



Monday, June 20, 2022

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Cucurbit downy mildew – get out and scout!

Katie Goldenhar, Pathologist—Horticulture, OMAFRA

Cucurbit downy mildew has not yet been identified in Ontario or the Great Lakes region in 2022 but has been identified in New Jersey on June 11 (<https://cdm.ipmPIPE.org/>) 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 rainfall, extended dew or heavy overhead irrigation.

If you suspect downy mildew in your field, send for confirmation immediately. Contact one of 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. Cucurbit downy mildew on cantaloupe

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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 occasionally be seen before any symptoms on the upper leaf (Figures 3 and 4). This downy growth is particularly noticeable in the morning after a period of wet weather or when conditions favour dew formation.



Figure 3. Black growth (spores) on the underside of the leaf

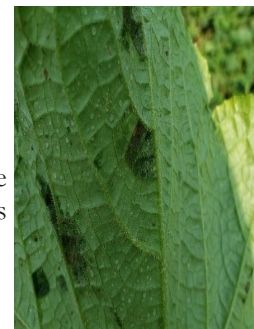


Figure 4. Early stages of infection. Upper leaf may not have noticeable lesions

Look alike – angular leaf spot

Downy mildew can be commonly confused with angular leaf spot (Figures 5 and 6). Angular leaf is caused by the bacteria *Pseudomonas syringae* pv. *lachrymans*. It is important to distinguish between the two, as the management strategies are different. Angular leaf spot will not have the black growth on the underside of the leaf, so being able to scout of the initial lesions where this growth is still visible is very important when it could be either downy mildew or angular leaf spot infecting the crop.



Figure 5. Angular leaf spot – watersoaked lesions on butternut squash



Figure 6. Angular leaf spot – necrotic lesions on cucumber

Spore trapping

Michigan State University annually conducts spore trapping and reports their findings here(<https://veggies.msu.edu/downy-mildew-news/>). 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 June 2, 2022(https://veggies.msu.edu/wp-content/uploads/2022/06/2022-spore-trapping-results_10June2022.pdf).

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, *Downy mildew specific fungicides*. 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. New for 2022, Allegro (fluazinam – FRAC group 29) is registered for downy mildew suppression/control in cucurbit crops. However, use is restricted by the 30-day pre-harvest interval.

Where possible, tank mix with chlorothalonil (maximum 2 applications per year, 2 day PHI) or mancozeb (maximum 3 applications per year, 14 day PHI). 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 the Ontario Crop Protection Hub(<https://cropprotectionhub.omafra.gov.on.ca/>)

Cucurbit downy mildew – get out and scout!...con't

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	3.25 kg (1.3 kg)	14	12 hours	3*
chlorothalonil (M05)	Bravo ZN Echo	4.8 L (1.9 L)	2	12 hours	2

*updated according to the re-evaluation/special review decision of Mancozeb RVD2020-12. While users are encouraged to follow this updated label immediately, the previously approved label is valid until 2022- 11-19 in accordance with the phase out period set out in the re-evaluation/special review decision of Mancozeb RVD2020- 12.

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 + NIS or organosilicone surfactant	1	12 hours	6
amectotradin (45) + dimethomorph (40)*	Zampro	0.8-1 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	0	12 hours	4
fluazinam (29)	Allegro	0.875-1.75 L (suppression at the low rate and control at the high rate).	30	24 hours	3

*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>).

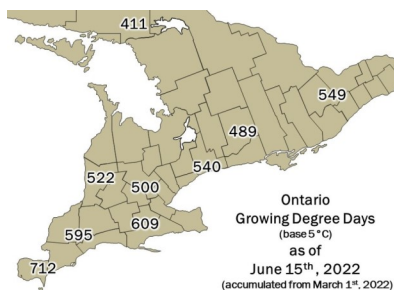
Contacts

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VCR – Vegetable Crop Report – June 16th, 2022

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 – All counties continue to match or slightly surpass their 10 year average GDD trend. Daytime temperatures are expected to fluctuate throughout the week between the low- to mid-twenties and thirties in Southwestern Ontario and mid-teens to mid-twenties in other regions

Precipitation – Simcoe and Peterborough have now surpassed their 10 year precipitation averages for June and many counties are catching up. Most received some rain again over the past week. Many counties may see some rain mid- next week and some with a risk of thunderstorms.

Crop Updates

Brassica Crops – Cutworms continue to be an issue this year. Damage found on the lower leaves of plants with no sign of lepidopteran pests may be the result of early-morning slug feeding. Continue to scout for imported cabbageworm, cabbage looper, diamondback moths, tarnished plant bugs and aphids. If wilted plants are found, dig up the transplant and inspect the root ball for cabbage maggot larvae.

Carrots – Carrot seeding has wrapped up and most fields are now between the 2-4 leaf stage. Carrot weevil remains a main concern on muck soil as adults are out laying eggs currently. The 1st generation of carrot rust fly has also emerged. There are two new herbicide options for weed control in 2022. Read more about them here: New Carrot Herbicide Options for 2022 – ONvegetables(<https://onvegetables.com/2022/05/05/new-carrot-herbicide-options-for-2022/>)

Celery – Transplants are establishing well. Scout for leaf damage caused by tarnished plant bug. Dig up wilted plants and inspect the roots for cutworm larvae, nematode cysts, or carrot weevil larvae (Figures 1 and 2).



Figure 1. Dig up wilted plants and look for carrot weevil larvae – June 15, 2021



Figure 2. Carrot weevil larvae in the base of a celery plant – June 15, 2021

Garlic – Plants showing tip dieback / yellowing of the leaves are likely from a lack of adequate moisture at some point over the past five weeks. Scapes have emerged in most fields across the province and should be removed shortly for the best yield potential. Leek moth counts are still low, but the second flight is likely to be occurring over the next two weeks. Scout for holes and feeding damage from leek moths as scapes are removed. Destroy all scapes with leek moth feeding damage as the larvae may still be inside (Figure 3). Target the next wave of leek moth larvae a week after the peak of leek moth adults have been trapped.

Register for the next **Garlic Production and Pest Management workshop** near **Janetville, ON**, that takes place **Friday, August 19th** from **9:30-4:30**. Register by calling 1-877-424-1300 or filling out this online form: <https://survey.clicktools.com/app/survey/go.jsp?iv=1y59n0qcz8rld>(<https://survey.clicktools.com/app/survey/go.jsp?iv=1y59n0qcz8rld>).



Figure 3. Leek moth larvae inside scape/stalk, June 14, 2020 – David Bianchi

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Onions – The largest direct seeded onions are reaching the 6th leaf stage while most fields are still around the 4th leaf stage. Cutworm damage is sporadic, and some fields are showing high amounts of damage this year (Figure 4). Monitor for thrips and dig up wilted plants to confirm onion maggot damage.



Figure 4. Cutworm next to direct seeded onion – June 14, 2022

Peppers – Planting should be wrapping up in the next week or so for processing peppers. With some recent storms in parts of Ontario there are sections of fields that are still very wet. Prolonged exposure to high soil moisture can cause an increase in *Pythium*, *Fusarium* and even early infections of *Phytophthora* in young plants. These storms have also caused quite a bit of sandblasting damage. If transplants are damaged and regrowing from the root, then they are not likely to produce much this season. If the transplant is starting to green up and has some foliage left, then it should rebound. Sandblasting can also leave tiny scratches and holes in stems and foliage. This can open plants up to disease infections. Make sure to scout fields for the early signs of soil borne diseases, like stem rots and wilting, and be sure to stay on top of your fungicide program throughout the year.

Potatoes – With planting completed the focus turns to crop protection. Later planted fields are just emerging while early seeded fields are already in flower. Many fields are filling the rows and beginning tuber initiation. In general growing conditions have been good this spring, with the plants benefiting from the cooler temperatures prior to this week. The recent spotty rains have put some fields on the wet side. Colorado Potato Beetle adults have emerged and are currently mating and laying eggs in the new crop. Monitor your populations to ensure the insecticide at planting is still having an effect. CPB resistance testing will continue this season if you are concerned about tolerance building. With a wet fall last year and cool/wet conditions this spring some soft rot might be an issue. Monitor for any signs of blackleg early this season like wilting, spotty emergence and inky black stems.

Tomatoes – Planting is completed for processing tomatoes in Ontario and early plantings are already flowering (Figure 5). Similar to peppers, saturated soils and high winds have left transplants vulnerable to many disease including soil borne disease like *Pythium*, *Fusarium* and *Phytophthora*, which spread through standing and splashing water (Figure 6). Tomatoes are a bit tougher than peppers and can bounce back from sandblasting as long as there is still some green at the growing point. Make sure to stay on top of your fungicide programs through the growing season.

Adult looper moths are already being captured in pheromone traps. They do not often cause a significant amount of damage in tomatoes, but you should still be aware and look for ragged feeding holes and “window panes” on leaves.



Figure 5. Transplanted tomato flowering

Figure 6. Water stressed tomato transplant (left) versus healthy tomato transplant (right)



VCR – Vegetable Crop Report – June 16th, 2022...con't

Pest Degree Day Forecasting

*NOTE: Data as of June 15, 2022

County	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*	874	792	567	445	299	637	792	392
Chatham-Kent*	744	667	461	351	206	526	667	305
Norfolk**	756	680	474	357	204	540	680	306
Huron***	664	593	398	290	154	458	593	244
Wellington**	637	567	375	269	139	435	567	227
Simcoe County***	640	569	380	274	145	440	569	230
Durham***	686	610	409	299	154	472	610	249
Peterborough	627	557	365	262	125	425	557	216
Kemptville***	700	622	423	317	172	483	622	269
Sudbury***	516	462	313	227	114	361	462	189

*- 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/2022/06/16/vcr2022-7/#essex>)

Chatham-Kent County(<https://onvegetables.com/2022/06/16/vcr2022-7/#chatham-kent>)

Norfolk County(<https://onvegetables.com/2022/06/16/vcr2022-7/#norfolk>)

Huron County(<https://onvegetables.com/2022/06/16/vcr2022-7/#Huron>)

Wellington County(<https://onvegetables.com/2022/06/16/vcr2022-7/#wellington>)

Simcoe County(<https://onvegetables.com/2022/06/16/vcr2022-7/#simcoe>)

Durham County(<https://onvegetables.com/2022/06/16/vcr2022-7/#durham>)

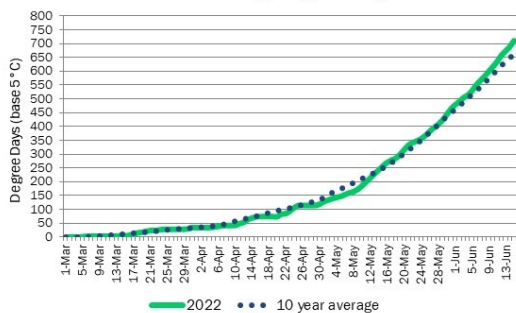
Peterborough(<https://onvegetables.com/2022/06/16/vcr2022-7/#peterborough>)

Kemptville(<https://onvegetables.com/2022/06/16/vcr2022-7/#kemptville>)

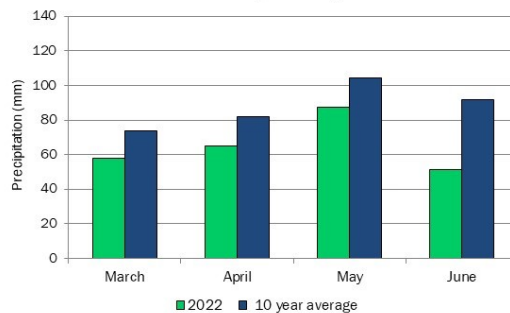
Sudbury(<https://onvegetables.com/2022/06/16/vcr2022-7/#sudbury>)

Essex County

Essex Growing Degree Days

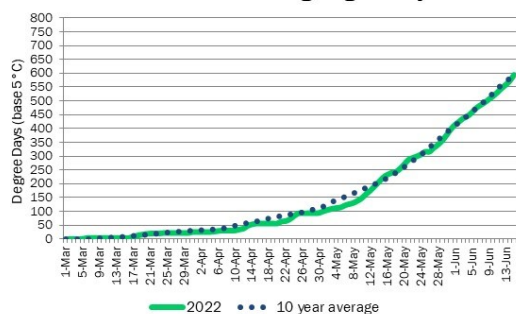


Essex Total Precipitation per Month

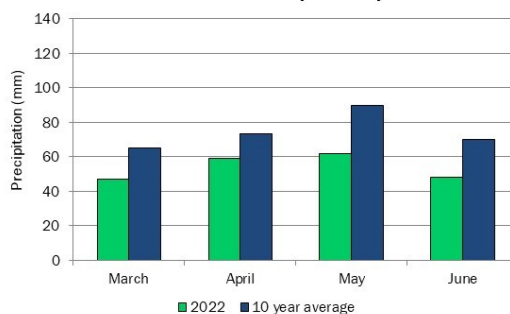


Chatham-kent County

Chatham-Kent Growing Degree Days



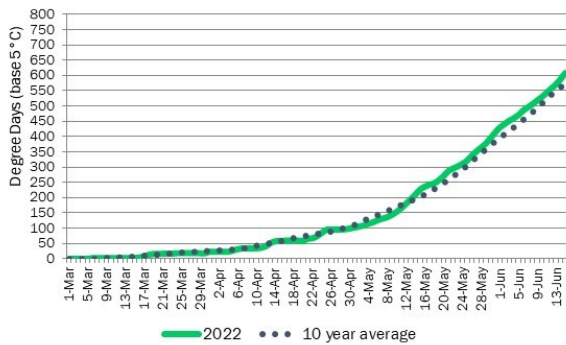
Chatham-Kent Total Precipitation per Month



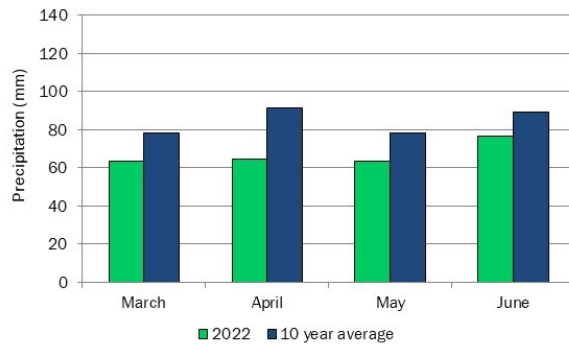
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Norfolk County

Norfolk Growing Degree Days

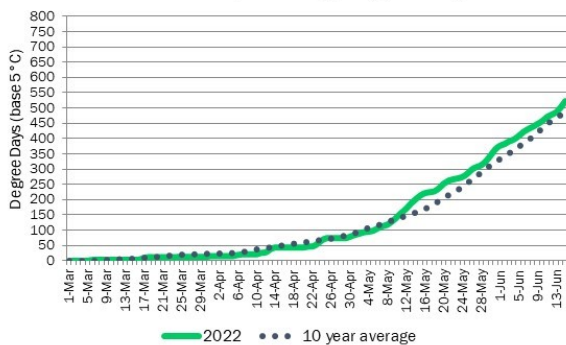


Norfolk Total Precipitation per Month

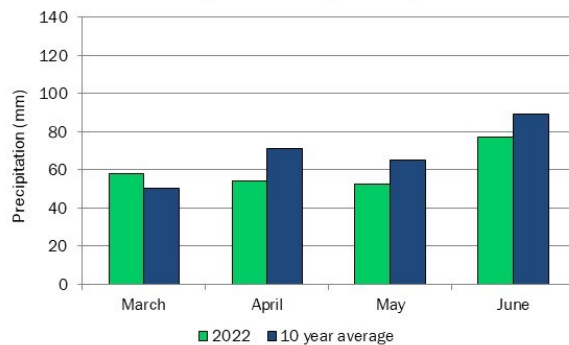


Huron County

Huron County Growing Degree Days

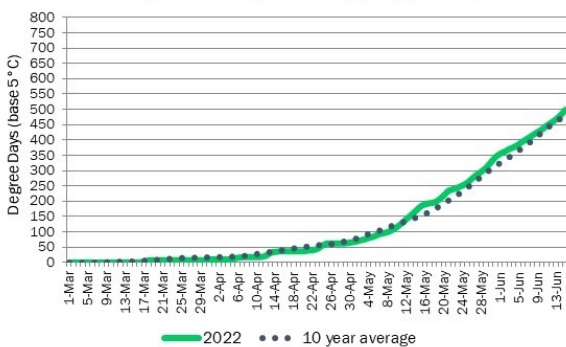


Huron County Total Precipitation per Month

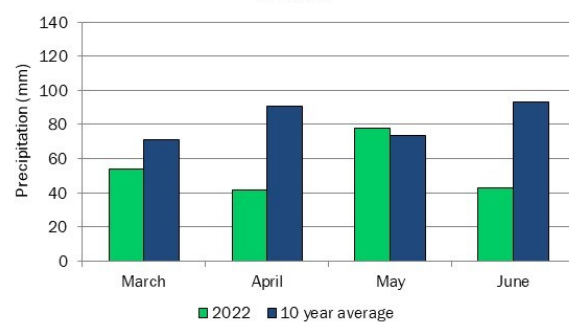


Wellington County

Wellington County Growing Degree Days

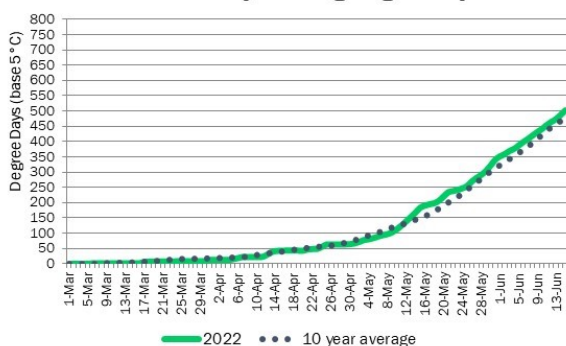


Wellington County Total Precipitation per Month

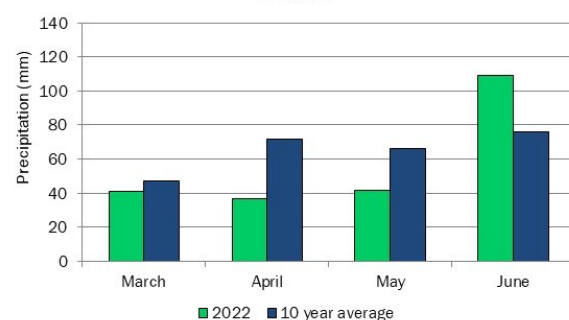


Simcoe County

Simcoe County Growing Degree days



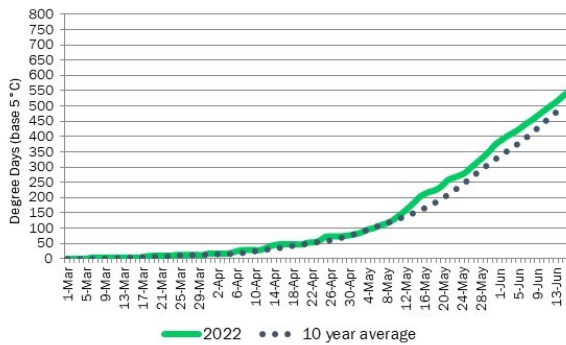
Simcoe County Total Precipitation per Month



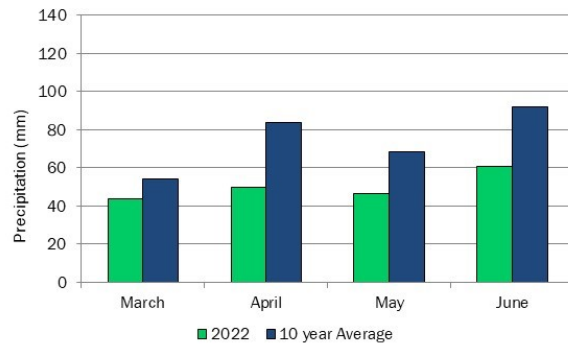
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Durham County

Durham Growing Degree Days

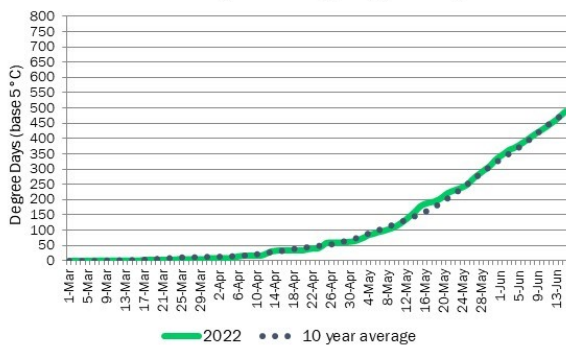


Durham Total Precipitation per Month

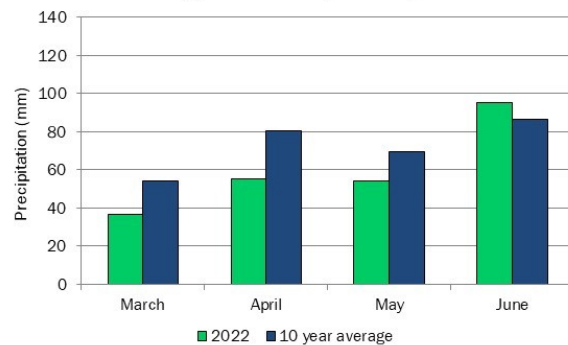


Peterborough

Peterborough Growing Degree Days

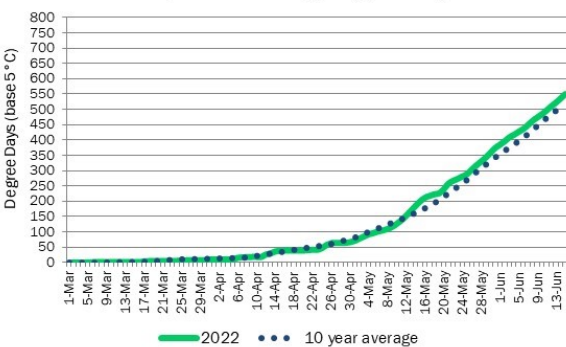


Peterborough Total Precipitation per Month

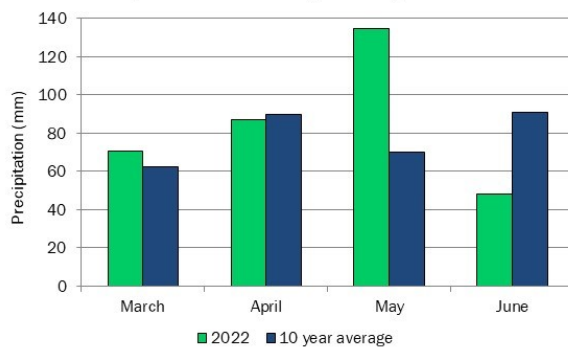


Kemptville

Kemptville Growing Degree Days

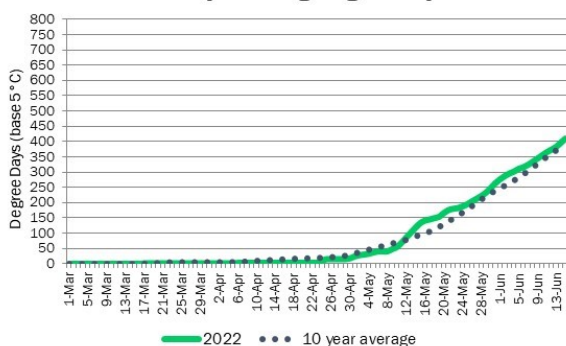


Kemptville Total Precipitation per Month



Sudbury

Sudbury Growing Degree Days



Sudbury Total Precipitation per Month

