



Tuesday, June 30, 2020

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What's Growing ON? – Episode 3

Cassandra Russell, Vegetable Crops Specialist, OMAFRA



Episode 3: Cucumber Beetle & Grape Set

In this episode, we are joined by Andrew C. Wylie, Vegetable Crop Specialist to get more information on striped cucumber beetle in cucurbits. As well, we hear from Kathryn Carter, Fruit Crop Specialist on factors impacting fruit set in grapes. Plus, Ontario crop updates for June 19th, 2020.

Editor's note: Since the recording of this podcast, spotted wing drosophila has now been caught in all monitoring regions of the province.

Listen Here: https://www.buzzsprout.com/1111115/4277126-cucumber-beetle-grape-set?client_source=small_player&iframe=true&referrer=https://www.buzzsprout.com/1111115/4277126.js?container_id=buzzsprout-player-4277126&player=small

Music: Aspire by Scott Holmes

Have a question or a topic you would like us to cover? Email us at ONhortcrops@gmail.com

Click here (<https://onvegetables.com/podcast/>) for a list of previous **What's Growing ON?** episodes

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Cucumber Downy Mildew Confirmed in the Great Lakes Region

22 Jun 2020

By: Andrew C. Wylie, Vegetable Crop Specialist, OMAFRA

Downy mildew has been confirmed in a pickling cucumber crop in Berrien county, in Southwest Michigan. Cucumber downy mildew has NOT been identified in Ontario, but the risk is high. Growers are advised to use a downy mildew specific fungicide program, if this hasn't been started.

MSU report: <https://www.canr.msu.edu/news/cucumber-downy-mildew-outbreak-of-2020>

IPM Pipe map: <https://cdm.ipmpipe.org/>

Katie Goldenhar, Pathologist-Horticulture

Downy mildew has been confirmed in a pickling cucumber crop in Berrien county, in Southwest Michigan. Growers are advised to use a downy mildew specific fungicide program, if this hasn't been started.

Cucumber downy mildew has NOT been identified in Ontario, but the risk is high for Ontario, with the confirmation in the Great Lakes Region, humid weather and cool nights.

High risk downy mildew conditions:

- ⇒ 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.
- ⇒ 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.

Trials in Michigan and Ontario have shown that the three most consistently effective downy mildew fungicides are **Orondis Ultra**, **Torrent** and **Zampro**. Where possible, it is important for resistance management to these products to Tank mix each application with **chlorothalonil** or **mancozeb**. In addition to tank mixing to delay resistance development, never make back-to-back applications of 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.

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



Early development of downy mildew on the underside of a cucumber leaf

Cucumbers are most at risk, but cantaloupe growers should be aware that downy mildew that infects cucumbers is also a risk. See crop labels for listed cucurbit crops registered on the products below.

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 Rainshield, Penncozeb 75DF Raincoat Manzate Pro-Stick	1.1-3.25 kg (0.4-1.3 kg)	14	24 hours	-
chlorothalonil (M05)	Bravo ZN Echo	4.8 L (1.9 L)	2	12 hours	2

Cucumber Downy Mildew Confirmed in the Great Lakes Region 22 Jun 2020...con't

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
ametoctradin (45) + dimethomorph (40)*	Zapro	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 ametoctradin in Orondis Ultra and Zapro, respectively, are effective on downy mildew.

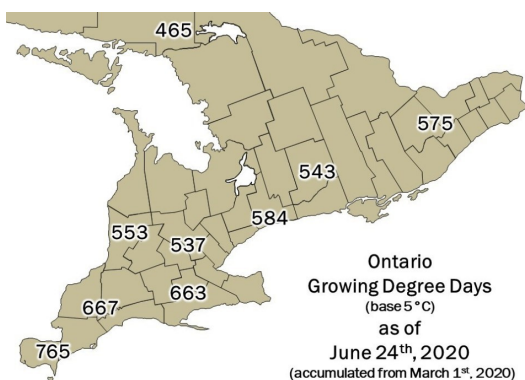
Katie Goldenhar, Pathologist—Horticulture, katie.goldenhar@ontario.ca, 519-835-5792
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Cucumber row with downy mildew

VCR – Vegetable Crop Report – June 25th, 2020

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 – Temperatures dropped towards the end of this past week but will increase again into the upcoming week. With the humidex, we may see temperatures reaching the high 30s throughout Ontario. All regions have similar GDD to the 10 year average and are following the same increasing trend. Onion maggot thresholds have been surpassed in all regions except Essex, Chatham-Kent and Norfolk which exited the first stage. Seedcorn maggot is at threshold in all regions except Essex and Sudbury. Essex, Chatham-Kent, Norfolk and Durham regions are at the second threshold stage for Carrot Weevil. Degree day data for each region is shown below.

Rainfall – Rain showers are forecasted for most regions over the weekend. The chance is higher in South Western Ontario where there is also a risk of

thunderstorms. No rain is expected for the remainder of the week. Huron, Simcoe, and Sudbury monthly precipitation are reaching the 10 year average levels while all other regions, particularly Durham and Kemptville regions, lag behind. Precipitation data for each region is shown below.

Crop Updates

Asparagus – Continue to scout ferns for insects and fungal disease. Be on the look-out for rust developing, especially on young plantings, which can then move to mature fields later this season.

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VCR – Vegetable Crop Report – June 25th, 2020...con't

Brassica Crops – See last weeks VCR(<https://onvegetables.com/2020/06/18/2020vcr-8/>) for scouting for lepidopteran pests such as diamondback moth and imported cabbage worm. Flea beetle pressure has decreased in most areas. Dig up wilted plants with a trowel or shovel and inspect the roots. Wilting can be caused by several pest/pathogens including cabbage maggot, nematodes, clubroot or wireworm damage.

Carrot – Carrots are growing well now that they've received some rain and are enjoying this weather. We're nearing the end of carrot weevil egg laying in most areas, so if the field was later planted and not yet at the 2nd leaf stage the risk of damage is decreasing.



Young carrots growing nicely between the protection of barley.

Celery – Tarnished plant bug and aster leafhoppers are active. Scout for Aster yellows and celery leaf curl and rogue out infected plants. Plants showing symptoms this early in the season will be a source of inoculum for infections later in the season.

Cucurbits – Now that we have had some precipitation, scout for wilting and test for bacterial wilt. Remove affected plants to control spread during second emergence of cucumber beetle. Look for virus symptoms so that infected plants can be rogued out before aphid populations start to build in July. A reminder that downy mildew has been confirmed in SW Michigan, so growers should switch to downy mildew specific programs. Click here to see our post on downy mildew in the Great Lakes region(<https://onvegetables.com/2020/06/23/cucumber-downy-mildew-confirmed-in-the-great-lakes-region-22-jun-2020/>) for more details. We are continuing to monitor for the arrival of both downy mildew spores and downy mildew symptoms in Ontario.

Garlic – Scaping is wrapping up and the amount of leek moth captures is increasing in several regions signaling the start of the second flight. A single insecticide application is most effective when it is applied 10 days after the date that corresponds to the peak moth capture. If you plan on two applications, make the first application 3 days after the date of peak moth capture and the second treatment 14 days later. Products such as Matador, Delegate, Entrust, Success, XenTari and Bioprotec are most effective when they make contact with the larvae.

Leafy Greens – With the hot, dry conditions, germination has been uneven leading to large variation in plant maturity in some fields. Tip burn from dry weather has been observed in a few fields and cutworm pressure continues to be higher relative to other years. Rhizoctonia, Fusarium and Pythium continue to be issues as some fields have been experiencing extremes when it comes to soil moisture. Tarnished plant bugs and aster leafhoppers are active.

Onions – The warm weather has created favourable conditions for Stemphylium leaf blight. For the first application, Sercadis (group 7) or a product containing mancozeb (group M3) may provide protection. Mancozeb products such as Manzate Pro-Stick, Dithane Rainshield, and Penncozeb 75 DF Raincoat are registered for Botrytis and Manzate Pro-Stick is registered for Botrytis and Alternaria/Purple Blotch. Avoid applying products from the same chemical group one after the other. Research has shown that there is very high resistance in Stemphylium to one of the fungicides in Quadris Top (group 11/3) and high resistance to one of the fungicides in Luna Tranquility (group 7/9). The 2019 Muck Crops Research Station Greenbook Report(<https://www.uoguelph.ca/muckcrop/annualreport.html>) has Stemphylium trial results starting on page 69(<https://www.uoguelph.ca/muckcrop/pdfs/Muck%20Vegetable%20Cultivar%20Trial%20&%20Research%20Report%202019%20Compiled%20Web%20Version%20.pdf#page=69&zoom=auto,-53,792>). While scouting, dig up wilted plants and look for maggots, wireworms or pink root. The pressure of thrips is low 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 1 thrips/leaf, Movento 240 SC could be followed by two applications of Agri-Mek (group 6), and then two applications of Delegate (group 5) and two applications Exirel (group 28). 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.

VCR – Vegetable Crop Report – June 25th, 2020...con't



Onion leaf with *Stemphylium* or *Alternaria* spores causing black spotting in tan lesion – June 24, 2020.

Potatoes – The crop is at varying growth stages across the province, from emergence to bulking. Many fields are filling the row or starting to flower and it's a critical time for fungicide application. As rows close, with the recent rains and cooler weather, the risk of disease is increasing. If you used Velum Prime in-furrow, don't use a fungicide that contains a Group 7 (Aprovia Top, Cantus, Sercadis, Vertisan, Luna Tranquility) for your first foliar application. Colorado Potato Beetle are out in full force right now. If you are seeing high levels and potential early breakdown of the at plant insecticide please contact Dennis ([519-766-5337](tel:519-766-5337)). The resistance testing of populations will continue in 2020 so that we can determine the best way to adjust our management strategies in the future.



Colorado Potato Beetle larvae feeding ferociously.

Rhubarb – Widespread leaf spotting was observed on rhubarb last week. Temperature fluctuations have provided a challenge for rhubarb this year.



Photo by Katie Goldenhar

Sweet corn – Scout fields in the evening or on overcast days when armyworm is active; this pest has moved into sweet corn. Concentrate on the edge of fields, especially those that border grain crops. If scouting during the day look for ragged feeding damage, frass, and potentially armyworm larvae hiding in the whorl or in the soil at the base of the plant. Check for the presence of parasitoid eggs on the larvae, this indicates that parasitic wasps are active and sprays may not be required. Some fields have been sprayed: thresholds are low on seedling corn, mid-whorl corn will be more tolerant if the growing tip is not damaged before the V7 stage.

VCR – Vegetable Crop Report – June 25th, 2020...con't

NOTE: Data as of June 24th, 2020

Pest Degree Day Forecasting

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*	947	852	613	492	339	685	852	438
Chatham-Kent*	835	746	532	420	258	595	746	370
Norfolk**	834	745	520	409	249	586	745	358
Huron***	692	620	439	335	192	493	620	287
Wellington**	685	607	421	322	188	477	607	278
Simcoe County***	689	613	432	333	201	488	613	288
Durham***	739	659	461	358	212	518	659	311
Peterborough	695	615	424	322	185	480	615	276
Kemptville***	725	648	453	353	215	509	648	308
Sudbury***	577	519	371	291	172	415	519	254

*- 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/2020/06/25/2020vcr-9/#essex>)

Chatham-Kent County(<https://onvegetables.com/2020/06/25/2020vcr-9/#chatham-kent>)

Norfolk County(<https://onvegetables.com/2020/06/25/2020vcr-9/#norfolk>)

Huron County(<https://onvegetables.com/2020/06/25/2020vcr-9/#huron>)

Wellington County(<https://onvegetables.com/2020/06/25/2020vcr-9/#wellington>)

Simcoe County(<https://onvegetables.com/2020/06/25/2020vcr-9/#simcoe>)

Durham County(<https://onvegetables.com/2020/06/25/2020vcr-9/#durham>)

Peterborough(<https://onvegetables.com/2020/06/25/2020vcr-9/#peterborough>)

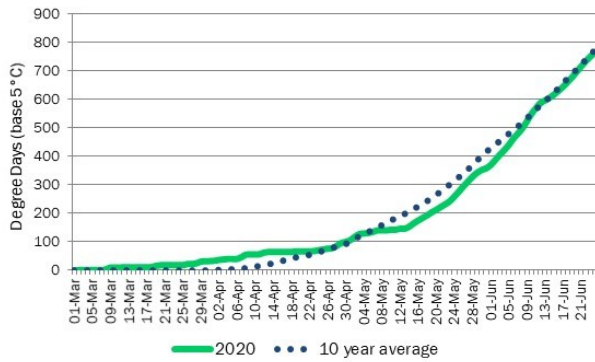
Kemptville(<https://onvegetables.com/2020/06/25/2020vcr-9/#kemptville>)

Sudbury(<https://onvegetables.com/2020/06/25/2020vcr-9/#sudbury>)

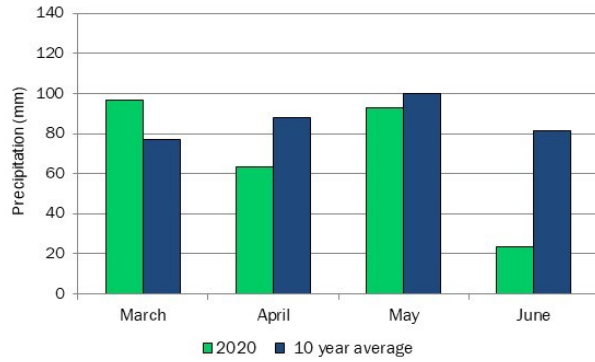
VCR – Vegetable Crop Report – June 25th, 2020...con't

Essex County

Essex Growing Degree Days

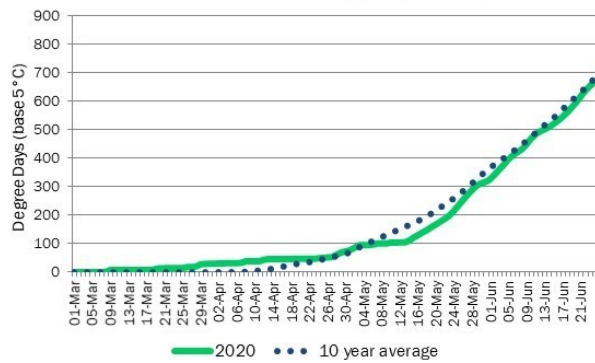


Essex Total Precipitation per Month

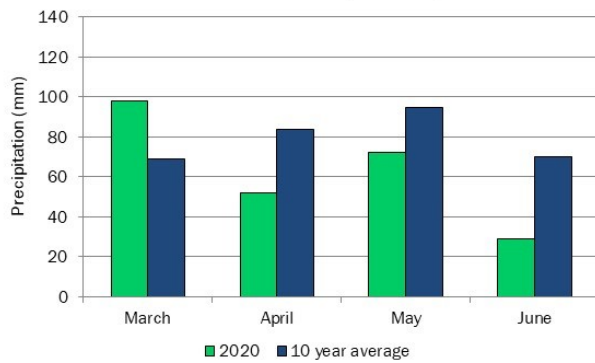


Chatham-Kent County

Chatham-Kent Growing Degree Days

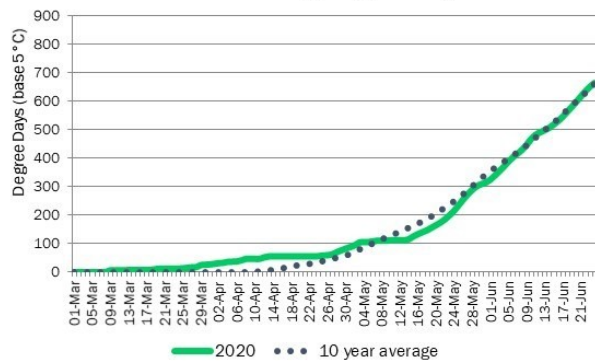


Chatham-Kent Total Precipitation per Month

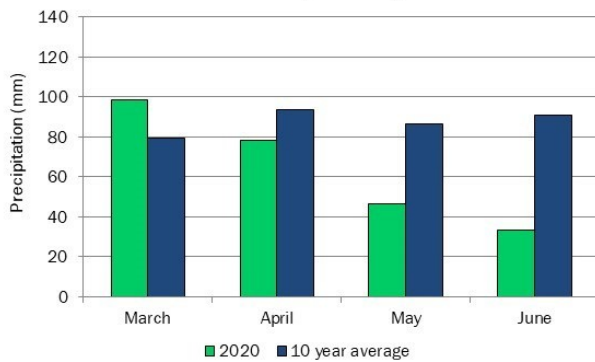


Norfolk County

Norfolk Growing Degree Days

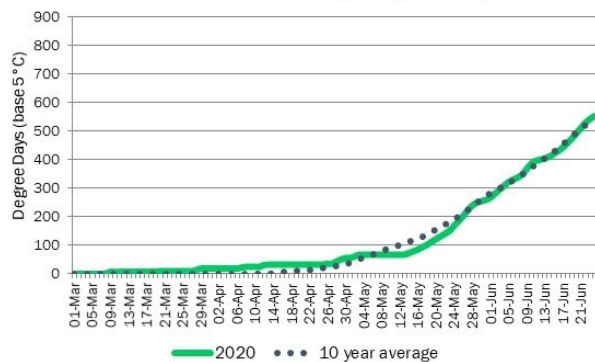


Norfolk Total Precipitation per Month

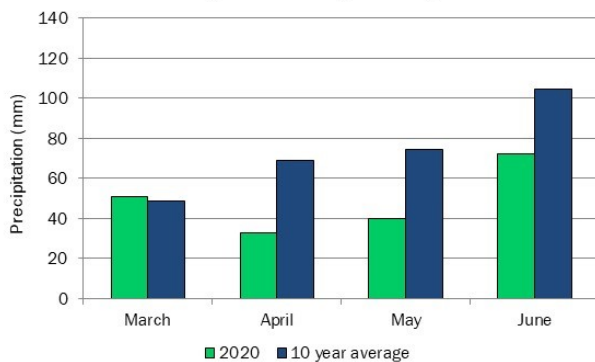


Huron County

Huron County Growing Degree Days



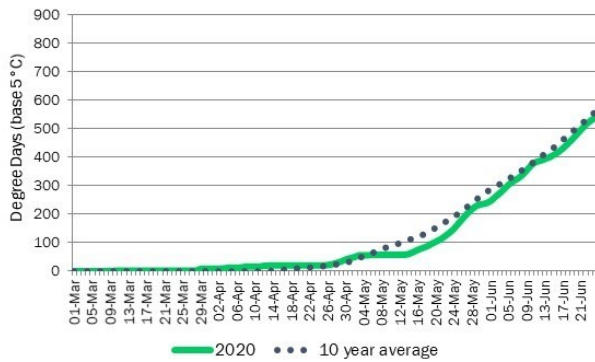
Huron County Total Precipitation per Month



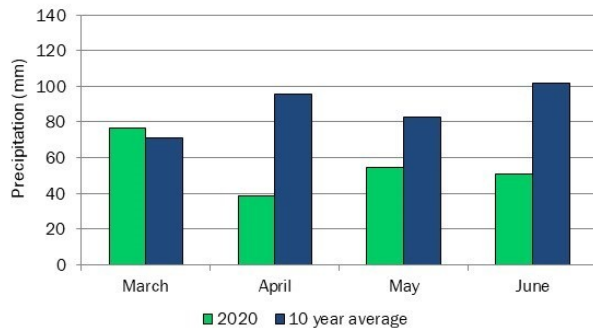
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Wellington County

Wellington County Growing Degree Days

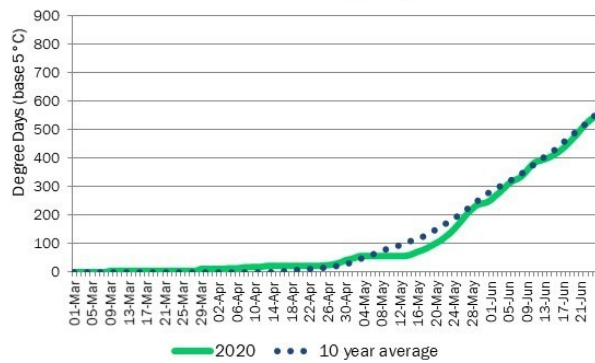


Wellington County Total Precipitation per Month

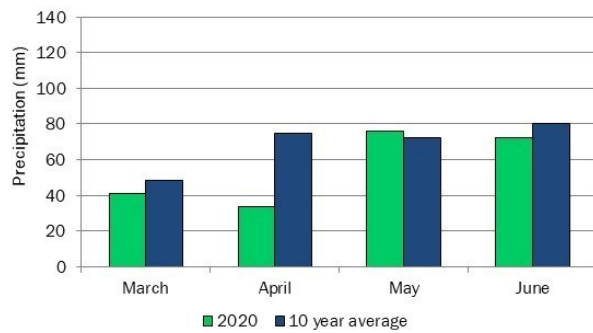


Simcoe County

Simcoe County Growing Degree days

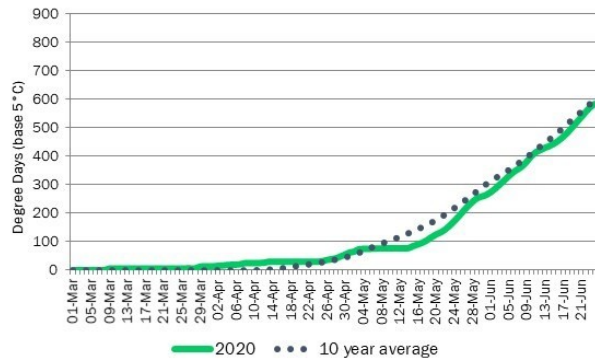


Simcoe County Total Precipitation per Month

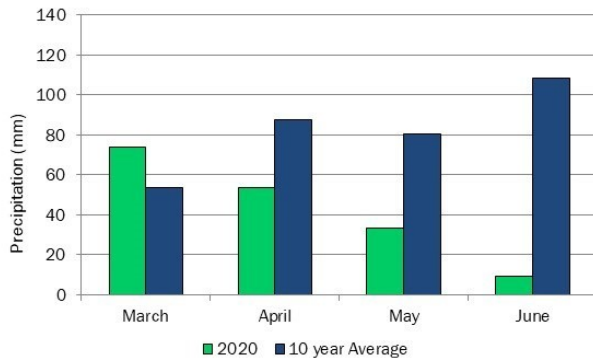


Durham County

Durham Growing Degree Days

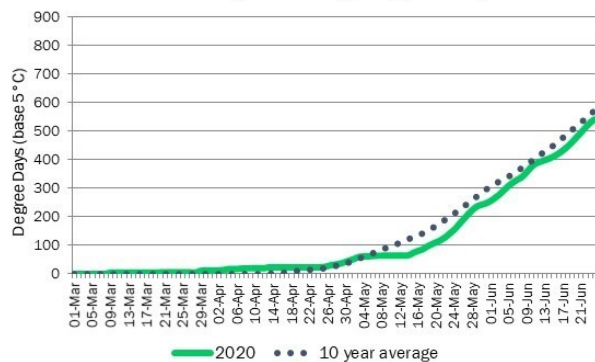


Durham Total Precipitation per Month

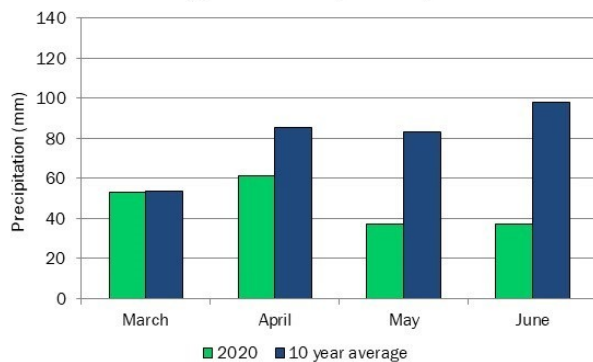


Peterborough

Peterborough Growing Degree Days



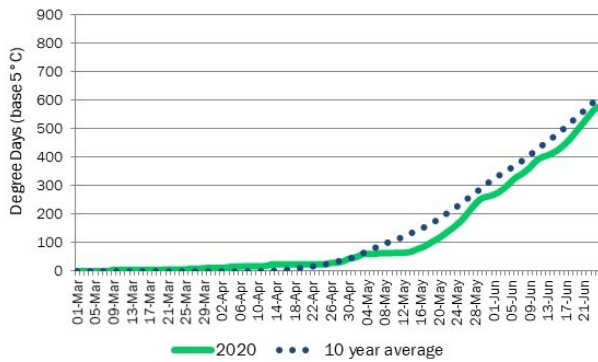
Peterborough Total Precipitation per Month



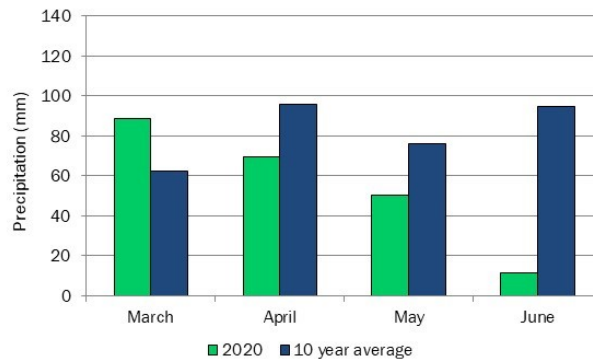
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Kemptville

Kemptville Growing Degree Days

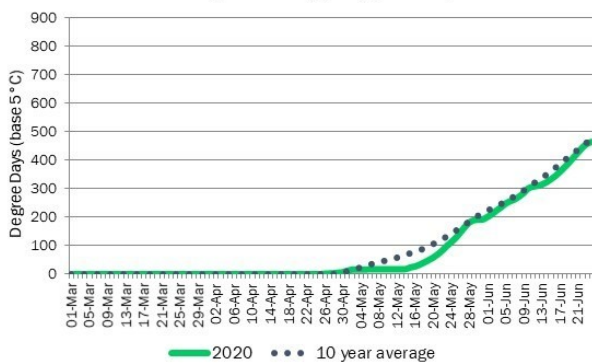


Kemptville Total Precipitation per Month

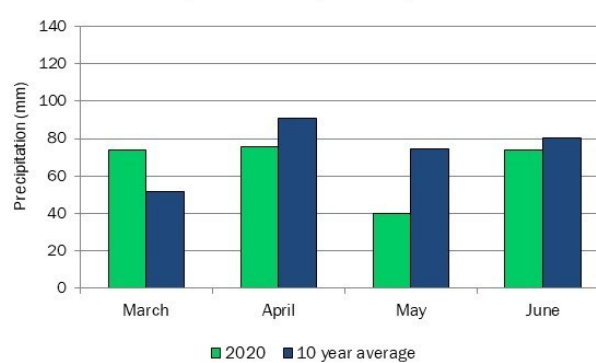


Sudbury

Sudbury Growing Degree Days



Sudbury Total Precipitation per Month



Evaluation of Garlic Cultivars for Ontario Growing Conditions in the 2018-2019 Field Season

By: Travis Cranmer, Vegetable Crop Specialist, OMAFRA



While Music has shown to be an excellent cultivar for growing conditions in Ontario, there may be other cultivars that perform just as well. Whether that is an increase in yield per acre, average bulb size or the ability to store into the spring. Additionally, consumers are becoming more aware of the different tastes of garlic and are willing to pay more for a spicy flavour.

Summary

Most agronomic information about garlic found online is from areas with different climatic conditions to Ontario and most information is written in a language other than English. Much of the production research in Ontario to date has been conducted by John Zandstra out of the University of Guelph – Ridgetown Campus over the last two decades. Trials conducted in conjunction with the Garlic Growers Association of Ontario have identified ideal planting densities, spacings, methods for bulbil production as well as scaping for the cultivar Music, but these production practices may not hold true for all of cultivars discussed below

Therefore, it is important to grow cultivars locally to confirm that they yield and store as well as they did in the previous location. Most cultivars that perform well in France, Spain, Brazil or China do not perform as well in Ontario and may take several field seasons to acclimatize to the climate and daylength. In general, softneck cultivars grow better in warmer climates and do not respond to changes in daylength compared to hardneck cultivars. Hardneck cultivars are more suited to temperate climates, such as Ontario, that have a winter vernalization period and greater changes in daylength throughout the year.

Evaluation of Garlic Cultivars for Ontario Growing Conditions in the 2018-2019 Field Season...con't

This trial was meant to demonstrate the differences in cultivars from the same planting stock but grown in different conditions and soil types. Last year 22 garlic cultivars (16 hardneck, 6 softneck) were planted in three locations in Southwestern Ontario in mid-October 2018. Before examining the data, it is important to note that the first two reps at the Gorrie location experienced flooding in the early spring and had a poor emergence rate. The plants that survived the unfavourable conditions at Gorrie are included for interest, as we found a few cultivars performed well regardless of the flooding.

Garlic Trial 2018-2019 Full Report(<https://onvegetables.com/wp-content/uploads/2020/06/GARLIC-CV-181002-1.pdf>)

Full Report

Materials

Garlic (*Allium sativum* L.), cvs. Music, Newfoundland, Ivan, Portugal 1 Azores, Mount Hood, Yugoslavian Red, Georgian Fire, Russian Red, Red Russian, Kranagasger Red, Duganski MPS, Duganski White, Purple Glazer, Guelph, Ukraine, Polish White, Sicilian Gold, Transylvanian, Nootka Rose, Saba Gold, Messadore, Thermadore

Objectives

Compare yield, fresh and dry bulb weights of 22 garlic cultivars.

Methods

Garlic cloves of 22 cultivars previously grown in Ontario were seeded by hand in three locations; Gorrie in Huron clay loam on 13 October, 2018, Dashwood in Huron clay loam on 16 October, 2018, and Ridgetown College in Wattford loamy sand 30 October, 2018. Hardneck cultivars include Music, Newfoundland, Ivan, Portugal 1 Azores, Mount Hood, Yugoslavian Red, Georgian Fire, Russian Red, Red Russian MPS, Kranagasger Red, Duganski MPS, Duganski White, Purple Glazer, Guelph, Ukraine, and Polish White. Softneck cultivars include, Sicilian Gold, Transylvanian, Nootka Rose, Saba Gold, Messadore and Thermadore. The average clove sizes for each cultivar were equal for each planting location. Cultivars were planted in a randomized complete block design with four replicate rows. Each row had 10 cloves of garlic planted per row at a depth of two inches. Planting densities varied based on location with ~170k plants per acre in Ridgetown and ~65k plants per acre in Dashwood and Gorrie. Black plastic was used as weed control at the Ridgetown location while plants were hand weeded as necessary at the other two locations. No plants received irrigation throughout the season. Scape stage was quantified 19 June in Gorrie and 26 June for Dashwood and Ridgetown by measuring the direction of the spathe in relation to the scape rising from the plant using a 0–2 scale where 0 = no scape observed, 1 = one full loop and 2 = two full loops. The scape stage at 21 June reflects when the scapes would most likely be harvested and may not reflect the final scape stage. The trial was harvested 24 July in Ridgetown, 25 July in Gorrie and 26 July in Dashwood. At harvest, bulb basal plates were rated for damage by assessing the percentage of basal plate missing using a 0–4 rating scale: where 0 = no damage; 1 = 1 – 24% basal plate missing; 2 = 25 – 50% basal plate missing; 3 = > 50% basal plate missing and 4 = completely desiccated bulb. Bulbs were cured in mesh bags within a pallet box in a forced air dryer over an 11 day period from 26 July to 6 August. Dry weights were collected on 21 August. Data were analyzed using SAS version 9.3 (SAS Institute, Cary NC). Means were separated using Tukey-Kramer multiple mean comparison test ($P = 0.05$).

Results

Flooding at the Gorrie location caused poor emergence for the first and second repetition. The plants that survived the unfavourable conditions at Gorrie are included for interest, as a few cultivars performed well despite the flooding. Height assessment on 15 May, found Polish White, Ukraine, Transylvanian, Guelph, Portugal 1 Azores, Purple Glazer, Mount Hood, Duganski MPS and Georgian Fire to be the tallest at the Dashwood location while Polish White, Mount Hood, Ukraine, Music and Portugal 1 Azores were the tallest at Ridgetown (Table 1, 2). Most of the hardneck cultivars had more leaves per plant than the softneck cultivars at the 15 May assessment at both locations with Transylvanian being the best performing softneck cultivar. Scape assessment showed a wide variation in the progression of the scape and no cultivars showed a double loop, as was seen in the 2017–2018 trial with Ivan. The strong bolting cultivars showed scape development as expected and no scapes were observed in the softneck cultivars. No cultivars displayed a straight scape and the umbel capsule/topset characteristics were not assessed. At harvest, the plant fresh weight found Portugal 1 Azores, Ukraine, Polish White, Duganski MPS, Red Russian MPS, Kranagasger Red and Mount hood to be the heaviest at the Dashwood location with Polish White, Duganski MPS, Red Russian MPS, Ukraine and Portugal 1 Azores weighing the most at Ridgetown. The marketable dry weight of Polish white, Portugal 1 Azores, Ukraine, Guelph, Transylvanian, Duganski MPS and Mount Hood showed no significant difference from Music at Dashwood. At Ridgetown, the marketable dry weights of Polish White, Duganski MPS, Ukraine, Transylvanian, and Red Russian MPS were significantly higher than Music. Transylvanian was consistently the top performer

Evaluation of Garlic Cultivars for Ontario Growing Conditions in the 2018-2019 Field Season...con't

of the softneck cultivars in fresh and dry weights at both locations. When comparing the fresh bulb weight to the clove weight at planting to get a multiplication value/rate (clove wt at planting x bulb to clove ratio = fresh bulb wt), there were not many significant differences between cultivars at the Ridgetown location, while at Dashwood Sicilian Gold, Nootka Rose, Russian Red, Purple Glazier, Saba Gold, Transylvanian, Portugal 1 Azores all performed significantly better; however the average clove planting size of Russian Red, Sicilian Gold and Nootka rose were small to start. At the Dashwood location, the largest bulbs when it came to circumference were from Duganski White & MPS, Polish White, Ukraine, Red Russian, Portugal 1 Azoles, Transylvanian, Kranagasger Red, Sicilian Gold, Mount Hood, Guelph, Purple Glazer, and Music. The greatest circumferences at the Ridgetown location were Duganski MPS, Red Russian MPS, Polish White, Kranagasger Red, Transylvanian and Ukraine. No significant differences were observed in basal plate rot at harvest. Cultivars were not tested for bulb and stem nematode or virus load prior to planting or after harvest.

Table 1. Assessments at Dashwood with height and leaf number collected 18 May, fresh weights collected 26 July and dry weights collected 21 August.¹

Cultivar	Assessments at Dashwood										
	Clove Weight at Planting (g)	Height (cm) May 18, 2019	Leaf Number May 18, 2019	Plant Fresh Weight (g)	Fresh Bulb Weight (g)	Marketable Dry Weight (kg)	Bulb to Clove Ratio	Diameter (cm)	Bulb Circumference (cm)	Basal Plate Rot ²	Bulb Wrapper Colour
Music	7.6 f	28.2 a-d	5.1 abc	116 c-f	59.9 c-g	0.464 a-f	7.9 def	5.3 b-g	16.4 abc	0.0 b	Pinkish White
Newfoundland	6.8 g	23.7 c-h	5.0 abc	81 g-j	44.7 fgh	0.249 efg	6.6 f	4.8 fgh	14.7 bc	0.0 b	White
Ivan	5.5 i	26.3 b-f	4.8 a-d	83 g-j	43.3 fgh	0.318 d-g	8.0 def	4.8 fgh	14.2 bc	0.1 b	White
Portugal 1 Azores	10.1 b	29.1 a-d	5.4 ab	176 a	90.2 a	0.613 abc	9.0 def	6.1 ab	18.8 abc	0.0 b	Pinkish White
Mount Hood	9.8 bcd	27.7 a-e	5.6 ab	140 a-e	73.1 a-e	0.475 a-f	7.5 ef	5.7 a-e	17.6 abc	0.0 b	Pinkish White
Yugoslavian Red	4.1 k	24.9 b-h	4.3 def	65 ij	40.5 fgh	0.146 g	10.0 def	4.9 e-h	14.9 bc	1.1 a	Pinkish White
Georgian Fire	6.2 h	26.8 a-e	5.3 abc	97 f-j	52.6 d-h	0.372 c-g	8.5 def	5.1 d-h	15.6 bc	0.1 b	White
Russian Red R	2.1 m	23.0 d-h	3.8 efg	58 j	33.1 h	0.205 fg	15.8 bc	4.5 gh	13.6 bc	0.4 ab	Purple Stripe
Red Russian MPS ³	9.9 bc	26.0 b-f	5.2 abc	155 abc	81.1 abc	0.392 b-g	8.2 def	6.1 ab	18.8 abc	0.2 b	Purple Stripe
Kranagasger Red	9.5 de	28.4 a-d	5.3 abc	149 a-d	76.2 a-d	0.390 b-g	8.1 def	6.0 abc	18.6 abc	0.1 b	Pinkish White
Duganski-MPS ³	11.0 a	27.3 a-e	5.1 abc	166 ab	89.6 a	0.486 a-f	8.1 def	6.3 a	19.1 ab	0.1 b	Pinkish White
Duganski-White	5.3 i	21.5 e-h	4.5 cde	123 c-g	66.4 a-f	0.468 -f	12.5 bcd	5.6 a-f	21.6 a	0.1 b	Purple Stripe
Purple Glazer	5.3 i	28.5 a-d	4.9 a-d	97 e-j	62.8 b-f	0.519 a-e	11.8 cde	5.5 a-f	16.9 abc	0.1 b	White
Guelph	9.2 e	29.3 a-d	5.6 ab	132 b-f	71.0 a-e	0.537 a-d	7.8 ef	5.6 a-f	17.5 abc	0.0 b	Pinkish White
Ukraine	10.0 bc	30.4 ab	5.5 ab	176 a	88.0 ab	0.662 ab	8.8 def	6.1 ab	18.9 ab	0.0 b	Pinkish White
Polish White	9.7 cd	33.0 a	5.6 a	168 ab	88.0 ab	0.721 a	9.1 def	6.1 ab	19.0 ab	0.0 b	Pinkish White
Sicilian Gold	3.0 l	18.1 h	3.7 efg	103 e-i	67.9 a-f	0.376 c-g	22.6 a	6.0 a-d	17.8 abc	0.1 b	Pinkish White
Transylvanian	7.0 g	29.6 abc	4.8 bcd	109 d-i	77.5 a-d	0.538 a-d	11.1 def	6.0 abc	18.7 abc	0.0 b	Pinkish White
Nootka Rose	3.3 l	24.7 b-g	3.6 fg	96 f-j	55.4 d-h	0.346 c-g	16.8 b	5.3 b-g	15.7 bc	0.0 b	White
Saba Gold	4.2 k	19.9 f-h	3.6 fg	74 hij	47.8 e-h	0.293 d-g	11.5 cde	5.1 c-h	15.8 bc	0.0 b	Light Brown
Messadore	4.0 k	19.1 gh	3.5 fg	56 j	34.7 gh	0.200 fg	8.7 def	4.3 h	13.2 c	0.0 b	Light Brown
Thermadore	4.7 j	18.9 gh	3.2 g	73 ij	45.7 fgh	0.246 efg	9.7 def	4.9 e-h	15.1 bc	0.3 ab	Light Brown

¹Marketable weight was determined by combining all marketable cloves within a single replicate

²Basal plate rot rating is calculated by assessing the percentage of basal plate missing using a 0-4 rating scale: where 0 = no damage, 1 = 1 - 24% basal plate missing; 2 = 25 - 50% basal plate missing; 3 = > 50% basal plate missing and 4 = completely desiccated bulb

³Marbled Purple Stripe

Table 1. Assessments at Dashwood with height and leaf number collected 18 May, fresh weights collected 26 July and dry weights collected 21 August.

Table 2. Assessments at Ridgetown with height and leaf number collected 15 May, fresh weights collected 24 July and dry weights collected 21 August.¹

Cultivar	Assessments at Ridgetown										
	Clove Weight at Planting (g)	Height (cm) May 15, 2019	Leaf Number May 15, 2019	Plant Fresh Weight (g)	Fresh Bulb Weight (g)	Marketable Dry Weight (kg)	Bulb to Clove Ratio	Diameter (cm)	Bulb Circumference (cm)	Basal Plate Rot ²	Bulb Wrapper Colour
Music	7.6 f	48.5 abc	6.0 abc	49 cde	28.8 c-f	0.195 e-j	3.8 bc	4.0 cde	12.2 def	0.0ns	White
Newfoundland	6.8 g	43.2 b-e	5.6 bcd	32 de	21.3 ef	0.160 g-j	3.1 c	3.7 e	11.5 ef	0.0	White
Ivan	5.5 i	47.3 bcd	5.7 a-d	37 cde	24.4 def	0.171 g-j	4.4 bc	3.8 de	11.8 def	0.1	White
Portugal 1 Azores	10.1 b	48.2 abc	6.1 abc	98 ab	52.7 abc	0.367 abc	5.2 abc	4.7 a-d	15.0 abc	0.0	White
Mount Hood	9.8 bcd	51.8 ab	6.2 ab	62 cd	40.5 a-f	0.315 b-e	4.1 bc	4.5 a-e	14.0 b-e	0.0	White
Yugoslavian Red	4.1 k	33.7 fgh	3.6 f	32 de	19.9 ef	0.075 j	4.9 abc	3.8 de	11.3 f	0.3	Pinkish White
Georgian Fire	6.2 h	43.4 b-e	5.8 a-d	46 cde	29.5 c-f	0.217 d-i	4.8 abc	4.1 cde	12.7 c-f	0.1	White
Russian Red R	2.1 m	35.8 e-h	4.2 ef	26 e	18.4 f	0.107 hij	8.8 abc	3.6 e	11.0 f	0.1	Purple Stripe
Red Russian MPS ³	9.9 bc	42.5 b-f	6.0 abc	106 a	58.4 ab	0.345 a-d	5.9 abc	5.3 ab	16.5 ab	0.3	Purple Stripe
Kranagasger Red	9.5 de	44.2 b-e	6.1 abc	95 ab	47.2 a-e	0.264 b-g	5.0 abc	4.8 abc	15.1 abc	0.1	White
Duganski-MPS ³	11.0 a	41.4 c-g	6.0 abc	124 a	64.5 a	0.384 ab	5.9 abc	5.5 a	17.0 a	0.1	Pinkish White
Duganski-White	5.3 i	36.4 e-h	4.9 cde	51 cde	32.9 b-f	0.244 c-h	6.2 abc	4.3 b-e	13.2 c-f	0.1	Pinkish White
Purple Glazer	5.3 i	45.9 bcd	5.6 bcd	53 cde	38.1 a-f	0.301 b-f	7.2 abc	4.4 b-e	14.0 b-e	0.0	Pinkish White
Guelph	9.2 e	43.6 b-e	5.6 bcd	66 bc	41.5 a-f	0.270 b-g	4.5 abc	4.2 cde	14.3 bcd	0.0	White
Ukraine	10.0 bc	51.6 ab	6.2 ab	102 a	50.1 a-d	0.382 abc	5.0 abc	4.8 abc	15.0 abc	0.0	White
Polish White	9.7 cd	56.7 a	6.9 a	125 a	59.0 ab	0.459 a	6.1 abc	5.2 ab	15.9 ab	0.1	White
Sicilian Gold	3.0 l	33.2 fgh	4.6 def	47 cde	29.4 c-f	0.161 g-j	9.8 ab	4.3 b-e	12.8 cdef	0.3	Pinkish White
Transylvanian	7.0 g	47.0 bcd	5.7 bcd	67 bc	46.2 a-e	0.378 abc	6.6 abc	4.8 abc	15.1 abc	0.0	White
Nootka Rose	3.3 l	36.3 efg	4.3 ef	57 cde	32.2 b-f	0.136 g-j	9.8 ab	4.5 b-e	12.9 c-f	0.0	White
Saba Gold	4.2 k	31.5 h	4.2 ef	26 e	20.6 ef	0.085 ij	5.0 abc	3.7 e	11.3 f	0.2	Light Brown
Messadore	4.0 k	32.3 gh	4.2 ef	25 e	44.4 a-f	0.094 ij	10.9 a	3.7 e	11.2 f	0.7	White
Thermadore	4.7 j	38.4 d-h	4.6 def	59 cd	37.8 a-f	0.214 d-i	8.1 abc	4.6 a-e	14.1 bcd	0.2	White

¹Marketable weight was determined by combining all marketable cloves within a single replicate

²Basal plate rot rating is calculated by assessing the percentage of basal plate missing using a 0-4 rating scale: where 0 = no damage, 1 = 1 - 24% basal plate missing; 2 = 25 - 50% basal plate missing; 3 = > 50% basal plate missing and 4 = completely desiccated bulb

³Marbled Purple Stripe

Table 2. Assessments at Ridgetown with height and leaf number collected 15 May, fresh weights collected 24 July and dry weights collected 21 August.

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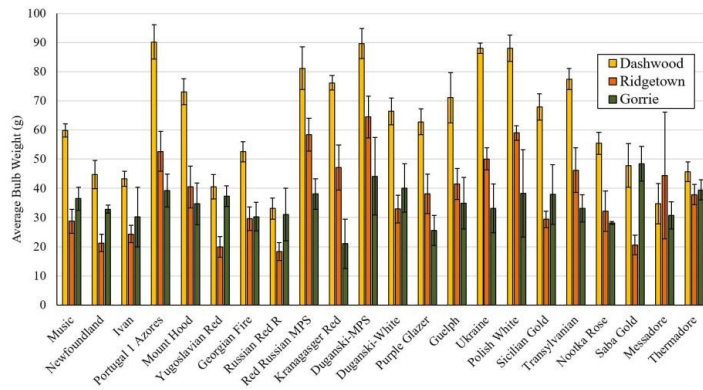


Figure 1. Fresh bulb weight in grams at harvest July 24 in Ridgetown, July 25 in Gorrie and July 26 in Dashwood. The average of four replicates is presented by the standard error. Many plants failed to emerge at the Gorrie location due to flooding. R=Racombole, MPS=Marbled Purple Stripe

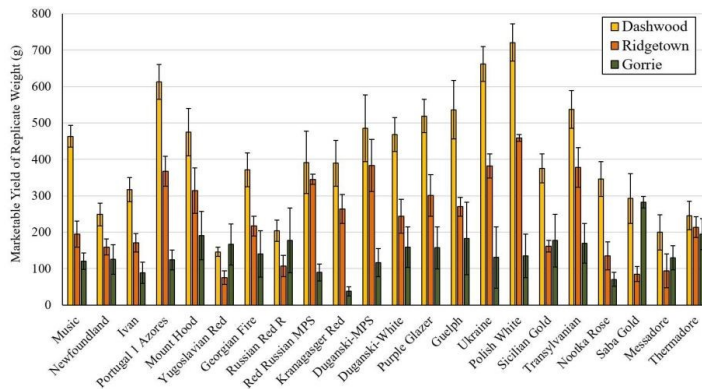


Figure 2. Marketable yield (dry weight) after curing 21 August, 2019. The average of four replicates is presented by the standard error. Many plants failed to emerge at the Gorrie location due to flooding. R=Racombole, MPS=Marbled Purple Stripe

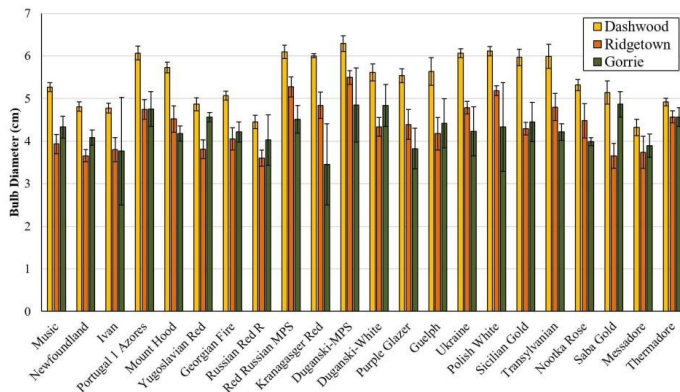


Figure 3. Bulb diameter at harvest July 24 in Ridgetown, July 25 in Gorrie and July 26 in Dashwood. The average of four replicates is presented by the standard error. Many plants failed to emerge at the Gorrie location due to flooding. R=Racombole, MPS=Marbled Purple Stripe

Table 3. Scape stage of garlic cultivars in Dashwood, Ontario observed 26 June. Scape stage was by the direction of spathe after looping. None = no scape observed, 1 = one full loop and 2 = two full loops. Scape stage at 26 June reflects when the scapes would most likely be harvested and may not reflect the final scape stage.^{1,2}

Cultivar	Scape Stage 26 June (%) ²									
	None	< ¼	¼	½	¾	1	1 ¼	1 ½	1 ¾	2
Music	0.0	0.0	0.0	0.0	2.6	5.3	23.7	68.4	0.0	0.0
Newfoundland	0.0	0.0	0.0	0.0	15.4	3.8	30.8	50.0	0.0	0.0
Ivan	2.9	0.0	0.0	0.0	2.9	2.9	34.3	57.1	0.0	0.0
Portugal 1 Azores	0.0	0.0	0.0	3.0	6.1	6.1	18.2	66.7	0.0	0.0
Mount Hood	0.0	0.0	0.0	9.4	0.0	15.6	15.6	59.4	0.0	0.0
Yugoslavian Red	3.2	3.2	0.0	48.4	45.2	0.0	0.0	0.0	0.0	0.0
Georgian Fire	0.0	0.0	0.0	14.3	2.9	11.4	28.6	42.9	0.0	0.0
Russian Red R	0.0	0.0	0.0	37.8	45.9	0.0	0.0	10.8	5.4	0.0
Red Russian MPS ³	0.0	0.0	3.1	21.9	71.9	3.1	0.0	0.0	0.0	0.0
Kranagasser Red	0.0	10.3	3.4	34.5	51.7	0.0	0.0	0.0	0.0	0.0
Duganski-MPS ³	14.3	0.0	0.0	5.7	80.0	0.0	0.0	0.0	0.0	0.0
Duganski-White	2.7	8.1	8.1	62.2	18.9	0.0	0.0	0.0	0.0	0.0
Purple Glazer	0.0	0.0	0.0	0.0	0.0	0.0	5.9	94.1	0.0	0.0
Guelph	0.0	0.0	0.0	0.0	0.0	0.0	25.0	75.0	0.0	0.0
Ukraine	0.0	0.0	0.0	0.0	0.0	8.3	33.3	58.3	0.0	0.0
Polish White	0.0	0.0	0.0	7.5	2.5	5.0	27.5	57.5	0.0	0.0
Sicilian Gold	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transylvanian	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nootka Rose	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saba Gold	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Messadore	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Thermadore	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

¹ Numbers in bold show the predominate scape stage of each cultivar

² Percentage was determined by the number of plants showing a particular loop stage divided by the total number of plants x 100

³ Marbled Purple Stripe

Table 4. Scape stage of garlic cultivars in Ridgetown, Ontario observed 26 June. Scape stage was by the direction of spathe after looping. None = no scape observed, 1 = one full loop and 2 = two full loops. Scape stage at 26 June reflects when the scapes would most likely be harvested and may not reflect the final scape stage.^{1,2}

Cultivar	Scape Stage 26 June (%) ²									
	None	< ¼	¼	½	¾	1	1 ¼	1 ½	1 ¾	2
Music	0.0	0.0	0.0	5.9	38.2	41.2	11.8	2.9	0.0	0.0
Newfoundland	0.0	0.0	0.0	18.2	45.5	6.1	6.1	24.2	0.0	0.0
Ivan	0.0	0.0	0.0	12.1	39.4	21.2	15.2	12.1	0.0	0.0
Portugal 1 Azores	0.0	0.0	0.0	5.9	35.3	32.4	11.8	14.7	0.0	0.0
Mount Hood	0.0	0.0	0.0	2.8	41.7	27.8	19.4	8.3	0.0	0.0
Yugoslavian Red	18.2	4.5	18.2	9.1	50.0	0.0	0.0	0.0	0.0	0.0
Georgian Fire	0.0	0.0	0.0	5.7	48.6	22.9	11.4	11.4	0.0	0.0
Russian Red R	3.7	3.7	18.5	63.0	11.1	0.0	0.0	0.0	0.0	0.0
Red Russian MPS ³	0.0	0.0	5.4	40.5	54.1	0.0	0.0	0.0	0.0	0.0
Kranagasser Red	6.5	3.2	29.0	32.3	29.0	0.0	0.0	0.0	0.0	0.0
Duganski-MPS ³	2.9	2.9	17.1	51.4	25.7	0.0	0.0	0.0	0.0	0.0
Duganski-White	8.1	2.7	27.0	54.1	8.1	0.0	0.0	0.0	0.0	0.0
Purple Glazer	0.0	0.0	0.0	0.0	15.4	12.8	12.8	51.3	7.7	0.0
Guelph	5.9	0.0	0.0	2.9	23.5	14.7	8.8	44.1	0.0	0.0
Ukraine	0.0	0.0	0.0	5.1	10.3	23.1	20.5	41.0	0.0	0.0
Polish White	0.0	0.0	0.0	2.5	30.0	27.5	22.5	17.5	0.0	0.0
Sicilian Gold	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Transylvanian	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nootka Rose	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Saba Gold	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Messadore	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Thermadore	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

¹ Numbers in bold show the predominate scape stage of each cultivar

² Percentage was determined by the number of plants showing a particular loop stage divided by the total number of plants x 100

³ Marbled Purple Stripe























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Conclusions

Most cultivars that recorded a taller height and an increase in number of leaves at the 15 May assessment also had the largest bulb weight at harvest. Many of the cultivars trialed performed better than the predominately grown cultivar in Ontario – Music – and most had a higher rate of multiplication from the time of planting to the final average bulb weight. The majority of the cultivars highlighted in this report will be assessed again in the 2019–2020 field season in Ridgeway and Dashwood. Further research should explore the storability of the various cultivars to determine if storage duration can be extended relative to Music.

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Table of harvest measurements from the Dashwood location only with pictures from the Dashwood and Ridgeway locations

Dashwood Ridgeway			
Music	59.9	5.3	
Porcelain Hardneck	Bulb Wt (g)	Bulb Dia.	
Newfoundland	44.7	4.8	
Porcelain Hardneck	Bulb Wt (g)	Bulb Dia.	
Ivan	43.3	6.4	
Porcelain Hardneck	Bulb Wt (g)	Bulb Dia.	
Portugal 1 Azores	90.2	6.1	
Porcelain Hardneck	Bulb Wt (g)	Bulb Dia.	
Mount Hood	73.1	5.7	
Porcelain Hardneck	Bulb Wt (g)	Bulb Dia.	
Yugoslavian Red	40.5	4.9	
Porcelain Hardneck	Bulb Wt (g)	Bulb Dia.	
Georgian Fire	52.6	5.1	
Porcelain Hardneck	Bulb Wt (g)	Bulb Dia.	
Russian Red	33.1	4.5	
Racamboule Hardneck	Bulb Wt (g)	Bulb Dia.	
Red Russian	81.1	6.1	
Marbled Purple Stripe Hardneck	Bulb Wt (g)	Bulb Dia.	
Kranagasger Red	76.2	6.0	
Marbled Purple Stripe Hardneck	Bulb Wt (g)	Bulb Dia.	
Duganski - MPS	89.6	6.3	
Marbled Purple Stripe Hardneck	Bulb Wt (g)	Bulb Dia.	
Duganski - White	66.4	5.6	
Purple Stripe Hardneck	Bulb Wt (g)	Bulb Dia.	
Purple Glazer	62.8	5.5	
Purple Stripe Hardneck	Bulb Wt (g)	Bulb Dia.	
Guelph	71.0	5.6	
Unknown Hardneck	Bulb Wt (g)	Bulb Dia.	
Ukraine	88.0	6.1	
Unknown Hardneck	Bulb Wt (g)	Bulb Dia.	
Polish White	88.0	6.1	
Unknown Hardneck	Bulb Wt (g)	Bulb Dia.	
Sicilian Gold	67.9	6.0	
Artichoke Softneck	Bulb Wt (g)	Bulb Dia.	
Transylvanian	77.5	6.0	
Artichoke Softneck	Bulb Wt (g)	Bulb Dia.	
Nootka Rose	55.4	5.3	
Silverskin Softneck	Bulb Wt (g)	Bulb Dia.	
Saba Gold	47.8	5.1	
Unknown Softneck	Bulb Wt (g)	Bulb Dia.	
Messadore	34.7	4.3	
Unknown Softneck	Bulb Wt (g)	Bulb Dia.	
Thermadore	45.7	4.9	
Unknown Softneck	Bulb Wt (g)	Bulb Dia.	

All harvest measurements are averages from the Dashwood location only.