Apple Disease Concerns & Management Updates from the 2015 Season

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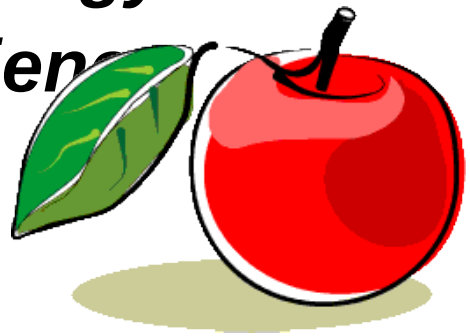


Outline

- **Using models manage fire blight & apple scab**

- Seasonal concerns & management considerations for summer rots and canker fungi

- 2015 product efficacy summary for ~~Fire blight,~~ Apple Scab, & Powdery Mildew

Managing disease using models

- Western NY followed models avoided blossom blight
  - Heavy June rains & high historical inoculum
  - Devastating shoot blight
- Eastern NY expected devastating blossom blight based on models
  - No BB or SB

Managing disease using models

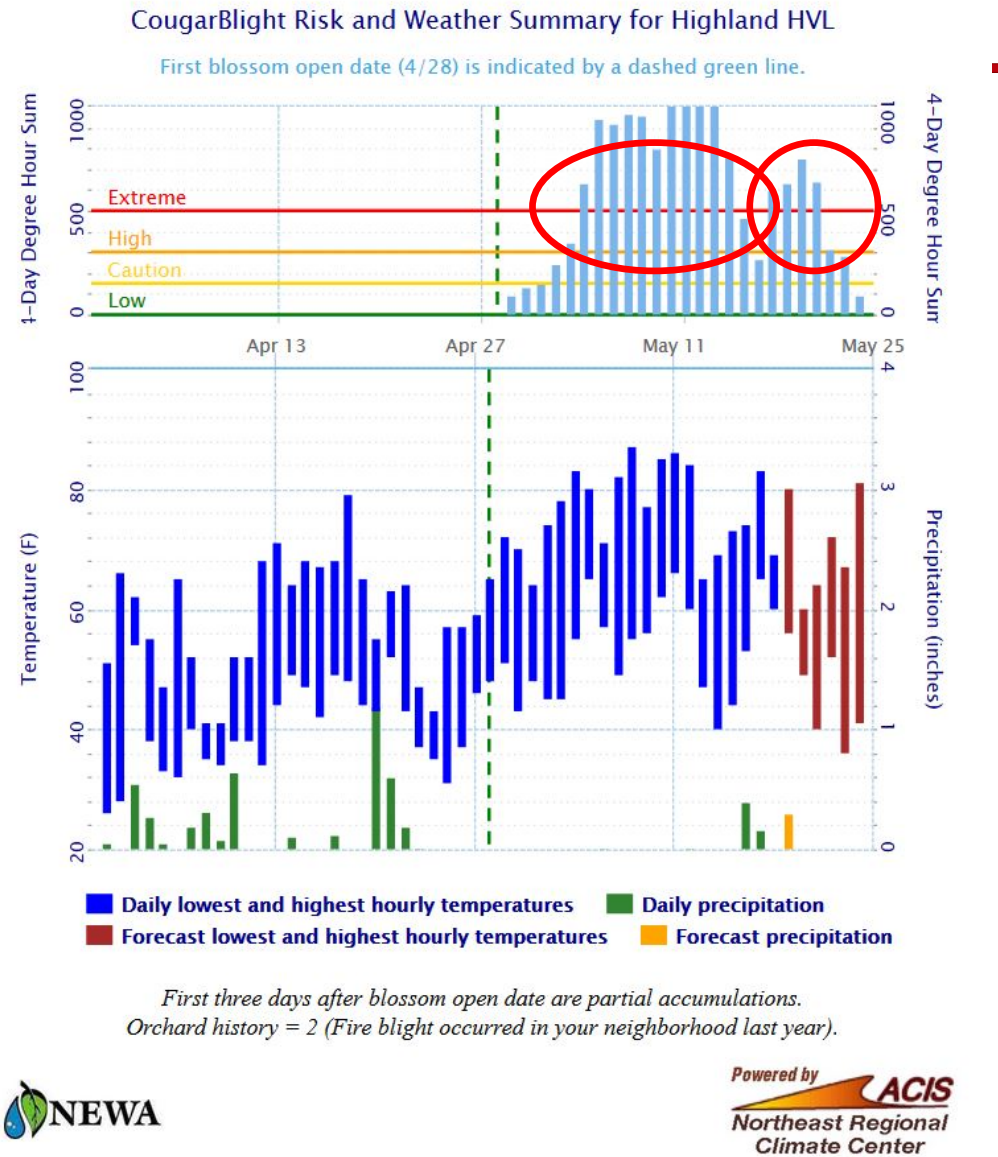
- Intuitive pest/disease forecasting web tools: developed from historically accepted logic
- Promoted and used for apples in WA, Canada, China, & Europe
- Prevents unnecessary pesticide applications, promotes pesticide stewardship, improves cost-effectiveness of pesticides, prevents losses due to disease

Managing fire blight using models

- Fire blight forecasting:
  - Predicts blossom blight infection risk periods
  - Helps track development of shoot blight only (not infection), **why?**
  - Best practice for avoiding antibiotic resistance
  - NEWA & Marybylt 7.1: both use heat units & presence of moisture

Managing fire blight using models

5-2-15



First three days after blossom open date are partial accumulations.
Orchard history = 2 (Fire blight occurred in your neighborhood last year).

NEWA

Powered by ACIS
Northeast Regional Climate Center

Managing fire blight using models

NEWA Apple Disease Models

Select a disease: Fire Blight

Weather Station: Highland HVL

Date of Interest: 05/02/2015

Calculate

5-2-15

Map | Results | More info

Fire Blight Risk Predictions for Highland HVL

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

First blossom open date: 4/28/2015

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	Apr 30	May 1	May 2	May 3	May 4	May 5	May 6	May 7
4-day DH	138*	151*	249	306	533	717	741	802
Risk Level	Low*	Caution*	Caution	High	Extreme	Extreme	Extreme	Extreme
Wetness Events								
Rain Amount	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00
Rain Prob (%) Night|Day			-|-	-|-	-|-	-|-	-|-	-|-
Dew	No	No	Yes	No	No	Yes	No	Yes
Leaf Wetness (hours)	0	0	0					

NA - data not available

Cougarblight Charts

Download Time: 5/2/2015 23:00

Managing fire blight using models

NEWA Apple Disease Models

Select a disease: Fire Blight

Weather Station: Highland HVL

Date of Interest: 05/18/2015

Calculate

5-18-15

Map | Results | More info

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Blossom Blight Summary - Cougarblight

	Past	Past	Current	Blossom Blight 5-Day Forecast (Forecast Details)				
Date	May 16	May 17	May 18	May 19	May 20	May 21	May 22	May 23
4-day DH	267	607	637	757	646	314	283	92
Risk Level	Caution	Extreme	Extreme	Extreme	Extreme	High	Caution	Low
Wetness Events								
Rain Amount	0.40	0.16	0.00	0.30	0.00	0.00	0.00	0.00
Rain Prob (%) Night|Day			-|-	-|-	-|-	-|-	-|-	-|-
Dew	Yes	Yes	Yes	Yes	Yes	No	No	No
Leaf Wetness (hours)	13	9	2					

NA - data not available

Cougarblight Charts

Download Time: 5/18/2015 23:00

Managing fire blight using models

- Considerations for models:
  - Tells: **When** and **How** favorable environmental conditions are for blossom blight infection
  - Doesn't predict control failures or future disease
  - Shoot blight: 1) **internal** movement of bacteria to growing shoot tips or 2) **external** injury following a warm windy storm
  - More cost-effective to spray for blossom blight when environment conditions are favorable
  - If you are going to spray for blossom blight, use the models to guide you application timing

Managing fire blight using models

- Considerations for models:
  - Fire Trials without inoculation during highly favorable conditions
    - No infection to Barely noticeable infection
    - Not enough to see differences between treatments
    - Shoot blight only if hot summer storms during periods of vigorous growth
  - Fire blight trial blocks don't get fire blight every year
  - Do you need to spray for fire blight?

Managing fire blight using models

- Considerations for models:
  - The consequences are too severe if fire blight develops or gets established (esp. New Plantings)

Managing apple scab using models

- Apple scab forecasting
  - Predicts ascospore maturity, ascospore release, conditions for 1’ infection
  - Helps track 1’ apple scab infection
  - 2’’ apple scab not well predicted by any model
  - NEWA & RIMpro

Infection Events Summary

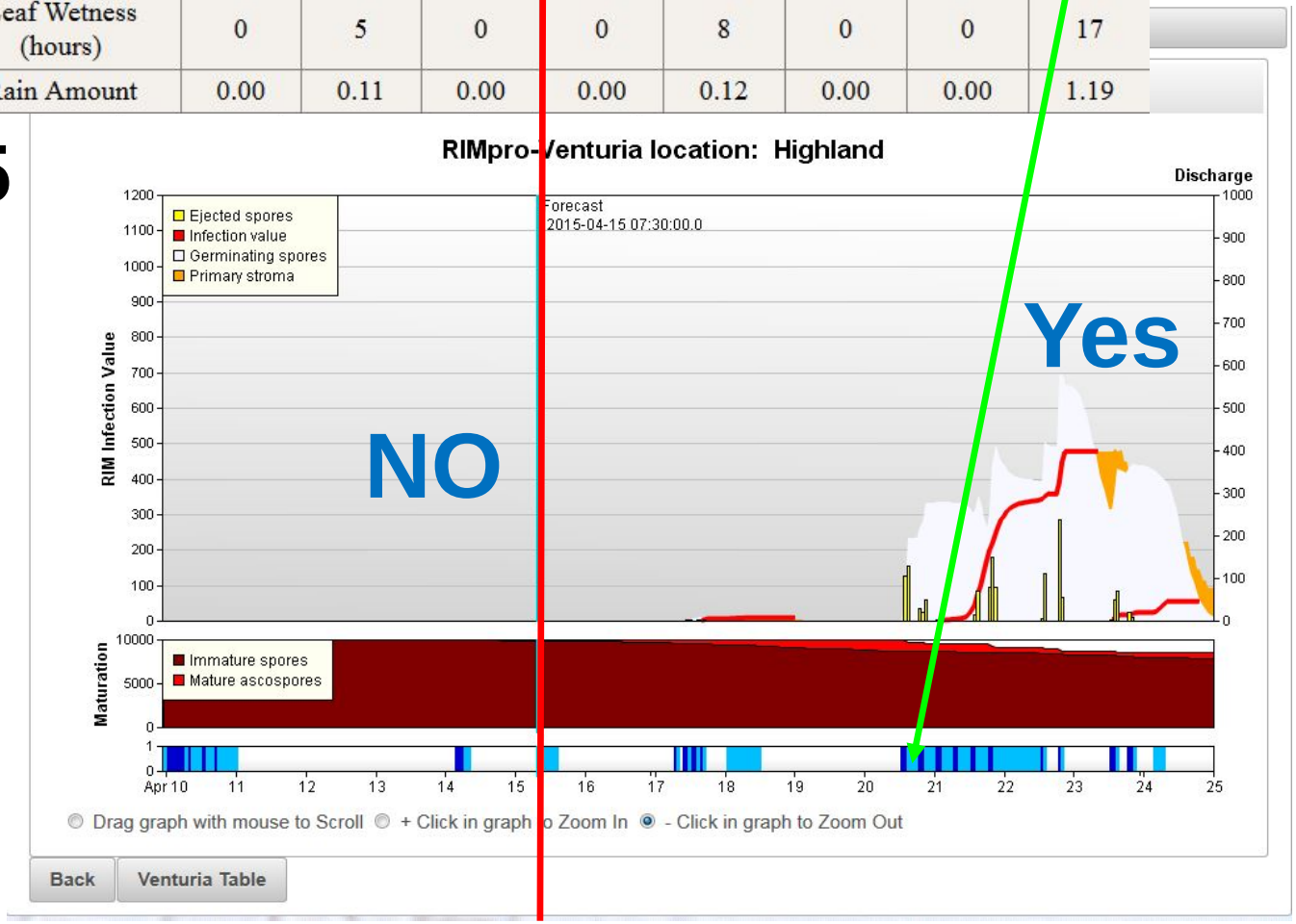
	Past	Past	Current	Ensuing 5 Days				
	Apr 13	Apr 14	Apr 15	Apr 16	Apr 17	Apr 18	Apr 19	Apr 20
Infection Events	No	No	No	No	No	No	No	Combined
Days to Symptoms	-	-	-	-	-	-	-	
Average Temp (F) for wet hours		51			51			49
Leaf Wetness (hours)	0	5	0	0	8	0	0	17
Rain Amount	0.00	0.11	0.00	0.00	0.12	0.00	0.00	1.19

NO

Yes

4-20-15

4-15-15



Infection Events Summary

	Past	Past	Current	Ensuing 5 Days				
	Apr 18	Apr 19	Apr 20	Apr 21	Apr 22	Apr 23	Apr 24	Apr 25
Infection Events	No	No	Combined	Yes	No	No	No	No
Days to Symptoms	-	-	-	15	-	-	-	-
Average Temp (F) for wet hours			49	53	49	42		
Leaf Wetness (hours)	0	0	17	12	8	2	0	0
Rain Amount	0.00	0.00	1.19	0.61	0.19	0.02	0.00	0.00

Still Yes

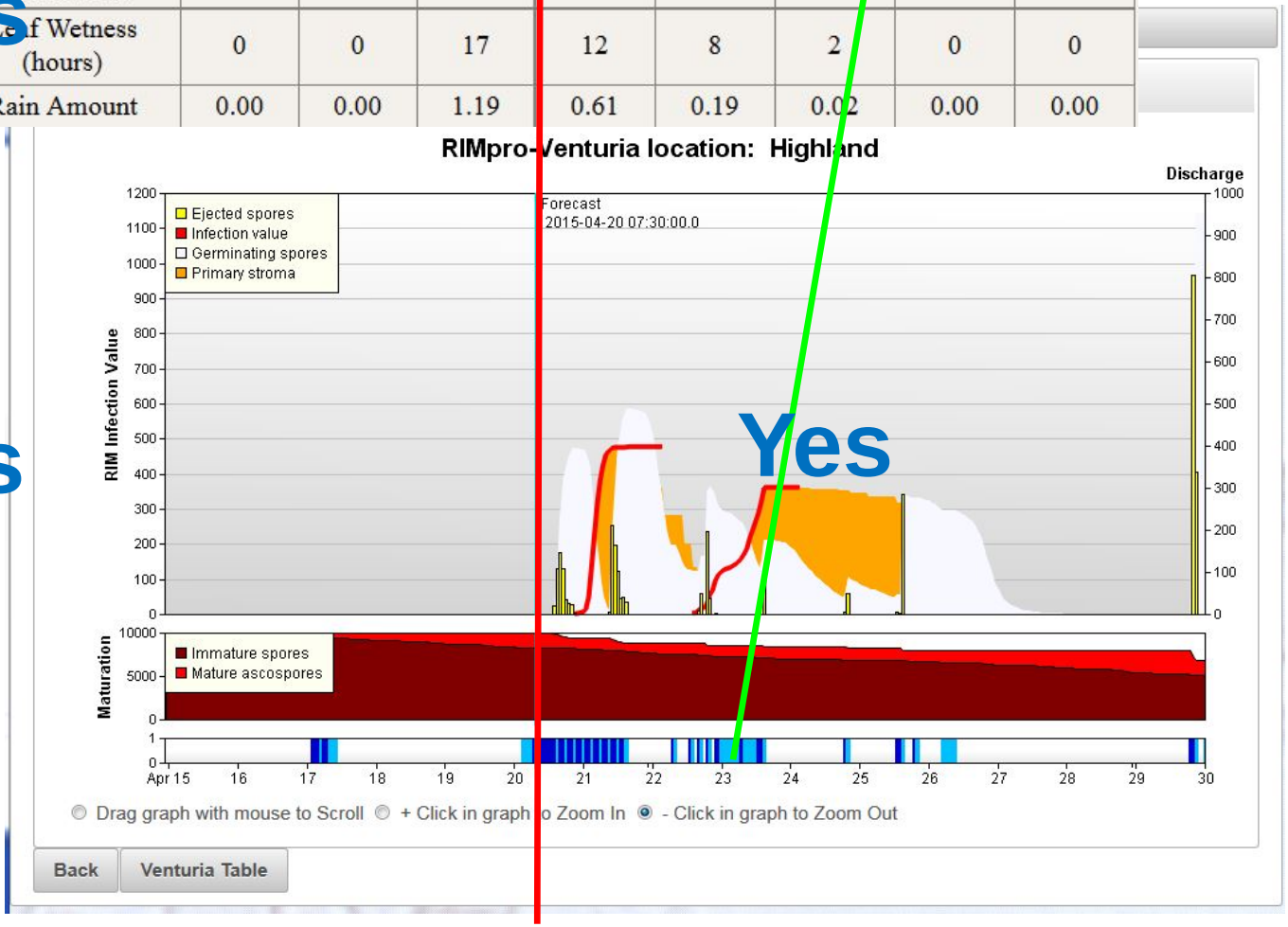
4-20-15

Still Yes

NO

4-23-15

Yes



Still NO

4-23-15

Now it's No

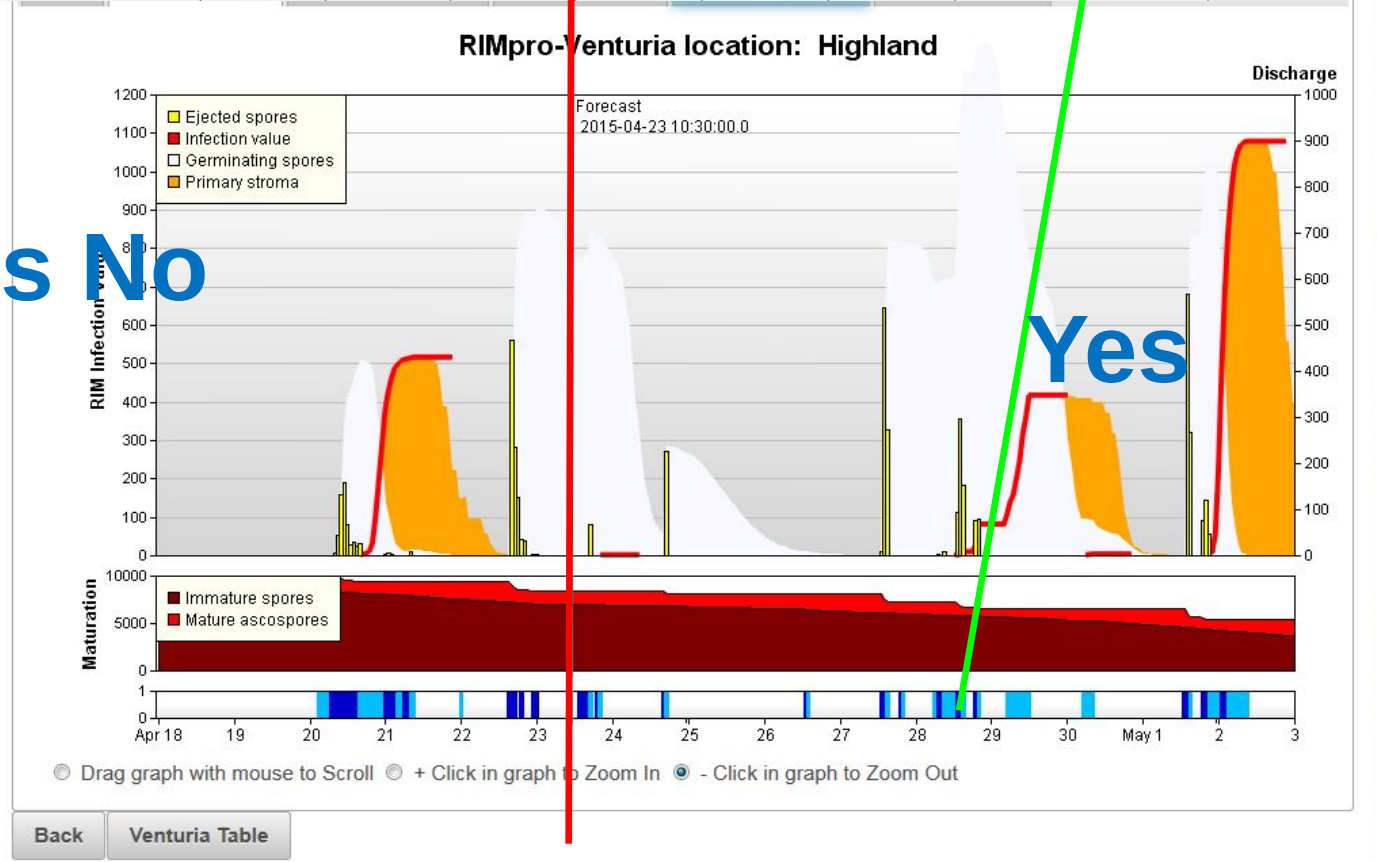
NO

4-28-15

Yes

Infection Events Summary

	Past	Past	Current	Ensuing 5 Days				
	Apr 21	Apr 22	Apr 23	Apr 24	Apr 25	Apr 26	Apr 27	Apr 28
Infection Events	Yes	No	No	No	No	No	No	No
Days to Symptoms	15	-	-	-	-	-	-	-
Average Temp (F) for wet hours	53	49	42				50	49
Leaf Wetness (hours)	12	8	2	0	0	0	2	1
Rain Amount	0.61	0.19	0.02	0.00	0.00	0.00	0.00	0.00



Infection Events Summary

	Past	Past	Current	Ensuing 5 Days				
	Apr 26	Apr 27	Apr 28	Apr 29	Apr 30	May 1	May 2	May 3
Infection Events	No	No	No	No	No	No	No	No
Days to Symptoms	-	-	-	-	-	-	-	-
Average Temp (F) for wet hours		50	49					76
Leaf Wetness (hours)	0	2	1	0	0	0	0	1
Rain Amount	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

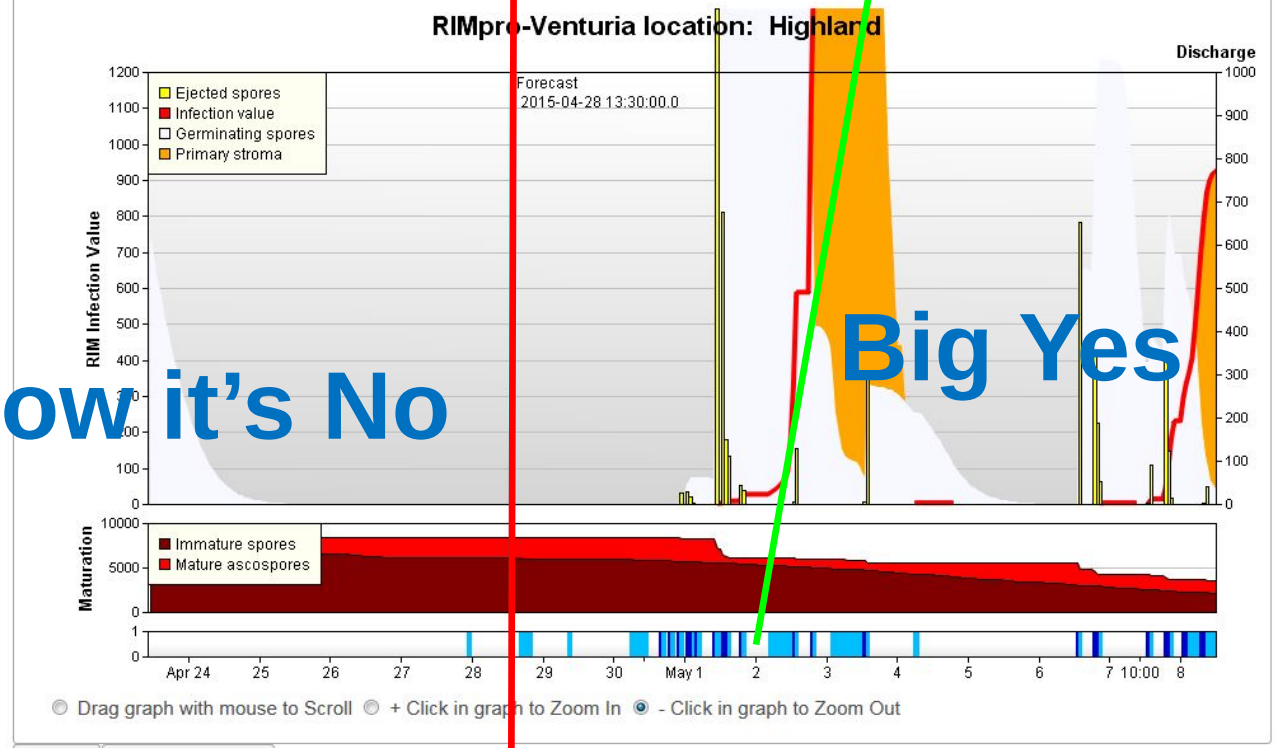
Still NO

NO

5-2-15

4-28-15

Info | Scab Primary | Scab secondary | Weather Data | My Breakpoints | My Sprayplan



Now it's No

Big Yes

Back | Venturia Table

Infection Events Summary

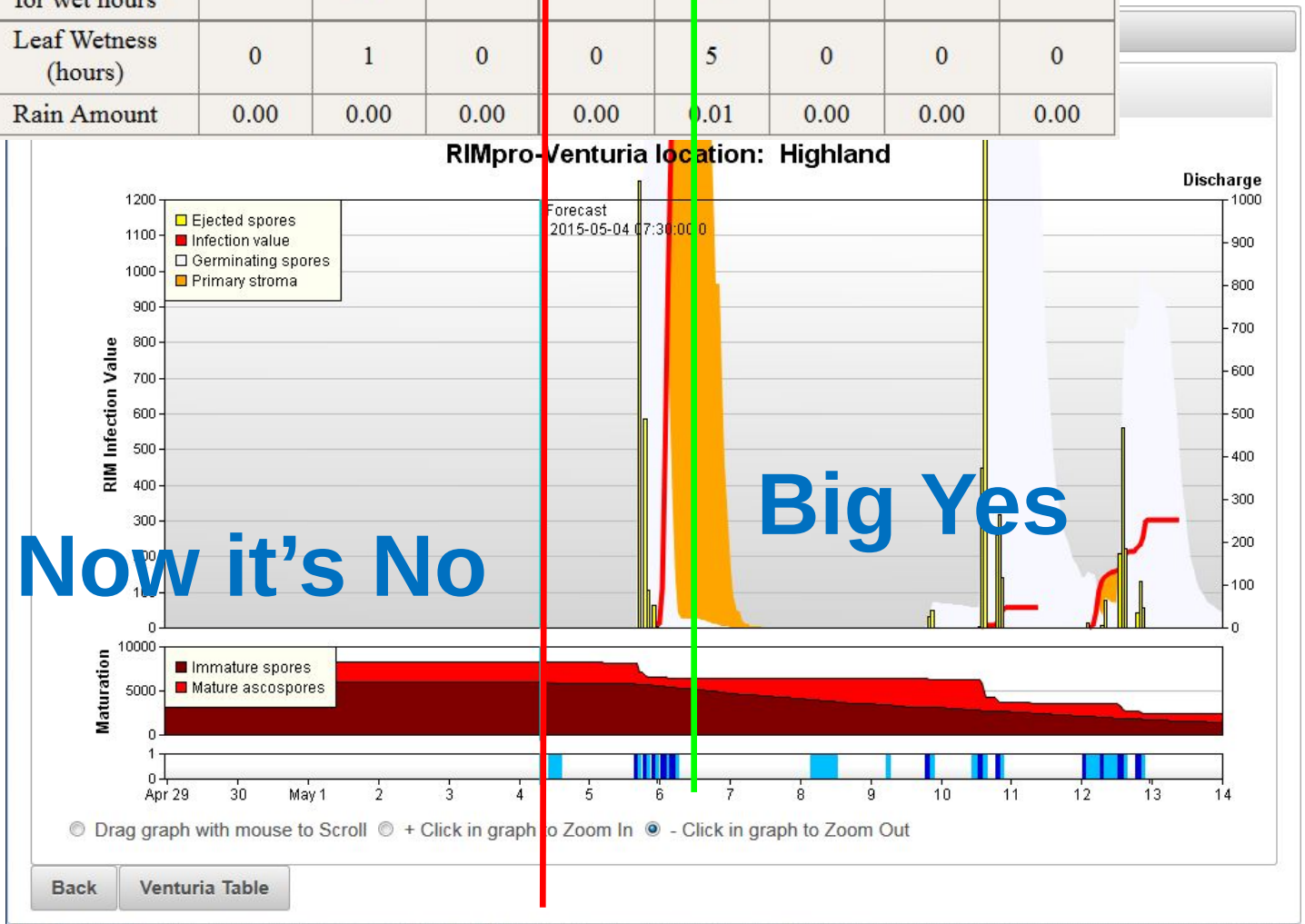
	Past	Past	Current	Ensuing 5 Days				
	May 2	May 3	May 4	May 5	May 6	May 7	May 8	May 9
Infection Events	No	No	No	No	No	No	No	No
Days to Symptoms	-	-	-	-	-	-	-	-
Average Temp (F) for wet hours		6			59			
Leaf Wetness (hours)	0	1	0	0	5	0	0	0
Rain Amount	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00

Still NO

NO

5-6-15

5-2-15



Big Yes

Now it's No

Managing apple scab using models

- Considerations for apple scab models:
  - Predictions on 1’ apple scab infection & ascospore dynamics
  - NEWA cursory information on ascospore maturity
  - RIMpro detailed information on ascospore maturity, ejection, germination
  - NEWA use forecast data conservatively > day 3-5 less weight than days 1&2
  - RIMpro considers more forecast data in estimations?

Managing apple scab using models

- Considerations for apple scab models:
  - Spraying in advance? Use common sense with any model – NEWA
  - Spraying during/after an infection period - RIMpro
  - Why not spray every 3-7 days depending on rain?
  - No models provide a good indication of 2” apple scab infections

Outline

- Using models manage fire blight & apple scab
- **Seasonal concerns & Management considerations for summer rots and canker fungi**
- 2015 Product efficacy summary for Fire blight, Apple Scab, & Powdery Mildew

Seasonal summer rot concerns

Callus Core

- White undifferentiated callus tissue around seed cavities
- Firm crystalline tissue not soft like fungal mycelium, not a health concern, & no off flavor
- Physiological problem mistaken for moldy core in certain varieties

Seasonal summer rot concerns

Moldy Core

- Fungal colonization of the seed: latent infections from bloom to early fruit development
- Gross but not major health concern
- *Alternaria*, *Botryosphaeria*, *Cladosporium*, *Penicillium*
- Infections become apparent post harvest/storage: confined to the flesh around the core
- Lead to load rejections


Kari Peter, PSU


Mike Ellis OSU

Seasonal summer rot concerns

Bitter rot

- Fungal fruit rot: latent infection from bloom to early fruit development or pre-harvest wounding of mature fruit
- Problem in warmer sandy regions
- *Colletotrichum* species
- Infections become apparent pre-harvest & post-harvest/storage: huge sunken lesions
- Lead to load rejections

Summer rot management

- Strong program of single-site fungicides at petal fall to 1st cover (SDHIs Aprovia or Fontellis, DMIs Inspire Super, QoI/SDHIs Pristine, Luna Sensation, or Merivon)
- Heavy rains > 1.5 – 2 inches consider another fungicide application if > 5 days
- Consider applying Pristine or Merivon right at harvest

Seasonal canker concerns

Tree cankers

- Slow growing wood decay fungi: affect compromised established trees after seasons of cold, roundup, or salt injury
- *Botryosphaeria & Schizophyllum, Nectria species*
- Slowly expanding sunken cankers in crotch angles and easily injured tissues

Canker management

- Tree Cankers
  - Remove cuttings from orchards and burn them or take them offsite > they can still infect from the ground
  - Apply copper fungicides: 20% and 80% leaf drop and after pruning (fruit finish)
  - Kocide 3000 & Badge SC are labeled for Nectria (European canker)
  - Include a summer cover spray of benomyl or t-methyl

Canker management

- Cankers
  - Avoid poorly drained and low-lying areas
  - Irrigation/fertilizer management: too much water or fertilizer > trees growing late into fall
  - Take care with herbicide use > mild damage decrease cold hardiness & susceptibility
  - Late summer pruning > decrease cold hardiness & susceptibility in fall rains
  - Scion variety: ‘Empire’, ‘Fuji’, and ‘Rome’ vs ‘McIntosh’ and ‘Gala’

Outline

- Using models manage fire blight & apple scab
- Seasonal concerns & management considerations for summer rots and canker fungi
- **2015 product efficacy summary for Fire blight, Apple Scab, & Powdery Mildew**

2015 Apple Scab & Powdery Mildew Summary

- Secondary apple scab pressure in sites that received heavy June rains
- Drier apple production along the lakes > high mildew pressure
- Effectiveness & longevity of new SDHI fungicides

Succinate dehydrogenase inhibitor (SDHI) fungicides

- FRAC Code: 7 Complex II succinate dehydrogenase
- Broadly effective against apple scab, sooty blotch, fly speck, powdery mildew
- Interfere with respiration: inhibits spore germination, mycelial growth, & sporulation

SDHI fungicides

- Current and forthcoming SDHI products!
  - Luna (fluopyram): Bayer CropScience
    - Luna Sensation: SDHI + QoI (trfloxystrobin) 2016NY
    - Luna Tranquility: SDHI + AP (pyramethanil)
  - Merivon (fluxapyroxad): BASF, SDHI + QoI (pyraclostrobin)
  - Fontellis (penthiopyrad): DuPont
  - (Isofetamid): ISK biosciences 2016US
  - Aprovia (Solatenol): Syngenta 2016US/2017NY

Apple scab & powdery mildew trials

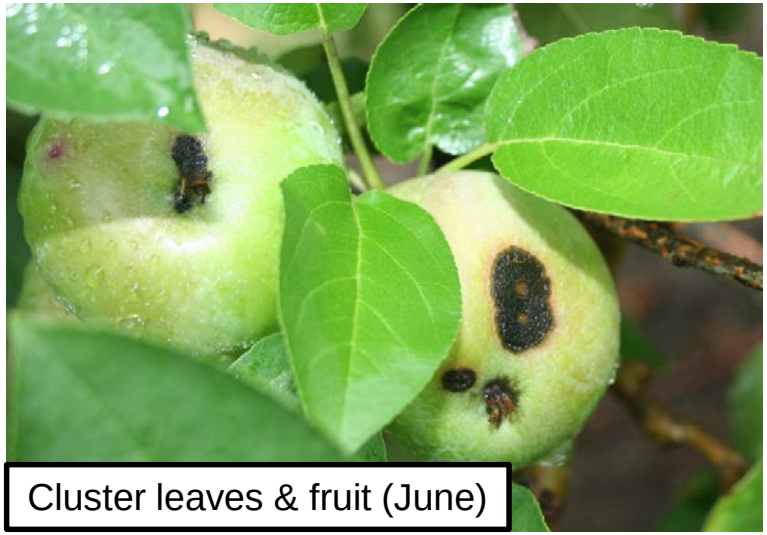
- 3.1-acre planting site Empire’ and ‘Jonagold’-M.9/M.111 interstem (18-20 years old)
- Widely-spaced two tree plots

Apple scab & powdery mildew trials

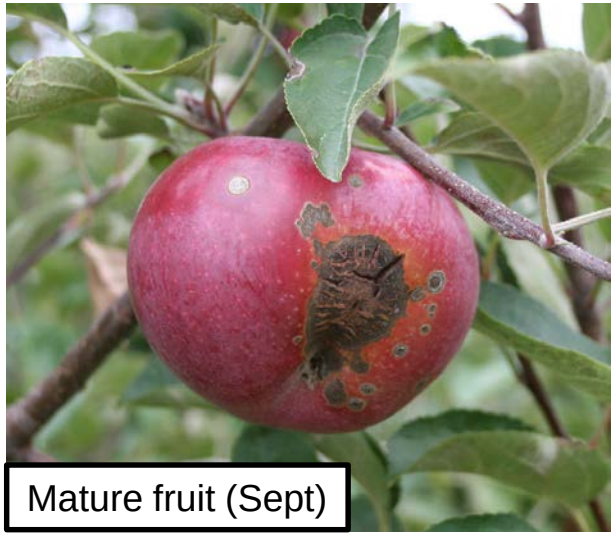
- Fungicide treatments
  - Dilute handgun application timed at **7-10 day intervals from TC- 2nd cover** or 14-21 days from 3rd-7th cover
  - Alternated with effective protectant standards ➔ not to exceed max applications (4 applications)

Apple scab trials

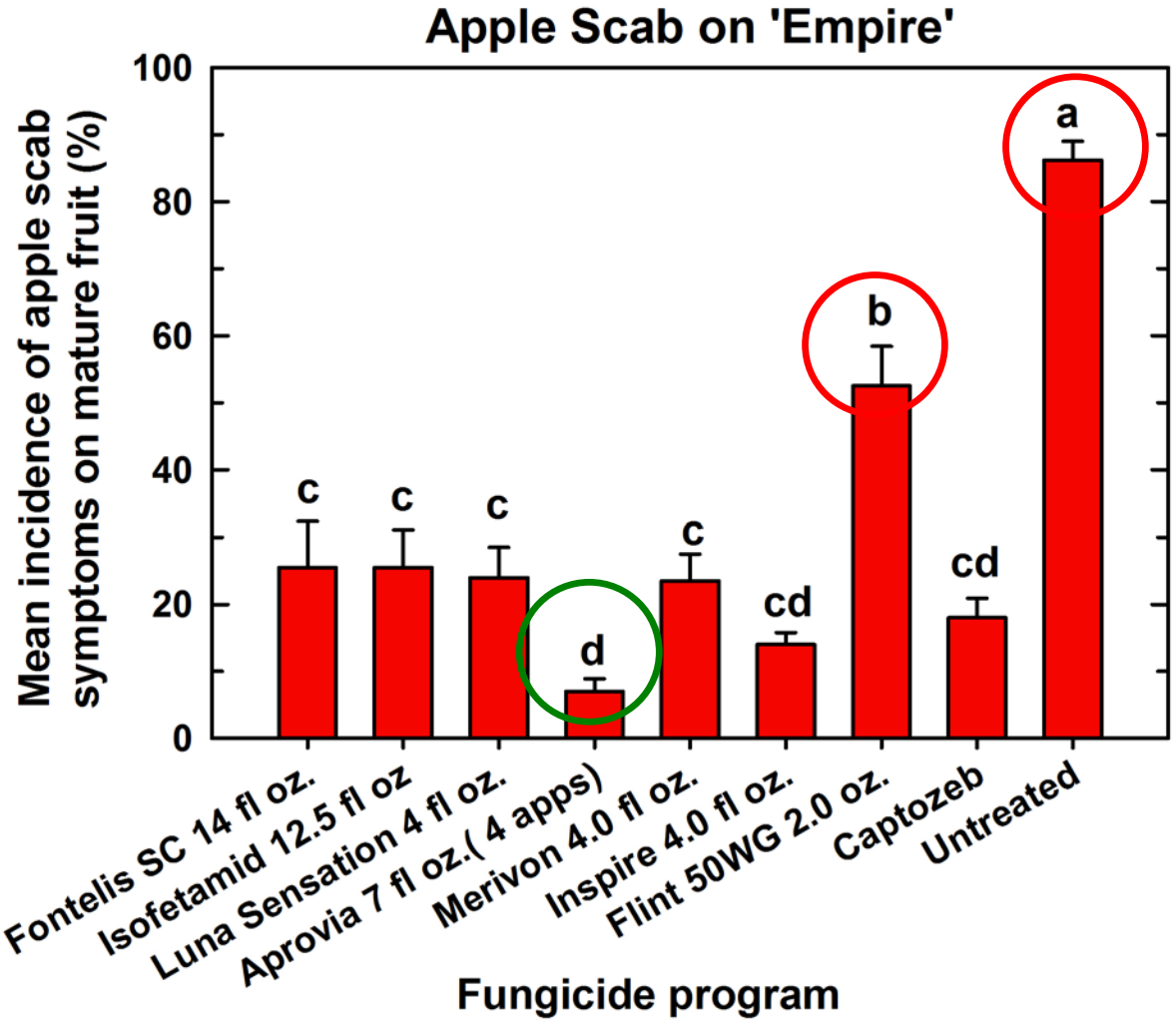
- Apple scab evaluation
  - Incidence any lesion on cluster leaves and fruit (June), terminal leaf scab (July), & **harvest mature fruit (Sept)**


Cluster leaves & fruit (June)


Terminal leaves (July)


Mature fruit (Sept)

Apple Scab Performance (2015)



- QoI/SDHI(premixes) & Aprovia still ≥ than protectant
- Practical resistance to QoI fungicides high: Merivon & Luna Sensation still unaffected

Apple Scab: Trends and Considerations

- Apple Scab
  - Inspire Super strongest DMI produce for apple scab (works on DMI resistant populations)
  - QoIs (Flint) work really well in the absence of practical resistance (30 orchards in NY)
  - Stand alone SDHI fungicides really strong against apple scab: Aprovia really potent
  - QoI/SDHI premixes **Not affected** by practical resistant to QoI fungicides

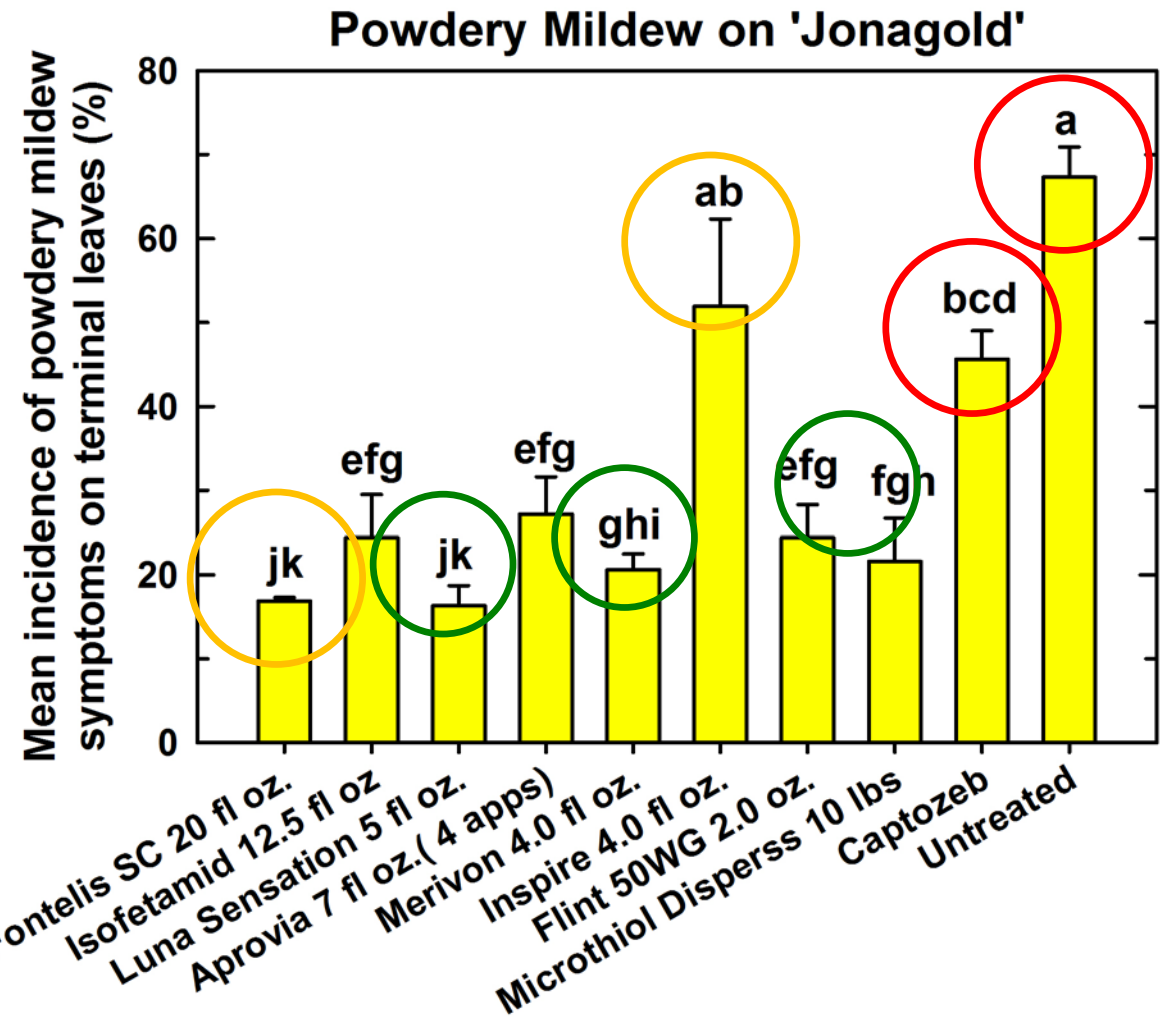
Powdery mildew trials

Disease assessment

- Powdery mildew:
  - Primary mildew (June) & Secondary mildew (July)

  - **Incidence (any lesion) & Severity (% area)**

Powdery Mildew Performance (2015)



- Note: QoI/SDHI premixes, sulfur/flint, Inspire, & Fontelis

Powdery Mildew of Apple: Trends and Considerations

- Powdery mildew
  - DMIs Topguard or Rally strongest mildew fungicides – high rates w/ mancozeb to manage DMI resistant scab
  - QoIs & SDHI-QoI premixes next best line of defense
  - Stand alone SDHI fungicides slight effect against mildew under high pressure
  - Sulfur 3.33 lbs/100 7-10 day intervals from bloom to end of terminal growth **= QoIs**: **phyto & smell**

Questions