Blueberry and Blackberry Disease Management

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2013 Southeast Regional Blueberry Integrated Management Guide

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www.smallfruits.org

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Recommendations are based on information from the manufacturer's label and performance data from research and extension field tests.

Because environmental conditions and grower application methods vary widely, suggested use does not imply that performance of the pesticide
will always conform to the safety and pest control standards indicated by experimental data.

This publication is intended for use only as a guide. Specific rates and application methods are on the pesticide label, and these are subject to change at any time. Always refer to and read the pesticide label before making any application! The pesticide label supersedes any information


Eddie Beasley; Berrien County

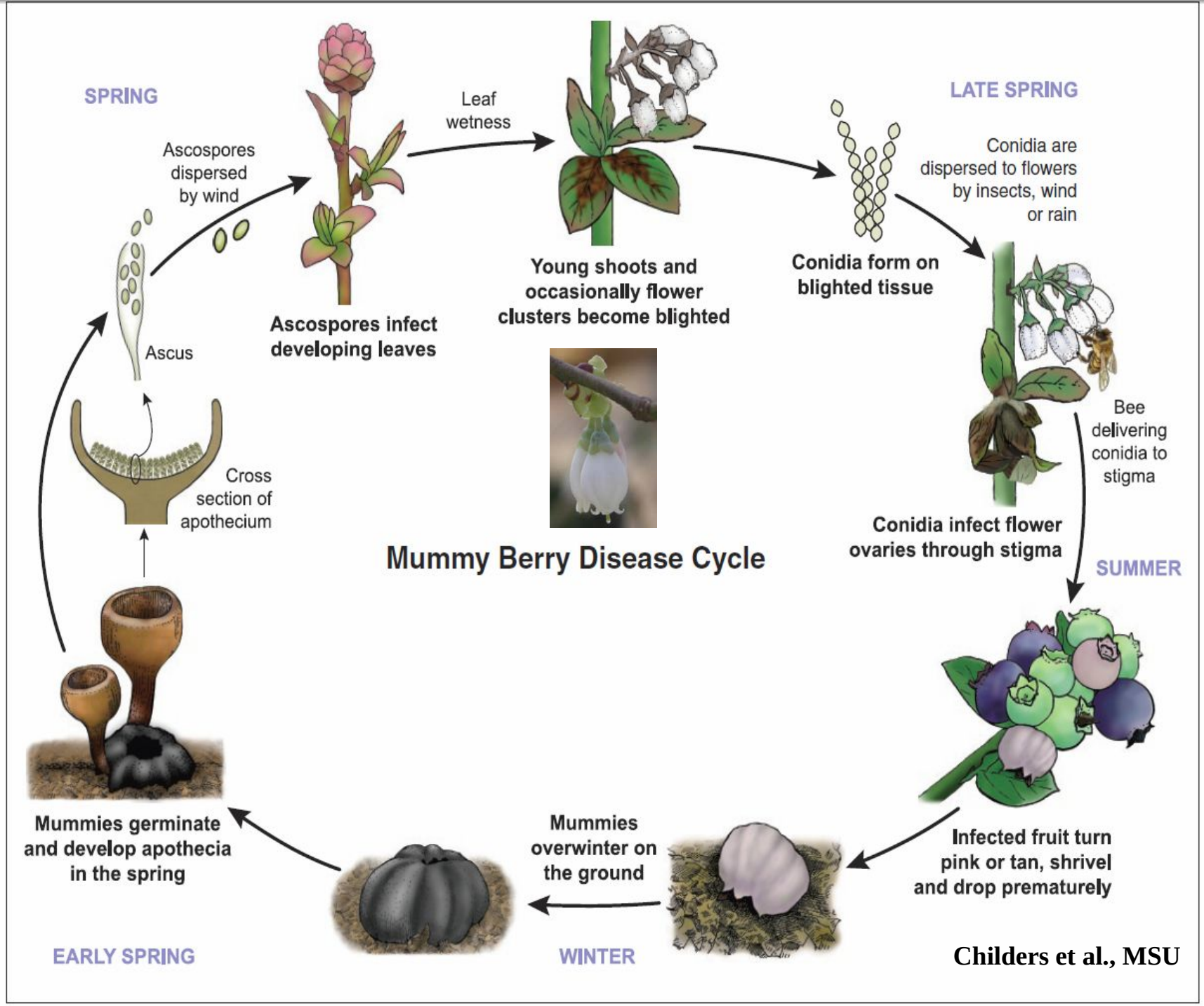

SPRING
Ascospores dispersed by wind
Ascus
Cross section of apothecium
Ascospores infect developing leaves
Leaf wetness
Young shoots and occasionally flower clusters become blighted
LATE SPRING
Conidia are dispersed to flowers by insects, wind or rain
Conidia form on blighted tissue
Bee delivering conidia to stigma
Conidia infect flower ovaries through stigma
SUMMER
Infected fruit turn pink or tan, shrivel and drop prematurely
WINTER
Mummies overwinter on the ground
EARLY SPRING
Mummies germinate and develop apothecia in the spring
Mummy Berry Disease Cycle
Childers et al., MSU

Table 2. Fungicide efficacy against shoot and fruit stages of mummy berry infection in blueberry in Michigan.

Fungicide	Active ingredient	Behavior	Shoot strikes	Fruit infection
Abound	azoxystrobin	systemic	fair*	fair to good
Bravo	chlorothalonil	protectant	fair	poor
Cabrio	pyraclostrobin	systemic	poor to fair	fair
Captan	captan	protectant	poor	poor to fair
Captevate	fenhexamid + captan	systemic + protectant	fair	fair
Elevate	fenhexamid	systemic	poor	poor
Indar	fenbuconazole	systemic	good to excellent	good to excellent
Orbit	propiconazole	systemic	good to excellent	good
Pristine	pyraclostrobin + boscalid	systemic + systemic	fair to good	good
Serenade	*Bacillus subtilis*	protectant	fair to good**	fair
Sulforix/lime sulfur	calcium polysulfide	protectant	fair	poor
Switch	cyprodinil + fludioxonil	systemic + protectant	poor	fair
Ziram	ziram	protectant	fair	poor to fair

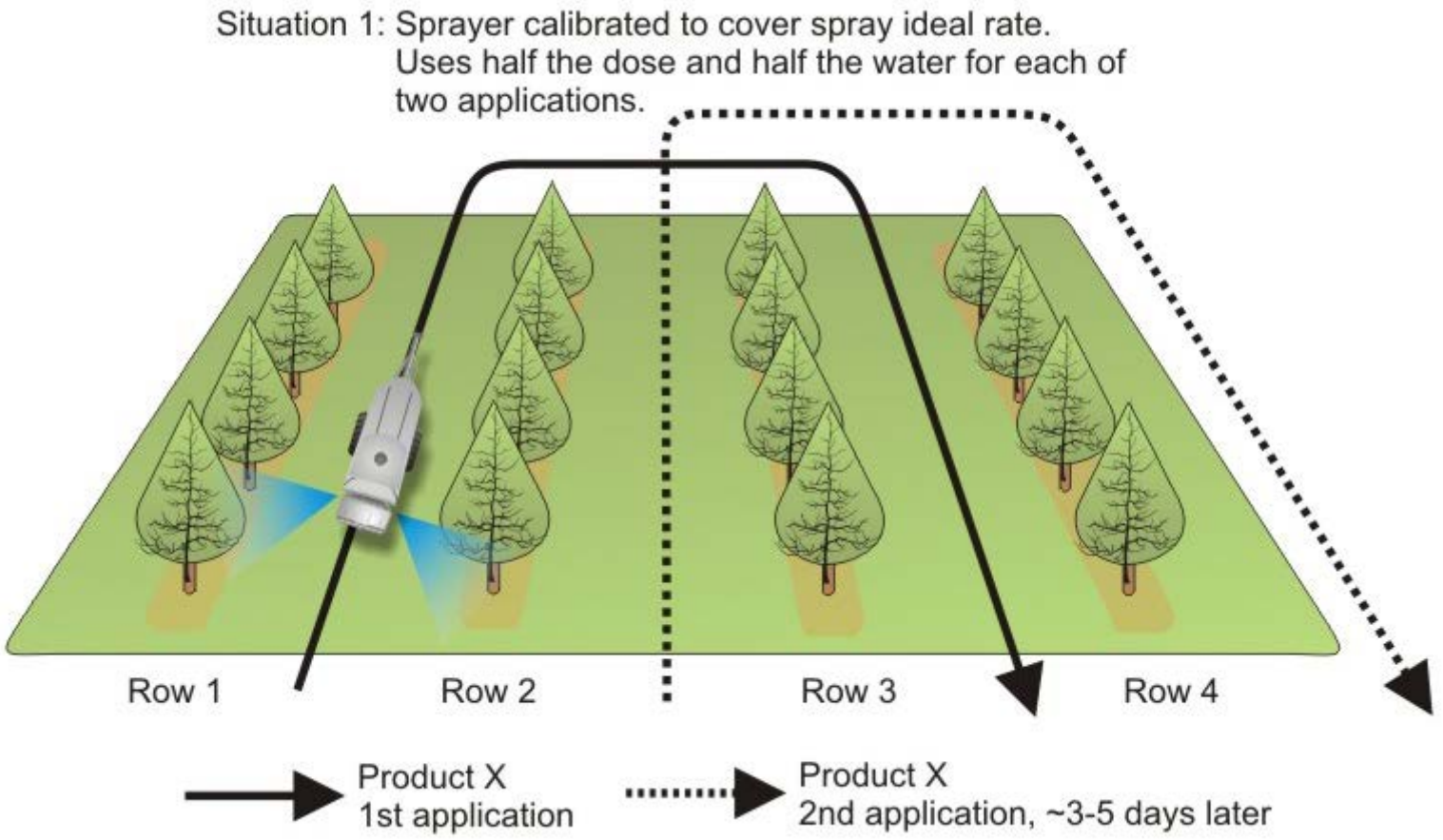
* Abound works better against shoot strikes in the southeastern United States than in Michigan. This difference may be due to differences in springtime temperatures.

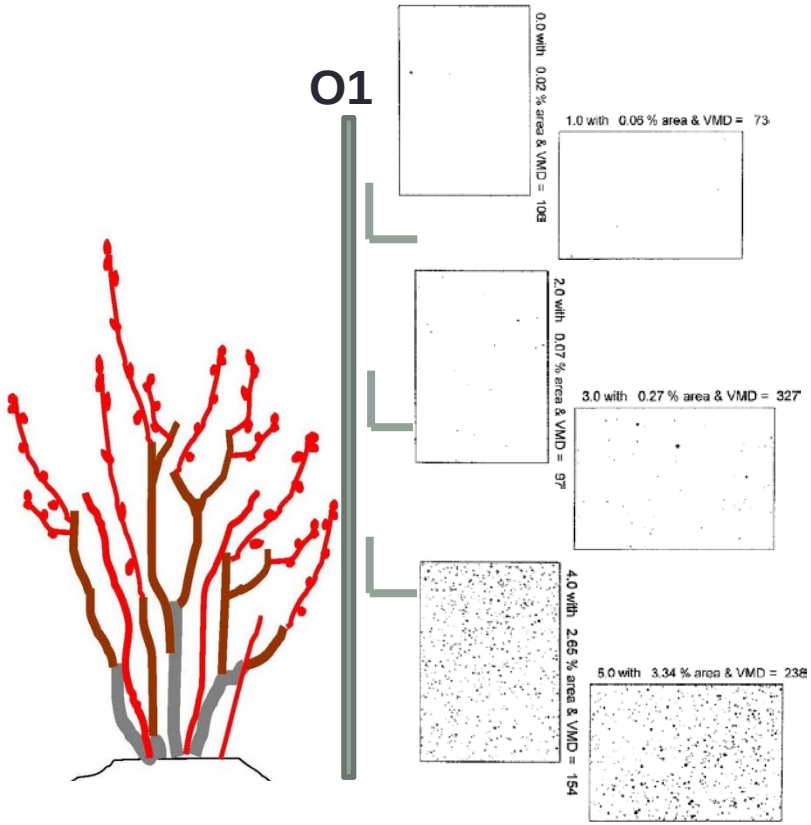
** Efficacy of Serenade can be improved by adding the adjuvant Nufilm-17.

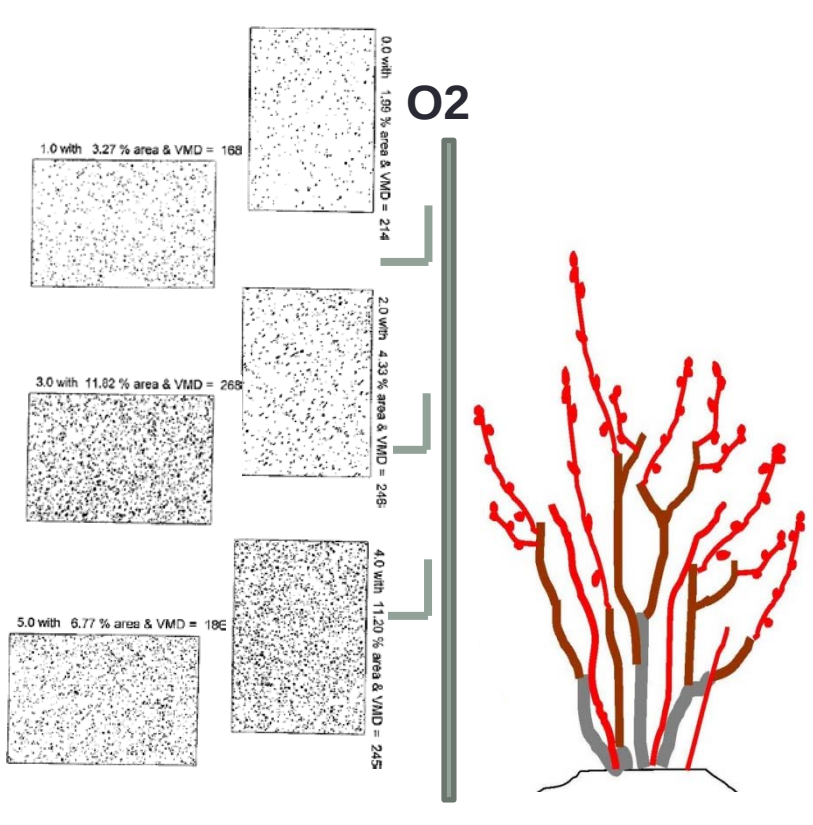
	Mummy Berry Sprays			
	Green Tip (or early bloom)	Bloom Sprays (10-20% bloom)	Bloom Sprays (full bloom)	Late bloom
1	NO FUNGICIDE			
2	Indar 75WSP @ 2.0 oz/A	Indar 75 WSP @ 2.0 oz/A	Indar 75 WSP @ 2.0 oz/A	Indar 75 WSP @ 2.0 oz/A
3	Regalia @ 4 quarts/A	Regalia @ 4 quarts/A	Regalia @ 4 quarts/A	Regalia @ 4 quarts/A
4	Quilt Xcel @ 21 fl.oz./A	Quilt Xcel @ 21 fl.oz./A	Quilt Xcel @ 21 fl.oz./A	Quilt Xcel @ 21 fl.oz./A
5	Quash 50WDG @ 2.5 oz/A	Quash 50WDG @ 2.5 oz/A	Quash 50WDG @ 2.5 oz/A	Quash 50WDG @ 2.5 oz/A
6	Indar 75WSP @ 2.0 oz/A	Optiva @ 16 oz/A	Indar 75WSP @ 2.0 oz/A	Optiva @ 16 oz/A
7	Indar 75WSP @ 2.0 oz/A	NO FUNGICIDE	Indar 75WSP @ 2.0 oz/A	NO FUNGICIDE
8	Abound drench (0.035 oz a.i./ plant)*	NO FUNGICIDE	NO FUNGICIDE	NO FUNGICIDE

Treatment and rate/A	Treatment date[z]	Mummy incidence (%)
Untreated control		74.5 a[y]
Indar 75WSP 2 oz	1-4	19.6 c
Regalia 4.0 qt	1-4	74.0 a
Quilt Xcel 21 fl oz	1-4	19.2 c
Quash 50WDG 2.5 oz	1-4	25.1 c
Indar 75WSP 2 oz	1,3	
Optiva 16 oz	2,4	47.1 b
Indar 75WSP 2 oz	1,3	62.4 ab
Abound[x]	1	65.4 ab
LSD ($\alpha = 0.05$)		19.5

[z]Treatment dates: 1 = 29 Mar (green tip); 2 = 9 Apr (10-20% bloom); 3 = 15 Apr (full bloom); 4 = 20 May (late bloom)
[y]Means within columns followed by the same letters are not significantly different according to Fisher's protected LSD test ($P \leq 0.05$).
[x]Abound was applied as a concentrated drench at 0.035 oz a.i. per plant.


Situation 1: Sprayer calibrated to cover spray ideal rate.
Uses half the dose and half the water for each of two applications.
Row 1
Row 2
Row 3
Row 4
Product X
1st application
Product X
2nd application, ~3-5 days later


O1
0.0 with 0.02 % area & VMD = 108
1.0 with 0.06 % area & VMD = 73
2.0 with 0.07 % area & VMD = 97
3.0 with 0.27 % area & VMD = 327
4.0 with 2.65 % area & VMD = 154
5.0 with 3.34 % area & VMD = 238

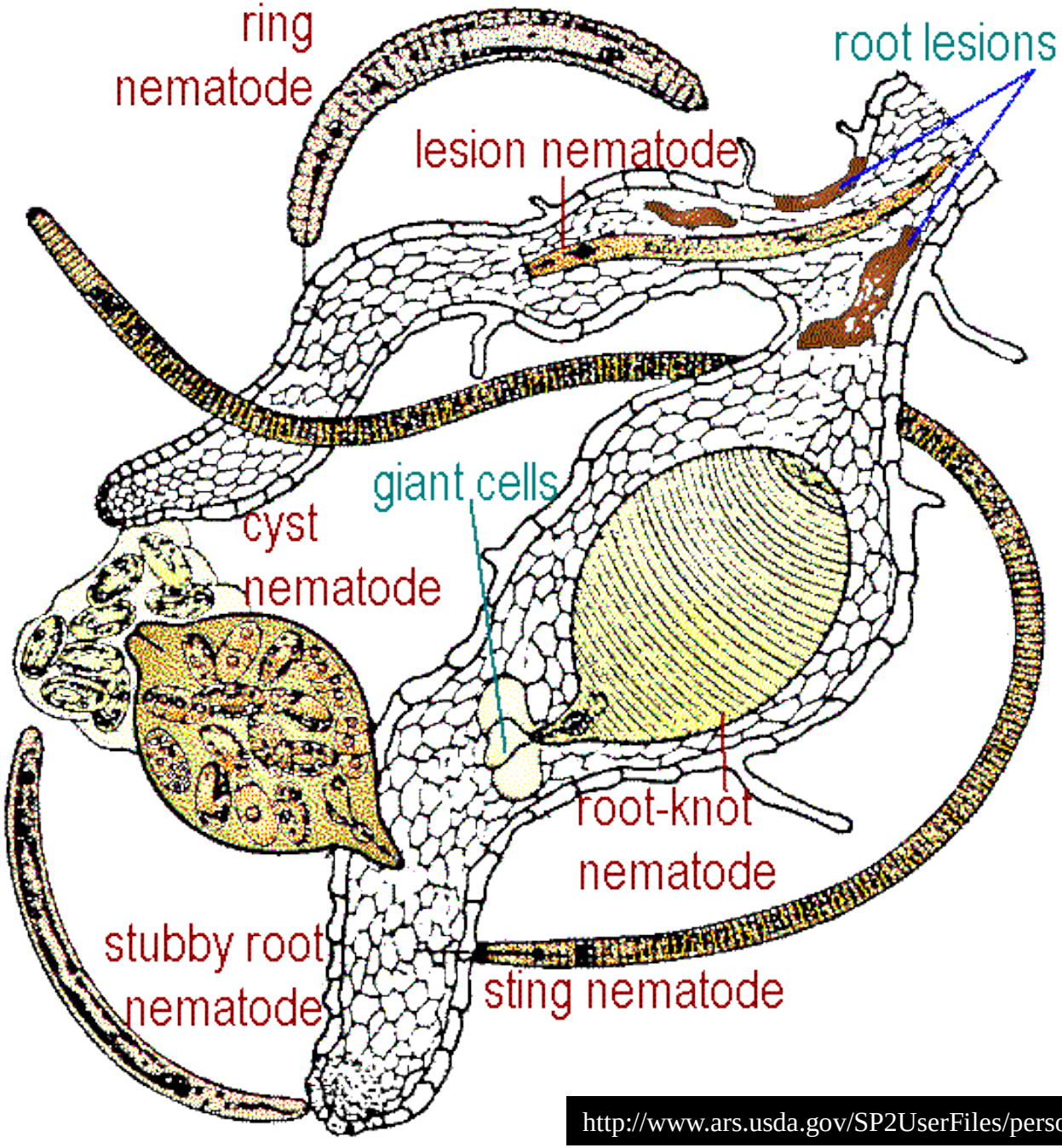

O2
0.0 with 1.99 % area & VMD = 214
1.0 with 3.27 % area & VMD = 168
2.0 with 4.33 % area & VMD = 245
3.0 with 11.82 % area & VMD = 265
4.0 with 11.20 % area & VMD = 245
5.0 with 6.77 % area & VMD = 186

	Mummy Berry Sprays			
	Green Tip (or early bloom)	Bloom Sprays (10-20% bloom)	Bloom Sprays (full bloom)	Late bloom
1	NO FUNGICIDE			
2	Indar 2F @ 2.0 oz/A	Indar 2F @ 2.0 oz/A	Indar 2F @ 2.0 oz/A	Indar 2F @ 2.0 oz/A
3	Proline 480 SC @ 5.7 oz/A	Proline 480 SC @ 5.7 oz/A	Proline 480 SC @ 5.7 oz/A	Proline 480 SC @ 5.7 oz/A
4	Luna Privilege @ 6.84 oz/A (drench)		Luna Privilege @ 6.84 oz/A (drench)	
5	Proline 480 SC @ 5.7 oz/A + Luna Privilege @ 6.84 oz/A (drench)	Proline 480 SC @ 5.7 oz/A	Proline 480 SC @ 5.7 oz/A + Luna Privilege @ 6.84 oz/A (drench)	Proline 480 SC @ 5.7 oz/A

Treatment and rate/A	Treatment date [z]	Strike severity [y]	Mummy Incidence
Untreated control	---	162.2 a	14.0 a
Indar 2F 2 fl oz (1/3 labelled rate)	1-5	226.2 a	6.7 b
Proline 480 SC 5.7 fl oz	1-5	5.2 b	0.5 c
Luna Privilege 6.84 fl oz (drench)[x]	1,3	210.3 a	18.0 a
Proline 480 SC 5.7 fl oz + Luna Privilege 6.84 fl oz (drench)	1,3		
Proline 480 SC 5.7 fl oz	2,4,5	8.9 b	0.5 c
LSD ($\alpha = 0.05$)		86.0	5.7

[z]Treatment dates: 1 = 24 Mar (green tip); 2 = 31 Mar (10-20% bloom); 3 = 8 Apr (full bloom 1); 4 = 16 Apr (full bloom 2); 5 = 21 Apr (late bloom)
[y]Means within columns followed by the same letters are not significantly different according to Fisher's protected LSD test ($P \leq 0.05$).
[x]Luna Privilege was applied as a concentrated drench at 0.006 oz a.i. per plant.

Proline (Bayer) received a registration in 2014.

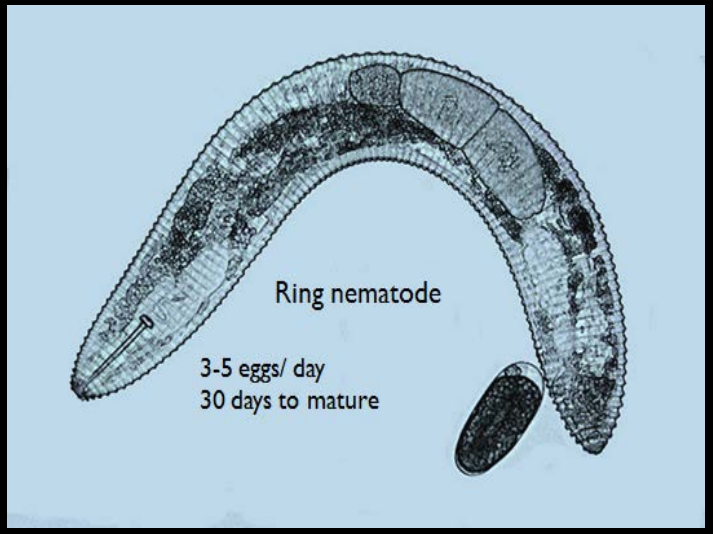


http://www.ars.usda.gov/SP2UserFiles/person/2279/rootnem4.gif

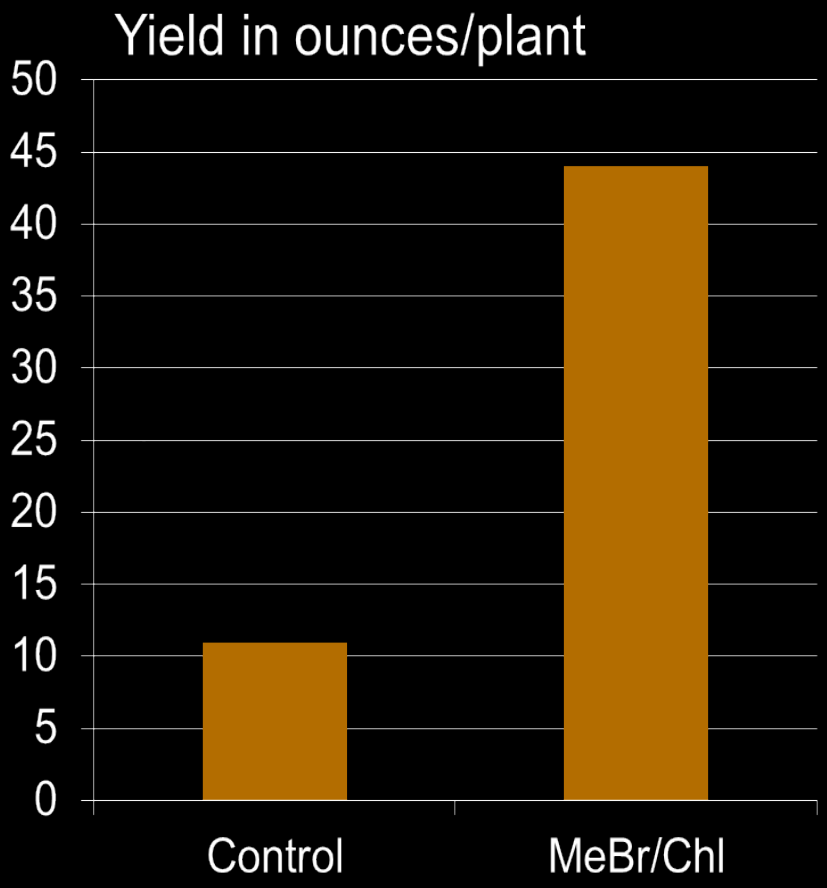
TABLE 1. Survey of frequency and abundance of plant-parasitic nematodes on blueberry in southeast Georgia on two dates.

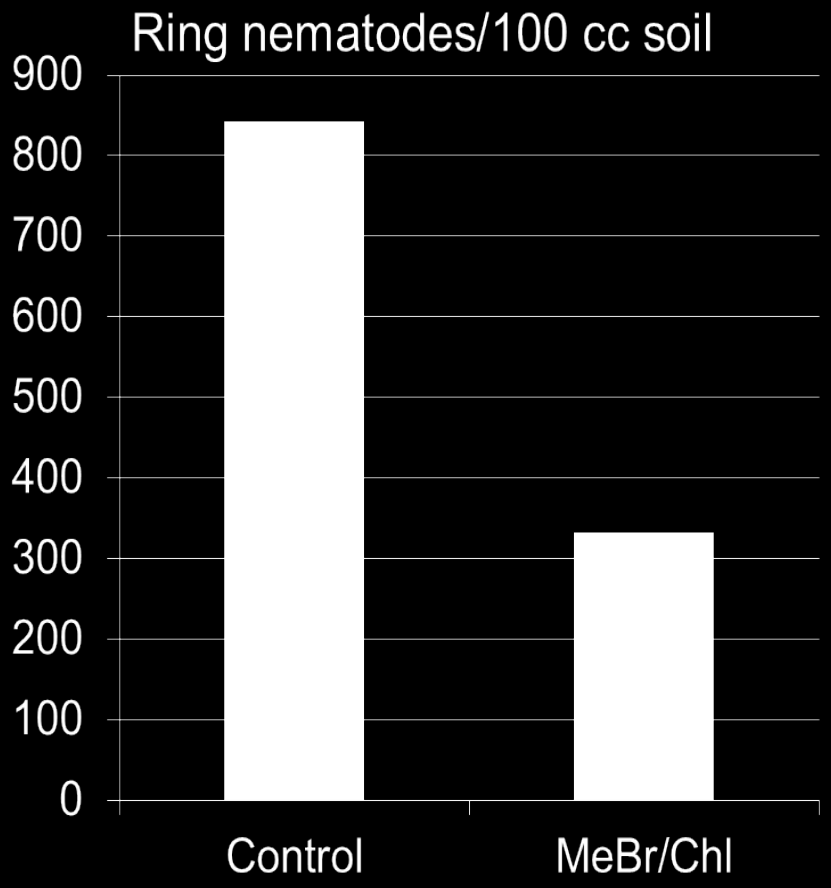
Nematode genera	Percent frequency[a]	April–May 2010			October–November 2010		
		Abundance[b]	Standard deviation	Maximum density[c]	Abundance	Standard deviation	Maximum density
Mesocriconema	55	251	590	5,248	348	604	3,776
Hoplolaimus	11	77	183	856	75	112	568
Tylenchorhynchus	10	15	17	68	10	16	52
Hemicycliophora	7	40	42	136	29	51	196
Paratrichodorus	7	13	15	60	2	4	16
Helicotylenchus	5	24	17	52	18	60	225
Belonolaimus	3	4	7	20	7	8	24
Dolichodorus	2	19	21	60	15	25	64
Xiphinema	2	14	10	26	160	265	676
Tylenchus	1	115	116	244	32	55	96

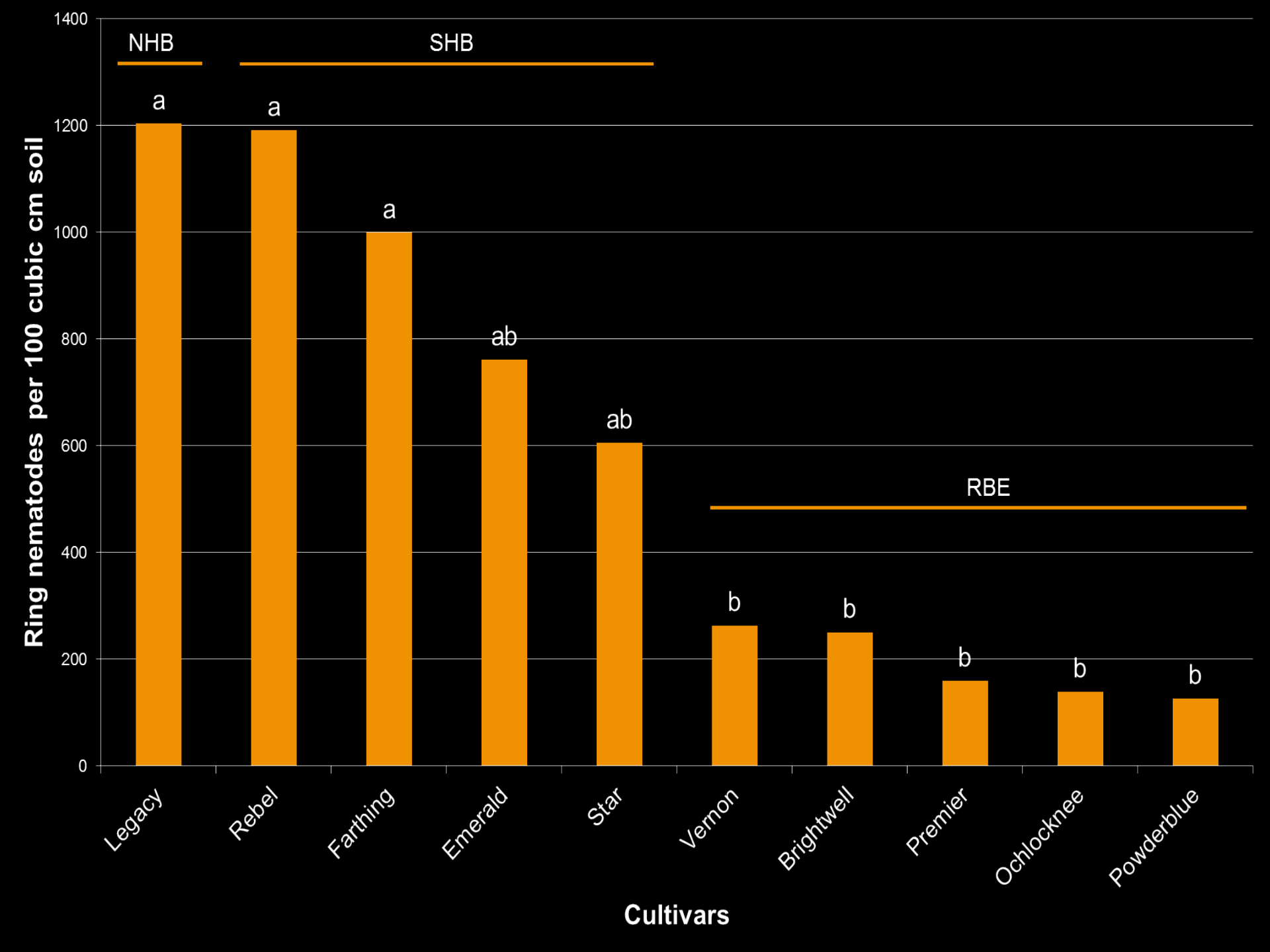
[a] Total number of samples in which the nematode genus was detected on either survey date divided by the total number of samples collected = 283 samples, multiplied by 100 to convert to a percentage.
[b] Sum of nematode densities per 100-cm^3 soil divided by the total number of samples in which the nematode genus was detected on either survey date.
[c] Maximum nematode density detected per 100-cm^3 soil.

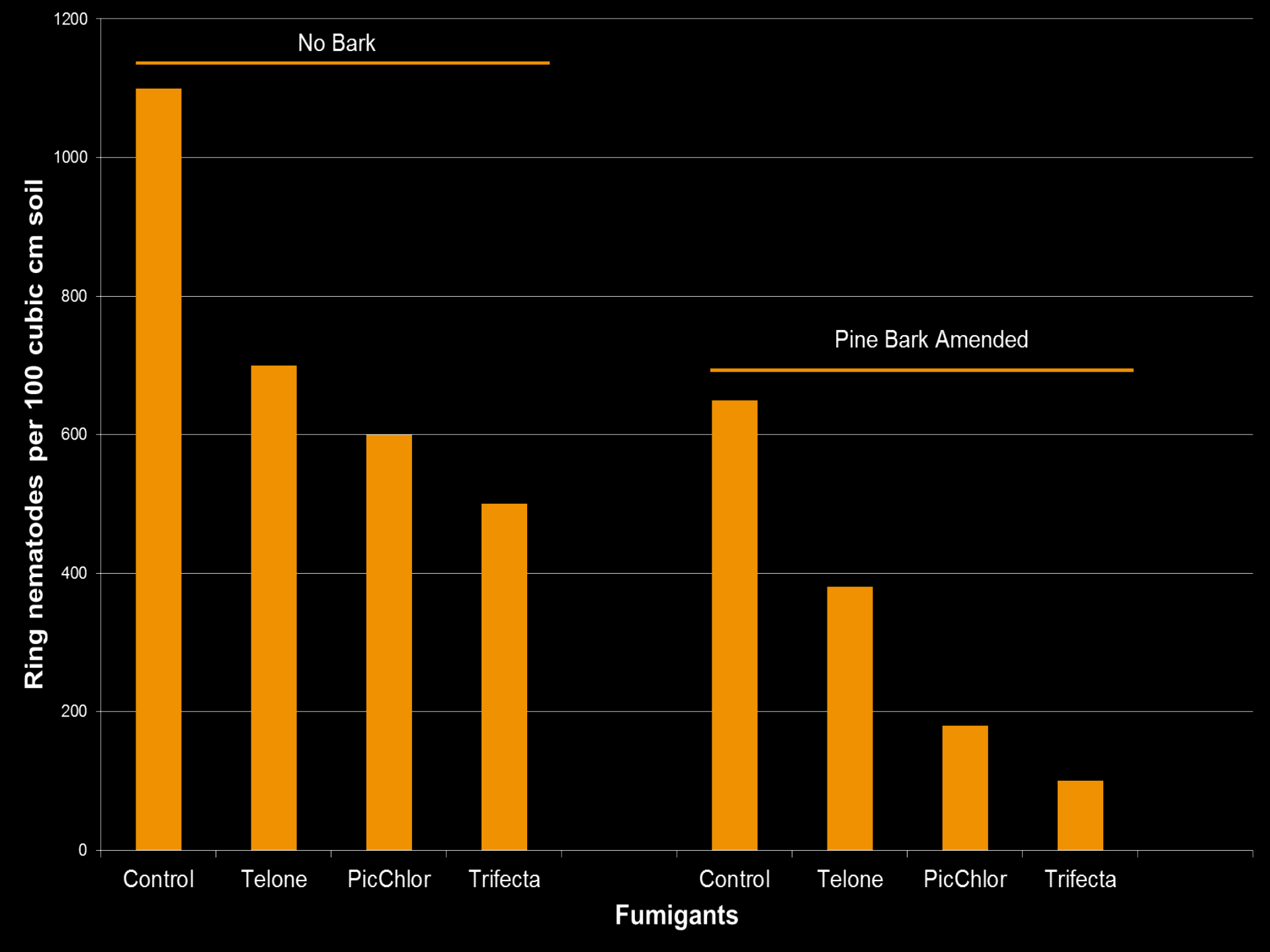


Yield of 3-yr-old blueberry plants and ring nematode counts in research plots with and without preplant treatment with methyl bromide/chloropicrin – Clinch County 2011






NHB
SHB
RBE
a
a
a
ab
ab
b
b
b
b
b
1400
1200
1000
800
600
400
200
0
Ring nematodes per 100 cubic cm soil
Legacy
Rebel
Farthing
Emerald
Star
Vernon
Brightwell
Premier
Ochlocknee
Powderblue
Cultivars


1200
1000
800
600
400
200
0
Ring nematodes per 100 cubic cm soil
No Bark
Pine Bark Amended
Control
Telone
PicChlor
Trifecta
Control
Telone
PicChlor
Trifecta
Fumigants

Conclusions

1. Fumigation is a good recommendation for replant sites, though the degree of impact may be variable.
2. Nematodes contribute to stunting associated with replant disorder.
3. Southern highbush are more susceptible.
4. Pine bark is possibly of value for nematode suppression.

Bacterial Leaf Scorch

2006 – bacterium *Xylella fastidiosa* confirmed as the cause of a new blueberry disease, bacterial leaf scorch

A small, fastidious, Gram negative, xylem-inhabiting bacterium related to *Xanthomonas* spp.

Tissue specific, confined to tracheary elements, tracheids or vessels

Xylella fastidiosa

Photo by H.C. Hoch, Cornell University; Journal of Bacteriology 189:7507–7510.

The glassy-winged sharpshooter (*H. vitipennis*) constituted 97% of leafhoppers sampled within bushes season-long at two field sites.

0.25%

Homalodisca insolita

0.77%

Paraulacizes irrorata

0.25%

Oncometopia nigricans

1%

Draeculacephala spp

0.51%

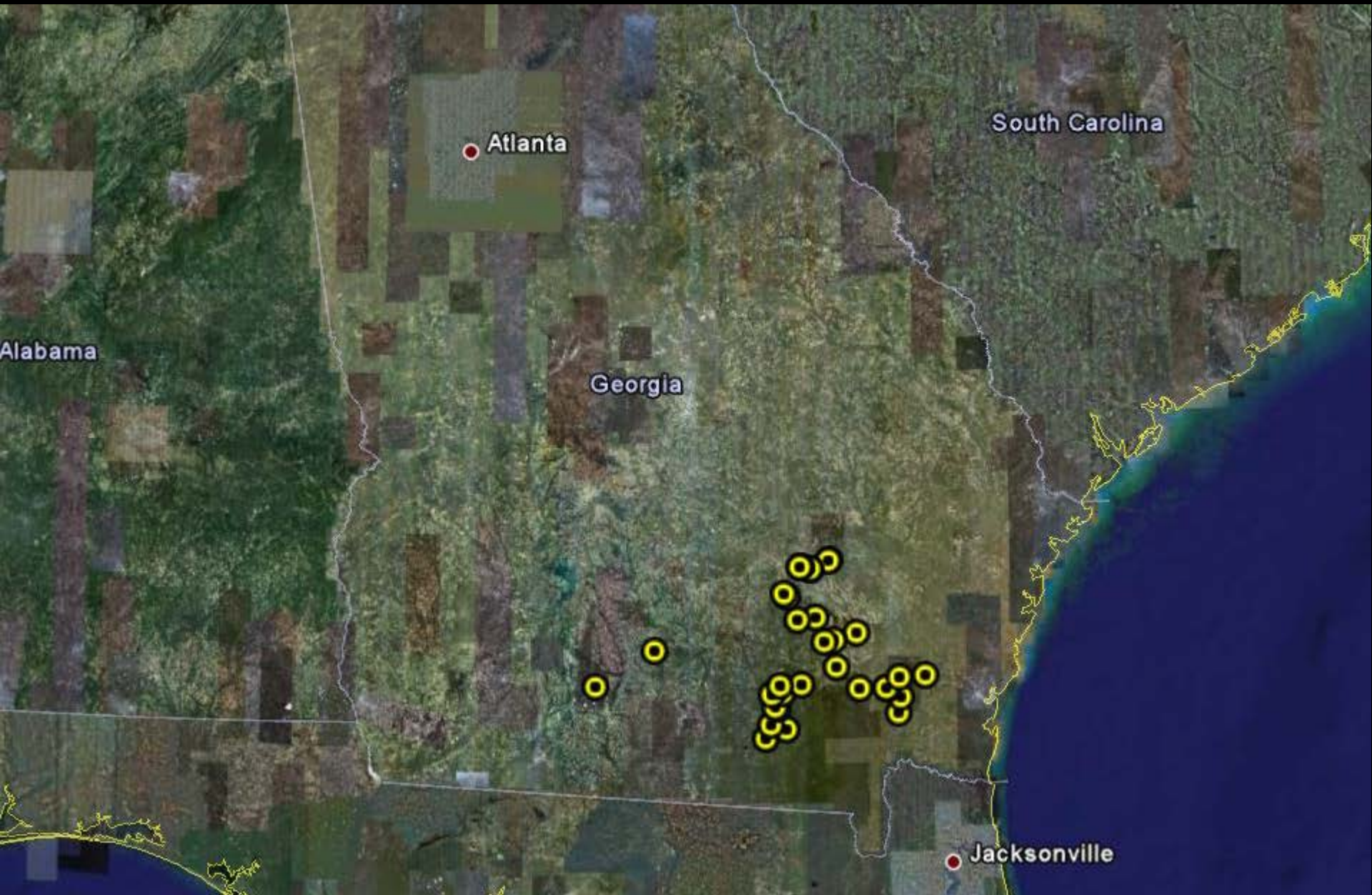
Graphocephala versuta

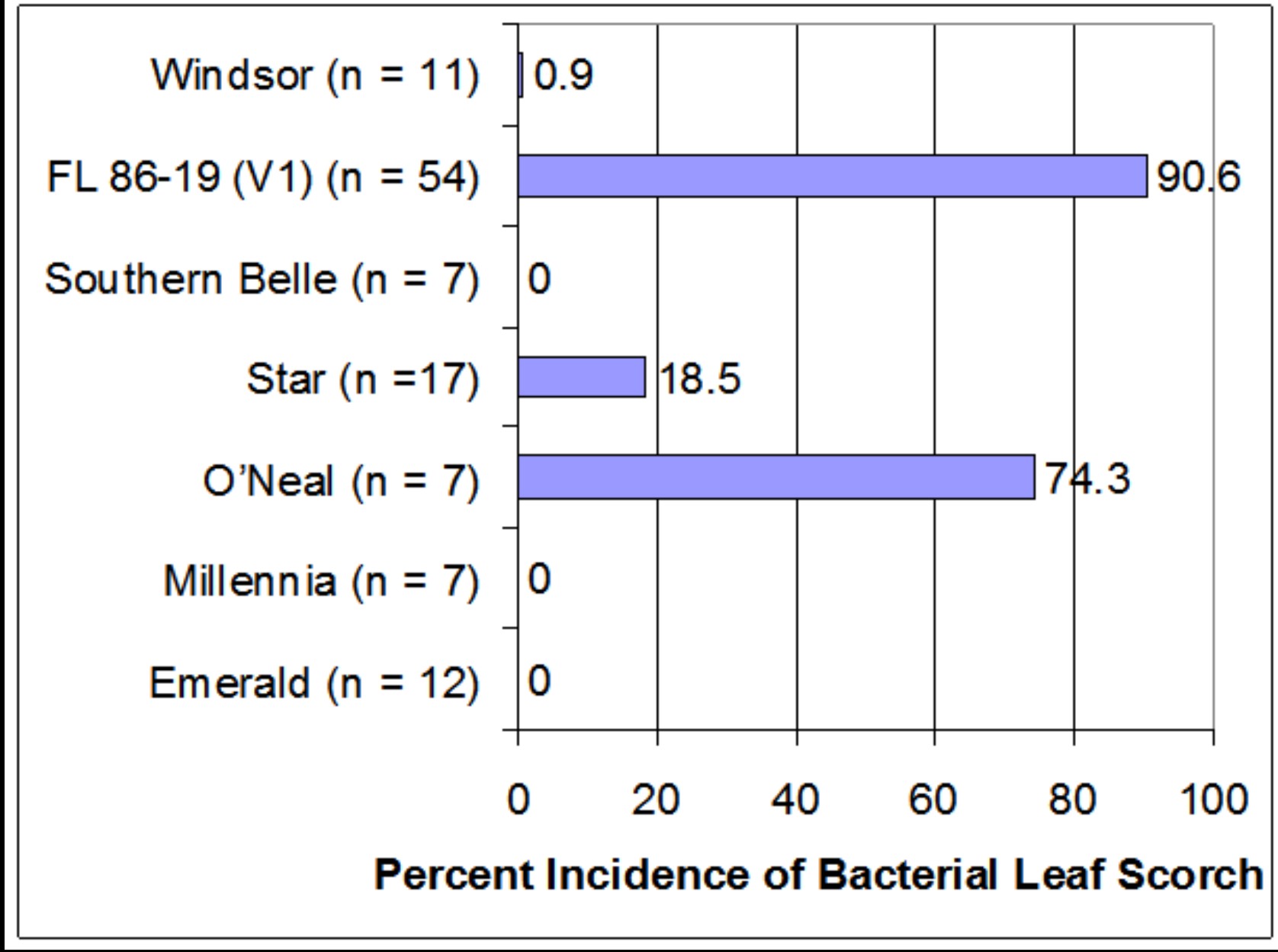
M. Tertuliano

Susceptibility and Variety

- Greenhouse results indicate that susceptible southern highbush varieties are more readily and rapidly colonized by the bacterium.
- Rabbiteye varieties are also colonized, and field symptoms have been observed on some cultivars.

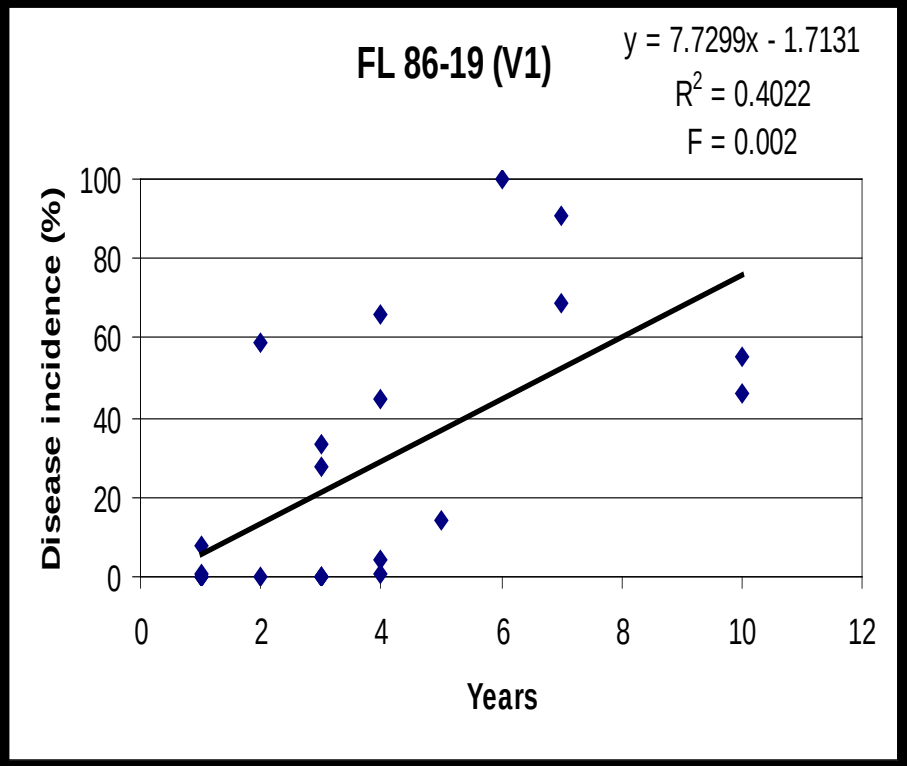
Blueberry survey locations with confirmed *Xylella fastidiosa* infections. Plants symptomatic for bacterial leaf scorch were confirmed through ELISA (map developed using Google Earth).

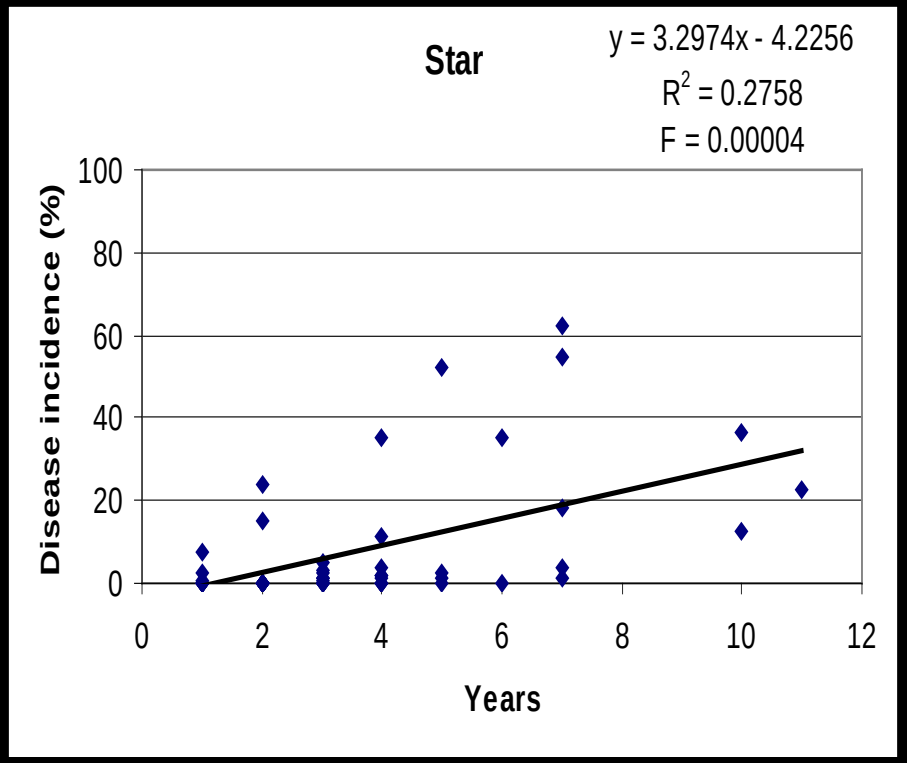




Incidence (percentage of symptomatic plants) of bacterial leaf scorch by cultivar at one 7th leaf producer site in Colquitt County. The number of rows surveyed (*n*) is shown in parentheses next to the cultivar name.


FL 86-19 [V1]
Emerald
Millennium
Windsor
Southern Belle





Disease incidence (percentage of symptomatic plants) of bacterial leaf scorch observed on cultivars FL 86-19 (V1) and Star over time (years in the field). Both cultivars are susceptible to the disease, but FL 86-19 is clearly more susceptible to disease development and spread than Star. Based on the trend lines projected through use of survey data, ~75% of FL 86-19 plants would be symptomatic by the tenth year in the field, versus ~30% in Star.

- *X. fastidiosa* is an important and expanding pathogen of southern highbush blueberry varieties.
- *X. fastidiosa* can infect rabbiteyes and cause symptoms, but little is known about the interaction of this pathogen in rabbiteyes or other blueberries at this time.
- Pruning out infected tissue is of no value, since the bacteria will have colonized the roots by the time symptoms are observed.
- Propagation may be one means of spread of *X. fastidiosa* in blueberries.

- Multiple potential vectors are found in association with southern highbush blueberries, but the glassy-winged sharpshooter is the primary potential vector observed in southern highbush blueberries in south Georgia.
- Varietal differences to susceptibility are very pronounced, indicating that breeding for resistance will likely provide the best control method. Other methods are being reviewed.

Blueberry Necrotic Ring Blotch Virus

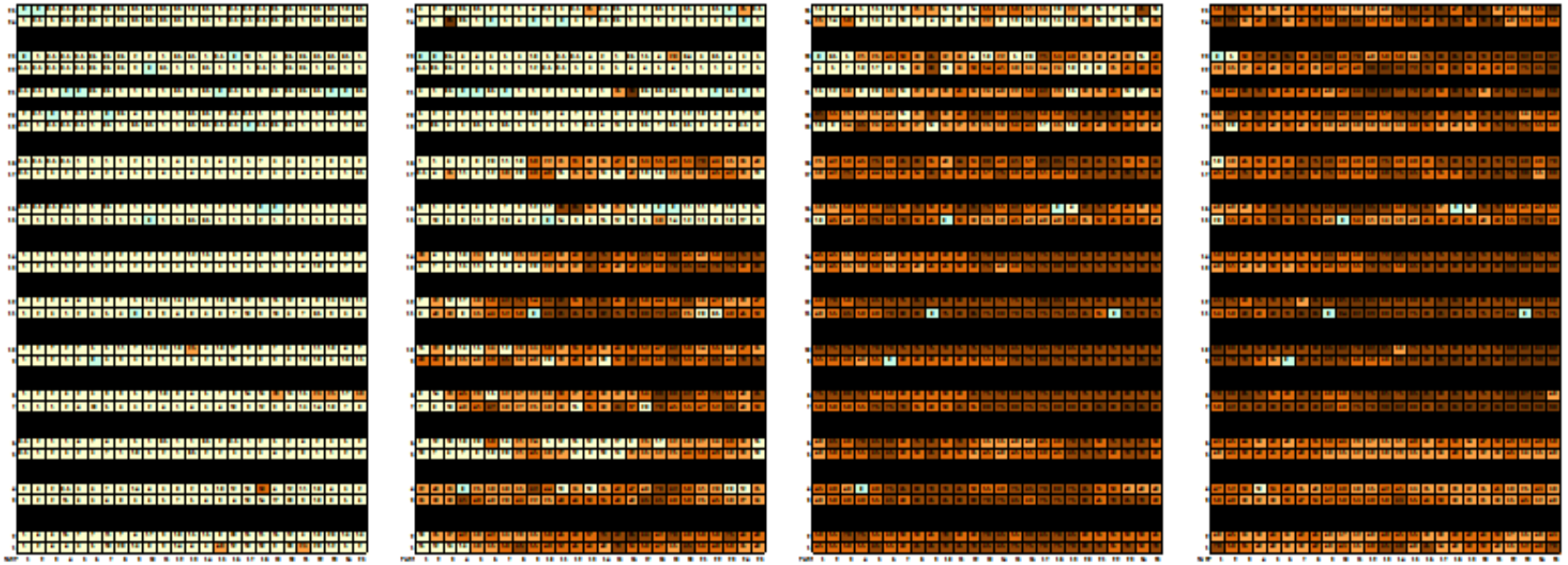


Figure 2.18. Temporal progression of *Blueberry necrotic ring blotch virus* in a 25 X 25 plant block of 'Star' southern highbush blueberry in Willacoochee, GA in 2011. Numbers in each square correspond to the disease severity per plant. Assessment dates were 27 June, 11 July, 26 July, and 13 August (from left to right). **Note:** Blueberry plantings at this site were planted in double-row beds; the black horizontal bars indicate blueberry of different variety.

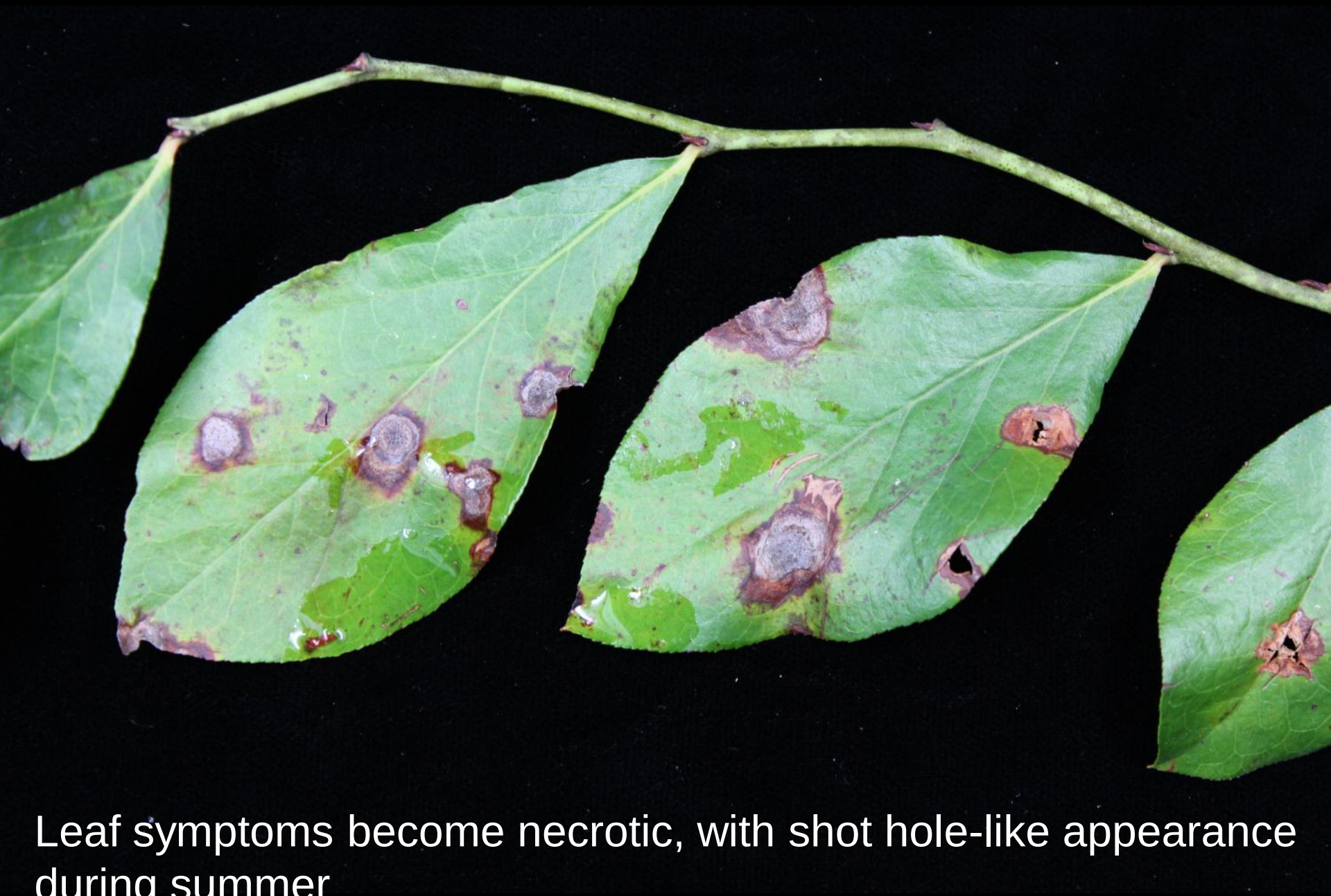
Red ringspot virus is readily transmitted through propagation, does not move, and is not likely vectored.

Blueberry Necrotic ring blotch virus is not readily transmitted through propagation, moves rapidly, and is likely mite transmitted.

Exobasidium leaf and fruit spot (*Exobasidium maculosum*)

- A once-rare/insignificant problem, now common in the Southeast
- Identified as a fungal disease in NC in 1997
- Initially reported in 2008 for Georgia
- Species named in 2014

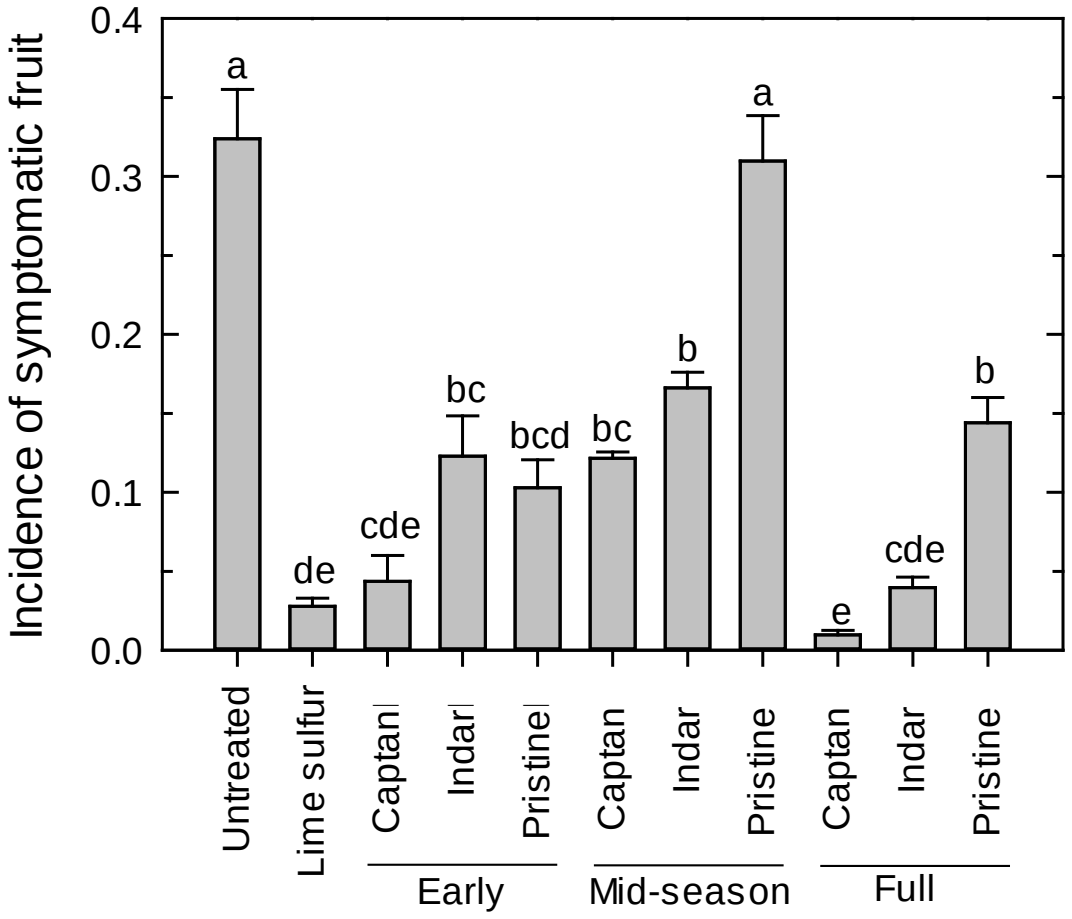
Exobasidium on rabbiteye blueberry in April/ May



Leaf symptoms become necrotic, with shot hole-like appearance during summer

Infected berries are highly visible in clear plastic clamshell containers, but it is nearly impossible to remove them all on the packing line!

Fruit Spot Incidence
Premier, 10 June 2013



- Full captan schedule best (8 apps)
- Lime sulfur (1 app) statistically equivalent
- Indar effective in full schedule (received a 2ee label in 2014)
- Early captan schedule (5 apps) looks good
- Pristine not effective

2014 Exobasidium Trial

- Randomized complete block design
- Minimum of four replications per site
- Plots were 10 ‘Premiere’ rabbiteye plants
- All applications were made at late dormant (stage 2 or 3)
- Single application of either lime sulfur (5 gal/A), Sulforix (2 gal/A), or Captan 4L (2.5 qt/A)
- Leaf and fruit incidence data collected

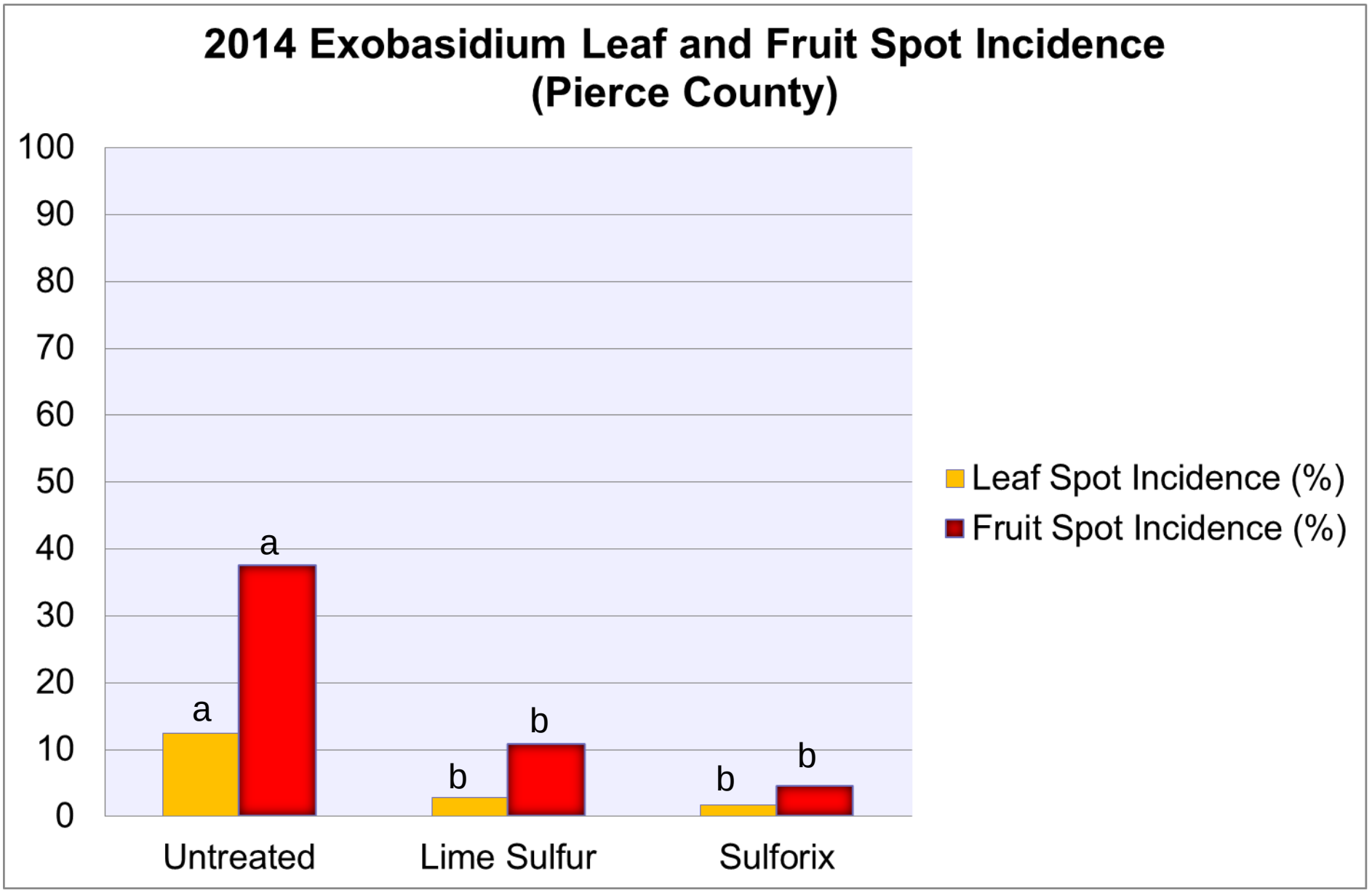
Leaf spot incidence[y]

Treatment and rate/A[z]	Appling County	Bacon County Site 1	Bacon County Site 2	Bacon County Site 3	Clinch County	Irwin County	Jeff Davis County
Untreated control	2.6 a	25.0 a	20.7 a	9.7 a	16.0 a	20.1 a	5.7 a
Lime Sulfur (5 gal)	0.7 ab	4.1 b	4.2 b	2.5 b	0.9 b	2.2 b	0.2 b
Sulforix (2 gal)	0.4 b	3.3 b	4.0 b	2.1 b	0.5 b	1.6 b	0.1 b
Captan 4L (2.5 qt)	N/A	27.42 a	16.52 a	6.62 a	N/A	N/A	N/A
LSD (α=0.05)	1.9	5.7	4.2	3.6	9.3	13.5	2.5

Fruit spot incidence[x]

Treatment and Rate/A	Appling County	Bacon County Site 1	Bacon County Site 2	Bacon County Site 3	Clinch County	Irwin County	Jeff Davis County
Untreated Control	2.3 a	14.3 a	15.4 a	13.3 a	8.1 a	27.3 a	31.8 a
Lime Sulfur (5 gal)	1.6 a	1.6 b	2.1 b	1.8 c	0.5 b	3.0 b	0.5 b
Sulforix (2 gal)	1.3 a	1.0 b	1.1 b	0.7 c	0.7 b	2.1 b	0.3 b
Captan 4L (2.5 qt)	N/A	13.8 a	13.4 a	7.2 b	N/A	N/A	N/A
LSD (α=0.05)	1.5	4.0	5.0	3.2	2.5	7.4	14.3

[z]Treatments were single late-dormant applications between Jan 17 and Feb 15, depending on location.
[y]Recorded for 20 shoots per plot with ~10 leaves per shoot on average. Means followed by the same letter are not significantly different when using Fisher's protected LSD test ($P \leq 0.05$).


2014 Exobasidium Leaf and Fruit Spot Incidence
(Pierce County)
100
90
80
70
60
50
40
30
20
10
0
a
a
b
b
b
b
Untreated
Lime Sulfur
Sulforix
Leaf Spot Incidence (%)
Fruit Spot Incidence (%)

Conclusions

- Calcium polysulfide (lime sulfur and Sulforix) products are effective as management tools for suppression of Exobasidium
- Sulforix at the reduced rate is equivalent in activity to lime sulfur at a higher rate
- Captan applied during a late-dormant phenology is not efficacious, but it is still an important management component for Exobasidium

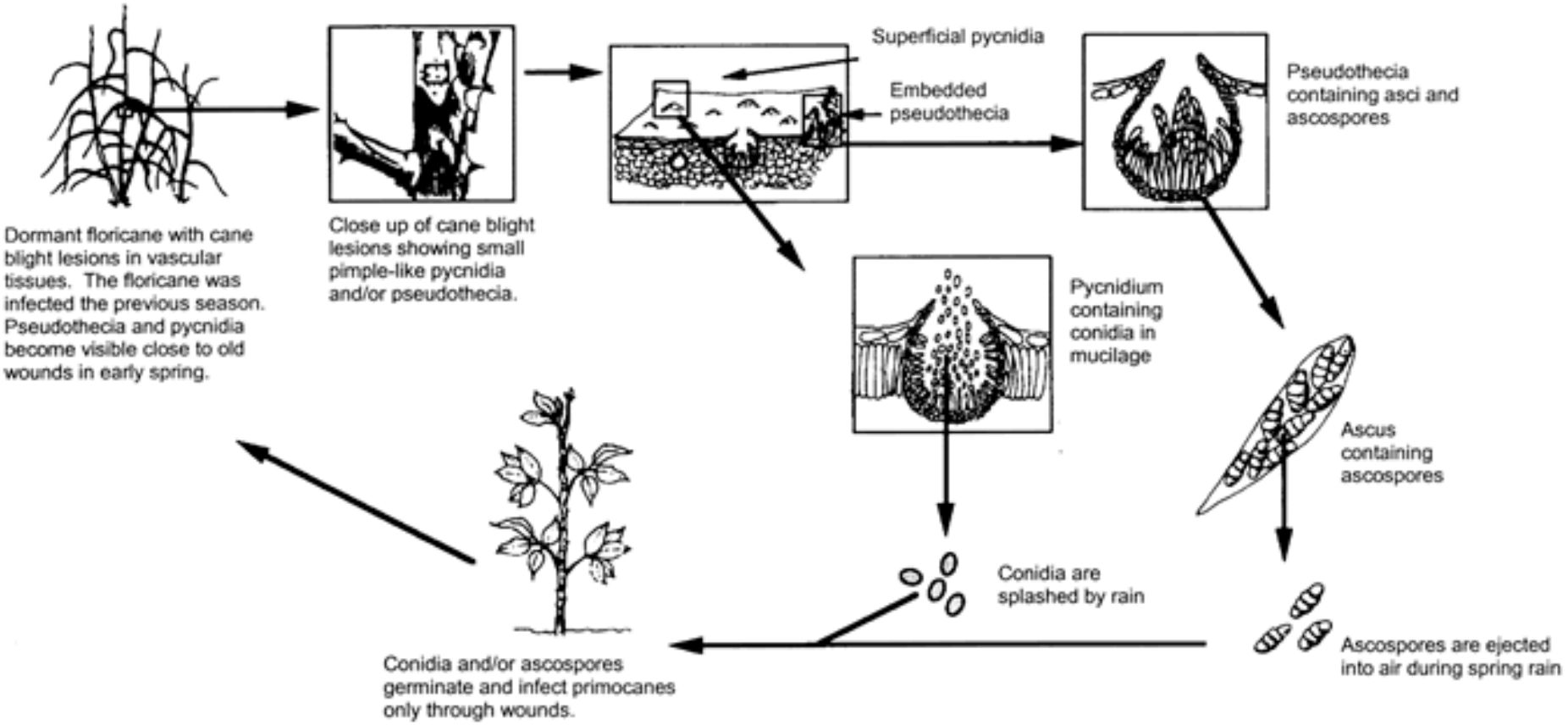
Blackberry Disease Problems (Potential)

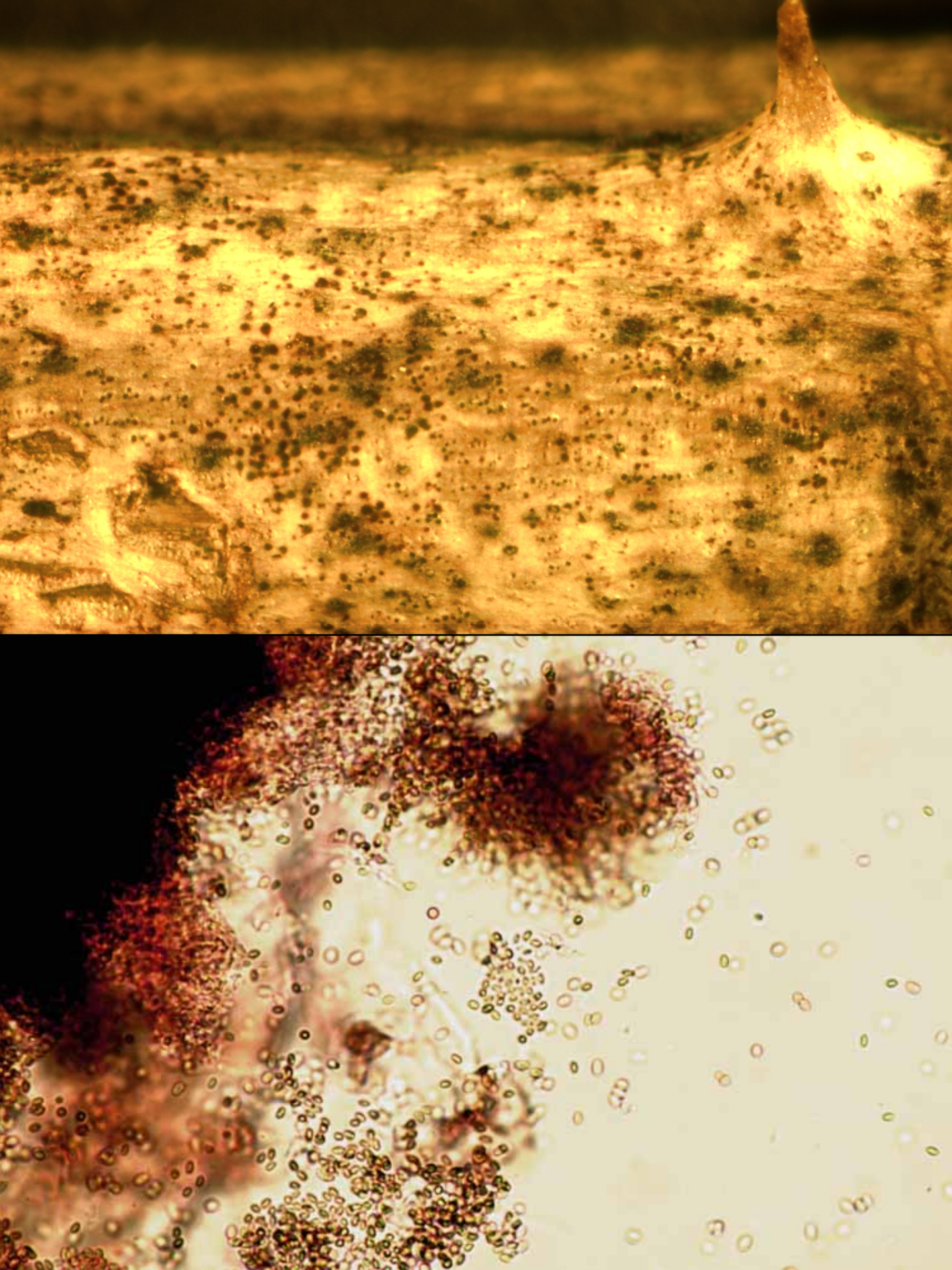
- Double blossom (Rosette)
- Botrytis gray mold
- Viruses
  - Dagger nematode
- Orange rust
- Leaf and cane rust
- Phytophthora root rot
- Spur blight
- Crown gall
- Cane blight
- Oak root rot
- Anthracnose
- Orange blotch
- Septoria leaf spot

Cane Blight
(*Leptosphaeria coniothyrium*)

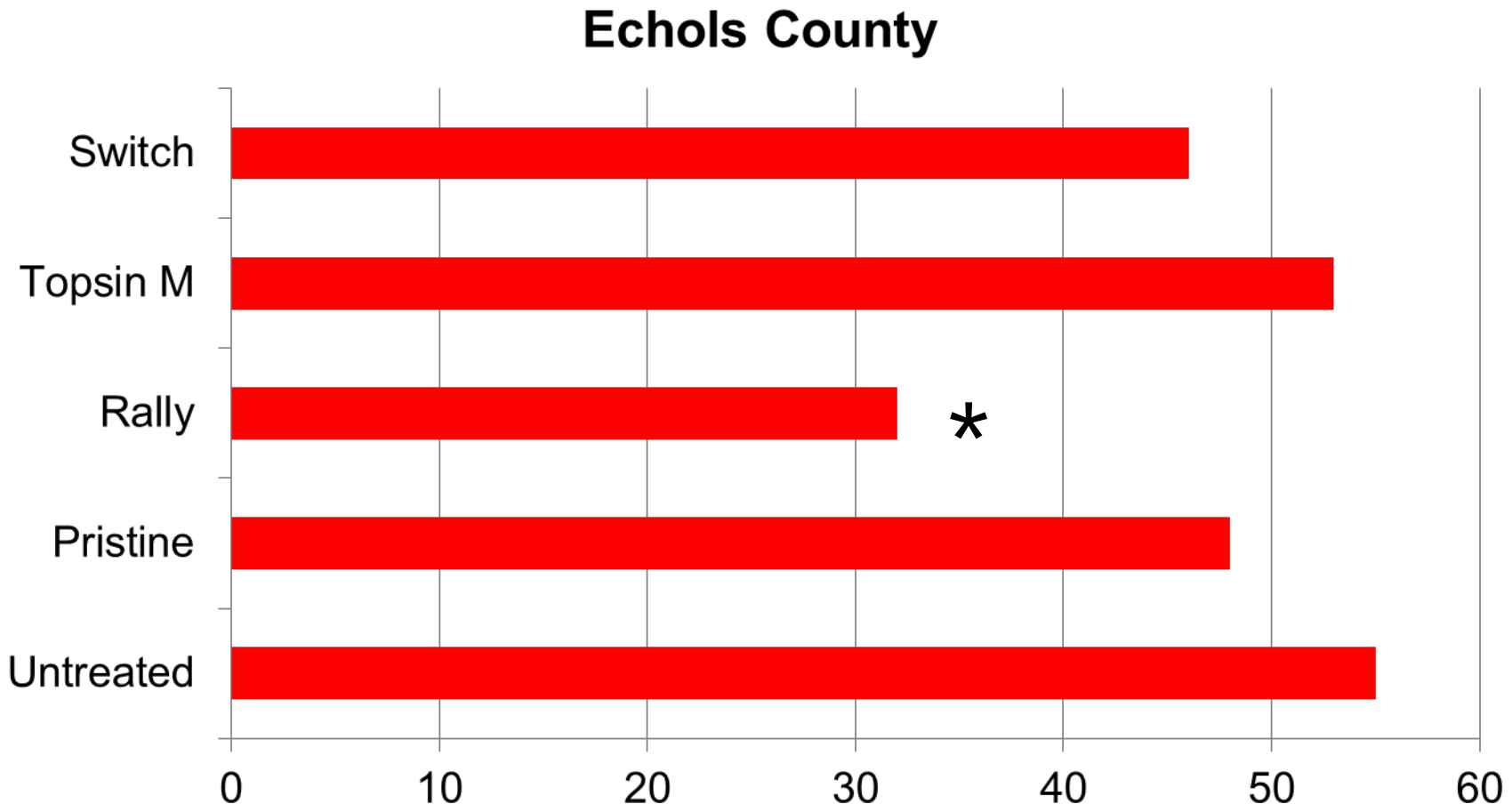
- **This disease impacts all *Rubus* spp., and it is a major pathogen of blackberries in the Southeast.**
- **The pathogen invades wounded tissues and then enters the plant vascular tissue.**
- **This disease is especially aggressive in wet years.**
- **Younger primocane tissues may be more susceptible to infection.**
- **Prune when four days of dry weather are expected. Pinch prune when possible.**
- **Destroy old floricanes after harvest.**
- **Use chemical fungicides such as Abound, Cabrio, Captevate, Cabrio and Pristine. Quilt Xcel and other fungicides should be reviewed.**


Cane Blight
(*Leptosphaeria coniothyrium*)


Superficial pycnidia
Embedded pseudothecia
Pseudothecia containing asci and ascospores
Dormant floricane with cane blight lesions in vascular tissues. The floricane was infected the previous season. Pseudothecia and pycnidia become visible close to old wounds in early spring.
Close up of cane blight lesions showing small pimple-like pycnidia and/or pseudothecia.
Pycnidium containing conidia in mucilage
Ascus containing ascospores
Conidia are splashed by rain
Ascospores are ejected into air during spring rain
Conidia and/or ascospores germinate and infect primocanes only through wounds.

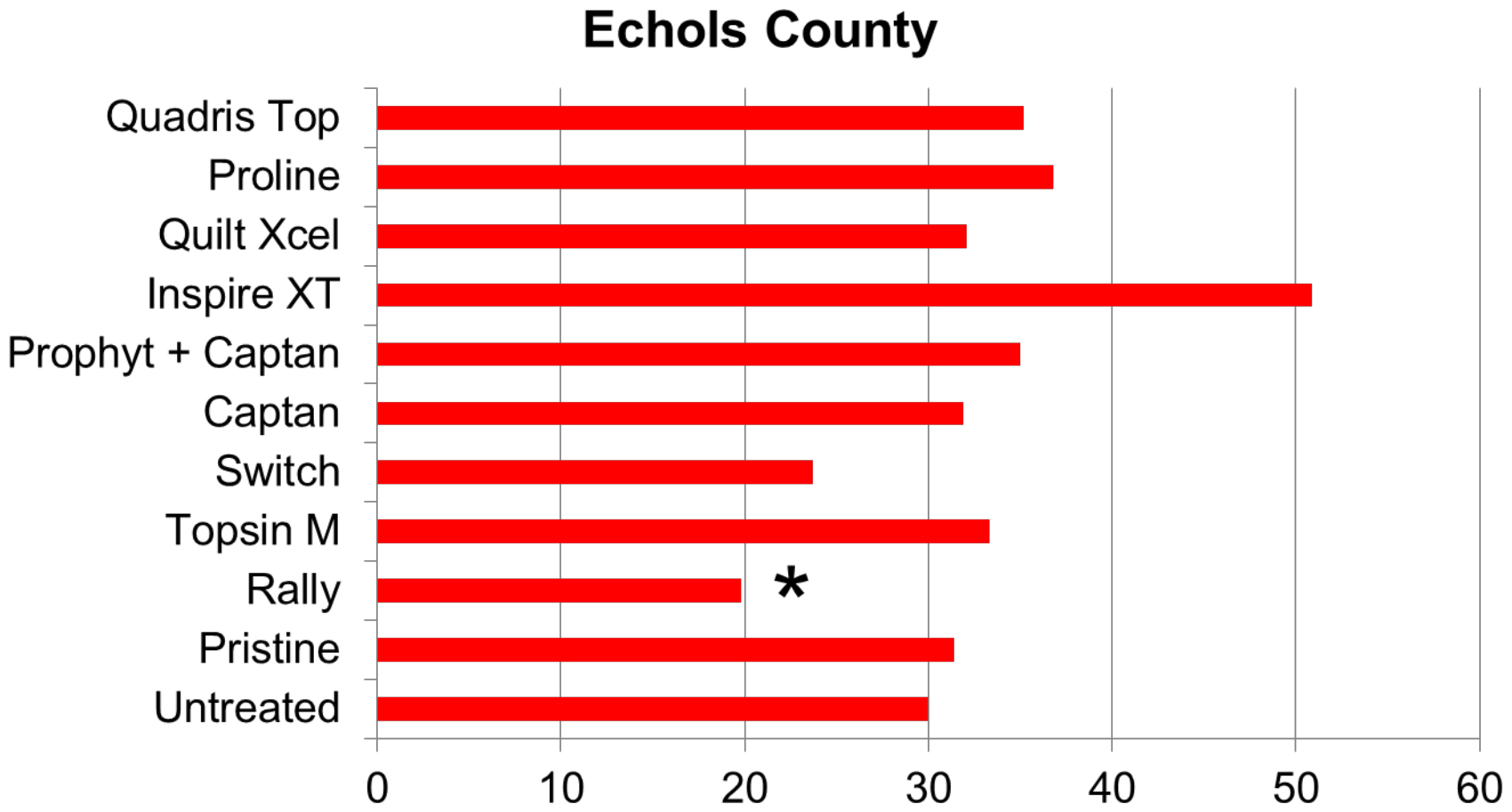


Incidence of Cane Blight (2013)



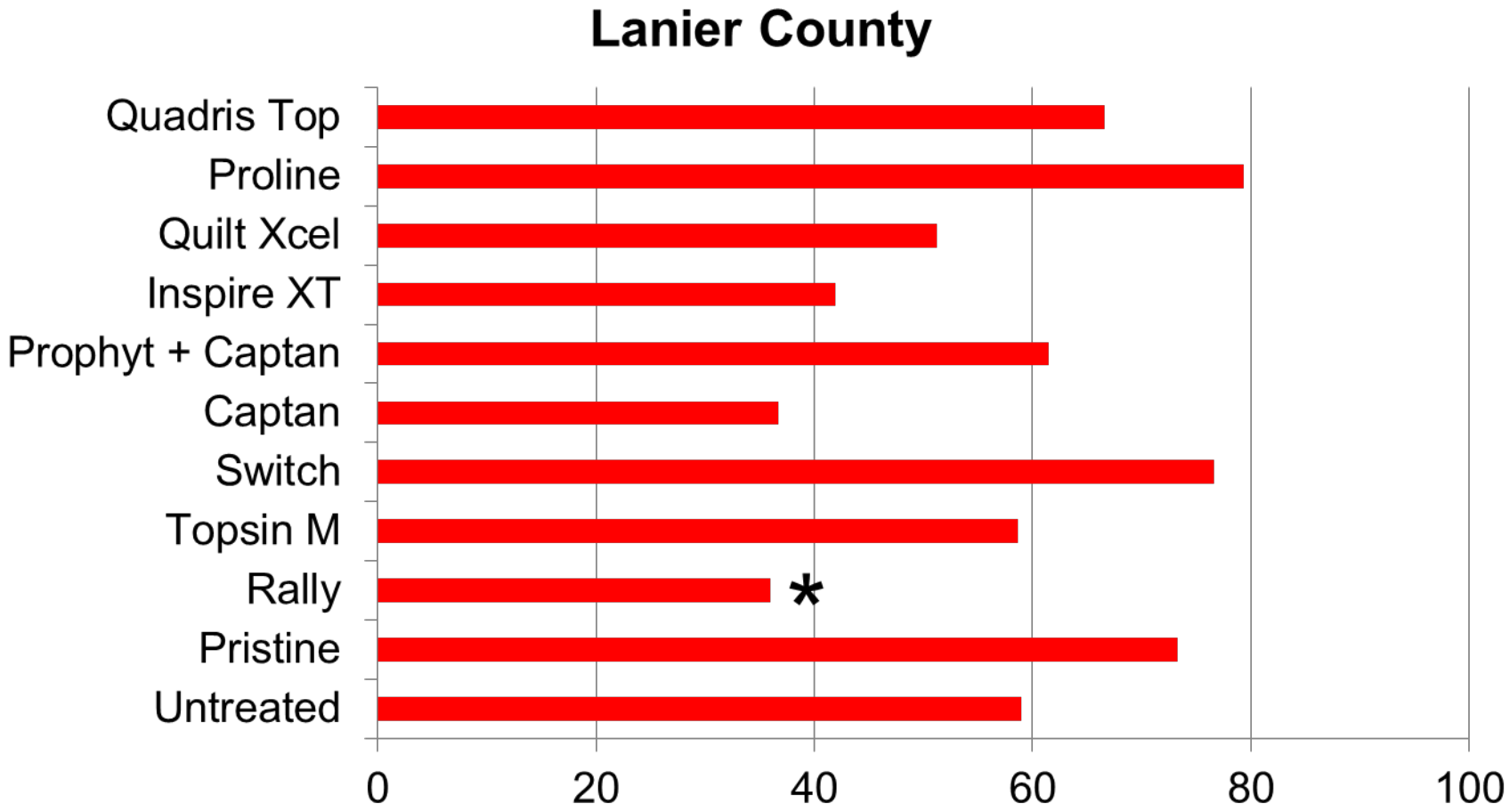
Justin Shealey

Incidence of Cane Blight (2014)



Justin Shealey

Incidence of Cane Blight (2014)

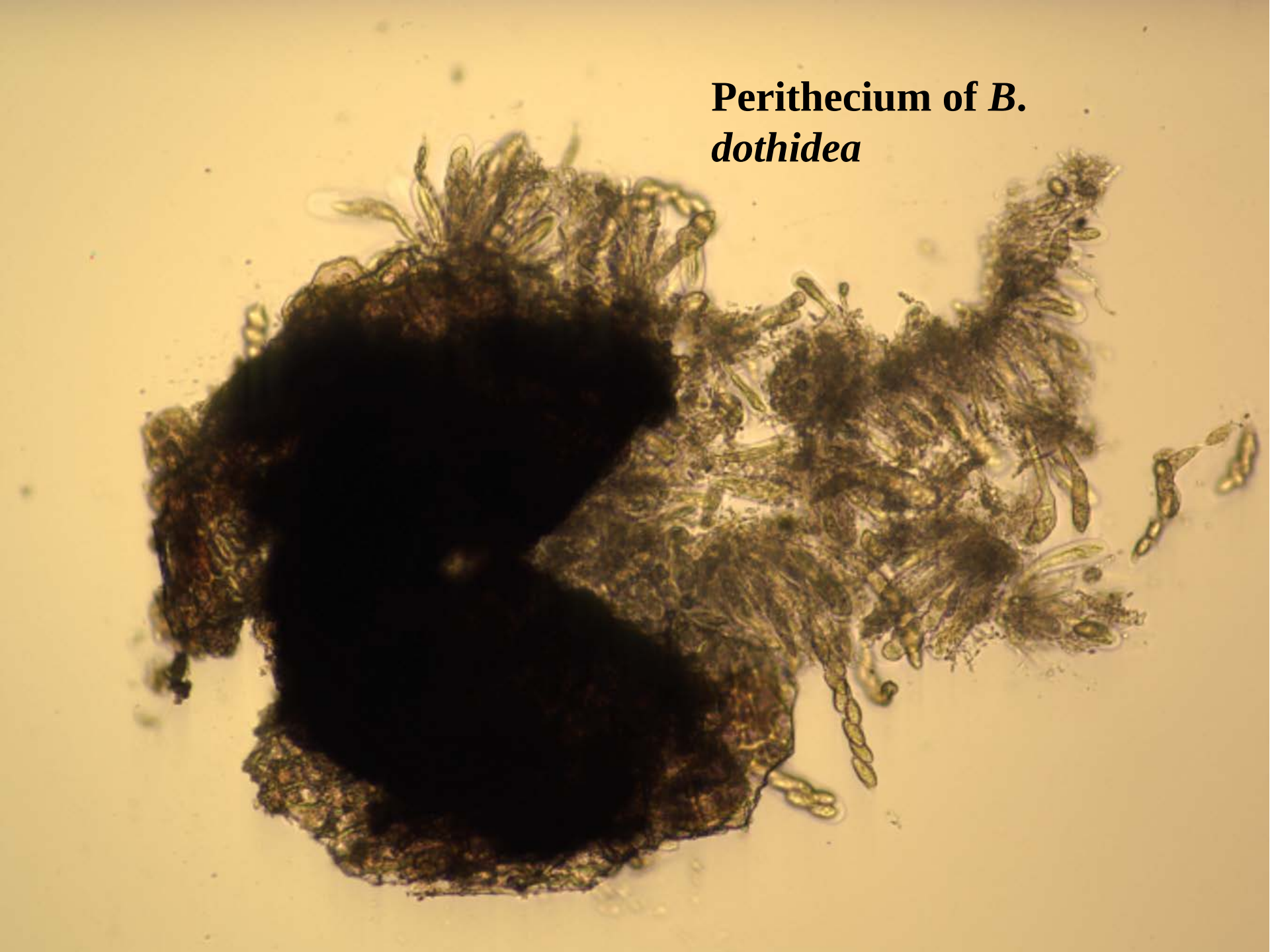


Jeremy Taylor


Botryosphaeria cane
canker of blackberry

Botryosphaeria cane canker of blackberry


Perithecia on the surface of
blackberry lesion

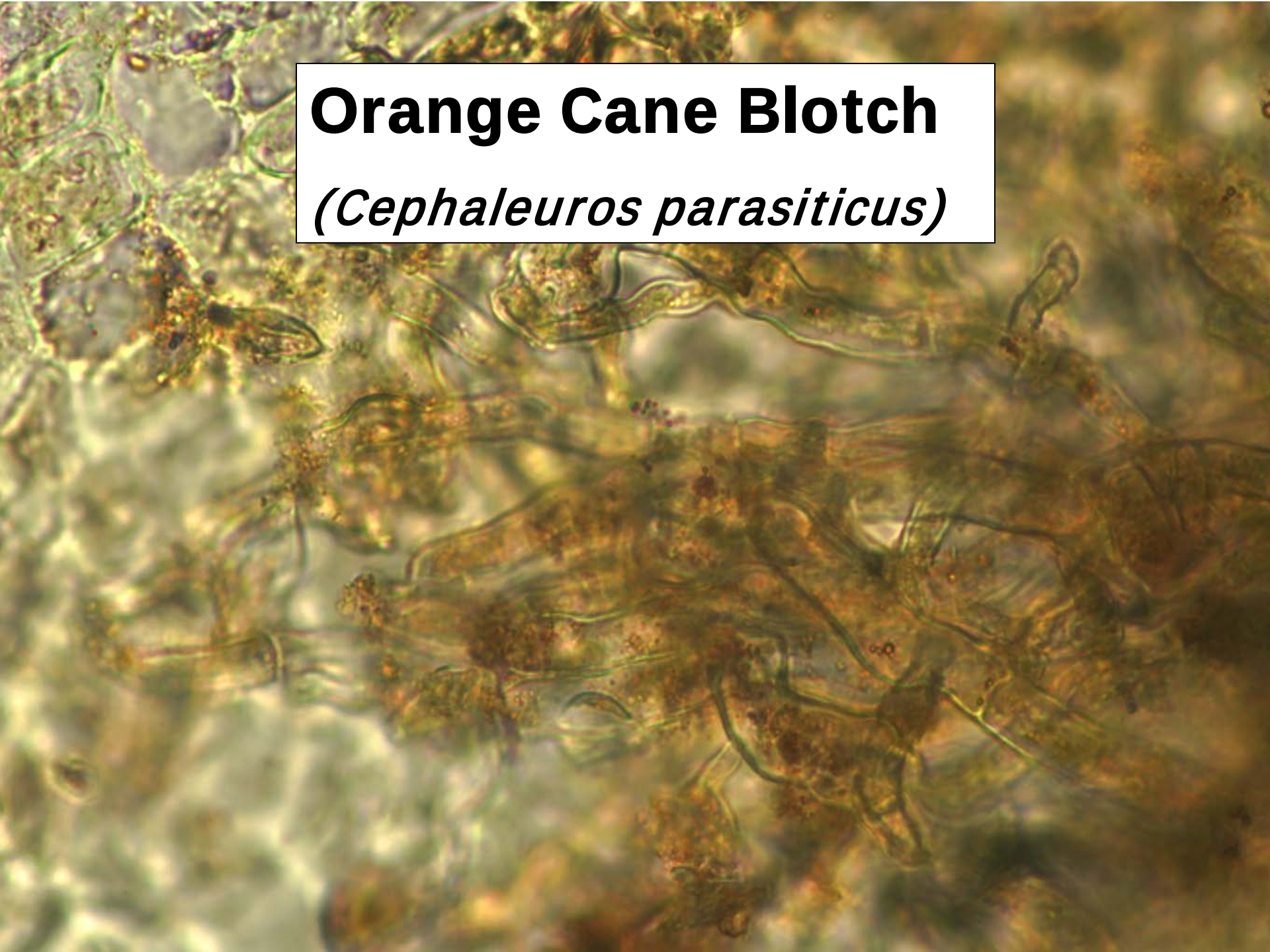

Perithecium of *B. dothidea*

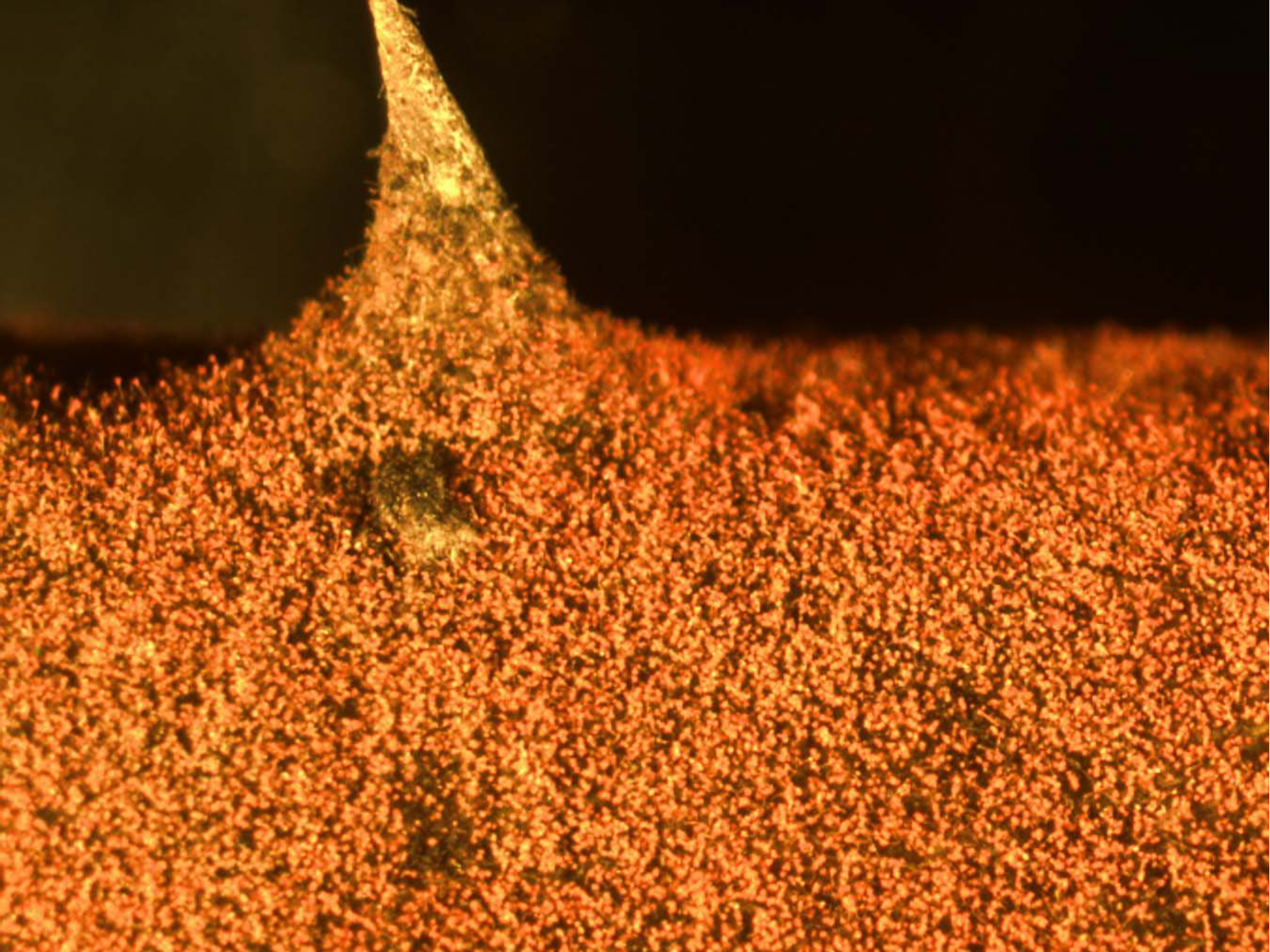

Individual
ascospores in asci

Orange Cane Blotch

(Cephaleuros parasiticus)

Patrick Willis and Tim Flanders


Orange Cane Blotch
(Cephaleuros parasiticus)




Phil Harmon, Univ. of Florida

Treatment and rate/A	Application timing[z]	Orange cane blotch severity (%) 29 Oct[y]	Orange cane blotch severity (%) 20 Nov	Orange cane blotch severity (%) 10 Mar
1. Non-treated control	----	34.8 a	37.2 ab	48.0 ab
2. Potassium benzoate 10% a.i.[x]	1-4	41.6 a	43.6 ab	66.0 a
3. Potassium sorbate 10% a.i.	1-4	29.2 ab	31.6 b	40.0 b
4. Oxidate 64 fl oz	1-4	42.2 a	40.4 ab	42.5 b
5. Bravo Weather Stik 4 pt	1-4	39.6 a	49.8 a	52.0 ab
6. Kocide 3000 1.75 lbs	1-4	39.6 a	44.2 ab	43.0 b
7. Lime sulfur 6 gal	1-4	40.8 a	44.0 ab	50.0 ab
8. Prophyt 4 pt	1-4	13.6 b	12.0 c	9.5 c
9. Sulforix 1qt	1-4	37.6 a	35.6 ab	42.5 b
10. Dithane 4.8 qt	1-4	37.6 a	38.4 ab	38.5 b
11. Junction 3.5 lbs	1-4	37.6 a	44.4 ab	50.0 ab
12. Omega 500 1.25 pt	1-4	38.8 a	45.2 ab	48.0 ab
13. Bleach 10%	1-4	43.6 a	41.8 ab	43.5 ab

[z]Treatment dates: 1 = 9 Sep; 2 = 23 Sep; 3 = 9 Oct; 4 = 18 Oct.

[y]Recorded for each plant. Means followed by the same letter are not significantly different when using Tukey's test ($P = 0.05$).

[x]Potassium benzoate, potassium sorbate, and bleach were prepared as indicated solutions and applied to runoff.

Jeremy Taylor, 2013

Treatment and rate/A	Lanier County Orange cane blotch severity (%)[y]	Berrien County Orange cane blotch severity (%)[x]
1. Non-treated control	4.9	6.2 ab
2. Ridomil Gold SL 3.6 pt	6.5	7.0 ab
3. Ridomil MZ 2.5 lb	4.7	5.1 abcd
4. Ridomil Cu 2 lb	3.5	7.6 a
5. Zampro 14 fl oz	5.8	3.5 bcd
6. Presideo 4 fl oz	5.5	7.7 a
7. Kocide 3000 1.75 lb	4.8	6.3 ab
8. Prophyt 4 pt	3.3	2.1 cd
9. Prophyt 4 pt + Kocide 3000 1.75 lb	1.5	1.7 d
10. Dithane F45 4.8 qt	2.0	3.3 bcd
11. Revus 8.0 fl oz	6.0	4.6 abcd
12. Captec 4L 2 qt	2.3	6.3 ab
13. Prophyt 4 pt + Captec 4L 2 qt	1.2	2.3 cd
14. OXTP 5 fl oz	7.2	5.8 abc

Eddie Beasley and Jeremy Taylor, 2014

Seasonal 'at a glance' fungicide spray schedule options for brambles

Developmental Stage	**Delayed Dormant**	**Shoots 6" long till Pre-Bloom**	**Early bloom (5-10%)**	**Full Bloom**[a]	**Petal Fall**	**Cover Sprays**	**Pre-Harvest**	**Harvest**	**After Harvest**
Disease (Registered fungicide)	**Anthracnose, Spur Blight, Cane Blight** (Lime Sulfur or Copper)	**Anthracnose, Cane Blight, Spur Blight, and Leaf Spots** (Copper, Cabrio, Abound, Pristine, and Captan) **Rusts** (Rally, Abound, Cabrio, Pristine, Orbit, Tilt) **Powdery Mildew** (Sulfur, Rally, Cabrio, Abound, Pristine) **Phytophthora Root Rot** (Ridomil, phosphorous acid-based products)	**Botrytis** (Rovral, Nevado, Iprodione, Elevate, Switch, Pristine) **Rosette** (Switch, Abound, Pristine) **Powdery Mildew** (Rally, Cabrio, Abound, Pristine) **Rusts** (Rally, Abound, Cabrio, Pristine, Orbit, Tilt) **Anthracnose, Cane Blight, Spur Blight, and Leaf Spots** (Cabrio, Abound, Pristine, and Captan)	**Botrytis** (Rovral, Nevado, Iprodione, Elevate, Switch, Pristine) **Rosette** (Switch, Abound, Pristine) **Powdery Mildew** (Rally, Cabrio, Abound, Pristine) **Rusts** (Rally, Abound, Cabrio, Pristine, Orbit, Tilt) **Anthracnose, Cane Blight, Spur Blight, and Leaf Spots** (Cabrio, Abound, Pristine, and Captan)	**Botrytis** (Rovral, Nevado, Iprodione, Elevate, Switch, Pristine) **Rosette** (Switch, Abound, Pristine) **Powdery Mildew** (Rally, Cabrio, Abound, Pristine) **Rusts** (Rally, Abound, Cabrio, Pristine, Orbit, Tilt) **Anthracnose, Cane Blight, Spur Blight, and Leaf Spots** (Cabrio, Abound, Pristine, and Captan)	**Botrytis** (Rovral, Nevado, Iprodione, Elevate, Switch, Pristine) **Rosette** (Switch, Abound, Pristine) **Powdery Mildew** (Rally, Cabrio, Abound, Pristine) **Rusts** (Rally, Abound, Cabrio, Pristine) **Anthracnose, Cane Blight, Spur Blight, and Leaf Spots** (Cabrio, Abound, Pristine, and Captan)	**Botrytis** (Rovral, Nevado, Iprodione, Elevate, Switch, Pristine) **Rosette** (Switch, Abound, Pristine) **Powdery Mildew** (Rally, Cabrio, Abound, Pristine) **Rusts** (Rally, Abound, Cabrio, Pristine, Orbit, Tilt) **Anthracnose, Cane Blight, Spur Blight, and Leaf Spots** (Cabrio, Abound, Pristine, and Captan)	**Botrytis** (Rovral, Nevado, Iprodione, Elevate, Switch, Pristine) **Rosette** (Switch, Abound, Pristine) **Powdery Mildew** (Rally, Cabrio, Abound, Pristine) **Rusts** (Rally, Abound, Cabrio, Pristine, Orbit, Tilt) **Anthracnose, Cane Blight, Spur Blight, and Leaf Spots** (Cabrio, Abound, Pristine, and Captan) **Cane Blight** (see notes)	**Phytophthora Root Rot** (Ridomil, phosphorous acid-based products) **Cane Blight** (see notes) **Orange Cane Blotch** (Copper, see notes and labels) **Powdery Mildew** (Rally, Cabrio, Abound, Pristine) **Rusts** (Rally, Abound, Cabrio, Pristine, Orbit, Tilt) **Leaf Spots** (Captan, Orbit, Tilt)

[a]Bramble bloom periods are protracted, so bloom and cover spray can be difficult to define clearly. Do not exceed label rates or spray intervals, but make sure that the pathogens indicated above are addressed with a thorough fungicide program as defined by the variety.