UMassAmherst

Some observations on using multiple disease forecasting models during the 2013 growing season from an Extension perspective

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Extension Educator

- Statewide tree fruit responsibility
- Grower visits, calls
- Healthy Fruit newsletter
- Twitter (@jmcextman) and Facebook
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- Jack of all trades, master of none…

Fruit notes article

University of Massachusetts Amherst

UMass Fruit Advisor

Fruit Notes

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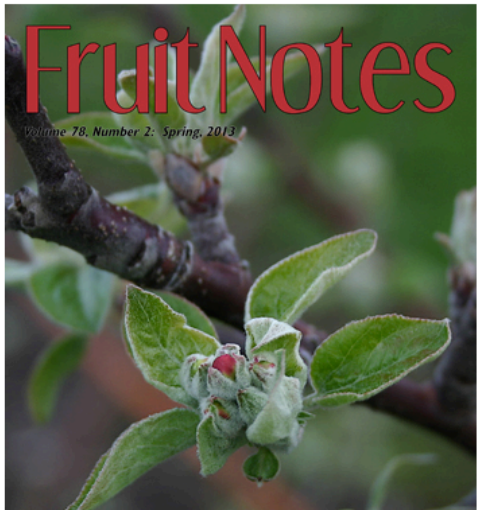

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Table of Contents

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Fruit Notes article

- “A Comparison of Two Sources of Environmental Data and Three Model Outputs for Primary Apple Scab in 2012 at the UMass Cold Spring Orchard.” Clements & Cooley. Vol. 78, No. 2. Spring, 2013. (umassfruitnotes.com)
- Environmental/weather data: SkyBit and on-site weather station (Rainwise MKIII LR)
- Models: NEWA, Orchard Radar, SkyBit, RIMPro

Conclusions

- “It appears all four [apple scab] models based on two sources of weather data were pretty much in agreement and would be useful information in managing primary scab.”
- “More specifically, models aligned well in infection periods, but differed more in declaring end of primary scab season based on 100% ASM.”

More conclusions

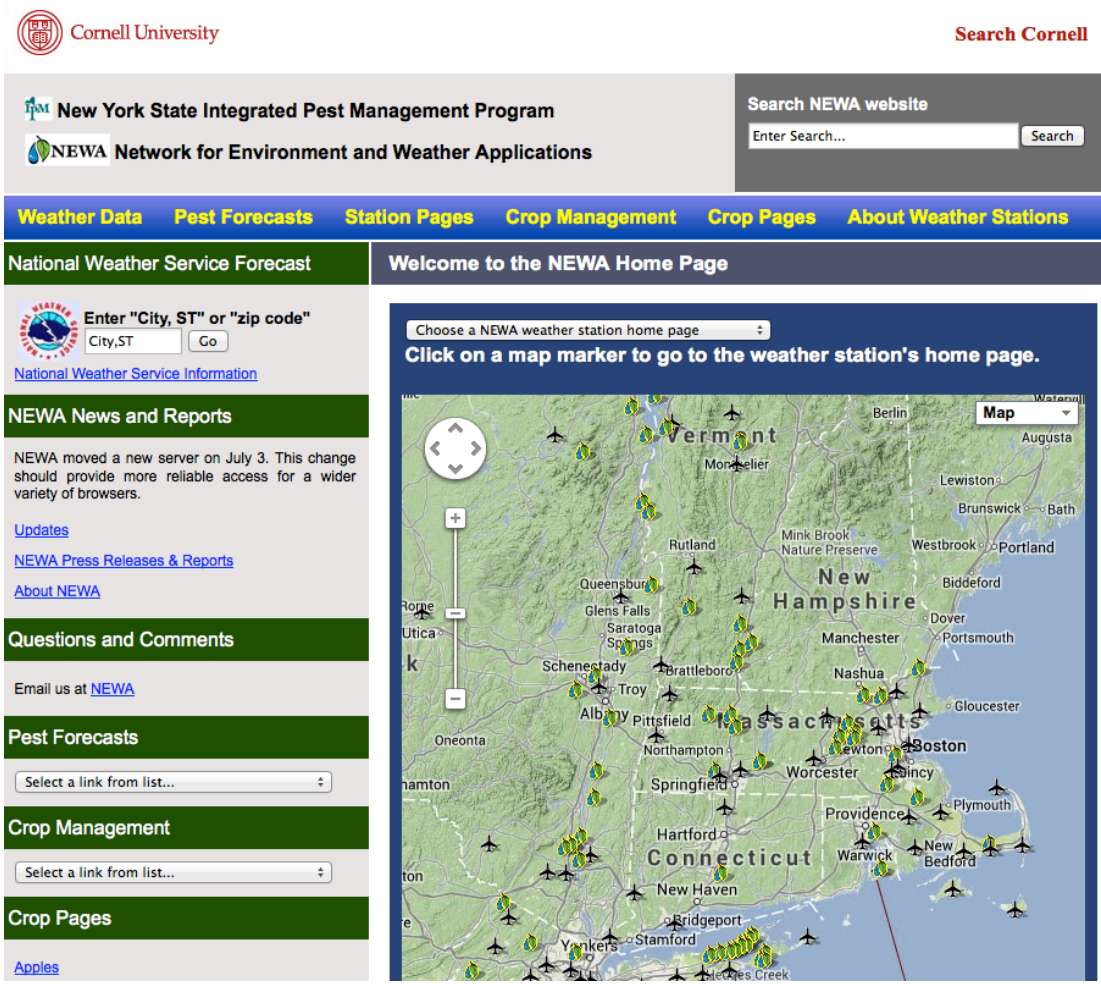
- “One advantage of using SkyBit (and Orchard Radar) is the predictive forecasts.”
- “All four models using two sources of weather data were/are very useful in managing sprays and apple scab during the primary season and should be used by all growers/Extension/consultants.”

2013 options

- NEWA
- SkyBit
- Orchard Radar
- RIMProWeb

2013 NEWA

- Network for Environment and Weather Applications
- 21 on-site weather stations (Rainwise, Onset)
- Includes airports (23)
- Weather data and disease/insect models
- http://newa.cornell.edu



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NEWA

NEWA Apple Disease Models

Select a disease: Apple Scab

Weather Station: Belchertown, MA

Date of Interest: 05/11/2013

Calculate

Map | Results | More info

Apple Scab Summary for Belchertown

	Past	Past	Current	5-Day Forecast (Forecast Details)				
	May 9	May 10	May 11	May 12	May 13	May 14	May 15	May 16
Ascospore Maturity	38%	46%	54%	61%	64%	67%	71%	77%
Infection Events	No	No	Yes					
Days to Symptoms	NA	NA	12-13					
Wetness Events								
Rain Amount	0.24	0.01	0.28	0.03	0.00	0.00	0.07	Trace
Rain Prob (%) Night|Day			-|-	-|-	-|-	-|-	-|-	-|-
Dew	Yes	Yes	Yes	Yes	No	No	No	Yes
Leaf Wetness (hours)	19		14					

NA - not applicable

Ascospore Maturity Graphs

Download Time: 5/11/2013 23:00

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: 4/14/2013

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NEWA

Primary scab season is over. Ascospores were essentially all released on May 22. Focus on protecting trees from secondary scab infections as needed, based on infection events.

Apple Scab Infection Events (March 1 - August 5)

Start Date & Time	End Date & Time	Wet Hours	Temp Avg. (F)	Rain (in.)	Days to Symptoms	Combined Event
August 1 12:01 PM	August 2 9:00 AM	21	65	0.94	9-10	
July 25 6:01 PM	July 26 12:00 PM	16	61	0.37	9-10	Yes
July 22 6:01 PM	July 23 5:00 PM	21	72	2.16	9-10	Yes
July 10 2:01 PM	July 11 10:00 AM	20	73	0.13	9-10	
July 7 3:01 PM	July 9 8:00 AM	28	72	0.96	9-10	Yes
July 1 12:01 PM	July 2 11:00 AM	14	72	1.66	9-10	Yes
June 27 7:01 PM	June 28 12:00 PM	16	67	0.79	9-10	Yes
June 24 6:01 PM	June 25 7:00 AM	13	67	0.17	9-10	
June 17 5:01 PM	June 19 7:00 AM	18	58	0.47	12-13	Yes
June 6 9:01 PM	June 14 10:00 AM	119	55	3.81	14	Yes
June 2 4:01 PM	June 3 11:00 AM	19	67	0.96	9-10	
May 29 2:01 AM	May 30 7:00 AM	18	60	1.20	9-10	Yes
May 23 12:01 PM	May 26 6:00 AM	57	52	2.96	15	Yes
May 21 5:01 PM	May 22 8:00 AM	15	55	0.56	14	
May 19 4:01 PM	May 20 9:00 AM	17	55	0.16	14	
May 8 4:01 PM	May 12 8:00 AM	56	58	0.89	12-13	Yes
April 9 4:01 AM	April 13 4:00 AM	31	42	1.03	-	Yes
March 12 7:01 AM	March 12 9:00 PM	14	51	0.68	16	

Dry conditions last 72 hours at download

Download Time: 8/5/2013 9:00

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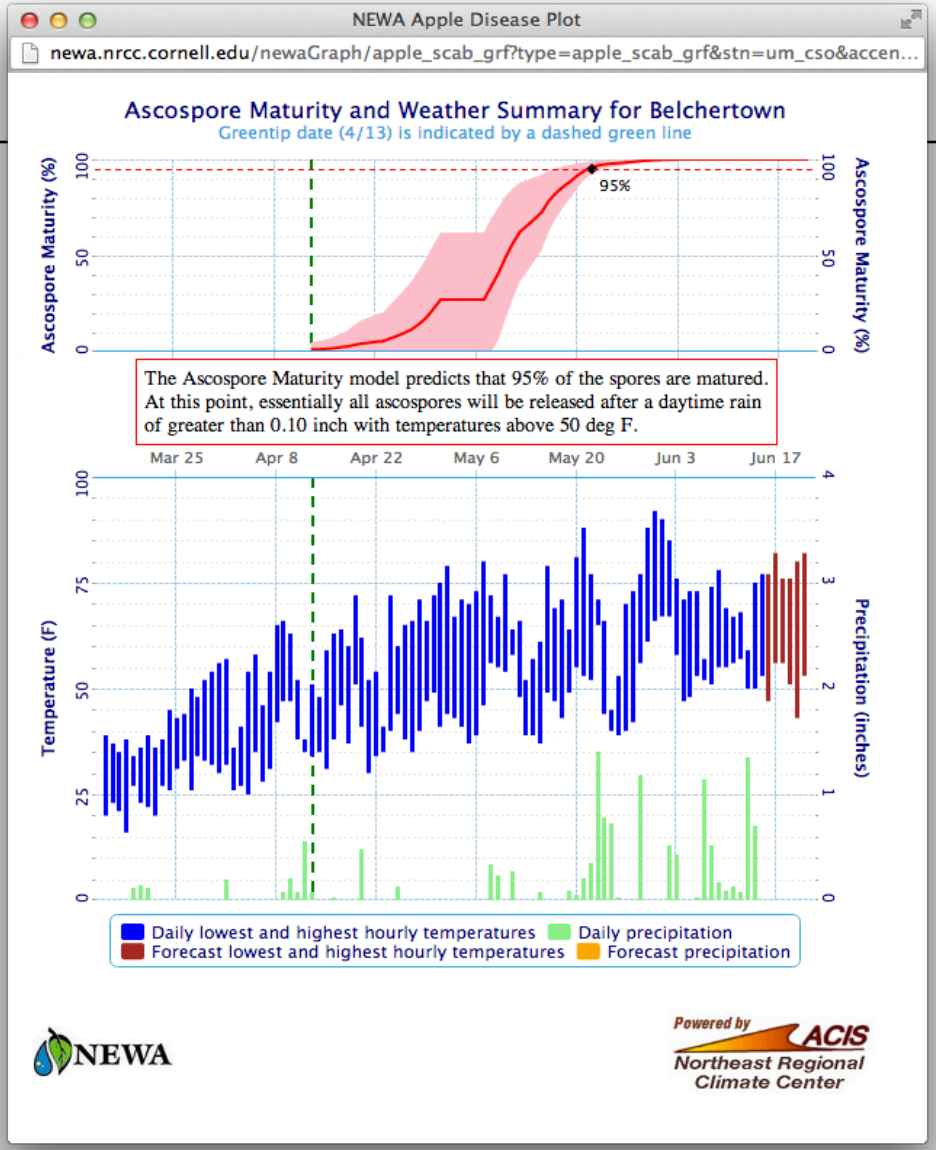
NEWA


NEWA Apple Disease Plot
newa.nrcc.cornell.edu/newaGraph/apple_scab_grf?type=apple_scab_grf&stn=um_cso&accen...
Ascospore Maturity and Weather Summary for Belchertown
Greentip date (4/13) is indicated by a dashed green line
Ascospore Maturity (%)
95%
The Ascospore Maturity model predicts that 95% of the spores are matured. At this point, essentially all ascospores will be released after a daytime rain of greater than 0.10 inch with temperatures above 50 deg F.
Mar 25
Apr 8
Apr 22
May 6
May 20
Jun 3
Jun 17
Temperature (F)
Precipitation (inches)
Daily lowest and highest hourly temperatures
Daily precipitation
Forecast lowest and highest hourly temperatures
Forecast precipitation
NEWA
Powered by ACIS
Northeast Regional Climate Center

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NEWA

- What I like…
  - Many sites and partial “ownership”
  - Linked to specific pesticide recommendations
  - Historical weather data and flexibility
  - Disease, insect, and horticulture
  - Multiple crops
  - Available to anyone, with the most data sites

NEWA

- What I don't like…
  - Cost (currently $5,750 annual fee)
  - A bit information-dense, can take some wading through
  - User interface could use some improvement
  - Reliance on weather stations (maintenance, accuracy, etc.)
  - Have to set out pheromone traps and enter biofix for maximum accuracy

2013 SkyBit E-weather

SkyBit, Inc.

- Subscription-based weather data and models
- Site-specific (Belchertown, MA)
- Daily e-mail (no web)
- Disease, insect (horticulture beta)

SkyBit

E-WEATHER SERVICE — AGWEATHER IPM APPLE DISEASE PRODUCT
For: MA-BELCHERTOWN-HORTRESCENTER — Date: Sat May 11, 2013

	WEATHER					APPLE SCAB 130414				FIRE BLIGHT 130506				SOOTY BLOTCH	
Date	TMX F	TMN F	PREC in	ARH %	LW hr	ASM %	AW hr	TW F	PW	ADH 65F	AW hr	TW F	PW	ALW hr	PW
BASED ON OBSERVATIONS															
0501	70	38	0.00	47	0	3	0	-	+	-	-	-	-	-	-
0502	75	41	0.00	51	0	4	0	-	+	-	-	-	-	-	-
0503	64	42	0.00	57	0	5	0	-	+	-	-	-	-	-	-
0504	67	40	0.00	56	0	6	0	-	+	-	-	-	-	-	-
0505	66	35	0.00	58	0	7	0	-	+	-	-	-	-	-	-
0506	70	40	0.00	63	0	9	0	-	+	22	0	-	-	-	-
0507	76	44	0.00	64	3	12	3	48	+	102	3	48	+	-	-
0508	69	54	0.58	84	22	16	22	62	++	122	22	62	++	-	-
0509	64	55	0.30	88	24	21	46	61	++	122	23	62	++	-	-
0510	76	53	0.00	69	10	27	56	60	++	207	56	60	+	-	-
BASED ON FORECASTS															
0511	66	57	0.48	81	23	34	23	62	++	211	22	62	++	-	-
0512	63	45	0.03	60	10	39	33	60	++	211	33	60	+	-	-
0513	56	40	----	48	0	44	0	-	+	211	0	-	-	-	-
0514	60	37	----	62	0	48	0	-	+	211	0	-	-	-	-
0515	67	38	----	62	0	54	0	-	+	216	0	-	-	-	-
0516	68	50	----	75	14	61	14	64	++	225	14	64	++	-	-
0517	71	55	----	78	24	69	38	63	++	225	38	63	++	-	-
0518	67	52	----	72	16	75	49	61	++	225	2	63	++	-	-
0519	67	50	----	71	13	80	16	56	++	225	2	57	+	-	-
0520	67	49	----	68	11	84	13	53	++	225	13	53	+	-	-

********* IMPORTANT: Check the dates at the top of each column. *********
Green Tip Date - is used for Apple Scab
Blossom Date - is used for Fire Blight
Petal Fall Date - is used for Sooty Blotch

ASM = Apple Scab Maturity Percentage
ADH = Accumulated degree-hours from blossom date up to a max of 225.
ALW = Accumulated leaf wetness hours from petal fall date.
AW = Accumulated wetness hours for the most severe event.
TW = Average temperature during the most severe event.
PW = Pest Wait/Watch/Warning: - = not active
+ = active but no infection
++ = possible infection & damage

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SkyBit

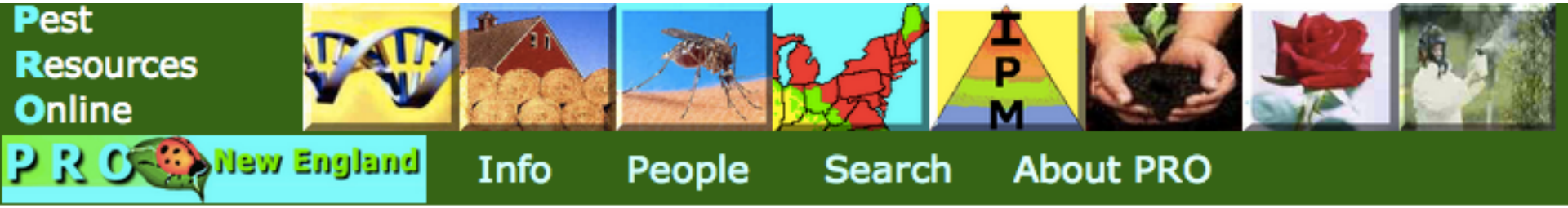
- What I like…
  - Daily “in-face” e-mail
  - Simple interpretation
  - Includes forecast
  - Can be set up for any site-specific location
  - Seasonal on/off

SkyBit

- What I don't like…
  - Cost?
  - Have to set out pheromone traps and enter biofix for maximum accuracy
  - Tendency to be pretty conservative, especially on forecast, i.e., accuracy is a bit vague…is this a good thing or a bad thing?

2013 Orchard Radar

- Glen Koehler, U. of Maine
- SkyBit subscription-based data source
- Disease/insect/horticulture
- http://pronewengland.org/allmodels/RadarIntro.htm



Belchertown MA, - Orchard Radar

Belchertown MA, - Orchard Radar

Apple Pest Monitoring Pocket Guide

Apple Calendar - Early season Apple Calendar - Late season

Jump down to sections:

Scab Fire blight Flyspeck Insects & Mites Horticulture Weather

Some of the longer tables may require hitting "refresh" (F5 key for Internet Explorer) to completely download.

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* CURRENT WEATHER *

Weather archive is at bottom of this page.

Hourly weather chart 32 day temp. chart 32 day rain chart

Hourly forecast table

Hourly observations - 7 days back

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* APPLE SCAB *

Back to top

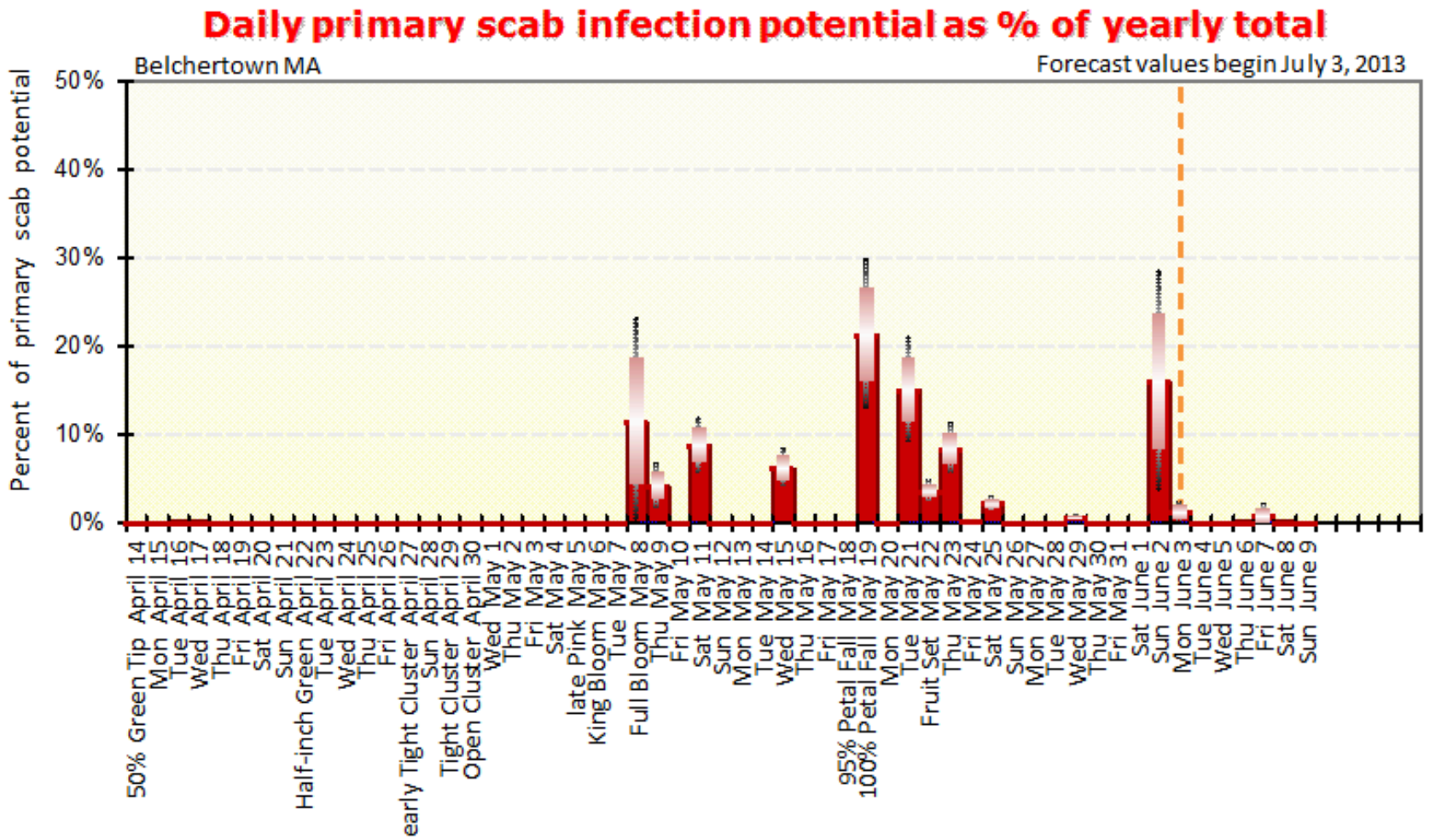
Apple scab - Key dates

SCAB BIOLOGY

Daily scab infection conditions rating chart Ratings on this chart account for ascospore maturity, previous ascospore releases, leaf wetness duration, amount and timing of rain, average temperature, leaf size, and foliar susceptibility. It is a comprehensive, but relative, estimate of primary scab infection conditions. It does not estimate the actual absolute risk because it does not account for inoculum level, which is the single most important component of scab risk.

Daily scab conditions in Table format

Orchard Radar



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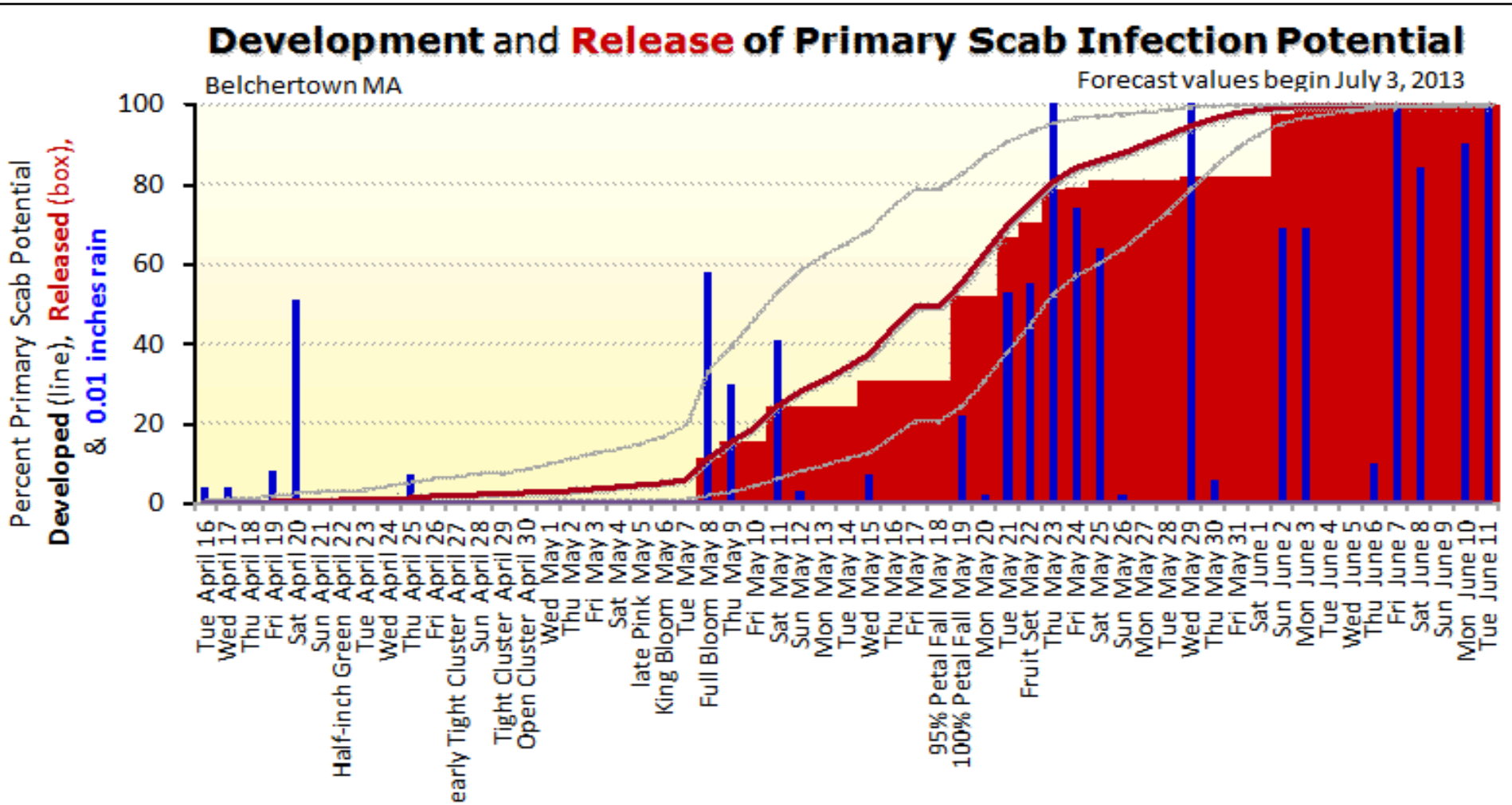
Orchard Radar



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Orchard Radar

- What I like…
  - Site-specific using SkyBit data
  - Excellent forecasting of insect/disease/ horticulture “situation”
  - Good historical record (for current year only)
  - Developer well-versed in biology and modeling (despite himself!)
  - Have used info in Healthy Fruit newsletter

Orchard Radar

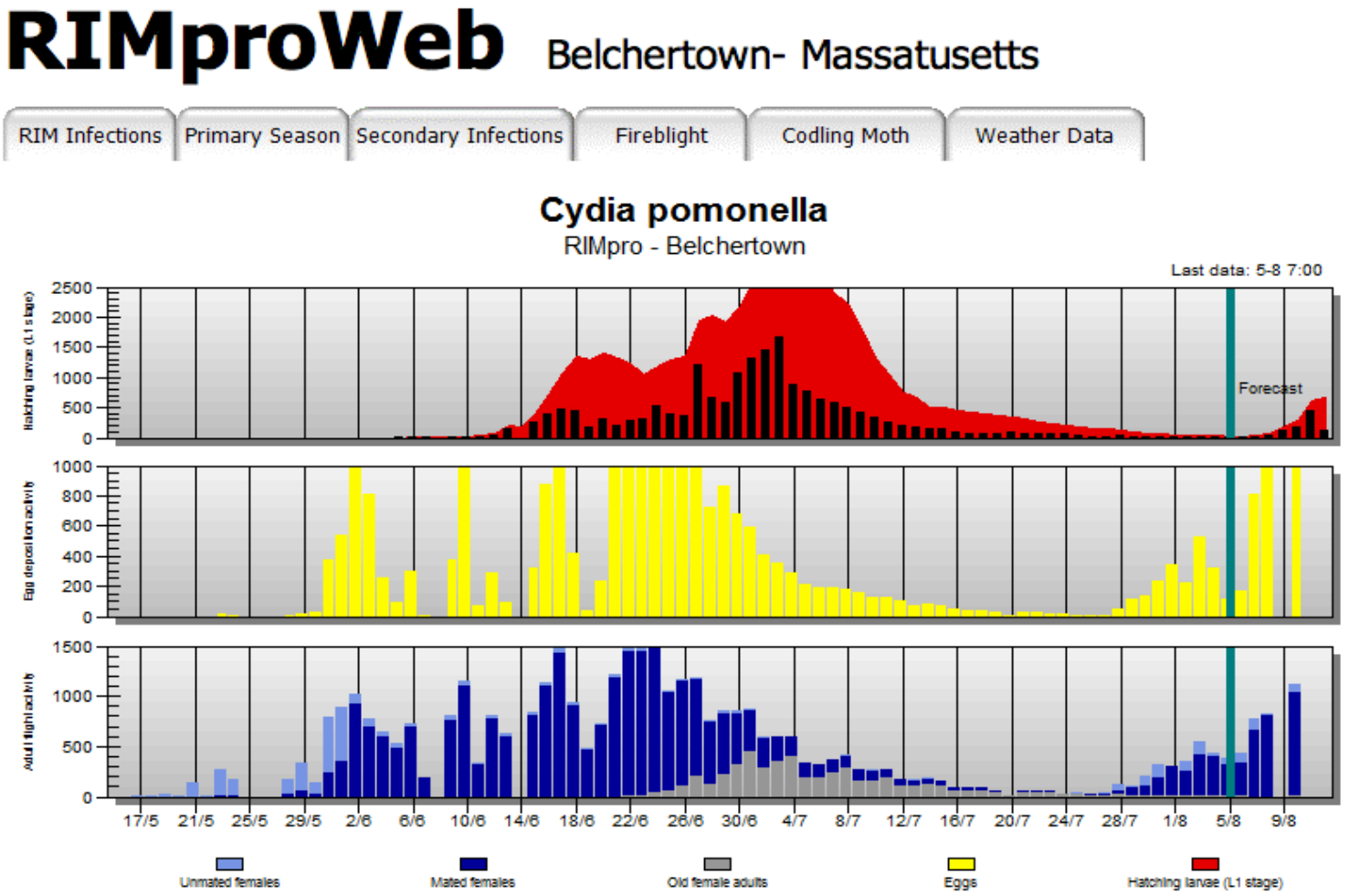
- What I don't like…
  - Cost?
  - Not yet a commercial turn-key application
  - Text-heavy, information dense, i.e., requires time and study to get the most out of it… sometimes it is just too much information

2013 RIMProWEB

RIMpro

- Marc Trapman, Bio Fruit Advies
- Uses on-site weather station
- Includes forecast
- PC application and web
- Scab, fireblight, codling moth, weather data
- http://www.biofruitadvies.nl/rimpro/rimpro_e.htm

RIMProWeb


RIMproWeb
Belchertown- Massatusetts
RIM Infections
Primary Season
Secondary Infections
Fireblight
Codling Moth
Weather Data
Cydia pomonella
RIMpro - Belchertown
Last data: 5-8 7:00
Forecast
Unmated females
Mated females
Old female adults
Eggs
Hatching larvae (L1 stage)

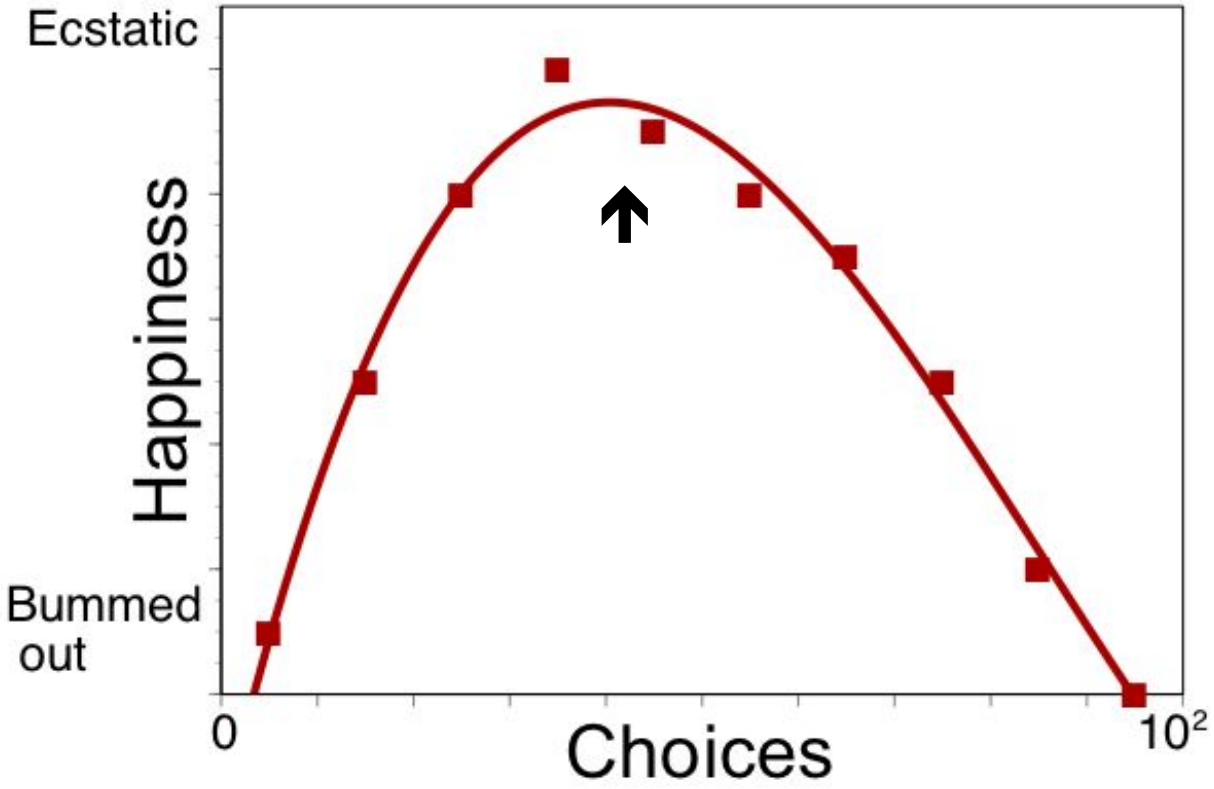
RIMPro

- What I like…
  - Intuitive, quick-switching, tabbed interface
  - All graphical, no text
  - Good forecasting
  - Models seemed very in-tune with real situation
  - Developer very knowledgeable of biology and modeling

RIMproWeb

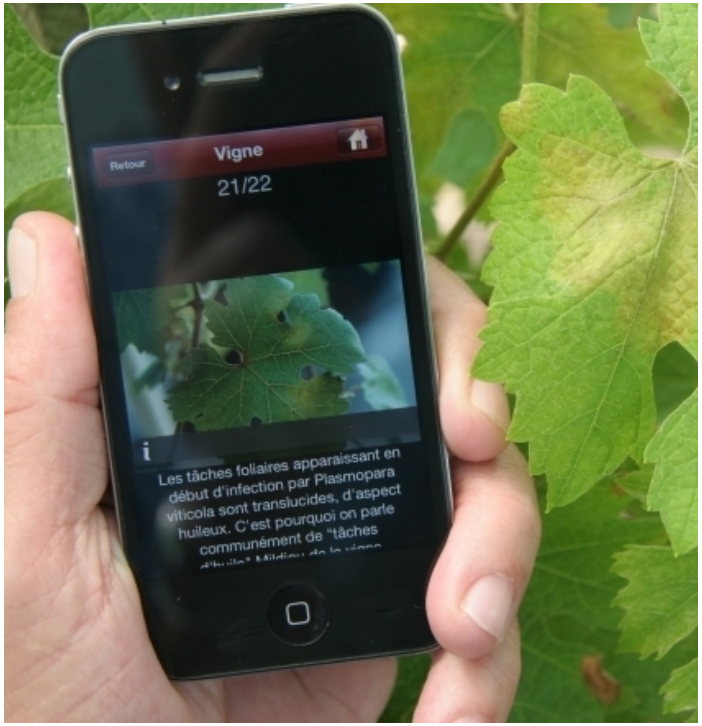
- What I don't like…
  - Not a turn-key solution (yet)
  - Unknown cost?
  - Relies on weather station for current and past situation
  - Needs some help with interpreting output
  - Apple and grape (experimental) only
  - Currently only a few pest models (but important ones)

Conclusion…



Wish list…

- Mobile first
- Push notification
- Simple, decisive interface w/o too much text to read
- Linked to immediate and specific action
- Models for all important diseases/pest
- Modest cost



Wish list…

- Does not rely on hardware-based on-site stations, but has site-specific accuracy
- Link to pesticide information and recordkeeping
- Above all, easy for *grower* to sign-up, configure, interpret, and perform action…

Above all: more time for beer…