Webinar on Using RIMpro Apple Scab, Fire Blight and Peach Brown Rot Prediction Models to Help Your Spray Decisions in Climate Change Challenging Conditions

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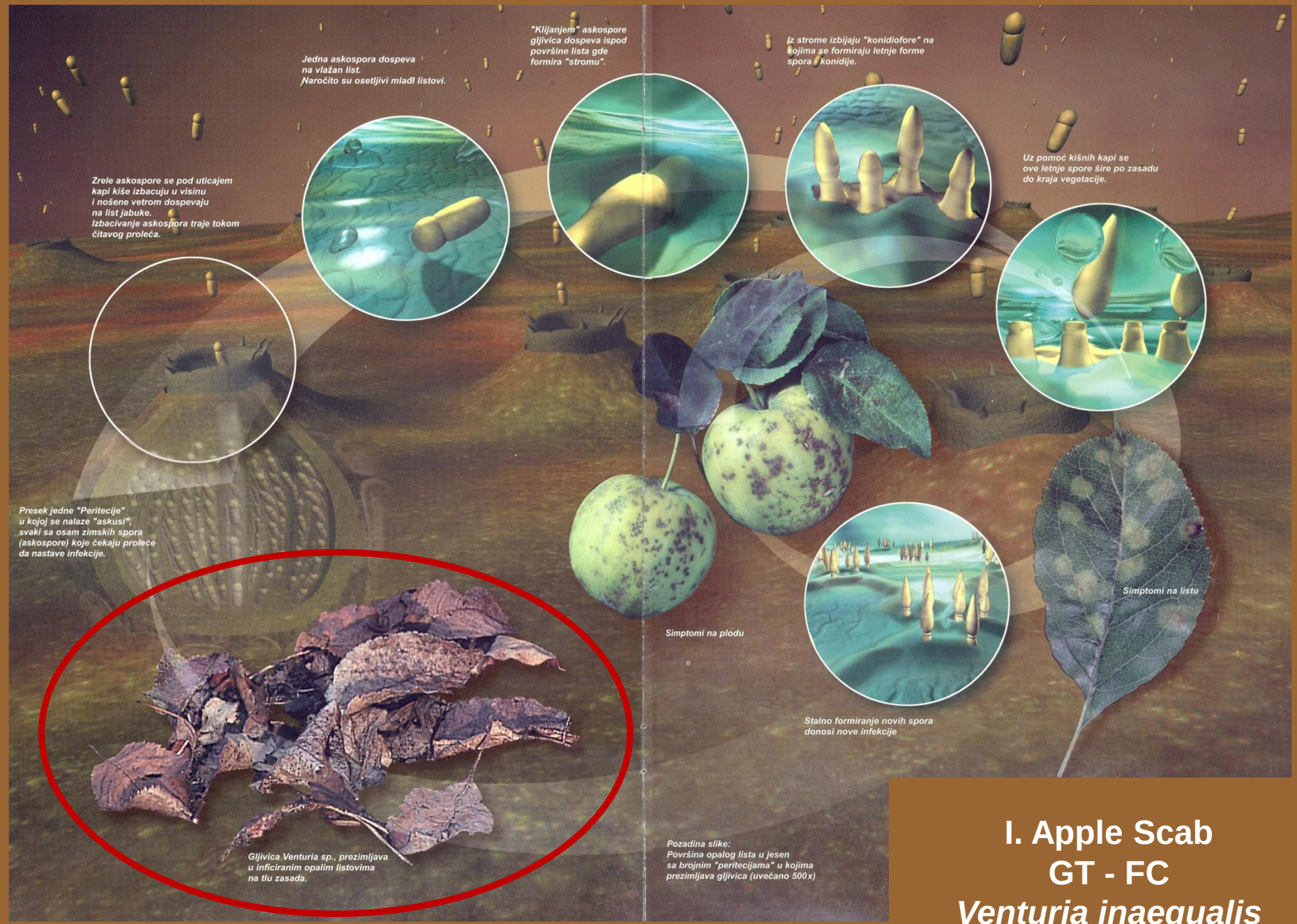
Acimovic Lab, Online

20 Feb 2024



I. Apple Scab
GT - FC
Venturia inaequalis

Symptoms and Why Leaf Scab Matters (2)

Fruit Scab

Scab Leaf Litter Breakdown

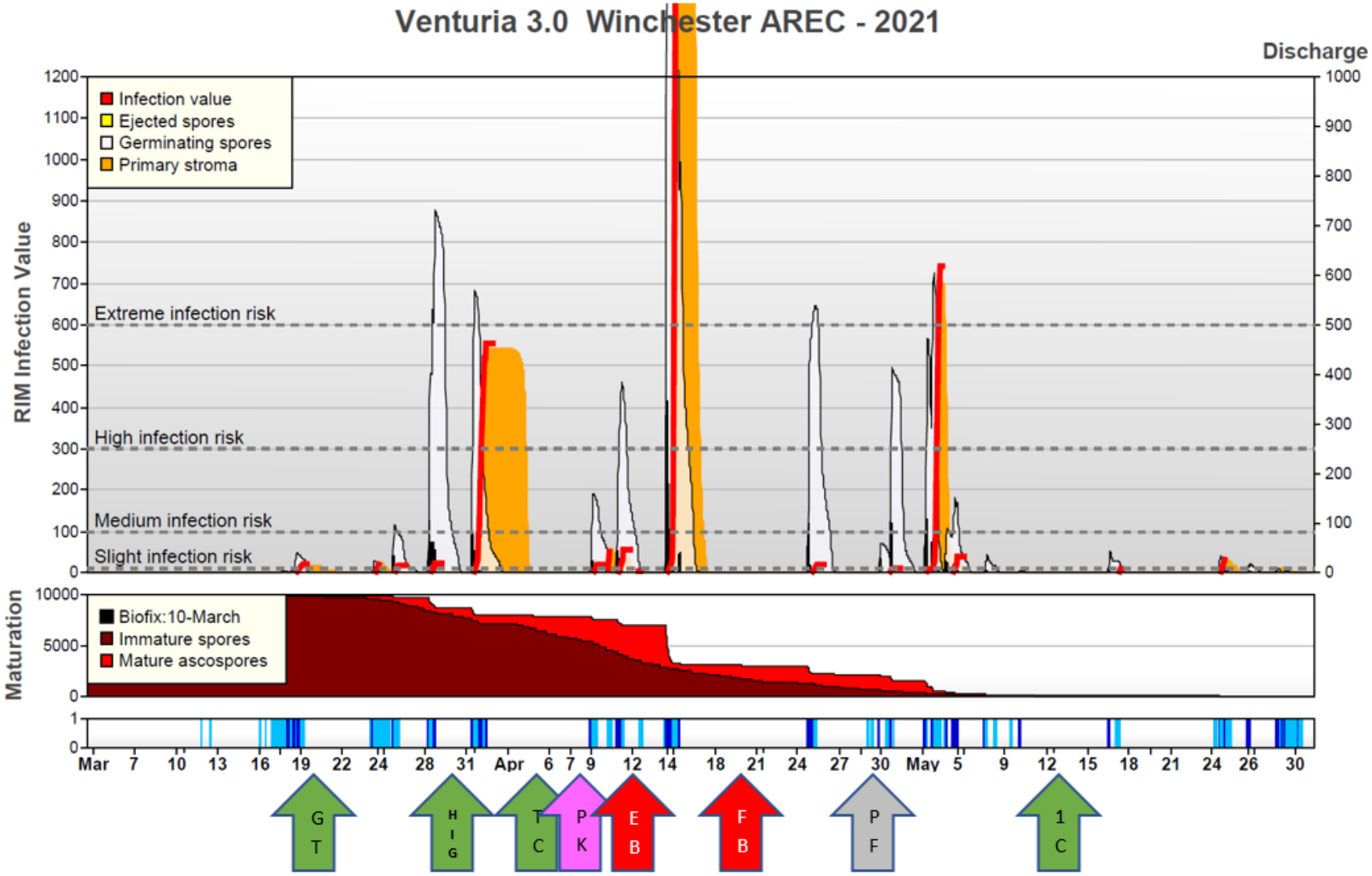
- **Eliminate fallen leaves by Urea or Lime spray to reduce ascospore dose 50-70%**

- **Urea 40 lb / A in 100 gal**
- **Dolomitic lime 2.5 t/A)**
- **Lime increases the pH or basicity (opposite to acidity) of soil surface promoting microbial activity**
- **Helps leaf litter breakdown!**
- **Powdered lime spreader**
- **Use flail mower to shred leaves the to smaller pieces**
- **Rake the leaves from under the trees into row middles and remove leaf piles with flail mower's mode for scalping the sod**

- **Prune for good air circulation**
- **Helps with Marssonina Leaf Blotch as well**

Partnership on RIMpro Apple Scab Model: Virginia

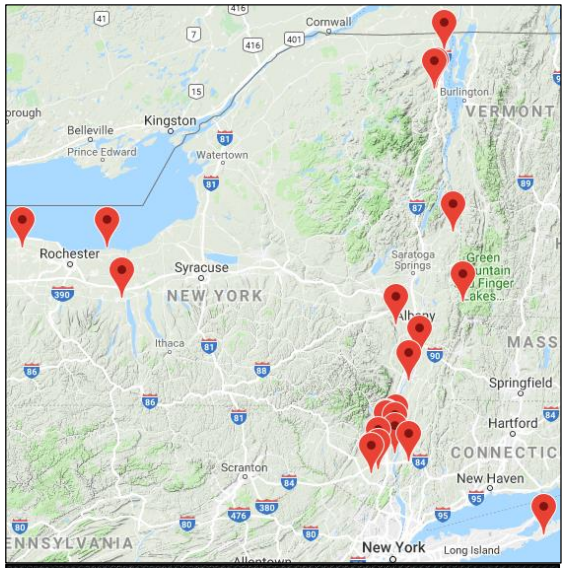
- Developed for Organic Producers, Netherlands -



Decision Support Network: NY, VT, NJ

- Twice a Week -

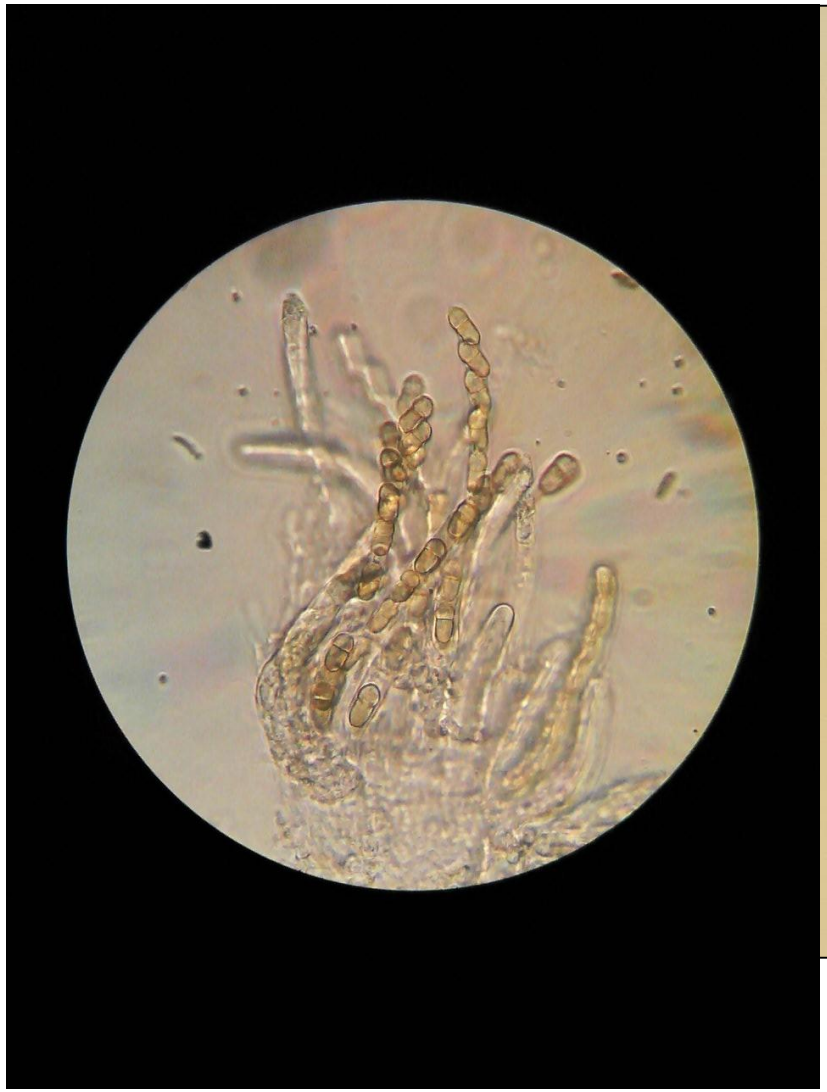
- Interpret scab, fire blight, MLB models with spray recommendations (e-mails):
  - 19 (2017)
  - 22 (2018)
  - 14 (2019)
  - **21 (2020)**
- Interpret scab, fire blight, SBFS, MLB, blister spot models & spray recs (blogs):
  - 43 (2017)
  - 44 (2018)
  - 43 (2019)
  - **48 (2020)**
- First disease symptoms
- Efficacy trial results



Monitor Ascospore Release

- Ascospores vs. Conidia -

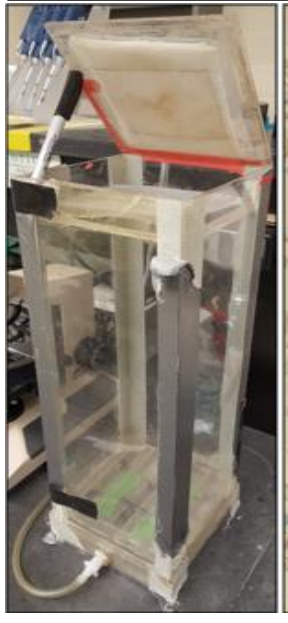
- Maturation is predicted when RH > 70%
- Speed and amount of maturation assumed proportional to the accumulated temperatures above 32˚ F.
- 50-60 spores an economic threshold in vacuum tower

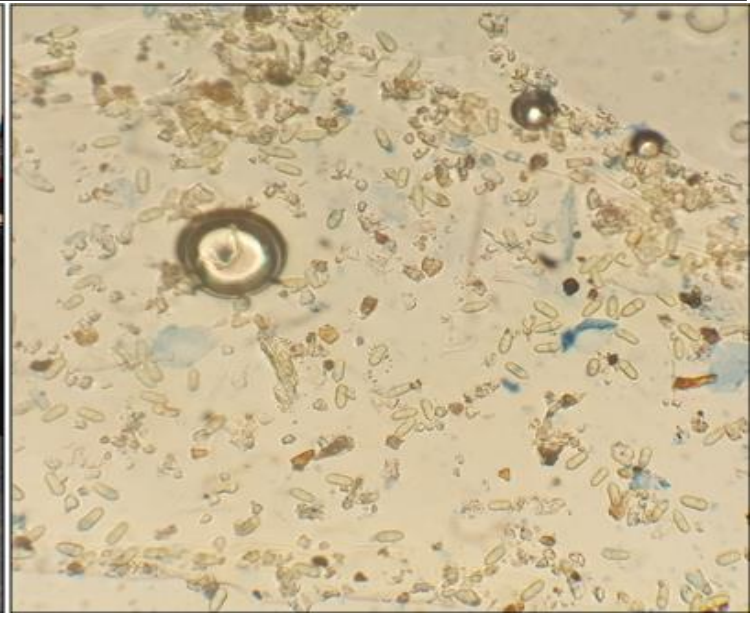


RIMpro Model Calibration

- Biofix Dates -

- Green tip date (Biofix 1): 50% green-tip of floral buds on earliest cultivar in an orchard.
- First ascospore release (Biofix 2):
  - Winchester
- Primary scab season end is when inoculum in leaves drops below 5%





VIRGINIA TECH

tree fruit pathology lab at virginia tech

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WELCOME TO THE AĆIMOVIĆ LAB

The Ačimović lab is located at the Virginia Tech's Alson H. Smith Jr. Agricultural Research and Extension Center (AREC) in Winchester, VA. As a part of School of Plant and Environmental Sciences our program involves research and extension focused on diseases of fruit tree crops with emphasis on apple, peach and cherry. We investigate all components of the disease triangle: pathogen, plant, and the environment in

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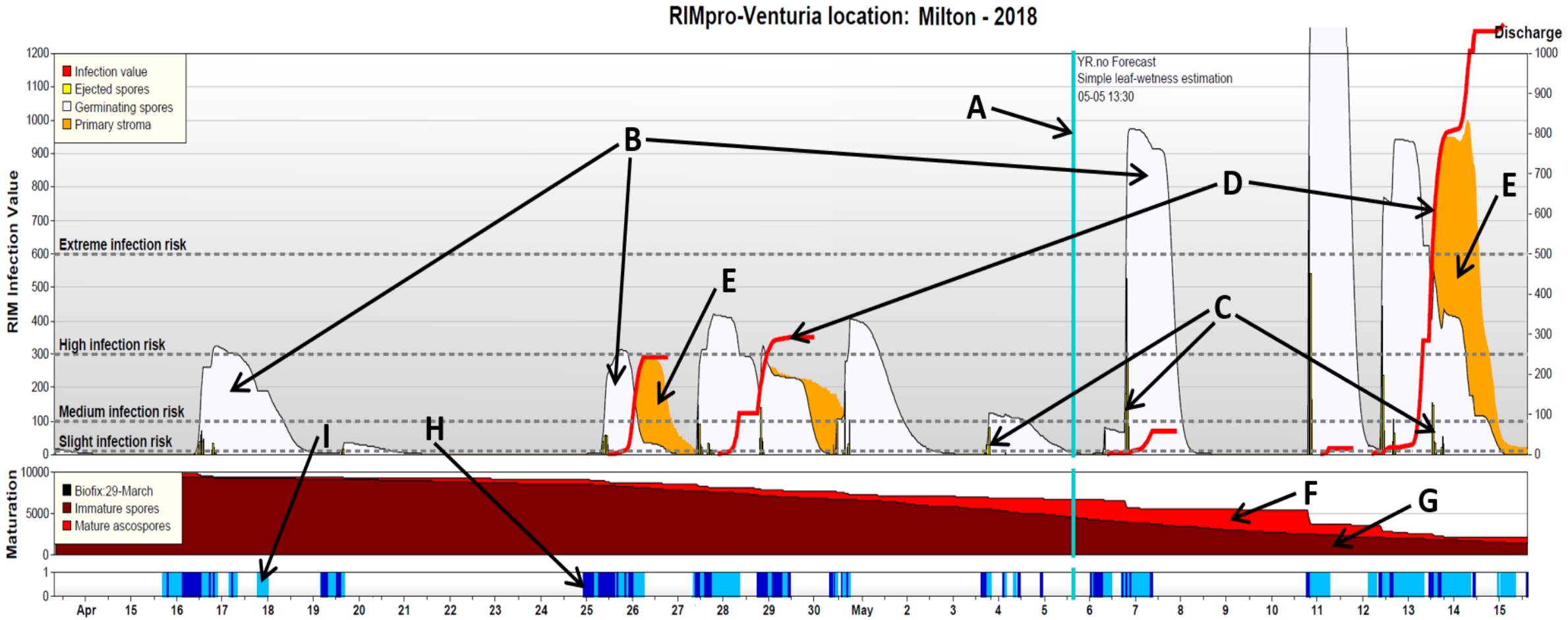
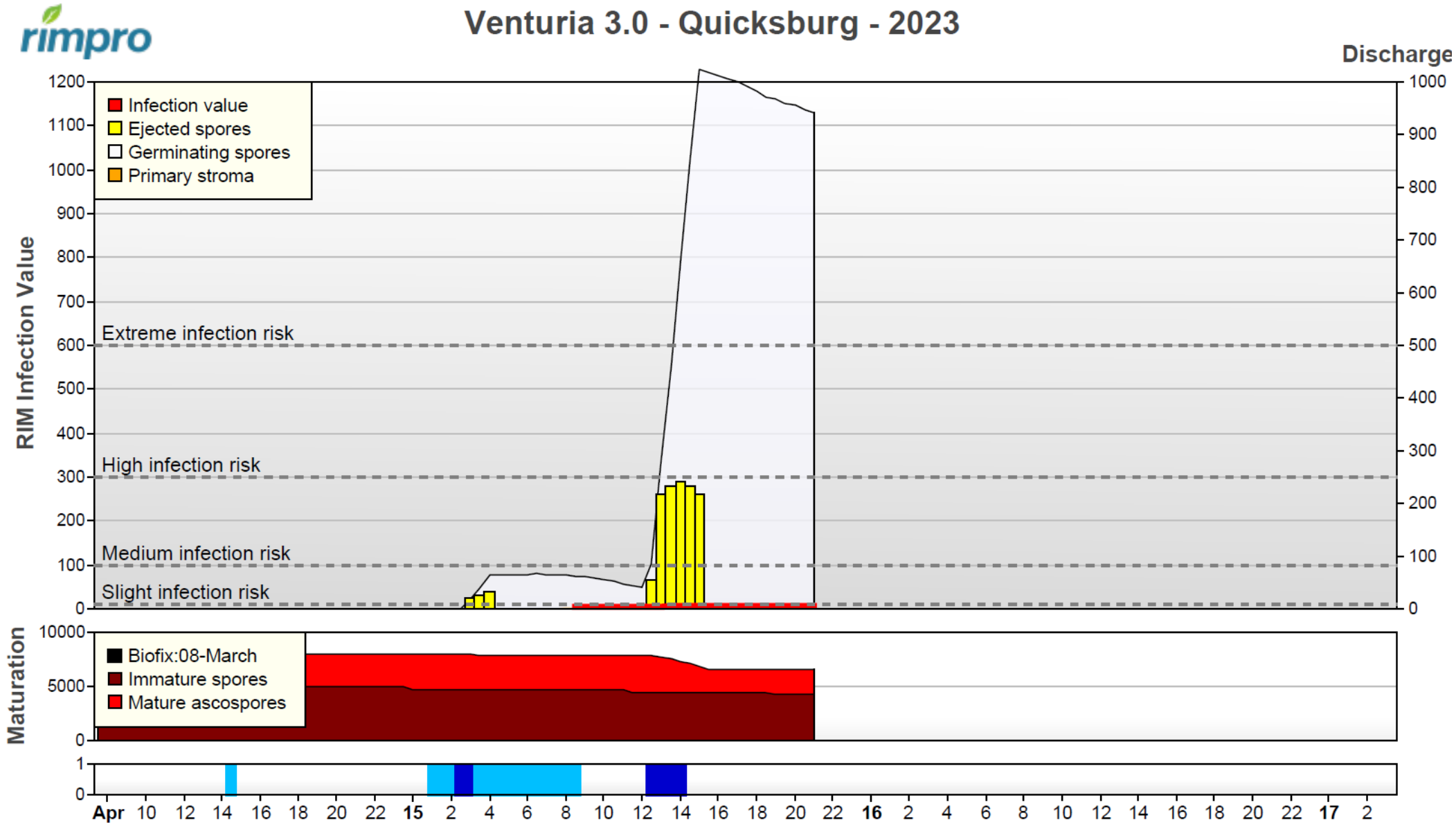
RIMpro Model Interpretation & When to Apply Fungicides?

- Forecast Reliability -



Available at: https://treefruitpathology.spes.vt.edu/extension-publications/

Zoom in tool:


rimpro
Venturia 3.0 - Quicksburg - 2023
Discharge
RIM Infection Value
Infection value
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Primary stroma
Extreme infection risk
High infection risk
Medium infection risk
Slight infection risk
Maturation
Biofix:08-March
Immature spores
Mature ascospores
Apr

Interpretation of RIMpro Scab Graph

- **(A) A vertical light blue line marks the current date and time within that day.**
- **(B) White camel hump-like areas labelled "Germinating spores" designate cumulative number of *Venturia inaequalis* ascospores that germinate over time and are read using the right-side vertical Y-axis scale that is labelled "Discharge".**
- **(C) Small yellow-black bars, which are seen better by using the zoom-in tool on the RIMpro screen, show the number of spores ejected from leaf litter in the orchard during each one-hour interval.**
- **(D) The red curved line is the RIM infection (Relative Infection Measure) value which, when divided by 100, is roughly the percentage of the total season's ascospores that are likely to cause infection in any given infection period (RIM = 0 – 1,200).**
- **Read each curve's peak RIM infection value/s using the vertical Y-axis scale on the left-hand side of the graph labelled "RIM Infection Value".**
- **In orchards that had little or no scab last year due to good spray programs, wetting periods that generate RIM values less than 300 are usually of no economic consequence. However, in orchards with high levels of carry-over scab inoculum from infections the previous year, any wetting periods generating RIM values greater than 100 should not be ignored.**

Interpretation of RIMpro Scab Graph

- **(E) Orange area called "Primary stroma" represents scab lesions that were initiated by infection from germinating spores and that are incubating in the leaf after which scab lesions will become visible. Incubating infections are worth noting because, if no fungicide was in place before the infection event began, some or all of the incubating infections can still be eliminated by using fungicides with post-infection activity.**
- **(F) The light red area in the middle "Maturation" graph is the proportion of mature ascospores that are ready for discharge with wetting events whereas the dark red area (G) shows the proportion of immature ascospores remaining in leaf litter.**
- **(H) The dark blue bars in the wetting graph with dates, at the bottom, are the actual or predicted rain periods.**
- **(I) The light blue bars are actual or predicted wetting periods when no rain is falling but trees continue to be wet after rain.**

- **In RIMpro's ascospore maturity model, the primary scab season is over when predicted infection events fail to reach RIM threshold values of 300 for clean orchards or 100 for high-inoculum orchards and petal fall has passed.**
- **This usually occurs after ascospores remaining to be discharged are less than 5% of the season total (middle graph labeled "Maturation")**

Scab Model Pros: Vincent Phillion, IRDA, CN

- RIMpro incorporates many more aspects of Apple scab epidemiology (and of other diseases, ex: Fire blight) because it is Dynamic, not Static.

- The first spore that lands on a leaf and the last spore that lands on the leaf have a different story.
- The first one was maybe in the evening, the last ones the next morning.

- NEWA (and other scab models) only see One rain event. The very “clever” static models will start counting infection hours in the morning because there is no ejection at night. No more.

- In contrast, RIMpro dynamically accounts for a very low ejection rate when rain occurs at night, and keeps track of these spores.

- When temperature changes or when day arrives, RIMpro knows it has to accelerate ejection.
- Keeps track of all the cohorts of spores and their life stories: From spore maturation, ejection, infection.

Jon Clements
UMass

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Out and about in the UMass Cold Spring Orchard...

Sunday, February 4, 2024

RIMpro - to spray or not to spray using 'virtual' vs. weather station weather data

RIMpro from their website (rimpro.cloud) "is a decision support system (DSS) for the sustainable management of pests and diseases in fruit and grape production. Every day, the cloud service together with the weather data system help thousands of growers and consultants worldwide to make the best decisions to protect their crops."

In 2023 I subscribed to RIMpro using both a hardware based weather station connected to NEWA (newa.cornell.edu, as Belchertown-2) and their virtual weather data service Meteoblue (meteoblue.com). My intent for using both was to be able to make a comparison of the weather station vs. virtual weather data 'after the fact' in terms of making spray decisions to manage apple scab, fire blight, and codling moth. It's obvious the two sources of weather data are going to differ, but that was not the point in making these comparisons. So I won't belabor that, but I will discuss how using the two different sources of weather data may have made an impact on the decision-making process to "spray or not to spray" to manage the above-mentioned pests. The answer, of course, and as always, is "it depends." Realize also this comparison was made at the end of the growing season when all the weather data was "in." No attempt made to compare the forecasts in the midst of the growing season. (That's a whole nother story.)

Apple scab

I just looked at primary scab using 1-April as a green tip date. Weather data that factor into the scab model include temperature (I presume but it does not show up in the RIMpro data file?), rainfall (to trigger spore release), and leaf wetness (duration). Looking at timing of spore maturity and last available spores to cause infection, there is not much difference there in the RIMpro chard (Figures 1 and 2) with an end date of approximately 10-June. I don't care so much about that as long as they are close, but what I do care about is the RIM value(s) which are a measure of infection risk, being low, medium, or high. In Figures 1 and 2 I placed

Blog Archive

- ▼ 2024 (1)
  - ▼ 02/04 - 02/11 (1)
    - RIMpro - to spray or not to spray using 'virtual' ...
- ▶ 2023 (8)
- ▶ 2022 (5)
- ▶ 2021 (9)
- ▶ 2020 (5)
- ▶ 2019 (6)
- ▶ 2018 (4)
- ▶ 2017 (2)
- ▶ 2016 (2)
- ▶ 2015 (3)
- ▶ 2014 (2)
- ▶ 2013 (4)
- ▶ 2012 (11)
- ▶ 2011 (12)
- ▶ 2010 (9)
- ▶ 2009 (29)
- ▶ 2008 (32)
- ▶ 2007 (18)

RIMpro and Apple Scab in New England: Accuracy and Grower Adoption

Elizabeth W. Garofalo, Jon M. Clements and Daniel R. Cooley
Stockbridge School of Agriculture and UMass Extension, University of Massachusetts, Amherst

Keywords: Apple scab, RIMpro, New England, Apple

RIMpro (rimpro.eu) is a cloud-based decision support system that provides fruit growers with information useful in managing insects and diseases in apples, pears and grapes. The system uses either local weather station data or web-based commercial weather service data in models to simulate risk of damage from diseases and pests. Apple models include scab, fire blight, sooty blotch, codling moth, sawfly, Marssonina leaf blotch, and fruit thinning. Users can sign up for an individual account, currently for

"RIMpro decision support system for scab management was evaluated in New England in from 2012-2018. RIMpro made conservative estimates, recommending applications when perhaps none were needed, and often over predicting the end of primary scab season. In a couple of instances it failed to predict a scab infection. The best results were with an on-farm weather station rather than cloud based weather data. RIMpro provides a detailed picture of the infection process behind major apple diseases, particularly scab, and is a valuable tool. But we recommend other sources of information also be considered, particularly a grower's experience and knowledge, when making pest management decisions."

scab spores and infections of trees under orchard conditions. In this article we discuss how well RIMpro did relative to observed infections and spore development, and our experience with a group of New England apple growers who used RIMpro.

Field Studies with RIMpro and Apple Scab

During 2016, 2017 and 2018, we worked with RIMpro at different orchards in MA and CT, where we ran RIMpro and established a system to determine ascospore maturity and the timing of apple scab infections. In the fall preceding each year, we collected scab-infected leaves from unsprayed trees before they fell. We put them in a layer, protected by landscape fabric and overlaid with hardware cloth, at sites adjacent to the study orchards to overwinter. The following spring, approximately three weeks before estimated apple bud break, six random leaves were collected and brought back to the laboratory to determine ascospore maturity using a Petri-plate assay developed many years ago in Geneva, NY to determine whether the scab fungus was ready to release infectious spores. We continued to collect leaves and observe release from each site each year until we no longer saw any spores, usually in June.

To identify actual, real-world apple scab infections, we used potted McIntosh trees kept under cover in a plastic hoop house at the UMass Cold Spring Orchard. When buds broke at each orchard, weather forecasts were monitored, and before the first predicted rain four trees were taken from the hoop house and

Two Years of Experience with RIMpro Apple Scab Prediction Model on Commercial Apple Farms in Eastern New York

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[2]Cornell Cooperative Extension, Eastern NY Commercial Horticulture Program, Plattsburgh, NY
[3]Section of Plant Pathology and Plant Microbe Biology, Cornell University, Cornell AgriTech at New York State Agricultural Experiment Station, Geneva, NY

Keywords: Apple scab, prediction models, RIMpro, NEWA,

Correctly timing early-season fungicide sprays is essential in regions where spring rains favor development of apple scab caused by the fungus *Venturia inaequalis*. Overly conservative spray programs can result in wasted fungicide applications and increased costs whereas leaving trees unprotected during a critical apple scab infection period can result in significant losses from development of scab lesions on fruit and/or development of primary scab lesions on leaves. When scab becomes established on new leaves in the spring, then more conservative fungicide protection programs may be required throughout the summer to pre-

> "Our comparisons of RIMpro and NEWA apple scab models indicated that RIMpro's model might provide opportunities for apple growers to reduce number of early season fungicide sprays, depending on the year. It seems that the RIMpro apple scab model incorporates valuable advances in describing *V. inaequalis* biology by increasing the accuracy for infection prediction early in the season and at the end of the season when ascospore inoculum is depleted from leaf litter. However, RIMpro will benefit only those growers willing to (1) learn how to use it, (2) check model outputs on a regular basis as they plan their fungicide spray applications, and (3) properly maintain their NEWA RainWise stations to ensure accurate weather data recording."

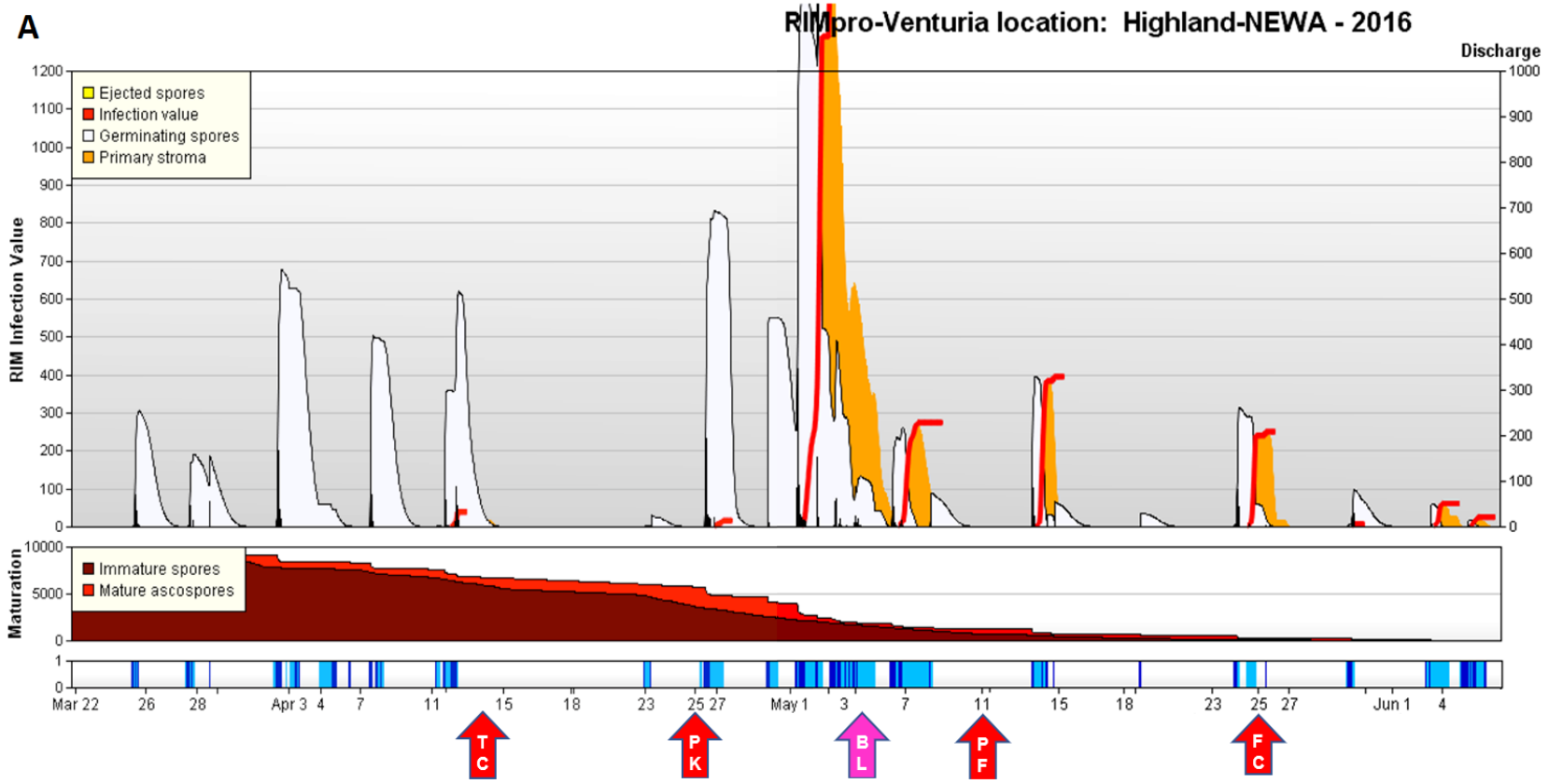
that apple trees reach the green-tip bud stage and that trees must therefore be protected from apple scab beginning at green tip. Relatively low rates of fungicide (e.g., 3 lb/A of mancozeb or 2 lb/A of captan-80) are usually considered sufficient for the first spray when relatively little inoculum in available. However, in some years, ascospore maturation is delayed compared to tree phenology, meaning that the first fungicide spray could be delayed for a week or more, whereas in other years ascospore maturity may be advanced compared to tree phenology, thereby creating a higher risk with the very first infection period.

In the Hudson Valley, Dr. David Rosenberger and his predecessors provided growers with information on apple scab ascospore maturity by having their technicians use overwintered leaves to conduct ascospore discharge tests and/or pseudothecial squash mounts that allowed assessment of spore maturity. These assessments provided information on the relative risks from early season wetting periods and an indication of when all ascospores had been discharged after bloom. However, these assessments required a skilled technician and a lot of time (at least three hours for each assessment), and their usefulness was limited by statistical uncertainties and by the fact that they were usually conducted using leaves from only one or two sites in the Hudson Valley. The fact that development and release of apple scab ascospores is entirely dependent on weather presents both a problem and an opportunity. The problem is that assessments of ascospore maturity in one location may not apply to locations a few or more miles away where rainfall and temperatures are slightly or significantly different. The opportunity involves linking

- **SAVINGS:**
- **You can omit 1-3 unnecessary fungicide sprays in 2017 & 2018**
- **1 or 2 additional sprays necessary to control scab before scab season end**
- **$310,000 – $930,000 for 12,375 acres in east NY**

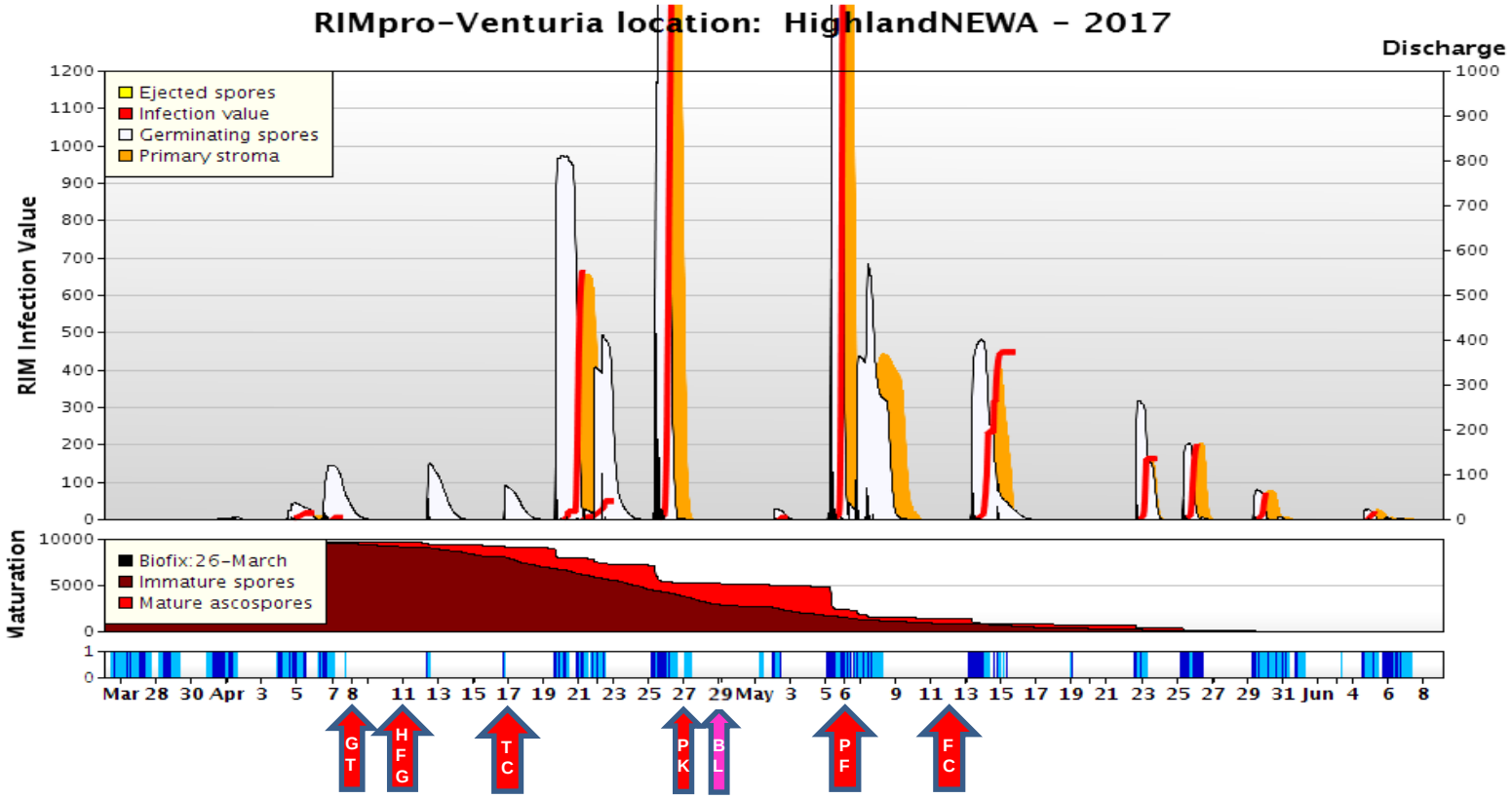
Year Differences in Scab Infections

- 2016 -



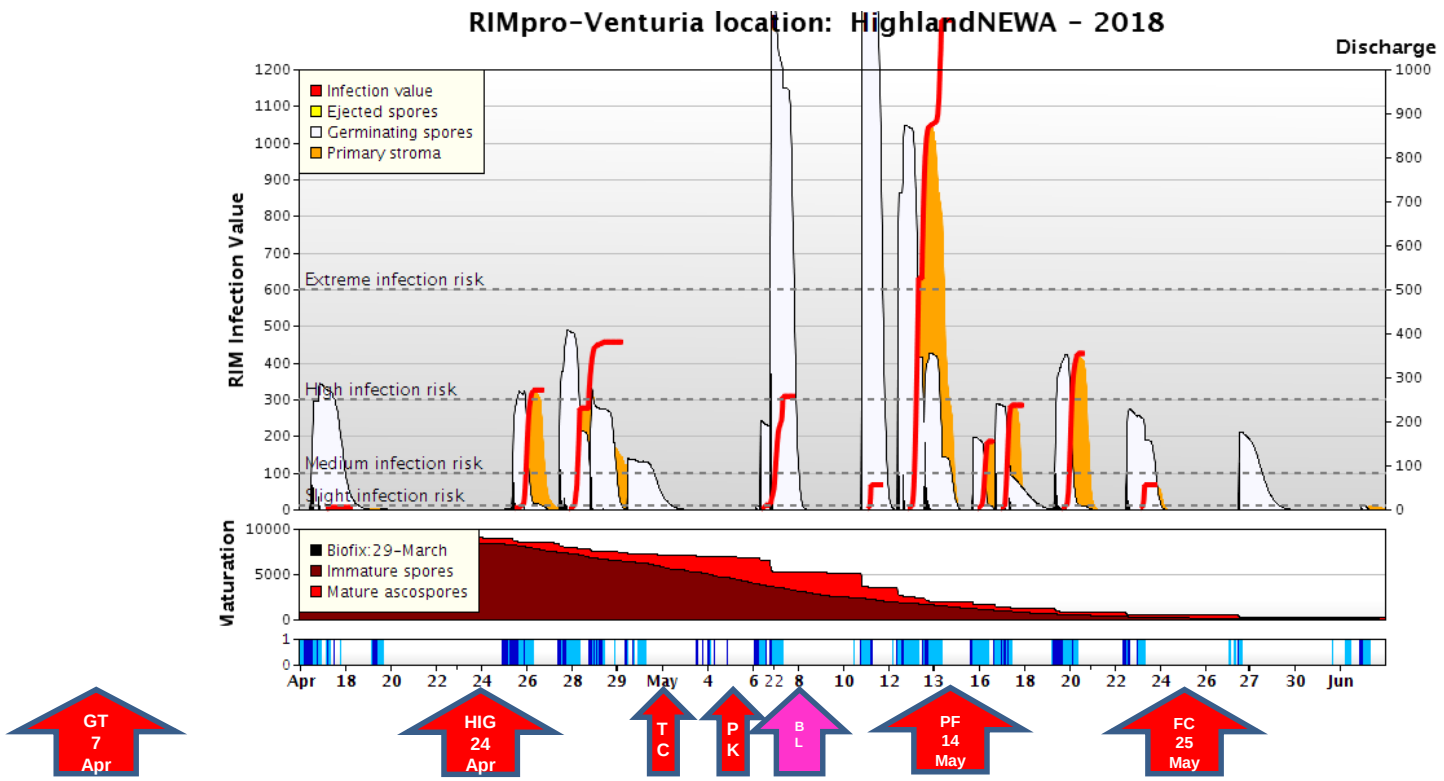
Year Differences

- 2017 -



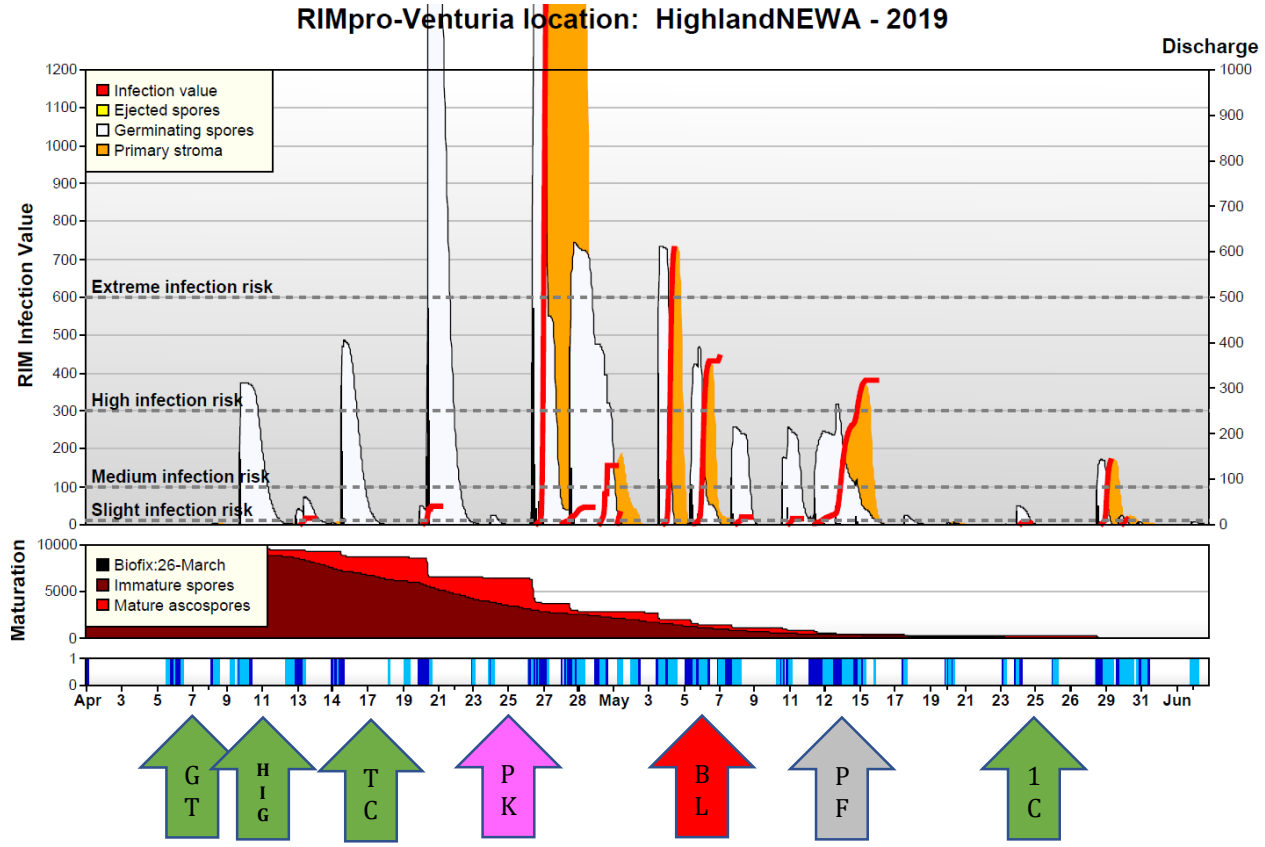
Year Differences

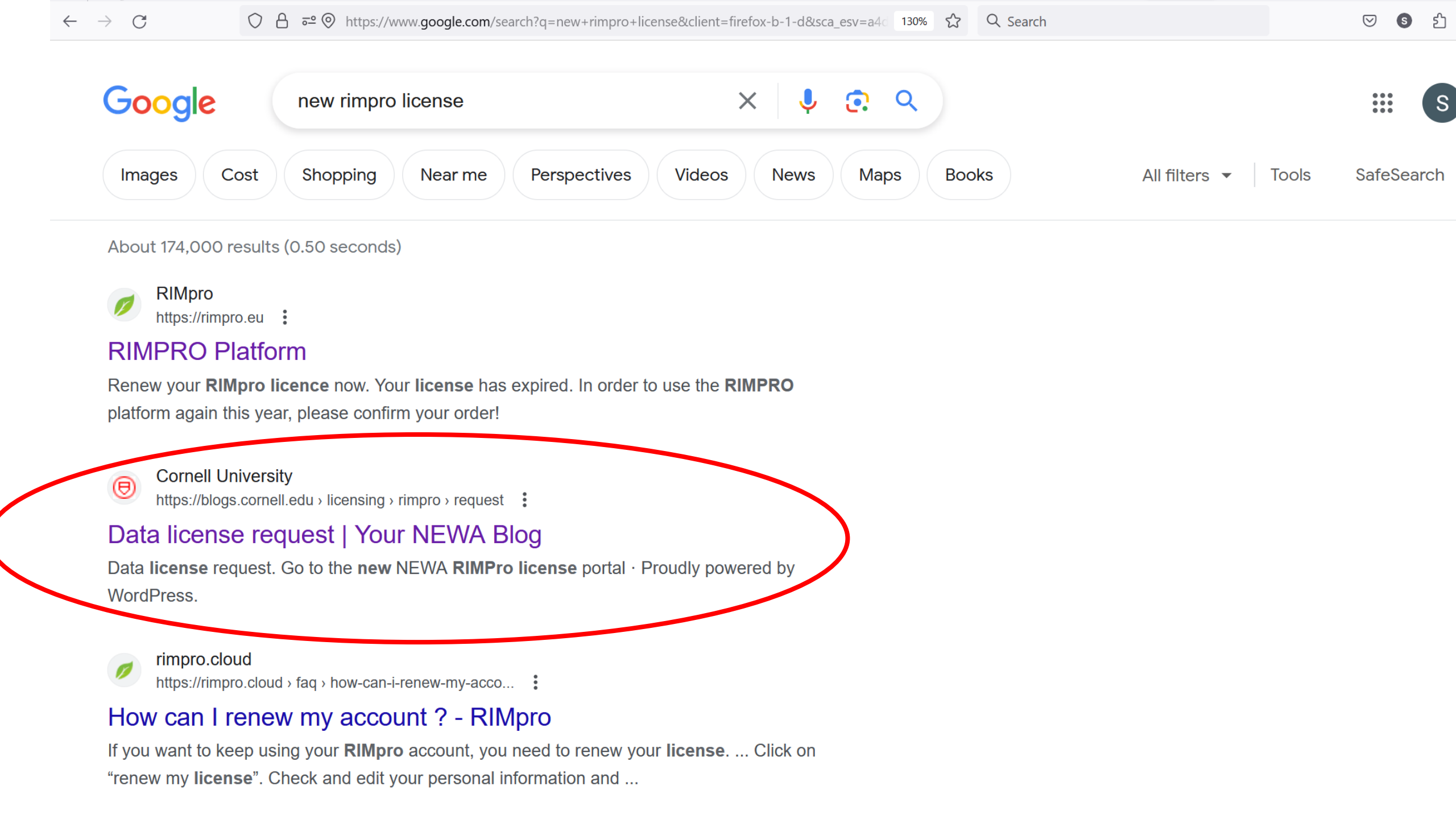
- 2018 -



Year Differences

- 2019 -

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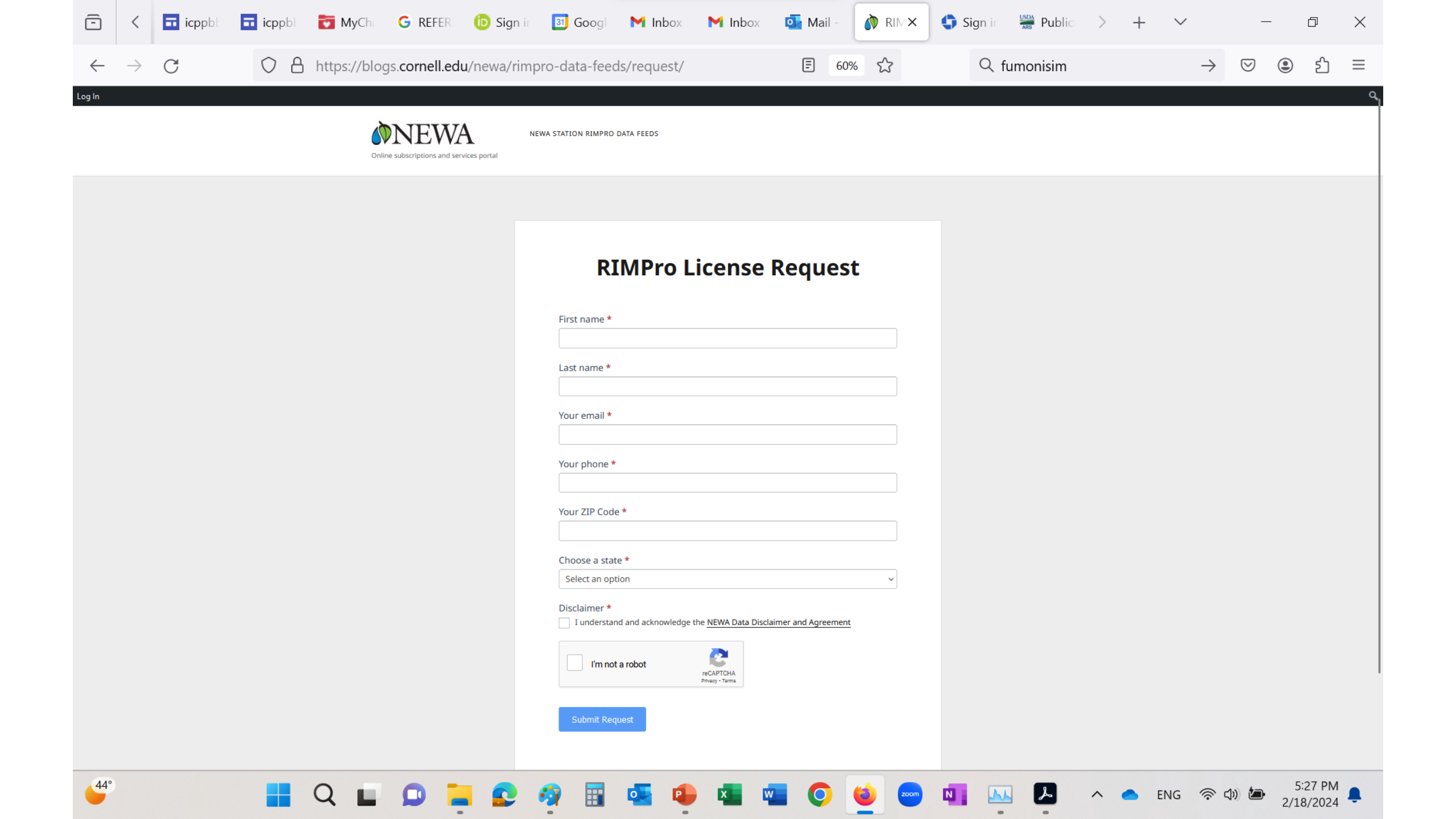
NEWA
Online subscriptions and services portal

NEWA STATION RIMPRO DATA FEEDS

NEWA Station RIMPro Data Feeds

NEWA station RIMPro data feeds are available for $60 per station per year. This fee covers the operational costs of this service which is provided as a courtesy to growers. Please contact support@rimpro.eu for all other questions about the RIMPro platform.

Continue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Choose a state *
Select an option
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https://rimpro.eu/protected/mainmenuPF6.xhtml

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Administration

Station

User Group: ENY Apple FARM

Your Location(s)

VT AREC GrapePath

Winchester AHS AREC (Parking)

General / overview

Orchard Outlook

Weather Data

Rain radar

Spray window

Meteogram Agro

Meteogram Climate

Virtual Leaf Wetness

Plant Stress

Winter Chilling

DD calculations

Tree fruit models

Apple Scab

Apple Powdery Mildew

Sooty Blotch

Fire Blight

Apple Canker

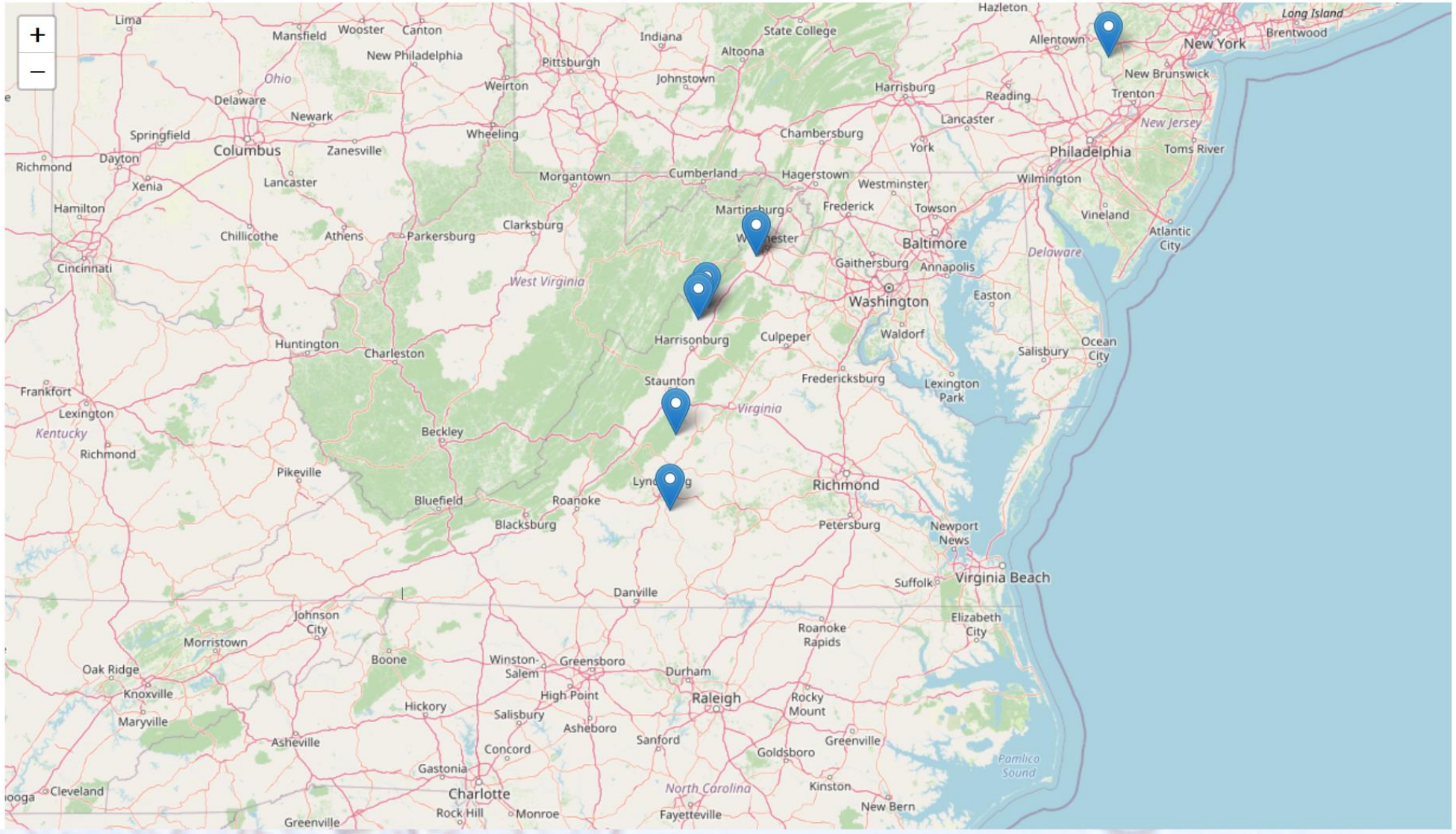
Marssonina coronaria

Pear Scab

Pear Brown Spot

Choose a Model : Apple Scab

RIMpro User Group: ENY Apple FARM Group member: Srdan Acimovic



SET BIOFIX: GREEN TIP OR/AND FIRST ASCOSPORE RELEASE

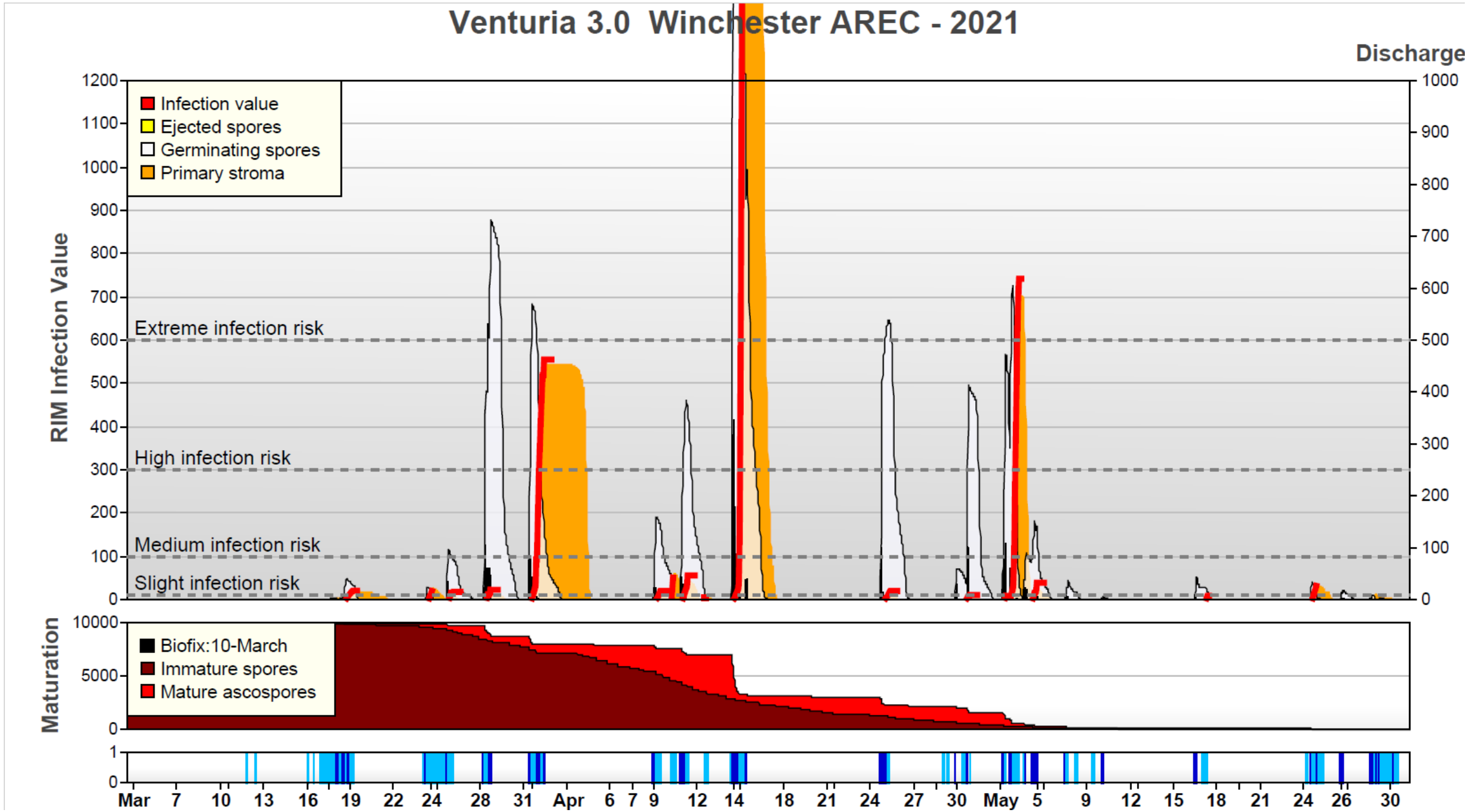
- BOTH ARE EQUALLY CORRECT

- Green tip is the apple growth stage when 50% of floral buds are with visible green tip

Demonstrate how model opens

Conditions for use are strict:

- You subscribe, you own access to the data but cannot share it beyond your subscription
- They can shut your data flow if you publicly share (they have done it)
- Srdjan Acimovic allowed to moderate a group
- I can help you learn interpret the model
- I can help you connect your station to RIMpro if you get NEWA RIMpro license


Venturia 3.0 Winchester AREC - 2021
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RIM Infection Value
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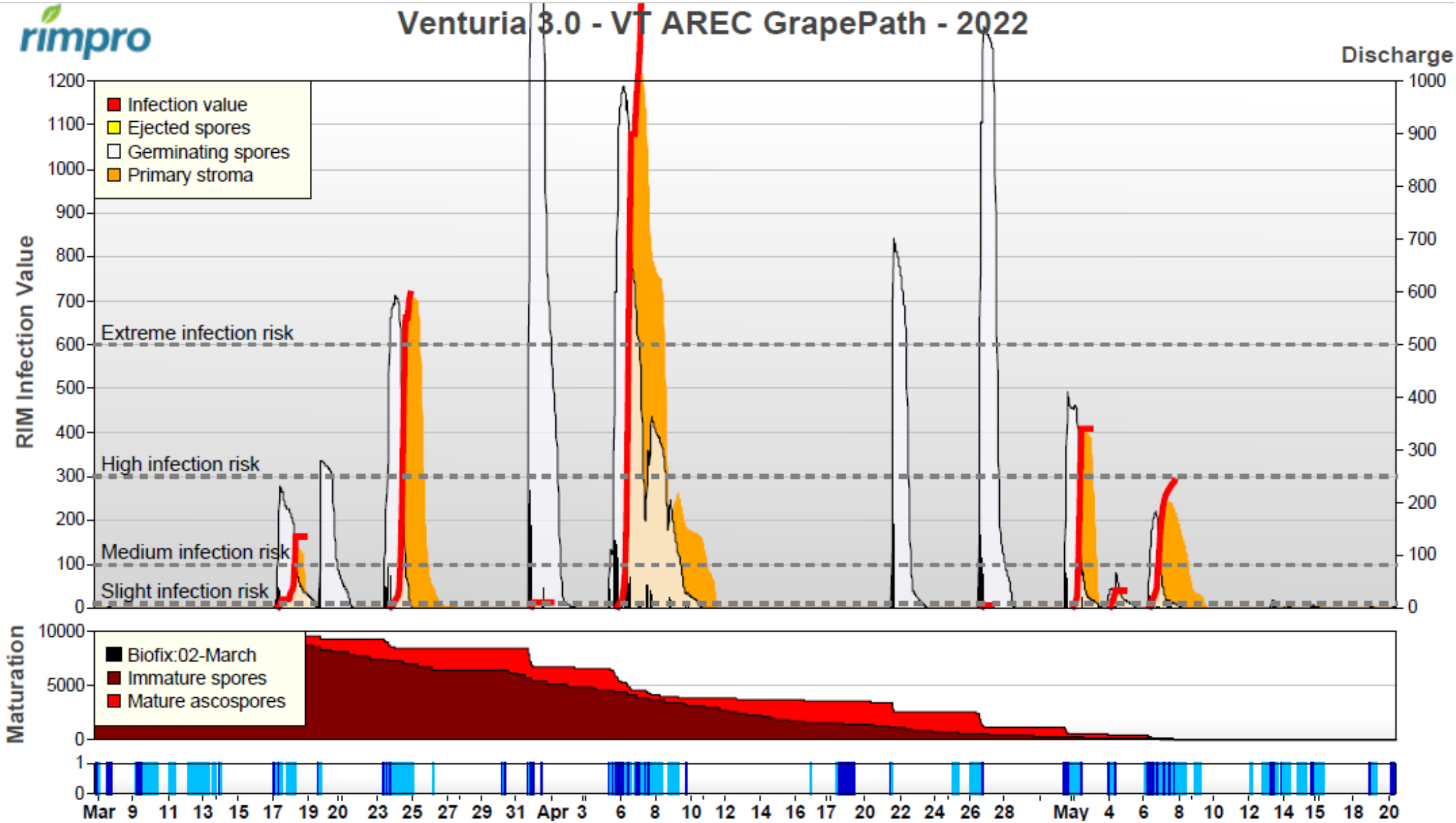
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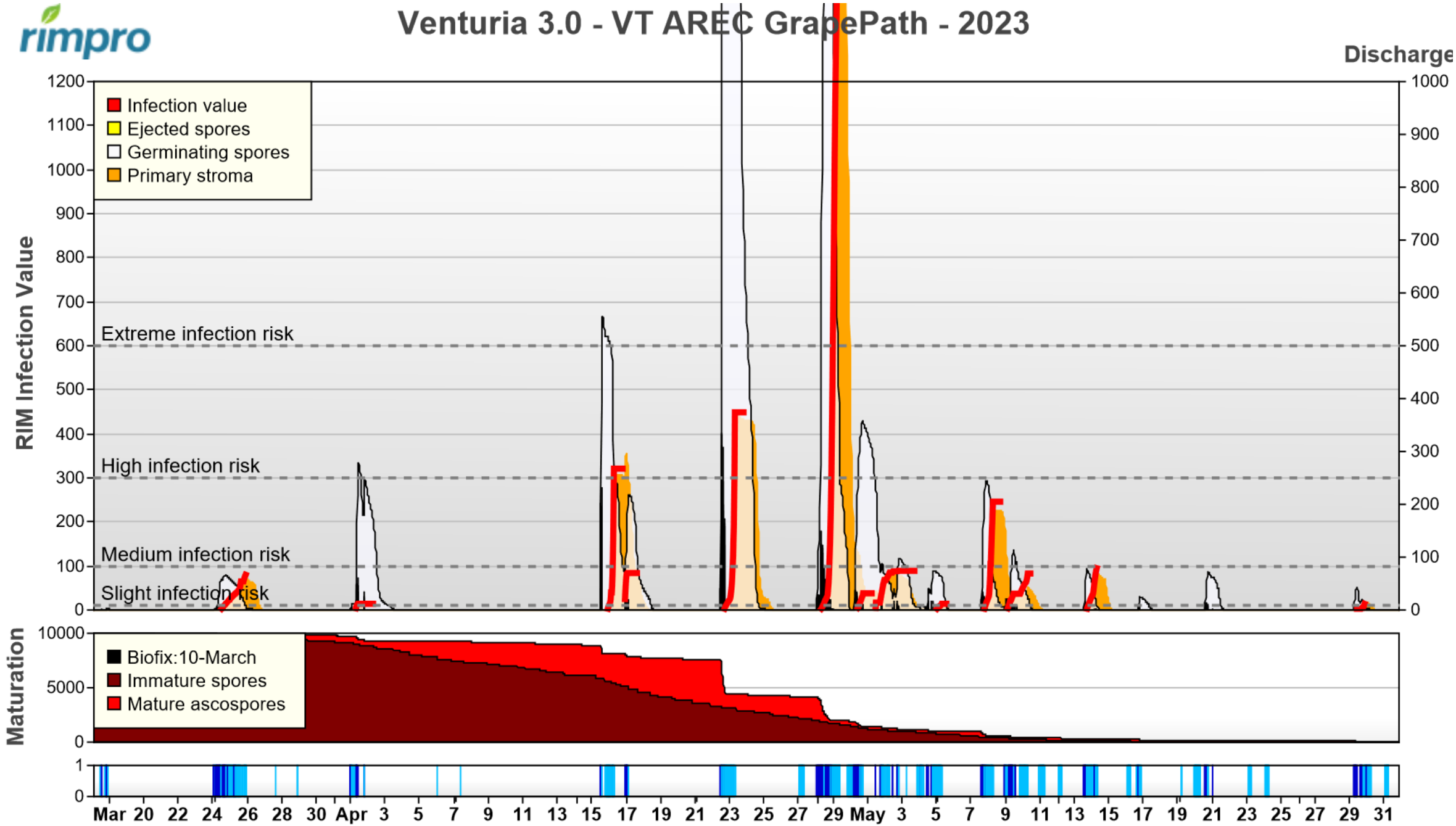
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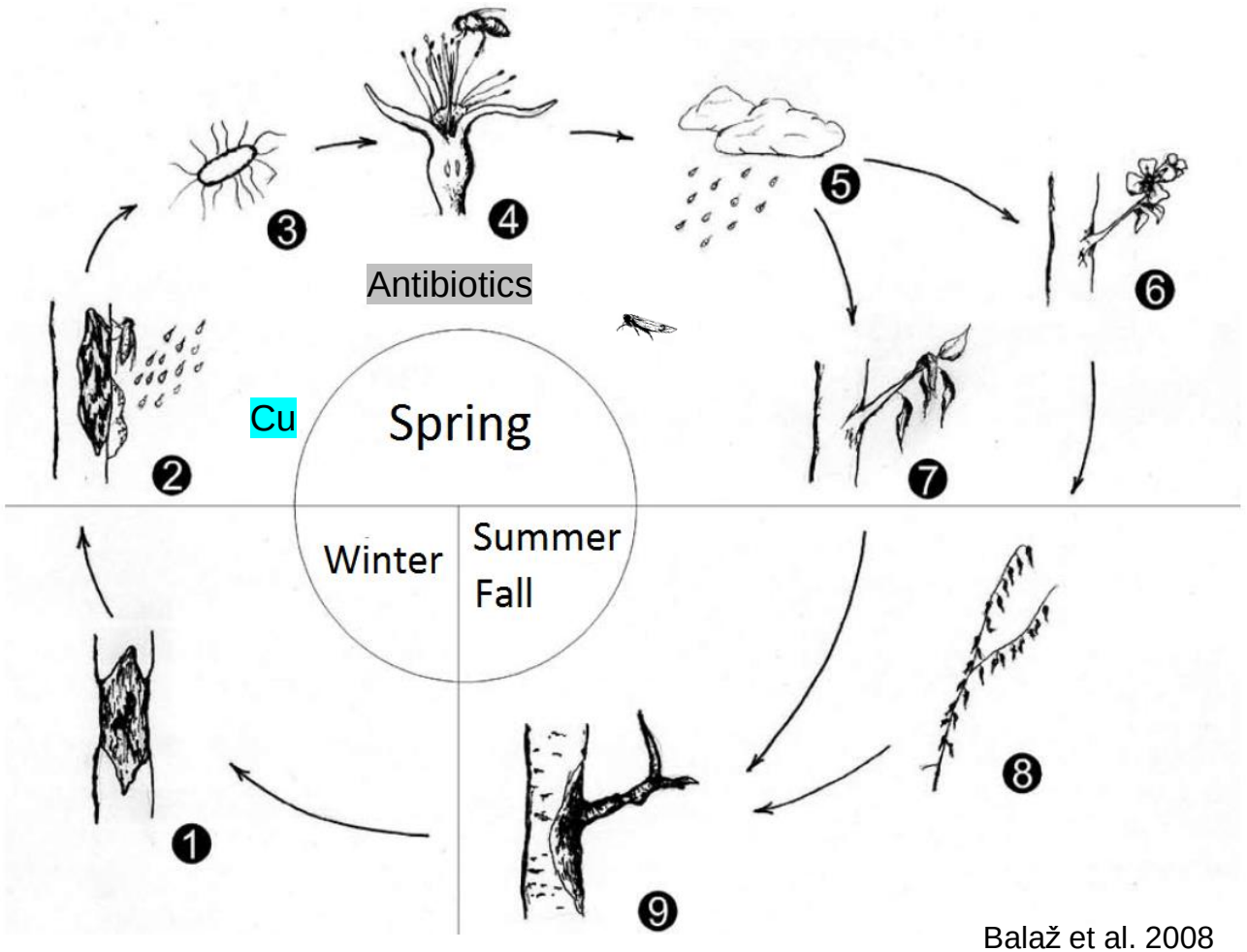
Erwinia amylovora Life Cycle



Balaž et al. 2008

Cankers Can Kill Spindle-shaped Apple Trees


cv. Ambrosia

NEWA Apple Disease Models

Select a disease:
Fire Blight

State:
Virginia

Weather station:
Winchester (VT AHS AREC)

Date of Interest:
04/27/2021

Calculate

Map | Results | More info

Fire Blight Risk Predictions for Winchester (VT AHS AREC)

Orchard Blight History: Fire blight occurred in your neighborhood last year.

Select the fire blight history in your orchard block of interest and the tool will calculate risk. Toggle orchard blight history to recalculate risk.

First blossom open date: 4/7/2021 Click if bloom has not occurred

The first blossom open date above is estimated based on degree day accumulations. Enter the actual first blossom open date for your orchard block of interest and the tool will calculate the protection period during bloom more accurately.

Accumulated degree days (base 43°F) through 4/27/2021: 574 (0 days missing)

	Past	Past	Current	Ensuing 5 Days				
Date	4/25	4/26	4/27	4/28	4/29	4/30	5/1	5/2
Cougarblight 4-Day DH	Low 0	Low 36	High 358	Extreme 776	Extreme 1093	Extreme 1080	Extreme 797	Extreme 685
Infection Potential EIP value	Moderate 0	Moderate 7	High 116	High 242	Infection 326	High 210	Moderate 64	High 157
Wetness Events								
Rain Amount	0.39	0.00	0.00	0.00	0.04	0.20	0.00	0.00
Dew ?	Yes	No	No	No	No	No	No	No
Leaf Wetness (hours)	9	0	0	0	11	4	0	0
Hours >90% RH	9	0	0	0	0	0	0	0
RH max/min	98/52	77/26	77/27	73/39	81/49	81/33	50/21	53/27
Temp avg F	52	54	66	74	72	56	56	68

NA - data not available

View Cougarblight Charts

Download Time: 5/3/2021 23:00

Second Infection Period application 5/3-5

Select a disease: Fire Blight

State: Virginia

Weather station: Winchester (VT AHS AREC)

Date of Interest: 05/02/2021

Calculate

Map | Results | More info

Fire Blight Risk Predictions for Winchester (VT AHS AREC)

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First blossom open date: 4/7/2021 Click if bloom has not occurred

The first blossom open date above is estimated based on degree day accumulations. Enter the actual first blossom open date for your orchard block of interest and the tool will calculate the protection period during bloom more accurately.

Accumulated degree days (base 43°F) through 5/2/2021: 687 (0 days missing)

	Past	Past	Current	Ensuing 5 Days				
Date	4/30	5/1	5/2	5/3	5/4	5/5	5/6	5/7
Cougarblight 4-Day DH	Extreme 1080	Extreme 797	Extreme 685	Extreme 524	Extreme 716	Extreme 763	High 459	High 303
Infection Potential EIP value	High 210	Moderate 64	High 157	Infection 139	Infection 188	Infection 102	Moderate 43	Moderate 22
Wetness Events								
Rain Amount	0.20	0.00	0.00	0.35	0.10	0.28	0.00	0.03
Dew	No	No	No	Yes	Yes	Yes	No	No
Leaf Wetness (hours)	4	0	0	14	12	7	0	5
Hours >90% RH	0	0	0	7	12	10	0	0
RH max/min	81/33	50/21	53/27	96/42	98/60	98/59	66/38	85/57
Temp avg F	56	56	68	65	70	63	54	50

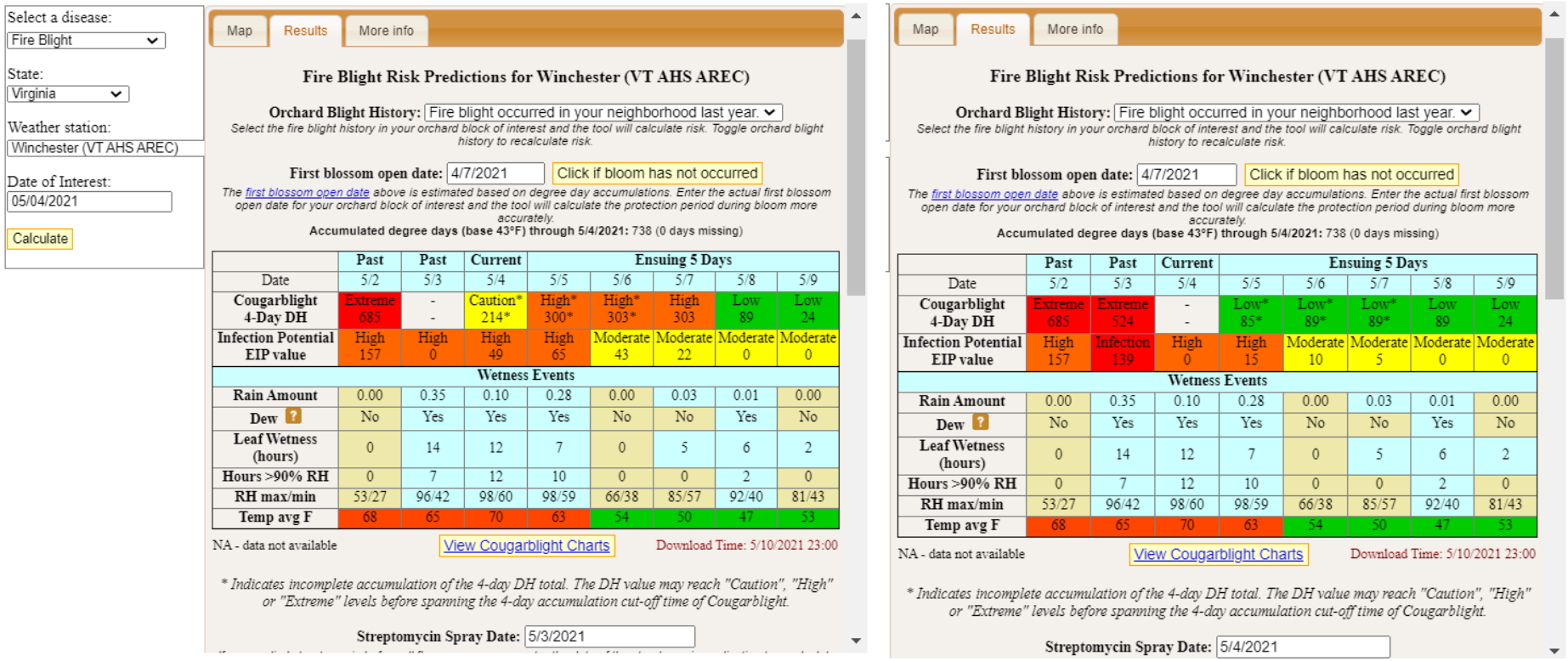
NA - data not available View Cougarblight Charts Download Time: 5/8/2021 23:00

1. **Open flowers**
2. **Accumulate heat units in bloom for inoculum to reach threshold**
3. **Wetting event after this point to wash bacteria flower down in flower (spray water)**
4. **Average temperature above 60F.**

- **EIP (Epiphytic Infection Potential) - index for infection risk for enough heat**
- **Threshold for infection is EIP ≥ 100**

Streptomycin application 5/3

Streptomycin application 5/3 vs. 5/4



Select a disease: Fire Blight

State: Virginia

Weather station: Winchester (VT AHS AREC)

Date of Interest: 05/04/2021

Calculate

Map | Results | More info

Fire Blight Risk Predictions for Winchester (VT AHS AREC)

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Accumulated degree days (base 43°F) through 5/4/2021: 738 (0 days missing)

	Past	Past	Current	Ensuing 5 Days				
Date	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9
Cougarblight 4-Day DH	Extreme 685	- -	Caution* 214*	High* 300*	High* 303*	High 303	Low 89	Low 24
Infection Potential EIP value	High 157	High 0	High 49	High 65	Moderate 43	Moderate 22	Moderate 0	Moderate 0
Wetness Events								
Rain Amount	0.00	0.35	0.10	0.28	0.00	0.03	0.01	0.00
Dew	No	Yes	Yes	Yes	No	No	Yes	No
Leaf Wetness (hours)	0	14	12	7	0	5	6	2
Hours >90% RH	0	7	12	10	0	0	2	0
RH max/min	53/27	96/42	98/60	98/59	66/38	85/57	92/40	81/43
Temp avg F	68	65	70	63	54	50	47	53

NA - data not available View Cougarblight Charts Download Time: 5/10/2021 23:00

** Indicates incomplete accumulation of the 4-day DH total. The DH value may reach "Caution", "High" or "Extreme" levels before spanning the 4-day accumulation cut-off time of Cougarblight.*

Streptomycin Spray Date: 5/3/2021

Map | Results | More info

Fire Blight Risk Predictions for Winchester (VT AHS AREC)

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Select the fire blight history in your orchard block of interest and the tool will calculate risk. Toggle orchard blight history to recalculate risk.

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Accumulated degree days (base 43°F) through 5/4/2021: 738 (0 days missing)

	Past	Past	Current	Ensuing 5 Days				
Date	5/2	5/3	5/4	5/5	5/6	5/7	5/8	5/9
Cougarblight 4-Day DH	Extreme 685	Extreme 524	- -	Low* 85*	Low* 89*	Low* 89*	Low 89	Low 24
Infection Potential EIP value	High 157	Infection 139	High 0	High 15	Moderate 10	Moderate 5	Moderate 0	Moderate 0
Wetness Events								
Rain Amount	0.00	0.35	0.10	0.28	0.00	0.03	0.01	0.00
Dew	No	Yes	Yes	Yes	No	No	Yes	No
Leaf Wetness (hours)	0	14	12	7	0	5	6	2
Hours >90% RH	0	7	12	10	0	0	2	0
RH max/min	53/27	96/42	98/60	98/59	66/38	85/57	92/40	81/43
Temp avg F	68	65	70	63	54	50	47	53

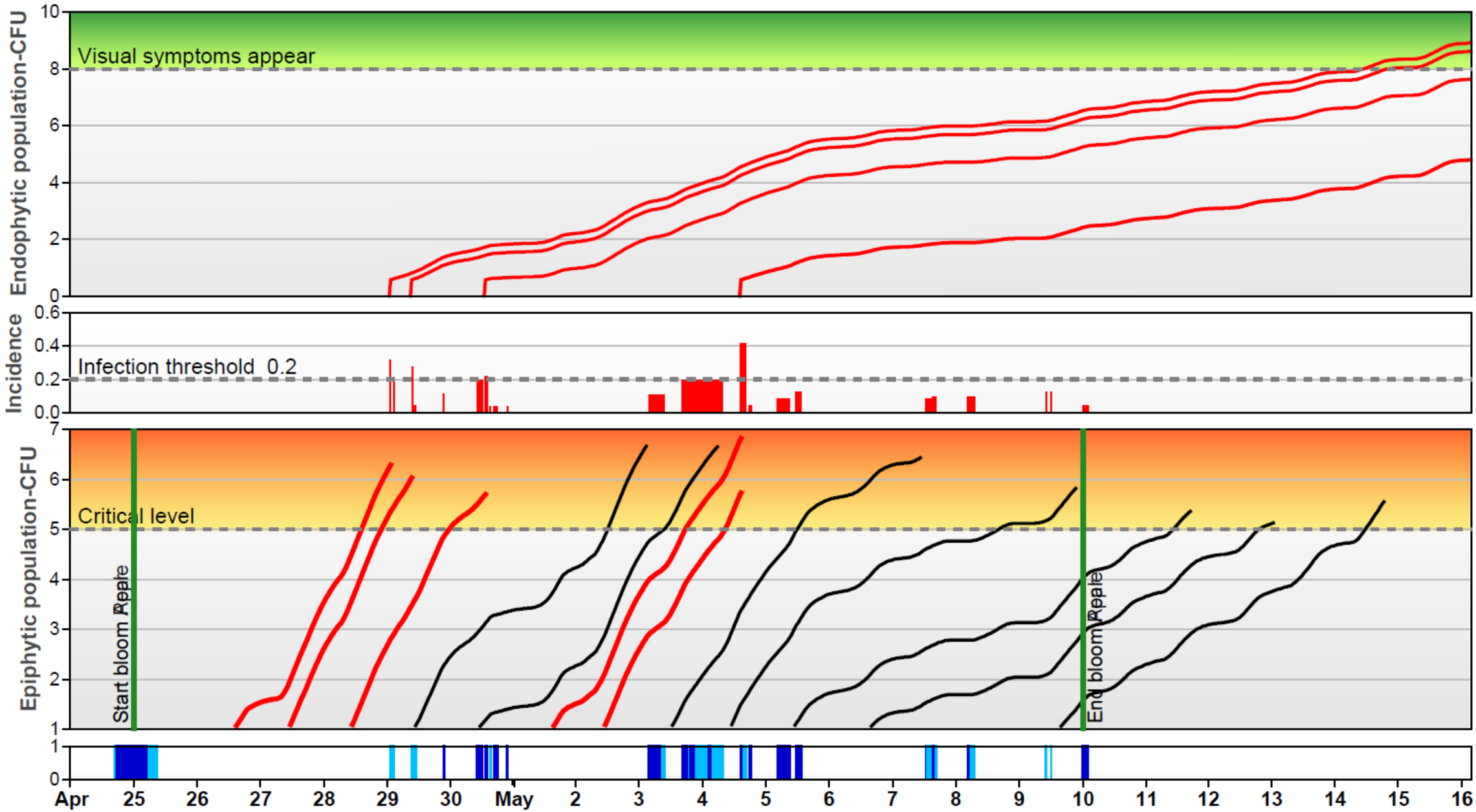
NA - data not available View Cougarblight Charts Download Time: 5/10/2021 23:00

** Indicates incomplete accumulation of the 4-day DH total. The DH value may reach "Caution", "High" or "Extreme" levels before spanning the 4-day accumulation cut-off time of Cougarblight.*

Streptomycin Spray Date: 5/4/2021

RIMpro-Erwinia location Winchester AREC - 2021

Indicated potential infection events only relevant for trees in bloom.



RIMpro Fire Blight graph interpreter: Blossom blight infections are predicted to occur when the red bars in the center graph go through the dashed line indicating an infection threshold of 0.2.

- Upper graph red curved line indicates incubation of the infections and the time needed for visual symptoms to occur (blossom blight).

- Black lines i.e. threads start at 59°F (15°C) when bees become active.

- Black/Red curved lines at the bottom graph show how bacterial populations grow on flowers: Any wetting that occurs after these line/s reach the orange area can trigger an infection.

RIMpro Fire Blight graph interpreter:

- Each black thread that starts from the bottom of the graph represents a new batch of flowers that open and are carrying bacteria.

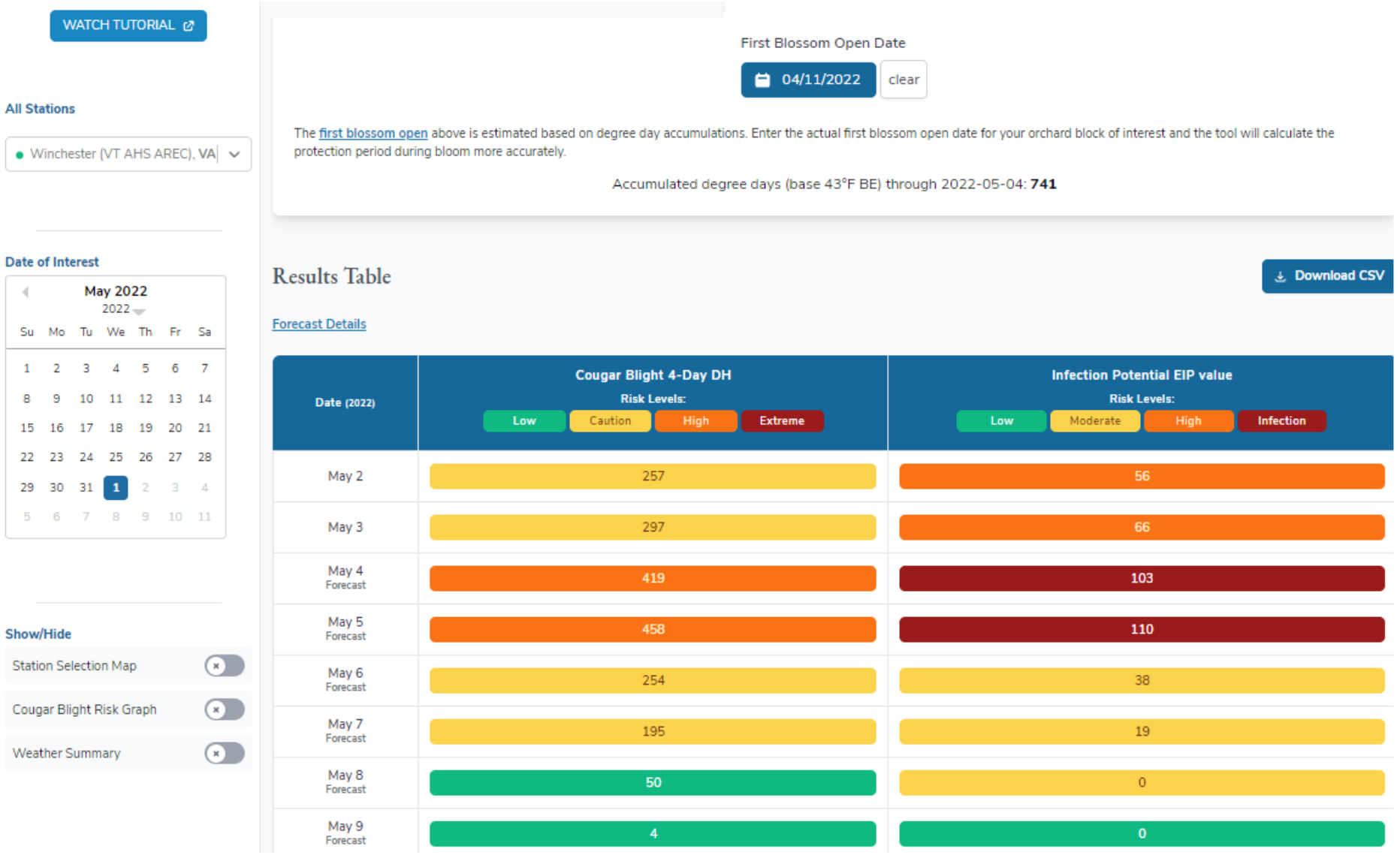
- When the bacterial population is high enough to cause infection, the black thread enters the yellow-orange area and will cause infection if it rains before those flower age out.

- When one applies streptomycin, then all of the flowers represented by different black threads that would be intersected by a spray on that date will be protected

- But threads not yet initiated at the time of the spray will be new flowers opening that are not protected by the spray.

Fire Blight Predictions (MaryBlyt)

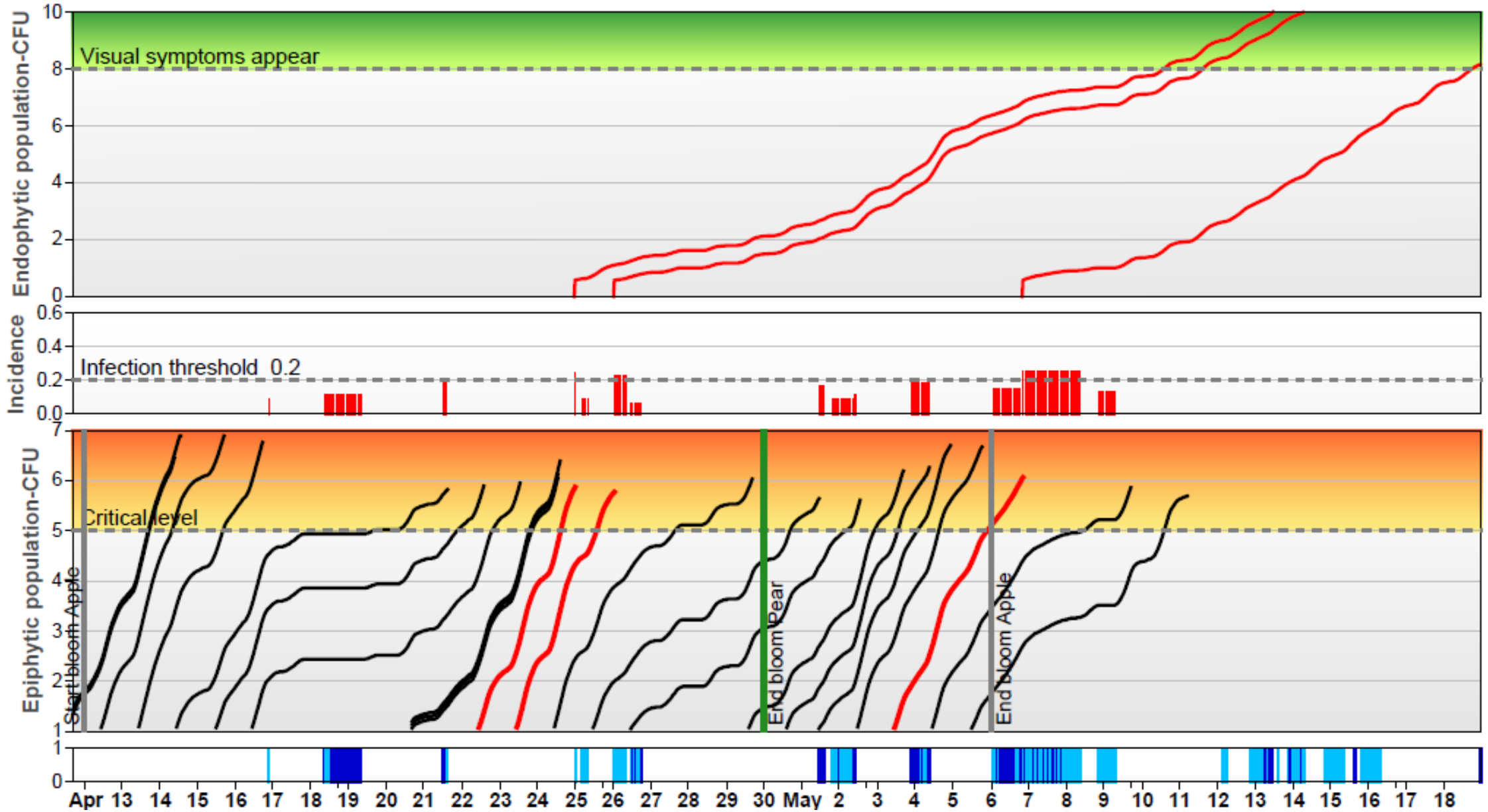
- Model, Flowers Still Open -



Date (2022)	Cougar Blight 4-Day DH Risk Levels: Low / Caution / High / Extreme	Infection Potential EIP value Risk Levels: Low / Moderate / High / Infection
May 2	257	56
May 3	297	66
May 4 Forecast	419	103
May 5 Forecast	458	110
May 6 Forecast	254	38
May 7 Forecast	195	19
May 8 Forecast	50	0
May 9 Forecast	4	0

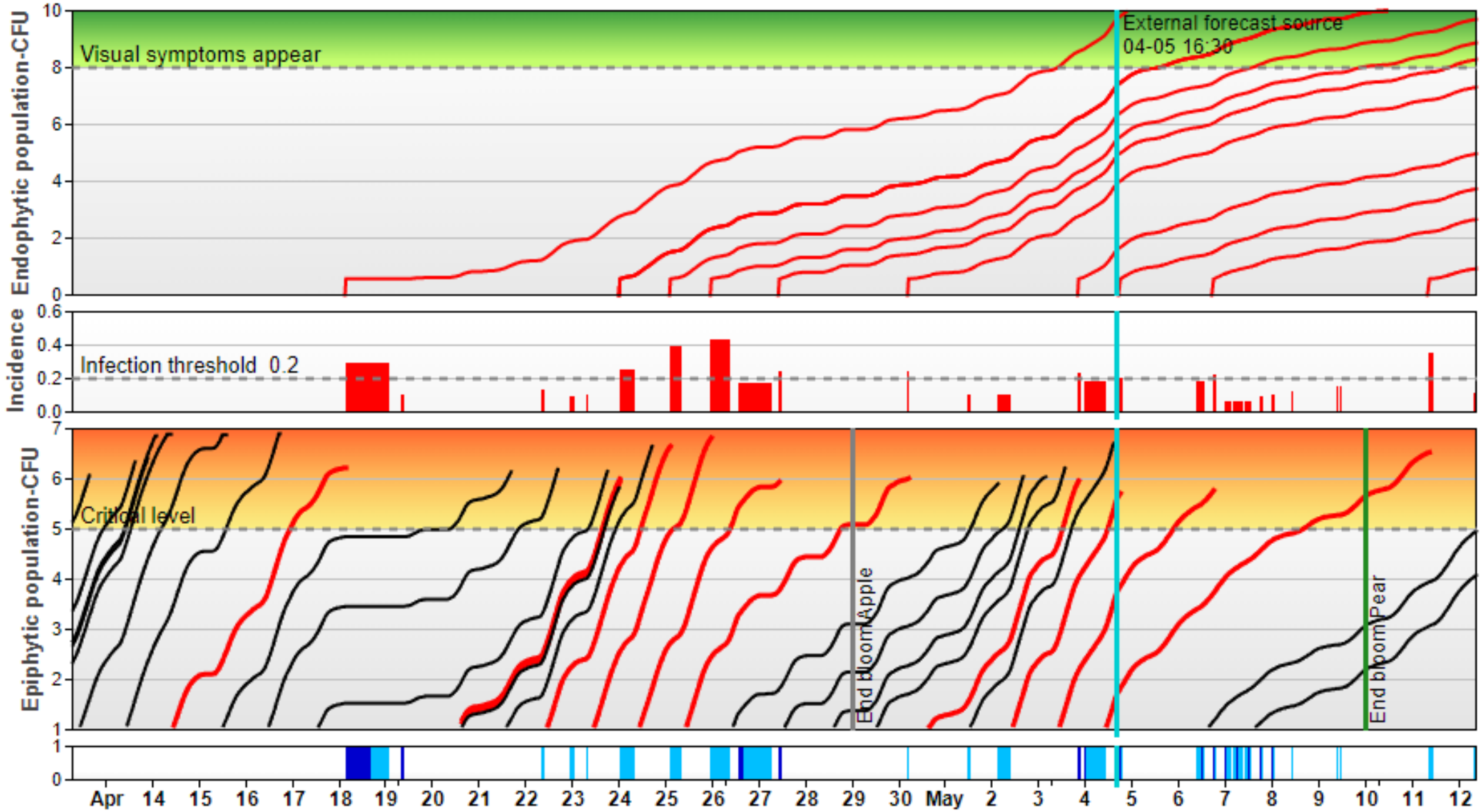
Fire Blight (Erwinia) - VT AREC GrapePath - 2022

Indicated potential infection events only relevant for trees in bloom.



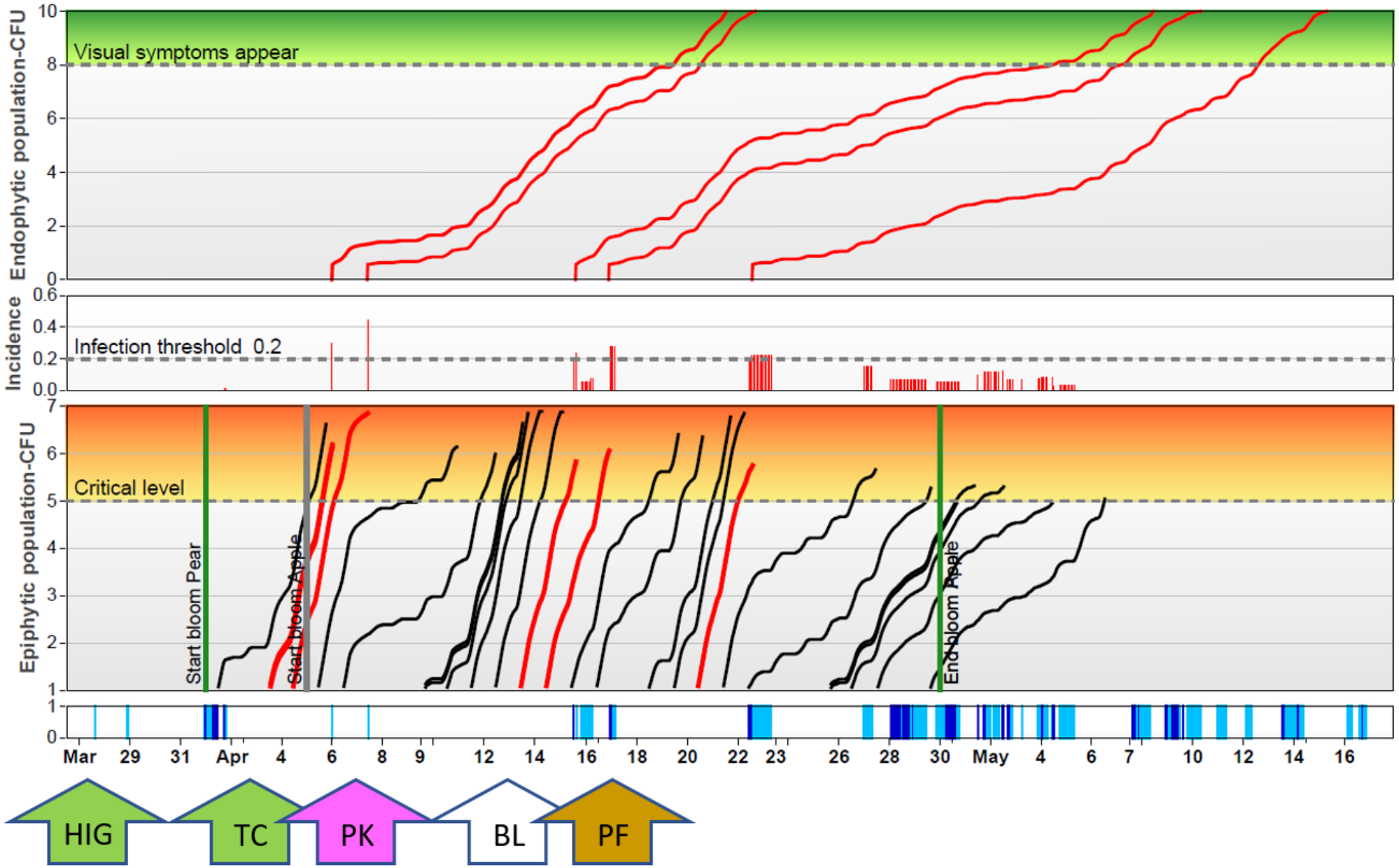
Fire Blight (Erwinia) - Rustburg (Bryant) - 2022

Indicated potential infection events only relevant for trees in bloom.



Fire Blight (Erwinia) - VT AREC GrapePath - 2023

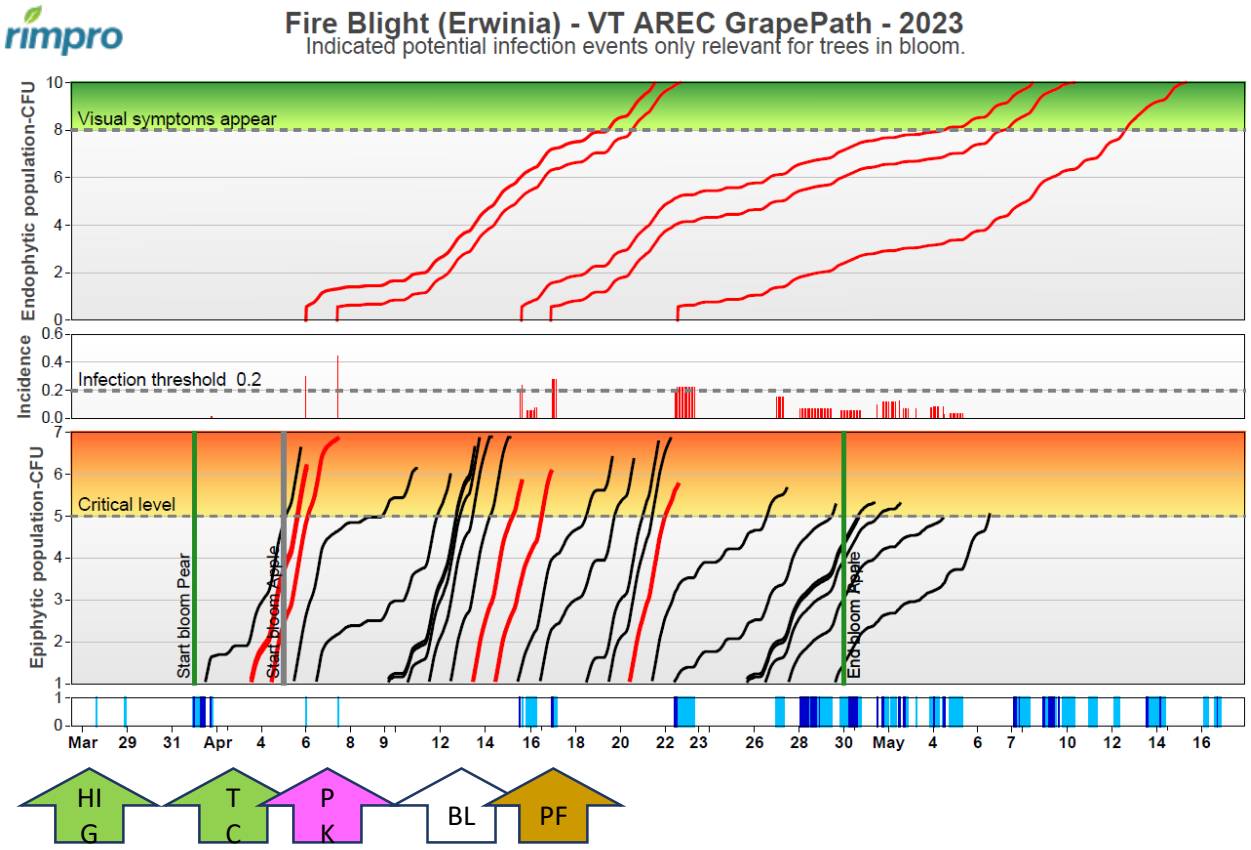
Indicated potential infection events only relevant for trees in bloom.



- Slide purposely left blank due to unpublished data

3. USDA CPPM: Inoculation and Conditions

- Fuji, Ea110 Rif+, 4/14/2023, 90% King bloom 1.51 × 10^7 CFU -



VIRGINIA TECH™

MaryBlyt agreed with RIMpro

Date (2023)	Infection Potential EIP value Risk Levels: Low / Moderate / High / Infection
April 12	124
April 13	222
April 14	299
April 15	283
April 16	271
April 17	115
April 18	67
April 19	109

- Slide purposely left blank due to unpublished data

Fire Blight Management - Pruning & Sprays

- Late Spring & Early Summer -

If model predicted infection: Scout 3 times per week for symptoms

~ 90-100 DD (base 55˚ F) after infection event

(rain during bloom or summer hailstorm)

- Low number of clusters/ strikes (5-15)
- **Prune out rapidly, sanitize tools?**
- 18-24” below visible symptom edge
- Or to older wood (12”)
- **Prevent further spread**
- Drop cuttings in the middle, let it dry, chop with flail-mower, or remove
- **Spray copper, Apogee**
- If done early – effective
- Scout and cut on a cool dry day

- High number of clusters/ strikes (25-30)
- **Spray Apogee high rate, copper with 1-3lbs/A of hydrated lime**
- Slow migration of bacteria to the larger limbs
- Prevent further spread
- **Severe pruning on a cool dry day**
- Every day/hour delay in spray allows FB spread
- Pruning promotes shoot growth – more infections
- Scout every week and cut

Management Strategy – Prevent Secondary Infections
- Mid Summer -

Do not use streptomycin

Fact: Bacteria inside flowers, shoots, wood, fruit

Goal: Prevent/ Reduce inoculum spread

- Copper before/ after pruning – lower doses, cultivar dependent
  - Limit spread to shoots
  - Cuprofix, Badge SC or X2 (16 fl oz)/ Kocide (CAUTION: Russeting)
  - Bordeaux Mixture
- Apogee: 6-12 oz/100 gal; 3-6 oz for trees <5 years
  - **1-3 inch shoot growth (late bloom)**
  - **14-21 days later**
  - Stunt current growth
  - Stop new growth
  - Limit new infections
  - Bridge to terminal bud set

Management Strategy – Continued Pruning and Sprays

- Late Summer -

- **Scout once every week and cut**
- **Terminal bud set is variable**
- **Pruning can promote new shoot growth**
- Apply copper before/after pruning
- **New shoot growth needs to be covered**
- **7-10 day interval – use low doses until terminal bud set**
- **Avoid slow drying (fruit russet)**
- **Hand thin on a cool dry day, then apply copper**

Management Strategy
- Young Trees and Suckers -

- **Later bloom**
- **Prone to lingering bloom**
- **Apply Actigard label rate, spray bottle**
- **Prune ASAP and if possible on a cool dry day**
- **No pruning in rain**
- **If 12” is into leader – remove & replant**
- **If early control effective - suckers should not be infected**
- **Avoid planting M.26 and M.9**
- **Avoid excessive nitrogen fertilization**
- **Minimize/ avoid irrigation**
- **Sanitize tools when removing suckers**
- Apogee effect on suckers – no data

Photo by Balaz J.

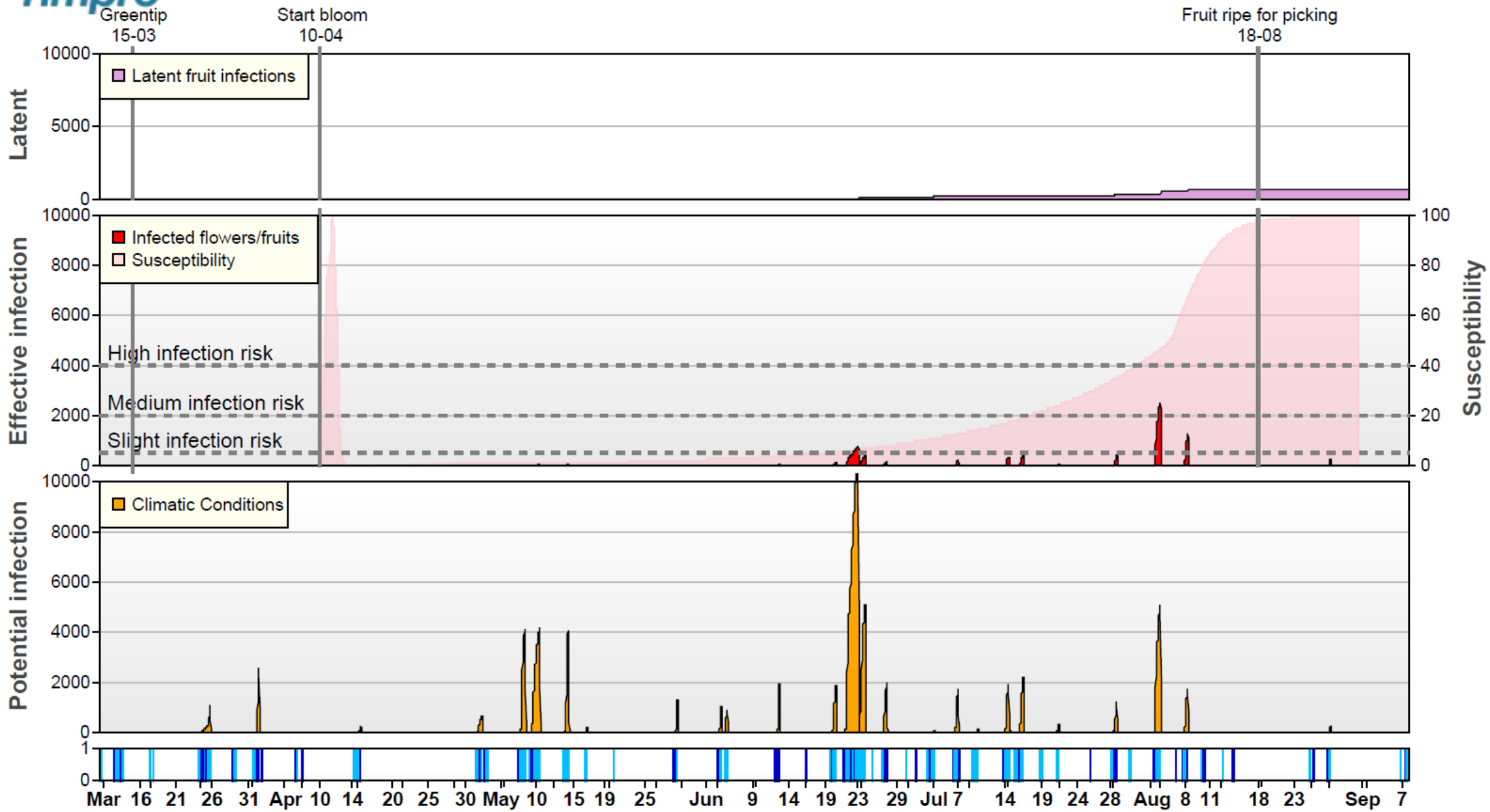
Hail
- Late Summer -

- No wounds on leaves - cause enough fruit injury for infection
- Blight is in the region
- Copper does not penetrate
- **Any hail, gusts, or T-storm (up to 24h):**
  You must spray STREPTOMYCIN: FireWall 50WP (10 oz) of 17 (24 oz) + Regulaid

  APPLE: Do not apply within 50 days of harvest.

  PEAR: Do not apply within 30 days of harvest.

Monilinia - Quicksburg - 2023



Peach program by Bill Mackintosh

Ziram - e-mail

If leaf curl hasn't been a problem in the past use copper in the fall.
If leaf curl has been a problem I will use ziram late fall or early spring, before bud swell.

petal fall	initiate	3 pints	scab
shuck s.	Rhyme	7 oz.	rusty spot
	permethrin	10 oz.	this is the best for the $$$
	wrangler	3.2 oz.	
1st,2nd covers	microthiol sulfur	10 lbs.	
	Rhyme	7 oz.	only if rusty spot is a concern
	Or		
	Captan 4L	4 pints	
	Topsin	16 oz.	
	+		
	assail	5 oz.	7-day PHI
	endigo	6 oz	19 oz/ac/season, 14dayPHI
3rd,4th covers	microthiol sulfur	10 lbs.	
	Or		
	Captan 4L	4 pints	
	Topsin L	16 oz.	
	+		
	baythroid/tombstone	2.8 oz	7 day PHI
	wrangler	3.2 oz	0 day PHI will help on scale

Peach pre-harvest
- As per Bill Mackintosh -

final sprays- alternate Merivon with Indar beginning 3 weeks before harvest

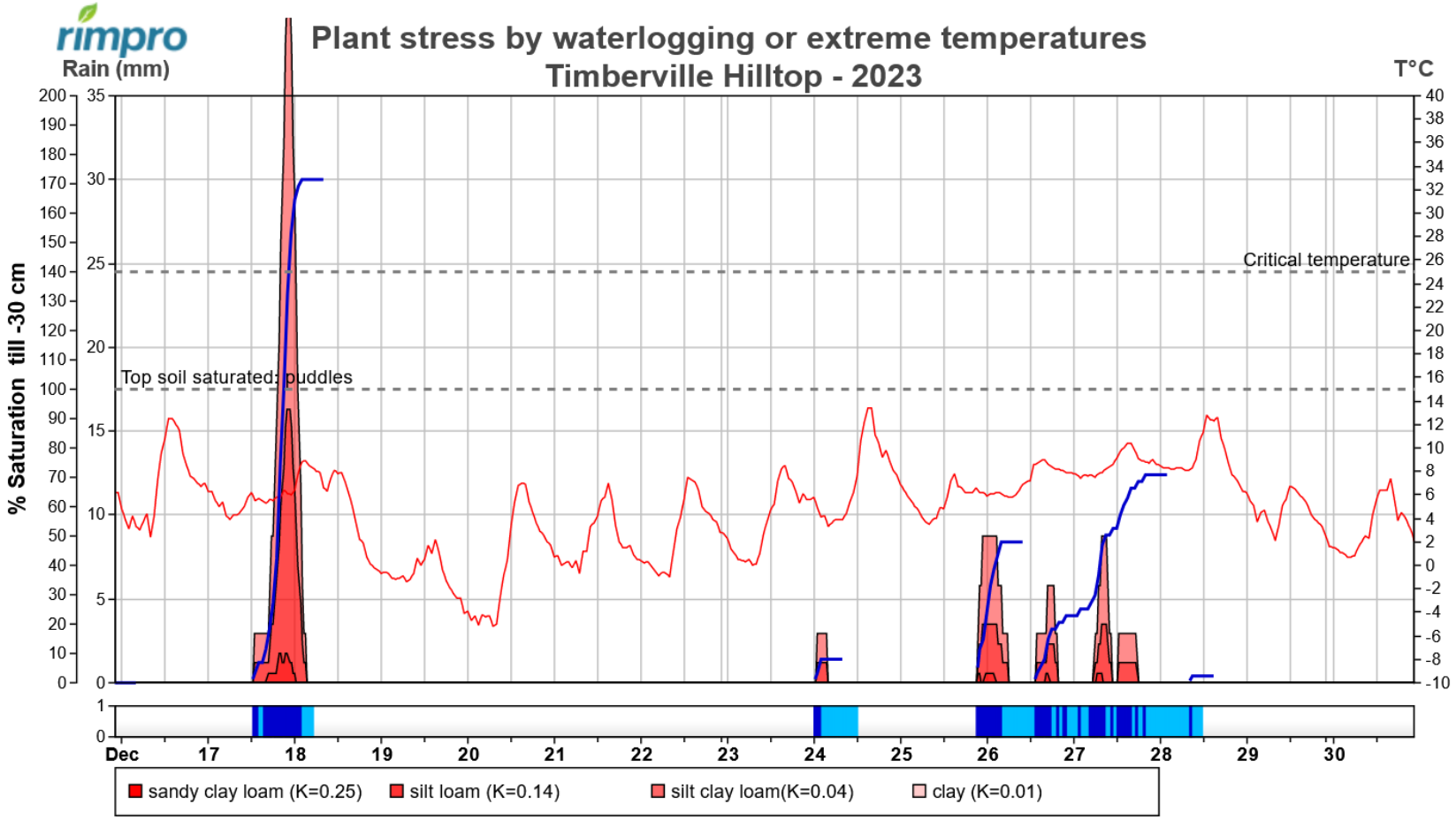
merivon	5 oz	0-day PHI	
Or			
indar	6 oz. ?	0-day PHI	8oz rate not labeled in VA
+ 1 of the following insecticides			
danitol	16 oz	3 day PHI	
permethrin	8 oz	14 day PHI	
mustang max	4 oz.	14 day PHI	
endigo	6 oz.	14 day PHI	
delegate	5.3 oz.	7 day PHI	
bathroid/Tombstone	2.8 oz.	7 day PHI	
pyganic 5%	15.6 oz.	12 hour PHI	

Station
User Group: ENY Apple FARM
Your Location(s)
VT AREC GrapePath
Winchester AHS AREC (Parking)

General / overview
Orchard Outlook
Weather Data
Rain radar
Spray window
Meteogram Agro
Meteogram Climate
Virtual Leaf Wetness
Plant Stress
Winter Chilling
DD calculations

Tree fruit models
Apple Scab
Apple Powdery Mildew
Sooty Blotch
Fire Blight
Apple Canker
Marssonina coronaria

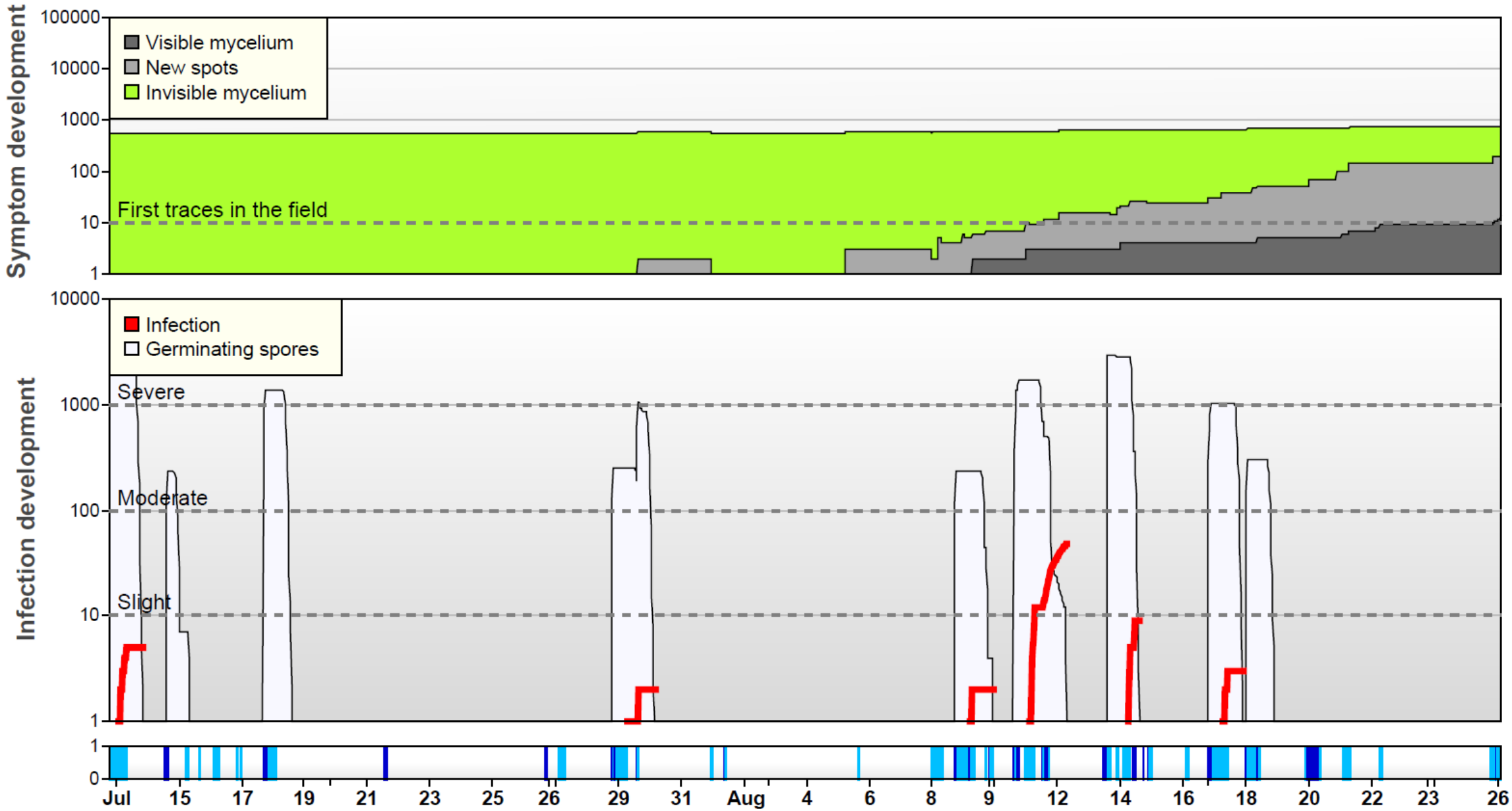
Plant Stress | Info



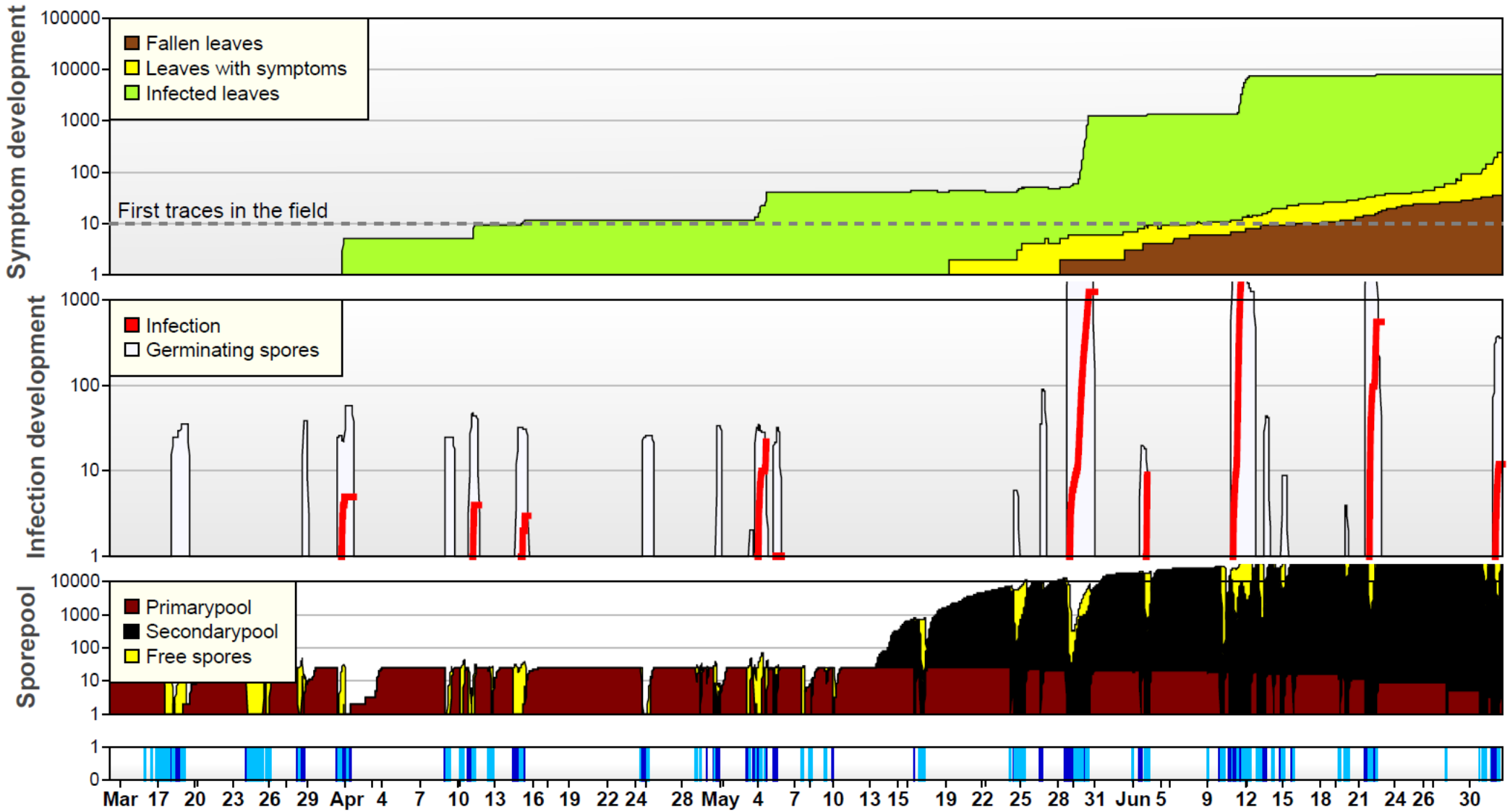
Mouse action: Drag graph with mouse to Scroll | Click in graph to Zoom In | Click in graph to Zoom Out

Entire year | Period: 01-01-2023 - 30-12-2023 | Plantstress Table

RIMpro-Sooty Blotch Winchester AREC - 2021

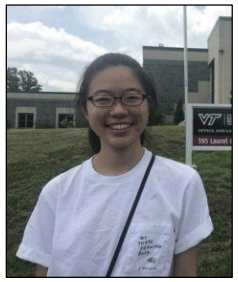


RIMpro-Marssonina Winchester AREC - 2021



Acknowledgments

Matheus Borba



Vivien Wong

Emmanuel Sempeles

Julie Wong

Fernanda Ferreira

NY Ag and Markets - Apple Research Development Program

Thank you for your attention !

https://treefruitpathology.spes.vt.edu/

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