WEED CONTROL IN PROCESSING VEGETABLES

RESEARCH RESULTS – 2011

PREPARED BY DARREN ROBINSON, RIDGETOWN CAMPUS

FOR THE ONTARIO PROCESSING VEGETABLE GROWERS

NOVEMBER 2, 2011

ACKNOWLEDGEMENTS

Purpose Of This Booklet

This booklet is provided as a guide to the 2011 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 2011 research program was provided by:

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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: Tolerance of Lima Bean to Preemergence Herbicides

Objective: Determine the tolerance of lima bean to PRE applications of Valtera, pyroxasulfone, Eragon and Sandea.

Materials & Methods:

Crop: Lima bean
Variety: Improved Kingston — Planting date: June 3/11
Planting rate: 137826 seeds/ha — Depth: 2 cm
Row spacing: 75cm — Plant spacing: 7 cm

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

Field Preparation: Field was fertilized on June 2 with 18-18-18 at 300 kg/ha and 26-0-0 at 250 kg/ha.

Soil Description:

Sand: 50%	OM: 3.8%	Texture: Loam
Silt: 26%	pH: 6.9	Soil: Watford/Brady
Clay: 24%	CEC 17	

Application Information:

	A
Application Date:	Jun-6-2011
Time of Day:	11:00 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	28 C
% Relative Humidity:	52
Wind Velocity, Unit:	3 KPH
Wind Direction:	SW
Dew Presence (Y/N):	N
Soil Temperature, Unit:	30 C
Soil Moisture:	NORMAL
% Cloud Cover:	0

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. Effect of herbicide treatment on lima bean percent injury 7, 14 and 28 days after application, dry weight at 28 days and yield.

HERBICIDE	RATE	PERCENT INJURY			DRY WT	YIELD
		7D	14D	28D	G	T/AC
1. Check (WEEDFREE)		0C	0B	0C	11A	2.2A
2. VALTERA	55 G/AC	0C	0B	3C	14A	2.6A
3. VALTERA	110 G/AC	3BC	3B	5BC	14A	2.5A
4. PYROXASULFONE	209 G/HA	3BC	3B	8BC	16A	2.5A
5. PYROXASULFONE	418 G/HA	1BC	3B	5BC	13A	2.6A
4. ERAGON	14 G/AC	8B	8B	16B	13A	1.4AB
5. ERAGON	28 G/AC	81A	89A	93A	3B	0.4B
4. SANDEA	25 G/AC	0C	0B	5BC	12A	2.5A
5. SANDEA	50 G/AC	0C	0B	0C	16A	2.2A
LSD (P <0.05)		7	8	12	6	1.2

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

Conclusions:

Conclusions: This trial was kept weed-free to test for the effect of various preemergence herbicides on visual injury, height, dry weight and yields of lima bean. Additional data were collected to support the submission for Sandea (26 G/AC).

Lima bean was tolerant to PRE applications of Valtera and pyroxasulfone. However, Eragon caused significant injury and yield loss, particularly at the overlap rate of 28 g/ac.

Data have been submitted to support Sandea registration in lima beans.

Trial 2: Tolerance and Weed Control with Herbicide-Insecticide Tank-Mixes in Snap Bean

Objective: Determine the level of weed control and crop tolerance of snap bean to tank mixes of Basagran Forte or Reflex with either Matador or Lagon.

Materials & Methods:

Crop: Snap bean
Variety: Matador
Planting date: Jun 3/11
Planting rate: 360333 seeds/ha
Depth: 4 cm
Row spacing: 75cm
Plant spacing: 3.6 cm

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

Field Preparation: Field was fertilized on June 10 with 6-27-27 at 8 kg/ha and 26-0-0 at 32 kg/ha. Dual II Magnum was applied over the area to control grass weeds.

Soil Description:
Sand: 50%
OM: 3.8%
Texture: Loam
Silt: 26%
pH: 6.9
Soil: Watford/Brady
Clay: 24%
CEC 17

Application Information:

	A
Application Date:	Jun-6-2011
Time of Day:	11:00 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	28 C
% Relative Humidity:	52
Wind Velocity, Unit:	3 KPH
Wind Direction:	SW
Dew Presence (Y/N):	N
Soil Temperature, Unit:	30 C
Soil Moisture:	NORMAL
% Cloud Cover:	0

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. Effect of herbicide treatment on percent control of common ragweed (AMBEL), common lamb's-quarters (CHEAL) and green foxtail (SETVI) control 28 days after application.

HERBICIDE	RATE	AMBEL %	CHEAL %	SETVI %
1. Check (WEEDFREE)		100A	100A	100A
2. MATADOR	33 ML/AC	0C	0C	0B
3. LAGON	400 ML/AC	0C	0C	0B
4. BASAGRAN FORTE	900 ML/AC	65B	81AB	8B
5. REFLEX	400 ML/AC	98A	91AB	5B
AGRAL 90	0.25% V/V			
6. MATADOR	33 GA/HA	43B	75B	13B
BASAGRAN FORTE	900 ML/AC			
7. MATADOR	33 GA/HA	100A	98A	18B
REFLEX	400 ML/AC			
AGRAL 90	0.25% V/V			
8. LAGON	400 ML/AC	58B	98A	15B
BASAGRAN FORTE	900 ML/AC			
9. LAGON	400 ML/AC	100A	93A	19B
REFLEX	400 ML/AC			
AGRAL 90	0.25% V/V			
10. Check (WEEDY)		0C	0C	0C
LSD (P <0.05)		24	17	18

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

Table 2.2. Effect of herbicide treatment on snap bean injury at 7 days after application, plant dry weight and yield.

HERBICIDE	RATE	INJURY %	DRY WT G	YIELD T/AC
1. Check (WEEDFREE)		0C	112A	7.7A
2. MATADOR	33 ML/AC	0C	66BCD	3.8D
3. LAGON	400 ML/AC	0C	64CD	3.4D
4. BASAGRAN FORTE	900 ML/AC	6B	66BCD	5.3BCD
5. REFLEX	400 ML/AC	3BC	94ABC	6.6AB
AGRAL 90	0.25% V/V			
6. MATADOR	33 GA/HA	6B	64CD	5.9ABC
BASAGRAN FORTE	900 ML/AC			
7. MATADOR	33 GA/HA	2C	83A-D	7.2AB
REFLEX	400 ML/AC			
AGRAL 90	0.25% V/V			
8. LAGON	400 ML/AC	10A	75BCD	4.1CD
BASAGRAN FORTE	900 ML/AC			
9. LAGON	400 ML/AC	2C	99AB	7.3A
REFLEX	400 ML/AC			
AGRAL 90	0.25% V/V			
10. Check (WEEDY)		0C	52D	3.5D
LSD (P <0.05)		3	33	2.0

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

Conclusions:

This trial was established to determine efficacy and snap bean tolerance to tank mixes of herbicides (Basagran Forte or Reflex) and insecticides (Matador or Lagon). Injury caused by Basagran Forte was increased when applied as a tank mix with Lagon at 7 days after treatment (DAT), however by 28 DAT, injury was no longer observed. None of the treatments caused commercially significant (ie. >10%) injury to snap bean. Due to poor control of common ragweed, all treatments except those where Reflex was applied had lower plant dry weight than the untreated check. Yield was less than the untreated weed-free check in all treatments except where Reflex was applied with an insecticide. There is no evidence to indicate that Matador or Lagon decreased weed control by Basagran Forte or Reflex.

Trial 3: Tolerance of Snap Bean to Preemergence Herbicides

Objective: Determine the tolerance of snap bean to PRE applications of Valtera, pyroxasulfone, Eragon and Sandea.

Materials & Methods:

Crop: Snap bean
Variety: Matador
Planting date: Jun 11/10
Planting rate: 360333 seeds/ha
Depth: 4 cm
Row spacing: 75cm
Plant spacing: 3.6 cm

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

Field Preparation: Field was fertilized on June 10 with 6-27-27 at 8 kg/ha and 26-0-0 at 32 kg/ha. Dual II Magnum was applied over the area to control grass weeds.

Soil Description:
Sand: 52%
OM: 5.7%
Texture: sandy clay loam
Silt: 25%
pH: 7.1
Soil: Watford/Brady
Clay: 23%
CEC 20

Application Information:

	A
Application Date:	Jun-6-2011
Time of Day:	11:00 AM
Application Method:	CO2 SPRAY
Application Timing:	PRE
Application Placement:	SOIL
Air Temperature, Unit:	28 C
% Relative Humidity:	52
Wind Velocity, Unit:	3 KPH
Wind Direction:	W
Dew Presence (Y/N):	N
Soil Temperature, Unit:	30 C
Soil Moisture:	NORMAL
% Cloud Cover:	0

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. Effect of herbicide treatment on snap bean percent injury 7, 14 and 28 days after application, dry weight at 28 days and yield.

HERBICIDE	RATE	PERCENT INJURY 7D	14D	28D	DRY WT G	YIELD T/AC
1. Check (WEEDFREE)		0C	0C	0C	17A	5.4A
2. VALTERA	55 G/AC	1C	4C	5BC	19A	7.0A
3. VALTERA	110 G/AC	4BC	6BC	9BC	20A	6.7A
4. PYROXASULFONE	209 G/HA	0C	1C	3C	16AB	7.4A
5. PYROXASULFONE	418 G/HA	0C	1C	5BC	15AB	7.7A
4. ERAGON	14 G/AC	23B	24B	44AB	10AB	1.5B
5. ERAGON	28 G/AC	85A	86A	64A	3B	0.3B
4. SANDEA	25 G/AC	0C	0C	8BC	16AB	6.2A
5. SANDEA	50 G/AC	0C	5BC	26ABC	18A	7.1A
LSD (P <0.05)		21	19	12	13	3.5

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

Conclusions:

Conclusions: This trial was kept weed-free to test for the effect of various preemergence herbicides on visual injury, height, dry weight and yields of snap bean. Additional data were collected to support the submission for Sandea (26 G/AC).

PRE applications of pyroxasulfone did not injure snap bean, nor did they cause a reduction in dry weight, height or snap bean yield. Snap bean showed some symptoms of leaf burn and necrosis in the Valtera treatment, though yield was unaffected. Eragon caused significant injury, growth reduction and yield loss in snap bean. There was temporary chlorosis at the 50 g/ac rate of Sandea, but snap bean outgrew the injury so that snap bean dry weight and yield were not less than the untreated check.

Trial 4: Herbicide Tolerance in Carrots

Objective: Determine the tolerance of carrots to preemergence applications of Valtera, Goal and sulfentrazone.

Materials & Methods:

Crop: Carrot
Variety: Fontana
Planting date: April 27/11
Planting rate: 260000 seeds/ha
Depth: 2 cm
Row spacing: 75cm

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

Field Preparation: Fertilized with 350 hg/ha of 19-19-19 and 200 kg/ha of 27-0-0. Back half of plots were kept weed-free by hand.

Soil Description:
Sand: 71%
OM: 3.5%
Texture: v.fine sandy loam
Silt: 16%
pH: 6.8
Soil: Maplewood/Normandale
Clay: 13%
CEC 11

Application Information:

	A
APPLICATION DATE	April 27
TIME OF DAY	10:00AM
TIMING	PRE
AIR TEMP (c)	18
RH (%)	23
WIND SPEED (KPH)	2
SOIL TEMP (c)	20
CLOUD COVER (%)	50
CROP STAGE	PRE

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 4.1. Effect of herbicide treatment on 'Fontana' carrot visual injury 28 days after application, stand count, carrot length and yield.

HERBICIDE	RATE	VISUAL INJURY 28D	STAND COUNT #/M ROW	LENGTH CM	YIELD T/AC
1. Check (WEEDFREE)		0B	34A	18AB	27A
2. VALTERA	40 G/AC	0B	21ABC	20A	27A
3. VALTERA	55 G/AC	0B	16A-D	20A	31A
4. VALTERA	110 G/AC	0B	14BCD	18AB	32A
5. GOAL	200 ML/AC	0B	29AB	17AB	28A
6. GOAL	400 ML/AC	0B	20A-D	18AB	30A
7. SULFENTRAZONE	236 ML/AC	48A	6CD	18AB	15A
8. SULFENTRAZONE	472 ML/AC	50A	3D	15B	3A
LSD (P <0.05)		42	18	3	16

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

Conclusions:

This trial was kept weed-free to test for the effect of preemergence and applications of Valtera, Goal and sulfentrazone on carrot visual injury, carrot stand, carrot length and yield of 'Fontana' carrot.

Sulfentrazone caused significant injury, reduced emergence and final stand of carrot, reduced carrot root length and marketable yield. This year, Goal did not injure carrot, which has been observed in most study years, except in 2010. In 2010, Goal caused significant stunting and stand reductions, and reduced carrot length and yield. We hypothesize that heavy spring rains in 2010 moved the Goal into the seed zone, resulting in the significant stand losses observed in 2010. Furthermore, it should be noted that sand content was much higher in 2010 (near 80%) than in the other years, including 2011.

Trial 5: Weed Control in Broccoli with PRE- and POST-transplant herbicides

Objective: Determine the level of weed control provided by PRE-T and POST-T applications of Authority, Chateau, Goal alone, or tank-mixed with Dual II Magnum.

Materials & Methods:

Crop: Broccoli
Variety: Iron Man
Planting rate: 29167 plants/ha
Row spacing: 45cm
Planting date: Jun 3/11
Depth: 5 cm

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

Field Preparation: June 1, 2011 applied 120 kg/ha of actual N of 27-0-0.

Soil Description:
Sand: 50%
Silt:26%
Clay: 24%
OM: 3.8%
pH: 7.2
CEC 17
Texture: sandy clay loam
Soil: Watford/Brady

Application Information:

	A	B
APPLICATION DATE	Jun-2-2011	Jun-5-2011
TIME OF DAY	6:45 PM	8:25 AM
TIMING	PRE-T	POST-T
AIR TEMP (c)	24C	21C
RH (%)	32	93
WIND SPEED (KPH)	2	1
SOIL TEMP (c)	30	26C
CLOUD COVER (%)	0	10
CROP STAGE	PRE-T	POST-T

Spray Equipment:

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

Table 5.1. Effect of herbicide treatment on percent control of velvetleaf (ABUTH), common lamb's-quarters (CHEAL) and crabgrass (DIGSS) control 42 days after application.

HERBICIDE	RATE	TIMING	ABUTH	CHEAL	DIGSS
			%	%	%
1. UNTREATED	0	PRE-T	0G	0F	0d
2. AUTHORITY	236 ML/AC	PRE-T	68A-E	68AB	15CD
3. CHATEAU	57 G/AC	PRE-T	25EFG	20C-F	10CD
4. GOAL	200 ML/AC	PRE-T	75A-D	18C-F	26C
5. DUAL II MAGNUM	700 ML/AC	PRE-T	25EFG	6EF	68AB
6. AUTHORITY	236 ML/AC	PRE-T	78A-D	82A	64B
DUAL II MAGNUM	700 ML/AC	PRE-T			
7. CHATEAU	57 G/AC	PRE-T	80ABC	48BC	60B
DUAL II MAGNUM	700 ML/AC	PRE-T			
8. GOAL	200 ML/AC	PRE-T	43C-G	31CDE	64B
DUAL II MAGNUM	700 ML/AC	PRE-T			
9. AUTHORITY	236 ML/AC	POST-T	18FG	42BCD	3D
10. CHATEAU	57 G/AC	POST-T	33D-G	18C-F	13CD
11. GOAL	200 ML/AC	POST-T	50B-F	15DEF	4D
12. DUAL II MAGNUM	700 ML/AC	POST-T	18FG	1EF	86A
13. AUTHORITY	236 ML/AC	POST-T	89AB	88A	66B
DUAL II MAGNUM	700 ML/AC	POST-T			
14. CHATEAU	57 G/AC	POST-T	100A	19C-F	70AB
DUAL II MAGNUM	700 ML/AC	POST-T			
15. GOAL	200 ML/AC	POST-T	68A-E	41BCD	73AB
DUAL II MAGNUM	700 ML/AC	POST-T			
LSD (P <0.05)			46	30	20

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

Table 5.2. Effect of herbicide treatment on percent injury at 7 and 28 days after transplanting, marketable head size and yield of broccoli.

CROP	RATE (ML/AC)	TIMING	INJURY 7D	INJURY 28D	HEAD SZ (G)	YIELD T/AC
1. UNTREATED	0	PRE-T	0B	0A	257A	3.0A
2. AUTHORITY	236 ML/AC	PRE-T	0B	0A	271A	3.5A
3. CHATEAU	57 G/AC	PRE-T	1B	1A	263A	2.8A
4. GOAL	200 ML/AC	PRE-T	0B	1A	259A	2.8A
5. DUAL II MAGNUM	700 ML/AC	PRE-T	0B	2A	250A	2.3A
6. AUTHORITY	236 ML/AC	PRE-T	0B	1A	278A	3.7A
DUAL II MAGNUM	700 ML/AC	PRE-T				
7. CHATEAU	57 G/AC	PRE-T	0B	0A	278A	3.5A
DUAL II MAGNUM	700 ML/AC	PRE-T				
8. GOAL	200 ML/AC	PRE-T	0B	1A	272A	3.8A
DUAL II MAGNUM	700 ML/AC	PRE-T				
9. AUTHORITY	236 ML/AC	POST-T	1B	0A	265A	3.0A
10. CHATEAU	57 G/AC	POST-T	0B	2A	300A	3.5A
11. GOAL	200 ML/AC	POST-T	1B	2A	271A	3.3A
12. DUAL II MAGNUM	700 ML/AC	POST-T	0B	1A	286A	3.3A
13. AUTHORITY	236 ML/AC	POST-T	1B	1A	303A	4.2A
DUAL II MAGNUM	700 ML/AC	POST-T				
14. CHATEAU	57 G/AC	POST-T	15A	4A	244A	3.4A
DUAL II MAGNUM	700 ML/AC	POST-T				
15. GOAL	200 ML/AC	POST-T	1B	0A	273AB	3.6A
DUAL II MAGNUM	700 ML/AC	POST-T				
LSD (P <0.05)			2	2	51	1.1

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

Conclusions: The tank mix of Authority + Dual II Magnum gave fair control of velvetleaf and crabgrass, and good control of common lambs'-quarters. The tank mix of Chateau + Dual II Magnum gave good control of velvetleaf, poor control of lamb's-quarters and fair control of crabgrass, when applied PRE-T, and gave better control of these species when applied POST-T. The tank mix of Goal + Dual II Magum gave poor to fair control of all species when applied PRE- or POST. Percent injury, harvestable head size and yield were not less than the untreated check in any treatments.

Trial 6: Tolerance of Transplanted Broccoli to Sulfentrazone and Clomazone

Objective: Determine the tolerance of broccoli to PRE-T applications of sulfentrazone and clomazone.

Materials & Methods:

Crop: Broccoli
Variety: Iron Man
Planting rate: 29167 plants/ha
Row spacing: 45cm
Planting date: May 11/11
Depth: 5 cm

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

Field Preparation: May 10, 2011 applied 120 kg/ha of actual N of 27-0-0.

Soil Description:
Sand: 40%
Silt:30%
Clay: 30%
OM: 6.0%
pH: 6.7
CEC 17
Texture: clay loam
Soil: Watford/Brady

Application Information:

	A
APPLICATION DATE	May 11-2011
TIME OF DAY	6:45 PM
TIMING	PRE-T
AIR TEMP (c)	24C
RH (%)	32
WIND SPEED (KPH)	2
SOIL TEMP (c)	30
CLOUD COVER (%)	0
CROP STAGE	PRE-T

Spray Equipment:

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

Table 6.1. Effect of herbicide treatment on percent injury and height (42 days after application).

HERBICIDE	RATE	INJURY %	HEIGHT CM
1. UNTREATED		0C	34A
2. AUTHORITY	118 ML/AC	1C	34A
3. AUTHORITY	236 ML/AC	0C	33A
4. COMMAND	470 ML/AC	9B	33A
5. COMMAND	940 ML/AC	15A	34A
LSD (P <0.05)		4	4

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

Table 6.2. Effect of herbicide treatment on broccoli head diameter, head weight and yield of marketable heads.

HERBICIDE	RATE	HEAD DIAM CM	HEAD WT G	YIELD T/AC
1. UNTREATED	0	11A	314A	4.5A
2. AUTHORITY	118 ML/AC	11A	298A	4.9A
3. AUTHORITY	236 ML/AC	10A	303A	4.4A
4. COMMAND	470 ML/AC	11A	314A	5.1A
5. COMMAND	940 ML/AC	12A	300A	4.7A
LSD (P <0.05)		3	43	1.4

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

Conclusions: This trial was established to determine the tolerance of transplanted broccoli to PRE-T applications of Authority and Command. We observed some bleaching of broccoli at the high rate of Command. However, plant height, marketable head size (diameter and weight), and yield were not less than the untreated check.

Trial 7: Tolerance of Transplanted Cabbage to Sulfentrazone and Clomazone

Objective: Determine the tolerance of cabbage to PRE-T applications of sulfentrazone and clomazone.

Materials & Methods:

Crop: Cabbage
Variety: Superstar 112 Planting date: Jun 14/11
Planting rate: 18750 plants/ha Depth: 5 cm
Row spacing: 45cm

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

Field Preparation: June 9, 2011 applied 170 kg/ha of actual N of 18-19-19.

Soil Description:
Sand: 40% OM: 6.0% Texture: clay loam
Silt:30% pH: 6.7 Soil: Watford/Brady
Clay: 30% CEC 17

Application Information:

	A
APPLICATION DATE	Jun-14-2011
TIME OF DAY	6:45 PM
TIMING	PRE-T
AIR TEMP (c)	24C
RH (%)	32
WIND SPEED (KPH)	2
SOIL TEMP (c)	30
CLOUD COVER (%)	0
CROP STAGE	PRE-T

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 7.1. Effect of herbicide treatment on percent injury and height (42 days after application).

HERBICIDE	RATE	INJURY %	HEIGHT CM
1. UNTREATED		0B	29A
2. AUTHORITY	118 ML/AC	1B	32A
3. AUTHORITY	236 ML/AC	0B	31A
4. COMMAND	470 ML/AC	0B	31A
5. COMMAND	940 ML/AC	3A	30A
LSD (P <0.05)		1	5

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

Table 7.2. Effect of herbicide treatment on cabbage head diameter, head weight and yield of marketable heads.

HERBICIDE	RATE	HEAD DIAM CM	HEAD WT G	YIELD T/AC
1. UNTREATED	0	14A	1442A	9.7A
2. AUTHORITY	118 ML/AC	16A	1641A	12.4A
3. AUTHORITY	236 ML/AC	15A	1418A	9.9A
4. COMMAND	470 ML/AC	14A	1478A	11.8A
5. COMMAND	940 ML/AC	15A	1622A	10.9A
LSD (P <0.05)		3	871	6.5

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

Conclusions: This trial was established to determine the tolerance of transplanted cabbage to PRE-T applications of Authority and Command. We observed some bleaching of cabbage at the high rate of Command. However, plant height, marketable head size (diameter and weight), and yield were not less than the untreated check.

Trial 8: Tolerance of Transplanted Cauliflower to Sulfentrazone and Clomazone

Objective: Determine the tolerance of cauliflower to PRE-T applications of sulfentrazone and clomazone.

Materials & Methods:

Crop: Cauliflower
Variety: Iron Man
Planting date: May 11/11
Planting rate: 29167 plants/ha
Depth: 5 cm
Row spacing: 45cm

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

Field Preparation: May 10, 2011 applied 120 kg/ha of actual N of 27-0-0.

Soil Description:
Sand: 40%
OM: 6.0%
Texture: clay loam
Silt:30%
pH: 6.7
Soil: Watford/Brady
Clay: 30%
CEC 17

Application Information:

	A
APPLICATION DATE	Jun-14-2011
TIME OF DAY	6:45 PM
TIMING	PRE-T
AIR TEMP (c)	24C
RH (%)	32
WIND SPEED (KPH)	2
SOIL TEMP (c)	30
CLOUD COVER (%)	0
CROP STAGE	PRE-T

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 8.1. Effect of herbicide treatment on percent injury and height (42 days after application).

HERBICIDE	RATE	INJURY %	HEIGHT CM
1. UNTREATED		0C	38A
2. AUTHORITY	118 ML/AC	1C	43A
3. AUTHORITY	236 ML/AC	0C	40A
4. COMMAND	470 ML/AC	4B	37A
5. COMMAND	940 ML/AC	10A	37A
LSD (P <0.05)		2	10

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

Table 8.2. Effect of herbicide treatment on cauliflower head diameter, head weight and yield of marketable heads.

HERBICIDE	RATE	HEAD DIAM CM	HEAD WT G	YIELD T/AC
1. UNTREATED	0	14A	548A	6.8A
2. AUTHORITY	118 ML/AC	14A	640A	7.5A
3. AUTHORITY	236 ML/AC	11A	554A	6.5A
4. COMMAND	470 ML/AC	11A	597A	5.8A
5. COMMAND	940 ML/AC	10A	542A	6.0A
LSD (P <0.05)		6	161	3.2

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

Conclusions: This trial was established to determine the tolerance of transplanted cauliflower to PRE-T applications of Authority and Command. We observed some bleaching of cauliflower at the high rate of Command. However, plant height, marketable head size (diameter and weight), and yield were not less than the untreated check.

Trial 9: Tolerance of Processing Peas to PRE Applications of Eragon

Objective: Determine weed control and tolerance of eight processing pea cultivars to PRE applications of Eragon.

Materials & Methods:

Crop: Pea
Variety: various
Planting date: May 10/11
Planting rate: 300 kg/ha
Depth: 5 cm
Row spacing: 18cm

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

Field Preparation: Worked the field twice with S-tine cultivator prior to planting. 38 kg/ha of actual N (19-19-19) was applied to the area and worked in with the S-tine cultivator on April 21, 2011.

Soil Description:
Sand: 78%
OM: 4.4%
Texture: V. Fine Sandy Loam
Silt:14%
pH: 5.9
Soil: WATFORD/BRADY
Clay: 8%
CEC 12

Application Information:

	A
APPLICATION DATE	MAY-19-2011
TIME OF DAY	9:00AM
TIMING	PRE
AIR TEMP (c)	15
RH (%)	100
WIND SPEED (KPH)	6
SOIL TEMP (c)	16
CLOUD COVER (%)	100
CROP STAGE	PRE

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 14.1. Effect of pea cultivar and Eragon rate on pea percent injury 7, 14 and 28 days after application.

CULTIVAR	ERAGIB RATE (G/AC)	VISUAL INJURY 7 DAT	14 DAT	28 DAT
1. CITATION	28.9	0A	0A	0A
	57.8	0A	0A	0A
2. GALLANT	28.9	0A	0A	0A
	57.8	0A	0A	0A
3. LIL MO	28.9	0A	0A	0A
	57.8	0A	0A	0A
4. NACHES	28.9	0A	0A	0A
	57.8	0A	0A	0A
5. RELIANCE	28.9	0A	0A	0A
	57.8	0A	0A	0A
6. SPRING	28.9	0A	0A	0A
	57.8	0A	0A	0A
7. SWEET SAVOUR	28.9	0A	0A	0A
	57.8	0A	0A	0A
8. TYNE	28.9	0A	0A	0A
	57.8	0A	0A	0A
	LSD (P <0.05) NS	NS	NS	NS

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

Table 14.2. Effect of pea cultivar and Eragon rate on pea tenderometer readings and marketable yield (T/AC).

VARIETY	ERAGON RATE (G/AC)	TENDEROMETER	YIELD (T/AC)
1. CITATION	0	128A	5.1A
	28.9	135A	5.5A
	57.8	72B	4.0B
2. GALLANT	0	123A	5.3AB
	28.9	67B	6.5A
	57.8	76B	3.8B
3. LIL MO	0	102A	6.7A
	28.9	93A	5.1AB
	57.8	72B	4.4B
4. NACHES	0	93A	4.6B
	28.9	87A	5.7A
	57.8	93A	5.3AB
5. RELIANCE	0	105A	5.5A
	28.9	87A	3.8B
	57.8	102A	3.6B
6. SPRING	0	64B	3.2B
	28.9	111A	3.8B
	57.8	98A	6.9A
7. SWEET SAVOUR	0	83B	5.1A
	28.9	112A	4.6AB
	57.8	109B	3.2B
8. TYNE	0	71B	6.2A
	28.9	114A	5.5AB
	57.8	120A	3.9B
LSD (P <0.05)		25	2.1

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

Conclusions:

This trial was established to determine the influence of Eragon applied preemergence on pea visual injury, tenderness, yield, and weed control. Though visual injury was not observed, Kixor applied PRE did influence maturity of most pea cultivars. Citation, Gallant, Lil Mo development were slowed by applications of injured pea by approximately 1 or 2 days. The maturity of Naches and Reliance were not affected by Eragon applications. Spring, Sweet Savour and Tyne maturity was hastened by preemergence applications of Eragon. As a result of the effect of Eragon on pea maturity, when we corrected for differences in maturity and pod tenderness, yields were generally lower where Eragon was applied, except in Naches and Spring pea, a result that is consistent with our earliest trials, which Spring was used. **Additional research should be conducted to examine tolerance of pea cultivars to the soybean rate of Eragon (14.5 g/ac), as this product would still offer pea growers a solution for control of Group 2 resistant eastern black nightshade. However, the rates tested in this trial, which are used in more tolerant crops such as field and sweet corn, caused developmental variability and commercially unacceptable yield loss in pea.**

Trial 10: Tolerance of pepper to preemergence herbicides under plastic

Objectives: Determine the tolerance of peppers to PRE-T tank-mix applications of Prowl H20 and Sandea.

Materials & Methods:

Crop: Pepper
Variety: Red Knight, Aristotle — Planting date: Jun 10/11
Planting rate: 29167 plants/ha — Depth: 5 cm
Row spacing: 45cm

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

Field Preparation: June 6, 2011 – applied 65 kg/ha of actual N of 10-26-26 and 170 kg/ha of actual phosphorus 10-53-0. Fertilizer incorporated with S-tine cultivator.

Soil Description:
Sand: 50% — OM: 3.8% — Texture: sandy clay loam
Silt: 26% — pH: 7.2 — Soil: Watford/Brady Series
Clay: 24% — CEC 17

Application Information:

	A
APPLICATION DATE	Jun 9
TIME OF DAY	6:30am
TIMING	PRE-T
AIR TEMP (c)	15
RH (%)	76
WIND SPEED (KPH)	5
SOIL TEMP (c)	23
CLOUD COVER (%)	0
CROP STAGE	PRE-T

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 10.1. Effect of herbicide treatment on percent injury 7, 28 and 49 days after planting, and height 49 days after planting.

HERBICIDE	RATE	PERCENT INJURY 7D	28D	49D	HEIGHT CM
ARISTOTLE PEPPER					
1. UNTREATED CHECK		0A	0F	0F	26BCD
2. SANDEA	25 G/AC	0A	6DEF	10DEF	23B-E
3. SANDEA	50 ML/AC	1A	10B-E	17CDE	23B-E
4. PROWL H20	1 L/AC	0A	4EF	4EF	25BCD
5. PROWL H20	2 L/AC	1A	6DEF	5EF	27BC
6. SANDEA	25 G/AC	1A	12BCD	20CD	22DE
+ PROWL H20	1 L/AC				
7. SANDEA	50 G/AC	1A	20A	47A	19E
+ PROWL H20	2 L/AC				
RED KNIGHT PEPPER					
1. UNTREATED CHECK		0A	0F	0F	33A
2. SANDEA	25 G/AC	1A	5EF	18CD	24BCD
3. SANDEA	50 ML/AC	1A	16AB	36AB	23CDE
4. PROWL H20	1 L/AC	0A	1F	3F	33A
5. PROWL H20	2 L/AC	0A	0F	0F	32A
6. SANDEA	25 G/AC	0A	7BC	17CDE	27B
+ PROWL H20	1 L/AC				
7. SANDEA	50 G/AC	1A	13BC	26BC	25BCD
+ PROWL H20	2 L/AC				
LSD (P <0.05)		1	7	13	4

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

Table 10.2. Effect of herbicide treatment on fruit weight, marketable fruit number and yield of pepper.

HERBICIDE	RATE	FRUIT #	FRUIT WT G	YIELD T/AC
ARISTOTLE PEPPER				
1. DUAL II MAG	0.4 L/AC	37CD	130A	3.1BCD
2. SANDEA	25 G/AC	37CD	113B-E	2.6CD
3. SANDEA	50 ML/AC	35DE	112CDE	2.5CDE
4. PROWL H20	1 L/AC	42BCD	131A	3.5BC
5. PROWL H20	2 L/AC	54ABC	124A-D	4.2AB
6. SANDEA	25 G/AC	28DEF	125ABC	2.2CDE
+ PROWL H20	1 L/AC			
7. SANDEA	50 G/AC	18F	96FG	1.1E
+ PROWL H20	2 L/AC			
RED KNIGHT PEPPER				
1. DUAL II MAG	0.4 L/AC	56AB	128A	2.0AB
2. SANDEA	25 G/AC	32DEF	108EFG	1.0CDE
3. SANDEA	50 ML/AC	20EF	94G	0.5E
4. PROWL H20	1 L/AC	63A	125ABC	2.2A
5. PROWL H20	2 L/AC	63A	128AB	2.2A
6. SANDEA	25 G/AC	33DEF	112CDE	1.0CDE
+ PROWL H20	1 L/AC			
7. SANDEA	50 G/AC	28DEF	109DEF	0.8DE
+ PROWL H20	2 L/AC			
LSD (P <0.05)		17	15	0.6

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

Conclusions:

This trial was established to determine tolerance of transplanted pepper to pre-transplant (PRE) applications of Prowl H20, and Sandea, and tank mixes of Sandea + Prowl H20 under plastic with the use of subsurface drip irrigation. Treatments were compared to an industry standard of Dual II Magnum.

In previous experiments, studies were done on bare soil, however, there has been some question about whether growing peppers under plastic with subsurface drip irrigation might affect the uptake of the herbicide, particularly Sandea, which can persist in the soil through the growing season. There are also questions about variety tolerance, so two varieties were included – Aristotle and Red Knight. We did not observe differences among the two varieties, however, we found significant injury in the Sandea treatments, that corresponded to reductions in plant height, fruit number, fruit size and yield. Prowl alone did not cause visual injury, nor did it reduce plant height, fruit number, fruit size or yield. However, the tank mix of Sandea + Prowl H2O did cause injury, reductions in plant height, fruit size and number, and yield.

It is recommended that once Sandea is registered that it not be used for pepper grown under plastic. On bare ground, injury and yield reductions have not been observed. Though these data are only preliminary (ie. one year's worth of data, and Sandea is not yet registered in the province, we are currently recommending the Sandea label be modified so its use under plastic is not allowed. Additional research should be conducted on the effect of tolerance among pepper varieties.

Trial 11: Comparison of Full, Split and Micro-rates of Pyramin+Upbeet in Red Beets

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

2. Compare weed control and tolerance of red beet to full, split and micro-rate applications of Pyramin+Upbeet Pyramin with and without Dual II Magnum.

Materials & Methods:

Crop: Red beet
Variety: Detroit Supreme Planting date: May 29/11
Planting rate: 265 684 seeds/ha Depth: 2 cm
Row spacing: 38cm

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

Field Preparation: Fertilized on May 28 with 27-0-0 at 250 kg/ha. Back halves of the plot were maintained weed free.

Soil Description:
Sand: 49% OM: 5.3% Texture: loam
Silt: 35% pH: 7.2 Soil: Watford/Brady Series
Clay: 15% CEC 29

Application Information:

	A	B	C	D	E
APPLICATION DATE	JUN 1	JUN 4	JUN 11	JUN 17	JUN 25
TIME OF DAY	10:00AM	3:00PM	9:00AM	6:30PM	9:00AM
TIMING	PRE	POST1	POST2	POST3	POST4
AIR TEMP (c)	23	22	20	28	22
RH (%)	52	72	79	36	66
WIND SPEED (KPH)	3	1	1	2	3
SOIL TEMP (c)	22	22	20	28	22
CLOUD COVER (%)	0	90	100	0	0
CROP STAGE	PRE	COT	2 LF	4 LF	6 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 11.1. Red beet injury in full, split and micro-rate applications of Pyramin+Upbeet, with or without Dual II Magnum.

HERBICIDE			VISUAL INJURY 7D	14D	28D
1. Check (WEED-FREE)			0C	0A	0A
2. DUAL II MAGNUM	500 ML/AC	PRE	0C	0A	0A
3. DUAL II MAGNUM	500 ML/AC	PRE	3B	0A	0A
PYRAMIN	2000 ML/AC	POST1			
SUPERSPREADER	1.5% V/V				
4. DUAL II MAGNUM	500 ML/AC	PRE	4AB	0A	0A
PYRAMIN +	2000 ML/AC	POST1			
UPBEET	14.4 G/AC	POST1			
SUPERSPREADER	1.5% V/V				
5. DUAL II MAGNUM	500 ML/AC	PRE	0C	0A	0A
PYRAMIN +	1000 ML/AC	POST12			
UPBEET	7.2 G/AC	POST12			
SUPERSPREADER	0.75% V/V				
6. DUAL II MAGNUM	500 ML/AC	PRE	0C	0A	0A
PYRAMIN +	500 ML/AC	POST1234			
UPBEET	3.6 G/AC	POST1234			
SUPERSPREADER	0.375% V/V				
7. PYRAMIN	2000 ML/AC	POST1	5A	0A	0A
SUPERSPREADER	1.5% V/V				
8. PYRAMIN +	2000 ML/AC	POST1	5A	0A	0A
UPBEET	14.4 G/AC	POST1			
SUPERSPREADER	1.5% V/V				
9. PYRAMIN +	1000 ML/AC	POST12	0C	0A	0A
UPBEET	7.2 G/AC	POST12			
SUPERSPREADER	0.75% V/V				
10. PYRAMIN +	500 ML/AC	POST1234	0C	0A	0A
UPBEET	3.6 G/AC	POST1234			
SUPERSPREADER	0.375% V/V				
LSD (P <0.05)			2	0	0

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

Table 11.2. Effect of herbicide treatment on redroot pigweed (AMARE) and common lamb's-quarters (CHEAL) control 56 days after application.

HERBICIDE	RATE		AMARE	CHEAL
1. Check (WEED-FREE)			0E	0C
2. DUAL II MAGNUM	500 ML/AC	PRE	88BC	23B
3. DUAL II MAGNUM	500 ML/AC	PRE	90ABC	80A
PYRAMIN	2000 ML/AC	POST1		
SUPERSPREADER	1.5% V/V			
4. DUAL II MAGNUM	500 ML/AC	PRE	95AB	85A
PYRAMIN +	2000 ML/AC	POST1		
UPBEET	14.4 G/AC	POST1		
SUPERSPREADER	1.5% V/V			
5. DUAL II MAGNUM	500 ML/AC	PRE	97A	97A
PYRAMIN +	1000 ML/AC	POST12		
UPBEET	7.2 G/AC	POST12		
SUPERSPREADER	0.75% V/V			
6. DUAL II MAGNUM	500 ML/AC	PRE	98A	98A
PYRAMIN +	500 ML/AC	POST1234		
UPBEET	3.6 G/AC	POST1234		
SUPERSPREADER	0.375% V/V			
7. PYRAMIN	2000 ML/AC	POST1	79D	80A
SUPERSPREADER	1.5% V/V			
8. PYRAMIN +	2000 ML/AC	POST1	85CD	78A
UPBEET	14.4 G/AC	POST1		
SUPERSPREADER	1.5% V/V			
9. PYRAMIN +	1000 ML/AC	POST12	95AB	95A
UPBEET	7.2 G/AC	POST12		
SUPERSPREADER	0.75% V/V			
10. PYRAMIN +	500 ML/AC	POST1234	97A	96A
UPBEET	3.6 G/AC	POST1234		
SUPERSPREADER	0.375% V/V			
LSD (P <0.05)			9	22

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

Table 11.3. Plant dry weight and red beet stand after full, split and micro-rate applications of Pyramin+Upbeet, with or without Dual II Magnum.

HERBICIDE			DRY WT G	STAND #/2M ROW
1. Check (WEED-FREE)			22A	91A
2. DUAL II MAGNUM	500 ML/AC	PRE	17A	66AB
3. DUAL II MAGNUM	500 ML/AC	PRE	18A	50B
PYRAMIN	2000 ML/AC	POST1		
SUPERSPREADER	1.5% V/V			
4. DUAL II MAGNUM	500 ML/AC	PRE	18A	87A
PYRAMIN +	2000 ML/AC	POST1		
UPBEET	14.4 G/AC	POST1		
SUPERSPREADER	1.5% V/V			
5. DUAL II MAGNUM	500 ML/AC	PRE	18A	69AB
PYRAMIN +	1000 ML/AC	POST12		
UPBEET	7.2 G/AC	POST12		
SUPERSPREADER	0.75% V/V			
6. DUAL II MAGNUM	500 ML/AC	PRE	19A	74AB
PYRAMIN +	500 ML/AC	POST1234		
UPBEET	3.6 G/AC	POST1234		
SUPERSPREADER	0.375% V/V			
7. PYRAMIN	2000 ML/AC	POST1	18A	81AB
SUPERSPREADER	1.5% V/V			
8. PYRAMIN +	2000 ML/AC	POST1	16A	80AB
UPBEET	14.4 G/AC	POST1		
SUPERSPREADER	1.5% V/V			
9. PYRAMIN +	1000 ML/AC	POST12	24A	64AB
UPBEET	7.2 G/AC	POST12		
SUPERSPREADER	0.75% V/V			
10. PYRAMIN +	500 ML/AC	POST1234	16A	77AB
UPBEET	3.6 G/AC	POST1234		
SUPERSPREADER	0.375% V/V			
LSD (P <0.05)			14	31

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

Table 11.4. Red beet yield in full, split and micro-rate applications of Pyramin+Upbeet, with or without Dual II Magnum.

HERBICIDE			YIELD (T/AC)		
			NO1	NO2	NO3
1. Check (WEED-FREE)			6A	9A	15AB
2. DUAL II MAGNUM	500 ML/AC	PRE	5AB	9A	20AB
3. DUAL II MAGNUM	500 ML/AC	PRE	5AB	10A	20AB
PYRAMIN	2000 ML/AC	POST1			
SUPERSPREADER	1.5% V/V				
4. DUAL II MAGNUM	500 ML/AC	PRE	4ABC	10A	21A
PYRAMIN +	2000 ML/AC	POST1			
UPBEET	14.4 G/AC	POST1			
SUPERSPREADER	1.5% V/V				
5. DUAL II MAGNUM	500 ML/AC	PRE	4ABC	10A	23A
PYRAMIN +	1000 ML/AC	POST12			
UPBEET	7.2 G/AC	POST12			
SUPERSPREADER	0.75% V/V				
6. DUAL II MAGNUM	500 ML/AC	PRE	2C	7A	18AB
PYRAMIN +	500 ML/AC	POST1234			
UPBEET	3.6 G/AC	POST1234			
SUPERSPREADER	0.375% V/V				
7. PYRAMIN	2000 ML/AC	POST1	4ABC	8A	17AB
SUPERSPREADER	1.5% V/V				
8. PYRAMIN +	2000 ML/AC	POST1	5AB	8A	20AB
UPBEET	14.4 G/AC	POST1			
SUPERSPREADER	1.5% V/V				
9. PYRAMIN +	1000 ML/AC	POST12	4ABC	9BC	22AB
UPBEET	7.2 G/AC	POST12			
SUPERSPREADER	0.75% V/V				
10. PYRAMIN +	500 ML/AC	POST1234	5AB	8AB	13B
UPBEET	3.6 G/AC	POST1234			
SUPERSPREADER	0.375% V/V				
LSD (P <0.05)			2	3	7

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+Upbeet applied as full, split or micro-rates, with or without a preemergence application of Dual II Magnum.

Redroot pigweed control was 85% or better where Pyramin was applied with Upbeet or after Dual II Magnum. However, lamb's-quarters control was only acceptable when Pyramin and Upbeet were applied either as a split- or micro-rate. The addition of Dual II Magnum did not improve control of common lamb's-quarters.

None of the treatments caused significant injury to red beet, nor did they reduce plant dry weight. Significant injury was observed in the micro-rate treatments, however in previous years, we applied Super Spreader at a rate of 1.5% V/V, and this year, we applied it at only 0.375% V/V. Furthermore, soil organic matter was higher (5.3% vs 3.2%) and sand content was lower (78 vs 49%) in 2009 than in 2010 or 2011. Previous research indicated that soil type could influence the tolerance of red beet to multiple applications of reduced rates of Pyramin + Upbeet, and our research this year provides support for this observation. Stand was less tthan the untreated check where Dual II Magnum and Pyramin were applied PRE to red beet; despite this injury, yield was not less than the untreated check.

Trial 12: Use of a Heat-Unit Model to Time Herbicide Applications in Red Beet

Objective: Determine whether a heat-unit model can be used to predict the timing of herbicide micro-rates for weed control in red beet.

Materials & Methods:

Crop: Red beet
Variety: Detroit Dark Red Planting date: May 29/11
Planting rate: 265 684 seeds/ha Depth: 2 cm
Row spacing: 38cm

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

Field Preparation: Fertilized on May 28 with 27-0-0 at 250 kg/ha. Back halves of the plot were maintained weed free.

Soil Description:

Sand: 49%	OM: 5.3%	Texture: loam
Silt: 35%	pH: 7.2	Soil: Watford/Brady Series
Clay: 15%	CEC 29	

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 12.1 Red beet percent injury 7, 14 and 28 days after application, of Pyramin micro-rates applied four times, every 150, 200, 250 or 300 crop heat units (CHUs), with or without a preemergence application of Dual II Magnum. Pyramin micro-rates were applied at the following rates: Pyramin (500 ML/AC) + Upbeet (3.6 G/AC) + SUPERSPREADER (0.375% V/V).

HERBICIDE	RATE / CHU	TIMING	PERCENT INJURY	
			7D	14D
1. Check (WEED-FREE)			0A	0A
2. DUAL II MAGNUM	500 ML/AC	PRE	0A	0A
3. DUAL II MAGNUM	500 ML/AC	PRE	1A	0A
PYRAMIN MICROS	150CHU	POST1234		
4. DUAL II MAGNUM	500 ML/AC	PRE	0A	0A
PYRAMIN MICROS	200CHU	POST1234		
5. DUAL II MAGNUM	500 ML/AC	PRE	0A	0A
PYRAMIN MICROS	250CHU	POST1234		
6. DUAL II MAGNUM	500 ML/AC	PRE	1A	0A
PYRAMIN MICROS	300CHU	POST1234		
7. PYRAMIN MICROS	150CHU	POST1234	0A	0A
8. PYRAMIN MICROS	200CHU	POST1234	0A	0A
9. PYRAMIN MICROS	250CHU	POST1234	3A	0A
10. PYRAMIN MICROS	300CHU	POST1234	0A	0A
11. Check (WEEDY)			0A	0A
LSD (P <0.05)			3	0

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

Table 12.2 Effect of herbicide treatment on lamb's-quarters (CHEAL) and redroot pigweed (AMARE) control 56 days after final micro-rate application. Pyramin micro-rates were applied four times, every 150, 200, 250 or 300 crop heat units (CHUs), with or without a preemergence application of Dual II Magnum. Pyramin micro-rates were applied at the following rates: Pyramin (500 ML/AC) + Upbeet (3.6 G/AC) + SUPERSPREADER (0.375% V/V).

HERBICIDE	RATE/ CHU	TIMING	CHEAL	AMARE
1. Check (WEED-FREE)			100A	100A
2. DUAL II MAGNUM	500 ML/AC	PRE	55C	86A
3. DUAL II MAGNUM	500 ML/AC	PRE	85AB	95A
PYRAMIN MICROS	150CHU	POST1234		
4. DUAL II MAGNUM	500 ML/AC	PRE	88AB	95A
PYRAMIN MICROS	200CHU	POST1234		
5. DUAL II MAGNUM	500 ML/AC	PRE	92AB	95A
PYRAMIN MICROS	250CHU	POST1234		
6. DUAL II MAGNUM	500 ML/AC	PRE	84B	89A
PYRAMIN MICROS	300CHU	POST1234		
7. PYRAMIN MICROS	150CHU	POST1234	79B	86A
8. PYRAMIN MICROS	200CHU	POST1234	83B	84A
9. PYRAMIN MICROS	250CHU	POST1234	89AB	88A
10. PYRAMIN MICROS	300CHU	POST1234	88AB	84A
11. Check (WEEDY)			0D	0B
LSD (P <0.05)			16	18

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

Table 12.3 Effect of herbicide treatment on red beet yield (by grade). Pyramin micro-rates were applied four times, every 150, 200, 250 or 300 crop heat units (CHUs), with or without a preemergence application of Dual II Magnum. Pyramin micro-rates were applied at the following rates: Pyramin (500 ML/AC) + Upbeet (3.6 G/AC) + SUPERSPREADER (0.375% V/V).

HERBICIDE	RATE/ CHU	TIMING	YIELD (T/AC) NO1	NO2	NO3
1. Check (WEED-FREE)			5A	8AB	13D
2. DUAL II MAGNUM	500 ML/AC	PRE	5A	8AB	19A-D
3. DUAL II MAGNUM	500 ML/AC	PRE	2BC	6AB	28A
PYRAMIN MICROS	150CHU	POST1234			
4. DUAL II MAGNUM	500 ML/AC	PRE	1BC	4B	26AB
PYRAMIN MICROS	200CHU	POST1234			
5. DUAL II MAGNUM	500 ML/AC	PRE	4AB	9A	23A-D
PYRAMIN MICROS	250CHU	POST1234			
6. DUAL II MAGNUM	500 ML/AC	PRE	2BC	4B	16BCD
PYRAMIN MICROS	300CHU	POST1234			
7. PYRAMIN MICROS	150CHU	POST1234	2BC	4B	26AB
8. PYRAMIN MICROS	200CHU	POST1234	3ABC	6AB	14D
9. PYRAMIN MICROS	250CHU	POST1234	2BC	8AB	24ABC
10. PYRAMIN MICROS	300CHU	POST1234	4AB	7AB	16BCD
11. Check (WEEDY)			0C	4B	9D
LSD (P <0.05)			3	4	10

Conclusions: This experiment was conducted to determine the tolerance of red beet to micro-rates of Pyramin +Upbeet (500 ml/ac + 7.2 g/ac) applied at 4 times using a heat-unit model approach, with and without a PRE application of Dual II Magnum. Micro-rates were applied at 150, 200, 250 and 300 crop heat units (CHUs).

Commercially unacceptable injury was not observed in any treatments. Common lambsquarters control was poor in the Dual II Magnum treatment, but was >80% in all other treatments. The micro-rate CHU model did not correlate well with weed control – refinement of the model is necessary before it will be useful at the field level. Best control is observed in the previous trial (Trial #11) where weeds are killed at the cotyledon stage in coordination with field scouting.

Trial 13: Effect of Timing on Tolerance of Red Beet to Nortron

Objective: Determine the tolerance of red beet to preemergence (PRE) applications, postemergence (POST) micro-rate applications, and preemergence followed by postemergence micro-rate applications (PRE fb POST) applications of Nortron.

Materials & Methods:

Crop: Red beet
Variety: Detroit Dark Red Planting date: Jun 3/11
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: Fertilized on Jun 3 with 27-0-0 at 250 kg/ha. Entire trial was maintained weed free.

Soil Description:
Sand: 50% OM: 3.8% Texture: sandy clay loam
Silt: 26% pH: 6.9 Soil: Watford/Brady Series
Clay: 24% CEC 17

Application Information:

	A	B	C	D
APPLICATION DATE	Jun 6	Jun 21	Jun 28	Jul 5
TIME OF DAY	11:00AM	10:00AM	9:00AM	9:00AM
TIMING	PRE	POST1	POST2	POST3
AIR TEMP (c)	28	26	24	25
RH (%)	54	52	79	79
WIND SPEED (KPH)	3	2	3	1
SOIL TEMP (c)	30	27	25	23
CLOUD COVER (%)	0	80	50	0
CROP STAGE	PRE	2 LF	4 LF	6-8 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 13.1 Red beet visual injury 7, 14 and 28 days after application of Nortron applied PRE, as POST micro-rates, or Nortron PRE followed by (fb) POST micro-rates.

HERBICIDE	TIMING	RATE	VISUAL INJURY		
			7D	14D	28D
1. Check (WEED-FREE)			0A	0B	0A
2. NORTRON	PRE	1.86 L/AC	0A	0B	0A
3. NORTRON	PRE	3.72 L/AC	0A	0B	0A
4. NORTRON	2LF	0.15 L/AC	0A	0B	0A
5. NORTRON	2LF	0.30 L/AC	0A	0B	0A
6. NORTRON	4LF	0.15 L/AC	0A	0B	0A
7. NORTRON	4LF	0.30 L/AC	0A	0B	0A
8. NORTRON	6-8LF	0.15 L/AC	0A	0B	0A
9. NORTRON	6-8LF	0.15 L/AC	0A	0B	0A
10. NORTRON	PRE	1.86 L/AC	0A	0B	0A
fb NORTRON	2LF	0.15 L/AC			
fb NORTRON	4LF	0.15 L/AC			
fb NORTRON	6-8LF	0.15 L/AC			
11. NORTRON	6-8LF	3.72 L/AC	0A	0B	0A
fb NORTRON	2LF	0.30 L/AC			
fb NORTRON	4LF	0.30 L/AC			
fb NORTRON	6-8LF	0.30 L/AC			
LSD (P <0.05)			NS	NS	NS

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

Table 13.2 Red beet stand, plant dry weight and percent sugar in red beets after application of Nortron applied PRE, as POST micro-rates, or Nortron PRE followed by (fb) POST micro-rates.

HERBICIDE	TIMING	RATE	STAND #/M	DRY WT G/PLANT	SUGAR %
1. Check (WEED-FREE)			38AB	156ABC	11A
2. NORTRON	PRE	1.86 L/AC	37AB	168AB	11A
3. NORTRON	PRE	3.72 L/AC	38AB	135A-D	12A
4. NORTRON	2LF	0.15 L/AC	43A	179A	12A
5. NORTRON	2LF	0.30 L/AC	43A	153ABC	11A
6. NORTRON	4LF	0.15 L/AC	34B	126BCD	11A
7. NORTRON	4LF	0.30 L/AC	36AB	126BCD	11A
8. NORTRON	6-8LF	0.15 L/AC	40AB	116CD	12A
9. NORTRON	6-8LF	0.15 L/AC	39AB	144ABC	11A
10. NORTRON	PRE	1.86 L/AC	37AB	122CD	12A
fb NORTRON	2LF	0.15 L/AC			
fb NORTRON	4LF	0.15 L/AC			
fb NORTRON	6-8LF	0.15 L/AC			
11. NORTRON	6-8LF	3.72 L/AC	37AB	94D	11A
fb NORTRON	2LF	0.30 L/AC			
fb NORTRON	4LF	0.30 L/AC			
fb NORTRON	6-8LF	0.30 L/AC			
LSD (P <0.05)			9	46	NS

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

Table 13.3 Effect of herbicide treatment on red beet yield (by grade).

HERBICIDE	RATE		YIELD (T/AC)		
			NO1	NO2	NO3
1. Check (WEED-FREE)			13.2A	14.0A	14.7AB
2. NORTRON	PRE	1.86 L/AC	12.4A	13.5A	12.9AB
3. NORTRON	PRE	3.72 L/AC	14.2A	14.9A	10.0AB
4. NORTRON	2LF	0.15 L/AC	13.9A	14.9A	11.6AB
5. NORTRON	2LF	0.30 L/AC	11.7A	12.6A	12.0AB
6. NORTRON	4LF	0.15 L/AC	11.7A	11.4A	9.4B
7. NORTRON	4LF	0.30 L/AC	12.3A	14.6A	16.6A
8. NORTRON	6-8LF	0.15 L/AC	13.7A	14.8A	12.9AB
9. NORTRON	6-8LF	0.15 L/AC	12.5A	11.5A	11.1AB
10. NORTRON	PRE	1.86 L/AC	12.4A	12.3A	10.1AB
fb NORTRON	2LF	0.15 L/AC			
fb NORTRON	4LF	0.15 L/AC			
fb NORTRON	6-8LF	0.15 L/AC			
11. NORTRON	6-8LF	3.72 L/AC	11.8A	11.6A	10.7AB
fb NORTRON	2LF	0.30 L/AC			
fb NORTRON	4LF	0.30 L/AC			
fb NORTRON	6-8LF	0.30 L/AC			
LSD (P <0.05)			4.0	5.0	7.2

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 Nortron applied preemergence, postemergence as micro-rates or preemergence followed by postemergence micro-rates. Nortron did not cause visual injury in any of the treatments, nor did it reduce red beet stand or sugar content of marketable beets. There was a reduction in plant above ground biomass when the high rate of Nortron applied preemergence was followed by high postemergence micro-rates. Though yield was not significantly less than the untreated check in any treatments, there did tend to be less yield where Nortron was applied PRE and followed by micro-rates, which corresponded to the reduction in plant dry weight in this treatment. Additional research should be conducted to determine which combinations of Nortron, Dual II Magnum, Betamix and Upbeet can be used to control weeds in red beet without reducing yield. Nortron applied PRE or early POST (as a micro-rate) was safe to use in red beet.

Trial 14: Tolerance of Sweet Corn to Prowl H20

Objective: Determine the tolerance of sweet corn to PRE and POST applications of Prowl H20.

Materials & Methods:

Crop: Sweet corn
Variety: various
Planting rate: 50000 plants/ha
Row spacing: 45cm
Planting date: May 21/11
Depth: 4 cm

Design: Randomized Complete Block Design
Plot width: 6m
Plot length: 10m
Reps: 4

Field Preparation: 24.2-2.5-4.2 (150 KG/HA ACTUAL N) WAS APPLIED MAY 17, 2011. FERTILIZER WAS WORKED INTO GROUND 1.5 HOURS AFTER APPLICATION WITH S-TINE CULTIVATOR.

Soil Description:
Sand: 77%
Silt:14%
Clay: 8%
OM: 34.4%
pH: 5.9
CEC 12
Texture: v. fine sandy loam
Soil: Watford/Brady Series

Application Information:

	A	B
Application Date:	May-22-2011	Jun-3-2011
Time of Day:	6:50 AM	10:00 AM
Application Method:	CO2 SPRAY	CO2 SPRAY
Application Timing:	PRE	2 LF
Application Placement:	SOIL	FOLIAR
Air Temperature, Unit:	15 C	25 C
% Relative Humidity:	100	59
Wind Velocity, Unit:	6 KPH	4 KPH
Soil Temperature, Unit:	17 C	27 C
% Cloud Cover:	100	100
Crop Stage	PRE	2-4LF

Spray Equipment:

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

Table 14.1. Effect of Prowl H20 timing and rate on sweet corn percent injury 7, 14 and 28 days after application.

VARIETY		PROWL H20 RATE (ML/AC)	VISUAL INJURY 7 DAT	14 DAT	28 DAT
1. CAHILL	PRE	1500	0B	0B	2A
		3000	3A	3A	0B
	POST	1500	0B	0A	0A
		3000	0B	0A	1A
2. GH4927	PRE	1500	0B	1A	0A
		3000	0B	1A	0A
	POST	1500	1B	0A	0A
		3000	2AB	0A	0A
3. HARV GOLD	PRE	1500	0B	1A	0A
		3000	0B	1A	1A
	POST	1500	3A	1A	1A
		3000	4A	1A	1A
4. ROCKER	PRE	1500	0B	0A	0A
		3000	1B	0A	0A
	POST	1500	0B	0A	0A
		3000	1B	0A	0A
LSD (P <0.05)			2	NS	NS

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

Table 14.2. Effect of Prowl timing and rate on sweet corn cob weight (g/cob) at harvest and marketable yield (T/AC).

VARIETY		PROWL RATE (ML/AC)	COB WT (G/COB)	YIELD (T/AC)
1. CAHILL		0	273	11
	PRE	1500	292	10
		3000	280	11
	POST	1500	276	11
		3000	295	12
2. GH4927		0	290	8
	PRE	1500	299	8
		3000	304	8
	POST	1500	302	8
		3000	282	8
3. HARV GOLD		0	343	7
	PRE	1500	315	6
		3000	321	7
	POST	1500	314	6
		3000	329	7
4. ROCKER		0	355	11
	PRE	1500	350	10
		3000	362	10
	POST	1500	357	10
		3000	349	10
LSD (P <0.05)			NS	NS

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

Conclusions:

Some leaf distortion was observed in all varieties tested at 7 and 14 days after emergence (DAE), but the injury was commercially acceptable and no longer visible by 28 DAE. Marketable cob size and yield were not reduced by Prowl H20. **Data were submitted to add sweet corn to the Prowl H20 label.**

Trial 15: Tolerance of Sweet Corn to Converge PRO and Converge FLEXX – PRE and early POST.

Objective: Determine tolerance of sweet corn to PRE and early POST applications of Converge PRO and Converge Flexx.

Materials & Methods:

Crop: Sweet corn
Variety: various
Planting date: May 21/11
Planting rate: 50000 plants/ha
Depth: 4 cm
Row spacing: 45cm

Design: Randomized Complete Block Design
Plot width: 6m
Plot length: 10m
Reps: 4

Field Preparation: 24.2-2.5-4.2 (150 KG/HA ACTUAL N) WAS APPLIED MAY 17, 2011. FERTILIZER WAS WORKED INTO GROUND 1.5 HOURS AFTER APPLICATION WITH S-TINE CULTIVATOR.

Soil Description:
Sand: 78%
OM: 4.4%
Texture: v. fine sandy loam
Silt:14%
pH: 5.9
Soil: Watford/Brady Series
Clay: 8%
CEC 12

Application Information:

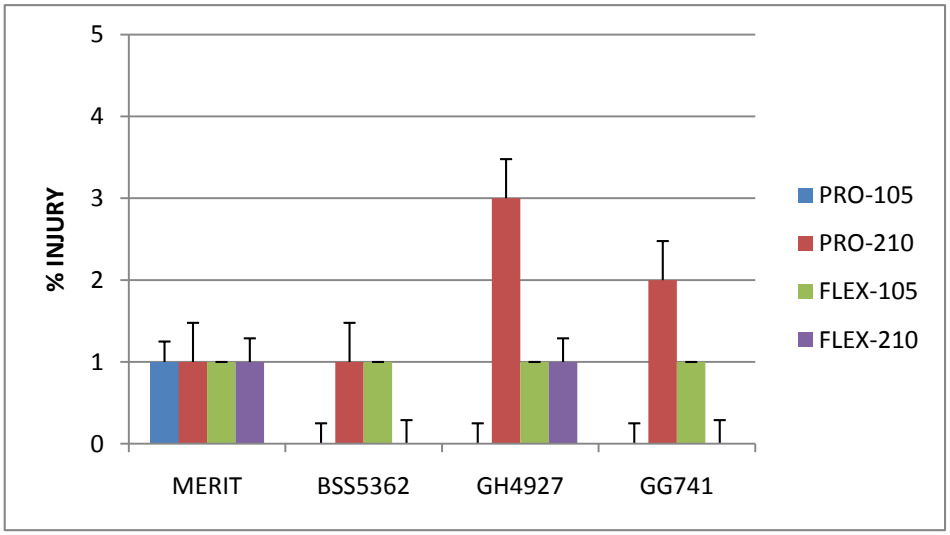
	A	
APPLICATION DATE	MAY 22	JUN 3
TIME OF DAY	6:20AM	9:30AM
TIMING	PRE	POST
AIR TEMP (c)	15	25
RH (%)	100	59
WIND SPEED (KPH)	6	4
SOIL TEMP (c)	17	27
CLOUD COVER (%)	100	100
CROP STAGE	PRE	3-4 LEAF

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)

Figure 15.1. Effect of Converge PRO and Converge FLEXX applied a) preemergence and b) postemergence to 'Merit', BSS5362, GG741, and GG741 sweet corn on percent injury 28 days after application.

a)



b)

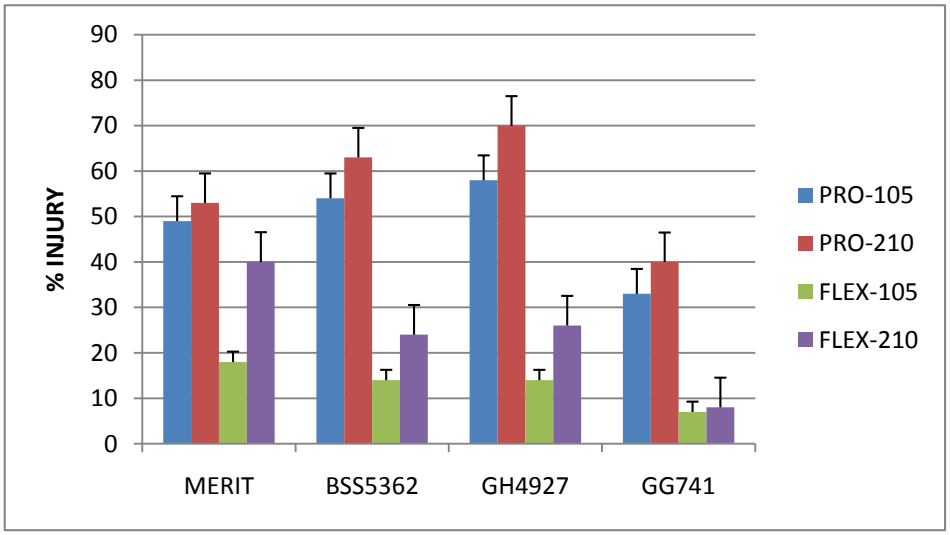
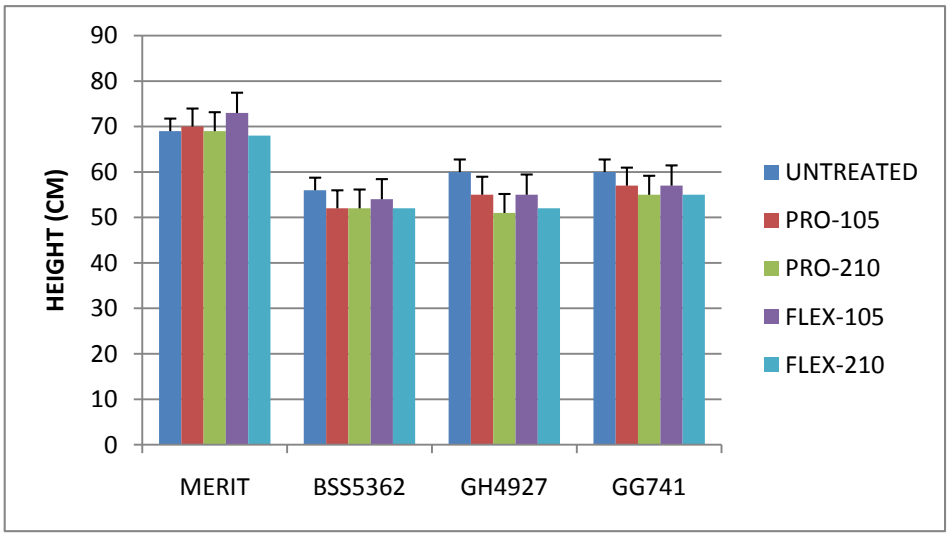


Figure 15.2. Effect of Converge PRO and Converge FLEXX applied a) preemergence and b) postemergence to 'Merit', BSS5362, GG741, and GG741 sweet corn on height 21 days after application.

a)



b)

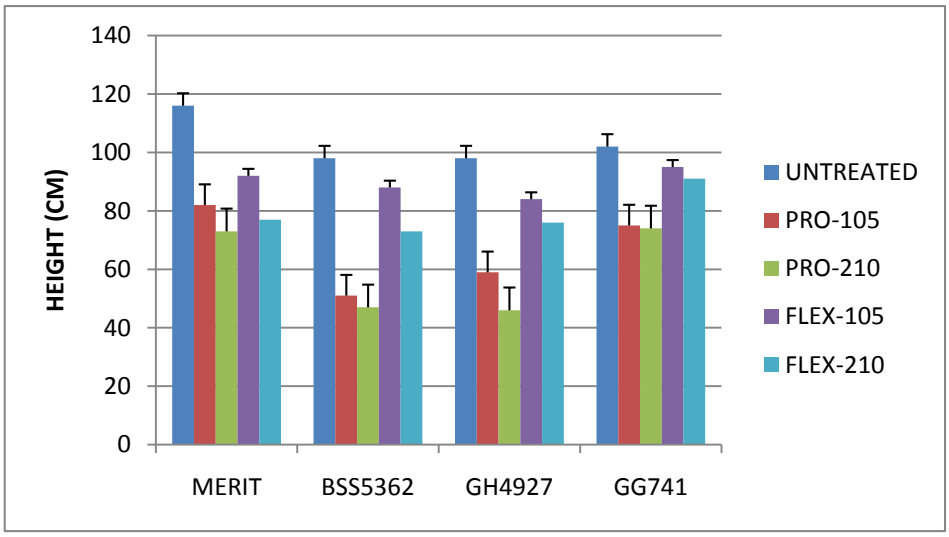
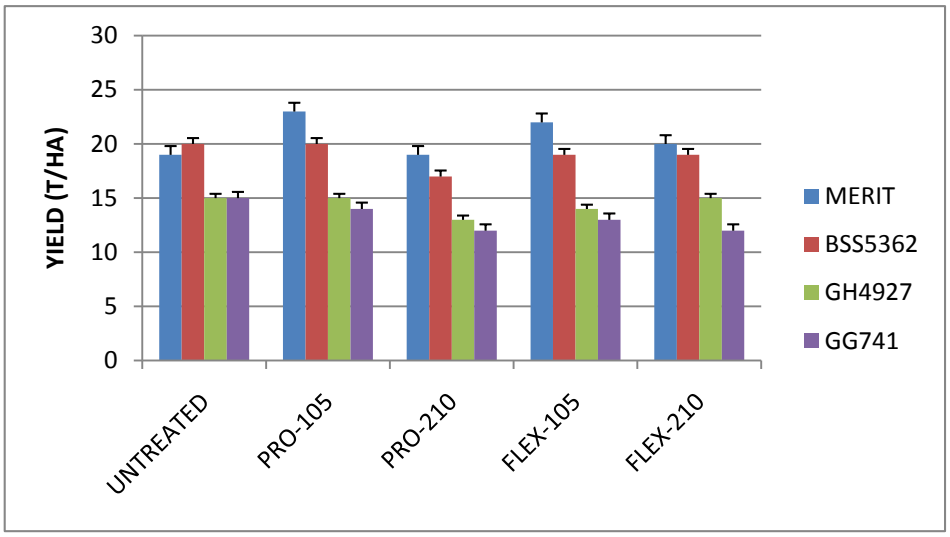
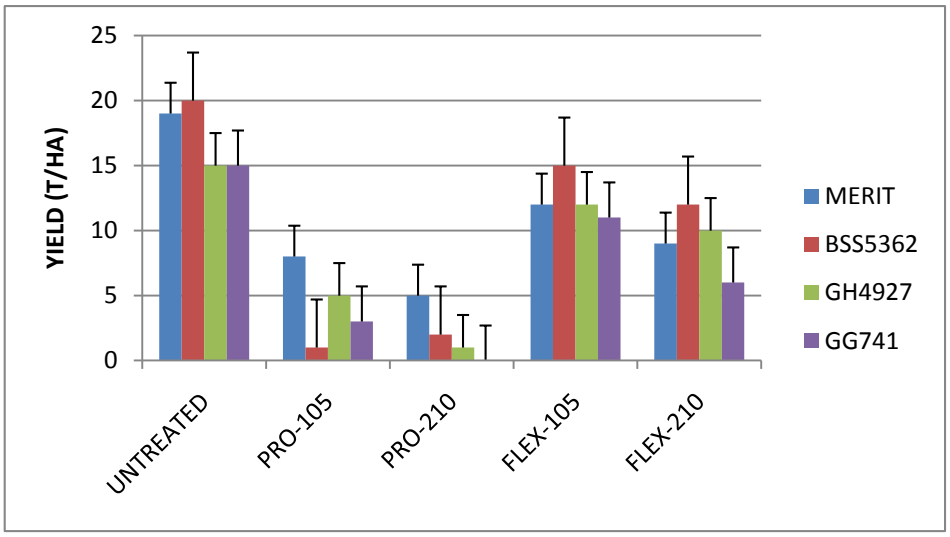


Figure 15.3. Effect of Converge PRO and Converge FLEXX applied a) preemergence and b) postemergence to 'Merit', BSS5362, GG741, and GG741 sweet corn on marketable yield.

a)



b)



Conclusions: Preemergence applications of Converge PRO and Converge FLEX did not injure sweet corn, nor did they reduce sweet corn height or marketable yield. Postemergence applications of Converge PRO caused more injury, and reduced height and marketable yield than Converge FLEX did to all sweet corn cultivars. These data provide preliminary evidence of the safening effect in Converge Flex in sweet corn.

Trial 16: Tolerance of Sweet Corn to Late POST Applications of Impact

Objective: Determine tolerance of sweet corn to late postemergence applications (8-, 10, and 12-leaf) of Impact + Atrazine.

Materials & Methods:

Crop: Sweet corn
Variety: Rocker Planting date: May 21/11
Planting rate: 50000 plants/ha Depth: 4 cm
Row spacing: 45cm

Design: Randomized Complete Block Design
Plot width: 6m Plot length: 10m
Reps: 4

Field Preparation: 24.2-2.5-4.2 (150 KG/HA ACTUAL N) WAS APPLIED MAY 17, 2011. FERTILIZER WAS WORKED INTO GROUND 1.5 HOURS AFTER APPLICATION WITH S-TINE CULTIVATOR.

Soil Description:
Sand: 78% OM: 4.4% Texture: v. fine sandy loam
Silt:14% pH: 5.9 Soil: Watford/Brady Series
Clay: 8% CEC 12

Application Information:

	A	B	C
APPLICATION DATE	JUN 14	JUN 20	JUN 28
TIME OF DAY	9:00PM	1:45PM	7:00AM
TIMING	POST1	POST2	POST3
AIR TEMP (c)	21	30	23
RH (%)	100	38	100
WIND SPEED (KPH)	1	2	3
SOIL TEMP (c)	26	38	25
CLOUD COVER (%)	98	85	95
CROP STAGE	8-LEAF	10-LEAF	12-LEAF

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 16.1. Effect of late postemergence applications of Impact + Atrazine on sweet corn visual injury 7, 14 and 28 days after application, height, cob size and marketable yield.

LEAF STAGE	INJURY			HEIGHT	COB SIZE	YIELD
	7D	14D	28D	M	G	T/HA
UNTREATED	0C	0B	0B	2.7B	393AB	21
8 LEAF	7A	2A	2A	2.7B	378B	21
10 LEAF	3B	1AB	0B	2.8A	393AB	20
12 LEAF	3B	1AB	0B	2.8A	411A	22
LSD (P <0.05)	2	1	1	0.1	25	NS

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

Conclusions:

Late postemergence applications (8-12 leaf) of Impact + Atrazine did not injure, or reduce height, cob size or marketable yield of sweet corn.

Trial 17: Effect of Hail Damage on Tolerance of Sweet Corn to Herbicides

Objective: Determine the effect of cumulative stress caused by hail damage and herbicide application, with and without application of fungicide.

Materials & Methods:

Crop: Sweet corn
Variety: Rocker
Planting date: May 21/11
Planting rate: 50000 plants/ha
Depth: 4 cm
Row spacing: 45cm

Design: Randomized Complete Block Design
Plot width: 6m
Plot length: 10m
Reps: 4

Field Preparation: 24.2-2.5-4.2 (150 KG/HA ACTUAL N) WAS APPLIED MAY 17, 2011. FERTILIZER WAS WORKED INTO GROUND 1.5 HOURS AFTER APPLICATION WITH S-TINE CULTIVATOR.

Soil Description:

Sand: 78%
OM: 4.4%
Texture: v. fine sandy loam
Silt:14%
pH: 5.9
Soil: Watford/Brady Series
Clay: 8%
CEC 12

Application Information:

	A
APPLICATION DATE	JUN 9
TIME OF DAY	8:30PM
TIMING	POST
AIR TEMP (c)	18
RH (%)	76
WIND SPEED (KPH)	3
SOIL TEMP (c)	24
CLOUD COVER (%)	15
CROP STAGE	4 LF

HAIL DAMAGE WAS SIMULATED ON JUNE 10 – ONE DAY BEFORE HERBICIDE APPLICATION.

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 17.1. Effect of hail damage, herbicide treatment and fungicide (pyraclostrobin) on sweet corn visual injury caused by hail and herbicide 7 days after application.

HAIL Y/N	HERBICIDE	FUNGICIDE? Y/N	VISUAL INJURY HAIL	VISUAL INJURY HERBICIDE
N	UNTREATED	N	0C	0F
Y	UNTREATED	N	21A	0F
Y	CALLISTO/ATRAZINE	N	19AB	2EF
Y	CALLISTO/ATRAZINE	Y	16B	3E
Y	ACCENT	N	18AB	13B
Y	ACCENT	Y	19AB	15A
Y	PARDNER	N	20AB	6D
Y	PARDNER	Y	19AB	8CD
N	CALLISTO/ATRAZINE	N	0C	1EF
N	CALLISTO/ATRAZINE	Y	0C	0F
N	ACCENT	N	0C	13B
N	ACCENT	Y	0C	14AB
N	PARDNER	N	0C	8C
N	PARDNER	Y	0C	9C
LSD (P <0.05)			5	2

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

Table 17.2. Effect of hail damage, herbicide treatment and fungicide (pyraclostrobin) on sweet corn plant dry weight and yield.

HAIL Y/N	HERBICIDE	FUNGICIDE? Y/N	DRY WT G/ 5PLANT	YIELD T/AC
N	UNTREATED	N	179A	10A
Y	UNTREATED	N	114C-F	9A
Y	CALLISTO/ATRAZINE	N	145A-D	10A
Y	CALLISTO/ATRAZINE	Y	104F	10A
Y	ACCENT	N	144A-E	9A
Y	ACCENT	Y	140B-F	9A
Y	PARDNER	N	108EF	9A
Y	PARDNER	Y	109DEF	10A
N	CALLISTO/ATRAZINE	N	175AB	11A
N	CALLISTO/ATRAZINE	Y	150ABC	11A
N	ACCENT	N	152AB	10A
N	ACCENT	Y	181A	11A
N	PARDNER	N	145A-D	10A
N	PARDNER	Y	173AB	10A
LSD (P <0.05)			37	4

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

Conclusions:

Injury, height and plant dry weight reductions were significant (>20%) in treatments that had hail damage, and greater than 10% in the Accent treatments. The addition of pyraclostrobin did not reduce the level of injury or reductions in dry weight. Despite the high level of visual injury in most treatments, marketable yield was not less than the untreated check in any treatments.

Trial 18. Weed Management in Pumpkins

Objective: Determine the tolerance of pumpkin to preemergence applications of Command, Sandea, and Reflex.

Materials & Methods:

Crop: Pumpkin
Variety: Appalachian
Planting date: May 26/11
Planting rate: 5000 plants/ha
Depth: 2.5 cm
Row spacing: 3m

Design: Randomized Complete Block Design
Plot width: 2m
Plot length: 10m
Reps: 4

Field Preparation: Trial fertilized with 150 kg/ha of actual N of 24.2-2.5-4.2 on May 17.

Soil Description:

Sand: 51%	OM: 5.5%	Texture: loam
Silt:28%	pH: 6.7	Soil: Watford/Brady Series
Clay: 21%	CEC 21	

Application Information:

	A
APPLICATION DATE	MAY 27
TIME OF DAY	8:00PM
TIMING	PRE
AIR TEMP (c)	21
RH (%)	62
WIND SPEED (KPH)	1
SOIL TEMP (c)	21
CLOUD COVER (%)	0
CROP STAGE	PRE

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 18.1. Effect of herbicide treatment on pumpkin visual injury 7, 14 and 28 days after application, pumpkin number per plot and yield.

HERBICIDE	RATE	VISUAL INJURY			#/PLOT	YIELD
		7D	14D	28D		T/AC
1. Check (WEEDFREE)		0B	0	0	11AB	65B
2. COMMAND	0.63L/AC	0B	0	0	10B	69AB
3. COMMAND	1.26 L/AC	0B	0	0	12AB	62B
4. SANDEA	25 G/AC	0B	0	0	11AB	69AB
5. SANDEA	50 G/AC	0B	0	0	11AB	62AB
6. REFLEX	0.4 L/AC	0B	0	0	11AB	71AB
7. REFLEX	0.8 L/AC	9A	0	0	11AB	68AB
8. COMMAND +	0.63 L/AC	0B	0	0	10AB	62B
SANDEA	25 G/AC					
9. COMMAND +	450 ML/AC	0B	0	0	12A	77A
REFLEX	0.4 L/AC					
LSD (P <0.05)		1	NS	NS	2	11

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

Conclusions:

This trial was kept weed-free to test for the effect of preemergence applications of Command, Sandea and Reflex on visual injury, stand and yields of pumpkin.

Visual initial injury was not observed in any of the treatments, and the number of pumpkins per plot and yield were not less than the untreated check. **Data were provided to support a minor use submission for Sandea in vine crops.**

Trial 19. Weed Management in Squash

Objective: Determine the tolerance of squash to preemergence applications of Command, Sandea, and Reflex.

Materials & Methods:

Crop: Squash
Variety: Early Butternut
Planting rate: 8333 seeds/ha
Row spacing: 3m
Planting date: May 26/11
Depth: 2.5 cm

Design: Randomized Complete Block Design
Plot width: 2m
Plot length: 10m
Reps: 4

Field Preparation: Trial fertilized with 150 kg/ha of actual N of 24.2-2.5-4.2 on May 17.

Soil Description:
Sand: 51%
Silt:28%
Clay: 21%
OM: 5.5%
pH: 6.7
CEC 21
Texture: loam
Soil: Watford/Brady Series

Application Information:

	A
APPLICATION DATE	MAY 27
TIME OF DAY	8:00PM
TIMING	PRE
AIR TEMP (c)	21
RH (%)	62
WIND SPEED (KPH)	1
SOIL TEMP (c)	21
CLOUD COVER (%)	0
CROP STAGE	PRE

Spray Equipment:

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

Table 19.1. Effect of herbicide treatment on squash visual injury 7, 14 and 28 days after application, squash number per plot and yield.

HERBICIDE	RATE	VISUAL INJURY 7D	14D	28D	#/PLOT	YIELD T/AC
1. Check (WEEDFREE)		0B	0C	0B	23AB	24AB
2. COMMAND	0.63L/AC	0B	0C	0B	27AB	27AB
3. COMMAND	1.26 L/AC	0B	0C	0B	27AB	27AB
4. SANDEA	25 G/AC	0B	0C	0B	22A	22B
5. SANDEA	50 G/AC	0B	0C	0B	24AB	25AB
6. REFLEX	0.4 L/AC	0B	0C	0B	24AB	24AB
7. REFLEX	0.8 L/AC	10A	4A	1A	24AB	25AB
8. COMMAND + SANDEA	0.63 L/AC 25 G/AC	0B	1BC	0B	22B	22AB
9. COMMAND + REFLEX	450 ML/AC 0.4 L/AC	0B	3AB	0B	28A	28A
LSD (P <0.05)		2	2	1	6	5

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

Conclusions:

This trial was kept weed-free to test for the effect of preemergence applications of Command, Sandea and Reflex on visual injury, stand and yields of squash.

Visual initial injury was observed in the Reflex treatments at 7 and 14 days after emergence (DAE), but by 28 DAE, the plants outgrew the injury. The number of squash per plot and yield were not less than the untreated check. **Data were provided to support a minor use submission for Sandea in vine crops.**