PRE AND POST EMERGENCE HERBICIDES IN CHICKPEAS
II. WEED CONTROL

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Summary. Between 1984 and 1989 a series of 28 experiments were conducted to evaluate the selectivity and weed control of a range of herbicides in chickpeas,*Cicer arietinum*. Effective and reasonably economical grass control is now possible due to the availability of a good range of pre and post-emergence herbicides. Weed control performance of the registered herbicides cyanazine and trifluralin is not adequate for control of the major broad-leaved weeds of northern N.S.W. and the cost is high. Similar weed control can be achieved at lower cost with the unregistered herbicide simazine or more effective weed control at a similar or slightly reduced cost with mixtures of simazine plus cyanazine, prometryn or metribuzin.

INTRODUCTION

The most troublesome winter weeds in the north-west cropping belt of NSW are, wild oats (*Avena fatua, A. ludoviciana*), annual phalaris (*Phalaris paradoxa)*, turnip weed (*Rapistrum rugosum*), wireweed (*Polygonum aviculare*) and black bindweed (*Polygonum convolvulus*) (3). Turnip weed is especially troublesome in chickpeas because it has proven difficult to control and is very competitive at low populations.

Chickpeas compete poorly against weeds, and a lack of a cheap and effective herbicides continues to limit the area sown to chickpeas. Previous herbicide work by Mahoney (2) and Amor (1) was not representative of the weed spectrum, soil types and climate of northern NSW and left considerable scope for further herbicide testing.

Within the same series of trials as reported in "I. Crop Damage", weed control of the herbicides was also evaluated. The aim of the programme was to develop recommendations, which would give safe and economic control of the major weeds of chickpea, and facilitate the expansion of the crop into weedier situations. This paper reports the weed control efficacy of the evaluated herbicides, and examines the findings in the two papers.

METHODS

Weed control was assessed by quadrat counts and visually using a 0-5 ranking scale, were 0 is no control, 3 or better is considered to be commercially acceptable weed control and 5 is 100% control.

The weeds covered by the trials include wild oats, milk or sow thistle (*Sonchus oleraceus*), turnip weed, wireweed, black bindweed, dead nettle (*Lamium purpureum*), Indian hedge mustard (*Sisymbrium orientale*), corn gromwell or white iron weed (*Buglossoides arvensis*) and prickley lettuce (*Lactuca serriola*).

All other details are the same as reported in "I. Crop Tolerance".

RESULTS AND DISCUSSION

Pre-plant incorporated herbicide treatments. A summary of the weed control results from the pre-plant incorporated herbicides is presented in table 1. Trifluralin and tri-allate gave satisfactory control of wild oats, both alone and in mixtures. Control of wild oats by trifluralin alone was only satisfactory at rates of 2.1 L/ha or 2.8 L/ha. Control of turnip weed with trifluralin alone was erratic. Addition of simazine improved results. Trifluralin, at rates safe on chickpeas, did not give good control of bindweed or prickly lettuce. Addition of cyanazine at

4.0L/ha improved control of prickly lettuce, but bindweed control was still not good. Wireweed was adequately controlled by trifluralin, either alone, or mixed with cyanazine.

Table 1. Weed control(%) with pre-plant incorporated herbicides.
(number of sites)[standard deviation of % control between trials].

Herbicide	Rate of product (L/ha)	Wild oats	Turnip weed	Bindweed	Wireweed	Prickly lettuce
trifluralin	1.4	88 (2)[3.0]	37(2)[0]	51 (1)	80 (1)	13 (1)
	2.1	95 (1)	-23 (1)	67 (1)	91 (1)	33 (1)
	2.8	96 (1)	100 (1)	78 (1)	92 (1)	62 (1)
tri-allate	1.4	93 (1)				
	2.8	98 (1)				
	5.6	100(1)				
trifluralin	1.4+					
tri-allate	1.4	96 (1)				
trifluralin	1.4+					
cyanazine	4.0	85 (1)	77 (1)	69 (1)	87 (1)	95 (1)
trifluralin	1.4					
+simazine	0.75	86 (1)				
+simazine	1.5	96 (1)				
+simazine	3.0	96 (1)				

Post-plant pre-emergence herbicide treatments. Weed control from post-plant pre-emergence herbicides is summarized in table 2. The registered herbicide cyanazine achieved fair turnip weed and wireweed control, but when weed populations are high this level of control is unacceptable. Other weeds such as milk thistle and dead nettle were adequately controlled. Control of certain weeds with cyanazine was inferior to prometryn, simazine or metribuzin.

Prometryn at 3 kg/ha has given good control of all broad-leaved except black bindweed, where control was moderate (80%). At 4kg/ha control was excellent in one experiment. Simazine gave good turnip weed, milk thistle and wireweed control at 2.0L/ha. Control of bindweed was poor. Control at 1.5L/ha was not as good. Turnip weed control with metribuzin, at 300g/ha is comparable to prometryn and simazine. Wireweed control is slightly inferior. Bindweed control was poor.

Prometryn produced consistent weed control when mixed with simazine and the pick of the mixtures used would be 1.5kg/ha prometryn + 1.5L/ha simazine. Mixed with cyanazine, simazine gave good control of turnip, bindweed and wireweed. The mixture with metribuzin was weaker on wireweed and bindweed than the other mixtures.

Post-emergence herbicide treatments. Post-emergence herbicides did not control weeds as effectively as the pre-emergence treatments (table 3).

At 4.0L/ha pyridate gave good control of dead nettle, bindweed and turnip and corn gromwell. Wireweed was not controlled. Increasing the rate of pyridate to 8.0L/ha improved the turnip weed control.

Table 2. Weed control(%) with post-plant pre-emergence herbicides.
(number of sites)[standard deviation of % control between trials]

Herbicide	Rate of product (L/ha)	Turnip weed	Wireweed	Bindweed	Milk thistle	Dead nettle
atrazine	2.0L	100 (2)[0]				
metribuzin	300g	89 (5)[6]	71 (3)[50]	64 (1)		
	400g	100 (2)[0]				
prometryn	1.5kg	64 (1)	88 (2)[11]			
	3kg	95 (5)[2]	97(2)[2]	95 (1)	88 (2)[11]	
	4kg	98 (1)	100 (1)	96 (1)		
cyanazine	3.0L	86 (5)[5]	89 (3)[6]	84 (1)	99 (2)[0]	100 (1)
	4.0L	80 (2)[18]	94 (2)[2]	6 (1)	88 (1)	
	6.0L	99 (1)	100 (1)			
simazine	0.75L	77 (1)				
	1.5L	83 (2)[10]	77 (1)	31 (1)	99 (2)[11]	
	2.0L	89 (3)[7]	90 (1)			
	2.5L	95 (1)				
	3.0L	93 (2)[7]	99 (1)	76 (1)	89 (2)[0]	
	5.0L	97 (1)	100 (1)			
acifluorfen	2.0L	100 (1)				
	3.0L	100 (2)[0]				
simazine	1.5L					
+cyanazine	1.5-2.0L	98 (4)[2]	93 (2)[3]	90 (1)		
+metribuzin	200g	94 (4)[6]	56 (2)[17]	70 (1)		
+prometryn	1.5kg	95 (4)[4]	96 (2)[2]	81 (1)		
+prometryn	2kg	94 (3)[4]	89 (1)			

MCPB 5.0L/ha and metribuzin + pyridate gave good control of turnip and wireweed. Terbutryn 1.0L/ha gave good control of milk thistle and mustard. All other broad-leaf herbicides gave poor results.All the post-emergence grass herbicides gave good control of wild oats (results not presented).

Grass weed control. Trifluralin and tri-allate were both safe and effective in controlling wild oats. However, there is an increasing trend to reduced tillage in the North-west plains and many farmers now substitute herbicide application for the final working before sowing. This limits the potential for pre-plant incorporated herbicides, particularly with the advent of cost-competitive post-emergence grass herbicides. It is possible to justify two post-emergent grass herbicide applications (early and late) on the basis of reducing disease carryover to subsequent winter cereal crops. Another benefit of good wild oat control in the chickpea crop is seen in reduced herbicide costs for the cereal cropping phase of the rotation.

Broad-leaved weed control.
At present cyanazine and trifluralin are the only herbicides registered for broad-leaved weed control in chickpeas in N.S.W. Cyanazine is expensive (Table 4). Simazine 1.5L/ha, by comparison is cheap and will give satisfactory control of the main weed, turnip weed, at moderate to low weed densities. However, there are no maximum residue levels available for simazine. The mixtures with prometryn (1.5+1.5) and cyanazine (1.5+1.5-2.0) gave the most promising results for pre-emergent broadleaf herbicides.

Post-emergence weed control for chickpeas is still some way off, given the cost of pyridate and the crop damage caused by most other herbicides tested.

Table 3. Weed control(%) with post emergence herbicides.
(number of sites)[standard deviation of %control between sites]

Herbicide	Rate of product (L/ha)	Milk thistle	Mustard	Turnip weed	Wire -weed	Dead nettle	Corn gromwell	Bind-weed
simazine	2.0L		72 (1)	20 (1)				
	2.5L	22 (1)	12 (1)					
terbutryn	0.5L						40(1)	74(1)
	0.85L		68 (1)	89 (1)				
	1.0L		91 (1)	99 (1)				
methabenziazuron	0.5L		17 (1)	67 (1)				
	0.85L		47 (1)	70 (1)				
2,4-DB	1.0L	-24(1)	99 (1)					
	1.4L			74 (2)[7]	20 (1)			
	2.0L	79 (1)	100 (1)					
	2.8L			65 (2)[35]	34 (1)			
pyridate	1.0L					49 (1)	30 (1)	34 (1)
	2.0L			79 (1)		61 (1)	75 (1)	53 (1)
	4.0L			68 (3)[15]	-12 (1)	85 (1)	87 (1)	71 (1)
	8.0L			82 (3)[6]	-22 (1)			
2,4-DB	1.4L							
+pyridate	4L			72 (2)[9]	55 (1)			
MCPB	2.5L			63 (2)[16]	82 (1)			
MCPB	5.0L			86 (2)[19]	84 (1)			
metribuzin	0.05g							
+pyridate	4L				86 (1)			
metribuzin	0.1g							
+pyridate	4L			98 (1)	98 (1)			
glyphosate	0.4L					6 (1)	34 (1)	
	0.8L						51 (1)	

Table 4. Summary of potential commercial treatments.

Herbicide and rate/ha.	Turnip weed	Wireweed	Bindweed	Milk thistle	Cost* ($/ha)
cyanazine 3.0 L	86 (5)	89 (3)	84 (1)	99 (2)	$34.50
simazine 1.5 L	83 (2)	77 (1)	31 (1)		$6.75
simazine 2.0 L	89 (3)	90 (1)			$9.00
cyanazine 1.5-2.0 +simazine 1.5 L	99 (4)	93 (2)	90 (1)		$24.00
metribuzin 150g-200g + simazine 1.5 L	94 (4)	66 (2)	70 (1)		$19.74
prometryn 1.5 kg +simazine 1.5 L	95 (4)	96 (2)	81 (1)		$27.30
prometryn 3.0 kg	95 (5)	97 (2)	95 (1)	88 (2)	$41.10
metribuzin 300 g	89 (5)	71 (3)	64 (1)		$26.00

* 1989 season prices

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