Phytophthora capsici Control in Processing Tomatoes

Research Report

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Introduction

Phytophthora capsici is a devastating fungal pathogen for the horticultural industry in Canada. Since 2018, *P. capsici* has proven to be a major fungal problem in processing tomatoes here in Ontario. Cultural and pesticide options are available for control or suppression of this pathogen, but little research has been conducted in processing tomatoes in several years, despite the spread of *P. capsici* in Ontario.

Fruit rot and crown rot are the main areas of concern for *P. capsici* infection in processing tomatoes. In-furrow and foliar fungicide applications can be made to suppress *P. capsici* infection in these areas. The goal of this research proposal is to look at the foliar fungicide options available to Ontario growers today and in the near future for control of *P. capsici* fruit rot. The results from this research will help develop foliar fungicide programs for controlling *P. capsici* fruit rot in conjunction with in-furrow applications for *P. capsici* crown rot.

Objective

To evaluate current and future fungicide options for the control of *Phytophthora capsici* fruit rot in processing tomatoes.

Materials and Methodology

The trial was established in a field near Chatham, ON known to have *Phytophthora capsici* present in previous cropping years. The trial was planted by the grower on May 29th. The tomato variety was 3406 and planted in twin rows with a commercial planter. The space between the twin rows was 50 cm, and in-row plant spacing was 50 cm. This provided an overall plant population of 30 393 plants/ha (12 300 plants/acre). Fertilizer applied to the trial area included 6-24-6 at 1% in the transplant water at planting. Nitrogen, phosphorus and potassium were applied pre-plant broadcast at 235 N kg/ha, 146 P kg/ha and 235 K kg/ha.

The grower maintained the trial area free of weeds using a standard herbicide program and provided manual labour to hoe weeds out later in the season. The trial area received two applications of Bravo Zn at 2.5 L/ha on 7-Jul-2025 and again on 19-Jul-2025 to suppress general disease pressure in the trial.

The trial was staked on 6-Jun-2025. Trial setup was a randomized complete block design with 10 treatments and 4 replications. Plots were 1.5 meter wide by 8 meter long with a 2 meter buffer between each replication. However, on 20-Jun-2025, the site received 63.5 mm of rain. As a result, water pooled in the center of the trial area and many of the tomato plants in the area drowned. Once the damaged to the tomato plants from excess water was determined, the trial was re-staked around the drowned-out area. Plots were shrunk to 1.5 m wide by 6 m long with 0.5 m buffer between replications to accommodate the smaller area of thriving tomato plants. (See Figure 1.)

Treatments in the trial were hand sprayed with a CO2 powered backpack sprayer. The water volume applied was 200 L/ha using AIXR 11002 nozzles for application A and B. A water volume of 500 L/ha was used for applications C and D to account for the larger, denser canopy. The treatment list is found in Table 1.

Figure 1. Plot setup after heavy rain in June.

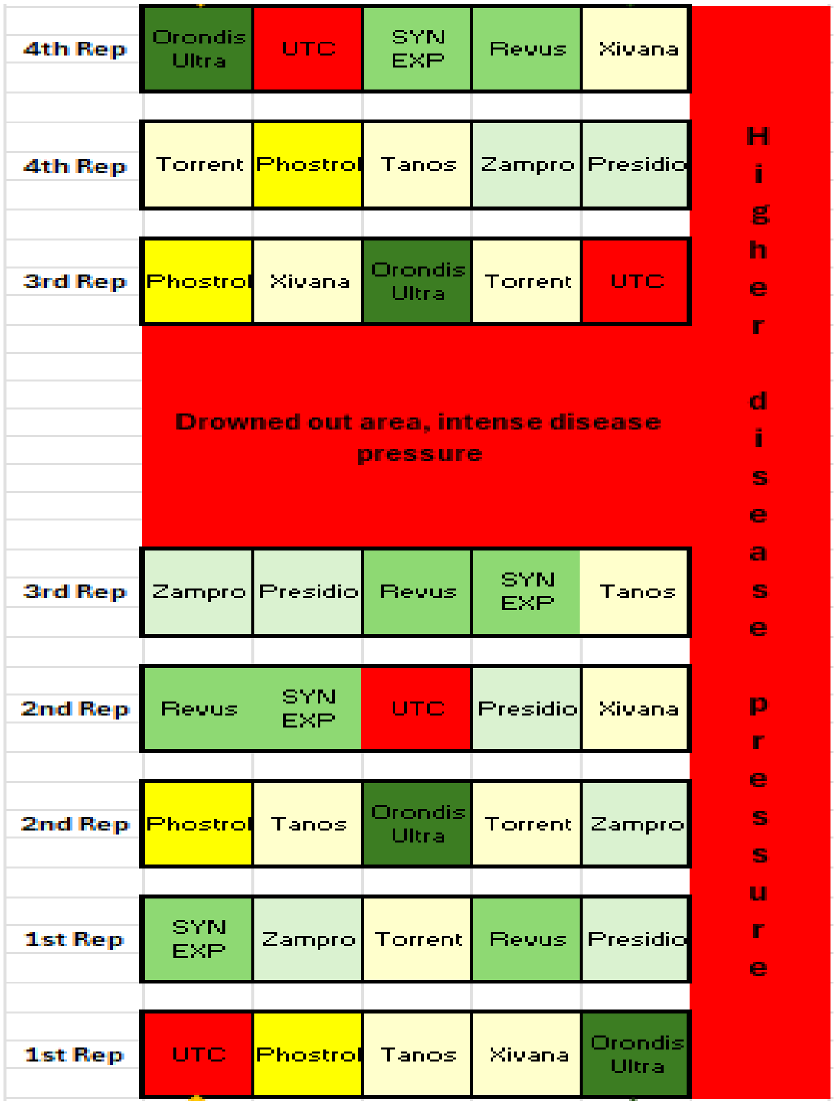

Table 1. Treatment List

Trt #	Product	FRAC Group	Rate		Application Timings
			Imperial	Metric	
1	**Untreated Check**	-	-	-	-
2	**Phostrol**	P07	2.35 L/ac	5.8 L/ha	A B C D
3	**Tanos**	11, 27	227 g/ac	561 g/ha	B C D
4	**Xivana Prime***	-	0.405 L/ac	1 L/ha	B C D
5	**Orondis Ultra**	49, 40	0.243 L/ac	0.6 L/ha	B C D
6	**SYN EXP**	-	0.623 L/ac	1.54 L/ha	B C D
7	**Zampro**	40, 45	0.405 L/ac	1 L/ha	B C D
8	**Torrent****	21	0.081 L/ac	0.2 L/ha	B C D
9	**Revus**	40	0.243 L/ac	0.6 L/ha	B C D
10	**Presidio**	43	0.118 L/ac	0.29 L/ha	B C D

*Tankmixed with Agral 90 @ 0.25% v/v

**Tankmixed with Sylgard @ 0.15 L/ha

Data collection consisted of weekly visual assessments of the fruit in each treatment for the % incidence *P. capsici* in each plot. At harvest, the fruit was hand picked from the plants in the center 2 meters of each plot. The fruit was graded by colour and marketability. The data was analysed using GDM Solutions Inc. ARM software. The means of the variables tested were separated using the LSD test with a confidence interval of P=0.05; means followed by the same letter are not different.

Applications

Applications for the trial began on 8-Jul-2025 and were repeated every 7 days. The growth stages and tomato heights for each application are listed in Table 2. Applications should have started one week earlier but were delayed due to the flooding and question on tomato plant survival. Once it was determined there were enough plants left, plots were shuffled to accommodate the drowned-out area and applications began.

Table 2. Processing Tomato growth stages at application

Application Date	Processing Tomato Growth Stage		
	BBCH Code		Description
	Average	Range	
8-Jul-2025	65	61 - 67	Full flowering, at least 50% of flowers open
15-Jul-2025	71	65 - 75	1st cluster of fruit has reached typical size
22-Jul-2025	72	69 - 77	2nd cluster of fruit has reached typical size
29-Jul-2025	77	75 - 79	7th fruit cluster has reached typical size

Results

Visual assessments were made weekly beginning on 8-Jul-2025 for *P. capsici* infections present in the fruit. This entailed examining the center 6 plants of each plot for infection on the plant early in July and then on the fruit after the 15-Jul-2025 assessment (Table 3.).

There was no visual *P. capsici* infection present in any of the treatments or the Untreated Check on 8-Jul-2025, 15-Jul-2025 or 22-Jul-2025.

At the fourth evaluation (29-Jul-2025), *P. capsici* was evident on a few fruit in the Untreated Check and Phostrol treatment. The incidence was very low and not significant (LSD, p=0.05) at this time.

The fifth evaluation was conducted on 5-Aug-2025. At this evaluation, *P. capsici* infections were low, but significantly (LSD, p=0.05) higher in the Untreated Check and Phostrol compared to the remaining treatments.

On 12-Aug-2025, the sixth evaluation was conducted. At this time, *P. capsici* pressure continued to build with infected fruit visible in every treatment in the trial. There were no statistical differences (LSD, p=0.05) between any of the treatments and the Untreated Check. Numerically, *P. capsici* infection was the highest in the Untreated Check.

The seventh visual assessment was conducted on 19-Aug-2025. All the treatments significantly (LDS, p=0.05) reduced *P. capsici* infection on the fruit compared to the Untreated Check. Orondis

Ultra significantly (LSD, p=0.05) reduced the incidence of infected fruit compared to Phostrol, Tanos, Torrent and Presidio.

On 27-Aug-2025, the eight visual assessment was conducted. *P. capsici* pressure was building quickly. The incidence of *P. capsici* on the fruit in the Untreated Check average 44.9%. Tanos, Xivana Prime, Orondis Ultra, SYN EXP, Zampro, Torrent, Revus and Presidio significantly (LSD, p=0.05) reduced *P. capsici* incidence on the fruit compared to the Untreated Check. SYN EXP significantly (LSD, p=0.05) reduced *P. capsici* incidence compared to Phostrol, Tanos and Torrent.

At the final visual assessment, 4-Sep-2025, the incidence of *P. capsici* on the fruit in the Untreated Check was 70%. Xivana Prime, Orondis Ultra, SYN EXP, Zampro, Torrent and Revus significantly (LSD, p=0.05) reduced *P. capsici* incidence on the fruit compared to the Untreated Check. Orondis Ultra and SYN EXP significantly (LSD, p=0.05) reduced % incidence of *P. capsici* compared to Phostrol and Tanos.

Table 3. P. Capsici Visual % Incidence Assessment AOV Table

Treatment	% Incidence of P. Capsici on Processing Tomato Fruit*											
	29-Jul		5-Aug		12-Aug		19-Aug		27-Aug		4-Sep	
UTC	0.5	-	1.1	a	2.0	-	21.7	a	44.9	a	70.0	a
Phostrol	0.3	-	0.6	a	1.4	-	9.7	b	19.0	ab	55.0	ab
Tanos	0.0	-	0.0	b	0.3	-	7.1	b	13.9	bc	52.5	ab
Xivana Prime	0.0	-	0.0	b	0.6	-	3.5	bc	9.2	bcd	37.5	bcd
Orondis Ultra	0.0	-	0.0	b	0.1	-	1.1	c	5.9	cd	26.3	cd
SYN EXP	0.0	-	0.0	b	0.6	-	2.8	bc	4.7	d	18.8	d
Zampro	0.0	-	0.0	b	0.9	-	5.7	bc	10.6	bcd	36.3	bcd
Torrent	0.0	-	0.0	b	0.5	-	7.6	b	13.5	bc	38.8	bcd
Revus	0.0	-	0.1	b	1.4	-	4.9	bc	7.5	bcd	40.0	bcd
Presidio	0.0	-	0.0	b	0.3	-	7.1	b	12.1	bcd	46.3	abc

*Means within column followed by the same letter are not different according to LSD at p=0.05.

Harvest assessments were conducted on 8-Sep-2025. At this time, all the fruit from the center 2 m of each plot were hand picked. Information collected at harvest were the total number and weight (kg) of fruit picked from each plot that were infected, marketable and unmarketable without disease (Table 4 and 5).

At harvest, there were no statistical (LSD, p=0.05) differences in the total number of fruit, unmarketable fruit and marketable fruit harvested between any of the treatments and the Untreated Check. Numerically, the total number of fruit harvested and marketable fruit harvested were higher in every treatment compared to the Untreated Check. The trend was the same with the weight of fruit from each plot harvested for total number of fruit harvested. Numerically, each treatment had a higher weight compared to the Untreated Check. There was a statistical (LSD,

Table 4. Processing Tomato Harvest – Number of Fruit

Treatment	# Processing Tomato Fruit Harvested based on Marketability*								
	# Fruit Total			# Infected Fruit		# Green Fruit		# Marketable Fruit		
			% **							%**
UTC	137	-	100	82	-	19	-	18	-	100
Phostrol	158	-	116	98	-	20	-	27	-	112
Tanos	142	-	104	70	-	14	-	23	-	161
Xivana Prime	161	-	118	103	-	13	-	31	-	123
Orondis Ultra	222	-	162	77	-	30	-	112	-	421
SYN EXP	229	-	168	72	-	45	-	77	-	312
Zampro	174	-	127	89	-	17	-	45	-	210
Torrent	165	-	121	108	-	14	-	30	-	130
Revus	209	-	153	89	-	22	-	69	-	326
Presidio	189	-	138	71	-	20	-	51	-	238

*Means within column followed by the same letter are not different according to LSD at p=0.05.
**Calculated percent of UTC of treatment means relative to mean of UTC

Table 5. Processing Tomato Harvest – Weight

Treatment	Processing Tomato Yield based on Marketability*									
	Total Yield					Marketable Yield				
	kg/plot		kg/ha		% **	kg/plot		Kg/ha		%**
UTC	4.4	-	44,250	-	100	0.6	c	6,143	c	100
Phostrol	5.8	-	58,250	-	132	1.2	bc	11,280	bc	192
Tanos	6.4	-	64,250	-	145	1.8	bc	14,947	bc	435
Xivana Prime	7.6	-	76,000	-	172	2.1	bc	20,606	bc	342
Orondis Ultra	13.2	-	132,000	-	298	7.8	a	77,641	a	1200
SYN EXP	10.6	-	105,750	-	239	4.4	ab	43,580	ab	781
Zampro	9.4	-	93,750	-	212	3.1	abc	29,075	abc	573
Torrent	8.1	-	81,000	-	183	2.1	bc	19,905	bc	369
Revus	11.1	-	110,500	-	250	4.6	ab	44,410	ab	850
Presidio	9.3	-	92750	-	210	2.8	bc	26,327.3	bc	527

*Means within column followed by the same letter are not different according to LSD at p=0.05.
**Calculated percent of UTC of treatment means relative to mean of UTC

p=0.05) difference in marketable yield between Orondis Ultra, SYN EXP and Revus and the Untreated Check.

Conclusions

Due to the major rainfall event in June, treatment application was delayed by at least one week from the optimum window for *P. capsici* control in processing tomatoes. The trial location had intense *P. capsici* pressure and was evident in all plots throughout the trial. The late application timing due to weather and the high disease pressure provided the worst-case scenario for *P. capsici* infection. Even in this situation, fungicides registered in Ontario are providing suppression of *P. capsici* in processing tomatoes. This does demonstrate that Ontario processing tomato growers have tools available to control *P. capsici*.

There was a wide range in activity between the fungicides used in the trial. This is due to the efficacy of the fungicide but could also be due to the location of the treatment in the trial design. The plots were reshuffled in the trial site to work around the area that was severely affected by the rain in June. This put several plots closer to the intense disease pressure in the center of the trial area. There was also high disease pressure present on the left side of the trial compared to the right side (Figure 2.). Due to the variability in disease pressure in the trial area, separation of treatments may not be strong. However, it does not take away from the fact that several fungicides in this trial do provide activity on *P. capsici* in a high-pressure situation.

Yields from the trial also reflect the same pattern of confidence to the fungicide efficacy results due to the variability in the trial area. All treatments increased # of harvestable fruit and harvestable yield compared to the Untreated Check. However, the increase in yield between treatments could be partially impacted by location in the trial versus the efficacy of the fungicide.

Opportunities

The trial in 2025 demonstrated that there are options for suppressing *Phytophthora capsici* in extreme situations. The extreme situations in 2025 included high natural disease pressure, weather conducive for disease infection, and delayed application due to extreme weather. Going forward, it would benefit Ontario processing tomato growers to look at a full disease control program looking at options such as variety sensitivity, planting population, fertility programs, and fungicide options for both foliar and transplant timings. Also, the treatments applied this year were to only evaluate specific fungicides on *P. capsici* activity. Going forward, fungicide programs should be evaluated with rotating FRAC groups to reduce the chance of resistance and consider the cost of certain fungicides.

Figure 2. Trial setup including disease pressure and yield potential.