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News

- Temperature is working correctly for the Port Williams weather station.
- AgWeather Atlantic recommends that you use FireFox as your browser. FireFox can be downloaded for free from the Mozilla website. If you use a different browser and experience issues on AgWeather Atlantic, try it on FireFox as it may fix the issue. Lately I’ve had issues with the website while using Google Chrome. There is limited time to troubleshoot these issues before bloom.
Bud Development
Over the last week, cool temperatures slowed bud development.

Table 1: Bud development in early regions of Kentville to Greenwich observed on May 13, 2019.

<table>
<thead>
<tr>
<th>Early Regions (Kentville/Greenwich)</th>
<th>Current Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Idared</td>
<td>Early bud separation</td>
</tr>
<tr>
<td>Gravenstein</td>
<td>Late tight cluster</td>
</tr>
<tr>
<td>Honeycrisp</td>
<td>Tight cluster</td>
</tr>
<tr>
<td>Ambrosia</td>
<td>Early tight cluster</td>
</tr>
<tr>
<td>Pear</td>
<td>Tight cluster</td>
</tr>
<tr>
<td>Sweet Cherry</td>
<td>Early white bud</td>
</tr>
<tr>
<td>Peach</td>
<td>Pink</td>
</tr>
<tr>
<td>Plum</td>
<td>White bud</td>
</tr>
<tr>
<td>Apricot</td>
<td>Full bloom to petal fall</td>
</tr>
</tbody>
</table>

2019 Degree Day Accumulations
A week of below-average temperatures continues to slow the accumulation of degree days. The degree day accumulations for 2019 at base 5°C and 10°C are below the 5- and 10-year averages (Figure 1).

Figure 1: Heating degree day accumulations for plant (above 5°C) and insect (above 10°C) development from March 1st to May 14th for the past 17 seasons. Provided by Jeff Franklin (AAFC).

Heating degree day accumulation from March 1st through May 14th:
- Approximately 6% less plant development heat units compared to the 5-year average, and 21% less compared to the 10-year average.
- Approximately 15% less plant development heat units compared to 2018, and 30% less compared with 2017.
- Approximately 33% less insect development heat units compared to the 5-year average, and 53% less compared to the 10-year average.
Diseases

Apple Scab

The environmental conditions for an apple scab infection are listed in the Modified Mills Table found in the Supplement to the Orchard Outlook.

Table 2: Apple scab infection events at the Kentville Research Station from May 8th to May 15th, based on the Modified Mills Table.

<table>
<thead>
<tr>
<th>No.</th>
<th>Date</th>
<th>Wetness Duration (hrs)</th>
<th>Average Temp (°C)</th>
<th>Type (Primary or Secondary)</th>
<th>Ascospore maturity*</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>May 10-11</td>
<td>19.5</td>
<td>6.4</td>
<td>Primary-Light</td>
<td>29%</td>
<td>Wetting began at 12:45 PM on Friday, May 10th with leaf wetness lasting until 8:15 AM on Saturday, May 11th.</td>
</tr>
<tr>
<td>2</td>
<td>May 14-15</td>
<td>ongoing</td>
<td>4.5</td>
<td>Pending</td>
<td>37%</td>
<td>Wetting began around 1:00 PM on Tuesday, May 14th and intermittent rain is ongoing. A light infection will occur after 29 hours of leaf wetness, a moderate infection after 41 hours and a heavy infection after 56 hours.</td>
</tr>
</tbody>
</table>

**Notes**
- Wetting began at 12:45 PM on Friday, May 10th with leaf wetness lasting until 8:15 AM on Saturday, May 11th.
- Wetting began around 1:00 PM on Tuesday, May 14th and intermittent rain is ongoing. A light infection will occur after 29 hours of leaf wetness, a moderate infection after 41 hours and a heavy infection after 56 hours.

Short Term Forecast**

Continue to reapply fungicide protection. Monitor the forecast for Saturday, May 18th. Ascospores are expected to mature to 48% by May 18th.

*Assuming a green tip date of Saturday, April 20th.

** All forecasts are estimates. Observe forecasts daily for more accurate predictions.

Single or Combined Infection Events?

Last week there was a combined scab infection event created by successive wet periods that were separated by less than 8-12 hrs of dry weather. I was asked if this was a new interpretation of the model. Certainly the length of time of the dry period has been debated over time. Some spores and germlings will die on dry leaves after 15-20 minutes but others can survive for days. Locally we adopted the rule that more than 8-12 hours are required for a drying period. This interpretation is really only out of curiosity because all potential apple scab infection events warrant a fungicide treatment and the objective is to maintain a regular protection program that will inactive spores on contact.

Recommendations:

- Reapply fungicide protection on a 5-7 day interval, with a shorter interval after wet weather (cumulative 1-2” rain) or rapid tissue growth.
- Captan should be avoided for 7 days before and after an oil application.
Powdery Mildew

Recommendations:
- Apply a powdery mildew fungicide at tight cluster, if not already applied, to prevent infection of leaf clusters. Timely application early in the season will reduce the risk of secondary infections. The weather has been cold and wet so infection is not spreading quickly but protection is still needed.
- The fungicides Fullback, Nova, Fontelis, Sercadis, Aprovia, Luna Tranquility, and Pristine are systemic so will have had good activity against powdery mildew prior to the heavy rainfall.
- Where young trees had extensive powdery mildew infections last year, remove infected tips back to a healthy bud and maintain a protective program this year to prevent new infections on young tissue growth.
- Remember to treat young plantings because severe infections can reduce shoot growth, which is most concerning for young, non-bearing orchards.
- Pay particular attention to susceptible and high-value varieties such as Honeycrisp and Gala.
- Fungicide groups 3 and 7 control powdery mildew. Powdery mildew is resistant to group 11 (Flint and Sovran on 43% and 38% of orchards, respectively). Group 3 fungicides Nova and Fullback give excellent control. Note solupacks (e.g. Nova) may not dissolve properly with the presence of oil or boron in the spray tank.
- Tank mixing Group M fungicides will slow resistance development in apple scab but not powdery mildew because group Ms do not have activity on PM. Rotating classes of PM fungicide groups 3 and 7 is key to slow resistance development.

Fire Blight

Recommendations:
- For on-farm nurseries, consider applying a copper product at the lowest labeled rate prior to training trees and follow the labeled REI. Make cuts on only dry and sunny days. Be cautious when applying registered post-emergent herbicides to prevent injury to young trees.
- Late spring and early summer pruning cuts create entry points for the bacteria during the time when bacterial ooze is active. In blocks with historically high pressure, prune only when the forecast calls for at least 2 days of sunny, dry weather. As an extra precaution, disinfect tools after working in a block with fire blight pressure.
- When pruning, remove fire blight strikes at least 2-4 ft below active infections then leave them in orchard alleyways to dry thoroughly for several weeks.

Crown Gall – Know the symptoms!
We need to revisit the issue of crown gall. I have been disappointed to see that imported nursery trees can be infected by crown gall with an incidence of up to 50%. Crown gall commonly infects about 10% of nursery stock. But nurseries should not be selling you the infected trees that harbour tumour-like growths. Undiagnosed crown gall could be the reason for some failed trees in young plantings but we could only know for sure by digging up a tree. The point is that you should monitor for crown gall prior to planting to improve the success of your new investment.

Crown gall, despite its name, appears on the roots or belowground stem of apple, pear, and stone fruit trees. The symptoms of this disease are tumours or ‘galls’ that develop as a result of infection by the bacteria Agrobacterium tumefaciens. The Agrobacterium alters the tree’s DNA to induce the overproduction of plant
hormones – leading to the galls. The bacteria grow within the galls where nutrients are supplied by the plant, and eventually galls can girdle the stem on a young tree.

The bacteria exists in our local soils and trees may become infected over time but a mature tree is usually capable of surviving crown gall disease. Young trees with galls, however, will be weak from the very start and should not be planted. Breaking off the galls will not solve the issue as the tree is already infected and will continue to produce galls.

Figure 2: A) A nursery tree on M9 rootstock infected with crown gall sits on top of a bundle showing unusual tumour-like growths. B) Rinsing the roots will reveal the suspected galls more clearly. C) Galls form even on lateral roots. D) Well-developed galls were removed and shown on a hand for scale.

Recommendations:
• Inspect apple and pear trees before planting and pay attention to unusual tumour-like growths. On suspected trees, you may need to rinse the roots to clearly see if galls are attached. Take pictures and ask questions if you are unsure.
• If crown gall is confirmed by your tree fruit specialist or by a lab report, report the issue to the nursery that provided the trees.
• Train your workers how to identify crown gall.
• The burden is also on you if you’re a local nursery grower. Inspect trees from your own nurseries and destroy infected material. Preventing wounds is a good approach to preventing infection. Also, do not plant nursery trees in heavy, poorly drained soils.
• In the Pacific Northwest of the United States and in Italy, the rootstocks M7, M9 and M26 are most susceptible to crown gall infection.
• Is 50% incidence surprising? Supposedly 80% of trees can be affected in an epidemic.
Replant Disease

Recommendations:
- Phytophthora is a component of replant disease that can be treated with the registered fungicide Aliette. Treat from tight cluster to pink when there is sufficient leaf area present to take up the spray. Treat again approximately 6 weeks later.
- For foliar application, apply at 3-5 kg of product per hectare in a water volume not greater than 1000 L/ha. Spray to good coverage but not to run-off. Treat again in the fall soon after harvest. Workers should not enter treated area until residues have dried. Maximum of 3 applications per year. Do not apply closer than 30 days before harvest.

Brown Rot

Brown rot infection of the flowers during bloom provides secondary inoculum for fruit infections later on.

Recommendations:
- Fungicide protection from brown rot is required on stone fruit when the crop stage is at pink/white bud.
- Two to three fungicide applications may be required from pink/white bud to petal fall if weather is warm and wet. Refer to the Stone Fruit Management Guide.
- For plums, the use of Captan/Maestro or Indar for brown rot during the white bud stage through fruit set will also give some control of new black knot infections.
- Rotating classes of brown rot fungicides is key to slow resistance development. There are many options in the management guide.

Insects

European Red Mite

Recommendations:
- Oil may still be used in later regions if you know your mite populations. Depending on where you are at in egg hatch, some mites might escape the oil but under high pressure the oil will still help with knock down.
- Avoid oil within 48 hours before and after frost to avoid injury. After oil, avoid Captan for 7 days before and after application, and Sulphur within 30 days.
- A delayed dormant oil can damage the bark of young trees—especially on young Ambrosia, Gala, and Red Delicious. Consider the effect of oil on single-tree replacements in mature orchards.
- Oil application should be applied with a minimum of 1000 L of water per hectare in order for the oil to find the cracks and crevices where the overwintering eggs are located. Larger trees can benefit from 2000-3000 L of water per hectare.
Spring Caterpillar Complex
(winter moth, green pug moth, eyespotted bud moth, speckled green fruitworm, obliquebanded leafroller)

Recommendations:
- Feeding can be observed at tight cluster as tiny holes in new leaves and flower buds and black specks (i.e. frass). Begin scouting procedures described in Perennia’s Best Management Practices. Check your scouting reports for notes on WM, GPM, and other caterpillars for those with scouting services.
- Treatments for spring caterpillars should not be applied until bud separation so product can enter the developing flower clusters where the larvae like to feed. However, treatments should be applied pre-bloom.
- Take note that there is a lower tolerance for WM than GPM. Green Pug Moth do not feed directly on developing fruitlets.
- If a treatment for just WM is required, then a Bt product (e.g. Dipel or Bioprotec) with Mako applied at bud separation is effective with a minimum impact on beneficial insects.
- If treatments for OBLR are required at pink, the treatments should also have some activity on WM and GPM. Similarly, if a pyrethroid is applied for tarnished plant bug at pink, it will also have activity on WM and GPM.
- When possible, full-rate pyrethroids should be avoided because of their negative impact on beneficial insects and predator mites.

Rosy Apple Aphid and Apple Grain Aphid
Rosy apple aphid females will suck sap on cluster leaves causing leaf curling. Their feeding can cause fruit to be small and distorted.

Recommendations:
- Aphids are present but it is still early for management. Scout by examining clusters for the presence of RAA colonies from tight cluster to pink according to the guidelines in Best Management Practices for Nova Scotia Apple Production.
- Blocks with a history of rosy apple aphid infestation may consider an insecticide application at pink.

Other Insect Notes
- Dr. Suzanne Blatt reported that leaf curling midge has started its flight.
- Jeff Franklin reported that soil temperatures are low for this time of year and are now similar to soil temperatures in 2015 when snow was slow to melt. Sawfly that emerges from the soil might be late this year in relation with low soil temperatures.

Horticulture
Tree/Rootstock Planting
- Trees should not be planted in waterlogged soil. Newly planted trees should be pruned for tree structure and supported as early as possible after planting.
- Post spacing as far as 45 to 50 ft apart is not recommended for modern high density orchards. More intense winds and rainfall are putting pressure on these systems. Spacing posts at 25 to 30 ft apart is more likely to produce a strong trellis that can support high yields.
Pruning
- Ensure that youngest blocks are pruned first so growth is directed into desirable leader and terminal extension. Mature blocks can be pruned later and are best when pruned prior to bloom.

Fertilizer and Lime
- Bud break to bloom is the ideal time for granular fertilizer application to maximize tree growth.
- Be cautious when spreading granular nitrogen fertilizer in nurseries because if a granule lands in a bud then it can cause leaf burn.
- Please note the dangers of using hydrated lime including the risk of blindness if dust comes into contact with your eyes. Limestone (calcium carbonate) is not the same as hydrated lime (calcium hydroxide). Hydrated lime also has a tendency to stay clumpy and the calcium is unavailable leading to false interpretations on a soil test.
- Adjusting pH is still very important because the pH of orchard soil should be between 5.5 and 6.6 (target 6.0) and nutrient availability is best within this range.
  - The results of a soil test will give a lime requirement based on your soil type and pH.
  - Apply calcitic limestone unless magnesium is needed from dolomitic limestone. The nearest source of calcitic-only lime for most NS growers is the Antigonish County quarry.
  - A surface application of no more than 3 tonnes/ha of limestone in any one year is recommended because higher volumes could be washed away and are ineffective.
  - If the lime is being worked into soil then you can follow the recommended rate on your soil report. Incorporating lime into soil will show benefits sooner than surface application.

Herbicide
- Studies have shown maintaining weed free strips from bud break to 30-days after full bloom has the greatest benefit to tree growth and yield.
- Be cautious when applying registered post-emergent herbicides to prevent injury to young trees that could be colonized by fire blight.
- Be cautious when applying herbicides this spring as washed out areas have exposed root systems that can be damaged by herbicides.
- Please note that herbicides registered for application in a nursery must be applied to the soil only and not to the nursery trees themselves.
- Syngenta received registration of a new paraquat-based product called GRAMOXONE® 200 SL Herbicide. This product will be sold in a unique closed system container which addresses mitigation requirements identified by the PMRA. However, this product will not be available for purchase until 2020 at the earliest.

Grafting
- It is still too early to begin bark grafting methods for top-working trees. Wait until pink to bloom for at least another week when bark slips.

Mowing
- Keeping the orchard floor cover mowed pre-bloom will minimize dandelion flowers that attract bees, which increases the safety of pre-bloom insecticide applications. An early start will help keep the orchard floor under control.
Site Preparation

Soil Pit with Amy Sangster

On Friday, May 10th Amy and I visited a new site for a high-density orchard. The soil survey is usually very good but in this case it didn’t match the site. The survey classified the soil at this site as being poorly drained. However, the survey didn’t take into account a nearby brook that created deposits of fine sediment that had been eroded by water over time.

The first soil pit was at a high elevation on the property (Figure 3 A-B). The rich brown layer on top was a layer of fill applied on top of the original soil profile. There were no concerning signs of saturated soils and overall drainage was very good (Figure 3A). The soil was high in organic matter and it was likely a silty loam rather than a sand but lab tests are needed to verify the soil texture. Confirming the excellent texture of this soil was earthworm channels (Figure 3B) and even deep roots at the bottom of the pit. The soil was better than expected and a great reason why we should analyze soil pits.

The second soil pit was at a low elevation on the property (Figure 3 C-D). This pit showed evidence of saturated soils in the bottom layer of the pit where soil was grey known as gleying (Figure 3C). Tile drainage should line up with the zone of wetness where the water will settle naturally so it can be carried away. This evidence of gleying was from past wetness, but seems to have been fixed in the meantime as there was no water present when the pit was dug (Figure 3D).

Note that the pale pocket of soil in the first soil pit is an eluviated horizon caused by the removal of iron from the upper to lower layer. It does not have agriculture significance other than to note it is not a gleyed soil.

Figure 3: The first soil pit at the highest elevation in the field is shown in photos A and B. A) There was no constriction layer and roots penetrated to almost the base of the pit. B) A closer look shows dark vertical lines (at the arrow) where earthworms pull down organic matter and naturally till the soil. The second soil pit at a low elevation in the field is shown in photos C and D. C) Gleyed soil is present in the bottom layer of this soil pit that is associated with poor drainage and low oxygen levels. D) A closer look at the gleyed features at the base of the pit show the bright blues associated with poor drainage. No water was present suggesting that the issue had been corrected by surface or subsurface drainage.
Events & Notices

IFTA 2019 Summer Study Tour – Save the date!
The IFTA Summer Study Tour will be in the Norfolk and Georgian Bay Areas of Ontario on July 21-24. The stops will include orchards, cherry processing plant, research station, and equipment yard. Topics will include orchard systems/tree architecture transitions, management and economics of modern orchard systems including Waffler-tip system, crop load management, NC140 rootstock trials, variety trails, apple production under super structure including cement posts, innovative sprayers, and intelligent fruit vision demonstration. Registration is now open.

Nova Scotia Agri-Food Accelerator Program
Perennia is pleased to introduce the Agri-Food Accelerator Program for agriculture producers and food and beverage food businesses in Nova Scotia. The focus of this program is to:

- support access to new markets through skills development and information, as well as food safety support, analytical testing and training to meet scientific, retailer and market expectations for safe food
- support the successful commercialization of Nova Scotia agriculture-sourced products into recognized retail markets through skills development and information, as well as market research validation and prototype product development and scale up support with the intent to have the product successfully reach the intended market with sales longevity

For more information, visit the Perennia website.

2019 Pest Management/Spray Guides

Hyperlinks to Tree Fruit Management Guides
- Orchard Outlook Supplement 2019
- Pome Fruit
- Stone Fruit
- Organic Apple
- Thinning and Growth Regulation

This Orchard Outlook has been published with the input of the Orchard Outlook Committee including Bill Craig, Danny Davison, Dr. Suzanne Blatt, Kim Barteaux Hiltz, Larry Lutz, Jeff Franklin, and Charlie Embree.

Edited by Michelle Cortens, Tree Fruit Specialist, Perennia Food and Agriculture Inc.