

2012 Processing Tomato Research Report

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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 measured 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It is requested that data **NOT BE PUBLISHED** or used for extension purposes without prior consent from the author.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, 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. 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.

Table of Contents

| | |
|--|-----------|
| Trial 1 – Evaluation of new herbicides for use in processing tomatoes..... | 5 |
| Trial 2 – Annual grass herbicide-fungicide tankmix evaluations..... | 7 |
| Trial 3 – Annual grass herbicide-insecticide tankmix evaluations..... | 10 |
| Trial 4 – The effect of copper fungicides with and without Dithane on Prism efficacy..... | 13 |

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 coverage: 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 LYPES TOMATO **Variety:** H9553
1:
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: | BROSOL | 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 H2O (PRE) | 0.89 L/ac | 0a | 0b | 0b | 49.7a |
| Prowl H2O (PRE) | 1.78 L/ac | 0a | 0b | 0b | 48.3a |
| Prowl H2O (POST) | 0.89 L/ac | 0a | 0b | 0b | 47.2a |
| Prowl H2O (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 Merge | 450 | EC | BASF | 0.14 | kg ai/ha | 0.126 | l/a | 1-6lf grasse | A |
| | | | 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 Merge | 450 | EC | BASF | 0.14 | kg ai/ha | 0.126 | l/a | 1-6lf grasse | A |
| | | | 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 Merge | 450 | EC | BASF | 0.14 | kg ai/ha | 0.126 | l/a | 1-6lf grasse | A |
| | | | 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 Merge | 450 | EC | BASF | 0.14 | kg ai/ha | 0.126 | l/a | 1-6lf grasse | A |
| | | | 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 coverage: 12.5%, Format definitions: G-Herb99.def, G-Herb99.frm

CROP AND WEED DESCRIPTION

| Weed | Code | Common Name | Scientific Name |
|------|-------|-------------|-------------------------|
| 1. | ECHCG | Ba | rnyardgrass |
| 2. | DIGSA | Cr | abgrass, Large/Hairy |
| 3. | ERAME | St | inkgrass |
| 4. | PANDI | Pa | nicum, Fall |
| | | | Echinochloa crusgalli |
| | | | Digitaria sanguinalis |
| | | | Eragrostis cilianensis |
| | | | 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 |
|----------------|------|
| 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-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: | H2O |
| 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 |
|---------|-------------------|-----------|-----------|-----------------------|-------|-----------|--------------|-------------------|----------|-----------|
| 1 | Check, Weedy | | | | | | | | | |
| 2 | Check, Weed-Free | | | | | | | | | |
| 3 | Poast Ultra Merge | 450 | EC | BASF | 0.14 | kg ai/ha | 0.126 | l/a | 1-6LF GR | A |
| 4 | Excel Super | 80.5 | EC | BASF | 0.25 | l/ha | 0.101 | l/a | 1-6LF GR | A |
| 5 | Venture L | 125 | EC | Bayer | 0.054 | kg ai/ha | 0.271 | l/a | 1-6LF GR | A |
| 6 | Poast Ultra Merge | 450 | EC | Syngenta | 0.075 | kg ai/ha | 0.243 | l/a | 1-6LF GR | A |
| 7 | Poast Ultra Merge | 450 | EC | BASF | 0.14 | kg ai/ha | 0.126 | l/a | 1-6LF GR | A |
| 8 | Poast Ultra Merge | 450 | L | BASF | 0.25 | l/ha | 0.101 | l/a | 1-6LF GR | A |
| 9 | Admire | 240 | F | Bayer (insecticide) | 200 | ml/ha | 0.081 | l/a | 1-6LF GR | A |
| 10 | Poast Ultra Merge | 450 | EC | BASF | 0.14 | kg ai/ha | 0.126 | l/a | 1-6LF GR | A |
| 11 | Poast Ultra Merge | 450 | L | BASF | 0.25 | l/ha | 0.101 | l/a | 1-6LF GR | A |
| 12 | Matador | 120 | EC | Syngenta (insecticid) | 83 | ml/ha | 0.0336 | l/a | 1-6LF GR | A |
| 13 | Excel Super | 80.5 | EC | Bayer | 0.054 | kg ai/ha | 0.271 | l/a | 1-6LF GR | A |
| 14 | Admire | 240 | F | Bayer (insecticide) | 200 | ml/ha | 0.081 | l/a | 1-6LF GR | A |
| 15 | Excel Super | 80.5 | EC | Bayer | 0.054 | kg ai/ha | 0.271 | l/a | 1-6LF GR | A |
| 16 | Matador | 120 | EC | Syngenta (insecticid) | 83 | ml/ha | 0.0336 | l/a | 1-6LF GR | A |
| 17 | Venture L | 125 | EC | Syngenta | 0.075 | kg ai/ha | 0.243 | l/a | 1-6LF GR | A |
| 18 | Admire | 240 | F | Bayer (insecticide) | 200 | ml/ha | 0.081 | l/a | 1-6LF GR | A |
| 19 | Venture L | 125 | EC | Syngenta | 0.075 | kg ai/ha | 0.243 | l/a | 1-6LF GR | A |
| 20 | Matador | 120 | EC | Syngenta (insecticid) | 83 | ml/ha | 0.0336 | l/a | 1-6LF GR | 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 coverage: 12.5%, Format definitions: G-Herb99.def, G-HERB99.fm

CROP AND WEED DESCRIPTION

| Weed | Code | Common Name | Scientific Name | |
|------|-------|-------------|------------------|-------------------------|
| 1. | ECHCG | Ba | rnyardgrass | Echinochloa crusgalli |
| 2. | DIGSS | Cr | abgrass, species | Digitaria sp. |
| 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 |
|----------------|------|
| 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-14-2012 | 8:30 AM | 0 | MM | Week before application |
| | | | 4.6 | MM | Week after application |
| | | | 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: | H2O |
| 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 L/ac | Density (#/m ²) | | | | Biomass (g/m ²) | | | | Yield (T/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 | 10.6b | 12.0cd | 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 Agral 90 | 25 L | DF L | DuPont NORAC | 0.015 0.2 | kg ai/ha % v/v | 24.3 0.18 | g/a l/a | 21 DATP | A |
| 5 | Prism Dithane | 25 75 | DF DG | DuPont DowAgro | 0.015 1.4025 | kg ai/ha kg ai/ha | 24.3 760 | g/a g/a | 21 DATP | A |
| 6 | Prism Kocide 2000 | 25 53.8 | DF DF | DuPont DuPont (fungicide) | 0.015 1.5473 | kg ai/ha kg ai/ha | 24.3 1160 | g/a g/a | 21 DATP | A |
| 7 | Prism Parasol | 25 50 | DF WG | DuPont Nufarm (fungicide) | 0.015 1.125 | kg ai/ha kg ai/ha | 24.3 910 | g/a g/a | 21 DATP | A |
| 8 | Prism Kocide 2000 Dithane | 25 53.8 75 | DF DF DG | DuPont DuPont (fungicide) DowAgro | 0.015 1.5473 1.4025 | kg ai/ha kg ai/ha kg ai/ha | 24.3 1160 760 | g/a g/a g/a | 21 DATP | A |
| 9 | Prism Parasol Dithane | 25 50 75 | DF WG DG | DuPont Nufarm (fungicide) DowAgro | 0.015 1.125 1.4025 | kg ai/ha kg ai/ha kg ai/ha | 24.3 910 760 | g/a g/a g/a | 21 DATP | A |
| 10 | Prism Agral 90 Kocide 2000 | 25 L 53.8 | DF L DF | DuPont NORAC DuPont (fungicide) | 0.015 0.2 1.5473 | kg ai/ha % v/v kg ai/ha | 24.3 0.18 1160 | g/a l/a g/a | 21 DATP | A |
| 11 | Prism Agral 90 Parasol | 25 L 50 | DF L WG | DuPont NORAC Nufarm (fungicide) | 0.015 0.2 1.125 | kg ai/ha % v/v kg ai/ha | 24.3 81 910 | g/a g/a g/a | 21 DATP | A |
| 12 | Prism Agral 90 Kocide 2000 Dithane | 25 L 53.8 75 | DF L DF DG | DuPont NORAC DuPont (fungicide) DowAgro | 0.015 0.2 1.5473 1.4025 | kg ai/ha % v/v kg ai/ha kg ai/ha | 24.3 0.18 1160 760 | g/a l/a g/a g/a | 21 DATP | A |
| 13 | Prism Agral 90 Parasol Dithane | 25 L 50 75 | DF L WG DG | DuPont NORAC Nufarm (fungicide) DowAgro | 0.015 0.2 1.125 1.4025 | kg ai/ha % v/v kg ai/ha kg ai/ha | 24.3 0.18 910 760 | g/a l/a g/a g/a | 21 DATP | A |
| 14 | Kocide 2000 Agral 90 | 53.8 L | DF L | DuPont (fungicide) NORAC | 1.5473 0.2 | kg ai/ha % v/v | 1160 0.18 | g/a l/a | 21 DATP | A |
| 15 | Parasol Agral 90 | 50 L | WG L | Nufarm (fungicide) NORAC | 1.125 0.2 | kg ai/ha % v/v | 910 0.18 | g/a l/a | 21 DATP | A |
| 16 | Kocide 2000 Dithane Agral 90 | 53.8 75 L | DF DG L | DuPont (fungicide) DowAgro NORAC | 1.5473 1.4025 0.2 | kg ai/ha kg ai/ha % v/v | 1160 760 0.18 | g/a g/a l/a | 21 DATP | A |
| 17 | Parasol Dithane Agral 90 | 50 75 L | WG DG L | Nufarm (fungicide) DowAgro NORAC | 1.125 1.4025 0.2 | kg ai/ha kg ai/ha % v/v | 910 760 0.18 | g/a g/a 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 | dystthumb Polygonum persicaria |
| 2. | SOLPT | Ni | ghtshade, Eastern Black Solanum ptycanthum |
| 3. | ABUTH | Ve | ivetleaf 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