NEWA 3.0 – Making the Most of Apple Disease Warning Systems

OHIO PRODUCE NETWORK

JANUARY 2022

Disease Warning Systems

- •Predictive models when an infection is most likely to occur and cause disease
- Decision-making tools
- •Apple scab
- •Fire blight
- •Sooty blotch and fly speck







Home Weather Tools

ols Crop & IPM Tools

Your source for weather and science-driven IPM tools

Find a Weather Station

for up-to-date IPM forecasts and weather data.

Select or search by weather station

NEWA.CORNELL.EDU



Weather stations

- Onset
- Rainwise
- Cellular or WIFI

NEWA.CORNELL.EDU

Apple Scab

- Primary phase
- Secondary phase



•One cycle of ascospore production and infection per season

•Ascospores are forcibly released during daylight following a wetting event

- Rain (0.1 inch)
- Temperature (~50 F)

•Spores are carried by rain and wind-blown rain to leaves and developing fruit



Revised Mill's Model

•Predicts days to infection based on leaf wetness and temperature

•Guides the application of fungicides

Average Temperature (F)	Wetting Period (Hr)	Incubation Period (Days)
79	11.3	
77	8	
75	6.1	
73-63	6	9-10
61	6.1	9-10
59-57	7	12-13
55	8	14
54	8.3	14
52	9	15
50	11	16
48	12.2	17
46	13.4	17
44	15.4	17
43	18	17
40	21.2	

NEWA– Scab Model

Infection events



Infection events, shown in red above, are based on the <u>Revised Mills Table</u> and are calculated beginning with 0.01 inch of rain. The word "Combined" means the wetting event on this day is being combined with another wetting event using the following rule: two successive wetting periods, the first started by rain, should be considered a single, uninterrupted wet period if the intervening dry period is less than 24 hours. When an infection event is in the 5-day forecast, the actual weather data logged may or may not translate into an actual infection event. Therefore, the table output may change once actual weather data are logged.

Ascospore Maturity Summary

> 20%

Daily Discharge Thresholds: ≥ 10%

Date	Ascospore Maturity	Daily Ascospore Discharge	Cumulative Ascospore Discharge
Apr 20	75%	0%	61%
Apr 21	75%	4%	65%
Apr 22	76%	<1%	65%
Apr 23	78%	0%	65%
Apr 24	81%	8%	73%
Apr 25	83%	<1%	74%
Apr 26	85%	0%	74%
Apr 27	88%	0%	74%

The Ascospore Maturity model predicts that 95% of the ascospores have matured. At this point, essentially all ascospores will be released after a daytime rain of greater than 1/10 inch with average temperature above 50° F

Ascospore discharge usually peaks from pink through bloom.

NEWA– Scab Model

- Ascospore maturity tracking
- Ascospore accumulation







NEWA– Scab Model

- Ascospore maturity tracking
- Ascospore accumulation

Fungicide Applications

Model provides a spray window

- •Fungicides timed around:
 - predicted infection events
 - inoculum availability
 - cultivar susceptibility
 - characteristics of the fungicides





Monitor and maintain program for 2 weeks after ascospore depletion

- Blossom blight phase
- Shoot blight phase
- Canker
- Fruit
- Root stock



Risk Assessment Models for Blossom Blight Management

Cougarblight or MaryBlyt

- Epiphytic Infection Potential (EIP)Model considers four variables:
 - 1. First bloom date
 - 2. Fire blight history in orchard
 - 3. Temperature for epiphytic growth
 - 4. Blossom wetting period



- Open blossoms
- Bacteria \geq 10 000 cells
- Temperatures ≥ 65 F
- Wetting event ≥ 2 hours



 Risk levels reported (EIP threshold)



* 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.

 Risk levels reported (EIP threshold)

Low risk	If none of these conditions is met during bloom, risk is 'Low' and bactericides are not needed.	
Caution or Moderate risk	If only the heat units are met during bloom, Cougarblight risk is 'Caution' and it is advisable to watch the forecast closely for continuing warm weather and rain. If only one of these conditions is met during bloom, Infection Potential risk is 'Moderate' and it is advisable to <u>watch the forecast closely for</u> continuing warm weather and rain.	
High risk	If two conditions are met during bloom, risk is 'High' and forecasted wetting events should be carefully considered and a bactericide applied just before (or after) a rain.	
Extreme or Infection risk	If all three conditions are met, risk is 'Extreme' or 'Infection' and an antibiotic should be applied just before (or after) a rain.	

- Risk levels reported (EIP threshold)
- Select treatment based on EIP threshold

Low risk	
	40 - 70: lo conditior
Caution or Moderate risk	70 - 100: CONCERI
High risk	100 - 150 (WORRY)
Extreme or Infection risk	200 - >25 (REALLY \

40 - 70: low chance for infection (BE ALERT to conditions) [use oxytetracycline or a biological]

70 - 100: few infections likely to occur (BE CONCERNED) <mark>[streptomycin]</mark>

100 - 150: Infections and potential epidemic (WORRY) [streptomycin]

200 - >250: Infections will occur; epidemic (REALLY WORRY) <mark>[streptomycin]</mark>

Slide adapted from K. Peter, Penn State

Sooty Blotch & Flyspeck



- Overwinter as on twigs of many woody species
- Spores dispersed by water splash or windblown mist
- Cool rainy springs, late summer rains and cool fall weather favor infections
- 20-60 day incubation period between infections and signs

Gleason et al. 2011. Plant Dis. 95: 368-383

Sooty Blotch and Fly Speck Disease Model

•Measurements begin after the first cover spray application (~ 10 days post petal fall)

•Based on three variables:

- Leaf wetness duration (LWD) measured in hours
 - Accumulation of a 175 wetting hours is predictive of an infection event
- Predicted rain events
- Last fungicide application date



Petal fall on cv. McIntosh

2019 Growing Season

Manually input the following parameters:

- Location
- Petal fall date
- Date of most recent fungicide application
- Resume calendar spray program or
- Reset fungicide spray date and follow model

Sooty Blotch and Flyspeck Risk Summary - Northeastern US Model								
	Past	Past	Current	Ensuing 5 Days				
Date	6/3	6/4	6/5	6/6	6/7	6/8	6/9	6/10
Days since petal fall	27	28	29	30	31	32	33	34
Accumulated Leaf Wetness Hours - ALWH	156	163	170	183	192	197	215	234
Risk Level	Moderate	Moderate	Moderate	High	High	High	High	High
Rain Events								
Daily rain amount (inches)	0.07	0.00	0.02	0.00	0.00	0.12	0.24	0.57
Rain probability (%) Night Day ?			- -	- -	- -	- -	- -	- -

Risk Level IPM Guidelines for Sooty Blotch and Flyspeck:

- NO RISK No action needed.
- **LOW RISK** If first cover application has not been made, make first cover fungicide application for apple scab. Otherwise, no action needed.
- **MODERATE RISK** Check the 5-day forecast; a cover application should be made if two or more days with precipitation are predicted. See Fungicides below.
- **HIGH RISK** A cover application for Sooty Blotch and Flyspeck should be made. See Fungicides below.

SAVE THE DATE!

NEWA

NEWA 3.0 Online Training for Apple Disease and Insect Models

CFAES

February 7th 2022 9:00 a.m. - 12:15 p.m EST

Topics will include: Fire blight, Apple scab, Plum Curculio and Internal Lep models.

Open (free!) to Ohio and all states and growers in the NEWA network Contact Melanie Lewis Ivey (ivey.14@osu.edu) for more information NEWA Apple Tools



DISEASE MANAGEMENT

Apple Scab

Manage apple scab (Venturia inaequalis) fungicide inputs by tracking ascospore maturity, daily and cumulative ascospore discharge, and scab infection events.

Fire Blight

Assess fire blight (Erwinia amylovora) blossom blight risk with Cougarblight and infection potential (EIP) assessments. Add your recent streptomycin application date to re-evaluate risk. A trauma blight tool helps track shoot blight symptom development.

Sooty Blotch and Fly Speck

Track sooty blotch and fly speck disease potential to assess daily and forecasted infection risk.



WATCH TUTORIAL

Apple Scab Model (9 minutes)

NEWA 3.0 Apple Scab Model Quickstart Tutorial

produced by The New York State Integrated Pest Management Program and Cornell Cooperative Extension at the Cornell University College of Agriculture and Life Sciences

with support from New York State Department of Agriculture and Markets United States Department of Agriculture National Institute of Food and Agriculture

NEWA.CORNELL.EDU