NEWA – Tools for IPM

Juliet Carroll
Fruit IPM Coordinator
NYS IPM Program
Cornell Cooperative Extension
What is NEWA?

Network for Environment & Weather Applications

• Web-based data from weather stations.
• Weather data & IPM forecast models.
• Automatically calculated and results displayed (i.e. degree day accum’s & infection events)

...as a direct result of using NEWA pest forecast models, growers could...
• reduce spray costs, on average, by up to $19,500 per year
• prevent crop losses of, on average, up to $256,000 per year
NEWA’s Home Page

- Easier navigation
- Header menu is on all NEWA web pages
- Footer is on all NEWA web pages
NEWA’s Station Pages

- Quick links
- Current pest forecasts
- Location-specific information

http://newa.cornell.edu
Welcome to the NEWA Apple Home Page

Apple Scab Disease Risk and Forecasting
- Apple Scab Infection Events and Ascospore Maturity
- Seasonal Apple Leaf Wellness Log (per station)

Fire Blight Disease Risk and Forecasting
- Fire Blight Model: Information about Concord Blight (Washington State Univ.)

Sooty Blotch and Flyspeck Risk and Forecasting
- Sooty Blotch and Flyspeck Model
- Seasonal Apple Leaf Wellness Log (per station)

Apple Insects
- Apple Insect Phenology Models and IPM Forecasts
- Degree-Day Accumulations Table (historical dates and degree day periods for free fruit pest phenology events)

The following pest phenological models are covered:

<table>
<thead>
<tr>
<th>Insect</th>
<th>Base T</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coding Moth</td>
<td>30 F, 50 F</td>
</tr>
<tr>
<td>Oriental Fruit Moth</td>
<td>45 F</td>
</tr>
<tr>
<td>Plum Curculo</td>
<td>50 F</td>
</tr>
<tr>
<td>Spotted Tentiform Leafminer</td>
<td>43 F</td>
</tr>
<tr>
<td>Apple Maggot</td>
<td>50 F</td>
</tr>
</tbody>
</table>

Apple Biofix Table

<table>
<thead>
<tr>
<th>Pest</th>
<th>Base T</th>
<th>Biofix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Scab</td>
<td>50 F</td>
<td>50% Green Tip Mac's</td>
</tr>
<tr>
<td>Fire Blight</td>
<td>65 F</td>
<td>1st Blossom Open</td>
</tr>
<tr>
<td>Sooty Blotch &amp; Flyspeck</td>
<td>NA</td>
<td>Estimate based on DD accumulations correlated with historical observations.</td>
</tr>
<tr>
<td>Coding Moth</td>
<td>50 F</td>
<td>1st Sustained Trap Catch</td>
</tr>
<tr>
<td>Oriental Fruit Moth</td>
<td>45 F</td>
<td>1st Sustained Trap Catch</td>
</tr>
<tr>
<td>Plum Curculo</td>
<td>50 F</td>
<td>Petal Fall</td>
</tr>
<tr>
<td>San Jose Scale</td>
<td>50 F</td>
<td>March 1</td>
</tr>
<tr>
<td>Spotted Tentiform Leafminer 1st summer generation</td>
<td>43 F</td>
<td>1st Sustained Trap Catch</td>
</tr>
<tr>
<td>Plum Curculo</td>
<td>50 F</td>
<td>Petal Fall</td>
</tr>
<tr>
<td>San Jose Scale</td>
<td>50 F</td>
<td>March 1</td>
</tr>
<tr>
<td>Spotted Tentiform Leafminer 2nd generation</td>
<td>43 F</td>
<td>1st Sustained Trap Catch</td>
</tr>
<tr>
<td>Apple Maggot</td>
<td>50 F</td>
<td>January 1</td>
</tr>
</tbody>
</table>

On-line Resources to Support Monitoring

Sampling Forms and Decision Support for Scouting and Monitoring Arthropod Pest
These are forms are also available in the Cornell Pest Management Guidelines for Commercial Tree Fruit Production to assist with scouting and monitoring for arthropod pests. They are linked here from the Fruit IPM website.

- Download Acrobat Reader to view pdf documents.

- Spotted Tentiform Leafminer (STLM)
  - Pink bud or early bloom stage scouting for STLM eggs (pdf)
  - Petal fall stage scouting for STLM sap-feeding mines (pdf)
  - Summer scouting for second generation STLM (pdf)

- Obliquebanded Leafroller (OLRL)
  - Begin OLRL scouting on July 5 in WV (5-7 days earlier in E NY or Long Island) or begin approximately 600 degree days Base 43 F after the first moth flight begins. First sustained moth catches in pheromone traps. See OLRL Infestation Threshold (pdf)
  - Mites
    - 2.5 mites/leaf threshold scouting in June (pdf)
    - 5 mites/leaf threshold scouting in July (pdf)
    - 10 mites/leaf threshold scouting August 1 to 15 (pdf)
  - Apple Maggot (AMG) scouting form (pdf)
  - Scouting and Monitoring Summary Form (pdf)

For Further Information:

- Fruit IPM Fact Sheets Information on many insect pests, mites, and diseases of tree fruit.
- Pest Management Guidelines for Commercial Tree Fruit Production contains the current year's tree fruit management information compiled by Cornell University extension faculty, including useful apple scab and fire blight information and scouting and monitoring forms for arthropod pests.


- For more information on tree fruit pest management, Fruit IPM Resources
- Cornell Fruit Resources, tree fruit IPM

Accuracy of the weather data is the responsibility of the owners of the weather station instruments. NEWA is not responsible for accuracy of the weather data collected by instruments in the network. If you notice erroneous or missing weather data, contact NEWA and we will contact the owner of the instrument.
NEWA weather station locations

~108 stations

💧 NEWA growers
➡️ Cornell CSS research farms
✈️ Airports

NEWA collaborates with the Northeast Regional Climate Center for additional weather locations.

http://newa.cornell.edu
Stations in Vermont

Six on apple farms
- Calais
- East Dorset
- Putney
- Shoreham
- South Burlington
- South Hero

Five on airports (NWS)
- Bennington
- Burlington
- Montpelier
- Morrisville
- Rutland

http://newa.cornell.edu
Weather information available

- Hourly data
- Daily summary
- Degree days
  - base 4°C, 32, 40, 43, 45, 48, 50, 55 & 86/50°F

precipitation
temperature
leaf wetness
relative humidity
solar radiation
wind speed
wind direction

http://newa.cornell.edu
Weather data summaries

Degree days - Also available using the Baskerville Emin formula (BE) and a max/min 86/50 formula.

Growing degree days are base 50.

http://newa.cornell.edu
Apple disease models

• Apple scab
  – Ascospore maturity
  – Infection events
  – Leaf wetness events

• Fire blight
  – Cougar blight
  – Shoot blight symptoms

These models provide 5-day future forecasts. They are interactive.
Apple scab – Ascospore maturity and infection events

NEWA Apple Disease Models

Select a disease: Apple Scab

Weather Station: Calais, VT

Date of Interest: 05/05/2010

Calculation Results:

**Apple Scab Summary for Calais**

<table>
<thead>
<tr>
<th>Date</th>
<th>Ascospore Maturity</th>
<th>Infection Events</th>
<th>Days to Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 3</td>
<td>61%</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>May 4</td>
<td>67%</td>
<td>No</td>
<td>NA</td>
</tr>
<tr>
<td>May 5</td>
<td>72%</td>
<td>Yes</td>
<td>16</td>
</tr>
<tr>
<td>May 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Wetness Events**

<table>
<thead>
<tr>
<th>Date</th>
<th>Rain Amount</th>
<th>Rain Prob (%)</th>
<th>Dew</th>
<th>Leaf Wetness (hours)</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.00</td>
<td>0.57</td>
<td>No</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>0.00</td>
<td>0.37</td>
<td>No</td>
<td>9</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td>11</td>
<td>NA</td>
</tr>
</tbody>
</table>

NA - not applicable

An apple scab infection period has been predicted and ascospores are mature. Ensure that young leaves and fruit are protected. Click here for pesticide information.

The Ascospore Maturity degree day model begins at 50% green tip on McIntosh flower buds. To recalculate ascospore maturity for your orchard, enter your green tip date.

Green Tip Date: 4/4/2010

http://newa.cornell.edu
### Apple Scab Infection Events (March 1 - May 5)

<table>
<thead>
<tr>
<th>Start Date &amp; Time</th>
<th>End Date &amp; Time</th>
<th>Wet Hours</th>
<th>Temp Avg. (°F)</th>
<th>Rain (in.)</th>
<th>Days to Symptoms</th>
<th>Combined Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 4 12:01 PM</td>
<td>May 5 10:00 AM</td>
<td>18</td>
<td>50</td>
<td>0.50</td>
<td>16</td>
<td>Yes</td>
</tr>
<tr>
<td>May 1 8:01 PM</td>
<td>May 2 10:00 AM</td>
<td>14</td>
<td>57</td>
<td>0.09</td>
<td>12-13</td>
<td></td>
</tr>
</tbody>
</table>

Dry conditions last 13 hours at download

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Ascospores, which cause primary scab, discharge during rain. Both ascospores and conidia, which cause secondary scab, infect at similar rates. A single set of conditions, the Revised Mills Table, can be used for determining infection events for both primary and secondary infections.

Longer wetting, beyond the minimum times for a given temperature specified in the Revised Mills Table, often results in more disease. Apple scab infection events are calculated beginning with 0.01 inch of rain. Two successive wetting periods are considered a single, uninterrupted wetting period if the intervening dry period is less than 24 hours.

**Pesticide Information**

**Disclaimer:** These are theoretical predictions and forecasts. The theoretical models predicting pest development or 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, pest presence, and disease occurrence determined through scouting or insect pheromone traps.
Apple scab – leaf wetness events

Logged from March 1 to October 30 each year.

http://newa.cornell.edu
Fire blight – blossom infection risk

**NEWA Apple Disease Models**

- **Select a disease:** Fire Blight
- **Weather Station:** Putney, VT
- **Date of Interest:** 05/30/2010

**Fire Blight Risk Predictions for Putney**

Blossom blight predictions using the Cougarblight model begin at first blossom open.

- **First blossom open date:** 5/26/2010

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

Additional information:
- No fire blight in your neighborhood last year.
- Fire blight is now active in your neighborhood.
**Fire blight – blossom infection risk results**

### Blossom Blight Summary - Cougarblight

<table>
<thead>
<tr>
<th>Date</th>
<th>Past</th>
<th>Past</th>
<th>Current</th>
<th>Blossom Blight 5-Day Forecast</th>
<th>Forecast Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>May 28</td>
<td>May 29</td>
<td>May 30</td>
<td>May 31</td>
<td>Jun 1</td>
</tr>
<tr>
<td>4-day DH</td>
<td>*</td>
<td>*</td>
<td>650</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Risk Level</td>
<td>*</td>
<td>*</td>
<td>Extreme</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Wetness Events**

<table>
<thead>
<tr>
<th>Wetness Event</th>
<th>Rain Amount</th>
<th>Rain Prob (%)</th>
<th>Night</th>
<th>Day</th>
<th>Dew</th>
<th>Leaf Wetness (hours)</th>
<th>NA - data not available</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.00</td>
<td>0.14</td>
<td>0.01</td>
<td>NA</td>
<td>NA</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

* indicates accumulating the 4-day DH total.

Scan 4-day degree hour (DH) totals, risk levels, rain, dew, leaf wetness, and note the infection risk level.

**Pest Management for Cougarblight Risk Level:**

- **Low**: bactericides probably unnecessary, check the 5-day forecast for warm weather (60°F or higher) and wetting events.
- **Caution**: check the 5-day forecast, expect infection if warm weather continues (60°F or higher) and a wetting event occurs.
- **High**: expect infection if there is a wetting event, even a heavy dew.
- **Extreme**: the blossoms should be protected with streptomycin.

[ Cougarblight Charts ](http://newa.cornell.edu)

**Figure 1:** CougarBlight Risk and Weather Summary for Putney

First blossom open date (SBD) is indicated by a dashed green line. Colors of bars on Cougarblight risk graph correspond to risk levels. Orchard history = 2 (Fire blight occurred in your neighborhood last year). Observed daily highest and lowest hourly temperatures are connected by dark blue bars. Observed precipitation is represented as light green bars.
Fire blight – streptomycin sprays
### Fire blight – shoot blight

**Scouting for strikes**

**Calculating infection dates**

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**Monitoring for Shoot Blight Symptoms:** To effectively limit shoot blight damage, strikes should be pruned throughout the terminal growth period. If you have a trauma event such as windy thunderstorm during bloom or a summer hailstorm, begin checking for symptoms 90-100 degree day base 55°F after the event. Enter the date of the infection/weather event:

- **Infection Event Date:** 06/25/2010

If you are seeing fire blight symptoms and want to determine approximately when the infection event occurred, enter the date of symptoms:

- **Symptom Occurrence Date:** Click to enter date

**Shoot Blight Infection for Calais**

Fire blight symptoms on infected shoots show up when about 90 to 100 degree days base 55°F have accumulated after an infection event.

- **Infection event:**
  - June 25

- **Degree Days (base 55 °F) 6/25 through 7/5:**
  - 108

Check for symptoms starting on July 5

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**Monitoring for Shoot Blight Symptoms:** To effectively limit shoot blight damage, strikes should be pruned throughout the terminal growth period. If you have a trauma event such as windy thunderstorm during bloom or a summer hailstorm, begin checking for symptoms 90-100 degree day base 55°F after the event. Enter the date of the infection/weather event:

- **Infection Event Date:** Click to enter date

If you are seeing fire blight symptoms and want to determine approximately when the infection event occurred, enter the date of symptoms:

- **Symptom Occurrence Date:** 07/05/2010

**Shoot Blight Infection for Calais**

Fire blight symptoms on infected shoots show up when about 90 to 100 degree days base 55°F have accumulated after an infection event.

- **Symptom Occurrence Date:** July 5

- **Approximate Infection Date:**
  - June 27

- **Degree Days (base 55 °F) 6/27 through 7/5:**
  - 98

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Apple insect models

- Codling moth
- Oriental fruit moth
- Obliquebanded leafroller
- Plum curculio
- Spotted tentiform leafminer
- Apple maggot

These models are interactive.
**Codling Moth Results for East Dorset**

**First Trap Catch:** 6/14/2010

First Trap Catch date above is estimated based on degree day accumulations or user input. Enter the actual date for blocks of interest and the model will calculate the protection period after first trap catch more accurately.

Accumulated degree days (base 50°F) first trap catch through 6/17/2010: 41 (0 days missing)

**Pest stage:** Moths flying & first eggs laid

The pest stage above is estimated. Select the actual stage and the model will recalculate recommendations.

<table>
<thead>
<tr>
<th>Pest Status</th>
<th>Pest Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>First eggs are laid at about 50 DD and the first eggs usually hatch after about 220 DD.</td>
<td>Apply insecticides that need to be present before egg laying at about 50-75 DD. Apply insecticides that target early egg laying period at 100-200 DD.</td>
</tr>
</tbody>
</table>

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NEWA Apple Insect Models

Select a pest:
Oriental Fruit Moth

Weather Station:
East Dorset, VT

Accumulation End Date:
05/30/2010

[Calculate]

Oriental Fruit Moth Results for East Dorset

First Trap Catch: Click to enter

Degree day accumulations estimate that First Trap Catch may not have occurred yet. If it has, enter the actual date for blocks of interest above and the model will calculate the protection period more accurately.

Accumulated degree days (base 43°F) 1/1/2010 through 5/30/2010: 342 (132 days missing)

Phenological stage: Pink Bud

The phenological stage above is estimated. Select the actual stage and the model will recalculate recommendations.

Pest stage: First generation moths emerge

Pest Status
First catch of moths from the overwintering generation is expected. Flight of OFM usually begins when trees are in the pink or bloom bud stages.

Pest Management
No insecticides need to be applied until eggs begin to hatch. Since OFM flight usually begins at bloom, it is not possible to apply an initial spray to kill adults.

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NEWA Apple Insect Models

Select a pest: Plum Curculio

Weather Station: East Dorset, VT

Accumulation End Date: 06/12/2010

Calculate

PLUM CURCULIO RESULTS FOR EAST DORSET

At petal fall, fruit become susceptible to feeding and oviposition injury. Control measures are only needed until 308 degree days have accumulated since petal fall.

90% petal fall on McIntosh apple: 6/12/2010

Petal Fall date above is estimated based on degree day accumulations or user input. Enter the actual date for blocks of interest and the model will calculate the protection period after petal fall more accurately.

Accumulated degree days (base 50°F) petal fall through 6/12/2010: 8 (0 days missing)

Pest stage: Adults ovipositing

The pest stage above is estimated. Select the actual stage and the model will recalculate recommendations.

<table>
<thead>
<tr>
<th>Pest Status</th>
<th>Pest Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plum curculio (PC) adults will continue to damage fruit (example 1, example 2) and may be moving among trees. PC activity is highly dependent upon temperatures, particularly at night when adults are most active. PC usually do not feed or oviposit when nighttime temperatures are below 50 deg F. If the weather is extremely warm after petal fall, the oviposition cycle may be completed in 2 weeks. In cooler seasons, PC may continue to oviposit for 4-6 weeks.</td>
<td></td>
</tr>
<tr>
<td>A petal fall spray should control plum curculio (PC) for about 10-14 days. Incidence of observed PC damage is highly variable among different orchards. PC damage usually occurs primarily along the edges of commercial orchards, and noticeable damage occurs in the same locations in orchards year after year, regardless of treatment levels. Therefore, the potential for damage in any particular orchard can be predicted from past observations. Usually, a post-petal fall spray for control of PC is not necessary in low-pressure orchards in which no damage has been observed in the past. In high-pressure orchards, additional sprays along the perimeter of the orchards should be applied until the oviposition model predicts that control is no longer necessary. Pesticide information</td>
<td></td>
</tr>
</tbody>
</table>

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http://newa.cornell.edu

NEWA

http://newa.cornell.edu

NEWA
NEWA Apple Insect Models

Select a pest: Spotted Tentiform Leafminer

Weather Station: East Dorset, VT

Accumulation End Date: 05/28/2010

Phenological stage: Pink Bud

Accumulated degree days (base 43°F) 1/1/2010 through 5/28/2010: 301 (132 days missing)

Pest stage: Moths flying and egg laying continues

Pest Status
First generation adult STLM are actively flying and laying eggs from tight cluster until the end of the pink bud stage.

Pest Management
No insecticidal control sprays are recommended against STLM adults. Control sprays targeted against younger instars of larval (sap feeding stages) feeding in the leaves can be applied either at pink or shortly after petal fall. To determine whether or not pink sprays are necessary, sample clusters for eggs at pink and if necessary apply insecticides before bloom. Pesticide information

Disclaimer: These are theoretical predictions and forecasts. The theoretical models predicting pest development or 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, pest presence, and disease occurrence determined through scouting or insect pheromones traps.

http://newa.cornell.edu
NEWA Apple Insect Models

Select a pest:
Apple Maggot

Weather Station:
Rutland, VT

Accumulation End Date:
07/30/2010

[Calculate]

Map Results Help

Apple Maggot Results for RUTLAND STATE AP

First Trap Catch: 7/24/2010

First Trap Catch date above is estimated based on degree day accumulations or user input. Enter the actual date for blocks of interest and the model will calculate the protection period after first trap catch more accurately.

Accumulated degree days (base 50°F) first trap catch through 7/30/2010: 128 (0 days missing)

Pest stage: Sexually immature females

The pest stage above is estimated. Select the actual stage and the model will recalculate recommendations.

Pest Status | Pest Management
--- | ---
Early emerging AM females are still sexually immature and have not yet started to lay eggs. | It is still too early to apply insecticide sprays against AM even if flies have been captured on traps deployed along the edges of commercial apple orchards.

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NEWA | PMEP

http://newa.cornell.edu
Production decision aids – future?

• Apple ET model (current ET model is for turf)
• Apple carbohydrate model - thinning

• Spring freeze/frost warnings
  NWS, Buffalo & Binghamton, NY
• Critical temperatures

• Others?
  – soft scald on Honeycrisp
  – Blanpied/Silsby CA model for timing harvest

http://newa.cornell.edu
Want to get a NEWA weather station?

Get a RainWise MKIII Weather Station for your NEWA location

Weather stations can be purchased by individuals or groups. NEWA makes it possible for farmers, consultants to share resources for weather data collection, analysis, distribution, and archiving.

NEWA RainWise MKIII stations measure:
- Temperature
- Dew Point Temperature
- Relative Humidity
- Rainfall
- Leaf Wetness
- Solar Radiation
- Wind Speed
- Wind Direction

The weather station price includes:
- 2-year warranty
- Software
- Cables
- Solar panel
- Computer Interface
- Non-volatile RAM – prevents data loss during power outage
- 8 integrated sensors – temperature, dew point temperature (relative humidity), tipping bucket rain gauge, leaf wetness, solar radiation, anemometer (wind speed), wind direction, and barometric pressure.
- For more information

Note: The monomount, mounting bracket, needs to be ordered separately. Price is approximately $50.

Get the SP1-LR model
MKIII SP1-LR with 2.4 GHz and up to 1 mile (line of sight) transmission, cost $1,690
Modern (not needed if FTP-computer connection with NEWA), cost $159
Weather data is sent to NEWA’s server via computer FTP or phone modem (see schematic)
Prices are based on shipping and billing within the contiguous United States.
Current delivery is 4-6 weeks.

To order a NEWA weather station for your site contact

Wayne Burnett
RainWise Inc.
PO Box 443
Bar Harbor, ME 04609-0443
- 1-800-762-5723 ext 103
wayne@rainwise.com
www.rainwise.com

http://newa.cornell.edu
To learn more about NEWA
visit newa.cornell.edu or www.newa.cornell.edu

Contact your NEWA-VT Administrator

Terence Bradshaw
Field Research Specialist
University of Vermont Apple & Grape Team
802-922-2591
tbradsha@uvm.edu