

**Strawberry diseases season roundup:
Neopestalotiopsis, of course, but that is not all!**

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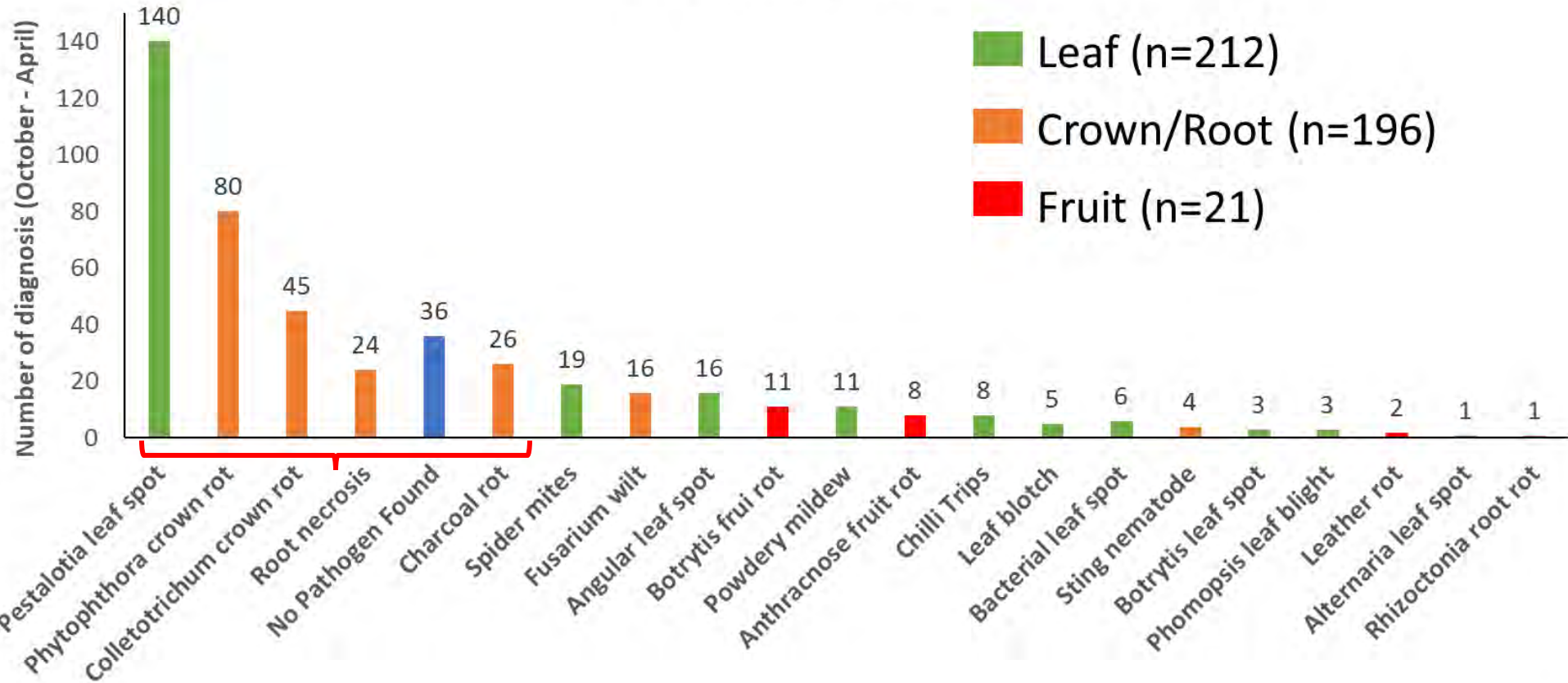
Carolina Rebello, Biological Scientist

Teresa Seijo, Biological Scientist



2023-24 Diagnosis sample summary

DIAGNOSIS (n=223)



*Most Pestalotia samples February/March

Root necrosis and crown rot caused by *Colletotrichum acutatum*

- ✓ *The fungus does not survive over summer in FL fields*
- ✓ **Introduced as quiescent infections from nursery plants**
- ✓ **'Medallion' particularly susceptible to *C. acutatum***
- ✓ **Fungicide applications (foliar or drip) are not effective**
- ✓ **Replanting was the only option - if diagnosed early enough**



2023-24 Fungicide trial (plants artificially inoculated with *C. acutatum*)

Treatment (product and rate/A)	Application method	% DI ^x	Yield (lb/acre) ^y
Non-inoculated control	-	0.0 a ^z	3573 a
Omega 20 fl oz*	dip	1.3 a	2638 b
Aprovia Top 13 fl oz*	dip	3.8 ab	2347 bc
Omega 14 fl oz*	dip	3.8 ab	2332 bc
Switch 8 fl oz	dip	1.3 a	2083 cd
Miravis Prime 8 fl oz	dip	5.0 ab	1760 de
Omega 20 fl oz* + Orondis 28 fl oz	planting hole	6.3 ab	1385 ef
Omega 20 fl oz*	planting hole	18.8 c	1154 fg
Inoculated control	-	17.5 c	678 g

* NOT REGISTERED



Summary recommendations for root necrosis caused by *Colletotrichum acutatum*

- ✓ Ask your nurseries to not plant Medallion fields close to day neutrals or other susceptible cultivars
 - ✓ captan and chlorotalonil sprays at nursery
- ✓ *IF Medallion* transplants are suspected to be infected, fungicide dip treatment prior planting *might* help
 - Treat one box at time to avoid spreading other
 - Zivion S (natamycin) – EPA labeled FL and CA

Charcoal Rot caused by *Macrophomina phaseolina*



Summary recommendations for fields with a history of Charcoal Rot

- ✓ **Early crop destruction**
- ✓ **Pre-plant fumigation with high rate Telone C-35 [35 gpta]**
- ✓ **Cultivar selection [Brilliance and Sensation tolerant]**
 - **If planting Medallion (HS) early, consider using white plastic**
- ✓ **Fungicides only *slow down* disease progress [Rhyme and Howler]**

Phytophthora Crown Rot



Crown rot symptoms caused by *Phytophthora cactorum* similar to those caused by *Colletotrichum gloeosporioides* or *Macrophomina phaseolina*



2023-24 Phytophthora trial

Treatment	Mortality (%)	Yield (lb/acre)
Orondis Gold DC 28 fl oz - planting hole	0.0h	3487.8a
Ridomil Gold SL 1 pt - planting hole + drip 4 WAP	0.0h	3214.6a
Orondis Gold DC 62 fl oz - planting hole	1.3h	3613.6a
Orondis Gold 28 fl oz - planting hole + Ridomil Gold 1 pt (2 applications @ 21 days interval)	2.5gh	3370.4a
Orondis Gold DC 28 fl oz - planting hole + drip 2 WAP	3.8fgh	3668.1a
Orondis Gold Premix 28 fl oz - planting hole + drip 2 WAP	6.3fgh	2393.9bc
Revus 16 fl oz - planting hole + drip 4 WAP	13.8fg	2513.1b
Ridomil Gold SL 1 pt - drip 1 and 4 WAP	15.3ef	2373.5bc
Curzate 60DF 5oz/A - drip ; 21 days interval	25.5de	2009.3bcd
Curzate 60DF 5oz/A - foliar ; weekly	31.3cd	1503.1de
Theia 1.5 lb - drip 21 days interval	33.5bcd	1769.7cde
SoilGard 2 lb planting hole; SoilGard 5 lb 21 days interval	40.3bc	821.9fg
Inoculated control	40.8bc	1132.8efg
Non-inoculated control	43.8b	1517.4de

*Orondis Gold now labeled for strawberry in FL. It has a 28-day PHI so recommended as first application after planting

*Revus is in the process of registration by the manufacturer (Syngenta) for nursery use only



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Ridomil Gold SL 1 pt - drip 1 and 4 WAP	15.3ef	2373.5bc
Curzate 60DF 5oz/A - drip ; 21 days interval	25.5de	2009.3bcd
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Summary recommendations for Phytophthora

- ✓ Infections come with transplants - quite a bit this season, likely due to wet weather at nursery locations
- ✓ First application of Orondis (28 PHI) as soon as possible after planting *(USDA project submitted with Nathan Boyd to develop equipment to apply products at the planting hole)*
- ✓ Follow up with Ridomil applications timed around peak production periods
- ✓ Foliar application of phosphite materials in between Ridomil apps, if needed

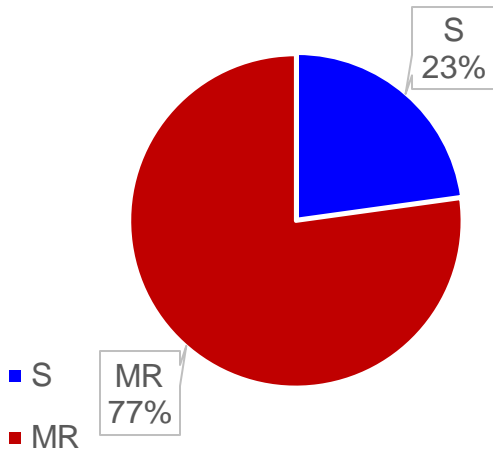
Botrytis fruit rot



Botrytis cinerea

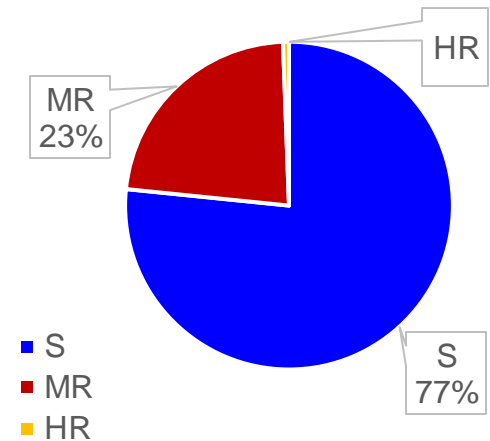
2023-24 Fungicide resistance screening

FLUDIOXONIL

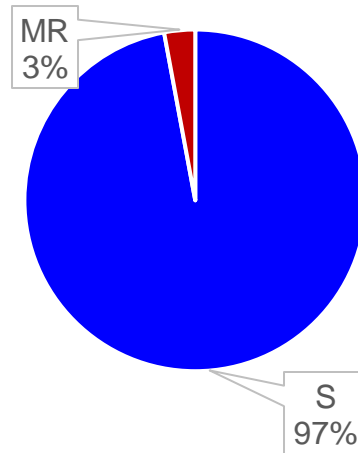


171 isolates from
7 commercial farms

ISOFETAMID



PYDIFLUMETOFEN



Kenja
isofetamid (7)

Switch

fludioxonil (12) + cyprodinil

Miravis Prime

fludioxonil (12) + pydiflumetofen (7)



2023-24 BFR fungicide trial

Treatment (products and rates/A)	Application timing	Yield (lb/A)	BFR incidence (%)
			Late Season
Switch 62.5WG 14 oz Thiram SC 1.5 qt	5, 7, 8, 13 1-4, 6, 9-12	24585 abcde	29.8 l
Thiram SC 1.5 qt	weekly	22439 cdefg	34.4 jkl
Thiram SC 2.5 qt	weekly	24910 abcd	33.6 kl
Switch 62.5WG 14 oz Captan Gold 80WDG 1.9 lb	5, 7, 8, 13 1-4, 6, 9-12	27219 a	36.1 ijkl
Miravis Prime 13.4 fl oz Captan Gold 80WDG 1.9 lb	5, 7, 8, 13 1-4, 6, 9-12	25974 abc	37.5 hijkl
V6M-5-14 27.4 fl oz	weekly	26965 ab	39.3 ghijk
Miravis Prime 13.4 fl oz + Actigard 0.33 oz Captan Gold 80WDG 1.9 lb + Actigard 0.33 oz	5, 7, 8, 13 1-4, 6, 9-12	24351 abcdef	39.4 ghijk
Kenja 15.5 fl oz Captan Gold 80WDG 1.9 lb	5, 7, 8, 13 1-4, 6, 9-12	20226 fghij	40.9 fghijk
Luna Tranquility 500SC 20 fl oz Captan Gold 80WDG 1.9 lb	5, 7, 8, 13 1-4, 6, 9-12	20432 efghi	47.6 cdef
Merivon 11 fl oz Captan Gold 80WDG 1.9 lb	5, 7, 8, 13 1-4, 6, 9-12	20472 efghi	46.6 cdefg
Inspire Super 16 fl oz Captan Gold 80WDG 1.9 lb	5, 7, 8, 13 1-4, 6, 9-12	20335 efghi	49.9 bcde
Luna Flex 13.6 fl oz Captan Gold 80WDG 1.9 lb	5, 7, 8, 13 1-4, 6, 9-12	18042 hijkl	51.3 abcd
WarHammer 12 oz	weekly	16678 ijkl	53.0 abc
Non-treated control	-	15609 kl	58.6 a

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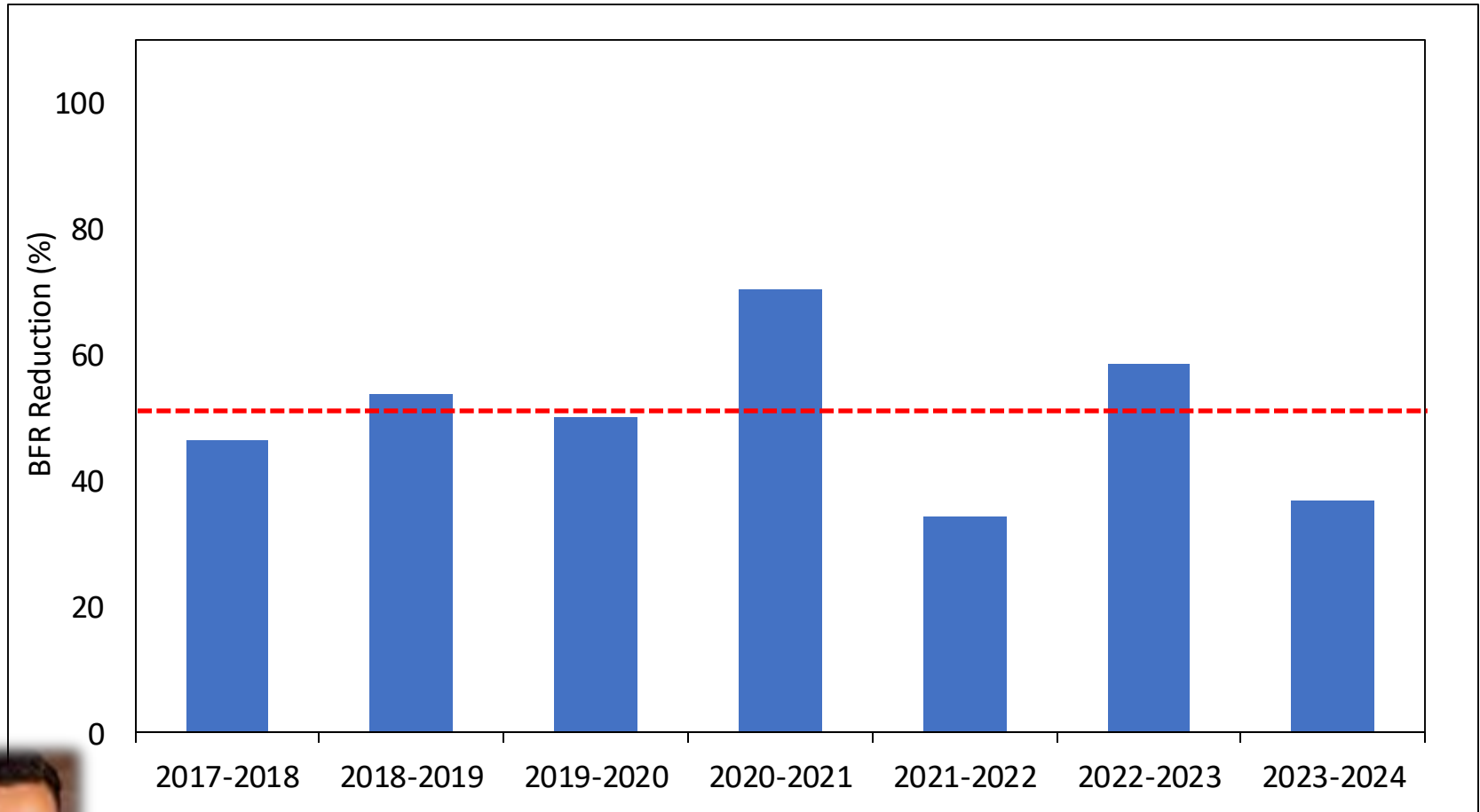
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Luna Tranquility 500SC 20 fl oz	5, 7, 8, 13	20432 efghi	47.6 cdef
Captan Gold 80WDG 1.9 lb	1-4, 6, 9-12		
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Switch vs Control (NT) - Reduction in % BFR



Summary recommendations for Botrytis

Cultural practices

- ✓ Manage N wisely so that plants don't get too big
- ✓ Increase plant spacing if possible

Chemical control

- ✓ Multi-site (captan, thiram) during weeks of low disease risk
- ✓ Miravis Prime, Switch or Kenja *only* during high alerts

Nurseries

- ✓ Talk to them about avoiding the use of the above single-site fungicides

Status of EPA re-registration for Thiram

- ✓ Proposed Interim Registration Review Decisions published April 30, 2024
- ✓ 60-day period for comments on EPA website until July 1, 2024
(<https://www.regulations.gov/commenton/EPA-HQ-OPP-2015-0433-0612>)
- ✓ Eastman conducted additional studies and provided additional dermal absorption data in 2022
- ✓ As it is, this will likely result in the cancelation of the foliar use on strawberry

Neopestalotiopsis



Can't emphasize enough the importance of clean transplants...

How much of a difference does it make to get transplants coming with low or high levels of inoculum?



Sensation® 'Florida127'

Florida Pearl™ 'FL 16.78-109'

Non-inoculated



10 spores/ml



100 spores/ml



1,000 spores/ml



10,000 spores/ml



If I get infected transplants...
**how effective is removing
symptomatic leaves to reduce
inoculum load?**



Effect of removing symptomatic leaves on disease and yield

Treatments	Pestalotiopsis fruit rot (%)	Yield (lb/acre)*
No leaf removal; fungicide application (weekly)	5.5 c	3859.4 a
Removal of leaves >50% disease; fungicide application (weekly)	8.7 c	3639.7 a
Removal leaves with >50% disease	28.7 ab	2419.2 b
Removal of senescent leaves	26.4 b	2274.4 b
No leaf removal; No fungicide	35.7 a	2095.9 b
Removal of leaves with at least one symptomatic spot	8.3 c	2033.0 b



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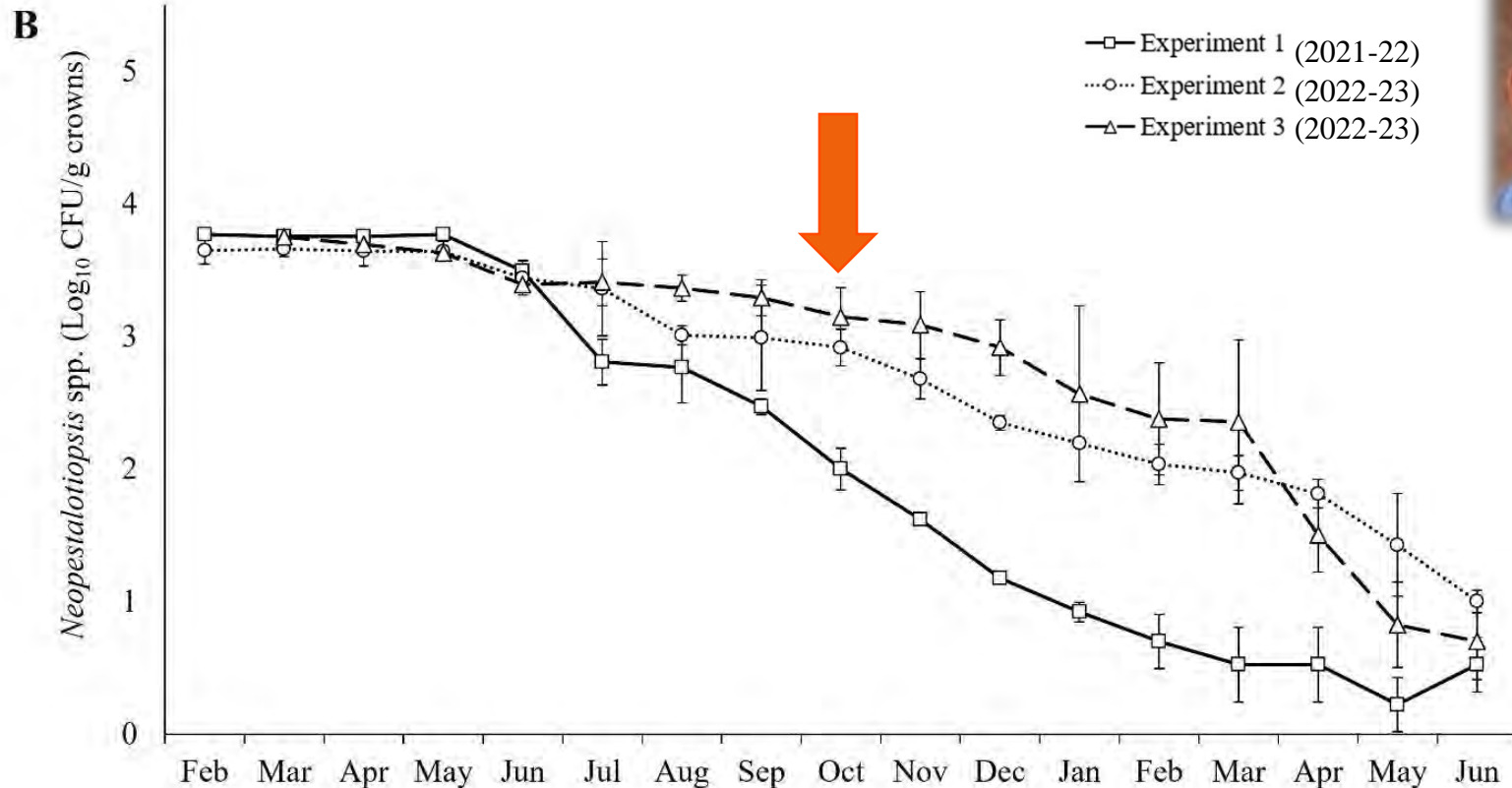
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BOTTOM LINE:

We are better off just applying fungicides and *NOT* removing the diseased leaves



I got clean plants but... We know now that the inoculum has established in our fields





2023-24 Neopestalotiopsis Fungicide trial

Treatment	Yield (lb/acre) whole season	% PFR	AUDPC PLS severity
Switch 14 oz + JMS stilet oil 1.6 pt alert, alt Thiram 2.5 qt + JMS oil 0.8 pt other weeks	10284.6a	37.2gh	259ij
Omega 500F 20 fl oz alerts; Thiram 2.5 qt other weeks	9609.1ab	36.9gh	250j
Switch 14 oz alerts; BFP-1 alt. Thiram SC 2.5 qt other weeks	8927.5abc	36.0h	272hij
Switch 14 oz alerts; Thiram SC 2.5 qt other weeks	8777.5abcd	40.5gh	302fgh
Thiram SC 2.5 qt, weekly	8160.8bcd	45.9fg	295ghi
Thiram SC 1.5 qt, weekly	7448.1cde	51.7ef	301fgh
Echo 720 1.5 pt, weekly	7295.6cde	42.4fgh	234j
Rovral 2 pt 1 WAP, Rhyme 7 fl oz alerts, Thiram SC 2.5 qt other weeks	6984.7de	51.3ef	312efgh
Rhyme 7 fl oz 1, 4, 10 WAP via drip; Thiram 2.5 qt 2, 3, 5, 7, 8, 9 WAP	5645.9ef	57.9e	323defg
Control, non treated, non-inoculated	4259.1fg	70.0d	273hij
Cueva 1%, weekly	3006.2gh	70.2cd	346bcde
IKF-5411 10.5 fl oz, weekly	2117.8hi	78.0bc	363abcd
Galvoxite Bz1.3 500 ppm	1816.0hi	79.6ab	359abcd
NSTKI-037 4lb, weekly	1714.2hi	82.1ab	371abc
IKF-5411 13.5 fl oz, weekly	1686.9hi	83.1ab	337cdef
MgSuN 600 ppm (MgSol + Sodium Polysulfide)	1671.5hi	80.7ab	367abc
WarHammer 12 oz, weekly	1617.8hi	80.8ab	379ab
Kenja 13.5 fl oz alerts, FunThyme (0.5% v/v) + Antero EA 0.125% v/v other weeks	1452.2hi	82.8ab	394a
Control, non-treated, inoculated	1372.9hi	83.5ab	387ab
YSY 1.3 lb, weekly	1315.9hi	84.0ab	356abcd
IKF-5411 15.5 fl oz, weekly	1278.9hi	83.4ab	380ab
FunThyme (0.5% v/v) + Antero 0.125% v/v alerts, Baja 14 fl oz + Antero 0.125% other wks	1040.7i	85.8a	390a

*** Five applications during alerts**





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Rhyme 7 fl oz 1, 4, 10 WAP via drip; Thiram 2.5 qt 2, 3, 5, 7, 8, 9 WAP	5645.9ef	57.9e	323defg
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FunThyme (0.5% v/v) + Antero 0.125% alerts, Baja 14 fl oz + Antero 0.125% other wks	1040.7i	85.8a	390a

* Five applications during alerts



2023-24 Neopestalotiopsis Fungicide trial

Treatment	Yield (lb/acre) whole season	% PFR	AUDPC PLS severity
Switch 14 oz + JMS stilet oil 1.6 pt alert, alt Thiram 2.5 qt + JMS oil 0.8 pt other weeks	10284.6a	37.2gh	259ij
Omega 500F 20 fl oz alerts; Thiram 2.5 qt other weeks	9609.1ab	36.9gh	250j
Switch 14 oz alerts; BFP-1 alt. Thiram SC 2.5 qt other weeks	8927.5abc	36.0h	272hij
Switch 14 oz alerts; Thiram SC 2.5 qt other weeks	8777.5abcd	40.5gh	302fgh
Thiram SC 2.5 qt, weekly	8160.8bcd	45.9fg	295ghi
Thiram SC 1.5 qt, weekly	7448.1cde	51.7ef	301fgh
Echo 720 1.5 pt, weekly	7295.6cde	42.4fgh	234j
Rovral 2 pt 1 WAP, Rhyme 7 fl oz alerts, Thiram SC 2.5 qt other weeks	6984.7de	51.3ef	312efgh
Rhyme 7 fl oz 1, 4, 10 WAP via drip; Thiram 2.5 qt 2, 3, 5, 7, 8, 9 WAP	5645.9ef	57.9e	323defg
Control, non treated, non-inoculated	4259.1fg	70.0d	273hij
Cueva 1%, weekly	3006.2gh	70.2cd	346bcde
IKF-5411 10.5 fl oz, weekly	2117.8hi	78.0bc	363abcd
Galvoxite Bz1.3 500 ppm	1816.0hi	79.6ab	359abcd
NSTKI-037 4lb, weekly	1714.2hi	82.1ab	371abc
IKF-5411 13.5 fl oz, weekly	1686.9hi	83.1ab	337cdef
MgSuN 600 ppm (MgSol + Sodium Polysulfide)	1671.5hi	80.7ab	367abc
WarHammer 12 oz, weekly	1617.8hi	80.8ab	379ab
Kenja 13.5 fl oz alerts, FunThyme (0.5% v/v) + Antero EA 0.125% v/v other weeks	1452.2hi	82.8ab	394a
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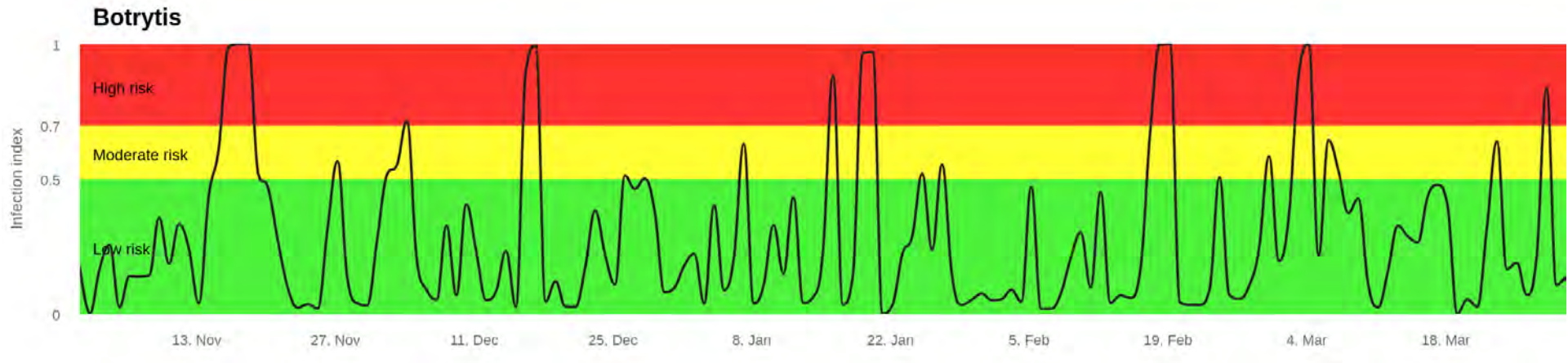


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2023-24 weather favorability for disease



Environmental conditions were particularly favorable for disease in the second part of the season [El Nino influence tends to be stronger from Jan-March]

Neopestalotiopsis model trials 2023-24

Highly susceptible: Sensation 'FL127'

Treatments	Number of sprays		PFR %	Yield (lb/A)
	Switch	Thiram		
Control, non-inoculated	-	-	23.0 d	7250 a
Switch 62.5WG (BFR StAS high alert); Thiram SC otherwise, weekly	4	12	29.8 cd	5369 b
Switch 62.5WG if >0.50 (Leaf inc. Model); Thiram SC if 0.40-0.49 (Leaf inc. Model)	4	5	37.0 bc	4813 bc
Switch 62.5WG if BFR high alert (StAS >0.70) Thiram SC if >0.40 (Leaf inc. Model) or >0.70 (Spore germ. Model)	4	6	36.3 bc	4407 bc
Switch 62.5WG if BFR high alert (StAS >0.70); Thiram SC if BFR moderate alert (StAS 0.50-0.69)	4	4	38.9 b	4018 c
Switch 62.5WG if BFR high alert (StAS >0.70); Thiram SC if >0.70 (Spore germ. Model)	4	5	41.1 b	4009 c
Switch 62.5WG if BFR high alert (StAS >0.70); Thiram SC if >0.40 (Leaf inc. Model)	4	5	39.2 b	3812 c
Control, inoculated	-	-	63.3 a	1569 d



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Neopestalotiopsis model trials 2023-24

Moderately susceptible: Pearl™ 'FL 16.78-109'

Treatments	Number of sprays		PFR %	Yield (lb/A)
	Switch	Thiram		
Control, non-inoculated	-	-	10.7 b	4687 a
Switch 62.5WG (BFR StAS high alert); Thiram SC otherwise, weekly	4	12	7.5 b	4560 a
Switch 62.5WG if BFR high alert (StAS >0.70); Thiram SC if >0.70 (Spore germ. Model)	4	5	11.7 b	4870 a
Switch 62.5WG if BFR high alert (StAS >0.70) Thiram SC if >0.40 (Leaf inc. Model) or >0.70 (Spore germ. Model)	4	6	13.0 b	4356 a
Switch 62.5WG if BFR high alert (StAS >0.70); Thiram SC if BFR moderate alert (StAS 0.50-0.69)	4	4	10.9 b	4253 a
Switch 62.5WG if BFR high alert (StAS >0.70); Thiram SC if >0.40 (Leaf inc. Model)	4	5	11.1 b	4018 a
Switch 62.5WG if >0.50 (Leaf inc. Model); Thiram SC if 0.40-0.49 (Leaf inc. Model)	4	5	13.3 b	3747 a
Control, inoculated	-	-	33.3 a	2168 b

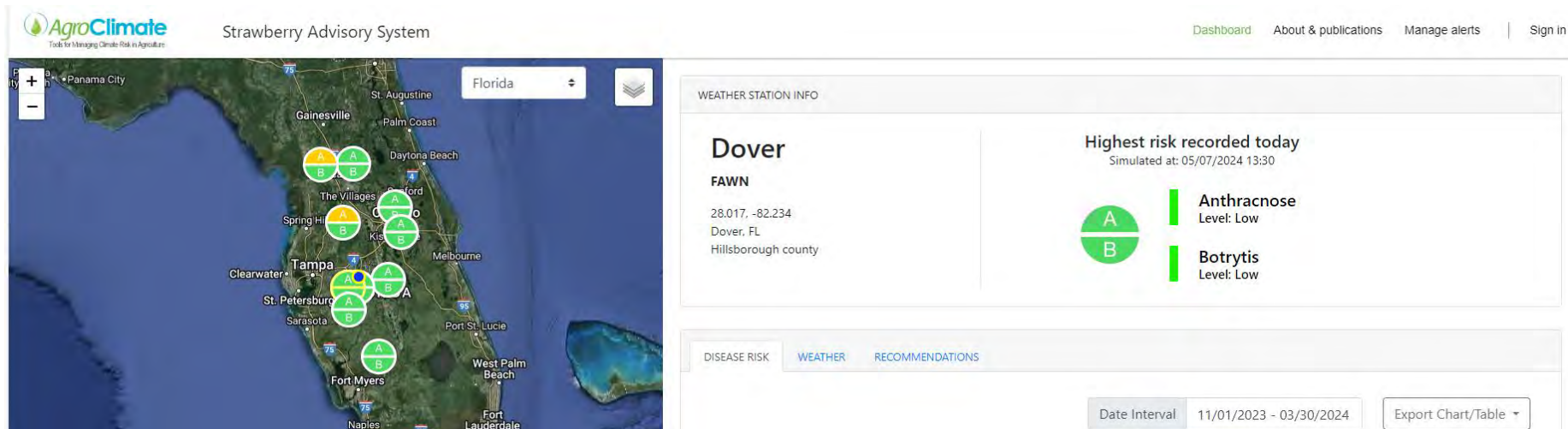


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Neopestalotiopsis model trials

Goal: Incorporate Neopestalotiopsis in the Strawberry Advisory System



Conditions are similar to favorable conditions for Botrytis, i.e. prolonged leaf wetness
[wider range of temperature]

Follow Botrytis high alerts

Summary recommendations for *Neopestalotiopsis*

- ✓ Start with clean plants
 - Fluazinam (Omega) and chlorothalonil (Echo) for nurseries
- ✓ Removal of symptomatic leaves does not seem to help much in managing the disease and can significantly affect yields
- ✓ Time applications of Switch during high alerts for Botrytis; ('rainy weeks' i.e. long wetness)
- ✓ Thiram and DMI products, i.e. Rhyme, can and should be used in the rotation
- ✓ Adding JMS stylet oil (paraffinic oil) has shown a significant increase in yield in our trials
- ✓ Progress is being made towards cultivars with more resistance – Ember™ 'FL 20.80-4' similar to Pearl™ 'FL 16.78-109'

Thank you!!

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Funding:



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