WEED CONTROL IN RED BEETS

RESEARCH RESULTS – 2006

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FOR THE ONTARIO PROCESSING VEGETABLE GROWERS

NOVEMBER 8, 2006

ACKNOWLEDGEMENTS

Purpose Of This Booklet
This booklet is provided as a guide to the 2006 processing vegetable weed control research control plots. The experiments outlined in this booklet are located at Ridgetown Campus. We appreciate the funding, cooperation and assistance provided by the Ontario Processing Vegetable Growers and the Ontario Food Processors Association. As well, we would like to thank the chemical companies and their representatives, agextension personnel, and other research scientists for their ideas, plant material and herbicide samples that were used in these trials. Funding for the 2006 research program was provided by:

Ontario Processing Vegetable Growers
Summer Job Service 2006
Agriculture & Agri-Food Canada

Ontario Food Processors Association
Summer Career Placements 2006
Agchemical Companies

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We trust that the information provided by this research will further the science of weed control by assisting with the registration of herbicides through the minor use system. We also hope this information will be of use in the extension of proper herbicide recommendations, thereby enabling growers to achieve consistent, broad spectrum weed control with a minimum of crop damage.

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Trial 1: Weed Control and Tolerance with Micro-rates in Red Beets

Objectives: 1. Determine weed control and tolerance of red beet to micro-rate applications of Pyramin+Upbeet+Lontrel.

2. Determine weed control and tolerance of red beet to an early postemergence application of Pyramin+Dual II Magnum.

Materials & Methods:

Crop: Red beet
Variety: Detroit Dark Red Planting date: May 26
Planting rate: 265 684 seeds/ha Depth: 2 cm
Row spacing: 75cm

Design: Randomized Complete Block Design
Plot width: 1.5m Plot length: 10m
Reps: 4

Field Preparation: Land was leveled with an S-tine cultivator May 4/06. Spread 411 kg/ha of 6-27-27 and 230 kg/ha of 46-0-0 and worked fertilizer in with an S-tine cultivator.

Soil Description:
Sand: 49% OM: 5.8% Texture: Loam
Silt: 30% pH: 5.8 Soil: Watford/Brady Series
Clay: 21% CEC 14

Application Information:

	A	B	C	D	
APPLICATION DATE	JUN 7	JUN 15	JUN 26	JUL 13	
TIME OF DAY	2:00PM	8:00AM	8:00AM	9:20AM	
TIMING	POST1	POST2	POST3	POST4	
AIR TEMP (c)	29	21	23	25	
RH (%)	28	34	90	78	
WIND SPEED (KPH)	2	2	2	3	
SOIL TEMP (c)	29	34	23	24	
CLOUD COVER (%)	60	90	100	30	
CROP STAGE	PRE	COT	COT-2 LF	2-3 LF	5-6 LF
LAMBSQUARTERS STAGE	PRE	COT-2 LF	COT-2 LF	COT-2 LF	COT-2 LF
REDROOT PIGWEED STAGE	PRE	COT-2 LF	COT-2 LF	COT-2 LF	COT-2 LF
VEVETLEAF STAGE	PRE	COT-2 LF	COT-2 LF	COT-2 LF	COT-2 LF
GREEN FOXTAIL STAGE	PRE	1-3 LF	1-2 LF	1-3 LF	1-2 LF

Spray Equipment:

Application Method: CO2 Backpack Pressure: 207 KPA (30 PSI)
Nozzle Type: AIR INDUCTION Nozzle Size: ULD120-02
Nozzle Spacing: 50 cm (20”) Boom Width: 1.5 m (60”)
Spray Volume: 200 L/ha (20 GAL/AC)

Table 1.1 Red beet visual injury 7, 14 and 28 days after application.

HERBICIDE	RATE	VISUAL INJURY		
		7D	14D	28D
1. Check (WEED-FREE)		0B	0B	0B
2. PYRAMIN UPBEET LONTREL SUPER SPREADER	500 ML/AC 3.6 G/AC 50 ML/AC 0.75% V/V	0B	3AB	3B
3. PYRAMIN UPBEET LONTREL SUPER SPREADER	1000 ML/AC 7.2 G/AC 100 ML/AC 1.5% V/V	1B	9A	10A
4. PYRAMIN DUAL II MAG	2000 ML/AC 500 ML/AC	10A	6AB	0B
LSD (P <0.05)		7	8	4

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Table 1.2. Effect of herbicide treatment on ragweed and lamb's-quarters control 28 days after application.

HERBICIDE	RATE	LAMBSQUARTERS	REDROOT PIGWEED
1. Check (WEED-FREE)		0B	0B
2. PYRAMIN UPBEET LONTREL SUPER SPREADER	500 ML/AC 3.6 G/AC 50 ML/AC 0.75% V/V	99A	98A
3. PYRAMIN UPBEET LONTREL SUPER SPREADER	1000 ML/AC 7.2 G/AC 100 ML/AC 1.5% V/V	99A	99A
4. PYRAMIN DUAL II MAG	2000 ML/AC 500 ML/AC	96A	96A
LSD (P <0.05)		3	4

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Table 1.3. Effect of herbicide treatment on redroot pigweed and velvetleaf control 28 days after application.

HERBICIDE	RATE	VELVETLEAF	GREEN FOXTAIL
1. Check (WEED-FREE)		0B	0B
2. PYRAMIN UPBEET LONTREL SUPER SPREADER 0.75% V/V	500 ML/AC 3.6 G/AC 50 ML/AC	98A	64A
3. PYRAMIN UPBEET LONTREL SUPER SPREADER 1.5% V/V	1000 ML/AC 7.2 G/AC 100 ML/AC	99A	80A
4. PYRAMIN DUAL II MAG	2000 ML/AC 500 ML/AC	96A	73A
LSD (P <0.05)		4	19

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Table 1.4 Effect of herbicide treatment on red beet sugar and yield (by grade).

HERBICIDE	RATE	% SUGAR	YIELD (T/AC)			
			NO1	NO2	NO3	NO4
1. Check (WEED-FREE)		7.2A	3.0BC	7.3B	21.7A	2.8AB
2. PYRAMIN UPBEET LONTREL SUPER SPREADER 0.75% V/V	500 ML/AC 3.6 G/AC 50 ML/AC	7.0A	5.0A	9.8A	19.1A	2.9AB
3. PYRAMIN UPBEET LONTREL SUPER SPREADER 1.5% V/V	1000 ML/AC 7.2 G/AC 100 ML/AC	6.5A	4.6AB	7.6B	17.6A	1.5B
4. PYRAMIN DUAL II MAG	2000 ML/AC 500 ML/AC	7.3A	2.2C	3.9C	20.2A	5.2A
LSD (P <0.05)		1.3	2.0	1.9	4.8	3.2

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Conclusions:

This experiment was conducted to determine the effectiveness of Pyramin micro-rates or a preemergence tank-mix of Pyramin+Dual II Magnum, and the potential for injury from each herbicide treatment in red beets.

Pyramin micro-rates caused some visual injury (leaf burning around the margins and chlorosis) to red beet at the 2X rate – plants were stunted and there was a decrease in plant dry weight. The yield of #1 and #2 red beets were no different than the untreated check, but there were fewer #3, #4 and #5 (oversized) beets at the 2X rate. Total yield was not significantly less than the untreated check.

Visual injury – stunting and reduced plant dry weight was observed in the Pyramin+Dual II Magnum treatment. Pyramin+Dual II Magnum applied early POST did reduce yield of #1 and #2 beets, while #3, #4 and #5 beet yields were significantly greater than the untreated check. Total yield was not less than the untreated check.

The Pyramin micro-rates did not reduce the quality of red beets, however, the Pyramin+Dual II Magnum treatment did increase the number of larger and oversized beets (#3, #4 and #5), which is undesirable for processing red beets.

TRIAL 2: Tolerance of Red Beets to Betamix and Upbeet

Objective: Determine the tolerance of red beet to Betamix and Upbeet.

Materials & Methods:

Crop: Red beet
Variety: Detroit Dark Red Planting date: May 29
Planting rate: 265 684 seeds/ha Depth: 2 cm
Row spacing: 75cm

Design: Randomized Complete Block Design
Plot width: 1.5m Plot length: 10m
Reps: 4

Field Preparation: Land was leveled with an S-tine cultivator May 4/06. Spread 411 kg/ha of 6-27-27 and 230 kg/ha of 46-0-0 and worked fertilizer in with an S-tine cultivator.

Soil Description:

Sand: 49%	OM: 5.8%	Texture: Loam
Silt: 30%	pH: 5.8	Soil: Watford/Brady Series
Clay: 21%	CEC 14	

Application Information:

	A
APPLICATION DATE	JUN 15
TIME OF DAY	8:00AM
TIMING	POST
AIR TEMP (c)	21
RH (%)	40
WIND SPEED (KPH)	1
SOIL TEMP (c)	19
CLOUD COVER (%)	0
CROP STAGE	

Spray Equipment:

Application Method: CO2 Backpack Pressure: 207 KPA (30 PSI)
Nozzle Type: AIR INDUCTION Nozzle Size: ULD120-02
Nozzle Spacing: 50 cm (20”) Boom Width: 1.5 m (60”)
Spray Volume: 200 L/ha (20 GAL/AC)

Table 2.1 Red beet visual injury 7, 14 and 28 days after application.

HERBICIDE	RATE	VISUAL INJURY		
		7D	14D	28D
1. Check (WEED-FREE)		0A	0A	0A
2. BETAMIX	1.1 L/AC	0A	0A	0A
3. BETAMIX	2.2 L/AC	1A	0A	0A
4. UPBEET	14 G/AC	1A	0A	0A
5. UPBEET	28 G/AC	3A	0A	0A
6. PYRAMIN	2.0 L/AC	1A	0A	0A
LSD (P <0.05)		3	0	0

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Table 2.2 Effect of herbicide treatment on red beet sugar and yield (by grade).

HERBICIDE	RATE	% SUGAR	YIELD (T/AC)			
			NO1	NO2	NO3	NO4
1. Check (WEED-FREE)		7.2A	4.4A	5.7A	20.1A	2.3A
2. BETAMIX	1.1 L/AC	7.7A	3.5A	6.2A	17.8AB	4.3A
3. BETAMIX	2.2 L/AC	7.5A	4.5A	7.2A	15.7B	2.7A
4. UPBEET	14 G/AC	8.1A	4.4A	7.6A	18.7AB	3.0A
5. UPBEET	28 G/AC	7.5A	4.7A	8.2A	17.2AB	1.4A
6. PYRAMIN	2.0 L/AC	7.3A	4.0A	5.9A	17.1AB	1.1A
LSD (P <0.05)		1.5	1.6	3.0	4.3	3.9

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Conclusions:

This experiment was conducted to determine the tolerance of red beet to Betamix and Upbeet – Pyramin was included for comparison to the industry standard. Betamix and Upbeet did not cause significant visual injury to red beets, nor did they reduce plant dry weight, sugars or yield.

Trial 3: Effect of Timing on Tolerance of Red Beet to Dual II Magnum

Objective: Determine the tolerance of red beet to Betamix and Upbeet.

Materials & Methods:

Crop: Red beet
Variety: Detroit Dark Red Planting date: May 29
Planting rate: 265 684 seeds/ha Depth: 2 cm
Row spacing: 75cm

Design: Randomized Complete Block Design
Plot width: 1.5m Plot length: 10m
Reps: 4

Field Preparation: Land was leveled with an S-tine cultivator May 4/06. Spread 411 kg/ha of 6-27-27 and 230 kg/ha of 46-0-0 and worked fertilizer in with an S-tine cultivator.

Soil Description:
Sand: 49% OM: 5.8% Texture: Loam
Silt: 30% pH: 5.8 Soil: Watford/Brady Series
Clay: 21% CEC 14

Application Information:

	A	B	C
APPLICATION DATE	MAY 29	MAY 30	JUN 7
TIME OF DAY	8:00PM	8:00AM	2:00PM
TIMING	PPI	PRE	POST
AIR TEMP (c)	28	24	29
RH (%)	65	88	28
WIND SPEED (KPH)	2	4	2
SOIL TEMP (c)	26	25	29
CLOUD COVER (%)	0	0	60
CROP STAGE	PPI	PRE	COT-2 LF

Spray Equipment:

Application Method: CO2 Backpack Pressure: 207 KPA (30 PSI)
Nozzle Type: AIR INDUCTION Nozzle Size: ULD120-02
Nozzle Spacing: 50 cm (20”) Boom Width: 1.5 m (60”)
Spray Volume: 200 L/ha (20 GAL/AC)

Table 3.1 Red beet visual injury 7, 14 and 28 days after application.

HERBICIDE	TIMING	RATE	VISUAL INJURY		
			7D	14D	28D
1. Check (WEED-FREE)			0A	0A	0A
2. DUALII MAG	PPI	0.5 L/AC	0A	0A	0A
3. DUALII MAG	PPI	1.0 L/AC	0A	0A	0A
4. DUALII MAG	PRE	0.5 L/AC	0A	0A	0A
5. DUALII MAG	PRE	1.0 L/AC	0A	0A	0A
6. DUALII MAG	POST	0.5 L/AC	0A	0A	0A
7. DUALII MAG	POST	1.0 L/AC	0A	0A	0A
LSD (P <0.05)			0	0	0

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Table 3.2 Effect of herbicide treatment on red beet sugar and yield (by grade).

HERBICIDE	RATE		% SUGAR	YIELD (T/AC)			
				NO1	NO2	NO3	NO4
1. Check (WEED-FREE)			7.4A	4.3A	6.3A	9.9AB	2.5A
2. DUAL II MAG	PPI	0.5 L/AC	7.9A	4.9A	8.3A	11.1AB	2.1AB
3. DUAL II MAG	PPI	1.0 L/AC	7.3A	4.4A	5.7A	10.5AB	0.4B
4. DUAL II MAG	PRE	0.5 L/AC	7.6A	5.5A	6.6A	12.8A	0.6AB
5. DUAL II MAG	PRE	1.0 L/AC	7.7A	4.4A	6.8A	12.1AB	0.0B
6. DUAL II MAG	POST	0.5 L/AC	7.4A	4.9A	7.4A	8.9B	0.0B
7. DUAL II MAG	POST	1.0 L/AC	7.4A	4.3A	6.3A	11.9AB	1.3AB
LSD (P <0.05)			1.6	1.8	3.2	3.7	2.1

Note: Means followed by the same letter are not significantly different (P=0.05, LSD).

Conclusions:

This experiment was conducted to determine the tolerance of red beet to Dual II Magnum applied pre-plant incorporated, preemergence or postemergence. Dual II Magnum did not cause visual injury to red beet. Sugar content and yield were not less than the untreated check at any of the herbicide timings or rates.