Hay freezing

Hay freezing is like brown manuring with the additional aim of creating standing hay. Herbicide is applied earlier than if the crop was to be mown for conventional hay making. Hay freezing is a more reliable tactic for controlling weed seed set than conventional hay making and uses existing boom sprays rather than specialised hay making equipment. The protein content and digestibility of standing hay are like those of conventionally baled hay.

The feed value and quantity of fodder from hay freezing, depend on the plant species and dry matter content of the area treated. Generally, feed value drops rapidly, and the treated area needs to be grazed within a few months of spraying to gain most benefit. The protein content and digestibility of fodder following hay freezing deteriorate rapidly after rain, and the fodder suffers trampling losses over time. However, it provides and maintains better feed value than hayed-off standing pasture.

A glyphosate treated pasture in Western Australia would be expected to maintain good quality for 2 months after spraying. Plan to graze soon after treatment to avoid the risk of forage quality loss due to weather damage. Strip grazing with an electric or movable fence can reduce trampling loss.

## Benefits of renovation cropping

- Manuring, mulching and/or hay freezing (all with regrowth control) reduce viable seed set.
- Manuring will have a beneficial effect on organic matter and soil nitrogen status. The benefit will be greater if the crop or pasture being manured has a high legume content.
- Hay freezing provides standing fodder for livestock.
- Green or brown manuring or hay freezing can be used to manage crop pests and diseases.
- Patches of weeds can be treated prior to the hectic harvest time.
- Costs of renovation cropping (income loss) can be offset by improved yield of subsequent cereal crops.

## In-crop weed management for seed set control

In-crop management of weed seed set can minimise the replenishment of seedbanks and/or reduce grain contamination. It is achieved by intercepting the seed production of weeds that have escaped, survived, or emerged after application of weed management tactics earlier in the cropping season.

Controlling weed seed set contrasts with early in-crop weed management tactics that aim to maintain or maximise crop yield by reducing weed competition. Generally, there is no grain yield benefit from seed set control, as most competition from weeds occurs earlier, during the vegetative stages of the crop.

## Spray-topping with selective herbicides

Selective spray-topping is the application of a post-emergent selective herbicide late in the season to prevent seed set of certain weeds. Selective spray-topping largely targets broadleaf (especially brassica) weeds and wild oats.

Correctly executed selective spray-topping will result in a 90% reduction in weed seed set. Weeds will not necessarily be killed by the tactic, but the growth and development of plants and subsequent seed set will be seriously impeded. The reduction in weed seed set achieved by selective spray-topping depends primarily on timing with respect to the maturity of the weed, the competitiveness of the crop and, most importantly, the density of the weed. Weeds at the reproductive phase are usually highly susceptible to herbicide application and, as herbicides are applied under warmer temperatures, efficacy may be enhanced.

The tactic should not be confused with pasture spray-topping, which occurs in a pasture phase, involves heavy grazing, uses a non-selective herbicide, and largely targets grass weeds.

## **Crop topping with non-selective herbicides**

Crop topping is the application of a non-selective herbicide, such as glyphosate or paraquat, prior to harvest when the target weed is at flowering, early grain fill. Crop-topping aims to minimise production of viable weed seed while minimising yield loss. The selectivity of the crop-topping process depends on a sufficient gap in physiological maturity between crop and weed.

Crop-topping improves harvest due to even maturity of crops, particularly pulses. The ideal time for crop-topping is when annual ryegrass is just past flowering, and the pulse crop is as mature as possible. The tactic works best with early maturing pulse varieties. Plan crop-topping at the start of the season so a suitable crop species and variety can be carefully selected to minimise yield loss. The best weed control will be achieved when crop-topping occurs when the weed is flowering and/or at the soft dough stage of seed development.

Crop-topping should not be performed on crops where the grain is intended for use as seed or for sprouting. Crop-topping is not recommended for wild radish and other brassica weed control in current pulse varieties because of the closely matched rate of development of weed and crop.

Currently, non-selective herbicide crop topping registrations in Western Australia are limited to use in pulse crops and predominantly target annual ryegrass.

## **Wiper technology**

Wick wiping, blanket wiping, carpet wiping, and rope wicking are forms of weed wiping technology that aim to reduce weed seed set by using devices to wipe low volumes of concentrated herbicide onto weeds that have emerged above the crop.

Keys to successful application include:

- controlling herbicide flow to avoid dripping onto the crop
- stabilising broadacre weed wipers to avoid contact with the crop canopy
- targeting areas of low weed density. Dense patches of weeds tend to be knocked into the crop, causing transfer of herbicide from the treated weeds to the crop
- wiping in two directions for best herbicide application
- applying only to target weeds that rise more than 25 cm above the crop canopy
- consulting product labels for application rates. At the time of writing, only some formulations of glyphosate have been registered for use through a weed wiper.

## **Crop desiccation and windrowing**

Crop desiccation and windrowing (also called swathing) are harvest aids that ignore the growth stage of any weeds present, so they are not true weed seed set control tactics. However, in certain conditions, windrowing and crop desiccation can provide significant weed management benefits. In conjunction with trash burning and the collection of residue at harvest, windrowing can minimise the addition of weed seeds to the seedbank.

Windrowing and desiccation can:

- assist harvest schedule
- encourage even ripening of crops
- increase harvest speed and efficiency
- minimise yield loss from shattering or lodging
- enhance crop yield quality
- overcome harvest problems caused by late winter or early summer weed growth
- minimise weather damage during harvest by increasing the speed of drying, while protecting the crop in the windrow
- improve the yield of following crops by halting water use by the current crop, because crop can continue to use soil water when past physiological maturity.

However:

- weed and crop regrowth (post-windrowing) must be controlled to stop seed-set
- weeds/tillers below cutting height will not be incorporated into the windrow
- windrowing in hot weather can increase losses due to shattering.

## Contact us

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## More information

[Integrated Weed Management Manual](#) | Grains Research and Development Corporation (grdc.com.au)

Refer to the department website at [dpird.wa.gov.au](http://dpird.wa.gov.au) for more information about the following:

- Effect of spray topping on pasture legumes
- Manage crop weeds
- Control small weeds of crops
- Crop topping pulse crops
- Crop weed management at harvest
- Hygiene to prevent crop weed seed introduction
- Best agronomic practices to enhance the impacts of crop weed management
- Herbicide resistance
- Assess weed population density

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