Using Orchard Radar Apple Pest Tracking and Forecasts to Enhance IPM

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Using Pest Forecasts to Enhance IPM

- How it works
- What it does
- What it means
- Making it work for you

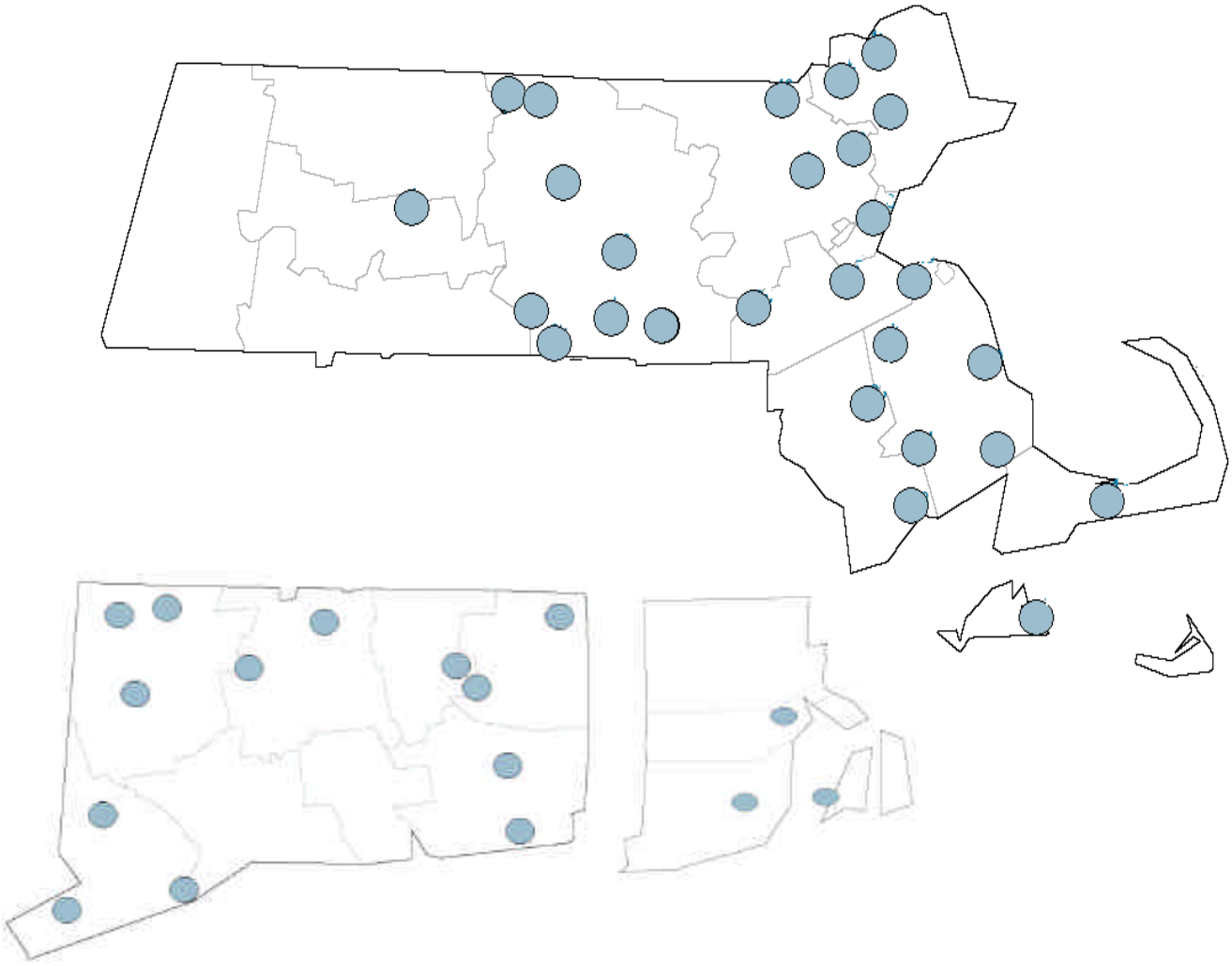
Using Pest Forecasts to Enhance IPM

- I. How it works
  - National Weather Service sites

    (currently limited to SkyBit Inc. data, but other source could be used)

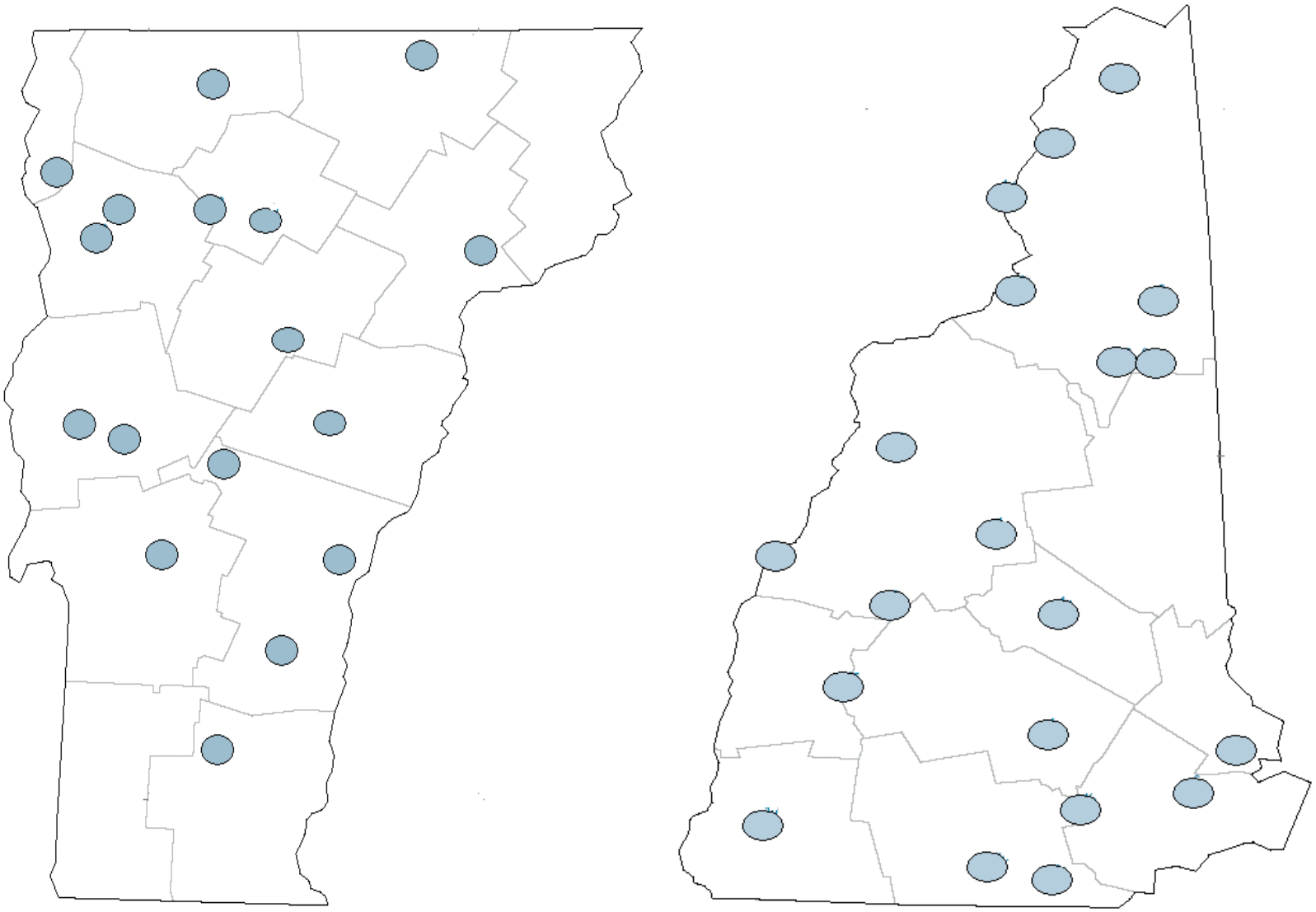
National Weather Service sites:

Massachusetts, Connecticut, Rhode Island

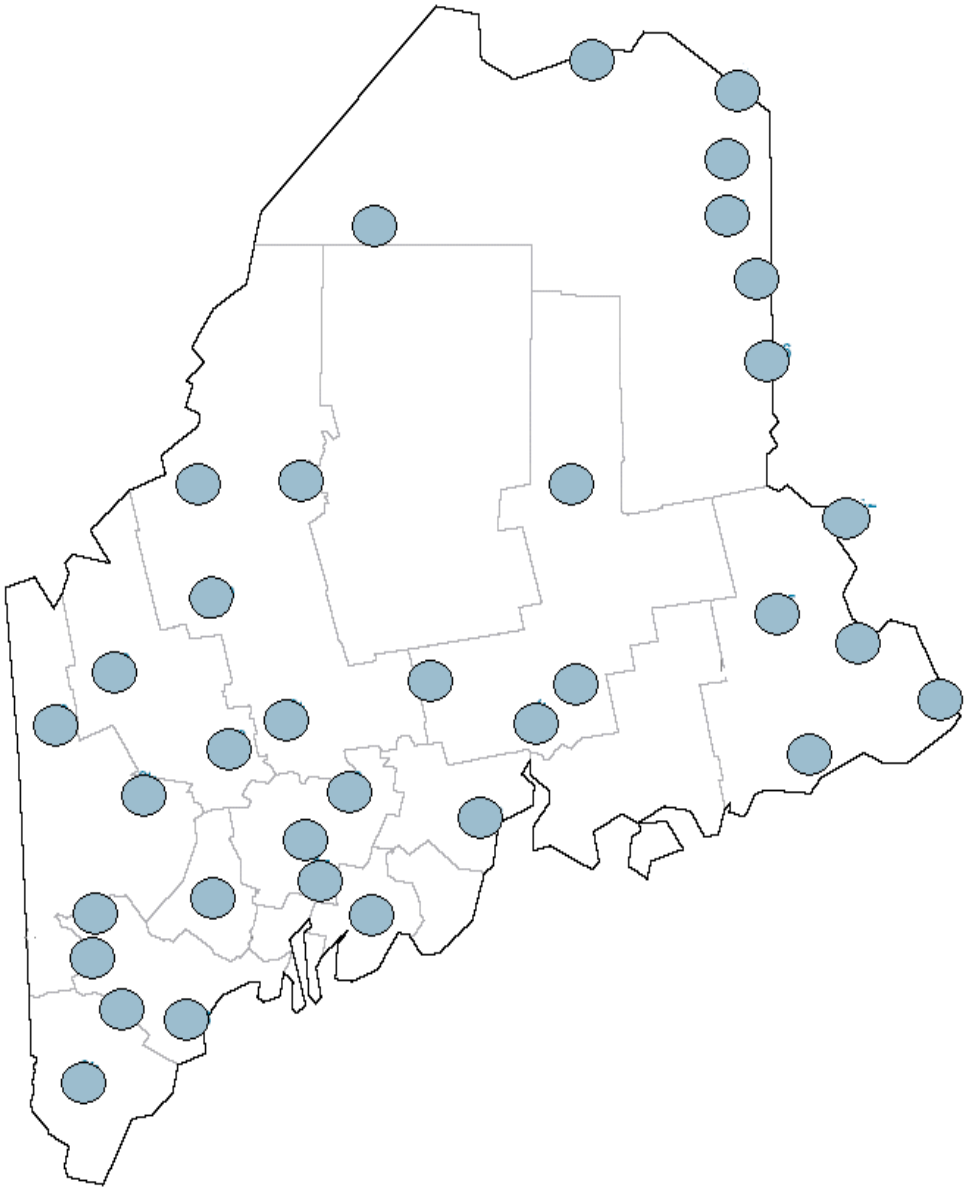


National Weather Service sites:

Vermont & New Hampshire



National Weather Service sites: Maine



Using Pest Forecasts to Enhance IPM

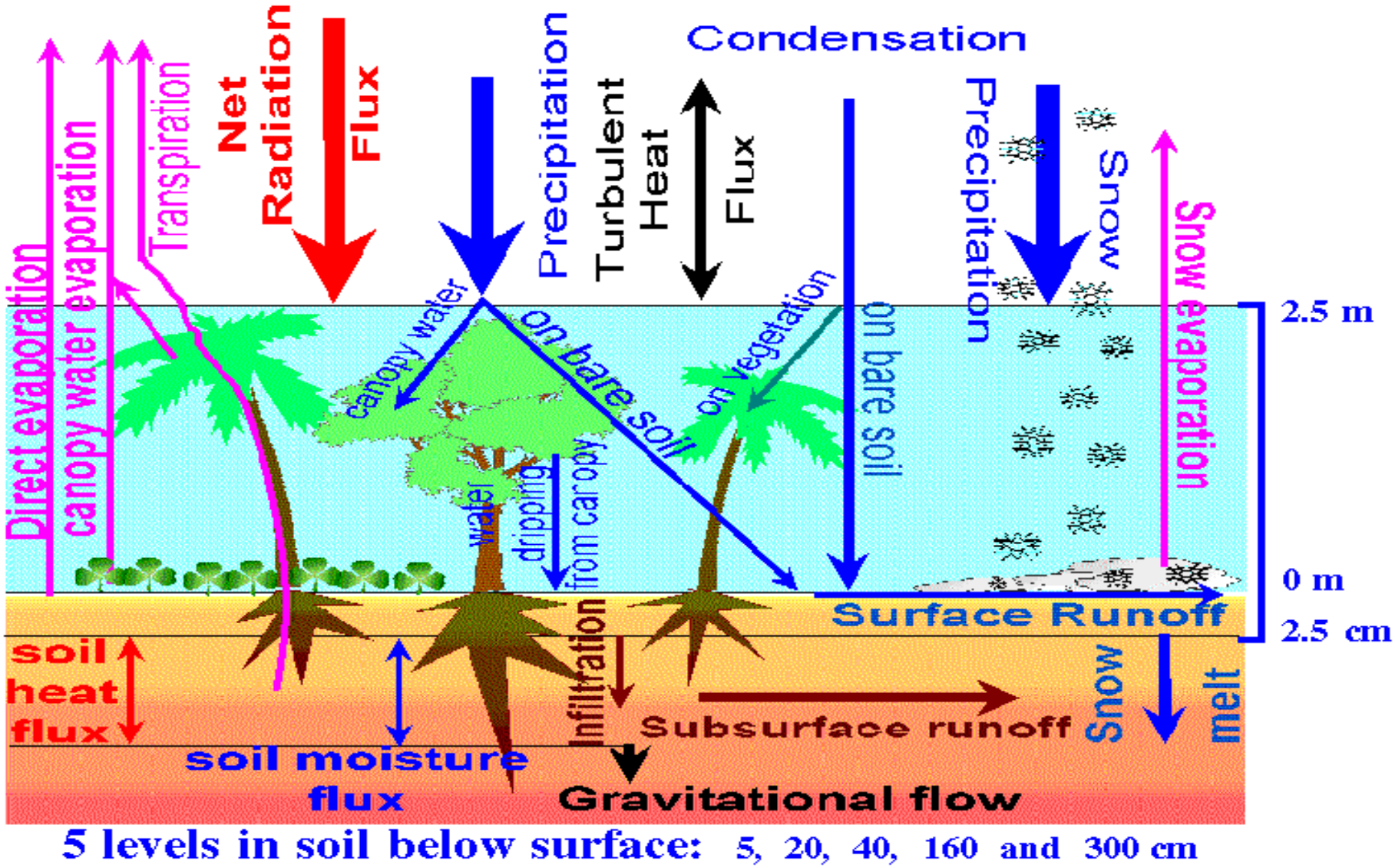
- How it works
  - National Weather Service sites
  - Interpolated weather values (temp., humidity, rain, wind etc.)
  - – Data transfer
    - – Number crunching
      - – Presentation
        - – Web publishing

Using Pest Forecasts to Enhance IPM

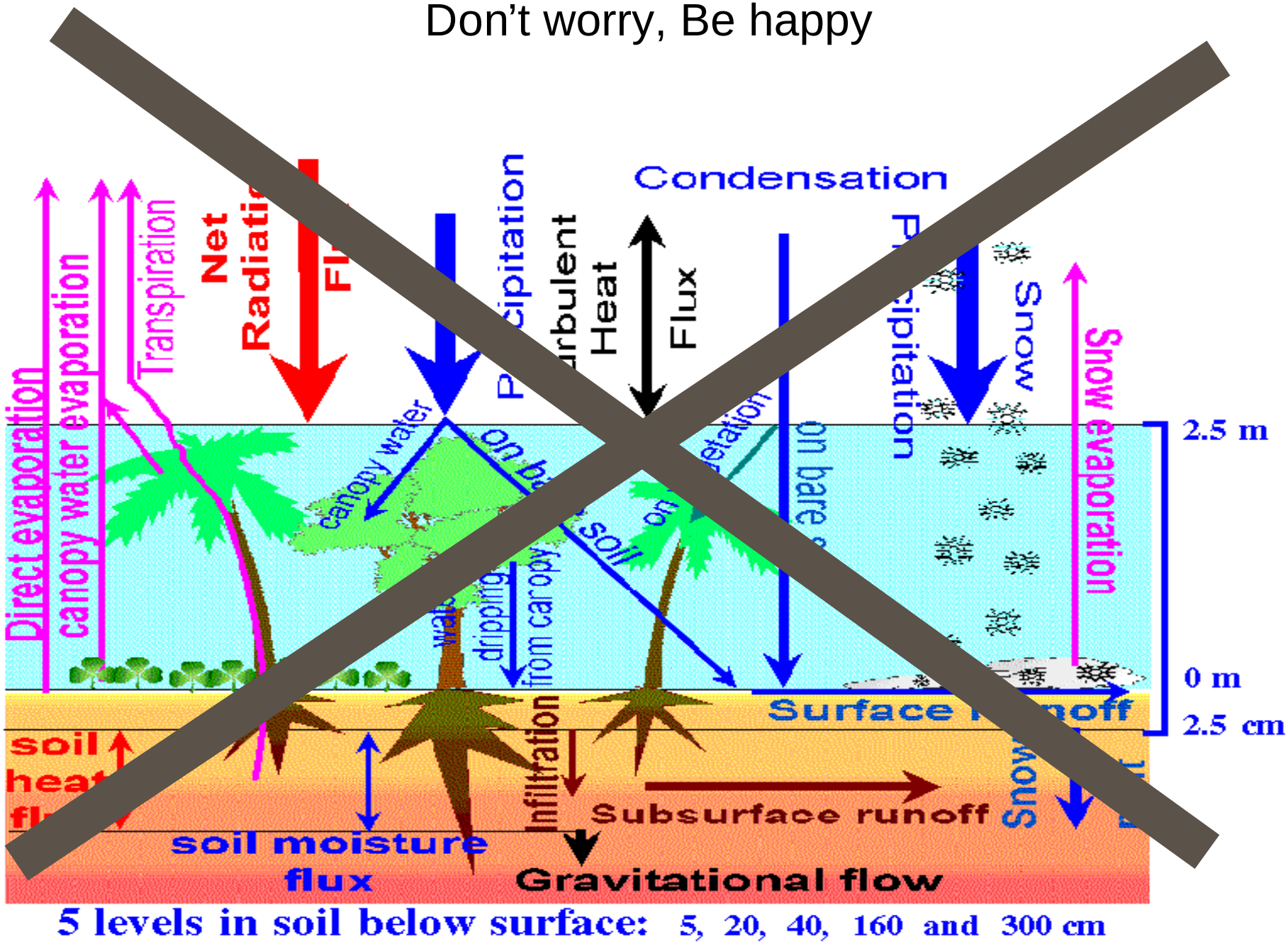
- II. What it Does
  - Disease infection periods:
    begin – peak - end dates
  - Insect/mite activity:
    hatching – feeding – oviposition
  - Key monitoring dates
  - Pesticide residue depletion:
    spray – respray dates

The word “models” covers a lot of territory

From things like this:



Don’t worry, Be happy



to simple but useful guidelines:

During primary scab,
a full dose captan application
is good for 7 days growth
or 2 inches rain

--- or ---

The best time to check for
2nd generation leafminers
is 690 degree days (base 43F)
after Petal fall

even estimates based on multiple factors are reduced to simple date observations:

If you last sprayed captan on Tuesday May 10, then due to rapid tissue growth, coverage should be renewed on May 15.

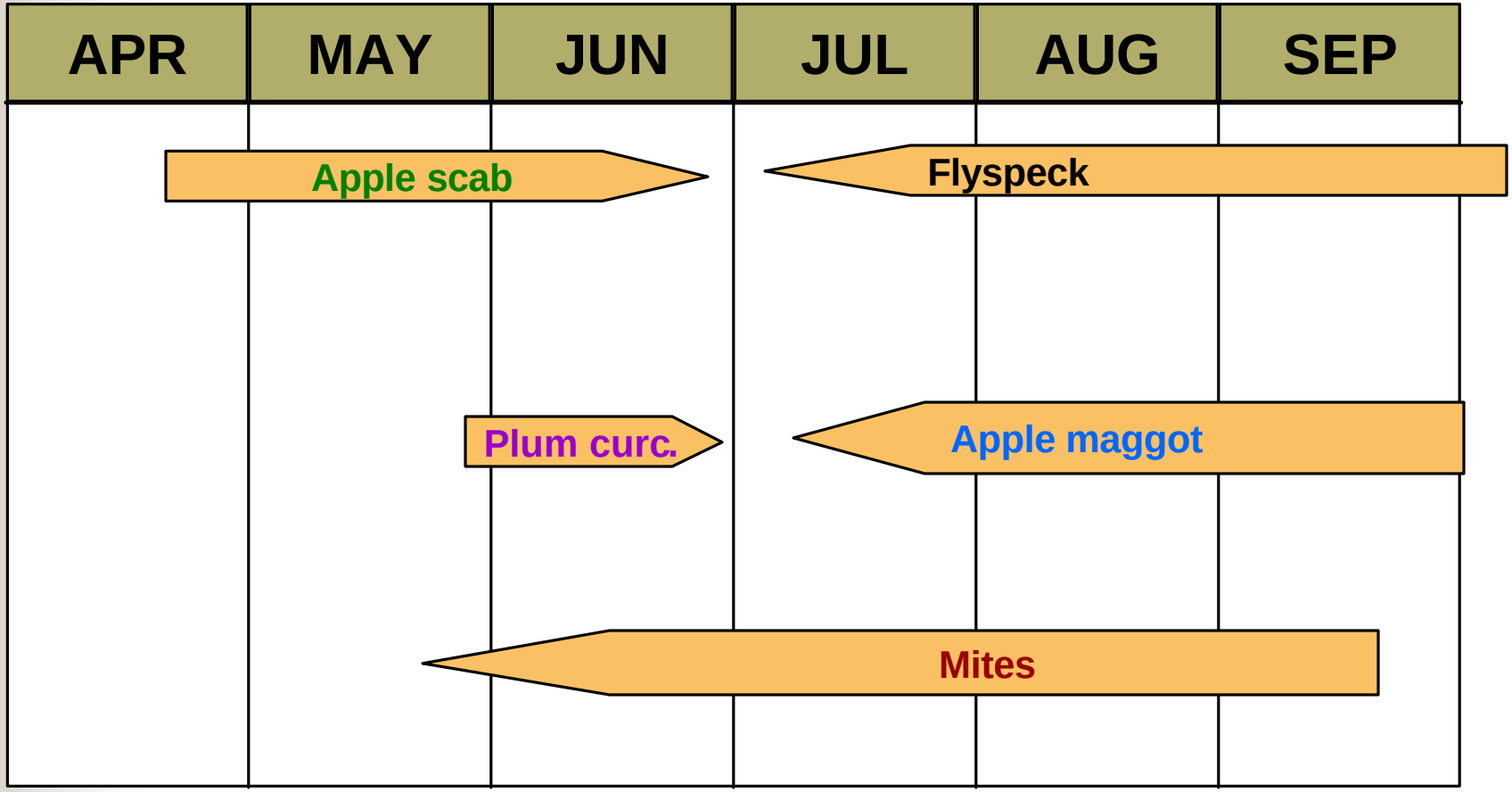
--- or ---

The best date to check for 2nd generation leafminers is July 14.

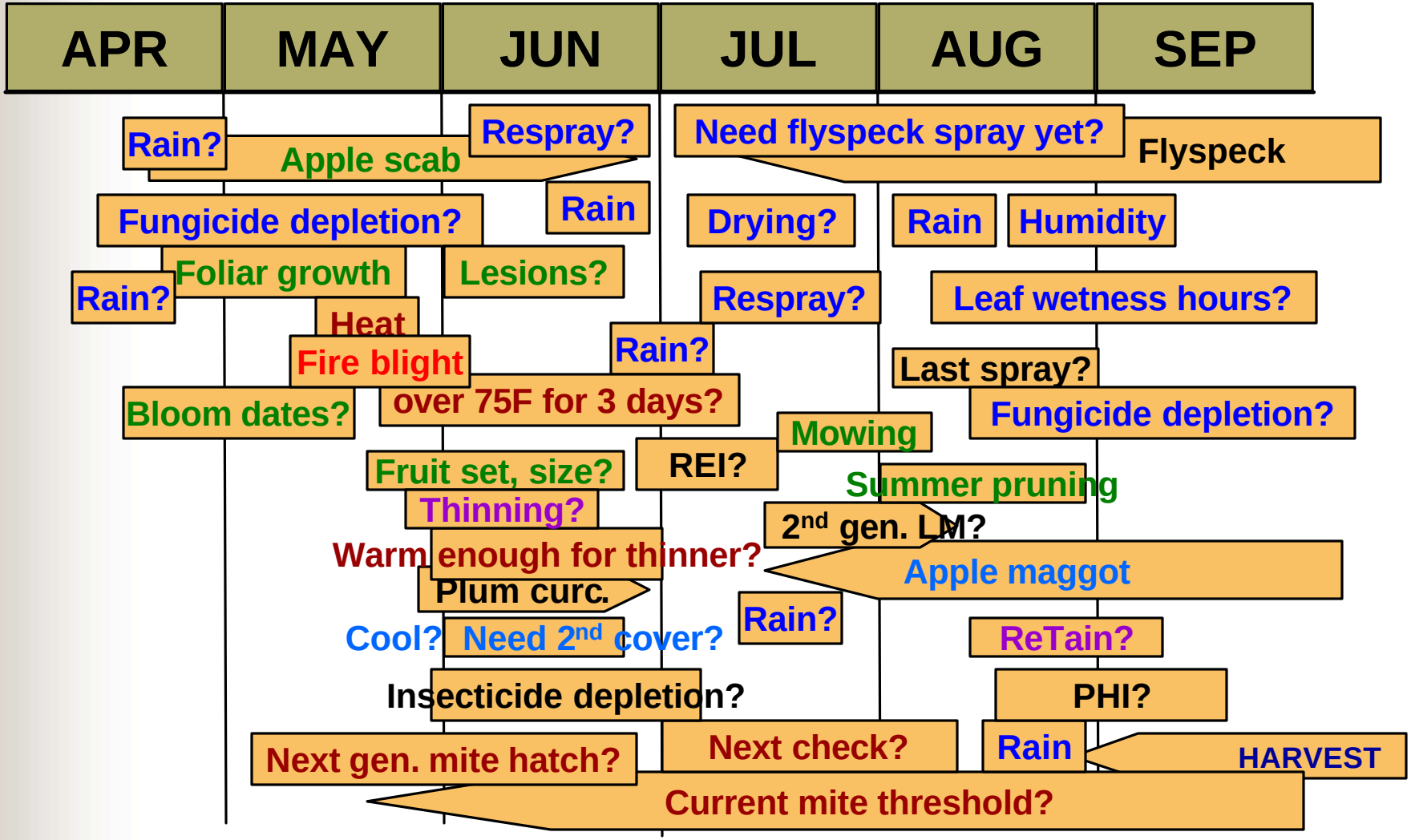
Using Pest Forecasts to Enhance IPM

- II. What it Does
  - Organizes information into usable format
  - Reference points and reminders to check your brain against
  - Gives early warning / lead time

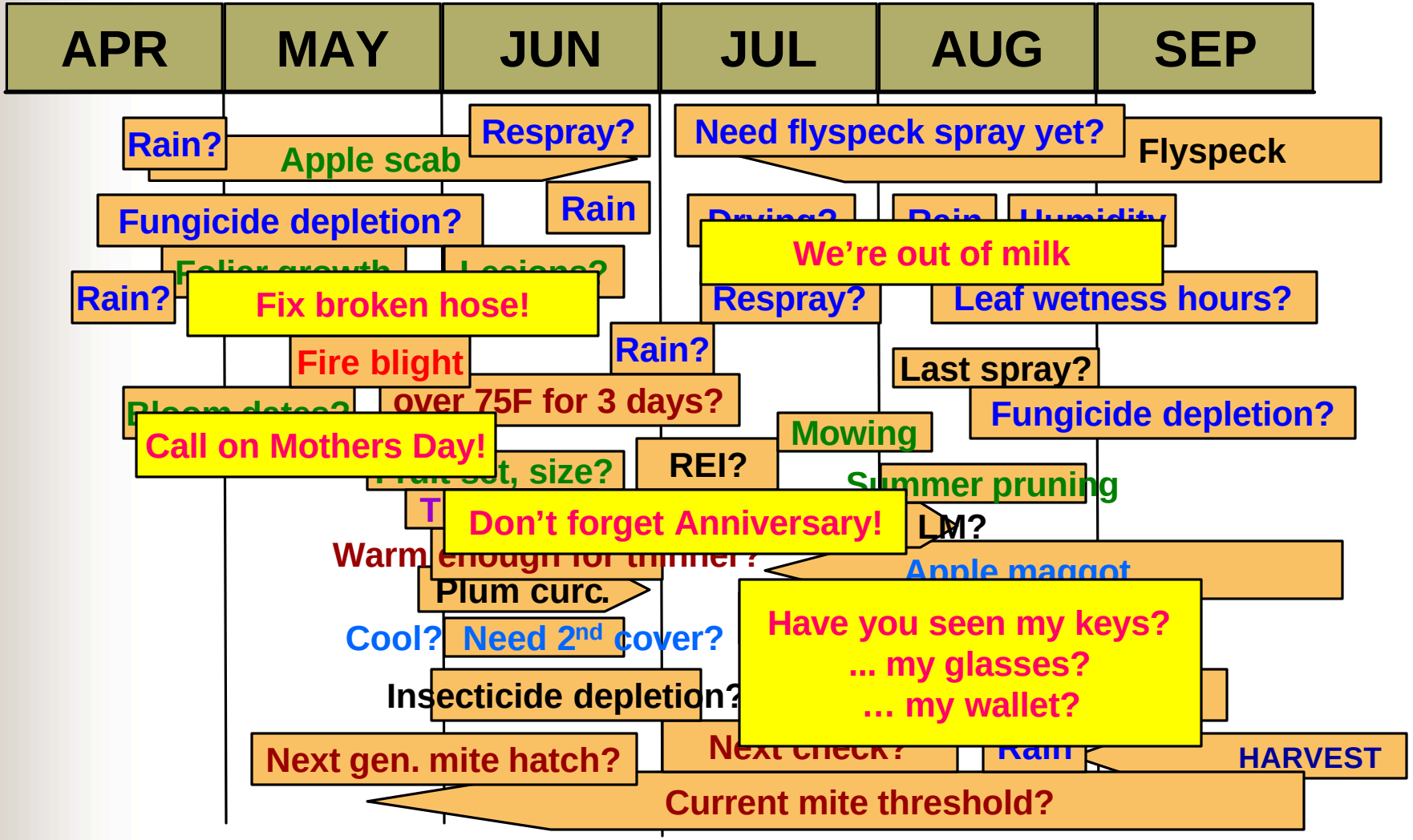
Major Apple Pest Timeline



…becomes Major Apple Pest Complexity



… and then there's the other stuff

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Using Pest Forecasts to Enhance IPM

- II. What it Does
  - Organizes information into usable format
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Using Pest Forecasts to Enhance IPM

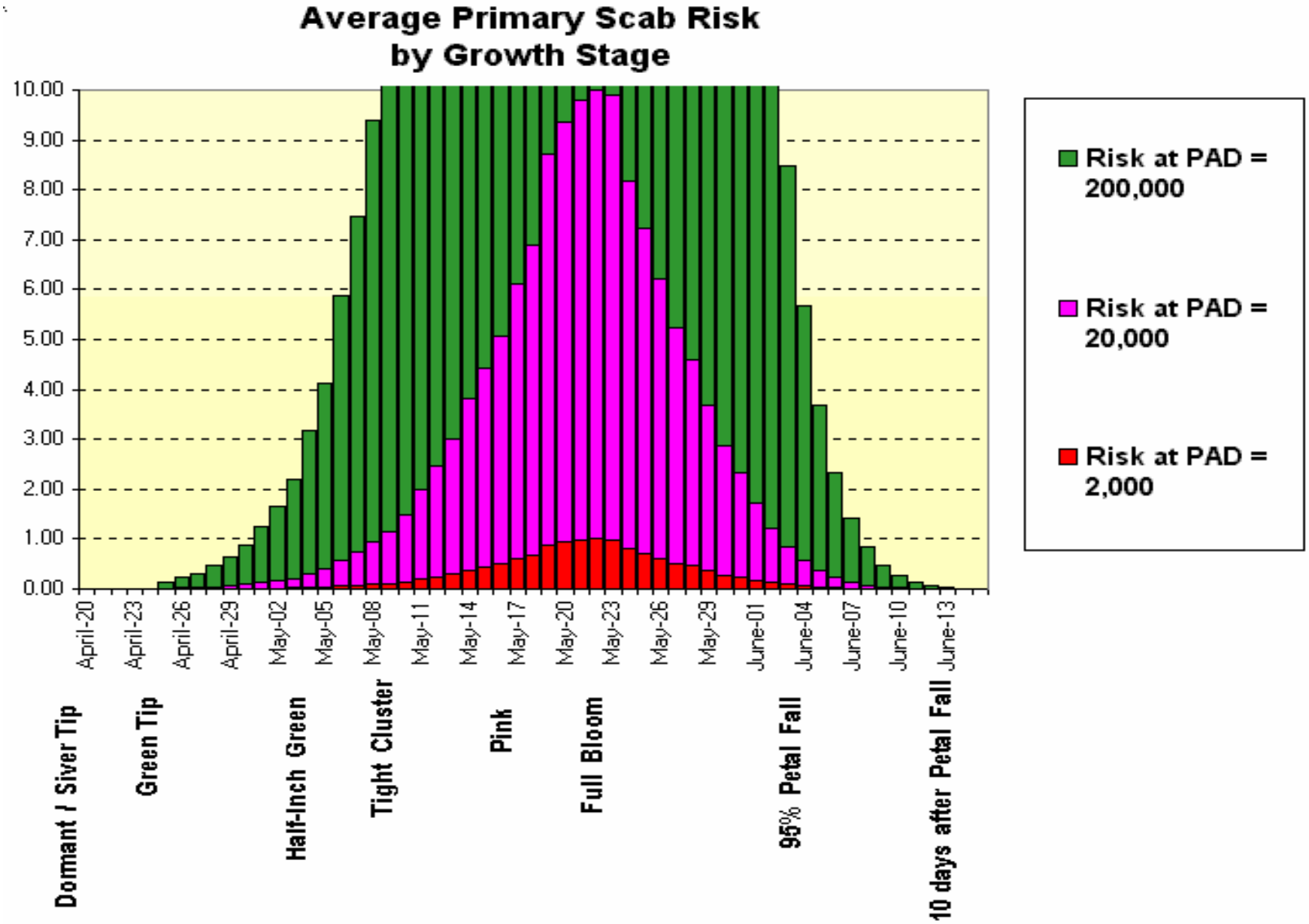
- III. What it Means

  - **As little or as much as you want it to It is a reference tool.**

    ‘Hammers don’t build houses, models don’t make decisions’ Tim Smith

  - **Risk estimates are relative**

Disease risk is RELATIVE



Using Pest Forecasts to Enhance IPM

- III. What it Means

  - **How accurate are the predictions?**

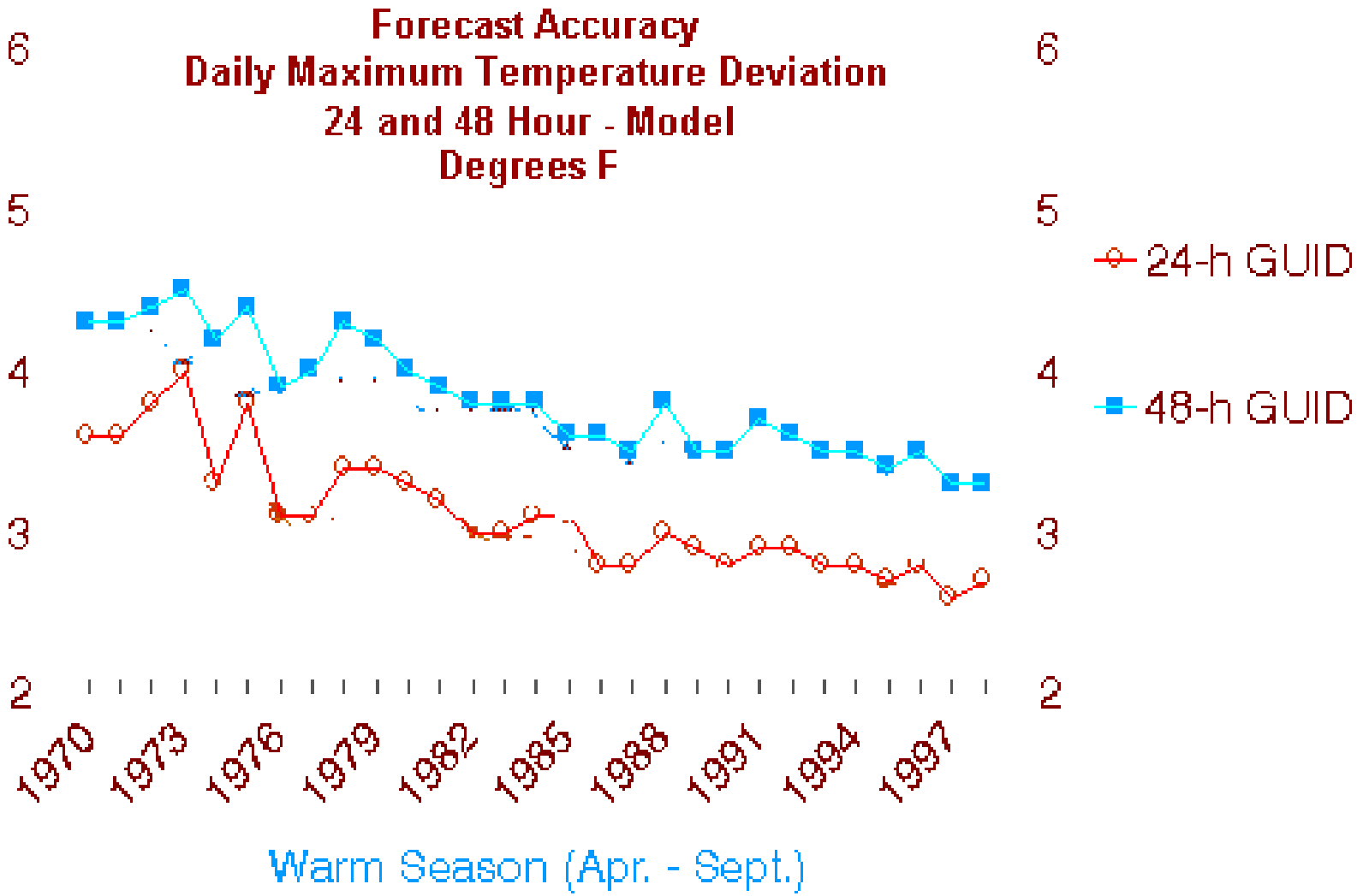
    Depends on

    Weather forecast accuracy

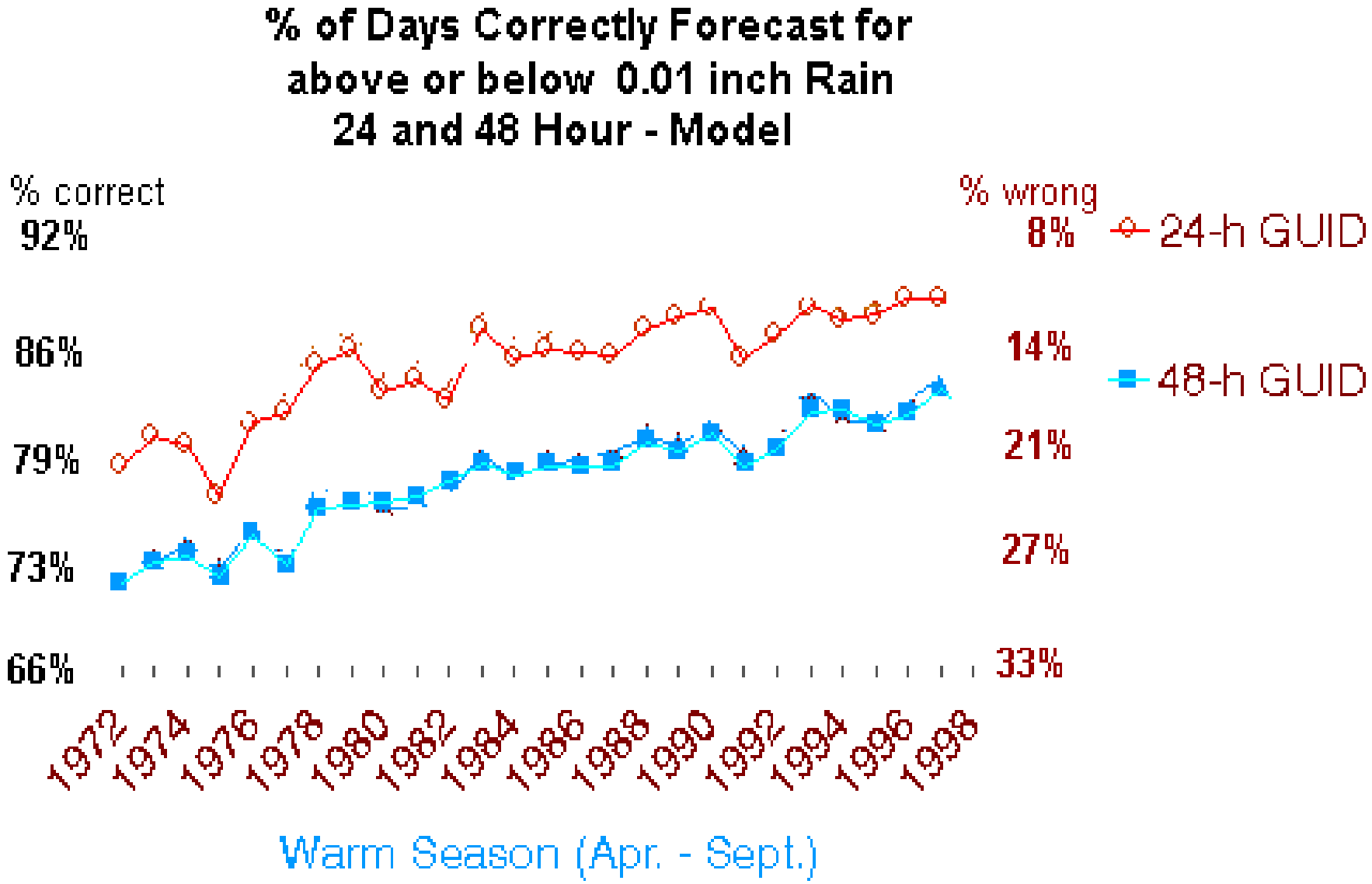
    &

    Model validity

How accurate are 1 and 2-day temperature forecasts?



How accurate are 1 and 2-day rain forecasts?



How far ahead are bud stage forecasts useful?

Geneva NY McIntosh bud stage dates 2004

Actual	10 day forecast	Deviation
King bloom – May 10	May 12	+2 (0)
Full bloom – May 13	May 12	- 1 (-2)
Petal fall – May 17	May 15	- 2 (-2)

How far ahead are insect activity forecasts useful?

Geneva & *Highland NY insect trap catch dates 2004

Actual	10 day forecast	Deviation
1st Codling moth May 17	May 19	+2 (+1)
*2nd gen. STLM flight June 7	June 7	0 (0)
1st flight OBLR - June 7	June 9	+2 (+2)
2nd flight OFM - June 24	July 1	+7 (+9)
1st catch AM June 24	June 23	-1 (-1)

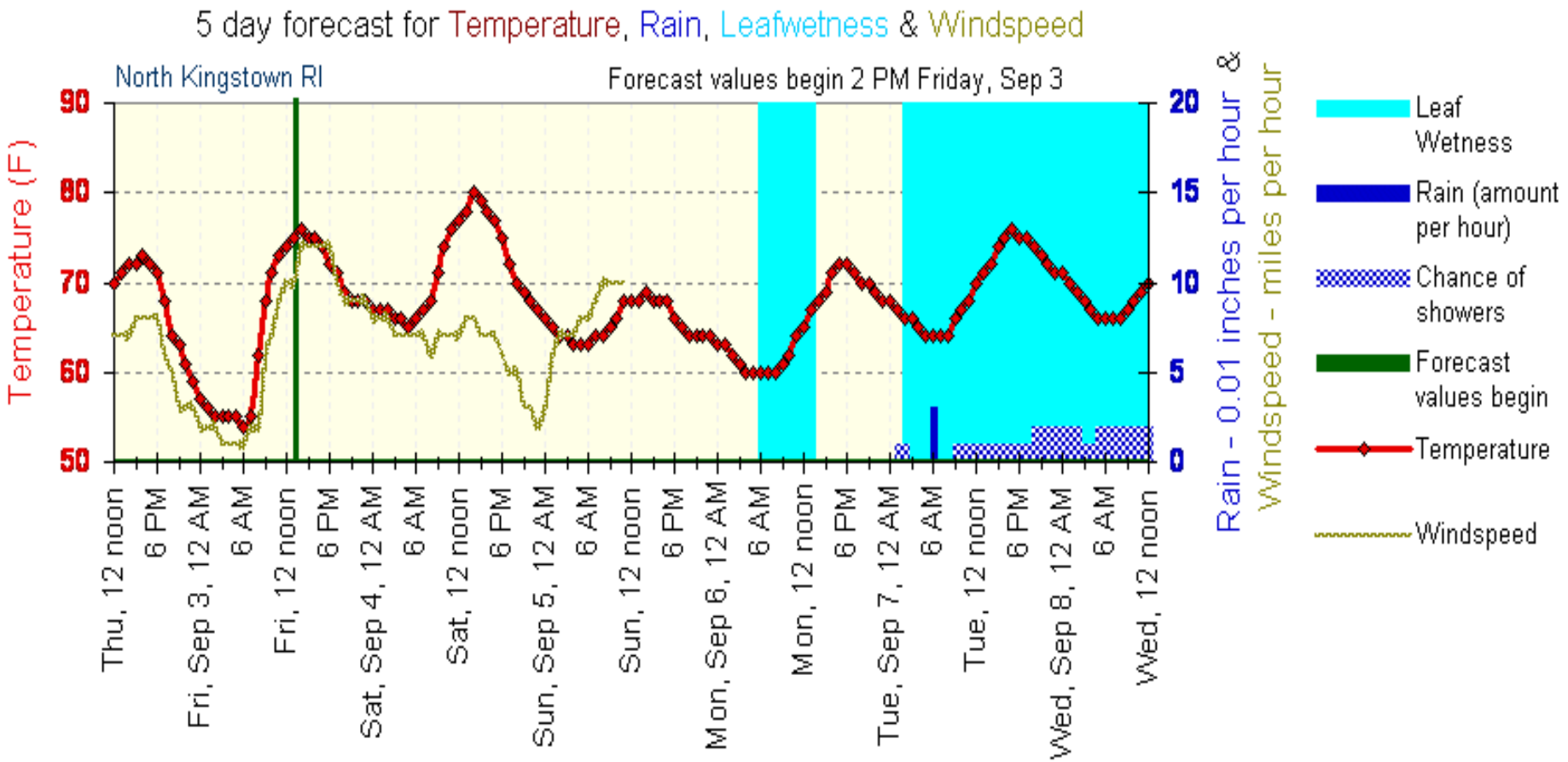
Using Pest Forecasts to Enhance IPM

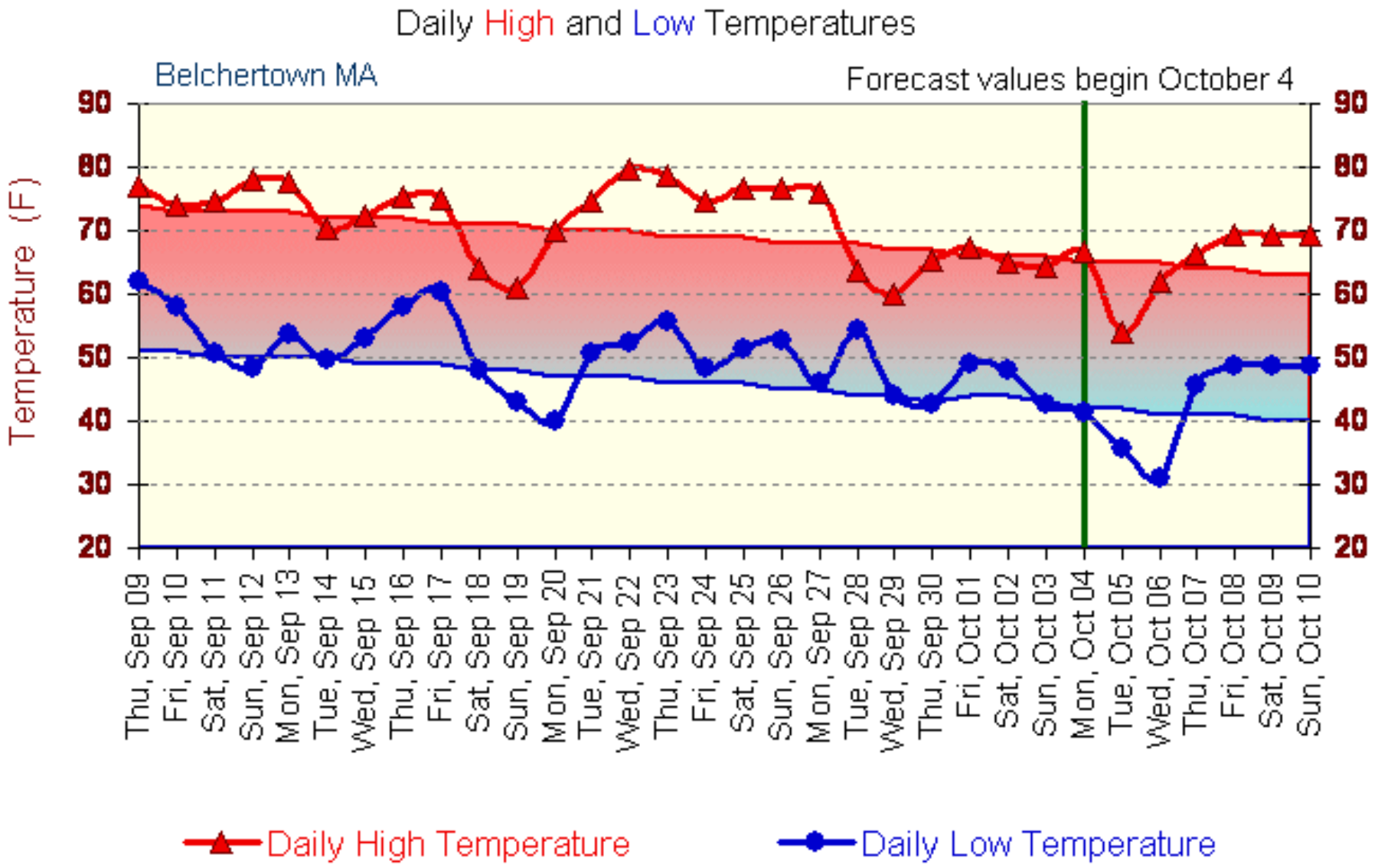
- IV. Making it Work for You

  - There are 68 tables and charts.
    You don't need to look at them all!

    Just pick the ones that match what's on your mind!

  - **Regular stops – weather graph, calendar**


5 day forecast for Temperature, Rain, Leafwetness & Windspeed
North Kingstown RI
Forecast values begin 2 PM Friday, Sep 3
Temperature (F)
90
80
70
60
50
20
15
10
5
0
Rain - 0.01 inches per hour &
Windspeed - miles per hour
Thu, 12 noon
6 PM
Fri, Sep 3, 12 AM
6 AM
Fri, 12 noon
6 PM
Sat, Sep 4, 12 AM
6 AM
Sat, 12 noon
6 PM
Sun, Sep 5, 12 AM
6 AM
Sun, 12 noon
6 PM
Mon, Sep 6, 12 AM
6 AM
Mon, 12 noon
6 PM
Tue, Sep 7, 12 AM
6 AM
Tue, 12 noon
6 PM
Wed, Sep 8, 12 AM
6 AM
Wed, 12 noon
Leaf Wetness
Rain (amount per hour)
Chance of showers
Forecast values begin
Temperature
Windspeed


Daily High and Low Temperatures
Belchertown MA
Forecast values begin October 4
Temperature (F)
90
80
70
60
50
40
30
20
Thu, Sep 09
Fri, Sep 10
Sat, Sep 11
Sun, Sep 12
Mon, Sep 13
Tue, Sep 14
Wed, Sep 15
Thu, Sep 16
Fri, Sep 17
Sat, Sep 18
Sun, Sep 19
Mon, Sep 20
Tue, Sep 21
Wed, Sep 22
Thu, Sep 23
Fri, Sep 24
Sat, Sep 25
Sun, Sep 26
Mon, Sep 27
Tue, Sep 28
Wed, Sep 29
Thu, Sep 30
Fri, Oct 01
Sat, Oct 02
Sun, Oct 03
Mon, Oct 04
Tue, Oct 05
Wed, Oct 06
Thu, Oct 07
Fri, Oct 08
Sat, Oct 09
Sun, Oct 10
Daily High Temperature
Daily Low Temperature

Orchard management: key dates

Return to radar list for Monmouth ME

Weather data for Monmouth ME. Last updated on Friday, October 06, 6:21 PM

Date	Event
April 11, Tue	McIntosh trees at 50% Green Tip (observed)
April 18, Tue	First primary scab infection period (may be insignificant in low-inoculum blocks)
April 26, Wed	McIntosh trees at Half-Inch Green
May 01, Mon	First primary scab infection period on or after Half Inch Green (typically considered 1st significant risk in blocks with good scab control previous season)
May 02, Tue	Beginning of 1st generation Spotted tentiform leafminer flight

'Surface fungicide' Respray Dates for Scab Suppression

Background Information for this page
Return to radar list for Sanford ME

Weather data for Sanford ME. Forecast values begin August 27

Final primary scab infection period starts: Tuesday, June 01

Full dose SURFACE fungicide (captan, mancozeb, Polyram, Syllit) **SPRAY DATE** (application time assumed as 6 AM)	**Inches Rain** on this date	**SURFACE fungicide** **DEPLETION TIME** limiting factor shown underneath	**Deadline for next pre-infection application** This is the start time for the next infection period that has rain past the depletion time.	**Last rain hour** for the infection period that started at time shown 1 column to left. Compare the last rain hour to the post-infection application deadline (next column to right). However, an interuption in the rain may provide a spray opportunity before this time. Conversely, wind may prevent spraying until later.	**Deadline for post-infection full dose sterol inhibitor or strobilurin fungicide** spray to reach back to start time of subsequent infection period (2 cols. to left), or back to end of protection from previous protectant fungicide spray (3 cols. to left), whichever is later. Assumes no fungicide-resistant scab strains.
Mon, April 19	0	**Apr 26, 6 AM 7 days normal growth**	**Sun, Apr 25, 7 PM**	April 27, 7 PM	Thu, Apr 29, 6 AM
Tue, April 20	0	**Apr 27, 6 AM 7 days normal growth**	**Sun, Apr 25, 7 PM**	April 27, 7 PM	Fri, Apr 30, 6 AM
Wed, April 21	0	**Apr 27, 6 AM rain removal**	**Sun, Apr 25, 7 PM**	April 27, 7 PM	Fri, Apr 30, 6 AM
Thu, April 22	0	**Apr 30, 9 AM slow growth**	**Mon, May 3, 11 AM**	May 4, 9 AM	Thu, May 6, 11 AM
Fri, April 23	0.48	**May 1, 4 AM slow growth**	**Mon, May 3, 11 AM**	May 4, 9 AM	Thu, May 6, 11 AM
Sat, April 24	0.06	**May 1, 8 AM slow growth**	**Mon, May 3, 11 AM**	May 4, 9 AM	Thu, May 6, 11 AM

****** Primary Infection Period 3 Details ******

Begin: Saturday, May 08 at 3 PM ---> End: Tuesday, May 11 at 11 AM.
Growth stage at start of period: Between Open Cluster and Full Pink
Infection period conditions rating is 59. This infection period accounts for roughly 14 % of the year's total primary scab risk.
44 leaf wet hours, with 56 F degrees average temperature during wet hours.
Cumulative scab ascospore release by end of this wetting period is roughly 38 %.

Reliable protection against infection during this period expected if full dose + good coverage contact fungicide applied since Tuesday, May 04, 8 AM.

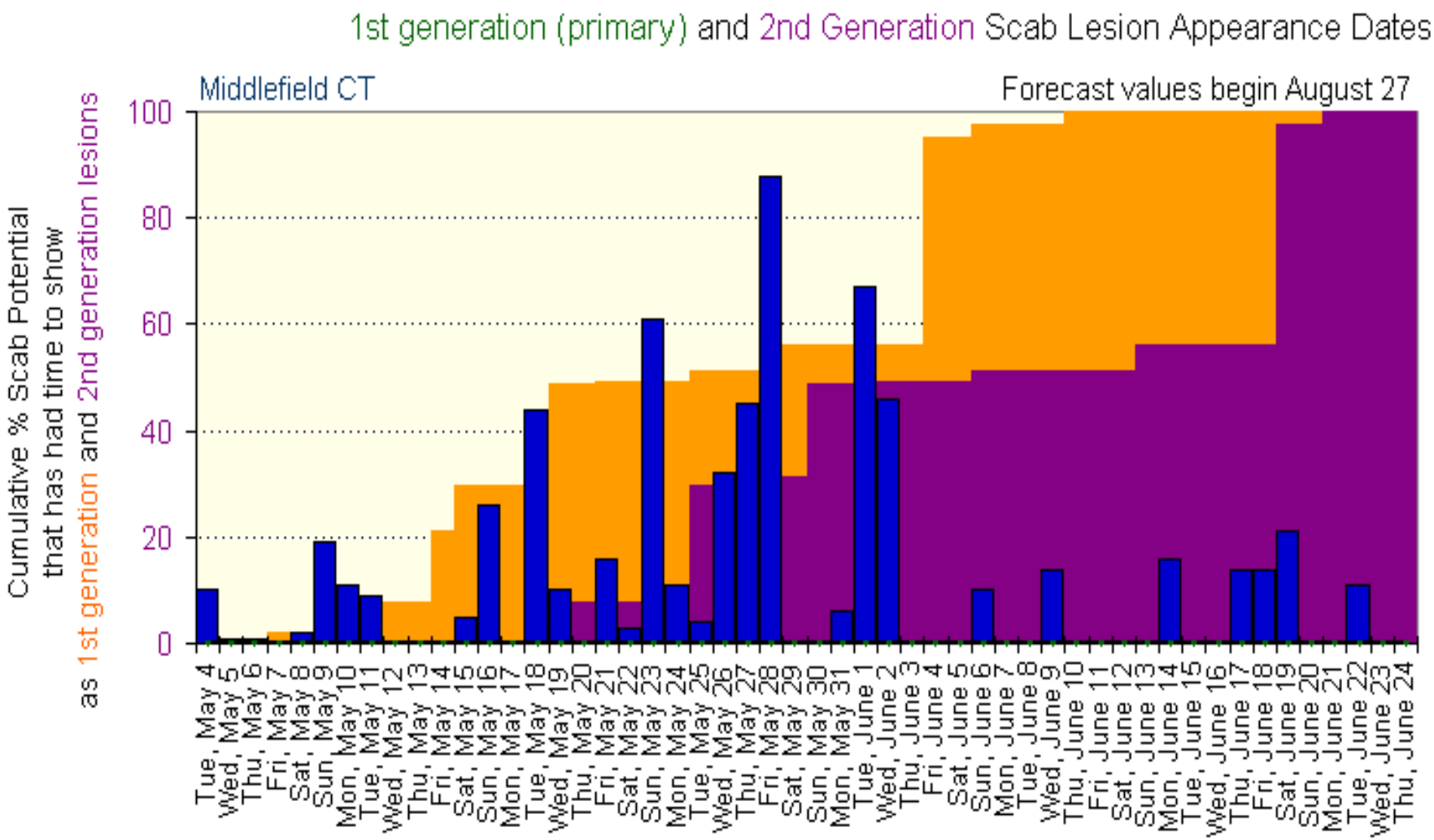
Infection period accompanied by daytime rain to release ascospores.

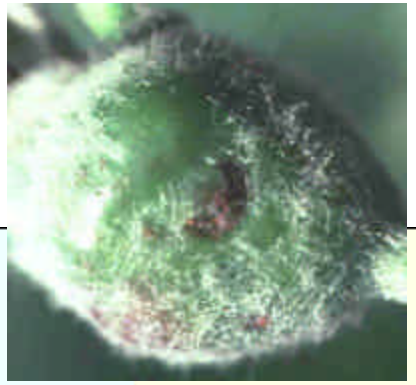
Opportunity for contact fungicide kickback ends Sunday, May 09, at 12 PM. Counting from beginning of daytime rain (low inoculum blocks), opportunity for contact fungicide kickback ends Sunday, May 09, at 12 PM.

Opportunity for sterol inhibitor fungicide 96 hour kickback ends Wednesday, May 12, at 3 PM. Counting from beginning of daytime rain (low inoculum blocks), opportunity for sterol inhibitor fungicide 96 hour kickback ends Wednesday, May 12, at 3 PM.

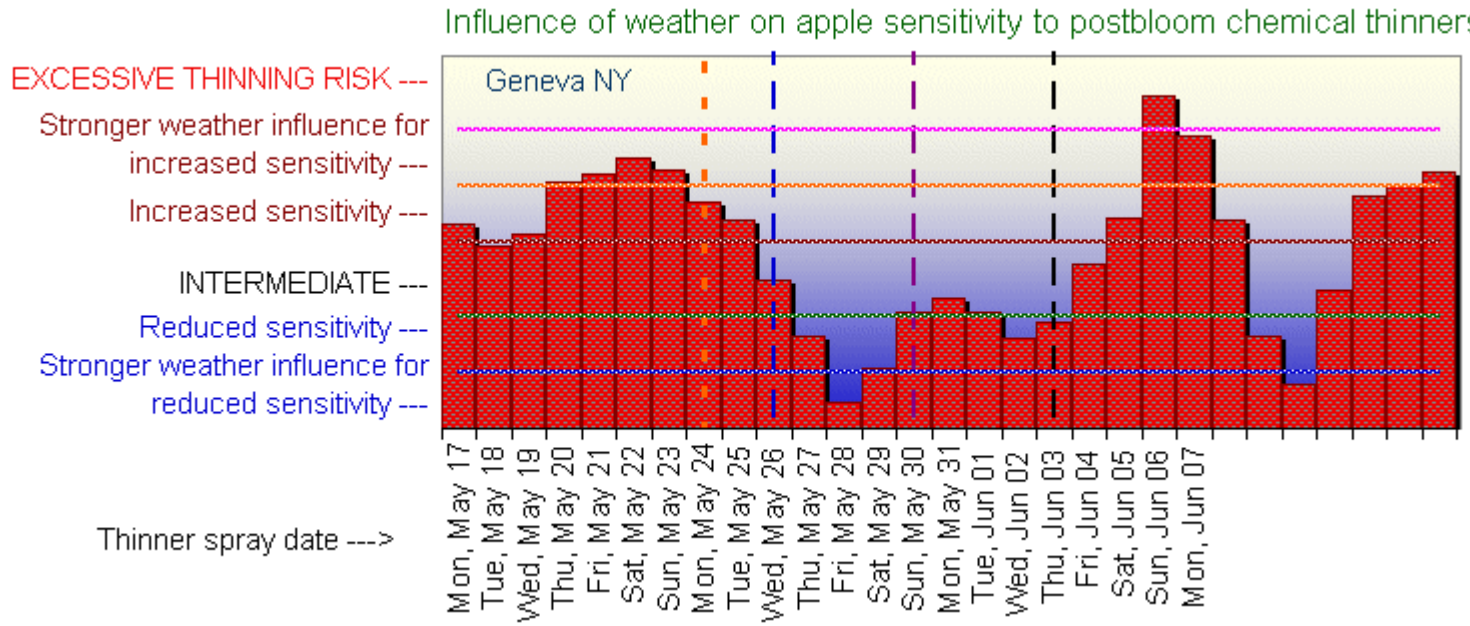
First generation lesions arising from this infection period could show as early as Friday, May 21. If conidia from 1st generation lesions spread infection, 2nd generation lesions could show as early as Saturday, June 05.

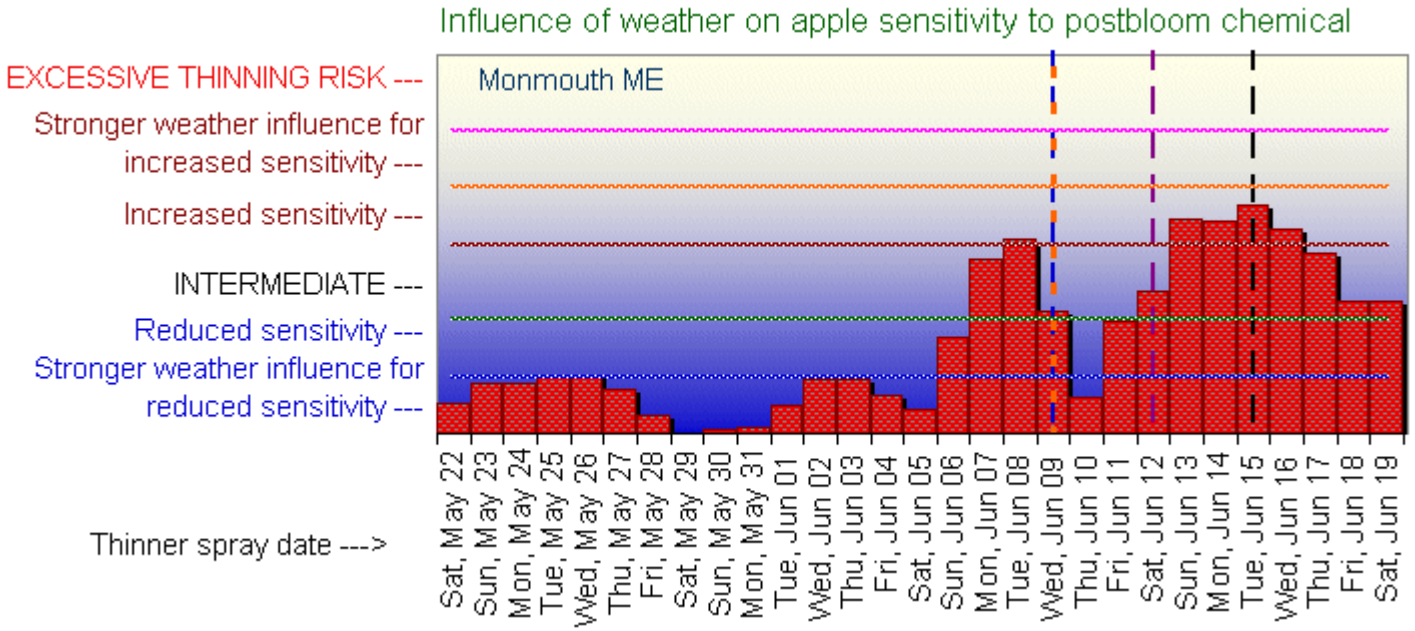
will have lost all open blossoms and susceptibility to blossom nfection. Gray box dates included for late cultivars and late-blooming young trees.	Inches Rain & Leaf Wet Hours & Heat Units	No area FB in last two years I	FB in area last year, but over 1 mile away II	FB last year within 1 mile III	Currently active FB IV
Mon, May 10	0.05", 11 hrs., 261 HU	Low	Low	Marginal	**HIGH!**
Tue, May 11	0.02", 10 hrs., 441 HU	Marginal	**HIGH!**	**HIGH!**	**EXTREME!**
Wed, May 12	0.", 0 hrs., 707 HU	0	0	0	0
Thu, May 13	0.22", 17 hrs., 1090 HU	**EXTREME!**	**EXTREME!**	**EXTREME!**	**EXTREME!**
Fri, May 14	0.46", 11 hrs., 1103 HU	**EXTREME!**	**EXTREME!**	**EXTREME!**	**EXTREME!**
Sat, May 15	0.43", 24 hrs., 967 HU	**EXTREME!**	**EXTREME!**	**EXTREME!**	**EXTREME!**
Sun, May 16	0.", 13 hrs., 709 HU	HIGH! (if dew)	EXTREME! (if dew)	EXTREME! (if dew)	EXTREME! (if dew)
Mon, May 17	0.01", 9 hrs., 545 HU	**HIGH!**	**HIGH!**	**EXTREME!**	**EXTREME!**
Tue, May 18	0.24", 16 hrs., 428 HU	Marginal	**HIGH!**	**HIGH!**	**EXTREME!**
Wed, May 19	0.", 12 hrs., 424 HU	Marginal (if dew)	HIGH! (if dew)	HIGH! (if dew)	EXTREME! (if dew)
Thu, May 20	0.41", 4 hrs., 540 HU	**HIGH!**	**HIGH!**	**EXTREME!**	**EXTREME!**
Fri, May 21	0.03", 19 hrs., 361 HU	Low	Marginal	**HIGH!**	**EXTREME!**
Sat, May 22	0.41", 13 hrs., 346 HU	Low	Low	**HIGH!**	**HIGH!**
Sun, May 23	0.93", 21 hrs., 457 HU	Marginal	**HIGH!**	**HIGH!**	**EXTREME!**
Mon, May 24	1.37", 21 hrs., 521 HU	**HIGH!**	**HIGH!**	**EXTREME!**	**EXTREME!**
Tue, May 25	0.23", 11 hrs., 519 HU	**HIGH!**	**HIGH!**	**EXTREME!**	**EXTREME!**
Wed, May 26	0.02", 15 hrs., 443 HU	Marginal	**HIGH!**	**HIGH!**	**EXTREME!**
Thu, May 27	0.47", 11 hrs., 446 HU	Marginal	**HIGH!**	**HIGH!**	**EXTREME!**
Fri, May 28	0.45", 14 hrs., 261 HU	Low	Low	Marginal	**HIGH!**
Sat, May 29	0.", 0 hrs., 222 HU	0	0	0	0
Sun, May 30	0.", 0 hrs., 182 HU	0	0	0	0


1st generation (primary) and 2nd Generation Scab Lesion Appearance Dates
Middlefield CT
Forecast values begin August 27
Cumulative % Scab Potential
that has had time to show
as 1st generation and 2nd generation lesions
100
80
60
40
20
0
Tue, May 4
Wed, May 5
Thu, May 6
Fri, May 7
Sat, May 8
Sun, May 9
Mon, May 10
Tue, May 11
Wed, May 12
Thu, May 13
Fri, May 14
Sat, May 15
Sun, May 16
Mon, May 17
Tue, May 18
Wed, May 19
Thu, May 20
Fri, May 21
Sat, May 22
Sun, May 23
Mon, May 24
Tue, May 25
Wed, May 26
Thu, May 27
Fri, May 28
Sat, May 29
Sun, May 30
Mon, May 31
Tue, June 1
Wed, June 2
Thu, June 3
Fri, June 4
Sat, June 5
Sun, June 6
Mon, June 7
Tue, June 8
Wed, June 9
Thu, June 10
Fri, June 11
Sat, June 12
Sun, June 13
Mon, June 14
Tue, June 15
Wed, June 16
Thu, June 17
Fri, June 18
Sat, June 19
Sun, June 20
Mon, June 21
Tue, June 22
Wed, June 23
Thu, June 24



Full-dose Plum Curculio (PC) insecticide Spray Date	PC degree days accumulated on spray date	Inches Rain	Estimated end of protection	Percent of PC control period (& PC deg. days) completed by end of protection
	95% McIntosh Petal Fall			
Tue, May 11		0.09	May 23, Sun	50% (170)
Wed, May 12	21	0	May 23, Sun	50% (170)
Thu, May 13	38	0	May 23, Sun	50% (170)
Fri, May 14	47	0	May 24, Mon	53% (180)
Sat, May 15	66	0.05	May 25, Tue	56% (190)
Sun, May 16	82	0.26	May 26, Wed	57% (193)
Mon, May 17	93	0	May 27, Thu	60% (203)
Tue, May 18	107	0.44	May 28, Fri	63% (213)
Wed, May 19	120	0.10	May 28, Fri	63% (213)
Thu, May 20	131	0	May 28, Fri	63% (213)
Fri, May 21	146	0.16	May 28, Fri	63% (213)
Sat, May 22	157	0.03	May 28, Fri	63% (213)
Sun, May 23	170	0.61	June 1, Tue	71% (240)
Mon, May 24	180	0.11	June 1, Tue	71% (240)
Tue, May 25	190	0.04	June 1, Tue	71% (240)
Wed, May 26	193	0.32	June 1, Tue	71% (240)
Thu, May 27	203	0.45	June 2, Wed	74% (253)
Fri, May 28	213	0.88	June 11, Fri	100% (381)
Sat, May 29	219	0	June 12, Sat	100% (392)
Sun, May 30	228	0	June 13, Sun	100% (405)


Influence of weather on apple sensitivity to postbloom chemical thinners
Geneva NY
EXCESSIVE THINNING RISK ---
Stronger weather influence for increased sensitivity ---
Increased sensitivity ---
INTERMEDIATE ---
Reduced sensitivity ---
Stronger weather influence for reduced sensitivity ---
Thinner spray date --->
Mon, May 17
Tue, May 18
Wed, May 19
Thu, May 20
Fri, May 21
Sat, May 22
Sun, May 23
Mon, May 24
Tue, May 25
Wed, May 26
Thu, May 27
Fri, May 28
Sat, May 29
Sun, May 30
Mon, May 31
Tue, Jun 01
Wed, Jun 02
Thu, Jun 03
Fri, Jun 04
Sat, Jun 05
Sun, Jun 06
Mon, Jun 07


Influence of weather on apple sensitivity to postbloom chemical
Monmouth ME
EXCESSIVE THINNING RISK ---
Stronger weather influence for increased sensitivity ---
Increased sensitivity ---
INTERMEDIATE ---
Reduced sensitivity ---
Stronger weather influence for reduced sensitivity ---
Thinner spray date --->
Sat, May 22
Sun, May 23
Mon, May 24
Tue, May 25
Wed, May 26
Thu, May 27
Fri, May 28
Sat, May 29
Sun, May 30
Mon, May 31
Tue, Jun 01
Wed, Jun 02
Thu, Jun 03
Fri, Jun 04
Sat, Jun 05
Sun, Jun 06
Mon, Jun 07
Tue, Jun 08
Wed, Jun 09
Thu, Jun 10
Fri, Jun 11
Sat, Jun 12
Sun, Jun 13
Mon, Jun 14
Tue, Jun 15
Wed, Jun 16
Thu, Jun 17
Fri, Jun 18
Sat, Jun 19

Insect pest degree day models

Return to radar list for Morrill ME

Weather data for Morrill ME. Last updated on Friday, October 01, 5:44 PM

Codling Moth CM

1st generation 3% CM egg hatch: June 14, Monday
(= first spray date where two sprays needed to control 1st generation codling moth, 2nd spray is 2-3 weeks later)

1st generation 20% CM egg hatch: June 23, Wednesday
(= single spray date where one spray needed to control 1st generation codling moth)

2nd generation 3% CM egg hatch: August 06, Friday
(= first spray date where two sprays needed to control 2nd generation codling moth, 2nd spray is 2-3 weeks later)

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