

# Northern Michigan FruitNet 2015 Northwest Michigan Horticultural Research Center

## Special Update

May 5, 2015

### CALENDAR OF EVENTS

#### 2015

- 5/5-7/14**      **Leelanau County IPM Updates**  
Bardenhagen Farm
- 5/5-7/14**      **Grand Traverse County IPM Updates**  
Wunsch Farm
- 5/6-7/15**      **Antrim County IPM Updates**  
Jack White Farms
- 5/6-7/15**      **Benzie County IPM Updates**  
Blaine Christian Church
- 5/9**              **Hazardous Waste and Pesticide Collection for Antrim County**
- 5/30**            **Hazardous Waste and Pesticide Collection for Leelanau County**
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### **A primer for Streptomycin, Kasumin, and Oxytetracycline use for fire blight management**

George Sundin, Dept. of Plant, Soil, and Microbial Sciences, MSU

*Three antibiotics are registered for blossom blight control on pome fruit in the United States. In this article, I provide informational summaries about streptomycin, Kasumin, and oxytetracycline, and outline the use patterns for them.*

The apple or pear flower is a critical site for multiplication of the fire blight pathogen *Erwinia amylovora*. When temperatures are conducive for growth (70s to low 80s optimal), *E. amylovora* populations can grow to 1 million cells per flower within 1-2 days. As these populations are growing, remember they will also be very quickly disseminated among flowers

by pollinators. Thus warm sunny days during bloom can very quickly lead to high percentages of flowers colonized with incredibly large fire blight populations.

The fire blight pathogen only grows well on flower stigmas, not on other flower parts. These bacteria do not need rain to grow on the stigma. They do however require free moisture (as little as 0.01" rain) to move from the stigma tip down the outside of the style to the base of the flower where infection occurs through the nectaries. Blossom blight infection can really kick start a fire blight epidemic because these infected flower clusters will ooze more inoculum out and also bacteria will be spreading internally through the tree.

With the full registration of Kasumin by the EPA last fall, we now have three antibiotics available for fire blight management during bloom. In this article, I will provide information about and suggestions for the best use of these materials. These suggestions will differ based on the occurrence of streptomycin resistance in the fire blight pathogen in your orchard or in your region.

**Streptomycin** – excellent fire blight material, provides forward control for 2-4 days prior to rain events and will be effective for blossom blight control if applied within 12 - 24 hr after a rain event. Streptomycin is used at a rate of 24 oz per acre and should be applied with a non-ionic surfactant such as Regulaid (1 pt per 100 gallons). The use of the surfactant enhances deposition of the antibiotic on flowers and increases the chances that the critical stigma targets will be hit. Note: if streptomycin is reapplied within 3-4 days after a previous application, Regulaid can be omitted to avoid phytotoxicity (usually viewed as yellowing of leaf margins). Streptomycin is partially systemic and can reach fire blight bacteria that have entered flower nectaries.

**Kasumin** – kasugamycin, an antibiotic related to streptomycin. There is no cross resistance between Kasumin and streptomycin, as Kasumin controls streptomycin-resistant strains of *E. amylovora*. Excellent fire blight material, provides forward control for 2-4 days prior to rain events and will be effective for blossom blight control if applied within 12 hr after a rain event. Kasumin is used at a rate of 2 quarts (64 fl oz) per acre in 100 gallons of water per acre and should be applied with a non-ionic surfactant such as Regulaid (1 pt per 100 gallons). Read the Kasumin label carefully as there are some specifications including: (i) do not apply Kasumin in orchards in which the soil has been fertilized with animal manure; (ii) do not apply after petal fall; and (iii) do not use alternate row applications. The main difference between Kasumin and streptomycin is that Kasumin is not partially systemic like streptomycin is. Thus, Kasumin will not penetrate into the nectaries and will not be able to control an infection once the fire blight pathogen reaches the nectaries.

**Oxytetracycline** – good fire blight material, for best results should be applied within 1 day prior to a rain event. Oxytetracycline is bacteriostatic and does not kill fire blight bacteria, it only inhibits their growth. Thus, it has to be applied prior to rains where it can prevent growth on stigmas, but it can't eliminate existing populations. Oxytetracycline is also highly sensitive to degradation by sunlight and much of the activity is lost within 1-2 days after application. Oxytetracycline is best used as a 200 ppm solution (1 lb per 100 gallons) and should be applied with a non-ionic surfactant such as Regulaid (1 pt per 100 gallons). Per the label, a maximum of 1.5 lbs per acre can be applied (using 150 gallons water in this case). Two slightly different formulations of oxytetracycline are sold: Mycoshield (OxyTc-calcium complex) and FireLine (OxyTc-hydrochloride). The FireLine formulation is a bit more soluble than Mycoshield and has performed slightly better for blossom blight control in head-to-head comparisons.

**Antibiotic use for blossom blight management.** Fire blight predictive models such as MaryBlyt or Cougar Blight should be used as guides for timing management decisions. The output of the MaryBlyt model, for example, is the epiphytic infection potential (EIP) number which is an estimator of the risk of blossom blight infection. The higher this number is, the larger the infection risk. I would place forecasted EIP numbers into four categories of risk: (i) low to moderate ( $50 < \text{EIP} < 75$ ); (ii) moderate to high ( $75 < \text{EIP} < 100$ ); (iii) high ( $\text{EIP} > 100$ ); (iv) epidemic potential ( $\text{EIP} > 200$ ).

*When the infection risk is moderate to high, high, or of epidemic potential, only streptomycin or Kasumin can be expected to provide adequate blossom blight control.* These two antibiotics provide the best blossom blight control and also reduce or eliminate most of the fire blight inoculum from flowers. During these types of high-risk conditions, the spray interval for streptomycin or Kasumin is usually predicated by the occurrence of rainfall. Very high EIPs ( $> 200$ ) also necessitate additional antibiotic applications at shorter intervals. Finally, remember that the overall risk increases as bloom progresses as the fire blight pathogen is building up populations on flowers over time. In addition, the more open flowers there are increases fire blight risk, provides more sites for pathogen growth, and increases the number of unprotected flowers (flowers opening since the last spray).

Firstly, when the EIP is high ( $> 100$ ) but conditions are dry for several days, remember that inoculum is building up rapidly on flower stigmas. Growers should apply streptomycin or Kasumin strategically in the middle of a period such as this to reduce inoculum potential. The outcome of enabling several days of population buildup by doing nothing will make blossom blight much more difficult to control if rain events follow. Controlling diseases under high inoculum situations is always more difficult than controlling diseases in a lower inoculum situation.

When the EIP is high and rain events are forecasted, the application of streptomycin or Kasumin would be best about 24 hr before the rain event and then followed up about 1-2 days after the rain event. Subsequent spray applications will be based on current and future conditions, i.e., if temperatures cool significantly and EIPs are reduced to low to moderate risk values, sprays can be held off. If EIPs remain high, a third application should be made within 2-4 days based on the occurrence of wet or dry conditions.

*Oxytetracycline is best used when the infection risk is low to moderate ( $\text{EIP} < 75$ ).* Under warmer conditions when *E. amylovora* is capable of very rapid growth on flower stigmas, oxytetracycline can be overwhelmed by the pathogen and fail to provide adequate control. In addition, the incidence of shoot blight infection is typically higher in oxytetracycline-treated trees compared to streptomycin- or Kasumin-treated trees because the innate activity of this antibiotic is the lowest of the three and its effect on inoculum reduction is the lowest.

**In the absence of streptomycin resistance,** streptomycin is the best choice for fire blight management. While the effectiveness of streptomycin and Kasumin are essentially equivalent in the inoculated blossom blight control tests that I have conducted over a 7-year period, the partial systemic nature of streptomycin gives it an advantage in that it can reach internal populations of *E. amylovora* that Kasumin cannot. Streptomycin is also significantly cheaper than Kasumin. Long-term evidence from around the Midwest and eastern U.S. suggests that if streptomycin use is limited to a maximum of 3-4 applications per season, and only used during the bloom period, then the chances of streptomycin resistance development are very low.

The main risk factor for streptomycin resistance development is an increased number of applications per season above 4 and regular use during the summer for shoot blight control. This use pattern increases the chances of mutation of the fire blight pathogen to streptomycin resistance or acquisition of a streptomycin-resistance gene from the indigenous microflora in orchards.

A resistance management strategy for streptomycin can be used; the best strategy would be to alternate applications of streptomycin and Kasumin. Be advised that a tank-mix strategy of using streptomycin and oxytetracycline is not a resistance management strategy – since the oxytetracycline is not killing bacterial cells, it would not kill any streptomycin-resistant cells that might arise, it would only temporarily prevent their growth.

**In streptomycin-resistance situations**, Kasumin is the antibiotic of choice and is best used in advance of moderate to high risk conditions. This is because where we have detected streptomycin resistance in orchards in Michigan, the incidence of resistant bacterial pathogen strains is usually very high to 100%. Thus, streptomycin should not be used in these situations because it will have no effect on the pathogen. If the disease risk is low to moderate, oxytetracycline is also an effective substitute for streptomycin in orchards where streptomycin resistance occurs.

**Summary – antibiotic use for fire blight management:** The target of antibiotic sprays for fire blight control is the stigma surface, style, and base of the flower. Adding a non-ionic surfactant such as Regulaid to antibiotic sprays increases the chances of deposition on target surfaces. The best timing for all antibiotics is to arrive prior to the arrival of fire blight bacteria because these arriving populations are typically small and can be readily controlled if the antibiotic is already present. However, both streptomycin or Kasumin can be used effectively after *E. amylovora* cells have arrived and started growing on stigmas.

When EIPs predict potential high risk to epidemic conditions, only streptomycin or Kasumin will be effective for blossom blight control. Under these conditions, the two most important considerations are very tight spray intervals and excellent spray coverage.

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## **HOUSEHOLD HAZARDOUS WASTE AND PESTICIDE COLLECTIONS:**

[Leelanau County](#) : upcoming collection on May 30

[Antrim County](#) : upcoming collection on May 9

Grand Traverse County : upcoming collection May 28, 2015

\*\*Reservations are required; every county has different requirements for materials they will take back.

GRAND TRAVERSE COUNTY RESOURCE RECOVERY DEPARTMENT (RecycleSmart) will conduct a Household Hazardous Waste (HHW) & Pesticide collection on Thursday, May 28, 2015.

The online scheduling system is a convenient and the recommended tool to secure an appointment.

An appointment is required and can be made at [www.RecycleSmart.info](http://www.RecycleSmart.info) or by calling the RecycleSmart Hotline at 941.5555.

This service is provided to Grand Traverse County residents at no cost, (up to 150 lbs., \$1.30 lb. thereafter). Accepted material includes cleaning products, pesticides, mercury, moth balls, motor oil, pool chemicals, oil based paint, latex paint, CFL bulbs and more...

**Latex paint is accepted.**

For more information visit [www.RecycleSmart.info](http://www.RecycleSmart.info) or call the RecycleSmart Hotline at 941.5555

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## **Predicted Weather Conditions Favor Both Brown Rots**

N. Rothwell, G. Sundin, and E. Pochubay

As we look at the forecast for our region for this weekend (forecast below), conditions vary from cool and wet on Saturday to warm and wet on Sunday. Either way, the predicted weather is going to be wet. Wet conditions favor both brown rots: European brown rot (EBR) and American brown rot (ABR). EBR is most often problematic under cool and wet conditions, which are in the forecast and ABR favors warm and wet conditions, which are also predicted for the weekend. In addition, the wet weather is forecasted to last for an extended period. In this unusual situation, growers should be aware of the potential for both brown rots to develop during bloom. In tart cherries, Indar is an effective fungicide for both diseases. In tart cherries, two sprays of Indar at 6 fl oz are optimal: popcorn and 7-10 days later. These Indar applications will also help control ABR. Balaton is more susceptible than Montmorency to EBR. However, we have observed high levels of EBR infection in Montmorency, especially in slower-to-dry orchard blocks. In sweet cherries, we recommend Rovral at 2 pints/acre for this blossom timing. Sweet cherries are not a favored host for EBR.

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## Traverse City, MI

Friday 1:00 PM

Mostly Cloudy



81 °F | °C

Precipitation: 0%

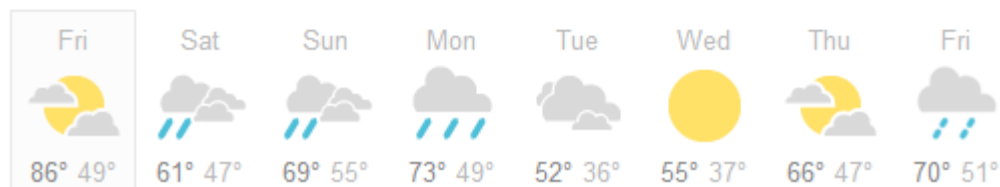
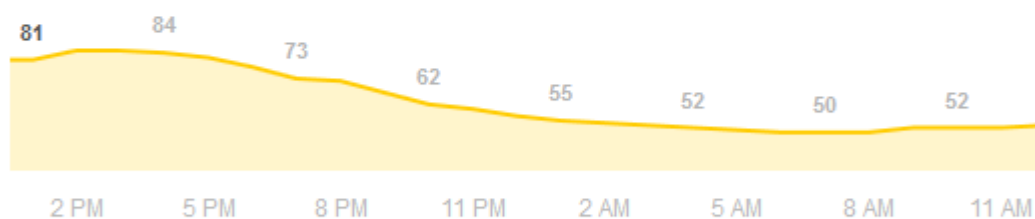
Humidity: 46%

Wind: 10 mph

Temperature

Precipitation

Wind



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### 2015 Tree Fruit IPM Update Series

Emily Pochubay and Nikki Rothwell  
Michigan State University Extension

Tree Fruit IPM Updates beginning the first week of May through mid-July (as needed) will highlight management of the season's current potential pest challenges dictated by weather and pest biology. Attendees are encouraged to bring examples of pests and damage found on the farm to these workshops for identification and discussion. Workshops will be held weekly in Leelanau and Grand Traverse counties and bi-weekly in Antrim and Benzie Counties. Tree fruit growers are welcome to attend meetings at any of the locations and times that are most convenient (see below). These workshops are free and do not require registration. Certified crop advisor continued education credits (two per meeting) and pesticide recertification credits (two per meeting) will be available. We are looking forward to seeing you in a few weeks! For more information, please contact Emily Pochubay ([pochubay@msu.edu](mailto:pochubay@msu.edu)), 231-946-1510.

## IPM Update Dates, Times, and Locations

### Leelanau County

Location: Jim and Jan Bardenhagen, 7881 Pertner Rd, Suttons Bay

Dates: May: 5, 12, 19, 26; June: 2, 9, 16, 23, 30; July: 14

Time: 12PM – 2PM

### Grand Traverse County

Location: Wunsch Farms, Phelps Road Packing Shed, Old Mission

Dates: May: 5, 12, 19, 26; June: 2, 9, 16, 23, 30; July: 14

Time: 3PM – 5PM

### Antrim County

Location: Jack White Farms, 10877 US-31, Williamsburg (is not correct in Google Maps) *North of Camelot Inn and South of Elk Rapids on the southeast side of US-31*

May: 6, 20; June: 3, 17; July: 1, 15

Time: 10AM – 12PM

### Benzie County

Location: Blaine Christian Church, 7018 Putney Rd, Arcadia, MI 49613

May: 6, 20; June: 3, 17; July: 1, 15

Time: 2PM – 4PM

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## WEB SITES OF INTEREST:

Insect and disease predictive information is available at:

<http://enviroweather.msu.edu/homeMap.php>

This issue and past issues of the weekly FruitNet report are posted on our website:

<http://agbioresearch.msu.edu/nwmihort/faxnet.htm>

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/>

Information on apples:

<http://apples.msu.edu/>

**Fruit CAT Alert Reports has moved to MSU News**

<http://news.msue.msu.edu>