Title: Management of anthracnose fruit and crown rot of strawberry in the Southeast
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Progress Report

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Objectives:
The objectives of this research proposal are to:

i) Validate a novel nursery sampling method through utilization of a newly developed real-time PCR to ensure use of clean planting stocks;
ii) To develop a decision support system to help strawberry growers to either fully avoid or reduce the number of fungicide sprays for anthracnose fruit rot management without compromising levels of disease control.

Methodology: Dr. Mahfuzur Rahman obtained a faculty position at West Virginia; therefore objective 1 was not completed since it was designed as a summer trial. We request a no cost extension on this portion of the work pending the hiring of another postdoc.

However, objective 2 was completed. Decision support system: Strawberries were fall planted at Castle Hayne NC with 4 replications and three treatments were imposed 1) not sprayed with fungicide; 2) sprayed weekly with our best standard program; 3) sprayed according to a weather forecasting system we adapted in collaboration with UFL personnel (Dr. N. Peres). Plots were inoculated with Colletotrichum acutatum (3 strains) by planting 2 infected plants at the end of each plot, allowing for natural spread.

Results:
We followed the following protocol:

- The variable %INF is calculated from the equation:
- *In (%INF / [1-%INF]) = -3.70 + 0.33W – 0.069WT + 0.0050WT2 – 0.93 x 10 – 4WT3 where W = the duration of a preceding wetness interval and T= mean temperature(0C) during the interval*.
- If threshold expressed by %INF is 0.15 will indicate the need for Captan spray
- When threshold reaches 0.50 will indicate the need for pyraclostrobin spray

The 2011 conditions called for 2 captan sprays and 1 pyraclostrobin spray (Table 1).

We also used in field monitoring devices and compared actual leaf wetness to predicted leaf wetness based on algorithms (Figure 1).

Figure 1: In field estimates of leaf wetness (Hobo sensor) compared to estimated leaf wetness values based on algorithms from regional weather stations.

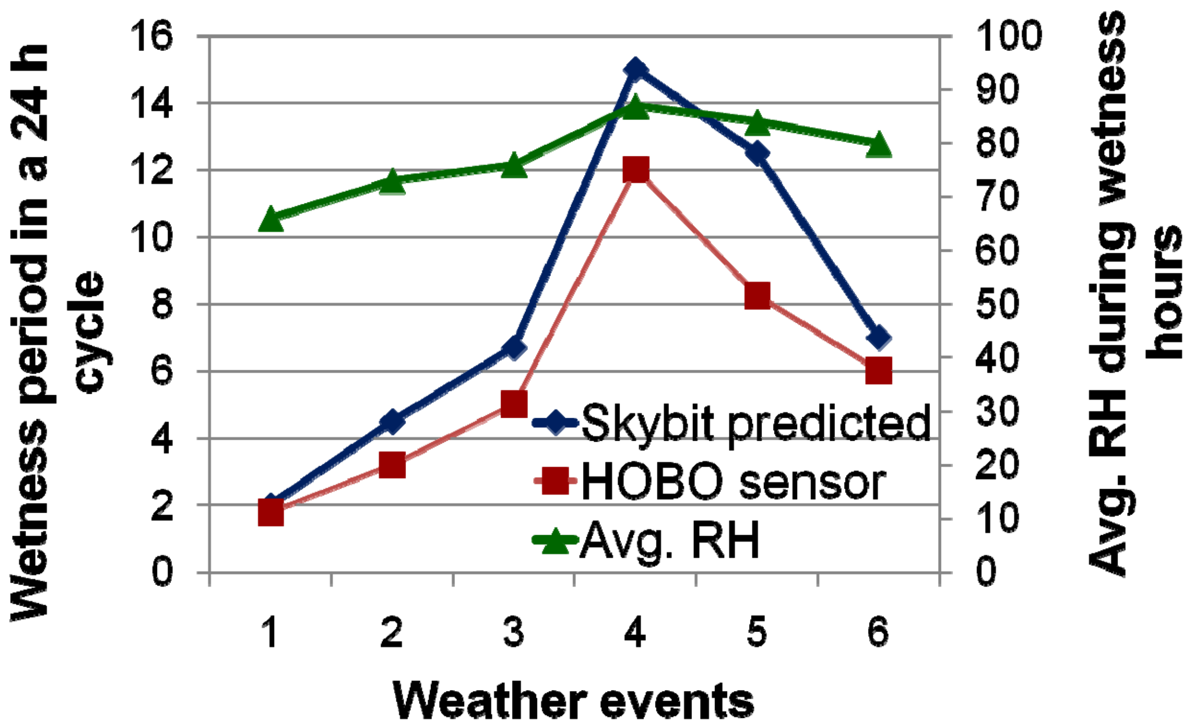


Table 1: Incidence of anthracnose fruit rot and marketable yield as impacted by spray schedules in 2011. Yield is based on 6 weekly harvests.

Treatments	# of sprays applied	AFR incidence (%) [ab]	Marketable yield (lb/Acre) [b]
Non Treated Control	**-**	**22.6 a**	**11651**
Regular Schedule **Captan 50WP 4.0 lb+ Topsin M 1.0 lb** **Pristine WG 1.45 lb** **CaptEvate 68WDG 4.5 lb** **Pristine WG 1.45 lb**	 **1** **2,4** **3,5,7** **6**	**6.425 b**	**12621**
Prediction based schedule **Captan 50WP 4.0 lb** **Pristine WG 1.45 lb** **Pristine WG 1.45 lb**	 **1** **2** **3**	**11.1 b**	**16229**

[a]Disease incidence was calculated from all harvested fruits over 6 weeks
*Harvest season was shortened likely due to late planting (Nov 1, 2010)
[b]Means in a column followed by the same letter are not significantly different by Fisher's protected LSD test ($\alpha \leq 0.05$).

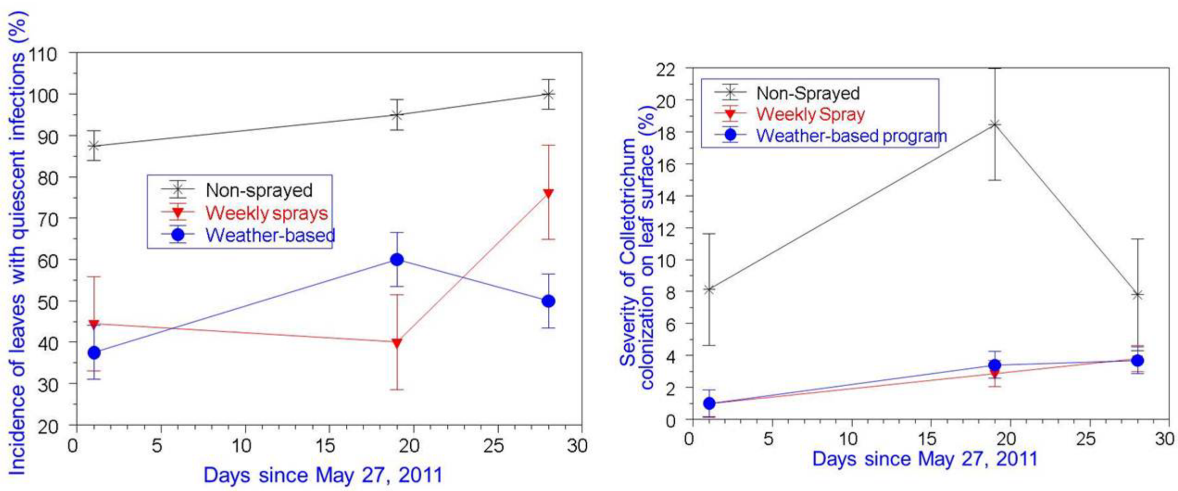
This data was very similar to data from 2010 (Table 2).

Treatments	# of sprays applied	AFR incidence (%)[ab]	Marketable yield (lb/Acre)[b]
Non treated control	**-**	**8.45 a**	**14,600 b**
Regular Schedule Captan 50WP 4.0 lb + Topsin M 70W 1.0 lb Pristine WG 1.45 lb CaptEvate 68WDG 4.5 lb Pristine WG 1.45 lb	 **1** **2, 4** **3, 5, 7** **6, 8**	**3.22 b**	**17,400 a**
Prediction based schedule Captan 50WP 4.0 lb Captan 50WP 4.0 lb Pristine WG 1.45 lb	**1** **2** **3**	**4.43 b**	**15,000 ab**

[a]Disease incidence was calculated from all harvested fruits over 8 weeks
[b]Means in a column followed by the same letter are not significantly different by Fisher's protected LSD test ($\alpha \leq 0.05$).

We also monitored quiescent infections in leaves to determine if the different spray schedules impacted potential inoculum. Both spray regimes substantial decreased the incidence of quiescent infections and severity of sporulation after the leaves were killed with paraquat (Figure 2)

Figure 2: Incidence of quiescent infections (Left) and severity of leaf surface colonization (sporulation; Right) after leaves collected from treatment plots were killed and incubated.



Conclusions:

- Remote data acquisition were done in real-time and could be highly correlated to in field data capture
- The forecast model significantly reduced the number of sprays in both years although 2010-2011 was more rainy compared to 2009-2010; Weekly sprays (6-8) did not offer significantly better control of AFR than 3 well timed forecast sprays.

Impact statement: Forecasting holds promise for NC and the SE region to manage AFR and can result in substantial savings in number of sprays. This is critical to reduce pressure on important fungicides where the threat of pathogen resistance to the fungicide is high.

Publications from this project: None other than we put out several extension newsletter publications that are based on these disease diagnostic notes.