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Cucurbit Downy Mildew – get out and scout!

Katie Goldenhar, Horticulture Crop Pathologist, OMAFRA

Cucurbit downy mildew has not been identified in Ontario or the Great Lakes region, but sporangia have been detected in Michigan (<https://www.canr.msu.edu/news/cucurbit-downy-mildew-spores-identified-in-air-samples-allegan-county>) so growers should be on high alert and scouting often for this disease. Cucumber and muskmelon crops are the most susceptible, especially if there is heavy overhead irrigation or significant rainfall.

If you suspect downy mildew in your field, send for confirmation immediately. Contact the OMAFRA specialists listed below if you have any questions about detection or management.

What to look for Downy mildew symptoms first appear as water-soaked lesions on the topside of leaves. The lesions can start anywhere in the canopy. These initial lesions are best seen during a heavy dew. The centre of the lesion then turns yellow (chlorotic) and eventually tan or brown (necrotic) (Figure 1). In cantaloupe, lesions appear irregularly shaped (Figure 2). As the disease progresses, lesions expand and multiply, causing foliage to become necrotic, and leading to plant death.



Figure 1. Downy Mildew on Cucumber Figure 2. Downy mildew on cantaloupe

Under humid conditions, a downy growth that resembles “dirt” often develops on the underside of the initial water-soaked lesions. This growth on the underside of the leaf can also be seen before any symptoms on the upper leaf (Figure 2). This downy growth is particularly noticeable in the morning after a period of wet weather or when conditions favour dew formation.

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Cucurbit Downy Mildew – get out and scout!...con't

Figure 3. Black spore growth on the leaf underside, best seen during the early stages of infection. Spores may not be apparent if an anti-sporulent fungicide has been applied.

Spore trapping

Michigan State University annually conducts spore trapping and reports their findings here (<https://veggies.msu.edu/downy-mildew-news/>). New this year, Dr. Hausbeck's lab is reporting the clade associated with each spore detection. Clade 1 infects pumpkins, squash and watermelons and is not a concern most years in Ontario. Clade 2 infects cucumbers and cantaloupe and is seen annually in the region. Clade 2 spores have been identified in Michigan on May 17, 2021.

In Ontario, passive spore traps have been placed across the province to detect for cucurbit downy mildew spores. Reports will be posted on the <https://onvegetables.com/> blog.

Management

For optimum control, use a preventative downy mildew management strategy. The broad-spectrum fungicides listed in Table 1, Downy mildew multi-site, broad spectrum fungicides, provide protection against downy mildew infections under low disease pressure conditions. Apply the first application no later than the vine development stage. Consider an earlier application under high risk downy mildew conditions.

Under higher risk conditions, refer to Table 2. For late crop cucumbers, be prepared to begin the preventative fungicide program soon after crop emergence. Banded applications on small plants greatly reduces the cost of the fungicide program. Trials in Michigan and Ontario have shown the three most consistently effective downy mildew fungicides are Orondis Ultra, Torrent and Zampro. Where possible, tank mix each application with chlorothalonil (Echo/Bravo) or mancozeb (Dithane, Penncozeb, Manzate). Never make back-to-back applications of the same product or products from the same chemical family. Follow a 5 to 7-day application interval, and rotation of the three products can be repeated as necessary.

See crop labels for listed cucurbit crops registered on the products below. For more information, refer to publication 838 (<http://www.omafra.gov.on.ca/english/crops/pub838/p838order.htm>).

Table 1. Downy mildew multi-site, broad spectrum fungicides

Common name (FRAC group)	Trade Names	Rate per hectare (Rate per Acre)	PHI (days)	Re-entry interval	Max applications
mancozeb (M03)	Dithane Rainsheild, Penncozeb 75DF Raincoat Manzate Pro-Stick	1.1-3.25 kg (0.4-1.3 kg)	14	12 hours	–
chlorothalonil (M05)	Bravo ZN Echo	4.8 L (1.9 L)	2	12 hours	2

High risk downy mildew conditions include downy mildew has been identified in the Great Lakes Region, prolonged periods of cool, wet weather, cooler night-time temperatures and heavy dew fall followed by warm, windy days and extended periods of leaf wetness due to dew, rain or overhead irrigation. Apply a preventative fungicide before a rainfall event or prior to overhead irrigation.

Table 2. Downy mildew specific fungicides

Common name (FRAC group)	Trade Name	Rate per hectare (Rate per Acre)	PHI (days)	Re-entry interval	Max applications
cyazofamid (21)	Torrent 400SC	150-200 ml (61-81 ml) + NIS or organosilicone surfactant	1	12 hours	6
amectotradin (45) + dimethomorph (40)*	Zampro	0.8-1 L (0.3-0.4 L)	1	1 day for hand harvesting, pruning or thinning, 12 hours for other activities	3
oxathiapiprolin (49) + mandipropamid (40)*	Orondis Ultra	0.4-0.6 L (162-243 ml)	0	12 hours	4

*resistance is known to the group 40 fungicides, mandipropamid and dimethomorph. Only the premix partners oxathiapiprolin and amectotradin in Orondis Ultra and Zampro, respectively, are effective on downy mildew.

For more information, check out the new cucurbit downy mildew factsheet(<https://www.ontario.ca/page/downy-mildew-cucurbits>).

Contacts

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June 15, 2020

VCR – Vegetable Crop Report – June 10th, 2021

The VCR (vegetable crop report) is a weekly update which includes crop updates, weather and growing degree summaries for various vegetable growing regions across Ontario.



Temperature – Day temperatures are forecasted to range from low 20s to high 30s depending on the region. Nighttime temperatures are forecasted to be around the mid-teens for most regions over the next week.

The recent few days of relatively hot weather in most regions have resulted in a spike in the growing degree days compared to the 10-year average. Most regions are now about 100 growing degree days ahead of their respective 10-year averages except for Peterborough which is about 50 degree days ahead.

Rainfall – Precipitation forecasts vary widely based on region, with most regions forecasted to have showers this Sunday the 13th. So far, June has had a significant increase in the amount of rain compared to May. Regions such as Essex, Chatham-Kent, Norfolk, Huron, Wellington, Kemptville, and Sudbury have already roughly matched or surpassed the amount of rain received in the month of May.

Crop Updates

Asparagus – As some growers begin to finish harvest, scout establishing fern for signs of rust and Stemphylium. Treatments are most effective when applied preventatively before the disease becomes established on the fern. Lesions usually appear on the bottom 12-24” of the stalk. Also scout carefully for asparagus beetle larvae. They often first appear in immature plantings, where they can have a significant impact on the health of the crop.

Brassica Crops – Flea beetles, cutworms and imported cabbage worms are active. Slug feeding damage on lower leaves has been reported. Irregular-sized holes on the inside of the leaves that have smooth edges are often the result of slug damage (**Figure 1.**), while flea beetle holes are smaller and imported cabbageworm damage is often larger, more ragged and a caterpillar can normally be found feeding throughout the day.



Figure 1. Slug damage on broccoli – June 2021

Carrots – Carrot weevils are out and actively laying eggs. If the carrots are in the 2-4 leaf stage or later they may be at risk of carrot weevil damage. There have been some localized catches of carrot rust flies but counts are generally low. Heat canker and stand losses have been common. Keep on irrigating.

Celery – Aster leafhopper, carrot weevil, and tarnished plant bugs (**Figure 2.**) are active and degree day thresholds have been reached in all regions.

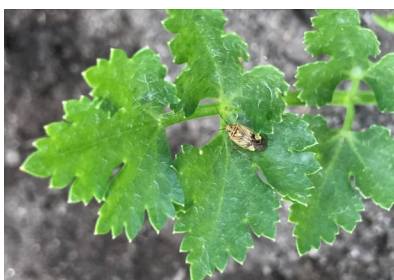


Figure 2. Tarnished plant bug on celery – Meagan Stager, June 2021

Cucurbit Downy Mildew – We have installed a network of passive spore traps across the Chatham-Kent, East Elgin and Norfolk growing regions. We will publish the trap results here weekly. Cucurbit downy mildew has not been identified in Ontario or the Great Lakes region, but sporangia have been detected in Michigan(<https://www.canr.msu.edu/news/cucurbit-downy-mildew-sporangia-identified-in-air-samples-allegan-county>). To date, field infections have been identified in Florida, Georgia and South Carolina. For more information about fungicide selection and timing, visit: <https://onvegetables.com/2021/06/10/cucurbit-downy-mildew-get-out-and-scout/>

VCR – Vegetable Crop Report – June 10th, 2021...con't

Garlic – The number of adult leek moths trapped has been down over the past two weeks and it's likely that the second flight will be occurring shortly. Target the next wave of leek moth larvae a week after the next peak of adults trapped. Scapes are emerging across Ontario in 'Music' and other hard neck cultivars. Be on the lookout for leek moth feeding damage to the scapes (**Figure 3.**) and kill any larvae or cocoon that you observe while scaping. Cut scapes of hardneck cultivars as soon as possible for the greatest yield benefit. Avoid using sickle bar mowers to remove scapes as they can easily spread garlic pathogens (including viruses) and often clip leaves during the scape removal process. Past research has shown that by accidentally removing one leaf when the scape was removed, bulb sizes were reduced by 13% and the yield was reduced by an average of 17.5%. The same trial showed that yield was greatly impacted as the number of leaves cut during mowing increased. If the top two leaves were cut, the yield was reduced by approximately 25%, almost outweighing any potential gains you would expect by removing the scape in the first place. The second generation of seedcorn maggot will be emerging soon in many regions, so dig up wilted plants and inspect the roots/bottom of the bulbs for feeding damage.



Figure 3. Garlic scape with leek moth larvae feeding damage and a leek moth cocoon – June 10, 2021

Leafy Greens – Leafminer pressure is high and will cause damage that is similar to frost (**Figure 4.**). Cut a leaf and hold it up and you may be able to see the dark spots of the larvae within the leaf.



Figure 4. Leafminer damage in spinach and Swiss chard – June 2021

Onions – Many direct seeded onions have reached the 3rd leaf stage and some areas are even a little further along. The pressure of thrips is low in direct seeded fields, but will increase dramatically as we see more hot and dry weather. Past research has shown that Movento 240 SC (group 23) has some residual activity that works better against larvae when it is applied earlier in the season. If the spray threshold exceeds 3 thrips/leaf, Movento 240 SC could be followed by two applications of Delegate (group 5) or Agri-Mek (group 6). Using a penetrating surfactant can be useful to maximize the effectiveness of products against thrips. Apply no more than two consecutive insecticides from the same IRAC crop as thrips have a relatively short life cycle with multiple generations through the summer months and are at a high risk of developing insecticide resistance. Onion maggots, wireworms, millipedes and cutworms are active and the second generation of seedcorn maggot has emerged in some regions and will be emerging shortly in the remaining regions.

Potatoes – Colorado Potato Beetles Wanted, dead or alive. (**Figure 5.**). We are looking for samples of Colorado Potato Beetles. Around 25-30 adults, even just picked off of some potato volunteers would be enough for a sample. If you have a jar full or are interested in helping out please contact Dennis (519-766-5337, dennis.vandyk@ontario.ca).

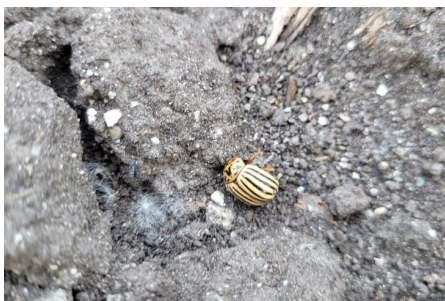


Figure 5.1 Dead Colorado Potato Beetle in potato field – June 2021



Figure 5.2 Colorado Potato Beetle on potato leaf – June 2021

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Insect activity appears to be high this year but one with particularly high numbers is potato leafhoppers. Check your fields for small lime green leafhoppers as seen in the picture. At this point, the at-plant insecticides should be controlling this first generation but keep an eye out for hopperburn symptoms. (Figure 6.).



Figure 6. Potato Leaf Hopper on leaf of potato plant

Sweet corn – Based on growing degree days (base 10) European corn borer has reached peak flight for the first generation in Essex. Chatham-Kent is not far behind. Also, be on the lookout for cutworm.

Pest Degree Day Forecasting

*NOTE: Data as of June 3rd, 2021

Pest	Carrot Rust Fly	Onion Maggot	Carrot Weevil	Aster Leafhopper	Tarnished Plant Bug	Cabbage Maggot	Seedcorn Maggot	European Corn Borer
THRESHOLD	329-395, 1399-1711	210-700, 1025-1515	138-156, 455+	128+	40+	314-398, 847-960, 1446-1604	200-350, 600-750, 1000-1150	See legend below
Essex*	780	698	468	349	221	539	698	301
Chatham-Kent*	726	646	438	327	188	501	646	281
Norfolk**	703	625	417	307	171	482	625	259
Huron***	663	591	407	309	183	462	591	268
Wellington**	602	528	346	250	136	400	528	210
Simcoe County***	640	564	369	270	154	427	564	229
Durham***	616	543	343	253	136	402	543	214
Peterborough	579	504	311	220	115	368	504	183
Kemptville***	698	621	408	296	165	474	621	251
Sudbury***	509	447	296	224	123	340	447	191

*- Bivoltine region for ECB. First Peak Catch: 300-350 DD, Second Peak Catch 1050-1100 DD

**-. Overlap region for ECB. First Peak Catch : 300-350 DD Second Peak Catch 650-700 DD, Third Peak Catch 1050-1100 DD

***-Univoltine region for ECB. Peak Catch 650-700 DD

Use these thresholds as a guide, always confirm insect activity with actual field scouting and trap counts.

Select a region below for the latest weather, crop and pest degree day information:

Essex County(<https://onvegetables.com/2021/06/11/vcr2021-4/#essex>)

Chatham-Kent County(<https://onvegetables.com/2021/06/11/vcr2021-4/#chatham-kent>)

Norfolk County(<https://onvegetables.com/2021/06/11/vcr2021-4/#norfolk>)

Huron County(<https://onvegetables.com/2021/06/11/vcr2021-4/#Huron>)

Wellington County(<https://onvegetables.com/2021/06/11/vcr2021-4/#wellington>)

Simcoe County(<https://onvegetables.com/2021/06/11/vcr2021-4/#simcoe>)

Durham County(<https://onvegetables.com/2021/06/11/vcr2021-4/#durham>)

Peterborough(<https://onvegetables.com/2021/06/11/vcr2021-4/#peterborough>)

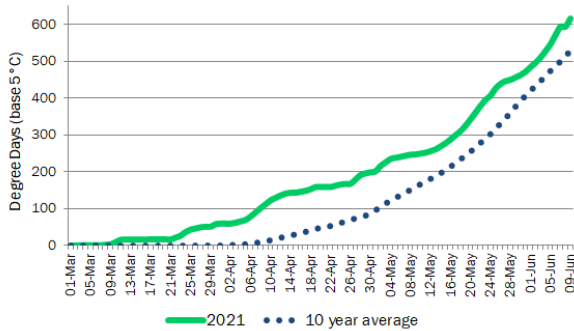
Kemptville(<https://onvegetables.com/2021/06/11/vcr2021-4/#kemptville>)

Sudbury(<https://onvegetables.com/2021/06/11/vcr2021-4/#sudbury>)

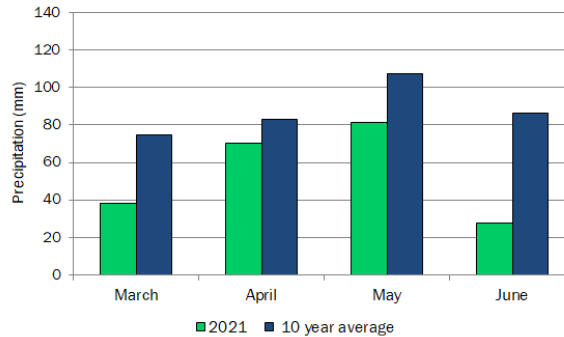
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Essex County

Essex Growing Degree Days

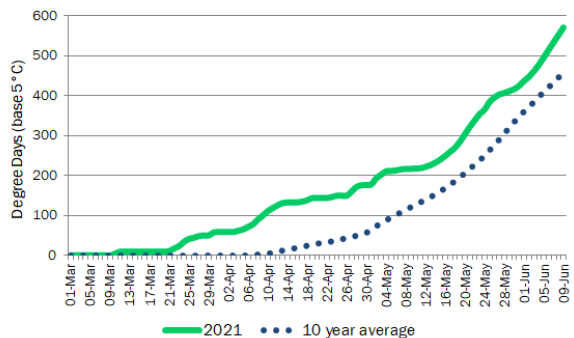


Essex Total Precipitation per Month

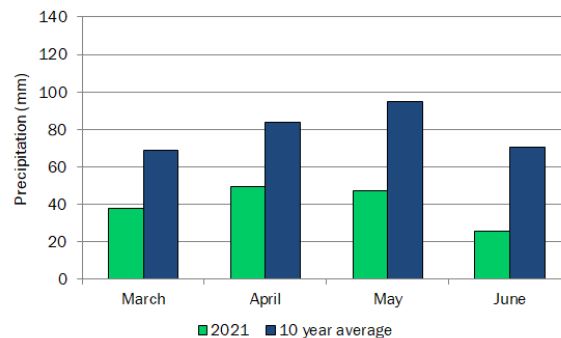


Chatham-Kent County

Chatham-Kent Growing Degree Days

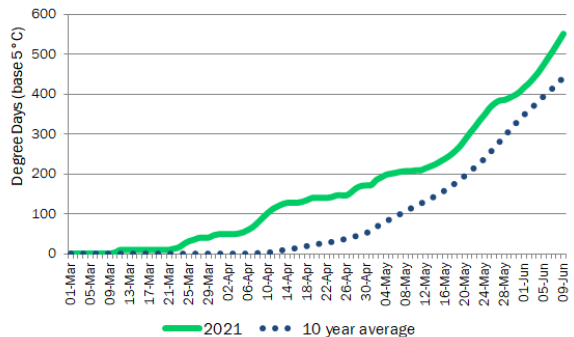


Chatham-Kent Total Precipitation per Month

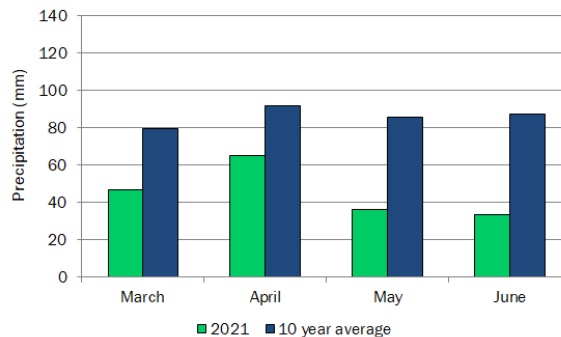


Norfolk County

Norfolk Growing Degree Days

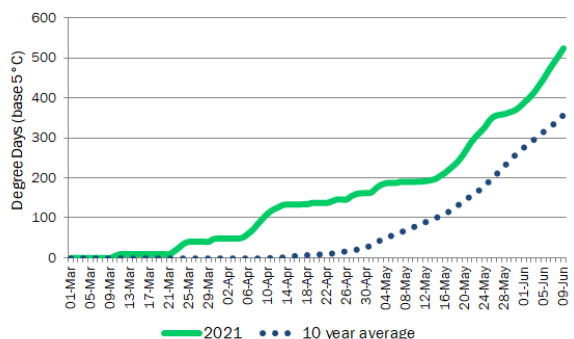


Norfolk Total Precipitation per Month

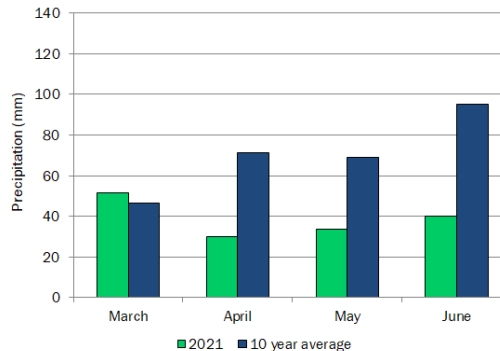


Huron County

Huron County Growing Degree Days

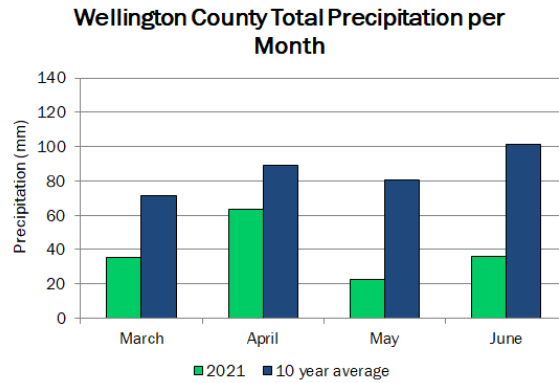
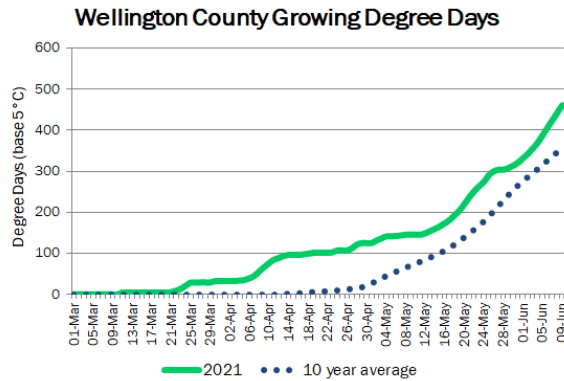


Huron County Total Precipitation per Month

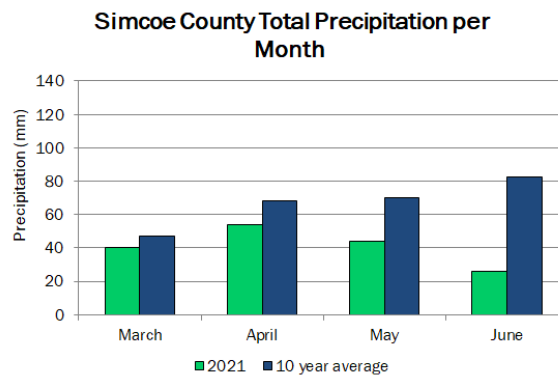
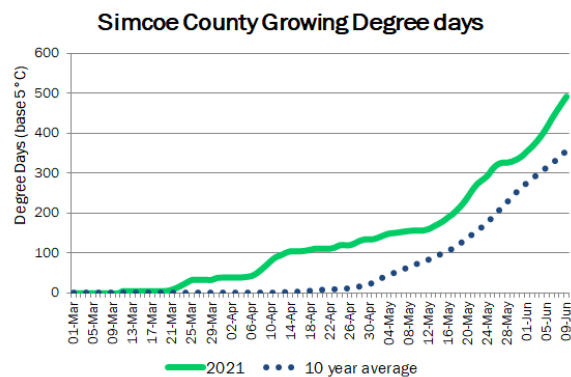


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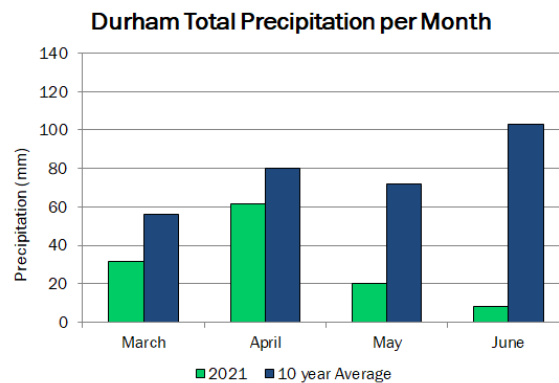
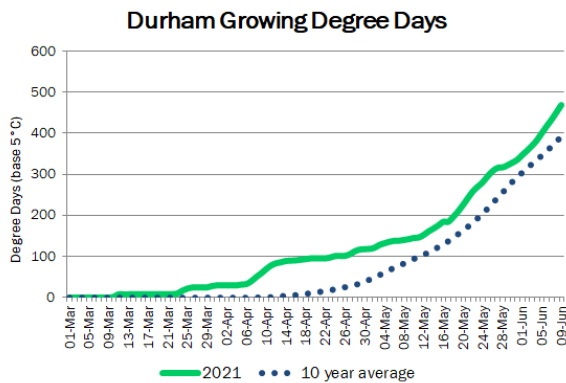
Wellington County



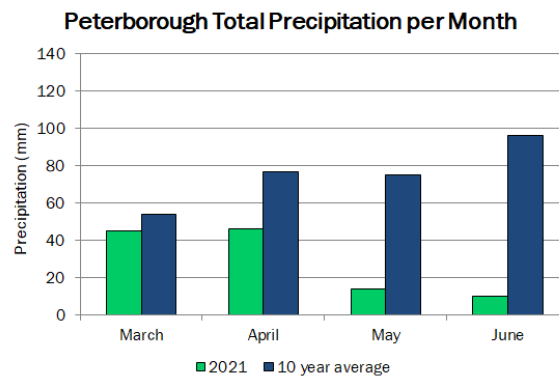
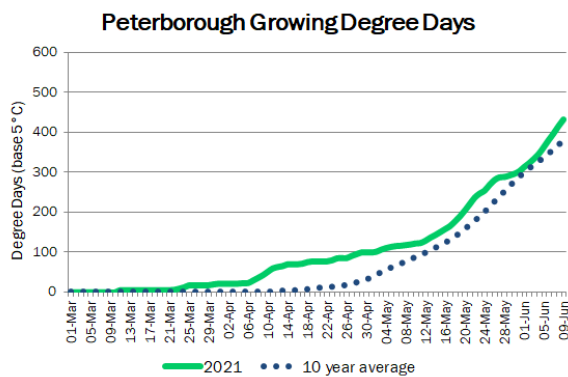
Simcoe County



Durham County



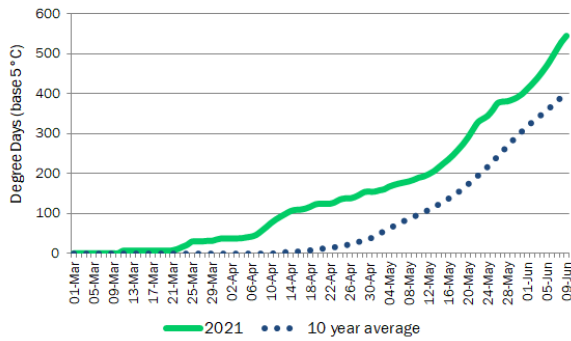
Peterborough



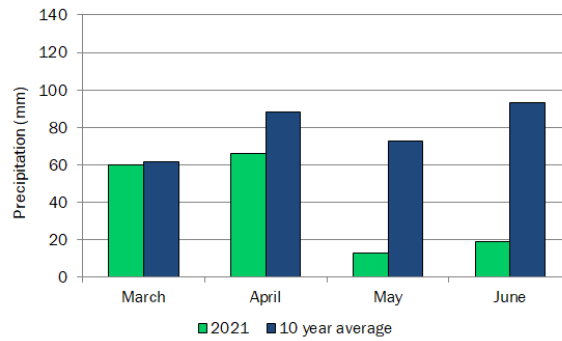
VCR – Vegetable Crop Report – June 10th, 2021...con't

Kemptonville

Kemptonville Growing Degree Days

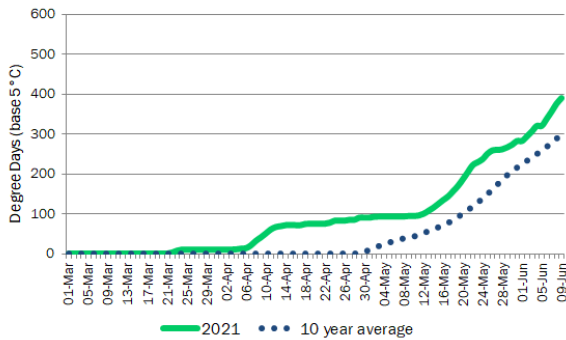


Kemptonville Total Precipitation per Month

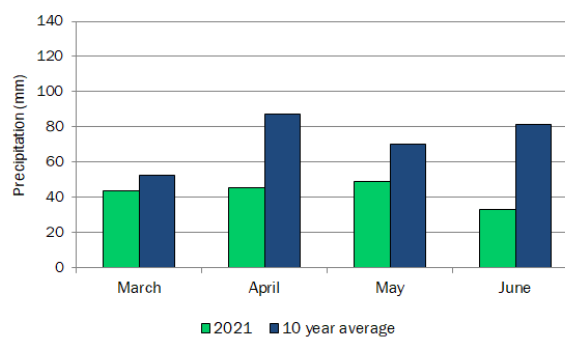


Sudbury

Sudbury Growing Degree Days



Sudbury Total Precipitation per Month



Nationwide monitoring pilot project for European corn borer, *Ostrinia nubilalis*



European corn borer larva. J. Smith,
University of Guelph, Ridgetown Campus.

The European corn borer (ECB; *Ostrinia nubilalis*), has been an important pest of corn and other crops in eastern Canada for nearly a century now but is also known to be a sporadic pest in western Canada. Despite its name, ECB is actually a generalist feeder, having a wide range of [hosts](#). Although corn is one of its preferred hosts, after decades of Bt corn use across Canada, ECB populations were significantly reduced. Successful control in corn may have led to a shift in ECB populations towards its other non-corn hosts.

Most of the collective knowledge on ECB however, has been from its history in corn and can be found here: <https://cornpest.ca/corn-pests/european-corn-borer/>. Corn is also not completely safe from harm. The recent confirmation of ECB resistance to Cry1F Bt corn in Nova Scotia has increased the need to monitor this pest across Canada. With so many new emerging crops being grown in Canada that are also hosts for ECB (eg. hemp, cannabis, quinoa, hops, millet and others) there is no better time for us to look at this pest across the Canadian ag landscape.

To monitor for ECB nationwide, the Surveillance Working Group of the Canadian Plant Health Council has developed a harmonized monitoring protocol for European corn borer in both English and French. The protocol can be used to report ECB eggs, larvae or damage in any host crop across Canada. This harmonized protocol has been designed to complement protocols that are already in use to make management decisions in order to generate data to compare ECB presence across all of Canada and across host crops.

Whether you are scouting corn, quinoa, hemp, millet, potatoes, apples or other crops susceptible to ECB, we encourage you to try the harmonized monitoring protocol and report the data from your field or research plots using the free Survey123 app (available for both desktop and mobile devices):

Early to Mid-Season ECB Survey (Before July) - <https://arcg.is/0qCCHH>

Later Season ECB Survey (July to Pre-Harvest) - <https://arcg.is/fSODf>

You do not need a login in to use the survey. Simply download the Survey123 app and click on the third option “Continue without logging in”, once on the login screen. A hardcopy version to take out to the field before entering it into Survey123 is available here in [English](#) and [French](#).

Real-time reporting may help estimate risk of corn borer outbreaks in your region. At the end of the growing season, maps illustrating the results of the monitoring program will be made available on the [Great Lakes and Maritimes Pest Monitoring Network](#) and [Prairie Pest Monitoring Network](#) websites, among others. Data will be used to answer questions about the preferred host crops of European corn borer in Canada and its distribution and relative abundance across Canada.

Please feel free to contact [Tracey Baute](#) (OMAFRA), [Meghan Vankosky](#) (AAFC-Saskatchewan), [John Gavloski](#) (Manitoba Agriculture and Resource Development), [James Tansey](#) (Saskatchewan Ministry of Agriculture) or [Brigitte Duval](#) (MAPAQ) if you have questions about this pilot project.