PEACH DISEASE MANAGEMENT UPDATE

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THE UNIVERSITY OF GEORGIA

COOPERATIVE EXTENSION

Colleges of Agricultural and Environmental Sciences & Family and Consumer Sciences

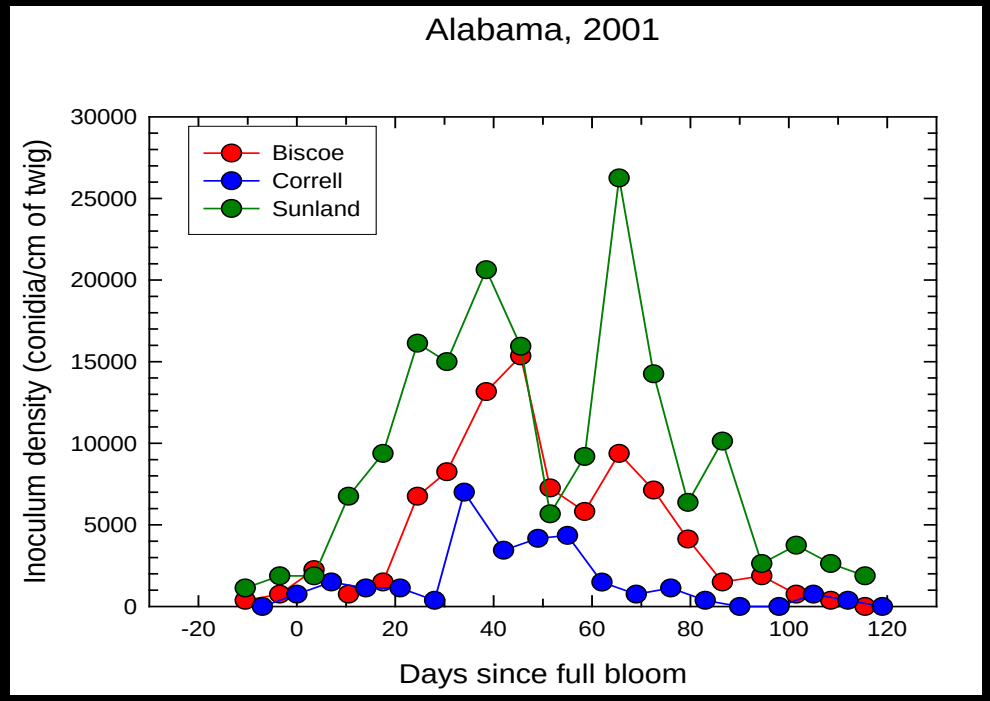
When using the current USDA grading system (United States Standards for Grades of Peaches; effective 21 May 2004), peach fruit is downgraded from #1 to #2 grade when scab damage occurs (defined as “cracked, or when aggregating more than 3/8 inch in diameter” – roughly 4-6 well-developed lesions on a fruit). When 10% or more of the fruit in a shipment has scab damage, as defined above, the whole shipment can be downgraded.

Scab

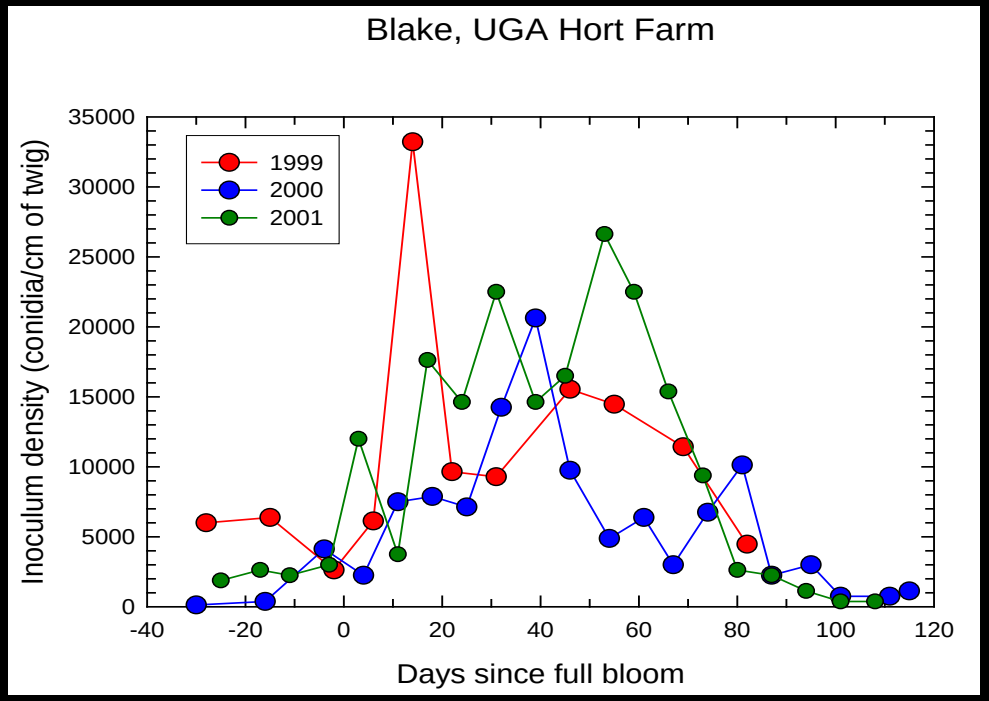
- Spores, conidia, are produced from overwintered stem lesions formed the previous year.
- Conidial production starts about two weeks before shuck split, and it continues in earnest till 3-4 weeks after shuck split.
- The time of onset, peak, and tapering-off of spore production potential is critical for management decisions.

Example Data Sets

Same site, same year, different cultivars

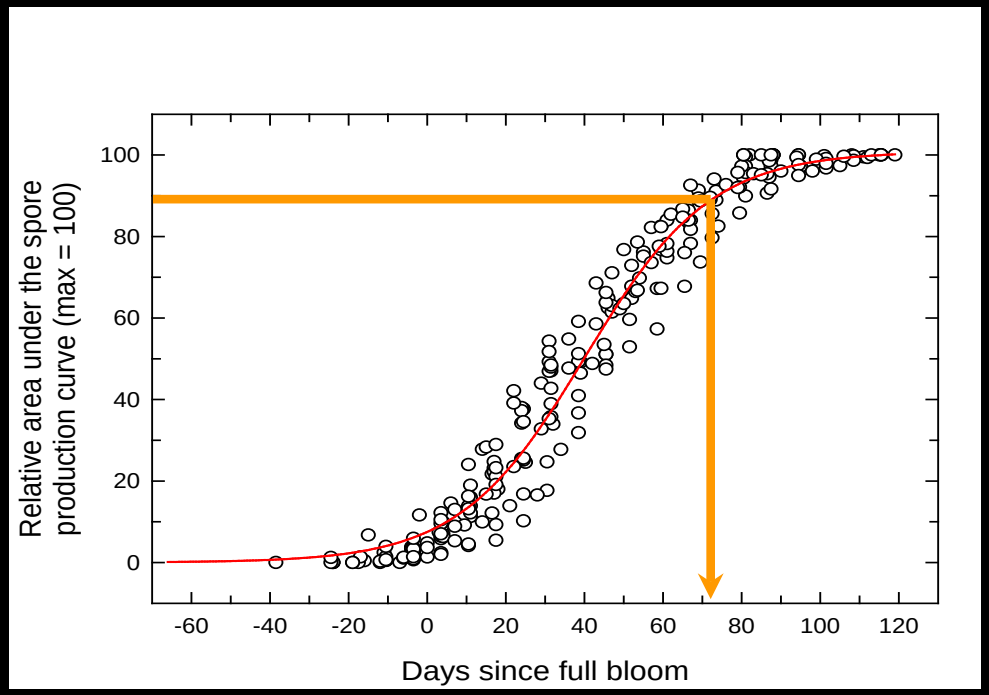


Same site, same cultivar, different years

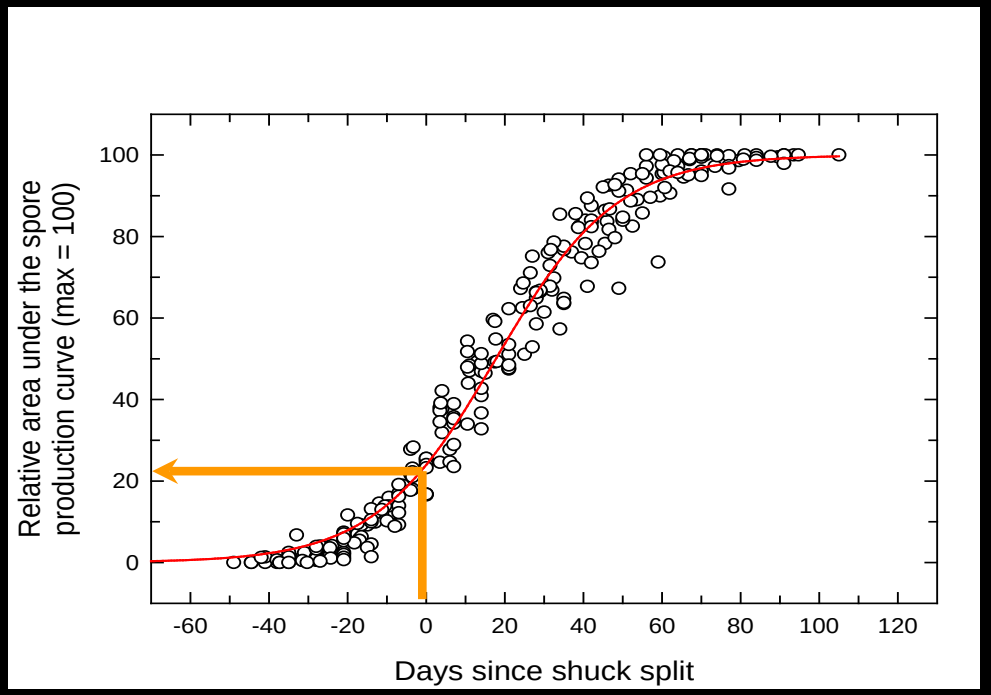


- Not a smooth curve
- High spore numbers occur relatively early

All 18 Data Sets -- Cumulative



90% of spores produced by 10 weeks after bloom



25% of spores produced by time of shuck split

Summary: Seasonal Scab Pressure

- Spore production potential takes off around bloom, tapers off 10 weeks later
- By shuck split, 25% of seasonal spore production potential already achieved
- Highest rate of potential spore production between shuck split and 10 weeks after bloom

For scab management, we have generally recommended the use of chlorothalonil (Bravo) applications at petal fall and shuck split, followed by sulfur and/or Captan applications for the remainder of the season – mainly as a resistance management plan for brown rot.

How does sulfur compare to Bravo for management of scab at petal fall and shuck split?

Scab control with various fungicides applied at shuck split.

Treatment[a]	Average Number of Scab Lesions per Fruit	Percent of Fruit with Scab Lesions (one or more)
1. Sulfur @ 9 lb/A	5	34
2. Bravo @ 4 pt/A	2	20
3. Pristine @ 0.92 lb/A	1	18
4. Flint @ 4 oz/A	1	16

[a]All treatments received a petal fall application of Bravo + sulfur and sulfur cover sprays for the remainder of the season.

2012 Peach Scab Data – Byron, GA

Treatment and rate/A	Application timing[z]	Scab incidence[y]	Scab severity[x]
1. Untreated Control	---	73.8 a	27.4 a
2. Bravo Weather Stik 6F 4.125 pt	PF, SS	7.5 b	0.2 c
Yellow Jacket Sulfur 90W 9 lb	1-8 C		
3. Bravo Weather Stik 6F 4.125 pt	PF, SS	21.9 b	2.6 bc
4. Abound 15 fl oz	PF, SS	10.0 b	0.2 c
5. Yellow Jacket Sulfur 90W 9 lb	PF, SS	58.8 a	9.0 bc
6. Orbit 4 fl oz	PF, SS	70.6 a	12.7 b
7. Topsin M 70WG 1.5 lb	PF, SS	63.1 a	10.9 bc
LSD (P = 0.05)		21.8	12.0

[z] PF = petal fall to 1% shuck split application, SS = shuck split to 10% shuck off application, and C = cover spray application.

[y] Scab incidence (percent infected fruit) was recorded for 40 randomly selected mature fruit from each plot. Means followed by the same letter are not significantly different when using Fisher's protected LSD test.

[x] Scab severity was determined by counting the number of scab lesions observed on each of 40 fruit. Means followed by the same letter are not significantly different when using Fisher's protected LSD test.

How important is the petal fall application?

Why would a petal fall application be important?

“Petal fall scab sprays are sometimes of little value. However, if conditions are particularly favorable for scab development, no strategy can undo infections that develop because of a missed spray.”

Treatment and rate/A	Application Timing	Scab Incidence (% infected fruit)	Scab Severity (# spots/fruit)
Untreated Control	----	84.4 a	24.1 a
Bravo Weather Stik 54 L 4 pt Yellow Jacket Sulfur 90 W 9 lb	PF, SS 1-6 C	42.5 cd	3.1 cd
Bravo Weather Stik 54 L 4 pt	PF	79.4 ab	18.1 ab
Bravo Weather Stik 54 L 4 pt	PF, SS	60.0 bc	10.7 bc
LSD (P=0.05)		22.9	9.4

Petal fall, a critical stage of scab development

Year, treatment (rate/acre)	Stage of development or spray interval (days) pf	ss	sf	7	14	14	% scab
1996							
Captan 50W	+	+	+	+	+	+	10.8
(4.0 lb)	-	+	+	+	+	+	30.0
	-	+	-	+	+	+	39.5
Control							99.8
1997							
Captan 50W	+	+	+	+	+	+	8.5
(4.0 lb)	-	+	+	+	+	+	21.2
	-	+	+	-	+	+	34.0
Control							100.0

E. Zehr, unpublished data
pf = petal fall, ss = shuck split, sf = shuck fall

2011 Peach Scab Data – Byron, GA

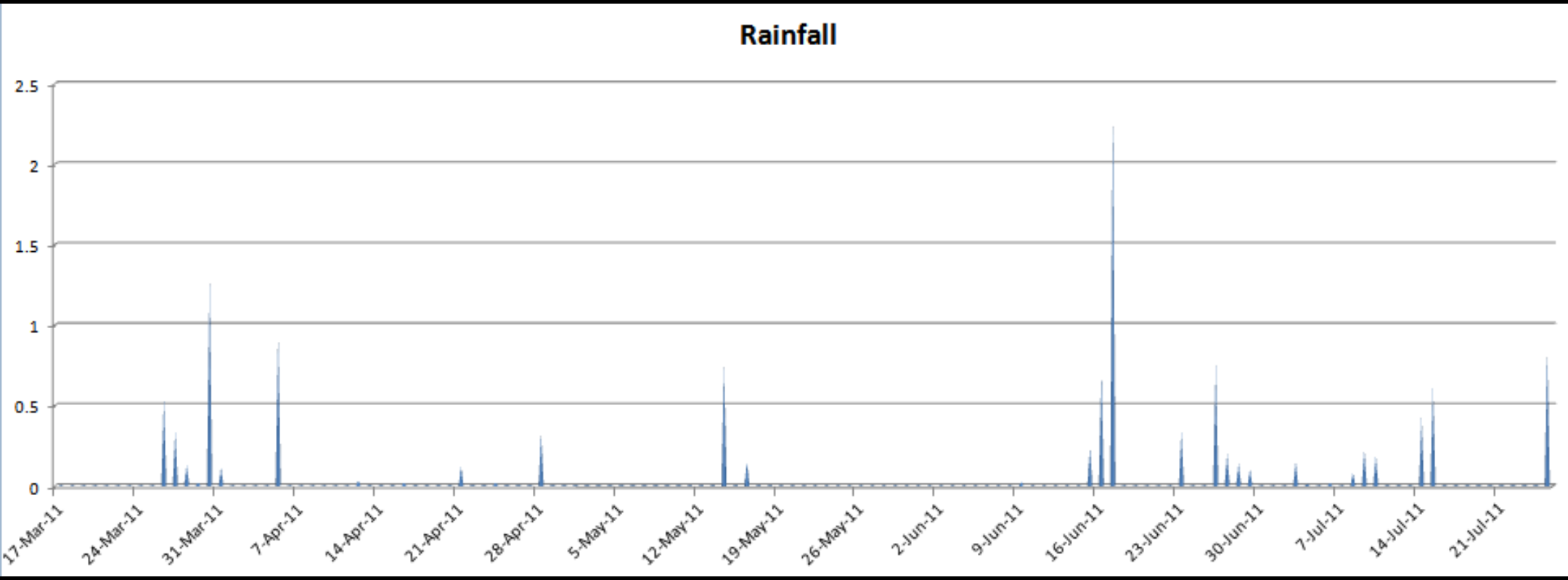
Treatment and rate/A	Application timing[z]	Scab incidence[y]	Scab severity[x]
1. Untreated Control	---	96.9 a	130.8 a
2. Bravo Weather Stik 6F 4.125 pt	PF	96.9 a	98.7 ab
3. Bravo Weather Stik 6F 4.125 pt	SS	88.8 ab	91.1 bc
4. Bravo Weather Stik 6F 4.125 pt	PF, SS	70.6 b	62.4 cd
5. Abound 15 fl oz	PF	81.3 ab	33.5 de
6. Abound 15 fl oz	SS	45.0 c	28.4 e
7. Abound 15 fl oz	PF, SS	20.6 d	3.2 e
8. Bravo Weather Stik 6F 4.125 pt ..... Yellow Jacket Sulfur 90W 9 lb	PF, SS 1-10 C	34.4 cd	8.3 e
9. Abound 15 fl oz ..... Yellow Jacket Sulfur 90W 9 lb	PF, SS 1-10 C	18.8 d	4.2 e
10. Yellow Jacket Sulfur 90W 9 lb	PF, SS, 1-10C	31.9 cd	8.4 e
LSD (P = 0.05)		20.0	33.6

[z] PF = petal fall to 1% shuck split application, SS = shuck split to 10% shuck off application, and C = cover spray application.

[y] Scab incidence (percent infected fruit) was recorded for 40 randomly selected mature fruit from each plot. Means followed by the same letter are not significantly different when using Fisher's protected LSD test.

[x] Scab severity was determined by counting the number of scab lesions observed on each of 40 fruit. Means followed by the same letter are not significantly different when using Fisher's protected LSD test.

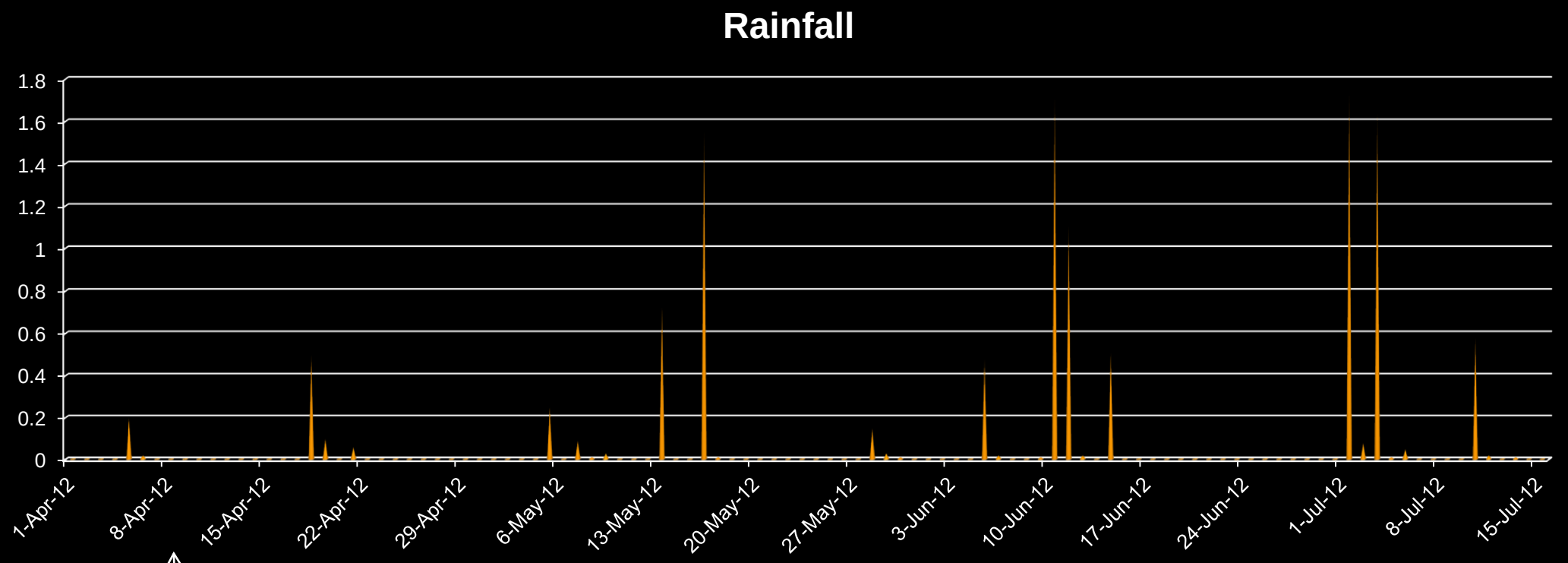
Byron, GA (USDA Station) Rainfall 2011



Shuck split

Petal fall

Byron, GA (USDA Station) Rainfall 2012



Shuck split

Petal fall

2012 Peach Scab Data – Byron, GA

Treatment and rate/A	Application timing[z]	Scab incidence[y]	Scab severity[x]
1. Untreated Control	---	73.8 a	35.4 a
2. Bravo Weather Stik 6F 4.125 pt	PF	77.5 a	32.3 a
3. Bravo Weather Stik 6F 4.125 pt	SS	40.6 b	5.0 b
4. Bravo Weather Stik 6F 4.125 pt	PF, SS	20.0 bc	2.0 b
5. Abound 15 fl oz	PF	20.0 bc	0.9 b
6. Abound 15 fl oz	SS	28.1 bc	2.2 b
7. Abound 15 fl oz	PF, SS	16.3 c	1.0 b
8. Bravo Weather Stik 6F 4.125 pt ..... Yellow Jacket Sulfur 90W 9 lb	PF, SS 1-8 C	13.1 c	1.0 b
9. Abound 15 fl oz ..... Yellow Jacket Sulfur 90W 9 lb	PF, SS 1-8 C	9.4 c	0.3 b
10. Yellow Jacket Sulfur 90W 9 lb	PF, SS, 1-8C	27.5 bc	4.0 b
LSD (P = 0.05)		21.2	12.3

[z] PF = petal fall to 1% shuck split application, SS = shuck split to 10% shuck off application, and C = cover spray application.

[y] Scab incidence (percent infected fruit) was recorded for 40 randomly selected mature fruit from each plot. Means followed by the same letter are not significantly different when using Fisher's protected LSD test.

[x] Scab severity was determined by counting the number of scab lesions observed on each of 40 fruit. Means followed by the same letter are not significantly different when using Fisher's protected LSD test.

Is Abound really that much better than Bravo? Why?

Peach Scab Control, 2001

PF	SS	SF	1-wk		1C	2C	3C	4C	5C	Cresthaven Peach scab, % of fruit Infected
control										98.7 a
B	B	B			C		C		C	5.3 c
B	B				C		C		C	3.2 c
B	A	A			C		C		C	1.2 c
B	A				C		C		C	1.7 c

(A) bound 13 floz, (B) ravo 3.5 pts, (C) aptan 5 lb

How does sulfur compare to Captan?

Non-Sulfur vs. Sulfur treatments

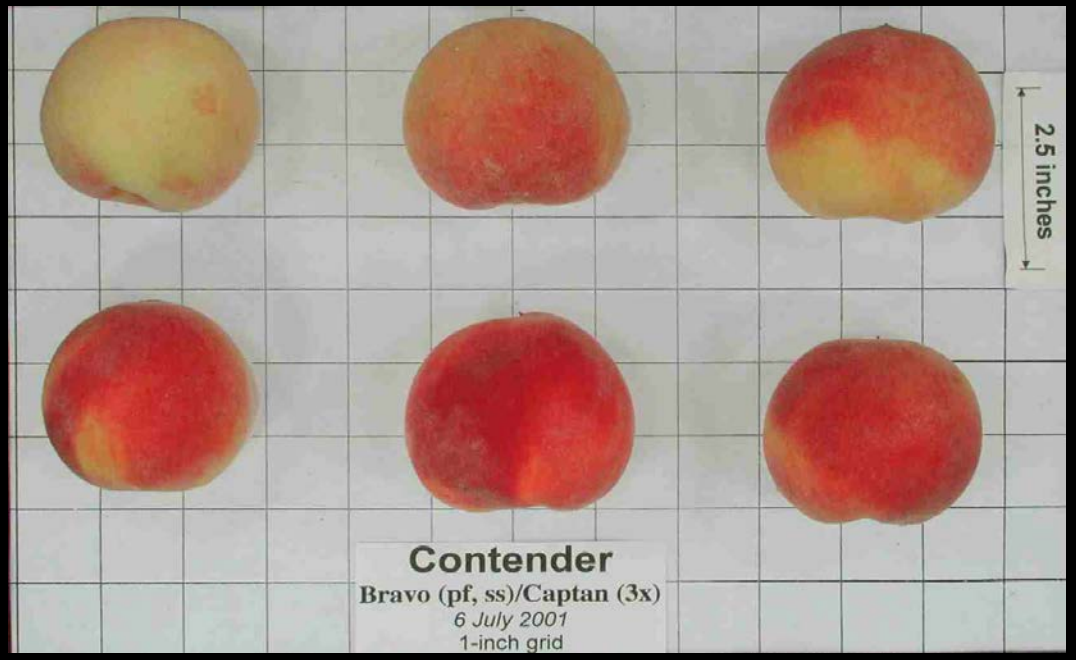
Treatments*			Spray interval (days)								
			7	7	7	7	7	7	7	7	7
1	Brvo	Brvo		C		C		C			
2	Brvo	Abnd		C		C		C			
3	Slfr	Slfr	S	S		S		S			
4	Slfr	Slfr	S	S	S	S	S	S	S	S	S

↓

*(B) Bravo 3.5pt
(C) Captan 5 lb
(A) Abound 13 floz
(S) Sulfur 12 lb

Peach Scab, Incidence (%)

Treatment	'Cresthaven'	'Contender'
2001 season		
Control	**98.7 a**	**35.0 a**
Brvo/Brvo/Cptn	3.2 c	0.2 b
Brvo/Abnd/Cptn	1.7 c	0.3 b
Sulfur-6x	15.0 b	1.1 b
Sulfur-11x	0.8 c	0.8 b
2002 season		
Control	**63.5 a**	**63.5 a**
Brvo/Brvo/Cptn	4.2 b	3.7 b
Brvo/Abnd/Cptn	5.2 b	6.2 b
Sulfur-6x	3.2 b	1.7 b
Sulfur-11x	0.0 b	0.0 b


2.5 inches
Contender
Bravo (pf, ss)/Captan (3x)
6 July 2001
1-inch grid


2.5 inches
Contender
Sulfur (11x)
6 July 2001
1-inch grid


2.5 inches
Cresthaven
24 July 2001
pf ss Bravo; 3xCaptan
1-inch grid

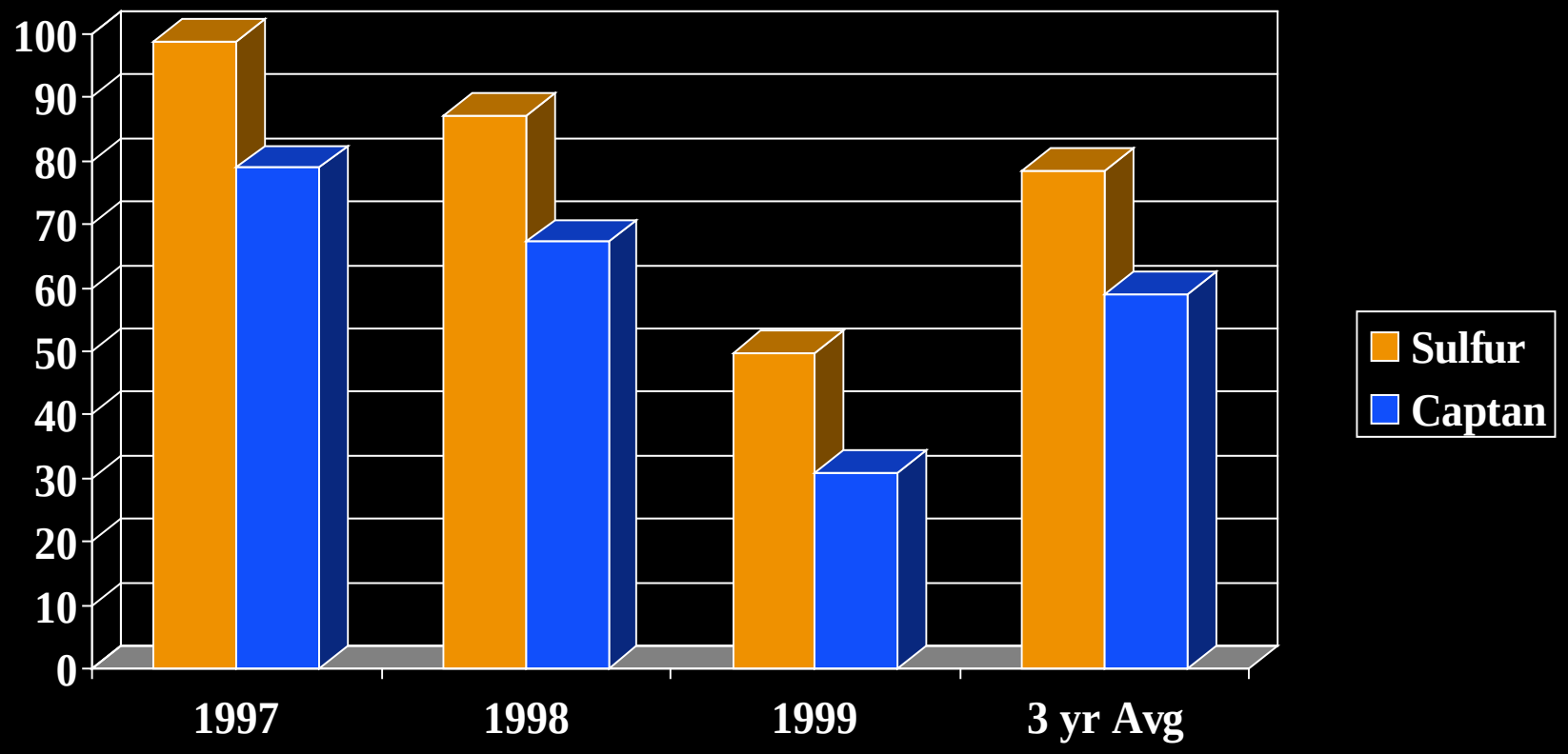

2.5 inches
Cresthaven
24 July 2001
pf ss sf Sulfur, 8xSulfur
p1-inch grid

Auburn University Studies

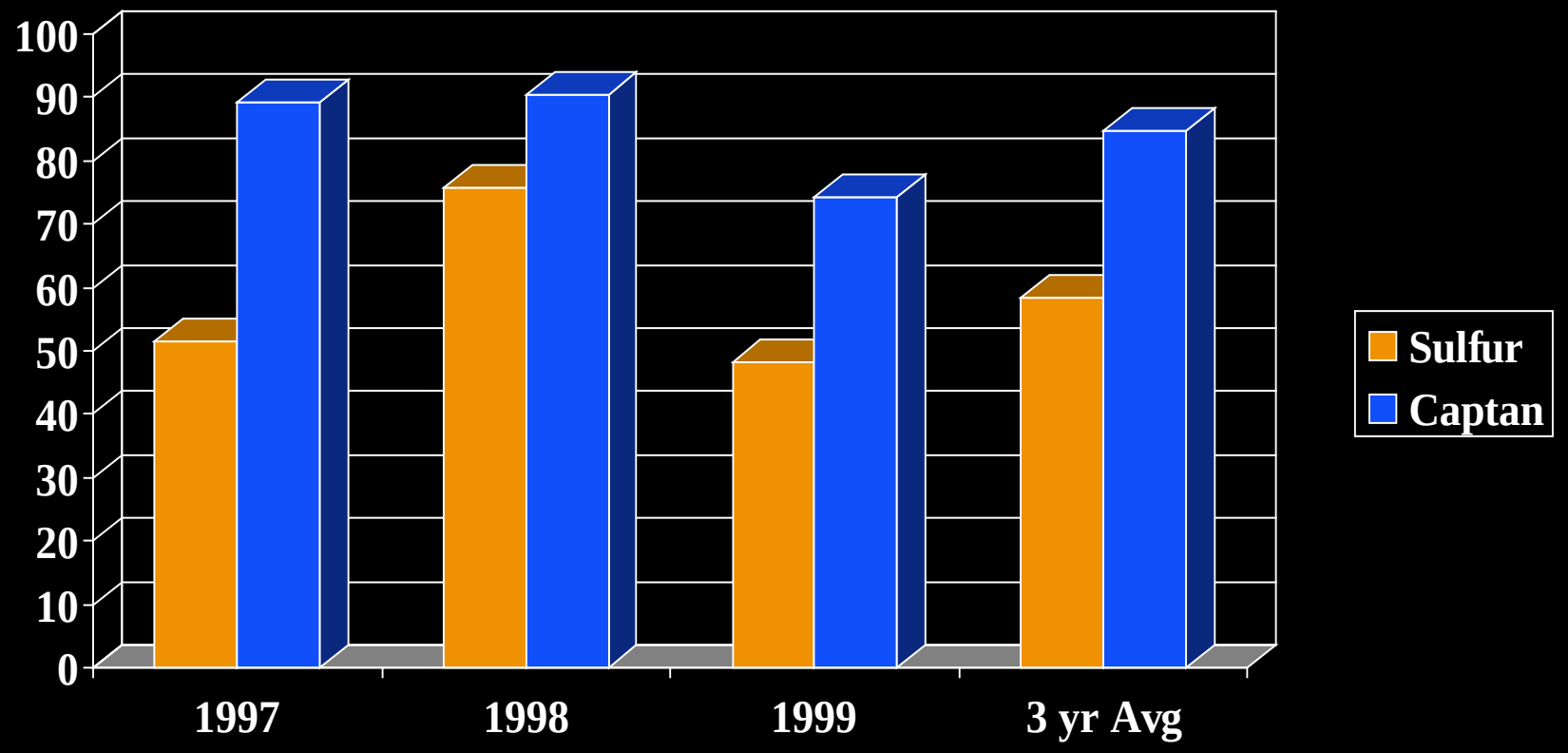
- Bloom sprays (2): Bravo 720

- Cover sprays (7): Captan or sulfur, 10-14 days

Scab Incidence (1997-1999)



Fruit Marketability (1997 - 1999)



Standard sulfur applications will provide control of scab, but they have to be applied in a shortened interval (weekly) as compared to Captan. Captan is also better for brown rot management in cover sprays, and it provides better fruit quality.

Does the sulfur formulation/rate matter?

Treatment and rate/A	Application Timing[1]	Scab Incidence[2]	Scab Severity[3]
Untreated Control	---	84.4 a	24.1 a
Bravo Weather Stik 54L 4 pt ..... Yellow Jacket Sulfur 90W 9 lb	PF, SS 1-6 C	42.5 cd	3.1 cd
TD2435-01 90DF 2.5 lb ..... Yellow Jacket Sulfur 90W 9 lb	PF, SS 1-6 C	33.1 de	4.7 cd
TD2435-01 90DF 3 lb ..... Yellow Jacket Sulfur 90W 9 lb	PF, SS 1-6 C	43.8 cd	4.1 cd
Bravo Weather Stik 54L 4 pt ..... Microthiol Disperse 80DF 10.125 lb	PF, SS 1-6 C	19.4 e	0.9 d
Bravo Weather Stik 54L 4 pt	PF	79.4 ab	18.1 ab
Bravo Weather Stik 54L 4 pt	PF, SS	60.0 bc	10.7 bc
LSD (P = 0.05)		22.9	9.4

Scab Control

- Scab sprays are critical from petal fall through the second and third cover sprays.
- Petal fall sprays can have value for reduction of scab, particularly when using Abound.
- Abound and Bravo provide similar efficacy, but Abound is moderately better.
- Sulfur is not the best choice for petal fall and shuck split applications.
- Captan is more active than sulfur for cover sprays. Captan should be utilized during periods of rainfall.

Brown rot of peach is an ideal candidate for resistance development.

- Large populations and rapid multiplication of target pathogen
- Extensive and concentrated areas of use
- Use of repetitive or sustained treatments

Trade Name	Active Ingredient	Chemical Class	Manufacturer
1. Fontelis (DPX-LEM17)	Penthiopyrad	SDHI	DuPont
2. Luna Sensation	Trifloxystrobin + Fluopyram	Strobilurin + SDHI	Bayer
3. Merivon	Pyraclostrobin + Fluxapyroxad	Strobilurin + SDHI	BASF
4. Inspire Super	Difenoconazole + Cyprodinil	DMI + AP	Syngenta
5. Inspire XT	Difenoconazole + Propiconazole	DMI + DMI	Syngenta
6. Quadris Top	Difenoconazole + Azoxystrobin	DMI + Strobilurin	Syngenta
7. Topguard	Flutriafol	DMI	Cheminova
Chemical Standard = **Pristine**	Pyraclostrobin + Boscalid	Strobilurin + SDHI	BASF

2012 Brown Rot Data – South Carolina

	Brown rot incidence (%)		Rhizopus/Gilbertella incidence (%)	
Treatment and rate/A	3 dph	7 dph	3 dph	7 dph
Merivon 6.5 oz	0 b	8 d	0	0
Topguard SC/ 28 fl oz	0 b	8 d	1	5
IKF-5411/ 17.1 fl oz	0 b	9.5 cd	0	2
IKF-5411/ 13.7 fl oz	1 b	16 cd	0	0
Mettle 125ME/ 10 oz	2 b	16.5 cd	0.5	1
Topguard SC/ 14 fl oz	5 b	18 c	0.5	2
Mettle 125ME/ 8 oz	1.5 b	22.5 c	0.5	2
Topguard SC/ 7 fl oz	1.5 b	25.5 c	1	3.5
Topguard SC/ 3.5 fl oz	5 b	48.5 b	0.5	0.25
Untreated control	37.5 a	86.5 a	0	0

*Column numbers followed by the same letter are not significantly different at α=0.05 as determined by analysis of variance. Mean separation was conducted in an all pairwise analysis using the Holm-Sidak method with SigmaStat 3.1 software, SPSS Inc.

2012 Brown Rot Data – Georgia

Treatment and rate/A	Post-harvest brown rot incidence* (% infected fruit)	
	4 days after harvest	7 days after harvest
Untreated Control	84.1 a	90.5 a
Pristine 38WDG 14.5 oz	9.5 de	31.8 de
Topguard SC 3.5 fl oz.....	68.3 ab	74.6 ab
Topguard SC 7.0 fl oz.....	60.3 b	73.0 ab
Topguard SC 14.0 fl oz.....	58.7 b	63.5 bc
Topguard SC 28.0 fl oz.....	36.5 c	47.6 cd
IKF-5411SC 13.7 fl oz.....	28.6 cd	52.4 bcd
IKF-5411SC 17.1fl oz.....	30.2 c	54.0 bcd
Merivon SC 6.5 fl oz.....	0.0 e	1.6 f
Elite WP 8 oz.....	0.0 e	7.9 ef
LSD ($\alpha = 0.05$)	20.5	24.1

2012 Brown Rot Data – Georgia

Treatment and rate/A	Post-harvest brown rot incidence* (% infected fruit)		
	4 days after harvest	7 days after harvest	10 days after harvest
Untreated Control	77.8 a	85.7 a	90.5 a
Pristine 38WDG 13.2 oz	0.0 b	38.1 b	54.0 b
Merivon 4.0 fl oz	0.0 b	12.7 cd	14.3 c
Merivon 5.5 fl oz.....	0.0 b	6.4 d	11.1 c
Merivon 6.5 fl oz.....	0.0 b	6.4 d	11.1 c
Fontelis 1.67SC 20 fl oz	3.2 b	31.7 bc	46.0 b
LSD ($\alpha = 0.05$)	9.1	19.8	22.5

*Brown rot incidence was recorded on fruit stored at ambient temperature. Means followed by the same letters are not significantly different according to an LSD test.

Pristine versus Merivon

13 comparisons; 5 states

Brown rot incidence
(Pristine = 21.4; Merivon = 9.2)

Merivon is more efficacious than Pristine
(P = 0.008)

Fontelis versus Merivon

8 comparisons; 5 states

Brown rot incidence
(Fontelis = 22.3; Merivon = 10.8)

Merivon is more efficacious than Fontelis
(P = 0.008)

Pristine versus Fontelis

18 comparisons; 5 states

Brown rot incidence
(Pristine = 30.8; Fontelis = 33.6)

Fontelis is as efficacious as Pristine
(P = 0.19)

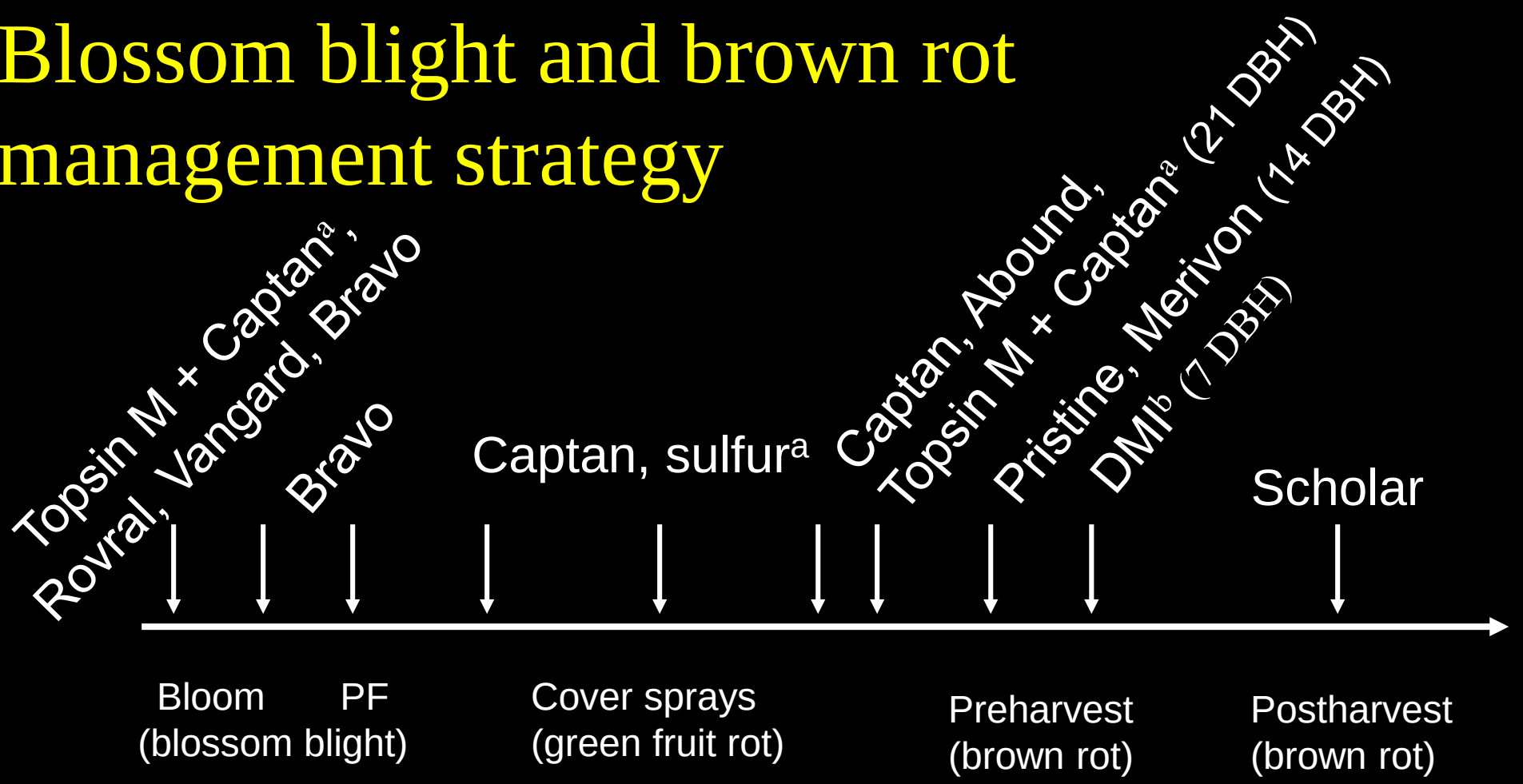
Pristine versus Inspire Super

9 comparisons; 4 states

Brown rot incidence
(Pristine = 17.2; Inspire Super = 29.1)

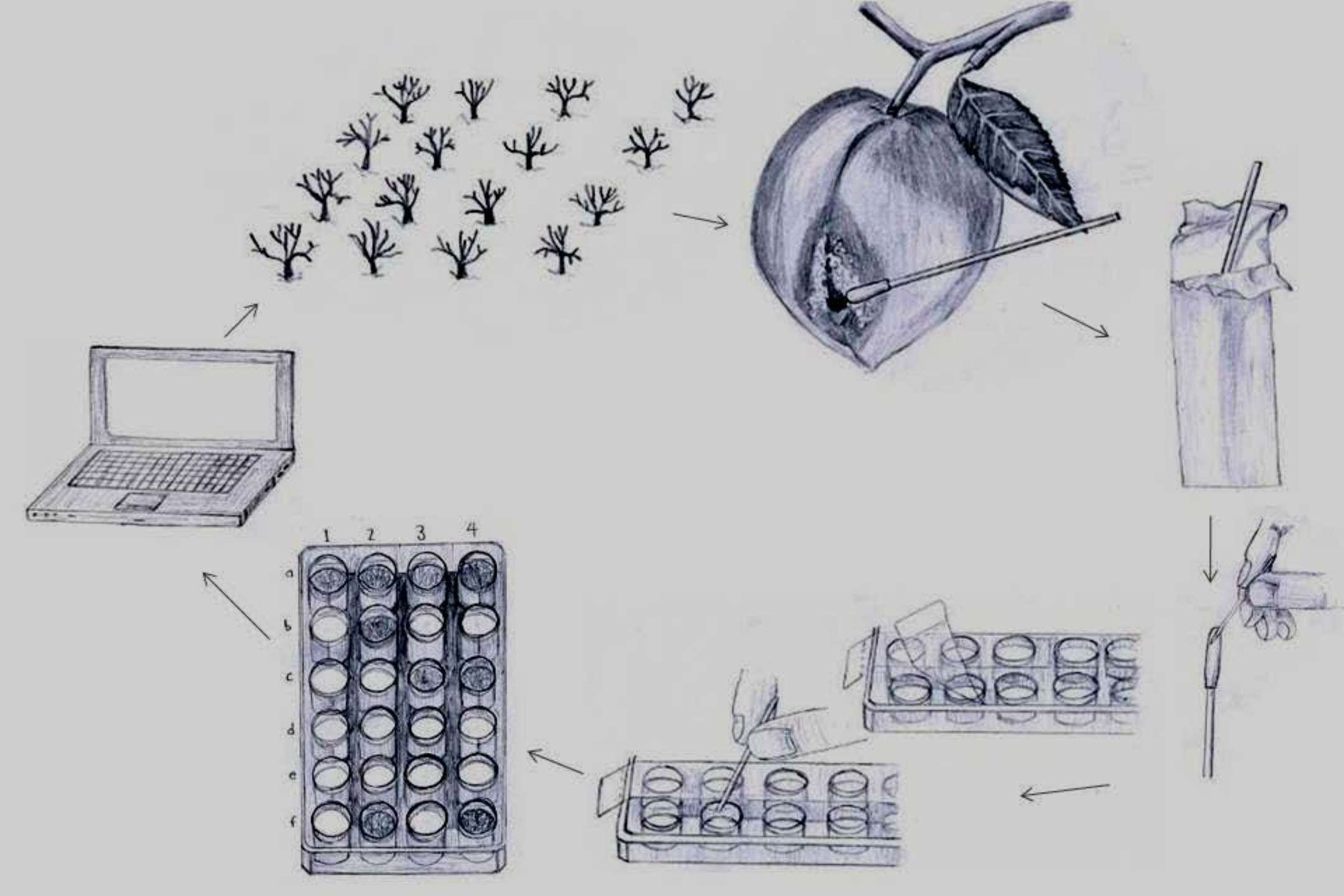
Pristine is more efficacious than Inspire Super
(P = 0.007)

Blossom blight and brown rot management strategy



[a] Topsin M should only be utilized once per year, and it should always be tank-mixed with Captan products for resistance management.

[b] If DMI resistance is suspected or documented, use captan instead of sulfur in cover sprays and use the high rate of Elite or Indar preharvest.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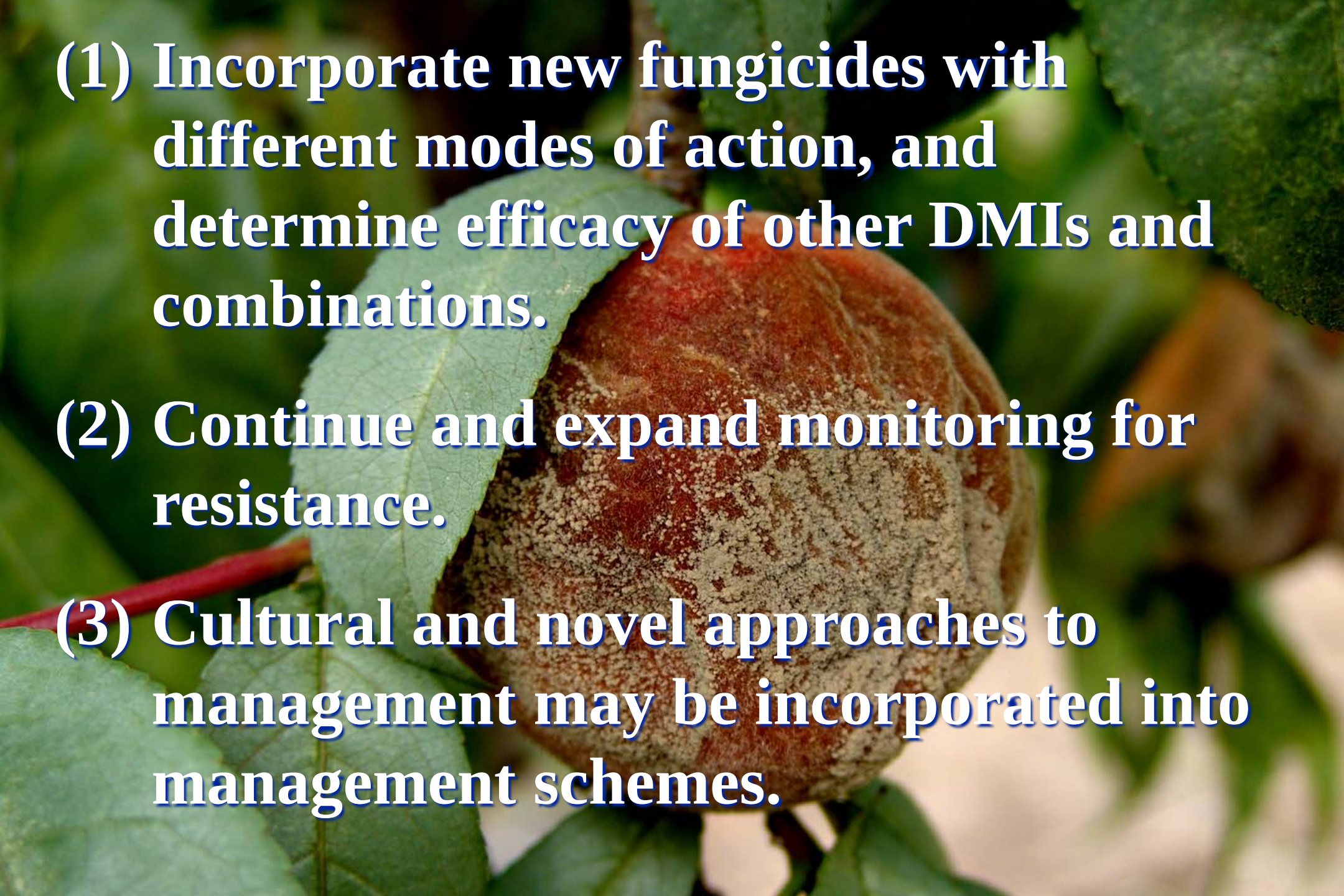

(1) Incorporate new fungicides with different modes of action, and determine efficacy of other DMIs and combinations.

(2) Continue and expand monitoring for resistance.

(3) Cultural and novel approaches to management may be incorporated into management schemes.

Bacterial Spot

- Can be very damaging disease on susceptible varieties (i.e. O'Henry).
- Occurrence is sporadic.
- Dependent on moisture and temperature.