Cornell University

Hudson Valley Research Laboratory

Fire Blight 101

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16 Feb 2017

121st Annual VTFGA Meeting and Educational Program

Outline

- Conditions Favoring Infections 2016
- History of FB in Champlain Valley
- Fire Blight is Risk of Production
- Management Strategy
- Future Outbreaks

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- **Conditions Favoring Infections 2016**
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Conditions Favoring Infections 2016

- NY -

- Late cv-s: still in bloom
- Early cv-s: rat-tail flowers; young shoots
- Extremely conducive conditions in NE:
  - **Bloom (still)**
  - **No terminal bud set**
  - **Shoot growth**
  - **Hot: high 80's**
  - **Several short rain or dew events**
  - **Storms with hail**
  - **Fire blight history (nursery, old cankers) 0.5 miles**
- May 27, thinning meeting: predicted extreme risks – rain on 29 & 30

NEWA - Summary

Fire Blight Risk Predictions for Peru

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

First blossom open date: 5/7/2016

First blossom open date above is estimated *based on degree day accumulations. Infection cannot occur without open blossoms. If the predicted bloom date is incorrect,* ***enter the actual date for blocks of interest*** *and the model will calculate the protection period during bloom more accurately. If bloom in your orchard has not yet occurred, continue to check Cougarblight daily and monitor your bloom. If bloom in your orchard has not yet occurred, enter a future bloom date, up to five days into the future, to gauge fire blight risk potential.*

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

The orchard blight history above is the NEWA default. Select the actual blight history for your orchard and the model will recalculate recommendations.

Blossom Blight Summary - Cougarblight

	Past	Past	Current	Blossom Blight 5-Day Forecast (Forecast Details)				
Date	May 18	May 19	May 20	May 21	May 22	May 23	May 24	May 25
4-day DH	15	33	140	311	407	599	743	866
Risk Level	Low	Low	Low	High	High	Extreme	Extreme	Extreme
Wetness Events								
Rain Amount	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.05
Rain Prob (%) Night|Day			-|-	-|-	-|-	-|-	-|-	-|-
Dew	Yes	Yes	Yes	No	No	Yes	No	Yes
Leaf Wetness (hours)	0	1	0					

NA - data not available

Cougarblight Charts

Download Time: 5/20/2016 23:00

Fire Blight Risk Predictions for Chazy

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

First blossom open date: 5/10/2016

First blossom open date above is estimated *based on degree day accumulations. Infection cannot occur without open blossoms. If the predicted bloom date is incorrect,* ***enter the actual date for blocks of interest*** *and the model will calculate the protection period during bloom more accurately. If bloom in your orchard has not yet occurred, continue to check Cougarblight daily and monitor your bloom. If bloom in your orchard has not yet occurred, enter a future bloom date, up to five days into the future, to gauge fire blight risk potential.*

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Blossom Blight Summary - Cougarblight

	Past	Past	Current	Blossom Blight 5-Day Forecast (Forecast Details)				
Date	May 18	May 19	May 20	May 21	May 22	May 23	May 24	May 25
4-day DH	10	51	180	342	436	602	745	863
Risk Level	Low	Low	Caution	High	High	Extreme	Extreme	Extreme
Wetness Events								
Rain Amount	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.05
Rain Prob (%) Night|Day			-|-	-|-	-|-	-|-	-|-	-|-
Dew	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Leaf Wetness (hours)	0	2	0					

NA - data not available

Cougarblight Charts

Download Time: 5/20/2016 23:00

Fire Blight Risk Predictions for Peru

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Blossom Blight Summary - Cougarblight

	Past	Past	Current	Blossom Blight 5-Day Forecast (Forecast Details)				
Date	May 27	May 28	May 29	May 30	May 31	Jun 1	Jun 2	Jun 3
4-day DH	1142	1358	1315	1527	1385	1101	1106	1017
Risk Level	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
Wetness Events								
Rain Amount	0.00	0.00	0.51	0.16	0.00	0.00	0.07	0.02
Rain Prob (%) Night|Day			-|-	-|-	-|-	-|-	-|-	-|-
Dew	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Leaf Wetness (hours)	0	0	9					

NA - data not available

Cougarblight Charts

Download Time: 5/29/2016 23:00

Fire Blight Risk Predictions for Chazy

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

First blossom open date: 5/10/2016

First blossom open date above is estimated *based on degree day accumulations. Infection cannot occur without open blossoms. If the predicted bloom date is incorrect,* ***enter the actual date for blocks of interest*** *and the model will calculate the protection period during bloom more accurately. If bloom in your orchard has not yet occurred, continue to check Cougarblight daily and monitor your bloom. If bloom in your orchard has not yet occurred, enter a future bloom date, up to five days into the future, to gauge fire blight risk potential.*

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Blossom Blight Summary - Cougarblight

	Past	Past	Current	Blossom Blight 5-Day Forecast (Forecast Details)				
Date	May 27	May 28	May 29	May 30	May 31	Jun 1	Jun 2	Jun 3
4-day DH	1095	1289	1241	1462	1293	1044	1072	958
Risk Level	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme	Extreme
Wetness Events								
Rain Amount	0.00	0.00	0.38	0.12	0.00	0.00	0.09	0.02
Rain Prob (%) Night|Day			-|-	-|-	-|-	-|-	-|-	-|-
Dew	No	Yes	Yes	No	No	Yes	Yes	No
Leaf Wetness (hours)	1	0	11					

NA - data not available

Cougarblight Charts

Download Time: 5/29/2016 23:00

Maryblyt 7.1

Maryblyt 7 (modified)

File Edit Options Help

Save Print Copy Paste Save Screen as Image View Graph

Inputs **Data Entry Mode**

Date	Phenology	Max Temp (F)	Min Temp (F)	Wetness (in)	Trauma	Spray	Notes	Avg Temp (F)	EIP	BHWTR	BBS
5/15/2016	B	51.4	39.5	0.03				45.4	-	+ - + - M	-
5/16/2016	B	54.9	37.1	0.02				46.0	-	+ - + - M	-
5/17/2016	B	64.8	33.6	0.00				49.2	-	+ - - - L	-
5/18/2016	B	60.9	39.9	0.00				50.4	-	+ - - - L	-
5/19/2016	B	65.1	45.1	0.00				55.1	-	+ - - - L	-
5/20/2016	B	71.6	42.7	0.00				57.2	17	+ - - - L	-
5/21/2016	B	74.4	47.0	0.00				60.7	46	+ - - + M	-
5/22/2016	B	79.0	55.3	0.01				67.2	106	+ + + + I	-
5/23/2016	B	76.8	49.8	0.00				63.3	148	+ + - + H	9 a
5/24/2016	B	82.6	52.1	0.00				67.4	205	+ + - + H	21 a
5/25/2016	B	80.8	54.9	0.00				67.8	244	+ + - + H	34 a
5/26/2016	B	74.9	54.3	0.00				64.6	222	+ + - + H	43 a
5/27/2016	B	90.0	60.1	0.00				75.0	238	+ + - + H	63 a
5/28/2016	B	83.4	67.8	0.00				75.6	298	+ + - + H	83 a
5/29/2016	B	83.8	61.8	0.51				72.8	362	+ + + + I	100 a
5/30/2016	B	84.5	66.4	0.02				75.4	356	+ + + + I	20 b
5/31/2016	B	80.2	61.3	0.00				70.8	306	+ + - + H	35 b
6/1/2016	B	75.1	57.9	0.00				66.5	248	+ + - + H	46 b
6/2/2016	B	74.9	59.7	0.03				67.3	166	+ + + + I	58 b
6/3/2016	B	83.0	63.0	0.00				73.0	188	+ + - + H	76 b
6/4/2016	B	76.1	58.0	0.00				67.0	193	+ + - + H	87 b
6/5/2016	B	67.1	55.8	1.46				61.4	153	+ + + + I	94 b
6/6/2016	B	75.9	59.9	0.00				67.9	103	+ + + + I	106 b
6/7/2016	B	70.4	53.9	0.01				62.2	120	+ + + + I	93 c

High RH

Peru station					
		LW	rain	RH	
5/30/16 9:00	70.9	7	0	96	
5/30/16 8:00	67.9	60	0	98	
5/30/16 7:00	66.4	60	0	98	
5/30/16 6:00	66.6	60	0.01	98	
5/30/16 5:00	66.5	60	0	98	
5/30/16 4:00	66.6	60	0.01	99	
5/30/16 3:00	66.6	60	0	98	
5/30/16 2:00	66.5	60	0	98	
5/30/16 1:00	66.8	60	0	98	
5/30/16 0:00	66.9	60	0	98	
5/29/16 23:00	67.7	60	0.02	98	
5/29/16 22:00	68.5	56	0.01	98	
5/29/16 21:00	69.5	53	0	96	
5/29/16 20:00	69	60	0	98	
5/29/16 19:00	69.7	60	0.15	98	
5/29/16 18:00	70.7	60	0.05	98	
5/29/16 17:00	71.2	60	0.07	98	
5/29/16 16:00	70.4	60	0.01	98	
5/29/16 15:00	72.3	26	0.2	94	

Outline

- Conditions Favoring Infections 2016
- **History of FB in Champlain Valley**
- Fire Blight is Risk of Production
- Management Strategy
- Future Outbreaks

Fire Blight in Champlain Valley?
- Past -

- Limited outbreaks = fire blight present
- Peru: 2012, 2010, 2006
- Chazy
- Crown Point

2016:

- Flower infections occurred May 29-30 with rains
- One flower can carry ≥ 1,000,000 cells
- One shoot infected with 20 cells

Outline

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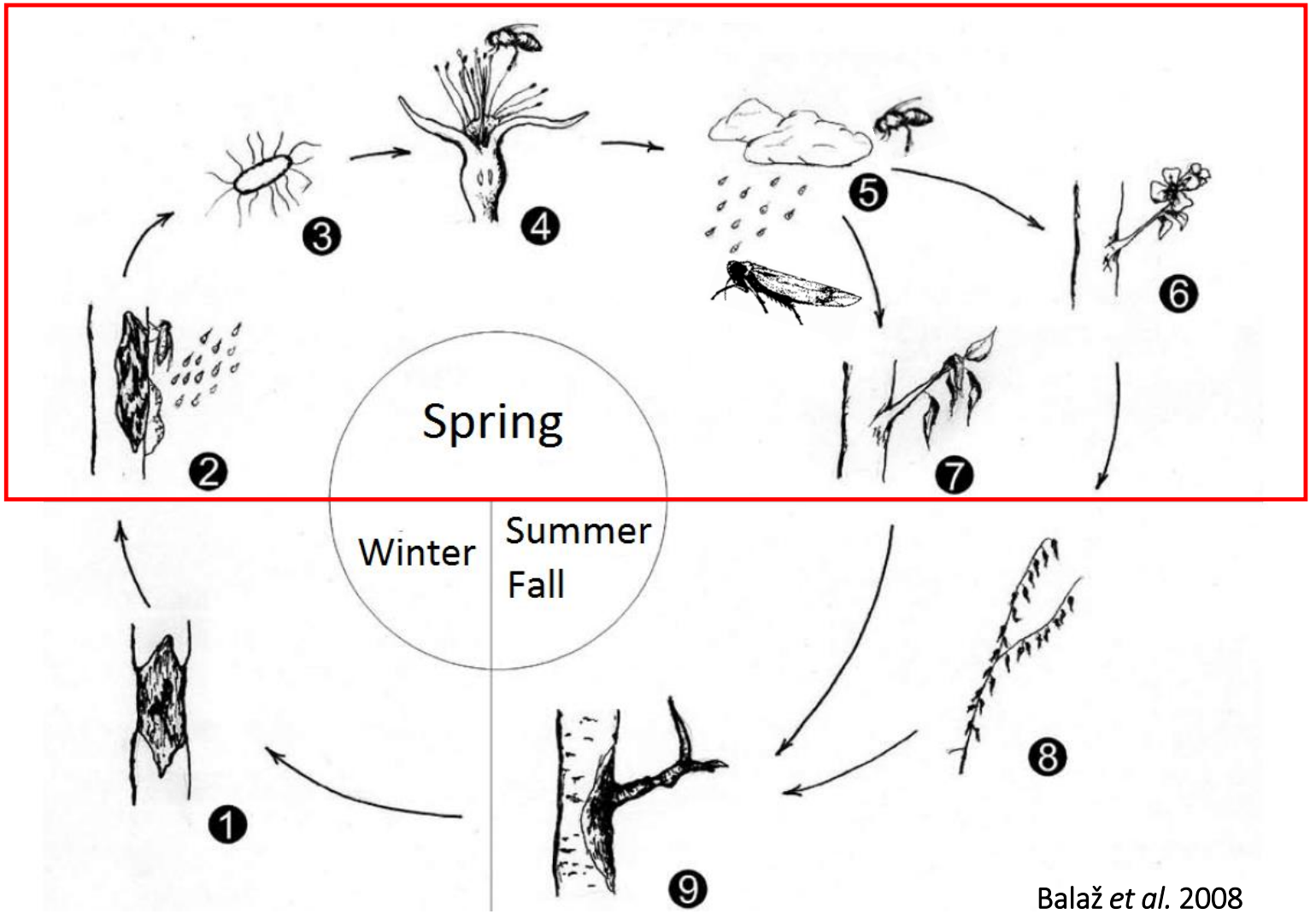
Fire Blight is a Risk of Production

- Biology -



Balaž *et al.* 2008

Diagnose – Know Your Enemy
- Actively Oozing Cankers -

http://www.omafra.gov.on.ca

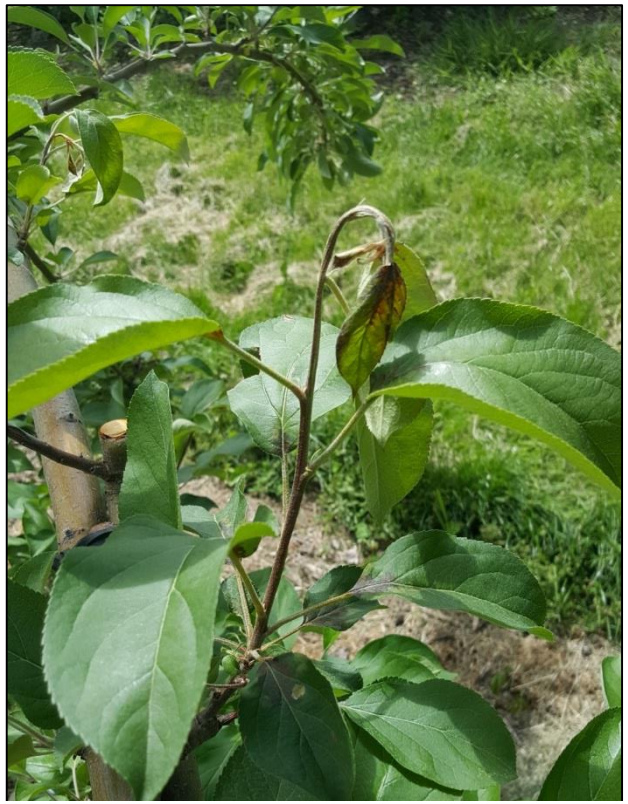
Flowers

- Ooze –

Shoots & Fruitlets

- Ooze -

Shoot Blight



Fire Blight Cankers

Determinate	Indeterminate

Worst Cases

- Trauma, Rootstock Blight -

Photo by Mark Longstroth

Photo by Michael A. Ellis


• High-density tall/super spindle (~1000/A)
• No large limbs
• Highly susceptible cultivars
• Trees < 6 yr old

Outline

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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 -

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**

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) like June 18:**
  You must spray STREPTOMYCIN: FireWall 50WP (10 oz) of 17 (24 oz) + Regulaid

Management Strategy
- Young Trees and Suckers -

- **Later bloom**
- **Prone to lingering bloom**
- **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 M.26 and M.9**
- **Avoid nitrogen**
- **Minimize/ avoid irrigation**
- **Sanitize tools when removing suckers**
- Apogee effect on suckers – no data?

Management Strategy – Scout, Pruning, Sprays
- Fall, Winter & Spring 2017 -

- **Scout, prune cankers & strikes, no tool sterilization**
  - Reduce inoculum sources (flail mow, pile burn,)
  - Difficult to find
  - 1 – 4 /2.5 Acres
- **Late dormant copper: silver to green tip/ QIG/ HIG**
  - Kills bacteria on the bark in ooze
- **Do not gamble - FB is there**
  - **Warm weather boosts bacterial populations in cankers**
- **Use prediction models - decide on bloom sprays**
  - **Bloom: streptomycin (0.5 lb/100 gal) 50 DPI**
- **Organic: Cueva + Double Nickel, Badge X2 + hydrated lime**
  - **Serenade Optimum, or Blossom Protect (alternate with strep)**

Spraying Antibiotics in Bloom 2017

- Considerations -

- Precise timing = high efficiency
- Bacterial build rapidly in flowers during warm weather (> 65 F)
- Antibiotic protects only blossoms that are open at the spray time
- After drying, antibiotic will not redistribute
- Spray just before wetting (all open blossoms are protected during infection)
- Use models to time strep sprays and avoid control failures
- MID-BLOOM: enter first strep spray in NEWA, calculate the need for additional treatment
- Reapplication to protect newly opened blossoms before the next rain

Petal fall 2017

Fact: For at-risk orchards (blight history), apply antibiotic:

1. Any open flowers,
2. No antibiotic in previous 3-4 days and the DH over 65° currently exceed or are expected to exceed 145 (MaryBlyt 7.1 EIP of 75) within the next few days

Goal: antibiotic protects lingering bloom in young orchards

Consequence: 50,000 infected shoots

- **One flower: ≥ 1,000,000 cells**
- **Shoot infection: 20 cells**

Outline

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Future Outbreaks = Yes
- Take home -

- FB present
- A lot of inoculum
- It waits until conditions are right
- Use prediction models to guide sprays
- Bloom: use FireWall (up 24h after rain event) or FireLine
- Cheaper to spray when conditions favor fire blight

FB prediction accuracy – depends on weather forecast:

- Each year is different: use NEWA Cougarblight & Maryblyt

Models Are Not Perfect

- However -

- **Border line cases - early season:**
  - **Warm but dry**
  - **Cold during bloom**
- Relative humidity unaccounted
  - 85%?
  - Canker survival research
- **Much more accurate from mid-bloom on**
  - **Usually much warmer days**
  - **Cold nights**
  - **Dew, fog, spraying**

Thank you!

- **blogs.cornell.edu/acimoviclab/**

Fire Blight in Champlain Valley 2016 (II) – Management Options in 2016 & 2017
September 12, 2016

Fire Blight in Champlain Valley 2016 (I) – History
August 26, 2016

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