Control of *Lantana camara* following monthly applications of herbicides at Tarong, Queensland

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Summary From May 2005 to April 2007, Dow AgroSciences tested four herbicides, applied at monthly intervals for 12 months, for the control of lantana (*Lantana camara* L.), variety Helidon white, at Tarong, southeast Queensland.

All herbicides performed well when applied to actively growing lantana plants in full flower. Results show that greater than 90% control of lantana across all application times was more achieved more often with Hotshot (10 out of 12) and Grazon DS (9 out of 12) compared to Starane 200 (7 out of 12) and Lantana 600 (2 out of 12).

Qualitative assessments of visual percent control correlated directly with the quantitative control numbers generated for percent mortality, twelve months after application.

Lantana seedling re-generation twelve months after application was not consistent with application timing, rainfall after application or herbicide efficacy of existing lantana bush.

Keywords Lantana, efficacy, aminopyralid, fluroxypyr, picloram, triclopyr, application timing.

INTRODUCTION

A planned programme approach to *Lantana camara* L. (lantana) control has been advocated for some thirty years (Bartholomew and Armstrong 1978), with the use of herbicides to control regrowth an important part of any programme.

The activity of grass selective herbicides for the control of lantana regrowth has been well reported (dichlorprop – Bartholomew and Armstrong 1978; fluroxypyr – Love 1989; picloram + triclopyr – Love 1999; and aminopyralid + fluroxypyr – Love and Annetts 2006). All are registered for the control of lantana in Australia.

Current field practice is to apply all herbicides in autumn (March–May) when lantana is actively growing (Hannan-Jones 1998). With less rain occurring in autumn, can lantana be effectively controlled outside this timeframe?

This paper reports the final results of this research project following on from an interim results poster presented at the 9th Queensland Weeds Symposium (Love 2007).

MATERIALS AND METHODS

The trial site was located on a commercial beef cattle property near Yarraman (26°50'08"S, 151°52'25"E) in south-eastern Queensland. Rainfall records were downloaded from the nearest Bureau of Meteorology automated weather station, Kingaroy, Queensland (Table 1).

The lantana variety, Helidon white, had been slashed in 2003 which made the lantana bushes even in size. A non-replicated plot of 7 m × 15 m was used for each herbicide treatment per application timing. Individual bushes that occurred within each plot were used for assessments.

The herbicides and rates tested were: Starane* 200 herbicide (200 g L^{-1} fluroxypyr) at 500 mL 100 L^{-1} water, Hotshot* herbicide (10 g L^{-1} aminopyralid + 140 g L^{-1} fluroxypyr) at 500 mL 100 L^{-1} water, Lantana 600 (600 g L^{-1} dichlorprop) at 500 mL 100 L^{-1} water and Grazon* DS herbicide (100 g L^{-1} picloram + 300 g L^{-1} triclopyr) at 350 mL 100 L^{-1} water. These were applied each month from May 2005 to April 2006.

Herbicides were applied with motorised high volume spray application equipment (2000 to 4000 L water ha^{-1} equivalent) on lantana up to 1.5 m tall.

Table 1. Monthly rainfall (mm) recorded at Kingaroy, Queensland, 2005–07.

Month	Long term average	2005	2006	2007
Jan	114.3	62.6	74.2	28.0
Feb	96.0	51.8	16.4	4.8
Mar	77.9	25.4	11.2	45.8
Apr	46.8	9.8	3.4	11.0
May	41.3	41.4	8.4	
Jun	42.6	163.0	11.8	
Jul	40.8	3.2	41.0	
Aug	28.6	2.4	8.8	
Sep	37.7	49.6	47.8	
Oct	64.7	109.4	12.0	
Nov	78.4	61.0	53.6	
Dec	110.7	64.4	96.8	
Annual	779.8	644.0	385.4	

Growth stage of the lantana was noted at application, which ranged from 50% leaf fall to actively growing at full flower.

The trial site was visited every month for the duration of the trial with a monthly photographic record taken of every plot to twelve months after application. Each plot was assessed at one and two months after treatment for percent visual brown out, then at six and 12 months after treatment for percent visual control.

At 12 months after application, each plot was assessed for total mortality of plants (percent calculated control) with a destructive sampling done to check for any live material. The numbers of new lantana seedlings were also counted in each plot at this time.

RESULTS AND DISCUSSION

The response of a plant to an applied herbicide is governed by three factors: the characteristics of the target plant; the environment under which the plant is growing and the characteristics of the herbicide (Hannan-Jones and Vitelli 1992). During this trial, drought conditions prevailed, especially from December 2005 to April 2006 (Table 1), however there was no mortality in the untreated plots.

Initial brown out Brown out speed is a key attribute when land managers want to quickly determine if any bushes have been missed during a spray program (Love and Annetts 2006), but it does not determine the ultimate level of control. Speed of brown out across all the application timings was consistent with dichlorprop faster than the other herbicides tested and fluroxypyr being the slowest to brown out.

Control Results from percent visual control (qualitative) and percent mortality (quantitative) of lantana 12 months after application is shown in Table 2. Across the 12 monthly applications, lantana control above 90% was achieved with aminopyralid + fluroxypyr ten times, picloram + triclopyr nine times, fluroxypyr seven times and dichlorprop twice.

There was general agreement between visual estimates of control and measured mortality when the mortality was above 60%. For values under 60%, there was variation in the results obtained.

Seedling regeneration The number of lantana seedlings that had regenerated in each plot treated with herbicide after twelve months is shown in Table 3. There was no seedling regeneration in the untreated area.

None of the herbicides in this trial caused injury to the grass present, however the drought conditions and grazing from cattle kept the grass short.

Treatments that provided good control of lantana reduced canopy cover and encouraged seedling regeneration compared to the non-treated areas. This was especially noticeable in June and October 2005 when significant rainfall events occurred before application. When considered over a 12 month period, all treatments would require follow-up to control seedlings.

Table 2. Control of lantana following application of four herbicides, Yarraman, Queensland.

Application date	Lantana growth stage at application	Percent visual control (percent mortality), 365DAA			
		Herbicide and use rate (g a.i. 100 L^{-1})			
		fluroxypyr	aminopyralid + fluroxypyr	dichlorprop	picloram + triclopyr
		100	5 + 70	300	35 + 105
18-May-05	Dormant, drought stressed	0 (0)	15 (27)	0 (0)	90 (92)
17-Jun-05	Dormant, drought stressed	5 (22)	85 (86)	0 (0)	80 (72)
15-Jul-05	New growth after rain	100 (100)	100 (100)	70 (62)	100 (100)
15-Aug-05	Flowering + fresh growth	85 (75)	100 (100)	100 (100)	100 (100)
19-Sep-05	Late flowering	100 (100)	100 (100)	70 (72)	98 (92)
17-Oct-05	Post flowering	85 (81)	100 (100)	0 (0)	95 (93)
18-Nov-05	Mid flowering after rain	99 (96)	98 (94)	95 (94)	100 (100)
19-Dec-05	Fruiting, 50% black seeds	99 (96)	100 (100)	60 (60)	99 (91)
13-Jan-06	Active growth after rain	100 (100)	100 (100)	80 (75)	100 (100)
17-Feb-06	Stressed, 20% leaf fall	90 (90)	100 (100)	50 (50)	80 (78)
16-Mar-06	Stressed, 40% leaf fall	95 (94)	100 (100)	20 (36)	95 (92)
13-Apr-06	Stressed, 50% leaf fall	50 (43)	95 (93)	0 (0)	80 (79)
	Average	76 (75)	91 (92)	45 (46)	93 (91)

Table 3. Number of lantana seedlings following application of four herbicides, Yarraman, Queensland.

Application date	Lantana growth stage at application	Number of lantana seedlings per plot, 365 DAA			
		Herbicide and use rate (g a.i. 100 L^{-1})			
		fluroxypyr	aminopyralid + fluroxypyr	dichlorprop	picloram + triclopyr
		100	5 + 70	300	35 + 105
18-May-05	Dormant, drought stressed	0	7	0	23
17-Jun-05	Dormant, drought stressed	4	19	0	18
15-Jul-05	New growth after rain	2	4	15	1
15-Aug-05	Flowering + fresh growth	3	1	1	0
19-Sep-05	Late flowering	0	2	18	5
17-Oct-05	Post flowering	9	4	3	28
18-Nov-05	Mid flowering after rain	7	31	34	26
19-Dec-05	Fruiting, 50% black seeds	19	9	22	1
13-Jan-06	Active growth after rain	12	1	15	1
17-Feb-06	Stressed, 20% leaf fall	5	0	2	2
16-Mar-06	Stressed, 40% leaf fall	0	0	8	2
13-Apr-06	Stressed, 50% leaf fall	2	33	0	5
	Average	5	9	10	9

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REFERENCES

Bartholomew, B.L. and Armstrong, T.R. (1978). A new look at lantana control. *Queensland Agricultural Journal* 104, 339-44.

Hannan-Jones, M.A. (1998). The seasonal response of *Lantana camara* to selected herbicides. *Weed Research* 38, 413-23.

Hannan-Jones, M.A. and Vitelli, J.S. (1992). Factors influencing *Lantana camara* herbicide response – past experience and future directions of research. Proceedings 2nd Queensland Weeds Symposium, pp 87-96.

Love, C.O. (1989). Control of *Lantana camara* with fluroxypyr by different application techniques in coastal New South Wales and Queensland, Australia. Proceedings II of the 12th Asian-Pacific Weed Science Society Conference, Seoul, Korea, pp. 353-57.

Love, C.O. (1999). What's new in woody weed control from Dow? Proceedings of the 10th Biennial Noxious Weeds Conference Ballina, pp. 131-35

Love, C.O. (2007). Control of *Lantana camara* with four herbicides following monthly high volume applications from May 2005 to April 2006, Tarong – (interim). Proceedings of the 9th Queensland Weeds Symposium, p. 167. (Weed Society of Queensland, Brisbane).

Love, C.O. and Annetts, R.A. (2006). Hotshot* herbicide – a new weapon for *Lantana camara* control. Proceedings of the 15th Australian Weeds Conference, eds C. Preston, J.H. Watts and N.D. Crossman, pp. 853-56 (Weed Management Society of South Australia, Adelaide).