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THE EVALUATION OF APPLICATION VOLUME AND SPRAY QUALITY ON THE EFFICACY OF ESTER + GARLON + ROUNDUP FOR THE CONTROL OF SUMMER WEEDS IN A KNOCKDOWN SITUATION

ONE TRIAL, YORK, WESTERN AUSTRALIA,
AUSTRALIA, 2013

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1. EXPERIMENTAL DETAILS

1.1 Site Details

Co-operator and Location	Rory Curtin, York, Western Australia
Crop	Summer fallow
Soil Type	Sandy loam
Seasonal Conditions	Moderate soil moisture conditions existed prior to spray application due to heavy rainfall events at the end of 2012. This aided weed growth over the summer period. During the trial period, rainfall events of 33.2 mm and 31.2 mm on 15 March (7 days after application) and 26 March (18 days after application) facilitated growing conditions further for summer weeds.

1.2 Target

Common Name	Scientific Name	Infestation Level
Paddy melon	<i>Cucumis myriocarpus</i>	0.4 per m ² , 40 cm diameter

Significant rainfall events on 15 and 26 March 2013 aided weed growth to those plants that were not fully control by the spray application.

1.3 Treatment List

Treatment	Target Application Volume	Ute Speed (km/hr)	Spray Quality	Nozzles/Pressure
1. Untreated control	-	-	-	-
2. ROUNDUP + GARLON + ESTER	40 L/ha	25	Coarse	TT-110-025 @ 200 kPa
3. ROUNDUP + GARLON + ESTER	40 L/ha	28	Medium	AIXR-110-02 @ 400 kPa
4. ROUNDUP + GARLON + ESTER	40 L/ha	28	Extremely Coarse	TTI-110-015 @ 700 kPa
5. ROUNDUP + GARLON + ESTER	60 L/ha	25	Coarse	TT-110-03 @ 300 kPa
6. ROUNDUP + GARLON + ESTER	60 L/ha	26	Medium	AIXR-110-025 @ 500 kPa
7. ROUNDUP + GARLON + ESTER	60 L/ha	25	Extremely Coarse	TTI-110-02 @ 700 kPa

1.4 Formulations

ROUNDUP CT BROADACRE HERBICIDE – a granular formulation containing 450 g/kg glyphosate as the isopropylamine salt marketed by Monsanto.

GARLON 600 HERBICIDE – a granular formulation containing 600 g/L triclopyr present as butoxyethyl ester as marketed Dow AgroSciences Australia Limited.

KENSO AGCARE KEN-ESTER LV 680 SELECTIVE HERBICIDE - an emulsifiable concentrate formulation containing 680 g/L 2,4-D present as the ethyl hexyl ester marketed by Kenso Corporation.

1.5 Treatment Method

Equipment	Ute mounted boom spray
Nozzles	As per treatment
Nozzle Spacing	50 cm
Pressure	As per treatment
Water Volume	As per treatment
Boom Height	50 cm
Water Source	Water was sourced from the Agrisearch office in York and transported to the site to provide consistency.

1.6 Application Details

Night Application	
Date	8 March 2013
Time of Day	0525-0625 hours
Temperature at Target	16.5°C
Relative Humidity at Target	75%
Temperature at 1.25m	18°C
Relative Humidity at 1.25m	65%
Cloud Cover	0%
Wind	8-14 km/hr SSE
Crop Growth Stage	40 cm diameter

Day Application	
Date	8 March 2013
Time of Day	1330-1430 hours
Temperature at Target	31.2°C
Relative Humidity at Target	30%
Temperature at 1.25m	33.6°C
Relative Humidity at 1.25m	28%
Cloud Cover	0%
Wind	5-8 km/hr SSE
Application Rate – Roundup	400 mL
Application Rate – Garlon 600	50 mL
Application Rate – Ken-ester LV 680	300 mL

1.7 Trial Design

Design	Randomised complete block
Replicates	Two
Plot Size	10 m x 100 m
Buffers	2 m (between plots, with 30 m buffer around trial)

1.8 Assessments

Date	Timing	Assessment
08-Mar-13	Pre-spray	Weed counts, weed ground cover
15-Mar-13	7 DAT	Weed counts, weed control
22-Mar-13	14 DAT	Weed counts, weed control
27-Mar-13	19 DAT	Weed counts, weed control
03-Apr-13	26 DAT	Weed counts, weed control

Assessments were made in the section of each plot on the downwind side, outside the tyre tracks and in part of plot where no effect from drift or changes in the tractor speed.

At the pre-spray assessment time, a point in each plot was permanently marked with a peg and a 1 metre square area centred on the peg was photographed. The weed species present were identified, counted and the ground cover (%) of each weed species present was estimated for each plot. At each assessment time, a one square metre quadrat was placed around this permanent marker and the surviving weeds present counted and recorded by species.

At the post spray assessment times, weed brownout/control was assessed using a 0-100 scale where 0 = no control, 50 = 50% brownout or reduction in weed biomass and 100 = complete control.

A photograph of each fixed quadrat within each plot was taken pre-spray and generally at each post spray assessment time. Photographs have been provided separately on a memory stick.

1.9 Statistical Analysis

Statistical analyses were conducted using GenStat Release 11.1 (PC/Windows 2008 – Lawes Agricultural Trust, Rothamsted Experimental Station). The model includes all treatment effects. Analysis of variance and least significant difference (LSD) procedures were used.

2. RESULTS

Results are summarised in Tables 1-2 and are given fully in the appendices.

**Table 1 Agrisearch Services Summary of Results - York, WA
Night Time Spraying**

Treatment/Nozzle	Pressure (Bar)	App Rate	7 DAT 15-Mar-13	14 DAT 22-Mar-13	19 DAT 27-Mar-13	26 DAT 03-Apr-13
1. Untreated	-	-	0.0 e	0.0 d	0.0 d	0.0 e
2. TT-025 (Course)	2	40 L/ha	37.5 c	25.0 cd	25.0 c	47.5 cd
3. AIXR-02 (Medium)	4	40 L/ha	20.0 d	12.5 cd	75.0 b	42.5 d
4. TTI-015 (Ex Course)	7	40 L/ha	35.0 c	32.5 bc	82.5 b	55.0 bc
5. TT-03 (Course)	3	60 L/ha	50.0 b	57.5 ab	75.0 b	60.0 b
6. AIXR-025 (Medium)	5	60 L/ha	57.5 b	85.0 a	95.0 a	85.0 a
7. TTI-02 (Ex Course)	7	60 L/ha	72.5 a	75.0 a	75.0 b	80.0 a
F Probability			<0.001	0.002	<0.001	<0.001
LSD 5 %			9.5	27.6	10.6	8.6

Means within the same column with a letter in common are not significantly different (P>0.05)

**Table 2 Agrisearch Services Summary of Results - York, WA
Day Time Spraying**

Treatment/Nozzle	Pressure (Bar)	App Rate	7 DAT 15-Mar-13	14 DAT 22-Mar-13	19 DAT 27-Mar-13	26 DAT 03-Apr-13
1. Untreated	-	-	0.0 d	0.0 d	0.0 c	0.0 c
2. TT-025 (Course)	2	40 L/ha	32.5 c	35.0 c	65.0 b	60.0 b
3. AIXR-02 (Medium)	4	40 L/ha	32.5 c	30.0 c	65.0 b	52.5 b
4. TTI-015 (Ex Course)	7	40 L/ha	37.5 bc	50.0 b	70.0 b	60.0 b
5. TT-03 (Course)	3	60 L/ha	50.0 ab	75.0 a	70.0 b	60.0 b
6. AIXR-025 (Medium)	5	60 L/ha	55.0 a	82.5 a	87.5 a	80.0 a
7. TTI-02 (Ex Course)	7	60 L/ha	40.0 bc	55.0 b	70.0 b	80.0 a
F Probability			<0.001	<0.001	<0.001	<0.001
LSD 5 %			13.4	10.6	11.8	10.6

Means within the same column with a letter in common are not significantly different (P>0.05)

3. APPENDICES

3.1 Full Results

3.1.1 Night Time Spray

Treatment/Nozzle	Pressure (Bar)	App Rate	Rep	Paddy melon 7 DAT	Paddy melon 14 DAT	Paddy melon 19 DAT	Paddy melon 26 DAT
1. Untreated	-	-	1	0.0	0.0	0.0	0.0
			2	0.0	0.0	0.0	0.0
			Mean	0.0	0.0	0.0	0.0
2. TT-025 (Course)	2	40 L/ha	1	35.0	40.0	20.0	50.0
			2	40.0	10.0	30.0	45.0
			Mean	37.5	25.0	25.0	47.5
3. AIXR-02 (Medium)	4	40 L/ha	1	20.0	10.0	80.0	50.0
			2	20.0	15.0	70.0	35.0
			Mean	20.0	12.5	75.0	42.5
4. TTI-015 (Ex Course)	7	40 L/ha	1	30.0	25.0	85.0	60.0
			2	40.0	40.0	80.0	50.0
			Mean	35.0	32.5	82.5	55.0
5. TT-03 (Course)	3	60 L/ha	1	55.0	40.0	80.0	60.0
			2	45.0	75.0	70.0	60.0
			Mean	50.0	57.5	75.0	60.0
6. AIXR-025 (Medium)	5	60 L/ha	1	55.0	80.0	95.0	90.0
			2	60.0	90.0	95.0	80.0
			Mean	57.5	85.0	95.0	85.0
7. TTI-02 (Ex Course)	7	60 L/ha	1	75.0	70.0	80.0	80.0
			2	70.0	80.0	70.0	80.0
			Mean	72.5	75.0	75.0	80.0

3.1.2 Day Time Spray

Treatment/Nozzle	Pressure (Bar)	App Rate	Rep	Paddy melon 7 DAT	Paddy melon 14 DAT	Paddy melon 19 DAT	Paddy melon 26 DAT
1. Untreated	-	-	1	0.0	0.0	0.0	0.0
			2	0.0	0.0	0.0	0.0
			Mean	0.0	0.0	0.0	0.0
2. TT-025 (Course)	2	40 L/ha	1	40.0	35.0	60.0	60.0
			2	25.0	35.0	70.0	60.0
			Mean	32.5	35.0	65.0	60.0
3. AIXR-02 (Medium)	4	40 L/ha	1	35.0	30.0	60.0	55.0
			2	30.0	30.0	70.0	50.0
			Mean	32.5	30.0	65.0	52.5
4. TTI-015 (Ex Course)	7	40 L/ha	1	30.0	60.0	60.0	60.0
			2	45.0	40.0	80.0	60.0
			Mean	37.5	50.0	70.0	60.0
5. TT-03 (Course)	3	60 L/ha	1	50.0	80.0	70.0	60.0
			2	50.0	70.0	70.0	60.0
			Mean	50.0	75.0	70.0	60.0
6. AIXR-025 (Medium)	5	60 L/ha	1	60.0	85.0	80.0	90.0
			2	50.0	80.0	95.0	70.0
			Mean	55.0	82.5	87.5	80.0
7. TTI-02 (Ex Course)	7	60 L/ha	1	40.0	60.0	60.0	80.0
			2	40.0	50.0	80.0	80.0
			Mean	40.0	55.0	70.0	80.0

3.2 Climate Data

Climate data from BOM Weather station at Northam, approximately 13 km from the trial site.

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Northam, Western Australia April 2013 Daily Weather Observations

Most observations from a site within the town.

Date	Day	Temps		Rain	Evap	Sun	Max wind gust			9am				3pm							
		Min	Max				Dirn	Spd	Time	Temp	RH	Cld	Dirn	Spd	MSLP	Temp	RH	Cld	Dirn	Spd	MSLP
		°C	°C	mm	mm	hours		kn/h	local	°C	%	eighths	kn/h	hPa	°C	%	eighths	kn/h	hPa		
1	Mo	10.7	31.0	0						19.7	53	0	SSE	9	1020.9	30.5	25	0	Calm	1017.6	
2	Tu	12.8	31.0	0						21.2	48	1	ESE	9	1020.3	30.5	23	0	ENE	4	1016.1
3	We	17.6	33.4	0						22.3	52	5		Calm	1017.5	32.5	33	2	Calm	1013.9	
4	Th	15.9	36.1	0						25.4	45	1		Calm	1016.5	35.0	23	6	NNE	17	1012.6
5	Fr	16.7	31.1	0						22.4	68	5		Calm	1015.8	30.2	38	6	SW	17	1014.0
6	Sa	17.7	27.0	0						20.6	69	7	SSE	28	1020.1	24.8	52	6	SSE	28	1017.5
7	Su	16.4	32.0	0						19.8	73	5	ESE	24	1018.3	30.6	35	1	E	17	1014.7
8	Mo	16.4	37.0	0						23.7	54	0		Calm	1017.5	35.6	18	5	NNE	24	1013.7
9	Tu	15.6	37.0	0						23.1	58	1		Calm	1017.0	34.5	20	3	N	17	1014.0
10	We	15.4	36.6	0						24.2	52	2		Calm	1015.4	36.6	23	6		Calm	1013.0
11	Th	20.9	36.7	2.2						25.6	60	3		Calm	1014.3	35.0	22	8	WNW	17	1011.0
12	Fr	21.6	24.8	0						23.2	66	8	ESE	24	1016.3	24.4	63	8	SSE	17	1015.8
13	Sa	19.5	27.5	1.2						20.6	87	8		Calm	1016.5	27.1	54	8		Calm	1014.6
14	Su	18.4	29.7	0						22.4	75	8		Calm	1017.2	28.0	47	8	ESE	4	1014.6
15	Mo	18.5	31.0	0						23.3	73	6		Calm	1016.2	29.1	51	8	W	4	1011.8
16	Tu	19.1	27.1	0.4						20.8	87	8		Calm	1015.0	26.6	53	7	WNW	9	1013.0
17	We	18.6	27.0	0						20.1	81	8	ESE	4	1015.4	25.6	54	8		Calm	1012.3
18	Th	14.7	26.7	0						17.8	96	4		Calm	1014.2	26.0	48	8		Calm	1012.3
19	Fr	17.3	25.8	6.2						18.5	95	7		Calm	1014.5	25.6	53	8	W	9	1013.1
20	Sa	14.1	23.4	0						18.1	83	5	SSE	17	1018.5	22.5	46	4	WSW	24	1016.0
21	Su	8.8	21.1							14.9	73	7		Calm	1017.7	20.0	56	7	WNW	17	1014.8
22	Mo	13.6	22.8	2.2						17.2	91	8		Calm	1018.2	21.2	56	7		Calm	1016.6
23	Tu	7.3	24.8	0						14.6	83	0		Calm	1018.8	23.4	48	1		Calm	1020.4
24	We	9.2	28.3	0						15.8	72	4		Calm	1022.1	27.8	29	7	N	9	1017.6
25	Th	14.5	25.8	0						17.2	74	8		Calm	1017.5	25.5	41	8		Calm	1013.9
26	Fr	13.9	28.6	0						20.6	63	0		Calm	1015.6	27.5	36	0	WSW	24	1014.2
27	Sa	10.5	26.8	0						16.7	82	1		Calm	1018.2	25.5	41	3	ENE	4	1015.7
28	Su	12.5	25.1	0						17.0	78	5	S	17	1020.2	24.1	44	6	WSW	9	1018.0
29	Mo	11.0	24.6	0						15.9	75	5	SE	9	1022.1	24.0	45	7		Calm	1019.0
30	Tu	12.1	30.0	0						16.8	66	8		Calm	1019.4	29.0	40	2		Calm	1014.7
Statistics for April 2013																					
Mean		15.0	29.0							20.0	71	4		4	1017.6	28.0	40	5		9	1014.9
Lowest		7.3	21.1							14.6	45	0		Calm	1014.2	20.0	18	0		Calm	1011.0
Highest		21.6	37.0	6.2						25.6	96	8	SSE	28	1022.1	36.6	63	8	SSE	28	1020.4
Total				12.2																	

Temperature, humidity, wind, cloud and rainfall observations are from Northam (station 010111). Pressure observations are from York (station 010311).
The mean sea level pressure at York is provided for convenience. On most occasions it will be within 1 hPa of that at Northam.

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