2012 Processing Tomato Research Report

Dr. Robert Nurse

AAFC, Harrow

FOREWORD

The information contained in this report is a summary of the 2012 tomato weed research conducted at the Greenhouse and Processing Crops Research Centre (GPCRC) of Agriculture and Agri-Food Canada. Included are summaries of site description variables, treatment lists outlining chemicals, rates, and timing of application as well as crop injury ratings, weed control ratings, and marketable crop yields.

Tomato transplanting went well in 2012. The trials received adequate precipitation within the first 2 weeks after herbicides were applied. This allowed for proper activation/movement through the soil profile of any pre-emergence herbicides.

Information regarding methods is summarized for each experiment. Any additional information required will be provided upon request. Weed ratings and crop injury are based on a 0 - 100 linear scale, where 0 represents no injury and 100 represents plant death. Individual weed species control was measure through destructive biomass collection and density counts.

Statistical analyses were conducted on crop injury, weed control ratings, and yield for each experiment where applicable. The least significant difference (LSD) was calculated whenever the F-test was significant at the 5% level.

Acknowledgment and thanks are extended to the chemical companies and producer organizations -specifically their representatives for supplying material, tomato transplants, and in-kind support. The Ontario Tomato Research Institute through The Ontario Processing Vegetable Growers are thanked for their financial assistance.

A sincere note of appreciation is extended to the technicians and summer students, whose willingness and hard work have enabled the collection of these data and the assembly of this report.

It is requested that data **NOT BE PUBLISHED** or used for extension purposes without prior consent from the author. The information in this report is primarily one year's data and constitutes neither a recommendation nor an endorsement.

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Executive Summary

The tomato variety H9553 was used in all trials.

Trial 1 – **Evaluation of new herbicides for use in processing tomatoes.**

The herbicides tested were Reflex (0.4 and 0.8 L/ac PRE), Eragon (7.2, 14.5, and29 g/ac PRE), and Prowl H2O (0.9 and 1.8 L/ac PRE and POST). The trial was kept weed-free so that crop tolerance could be accurately assessed. Visual injury symptoms from all treatments were minor. Eragon did show some injury (15%) at the highest rate which reduced tomato biomass but not yield. Yield in the untreated control averaged 48 Ton/ac and did not differ from yields in any of the herbicide treatments.

Trial 2 – **Annual grass herbicide-fungicide tankmix evaluations**.

In this trial grass herbicides were tank-mixed with several fungicides to determine if there was antagonism/synergism to weed control and any crop tolerance concerns. The grass herbicides tested were Excel Super (0.271 L/ac), Venture L (0.243 L/ac), and Poast Ultra (0.126 L/ac). The fungicides tested were Kocide 2000, Quadris, and Cabrio. Average yields in the weed-free control and herbicide only controls averaged 36 Ton/ac. Weed control was not compromised when the herbicides were tank-mixed with the fungicides and when the herbicide except there was a decrease in crabgrass control and tomato yield when Poast was tankmixed with Kocide.

Trial 3 – **Annual grass herbicide-insecticide tankmix evaluations**.

In this trial grass herbicides were tank-mixed with several fungicides to determine if there was antagonism/synergism to weed control and any crop tolerance concerns. The grass herbicides tested were Excel Super (0.271 L/ac), Venture L (0.243 L/ac), and Poast Ultra (0.126 L/ac). The insecticides tested were Admire and Matador. Average yields in the weed-free control and herbicide only controls averaged 30 Ton/ac. Weed control was not compromised when the herbicides were tank-mixed with the insecticides except for crabgrass and barnyardgrass control when Excel Super was tank-mixed with either insecticide. A direct comparison between herbicide only treatments and the appropriate tank-mix treatments showed no differences in yield.

Trial 4 – **The effect of copper fungicides with and without Dithane on Prism efficacy.**

The efficacy of Prism was tested when tankmixed with Parasol, or Kocide 2000 with and without Dithane. Average yields in the weed-free control were 45 Ton/ac. Weed control and yield did not differ among treatments.

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Trial 1 - Tolerance of processing tomatoes to new herbicides.

Location: Harrow G2

Trt No.	Treatment Name	Form Conc	Form Type	Lot Code	Rate	Rate Unit	Product Rate	Product Rate Unit	Grow Stg	Appl Code
1	Check, Weed-Free									
2	Reflex	240	SL	Syngenta	0.24	kg ai/ha	0.405	l/a	PRETRANS	A
3	Reflex	240	SL	Syngenta	0.48	kg ai/ha	0.81	l/a	PRETRANS	A
4	Eragon	70	WG	BASF	0.0125	kg ai/ha	7.2	g/a	PRETRANS	A
5	Eragon	70	WG	BASF	0.025	kg ai/ha	14.5	g/a	PRETRANS	A
6	Eragon	70	WG	BASF	0.05	kg ai/ha	29	g/a	PRETRANS	A
7	Prowl H20	455	SL	BASF	1	kg ai/ha	0.89	l/a	PRETRANS	A
8	Prowl H20	455	SL	BASF	2	kg ai/ha	1.78	l/a	PRETRANS	A
9	Prowl H20	455	SL	BASF	1	kg ai/ha	0.89	l/a	5CM WEED	B
10	Prowl H20	455	SL	BASF	2	kg ai/ha	1.78	l/a	5CM WEED	B

Replications: 4, Design: Randomized Complete Block (RCB), Treatment units: Treated 'Plot' size, Dry Form. Unit: %, Treated 'Plot' size Width: 1.5 meters, Treated 'Plot' size Length: 8 meters, Application volume: 222 L/ha, Mix size: 1.2 liters, Mix overage: 12.5%, Format definitions: G-Herb99.def, G-HERB99.frm

* 'Per area' calculations based on spray volume= 222 L/ha, mix size= 1.2 liters (mix size basis).

Crop 1: LYPES TOMATO **Variety:** H9553
Planting Date: May-31-2012 **Planting Method:** TRANSPLANTED - MACHINE
Rate: 30000 S/H
Row Spacing: 1.5 M

SITE AND DESIGN

Plot Width, Unit: 1.5 m **Plot Length, Unit:** 8 m **Reps:** 4
Tillage Type: CONVENTIONAL-TILL **Study Design:** RACOBL

	Previous Crops	Year
1.	Red clover	2011

SOIL DESCRIPTION

% Sand: 82.5 **% OM:** 2.0 **Texture:** FOX SANDY LOAM
% Silt: 5.0 **pH:** 6.1 **Soil Name:** Hapludalf subgroup
% Clay: 12.5

MOISTURE CONDITIONS

	Date	Time	Amount	Unit	Type
1.	May-29-2012	3:00PM	11.9	mm	Week before application
			31.3	mm	Week after application
			0.4	mm	Second week after application
			1	dd	Days until first significant rainfall
			16.51	mm	Amount of first significant rainfall
6.	Jun-20-2012	2:30 PM	4.6	mm	Week before application
			13.9	mm	Week after application
			43.9	mm	Second week after application
			2	dd	Days until first significant rainfall
			7.9	mm	Amount of first significant rainfall

APPLICATION DESCRIPTION

	A	B
Application Date:	May-29-2012	Jun-20-2012
Time of Day:	3:00 PM	2:30PM
Application Method:	CO2 HAND	CO2 HAND
Application Timing:	PRETRANS	5cm weeds
Applic. Placement:	BROSOI	BROFOL
Air Temp., Unit:	29.4 C	34.9 C
% Relative Humidity:	43	51
Wind Velocity, Unit:	10.5 KPH	43.3 KPH
Dew Presence (Y/N):	N	N

CROP STAGE AT EACH APPLICATION

	A	B

Crop 1 Code, Stage:	LYPES	LYPES
Stage Scale:		7 branch
Height, Unit:		24.8 CM

APPLICATION EQUIPMENT

	A	B
Appl. Equipment:	CO2 Hand	CO2 Hand
Operating Pressure:	210 KPa	210 KPa
Nozzle Size:	ULD120-02	ULD120-02
Nozzle Spacing, Unit:	50 CM	50 CM
Nozzles/Row:	3	3
Band Width, Unit:	150 CM	150 CM
Boom Height, Unit:	50 CM	50 CM
Carrier:	H20	H20
Spray Volume, Unit:	222 L/ha	222 L/ha
Propellant:	CO2	CO2

Purpose: To determine the tolerance of tomatoes to several herbicides that are not currently registered in Canada for use on processing tomato. Products that show good tolerance will be considered for label expansions or registration.

Results: The herbicides tested were Reflex (0.4 and 0.8 L/ac PRE), Eragon (7.2, 14.5, and 29 g/ac PRE), and Prowl H2O (0.9 and 1.8 L/ac PRE and POST). The trial was kept weed-free so that crop tolerance could be accurately assessed. Visual injury symptoms from all treatments were minor. Eragon did show some injury (15%) at the highest rate which reduced tomato biomass but not yield (Table 1). Yield in the untreated control averaged 48 Ton/ac and did not differ from yields in any of the herbicide treatments.

Table 1 – Tomato injury 7, 14, and 21 days after application and final marketable tomato yield at Harrow in 2012.

Treatment	Rate	Injury			Yield
		7 DAA	14DAA	21 DAA	T/ac
Weed-Free Control		0a	0b	0b	48.0a
Reflex	0.405 L/ac	0a	0b	0b	46.4a
Reflex	0.81 L/ac	0a	0b	0b	47.7a
Eragon	7.2 g/ac	0a	0b	0b	49.6a
Eragon	14.5 g/ac	0a	7.5a	1.5b	44.8a
Eragon	29 g/ac	0a	10a	15a	47.0a
Prowl H20 (PRE)	0.89 L/ac	0a	0b	0b	49.7a
Prowl H20 (PRE)	1.78 L/ac	0a	0b	0b	48.3a
Prowl H20 (POST)	0.89 L/ac	0a	0b	0b	47.2a
Prowl H20 (POST)	1.78 L/ac	0a	0b	0b	43.4a

Trial 2 – Herbicide-fungicide tankmix evaluations for control of annual grasses.

Trt No.	Treatment Name	Form Conc	Form Type	Lot Code	Rate	Rate Unit	Product Rate	Product Rate Unit	Grow Stg	Appl Code
1	Weedy Check									
2	Weed-Free Check									
3	Excel Super	80.5	EC	Bayer	0.054	kg ai/ha	0.271	l/a	1-6lf grasse	A
4	Venture L	125	EC	Syngenta	0.075	kg ai/ha	0.243	l/a	1-6lf grasse	A
5	Poast Ultra	450	EC	BASF	0.14	kg ai/ha	0.126	l/a	1-6lf grasse	A
	Merge		L	BASF	0.25	l/ha	0.101	l/a	1-6lf grasse	A
6	Excel Super	80.5	EC	Bayer	0.054	kg ai/ha	0.271	l/a	1-6lf grasse	A
	Kocide 2000	53.8	DF	DuPont (fungicide)	1.547	kg ai/ha	1160	g/a	1-6lf grasse	A
7	Venture L	125	EC	Syngenta	0.075	kg ai/ha	0.243	l/a	1-6lf grasse	A
	Kocide 2000	53.8	DF	DuPont (fungicide)	1.547	kg ai/ha	1160	g/a	1-6lf grasse	A
8	Poast Ultra	450	EC	BASF	0.14	kg ai/ha	0.126	l/a	1-6lf grasse	A
	Merge		L	BASF	0.25	l/ha	0.101	l/a	1-6lf grasse	A
	Kocide 2000	53.8	DF	DuPont (fungicide)	1.547	kg ai/ha	1160	g/a	1-6lf grasse	A
9	Excel Super	80.5	EC	Bayer	0.054	kg ai/ha	0.271	l/a	1-6lf grasse	A
	Quadris	250	F	Syngenta (fungicide)	0.125	kg ai/ha	0.202	l/a	1-6lf grasse	A
10	Venture L	125	EC	Syngenta	0.075	kg ai/ha	0.243	l/a	1-6lf grasse	A
	Quadris	250	F	Syngenta (fungicide)	0.125	kg ai/ha	0.202	l/a	1-6lf grasse	A
11	Poast Ultra	450	EC	BASF	0.14	kg ai/ha	0.126	l/a	1-6lf grasse	A
	Merge		L	BASF	0.25	l/ha	0.101	l/a	1-6lf grasse	A
	Quadris	250	F	Syngenta (fungicide)	0.125	kg ai/ha	0.202	l/a	1-6lf grasse	A
12	Excel Super	80.5	EC	Bayer	0.054	kg ai/ha	0.271	l/a	1-6lf grasse	A
	Cabrio	20	EG	BASF (fungicide)	0.168	kg ai/ha	340	g/a	1-6lf grasse	A
13	Venture L	125	EC	Syngenta	0.075	kg ai/ha	0.243	l/a	1-6lf grasse	A
	Cabrio	20	EG	BASF (fungicide)	0.168	kg ai/ha	340	g/a	1-6lf grasse	A
14	Poast Ultra	450	EC	BASF	0.14	kg ai/ha	0.126	l/a	1-6lf grasse	A
	Merge		L	BASF	0.25	l/ha	0.101	l/a	1-6lf grasse	A
	Cabrio	20	EG	BASF (fungicide)	0.168	kg ai/ha	340	g/a	1-6lf grasse	A
15	Kocide 2000	53.8	DF	DuPont (fungicide)	1.547	kg ai/ha	1160	g/a	1-6lf grasse	A
16	Quadris	250	F	Syngenta (fungicide)	0.125	kg ai/ha	0.202	l/a	1-6lf grasse	A
17	Cabrio	20	EG	BASF (fungicide)	0.168	kg ai/ha	340	g/a	1-6lf grasse	A

Replications: 4, Untreated treatments: 1, Design: Randomized Complete Block (RCB), Treatment units: Treated 'Plot' size, Dry Form. Unit: %, Treated 'Plot' size Width: 1.5 meters, Treated 'Plot' size Length: 8 meters, Application volume: 222 L/ha, Mix size: 1.2 liters, Mix overage: 12.5%, Format definitions: G-Herb99.def, G-Herb99.frm

CROP AND WEED DESCRIPTION

Weed	Code	Common Name	Scientific Name	
1.	ECHCG	**Ba**	rnyardgrass	Echinochloa crusgalli
2.	DIGSA	**Cr**	abgrass, Large/Hairy	Digitaria sanguinalis
3.	ERAME	**St**	inkgrass	Eragrostis cilianensis
4.	PANDI	**Pa**	nicum, Fall	Panicum dichotomiflorum

Crop 1: LYPES TOMATO **Variety:** H9553
Planting Date: May-31-2012 **Planting Method:** TRANSPLANTED - MACHINE
Rate: 30000 S/H
Row Spacing: 1.5 M

SITE AND DESIGN
Plot Width, Unit: 1.5 m **Plot Length, Unit:** 8 m **Reps:** 4
Tillage Type: CONVENTIONAL-TILL **Study Design:** RACOBL

	Previous Crops	Year
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SOIL DESCRIPTION
% Sand: 82.5 **% OM:** 2.0 **Texture:** FOX SANDY LOAM
% Silt: 5.0 **pH:** 6.1 **Soil Name:** Hapludalf subgroup
% Clay: 12.5

MOISTURE CONDITIONS

	Date	Time	Amount	Unit	Type
1.	Jun-14-2012	9:00 AM	0	mm	Week before application
			4.6	mm	Week after application
			13	mm	Second week after application
			4	dd	Days until first significant rainfall
			4.6	mm	Amount of first significant rainfall

APPLICATION DESCRIPTION

	A
Application Date:	Jun-14-2012
Time of Day:	9:00 AM
Application Method:	CO2 HAND
Application Timing:	1-6 LF
Applic. Placement:	BROFOL
Air Temp., Unit:	20.0 C
% Relative Humidity:	60.0
Wind Velocity, Unit:	8.6 KPH
Dew Presence (Y/N):	N

CROP STAGE AT EACH APPLICATION

	A
Crop 1 Code, Stage:	LYPES
Stage Scale:	6 LF
Height, Unit:	12.2 CM

WEED STAGE AT EACH APPLICATION

	A
Weed 1 Code, Stage:	ECHCG 3.1 CM
Stage Scale:	3 LF
Density, Unit:	32 M2
Weed 2 Code, Stage:	DIGSA 2.1 CM
Stage Scale:	3 LF
Density, Unit:	32 M2
Weed 3 Code, Stage:	ERAME
Weed 4 Code, Stage:	PANDI

APPLICATION EQUIPMENT

	A
Appl. Equipment:	CO2 Hand
Operating Pressure:	210 KPa
Nozzle Size:	ULD120-02
Nozzle Spacing, Unit:	50 CM
Nozzles/Row:	3
Band Width, Unit:	150 CM
Boom Height, Unit:	50 CM
Carrier:	H20
Spray Volume, Unit:	222 L/ha
Propellant:	CO2

Purpose: To determine the utility of tank-mixing herbicides and fungicides in processing tomatoes. Tank-mixes that do not reduce weed control or yield may be considered.

Results: In this trial grass herbicides were tank-mixed with several fungicides to determine if there was antagonism/synergism to weed control and any crop tolerance concerns. The grass herbicides tested were Excel Super (0.271 L/ac), Venture L (0.243 L/ac), and Poast Ultra (0.126 L/ac). The fungicides tested were Kocide 2000, Quadris, and Cabrio. Average yields in the weed-free control and herbicide only controls averaged 36 Ton/ac. Weed control was not compromised when the herbicides were tank-mixed with the fungicides except there was a decrease in crabgrass control (44.9 vs. 103.2) and tomato yield (26 vs. 18.4) when Poast was tankmixed with Kocide (Table 2).

Table 2- Mean density, biomass and marketable yield for processing tomatoes after application of herbicide-fungicide tank-mixes at Harrow, ON, 2012.

Treatment	Rate	Density (#/m^2)				Biomass (g/m^2)				Yield (T/ac)
		DIGSA [a]	ECHCG	ERAME	PANDI	DIGSA	ECHCG	ERAME	PANDI	
Weedy		4cde	2ab	1cd	1c	104.7bc	20.4bcde	14.9cdef	48.9ab	8.0e
Weed-free		-	-	-	-	-	-	-	-	36.1a
Excel Super	0.271 L/ac	2df	2ab	0d	2b	22.1de	26.9bcde	0d	18.2bc	30.6ab
Venture L	0.243 L/ac	1f	1bc	1c	1c	15.1de	7.7ef	49.a	18.9bc	34.3ab
Poast Ultra + Merge	0.126 + 0.101 L/ac	3def	3a	4a	1c	44.9cde	72.7a	44.6ab	75.3a	26.0bc
Excel Super + Kocide 2000	0.271 L/ac + 160 g/ac	3def	1bc	2bc	1c	71.1cde	24.7bcdef	25.3bc	49.8ab	28.8ab
Venture L + Kocide 2000	0.243 L/ac + 160 g/ac	4cde	1bc	3ab	2b	103.6bc	41.2bc	42.7ab	56.1ab	25.1bc
Poast Ultra + Merge + Kocide 2000	0.126 L/ac + 0.101 L/ac + 160 g/ac	5bcd	1bc	1cd	2b	103.2bc	23.3bcdef	12.4cd	81.3a	18.4cd
Excel Super + Quadris	0.271 L/ac + 0.202 L/ac	3def	1bc	1cd	1c	11.2e	4.9ef	10.6cd	19.3bc	38.1a
Venture L + Quadris	0.243 L/ac + 0.202 L/ac	1f	1bc	1cd	0d	33.1de	22.6bcdef	6.3cd	0c	36.7a
Poast Ultra + Merge + Quadris	0.126 L/ac + 0.101 L/ac + 0.202 L/ac	2efg	1bc	2bc	0d	22.7de	26.6bcde	44.5ab	0c	29.8ab
Excel Super + Cabrio	0.271 L/ac + 340 g/ac	2efg	1bc	1cd	0d	16.9de	30.6bcde	16.1cd	0c	34.5ab
Venture L + Cabrio	0.243 L/ac + 340 g/ac	2efg	1bc	0d	0d	11.3e	14.5def	0d	0c	34.3ab
Poast Ultra + Merge + Cabrio	0.126 L/ac + 0.101 L/ac + 340 g/ac	4cde	0c	3ab	1c	82.2cd	0f	48.5a	22.5bc	25.8bc
Kocide 2000	160 g/ac	7ab	2ab	2bc	2b	153.7ab	38.1bcd	15.9cd	52.2ab	8.9de
Quadris	0.202 L/ac	8a	2ab	2bc	3a	217.9a	48ab	23.6bc	48abc	6.0e
Cabrio	340 g/ac	6abc	2ab	2bc	2b	156.3ab	44.3bc	18.1cd	86.6a	6.5e

[a] – DIGSA – Crabgrass; ECHCG – Barnyardgrass; ERAME – Stinkgrass; PANDI – Fall Panicum

Trial 3 – Herbicide-insecticide tankmix evaluations for control of annual grasses.

Trt No.	Treatment Name	Form Conc	Form Type	Lot Code	Rate	Rate Unit	Product Rate	Product Rate Unit	Grow Stg	Appl Code
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	Merge		L	BASF	0.25	l/ha	0.101	l/a	1-6LF GR	A
	Admire	240	F	Bayer (insecticide)	200	ml/ha	0.081	l/a	1-6LF GR	A
7	Poast Ultra	450	EC	BASF	0.14	kg ai/ha	0.126	l/a	1-6LF GR	A
	Merge		L	BASF	0.25	l/ha	0.101	l/a	1-6LF GR	A
	Matador	120	EC	Syngenta (insecticid	83	ml/ha	0.0336	l/a	1-6LF GR	A
8	Excel Super	80.5	EC	Bayer	0.054	kg ai/ha	0.271	l/a	1-6LF GR	A
	Admire	240	F	Bayer (insecticide)	200	ml/ha	0.081	l/a	1-6LF GR	A
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Row Spacing: 1.5 M

SITE AND DESIGN

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			13.9	MM	Second week after application
			4	DD	Days until first significant rainfall
			4.6	MM	Amount of first significant rainfall

APPLICATION DESCRIPTION

	A
Application Date:	Jun-14-2012
Time of Day:	8:30 AM
Application Method:	CO2 HAND
Application Timing:	1-6 LF
Applic. Placement:	BROFOL
Air Temp., Unit:	19.8 C
% Relative Humidity:	60
Wind Velocity, Unit:	9.8 KPH
Dew Presence (Y/N):	N

CROP STAGE AT EACH APPLICATION

	A
Crop 1 Code, Stage:	LYPES
Stage Scale:	6 LF
Height, Unit:	15.2 CM

WEED STAGE AT EACH APPLICATION

	A
Weed 1 Code, Stage:	ECHCG 6.5 CM
Stage Scale:	4 LF
Density, Unit:	32 M2
Weed 2 Code, Stage:	DIGSS 1.2 CM
Stage Scale:	3 LF
Density, Unit:	80 M2
Weed 3 Code, Stage:	ERAME
Weed 4 Code, Stage:	PANDI

APPLICATION EQUIPMENT

	A
Appl. Equipment:	CO2 Hand
Operating Pressure:	210 KPa
Nozzle Size:	ULD120-02
Nozzle Spacing, Unit:	50 CM
Nozzles/Row:	3
Band Width, Unit:	150 CM
Boom Height, Unit:	50 CM
Carrier:	H20
Spray Volume, Unit:	222 L/ha
Propellant:	CO2

Purpose: To determine the utility of tank-mixing herbicides and insecticides in processing tomatoes. Tank-mixes that do not reduce weed control or yield may be considered.

Results: In this trial grass herbicides were tank-mixed with several fungicides to determine if there was antagonism/synergism to weed control and any crop tolerance concerns. The grass herbicides tested were Excel Super (0.271 L/ac), Venture L (0.243 L/ac), and Poast Ultra (0.126 L/ac). The insecticides tested were Admire and Matador. Average yields in the weed-free control and herbicide only controls averaged 30 Ton/ac. Weed control was not compromised when the herbicides were tank-mixed with the insecticides except for crabgrass and barnyardgrass control when Excel Super was tank-mixed with either insecticide. A direct comparison between herbicide only treatments and the appropriate tank-mix treatments showed no differences in yield.

Table 3 - Mean density, biomass and marketable yield for processing tomatoes after application of herbicide-insecticide tank-mixes at Harrow, ON, 2012.

Treatment	Rate	Density (#/m^2)				Biomass (g/m^2)				Yield (T/ac)
	L/ac	DIGSA [a]	ECHCG	ERAME	PANDI	DIGSA	ECHCG	ERAME	PANDI	
Weedy Control		8a	3a	2a	3a	271.1a	70.7a	19.5bc	68.8a	6.7d
Weed-Free Control		-	-	-	-	-	-	-	-	28.0a
Poast Ultra + Merge	0.126 + 0.101	6ab	0d	1bc	1b	168.3ab	0b	13.1cd	23.2cd	16.0cd
Excel Super	0.271	2d	1cd	2a	2b	24.8c	17.7b	19.7bc	58.3ab	28.2a
Venture L	0.243	3cd	1cd	0c	2b	61.1bc	15.4b	0d	30.8c	27.8ab
Poast Ultra + Merge + Admire	0.126 + 0.101 + 0.081	6ab	1cd	1bc	2b	117.2bc	10.b5	12.cd9	34.1bc	15.3cd
Poast Ultra + Merge + Matador	0.126 + 0.101 + 0.0336	4bcd	0d	2a	0c	106.0bc	0b	36.9b	0d	15.4cd
Excel Super + Admire	0.271 + 0.081	3cd	1cd	1bc	0c	89.1bc	25.9b	62.8a	0d	22.5abc
Excel Super + Matador	0.271 + 0.0336	3cd	2ab	1bc	1b	149.3b	73.6a	20.8bc	24cd	24.0abc
Venture L + Admire	0.423 + 0.081	4bcd	2ab	0c	0c	157.2b	13.1b	0d	0d	18.1bc
Venture L + Matador	0.423 + 0.0336	5abcd	1cd	1bc	1b	67.5bc	11.6b	11.6cd	20.3cd	22.8abc

[a] – DIGSA – Crabgrass; ECHCG – Barnyardgrass; ERAME – Stinkgrass; PANDI – Fall Panicum

Trial 4 – The effect of copper fungicides with and without Dithane on Prism efficacy.

Trt No.	Treatment Name	Form Conc	Form Type	Lot Code	Rate	Rate Unit	Product Rate	Product Rate Unit	Grow Stg	Appl Code
1	Weedy Check									
2	Weed-Free Check									
3	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
4	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Agral 90		L	NORAC	0.2	% v/v	0.18	l/a	21 DATP	A
5	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Dithane	75	DG	DowAgro	1.4025	kg ai/ha	760	g/a	21 DATP	A
6	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Kocide 2000	53.8	DF	DuPont (fungicide)	1.5473	kg ai/ha	1160	g/a	21 DATP	A
7	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Parasol	50	WG	Nufarm (fungicide)	1.125	kg ai/ha	910	g/a	21 DATP	A
8	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Kocide 2000	53.8	DF	DuPont (fungicide)	1.5473	kg ai/ha	1160	g/a	21 DATP	A
	Dithane	75	DG	DowAgro	1.4025	kg ai/ha	760	g/a	21 DATP	A
9	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Parasol	50	WG	Nufarm (fungicide)	1.125	kg ai/ha	910	g/a	21 DATP	A
	Dithane	75	DG	DowAgro	1.4025	kg ai/ha	760	g/a	21 DATP	A
10	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Agral 90		L	NORAC	0.2	% v/v	0.18	l/a	21 DATP	A
	Kocide 2000	53.8	DF	DuPont (fungicide)	1.5473	kg ai/ha	1160	g/a	21 DATP	A
11	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Agral 90		L	NORAC	0.2	% v/v	81	g/a	21 DATP	A
	Parasol	50	WG	Nufarm (fungicide)	1.125	kg ai/ha	910	g/a	21 DATP	A
12	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Agral 90		L	NORAC	0.2	% v/v	0.18	l/a	21 DATP	A
	Kocide 2000	53.8	DF	DuPont (fungicide)	1.5473	kg ai/ha	1160	g/a	21 DATP	A
	Dithane	75	DG	DowAgro	1.4025	kg ai/ha	760	g/a	21 DATP	A
13	Prism	25	DF	DuPont	0.015	kg ai/ha	24.3	g/a	21 DATP	A
	Agral 90		L	NORAC	0.2	% v/v	0.18	l/a	21 DATP	A
	Parasol	50	WG	Nufarm (fungicide)	1.125	kg ai/ha	910	g/a	21 DATP	A
	Dithane	75	DG	DowAgro	1.4025	kg ai/ha	760	g/a	21 DATP	A
14	Kocide 2000	53.8	DF	DuPont (fungicide)	1.5473	kg ai/ha	1160	g/a	21 DATP	A
	Agral 90		L	NORAC	0.2	% v/v	0.18	l/a	21 DATP	A
15	Parasol	50	WG	Nufarm (fungicide)	1.125	kg ai/ha	910	g/a	21 DATP	A
	Agral 90		L	NORAC	0.2	% v/v	0.18	l/a	21 DATP	A
16	Kocide 2000	53.8	DF	DuPont (fungicide)	1.5473	kg ai/ha	1160	g/a	21 DATP	A
	Dithane	75	DG	DowAgro	1.4025	kg ai/ha	760	g/a	21 DATP	A
	Agral 90		L	NORAC	0.2	% v/v	0.18	l/a	21 DATP	A
17	Parasol	50	WG	Nufarm (fungicide)	1.125	kg ai/ha	910	g/a	21 DATP	A
	Dithane	75	DG	DowAgro	1.4025	kg ai/ha	760	g/a	21 DATP	A
	Agral 90		L	NORAC	0.2	% v/v	0.18	l/a	21 DATP	A

Replications: 4, Design: Randomized Complete Block (RCB), Treatment units: Treated 'Plot' size, Dry Form. Unit: %, Treated 'Plot' size Width: 1.5 meters, Treated 'Plot' size Length: 8 meters, Application volume: 222 L/ha, Mix size: 1.2 liters, Mix overage: 12.5%, Format definitions: G-Herb99.def, G-HERB99.frm

CROP AND WEED DESCRIPTION

Weed	Code	Common Name	Scientific Name	
1.	POLPE	**La**	dysthumb	Polygonum persicaria
2.	SOLPT	**Ni**	ghtshade, Eastern Black	Solanum ptycanthum
3.	ABUTH	**Ve**	lvetleaf	Abutilon theophrasti
4.	ECHCG	**Ba**	rnyardgrass	Echinochloa crusgalli
5.	PANDI	**Pa**	nicum, Fall	Panicum dichotomiflorum
6.	DIGSS	**Cr**	abgrass, species	Digitaria sp.

Crop 1: LYPES TOMATO **Variety:** H9553
Planting Date: May-31-2012 **Planting Method:** TRANSPLANTED - MACHINE
Rate: 30000 S/H
Row Spacing: 1.5 M

SITE AND DESIGN

Plot Width, Unit: 1.5 m **Plot Length, Unit:** 8 m **Reps:** 4
Tillage Type: CONVENTIONAL-TILL **Study Design:** RACOBL

	Previous Crops	Year
1.	Red clover	2011

SOIL DESCRIPTION

% Sand: 82.5 **% OM:** 2.0 **Texture:** FOX SANDY LOAM
% Silt: 5.0 **pH:** 6.1 **Soil Name:** Hapludalf subgroup
% Clay: 12.5

MOISTURE CONDITIONS

	Date	Time	Amount	Unit	Type
1.	Jun-21-2012	10:30AM	4.6	MM	Week before application
			13.9	MM	Week after application
			48.4	MM	Second week after application
			1	DD	Days until first significant rainfall
			7.9	MM	Amount of first significant rainfall

APPLICATION DESCRIPTION

	A
Application Date:	Jun-21-2012
Time of Day:	10:30 AM
Application Method:	CO2 HAND
Application Timing:	21 DATP
Applic. Placement:	BROFOL
Air Temp., Unit:	29.5 C
% Relative Humidity:	59.5
Wind Velocity, Unit:	9.2 KPH
Dew Presence (Y/N):	N

CROP STAGE AT EACH APPLICATION

	A
Crop 1 Code, Stage:	LYPES
Stage Scale:	8 BRANCH
Height, Unit:	26 CM

WEED STAGE AT EACH APPLICATION

	A
Weed 1 Code, Stage:	POLPE
Weed 2 Code, Stage:	SOLPT
Weed 3 Code, Stage:	ABUTH
Weed 4 Code, Stage:	ECHCG
Weed 5 Code, Stage:	PANDI
Weed 6 Code, Stage:	DIGSS

APPLICATION EQUIPMENT

	A
Appl. Equipment:	CO2 Hand
Operating Pressure:	210 KPa
Nozzle Size:	ULD120-02
Nozzle Spacing, Unit:	50 CM
Nozzles/Row:	3
Band Width, Unit:	150 CM
Boom Height, Unit:	50 CM
Carrier:	H20
Spray Volume, Unit:	222 L/ha
Propellant:	CO2

Purpose: To determine the efficacy of Prism when tank-mixed with Parasol or Kocide 2000 with and without Dithane.

Results: The efficacy of Prism was tested when tankmixed with Parasol, or Kocide 2000 with and without Dithane. Average yields in the weed-free control were 45 Ton/ac. Weed control and yield did not differ among treatments. The addition of Agral 90 to the tank-mix improved weed control.

Table 4 - Mean density, biomass and marketable yield for processing tomatoes at Harrow, ON, 2012.

Treatment	Rate	Density (#/m^2)		Biomass (g/m^2)		Yield (T/ac)
		ECHCG[a]	PANDI	ECHCG	PANDI	
Weedy		2a	1b	82.4a	59.8cd	44.4ab
Weed-free		-	-	-	-	45.4ab
Prism	24.3 g/ac	1b	1b	31.1b	13.4de	48.5a
Prism + Agral 90	24.3 g/ac + 0.18 L/ac	0c	0c	0d	0e	40.7ab
Prism + Dithane	24.3 g/ac + 760 g/ac	2a	1b	15.6bcd	26.0cde	46.5a
Prism + Kocide 2000	24.3 g/ac + 1160 g/ac	2a	1b	79.2a	116.9ab	48.2a
Prism + Parasol	24.3 g/ac + 910 g/ac	1b	2a	7.4cd	37.4cde	43.1ab
Prism + Kocide2000 + Dithane	24.3 g/ac + 1160 g/ac + 760 g/ac	1b	1b	15.6bcd	132.4a	46.8a
Prism + Parasol + Dithane	24.3 g/ac + 910 g/ac + 760 g/ac	1b	1b	13.6bcd	12.6de	48.7a
Prism + Agral 90 + Kocide 2000	24.3 g/ac + 0.18 L/ac + 1160 g/ac	1b	1b	15.0bcd	28.0cde	47.3a
Prism + Agral 90 + Parasol	24.3 g/ac + 0.18 L/ac + 910 g/ac	1b	1b	10.3bcd	27.7cde	45.4ab
Prism + Agral 90 + Kocide 2000 + Dithane	24.3 g/ac + 0.18 L/ac + 1160 g/ac + 760 g/ac	1b	1b	12.2bcd	12.7de	46.8a
Prism + Agral 90 + Parasol + Dithane	24.3 g/ac + 0.18 L/ac + 910 g/ac + 760 g/ac	1b	1b	16.4bcd	35.0cde	46.6a
Kocide 2000 + Agral 90	1160 g/ac + 0.18 L/ac	2a	1b	23.8bc	62.0cd	42.0ab
Parasol + Agral 90	910 g/ac + 0.18 L/ac	1b	1b	12.5bcd	27.0cde	35.3b
Kocide 2000 + Dithane + Agral 90	1160 g/ac + 760 g/ac + 0.18 L/ac	1b	1b	76.1a	71.8bc	40.0ab
Parasol + Dithane + Agral 90	910 g/ac + 760 g/ac + 0.18 L/ac	1b	1b	7.9cd	155.9a	46.1a

[a] – ECHCG – Barnyardgrass; PANDI – Fall Panicum