

Fenugreek Herbicide Tolerance

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The aim of this trial was to investigate the effect of post-sowing pre-emergent herbicides and post emergent herbicides on fenugreek growth and yield and weed control.

Summary

Spinnaker at 150ml/ha was the safest post-sowing-pre-emergent herbicide for use in fenugreek. Post-emergent herbicides with good crop safety included Broadstrike 25 g/ha + Uptake 0.5%, Buttress 2 L/ha, Buticide 2.5 L/ha and Broadstrike 25 g/ha + Buttress 1 L/ha.

Background

Fenugreek grows slowly in the winter and competes poorly with weeds. Herbicide options are limited for broadleaf weed control in fenugreek. Post-Sowing-Pre-Emergent (PSPE) herbicides would provide early weed control and reduce competition when fenugreek is growing slowly. Broadstrike and 2,4-DB are the most commonly used post emergent (PE) herbicides for broadleaf weed control in fenugreek. Broadstrike is very safe on fenugreek and provides good control of brassica weeds but has a narrow weed spectrum. 2,4-DB has a wider weed spectrum than Broadstrike but can damage the crop. This trial builds on previous work on fenugreek herbicide tolerance and investigates several PSPE and PE herbicide treatments.

Methods

Two experiments were conducted, one examining PSPE options and the other exploring PE options. Each experiment was designed as a randomised complete block with four replications for each treatment.

The site was on thick wheat stubble that had been prickle chained. Superfect fertiliser was spread at 130 kg/ha in Mid May and 1.5L/ha Roundup CT extra was sprayed on May 25. The PE site was sprayed with 0.8L/ha Trifluralin 480. Fenugreek seed was treated with P Pickle T, inoculated with *Trigonella* rhizobium (SU277) and sown at 22 kg/ha on June 26 into a moist seedbed with heavy stubble cover. Plots were 20m long and 1.1 m wide. On June 29 the site was levelled by harrowing the straw and rolling with a rubber tyre roller. Imidan insecticide was applied at 250 ml/ha on June 29. Decis at 300ml/ha was aerially applied for native budworm control on November 13.

Table 1 summarises the application details for PSPE and PE treatments. Plots were assessed for crop tolerance and weed control using the EWRC scoring system of 1-9. Low scores indicate effective weed control and acceptable crop tolerance. High scores indicate poor weed control and unacceptable crop damage. All plots were harvested for grain yield with a Kingaroy plot harvester.

Table 1. Spraying details for fenugreek herbicide tolerance trials

	PSPE	PE
Date of spraying	July 3	September 9
Crop stage	Pre-emergent	4 to 5 trifoliolate leaves
Weeds	None present	Mustard (maximum diameter 10 cm) Hoary cress (maximum diameter 8 cm)
Soil conditions	100 % stubble cover, moist soil	Moist
Weather	Clear sunny day, no wind, 15°C	Fine sunny day, 30% cloud , NW breeze, 18°C

Results

Post-Sowing-Pre-Emergent Herbicides

Weed Control (Table 2)

Indian Hedge Mustard was the dominant weed species at the site. All treatments provided commercially acceptable control of mustard except for Raptor, which suppressed mustard. Spinnaker mixes achieved significantly better mustard control than simazine mixes. Whip thistle population was low and patchy across the site. There were no significant differences between herbicide treatments for whip thistle EWRC scores, however simazine treatments appeared to be more effective on whip thistle than Spinnaker treatments. Most simazine mixes provided acceptable control of milk thistle but Spinnaker treatments were ineffective. None of the herbicide treatments controlled hoary cress.

Table 2. Effectiveness of PSPE weed control in fenugreek.

PSPE Treatments	EWRC Weed control scores 121 DAT 6/11		
	Mustard	Whip Thistle	Milk thistle
Nil	9	9	9
Spinnaker 0.150 L/ha	1	4	9
Spinnaker 0.200 L/ha	1	5.5	9
Spinnaker 0.125 L/ha + simazine 1 L/ha	1	1.8	3.7
Simazine 1.2 L/ha	2.8	2.5	5
Simazine 1 L/ha + Sencor 0.2 L/ha	2.5	4.5	3.7
Simazine 1 L/ha + diuron 1.2 L/ha	2.3	2.8	2.3
Raptor 45 g/ha	4.5	6.5	9
Significant difference P<0.05	S	NS	S
LSD	1.3		4.3

EWRC weed control score: 1 = complete kill, 4 = acceptable control, 9 = no effect. DAT = Days after treatment.
EWRC score statistics are for comparing between herbicide treatments but not for comparing herbicide treatments with the Nil treatment. None of the above treatments are registered for use in fenugreek.

Crop tolerance and yield (Table 3)

Spinnaker and Raptor treatments caused stunting of plants however crop damage scores were acceptable and late season rainfall and cool conditions ensured a fully recovery. Simazine treatments caused burning of cotyledons and some plant death. Simazine + Sencor was the worst effected treatment and simazine + Spinnaker had a combination of stunting and plant loss. Simazine 1.2 L/ha, Simazine 1 L/ha + Spinnaker 125ml/ha and Simazine 1L/ha + Sencor 200 ml/ha suffered significant yield loss compared to the Nil treatment. There was no significant difference between the Nil treatment yield and that of Spinnaker at 150 ml/ha or 200 ml/ha, however the yield of Spinnaker 200ml/ha was lower.

Table 3. Tolerance of fenugreek to PSPE herbicide treatments.

PSPE Treatments	EWRC Crop Tolerance Scores			Yield T/ha	Herbicide Cost \$/ha
	1/8 30DAT	13/9 72DAT	6/11 121DAT		
Nil	1	1	1	2.96	-
Spinnaker 0.150 L/ha	1	2.3	1.3	3.06	16.50
Spinnaker 0.200 L/ha	1.1	3.3	3	2.75	22.00
Spinnaker 0.125 L/ha + simazine 1 L/ha	2.4	3.8	4	2.58	19.25
Simazine 1.2 L/ha	2.5	1.3	1.5	2.61	6.60
Simazine 1 L/ha + Sencor 0.2 L/ha	2.5	3.8	4	2.58	17.30
Simazine 1 L/ha + diuron 1.2 L/ha	1.5	1.3	1.5	2.74	15.10
Raptor 45 g/ha	1	3.3	1.5	2.81	29.25
Significant difference P<0.05	S	S	S	S	
LSD	0.9	1.4	1.6	0.33	

EWRC crop tolerance score: 1 = no effect, 5 = unacceptable damage, 9 = complete kill. DAT= Days after treatment.
EWRC score statistics are for comparing between herbicide treatments but not for comparing herbicide treatments with the Nil treatment. None of the above treatments are registered for use in fenugreek.

Post-Emergent Herbicides

Weed control (Table 4)

Broadstrike + Uptake and Raptor + wetter were the best treatments for mustard control. Broadstrike + MCPA, Broadstrike + Brodal and Brodal also controlled mustard effectively. Buticide and Buttress both provided commercially acceptable control but some mustard plants survived. Broadstrike and Raptor treatments did not provide acceptable control of whip thistle. Mixing the full rate of Broadstrike with Buttress 1L/ha or MCPA 300ml/ha improved whip thistle control but results were variable due to the sporadic whip thistle population. Broadstrike 12.5 g/ha + Spinnaker 125 ml/ha was no more effective on whip thistle than straight Broadstrike. Buttress, Buticide and Brodal treatments gave good whip thistle control. Partial control of milk thistle was achieved with Buttress, Buticide, Brodal, Brodal + MCPA and Broadstrike + Buttress. Hoary Cress was suppressed by Buttress, Buticide, Brodal, Brodal + MCPA, MCPB and Broadstrike + Buttress.

Table 4. Effectiveness of PE weed control in fenugreek.

PE Treatments (L or g/ha)	EWRC Weed control scores	
	57 DAT	6/11
	Mustard	Whip thistle
Nil	9.0	9.0
Broadstrike 25 g/ha + Uptake 0.5 %	1.0	7.0
Broadstrike 12.5 g/ha + Spinnaker 0.125 L/ha	2.8	8.3
Broadstrike 25 g/ha + MCPA 500 0.3 L/ha	1.5	6.5
Broadstrike 25 g/ha + Buttress 1 L/ha	1.5	3.8
Buttress 2 L/ha	2.5	1.8
Buticide 2.5 L/ha	2.8	3.8
Buttress 1 L/ha + Diuron 0.3 L/ha	4.0	4.5
Brodal 0.2 L/ha	1.8	2.5
Brodal 0.1 L/ha + MCPA 500 0.120 L/ha	2.3	2.5
Diuron 0.3 L/ha + MCPA 500 0.3 L/ha	4.3	3.3
Spinnaker 0.125 L/ha + MCPA 500 0.15 L/ha	3.5	5.1
MCPB 2.5 L/ha	3.5	3.8
Raptor 45 g/ha + BS1000 0.2%	1.0	7.8
Significant difference P<0.05	S	S
LSD	1.4	3.4

EWRC weed control score: 1 = complete kill, 4 = acceptable control, 9 = no effect. DAT = Days after treatment. EWRC score statistics are for comparing between herbicide treatments but not for comparing herbicide treatments with the Nil treatment. Broadstrike 25 g/ha + Uptake is registered for use in fenugreek.

Crop tolerance and yield (Table 5)

Broadstrike + Uptake and Raptor appeared very safe on fenugreek. Diuron + MCPA and Buttress + Diuron caused significant damage that was visible 3 days after spraying. Fenugreek plants were twisted and laying flat on the ground. Brodal also caused significant visual damage and shortened plants. Brodal + MCPA and MCPB also caused visible crop damage. Crop damage caused by Buttress, Buticide and Broadstrike + Buttress was commercially acceptable. Visible herbicide damage was reflected in yield with Buttress + diuron, MCPA + diuron, Brodal, Brodal + MCPA and MCPB all yielding significantly less than the Nil treatment. All other treatments had yields similar to the Nil treatment.

Table 5. Tolerance of fenugreek to PE herbicide treatments.

PSPE Treatments (L or g/ha)	EWRC Crop Tolerance Scores			Yield T/ha	Herbicide Cost \$/ha
	13/9	3/10	6/11		
	3 DAT	23 DAT	57 DAT		
Nil	1.0	1.0	1.0	2.81	-
Broadstrike 25 g/ha + Uptake 0.5 %	1.8	1.3	1.3	2.66	15.65
Broadstrike 12.5 g/ha + Spinnaker 0.125 L/ha	2	2.3	2.3	2.69	21.23
Broadstrike 25 g/ha + MCPA 500 0.3 L/ha	3.8	2.6	2.8	2.71	16.63
Broadstrike 25 g/ha + Buttress 1 L/ha	2.8	2.0	1.9	2.83	28.70
Buttress 2 L/ha	2.3	2.0	2.0	2.71	27.50
Buticide 2.5 L/ha	3.5	2.5	2.0	2.61	29.56
Buttress 1 L/ha + Diuron 0.3 L/ha	6.0	4.5	5.3	2.15	16.15
Brodal 0.2 L/ha	2.0	4.6	4.5	2.27	29.60
Brodal 0.1 L/ha + MCPA 500 0.120 L/ha	2.8	4.2	3.3	2.42	15.47
Diuron 0.3 L/ha + MCPA 500 0.3 L/ha	6.8	5.3	5.3	2.20	4.08
Spinnaker 0.125 L/ha + MCPA 500 0.15 L/ha	3.3	1.9	1.8	2.76	14.59
MCPB 2.5 L/ha	4.5	2.6	3.1	2.47	34.30
Raptor 45 g/ha + BS1000 0.2%	1.8	1.8	1.5	2.66	29.65
Significant difference P<0.05	S	S	S	S	
LSD	1.4	1.6	0.33	0.27	

EWRC crop tolerance score: 1 = no effect, 5 = unacceptable damage, 9 = complete kill. DAT= Days after treatment.

EWRC score statistics are for comparing between herbicide treatments but not for comparing herbicide treatments with the Nil treatment Broadstrike 25 g/ha + Uptake is registered for use in fenugreek.

Commercial Practice

Spinnaker provides good control of Brassica weeds but only minimal suppression of whip thistle. Spinnaker PSPE would be cost effective where muskweed or mustard are present in high numbers. Simazine has been used commercially with mixed results. While weed control is generally effective there is a high risk of significant yield damage to the crop. The use of a more expensive post emergent spray may turn out to be more economical.

Broadstrike, Buttress, Buticide and Raptor appear safe enough for use on fenugreek. Chemical choice will depend on weed spectrum and pressure. Spraying when fenugreek has 4 trifoliate leaves is a good strategy as weeds are still relatively small and fenugreek is less susceptible to herbicide damage. Spraying after the 6 leaf stage could increase the chance of yield loss when using Buticide or Buttress. Applying mixtures such as Broadstrike + Buttress is a trade off between increasing the weed spectrum but potentially harming the crop. The weed burden and potential yield loss due to competition and cost of the herbicide mixture need to be considered when planning a weed control strategy.

Acknowledgments

Thanks to Birchip Cropping Group for technical assistance with this trial.