WEED CONTROL IN PROCESSING VEGETABLES

RESEARCH RESULTS – 2010

PREPARED BY DARREN ROBINSON, RIDGETOWN CAMPUS

FOR THE ONTARIO PROCESSING VEGETABLE GROWERS

NOVEMBER 2, 2010

ACKNOWLEDGEMENTS

Purpose Of This Booklet

This booklet is provided as a guide to the 2010 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 2010 research program was provided by:

Ontario Processing Vegetable Growers
New Directions
Agriculture & Agri-Food Canada
Ontario Food Processors Association
Agchemical Companies

Technical Assistants

Research Technician
Dave Bilyea
Kristen McNaughton
Sean Vink

Research Assistants
Ashley Devereaux
Sarah Sikkema
Kyle Vink

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.

D.E. Robinson
Ridgetown Campus, University of Guelph
Ridgetown, Ontario
N0P 2C0
(519) 674-1604
drobinso@ridgetownc.uoguelph.ca

TABLE OF CONTENTS

# TRIAL NAME	PAGE
1. Tolerance of Lima Bean to Sandea	4
2. Tolerance of Lima Bean to Prowl H20	6
3. Tolerance and Weed Control with Herbicide-Fungicide Tank-Mixes in Snap Bean	8
4. Tolerance of Snap Bean to Sandea	11
5. Tolerance of Snap Bean to Prowl H20	13
6. Herbicide Tolerance in Carrots	15
7. Tolerance of Broccoli to PRE- and POST-transplant herbicides	17
8. Weed Control in Broccoli with PRE- and POST-transplant herbicides	19
9. Tolerance of Processing Peas to PPI Herbicides	22
10. Tolerance of Processing Peas to PRE Herbicides	26
11. Tolerance of Peppers to Preemergence Herbicides	30
12. Full, Split and Micro-rates of Pyramin+Upbeet in Red Beets	34
13. Use of a Heat Unit Model to Time Herbicide Applications in Red Beet	40
14. Effect of Timing on Tolerance of Red Beet to Outlook	44
15. Tolerance of Sweet Corn to Prowl H20	46
16. Tolerance of Sweet Corn to Converge PRO and Converge Flex	49
17. Tolerance of Sweet Corn to Late POST applications of Impact	53
18. Effect of Hail Damage on Tolerance of Sweet Corn to Herbicides	55
19. Weed Management in Pumpkins	58
20. Weed Management in Squash	60

Trial 1: Tolerance of Lima Bean to Sandea

Objective: Determine the tolerance of lima bean to PRE and POST applications of Sandea.

Materials & Methods:

Crop: Lima bean
Variety: Improved Kingston Planting date: June 11/10
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 10 with 18-18-18 at 300 kg/ha and 26-0-0 at 250 kg/ha.

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

Application Information:

	A	B
Application Date:	Jun-11-2010	Jun-30-2010
Time of Day:	8:30 PM	6:30 PM
Application Method:	CO2 SPRAY	CO2 SPRAY
Application Timing:	PRE	1-2 TRI
Application Placement:	SOIL	FOLIAR
Air Temperature, Unit:	23 C	25 C
% Relative Humidity:	52	47
Wind Velocity, Unit:	2 KPH	2.2 KPH
Wind Direction:	SW	NE
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	25 C	27 C
Soil Moisture:	NORMAL	NORMAL
% Cloud Cover:	5	35

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 7D	14D	28D	DRY WT G	YIELD T/AC
1. Check (WEEDFREE)		0B	0C	0B	107AB	2.2A
2. SANDEA – PRE	26 G/AC	0B	3BC	1B	117AB	2.0A
3. SANDEA – PRE	52 G/AC	1B	7AB	2B	130A	2.3A
4. SANDEA - POST	26 G/AC	21A	8A	5AB	105AB	2.0A
5. SANDEA – POST	52 G/AC	21A	10A	6A	94B	1.9A
LSD (P <0.05)		3	4	3	28	0.7

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 preemergence and postemergence applications of Sandea (26 and 52 G/AC) on visual injury, height, dry weight and yields of lima bean.

Lima bean was tolerant to PRE applications of Sandea – some leaf distortion was observed up to 14 days after emergence (DAE), which the plants outgrew without any decrease in dry weight or yield.

POST applications of Sandea caused commercially unacceptable visual injury. However, dry weight and yields were not less than the untreated check in either POST treatment.

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

Trial 2: Tolerance of Lima Bean to Prowl H20

Objective: Determine the tolerance of lima bean to PRE and POST applications of Sandea.

Materials & Methods:

Crop: Lima bean
Variety: Improved Kingston — Planting date: June 11/10
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 10 with 18-18-18 at 300 kg/ha and 26-0-0 at 250 kg/ha.

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

Application Information:

	A
Application Date:	Jun-11-2010
Time of Day:	7:30 AM
Application Method:	CO2 SPRAY
Application Timing:	PPI
Application Placement:	SOIL
Air Temperature, Unit:	19 C
% Relative Humidity:	76
Wind Velocity, Unit:	2 KPH
Wind Direction:	W
Dew Presence (Y/N):	Y
Soil Temperature, Unit:	17 C
Soil Moisture:	WET
% Cloud Cover:	95

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 lima 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)		0A	0A	0A	37AB	2.3A
2. PROWL H20	1000 ML/AC	0A	0A	0A	41A	2.7A
3. PROWL H20	2000 ML/AC	0A	0A	0A	34B	2.5A
LSD (P <0.05)		0	3	0	7	1.0

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 pre-plant incorporated applications of Prowl H20 on visual injury, height, dry weight and yields of lima bean.

None of the treatments caused commercially unacceptable visual injury. Dry weight, height and yield were not less in any of the herbicide treatments compared with the untreated check.

A minor use request has been made to BASF, and is awaiting their approval before it can be submitted to the PMRA.

Trial 3: 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 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-9-2010
Time of Day:	1:38 PM
Application Method:	CO2 SPRAY
Application Timing:	POST
Application Placement:	FOLIAGE
Air Temperature, Unit:	28 C
% Relative Humidity:	82
Wind Velocity, Unit:	4 KPH
Wind Direction:	N
Dew Presence (Y/N):	N
Soil Temperature, Unit:	30 C
Soil Moisture:	WET
% Cloud Cover:	95

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 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 3.2. 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 4: Tolerance of Snap Bean to Sandea

Objective: Determine the tolerance of snap bean to PRE and POST applications of 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	B
Application Date:	Jun-11-2010	Jun-30-2010
Time of Day:	8:30 PM	6:30 PM
Application Method:	CO2 SPRAY	CO2 SPRAY
Application Timing:	PRE	1-2 TRI
Application Placement:	SOIL	FOLIAR
Air Temperature, Unit:	23 C	25 C
% Relative Humidity:	52	47
Wind Velocity, Unit:	2 KPH	2.2 KPH
Wind Direction:	SW	NE
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	25 C	27 C
Soil Moisture:	NORMAL	NORMAL
% Cloud Cover:	5	35

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 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)		0A	2B	0A	85A	9.1A
2. SANDEA – PRE	26 G/AC	0A	0B	0A	91A	9.1A
3. SANDEA – PRE	52 G/AC	0A	1B	0A	92A	9.5A
4. SANDEA - POST	26 G/AC	0A	15A	1A	85A	8.9A
5. SANDEA – POST	52 G/AC	0A	17A	2A	75A	8.5A
LSD (P <0.05)		0	2	2	21	1.5

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 preemergence and postemergence applications of Sandea (26 and 52 G/AC) on visual injury, height, dry weight and yields of snap bean.

PRE applications of Sandea did not injure snap bean, nor did they cause a reduction in dry weight, height or snap bean yield. Snap bean showed temporary chlorosis following POST applications of Sandea at 14 days after treatment (DAT), which the plants outgrew by 28 DAT. Snap bean dry weight, height and yield were not less than the untreated check.

Trial 5: Tolerance of Snap Bean to Prowl H20

Objective: Determine the tolerance of lima bean to PPI applications of Prowl H20.

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-11-2010
Time of Day:	8:30 AM
Application Method:	CO2 SPRAY
Application Timing:	PPI
Application Placement:	SOIL
Air Temperature, Unit:	23 C
% Relative Humidity:	52
Wind Velocity, Unit:	2 KPH
Wind Direction:	SW
Dew Presence (Y/N):	N
Soil Temperature, Unit:	23 C
Soil Moisture:	NORMAL
% Cloud Cover:	5

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 5.1. 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	VISUAL INJURY			DRY WT	YIELD
		7D	14D	28D	G	T/AC
1. Check (WEEDFREE)		0A	0A	0A	28A	9.5A
2. PROWL H20	1000 ML/AC	0A	0A	0A	26A	9.0A
3. PROWL H20	2000 ML/AC	0A	0A	0A	27A	9.3A
LSD (P <0.05)		0	0	0	7	2.1

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 pre-plant incorporated applications of Prowl H20 on visual injury, height, dry weight and yields of snap bean.

Prowl H20 did not injure snap bean, or reduce dry weight, height or yield of snap bean.

Trial 6: Herbicide Tolerance in Carrots

Objective: Determine the tolerance of carrots to preemergence applications of Dual II Magnum, Goal, Prowl H20 and Command.

Materials & Methods:

Crop: Carrot
Variety: Fontana
Planting date: April 23/10
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: 82%
OM: 4.1%
Texture: loamy v. fine sand
Silt: 10%
pH: 5.7
Soil: Normandale
Clay: 7%
CEC 13

Application Information:

	A
APPLICATION DATE	MAY 3
TIME OF DAY	6:00PM
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 6.1. Effect of herbicide treatment on 'Fontana' carrot visual injury 7, 14 and 28 days after application, stand count, carrot length and yield.

HERBICIDE	RATE	VISUAL INJURY 7D	VISUAL INJURY 14D	VISUAL INJURY 28D	LENGTH CM	YIELD T/AC
1. Check (WEEDFREE)		0C	0C	0C	15A	25A
2. DUAL II MAG	400 ML/AC	0C	0C	0C	14A	27A
3. DUAL II MAG	800 ML/AC	0C	0C	0C	14A	24A
4. DUAL II MAG	1200 ML/AC	4C	4C	3C	13A	24A
5. GOAL	200 ML/AC	34B	25B	25B	9A	20A
6. GOAL	400 ML/AC	75A	55A	48A	6A	15A
7. PROWL H20	1.5 L/AC	0C	0C	0C	14A	25A
8. PROWL H20	3.0 L/AC	0C	0C	0C	16A	29A
9. COMMAND	210 ML/AC	0C	0C	0C	15A	22A
10. COMMAND	420 ML/AC	0C	0C	0C	17A	29A
11. COMMAND	840 ML/AC	0C	0C	0C	14A	29A
LSD (P <0.05)		15	13	13	3	21

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 Dual II Magnum, Goal, Prowl H20 and Command on carrot visual injury, carrot length and yield of 'Fontana' carrot.

Goal caused significant stunting and stand reductions, and reduced carrot length and yield. The remaining treatments did not injure carrot, and carrot length and yield were similar to that in the untreated check. In previous research, this injury had not been observed, however, this study was conducted on a very sandy soil (82%), whereas in 2008 and 2009, sand content was 49% and 52%, respectively. We hypothesize that rain moved the Goal into the seed zone, resulting in the significant stand losses observed in 2010.

Trial 7: Tolerance of Broccoli to PRE- and POST-transplant herbicides

Objective: Determine the tolerance of broccoli to PRE-T and POST-T applications of Authority, Chateau, Goal, and Dual II Magnum.

Materials & Methods:

Crop: Broccoli
Variety: Iron Man
Planting rate: 29167 plants/ha
Row spacing: 45cm
Planting date: May 26/10
Depth: 5 cm

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

Field Preparation: May 17, 2010 applied 22 kg/ha of actual N of 19-19-190.

Soil Description:
Sand: 49%
Silt:28%
Clay: 23%
OM: 5.3%
pH: 6.4
CEC 20
Texture: loam
Soil: Watford/Brady

Application Information:

	A	B
APPLICATION DATE	May-25-10	May-28-2010
TIME OF DAY	8:30 PM	7:30 AM
TIMING	PRE-T	POST-T
AIR TEMP (c)	22C	18C
RH (%)	64	66
WIND SPEED (KPH)	2	4
SOIL TEMP (c)	21	17C
CLOUD COVER (%)	0	0
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 7.1. Effect of herbicide treatment on percent injury, dry weight and yield of broccoli.

CROP	RATE (ML/AC)	TIMING	INJURY 7D	INJURY 14D	DRY WT (G)	YIELD T/AC
1. UNTREATED	0	PRE-T	0D	0C	226AB	3.1AB
2. AUTHORITY	236 ML/AC	PRE-T	1D	0C	262AB	4.3A
3. AUTHORITY	472 ML/AC	PRE-T	1D	0C	249AB	3.6AB
4. CHATEAU	57 G/AC	PRE-T	0D	0C	271AB	3.4AB
5. CHATEAU	114 G/AC	PRE-T	1D	0C	251AB	3.0B
6. GOAL	200 ML/AC	PRE-T	1D	0C	222AB	3.0B
7. GOAL	400 ML/AC	PRE-T	2CD	1BC	301A	4.0AB
8. DUAL II MAGNUM	700 ML/AC	PRE-T	1D	0C	282AB	4.1AB
9. DUAL II MAGNUM	1400 ML/AC	PRE-T	0D	0C	242AB	3.2AB
10. AUTHORITY	236 ML/AC	PRE-T	1D	0C	259AB	3.7AB
11. AUTHORITY	472 ML/AC	PRE-T	1D	0C	264AB	3.0AB
12. CHATEAU	57 G/AC	PRE-T	1D	1BC	269AB	3.3AB
13. CHATEAU	114 G/AC	PRE-T	3CD	2B	241AB	4.1AB
14. GOAL	200 ML/AC	PRE-T	4BC	1BC	240AB	3.5AB
15. GOAL	400 ML/AC	PRE-T	8A	6A	205B	3.6AB
16. DUAL II MAGNUM	700 ML/AC	PRE-T	1C	0C	234AB	3.5AB
17. DUAL II MAGNUM	1400 ML/AC	PRE-T	2CD	0C	226AB	3.8AB
LSD (P <0.05)			2	2	87	1.4
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 determine the tolerance of broccoli to PRE-T and POST-T applications of Authority, Chateau, Goal and Dual II Magnum. Goal caused 8% injury (leaf deformation) at 7 and 14 days after the POST-T treatment, but plants outgrew this injury by 28 days after transplanting. Stand count, plant dry weight, marketable head size, and yield were not less than the untreated check in any herbicide treatments.

These data were submitted to support the UMRULE submission for Chateau in broccoli.

Trial 8: 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: May 26/10
Depth: 5 cm

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

Field Preparation: May 17, 2010 applied 22 kg/ha of actual N of 19-19-190.

Soil Description:
Sand: 49%
Silt:28%
Clay: 23%
OM: 5.3%
pH: 6.4
CEC 20
Texture: loam
Soil: Watford/Brady

Application Information:

	A	B
APPLICATION DATE	May-25-10	May-28-2010
TIME OF DAY	8:30 PM	7:30 AM
TIMING	PRE-T	POST-T
AIR TEMP (c)	22C	18C
RH (%)	64	66
WIND SPEED (KPH)	2	4
SOIL TEMP (c)	21	17C
CLOUD COVER (%)	0	0
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 8.1. Effect of herbicide treatment on percent control of velvetleaf (ABUTH), common lamb's-quarters (CHEAL) and green foxtail (SETVI) control 42 days after application.

HERBICIDE	RATE	TIMING	ABUTH	CHEAL	SETVI
			%	%	%
1. UNTREATED	0	PRE-T	0F	0C	0E
2. AUTHORITY	236 ML/AC	PRE-T	90ABC	100A	70A-D
3. CHATEAU	57 G/AC	PRE-T	48DE	96A	45D
4. GOAL	200 ML/AC	PRE-T	98AB	88A	53CD
5. DUAL II MAGNUM	700 ML/AC	PRE-T	54CDE	56B	58BCD
6. AUTHORITY	236 ML/AC	PRE-T	73A-E	98A	83AB
DUAL II MAGNUM	700 ML/AC	PRE-T			
7. CHATEAU	57 G/AC	PRE-T	63B-E	58B	45D
DUAL II MAGNUM	700 ML/AC	PRE-T			
8. GOAL	200 ML/AC	PRE-T	83A-D	88A	83AB
DUAL II MAGNUM	700 ML/AC	PRE-T			
9. AUTHORITY	236 ML/AC	POST-T	99AB	99A	86A
10. CHATEAU	57 G/AC	POST-T	100A	94A	58BCD
11. GOAL	200 ML/AC	POST-T	98AB	94A	66A-D
12. DUAL II MAGNUM	700 ML/AC	POST-T	43E	78AB	75ABC
13. AUTHORITY	236 ML/AC	POST-T	74A-E	99A	90A
DUAL II MAGNUM	700 ML/AC	POST-T			
14. CHATEAU	57 G/AC	POST-T	98AB	91A	85A
DUAL II MAGNUM	700 ML/AC	POST-T			
15. GOAL	200 ML/AC	POST-T	99AB	86A	84A
DUAL II MAGNUM	700 ML/AC	POST-T			
LSD (P <0.05)			37	24	26

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

Table 8.2. 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	0C	0B	253AB	3.7AB
2. AUTHORITY	236 ML/AC	PRE-T	1C	0B	321A	4.2A
3. CHATEAU	57 G/AC	PRE-T	1C	0B	282AB	4.4A
4. GOAL	200 ML/AC	PRE-T	0C	0B	308AB	4.9A
5. DUAL II MAGNUM	700 ML/AC	PRE-T	1C	0B	245AB	3.2B
6. AUTHORITY	236 ML/AC	PRE-T	1C	0B	242B	3.5B
DUAL II MAGNUM	700 ML/AC	PRE-T				
7. CHATEAU	57 G/AC	PRE-T	1C	0B	260AB	4.1A
DUAL II MAGNUM	700 ML/AC	PRE-T				
8. GOAL	200 ML/AC	PRE-T	2BC	0B	299AB	4.7A
DUAL II MAGNUM	700 ML/AC	PRE-T				
9. AUTHORITY	236 ML/AC	POST-T	0C	0B	290AB	4.4A
10. CHATEAU	57 G/AC	POST-T	0C	0B	294AB	4.6A
11. GOAL	200 ML/AC	POST-T	1C	0B	240B	3.7AB
12. DUAL II MAGNUM	700 ML/AC	POST-T	4BC	0B	285AB	4.3A
13. AUTHORITY	236 ML/AC	POST-T	4BC	0B	234B	3.7AB
DUAL II MAGNUM	700 ML/AC	POST-T				
14. CHATEAU	57 G/AC	POST-T	60A	24A	245AB	2.6C
DUAL II MAGNUM	700 ML/AC	POST-T				
15. GOAL	200 ML/AC	POST-T	5B	0B	280AB	4.6A
DUAL II MAGNUM	700 ML/AC	POST-T				
LSD (P <0.05)			4	2	77	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 good control of common lambsquarters and green foxtail. The tank mix of Chateau + Dual II Magnum gave poor control of all weed when applied POST-T, but gave excellent control of these species when applied PRE-T. The tank mix of Goal + Dual II Magum gave good to excellent control of all species when applied PRE- or POST. Percent injury, harvestable head size and and yield were less than the untreated check in flumioxazin + smetolachor treatment. None of the other treatments reduced harvest number, marketable head size or yield.

Trial 9: Tolerance of Processing Peas to PPI Herbicides

Objective: Determine weed control and tolerance of processing pea to PPI applications of Kixor (saflufenacil), Prowl H20, Valtera (flumioxazin), Sandea, and pyroxasulfone.

Materials & Methods:

Crop: Pea
Variety: Spring
Planting date: Apr 19
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, 2009.

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	APR 19
TIME OF DAY	10:00AM
TIMING	PPI
AIR TEMP (c)	13
RH (%)	44
WIND SPEED (KPH)	5
SOIL TEMP (c)	10
CLOUD COVER (%)	0
CROP STAGE	PPI

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 9.1. Effect of herbicide treatment on 'Spring' pea percent injury 7, 14 and 28 days after emergence.

HERBICIDE	RATE	PERCENT INJURY		
		7D	14D	28D
1. Check (WEEDFREE)		0A	0B	0C
2. KIXOR	58 ML/AC	0A	2AB	1BC
3. KIXOR	116 ML/AC	0A	1AB	1BC
4. PROWL H20	1500 ML/AC	0A	3ABC	3ABC
5. PROWL H20	3000 ML/AC	0A	0B	3ABC
6. VALTERA	57 G/HA	0A	1AB	3ABC
7. VALTERA	114 G/HA	0A	1AB	7A
8. SANDEA	25 G/AC	0A	2AB	5AB
9. SANDEA	50 G/AC	1C	3A	2ABC
10. PYROXASULFONE	100 G/AC	0A	1AB	5AB
11. PYROXASULFONE	200 G/AC	0A	0B	2ABC
12. DUAL II MAGNUM	500 ML/AC	0A	1AB	1C
LSD (P <0.05)	1/L	2	2	5

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

Table 9.2. Effect of herbicide treatment on common ragweed (AMBEL), common lamb's-quarters (CHEAL) and eastern black nightshade (SOLPT) control 42 days after application.

HERBICIDE	RATE	AMBEL	CHEAL	SOLPT
1. Check (WEEDFREE)		0F	0C	0C
2. KIXOR	58 ML/AC	75BC	93A	100A
3. KIXOR	116 ML/AC	93A	100A	100A
4. PROWL H20	1500 ML/AC	1F	89A	94A
5. PROWL H20	3000 ML/AC	5F	85A	99A
6. VALTERA	57 G/HA	26E	100A	100A
7. VALTERA	114 G/HA	68C	100A	100A
8. SANDEA	25 G/AC	84ABC	99A	30B
9. SANDEA	50 G/AC	90AB	100A	20BC
10. PYROXASULFONE	100 G/AC	48D	95A	100A
11. PYROXASULFONE	200 G/AC	83ABC	98A	100A
12. DUAL II MAGNUM	500 ML/AC	10EF	64B	95A
LSD (P <0.05)		16	19	24

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

Table 9.3. Effect of herbicide treatment on 'Spring' pea tenderness and yield.

HERBICIDE	RATE	TENDEROMETER READING (PSI)	YIELD T/AC
1. Check (WEEDFREE)		119B	2.6AB
2. KIXOR	58 ML/AC	35ABC	2.5AB
3. KIXOR	116 ML/AC	119C	2.5AB
4. PROWL H20	1500 ML/AC	132ABC	2.3AB
5. PROWL H20	3000 ML/AC	128ABC	2.1B
6. VALTERA	57 G/HA	131128ABC	2.8A
7. VALTERA	116 G/HA	122BC	2.7AB
8. SANDEA	129 G/AC	129ABC	2.8A
9. SANDEA	50 G/AC	135AB	2.6AB
10. PYROXASULFONE	100 G/AC	129ABC	2.6AB
11. PYROXASULFONE	200 G/AC	141A	2.3AB
12. DUAL II MAGNUM	500 ML/AC	131ABC	2.2AB
LSD (P <0.05)		1.1	0.6

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 Kixor, Prowl H20, Valtera, Sandea, and pyroxasulfone applied pre-plant incorporated on pea visual injury, tenderness, yield, and weed control.

Kixor provided excellent control of common lamb's-quarters, eastern black nightshade and fair control of common ragweed. Prowl H2O gave good control of common lamb's-quarters and eastern black nightshade, but poor control of common ragweed. Valtera gave excellent control of eastern black nightshade and common lamb's-quarters and poor control of common ragweed. Sandea gave excellent control of common lamb's-quarters, good control of common ragweed and poor control of eastern black nightshade. Pyroxasulfone gave excellent control of common lamb's-quarters and eastern black nightshade and poor control of common ragweed.

Yield was the same as the untreated check in the all herbicide treatments, however pea tenderness was lower at the 2X rate of Valtera than in the untreated check.

Trial 10: Tolerance of Processing Peas to PRE Herbicides

Objective: Determine weed control and tolerance of processing pea to PRE applications of Kixor, Prowl H20, Valtera, Sandea, and pyroxasulfone.

Materials & Methods:

Crop: Pea
Variety: Spring — Planting date: Apr 19
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, 2008.

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	APR 23
TIME OF DAY	9:00AM
TIMING	PRE
AIR TEMP (c)	15
RH (%)	39
WIND SPEED (KPH)	3
SOIL TEMP (c)	10
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 10.1. Effect of herbicide treatment on 'Spring' pea percent injury 7, 14 and 28 days after emergence.

HERBICIDE	RATE	PERCENT INJURY		
		7D	14D	28D
1. Check (WEEDFREE)		0B	0C	0B
2. KIXOR	58 ML/AC	0B	2C	0B
3. KIXOR	116 ML/AC	0B	1C	1B
4. PROWL H20	1500 ML/AC	0B	1C	0B
5. PROWL H20	3000 ML/AC	1AB	2C	0B
6. VALTERA	70 GA/HA	0B	10B	2B
7. VALTERA	140 GA/HA	0B	23A	10A
8. SANDEA	25 G/AC	0B	2C	0B
9. SANDEA	50 G/AC	0B	1C	1B
10. PYROXASULFONE	100 G/AC	0B	0B	0B
11. PYROXASULFONE	200 G/AC	3A	1B	0B
12. DUAL II MAGNUM	500 ML/AC	0B	0C	2B
LSD (P <0.05)		2	3	18

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

Table 10.2. Effect of herbicide treatment on redroot pigweed (AMARE), and common lamb's-quarters control 42 days after application.

HERBICIDE	RATE	AMARE	CHEAL
1. Check (WEEDFREE)		0B	0D
2. KIXOR	58 ML/AC	100A	94A
3. KIXOR	116 ML/AC	100A	98A
4. PROWL H20	1500 ML/AC	88A	43BC
5. PROWL H20	3000 ML/AC	91A	76AB
6. VALTERA	70 GA/HA	100A	80A
7. VALTERA	140 GA/HA	100A	90A
8. SANDEA	25 G/AC	100A	73AB
9. SANDEA	50 G/AC	100A	71AB
10. PYROXASULFONE	100 G/AC	100A	63AB
11. PYROXASULFONE	200 G/AC	100A	85A
12. DUAL II MAGNUM	500 ML/AC	93A	26C
LSD (P <0.05)		9	25

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

Table 10.3. Effect of herbicide treatment on 'Spring' pea tenderness and yield.

HERBICIDE	RATE	TENDEROMETER READING (PSI)	YIELD T/AC
1. Check (WEEDFREE)		92A	2.2A
2. KIXOR	58 ML/AC	84A	1.8A
3. KIXOR	116 ML/AC	86A	1.5A
4. PROWL H20	1500 ML/AC	87A	2.4A
5. PROWL H20	3000 ML/AC	83A	2.5A
6. VALTERA	70 GA/HA	86A	1.8A
7. VALTERA	140 GA/HA	83A	1.6A
8. SANDEA	25 G/AC	89A	2.3A
9. SANDEA	50 G/AC	86A	1.7A
10. PYROXASULFONE	100 G/AC	87A	2.2A
11. PYROXASULFONE	200 G/AC	87A	2.4A
12. DUAL II MAGNUM	500 ML/AC	92A	2.2A
LSD (P <0.05)		9	0.8

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 Kixor, Prowl H20, Valtera, Sandea, and pyroxasulfone applied preemergence on pea visual injury, tenderness, yield, and weed control. Kixor applied PRE injured pea, but did not reduce yield or delay pea maturity. The Valtera treatments injured pea – injury consisted of delayed and uneven emergence, stunting and leaf deformation.

Kixor gave excellent control of velvetleaf, redroot pigweed, common ragweed, common lamb's-quarters, lady's thumb, and poor control of barnyardgrass. Prowl H20 gave good control of redroot pigweed, and poor control of velvetleaf, common ragweed, common lamb's-quarters, lady's thumb, and barnyardgrass. Valtera gave excellent control of redroot pigweed, good control of velvetleaf and common lamb's-quarters, fair control of common ragweed and lady's thumb, and poor control of barnyardgrass. Sandea gave excellent control of redroot pigweed, good control of velvetleaf, fair control of common ragweed and common lamb's-quarters and poor control of barnyardgrass. Pyroxasulfone gave excellent control of redroot pigweed, good control of velvetleaf, and poor control of common ragweed, common lamb's-quarters, and barnyardgrass.

Trial 11: Tolerance of pepper to preemergence herbicides

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

Materials & Methods:

Crop: Pepper
Variety: Red Knight — Planting date: May 31/10
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 29, 2010 – applied 37 kg/ha of actual N of 11-52-0 and 45 kg/ha of 19-19-19. Fertilizer incorporated with S-tine cultivator.

Soil Description:

Sand: 49%	OM: 5.3%	Texture: loam
Silt: 28%	pH: 6.4	Soil: Watford/Brady Series
Clay: 23%	CEC 20	

Application Information:

	A
APPLICATION DATE	May 30
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 11.1. Effect of herbicide treatment on percent injury 7, 14 and 28 days after planting, and height 28 days after planting.

HERBICIDE	RATE	PERCENT INJURY			HEIGHT
		7D	14D	28D	CM
1. UNTREATED CHECK		0B	0D	0D	16A
2. REFLEX	400 ML/AC	0B	0D	0D	17A
3. REFLEX	800 ML/AC	2AB	4BC	1CD	16A
4. PROWL H20	1 L/AC	1B	1CD	0D	16A
5. PROWL H20	2 L/AC	0B	1D	1CD	16A
6. SANDEA	25 G/AC	3A	5AB	4B	14A
7. SANDEA	50 G/AC	1AB	7A	7A	15A
8. DUAL II MAGNUM	500 ML/AC	0B	2CD	0D	17A
9. REFLEX	400 ML/AC	1AB	3CD	1CD	16A
PROWL H20	1 L/AC				
10. REFLEX	400 ML/AC	3A	4BC	3BC	16A
SANDEA	25 G/AC				
11. SANDEA	25 G/AC	2AB	2CD	1CD	17A
PROWL H20	1 L/AC				
LSD (P <0.05)		2	3	3	2

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

Table 11.2. Effect of herbicide treatment on percent control of redroot pigweed (AMARE), common lamb's-quarters (CHEAL) and eastern black nightshade (SOLPT) 56 days after transplanting.

HERBICIDE	RATE	AMARE	CHEAL	SOLPT
1. UNTREATED CHECK		0D	0C	0D
2. REFLEX	400 ML/AC	45BC	44AB	33ABC
3. REFLEX	800 ML/AC	43BC	39AB	61A
4. PROWL H20	1 L/AC	3D	43AB	28BCD
5. PROWL H20	2 L/AC	11CD	40AB	53AB
6. SANDEA	25 G/AC	75AB	49AB	0D
7. SANDEA	50 G/AC	95A	68A	0D
8. DUAL II MAGNUM	500 ML/AC	66AB	11BC	40AB
9. REFLEX	400 ML/AC	28CD	48AB	43AB
PROWL H20	1 L/AC			
10. REFLEX	400 ML/AC	93A	50A	10CD
SANDEA	25 G/AC			
11. SANDEA	25 G/AC	0D	40AB	0D
PROWL H20	1 L/AC			
LSD (P <0.05)		34	37	31

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

Table 11.3. Effect of herbicide treatment on fruit weight and yield of pepper.

HERBICIDE	RATE	FRUIT WT G	YIELD T/AC
1. UNTREATED CHECK		134A	9A
2. REFLEX	400 ML/AC	128A	10A
3. REFLEX	800 ML/AC	128A	10A
4. PROWL H20	1 L/AC	124A	9A
5. PROWL H20	2 L/AC	147A	9A
6. SANDEA	25 G/AC	122A	8A
7. SANDEA	50 G/AC	133A	8A
8. DUAL II MAGNUM	500 ML/AC	129A	9A
9. REFLEX	400 ML/AC	122A	10A
PROWL H20	1 L/AC		
10. REFLEX	400 ML/AC	136A	10A
SANDEA	25 G/AC		
11. SANDEA	25 G/AC	131A	9A
PROWL H20	1 L/AC		
LSD (P <0.05)		20	3

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 Reflex, Prowl H20, and Sandea, and tank mixes of Reflex + Prowl H20, Reflex + Sandea and Sandea + Prowl H20. Treatments were compared to an untreated check and an industry standard of Dual II Magnum (0.4 l/ac)

None of the treatments caused commercially significant injury (injury was less than 10%), or reduced plant height. Reflex + Sandea gave excellent control of redroot pigweed, but overall, weed control was poor in the trial, due to low rainfall during the week after herbicide application.

Average fruit size and yield were not less than the untreated check in any herbicide treatments in the weed-free portion of the trial.

Trial 12: 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 29/10
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 12.1. 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 12.2. 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 12.3. 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 12.4. 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. 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 13: 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 29/10
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 13.1 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 13.2 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 13.3 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 #12) where weeds are killed at the cotyledon stage in coordination with field scouting.

Trial 14: Effect of Timing on Tolerance of Red Beet to Outlook

Objective: Determine the tolerance of red beet to PPI, PRE and POST applications of Outlook.

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: 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
APPLICATION DATE	May 28	Jun 1	Jun 11
TIME OF DAY	4:00PM	10:00AM	9:00AM
TIMING	PPI	PRE	POST
AIR TEMP (c)	31	23	20
RH (%)	54	52	79
WIND SPEED (KPH)	1	3	1
SOIL TEMP (c)	31	22	20
CLOUD COVER (%)	100	0	100
CROP STAGE	PPI	PRE	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 14.1 Red beet visual injury 7, 14 and 28 days after application of Outlook PPI, PRE or POST.

HERBICIDE	TIMING	RATE	VISUAL INJURY		
			7D	14D	28D
1. Check (WEED-FREE)			0B	0B	0A
2. OUTLOOK	PPI	0.42 L/AC	0B	0B	0A
3. OUTLOOK	PPI	0.84 L/AC	0B	0B	0A
4. OUTLOOK	PRE	0.42 L/AC	5A	1AB	0A
5. OUTLOOK	PRE	0.84 L/AC	6A	4A	0A
6. OUTLOOK	POST	0.42 L/AC	3AB	3AB	0A
7. OUTLOOK	POST	0.84 L/AC	5A	3AB	0A
LSD (P <0.05)			4	3	0

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

Table 14.2 Effect of herbicide treatment on red beet sugar and yield (by grade).

HERBICIDE	RATE		% SUGAR	YIELD (T/AC)		
				NO1	NO2	NO3
1. Check (WEED-FREE)			10A	2A	5A	21A
2. OUTLOOK	PPI	0.42 L/AC	10A	3A	7A	20A
3. OUTLOOK	PPI	0.84 L/AC	10A	4A	6A	18A
4. OUTLOOK	PRE	0.42 L/AC	10A	2A	5A	18A
5. OUTLOOK	PRE	0.84 L/AC	10A	2A	5A	16A
6. OUTLOOK	POST	0.42 L/AC	10A	3A	6A	20A
7. OUTLOOK	POST	0.84 L/AC	9A	2A	6A	21A
LSD (P <0.05)			1	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 tolerance of red beet to Outlook applied pre-plant incorporated, preemergence or postemergence. Outlook caused some injury (6% or less) at 7 and 14 DAE in the PRE and early POST treatments, but by 28 DAE, the injury was no longer evident. Despite this injury, sugar content and yield were not less than the untreated check at any of the herbicide timings or rates.

Trial 15: 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
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, 2010. 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-22-2010	Jun-3-2010
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 15.1. 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 15.2. 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 16: 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 rate: 50000 plants/ha
Row spacing: 45cm
Planting date: May 21
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, 2010. FERTILIZER WAS WORKED INTO GROUND 1.5 HOURS AFTER APPLICATION WITH S-TINE CULTIVATOR.

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

Application Information:

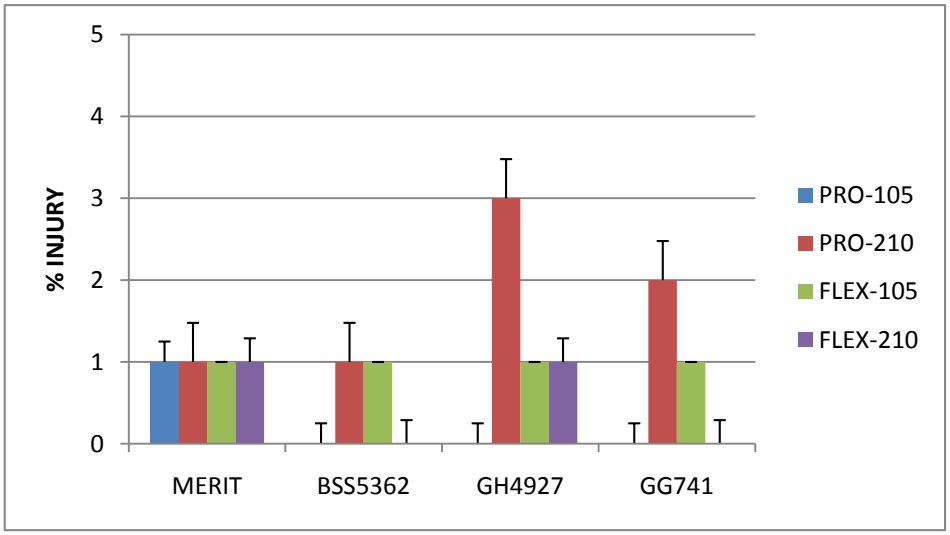
	A	
APPLICATION DATE	MAY 22	JUN 3
TIME OF DAY	6:20AM	9:30AM
TIMING	PRE	POST
AIR TEMP (c)	15	25
RH (%)	100	59
WIND SPEED (KPH)	6	4
SOIL TEMP (c)	17	27
CLOUD COVER (%)	100	100
CROP STAGE	PRE	3-4 LEAF

Spray Equipment:

Application Method: CO2 Backpack
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”)

Figure 16.1. 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)

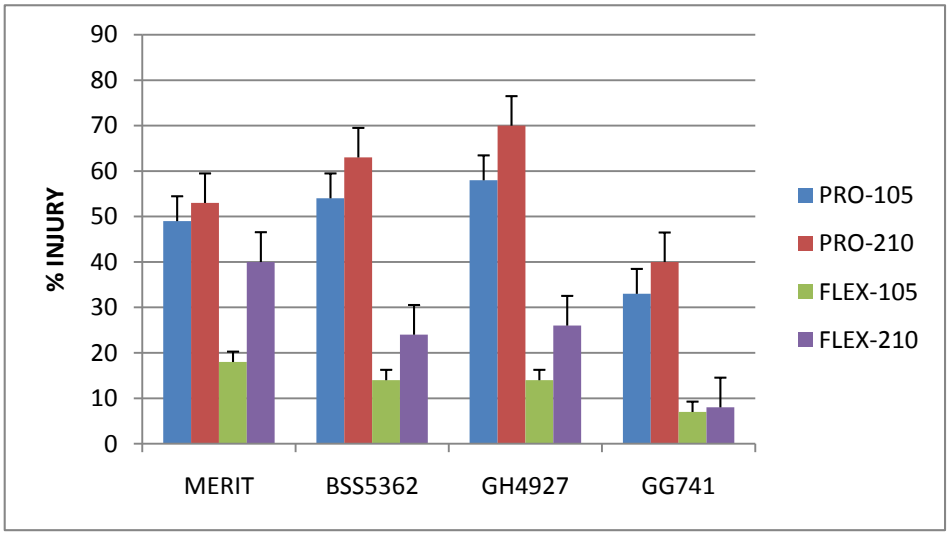
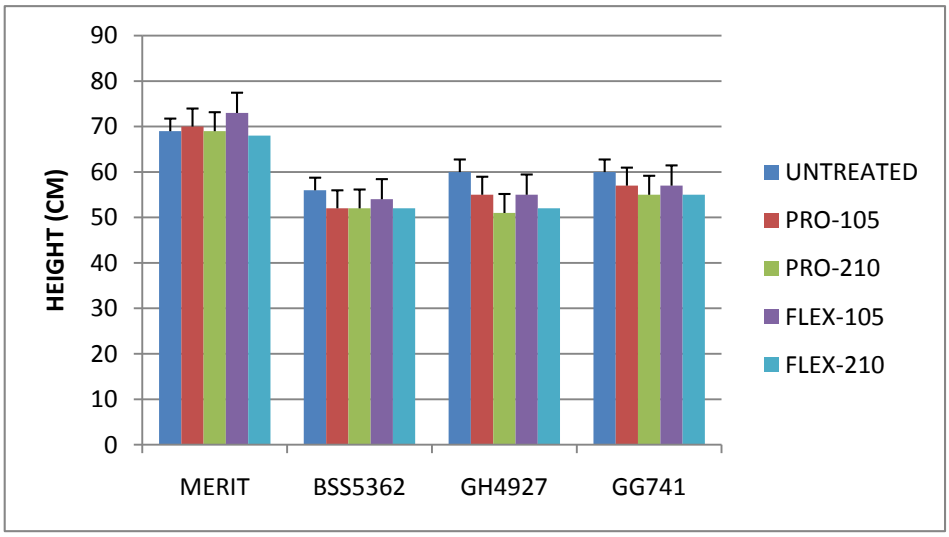


Table 16.2. Effect of Converge PRO and Converge FLEXX applied a) preemergence and b) postemergence to 'Merit', BSS5362, GG741, and GG741 sweet corn on height 21 days after application.

a)



b)

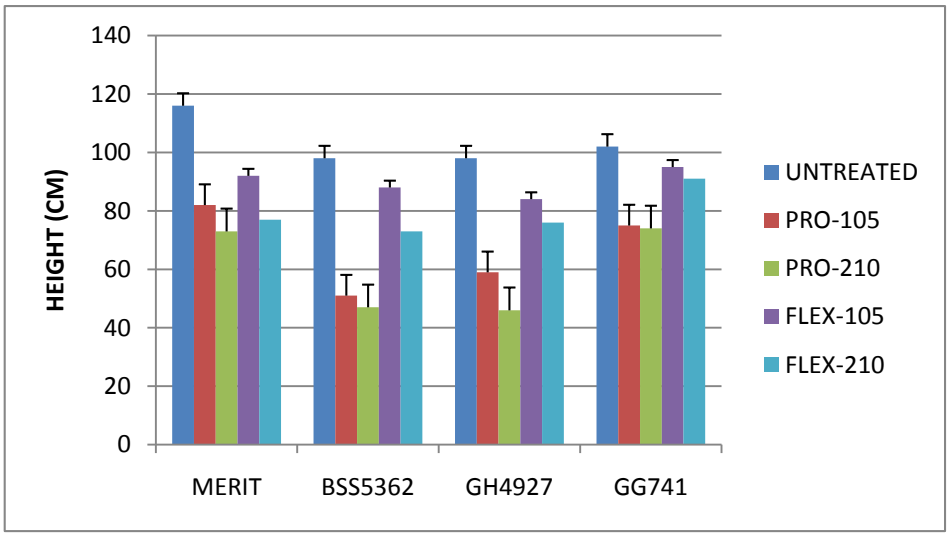
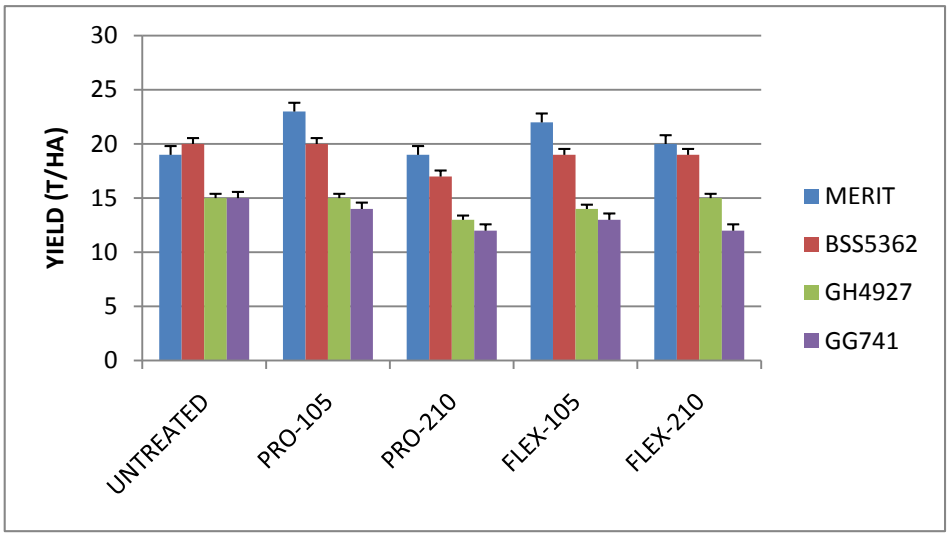
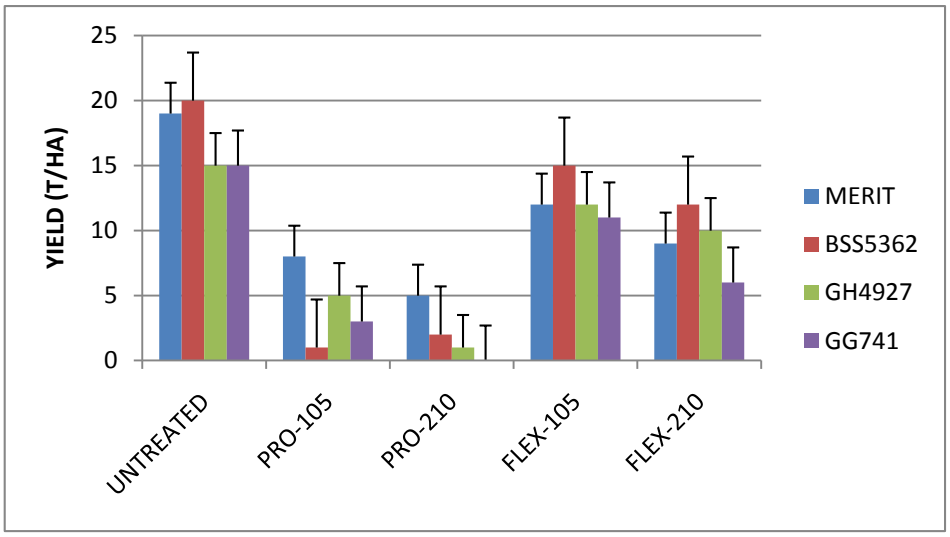


Table 16.3. Effect of Converge PRO and Converge FLEXX applied a) preemergence and b) postemergence to 'Merit', BSS5362, GG741, and GG741 sweet corn on marketable yield.

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 17: 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
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, 2010. 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 17.1. 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 18: 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
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, 2010. 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 18.1. 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 18.2. 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 19. 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
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 19.1. 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 + SANDEA	0.63 L/AC 25 G/AC	0B	0	0	10AB	62B
9. COMMAND + REFLEX	450 ML/AC 0.4 L/AC	0B	0	0	12A	77A
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 20. 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 date: May 26
Planting rate: 8333 seeds/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 20.1. 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.**