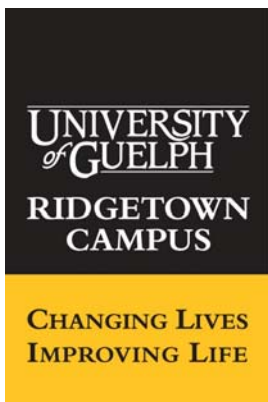


## **Weed Management in Sugar Beets: 2008 Research Results**

Prepared for the

Ontario Sugar Beet Growers' Association



Darren Robinson

University of Guelph

Ridgetown Campus,

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## EXECUTIVE SUMMARY

The registration of glyphosate-tolerant sugar beets provides growers with an effective weed control option that is much simpler to use than conventional herbicides that rely on split- or micro-rate applications. However, there are still questions regarding the potential utility of the RR-system, specifically on tank-mixing glyphosate (Weathermax) with fungicides to reduce the number of passes over a field. The first objective of this research was to determine whether Weathermax can be safely applied in a tank-mix with Quadris, Headline, Eminent and Proline and still obtain acceptable weed control. Since herbicides and fungicides may be applied at different pressures, water volumes and spray pressures than one another, we conducted three studies to examine each of these factors, when Weathermax was applied alone, or with each of the four fungicides mentioned above.

### **The two take home messages of this research are:**

- Quadris, Headline, Eminent and Proline did not antagonize Weathermax (667 ml/ac – applied just prior to row closure), nor did they cause injury when tank-mixed with Weathermax with either nozzle type (air induction or hollow cone), water volume (10 or 20 gallon/acre) or spray pressure (30 or 80 PSI).
- Nozzle type, water volume and spray pressure did not reduce weed control when the various fungicides were tank-mixed with Weathermax.

One concern that RR-sugar beet growers face is control of volunteer RR-corn. To meet this objective, research was conducted to determine whether Weathermax can be safely tank-mixed with Assure II and still obtain acceptable control. Volunteer RR-corn seed was spread over the entire trial area, planted to sugar beet, and Assure II alone, Weathermax alone, and the tank-mix of Assure II + Weathermax was applied once the corn reached the 3-4 leaf stage.

### **The two take home messages of this research are:**

- The tank-mix of Assure II + Weathermax did not injure RR-sugar beet (as seen in both injury ratings and in yield).
- The tank mix of Assure II + Weathermax effectively controlled volunteer RR-corn.

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## TRIAL 1: EFFECT OF NOZZLE TYPE ON EFFICACY OF WEATHERMAX-FUNGICIDE TANK MIXES

**Objective:** Compare AI to Hollow Cone nozzles for weed control and tolerance of sugar beet to applications of Weathermax with Quadris, Headline, Eminent and Proline.

### Materials & Methods:

Variety: Crystal RR827  
Planting rate: 59355 seeds/ha  
Row spacing: 30"

Planting date: April 30  
Depth: 1"  
Plant spacing: 4.2"

**Design:** Randomized Complete Block Design  
Plot width: 6'  
Reps: 4

Plot length: 30'

### Soil Description:

Sand: 49%  
Silt: 34%  
Clay: 17%

OM: 5.9%  
pH: 7.2  
CEC 20

### Application Information:

APPLICATION DATE	A
TIME OF DAY	JUL 4
TIMING	1:00 PM
AIR TEMP (c)	POST
RH (%)	27
WIND SPEED (KPH)	29
CLOUD COVER (%)	3
CROP STAGE	10
	PRIOR TO ROW CLOSURE

### Spray Equipment:

Application Method: CO2 Backpack  
Nozzle Type: AI OR HOLLOW CONE  
Spray Volume: 20 GAL/AC

Pressure: 80 PSI  
Nozzle Spacing: 20"  
Boom Width: 60"

**Table 1.1. Effect of nozzle type, Weathermax (667 ml/ac) and fungicide on sugar beet visual injury 14 days after application and sugar beet yield.**

<b>NOZZLE TYPE</b>	<b>HERBICIDE</b>	<b>FUNGICIDE</b>	<b>VISUAL INJURY</b>	<b>% WEED</b>	<b>TOTAL YIELD</b>
			<b>%</b>	<b>CONTROL</b>	<b>T/AC</b>
1. AI	NONE	NONE	0A	0A	13.2A
2. AI	WEATHERMAX	NONE	0A	97B	31.8B
3. AI	WEATHERMAX	QUADRIS	0A	98B	31.7B
4. AI	WEATHERMAX	HEADLINE	0A	96B	31.6B
5. AI	WEATHERMAX	EMINENT	0A	97B	34.0B
6. AI	WEATHERMAX	PROLINE	0A	96B	35.8B
7. HOLLOW CONE	NONE	NONE	0A	0A	13.2A
8. HOLLOW CONE	WEATHERMAX	NONE	0A	97B	32.0B
9. HOLLOW CONE	WEATHERMAX	QUADRIS	0A	98B	32.0B
10. HOLLOW CONE	WEATHERMAX	HEADLINE	0A	97B	32.3B
11. HOLLOW CONE	WEATHERMAX	EMINENT	0A	96B	35.1B
12. HOLLOW CONE	WEATHERMAX	PROLINE	0A	98B	32.9B
LSD (P <0.05)			0	12	3.9

**Conclusions:**

The purpose of this experiment was to determine the effect of nozzle type on weed control and tolerance of sugar beet to Weathermax (667 ml/ac) applied alone or in tank mix with Quadris, Headline, Eminent and Proline immediately prior to row closure in sugar beets.

There was no visual injury in sugar beet, and the addition of a fungicide to Weathermax did not reduce weed control or yield in either the AI or Hollow Cone nozzle treatments.

## TRIAL 2: EFFECT OF SPRAY PRESSURE ON EFFICACY OF WEATHERMAX-FUNGICIDE TANK MIXES

**Objective:** Compare weed control and tolerance of sugar beet to applications of Weathermax with Quadris, Headline, Eminent and Proline, applied at 30 or 80 PSI pressure.

### Materials & Methods:

Variety: Crystal RR827

Planting rate: 59355 seeds/ha

Row spacing: 30"

Planting date: April 30

Depth: 1"

Plant spacing: 4.2"

**Design:** Randomized Complete Block Design

Plot width: 6'

Reps: 4

Plot length: 30'

### Soil Description:

Sand: 49%

Silt: 34%

Clay: 17%

OM: 5.9%

pH: 7.2

CEC 20

### Application Information:

APPLICATION DATE	A
TIME OF DAY	JUL 4
TIMING	1:00 PM
AIR TEMP (c)	POST
RH (%)	27
WIND SPEED (KPH)	29
CLOUD COVER (%)	3
CROP STAGE	10
	PRIOR TO ROW CLOSURE

### Spray Equipment:

Application Method: CO2 Backpack

Nozzle Type: AI

Spray Volume: 20 GAL/AC

Pressure: 30 or 80 PSI

Nozzle Spacing: 20"

Boom Width: 60"

**Table 2.1. Effect of spray pressure, Weathermax (667 ml/ac) and fungicide on sugar beet visual injury 14 days after application and sugar beet yield.**

	SPRAY PRESSURE	HERBICIDE	FUNGICIDE	VISUAL INJURY	% WEED	TOTAL YIELD
	PSI			%	CONTROL	T/AC
1.	30	NONE	NONE	0A	0A	12.2A
2.	30	WEATHERMAX	NONE	0A	98B	28.8B
3.	30	WEATHERMAX	QUADRIS	0A	96B	29.6B
4.	30	WEATHERMAX	HEADLINE	0A	96B	27.7B
5.	30	WEATHERMAX	EMINENT	0A	98B	29.1B
6.	30	WEATHERMAX	PROLINE	0A	97B	28.5B
7.	80	NONE	NONE	0A	0A	13.5A
8.	80	WEATHERMAX	NONE	0A	96B	29.9B
9.	80	WEATHERMAX	QUADRIS	0A	99B	29.0B
10.	80	WEATHERMAX	HEADLINE	0A	96B	31.2B
11.	80	WEATHERMAX	EMINENT	0A	97B	30.9B
12.	80	WEATHERMAX	PROLINE	0A	98B	29.2B
LSD (P <0.05)				0	13	4.1

**Conclusions:**

The purpose of this experiment was to determine the effect of spray pressure on weed control and tolerance of sugar beet to Weathermax (667 ml/ac) applied alone or in tank mix with Quadris, Headline, Eminent and Proline immediately prior to row closure in sugar beets.

There was no visual injury in sugar beet, and the addition of a fungicide to Weathermax did not reduce weed control or yield in either the 30 or 80 PSI spray pressure treatments.

## **TRIAL 3: EFFECT OF WATER VOLUME ON EFFICACY OF WEATHERMAX-FUNGICIDE TANK MIXES**

**Objective:** Compare weed control and tolerance of sugar beet to applications of Weathermax with Quadris, Headline, Eminent and Proline, applied at 10 or 20 gal/ac water volume.

### **Materials & Methods:**

Variety: Crystal RR827

Planting rate: 59355 seeds/ha

Row spacing: 30"

Planting date: April 30

Depth: 1"

Plant spacing: 4.2"

**Design:** Randomized Complete Block Design

Plot width: 6'

Reps: 4

Plot length: 30'

### **Soil Description:**

Sand: 49%

Silt: 34%

Clay: 17%

OM: 5.9%

pH: 7.2

CEC 20

### **Application Information:**

APPLICATION DATE	A
TIME OF DAY	JUL 4
TIMING	1:00 PM
AIR TEMP (c)	POST
RH (%)	27
WIND SPEED (KPH)	29
CLOUD COVER (%)	3
CROP STAGE	10
	PRIOR TO ROW CLOSURE

### **Spray Equipment:**

Application Method: CO2 Backpack

Nozzle Type: AI

Spray Volume: 10 or 20 GAL/AC

Pressure: 80 PSI

Nozzle Spacing: 20"

Boom Width: 60"



**Table 3.1. Effect of water volume, Weathermax (667 ml/ac) and fungicide on sugar beet visual injury 14 days after application and sugar beet yield.**

	<b>WATER VOLUME</b>	<b>HERBICIDE</b>	<b>FUNGICIDE</b>	<b>VISUAL INJURY</b>	<b>% WEED</b>	<b>TOTAL YIELD</b>
	<b>GA/AC</b>			<b>%</b>	<b>CONTROL</b>	<b>T/AC</b>
1.	10	NONE	NONE	0A	0A	10.7A
2.	10	WEATHERMAX	NONE	0A	97B	31.6B
3.	10	WEATHERMAX	QUADRIS	0A	98B	30.4B
4.	10	WEATHERMAX	HEADLINE	0A	96B	28.9B
5.	10	WEATHERMAX	EMINENT	0A	97B	30.6B
6.	10	WEATHERMAX	PROLINE	0A	96B	27.4B
7.	20	NONE	NONE	0A	0A	12.5A
8.	20	WEATHERMAX	NONE	0A	97B	31.8B
9.	20	WEATHERMAX	QUADRIS	0A	98B	32.6B
10.	20	WEATHERMAX	HEADLINE	0A	97B	33.6B
11.	20	WEATHERMAX	EMINENT	0A	96B	30.2B
12.	20	WEATHERMAX	PROLINE	0A	98B	31.2B
LSD (P <0.05)				0	11	4.6

**Conclusions:**

The purpose of this experiment was to determine the effect of water volume on weed control and tolerance of sugar beet to Weathermax (667 ml/ac) applied alone or in tank mix with Quadris, Headline, Eminent and Proline immediately prior to row closure in sugar beets.

There was no visual injury in sugar beet, and the addition of a fungicide to Weathermax did not reduce weed control or yield in either the 10 or 20 gallon/acre water volume treatments.

## TRIAL 4: CONTROL OF VOLUNTEER RR-CORN IN RR-SUGAR BEETS

**Objective:** Determine whether volunteer RR-corn control and tolerance of sugar beet are reduced by tank mixing Assure II with Weathermax.

### Materials & Methods:

Variety: Crystal RR827

Planting rate: 59355 seeds/ha

Row spacing: 30"

Planting date: April 30

Depth: 1"

Plant spacing: 4.2"

**Design:** Randomized Complete Block Design

Plot width: 6'

Reps: 4

Plot length: 30'

### Soil Description:

Sand: 49%

Silt: 34%

Clay: 17%

OM: 5.9%

pH: 7.2

CEC 20

### Application Information:

	A
APPLICATION DATE	JUN 24
TIME OF DAY	10:00 AM
TIMING	POST
AIR TEMP (c)	27
RH (%)	29
WIND SPEED (KPH)	3
CLOUD COVER (%)	10
CROP STAGE	8 LEAF

### Spray Equipment:

Application Method: CO2 Backpack

Nozzle Type: AI

Spray Volume: 20 GAL/AC

Pressure: 80 PSI

Nozzle Spacing: 20"

Boom Width: 60"

**Table 4.1. Effect of tank-mixing Assure II with Weathermax on sugar beet visual injury, volunteer RR-corn control and sugar beet yield.**

HERBICIDE TREATMENT	VISUAL INJURY %	% WEED CONTROL	TOTAL YIELD T/AC
1. UNTREATED	0A	0B	12.6B
2. WEATHERMAX (667 ML/AC)	0A	0B	18.6AB
3. ASSURE II (100 ML/AC) + SUREMIX (0.5% V/V)	0A	93A	23.9A
4. WEATHERMAX (667 ML/AC) + ASSURE II (100 ML/AC) + SUREMIX (0.5% V/V)	0A	95A	26.4A
5. WEATHERMAX (1334 ML/AC) + ASSURE II (200 ML/AC) + SUREMIX (1.0% V/V)	0A	95A	26.8A
LSD (P <0.05)	0	3	7.4

**Conclusions:**

The purpose of this experiment was to determine the effect of tank mixing Assure II with Weathermax to control volunteer RR-corn in RR-sugar beet on weed control and tolerance of sugar beet.

Tank mixing Assure II with Weathermax did not injure sugar beets. Volunteer RR corn control and sugar beet yield were not reduced by tank-mixing Weathermax with Assure II.