

Flumioxazin – A new knockdown spike herbicide for the Australian market

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Summary A series of trials conducted across Australia over the period 1999–2001, have confirmed the usefulness of Flumioxazin as a spike for knockdown herbicides in both conventional and ‘no-till’ cropping systems for winter crops, with no plant back restrictions associated with it.

Flumioxazin, to be sold under the trade name of Pledge®, has shown useful efficacy on major broadleaf weeds such as capeweed (*Arctotheca calendula*), wild radish (*Raphanus raphanistrum*), marshmallow (*Malva parviflora*), doublegee (*Emex australis*), wire weed (*Polygonum aviculare*) and *Erodium* spp. Flumioxazin has also been shown to significantly increase the speed of ‘brownout’ with all weeds, including grasses.

Keywords Flumioxazin, Pledge®, spike, knock-down.

INTRODUCTION

Flumioxazin is a protoporphyrinogen oxidase (PPO) inhibition herbicide, and has been classified in Australia as a Group ‘G’ herbicide.

Flumioxazin has been shown to improve the efficacy of knock down herbicides on weeds such as capeweed, wild radish, marshmallow, doublegee, wire weed, and capeweed as well as increasing the speed of ‘brown out’ in general.

Flumioxazin has been used on lupins, wheat and barley extensively, and also across all the grain legumes and pulses with no significant concerns about crop safety.

Flumioxazin has also shown useful efficacy in summer weed control programs against marshmallow.

MATERIALS AND METHODS

All trials discussed here were carried out under contract to Sumitomo Chemical Australia by various contract researchers. Trials were established as randomised complete block designs with either three or four replicates depending on the contract researcher involved.

Spraying equipment in all cases was conventional hand booms operating at 200 Kpa, with water volumes between 60–70 L ha⁻¹.

RESULTS

The results for this trial program will be presented in three broad areas (1) a very broad summary of trial results from 2000 (2) a more detailed examination of a couple of trials from 2001 (3) a summary of some background work testing adjuvant rates and glyphosate formulation types.

Year 2000 summary Table 1 overleaf summarises the data obtained on various weeds in 2000. The control figures quoted are an average for the number of trials where particular weeds were recorded.

All trials in 2000 used glyphosate (45% formulations) products applied at 1 L ha⁻¹. Pledge was applied at 30 g ha⁻¹. Hasten® was added as an adjuvant at 1% across all treatments, because Pledge will only be recommended for use with a crop oil.

Table 1 presents data from assessments made three days after treatment (DAT), and from 14 DAT.

As would be expected with a knockdown spike product, the differences between treatments did decrease over time. This is seen clearly by the narrowing of the differences between treatments by the 14 DAT assessment.

2001 Trials Table 2 summarises a trial carried out in Shepparton, Victoria in 2001. There is clearly an increased speed of brown out of the weeds at the 4 DAT assessments. By the 14 DAT assessments, the only weed still showing a significant improvement in weed control is wild radish. The improved control of Wild radish was still evident 28 DAT.

Table 3 shows similar information from a West Australian trial in 2001. All weeds at the site showed significant differences in the weed control obtained using Pledge at the 4 DAT assessments.

The information from the 17 DAT assessment indicates that significant improvements over glyphosate alone were still evident.

Weed control was measured by final plant counts at the conclusion of the trial. Application of Pledge had significantly reduced the number of wild radish plants.

Final control of wild radish was not outstanding, but this needs to be interpreted in the light of the fact that no crop was sown into the trial area, therefore there was no effect of crop competition.

Table 1. Summary of trials conducted in 2000. N is the number of observations.

Common name	Scientific name	N	Glyphosate + Hasten 1%	Glyphosate + Hasten 1% + Pledge 30 g	Glyphosate + Hasten 1%	Glyphosate + Hasten 1% + Pledge 30 g
			3 Days After Treatment			14 Days After Treatment
Wire weed	<i>Polygonum aviculare</i>	2	4.4	46.0	55.9	99.0
Paterson's curse	<i>Echium plantagineum</i>	1	0.0	55.0	50.0	95.8
Capeweed	<i>Arctotheca calendula</i>	2	2.2	66.9	78.8	94.5
Doublegee	<i>Emex australis</i>	2	29.2	65.4	71.7	97.5
Erodium	<i>Erodium</i> spp.	2	0.0	55.0	80.0	92.5
Shepherds purse	<i>Capsella bursa-pastoris</i>	1	2.5	20.0	25.0	67.5
Sorrel	<i>Rumex acetosella</i>	1	0.0	32.5	60.0	85.0
Saffron thistle	<i>Carthamus lanatus</i>	1	0.0	13.8	17.5	55.0
Variegated thistle	<i>Silybum marianum</i>	1	0.0	15.0	22.5	60.0
Sub clover	<i>Trifolium subterraneum</i>	4	0.6	29.7	37.5	79.4
Burr medic	<i>Medicago polymorpha</i>	1	5.8	76.3	82.8	98.3
Volunteer lupins	<i>Lupinus</i> spp.	1	0.0	77.5	95.0	100.0
Vulpia spp.	<i>Vulpia</i> spp.	1	0.0	5.0	80.0	85.0
Annual ryegrass	<i>Lolium rigidum</i>	5	12.1	42.5	77.4	90.1
Brome grass	<i>Bromus diandrus</i>	1	0.0	30.0	88.8	92.5
Wild oats	<i>Avena fatua</i>	1	0.0	70.0	100.0	98.8

Table 2. Trial summary: Shepparton Victoria 2001.

Common name	Scientific name	Weed control – 3 DAT (0–100 Scale)			Weed control – 14 DAT (0–100 Scale)		
		Glyphosate CT + Hasten 1%	Glyphosate CT + Pledge + Hasten 1%	LSD 95%	Glyphosate CT + Hasten 1%	Glyphosate CT + Pledge + Hasten 1%	LSD 95%
Annual ryegrass	<i>Lolium rigidum</i>	1.7	18.3	11.52	50.0	93.3	9.77
Tame oats	<i>Avena sativa</i>	3.7	80.0	13.38	65.0	93.3	8.94
Wild radish	<i>Raphanus raphanistrum</i>	0.0	16.7	7.04	60.0	90.0	8.84
Wall fumitory	<i>Fumaria muralis</i>	0.0	66.7	16.42	100.0	100.0	0.00

Table 3. Trial summary: Goomalling Western Australia 2001.

Common name	Scientific name	Weed brownout – % 3 DAT			Weed brownout – % 17 DAT		
		Glyphosate CT + Hasten 1%	Glyphosate CT + Pledge + Hasten 1%	LSD 95%	Glyphosate CT + Hasten 1%	Glyphosate CT + Pledge + Hasten 1%	LSD 95%
Brome grass	<i>Bromus diandrus</i>	11.3	41.3	6.11	78.8	96.5	3.40
Sub clover	<i>Trifolium subterraneum</i>	5.0	20.0	4.94	66.3	70.0	3.56
Wild radish	<i>Raphanus raphanistrum</i>	8.8	31.3	5.25	58.8	85.0	3.42

Adjuvants Pledge will be recommended to be applied with a crop oil based adjuvant at all times. Trials were carried out in 2000 and 2001 to test various adjuvants and various adjuvant rates.

Table 4 summarises a trial carried out at Goomalling. All treatments had 800 mL ha⁻¹ of a 45%

glyphosate product, plus 30 g ha⁻¹ of Pledge. The data for wild radish has been used to illustrate the performance of the adjuvants.

All of the crop oil based products performed similarly. There was a significant response to increasing the rate of Hasten from 0.5% to 1.0% (at 17 DAT).

Table 4. Comparison of adjuvants: wild radish biomass reduction – Goomalling WA, 2001.

Adjuvant	Rate	3 DAT	17 DAT	26 DAT
Hasten	1.00%	31.3	73.8	70.9
Hasten	0.50%	33.8	62.5	65.4
Supercharge	1.00%	31.3	77.5	68.8
Uptake	0.50%	30.0	68.8	63.7
Hotup	0.25%	26.3	78.8	50.4
Freeway	0.02%	27.5	70.0	24.0
LSD 95%		5.25	3.42	–

Table 5. Marshmallow control – Hyden 2001.

Treatment	3 DAT	7 DAT	29 DAT (final)
Glyphosate + Pledge 30 g + Hasten 1%	63.3	92.5	96.7
Glyphosate + Goal + BS1000 + Liase	20.8	45.0	80.8
Glyphosate + 2,4-D Ester + BS1000 + Liase	18.3	45.0	94.2
LSD 95%	14.3	5.3	9.4

The only product to provide significantly poorer weed control was Freeway, which is an organosilicone crop penetrant, rather than a crop oil.

Summer weed control A trial in February of 2001 established the potential usefulness of Pledge in the summer weed control situation. This is an area where further work will be required before major conclusions can be drawn.

Glyphosate formulations A number of different formulations of glyphosate have been tested in conjunction with Pledge herbicide. Products tested in 2001 were Roundup CT, Roundup Max, Davison Gold 500, Roundup Dry, Touchdown broadacre, and glyphosate CT (ex Nufarm).

No consistent differences in performance of the various forms of glyphosate were noted when applied with Pledge at 30 g ha⁻¹.

Crop safety Extensive trial work has been carried out over the length of the program to assess the safety of Pledge applied close to the time of seeding of various crops.

At this stage it is possible to say with certainty that Pledge will be safe on Wheat, Lupins, and other grain legumes. The situation with Canola is less clear, and further work will be undertaken.

DISCUSSION

There are obviously a number of gaps that need to be filled in our knowledge base around the use of Pledge, however the data seems clear that pledge significantly increases the speed of brown out of all weeds when applied in conjunction with glyphosate, and has demonstrated improved final level of control on some of the tougher weeds such as wild radish, capeweed, wireweed.

REFERENCES

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