

# Controlling volunteer seedling cotton

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The control of seedling volunteer cotton is increasingly important to maintain rotation flexibility and good farm hygiene practice. Most seedling volunteers on-farm come from seed cotton but can also establish directly from fuzzy seed or planting seed.

Control of volunteer cotton plants on all areas of cotton farms and roadsides is highly desirable as they are, in effect, a weed. Volunteers are often scattered across furrows and plant lines within fields and rarely yield as well as newly planted seed due to seedling disease and early emergence in cool conditions.

They can also provide problems for resistance management of Bt cotton, reduce seed purity and act as early host plants for pests such as spider mites and aphids. In addition, susceptible varieties can be a confounding factor in disease management.

Cultivation and herbicides are the two most common methods to control volunteer cotton. Glyphosate has been used extensively to control seedling volunteer cotton, either deliberately or inadvertently, when targeting other weeds prior to cotton planting, as a fallow spray, or within crop as a shielded spray.

The release and widespread adoption of Roundup Ready cotton, which has a gene allowing the tolerance of topical applications of glyphosate, will eliminate the use of glyphosate as a potential control herbicide in seedling volunteer cotton. Growers will have to use alternative herbicides that control the volunteers but do not have residual effects on subsequent crops, including cotton.

## Herbicide control

Preliminary studies were conducted to determine a range of suitable herbicides for the control of seedling volunteer cotton. Two experiments were



The effect of carfentrazone (Hammer 240 EC) sprayed at four true leaves.



The effect of paraquat+diquat sprayed at eight true leaves.

conducted in 2001–02 — one at St George and one in the Namoi Valley, close to Narrabri.

Herbicides were selected based on their likely efficacy on controlling seedling cotton with minimal residual carryover to either cotton or rotation crops. Glyphosate was excluded from this list which meant the results were also relevant to the control of Roundup Ready cotton.

Plants were sprayed at St George at the four true leaf stage and the eight leaf stage at Narrabri. Water volume was 100 litres per hectare. The centre two rows of each plot were counted four weeks after spraying to determine the number alive and the number dead in each treatment.

Volunteers were also counted at both sites if they were within 50 cm of the two centre plant lines. Plants were still considered alive if they had green foliage or stems and if they regrew at any stage. This very strict definition of control was used, as several herbicides severely damaged the cotton plants but did not completely result in plant death.

#### Trial results

The results are presented in Table 1 and herbicides could be grouped into three classes:

- Effective control;
- Incomplete control; and,
- No control.

The results found in this experiment were preliminary and no attempt was made to ascertain the most appropriate herbicide rate or the effects of combinations of herbicides. The most promising herbicides that were effective in controlling seedling cotton (including Roundup Ready volunteers) were paraquat+diquat and carfentrazone. Both of these products are contact herbicides with no residual carryover and their use patterns have been designed as pre-emergent knockdowns.

Paraquat and diquat are from the bipyridyl group of herbicides which inhibit photosynthesis at photosystem I (group L) and carfentrazone is a member of the aryl triazoline group which inhibits protoporphyrinogen oxidase (group G).

The differences in modes of action from glyphosate,

**TABLE 1: Effect of herbicides on seedling cotton at St George (four true leaves) and Narrabri (eight true leaves) in 2001-02**

Herbicide	Trade name	Rate/ha (kg or L/ha)	Active ingredient (g/ha)	Percentage control	
				St George 4 true leaves	Narrabri 8 true leaves
Unsprayed	-	-	-	0	0
<b>Effective control</b>					
Bromoxynil	Buctril 200	4	800	100	100
Carfentrazone	Hammer 240 EC	0.15	36	100	100
Paraquat+Diquat	Sprayseed 250	2	270+230	100	100
<b>Incomplete control</b>					
2,4-D Amine	Surpass	2	450	0	95
Glufosinate-ammonium	Basta (Changing to Liberty)	3	600	92	96
Fluroxypyr	Starane 200	1	200	25	95
MCPA Amine	MCPA 500	2	1000	30	88
<b>No control</b>					
Clopyralid	Lontrel	0.15	45	0	0
Dicamba	Barvel 200	1.4	280	2	0
Diuron	Diuron DF	1.9	1710	0	0
Fluometuron	Nu-Tron 900 DF	1.9	1710	0	0
Oxyfluorfen	Goal CT	0.25	60	15	0
Prometryn	Gesagard 500 SC	3	1500	19	10
Tridopyr	Garlan	0.15	90	0	0

which inhibits EPSP synthase (group M) are important, as it allows these herbicides to control glyphosate tolerant cotton and also control weeds using a different herbicide group. Rotating herbicide chemistry is an important component of preventing herbicide resistance.

Carfentrazone can also be mixed with glyphosate or paraquat+diquat to improve the weed spectrum it controls. In theory, a mixture of carfentrazone (at an adequate rate) and glyphosate would control Roundup Ready seedling volunteers as well as the usual weeds glyphosate is targeted against. But this mixture was not tested in these experiments.

Bromoxynil at four litres per hectare provided excellent control, but a dose rate response study would need to be conducted to examine if lower rates are effective before this product became economically useful.

Gluofosinate-ammonium also showed promise but excellent spray coverage seemed more important with this product than paraquat+diquat or carfentrazone. A small number of plants that received less than optimal spray coverage were not completely controlled, suggesting that herbicide dose rates will be important for this product's robustness.

2,4-D amine, MCPA amine and fluroxypyr did not provide complete control of plants immediately, but would have eventually provided acceptable control for commercial situations. It is unclear why applications at the eight leaf stage provided better control than at the four leaf stage.

The disadvantage of these herbicides is the plant-back requirements when planting to cotton crops. Depending on the herbicide rate used, a minimum of seven days after application is often required before planting to cotton.

Other herbicides examined in these experiments would not have provided suitable control of seedling cotton and do not warrant further investigation. No investigation of the effect of the herbicides on ratoon cotton was conducted in these experiments so potential ratoon control cannot be inferred.

## Conclusion

The use of both paraquat+diquat and carfentrazone for the control of seedling volunteer cotton appears

to have potential. These two products had high efficacy against seedling cotton and their original registrations are very close to the extended use pattern that was examined in this experiment.

At the time of writing this article, both products were unregistered for the control of volunteer cotton but it is likely that registration will be sought for both these products. Excellent spray coverage is required for these products to work effectively.

Future herbicide dose response experiments need to be conducted over a range of locations and environments to confirm the efficacy of these compounds.

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[Go back.](#)