MANAGING WEEDS IN VETCH ROTATION CROPS

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Background

Vetch is being increasingly grown as an alternative rotation crop for cotton. It is a useful green manure crop, and is capable of adding large amounts of nitrogen to the soil.

Vetch crops can be sown in autumn into a fallow or crop stubble. They are commonly sown into cotton stubble soon after picking. Vetch grows over winter, and is normally removed in early spring, prior to cotton planting and before the vetch has started to set seed. Removing the crop prior to seed-set is important as vetch is hard-seeded and can produce large quantities of viable seed. If it is allowed to seed, vetch will be a nuisance weed in later cotton crops.

Weed management in vetch is problematic, with few herbicides registered for in-crop weed control. Management of broadleaf weeds is especially difficult in vetch. Broadleaf weeds can compete strongly with the vetch, reducing the value of the crop and potentially leading to increased weed problems in later years. Also, no herbicides are registered for controlling the vetch to allow replanting back to cotton where this option is desired.

It is a legal requirement that pesticide users follow the directions on the product label. Growers who wish to make an off-label pesticide application must first obtain a minor-use permit from the APVMA for the proposed use.

Many of the herbicide options discussed in this article are off-label and must be covered by a minor-use permit.

Vetch crops may be sown into cotton trash after picking. They can fix large amounts of nitrogen and may be plowed in as green manure, or killed by herbicides and left as a surface mulch.

Pre-planting herbicides

Vetch should be sown into a clean seedbed, with weeds controlled prior to planting with cultivation and/or herbicides. A wide range of products are registered for controlling weeds in fallows. Spray.Seed (various trade names) and Surpass + glyphosate (various trade names for both products) are registered for controlling weeds prior to planting vetch. There is a 7 – 10 day plant-back period constraint before planting vetch following a Surpass application.

Growers should be aware that vetch emergence and establishment may be adversely affected by residual herbicides previously applied to cotton when vetch is planted immediately following a cotton crop.

There are no pre-planting residual herbicides registered for use with vetch crops in NSW or Qld. Some formulations of trifluralin (sold under a range of trade names) are registered for pre-planting use in vetch crops in SA and WA, but not in NSW or Qld.

A range of residual pre-planting herbicides and herbicide combinations were screened in an experiment at the ACRI in 2005. Herbicides were applied and incorporated prior to planting the vetch and the crop was watered up.

No establishment problems were observed with any of the herbicides used, with satisfactory establishment levels on all treatments (Table 1). Some variability was apparent in the data related to background residual herbicides used on the preceeding cotton crop.

Table 1. *Establishment of vetch following applications of pre-planting residual herbicides.*

Herbicide	% establishment
Diuron 2kg/ha	95
Simazine 2 kg/ha	93
Crew* 2.4 L/ha + Diuron 2 kg/ha	90
Fluometuron 4 L/ha	88
Stomp 3 L/ha + Prometryn 2 kg/ha	85
Prometryn 2 kg/ha	85
Stomp 3 L/ha + Simazine 2 kg/ha	83
Stomp 3 L/ha + Fluometuron 4 L/ha	80
Crew 2.4 L/ha + Prometryn 2 kg/ha	80
Crew 2.4 L/ha + Simazine 2 kg/ha	80
Crew 2.4 L/ha	78
Crew 2.4 L/ha + Fluometuron 4 L/ha	78
Stomp 3 L/ha + Diuron 2kg/ha	78
Stomp 3 L/ha	73
Nil	90

**The active ingredient in Crew is trifluralin (330 g/L).*

Vetch growth was monitored following establishment. All treatments grew satisfactorily, but some stunting was observed on treatments containing simazine and fluometuron (Table 2), indicating that vetch had less tolerance to these herbicides.

These results indicate that pendimethalin, trifluralin, diuron and prometryn might all be satisfactorily used as pre-planting residual herbicides for vetch crops.

Table 2. *Vetch growth following applications of pre-planting residual herbicides. Growth was recorded relative to the nil treatment.*

Herbicide	Relative growth %
Prometryn 2 kg/ha	100
Crew 2.4 L/ha	100
Stomp 3 L/ha	100
Crew 2.4 L/ha + Diuron 2 kg/ha	100
Stomp 3 L/ha + Diuron 2kg/ha	100
Crew 2.4 L/ha + Prometryn 2 kg/ha	99
Diuron 2kg/ha	99
Simazine 2 kg/ha	99
Crew 2.4 L/ha + Fluometuron 4 L/ha	96
Stomp 3 L/ha + Simazine 2 kg/ha	96
Stomp 3 L/ha + Prometryn 2 kg/ha	95
Stomp 3 L/ha + Fluometuron 4 L/ha	95
Crew 2.4 L/ha + Simazine 2 kg/ha	86
Fluometuron 4 L/ha	81

Herbicide combinations for early removal of a vetch crop 7 weeks after planting.

Post-emergence weed control in vetch crops

A number of herbicides are registered for controlling grass weeds in vetch. These herbicides include Aramo, Correct, Fusilade Forte, FusionSuper, Targa and Verdict.

No herbicides are registered for broad-leaf weed control in vetch crops.

A range of herbicides were screened for broad-leaf weed control in vetch, not all of which could be safely used if a cotton crop was to be planted in the same season. Basagran and simazine had no negative affect on the vetch (Table 3), but simazine has a long soil half-life and a 9-month plant-back to cotton. Fluometuron, prometryn, atrazine and diuron all caused some initial leaf damage to the vetch, but caused no long-term damage. These products could be used with some caution, with lower rates used where possible. These products would ideally be applied as shielded or directed sprays in young vetch. Atrazine also has a long soil half-life and an 18-month plant-back to cotton at the rate used in this experiment. Spinniker, Sencor and Ally all caused unacceptable levels of damage and could not be safely used with vetch.

Table 3. *Herbicides applied broadcast, post-planting to vetch.*

Herbicide	Phytotoxicity*	
	3 weeks	6 weeks
Simazine 2 kg/ha	0	0
Basagran 2 L/ha	0	0
Fluometuron 4 L/ha	1.4	0.3
Prometryn 2 kg/ha	1.8	0.3
Atrazine 2 kg/ha	1.5	0.4
Diuron 2kg/ha	2.1	0.4
Spinniker 0.2 L/ha	1.4	1.1
Sencor 1.4 L/ha	3.9	3.6
Ally 10 g/ha	4.5	5.0
Nil	0	0

**Herbicide phytotoxicity was rated 0 (no phytotoxicity) to 5 (dead plants).*

Removing vetch crops with herbicides

Vetch crops are normally planted in the autumn/winter before a cotton crop and must be killed prior to cotton planting.

Slashing and incorporating the vetch crop is the best option for removal, as this method returns the maximum amount of available nitrogen to the following cotton crop, while minimising any potential problems with insects and diseases.

There are no herbicides registered for killing a vetch crop. 2,4-D (a range of trade names) is registered for controlling vetches in a range of crops, but the registrations only covers Vic. and SA, not NSW or Qld.

A range of herbicides and herbicide combinations with Roundup PowerMAX were screened for removing a young vetch crop in late winter (Tables 4 & 5), and an older crop at the flowering stage in spring (Table 6).

MCPA 500 at 4 L/ha and Starane at 1 and 2 L/ha gave the best control of young vetch, with better than 95% control observed (Table 4). There was some background vetch emergence on the site from an experiment run in the previous season and it is likely that some of the “surviving” shoots came from seedlings that emerged after the herbicide application.

Table 4. *Herbicides for early removal of a vetch crop in late winter (28 July), 7 weeks after planting.*

Herbicide	% Vetch kill	
	3 weeks	6 weeks
MCPA 500 4 L/ha	95	98
Starane 2 L/ha	97	97
Starane 1 L/ha	92	96
Roundup PowerMAX 4 L/ha	84	89
MCPA 500 2 L/ha	86	87
Buctril MA 4 L/ha	90	86
Roundup PowerMAX 2 L/ha	77	81
Surpass 2 L/ha	86	80
Buctril MA 2 L/ha	94	66
Buctril 4 L/ha	87	56
Spray.Seed 3.6 L/ha	88	45
Surpass 1 L/ha	72	22
Spray.Seed 2.4 L/ha	82	17
Buctril 2 L/ha	72	14
Nil	0	0

Roundup PowerMAX at 4 L/ha gave a reasonable result, also controlling all other weeds present on

the plots. A range of combinations using lower rates of Roundup PowerMAX in combination with lower rates of some of the other herbicides was also screened (Table 5).

Table 5. *Herbicide combinations for early removal of a vetch crop in late winter (28 July), 7 weeks after planting.*

Herbicides	% Vetch kill	
	3 weeks	6 weeks
Roundup PowerMAX 1 L/ha + Envoke 10 g/ha	81	96
Roundup PowerMAX 2 L/ha + Envoke 10 g/ha	89	96
Roundup PowerMAX 2 L/ha + Starane 1 L/ha	99	94
Roundup PowerMAX 2 L/ha + Surpass 2 L/ha	97	90
Roundup PowerMAX 2 L/ha + Buctril MA 2 L/ha	98	89
Roundup PowerMAX 1 L/ha + Starane 0.5 L/ha	87	84
Roundup PowerMAX 1 L/ha + Surpass 1 L/ha	86	80
Roundup PowerMAX 2 L/ha + Buctril 2 L/ha	91	79
Roundup PowerMAX 1 L/ha + Buctril MA 1 L/ha	87	61
Roundup PowerMAX 2 L/ha + Hammer 750 mL/ha	80	60
Roundup PowerMAX 2 L/ha + Pledge 30 g/ha	93	56
Roundup PowerMAX 1 L/ha + Buctril 1 L/ha	87	51
Roundup PowerMAX 1 L/ha + Pledge 30 g/ha	80	25
Nil	0	0

The Roundup PowerMAX + Envoke and Roundup PowerMAX + Starane at 1 L/ha combinations both gave good results, although the result for the Starane combination was no improvement over Starane alone at 1 L/ha (Table 4). Envoke was not tested by itself in this experiment.

Cotton was planted into all treatments in early October and no phytotoxicity was observed with any of the treatments. However, the Envoke label specifies a 9-month plant-back period to cotton and so Envoke can not be used to remove vetch prior to a cotton crop.

A later application was made to much larger vetch on 30 Sept., 16 weeks after planting (Table 6).

Envoke at 20 g/ha, Starane and MCPA 500 all gave very good control of large vetch plants. The combination of Roundup PowerMAX + Envoke at 10 g/ha also gave good control and controlled all other weeds present on the plots. The combination gave much better control than Envoke alone at 10 g/ha. However, Envoke has a 9-month plant-back period to cotton and so can't be used to remove vetch immediately prior to a cotton crop. Starane has a much shorter plant-back to cotton of 14 to 28 days (depending on the application rate). The plant-back to MCPA should be similar, at around 14 days, although the plant-back period to cotton is not specified on the product label.

Table 6. *Herbicides for late removal of a vetch crop in spring (30 September), 16 weeks after planting. The crop had begun to naturally senesce, resulting in some plant death on all treatments.*

Herbicide	% Vetch kill
	4 weeks
Envoke 20 g/ha	100
Starane 2 L/ha	100
MCPA 500 4 L/ha	100
Starane 1 L/ha	100
Roundup PowerMAX 2 L/ha + Envoke 10 g/ha	100
Roundup PowerMAX 2 L/ha + MCPA 500 4 L/ha	95
Envoke 10 g/ha	80
Staple 120 g/ha	58
Staple 60 g/ha	38
Nil	43

Both Roundup and Envoke may be valuable for controlling volunteer vetch plants in a cotton crop, should these become a problem.

The Roundup PowerMAX + MCPA 500 at 4 L/ha combination also gave a good result and controlled all other weeds, but gave a slightly inferior result to MCPA 500 at 4 L/ha alone. Growers electing to use this combination would have to weigh up the advantage of an increased weed control spectrum with the disadvantage of possibly poorer control of vetch. The results with the Roundup PowerMAX + Envoke combinations in Table 5 suggest that a lower rate of Roundup PowerMAX may have given as good or better control of vetch without compromising the control of other weeds.

Herbicides for late removal of a vetch crop in late September, 16 weeks after planting, when vetch was at the flowering stage.

Summary

Vetch is being increasingly grown as an alternative rotation crop for cotton, capable of adding large amounts of nitrogen to the soil.

Weed management in vetch is problematic, with few registered herbicides for pre-planting applications, and no herbicides registered for controlling broad-leaf weeds in vetch, or for controlling vetch prior to planting cotton.

Many of the herbicide options discussed in this article are off-label. Growers wishing to make an off-label pesticide application must first obtain a minor-use permit from the APVMA for the proposed use.

Vetch should be sown into a clean seedbed, with weeds controlled prior to planting with cultivation and/or herbicides. A wide range of products are registered for controlling weeds in fallows. Spray.Seed and Surpass + glyphosate are registered for controlling weeds prior to planting vetch. There is a 7 – 10 day plant back period restraint following a Surpass application.

A range of herbicides were screened for use with vetch crops. Pendimethalin, trifluralin, diuron and prometryn applied as pre-planting residual herbicides caused no establishment or growth problems.

A range of herbicides are registered for controlling grass weeds in vetch. These herbicides include Correct, FusionSuper, Targa and Verdict.

For post-emergence broad-leaf weed control in vetch, Basagran and simazine had excellent crop safety), but simazine has a 9-month plant-back to cotton. Fluometuron, prometryn and diuron all caused some initial leaf damage to the vetch, but caused no long-term damage. These products could be used with some caution, with lower rates used where possible. They would ideally be applied as shielded or directed sprays in young vetch crops.

A range of herbicides were screened for removing vetch crops. MCPA 500 at 4 L/ha and Starane at 1 and 2 L/ha gave the best control of young vetch.

Envoke at 20 g/ha, Starane and MCPA 500 all gave good control of large vetch plants. However, Envoke has a 9-month plant-back period to cotton. Starane has a much shorter plant-back of 14 to 28 days and MCPA around 14 days.

Both Roundup and Envoke may be valuable for controlling volunteer vetch plants in a cotton crop, should these become a problem.