

*A practical guide for growers,  
consultants*

*&  
agronomists*



# VOLUNTEER COTTON MANAGEMENT GUIDE

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# Controlling volunteer cotton

In any crop, volunteers from the previous season may become a nuisance as they compete for valuable resources such as water and nutrients. For farm managers the key to preventing volunteers from becoming a problem is to plan ahead and use the right tool at the right rate and the right time.

The purpose of this guide is to offer possible solutions for controlling conventional, Roundup Ready® and Roundup Ready Flex® cotton volunteers in a range of cropping scenarios.

Remember to always follow directions detailed on product labels.

## *Effective resistance management*

Well planned cotton volunteer control can be a useful resistance management tool as alternative weed control methods are generally utilized over the same growing period where weed selection is occurring to herbicide use in-crop.

## Fallow control



In fallow fields where removal of volunteer or regrowth (ratoon) cotton is required, cultivation represents a highly effective option for satisfactory control of seedlings and larger plants.

Where cultivation is not appropriate the use of herbicides may be effective in controlling volunteers; however timing is critical as the maturity of the volunteers can greatly impact the effectiveness of many herbicides.

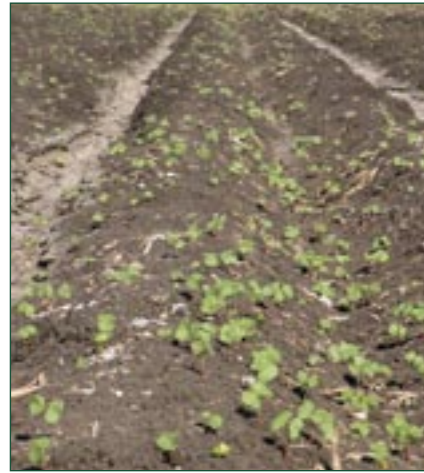
Roundup can be tank-mixed with a number of products including Bromicide and Hammer to give effective control on a large range of weeds including seedling volunteer Roundup Ready cotton plants [note the relevant plant-back timelines on some products.] Remember, Roundup on its own will have no effect on Roundup Ready cotton or Roundup Ready Flex plants.

Fallow control options	Conventional cotton	Glyphosate tolerant cotton
<b>Mechanical</b>		
Cultivation	✓	✓
Chains. Drag off dry soil & break seedling cotton stems (pre-plant)	✓	✓
<b>Herbicides</b>		
Paraquat /Diquat	✓	✓
Bromoxynil (+/- Roundup)*	✓	✓
Carfentrazone (+/- Roundup)*	✓	✓
Roundup*	✓	X
<b>Rotation cropping scenario (Refer to label)</b>		
Flumioxazin (Pledge®)	✓	✓
Atrazine, metasulfuron, chlorsulfuron, 2, 4-D etc	✓	✓

Always follow label directions. Target small plants (<6nodes) for optimum results

\*Glyphosate is not registered for use on volunteer cotton

# Control prior to planting



The pre-irrigation of back-to-back cotton fields is generally a better option than watering up, as it allows volunteer seedlings an opportunity to germinate prior to cotton planting. This means that the small volunteer seedlings can be targeted at planting time with a non-residual herbicide such as Bromicide, Pledge, Spray.Seed® or Hammer.

Once the cotton crop has emerged it is very difficult to control unwanted volunteers in-crop other than using interrow cultivation.

## Control options prior to crop emergence

Always follow label directions

What was the previous cotton crop?	Conventional cotton				Roundup Ready® cotton			
	Conventional cotton		RR cotton/RRF cotton		RR cotton/RRF cotton		Conventional cotton	
What will be the next crop?	Conventional cotton		RR cotton/RRF cotton		RR cotton/RRF cotton		Conventional cotton	
Do you plan to pre-irrigate or Water up?	water up	pre water	water up	pre water	water up	pre water	water up	pre water
<b>Cultivation</b>								
Pre-plant cultivation	✓	✓	✓	✓	✓	✓	✓	✓
Plant line renovation/moisture seeking	✓	✓	✓	✓	✓	✓	✓	✓
<b>Herbicides before irrigation</b>								
Paraquat /Diquat	✓	✓	✓	✓	✓	✓	✓	✓
Bromoxynil (+/- Roundup)	✓	✓	✓	✓	✓	✓	✓	✓
Carfentrazone (+/- Roundup)	✓	✓	✓	✓	✓	✓	✓	✓
Flumioxazin (+/- Roundup)	✓	✓	✓	✓	✓	✓	✓	✓
Roundup*	✓	✓	✓	✓	X	X	X	X
<b>After irrigation#</b>								
Paraquat /Diquat	X	✓	X	✓	X	✓	X	✓
Bromoxynil (+/- Roundup)	X	✓	X	✓	X	✓	X	✓
Carfentrazone (+/- Roundup)	X	✓	X	✓	X	✓	X	✓
Flumioxazin (+/- Roundup)	X	✓	X	✓	X	✓	X	✓
Roundup*	X	✓	✓	✓	X	X	X	X

Target small plants (< 6 nodes) for optimum results

\*Glyphosate not registered for use on volunteer cotton  
# For applications made pre-crop emergence

# Control within the crop

Follow your normal weed control program, using Roundup Ready® herbicide in Roundup Ready cotton and Roundup Ready Flex as per the Crop Management Plan and label recommendations. If volunteers establish at the same time as the crop and require control after emergence, refer to the below options.

Labelled, non-glyphosate herbicides may be applied through shielded sprayers or other equipment to effectively control volunteer plants and other weeds in the furrows.

Make sure non-selective herbicides do not make contact with the cotton crop.

Cultivation with sweeps that lift or till out volunteers and other weeds are effective tools for control when volunteers are small.

## Control after crop emergence

Always follow label directions

What was the previous cotton crop?	Conventional cotton				Roundup Ready® cotton			
	Conventional cotton		RR cotton/RRF cotton		RR cotton/RRF cotton		Conventional cotton	
What will be the next crop?	Conventional cotton		RR cotton/RRF cotton		RR cotton/RRF cotton		Conventional cotton	
Do you plan to pre-irrigate or Water up?	water up	pre water	water up	pre water	water up	pre water	water up	pre water
<b>Cultivation</b>								
Lillistons +/- sweeps	✓	✓	✓	✓	✓	✓	✓	✓
Sweeps alone	✓	✓	✓	✓	✓	✓	✓	✓
Knives or disc +/- sweeps	✓	✓	✓	✓	✓	✓	✓	✓
<b>Herbicides OTT</b>								
Roundup	X	X	✓	✓	X	X	X	X
<b>Shield spray</b>								
Paraquat /Diquat	✓	✓	✓	✓	✓	✓	✓	✓
Carfentrazone (+/- Roundup)	✓	✓	✓	✓	✓	✓	✓	✓
Flumioxazin (+/- Roundup)	✓	✓	✓	✓	✓	✓	✓	✓
Roundup*	✓	✓	✓	✓	X	X	X	X

Target small plants (< 6 nodes) for optimum results

\*Glyphosate not registered for use on volunteer cotton

## Management post harvest

Every effort should be made to ensure that the amount of seed cotton remaining on the plant or on the ground after picking is minimised. This not only reduces the cotton seed bank, but puts more money into the grower's pocket.

Crop stubble removal through stalk pulling or root cutting and mulching following picking are recommended for Roundup Ready and Roundup Ready Flex cotton crops.

This process will reduce the potential for ratoon cotton to become a major problem in future months. Poor quality control of these operations post-harvest may result in regrowth or ratoon cotton that can be very difficult to control.

When cultivation is being used to remove crop stubble, it is important to ensure that adequate disturbance to the root system is being achieved for good control.

## *Pupae Busting*

Effective pupae control will aid in reducing the potential for seedling cotton to become a problem in following crops. Root cutting 10 cm below the soil surface will reduce the ability for cotton to ratoon. Deep burial of seed cotton will reduce the ability of the seed to germinate at a later time and invariably become a volunteer problem.

Head ditches and channels can be challenging areas in which to control cotton volunteers.

Ideal growing conditions and the difficulty of mechanical removal such as cultivation means that head ditches and channels need particular attention.

Residual herbicides have been used to control weeds in head ditches and channels for a number of years and many of these products will suppress the growth of cotton seedlings.

Only registered products should be used and it is recommended that all label directions are followed.

Typically volunteer plants germinate in spring once the soil temperatures increase and rainfall or irrigation has occurred.

The other key period is after harvest when fresh seed has fallen to the ground and the weather conditions are warm and rainfall occurs.

Identifying these key times and using registered knockdown herbicides such as Spray.Seed or Hammer will help prevent the volunteers from becoming a problem.

Grader blades and/or appropriate herbicides are effective in module building or storage areas.



Physical collection of spilled cotton during picking/module building is good farm hygiene and this will reduce the seed burden in these areas.

### Control in non cropping areas

#### Management

Physical collection of spilled cotton during picking/module building is good farm hygiene and will also aid in reducing the seed burden in these areas.

#### Mechanical

Mechanical removal methods such as cultivation are possible but can be difficult in head ditches and channels. Grader Blades and/or appropriate herbicides are effective in module building or storage areas.

#### Herbicides

Residual herbicides have been used to control weeds in head ditches and channels for a number of years and many of these products will suppress the growth of both conventional and glyphosate tolerant cotton seedlings. Registered knockdown herbicides as detailed on pages 8 & 9 (in conjunction with good management and cultivation) will help prevent volunteers from becoming a problem.

# Herbicide control options

Always read product labels and use as recommended		Monsanto cotton volunteer control comparison 3 year trial*															
Chemical	Bromoxynil	<table border="1"> <caption>% Control @ 21DAT for Bromoxynil</caption> <thead> <tr> <th>Treatment</th> <th>n</th> <th>% Control @ 21DAT</th> </tr> </thead> <tbody> <tr> <td>1.5L/ha</td> <td>3</td> <td>~95</td> </tr> <tr> <td>1.L/ha</td> <td>14</td> <td>~90</td> </tr> <tr> <td>700mL/ha</td> <td>14</td> <td>~90</td> </tr> <tr> <td>750mL/ha</td> <td>14</td> <td>~88</td> </tr> </tbody> </table>	Treatment	n	% Control @ 21DAT	1.5L/ha	3	~95	1.L/ha	14	~90	700mL/ha	14	~90	750mL/ha	14	~88
Treatment	n		% Control @ 21DAT														
1.5L/ha	3		~95														
1.L/ha	14		~90														
700mL/ha	14		~90														
750mL/ha	14		~88														
Product(s)	Bromicide® 200 (200g/L Bromoxynil)																
Herbicide group	C																
Labelled cotton control	Cotyledon to 6 leaves																
Additional control	Bellvine, cowvine/peachvine, climbing buckwheat, physalis, datura, milkthistle, noogoora burr, bladder ketmia (variable)																
Rate	1.5 L/ha																
Water volume	Minimum spray volume 80L/ha																
Adjuvant	Not required																
Droplet spectrum	Contact herbicide																
Roundup compatible	YES																
Additional information																	
Chemical	Flumioxazin	<table border="1"> <caption>% Control @ 21DAT for Flumioxazin</caption> <thead> <tr> <th>Treatment</th> <th>n</th> <th>% Control @ 21DAT</th> </tr> </thead> <tbody> <tr> <td>30g+Hasten</td> <td>12</td> <td>~95</td> </tr> <tr> <td>45g+Hasten</td> <td>12</td> <td>~100</td> </tr> <tr> <td>90g+Hasten</td> <td>12</td> <td>~95</td> </tr> <tr> <td>120g+Hasten</td> <td>12</td> <td>~98</td> </tr> </tbody> </table>	Treatment	n	% Control @ 21DAT	30g+Hasten	12	~95	45g+Hasten	12	~100	90g+Hasten	12	~95	120g+Hasten	12	~98
Treatment	n		% Control @ 21DAT														
30g+Hasten	12		~95														
45g+Hasten	12		~100														
90g+Hasten	12		~95														
120g+Hasten	12		~98														
Product(s)	Pledge 500 WG®																
Herbicide group	G																
Labelled cotton control	1 true leaf to 4 leaves																
Additional control	Bellvine, cowvine/peachvine, yellowvine, noogoora burr, bladder ketmia																
Rate	45 grams/ha																
Water volume	Minimum spray volume 80 L/ha																
Adjuvant	eg. Hasten at 0.5-1.0% or Uptake Oi at 0.5%																
Droplet spectrum	Contact herbicide																
Roundup compatible	YES																
Additional information	Spraying at night or late afternoon recommended																

\*Monsanto (Aust) conducted 18 individual replicated trials across 4 growing regions. Work was done in 2000/01, 01/02 & 02/03 under APVMA permit number TPM0001A. The size of the volunteer seedlings over the trials conducted ranged from just emerged through to the 8 leaf stage. All products were applied in 75-80L/ha water volume. Pledge trial work was conducted over two years.

Always read product labels and use as recommended		Monsanto cotton volunteer control comparison 3 year trial*															
Chemical	Carfentrazone	<table border="1"> <caption>% Control @ 21DAT for Carfentrazone</caption> <thead> <tr> <th>Treatment</th> <th>n</th> <th>% Control @ 21DAT</th> </tr> </thead> <tbody> <tr> <td>100mL/ha</td> <td>3</td> <td>~95</td> </tr> <tr> <td>50mL/ha</td> <td>3</td> <td>~75</td> </tr> <tr> <td>70mL/ha</td> <td>6</td> <td>~80</td> </tr> </tbody> </table>	Treatment	n	% Control @ 21DAT	100mL/ha	3	~95	50mL/ha	3	~75	70mL/ha	6	~80			
Treatment	n		% Control @ 21DAT														
100mL/ha	3		~95														
50mL/ha	3		~75														
70mL/ha	6		~80														
Product(s)	Hammer® herbicide (240g/L Carfentrazone-ethyl)																
Herbicide group	G																
Labelled cotton control	Seedlings at 2 - 6 leaves																
Additional control	Marshmallow and certain other broadleaf weeds																
Rate: Roundup Ready cotton	75 - 100 ml/ha																
Rate: Conventional cotton	50 - 75 ml/ha																
Water volume	Minimum spray volume 80 L/ha																
Adjuvant	eg. Hasten or Supercharge at 0.5%																
Droplet spectrum	Contact herbicide																
Roundup compatible	YES																
Additional information	Post - emergence herbicide to be added to knockdown herbicide or stand alone for cotton volunteers (with adjuvant)																
Chemical	Paraquat + Diquat	<table border="1"> <caption>% Control @ 21DAT for Paraquat + Diquat</caption> <thead> <tr> <th>Treatment</th> <th>n</th> <th>% Control @ 21DAT</th> </tr> </thead> <tbody> <tr> <td>0.8L/ha + 300mL/ha Diuron</td> <td>4</td> <td>~90</td> </tr> <tr> <td>0.8L/ha + BS 1000</td> <td>4</td> <td>~88</td> </tr> <tr> <td>1.6L/ha + 300mL/ha Diuron</td> <td>4</td> <td>~95</td> </tr> <tr> <td>1.6L/ha + BS 1000</td> <td>20</td> <td>~100</td> </tr> </tbody> </table>	Treatment	n	% Control @ 21DAT	0.8L/ha + 300mL/ha Diuron	4	~90	0.8L/ha + BS 1000	4	~88	1.6L/ha + 300mL/ha Diuron	4	~95	1.6L/ha + BS 1000	20	~100
Treatment	n		% Control @ 21DAT														
0.8L/ha + 300mL/ha Diuron	4		~90														
0.8L/ha + BS 1000	4		~88														
1.6L/ha + 300mL/ha Diuron	4		~95														
1.6L/ha + BS 1000	20		~100														
Product(s)	Revolver®, Sprayseed® herbicide (135g/L Paraquat + 115g/L Diquat)																
Herbicide group	L																
Labelled cotton control	Cotyledons/Seedlings at 1 - 9 leaves																
Additional control	Wide range of grasses and broadleaf weeds																
Rate: 1- 4 leaves	1.6 - 2.4 L/ha																
Rate: 5- 9 leaves	2.4 - 3.2 L/ha																
Water volume	Minimum spray volume 80 L/ha																
Adjuvant	For spray volumes above 100 L/ha, additional wetter should be added at the rate of 200mL/100L Agral or 120mL/ha BS1000																
Droplet spectrum	Contact herbicide																
Roundup compatible	NO																
Additional information	Avoid spraying under hot/dry conditions. Best results will be obtained when spraying is carried out in the evening or in humid conditions																

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# Volunteer control checklist

- ✓ The size of the volunteer plants needs to be assessed prior to removal as the effectiveness of registered herbicides on cotton is generally limited to new seedlings of no more than 4 - 6 leaf, or about 25cm in height
- ✓ Larger plants will generally be more difficult to control with a single pass
- ✓ Cultivation may be a better option if cotton volunteers are too large for herbicide control
- ✓ Correct herbicide choice is important to provide the best control possible. It is important to read all labels before use to confirm the correct timing and rates. The respective label directions must be followed
- ✓ Water volume used in herbicide control is imperative. Rates of 100L/ha are recommended to provide sufficient coverage of herbicides for effective control
- ✓ Other weeds within the field should be taken into consideration when determining herbicide control
- ✓ Reduce the cottonseed bank. This can be achieved by encouraging volunteer emergence during fallow periods via cultivation and irrigation and eliminating the volunteers prior to planting
- ✓ Effective pupae busting will reduce potential problems
- ✓ Quality control at harvest and during the elimination of the crop residue will reduce the cottonseed bank
- ✓ Typically, volunteer plants germinate in spring once the soil temperatures increase and rainfall or irrigation has occurred. The other key time is after harvest when fresh seed has fallen to the ground and the weather conditions are warm and rainfall occurs
- ✓ Cool, wet winters will help to reduce volunteer seed banks compared to dry, warmer winters
- ✓ Crop rotation can be used to help dramatically reduce volunteer numbers



# Right **tool** **rate** **time**

Target small volunteer plants, using the appropriate herbicide option applied in a sufficient spray volume to achieve good coverage.

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