
PEACH BLOSSOM BLIGHT

*Biology, Control, and
Fungicide Resistance Management*

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Peach Blossom Blight

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Brown Rot

Causal Agents

Brown Rot of Stone Fruit

Causal Agents

- ❖ *Monilinia fructicola*
- ❖ *Monilinia laxa*
- ❖ *Monilinia fructigena*
 - Stone & pome fruit
 - Serious apple rot
 - Europe only

Brown Rot of Stone Fruit

Pathogen Comparison

	Location		Disease	
Causal Agent	Eastern U.S.	Western U.S.	Blossom Blight	Fruit Rot
<i>M. fructicola</i>	✓ ✓ ✓	✓ ✓	✓ ✓	✓ ✓ ✓
<i>M. laxa</i>	✓	✓ ✓	✓ ✓ ✓	✓ ✓

Types of Inoculum

Types of Inoculum

Ascospores

Ascocarp Formation

- During bloom in Spring
- Mummies on ground
- Mushroom-like structures

Ascocarps > Ascospores

- Sexual spores
- Genetic recombination

Frequency of Formation

- Do occur... not common
- Ascospores not important inoculum source



Types of Inoculum

Conidia

Conidia Importance

- Asexual spores
- Main type of inoculum
 - Flower / fruit infection

Conidia Production

- Begins early Spring ...
- Throughout Summer
- Large numbers produced on fruit during harvest period
- Drives brown rot epidemic



Overwintering Inoculum Sources

Overwintering Inoculum Sources

Pathogen survives as mycelium in:

- 1. Fruit mummies**
- 2. Fruit stems (peduncles)**
- 3. Cankers on twigs / branches**
- 4. Leaf scars**
- 5. Buds**

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Overwintering Inoculum Sources

Mummies and Peduncles



Overwintering Inoculum Sources

Relative Importance as Inoculum Sources

1. **Mummies**

2. **Peduncles**

3. **Cankers**

4. **Leaf scars**

5. **Buds**

MOST



LEAST

1×10^6 spores/mummy

1×10^3 spores/peduncle

Usually heal / invaded

Few spores formed

Few spores formed

Inoculum Production, Survival, & Dispersal

Inoculum Production

Factors Influencing Inoculum Production

- 1. Temperature: >40 °F, ~ 68 °F optimum**
- 2. Water content of spore-bearing tissues**
 - Soaking rains re-hydrate tissue
 - Mummies – water content 21% by weight
- 3. Duration of moist tissue at favorable temps**
 - At 68 °F, sporulation evident after 12 hours
 - Max sporulation between 36 and 48 hours
- 4. Sporulation continues with minimal water loss from tissue**
 - Achieved with RH's of 94-100%

Inoculum

Survival and Dispersal

Spore Survival

- ❖ New conidia on mummies: 97-100% germination
 - After 2-4 weeks, germination reduced to 10%
- ❖ Detached conidia (canopy): <1% viable after 8 d

Spore Dispersal

1. Wind

- High temperatures & low relative humidities
- Long range dissemination – between orchards

2. Rain Splash

- Also provides moisture required for germination
- Short-range dissemination – w/in tree

Blossom Infection and Disease Development

Blossom Infection

Environmental Factors

Moisture

- Free water necessary for conidia germination
- Rainfall / Dew

Temperature

- Range: 32 to 86°F Optimum: 77°F
- Cooler/warmer temps delay but do not prevent infection
- Example: At 50°F, 20% conidia germ after 1 hour, but 98% germ after 50 hours; 81°F- 65% in 1 hr

Nutrient Source

- Conidia lack sufficient food reserves for germination
- Require nutrients (esp. carbohydrates) from host
- Example: 0.5% germination in deionized water
93% germination in water with 0.1% sucrose

Relative Susceptibility *Flower Parts*



Stamens

- Anther
- Filament

Pistil

- Stigma
- Style
- Ovary

Petals

Calyx

- Sepals

MOST



LEAST

Disease Development

Early Flower Symptoms



Early Stages

- < Infected stigma / style
- < Infected anther

Later Stages

- Infected petals >
- Infected sepals / calyx >



Disease Development

Twig Canker Symptoms



- < Elliptical canker
- < Girdling (rare) causes twig blight symptom



Flower parts stick >
Canker gumming >
Wet/humid - sporulation >

PEACH BLOSSOM BLIGHT



Shoots w. Canker / Cankers per Shoot

2012: Encore 88% / 3.4

Autumnglo 94 % / 6.1

2013: Encore 26% / 0.3

Autumnglo 59 % / 1.0

Disease Management

Cultural Control Strategies

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Cultural Control

Removal of Overwintering Inoculum Sources

1. Mummies

- Removal possible ... large, easy to find
- Remove peduncle at same time?

2. Fruit Peduncles

- Removal not practical ... too small to locate

3. Twig Cankers

- Remove during pruning; difficult w/o flagging
- Not critical since most cankers “heal over”

4. Infected Leaf Scars & Buds

- Not practical ... but not importance source

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Mummy Removal

Removal	Efficacy / Benefits *
<i>Fall</i>	➤ Complete mummy decomposition ➤ Little / no inoculum from mummies
<i>Winter</i> **	➤ Partial mummy decomposition ➤ Some inoculum reduction ➤ Inoculum source displacement
<i>Spring</i> **	➤ No mummy decomposition ➤ 100% inoculum production ➤ Only advantage – inoc. displacement

* Mummies require 3-5 months for complete decomposition

** Full benefits if mummies collected & removed from orchard

Fungicide Control

Efficacy and Resistance Management

Peach Blossom Blight

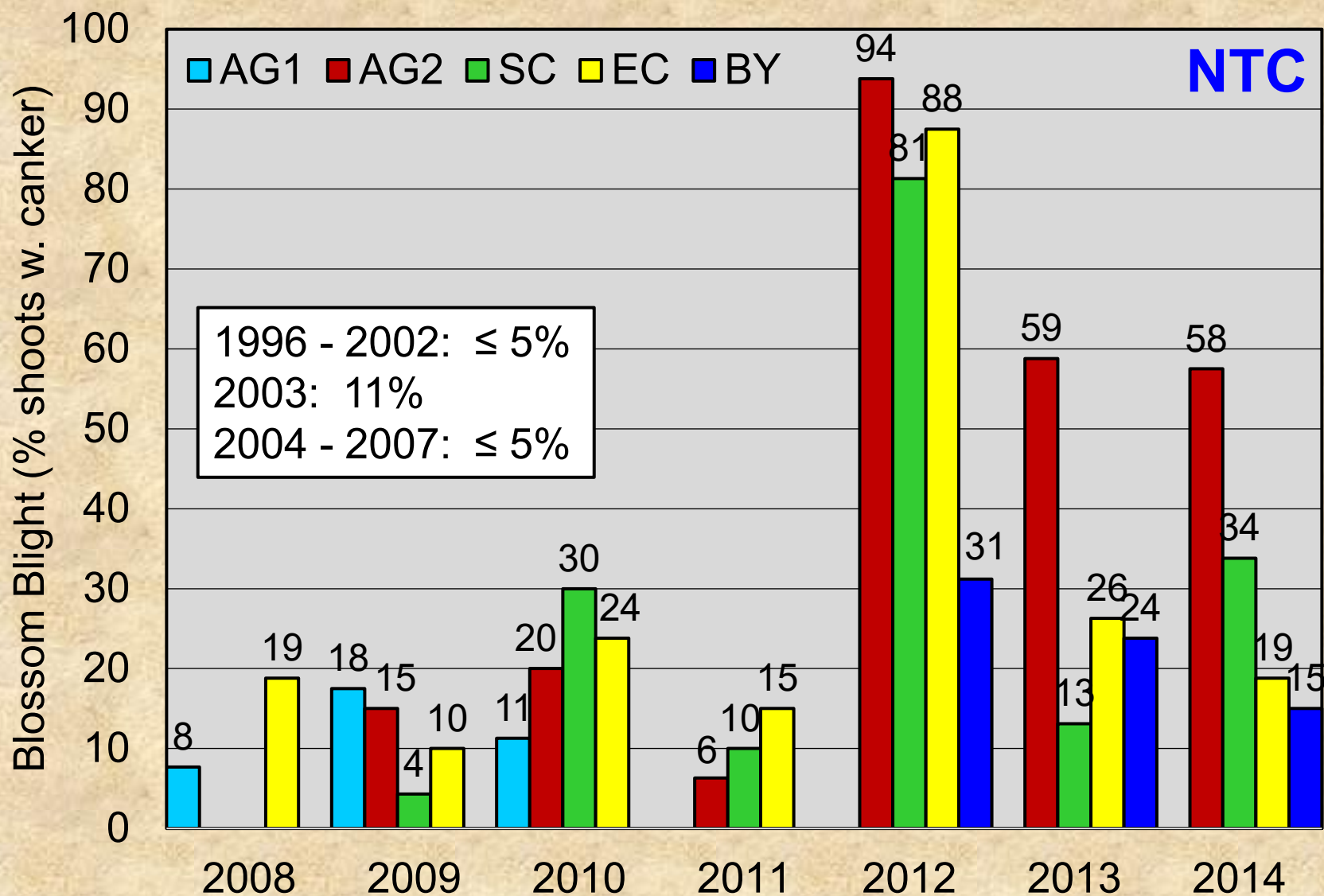
Fungicide Efficacy

Evaluation of Past RAREC Data

- ❑ Results from 12 years of field studies
 - 2003 – 2014
- ❑ Examined 77 treatment tests
- ❑ Evaluation of 24 different fungicides
 - 17 Conventional fungicides
 - 7 Biorational / biological fungicides
- ❑ Wide range of disease pressures (NTC)
 - 4% to 94% shoots with canker
 - Mean of 32% shoots with canker

Peach Blossom Blight

Blossom Blight Canker Incidence



Peach Blossom Blight

Fungicide Efficacy

Fungicide	Type	# Tests	Rate/A	NTC Range % Inf Shoots	% Control
Merivon	C2	1	5 fl oz	6	100
		1	6.5 fl oz	88	100
Quadris Top	C2	2	14 fl oz	4 - 6	100
Inspire Super	C2	3	10-20 fl oz	4 - 20	100
Inspire XT *	C2	3	5-7 fl oz	4 - 20	100
Indar	C1	2	9 fl oz	6 - 26	100
		1	9 fl oz	88	93
Topsin M	C1	1	1.5 lb	26	100
		1	1.5 lb	58	89

* Not registered yet for stone fruit

Peach Blossom Blight

Fungicide Efficacy

Fungicide	Type	# Tests	Rate/A	NTC Range % Inf Shoots	% Control
Fontelis	C1	4	14-20 fl oz	6 - 26	97
		3	16-20 fl oz	59 - 88	91
Rovral / Meteor / Iprodione	C1	2	2 pt	19 - 26	97
		2	1.5 - 2pt	58 - 59	84
Pristine	C2	4	12-14.7 fl oz	4 - 18	95
Luna Sensation*	C2	4	4-5 fl oz	6 - 18	92
Vangard	C1	5	5 oz	10 - 26	92
		2	5 oz	59 - 94	66
Scala	C1	1	18 fl oz	11	91

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Fungicide Efficacy

Fungicide	Type	# Tests	Rate/A	NTC Range % Inf Shoots	% Control
Trilogy	B1	4	1 - 2 gal	10 – 20	88
		2	1 - 2 gal	94	15
Kumulus	C1	1	10 lb	19	87
Luna Experience*	C2	1	5 fl oz	18	86
Serenade Max	B1	5	1.5 - 3 lb	10 – 24	82
		2	1.5 - 3 lb	94	4
Kaligreen / Armicarb	B1	5	3 - 5 lb	10 - 24	77
		2	3 - 5 lb	94	7
Quash 50WG	C1	1	2.5 oz	8	74

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Fungicide Efficacy

Fungicide	Type	# Tests	Rate/A	NTC Range % Inf Shoots	% Control
Captan	P1	2	2.5 - 3.75 lb	13 - 20	73
		2	3.75 - 5 lb	59 - 81	24
Gem	C1	1	3 fl oz	19	73
		1	3 fl oz	58	78
Lime Sulfur	B1	1	2 qt	19	60
Oxidate	B1	1	1 gal	19	60
Bravo Ultrex	P1	2	3.3 lb	58 - 59	55
Actinovate	B1	2	6 - 12 oz	34	44

Peach Brown Rot - Fruit

Cumulative # Fungicide Sprays

#	Ripening Date	Cultivar	Cumulative # Sprays	
			Bloom	Preharvest
1	25June – 5July	Desiree	3	3
2	6-12 July	Sentry	6	6
3	13-19 July	Vulcan	9	9
4	20-26 July	GaLa	12	12
5	27July – 3 Aug	John Boy	15	15
6	4-10 Aug	Bounty	18	18
7	11-18 Aug	FFury PF-24-007	21	21
8	19-26 Aug	Messina	24	24
9	27Aug – 3 Sep	Fayette	27	27
10	3-10 Sep	Encore	30	30

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Recommended Fungicides

Fungicide	Chemistry	FRAC	Rating	PHI
Conventional / Systemic / Single Active				
Rovral, Meteor, & Iprodione	Dicarboxamide	2	++++	PF
Vangard	AP	9	+++	B
Scala	AP	9	+++?	2 days
Topsin-M	MBC	1	++++	1 day
Biorational / Biofungicide / OMRI				
Kumulus / other	Sulfur	M2	+++	0 days
Serenade Max	Biological	NC	+++	0 days
Trilogy	Organic Oil	NC	+++	Pit hard.

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Some Recommended Programs

Program	Pink	Bloom	Petal Fall
Conventional Fungicide Programs			
BB Standard	Vanguard	Rovral, Meteor, or Iprodione	Topsin M + Captan
BB + SB + RS			Gem
BB + RS			Rally + Captan
Integrated Biorational / Conventional Programs			
BB Standard	Trilogy, Sulfur, or Serenade	Rovral, Meteor, or Iprodione	Topsin M + Captan
BB + SB + RS			Gem
BB + RS			Rally + Captan

Questions ?

