

Final Report


Aphid Monitoring and Virus Testing Program

Appendices

Appendix 1 – Example blog and email notifying growers of aphid flight <https://www.berryblog.ca/>

BERRY BLOG

A BLOG BY PERENNIA




[HOME](#)
[CONTACT](#)
[ABOUT PERENNIA](#)
[MONILINIA BLIGHT MONITORING](#)

Cranberry
 Highbush Blueberry
 Raspberry
 Strawberry


Showing posts sorted by date for query **aphid**. [Sort by relevance](#) [Show all posts](#)

2019 Strawberry Season Update #1- Aphids
 Wednesday, July 17, 2019

Perennia is continuing the strawberry aphid monitoring project this season. Strawberry aphids are the primary vector of the strawberry viruses (strawberry mild yellow edge virus and strawberry mottle virus) found in Nova Scotia, and by monitoring the aphid we aim to prevent further spread of viruses in the province. The risk of new infection is highest during the strawberry aphid flight period when winged aphids can move large distances to new fields and spread infection. As of last week's aphid trapping and monitoring we found our first winged strawberry aphids. Because of this it is crucial to continue to monitor and scout for winged and wingless strawberry aphids in your fields.




Winged strawberry aphid (scale 1mm)



Adult strawberry aphid (scale 1mm)

To prevent virus spread it is important to protect new plantings by controlling aphids in established fruiting fields. Seeing that we are in the midst of harvest there are limited products available for fruiting fields but there are a few tools with short (0 day or 1 day) pre-harvest intervals. For information on control options please see [Strawberry Management Guide 2019](#)

By Perennia Blogs at July 17, 2019 


Labels: [Strawberry](#)

SUBSCRIBE TO
PERENNIA'S
BERRY BLOG


SEARCH THIS BLOG

aphid

BERRY SPECIALIST







GORDON (SONNY) MURRAY



**MONILINIA
BLIGHT
MONITORING**

FOLLOW PERENNIA

ARCHIVE

ARCHIVE



Good Afternoon!

Through our provincially funded strawberry aphid monitoring program, we have trapped our first winged strawberry aphid this season this past week in the Annapolis Valley. We expect areas North-East of the valley to be slightly behind in development. As temperatures begin to climb, conditions favour aphid development and we expect to see a spike in the population in the coming weeks. If you have not already applied an insecticide targeting aphids, it may be timely to do so now (a bit later in the North-East).

The primary concern with aphid colonization of strawberries is the potential for virus transmission. Mixed virus infections can cause general plant decline, including leaf yellowing, distortion, stunting, reduced berry size, and ultimately yield loss. Several aphid species have been implicated in this phenomenon, but the primary species for virus transmission in strawberries is the strawberry aphid (*Chaetosiphon fragaefolii*) which has been known to transmit as many as four different viruses in strawberries. For more information on aphids in strawberries please see the attached fact sheet.

Also attached is the updated recommendations for strawberry aphid management.

This is a quick update related to the impact of the pesticide re-evaluation for Imidacloprid on strawberry aphid management. The re-evaluation decision can be found on the health Canada website here:

<https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/decisions-updates/reevaluation-decision/2019/imidacloprid.html>

Jen

Jennifer Haverstock

Small Fruit Specialist
Manager of Horticulture | Agricultural Services
Perennia Food and Agriculture Inc.
[e-mail: jhaverstock@perennia.ca](mailto:jhaverstock@perennia.ca)
office: 902.678-7722 ext 223
mobile: 902-670-5003
www.perennia.ca

*** Perennia, Coronavirus and our Clients: please read how we are working differently: www.perennia.ca/coronavirus***

Appendix 2 – Annual aphid spray management program

2020 Strawberry Aphid Management Program

Updated: April 2020

Strawberry Aphid Management for Nova Scotia

Jennifer Haverstock, Small Fruit Specialist, Perennia Food & Agriculture Inc.

Successful prevention of virus transmission in strawberries involves careful monitoring and management of strawberry aphids, the primary virus vector. Proper scouting combined with a complete integrated pest management program with appropriate chemical control strategies is the most effective aphid management in strawberries. Spray strategies for aphid, and hence virus control should focus on the high-risk flight period as this is the period of greatest virus movement. Strawberry aphid population typically peaks in Nova Scotia around the second week of June, followed by flight in late June/early July. A second peak often occurs in early September, necessitating the need for management through the fall. It is strongly encouraged that growers monitor strawberry aphid populations to ensure sprays are being applied at the time that they will provide the best protection. For additional information on aphids as vectors, their management and monitoring please see [Perennia's Strawberry Aphid Factsheet](#).

The following management information was developed to aide in aphid management in strawberries for Nova Scotia growers. For a full list of registered products visit Perennia's Strawberry Insect & Disease Management Schedule found under [Perennia Pest Management Guides](#).

Planting Year

Strawberry aphid management is important in the planting year because it sets the stage for the health of the planting in the following fruiting years. The planting year allows farms an opportunity to stop the movement of strawberry aphids and therefore virus from older fields into newly planted ones, as more insecticide options are available for use. Virus infection in the planting year can result in significant yield and quality loss in subsequent fruiting years.

Foliar insecticide application timing is critical to ensure control measures are most effective at the times when aphid population peaks and flight occurs. Biosecurity practices commonly practiced, such as working from newer to older fields, will also help minimize the spread of aphids between older and newer fields.

Fruiting Year

Spring aphid monitoring is essential to determine the need for controls to limit population build-up prior to the flight period. When deciding to apply a control measure, consider several things:

- identification of strawberry aphid presence (population peak and flight period);
- what products are available for use;
- proximity to harvest (PHI);
- and length of time requiring aphid management.

Using this information, develop a spray strategy before the season begins to ensure you have the products required on hand and spray intervals worked out to provide adequate coverage for the season.

Carried over fruiting fields potentially have the highest levels of virus infection and therefore inoculum, presenting a risk to newer fields. If virus test results indicate high levels of virus load, these fields should be removed immediately after harvest to minimize on and off-farm transmission of virus.

Foliar Applications

Whenever employing chemical control options, be sure to read and follow all labels carefully. Chemical control options should be rotated appropriately between chemical groups for resistance management.

Group	Product	Rate / ha	REI	PHI	Note
1	Cygon 480-AG	2.25 L/ha	48 hrs	7 days	Do not apply when bees are actively foraging.
	Lagon 480 E				
4A	Admire 240	175 ml/ha	24 hrs	7 days	Do not apply pre-bloom or during bloom or when bees are actively foraging. Apply post-bloom only. Maximum of 2 applications per season.
	Assail 70 WP	86-86 g/ha	12 hr	1 day	
4D	Sivanto Prime	500-750 ml/ha	12 hrs	0 days	Toxic to certain beneficial insects. Maximum 2 applications per season. Where possible, rotate with products outside of Group 4.
29	Beleaf 50SG	120-160 g/ha, min. 94 L/ha water	12 hrs	0 days	Max 3 applications per year.

Pre-Harvest Management

At first report or identification of winged aphids (flight) in your area, begin alternating foliar applications of Cygon 480-Ag/ Lagon 480E, Admire 240 up to 7 days before expected harvest.

Harvest Management

At the onset of harvest, alternate products with short- or 0-day pre-harvest intervals, such as Beleaf 50SG or Sivanto Prime at recommended intervals until harvest is complete. Pay close attention to pre-harvest and re-entry intervals indicated on the product labels. Continue alternating applications until the flight collapses or the maximum number of applications/amounts of product has been reached.

Suppression Products

Group NC products such as Purespray Green Oil (feeding deterrent) or Vegol Crop Oil (aphid suppression) are important rotational products during the harvest period. They can be used at any point leading up to the aphid flight as well as part of a spray rotation with other foliar applied products.

* Tolerance has not been determined for all varieties, so test product on a small area first.

* Do not use within 14 days of Supra Captan, Maestro, Folpan or copper and 30 days of sulfur.

* Do not use these products within 48 hours of freezing temperatures; when temperatures are high; or to a stressed crop caused by environmental factors (e.g. drought, flooding).

This publication was compiled by representatives from Perennia using information from the Pest Management Regulatory Agency of Health Canada, specific pesticide labels and manufacturer's information. This information is continuously changing and therefore it can cease to be current and accurate. Pesticide labels are the best source of information and should always be consulted prior to using a product.

By printing this publication, Perennia does not offer any warranty or guarantee, nor do they assume any liability for any crop loss, animal loss, health, safety or environmental hazard caused by the use of a pesticide mentioned in this publication.

Where there are multiple brand names of a specific active ingredient registered in Canada, Perennia has only listed a couple for reference purposes and as such does not endorse one brand over another. If you have purchased a generic product not specifically in this guide but has your crop and pest on the label, always follow that product label.

If any information in this or any other publication conflicts with the information on the label, always use the label recommendation.

Appendix 3 – Grower Aphid Information

Strawberry aphid factsheet

<https://www.perennia.ca/wp-content/uploads/2020/04/Aphid-Fact-Sheet-FINAL.pdf>



EXTENSION AND ADVISORY TEAM

FACT SHEET

FEBRUARY 2020 | ©Perennia 2020



APHIDS

The primary concern with aphid colonization of strawberries is the potential for virus transmission. Mixed virus infections can cause general plant decline, including leaf yellowing, distortion, stunting, reduced berry size, and ultimately yield loss. Several aphid species have been implicated in this phenomenon, but the primary species for virus transmission in strawberries is the strawberry aphid (*Cheatosiphon frugaeifolii*) which has been known to transmit as many as four different viruses in strawberries. A less important vector for virus transmission in Nova Scotia is the melon aphid (*Aphis gossypii*) but this aphid is present in smaller populations and is only capable of transmitting one virus to strawberries.

APHID MONITORING

Successful prevention of virus establishment and transmission into strawberries involves careful monitoring and management of strawberry aphids.

In overwintered strawberry fields, aphid eggs (Figure 1) should be scouted in fields/blocks by randomly collecting 50 mature trifoliates located close to the ground immediately after mulch removal. It's possible that these eggs are not strawberry aphid, but this species has shown itself to be the dominant colonizer of strawberries in Nova Scotia.

Wingless strawberry aphids (Figure 2) should be scouted weekly following egg hatch by randomly collecting 60 immature leaf buds from fields/blocks. Aphids prefer to feed on the underside of young succulent leaves, so scouting immature leaf buds is the easiest and most effective method of scouting for this pest. A 20x hand lens can be used in the field to verify strawberry aphid or samples can be analyzed using stereomicroscopic. Although no economic thresholds for treatment have been established, it's generally felt that more than 15 strawberry aphids per 60 leaves warrant appropriate action in commercial fruiting fields and even lower thresholds are warranted in nursery blocks.



Figure 2. Wingless "Apterous" form of strawberry aphid, noting the knobbed hairs covering the body.

The highest risk for virus transmission is from the winged form of strawberry aphid. Scouting for winged aphids (Figure 3) should be initiated in mid to late May to identify the beginning flight and minimize the movement of aphids. Scouting for winged strawberry aphid can be accomplished in two ways: 1) the use of yellow "sticky traps" and/or 2) yellow pan traps (Figure 4). Sticky traps should be deployed at canopy level field/block and collected weekly for examination. Sticky traps are a coarse but effective method of identifying the flight period of strawberry aphid in Nova Scotia. Although it's somewhat more tedious,

yellow pan traps are a more precise method of winged strawberry aphid identification. No economic thresholds for treatment have been research validated but practical experience in Nova Scotia has suggested that as few as one winged strawberry aphid in a ten sticky trap set is enough to warrant treatment in commercial fields. In a nursery, even more conservative thresholds are warranted, and treatments are recommended for the duration of the flight period regardless of weekly catch numbers.



Figure 3. Winged "Alatae" form of strawberry aphid.



Figure 1. Aphid eggs on the underside of an old strawberry leaf (photo courtesy of Dr. Debra Mousavi, AAFC, Kenilworth, NS).

APHID MONITORING

Both aphid species build up a population of colonies of consequence and consequently require two harvests after the first harvest.

Proper scouting are the most important strawberry virus control is the period.





Figure 4. Yellow sticky and yellow pan traps used for winged aphid scouting.

For a list of insecticides registered for control of aphids on strawberries in Nova Scotia, please see Perennia's Pest Guide.

Please read and follow all labels carefully. Chemical control options should be rotated appropriately between chemical groups to help prevent resistance development.

FOR MORE INFORMATION

Perennia Food and Agriculture Inc.
Tel: 1-902-678-7722

WWW.PERENNIA.CA

FOLLOW US @NSPERENNIA



WWW.PERENNIA.CA

FOLLOW US @NSPERENNIA



6 | Page

Raspberry Aphid Factsheet

<https://www.perennia.ca/wp-content/uploads/2018/04/do-you-have-raspberry-viruses.pdf>

Extension and Advisory Team

Do you have Raspberry Viruses?

A concern for raspberry & blackberry producers in Nova Scotia.

Introduction & Symptoms

Two raspberry viruses were found in several commercial raspberry operations during the 2014 growing season and growers should be on the look-out for this new virus problem. The two viruses, Rubus Yellow Net Virus (RYNV) and Raspberry Leaf Mottle Virus (RLMV) are individually symptomatic and collectively symptomatic, causing reduced yields, smaller leaves and berries, and chlorotic foliage (Fig.1).

Spread

RYNV and RLMV are transmitted by the large raspberry aphid (*Amphorophora agathonica*) and not surprisingly this aphid has been confirmed in Nova Scotia. It is found on cultivated red raspberry, blackberry and wild *Rubus* species.

The large raspberry aphid is a large, light to dark green aphid, 2.5 – 4.5 mm long, with very long antennae and legs, often dropping from the raspberry leaf when disturbed (Fig.2). It overwinters as eggs which often begin to hatch at bud break. Peak population is reported to occur just before harvest and some areas report a single flight while others report two. Flight patterns have not been studied previously in Nova Scotia but monitoring began in the 2015 growing season.

RYNV and RLMV are semi-persistent which means that continuous feeding for a few hours by the aphid is generally required for transmission. The viruses are not transmitted to young aphids, nor are they transmitted by contact among plants, or by pollen. However, infection levels can increase rapidly with up to 100% infection of plants after as few as five seasons.

Management

Management of RYNV and RLMV involves removing infected bushes when first observed; an application of an appropriate insecticide before removal is prudent to prevent any aphids from scattering to healthy plants nearby. Individual plants can be replanted if the stand is high yielding and if the disease incidence is low. However, plantings with declining production and significant levels of disease should be removed outright and replanted with clean stock. Isolation from other plantings is also desirable if possible. Lastly, the large raspberry aphid must be managed effectively to minimize new infections and this is best done by careful monitoring for population build-up in the spring and for the high risk flight period(s) with application of appropriate insecticides as necessary.

Perennia management schedules are regularly updated. Producers are advised to check them for up to date pest information.



Figure 1

“Two raspberry viruses were found in several commercial raspberry operations during the 2014 growing season and growers should be on the look-out for this new virus problem.”



Figure 2

For more information, contact:

Jennifer Haverstock
Perennia Extension and Advisory Services Team
Tel: 902-678-7722
Email: jhaverstock@perennia.ca

June 2016

Appendix 4 – Example virus result grower email communication

High Virus Results Email

Hi XXXXX,

I wanted to follow up with you on your results from the 201X strawberry virus testing. As you know, samples were collected from your newly planted strawberry field this past fall to test for the two viruses that have historically caused problems around the province. The sampling methodology is designed to identify the level of infection of strawberry mild yellow edge virus (SMYEV), the “canary” virus in Nova Scotia; and the secondary virus, strawberry mottle virus (SMoV). These viruses were tested separately, with twenty 3-leaf samples being tested for strawberry mild yellow edge virus (SMYEV) and two 3-leaf samples being tested for strawberry mottle virus (SMoV). The biggest problem with our testing is that it does not (due to excessive cost for the test) provide us with a statistically significant sampling for the second virus (SMoV) with only 6 leaves being tested per field.

The results of the 201X tests were as follows:

Block 1 (Mixed) - 17 positives out of 20 samples for SMYEV; 2 positives out of 2 samples for SMoV.

With high levels of both viruses detected in your field there is a higher chance of disease symptoms appearing, represented by poor vigour and decline, and low yields. If possible, be vigilant with your spray during the aphid flight to prevent spread. This level of infection represents a significant inoculum pool that is a high risk to yourself and your neighbors.

To mitigate this risk as much as possible you should consider the following recommendations:

- 1) Remove fields in a timely way as virus levels increase each additional year a field is kept (following 201X harvest).
- 2) Always replant with certified and virus tested stock.
- 3) Monitor and manage strawberry aphid focusing primarily on the high-risk flight period when most new infections and virus spread occurs.

A few reminders about these viruses: 1) it takes both viruses in a plant to cause disease, 2) the viruses are spread primarily by the strawberry aphid, and 3) high levels of virus in a field represent a high inoculum risk for new infections in both your own fields and those of neighbors.

Attached is a fact sheet on the strawberry aphid but please don't hesitate to contact me if you have any questions about aphid management.

Moderate Virus Results Email

Hi XXXXX,

I wanted to follow up with you on your results from the 201X strawberry virus testing. As you know, samples were collected from your newly planted strawberry field in the of fall 201X to test for the two viruses that have caused problems around the province. These viruses were tested separately, with twenty 3-leaf samples being tested for strawberry mild yellow edge virus (SMYEV) and two 3-leaf samples being tested for strawberry mottle virus (SMoV). The biggest problem with our testing is that it does not (due to excessive cost for the test) provide us with a statistically significant sampling for the second virus (SMoV) with only 6 leaves being tested per field. The results of these tests were as follows:

Block 1 (Albion) - 2 positives out of 20 samples for SMYEV; 1 positive out of 2 samples for SMoV

Block 2 (Mixed) - 5 positives out of 10 samples for SMYEV; 1 positive out of 1 sample for SMoV

While your virus results are not highly concerning for independent fields, they do cause a red flag, particularly because it shows that both viruses are present on your farm. Please note if you see virus disease symptoms, represented by poor vigour and decline, and low yields.

A few reminders about these viruses: 1) it takes both viruses in a plant to cause disease, 2) the viruses are spread primarily by the strawberry aphid, and 3) high levels of virus in a field represent a high inoculant risk for new infections in both your own fields and those of neighbors.

If you have any questions or would like more clarification, please get in touch.

Low Strawberry Virus Results Email

Good afternoon,

As you know, for the past number of years we have been conducting virus testing on all newly planted strawberry fields in Nova Scotia. The sampling protocol is designed to identify the level of infection by the strawberry mild yellow edge virus (SMYEV), the “canary” virus, in these newly planted fields. A subsample of 10% of the sampled leaves from each field are also tested for the strawberry mottle virus (SMoV), which is the secondary virus in Nova Scotia.

Twenty 3-leaf samples were tested for SMYEV from each block or field. **Your 201X results showed 10% or less samples that tested positive for SMYEV in each block or field.**

Two 10-leaf samples were tested for SMoV for each block or field. **Your 201X results showed no samples that tested positive for SMoV.**

A few reminders about these viruses:

- Both viruses are required in a plant to cause disease
- The viruses are spread mainly by the strawberry aphid
- High levels of virus in a field represent high inoculant risk for new infections

Thank you for your cooperating in the strawberry virus recovery program and keep up the good work.

For more information on our testing procedure or specific details on your results, don't hesitate to contact me.

Good afternoon,

As you know, for the past number of years we have been conducting virus testing on all newly planted strawberry fields in Nova Scotia. The sampling protocol is designed to identify the level of infection by the strawberry mild yellow edge virus (SMYEV), the “canary” virus, in these newly planted fields. A subsample of 10% of the sampled leaves from each field are also tested for the strawberry mottle virus (SMoV), which is the secondary virus in Nova Scotia.

I am happy to report that your 201X results came back with 0% infection of either virus.

Thank-you for your continued cooperation in the strawberry virus recovery program and keep up the good work.

For more information on our testing procedures or specific details on your results, please feel free to contact me.