



# What else have we learned about *Neopestalotiopsis*?

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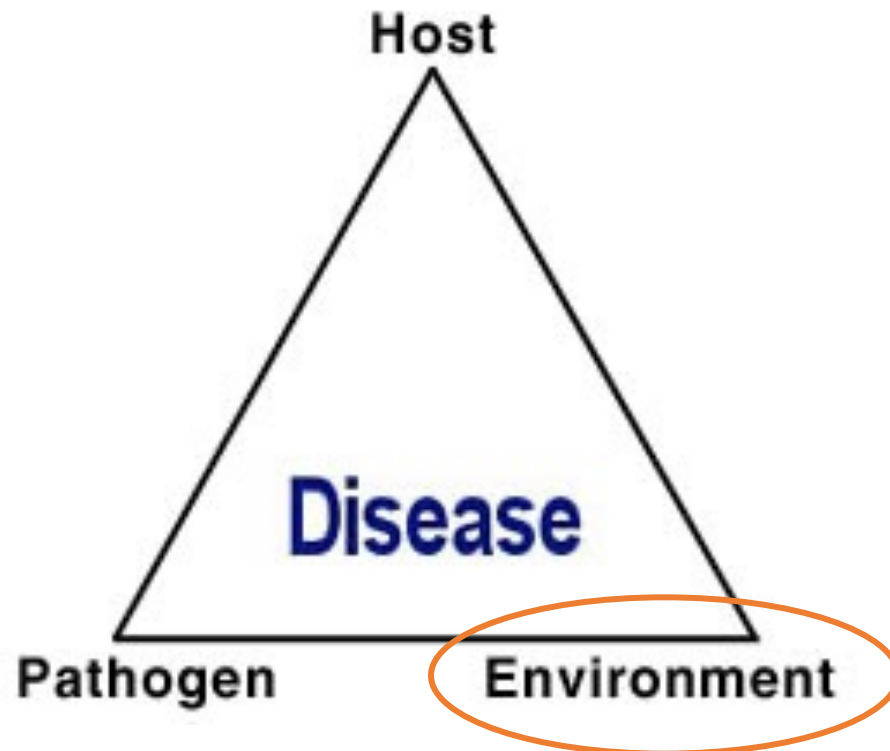
# *Neopestalotiopsis* was not as bad this season



**...except for a few fields that received plants that were quiescently infected**

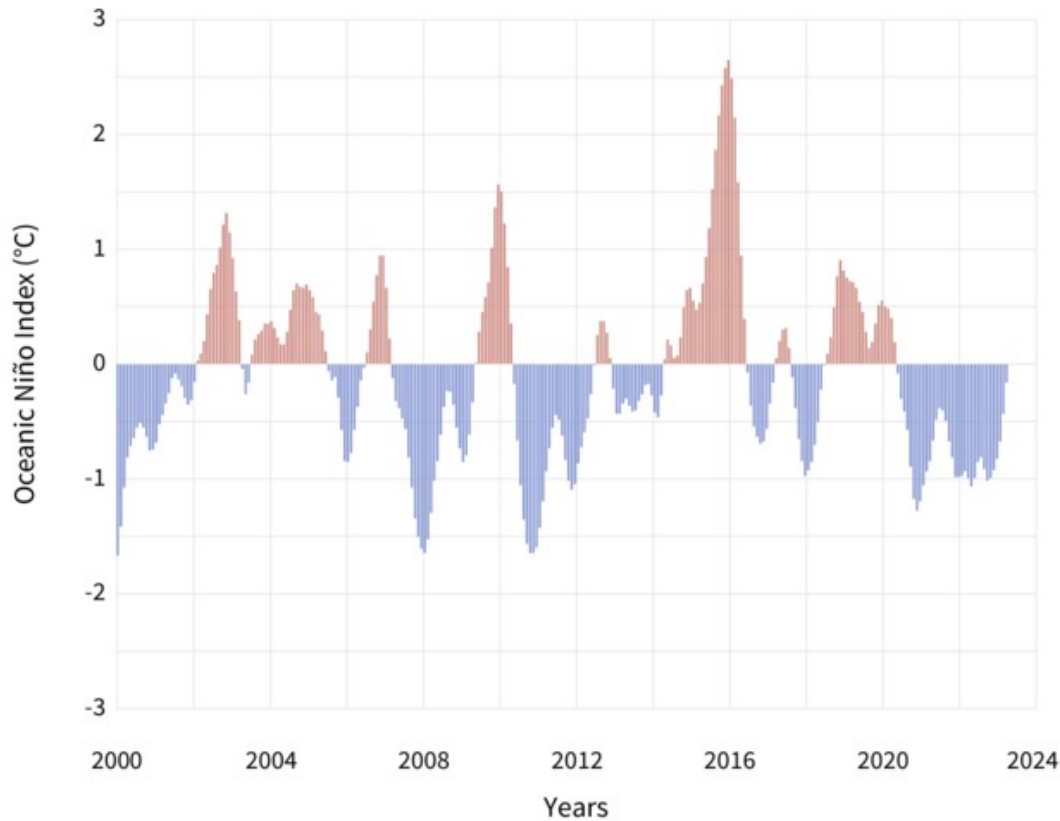
# We like to think whatever we were doing was working...

...we did learn a lot in these past few years, but I think we were mostly blessed with good weather :)



# Past 3 seasons of La Niña...

## OCEANIC NIÑO INDEX (ONI)

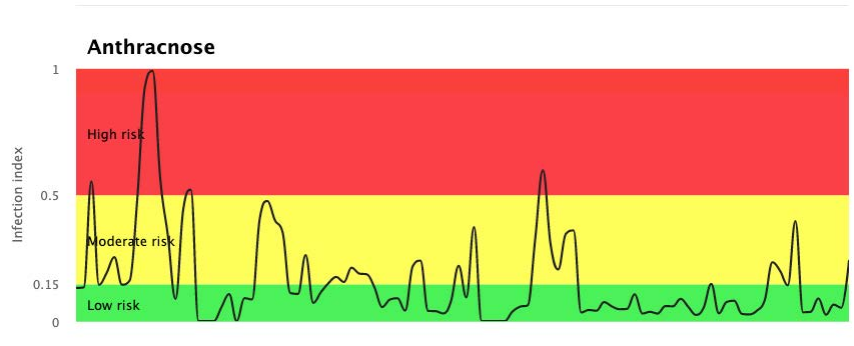


La Niña: warmer and drier than average December, January and February for Central Florida

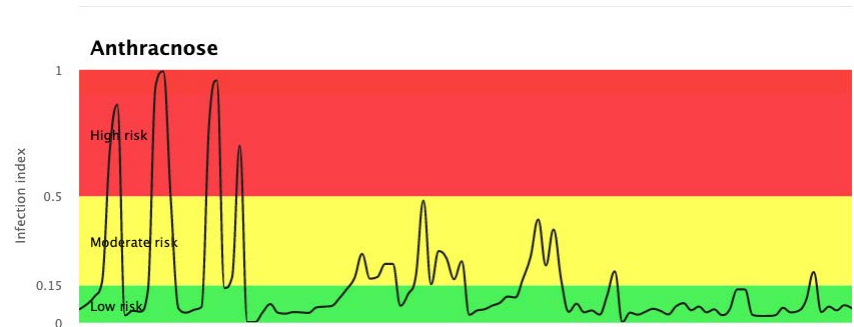
<https://www.ncei.noaa.gov/access/monitoring/enso/>

# Lower disease pressure during La Niña seasons

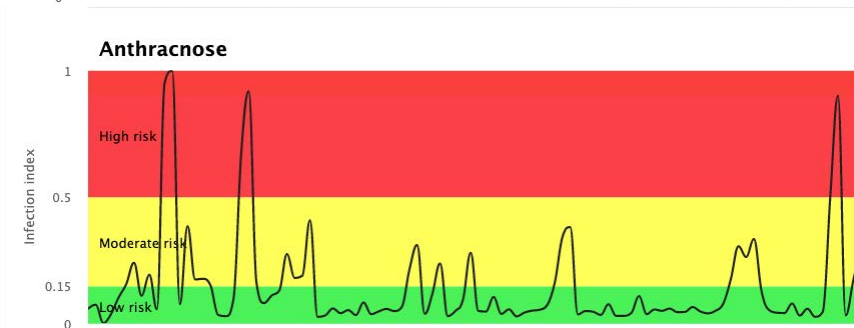
Plant City, Florida  
Anthracnose risk  
Nov 1 – Feb 10



2022-23

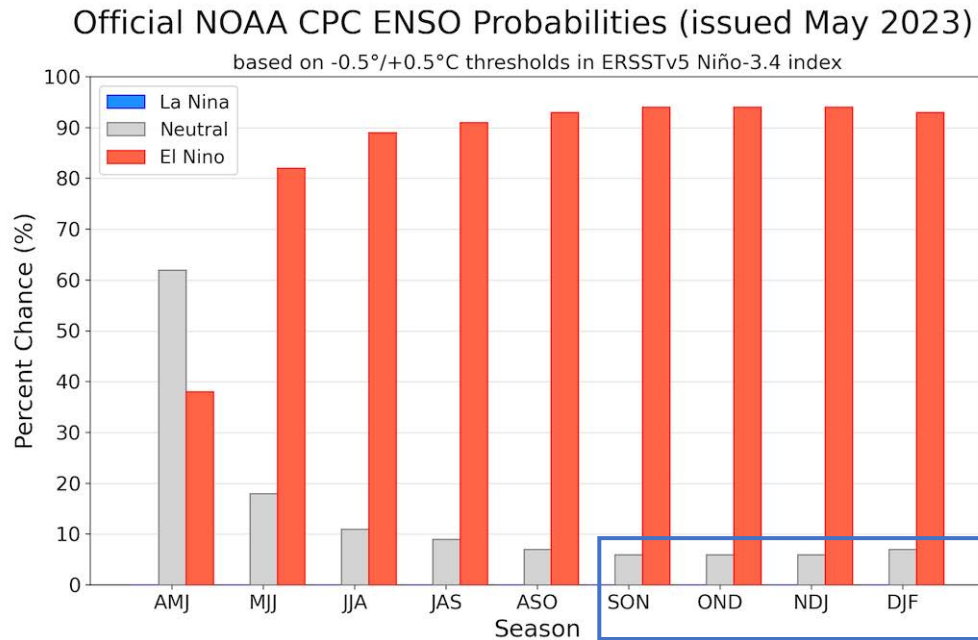


2021-22



2020-21

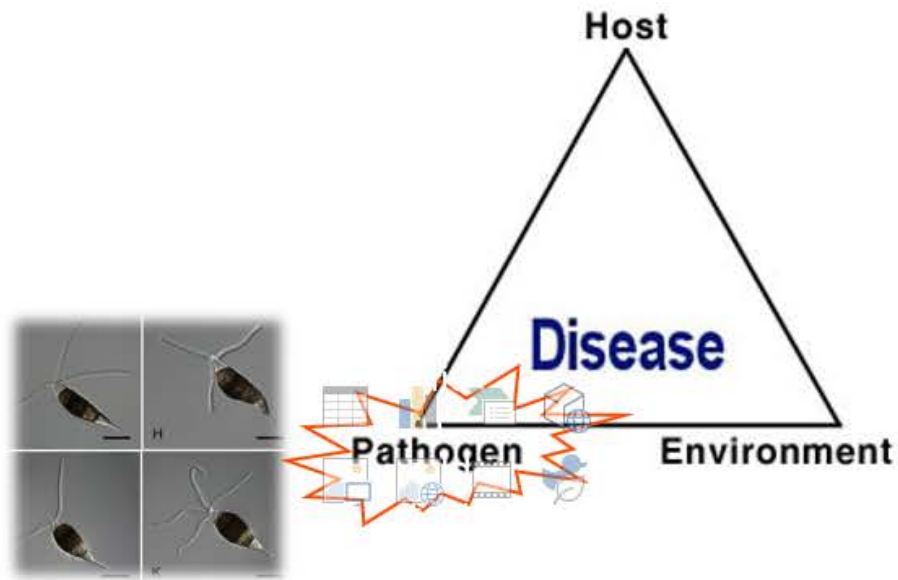
# El Niño likely 2023-24 season



<https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/>

# In preparation for next season...

*If possible, avoid introducing the pathogen on transplants*



# In preparation for next season...

We now know that *Neopestalotiopsis* survives over summer

✓ *Strawberry residue*



- Early crop destruction AND disking to break down plant material as quick as possible





# Neopestalotiopsis survived on strawberry crowns for up to 17 months

## Strawberry Plant Debris

Year	Month	<i>Neopestalotiopsis</i> sp. CFU/g)	
		Leaves	Crowns
2021	February	> 6000.0	5873.3
	March	> 6000.0	5685.0
	April	> 6000.0	5703.3
	May	> 6000.0	5885.0
	June	> 6000.0	3120.0
	July	3746.7	640.0
	August	2285.0	585.0
	September	-	295.0
2022	October	-	100.0
	November	-	41.7
	December	-	15.0
	January	-	8.3
	February	-	5.0
	March	-	3.3
	April	-	3.3
	May	-	1.7
June	-	3.3	

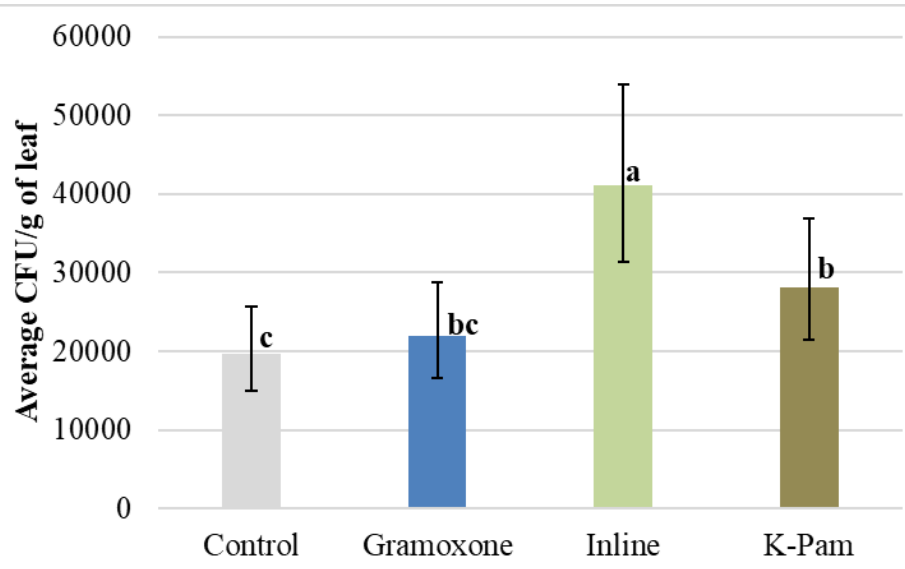


- It survives on strawberry leaves until leaf decomposition, (August)
- In the crowns, it survived for up to 17 months (February to June following year)

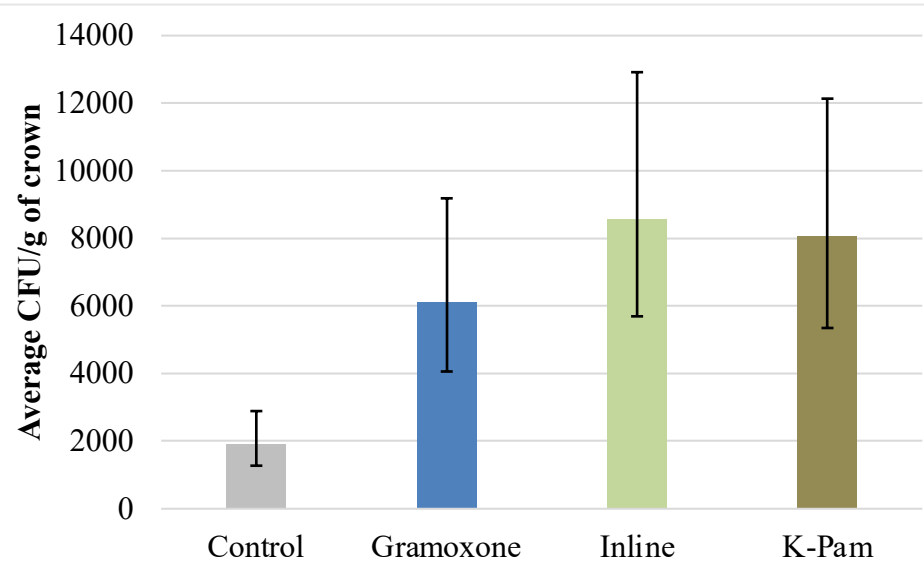


# 2023 Crop termination trial

## Leaves



## Crowns



**Gramoxone and fumigants Inline and K-Pam (applied through drip) did not reduce *Neopestalotiopsis* inoculum on leaves or crowns**



# Pre-season bed fumigation is effective, but *Neopestalotiopsis* remains on the alleys

Farm	Sampling Site	<i>Neopestalotiopsis</i> sp. CFU* per gram of soil			
		End of season	Before fumigation	After fumigation	
				Bed	Alley
1	A	75.0	15.0	0	2.5
2	A	555.0	52.5	0	25.0
3	A	547.5	3.3	0	5.0
4	A	459.2	125.0	0	21.7
	B	48.3	4.2	0	2.5
5	A	90.0	2.5	0	1.7
	B	1962.5	1.7	0	2.5
6	A	603.3	4.2	0	3.3
	B	2410.8	630.8	0	18.3

\*Colony-forming unit (CFU) per gram of sample



# Flat fumigation effective and may be used to rescue highly infested fields



Farm	Farm / treatment	Before fumigation	CFU/g soil	
			After bed fumigation	After bed fumigation
			Bed	Row middles
1	Non-treated	105.93		
	Flat fume only	-	0.00	1.85
	Flat fume + Bed	-	0.00	0.37
	Bed only	-	0.00	30.74
2	Non-treated	62.96		
	Flat fume only	-	0.00	3.33
	Flat fume + Bed	-	0.00	2.59
	Bed only	-	0.00	44.07
3	Non-treated	80.00		
	Flat fume only	-	0.19	0.00
	Flat fume + Bed	-	0.00	0.74
	Bed only	-	0.37	6.30
4	Non-treated	1.11		
	Flat fume only	-	0.00	0.00
	Flat fume + Bed	-	0.00	0.00
	Bed only	-	0.00	5.56

Telone C-35 (400 lb/ac) used for all fumigant treatments

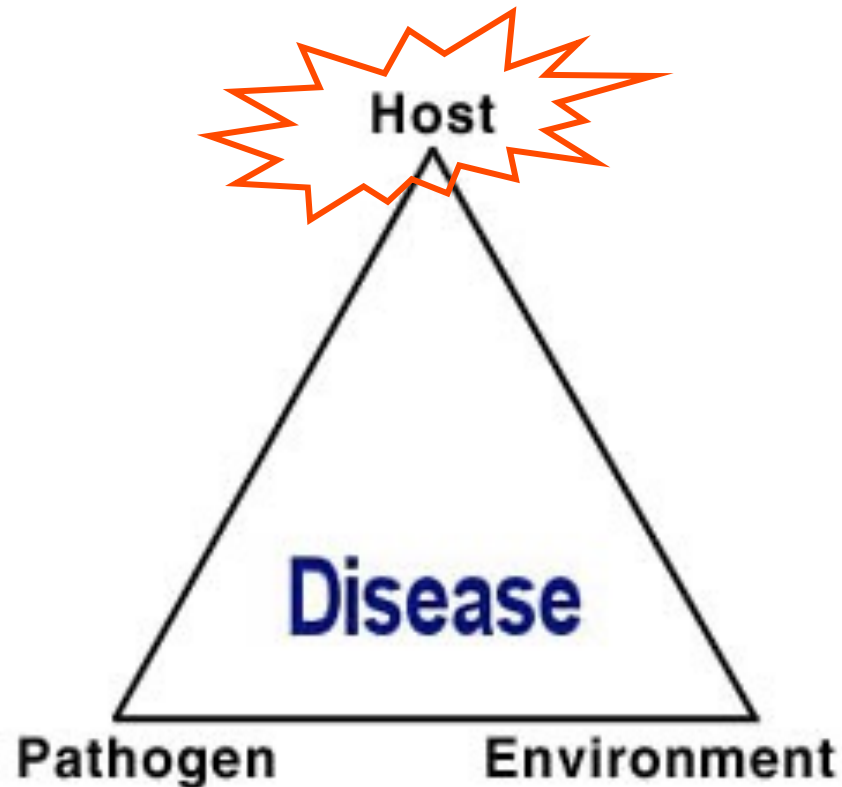


# Fumigant choice and rate for field trials from lab studies that showed 1,3-D has good fungicidal activity

Treatments	Rate (lb/acre)		Pestalotiopsis (CFU/g crown)
	1,3-D	chloropicrin	
Non-treated control	-	-	18465a
chloropicrin (Pic)	-	60	2500bc
chloropicrin (Pic)	-	120	269d
chloropicrin (Pic)	-	180	293d
chloropicrin (Pic)	-	240	383cd
chloropicrin (Pic)	-	320	321d
1,3-dichloropropene (Telone)	30	-	7080ab
1,3-dichloropropene (Telone)	60	-	5153b
1,3-dichloropropene (Telone)	120	-	593cd
1,3-dichloropropene (Telone)	180	-	726d
<b>1,3-dichloropropene (Telone)</b>	<b>240</b>	<b>-</b>	<b>90d</b>

**Significant rate response observed – highest label rate recommended for best inoculum reduction**

# Cultivar choice: Good progress being made towards more tolerant cultivars

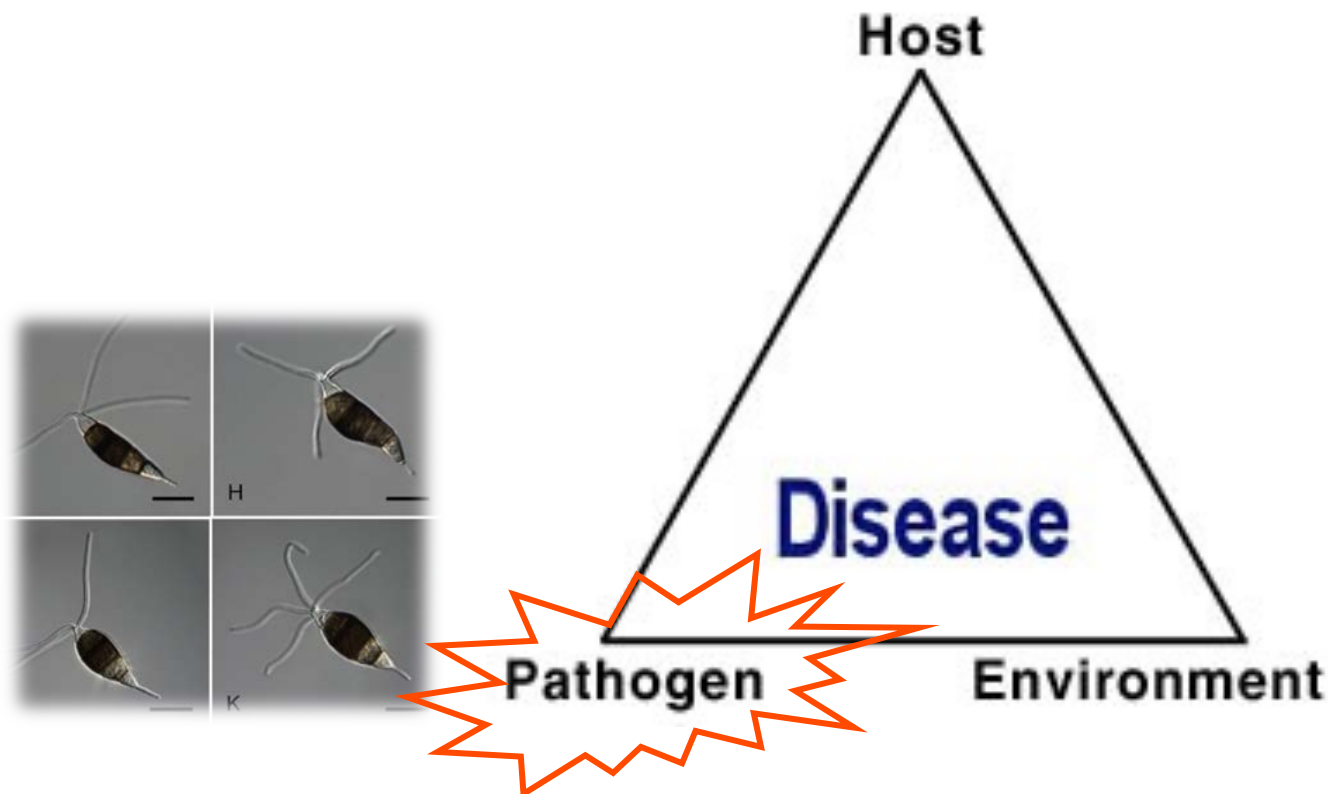


# 2022-23 Cultivar screening trial

Cultivar/	Pestalotia leaf spot rating (0-6)		
<b>Beauty</b>	<b>4.75</b>	<b>m</b>	<b>HS/S</b>
19.11-41	4.46	lm	HS/S
20.74-80	4.46	lm	HS/S
19.36-125	4.42	lm	HS/S
<b>Brilliance</b>	<b>4.29</b>	<b>jklm</b>	<b>HS/S</b>
19.10-55	4.29	klm	HS/S
<b>Radiance</b>	<b>4.17</b>	<b>ijklm</b>	<b>HS/S</b>
<b>Sensation® 'Florida 127'</b>	<b>4.04</b>	<b>ijklm</b>	<b>HS/S</b>
18.FL127.SC-179	3.92	hijklm	HS/S
20.24-70	3.88	ghijklm	HS/S
20.71-50	3.71	fghijklm	HS/S
<b>Elyana</b>	<b>3.71</b>	<b>fghijklm</b>	<b>HS/S</b>
<b>20.34-183</b>	<b>3.67</b>	<b>fghijklm</b>	<b>HS/S</b>
<b>Medallion™ 'FL 16.30-128'</b>	<b>3.63</b>	<b>fghijklm</b>	<b>HS/S</b>
<b>Strawberry Festival</b>	<b>3.58</b>	<b>fghijklm</b>	<b>HS/S</b>
<b>Florida Pearl™ 'FL 16.78-109'</b>	<b>3.42</b>	<b>efghijklm</b>	<b>MS</b>
20.24-50	3.38	defghijklm	MS
19.15-6	3.21	cdefghijkl	MS
Treasure	3.08	cdefghijk	MS
<b>20.80-4</b>	<b>3.04</b>	<b>cdefghijk</b>	<b>MS</b>
<b>Florida Pearl™ 'FL 18.52-66'</b>	<b>3.00</b>	<b>cdefghijk</b>	<b>MS</b>
Winterstar	3.00	cdefghijk	MS
20.62-27	2.62	abcdefg	MS
17.76-93	2.33	abcdef	R
17.76-92	1.83	abcd	R



# Anything new about fungicides to manage *Neopestalotiopsis* during the season?





Treatment	Pest Fruit Rot incidence (%)	Pest Leaf Spot severity (0-6)	Yield (lb/acre)
Rotation (Thiram, Switch, Rhyme, Orbit, Miravis Prime, Inspire, Cabrio)	33.2 l	2.08 h	10186.1 ab
Omega 500F 20 fl oz	35.9 kl	2.17 gh	12283.3 a
Switch + "Adj1" alt Thiram + "Adj1"	39.0 jkl	2.92 cdefgh	9930.5 ab
Switch + "Adj2" alt Thiram + "Adj2"	42.4 ijk	2.58 fgh	9366.7 ab
XDE-659 20.5 fl oz	44.5 hijk	2.17 gh	9532.5 ab
Switch + Actigard alt Thiram + Actigard	46.1 ghij	3.29 abcdef	7424.4 bcd
Switch alt Thiram ←	48.1 fghi	2.83 cdefgh	9376.0 ab
Switch + Ag Wash alt Thiram + Ag Wash	48.7 fghi	3.00 abcdef	8121.7 bc
Thiram SC 2.5 qt	49.8 efghi	2.83 bcdefgh	5865.9 cdef
Catamaran 4.3 pt	52.8 efgh	2.21 gh	5843.0 cdef
Rhyme (drip) alt Thiram	54.8 efg	2.83 abcdefg	6237.8 cde
Rhyme alt Thiram	55.1 efg	2.79 cdefgh	5747.8 cdef
Control, not inoculated ←	56.2 def	2.71 efgh	6258.2 cde
Bravo Weather Stik 1.5 pt	56.6 def	2.75 defgh	4897.1 defg
Captan 80WDG 2.5 lb	57.0 def	3.13 abcdef	6092.1 cdef
Aprovia Top alt Thiram	59.5 de	3.96 abc	3821.3 efghi
ProPhyt 4 pt	64.3 cd	3.46 abcde	3460.6 efghi
Switch alt Theia	64.5 cd	3.58 abcd	4317.9 efgh
Switch alt Howler	64.8 cd	3.79 abcd	3677.8 efghi
Theia alt Thiram	69.0 bc	3.92 ab	3158.4 fghi
Miravis Top 15.2 fl oz	70.0 bc	4.17 ab	1757.4 hi
Howler alt Thiram	71.2 bc	3.42 abcde	2453.4 ghi
Ag Wash (quaternary ammonium) ←	75.5 ab	4.13 a	1426.2 hi
Control inoculated 4 weeks after planting ←	79.2 a	3.96 ab	1240.4 i

# Summary fungicide trials

- Treatments with combinations of Switch and Thiram have consistently performed best – Switch applications should be timed around ‘rainy weeks’ (long wetness)
- DMI products such as Rhyme, Inspire Super and Orbit can and should be used in the rotation
- Quaternary ammonium not effective when applied on plants

# Quaternary ammonium products recommended for decontamination of vehicles and equipment



<https://edis.ifas.ufl.edu/publication/PP136>

# Sanitation remains an important component to reduce inoculum

<https://www.fdacs.gov/content/download/9901/file/decontamination.pdf>

## APPROVED DECONTAMINATION PRODUCTS & METHODS

CITRUS HEALTH RESPONSE PROGRAM - COMPLIANCE AGREEMENT ATTACHMENT – SCHEDULE 11

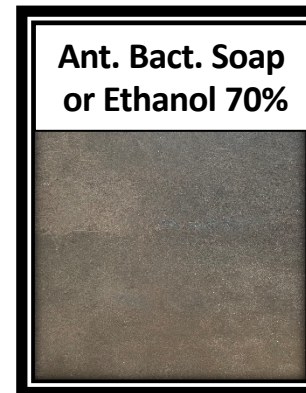
In order to prevent the spread of citrus diseases, it is essential that personnel and equipment working near or contacting any citrus plant material be decontaminated in accordance with Citrus Health Response Program rules, with an approved material, regardless of whether an infestation has been proven to exist. Risks of acquiring and dispersing citrus diseases such as citrus canker bacterial inoculum and the black spot fungal pathogen are greatest when diseased citrus plant material and surrounding vegetation are wet. Avoid unnecessary contact with citrus.

**DECONTAMINATION of personnel and equipment** are required procedures to be carried out by the terms set forth within each Citrus Health Response Program Compliance Agreement under authority of Chapter 581.184 (6), Florida Statutes and Rule Chapter 5B-63, F.A.C. The following steps meet minimum standards for most regulated entities. Citrus nurseries have additional requirements.

1. Prior to departing a citrus grove or citrus production unit, a citrus receiving facility, or a disposal site, all personnel must **inspect** vehicles and equipment for citrus plant material and debris and **clean** all vehicles, equipment, picking sacks, clothing and hand tools free of fruit, leaves, limbs, soil and debris prior to microbial decontamination. This plant material and debris must be left on the property or be disposed of in accordance with established Citrus Health Response Program procedures.
2. All personnel, vehicles and equipment (picking sacks, hand tools, etc.) should be **decontaminated** by an appropriate sanitizing method in accordance with the *Approved Decontamination Products & Methods* (Schedule 11). All personnel and equipment entering a grove in a citrus black spot quarantine area for any purpose must be decontaminated by an appropriate sanitizing method in accordance with the Approved Decontamination Products & Methods (Schedule 11).

It is important that all users of approved products in this listing always **READ AND FOLLOW THE PRODUCT LABEL**. Please note that no single antimicrobial product is approved for use interchangeably on both personnel and equipment. In addition to grove and harvesting equipment and vehicles, citrus fruit picking sacks and clippers must also be disinfected with an approved **equipment** decontaminant listed in this document under **“DECONTAMINATION OF EQUIPMENT.”**

**DECONTAMINATION OF PERSONNEL:** All persons should disinfect hands, arms and any other parts of the body that have contacted citrus and surrounding vegetation, **plus gloves and hats**, and any clothing, shoes and small personal items (pen, hand lens, glasses, pocketknife, etc.) that have come in contact with risky plant material, using one of the following prescribed products in accordance with label directions. (Larger equipment and worker accessories associated with harvesting operations should be treated with the products described in the EQUIPMENT section below.) Some personnel



Leather



Gloves

### PERSONNEL DECONTAMINANTS for use on Clothing AND Skin:

1. * GX-1027 Antimicrobial Soap	Galloway Chemical	(800) 445-1143
2. * Canker Guard	Flo Tech. Inc.	(800) 335-6832
3. * Csan 154 QT Soap	Bell Chem Corporation	(866) 877-2355
4. * EcoCare 360	Ecolab	(800) 352-5326
5. * Medi-Kwik AntiMicrobial & Fungicidal Skin Cleanser	(by EnviroSAFE, Inc.)	No Contact
6. * Triple Crown Super Healer	(by EnviroSAFE, Inc.)	No Contact
7. * QHS Quaternary Hand Sanitizer (ChemStar; Prod. Discontinued)	Stepan Co.	(No Direct Sales)
8. * C-Soap	Agri Flow	(863) 382-8803

Revised November 2017

Schedule 11 - [www.freshfromflorida.com/CHRP](http://www.freshfromflorida.com/CHRP)

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# Evaluation of disease models for timing fungicide applications – Sensation (HS)

Treatments	Number sprays	PLS severity (0-6)	PFR (%) (11/28/22 to 3/27/23)	Yield (lb/A) (11/28/22 to 3/27/23)
Control, non-inoculated	0	1.14c	19.64bc	14194.06a
<b>Control, inoculated</b>	<b>0</b>	<b>2.68a</b>	<b>41.51a</b>	<b>5253.51b</b>
Switch 62.5WG if BFR alert (StAS-high risk); Thiram SC otherwise, weekly	20	1.30b	16.33c	16440.61a
Thiram SC if 0.40-0.49 (Leaf inc. Model); Switch 62.5WG if >0.50 (Leaf inc. Model)	9	1.45b	24.69b	13594.21a
Thiram SC if >0.40 (Leaf inc. Model); Switch 62.5WG if BFR alert (StAS-high risk)	9	1.43b	24.01bc	14517.94a
Thiram SC if >0.70 (Spore germ. Model); Switch 62.5WG if BFR alert (StAS-high risk)	8	1.38b	25.99b	13532.21a
Thiram SC if >0.40 (Leaf inc. Model) or >0.70 (Spore germ. Model); Switch 62.5WG if BFR alert (StAS-high risk)	9	1.34b	27.26b	13893.65a

# Evaluation of disease models for timing fungicide applications – Pearl (MS)

Treatments	Number sprays	PLS severity (0-6)	PFR (%) (11/28/22 to 3/27/23)	Yield (lb/A) (11/28/22 to 3/27/23)
Control, non-inoculated	0	0.83c	3.87ab	23165.26a
<b>Control, inoculated</b>	<b>0</b>	<b>2.55a</b>	<b>6.21a</b>	<b>17604.15b</b>
Switch 62.5WG if BFR alert (StAS-high risk); Thiram SC otherwise, weekly	20	1.38b	1.47c	25008.12a
Thiram SC if 0.40-0.49 (Leaf inc. Model); Switch 62.5WG if >0.50 (Leaf inc. Model)	9	1.39b	2.49bc	25611.67a
Thiram SC if >0.40 (Leaf inc. Model); Switch 62.5WG if BFR alert (StAS-high risk)	9	1.37b	2.28bc	24233.76a
Thiram SC if >0.70 (Spore germ. Model); Switch 62.5WG if BFR alert (StAS-high risk)	8	1.47b	2.75b	23219.17a
Thiram SC if >0.40 (Leaf inc. Model) or >0.70 (Spore germ. Model); Switch 62.5WG if BFR alert (StAS-high risk)	9	1.42b	2.38bc	24814.68a

# Our goal is to include the model for *Neopestalotiopsis* in the Strawberry Advisory System

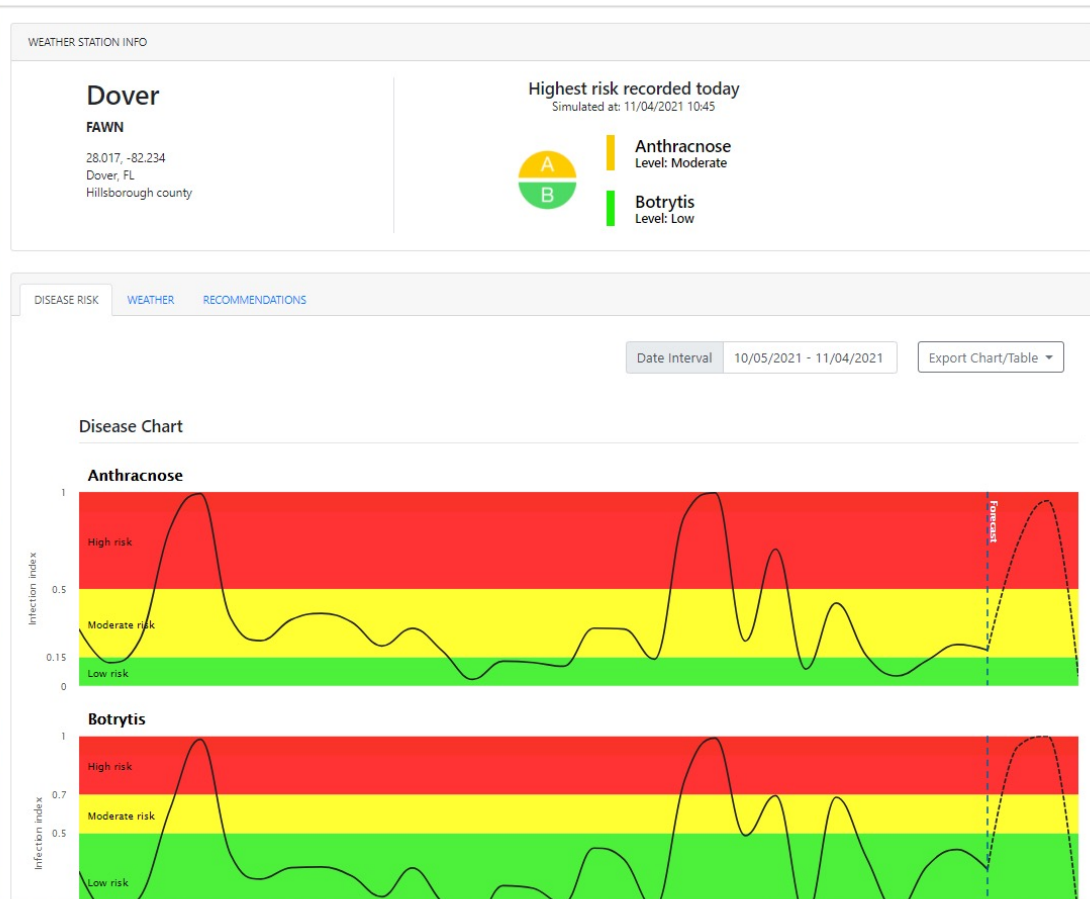
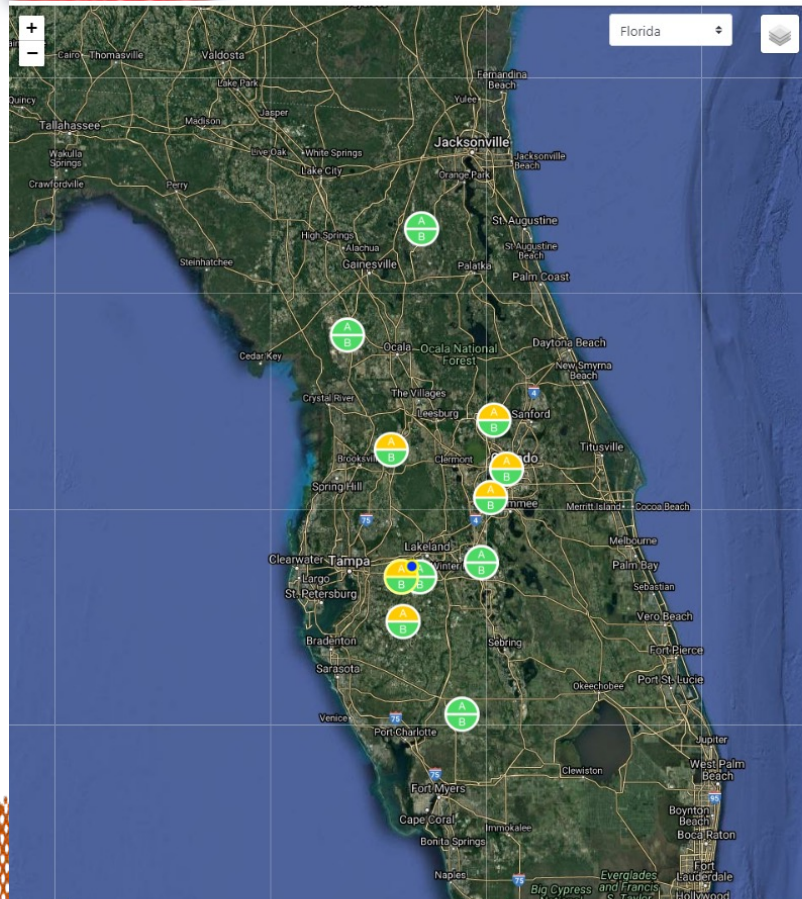


A

<http://sas.agroclimate.org/fl/>



B



# Acknowledgments



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