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Southeastern Peanut Research Initiative 2015
FINAL REPORT + Summary pg 5

UF Project Number: 00122630
Project Title: Developing and validating of a weather-based decision support system (DSS) for the management of white mold (Sclerotium rolfsii) in peanut.
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1. **Abstract**

Decision support systems (DSS) are frequently used by extension agents, crop consultants, growers and other agricultural clientele to provide accurate and timely management of plant diseases. Currently, the main DSS for peanut growers is the Peanut Rx disease risk index. Peanut Rx is an excellent pre-plant DSS tool, however, it does not include the site-specific weather conditions growers experience in their fields each year. Management programs may need to be adjusted to account for disease development related to the unique environments created from these weather conditions. It is hypothesized that by integrating Peanut Rx with weather-based models producers will have more robust information available to determine the best management practices (i.e. fungicide spray selection & timing) for their peanut fields.

2. **Objectives**

The objective of this study was to further validate this model through field studies using the DSS to determine early season spray schedules at different locations. The long term goal of this study is to use this model in an in-season ensemble risk assessment with DSS aimed at determining the optimal times for white mold development. This in-season ensemble risk assessment, along with Peanut Rx, will be used to develop disease a risk advisory system for white mold across Florida and ultimately throughout the southeastern U.S.

3. **Methods**

Peanut experimental plots were planted at the University of Florida's Plant Science Research and Education Unit (PSREU) in Citra, FL and the North Florida Research and Education center in Quincy and Marianna, FL on 30 April 2015 and 5 June 2015. The variety Georgia-06G was used in this study and planted at a density of six seeds per foot of row on 36-in. row centers. Plots consisted of paired 25-ft long treatment rows with untreated buffer rows between each treatment arranged in a split-plot design with 4 replications (0.77 A). Fungicide applications were made throughout the season following the schedule outlined in table 1. Foliar treatments were applied with a CO_2 backpack sprayer calibrated to deliver 25 gal/A at 30 psi with TeeJetXR 8004VF nozzles at 36-in. spacing. Research plots at the PSREU were inoculated with *S. rolfsii* infected grain 2 weeks after planting. Fungicides treatments began based on the white mold risk model or 30 days after planting as indicated in table 1 below.

Percent disease incidence was estimated by recording the presence of white mycelia in 1-ft sections of the canopy. This values were recorded as hits with the maximum number of hits possible being 50. Yields were obtained by weighing harvested peanuts from the two treatment rows on a scale. All data was analyzed with ANOVA using SAS version 9.2 and differences were determined using the multiple comparison test Fisher's least significant difference (LSD; $P < 0.05$).

Table 1. Spray schedule for fungicide treatments in the field trials at the three different sites listed in the methods above.. Numbers in the top row indicate the day after planting (DAP) when the product below was applied to the plots.

Treatment ID	#	20 DAP Banded	30 DAP Leaf Spot	40 DAP	45 DAP Leaf Spot	60 DAP Stem Rot	75 DAP Leaf Spot	90 DAP Stem Rot/Limb Rot	105 DAP Leaf Spot	120 DAP Leaf Spot
Untreated	1									
Leaf Spot	2		Echo 720 @ 1.5 pt/a		Echo 720 @ 1.5 pt/a	Echo 720 @ 1.5 pt/a	Echo 720 @ 1.5 pt/a	Echo 720 @ 1.5 pt/a	Echo 720 @ 1.5 pt/a	Echo 720 @ 1.5 pt/a
Tebuconazole	3		Echo 720 @ 1.5 pt/a		Echo 720 @ 1.5 pt/a	TebuStar @ 7.2 fl oz/a + Echo 720 1 pt/a	TebuStar @ 7.2 fl oz/a + Echo 720 1 pt/a	Abound 2.08SC @ 18 fl oz/a + Echo 720 1 pt/a	TebuStar @ 7.2 fl oz/a + Echo 720 1 pt/a	Echo 720 @ 1.5 pt/a
Provost	4		Echo 720 @ 1.5 pt/a		Echo 720 @ 1.5 pt/a	Provost 433 SC 8 fl oz/a	Provost 433 SC 8 fl oz/a	Convoy @ 13 oz/a + Headline @ 6 fl oz/a	Provost 433 SC 8 fl oz/a	Echo 720 @ 1.5 pt/a
Teb. Model[a]	5	Model Dependent TebuStar @ 7.2 fl oz/a + Echo 720 1 pt/a				TebuStar @ 7.2 fl oz/a + Echo 720 1 pt/a	Echo 720 @ 1.5 pt/a	Abound 2.08SC @ 18 fl oz/a + Echo 720 1 pt/a	TebuStar @ 7.2 fl oz/a + Echo 720 1 pt/a	Echo 720 @ 1.5 pt/a
Proline Model[b]	6	Model Dependent Proline SC 5.7 fl oz/a				Provost 433 SC 8 fl oz/a	Provost 433 SC 8 fl oz/a	Convoy @ 13 oz/a + Headline @ 6 fl oz/a	Provost 433 SC 8 fl oz/a	Echo 720 @ 1.5 pt/a
Proline Early	7			Proline SC 5.7 fl oz/a		Provost 433 SC 8 fl oz/a	Provost 433 SC 8 fl oz/a	Convoy @ 13 oz/a + Headline @ 6 fl oz/a	Provost 433 SC 8 fl oz/a	Echo 720 @ 1.5 pt/a
Teb. Early	8		TebuStar @ 7.2 fl oz/a + Echo 720 1 pt/a		Echo 720 @ 1.5 pt/a	TebuStar @ 7.2 fl oz/a + Echo 720 1 pt/a	Echo 720 @ 1.5 pt/a	TebuStar @ 7.2 fl oz/a + Echo 720 1 pt/a	Echo 720 @ 1.5 pt/a	Echo 720 @ 1.5 pt/a

[a] In the early planting (before May 1st) sprays occurred at 40, 40, 40 DAP for Citra, Marianna and Quincy, respectively. Late planting (after June 1st) had sprays applied at 20, 30, 30 DAP for Citra, Marianna and Quincy, respectively.

[b] In the early planting (before May 1st) sprays occurred at 40, 40, 40 DAP for Citra, Marianna and Quincy, respectively. Late planting (after June 1st) had sprays applied at 20, 30, 30 DAP for Citra, Marianna and Quincy, respectively.

4. Results

Planting date effect on white mold development.

Both the Quincy and Marianna trials were not inoculated with white mold in 2015, and were only considered a moderate risk for white mold based on Peanut Rx. Reduced numbers of white mold symptoms and signs were observed at all sites in 2015 even the inoculated site in Citra, FL (Fig. 1).

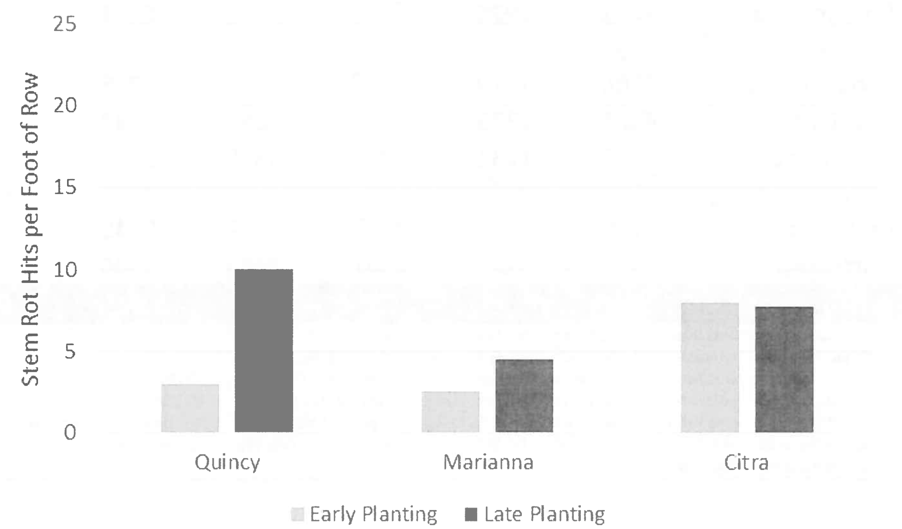

Figure 1: Average number of *S. rolfsii* hits per 1 foot of row in the plots at the different tests within Florida recorded between 90 and 110 days after planting. Early plantings were done at or before April 30th and late plantings were done at or after June 5th. Both the Marianna and Quincy sites relied on natural inoculum and the Citra site was inoculated with *S. rolfsii* infested grains at cracking. Typical inoculated plot disease ratings for early plantings are 25 to 30 hits per foot of row.

Field Trial Results:

Yield data was collected from research plots located in Citra, Quincy and Marianna, FL examining the effects of the treatments listed in Table 1 except for Quincy planting date 2 (after June 1st). All treatments produced significantly higher yields than the untreated check. In general, the model provide better or equal yield results when compared to the standard calendar based system (Table 2). This is result is consistent with disease pressure as overall incidence was much lower than 2014, even in inoculated plots.

Table 2. Yield results from the different field sites for the different treatments listed in Table 1. Yield data is estimated lbs/A based on weights obtained from the small plots. A protected Fisher's least significant difference is provided at the bottom for a p-value of 0.05. Bolded values mark the numerically highest yields observed at each site.

Treatment ID	CPD1[a]	CPD2[b]	MPD1[c]	MPD2[d]	QPD1[e]	QPD2[e]
Provost	4857	**2076**	**7983**	4651	5934	--
Proline Model	**5241**	**1920**	7718	4441	**6381**	--
Tebuconazole	4904	1379	6640	**4771**	5778	--
Teb. Early	4984	1339	6953	4259	5934	--
Teb. Model	4592	1231	6834	3885	5439	--
						--
Leaf Spot	4799	1230	7275	4222	5245	--
Untreated	2893	704	6087	3193	3166	--
LSD ($p < 0.05$)	*393*	*199*	*523*	*810*	*792*	

[a] Yield data for treatments listed in Table 1 from Citra, FL for peanuts planted before May 1st, 2015.
[b] Yield data for treatments listed in Table 1 from Citra, FL for peanuts planted after June 1st, 2015.
[c] Yield data for treatments listed in Table 1 from Marianna, FL for peanuts planted after May 1st, 2015.
[d] Yield data for treatments listed in Table 1 from Marianna, FL for peanuts planted before June 1st, 2015.
[e] Yield data for treatments listed in Table 1 from Quincy, FL for peanuts planted after May1st, 2015. No late planting was conducted in 2015 at Quincy, FL. The model for Proline did not indicate a spray that year, so similar program was done compared to the Provost only.

5. Summary

In 2014, the model performed as well or numerically better than the calendar based sprays in all but 5 treatments for both Proline and tebuconazole products. However, the results from 2015 did not produce the same results, especially for the tebuconazole programs. Disease pressure in 2014 was significantly higher that observed in 2015 which could account for these discrepancies. Also, the model showed at each site in 2015 that fungicide applications for white mold were generally not need until 60 days after planting (DAP), but proline and tebuconazole treatments were applied at 40 DAP even if the model did not indicate to. It is likely that leaf spot pathogen control was critical to final yield results, which could account for the lack of separation between the chlorothalonil only spray and the treatments. Thus, it appears in a year when the environment is not conducive for white mold, even in high risk situations, that waiting to spray is most beneficial.

Overall, the results indicate the importance of understanding pathogen's population response to environmental conditions when assessing early season disease risk in order to determine the proper management inputs (i.e. fungicides). Many factors can affect disease intensity, and continued research to understand these affects is critical to obtaining optimal peanut yields. As new resistant and tolerant varieties are developed, researchers will need to determine disease inputs carefully and over multiple seasons. This study provides more information about *S. rolfsii* development in a field setting and provides data for comparison with optimal years. Overall, it indicates that management improvements can be obtained using the DSS for *S. rolfsii*, especially in high risk situations.