

WEED CONTROL IN TOMATOES

RESEARCH RESULTS – 2008

**PREPARED BY DARREN ROBINSON,
RIDGETOWN COLLEGE**

**FOR THE ONTARIO TOMATO
RESEARCH INSTITUTE**

NOVEMBER 3, 2008

EXECUTIVE SUMMARY – WEED CONTROL IN TOMATOES (2008)

BY: DARREN ROBINSON, RIDGETOWN COLLEGE

Tolerance of Tomatoes to PRE Applications of Reflex

Reflex did not injure tomato and did not cause a reduction in plant biomass or yield. Reflex gave excellent control of redroot pigweed, but poor control of lamb's-quarters, lady's thumb and eastern black nightshade. As a result of weed interference, yields were less in the untreated check than in treated plots.

Tolerance of Eight Tomato Varieties to Rimsulfuron (Prism)

Prism applied at 40 or 80 g/ac did not injure any of the tomato varieties tested, nor did it reduce plant dry weight or marketable yield. Some Pinnacle-sensitive varieties (T900 and H9909) were included in the trial, none of which were injured.

Tolerance of Processing Tomato Varieties to Pinnacle

Pinnacle injured H2206, H2306, H3907, H4707, H5007 and reduced yield of H2306, H3907, H4707 and H5007.

Control of Triazine- Tolerant Lambsquarters with Increased Rates of Prism

Increased rates of Prism (from 24 to 40 g/ac) were applied in on-farm trials to determine their effectiveness on triazine-tolerant lambsquarters at the 3-4 leaf stage. In all cases, increasing Prism rates improved efficacy to greater than 80%.

Control of Hairy Nightshade with Increased Rates of Prism

Increased rates of Prism (from 24 to 40 g/ac) were applied in on-farm trials to determine their effectiveness on hairy nightshade at the 3-4 leaf stage. Increasing Prism rates improved efficacy to greater than 90%.

ACKNOWLEDGEMENTS

Purpose Of This Report

This report is provided as a guide to the 2008 tomato weed control research control plots. The experiments outlined in this booklet are located at Ridgetown College. We appreciate the funding, cooperation and assistance provided by the Ontario Tomato Research Institute (tomato growers and processing companies). 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 2008 research program was provided by:

Ontario Tomato Research Institute
Agchemical Companies

Ontario Food Processors Association
Agriculture & Agri-Food Canada

Technical Assistants

Research Technician
Kristen McNaughton

Research Assistants
Mark Beenackers
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 College, University of Guelph
Ridgetown, Ontario
NOP 2C0
(519) 674-1604
drobinso@ridgetownc.uogelph.ca

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Trial 1: Tolerance of Tomatoes to Preemergence Applications of Reflex

Objectives:

1. Determine the efficacy and tolerance of tomato to Reflex applied PRE-T.

Materials & Methods:

Crop: Tomato

Variety: H9909

Planting rate: 14850 plants/ha

Row spacing: 1.5m

Planting date: May 22

Depth: 5 cm

Plant spacing: 45 cm

Design: Randomized Complete Block Design

Plot width: 1.5m

Plot length: 10m

Reps: 4

Field Preparation: Field was worked with an S-tine cultivator and fertilizer was applied at 190 kg N/ha on May 6.

Soil Description:

Sand: 49%

Silt: 30%

Clay: 21%

OM: 5.8%

pH: 5.8

CEC 14

Texture: Loam

Soil: Watford/Brady

Application Information:

APPLICATION DATE	A
TIME OF DAY	MAY 22
TIMING	6:30AM
AIR TEMP (c)	PRE-T
RH (%)	7
WIND SPEED (KPH)	98
SOIL TEMP (c)	8
CLOUD COVER (%)	9
CROP STAGE	100
	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 1.1. Effect of herbicide treatment on tomato visual injury 7, 14 and 28 days after planting, plant dry weight 28 days after planting, and yield.

HERBICIDE	RATE	VISUAL INJURY			DRY WT	YIELD
		7D	14D	28D	G	T/AC
1. Check (WEEDFREE)		0A	0A	0A	35A	23.9A
2. REFLEX	400 ML/AC	0A	2A	1A	43A	23.7A
3. REFLEX	800 ML/AC	0A	2A	2A	39A	29.0A
LSD (P <0.05)		2	3	6	9	12.0

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

Table 1.2. Effect of herbicide treatment on redroot pigweed (AMARE), lamb's-quarters (CHEAL), lady's thumb (POLPE) and eastern black nightshade (SOLPT) control 56 days after application.

HERBICIDE	RATE	AMARE	CHEAL	POLPE	SOLPT
1. Check (WEEDFREE)		0B	0B	0B	0B
2. REFLEX	400 ML/AC	86A	25B	34A	50A
3. RELFLEX	800 ML/AC	98A	71A	46A	58A
LSD (P <0.05)		13	29	30	22

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 tomato to pre-transplant applications of Reflex. Reflex did not injure tomato and did not cause a reduction in plant biomass or yield. Reflex gave excellent control of redroot pigweed, but poor control of lamb's-quarters, lady's thumb and eastern black nightshade. As a result of weed interference, yields were less in the untreated check than in treated plots.

Trial 2: Tolerance of Eight Tomato Varieties to Rimsulfuron (Prism)

Objective: Determine the tolerance of eight varieties of tomato to Prism at 40 and 80 g/ac, to support an URMULE submission to increase the current Prism rate for control of triazine-tolerant lamb's-quarters.

Materials & Methods:

Crop: Tomato

Variety: various

Planting rate: 14850 plants/ha

Row spacing: 1.5m

Planting date: May 23

Depth: 5 cm

Plant spacing: 45 cm

Design: Randomized Complete Block Design

Plot width: 1.5m

Plot length: 10m

Reps: 4

Field Preparation: Field was worked with an S-tine cultivator and fertilizer was applied at 190 kg N/ha on May 6.

Soil Description:

Sand: 49%

Silt: 30%

Clay: 21%

OM: 5.8%

pH: 5.8

CEC 14

Texture: Loam

Soil: Watford/Brady

Application Information:

	A
APPLICATION DATE	JUN 18
TIME OF DAY	7:00PM
TIMING	28DAT
AIR TEMP (c)	16
RH (%)	88
WIND SPEED (KPH)	4
SOIL TEMP (c)	21
CLOUD COVER (%)	100
CROP STAGE	6-10 LF

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 2.1. Effect of tomato variety and Prism rate on visual injury in tomatoes 7, 14 and 28 days after treatment.

Variety	PRISM RATE (G/AC)	VISUAL INJURY (D AFTER TREATMENT)		
		7D	14D	28D
H9909	40	4B	1	0B
	80	9A	2	2A
CC337	40	2B	1	0B
	80	5A	0	0B
T900	40	4B	3	2A
	80	6A	3	3A
CC390	40	7A	1	0B
	80	11A	4	5A
SUNCHIEF	40	7A	2	1B
	80	13A	3	5A
FLORIDA47	40	5A	2	1B
	80	5A	3	3A
MTN FRESH	40	4A	2	0B
	80	5A	1	1A
SUNOMA	40	4A	1	0B
	80	5A	3	1A
LSD (P <0.05)		3	NS	2

Table 2.2. Effect of tomato variety and Prism rate on plant dry weight at 28 days after transplanting and marketable yield in tomatoes.

Variety	PRISM RATE (G/AC)	DRY WT (G)	YIELD (T/AC)
H9909	0	847	29
	40	738	26
	80	766	30
CC337	0	574	35
	40	565	35
	80	587	34
T900	0	554	36
	40	522	30
	80	442	38
CC390	0	493	32
	40	479	33
	80	545	34
SUNCHIEF	0	713	30
	40	794	28
	80	617	28
FLORIDA47	0	520	27
	40	530	27
	80	574	30
MTN FRESH	0	695	28
	40	753	30
	80	650	30
SUNOMA	0	593	25
	40	650	27
	80	576	27
LSD (P <0.05)		NS	NS

Note: Means followed by the same letter are not significantly different.

Conclusions:

Temporary chlorosis was observed in many varieties, particularly CC390 and Sunchief, particularly at the high rate of Prism. However, Prism did not reduce plant dry weight or marketable yield. Some Pinnacle-sensitive varieties (T900 and H9909) were included in the trial, none of which were injured.

Trial 3: Tolerance of Processing Tomato Varieties to Pinnacle

Objective: Determine the tolerance of several tomato varieties to Pinnacle.

Materials & Methods:

Materials & Methods:

Crop: Tomato

Variety: various

Planting rate: 14850 plants/ha

Row spacing: 1.5m

Planting date: May 23

Depth: 5 cm

Plant spacing: 45 cm

Design: Randomized Complete Block Design

Plot width: 1.5m

Plot length: 10m

Reps: 4

Field Preparation: Field was worked with an S-tine cultivator and fertilizer was applied at 190 kg N/ha on May 6.

Soil Description:

Sand: 49%

Silt: 30%

Clay: 21%

OM: 5.8%

pH: 5.8

CEC 14

Texture: Loam

Soil: Watford/Brady

Application Information:

APPLICATION DATE	A JUN 18
TIME OF DAY	7:00PM
TIMING	28DAT
AIR TEMP (c)	16
RH (%)	88
WIND SPEED (KPH)	4
SOIL TEMP (c)	21
CLOUD COVER (%)	100
CROP STAGE	6-10 LF

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 3.1. Effect of tomato variety and time of Pinnacle (6.4 G/AC) application on visual injury in tomatoes 7, 14 and 28 days after treatment.

Variety	VISUAL INJURY (D AFTER TREATMENT)		
	7D	14D	28D
H9553	9	2	8
H2306 *	43	40	38
H5108 *	45	35	38
H5208 *	40	30	29
H5408 *	33	30	28
H9909	8	0	4
LSD (P <0.05)	4	8	5

* ASTERISK INDICATES VARIETY IS SENSITIVE TO PINNACLE.

Table 3.2. Effect of tomato variety and time of Pinnacle (6.4 G/AC) application on red and green yield.

Variety	PINNACLE RATE (G/AC)	YIELD (T/AC)	
		RED	GREEN
H9553	0	44	2
	6	45	4
H2306	0	36	4
	6	22	13
H5108	0	32	5
	6	21	10
H5208	0	32	3
	6	19	8
H5408	0	33	4
	6	26	7
H9909	0	29	4
	6	33	5
LSD (P <0.05)		8	4

Conclusions:

Pinnacle injured H2306, H5108, H5208, and H5408, and reduced yield and delayed maturity of each of these varieties. H9553 and H9909 were tolerant to Pinnacle.

Trial 4: Control of Triazine-Tolerant Lamb's-quarters with Increased Rates of Prism - I

Objective: Determine triazine-tolerant lambsquarters control when Prism rate is increased to 40 g/ac.

Materials & Methods:

Crop: Tomato

Variety: H8204

Planting rate: 14850 plants/ha

Row spacing: 1.5m

Planting date: May 30

Depth: 5 cm

Plant spacing: 45 cm

Design: Randomized Complete Block Design

Plot width: 1.5m

Plot length: 10m

Reps: 4

Application Information:

APPLICATION DATE	A MAY 17
TIME OF DAY	8:45 AM
TIMING	21 DAYS POST-T
AIR TEMP (c)	13
RH (%)	74
WIND SPEED (KPH)	8
SOIL TEMP (c)	18
CLOUD COVER (%)	85
CROP STAGE	4-7 LF
WEED STAGE	3-4 LF

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 4.1. Effect of herbicide application on tomato visual injury and control of triazine-tolerant lambsquarters.

TREATMENT	VISUAL INJURY			CONTROL
	7D	14D	28D	
1. UNTREATED	0A	0A	0A	0C
2. PRISM 24G/AC	0A	0A	0A	61B
3. PRISM 40 G/AC	0A	0A	1A	81A
4. SENCOR 120 G/AC	0A	0A	4A	0C
LSD (P <0.05)	NS	NS	4	4

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

Conclusions:

Tomato was not injured by the increased rate of Prism. Increasing the rate of Prism from 24 to 40 g/ac increased control of lamb's-quarters from 61 to 81%. Metribuzin did not control common lambsquarters.

Trial 5: Control of Triazine-Tolerant Lamb's-quarters with Increased Rates of Prism - II

Objective: Determine triazine-tolerant lambsquarters control when Prism rate is increased to 40 g/ac.

Materials & Methods:

Crop: Tomato

Variety: H8204

Planting rate: 14850 plants/ha

Row spacing: 1.5m

Planting date: May 29

Depth: 5 cm

Plant spacing: 45 cm

Design: Randomized Complete Block Design

Plot width: 1.5m

Plot length: 10m

Reps: 4

Application Information:

APPLICATION DATE	A MAY 17
TIME OF DAY	7:45 PM
TIMING	21 DAYS POST-T
AIR TEMP (c)	17
RH (%)	73
WIND SPEED (KPH)	8
SOIL TEMP (c)	18
CLOUD COVER (%)	100
CROP STAGE	5-8 LF
WEED STAGE	3-4 LF

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 application on tomato visual injury and control of triazine-tolerant lambsquarters.

TREATMENT	VISUAL INJURY			CONTROL
	7D	14D	28D	
1. UNTREATED	0A	0A	0A	0C
2. PRISM 24G/AC	0A	0A	0A	64A
3. PRISM 40 G/AC	0A	0A	0A	91A
4. SENCOR 120 G/AC	0A	0A	0A	35B
LSD (P <0.05)	NS	NS	NS	25

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

Conclusions:

Tomato was not injured by the increased rate of Prism. Increasing the rate of Prism from 24 to 40 g/ac increased control of lamb's-quarters, and was more efficacious than metribuzin, which only provided 41% control.

Trial 6: Control of Hairy Nightshade with Increased Rates of Prism

Objective: Determine hairy nightshade control when Prism rate is increased to 40 g/ac.

Materials & Methods:

Crop: Tomato

Variety: TSH18

Planting rate: 14850 plants/ha

Row spacing: 1.5m

Planting date: May 24

Depth: 5 cm

Plant spacing: 45 cm

Design: Randomized Complete Block Design

Plot width: 1.5m

Plot length: 10m

Reps: 4

Application Information:

APPLICATION DATE	A JUNE 11
TIME OF DAY	2:30 PM
TIMING	21 DAYS POST-T
AIR TEMP (c)	28
RH (%)	76
WIND SPEED (KPH)	6
SOIL TEMP (c)	35
CLOUD COVER (%)	10
CROP STAGE	6-9 LF
WEED STAGE	3-4 LF

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 application on tomato visual injury and control of hairy nightshade.

TREATMENT	VISUAL INJURY			CONTROL
	7D	14D	28D	
1. UNTREATED	0A	0A	0A	0B
2. PRISM 24G/AC	0A	0A	0A	64A
3. PRISM 40 G/AC	0A	0A	0A	90A
4. SENCOR 120 G/AC	0A	0A	0A	10B
LSD (P <0.05)	NS	NS	NS	14

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

Conclusions:

Increasing the rate of Prism from 24 to 40 g a/ac increased control of hairy nightshade, and was more efficacious than Sencor, which only provided 10% control. None of the treatments caused visual injury to tomato.