Fire blight on my cherry tree? Prevalence and management challenges of the brown rot pathogen, Monilinia Iaxa in the Northeastern US

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Brown Rot in NY

• Prior to 2008

- 100% brown rot isolates:
 M. fructicola
 - Mature fruit or mummies
- Control failures with sitespecific fungicide management programs
- Monitoring of *M. fructicola* populations resistance to DMI and QoI fungicide classes





Brown Rot in NY

• Summer 2008

- *M. laxa* confirmed on 'Surefire' cherry in Niagara county
 - First report of *M. laxa* in NE US
- Causal agent of European brown rot
- Symptoms: blighted shoots, cankered branches, blighted leaves, brown/gray sporulation on fruit

• Summer 2009

 - 'Balaton' (Niagara) and 'Montmorency' (Wayne) tart cherry and Kwanzan cherry (RI)





European Brown Rot in NY

- Discoveries from initial *M. laxa* outbreak
 - Pathogen can infect all susceptible tissues
 (blossoms, fruit, shoots, leaves)
 - Tend to exhibit greater sensitivity to DMI and QoI fungicides than *M. fructicola* isolates from the same orchard location



Relative fungicide sensitivity comparisons of New York *Monilinia* populations

Brown Rot in Northeast 2011

- Western NY and New England: Bloom → Shuck Split
 - Extended cool and wet spring
 - Suspected *M. laxa* outbreaks in variety of stone fruit plantings
 - Brown rot control: Bravo Weather-Stik
- NYSAES apricots
- Additional shoot b failures received t



fruit rot control



Objectives

- Isolate and confirm the identity of the brown rot pathogens infecting sweet cherry (*Prunus avium*), nectarine (*Prunus persica*), plum (*Prunus domestica*) and apricot (*Prunus armeniaca*) to determine *M. laxa* prevalence in the NE
- 2. Compare the fungicide sensitivities of *M. laxa* and *M. fructicola* to:
 - Fenbuconazole (DMI) and pyraclostrobin (QoI)
 - Chlorothalonil (broad-spectrum)

Identification of Brown Rot Pathogens

- Brown rot isolated from fruit, florets, leaves, wood (sterile and non-sterile)
 - 308 Monilinia spp. isolates





Identification of Brown Rot Pathogens

- Morphology not always reliable
- PCR with Monilinia specific primers
 - Intron 6-2F/Intron 6-2R
 - Differentiate *M. fructicola* (621bp), *M. laxa* (501bp), and *M. fructigena* (783bp)



Identification of Brown Rot Pathogens

		Number of isolates (<i>M. fructicola</i> , <i>M. laxa</i> , mixed)				
Orchard	Total Number of Isolates (<i>M. fructicola</i> , <i>M. laxa,</i> mixed)	Fruit	Florets	Leaves	Wood NS	Wood sterile
DA	42 (22,14,3)	1,0,0	6,0,1	1,0,1	8,4,1	6,10,0
DB	16 (6,2,4)	0,0,0	1,0,0	1,0,0	3,1,2	1,1,2
DC	40 (31,9,0)	24,0	2,1,0	0,0,0	4,4,0	1,4,0
HF	16 (16,0,0)	1,0,0	1,0,0	1,0,0	7,0,0	6,0,0
DL	6 (6,0,0)	0,0,0	1,0,0	0,0,0	2,0,0	3,0,0
PB-BD	20 (20,0,0)	20,0,0	n/a	n/a	n/a	n/a
PB-DL	20 (20,0,0)	20,0,0	n/a	n/a	n/a	n/a
PB-MB	20 (20,0,0)	20,0,0	n/a	n/a	n/a	n/a
PB-MS	20 (20,0,0)	20,0,0	n/a	n/a	n/a	n/a
PB-OK	20 (20,0,0)	20,0,0	n/a	n/a	n/a	n/a
PB-PW	15 (15,0,0)	15,0,0	n/a	n/a	n/a	n/a
JE	73 (73,0,0)	22,0,0	0,0,0	19,0,0	17,0,0	15,0,0

• *M. laxa* identified in 3 of 12 orchards, 2 new counties, MA

- Primarily in wood, no fruit
- Apricots, plum, sweet cherry
- Found in early season collections only

• Mixed M. fructicola/M. laxa isolates

- Isolates assayed for sensitivity to:
 - SI fenbuconazole: 0.3 µg/mL (Indar 2F)
 - Qol pyraclostrobin: 1.1 µg/mL (component of Pristine)
- Sensitivity to chlorothalonil: 0.019 µg/mL (Bravo Weather-Stik) (Emery et al. 2002)
 - Select isolates from NYSAES apricots

Sensitivity of 98 *Monilinia* isolates to the DMI fungicide fenbuconazole (0.3 µg/ml)



- %RG M. fructicola: 0.0-158.9% (28.5%)
- %RG *M. laxa:* 0.0-22.5% (2.3%)
- DA mixed: mean = 24.5% ; DB mixed: mean = 66.6%
 - Least sensitive population in respective orchard



- %RG *M. fructicola:* 25.4-119.5% (52.6%)
- %RG *M. laxa:* 0.0-46.6% (25.2%)
- DA mixed: mean = 34.6% ; DB mixed: mean = 52.6%

Efficacy of site-specific fungicides to 2011 western NY *M. fructicola* populations



- All orchards have *M. fructicola* populations with high level of reduced sensitivity to Qols (resistant?)
 - Most populations resistant to fenbuconazole

Sensitivity of 42 *Monilinia* isolates to chlorothalonil (0.019 µg/ml)



Monilinia Species

- %RG *M. fructicola:* 30.4-123.5% (54.0%)
- %RG *M. laxa:* 44.9-109.1% (79.3%)
- %RG mixed: 78.5-84.8% (81.8%)

2011 Northeast US Brown Rot Summary

- *M. laxa and M. fructicola* both present in early brown rot infection
 - M. fructicola predominates later in the season
- Chlorothalonil less effective for controlling M. laxa
- *M. laxa* populations more sensitive to site-specific fungicides used after shuck split
 No shifts in site-specific fungicide sensitivity in *M. laxa*
- Mixed Monilinia populations generally less sensitive to any of the fungicide chemistries tested
 - Competitive advantage?

2011 Northeast US Brown Rot Summary-What happened?

- A combination of "worst case" scenarios
 - Early Spring
 - Majority of *M. laxa* control failures in early spring due to ineffectiveness of Bravo Weather-Stik against the pathogen and cool, wet spring
 - Early season *M. fructicola* control failures likely due to inadequate spray timing and coverage due to heavy spring rains
 - Harvest
 - Loss of DMI and QoI efficacy against *M. fructicola* populations
 - High level of DMI and QoI efficacy against M. laxa

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Questions?

