Northern Michigan FruitNet 2013
Special Update
NW Michigan Horticultural Research Center

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EUROPEAN BROWN ROT BLOSSOM BLIGHT OUTBREAK ON MONTMORENCY TART CHERRY IN NW MICHIGAN

George W. Sundin, Dept. of Plant, Soil, and Microbial Sciences, MSU
Nikki Rothwell, Northwest Michigan Horticultural Research Center
Kim E. Lesniak, Cory A. Outwater, Dept. of Plant, Soil, and Microbial Sciences, MSU

We have observed brown rot blossom blight symptoms in Montmorency tart cherry blocks in several areas of NW Michigan. Symptoms can be extremely severe in some cases with > 80% crop loss observed in affected blocks. In other cases, pockets of trees were observed in orchards with up to 100% spurs blighted on affected trees. Blighted shoot samples from six orchards (25-40 samples per orchard) were collected on 5 June 2013 and examined in the Sundin tree fruit pathology laboratory at MSU. Fungal pathogen isolates were obtained in pure culture from the samples and identified using genetic testing. The pathogen identified from these samples was *Monilinia laxa*, causal agent of European brown rot (EBR).

The main symptom of EBR is blossom blight (dead flowers), which is often accompanied by collapse and death of affected shoots (Fig. 1).

EBR is a cool weather disease, and EBR occurrence is most commonly associated with wet weather and temperatures in the 40's and 50's prior to and during tart cherry bloom. Prior to 2013, we observed EBR predominantly on Balaton tart cherries in Michigan with occasional occurrence at low levels on Montmorency.

Some of the initial disease symptoms observed on Montmorency in 2013 only included blossom blight (Fig. 2), and shoots seemed unaffected as leaves appeared healthy (Fig. 3). Isolates recovered from these early blossom blight samples were identified as *Monilinia laxa*. Upon return to affected orchards 12 days later, we observed extensive shoot collapse, although collapse was not observed in all infected shoots (Figs. 4 and 5).

We know that Montmorency tart cherry is less susceptible to EBR than Balaton, and it was unusual to see such extensive symptoms on Montmorency this year. However, environmental conditions in northwest Michigan were conducive to EBR infection. A long 17 hr wetting period (0.61" rain measured on May 10th at the Northwest Michigan Horticultural Research Center) occurred at the first open Montmorency flowers. In addition, the average relative humidities stayed above 86% for a 48 hr period. Measurable rainfall occurred on four consecutive days (May 9-12) with temperatures in the 30's and 40's. There was also a possibility that frost injury contributed to EBR infection, as low temperatures of 32, 32.3, and 31.7 were observed at the NWMHRC from May 10-12. At one orchard site, we only observed EBR symptoms on trees located in a low area within the orchard.

A common denominator associated with EBR-infected trees in 2013 is that the trees were located in areas of orchards that were adjacent to woods or windrows with poor air flow (Fig. 6). These trees would be very slow to dry following wetting events. We observed several orchard blocks in which blocks with poor air flow with extensive EBR infection were located adjacent to open blocks with good air flow that showed very limited or no EBR infection. This illustrates the fickle nature of EBR on Montmorency and the heavy dependence of this disease on favorable environmental conditions. Many affected orchards were also in locations near Lake Michigan where cool wet weather is more common and often associated with fog; we think the proximity of these orchards near the water may have exacerbated the EBR infection.

A second common observation made was that affected trees were not sprayed with a fungicide targeting EBR until May 18 or later, which was at least six days after the May 9-12 period when infection presumably occurred. Thus, the flowers on these trees were not protected during the EBR infection event.

Where did the EBR inoculum come from? The EBR fungus *Monilinia laxa* overwinters in infected spurs and sporulates from these overwintering sites the following season before and during bloom. We found many infected spurs from the previous season in Montmorency trees showing EBR symptoms (Fig. 7). Some growers may not have known they had EBR last year as bacterial canker was so widespread, and the EBR symptoms may have been mistaken for canker.
In summary, the outbreak of blossom blight occurring on Montmorency tart cherry in northwest Michigan in 2013 was a result of EBR infection. Please see the accompanying article for information on fungicide use strategies for fruit protection.

Note: Pictures for this article have been compiled into a PDF document due to the size of the photo files. Click here to view them.

FUNGICIDE PROTECTION STRATEGIES FOR RIPENING TART CHERRIES IN ORCHARDS WITH EUROPEAN BROWN ROT BLOSSOM BLIGHT SYMPTOMS

George W. Sundin, Dept. of Plant, Soil, and Microbial Sciences, MSU
Nikki Rothwell, Northwest Michigan Horticultural Research Center

An outbreak of European brown rot (EBR) blossom blight has been observed this year on Montmorency tart cherry in northwest Michigan (Fig. 1). In some cases, entire orchard blocks were heavily infected, while in other orchards, infected groups of trees were found in low areas within the orchard or close to windrow tree borders or woods on at least two sides. When symptoms were first observed, the EBR fungus was sporulating on blighted flower tissue (Fig. 2).

EBR has been reported to cause fruit rot symptoms on stone fruit that are similar to those caused by the more common American brown rot (ABR) fungus *Monilinia fructicola*. Data have implicated EBR as the cause for fruit rots in sweet cherry in Australia and Europe. These observations are surprising because we have not observed EBR on sweet cherry in Michigan; furthermore, blossom blight symptoms were not observed on sweet cherry this year.
We will be assessing the susceptibility of tart cherry fruit to EBR this season. However, since the potential of EBR to infect tart cherry is unknown at this time, we believe that it would be prudent to use the typical American brown rot fruit control strategies to minimize orchard impacts by EBR at this time. These fungicide applications would not likely be extra applications as fruit would have to be protected from ABR infection anyway. Ripening fruit are most susceptible to brown rot infection, and as the sugar content in fruit increases, the likelihood of brown rot infection increases.

Protective fungicide applications targeting brown rot are usually initiated approximately three weeks prior to harvest if conducive conditions are present (temperatures in the 70's accompanied by rain). In orchards where EBR symptoms are present, **we suggest that the fungicide combination Gem 500SC (at 3.8 fluid ounces per acre) and Captan 80WDG (1.75-2 lbs/A) be applied approximately 1 month prior to projected harvest**. Gem has been shown to have anti-sporulation properties against the ABR fungus in studies conducted on peach (about a 70% reduction in spore production from an infection source) conducted by Dr. Norm Lalancette in New Jersey. We anticipate that Gem will have similar anti-sporulation effects against the EBR fungus. The Gem + Captan spray will also provide effective control of cherry leaf spot and powdery mildew.
This Gem + Captan application should be followed by an aggressive Indar + Captan program involving multiple applications closer to harvest. With the Section 24(c) label for Indar use, the amount of Indar applied for brown rot fruit protection should be 9-10 fluid ounces per acre. Note that the Indar + Captan combination may not provide adequate cherry leaf spot control due to sterol inhibitor fungicide resistance in the leaf spot pathogen.

As such an extensive EBR outbreak has not been previously seen in Montmorency tart cherry, we have much to learn about this disease. We will be conducting further work on this disease next season.

Fig. 1. Symptoms of European brown rot blossom blight observed on Montmorency tart cherry in northwest Michigan in 2013.

Fig. 2. Sporulation of the EBR fungus (denoted by arrow) on pedicels of blighted flowers.

GROWERS NEED TO SCOUT NOW FOR PRESENCE OF SPORULATING AMERICAN BROWN ROT FUNGUS IN SWEET CHERRY ORCHARDS

Nikki Rothwell, Northwest Michigan Horticultural Research Center
George W. Sundin, Dept. of Plant, Soil, and Microbial Sciences, MSU

We are recommending that growers scout now for the presence of green sweet cherry fruit showing sporulation due to American brown rot (ABR) infection. These fruit will be sources of disease inoculum that can result in excessive ABR-infected fruit at harvest.

We have recently observed green sweet cherry fruit and/or non-pollinated fruit (June drop fruit) in trees that were infected and showed signs of active sporulation by the American brown rot (ABR) fungus *Monilinia fructicola* (Fig. 1).

Fig. 1. Sporulating American brown rot fungus infecting a non-pollinated sweet cherry fruit. These spores serve as a high inoculum source for further infection of sweet cherry fruit as they ripen, beginning approximately 3 weeks before harvest.

In many cases, the green sweet cherries showed signs of bacterial canker infection, which likely came in first and provided infection sites for the ABR fungus. On the sporulating non-pollinated fruit, we could not determine if these fruit were wounded prior to ABR infection or if the ABR fungus can invade the tissues of non-pollinated fruit.

These sporulating fruit were present at very low numbers in the affected orchards (ex. 1 fruit per 25 trees). However, our experience with ABR infection in 2011 indicates that this current level of inoculum is significant and can result in heavy fruit infection at harvest. This fungus can move quickly under warm and wet conditions, so an early infection now can set the stage for a real challenge to control this disease as fruit sugars increase near harvest.

Sweet cherry fruit are typically initially infected by the ABR fungus as they begin to ripen and their sugar content increases. This infection window usually opens about three weeks prior to harvest. The optimal temperature for infection is between 67 and 77°F, and spore production is greatest between 59 and 74°F. Although fruit injury may lead to increased infection or entry sites for the ABR fungus, this disease can can cause infections on ripening fruit when no wounds are present. Other factors influencing increased infection are fruit-to-fruit or fruit-to-branch contact on trees.

Green fruit must be wounded prior to ABR infection; hail or bacterial canker infections or green fruit worm feeding are all good examples on how the ABR fungus can infect green fruit. From past experience, fruit with bacterial canker infection lesions are highly susceptible to ABR infection. Once the diseased fruit is colonized by the brown rot fungus, they quickly become ABR "disease spreaders". The ABR fungus is a prolific sporulator, and each infected fruit is a ready source of large numbers of new spores. Once the ABR fungus begins to sporulate, these fruits are capable of infecting healthy, ripening cherries.

It is critical to scout now for the presence of green sweet cherry fruit showing sporulation due to ABR. We would expect these fruit to be present at very low levels at this time. If growers are scouting and observe fruit infected with ABR, it is likely that there are other fruit that are infected but not showing symptoms yet. Even if growers find these sporulating fruits in small numbers, the likelihood of more infected fruits are located high up in the tree and cannot be seen from the ground or truck window. In orchards with green sporulating fruit, an active, aggressive fungicide program for ABR control should be utilized to protect ripening fruit. *The two most important issues in ABR control of fruit infection are use of an effective fungicide and adequate fungicide coverage of fruit surfaces.* An ABR spray program should be initiated about 1 month prior to the expected harvest date, and **we suggest that the fungicide combination Gem 500SC (at 3.8 fluid ounces per acre) and Captan 80WDG (1.75-2 lbs/A) should be applied**. Gem has been shown to have anti-sporulation properties against the ABR fungus in studies conducted on peach (about a 70% reduction in spore production from an infection source) conducted by Dr. Norm Lalancette in New Jersey. This fungicide combination will have the anti-sporulation effect and also protect uncolonized fruit from infection. The Gem + Captan spray will also provide effective control of cherry leaf spot and powdery mildew. This combination is a good choice for the next application(s), and Indar should be saved for sprays made closer to harvest.

This Gem + Captan application should be followed by an aggressive Indar + Captan program involving multiple applications closer to harvest. With the Section 24(c) label for Indar use, the amount of Indar applied for brown rot fruit protection should be 9-10 fluid ounces per acre. If we are experiencing weather with temperatures in the 67 and 77°F range, Indar + Captan sprays should be applied prior to rain events.

As we approach harvest, growers should take the time to scout their orchards for ABR. If the orchard has this disease present, it will not be difficult to locate fruit with the typical gray-brown fungus growing on the cherry. Blocks with bacterial canker, hail damage, or problematic orchards should be the first stop for scouting. If ABR is detected, growers should move to an every row spray regime for fungicide applications, particularly if the trees are large. Growers should also slow down the tractor speed to obtain adequate coverage. Efforts should be made to apply fungicide applications with ample water to ensure that the entire tree is properly covered. Controlling obliquebanded leafroller (OBLR) is also of utmost importance as we approach harvest. These larvae web cherry clusters together and prevent fungicide penetration inside the cluster. If growers know that they have had an OBLR problem in the past and did not control them at the overwintering generation timing, they will decidedly need to apply an insecticide for the summer generation as these insects could ultimately impact ABR control at or near harvest.

CIAB MEETING SUMMARY

N.R. Rothwell, NWMHRC

The annual guesstimate to estimate the fruit crops in Michigan was held on Wednesday, June 19 in Grand Rapids. As mentioned before, due to the sequestration, USDA was not there to provide the estimate, so the estimate was produced by members of the cherry and apple industries. The tart cherry estimate that was provided by processors was as follows:

<u>Michigan</u>
NW: 125
WC: 60
SW: 23.5

Michigan Total 208.5

<u>Other States</u>
NY: 9 *
OR: 2 *
PA: 2 *
UT: 25
WA: 20
WI: 9.3 *
*unregulated districts

Other States Total 67.3

United States Total 275.8

These estimates are used in the Optimum Supply Formula (OSF) to calculate the amount of set aside the industry will have, and at the CIAB Board meeting, which was held Thursday, June 20, the Board members used these same numbers for the formula.

In summary, regulated districts estimated they would produce 253.5 million pounds and the unregulated districts estimated they would produce 22.3 million pounds for a total of 275.8 million pounds. There is an estimate 17.3 million pound carry in and 0 orchard diversion for a total supply of 293.1 million pounds. The demand is based on our three-year average and is 208 with a market growth factor of 21, and the Board put in a 42 million pound adjustment for pre-2012 sales. The Board also voted (a few meetings ago) to have a 20 million pound carry out for a total demand of 291 million pounds.

When these numbers were plugged into the OSF, the amount of regulated tonnage was 1%. However, the Board passed a motion that if the numbers at the end of the season are close to the estimates provided yesterday, the Board can decide to go down to no regulation at the September meeting.

WEBSITES OF INTEREST

Insect and disease predictive information is available at:
http://enviroweather.msu.edu/homeMap.php

60 Hour Forecast
http://www.agweather.geo.msu.edu/agwx/forecasts/fcst.asp?fileid=fous46ktvc

Information on cherries is available at the new cherry website:
http://www.cherries.msu.edu/

Fruit CAT Alert Reports have moved to MSU News
http://news.msue.msu.edu