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COMING EVENTS

	43°F	50°F
Current DD* accumulations		
(Geneva 1/1-5/1):	352.9	169.7
(Geneva 1/1-5/1/2016):	265.3	112.4
(Geneva "Normal"):	270.0	130.6
(Geneva 1/1-5/8, predicted):	409.4	191.5
(Highland 1/1-5/1):	510.0	264.7

Upcoming Pest Events – Ranges (Normal +/- Std Dev):

Codling moth 1st catch	396-566	200-307
Comstock mealybug 1st gen crawlers in pear buds	215-441	80-254
European red mite egg hatch complete	368-470	182-280
Green fruitworm flight subsides	267-465	124-249
Lesser appleworm 1st catch	276-564	129-305
Lesser appleworm 1st flight peak	364-775	183-444
Mullein plant bugs 1st hatch	331-443	163-229
Oriental fruit moth		

1st flight peak	329-534	165-285
Redbanded leafroller		
1st flight peak	228-378	104-198
Spotted tentiform leafminer		
1st flight peak	268-407	123-214
Spotted tentiform leafminer		
sapfeeding mines present	343-601	165-317
White apple leafhopper		
nymphs on apple	302-560	146-308
McIntosh bloom	344-416	169-219

*[all DDs Baskerville-Emin, B.E.]

Phenologies

Geneva:	Current	5/8, Predicted
Apple (McIntosh):	pink/ early king bloom	bloom
Apple (Empire):	king bloom	bloom
Apple (Red Del.):	pink/ early king bloom	bloom
Apple (Idared):	king bloom	
Pear (Bartlett):	bloom	petal fall
Pear (Bosc):	white bud/ bloom	petal fall
Tart Cherry:	full bloom	petal fall
Sweet Cherry:	25% petal fall	fruit set
Peach:	petal fall	petal fall/shuck

Plum:	50% petal fall	split petal fall

Highland:	
Apple (McIntosh, Empire, Ginger Gold, Spur Red Delicious):	full bloom
Pear (all):	50% petal fall
Peaches, Cherries, Plums:	petal fall

TRAP CATCHES (Number/trap)

Geneva

	4/20	4/24	4/27	5/1
Green Fruitworm	0.5	0.0	0.0	5.0
Redbanded Leafroller	18.5	57.0	35.5	105.5
Spotted Tent. Leafminer	1.5*	8.0	25.5	89.5
Oriental Fruit Moth	0.0	0.5*	13.5	30.5

Highland (Peter Jentsch)

	4/10	4/17	4/24	5/1
Green Fruitworm	1.0*	0.0	0.0	0.0
Redbanded Leafroller	10.0*	98.0	103.5	109.5
Spotted Tent. Leafminer	0.0	0.0	75.5*	154.5
Oriental Fruit Moth	0.0	2.0*	0.5	47.0

Lesser Appleworm	0.0	5.0*	8.5	93.5
Obliquebanded Leafroller	0.0	0.0	0.0	0.0

* 1st catch

ORCHARD RADAR DIGEST

[H = Highland; G = Geneva]:

Roundheaded Appletree Borer

RAB egglaying begins: June 2 (H)/June 6 (G). Peak egglaying period roughly: June 22-July 6 (H)/June 26-July 10. First RAB eggs hatch roughly: June 17 (H)/June 21 (G).

Dogwood Borer

First DWB egg hatch roughly: June 17 (H)/June 21 (G).

Codling Moth

1st generation 3% egg hatch expected: June 3 (H)/June 7 (G).

Lesser Appleworm

1st LAW trap catch: May 2 (H)/May 6 (G).

Mullein Plant Bug

Expected 50% egg hatch date: May 5 (H)/May 11 (G), which is 7 days before rough estimate of Red Delicious petal fall date

Obliquebanded Leafroller

1st generation OBLR flight, first trap catch expected: June 2 (H)/June 6 (G).

Oriental Fruit Moth

1st generation 55% egg hatch and first treatment date, if needed: May 22 (H)/May 27 (G)

San Jose Scale
First adult SJS caught on trap: May 11 (H)/May 16 (G).
1st generation SJS crawlers appear: June 12 (H)/June 17 (G).

Spotted Tentiform Leafminer
1st STLM flight peak trap catch: May 3 (H)/May 4 (G).

White Apple Leafhopper
1st generation WALH found on apple foliage: May 3 (H)/May 8 (G).

[Section: DISEASES]

MANAGING FIRE BLIGHT IN 2017

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[Box text: PLAYING WITH FIRE]

2016 Fire Blight Season Recap

The number and magnitude of fire blight outbreaks in western NY was every bit as intense as the last few years, and it seems that every season is a tough fire blight year for western NY. Last year was the first season in western NY where there was increased adoption of prohexadione calcium, because growers' concerns for planting-wide losses seemed to outweigh slowed establishment in young plantings. The Hudson Valley and the Lake Champlain regions got a reprieve from fire blight in 2015, but in 2016 the Lake Champlain region suffered considerable shoot blight outbreaks.

We received numerous fire blight samples for streptomycin resistance diagnosis from the western NY and Lake Champlain regions (no resistance was found). As usual, shoot blight was the primary type of sample submitted. Blossom blight was not reported in the 2016 survey and perhaps rarely observed by growers. Despite the apparent rarity, low levels or even unnoticeable blossom blight could have still been the source of the late season shoot blight outbreaks in 2016. As we move into bloom in this year, it will be important to keep track of the fire blight history in apple blocks, and, where fire blight history and scion/rootstock susceptibility warrant, to protect apples during high-risk weather conditions during petal fall and shoot elongation.

Present Season

Currently, orchards in the Hudson Valley are coming into bloom, but orchards in western NY and the Lake Champlain region are just starting to reach king bloom. The weather over the weekend and the beginning of the week presents a moderate to high risk of fire blight infection, but this risk should be somewhat tempered by the low numbers of open flowers and cool temperatures in the forecast. While regional extension specialists in the Hudson Valley are rightfully concerned about the risk of blossom blight infection in the early part of the week, the situation seems less dire in the other production regions of the state.

The warm weather at the beginning of bloom could boost inoculum levels, but several days in the low 60s toward the end of the week will slow bacterial reproduction and reduce risk. It is hard to tell how the remainder of bloom will proceed. Regardless, orchards with considerable shoot blight outbreaks in 2016 could have inoculum from overwintering cankers present during bloom. In this regard, it will be important to watch forecasts, check the models, and follow extension specialists' alerts.

As you consider model outputs from NEWA or other forecasting models, here are some things to consider before making applications of antibiotics or other costly materials for blossom blight:

1 - These are theoretical predictions and forecasts. The theoretical models predicting disease risk use the weather data collected (or forecasted) from the weather station location. These results should not be substituted for actual observations of plant growth stage and disease occurrence determined through scouting or monitoring.

2 - Consider the history of fire blight in the planting. If there was not fire blight the previous season or if you have never had fire blight, do not let copious model predictions or extension alerts (such as this article) "intimidate you" into applying unnecessary antibiotics each time an alert is released.

3 - Consider the age of the planting and the susceptibility of variety and rootstock. These factors play a large role in the development of fire blight. None of the models consider these factors. Have a look at the table of variety susceptibility at the end of the article. If you have a young planting of a highly susceptible variety, it may be more important to protect these blocks based on model predictions than a 15-year-old McIntosh planting on resistant rootstocks, which may not warrant the same level of protection during bloom.

4 - The models only identify periods of weather that are favorable for infection. All wetting events are now color-coded light blue in NEWA to draw attention to the weather factors that promote bacteria getting into the flower nectar glands or other plant openings. Despite words like "extreme" and "infection" colored in vibrant red, the models only predict favorable weather conditions. If favorable weather for infection is not in the current or forecasted prediction, if the apple variety is not very susceptible, if there is no prior history of fire blight, and if the trees aren't being pushed with nitrogen, the actual risk of fire blight infection may be low to non-existent.

5 - Weather forecasts can vary and change daily. When this happens, the model predictions will change drastically, and the risk will change as well. Bacteria double about once every 20 minutes under optimal conditions; for fire blight bacteria this is warm (>60°F) wet conditions. The models use degree hours, not degree days, to accommodate the rapid growth rate of these pathogens. Check the fire blight predictions, especially those in the forecasts, frequently. The 1- and 2-day forecasts are usually reliable, those at 3, 4, and 5-days are not as reliable. NEWA uses the National Weather Service forecasts. Compare these with your favorite local weather forecast provider.

6 - We have added a new "EIP" line of prediction to the NEWA model with the threshold of concern being "100". Before there is considerable risk of infection from reaching this threshold, trees would also need to experience average temperatures over 60°F, and a wetting event — warm and wet. It may be prudent to only take action when both models are predicting sufficient risk as described in the new "Disease Management" messages in the model outputs.

Status of Antibiotic Resistance in 2017

Streptomycin resistance has not been detected in NY for the last three years, despite extensive screening of shoot blight samples. If we keep practicing resistance management by rotating bactericides and antibiotics with limited use of streptomycin application after bloom, we may never experience outbreaks of streptomycin resistance again. However, screening blossom blight or trauma blight, when they occur after streptomycin applications, would provide a direct approach to determining the occurrence of streptomycin resistance in NY, similar to sampling for fungicide resistance after an apple scab control failure.

Even in the absence of streptomycin resistance, fire blight can still be difficult to control if weather favors the pathogen. Moreover, the shoot blight phase of the disease can still present a considerable problem following an apparent success in blossom blight management. In this regard, we have continued to refine and update our guidelines for managing fire blight in NY with an emphasis on young plantings. The guidelines are broken up into three sections: general guidelines for season-long management, additional guidelines for new plantings, and guidelines for on-farm nursery production. Tables of fire blight susceptibility of cultivars and rootstocks are at the end of the article and will be linked from the NEWA model.

General guidelines for season-long management.

1 - All fire blight strikes and shoots with larger cankers should be removed during winter pruning. Remove any trees where the central leader or main trunk has become infected. Infected wood should be removed from the orchard and either burned or placed where it will dry out rapidly. The fire blight pathogen can withstand cold temperatures, but is intolerant to drying.

2 - Copper sprays should be applied at green tip. Processing varieties can be protected with copper as late as 1/2-inch green, depending on requirements of the label.

3 - During bloom, follow a blossom blight forecasting modeling system such as the ones offered in NEWA (newa.cornell.edu/index.php?page=apple-diseases), Maryblyt(TM) 7.1 (http://anr.ext.wvu.edu/pests/diseases/forecasting-

software), or RIMpro (http://www.rimpro.eu/). Time applications during high-risk weather only. If the operation has rarely or never had fire blight, it may not be necessary to apply antibiotic each time a high-risk period is forecast. Regardless of model predictions, it is rarely necessary to make more than three applications for blossom blight.

4 - Begin antibiotic applications for blossom blight with a single application of streptomycin at 24 oz/acre. Consider including the penetrating surfactant Regulaid (1 pt/100 gal of application volume) in the first streptomycin spray to enhance the effectiveness of streptomycin. Regulaid would be especially beneficial when applied under rapid drying conditions. Regulaid can be omitted from subsequent applications so as to minimize the leaf yellowing that is sometimes associated with repeated applications of streptomycin. If later antibiotic applications are needed, streptomycin or kasugamycin (Kasumin 2L 64 fl oz/A in 100 gallons of water) should be used. Consider making at least one application of Kasumin 2L for resistance management purposes. If there are concerns about the effectiveness of streptomycin or kasugamycin, contact the authors of this article to discuss the product failure and determine if it would be necessary to submit a sample for antibiotic resistance testing. The presence of shoot blight later in the

season isn't necessarily an indication that antibiotics applied during bloom failed due to resistance.

5 - In the two weeks following bloom, scout for and prune out fire blight strikes promptly. Destroy pruned strikes by burning or leaving them out to dry. It is best to prune well back into healthy wood, at least 12 inches behind the water-soaked margin. Take care, as summer pruning may stimulate active shoot growth, leading to new susceptible tissues that could later become infected. If fire blight reaches the central leader, the tree should be removed. However, the spot may be safely replanted.

6 - Preventive applications of prohexadione-calcium (Apogee or Kudos) for shoot blight should be seriously considered, especially on highly susceptible apple varieties during shoot elongation beginning in late bloom.

a) For maximum effectiveness, prohexadione-calcium should be applied at 6–12 oz/100 gal (3–6 oz/100 gal for trees <5 years) when trees have 1–2" of shoot growth. A second application should be made 14–21 days later.

b) A program where prohexadione-calcium is applied at low rates slowly over the period of active shoot growth is gaining popularity for reduced impacts on tree productivity. Specific programs may vary slightly, but generally consist of three applications at 1–2 oz/100 gal on a 14-day schedule, beginning with early shoot growth in mid- to late bloom. Take caution, as such programs have not been widely validated over many seasons and locations.

7 - Preventive applications of copper can be used post-bloom and during the summer to protect against shoot blight infections. Copper must be applied before infection occurs, as it will only reduce bacteria on the surface of tissues. Copper will have no effect on existing shoot blight infections. Copper may cause fruit russet in young developing fruit. Apply with adequate drying time and use hydrated lime to safen copper. An example would be Badge SC at rate of 0.75 to 1.75 pt/acre buffered with 1–3 lbs of hydrated lime for every 2 pints of Badge, to minimize fruit finish damage. Terminal shoots can outgrow protective residues of copper. Hence, a low-rate fixed copper program consists of applications on a 7–10-day schedule during high-risk weather until terminal bud set.

8 - It may be possible to save plantings on resistant rootstocks that have a moderate amount of shoot blight. Apply prohexadione-calcium at the highest rate for the planting (6–12 oz/100 gal) and allow 5 days for the product to affect the tree. Afterwards, prune out existing and newly developing shoot blight every two weeks for the rest of the season. Remove any trees where fire blight has

reached the central leader. If pruning seems to stimulate additional shoot growth, a second application of prohexadione-calcium could be warranted.

9 - If you need to interplant apple trees in existing orchards where fire blight was observed, replant in late fall to better synchronize bloom with the established trees in the following season.

Additional Guidelines for New Plantings (1–2 years)

1 - If possible, plant varieties grafted on fire blight-resistant rootstocks.

2 - Trees should be carefully examined for fire blight infections before planting. Any infected trees should be discarded.

3 - Immediately after planting, and 14 days later, a copper application should be made using the lower copper rates that are labeled for use after green tip. Ensure that soil has settled to avoid phytotoxicity to roots.

4 - Trees should be scouted at 7-day intervals for fire blight strikes until July 31st. Infected trees should be removed as described above. Plantings also need to be scouted 7–10 days after hail or severe summer storms. The NEWA fire

blight disease forecast tool (newa.cornell.edu/index.php?page=apple-diseases) can assist by providing an estimate of symptom emergence following a storm or other trauma event. Also, scout the planting at the end of the season (mid-September).

5 - If possible, remove flowers before they open. New plantings may have considerable numbers of flowers the first year, and blossom removal may not be practical. If practiced, the blossoms should be removed during dry weather and before a lot of heat units have been accumulated, because both factors contribute to higher risk of fire blight infection.

6 - Trees should receive an application of copper at a stage equivalent to bloom. Observe the labeled REI before blossom removal.

7 - To protect any remaining bloom, follow the chemical management program for your regions of streptomycin resistance risk.

Guidelines for on-farm nursery production

1 - Collect budwood from orchards where fire blight is not established or from a neighboring farm without fire blight.

2 - Limit streptomycin and kasugamycin applications to 2–3 per season. These should be timed according to a disease forecast prediction or CCE alert.

3 - When fire blight pressure is high and shoots are actively growing, apply copper at the lowest labeled rate to prevent shoot blight.

4 - Before conducting tree management tasks in the nursery, apply a copper product at the lowest labeled rate and observe the labeled REI.

5 - Any pinching or leaf twisting should be done on dry, sunny days with low relative humidity, after the REI of a copper application has expired.

6 - When working in the nursery, field workers must wear clean clothing, and should wash hands and disinfect working tools often.

7 - If fire blight is found in the nursery, completely remove the infected trees, including the root system, and place them in trash bags between rows. Subsequently, remove the culled trees from between the rows and discard them. Under no circumstances should unbagged infected trees be

pulled between nursery rows when trees are wet, otherwise fire blight will be spread down the rows.

8 - Manage potato leafhoppers in the nursery using a registered product.

9 - Maintain weed control through cultivation. Apply registered post-emergence herbicides using a shielded boom. There are some residual herbicides registered for use in nurseries.

10 - When trees have reached the desired height, consider applying the lowest labeled rate of Apogee (1-2 oz/100 gal) to slow growth and reduce susceptibility to shoot blight.

11 - Manage nitrogen levels to balance tree growth and fire blight susceptibility.

Fire Blight Susceptibility in Apple Cultivars and Rootstocks, compiled by Nicole Mattoon and Juliet Carroll, NYS IPM Program.

Susceptibility guide to management:

Highly Susceptible – fire blight management needed.

Apple Cultivar	Source	Apple Rootstock	Source
Highly Susceptible Cultivars		**Highly Susceptible Rootstocks**	

Barry	2, 6	M.26	1, 2, 3, 4, 5
Ben Davis	2, 6	M.27	2, 3, 4, 6
Braeburn	2, 6	M.9	2, 3, 4, 5
Burgundy	2, 6	Mark	2, 3, 4
Fuji	2, 5, 6, 7	Ottawa 3	1, 2, 3, 4, 5
Gala (all strains)	2, 5, 6, 7	P. 2, 16, 22	2, 3, 4
Ginger Gold	2, 5, 6, 7		
Golden Russet	6		
Granny Smith	2, 5, 6, 7		
Idared	2, 5, 6, 7		
Jonagold	2, 5, 6, 7		
Jonathan	2, 5, 6, 7		
Lady Apple	4		
Lodi	2, 5, 6, 7		
Monroe	4, 6		
Mutsu (Crispin)	2, 4, 5, 6, 7		
Niagara	2, 4, 6		
Nittany	2, 4, 6		
NY 2	4		
NY 674	4		
Paula Red / Dandee Red	2, 4, 5, 6, 7		
Pink Lady	5, 6		
Raritan	2, 4, 6		
Red Yorking	2, 4, 6		
R.I. Greening	2, 5, 6		
Rome Beauty	2, 5, 6, 7		
Ruby Frost	4		
Spigold	2, 6, 7		
Starr	2, 4, 6		
Suncrisp	4		
Twenty Ounce	2, 6, 7		
Tydeman	4		
Yellow Transparent	2, 4, 6		
York Imperial	2, 4, 6		

Susceptibility guide to management:

Moderately Susceptible – fire blight management usually needed where disease is prevalent

Apple Cultivar	Source	Apple Rootstock	Source
Moderately Susceptible Cultivars		**Moderately Susceptible Rootstocks**	
Ambrosia	4	Antonovka 313	2
Arlet	4	B.118	1, 4
Baldwin	2, 4, 6	Bud. 9	2, 3, 4, 5
Beacon	2, 6, 7	G.11	1, 2, 5, 6
Cameo	3, 7	G.935	6
Cortland	2, 4, 6, 7	MM. 106	2, 3, 4
Creston (BC815-10)	3, 4, 7	MM. 111	3, 4
Earligold	2, 4, 6	M.7	3, 6
Enterprise	5, 6, 7	P.18	1, 2
Fortune	7		
Gloster	2, 4, 6		
Goldrush	4, 7		
Golden Delicious	2, 4, 5, 6, 7		
Golden Supreme	7		
Gravenstein Holly	2, 4, 5, 6, 7		
Grimes Golden	2, 5, 6		
Honeycrisp	7		
Jerseymac	2, 5, 6, 7		
Jonafree	6, 7		
Jonamac	2, 5, 6, 7		
Julyred	2, 4, 5, 6		
Macoun	2, 5, 6, 7		
Maiden Blush	2, 4, 6		
McIntosh	2, 5, 6, 7		
Milton	2, 4, 5, 6		
Minneiska (SweeTango)	4		
Mollies Delicious	2, 4, 5, 6		

Northern Spy	2, 5, 6, 7
NY 1	4
NY 674 (Autumn Crisp)	7
NY 75414-1	7
Orin	7
Pinova	5, 6
Pioneer Mac	3, 7
Pristine	7
Puritan	2, 4, 6
Quinte	2, 4, 6
Redfree	2, 4, 5, 6, 7
Sansa	3, 7
Scotia	2, 4, 6
SnapDragon	4
Spartan	2, 6, 7
Spijon	2, 4
Starkspur (Delicious)	7
Starkspur Earliblaze	2, 4, 6
Stayman	2, 4, 7
Summer Rambo	2, 4
Summerred	2, 4, 6
Sunrise	3, 7
Wayne	2, 4, 6
Wealthy	2, 6
Winesap	2, 4, 6
Zestar!	4

Susceptibility guide to management:

Least Susceptible – fire blight management needed only under high disease pressure or not needed

Apple Cultivar	Source	Apple Rootstock	Source
Least Susceptible Cultivars		**Least Susceptible Rootstocks**	

Arkansas Black	2, 4, 6	G.16	2, 3
Britemac	2, 4, 6	G.202	1, 3
Carroll	2, 4, 6	G.210	1, 2, 3, 6
Delicious	2, 6, 7	G.214	1, 3, 6
Empire	2, 6, 7	G.222	1, 3, 6
Freedom	5, 6	G.30	2, 3, 4, 6
Haralson	5, 6	G.41	1, 3
Jamba	2, 4, 6	G.65	2, 3, 4
Liberty	2, 5, 6, 7	G.814	3, 6
Macfree	5, 6, 7	G.890	3, 6
Melba	2, 4, 6	G.969	1, 3, 6
Melrose	5, 6	V.1	1, 3
Early McIntosh	4, 7		
Murray	5		
Northwestern Greening	2, 4, 6		
Nova Easygrow	5, 6		
Novamac	5		
Prima	6, 7		
Priscilla	2, 5, 6, 7		
Smoothee (Golden Delicious)	6		
Stark Bounty	2, 6, 7		
Stark Splendor	2, 6, 7		
Turley	2, 4, 6		
Viking	2, 7		
Wellington	2, 4		
Cultivar Susceptibility Unknown			
Acey Mac			
Elliot			
Senshu			
Shizuka			

Sources of information on cultivar susceptibility to fire blight:

1 - Michigan State University Web site, Nancy J. Butler, "Disease on Apples".
2 - West Virginia University, Kearneysville website, K.S. Yoder and A.R. Biggs.
3 - Steven Miller and Alan Biggs in NE183 plot, West Virginia.
4 - Other field observations (private consultants, faculty and Extension educators).
5 - Purdue University, Janna Beckerman, "Disease Susceptibility of Common Apple Cultivars".
6 - Colorado State University, R.D Koski and W.R Jacobi, "Fire Blight".
7 - Breth, D.I., Reddy, M.V.B., Norelli, J., and Aldwinckle, H. 2000. Successful fire blight control is in the details. NY Fruit Quarterly 8(1):6–12.

Sources of information on rootstock susceptibility to fire blight:

1 - Robert Crassweller and James Schupp, Penn State, "Apple Rootstocks." extension.psu.edu/plants/tree-fruit/tfpg
2 - Paul Domoto, Department of Horticulture, Iowa State University, and Jim Cummins, Cornell University. "Characteristics of Apple Rootstock." www.ars.usda.gov/northeast-area/geneva-ny/plant-

genetic-resources-research/docs/characteristics-of-apple-rootstock/
3 - R.D Koski and W.R. Jacobi, Colorado State University, "Fire Blight."
extension.colostate.edu/docs/pubs/garden/02907.pdf
4 - Janna Beckerman, Department of Botany and Plant Pathology, Purdue University, "Fire Blight on Fruit Trees in the Home Orchard"
5 - Russo, N.L., Robinson, T.L., Fazio, G., and Aldwinckle, H.S. 2007. Field evaluation of 64 apple rootstocks for orchard performance and fire blight resistance. HortScience 42(7):1517–1525.
6 - Other field observations (private consultants, faculty and Extension educators).

CAN BLOSSOM BLIGHT ON APPLES AND PEARS BE TRIGGERED BY WATER FROM SPRAYERS?

(Dave Rosenberger, PPPMB, Highland; dar22@cornell.edu)

[Box text: SOMETHING IN THE WATER]

A recent extension alert about fire blight risks in eastern New York included the statement that water is required to trigger blossom blight infections on apples and pears, but that even water delivered by a sprayer can trigger fire blight if (i) bacterial populations on flowers were high, (ii) temperatures were warm enough for infection, and (iii) no streptomycin was included in the spray solution. Although the warning that spray water can trigger blossom blight has been included in extension alerts for many years, a respected consultant contacted me to complain that this statement confused growers and could result in unneeded applications of strep to protect against something that, if it occurred at all, was an exceedingly rare event. The consultant asked if I could provide any published evidence from controlled trials where water from a sprayer had triggered blossom blight.

As usual, a valid challenge to long-held assumptions caused me to step back and re-evaluate the evidence. I was not aware of any published studies that actually reported blight outbreaks triggered by water from sprayers, but I was certain that I had heard colleagues (some of whom are now deceased) report on blight outbreaks that they believed were explainable only if one included wetting from spray solutions. But perhaps blossom blight infections induced by spray water only occurred in the distant past when many folks were still applying upwards of 150 gallons of spray solution per acre, thereby thoroughly wetting trees with enough water to trigger blight infections. If so, then presumably my non-deceased colleagues, with their experiences and observations limited to more modern times, would never have encountered a situation where sprays applied during bloom provided the only explanation for blossom blight outbreaks.

At 6:30 PM on Saturday, I sent an e-mail query to 11 colleagues in eastern United States, all of whom I view as experts on fire blight, asking if they were aware of published evidence that water from sprayers could trigger blossom blight or if they had observed cases where spray water provided the only plausible explanation for blossom blight outbreaks. My list of experts included university research scientists as well as experienced fruit extension educators and consultants. By 8:00 AM on Sunday morning, I had 12 responses from six different experts. (If you question the dedication of your fruit research/extension community or the return on tax dollars spent on agriculture, try getting a >50% response rate within 14 hours on a weekend query sent to any other tax-funded entity!) The e-mail conversation continued through Monday morning.

None of the experts I contacted could point to published evidence that spray water could trigger fire blight, but three of them had seen blossom blight outbreaks that could have been triggered only by water from sprayers because no natural wetting events occurred in those blocks. Respondents who had not personally seen evidence of spray water-induced blossom blight still felt that it would be very risky (and foolish?) to ignore that possibility.

Dr. Keith Yoder from Virginia Tech's Winchester station provided the following relevant comments written by Dr. Paul Steiner in his Maryblyt manual, the most recent edition of which can be found at http://anr.ext.wvu.edu/r/download/235636:

- p. 12: "when all other conditions for flower infection exist, simply spraying the trees with water is enough to trigger the development of blossom blight. On this basis, it appears that infections can be initiated within minutes and that high-volume, water-based fungicide sprays for other diseases and overhead irrigation should be avoided during bloom. We have no evidence to indicate a similar risk occurs with low volume sprays (e.g., approx. 100 gallons per acre or 1,000 liters per hectare)."
- p. 19: "Note too, that applying fungicides or plant growth regulators during bloom using high volumes of water can provide the wetting event necessary for

infection when all other conditions for blossom blight are present. In one Missouri trial (W. H. Shaffer, unpublished), simply spraying trees to the drip point with water during the bloom period resulted in 227 strikes per tree.

• p. 18: "Blossom blight is usually (but not always) the earliest phase of a fire blight epidemic. It can be extensive because of the large number of susceptible infection sites, because flowers are readily and selectively colonized well in advance of infection and because inoculation occurs within minutes when the blossoms become wet (rain, dew, spray)."

However, another respondent provided the following anecdote: "I sprayed once and had an incredible crop of morels (unpublished). I didn't control for any variables. I can't seem to repeat it. How is this any different..." from using observational evidence to support the argument that spray water can trigger fire blight? This respondent effectively illustrates the potential absurdity of basing blight control guidelines on nothing more that observational evidence.

Thus, responses to my queries indicate that, although both observational evidence from a few specific cases and our understanding of pathogen biology would support the concept that spray water can induce blossom blight, we do not have evidence from replicated trials to prove it can happen. Therefore, I must admit that the challenge brought by my respected consultant friend has merit, not because risks of sprayer-induced blossom blight have been proven to be minimal, but only because no one has ever quantified that risk.

So, do growers really need to be concerned about triggering blossom blight with spray water? Every grower will need to draw their own conclusions, but following are some points that may help in making that decision:

1 - Not every spray during bloom poses a risk for triggering fire blight. Water from sprayers can (theoretically) trigger fire blight ONLY when bacterial populations on flower stigmas are high AND when the mean temperature for the day will be greater than 60°F. Furthermore, risks are probably greater if sprays are applied on days with high humidity, as compared with days when relative humidity remains below 80%. (For a more detailed discussion of and speculations about the potential impact of relative humidity on flower susceptibility, see

http://blogs.cornell.edu/plantpathhvl/2016/04/21/credibility-of-fire-blight-forecasts/)

2 - In the past, it was difficult for growers to quickly determine if the criteria for high bacterial populations and mean temperature of 60°F were likely to be met on any given day when they might apply a spray during bloom. However, a new innovation on the NEWA network this year allows anyone to access this information with two clicks, as follows: First, go to the NEWA network at http://newa.cornell.edu, find the weather station closest to your location, click on the weather station page for that location, and then bookmark that location. In the future, you can access your selected weather station directly via that bookmark, and then click on the "Fire Blight" link under "pest forecasts." That will bring up the page showing fire blight risks for the past few days, for the current day, and the predictions for the next few days. One line of the table is labeled "Infection potential EIP value." If that value for the current day is ≥100 AND if the predicted mean temperature for the current day is ≥60°F (shown on the bottom line of that table), then there is at least a theoretical risk that applying a spray to open flowers on the current day could trigger blossom blight if streptomycin is not included in the

spray tank. Conversely, if either the EIP for the current day is <100 or the mean temperature for the day will be <60°F, then the risks of triggering blossom blight with water from a sprayer will be minimal. (Note that early in the bloom period, you will need to reset the date for the first open flowers at the top of the fire blight page in NEWA, but later during bloom, the outcomes will be the same if the default date is earlier than the actual bloom date.)

3 - In many cases, the timing of plant growth regulator sprays or fungicide sprays applied during bloom can be adjusted to avoid the days when there is a potential risk of triggering fire blight by moving the spray to a cooler day or to a day with EIP<100. If the spray date cannot be adjusted to avoid these high-risk days, then it would seem prudent to include streptomycin in the spray solution being applied. If the fire blight page on NEWA already indicates that infection is likely on the current day due to natural wetting, then one presumably would be including strep in the spray mixture anyway, unless all open flowers had already been protected via an earlier application of streptomycin.

4 - This same assessment process can be used to determine if sprays applied at petal fall or thereafter

might trigger blossom blight on any late-opening flowers. Generally, we assume that the risk of blossom blight ends at petal fall, but we increasingly see lingering flowers here and there on trees at the time when petal fall sprays are being applied. These late flowers need to be protected just as much as flowers during the main bloom period.

5 - Many growers look at trees with a few remaining flowers and decide that those few flowers do not warrant including strep in their petal fall spray, even if blight models are indicating that infection is possible. My approach to evaluating the economics of including strep in the petal fall spray is to suggest that, rather than applying step at petal fall, the grower should send a crew through the block to prune out all of the remaining flowers, thereby eliminating the risk. If doing that would be prohibitively expensive, then a strep spray is justified (if models indicate an infection is possible) because removing those few flowers after blight appears in the orchard will cost more than adding strep to the petal fall spray.

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[Section: CHEM NEWS]

SUPRA-CEDED

Last week's article on San Jose scale management included an option for Supracide, but we have since learned that the EPA revoked all tolerances for the active ingredient, methidathion, on pome and stone fruits effective Dec. 31, 2016. This means that, although the NYS DEC pesticide portal may indicate that Supracide is still registered in NYS through the end of the year, the registration is effectively canceled and it is actually illegal to use any leftover stock.

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