

Apple Diseases and Management

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Past, Present, and Future of Apple Diseases and Management

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The Past (2016-2018)

Diseases

- Fire blight
- Sudden Apple Decline
- Fruit rots

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2017 -2018

Fire blight

- Caused by the bacterium *Erwinia amylovora*
- Canker, blossom, shoot, fruit, and rootstock phases

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Antibiotics for Blossom Blight Management

Management

Antibiotic	Product	Rate
Streptomycin	Streptomycin 17	1 lb/A
Kasugamycin	Kasumin	64 fl oz/A
Oxytetracycline	Mycoshield FireLine	1 lb/100 gal/A

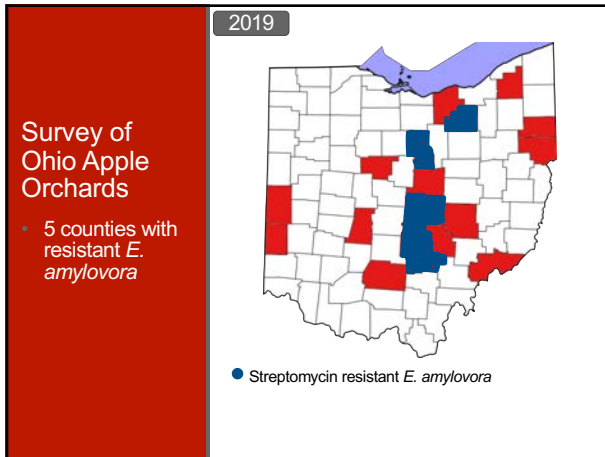
- Addition of a non-ionic surfactant recommended (Regulaid, 1 pt/A)
- Do not use treated crops for animal feed or allow animals to graze on treated orchards

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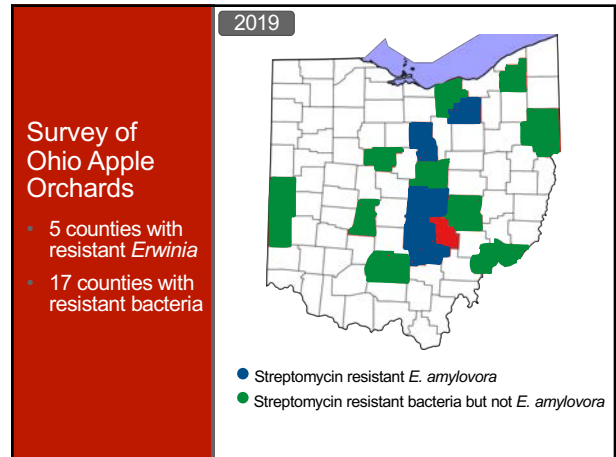
Survey of Ohio Apple Orchards

- 24 orchards
- 18 counties
- 216 *E. amylovora* isolates

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Risk Assessment Models for Blossom Blight Management

Management

- Available through NEWA
 - newa.cornell.edu
 - Select Ohio and fire blight
- Model considers four variables:
 1. First bloom date
 2. Fire blight history in orchard
 3. Temperature for epiphytic growth
 4. Blossom wetting period

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Fire Blight Risk Prediction Models

Management

History of fire blight

First bloom date

Wetting period

Temperature

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	Past	Past	Current	Ensuing 5 Days				
Date	4/30	5/1	5/2	5/3	5/4	5/5	5/6	5/7
CougarBlight 4 Day DR	Low	Caution	Extreme	Extreme	Extreme	Extreme	High	High
Infection Potential	Low	High	High	Extreme	Extreme	High	Extreme	Moderate
EIP value	0	57	145	380	347	121	146	94

EIP >100 and rain or trauma event will initiate an infection

Wetness Events	
Rain Amount	0.00 0.00 0.00 0.44 0.04 0.00 0.05 0.00
Dew	Yes No No Yes Yes Yes Yes Yes
Leaf Wetness (hours)	7 0 0 14 7 9 10 8
Hours >90% RH	5 0 0 4 2 8 9 9
RH max/min	96/22 82/23 68/47 96/63 93/52 98/43 97/42 97/31
Temp avg F	68 55 68 69 66 57 63 58

Risk Level	Action
Low	None
Moderate (Caution)	Watch the forecast for continuing warm weather and rain.
High	Apply antibiotic
Extreme (Infection)	Apply antibiotic

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Fire Blight Management in the Orchard

Management

1. Holdover cankers
 - Prune out cankers
 - Copper applications (before green tip)
 - Apply insecticides (before bloom)
2. Flower blight or traumatic injury
 - Apply antibiotics (at least one application of Kasumin)
3. Shoot blight
 - Apply Apogee
 - Balanced fertility

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2017



Sudden Apple Decline (SAD)

- Wilting, premature leaf yellowing, browning leaves, stem cankers
- No pattern of decline in the orchard but often occurs when there is heavy fruit set

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Sudden Apple Decline (SAD)

- Affects young, dwarfing trees
- Decline occurs rapidly (weeks to months)
- Cause is unknown

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Management

SAD Management/Prevention

- Minimize Tree Stress
 - Prevent drought conditions
 - Irrigation, especially young plantings and trees on M9 rootstocks
 - Limit winter cold injury
 - Paint trunks white or use white tree guards to prevent southwest injury
- Prevent trunk injury
 - Chemical and physical



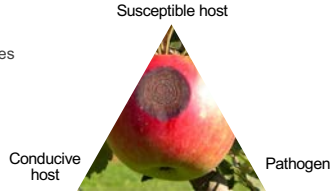
Images courtesy of Mike Fargione

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2016 -2018

Fruit Rot Incidence Increasing in Midwest and Northeastern United States

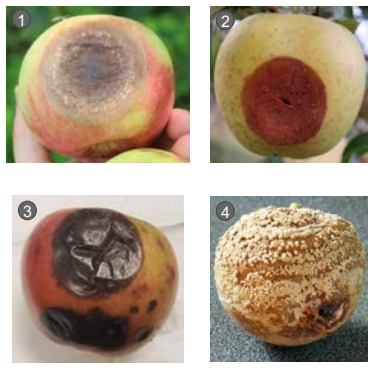
- Changing climate
 - Increase in rain events
 - Fluctuating temperatures
- Fungicide resistance development
- New varieties/orchard management



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SUMMER FRUIT ROTS

1. Bitter Rot
2. White Rot
3. Black Rot
4. Brown Rot



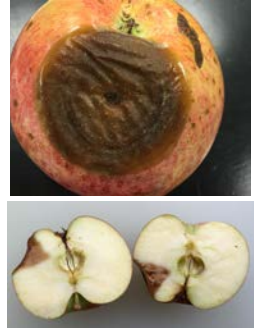
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Bitter Rot

Colletotrichum species complex

- *C. gloeosporioides* (Cg)
- *C. acutatum* (Ca)

• Ohio has isolates of *C. siamense* and *C. chrysophilum* (Cg complex)



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White Rot (Bot Rot)
Botryosphaeria dothidea

cv. Honey Crisp (2019)

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Black Rot
Botryosphaeria obtusa

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Brown Rot
Monilinia fructicola
Monilinia fructigena

Brown rot on Apple 'Coronation', early September.
 Alan Buckingham

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Management

Fungicide Spray Program for Summer Rots of Apple

	Past	Present	Future?
First cover through third cover	Protectants 7-10 days	Protectants + systemic 7-10 days	Protectants + systemic 7 days
Third cover through harvest	Protectants 10-14 days	Protectants 7-10 days	Protectants 7 days
Immediate pre-harvest	Protectant or nothing	Systemic or protectant	Systemic or post-harvest

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The Present (2019)

- Root asphyxiation

- Root death due to a lack of soil oxygen
- Water displaces soil oxygen

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The Present (2019)

- Root asphyxiation

- Leaf growth stopped and leaves stayed attached to the tree
- Rubbery stems
- Blue-purple colored root tissue
- Sour smell

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Impact of Root Asphyxiation on Fruit Trees

- Loss of leaves and fruit
- Older trees may recover after 3-6 months
- Young trees die
- Increased susceptibility to crown and root rot diseases



Phytophthora crown and root rot

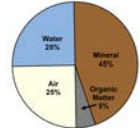
Image courtesy of D. Cooley

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Management

Preventing Root Asphyxiation

- Practices that promote healthy and balanced soil and good water drainage
- 'Preventative' treatment for Phytophthora root and crown rot (collar rot)
 - Ridomil Gold applied in early spring



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USDA Tree Assistance Program (TAP)
 Provides financial assistance to qualifying orchardists and nursery tree growers to replant or rehabilitate eligible trees, bushes and vines damaged by natural disasters.

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Eligible Tree Types

- Trees, bushes, vines from which an annual commercial crop is produced

Eligible Producers

- Own trees when disaster occurred (but not land)
- Replace trees within 12 months from TAP application

Eligible Losses

- >15% mortality in a stand
- Losses due to natural disaster
- Visible and obvious
- Assessed by FSA rep
- Not preventable

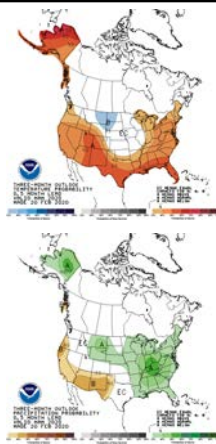
Contact Information

- Farm Service Agency within your county
- offices.usda.gov

USDA Tree Assistance Program (TAP)

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The Future (Spring 2020)



- Mar-Apr-May
- 33-49% probability of above average temperatures
 - 40-50% probability of above average precipitation

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The Future (2020)

Diseases

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The Future
(2020)

Management

- Monitoring weather patterns more closely
- Adjust spray intervals for calendar spray programs
- Utilize forecasting and prediction models to improve application timing
- Diligent sanitation practices
- Incorporate antimicrobial resistance management into your programs
- Plant resistant varieties in future plantings

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FRUIT PATHOLOGY LAB

Supporting Healthy & Safe Fruit Production

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