

Controlling Weeds  
in Broccoli, Cauliflower  
and Brussels Sprouts

# A Guide to Effective Weed Control in Australian Brassicas



## Background

Effective weed management is an essential requirement for reliably achieving high quality brassica produce. By taking a long term view of weed management and adopting an integrated weed management strategy, you can consistently control the weeds that compete with brassica crops.

In-crop weed management requires a long term integrated approach.

Weed management commences prior to planting of the crop and does not stop until the crop has been harvested and residual produce/weeds are destroyed or cultivated.

Conducting all activities at the right time is the key to successful integrated weed control. Being too late reduces effectiveness and can lead to poor weed control.

## Key Points

- Reduce the seed bank prior to planting
- Transplant into weed free beds
- Apply appropriate pre-emergence herbicides before and/or immediately post transplanting
- Herbicides **MUST** be used correctly
- Inter-row cultivate OR use knockdown herbicide through protected sprayers to control weeds later in the crop as required
- Post-harvest clean up is essential

## Introduction

This brochure is a guide to integrated weed management in Australian broccoli, cauliflower and Brussels sprout crops. It provides an overview of weed management methods in these crops based on research conducted for Horticulture Australia Limited. There are 3 key steps to effective weed management. These are:

1. Plan your rotations
2. Identify your weeds
3. Develop your weed management strategy



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## Step 1: Plan Your Rotations

The first step in effective weed management is to plan your rotations. Adoption of a long term view of how you intend to combat weeds includes considering:

- Your crop rotation
- How you want to carry out each weed control stage, and
- Which herbicides or method you need.

The use of rotation crops in which problem weeds can be more easily controlled will help to reduce seed banks prior to planting. Good weed control between crops is easy to achieve and can be done using knockdown herbicides such as glyphosate or paraquat and through cultivation. The use of cover or green manure crops will also aid in reducing weed seed banks and are an essential part of a long term integrated weed management system.

## Key Points

- Use rotation crops to control weed seed banks between brassica crops
- Using herbicides at the right time is crucial

## Step 2: Identify Your Weeds

The key to getting the most from an integrated weed management strategy is to understand the weeds which will be a problem in your crop.

To most growers this will come from experience in individual blocks and from observation of the major weeds present in your district.

There are two main groups of weeds that cause problems in vegetable brassicas in Australia;

- broadleaf weeds, and
- grass weeds.

It is important to identify which weeds are present in your crops as herbicides and control methods will vary accordingly. With this knowledge a weed control plan can be developed which should give 'best possible' outcomes for that weed or weed spectrum.

11 key broadleaf weeds have been identified that cause problems to brassicas in Australia. Grass weeds are seldom a problem in brassica crops as they are controlled by the management strategies used for broadleaf weeds. A range of products are registered for their control.

## Key Points

- Identifying present weeds will determine which herbicide you can use
- Grass weeds do not need to be considered but can be a problem if knockdown herbicides are not used





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## Step 3: Develop Your Weed Management Strategy

There are five possible stages in which weed control will be most effective. These are pre-planting, transplanting, early in-crop and late in-crop, post-harvest and when the paddock is fallow. There are several options per stage depending on your strategy and the density and diversity of the weed population.

### Pre-Planting

In-crop weed management is easier and more effective where longer rotations and suitable break crops to reduce weed seed bank are used.

However in intensive production systems where crop rotations times are tight this option can be difficult. Getting crop rotation correct and minimising weed populations in the previous crop will reduce weed pressure in the current crop.

Successful weed control commences with transplanting into a weed free seed bed. Best results are obtained using a combination of cultural and chemical controls. There are two main options:

#### Option 1

Form beds well before planting, irrigate to germinate an initial flush of weeds. These weeds can be controlled by spraying with a knockdown herbicide. Alternatively, weeds can be controlled with a very shallow cultivation.

#### Option 2

Form beds just before planting, with a final cultivation to prepare the seedbed and control any emerged weeds. This is discouraged in paddocks with substantial weed burdens, but does minimise pre-plant herbicide applications.

Herbicide options in the pre-plant management phase are all knockdown herbicides with no residual activity. The options at this time are glyphosate, paraquat or diquat. The choice of the correct herbicide will depend upon the weeds present, their size and the herbicide cost. It is best to apply these products when weeds are small as lower rates can be used and better coverage obtained leading to more effective control at lower cost.

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### Broadleaf Weeds

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- Wild Radish, *Raphanus raphanistrum*
- Redroot Amaranth / Prince-of-Wales Feather, *Amaranthus spp.*
- Hogweed / Wireweed, *Polygonum aviculare*
- Black Berry Nightshade, *Solanum nigrum*
- Pigweed, *Portulaca oleracea*
- Sowthistle / Milk Thistle, *Sonchus spp.*
- Fat Hen, *Chenopodium album*
- Wild Turnip, *Brassica spp.*
- Annual Nettle / Stinging Nettle, *Urtica urens*
- Chickweed, *Stellaria media (suppression)*
- Shepherd's purse, *Capsella bursa-pastoris*

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### Grass Weeds

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- Annual ryegrass, *Lolium rigidum*
  - Winter grass, *Poa annua*
  - Barnyard grass, *Echinochloa spp.*
  - Summer grass, *Digitaria spp.*
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## Key Points

- Forming beds well before planting then using a knockdown herbicide and cultivating any emerged weeds is the preferred method
- In beds with low weed populations cultivation can be carried out at time of bed formation to reduce herbicide applications



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## Actions Around Planting (Transplanting)

Transplanting is the most critical time for obtaining good in-crop weed control. This is when most herbicides available for use in vegetable brassicas are applied. There are currently

six different actives which are registered for application just before or just after transplanting, and before weeds have emerged.

Herbicide	Trade Name	Application Timing	Key Weeds Controlled	Critical Comments
Chlorthal-dimethyl	Dacthal 900 WG	Immediately post transplant	Grasses, nettles, milk thistle, amaranth, pigweed, chickweed, wireweed	Does not control brassica weeds or marshmallow. Requires incorporation by irrigation immediately after transplanting. 8 month plant back for sensitive crops (i.e. lettuce).
Metolochlor S-metolochlor	Dual/Dual Gold Plus and other	Immediately post transplant	Grasses, nettles, milk thistle, nightshade, amaranth, pigweed, chickweed, wireweed	Does not control brassica weeds or marshmallow. Requires incorporation by irrigation within 24 hours after transplanting. Can reduce crop growth in soils with low organic matter or > 60% silt or fine sand.
Oxyfluorfen EC	Goal and others	Pre-plant	Grasses, brassica weeds, nettles, milk thistle, pigweed, chickweed, wireweed	Requires incorporation by irrigation within 7 days of application. Transplanting can break herbicide barrier. 6 month plant back for sensitive crops (i.e. onions).
Oxyfluorfen WP	Baron 400 WP	Immediately post transplant (within 3 days)	Grasses, brassica weeds, nettles, milk thistle, pigweed, chickweed (Suppression), wireweed	Requires incorporation by irrigation within 7 days of application. Can cause crop damage on sandy soils and when applied in cold weather.
Pendimethalin	Stomp and others	Pre-plant	Grasses, fat hen, milk thistle, pigweed, chickweed, wireweed	Requires incorporation by irrigation within 5 days of application. Transplanting can break herbicide barrier. Can cause crop damage when applied in cold weather. 12 month plant back for sensitive crops (i.e. silver beet).
Propachlor	Ramrod	Immediately post transplant	Grasses, nettles, fat hen, milk thistle, amaranth, chickweed, wireweed	Does not control brassica weeds or marshmallow Requires incorporation by irrigation within 24 hours after transplanting.
Trifluralin	Triflur and others	Pre-plant	Grasses, amaranth, pigweed, wireweed	Requires incorporation by irrigation within 6 hours of application. Transplanting can break herbicide barrier.

To effectively control the widest weed spectrum for an extended period a split application of metolochlor OR pendimethalin followed by Baron 400 WP provides the best result. However growers need to evaluate their individual situations with emphasis on environment, weeds present, time of the year, crop rotation, irrigation methods and herbicide cost before making a final decision.



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### Early In-Crop

Options for good control are limited if weeds develop in-crop. Grass weeds can be easily controlled using a number of group A herbicides which are registered in these crops.

These include fluazifop-p-butyl (Fusilade), sethoxydim (Sertin), quizalofop and clethodim (Select). Note these products may not be registered in all crops (check labels for registration rates and withholding periods).

Broadleaf weeds can only be killed by cultivation or by inter-row spraying with a shielded spray unit. There is an optimal time when cultural operations are most effective. If done too early the full benefits of the pre-emergence herbicide will be lost as there is time for further weeds to germinate before the canopy closes over. If done too late crops may just be transplanted and some damage can occur.

The actual timing depends upon the crop, the weeds and the time of the year, however this is generally around 4 weeks following transplanting. In many areas cultivation is also a necessary part of the production process and is needed to ensure good soil aeration and to optimise crop growth.

An alternative option is to control weeds through the use of directed inter-row spraying with non selective herbicides using shielded spraying equipment. This method is effective and very efficient, however it does come with some risk, as any herbicide escape can lead to severe injury or death to the crop. The shielded unit must be well made and maintained to ensure that herbicide does not escape when spraying on uneven surfaces. Currently the only product registered for this use is Gramoxone. Please consult the product label and consult your local agronomist prior to adopting this form of in-crop weed control.

## Key Points

- Grass weeds can be killed using group A herbicides, but options are limited for broadleaf weeds
- Cultivation and inter-row shielded spraying are the only options to control broadleaf weeds prior to canopy



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### Late In-Crop and Post-Harvest Weed Control

Once a crop is established and canopy closure achieved it will suppress the growth of most weed species. However species such as Fat Hen, Radish and Potato Weed can grow rapidly and rise above the crop during the last few weeks and interfere with harvest. These weeds can also set seeds and reduce the effectiveness of your integrated weed management strategy. It is important to reduce their numbers and subsequent seed set.

Hand weeding is the only way to reduce weed numbers prior to harvest and whilst this may be expensive in the short term, the longer term benefits of reducing the weed seed bank, will be seen in future crops. Following harvest, effective weed clean up and maintenance of a clean fallow between crops is essential.

The use of cultivation or non selective herbicide sprays, or a combination of both will ensure clean fields and easier and more cost effective weed management in future crops.

### Key Points

- It is important to control weeds prior to harvest to reduce the opportunity for weeds to set viable seed.
- Hand weeding is an expensive option but will reduce the subsequent seed banks and costs in the long term.

Crop Stage	Fallow	Pre-transplant	Transplanting	In-crop	Post-harvest
<ul style="list-style-type: none"> <li>• Weed control options</li> </ul>	<ul style="list-style-type: none"> <li>• Green manure crop</li> <li>• Knockdown herbicides</li> <li>• Cultivation</li> </ul>	<ul style="list-style-type: none"> <li>• Cultivation</li> <li>• Bed forming</li> <li>• Knockdown herbicides</li> <li>• Some pre-emergence incorporated herbicides</li> </ul>	<ul style="list-style-type: none"> <li>• Post transplant pre-emergence herbicides</li> </ul>	<ul style="list-style-type: none"> <li>• Cultivation</li> <li>• Inter-row spraying</li> <li>• Hand weeding</li> </ul>	<ul style="list-style-type: none"> <li>• General knockdown herbicides</li> <li>• Cultivation</li> </ul>

### References

Dal Santo, P and Velthuis, R, (2007), "A scoping study to review the current herbicides available for weed control in brassica crops and possible future strategies" (Project VG06107) Final report conducted for Horticulture Australia Ltd

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