

PYRIDATE - A NEW SELECTIVE BROAD-LEAVED HERBICIDE  
FOR POST-EMERGENCE USE IN CHICKPEAS

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*Summary.* Pyridate (Tough®) is a new post-emergence herbicide for the selective control of annual broad-leaved weeds in chickpeas. Trials in eastern states of Australia have indicated that rates from 450 to 1800 g ai/ha were effective on a wide spectrum of weeds. Features of pyridate include a relatively flat dose response curve and rapid effect. Young weeds are more susceptible to pyridate. The addition of metribuzin to pyridate improved performance against less susceptible weeds. Trials indicated chickpeas tolerated more than 3.6 kg/ha pyridate, which is several fold more than rates needed for weed control.

### INTRODUCTION

Chickpeas are very sensitive to weed competition (1). Their slow growth requires a high degree of weed control to maximise yields. Although grass weed control in chickpeas is readily accommodated by a range of registered herbicides there is a limited choice of herbicides for broad-leaved weed control.

At present only cyanazine is registered for broad-leaved weeds as a pre-emergence herbicide (2).

Pyridate belongs to the phenyl-pyridazine group of herbicides. Apart from its potential use as a post-emergence broad-leaved herbicide in chickpeas it has also shown selectivity in peanuts, lucerne, subterranean clover, medics, asparagus and potatoes.

Pyridate is a contact herbicide of low volatility and with no systemic action. It is lipophilic and readily penetrates the leaf cuticle. Once inside the plant pyridate is hydrolysed to a metabolite, 6-chloro-3-phenyl-pyridazine-4-01, which is the active principal.

It causes inhibition of the Hill reaction in the photosynthetic pathway. The selectivity of pyridate derives from the ability of certain plants to rapidly deactivate the active metabolite by forming glycosidic conjugates. Pyridate is rapidly absorbed by plants. Photosynthesis is reduced within hours of application and death is complete within 10 days. Pyridate has a short half life in soil. It is readily absorbed on soil colloids and thus has low soil mobility. Mammalian toxicity of pyridate is low and it is of low hazard to fish, birds or bees. This paper describes experimental results with pyridate used to control broad-leaved weeds in chickpeas.

### METHODS

Experiments on chickpeas began in 1987. Plots, usually 3 x 15 m, with treatments in a randomised block design of 4 replicates, were sprayed with a CO<sub>2</sub> plot sprayer applying 60 to 200 L/ha.

Formulations of pyridate used were a 450 g/kg wettable powder and a 450 g/L emulsifiable concentrate. Treatment effects were measured by detailed weed counts, crop injury ratings and grain yield. Grain was harvested using a Hegi 125B header harvesting a 1.25 m wide strip from each plot.

## RESULTS AND DISCUSSION

Control of a range of weeds with pyridate at 4 rates is given in Table 1.

Table 1. % Control of weeds with pyridate.

Treatment	g ai/ha	% WEED CONTROL									
		F	C	MC	PL	ST	S	WR	WM	M	TW
Untreated (weeds/m <sup>2</sup> )	147	55.8	176.5	116.5	60	49	-	25	73	-	1900
Pyridate	450	99	99	96	93	80	98	-	12	-	100
"	900	99	100	100	100	96	99	61	28	59	78
"	1800	100	100	100	100	100	100	92	-	88	84
"	2700	-	-	-	-	-	-	97	84	-	96

Fumitory (F), *Fumaria densiflora*; Capeweed (C), *Arctotheca calendula* L.;  
 Mouse-eared chickweed (MC), *Cerastium glomeratum* Thuill; Prickly lettuce (P L),  
*Lactuca serriola* L.; Sow thistle (ST), *Sonchus oleraceus* L.;  
 Sheepweed (S), *Buglossoides arvensis* L.; Wild radish (WR), *Raphanus raphanistrum* L.;  
 Wild mustard (WM), *Sinapsis arvensis* L.;  
 Mintweed (M), *Salvia reflexa* L.; Turnip weed (TW), *Rapistrum rugosum* L.  
 All; Toad rush (TR), *Juncus bufonius* L.  
 Pyridate has also been observed to have good activity against:  
 Shepherds Purse (*Capsella bursa-pastoris* L.)  
 Amsinckia (*Amsinckia intermedia*, Tisch and C.A. Meyer)  
 Erodium (*Erodium botrys* (cav.) Bortol)  
 Paterson's Curse (*Echium plantagineum* L.)  
 Corn Gromwell (*Buglossoides arvensis* L.)  
 Corn spurry (*Spergula arvensis* L.)  
 Common thornapple (*Datura stramonium* L.)  
 Anoda weed (*Anoda christata*)  
 Potato weed (*Heliotropium europacum* L.)  
 Deadnettle (*Lamium alexiclaule* L.)

These data show that pyridate has a flat dose response curve with a high rate of application needed to gain 100% control.

The addition of metribuzin at 17 g ac/ha improved the performance of pyridate on less susceptible weeds.

Table 2. % Control of weeds with pyridate plus metribuzin.

Treatment	g ai/ha	Turnip Weed		Mintweed	
		0	+ metribuzin 17 g ai/ha	0	+ metribuzin 17 g ai/ha
Untreated	-	-	0	-	58 b
Pyridate	450	-	90 abc	-	-
"	900	78 d	97 a	59 b	91 a
"	1800	84 cd	95 ab	88 a	98 a
l.s.d. (P=0.05)		11.2		11.9	

Timing of application trials have indicated weeds become less susceptible as weed age increases.

Table 3. % Control of weeds with pyridate at 450 g ai/ha.

Spray Timing	Weed stage	Weed	
		Fumitory	Mouse-eared chickweed
1	Cotyledon to 5 leaf	99	96
2	4 leaf to 10 leaf	86	65
3	Flowering	83	71

These results confirm work by Gaillardon (4) which shows leaf absorption of pyridate was greatest by younger leaves. Accordingly the best spray timing for pyridate is from cotyledon to the 4 leaf stage of the weed.

The removal of broad-leaved weeds from chickpeas by pyridate has resulted in significant yield responses.

Table 4. Grain yield (kg/plot), efficacy trials.

Treatment	g ai/ha	Site - Parkes		Site - Dookie	
		kg/plot	Yield %	kg/plot	Yield %
Untreated	-	1.15 c	100	0.33 b	100
Pyridate	450	1.74 b	152	0.62 a	189
"	900	2.10 b	182	0.60 a	183
"	1800	2.68 a	233	0.60 a	184
l.s.d. (P=0.05)		.38		.15	

A feature of pyridate is the safety to chickpeas. Experiments under a range of agronomic conditions indicate that over 3.6 kg ac/ha of pyridate is safe to both desi and garbanzo varieties of chickpeas.

Table 5. Grain Yield (Tonnes/ha), crop tolerance trials.

Treatment	g ai/ha	Moree Site (grey clay) Variety Tyson		Dookie Site (Red clay loam) Variety Dooen	
		Sprayed days after sowing		Sprayed days after sowing	
		22	47	47	
Untreated	-	2.47 ab	2.62	2.04	
Pyridate	900	2.62 a	2.7	2.07	
"	1800	2.47 ab	2.52	2	
"	2700	2.49 ab	-	-	
"	3600	2.61 a	2.58	2.10	
l.s.d. (p=0.05)		0.28	n.s.d.	n.s.d.	

These results indicate that pyridate will control broad-leaved weeds in chickpeas and generate significant yield responses.

## REFERENCES

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