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"In This Issue"

Command 360 ME Herbicide label expanded via Minor Use Program for management of labeled weeds on cilantro and for use with a reduced PHI on cucumbers and squash in Canada

J. Chaput, Minor Use Coordinator, OMAFRA

The Pest Management Regulatory Agency (PMRA) recently announced the approval of minor use label expansion registrations for Command 360 ME Herbicide for management of labeled weeds on cilantro and for use at a reduced pre-harvest interval on cucumbers and squash in Canada. Command 360 ME Herbicide was already labeled for use on a number of crops in Canada for control of several weeds.

These minor use projects were submitted by Agriculture & Agri-Food Canada, Pest Management Centre (AAFC-PMC) as a result of minor use priorities established by growers and extension personnel.

The following is provided as an abbreviated, general outline only. Users should be making weed management decisions within a robust integrated weed management program and should consult the complete label before using Command 360 ME Herbicide.

Crop(s)	Target	Rate (L/ha)	Application Information	PHI (days)
Cilantro	Labeled weeds	0.78	Apply broadcast after seeding but prior to crop or weed emergence.	50
Cucumbers, squash (including processing pumpkin varieties)	Labeled weeds	0.78 – 1.17	Apply as a single, soil-applied, pre-emergent treatment after seeding and prior to crop or transplanting and prior to weed emergence.	30 (new)

Command 360 ME Herbicide label expanded via Minor Use Program for management of labeled weeds on cilantro and for use with a reduced PHI on cucumbers and squash in Canada…con't

Command 360 ME Herbicide is toxic to aquatic organisms and non-target terrestrial plants. Do not apply this product or allow drift to other crops or non-target areas. Do not contaminate off-target areas or aquatic habitats when spraying or when cleaning and rinsing spray equipment or containers.

Follow all other precautions, restrictions and directions for use on the Command 360 ME Herbicide label carefully.

For a copy of the new minor use label contact your local crop specialist, regional supply outlet or visit the PMRA label site https://www.canada.ca/en/health-canada/services/consumer-product-safety/pesticides-pest-management/registrants-applicants/tools/pesticide-label-search.html

Note: This article is not intended to be an endorsement or recommendation for this particular product, but rather a notice of registration activity.

Presidio® Fungicide label expanded via Minor Use Program for control of various diseases on field and greenhouse grown basil, hops and edible-podded beans in Canada

J. Chaput, Minor Use Coordinator, OMAFRA

The Pest Management Regulatory Agency (PMRA) recently announced the approval of URMULE registrations for Presidio Fungicide for control of downy mildew on field and greenhouse basil and downy mildew of hops, and suppression of Phytophthora blight and pod rot and downy mildew on edible-podded beans in Canada. Presidio Fungicide was already labeled for use on a number of crops in Canada for control of several diseases.

These minor use projects were sponsored by Agriculture and Agri-Food Canada, Pest Management Centre (AAFC -PMC) in collaboration with the US IR-4 program as a result of minor use priorities established by growers and extension personnel.

The following is provided as an abbreviated, general outline only. Users should be making pest management decisions within a robust integrated disease management program and should consult the complete label before using Presidio Fungicide.

Presidio® Fungicide label expanded via Minor Use Program for control of various diseases on field and greenhouse grown basil, hops and edible-podded beans in Canada…con't

Crop(s)	Target	Rate (mL/ha)	Applications	PHI (days)
Basil, field and greenhouse grown	Downy mildew	292	Apply on a 7 day schedule beginning when conditions begin to favour disease development. Presidio must be tank mixed with a labeled rate of another fungicide registered for the target pathogen, but with a different mode of action. Maximum of 3 applications per season.	1
Hops	Downy mildew	292	Apply on a 10-14 day schedule beginning when conditions begin to favour disease development. Presidio must be tank mixed with a labeled rate of another fungicide registered for the target pathogen, but with a different mode of action. Maximum of 3 applications per season.	24
Edible podded beans (*Phaseolus spp, Vigna spp*, jackbean, soybean, immature seed, sword bean)	Downy mildew and Phytophthora blight and pod rot (suppression)	292	Apply on a 7-14 day schedule beginning when conditions begin to favour disease development. Presidio must be tank mixed with a labeled rate of another fungicide registered for the target pathogen, but with a different mode of action. Maximum of 3 applications per season..	0

Presidio Fungicide is toxic to aquatic organisms and non-target terrestrial plants. Do not apply this product or allow drift to other crops or non-target areas. Do not contaminate off-target areas or aquatic habitats when spraying or when cleaning and rinsing spray equipment or containers. The use of this product in areas where soils are permeable, particularly where the water table is shallow, may result in ground water contamination. Fluopicolide is persistent and may carryover. It is recommended that any products containing fluopicolide not be used in areas treated with this product during the previous season.

Follow all precautions and detailed directions for use on the Presidio Fungicide label carefully.

For a copy of the new minor use label contact your local crop specialist, regional supply outlet or visit the PMRA label site http://www.hc-sc.gc.ca/cps-spc/pest/registrant-titulaire/tools-outils/label-etiq-eng.php

Note: This article is not intended to be an endorsement or recommendation for this particular product, but rather a notice of registration activity

Diplomat 5SC Fungicide label expanded via Minor Use Program for control of supplementary diseases on additional field and greenhouse crops in Canada

J. Chaput, Minor Use Coordinator, OMAFRA

The Pest Management Regulatory Agency (PMRA) recently announced the approval of a minor use label expansion registration for Diplomat 5SC Fungicide for control or suppression of various diseases on greenhouse and field grown fruits and vegetables in Canada. Diplomat 5SC Fungicide was already labeled for use against several diseases on outdoor and greenhouse grown crops in Canada.

These minor use projects were submitted by Ontario as a result of minor use priorities established by growers and extension personnel.

The following is provided as an abbreviated, general outline only. Users should be making disease management decisions within a robust integrated disease management program and should consult the complete label before using Diplomat 5SC Fungicide.

Crop(s)	Target	Rate (mL/ha)	Application Information	PHI (days)
Lettuce (head, leaf) [GH & field]	Downy mildew (suppression)	463 – 926	Begin as a preventative application when conditions favour disease development.	0
Spinach	White rust (suppression)	463	Begin as a preventative application when conditions favour disease development.	
Fruiting vegetables, CG 8-09 [GH & field]	Botrytis blight, grey mold (suppression)	463 – 926	Begin as a preventative application when conditions favour disease development.	0
Fruiting vegetables, CG 8-09 [GH & field]	Early blight (suppression)	537 – 926	Begin as a preventative application when conditions favour disease development.	
Tomatoes (Greenhouse)	Powdery mildew (control)	278 – 926	Begin as a preventative application when conditions favour disease development.	0
Cucurbit vegetables, CG 9 [GH & field]	Anthracnose (control) Downy mildew (suppression)	463 – 926	Begin as a preventative application when conditions favour disease development.	0
Cucurbit vegetables, CG 9 [GH & field]	Gummy stem blight (suppression) Powdery mildew (control)	463 – 926	Begin as a preventative application when conditions favour disease development.	0
Cucurbit vegetables, CG 9 [GH & field]	Grey mold, powdery mildew (suppression)	259 – 926	Begin as a preventative application when conditions favour disease development.	0

Diplomat 5SC Fungicide label expanded via Minor Use Program for control of supplementary diseases on additional field and greenhouse crops in Canada...Con't

Do not apply this product or allow drift to other crops or non-target areas. Do not contaminate off-target areas or aquatic habitats when spraying or when cleaning and rinsing spray equipment or containers.

Follow all other precautions, restrictions and directions for use on the Diplomat 5SC Fungicide label carefully.

For a copy of the new minor use label contact your local crop specialist, regional supply outlet or visit the PMRA label site https://www.canada.ca/en/health-canada/services/consumer-product-safety/pesticides-pest-management/registrants-applicants/tools/pesticide-label-search.html

Note: This article is not intended to be an endorsement or recommendation for this particular product, but rather a notice of registration activity

Intake Announced for CAP Funding for Horticultural Growers

Take advantage of the Canadian Agricultural Partnership five-year federal-provincial-territorial initiative. A new intake will take place between **March 22, 2019 and May 6, 2019**. All cost-share funding assistance is merit-based, and project funding amounts are individually established based on the new and updated project categories. Cost-share funding will support targeted projects in three priority areas, with research and innovation continuing to be important across all programming:

- **Economic Development** in the agri-food and agri-products sectors
- **Environmental Stewardship** to enhance water quality and soil health
- **Protection and Assurance** to reinforce the foundation for public trust in the sector through improved assurance systems in food safety and plant and animal health

An outline of the Program Guide: http://adaptcouncil.org/program/cap

A list of available projects: http://adaptcouncil.org/program/cap/appendix1projectcategoryleveldescriptions

Vegetable crop growers may be interested in funding for **Technology Solutions – Productivity.** This includes any equipment or machinery that would increase productivity for growers of horticultural crops. Cost share starts at 35% but if the project demonstrates multiple project category priorities it may be considered for up to a 75% cost share. The specific project details can be found here: https://adaptcouncil.org/program/cap/productivity-technology-solutions-productivity-pilots-and-demonstrations-of-new-technology

More information will be available on the websites of the Ontario Soil and Crop Improvement Association and the Ontario Ministry of Agriculture, Food and Rural Affairs on or before March 8, 2019.

Can Onion Maggot be managed without insecticides?

Travis Cranmer, Vegetable Crops Specialist, OMAFRA

The onion maggot (*Delia antiqua*) is the larvae stage of the onion maggot fly which can cause severe damage to onions but can also feed on other Alliums including shallots, leeks, garlic and chives. The adult onion maggot is a fly that is about half the size of a house fly, has a body that is grey in colour and has reddish eyes (**Figure 2**).

The onion maggot fly overwinters as a pupae in the top 15 cm of soil. In the early spring, adult flies emerge and the females lay small, white eggs ~2–10 cm below the soil line around the base of the plant. Once the eggs hatch, the larvae start feeding off susceptible Allium species. Small plants are most susceptible, and in onion, one maggot can kill up to 20 plants. Cool, wet weather favours development and without control, *D. antiqua* can reduce plant stands by over 50% if crops are not protected. Even if the plant is not killed, wounds caused by the larvae can cause secondary rots in storage.

Figure 1. Wilted onion due to onion maggot damage.

Onion maggot management relies heavily on seed treatments, or on group 1B organophosphates, specifically chlorpyrifos insecticides which have been identified as a major surface water contaminant in some vegetable growing areas. The prospect of insecticide resistance and potential restrictions of use illustrate the importance of alternative management strategies for this insect. Sterile Insect Technology (SIT) in Quebec has proven to eliminate the application of soil and foliar chlorpyrifos insecticides in most fields while maintaining onion yields comparable to pesticide-based programs.

Figure 2. Adult onion maggot fly on yellow sticky card

The idea is that by releasing sterile male onion maggot flies on a weekly basis, these male flies will mate with the wild, fertile females and the eggs that they lay will not be fertile. These eggs would not hatch into larvae, there would be no larvae to cause damage to the onion, and the population of flies would decrease over time.

This strategy has proven to be successful in Quebec, and acreage using SIT has grown from 346 acres in 2011 to 1680 acres in 2017. Work in Quebec has shown that the release rates of sterile flies could be decreased by up to 90% within 5 years of repeated use due to the reduction of wild populations while also decreasing the cost of the sterile fly program itself.

An AAFC project to demonstrate the use of sterile fly release technology for onion maggot management in Ontario was conducted in 2018 in collaboration with Phytodata Inc. and OMAFRA. The trial was set up in two fields of onion sets approximately 4.3 km apart with no other major onion fields within a 20 km radius. Flies were sterilized and released according to the protocol developed by Phytodata in the 'release' field while no flies were released in the 'control' field. Sticky cards were used weekly to monitor natural onion maggot populations as well as the displacement of sterile flies throughout the growing season. Sterile flies were differentiated on sticky cards by their colour as these flies were dyed pink before they were released.

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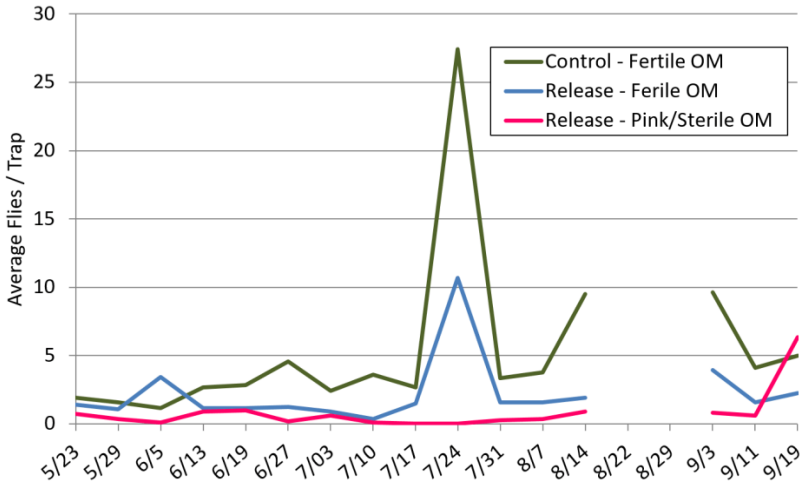

Figure 3. Average flies per sticky trap per week at both field sites. Fertile fly counts at the control field (green) were generally higher than counts at the release field (blue). Sterile flies were found in relatively low numbers at the release field (pink) while no sterile flies were found at the control field 4.3 km away.

Sticky card counts throughout the season indicate that the control field had a higher fertile fly pressure than the release field from June 13 until harvest. An average of 2.2 flies/trap/week were counted per trap in the release field compared to 5.4 flies/trap/week in the control (**Figure 3**). No pink flies were found on any of the sticky cards at the control field. Sticky cards were compromised by a weather event on August 22nd and therefore card counts were not quantified between August 15th and August 28th.

While this trial showed a population reduction of over 50% of fertile onion maggot flies at the release field within a single year, it is unknown whether the wild onion maggot population was equal between the two sites. A continuation of this program would most likely reduce the need of chemical control options for onion maggot fly in the area if continued. If you are interested in applying this management strategy on your farm, please contact Anne-Marie Fortier at afortier@phytodata.ca.

FULL REPORT
FIELD DEMONSTRATION OF THE STERILE FLY RELEASE TECHNOLOGY FOR ONION MAGGOT MANAGEMENT IN ONION SET PRODUCTION IN ONTARIO

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MATERIALS: Sterilized/irradiated *Delia antiqua* pupae.

METHODS: Two fields of onion sets approximately 4.3 km apart were sown in Granby sandy loam near Exeter, Ontario in the spring of 2018. Both fields were seeded at a high density of ~20 million seeds / ha (~8 million seeds / ac) with no soil application of chlorpyrifos. The release field was approximately 7.4 ha (18.3 ac) in size and was sown on 10 May. The control field was approximately 3.7 ha (9.3 ac) in size and was seeded one week after the release field approximately 4.3 km away (**Figure 1**). There were no other major onion fields within a 20 km radius from either the control or release field. The field used for onion sets the previous year (2017), was approximately 2.8 km and 2.9 km away from the control and release fields respectively. Onion flies were produced by Phytodata, and then sterilized and released according to the protocol developed by Phytodata, using the Sterile Insect Technology (SIT). The *Delia antiqua* pupae were irradiated by Nordion and then shipped to Guelph, ON, and kept alive until release following protocols developed by Phytodata Inc.

Figure 1. The control field (**A**) was approximately 3.7 ha (9.3 ac) in size while the release field (**B**) was situated 4.3 km away and was approximately 7.4 ha (18.3 ac) in size.

Four onion maggot sticky traps consisting of three stakes with blue sticky cards clipped above the crop canopy were placed on each side of both fields (**Figure 2B**). Cards were monitored weekly for natural onion maggot populations as well as for the displacement of sterile / pink flies throughout the growing season. Fly releases began on May 16 and continued weekly until September 11. Flies were released on the north-west corner of the release field at least 30 m from the closest sticky card trap at the west side of the field. Damage plots measuring 30 x 30 cm capturing approximately 100 plants were set up a short distance away from the sticky traps at the flag leaf stage May 29 at each of the four sites per field (**Figure 2A**). The number of plants were counted weekly until August 7. In addition, 50 onions were harvested every week starting on July 10 and commencing on September 3 to monitor for maggot damage (**Figure 2C**). The control field was harvested September 7 and the release field was harvested September 14. The final fly release took place September 11 and the final sticky card assessment was on September 19. Weather parameters were measured hourly using a HOBO datalogger U30 RX3000 (Onset Computer Corporation) from April 11 onwards. Weather data from April 1 to April 10 was collected for degree day modeling from a nearby weather station (43.437, -81.654) approximately 12.3 km from the field site. An onion maggot degree day model was used to track the development and predict the generation time of adult flies. Degree day values using a base of 4°C started to accumulate April 1 using the following formula: ((Max Temp + Min Temp)/2) – 4°C.

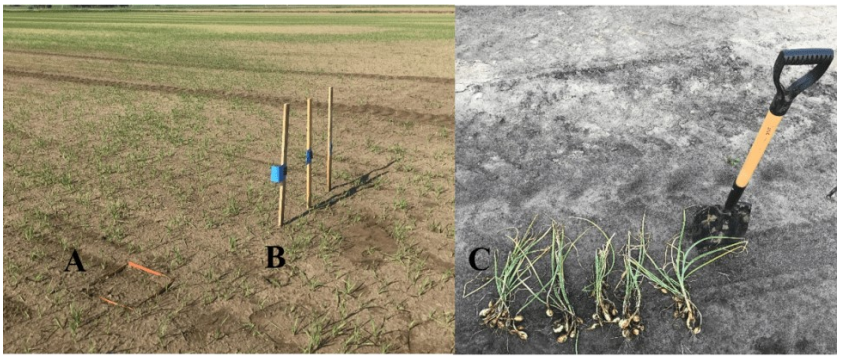

Figure 2. Damage plots (**A**), sticky cards (**B**) and destructive sampling (**C**) conducted on various dates outlined in **Table 1**.

RESULTS: Sticky card counts throughout the season indicate that the control field had a higher fertile fly pressure than the release field from June 13 until harvest (**Figure 3**). An average of 2.2 flies/trap/week were counted per trap in the release field compared to 5.4 flies/trap/week in the control (**Table 1**). Pink flies were found at every trap at the release field but most were quantified throughout the season at the west trap which was the closest trap relative to where the sterile flies were release. No pink flies were found on any of the sticky cards at the control field. Degree day modeling predicted generational peaks for onion maggot fly emergence to occur May 16 (1st Generation, 210DD), July 5 (2nd generation, 1025DD) and August 17 (3rd generation, 1772DD) using the DD model ((Max Temp + Min Temp)/2) – 4°C with values accumulating after April 1st (**Figure 4**). The emergence peak observed in the field on July 24 was ~19 days after the predicted second generation emergence and ~24 days before the third generation emergence. It is likely that the second emergence peak occurred July 24 and the third emergence occurred between August 15 and August 28 when the sticky cards were compromised due to a weather event. Sticky card trap counts indicated that the main spike in fertile flies at both field sites occurred the week leading up to July 24, (release: 27 flies/trap/week, control: 10 flies/trap/week). The emergence peak observed in the field on July 24 was ~19 days after the predicted second generation emergence and ~24 days before the third generation emergence. Destructive sampling did not find any onion maggot larvae throughout the season. The level of onion maggot damage in these fields this year was low relative to other years (Grower correspondence).

Table 1. Sterile fly release dates, plant stage, trap counts and damage plot levels.

	Release Field					Control Field			
Date	Release Quantity ('000)	Plant Stage[1]	Fertile Flies	Pink Flies	Damage Plots	Plant Stage[1]	Fertile Flies	Pink Flies	Damage Plots
18/05/16	56	pre	--	--	--	pre	--	--	--
18/05/23	69	loop	1.4	0.7	--	loop	1.9	0.0	
18/05/29	85	flag	1.1	0.3	131	loop	1.6	0.0	86
18/06/05	108	flag	3.4	0.1	--	flag	1.2	0.0	--
18/06/13	155	1LS	1.2	0.9	119	1LS	2.7	0.0	104
18/06/19	182	2LS	1.2	1.0	104	2LS	2.8	0.0	93
18/06/27	182	3LS	1.3	0.2	101	3LS	4.6	0.0	89
18/07/03	155	3LS	0.9	0.6	106	3LS	2.4	0.0	80
18/07/10	142	4LS	0.3	0.1	105	3LS	3.6	0.0	88
18/07/17	101	4LS	1.5	0	104	4LS	2.7	0.0	90
18/07/24	56	5LS	10.7	0	96	4LS	27.4	0.0	85
18/07/31	46	5LS	1.6	0.3	93	5LS	3.3	0.0	89
18/08/07	77	5LS	1.6	0.3	74	5LS	3.8	0.0	75
18/08/14	60	5LS	1.9	0.9	--	5LS	9.5	0.0	--
18/08/22	41	5LS	--	--	--	5LS	--	--	--
18/08/29	34	5LS	--	--	--	5LS	--	--	--
18/09/03	42	5LS	3.9	0.8	--	5LS	9.6	0.0	--
18/09/11	36	5LS	1.6	0.6	--	post	4.1	0.0	--
18/09/19	--	post	2.3	6.3	--	post	5.0	0.0	--

[1] Plant stage where pre = pre-emergence, loop = loop stage, flag = flag leaf stage, LS = leaf stage and post = after harvest

-- = Data points not taken or no flies were released

Table 1. Sterile fly release dates, plant stage, trap counts and damage plot levels.

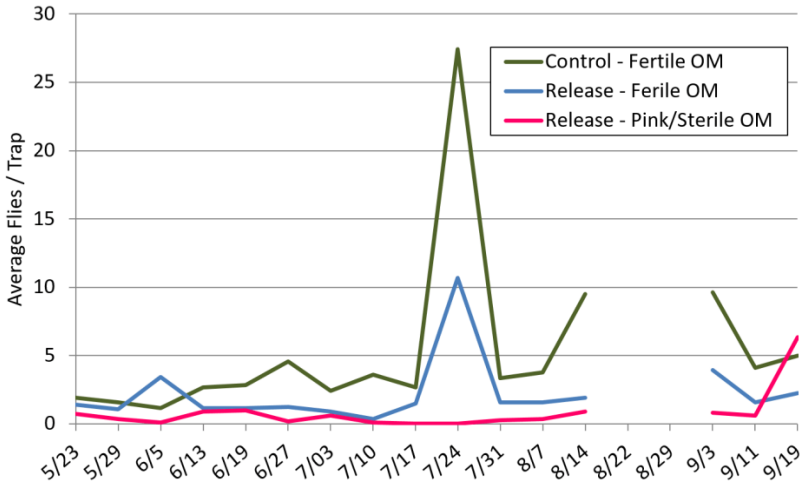

Figure 3. Average flies per sticky trap per week at both field sites. Fertile fly counts at the control field (green) were generally higher than counts at the release field (blue). Sterile flies were found in relatively low numbers at the release field (pink) while no sterile flies were found at the control field 4.3 km away.

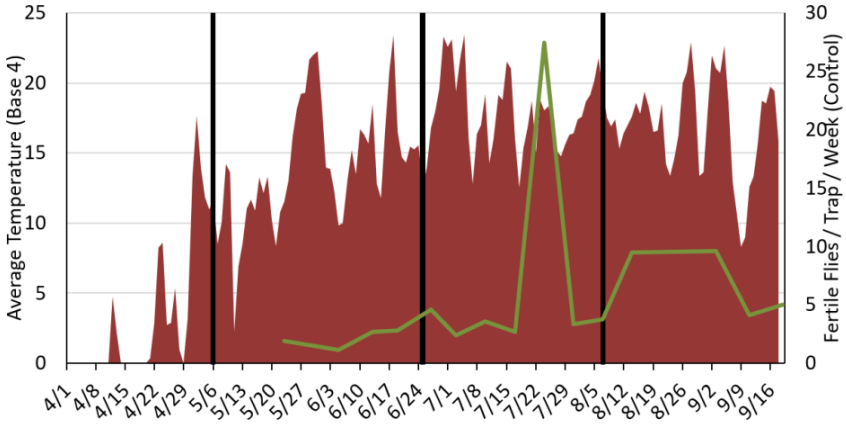

Figure 4. Growing Degree Days values (red) using a base of 4°C from April 1st using the formula: ((Max Temp + Min Temp)/2) – 4°C. Generational peaks for onion maggot fly emergence (black columns) were predicted to occur May 16 (1st Generation, 210DD), July 5 (2nd generation, 1025DD) and August 17 (3rd generation, 1772DD). Average fertile flies per sticky trap per week from the control field (green) on secondary axis.

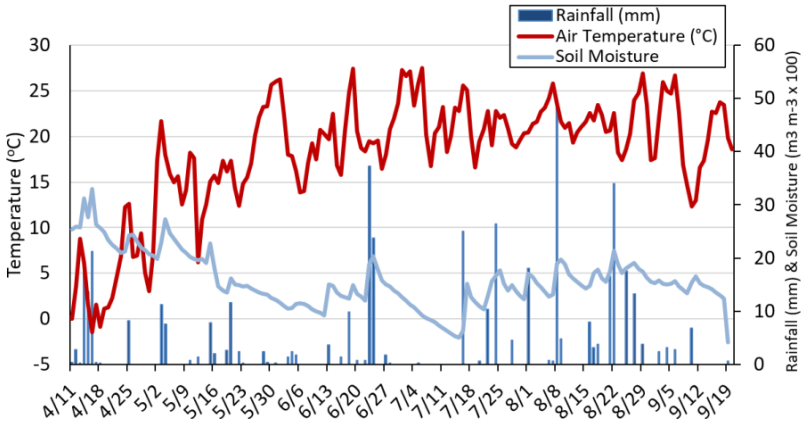

Figure 5. Ambient temperature (°C), rainfall (mm) and relative humidity (%) taken from the onsite weather station.

Figure 6. Crop development of the release field June 13 (**A**), as well as the control field, July 17 (**B**) and August 7 (**C**).

Figure 7. Crop development of the release field August 29 (**A & B**), and September 3 (**C**).

CONCLUSION: Onion maggot (*Delia antiqua*) management relies heavily on group 1B organophosphates, specifically chlorpyrifos insecticides which have been identified as a major surface water contaminant in some vegetable growing areas. The prospect of insecticide resistance and potential restrictions of use illustrate the importance of alternative management strategies for this insect. Throughout this trial, sticky cards were the only monitoring strategy that could compare insect levels between the two fields since destructive sampling did not find any onion maggot larvae throughout the season. Differences in stand-loss observed by damage plots between the two fields showed a 43% loss in the release field and 28% in the control. Given the higher seeding density of the field, it is likely that competition for space and moisture resulted in the greater stand loss percentage in the release field compared to the control. Overall, both fields were harvested with roughly the same density of onions at harvest between the two fields. Sterile Insect Technology (SIT) in Quebec has proven to eliminate the application of soil and foliar chlorpyrifos insecticides in most fields while maintaining onion yields comparable to pesticide-based programs. Onion acreage in Quebec using SIT has grown from 140 ha in 2011 to 680 ha in 2017. Work in Quebec has shown that the release rates of sterile flies could be decreased by up to 90% within 5 years of repeated use due to the reduction of wild populations while also decreasing the cost of the sterile fly program itself.

If you are interested in applying this management strategy on your farm, please contact Anne-Marie Fortier at afortier@phytodata.ca.

Funding for this project was provided by Pesticide Risk Reduction Program through the Pest Management Centre. Thank you to Hannah Fraser, Cora Loucks, Dennis Van Dyk, Ashleigh Ahrens, Jordan Elshof, Josh Mosiondz, and Laura Stoltz for their help throughout the growing season.