RESEARCH REPORT 2025

Project Title: Efficacy of Fungicides for Downy Mildew Control in Processing Cucumbers

Prepared for: Ontario Processing Vegetable Growers,
Ontario Cucumber Research Committee

Research Location: Ontario Crops Research Centre – Simcoe
Department of Plant Agriculture, University of Guelph
1283 Blueline Rd., Simcoe, ON

Research Team: Principal Investigator: Rene Van Acker
Research Technician(s): Rachel Riddle and Lisa Weber

Objective: Cucurbit downy mildew (CDM), an aggressive plant pathogen (*Pseudoperonospora cubensis)*, can develop at any time during the cucumber season and have devastating consequences for cucumber growers. It is a very destructive disease and progresses rapidly under favourable weather conditions. In 2006, downy mildew appeared early in Ontario causing extensive crop defoliation and yield losses. The severity of the disease resulted in some growers only meeting about 70% of the contracted tonnage. From 2007 to 2009, with the availability of more fungicides through emergency registrations, the severity of the disease was reduced, and crop yields were maintained. Disease pressure in Ontario varies from year to year, depending on when it first appears in the field. The last couple of years CDM has been detected mid-July. In 2025, the disease was first detected in cucumber trials at the Simcoe research centre on July 3, 12 days earlier than in 2024 and earlier than previous years. There has been a trend of downy mildew arriving earlier in the Norfolk County area for the past several years.

The downy mildew pathogen has developed resistance to some fungicides that were effective in the past in controlling downy mildew in cucumbers. Testing of current registered products is necessary for making informed recommendations on spray programs that will continue to be effective in controlling downy mildew. Evaluating new products is important for the registration of new effective fungicides to control downy mildew, which is a great benefit to the Ontario processing cucumber industry. In addition, the cucumber processing industry in North America has shifted to planting parthenocarpic-type varieties. Current research on fungicide efficacy should be on the varieties being grown and processed, thus a parthenocarpic variety was planted for the 2025 trial.

Methodology: A fungicide efficacy trial was conducted at Ontario Crops Research Center – Simcoe, in 2025. The parthenocarpic variety “Springsteen” was seeded using a precision seeder on July 3 in rows 30 inches apart with in-row plant spacing of 8" to give a target plant population of 28,000 plants/acre. The crops were grown according to accepted commercial practices used in Ontario. The trial was set up as a randomized complete block design with four replications. Treatments were applied using a hand-held CO_2 backpack sprayer with air induction, low drift (AI TeeJet 110015-VS) nozzles at a pressure of 40 psi and water volume of 250 L/ha. 15 treatments were evaluated, including an untreated control. Treatments were applied to plots on July 16, July 24, August 1 and August 7.

Downy mildew visual ratings were made at weekly intervals starting on July 15. Symptoms of downy mildew was first detected in plots of this trial on July 22. Mature fruit was harvested by hand on August 20. Fruit ranged in size from grade 1 to oversize (OS) with the majority being in the 3A/3B grade size

at harvest which is an ideal size to maximize yields and profit for machine harvest cucumbers. Yields were measured as graded fruit numbers and weights. Plot yields were converted to tons/acre and US $/acre for reporting purposes.

Results: In 2025, downy mildew infection was present in surrounding cucumber trials at the research centre at the time of planting. The disease was detected in significant amounts (>5%) in untreated trial plots on July 22 at the 3-4 leaf stage. By July 30 disease was observed in all plots except for one treatment. A week later, disease increased in all plots due to favourable weather conditions and high disease pressure. At the last rating on August 13, seven days prior to harvest, infection in untreated plants was 79%. Plants treated with products that were providing good residual control of downy mildew had decreased disease incidence at the last rating when compared to the August 6 rating due to the new growth of leaves and vines.

Confidential product Exp 1, Xivana Prime (low and high rates) and Orondis Ultra provided the best control of downy mildew with 25, 30, 34 and 35% leaf infection, respectively. This is a higher amount of infection than has been observed in previous years with the best treatment options, however disease pressure was high in this trial. Intermediate disease control was observed from plants treated with Allegro, Torrent, Zampro, Presidio and Tattoo C at the July 30 rating, but disease progressed with all these treatments by August 13 in which there was over 53% leaf infection (Table 1).

Final yields were significantly reduced for the treatments with the highest downy mildew infection when compared to the best treatments of Orondis Ultra, Exp 1 and Xivana Prime (low and high rates) (Table 1). Confidential product Exp 1 and Xivana Prime are currently unregistered products for downy mildew on cucurbits, but provided excellent control of the disease and have yields comparable to Orondis Ultra.

Presidio controlled downy mildew when it was first registered 15 years ago, but efficacy has decreased over time and it is no longer recommended in a spray program in Ontario. This product was reintroduced into this trial based on recent research results conducted at academic institutions in the United States that have reported Presidio to have an increased efficacy on cucurbit downy mildew control possibly due to changes with the pathogen. In this trial Presidio had some control of downy mildew, comparable to Bravo with yields not significantly different. Presidio should continue to be evaluated since this product has shown the potential for better efficacy against the changing downy mildew pathogen.

These results show that Orondis Ultra is still the most effective registered product at controlling cucurbit downy mildew to levels that do not have an economic impact on the final yield of cucumbers, even under high disease pressure. Torrent and Zampro provided intermediate control suggesting that if used in a program with Orondis, these products remain the best downy mildew control option.

Table 1: Incidence of cucumber leaves with downy mildew symptoms and yield of cucumbers, variety 'Springsteen', harvested from plots sprayed with different fungicides, Simcoe, ON, 2025.

	FRAC[b]	Rate	% Downy Mildew Infection[c]				Yield	
Product[a]	Group	per Hectare	July 22	Jul 30	Aug 6	Aug 13	t/acre	US $/acre
Bravo ZN	M5	4.8 L	2	32	63	70	8.9 cde	2,306 cde
Torrent + Sylgard	21	200 ml 0.25 % v/v	0	12	40	53	10.9 cd	2,933 cd
Zampro + Sylgard	40, 45	1.0 L 0.25 % v/v	2	38	50	60	10.9 cd	2,796 cd
Captan	M4	3.25 Kg	2	43	63	75	7.3 c-f	1,887 c-f
Presidio	43	292 ml	0	35	63	68	5.8 def	1,564 def
Tattoo C	28, M5	2.70 L	0	27	60	53	13.0 bc	3,420 bc
Allegro	29	1.75 L	0	32	70	68	11.6 cd	2,960 cd
Orondis Ultra	40, 49	600 ml	0	1	35	35	20.5 ab	5,193 ab
Exp 1			0	1	38	25	21.8 a	5,321 ab
Xivana Prime	49	0.75 L	0	1	43	34	21.2 ab	5,293 ab
Xivana Prime	49	1.0 L	0	0	38	30	24.2 a	5,746 a
Cueva	M1	2.4 % v/v	4	50	70	68	3.2 f	724 f
Stargus	BM2	6.0 L	2	47	70	78	4.5 ef	1,128 ef
Cueva alt Stargus	M1 BM2	2.4 % v/v 6.0 L	3	52	65	75	5.1 ef	1,284 ef
Untreated Control			5	65	73	79	4.0 ef	978 f

Planting Date : July 3 — Date of First Application : July 16

Plant Population : 28,000 plants/Ac — Harvest Date : August 20

[a] First application was applied at the 2-leaf stage, subsequent applications were made on a 7-day spray interval, 4 total

[b] Fungicide Resistance Action Committee

[c] Based on % leaves infected

Means followed by the same letter do not significantly differ (P=0.05, Tukey's HSD)