

Clopyralid improves control of volunteer legumes with glyphosate

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Summary Tankmixes of clopyralid and glyphosate have been widely used for fallow weed control prior to either cereals or canola (*Brassica napus* L. var. *napus*), where volunteer legumes or Asteraceae weeds were present. As glyphosate price has reduced, application rates have been increased to try to improve weed control. However, some volunteer legumes are not well controlled with rates of glyphosate up to 1080 g a.i. ha⁻¹.

The aim of these studies was to determine the rate of clopyralid required to improve legume control to a commercially acceptable level when tankmixed with glyphosate. These trials showed rates of 30–45 g a.i. ha⁻¹ clopyralid tankmixed with glyphosate gave commercially acceptable control of more than 90%.

Keywords Clopyralid, glyphosate, pre-plant, fallow, weeds, tankmixes, volunteer legumes, efficacy, medic, chickpea, faba bean, lentil, subclover, field pea, vetch, lupin.

INTRODUCTION

Glyphosate based sprays have been used for fallow and pre-plant paddock preparation in Australia since Roundup™ was first registered in Australia. In that time some weaknesses in glyphosate efficacy have been identified, which are not corrected even with use of very high rates.

Effective fallow or pre-plant weed control is critical to conserving soil moisture and nutrients in the dryland cropping systems of southern Australia. Expiry of the glyphosate patent and subsequent reduction in price has led to higher rates of glyphosate being applied in these situations.

Despite use of higher glyphosate rates, some legumes continue to survive treatment. This study was undertaken to determine whether use of a low rate of clopyralid added to glyphosate could improve the control of volunteer legumes.

MATERIALS AND METHODS

Dow AgroSciences conducted four replicated small plot trials from 1996 to 2003, to determine the efficacy of tankmixes of clopyralid with glyphosate for the control of volunteer legumes (Dorigo 2000, Davies 2003).

Trials were conducted at Halbury in South Australia. Treatments were applied to crops planted

as volunteer weeds in trials on a research station. Treatments were applied to medic (*Medicago* sp.), chickpea (*Cicer arietinum* L.), faba bean (*Vicia faba* L.), lentil (*Lens culinaris* Medik.), subclover (*Trifolium subterraneum* L.), field pea (*Pisum sativum* L.), vetch (*Vicia sativa* L. ssp. *sativa*), or lupin (*Lupinus angustifolius* L.) with an Azo precision gas powered sprayer delivering 100 L ha⁻¹ spray volume, via flat fan spray tips in a single pass. Trials were of a randomised complete block design with four replicates. Plot size was a minimum of 2 × 20 m.

Statistical analyses were carried out using analysis of variance with least significant difference (P = 0.05) used for separation of treatment means. Products used in the trial work are shown in Table 1.

Planted crops were used as weeds and treated at various growth stages as shown in Table 2.

Assessment of weed control was done at about two, four and seven to eight weeks after application.

Table 1. Products used in glyphosate + clopyralid efficacy trials.

Trade name	Active ingredient (g L ⁻¹ or g kg ⁻¹)	Rates tested (g a.i. ha ⁻¹)
Roundup CT™	450 g glyphosate isopropylamine	360–1080
Lontrel® herbicide	300 g clopyralid triisopypylamine	0–45
Lontrel 750SG	750 g clopyralid potassium salt	0–45

Table 2. Weed growth stages in trials.

Weed	Growth stage (leaf no.)	Size (cm)
Chickpea	4–6	5–10
Lentil	4–6	5–10
Lupin	3–5	5–10
Medic	4–12	5–10
Field Pea	6	15
Subclover	5–10	5–10
Faba bean	5–7	5–20
Vetch	4–8	5–15

A per cent scale was used for subjective visual assessment of control, where 100 = complete control. Final weed control assessments are presented.

RESULTS AND DISCUSSION

Results from trial 985022RD (Table 3) show the high rate of 1080 g a.i. ha⁻¹ glyphosate did not effectively control the volunteer legumes – chickpea, faba bean and vetch.

Results from trials 965035PN, 995012RD and 995012KD (Table 4), show a clear advantage in the use of clopyralid with glyphosate. Legume control was better where clopyralid was added for all weeds except lupin. Lupin was effectively controlled by glyphosate alone.

Lentil, lupin and subclover These weeds were all generally well controlled by using higher rates of glyphosate.

Chickpea, medic, field pea, faba bean and vetch control Chickpea control with glyphosate was improved by the addition of clopyralid in two of three trials. Medic control was improved in one trial where low glyphosate rates were used. Field pea control was improved at glyphosate rates up to 720 g a.i. ha⁻¹ but only with the addition of clopyralid. Faba bean and vetch control with glyphosate at any rate was also improved by the addition of clopyralid at 30 or 45 g a.i. ha⁻¹.

Table 3. Volunteer legume control (seven weeks after treatment), in a glyphosate dose response trial, Halbury, South Australia.

Glyphosate rate (g a.i. ha ⁻¹)	Chickpea	Lentil	Field pea	Sub -clover	Faba bean	Vetch
180	12	82	100	73	22	23
360	38	87	100	81	37	43
540	50	93	100	97	52	55
720	83	97	100	97	75	70
1080	85	97	100	100	88	80
LSD (P = 0.05)	12.6	11	11.7	15.9	13.1	15.1

Table 4. Volunteer legume control (seven weeks after application) with tankmixes of clopyralid and glyphosate, Halbury, South Australia.

Glyph. rate (g a.i. ha ⁻¹)	Clop. rate (g a.i. ha ⁻¹)	Chick-pea	Chick-pea	Chick-pea	Lentil	Lentil	Lupin	Medic	Medic	Medic
Trial		965035PN	995012RD	035009KD	995012RD	035009KD	965035PN	965035PN	995012RD	035009KD
360	0	62	89	69	97	90	100	68	86	53
360	30	70	100	100	100	100	100	87	96	89
360	45	98	100	100	100	100	100	99	97	99
540	0	78	98	86	100	99	100	87	92	83
540	30		100	100	99	100			96	99
540	45		100	100	100	100			98	100
720	0		100		99				98	
720	30		100		100				96	
720	45		100		100				99	
LSD (P = 0.05)		9.6	8.2	7	4.6	1.7	9.6	8.6	7.6	8.8

Table 4 (continued). Volunteer legume control (seven weeks after application) with tankmixes of clopyralid and glyphosate, Halbury, South Australia.

Glyph. rate (g a.i. ha ⁻¹)	Clop. rate (g a.i. ha ⁻¹)	Field pea	Sub clover	Sub clover	Sub clover	Faba bean	Faba bean	Faba bean	Vetch	Vetch	Vetch
Trial		995012RD	965035PN	995012RD	035009KD	965035PN	995012RD	035009KD	965035PN	995012RD	035009KD
360	0	83	90	95	84	40	47	56	41	50	53
360	30	99	82	96	95	63	88	94	94	98	92
360	45	98	93	98	94	77	92	97	100	100	97
540	0	91	96	97	96	53	60	79	73	65	68
540	30	99		98	100		96	95		99	98
540	45	99		100	100		98	98		100	99
720	0	87		98			67			85	
720	30	99		100			94			98	
720	45	99		100			98			100	
LSD (P = 0.05)		5.9	7.1	8.1	5	7.3	11.3	6.3	5.1	13.9	5.8

CONCLUSION

Clopyralid enhanced control of volunteer legumes with glyphosate on all weeds at low glyphosate rates of 360 g a.i. ha⁻¹. Glyphosate alone gave better control when applied at higher rates of 720 g a.i. ha⁻¹, except on vetch, field pea and faba bean, where clopyralid was required for effective control.

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