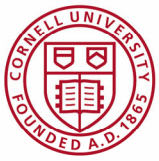

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1

Current status of Stemphylium leaf blight fungicide resistance in onion in New York.

Sen. Ext. Assoc. Frank Hay
Cornell AgriTech, Geneva

Sen. Ext. Assoc. Christy Hoepting
CCE, Albion

Assoc. Prof. Sarah Pethybridge
Cornell AgriTech, Geneva

Fungicide Resistance Action Committee.

- Fungicides are allocated to a FRAC group depending upon mode of action.

Two ingredients:

- Fluopyram (FRAC 7)

(SDHI: Succinate dehydrogenase inhibitor - respiration)

- Pyrimethanil (FRAC 9)
- (Anilinopyrimidine fungicides: target methionine biosynthesis)

History of FRAC group use in NY onion.

	FRAC group and active ingredient:					
Fungicide	**2**	**3**	**7**	**9**	**11**	**Year labelled in NY onion**
Rovral®	iprodione					2003
Amistar®					azoxystrobin	2003
Endura®			boscalid			2005
Pristine®			boscalid		pyraclostrobin	2005
Scala®				pyrimethanil		2005
Quadris Top®		difenoconazole			azoxystrobin	2010
Inspire Super®		difenoconazole		cyprodinil		2012
Merivon Xemium®			fluxapyroxad		pyraclostrobin	2015
Luna Tranquility®			fluopyram	pyrimethanil		2016

FRAC = Fungicide Resistance Action Committee. Fungicides are organized by FRAC code into modes of action.

Fungicide resistance in NY onion to Stemphylium leaf blight.

2015 field trial conducted by Christy Hoepting (CCE) showed poorer efficacy of Quadris® (azoxystrobin) vs Quadris Top® (azoxystrobin + difenoconazole)

Quadris (11) Quadris Top (11+3)

Side-by-side comparison of the efficacy of Quadris (left) and Quadris Top (right) for control of Stemphylium leaf blight in onion in fungicide evaluation field trial, Elba, NY, 2015. Fungicides belonging to fungicide resistance group 11 (e.g. Quadris) failed to control SLB, while fungicides belonging to groups 3 (component of Quadris Top) and 7 (example not shown) provided best control of SLB with the healthiest foliage and proper lodging at harvest.
Photos: Christy Hoepting, Cornell Vegetable Program

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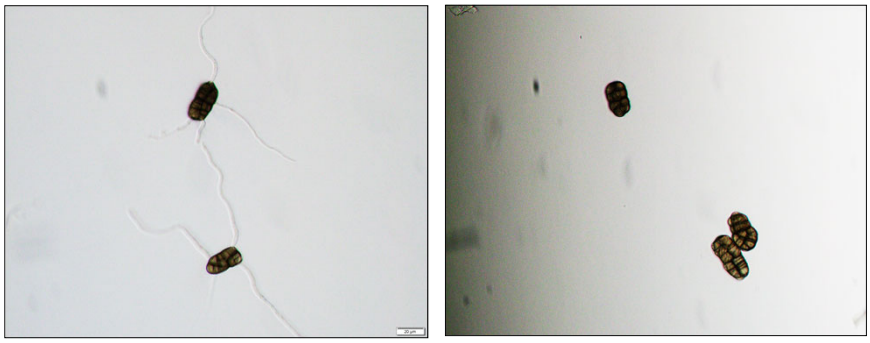
Testing sensitivity of Stemphylium to azoxystrobin.

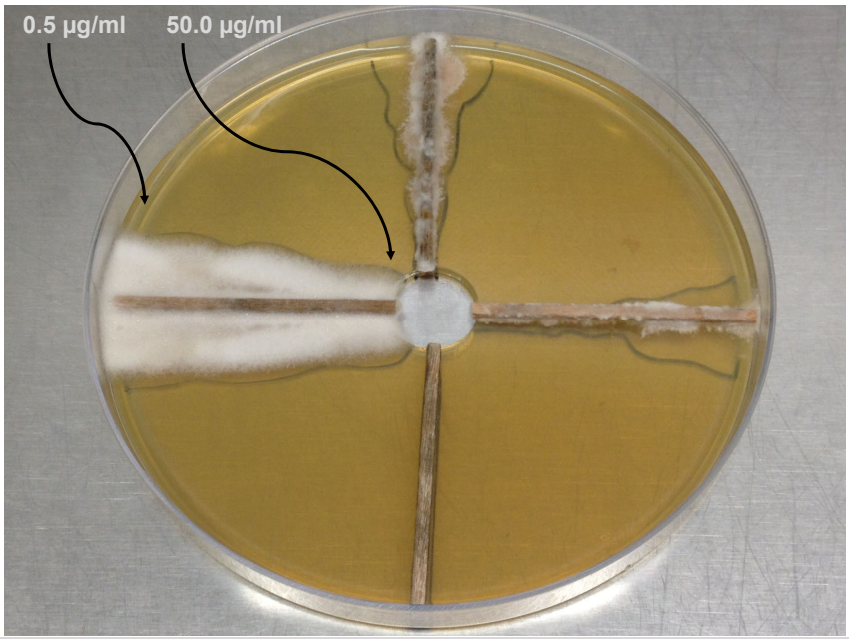
Conidia after 12 hours on agar with:

No fungicide **Azoxystrobin 0.5 µg/ml**

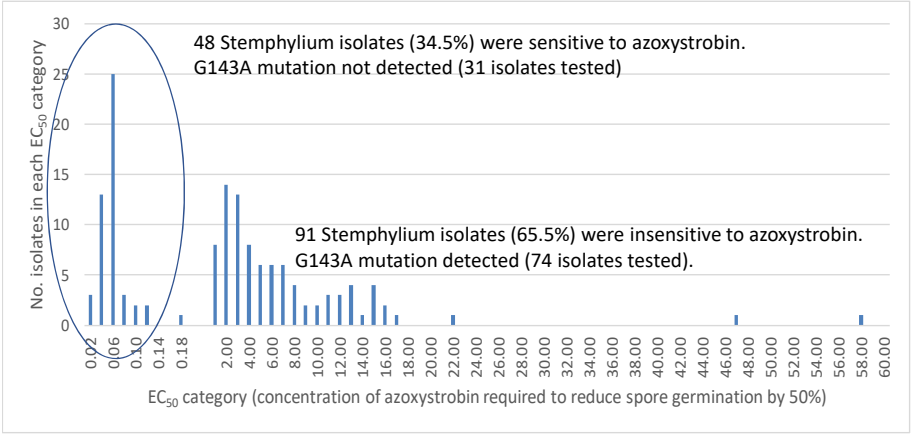


Calculate EC_{50} = the lowest concentration of fungicide required to reduce conidial germination by 50%.

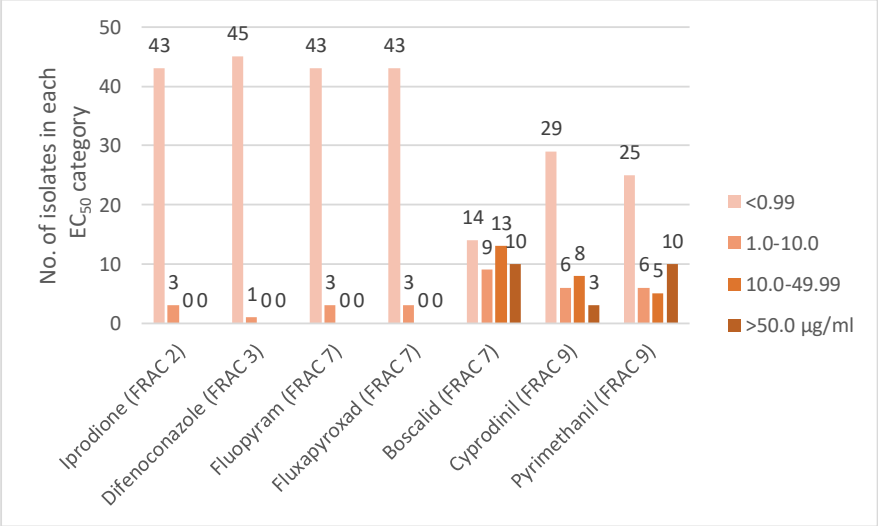
6



Concentration of azoxystrobin (µg/ml) required to inhibit spore germination by 50% (EC_{50}) for 139 isolates of *Stemphylium vesicarium* from 21 NY onion crops in 2016.



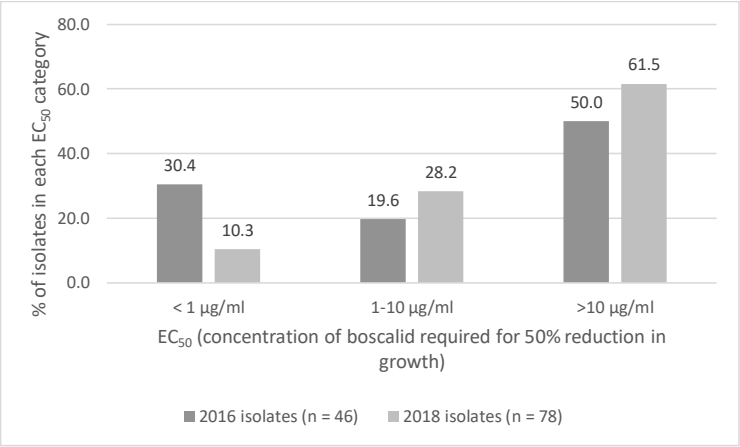
2016 testing: Frequency of isolates of *Stemphylium* in each EC_{50} category (concentration of fungicide required to reduce growth by 50%)



Product	FRAC 2	FRAC 3	FRAC 7	FRAC 9	FRAC 11
Quadris®					azoxystrobin[1]
Cabrio®					pyraclostrobin[1]
Endura®			boscalid[1]		
Scala®				pyrimethanil	
Rovral®	iprodione				
Merivon®			fluxapyroxad		pyraclostrobin[1]
Quadris Top®		difenoconazole			azoxystrobin[1]
Inspire Super®		difenoconazole		cyprodinil	
Luna Tranquility®			fluopyram	pyrimethanil	
Luna Experience®		tebuconazole	fluopyram		
Tilt®		propiconazole			
Viathon®		tebuconazole (+ FRAC 33)			

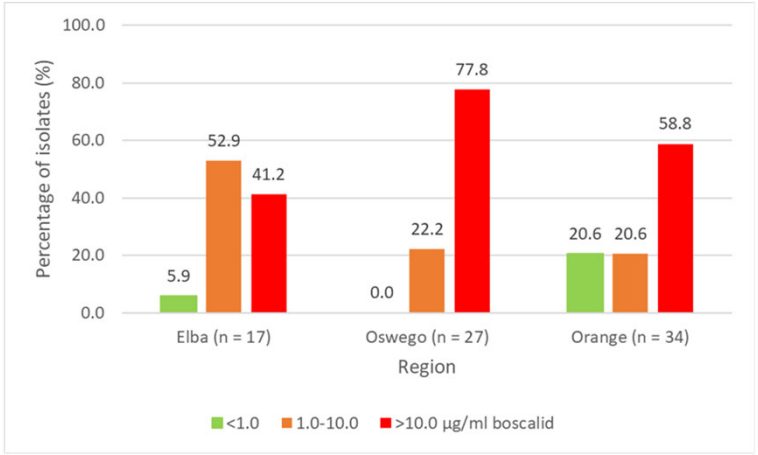
[1] In 2017: Evidence of resistance (laboratory/field) to FRAC 11 (azoxystrobin/ pyraclostrobin) and one FRAC 7 ingredient (boscalid). Endura® was efficacious in C. Hoepting's field trials in Elba in 2015, but not in 2017.

Changes in sensitivity of Stemphylium isolates to boscalid (FRAC 7) between 2016 and 2018.



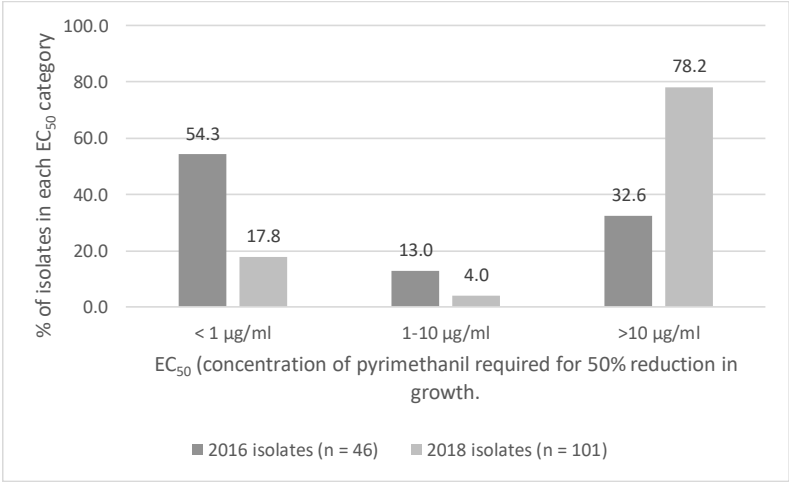
2018: Elba (2 crops/18 isolates), Oswego (2 crops/26 isolates), Orange Co. (7 crops/34 isolates)

2018: Sensitivity of Stemphylium to boscalid by region.



Isolates from Elba (2 crops), Oswego (2 crops), Orange Co. (7 crops)

Changes in sensitivity of Stemphylium isolates to pyrimethanil (FRAC 9) between 2016 and 2018.



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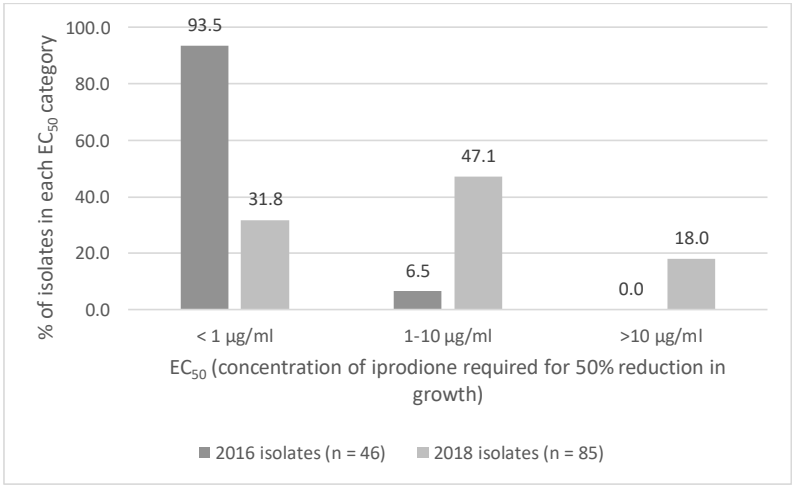
13

Changes in sensitivity of Stemphylium isolates to iprodione (FRAC 2) between 2016 and 2018.



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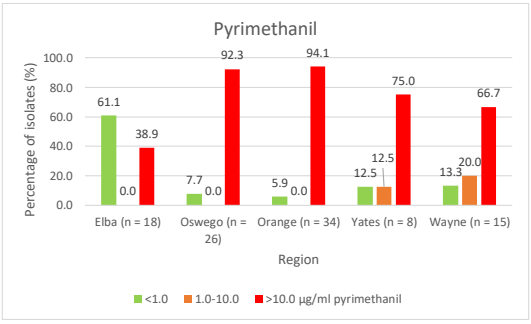
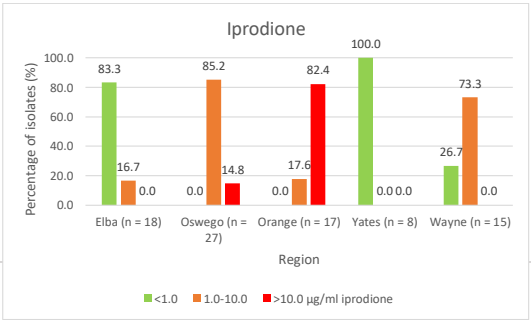
14

2018: regional differences in sensitivity to pyrimethanil and iprodione?

- Laboratory results suggest a higher proportion of sensitive isolates in Elba? (**small number of farms/isolates tested**).
- Scala® (pyrimethanil) + Rovral® (iprodione) gave reasonable control of SLB in a field trial in Elba, but not Wayne Co. in C. Hoepting's 2019 field trials.
- However, with continual use we would expect a similar reduction in efficacy in Elba.





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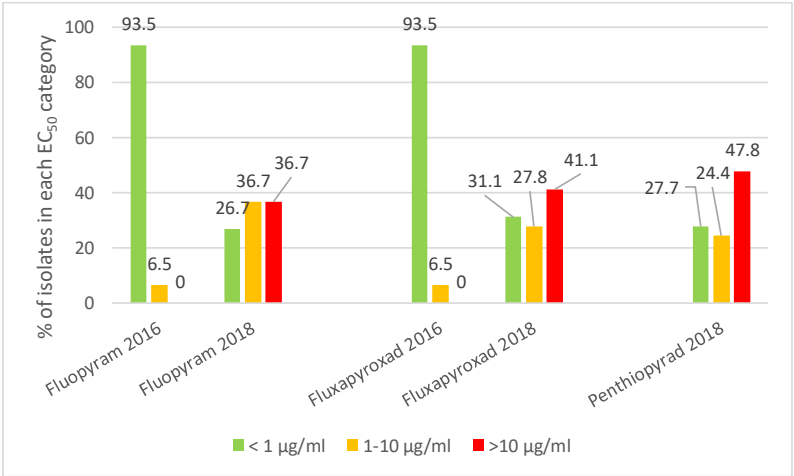
Changes in sensitivity of Stemphylium isolates to FRAC 7 active ingredients between 2016 and 2018.



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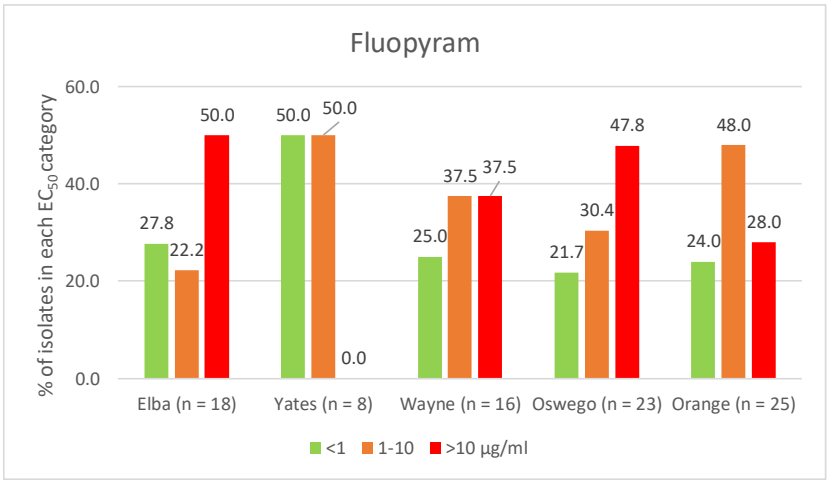
16

Similar levels of insensitivity to FRAC 7 active ingredients (fluopyram, fluxapyroxad and penthiopyrad) in most regions.



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Luna Experience®		tebuconazole	fluopyram		
Tilt®		propiconazole			
Viathon®		tebuconazole (+ FRAC 33)			

= resistance (field + laboratory agree), = developing resistance (laboratory + indications of poorer control in field), = laboratory and field indicate still efficacious.

Why has fungicide resistance developed?

- Stemphylium appears to be very adaptable.
- Long history of using FRAC 2, 7, 9 and 11 in NY onion production.
- Growers or neighboring growers do not always adhere to good fungicide resistance management strategies.
  - No more than three applications of the same FRAC group within a season.
  - No more than two consecutive applications of the same FRAC group.
  - Rotation between FRAC groups.
- Intensive production system on muck soils (limited crop rotation).

Can we reduce the number of fungicides required by forecasting?

Stemphylium vesicarium causes an important disease of pear in Europe (Brown Spot).

A forecasting system has been developed (BSPcast) which predicts risk based on daily leaf wetness duration and mean air temperature during wet periods.

Average of 20-70% saving in number of fungicide applications.

NIFA CPPM project NYG-625592
Underpinning the development of an integrated disease management strategy for Stemphylium leaf blight of onion in New York.

https://gd.eppo.int/taxon/PLEOAL/photos

Acknowledgements

- **Staff:**
  - Audrey Klein
  - Carol Bowden, Sean Murphy, Alex Silva, Elizabeth Burbine, David Strickland, Karen Luong, Sandeep Sharma
  - Nault Laboratory.
  - Cornell Co-operative Extension and Geneva FRU staff.
- **Growers:** for allowing field trials and surveys especially CY Farms, Triple G Farms and Torrey Farms, Elba.
- **Funding:**
  - Organic Research and Extension Initiative
  - Onion Research Development Program.
  - NIFA CPPM 2016-70006-25838.
  - Federal Capacity Fund 2016-17-149
  - NYFVI SCBG SG16-008, SCG18-003
  - USDA Hatch Project NYG-625445

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