

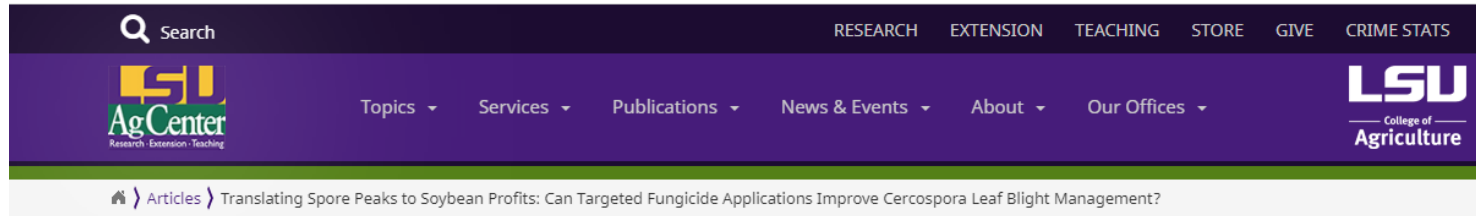
Translating spore peaks to soybean profits: *Can targeted fungicide applications improve Cercospora leaf blight management?*

Sara Thomas-Sharma

Assistant Professor, Field Crop Pathology
Department of Plant Pathology & Crop Physiology
Louisiana State University



LA Agriculture magazine article summarizes work



Translating Spore Peaks to Soybean Profits: Can Targeted Fungicide Applications Improve Cercospora Leaf Blight Management?



Sara Thomas-Sharma, Price, III, Paul P, Padgett, Guy B., Connor, Lawson, Galagedara, Nelomie, Doyle, Vinson, Dhakal, Rajan, Setiyono, Tri

LOUISIANA Agriculture

"When is the best time to spray fungicides?" is a question that is central to managing many plant diseases. A good answer, however, is rarely simple and several factors, from the economics of fungicide applications to the biology of the pathogen, need to be considered. For the past four years, a group of researchers has been tracking the spores of the pathogens causing Cercospora leaf blight (CLB) of soybean to get a better answer to this question and provide stakeholders with the information to efficiently manage the disease with fungicide applications.

Cercospora leaf blight is the focus of several research projects within the LSU AgCenter because it has been the main foliar disease of soybean in Louisiana and across the Midsouth for a few decades. Leaf symptoms of CLB are frequently observed in the field when the crop reaches pod-fill stages, and symptoms can be



Figure 1: Spore traps placed around soybean fields in Louisiana include the Burkard spore trap, wind vane spore trap and garden motor spore trap. These are used to monitor peaks of spores of the pathogens causing Cercospora leaf blight of soybean. Photos by Sara Thomas-Sharma

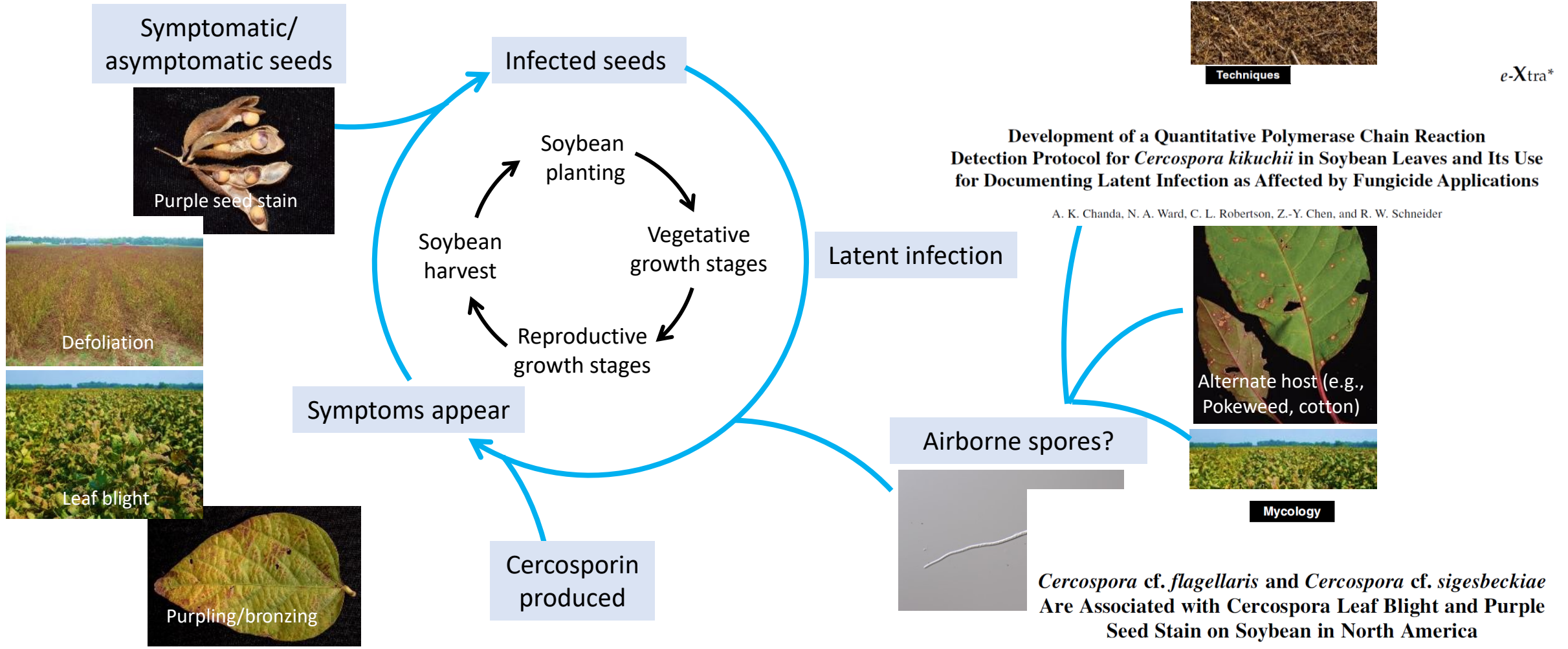
	Baton Rouge	Alexandria	Winnsboro
80-			

Cercospora leaf blight (CLB), a production constraint in the mid-South

- Late season disease, first symptoms in late reproductive growth stage
- Symptoms observed on leaf, petioles, seeds, ultimately defoliation
- Some resistance in commercial varieties, but not always consistent across locations
- Effective fungicide products available, but history of fungicide resistance



Research suggests important role of airborne spores in CLB outbreak



Cause: *Cercospora kikuchii*

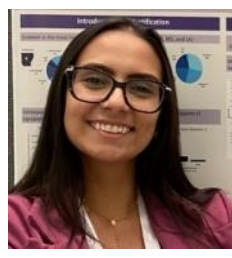
—————→
2016

Cause: *Cercospora* cf. *flagellaris*, *Cercospora* cf. *sigesbeckiae*

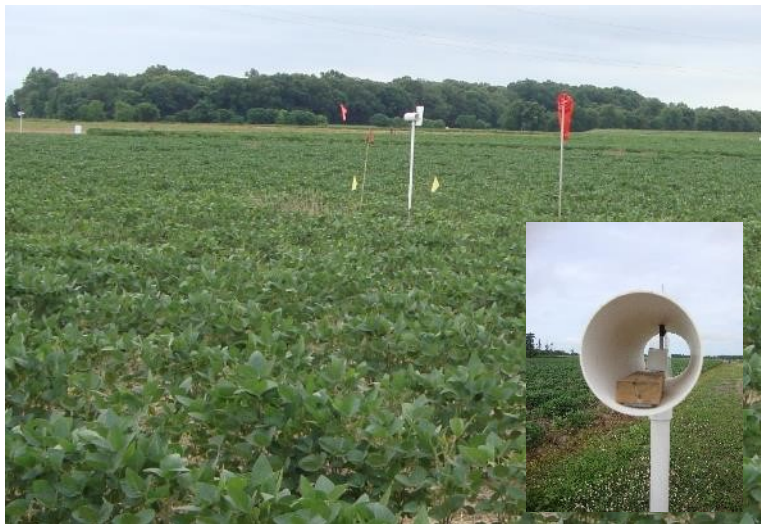
Weekly spore trapping conducted during season, processed to detect spore peaks



Nelomie Galagedara

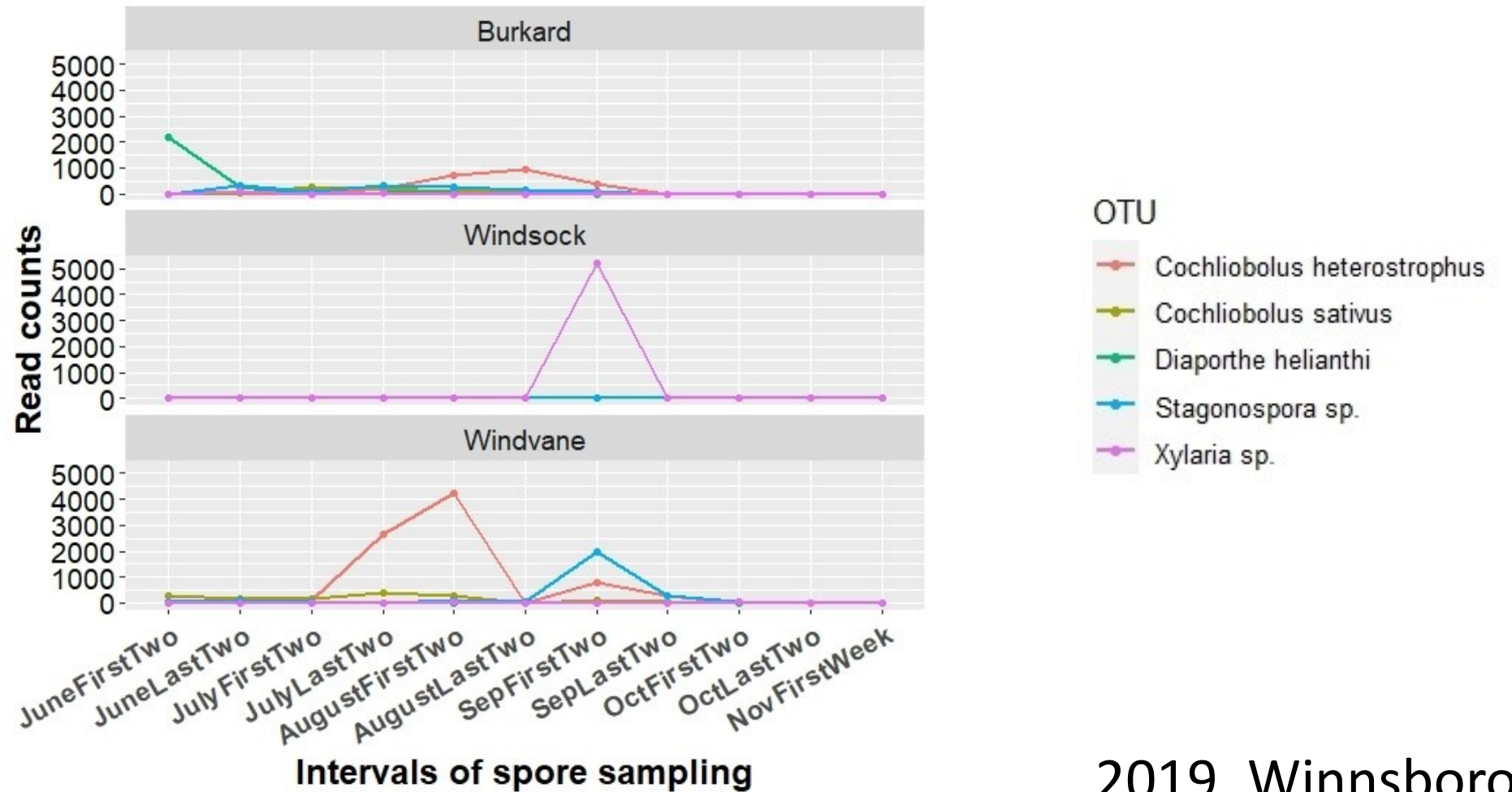


Stephanie Ramos



Year	Location	Burkard spore trap	Windvane spore trap	Windsock spore trap	Garden motor spore trap
2019	Winnsboro (MRRS)	✓	✓	✓	-
2020	Winnsboro (MRRS)	✓	✓	-	-
	Baton Rouge (CRS)	-	✓	✓	-
2021, 2022, 2023	Winnsboro (MRRS)	✓	✓	-	✓
	Baton Rouge (CRS)	-	✓	-	✓
	Alexandria (DLREC)	-	✓	-	✓ ⁵

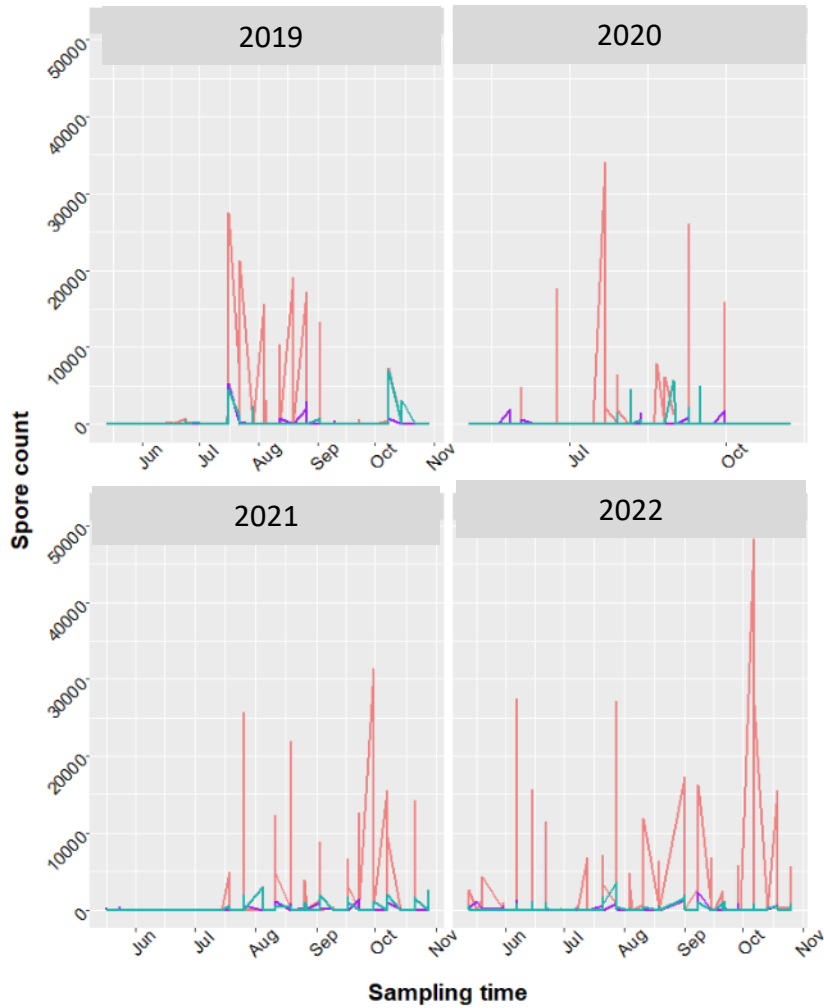
The air has spores of several fungal plant pathogens



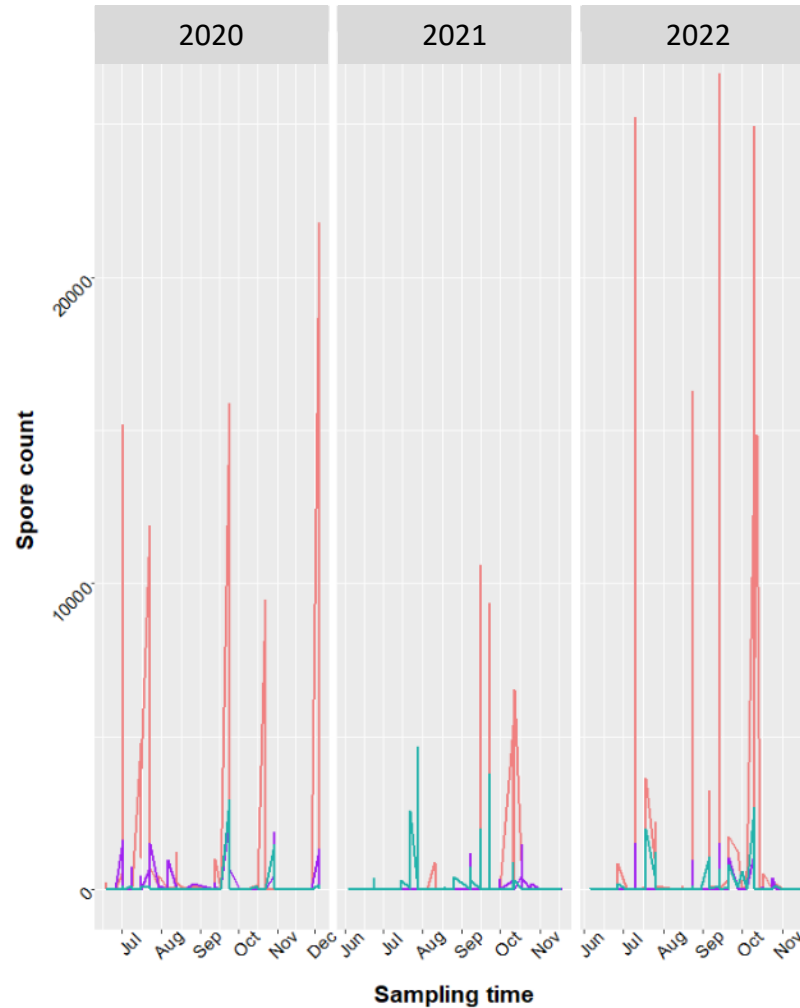
2019, Winnsboro

All three pathogen species present in all locations, though *C. cf. flagellaris* is predominant with multiple peaks before symptoms

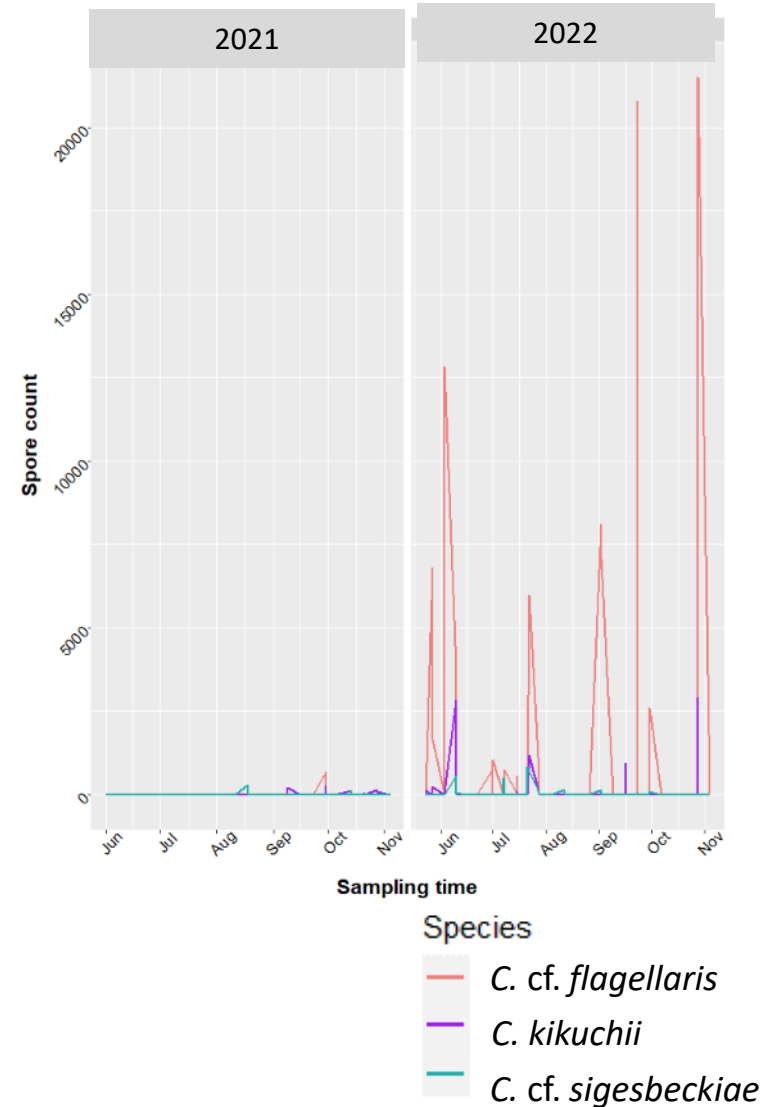
Winnsboro



Baton Rouge



Alexandria

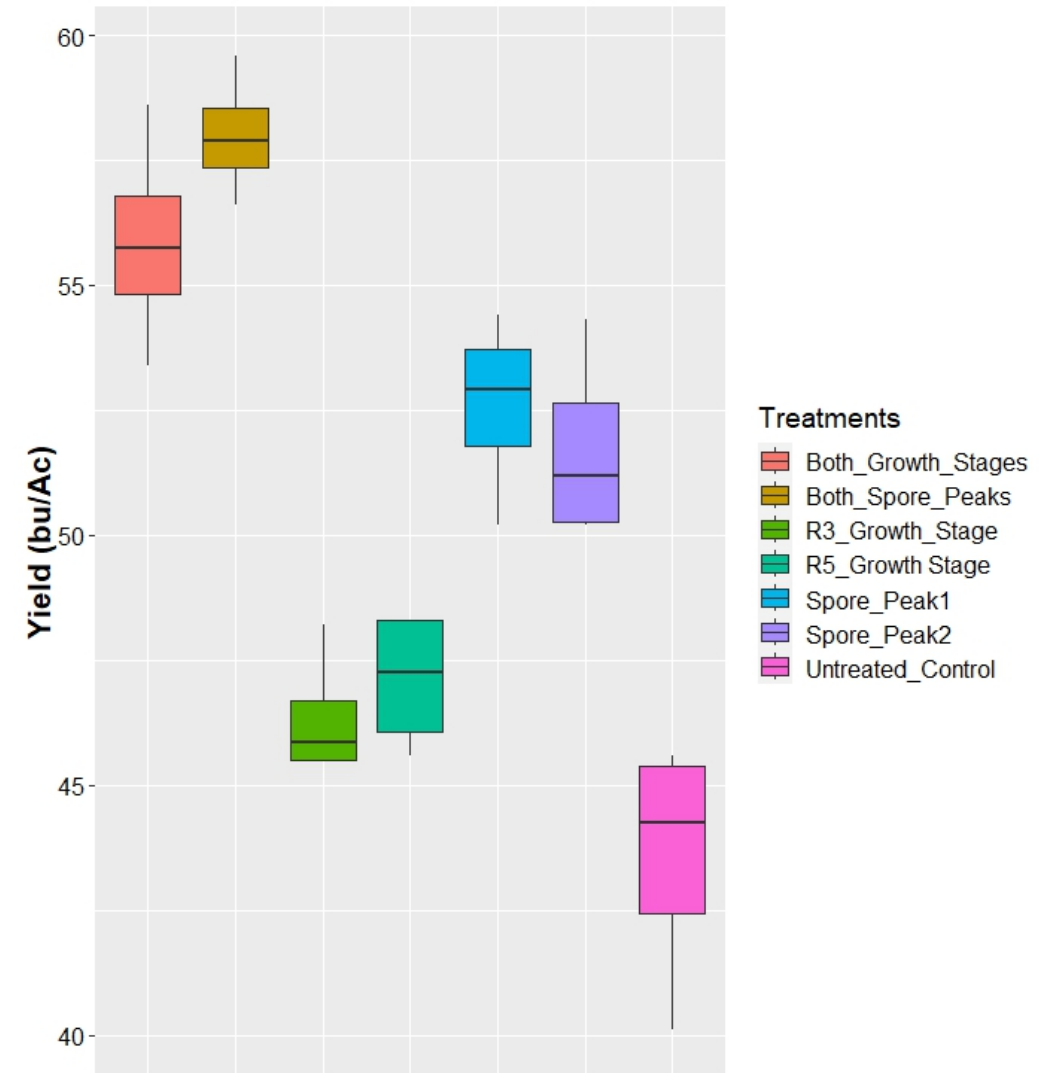


Experimental trials to target spore peaks with fungicide applications

Treatments	
One susceptible variety, 2021-2023	
Growth stage-based application	R3
	R5
	R3 and R5
Spore peak-based application	Spore 1
	Spore 2
	Spore 1 & 2
Negative control (Untreated)	-

Only one fungicide tested: Revytek, 15 oz/ac

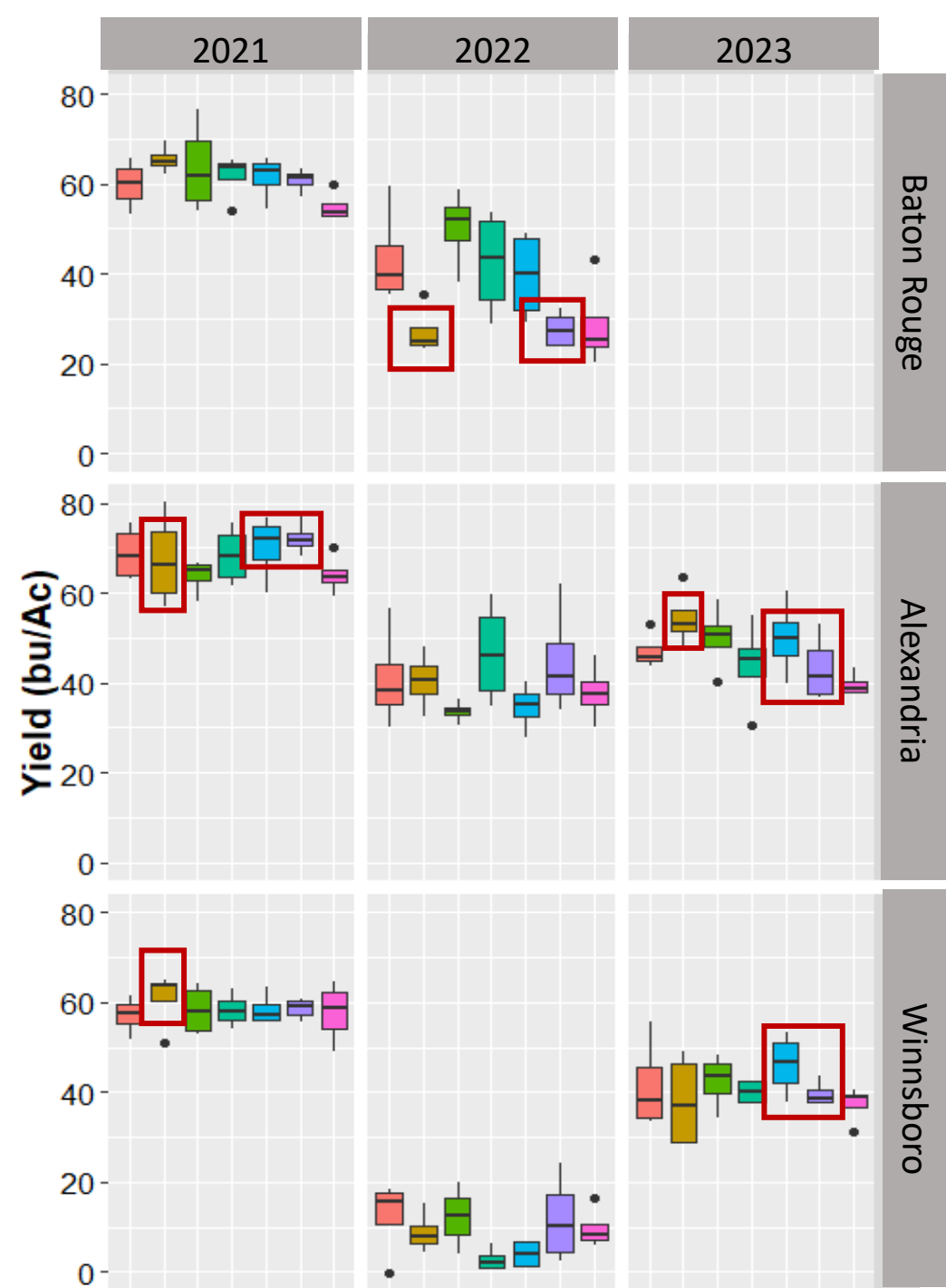
Expectation of treatment effects



Treatments did not always have significant effects on yield, but showed positive trends

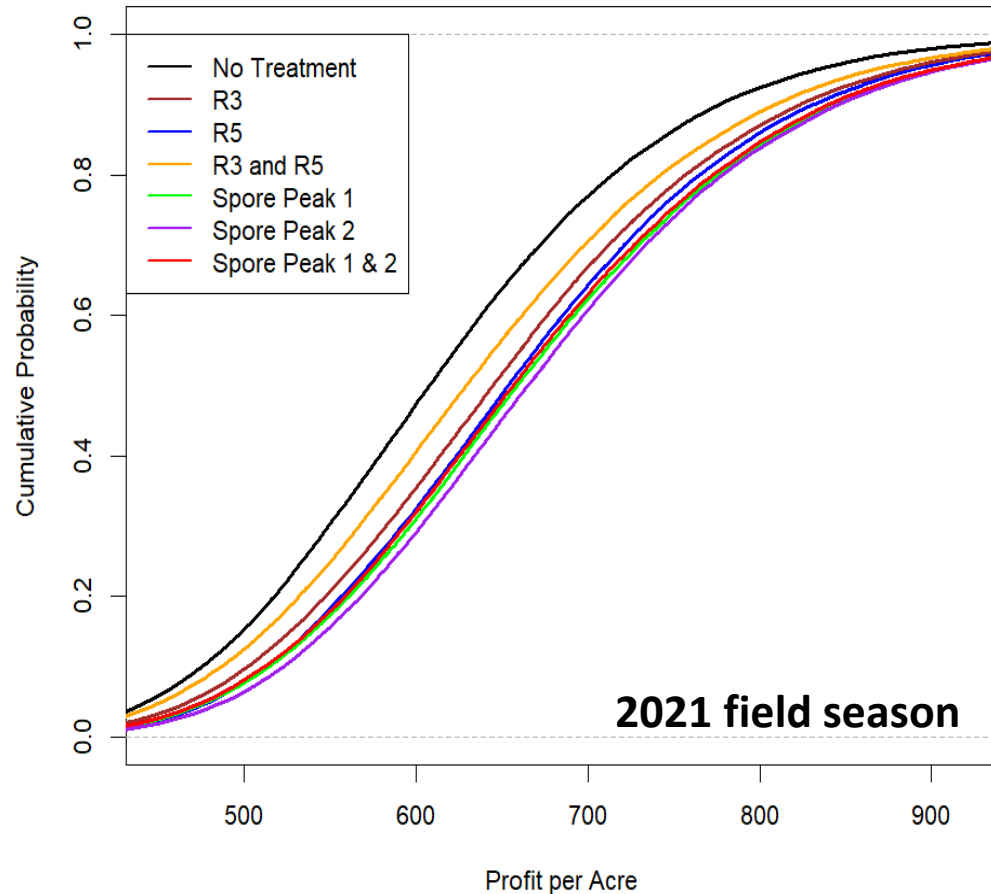
Treatments

- Both_Growth_Stages
- Both_Spore_Peaks
- R3_Growth_Stage
- R5_Growth_Stage
- Spore_Peak1
- Spore_Peak2
- Untreated_Control

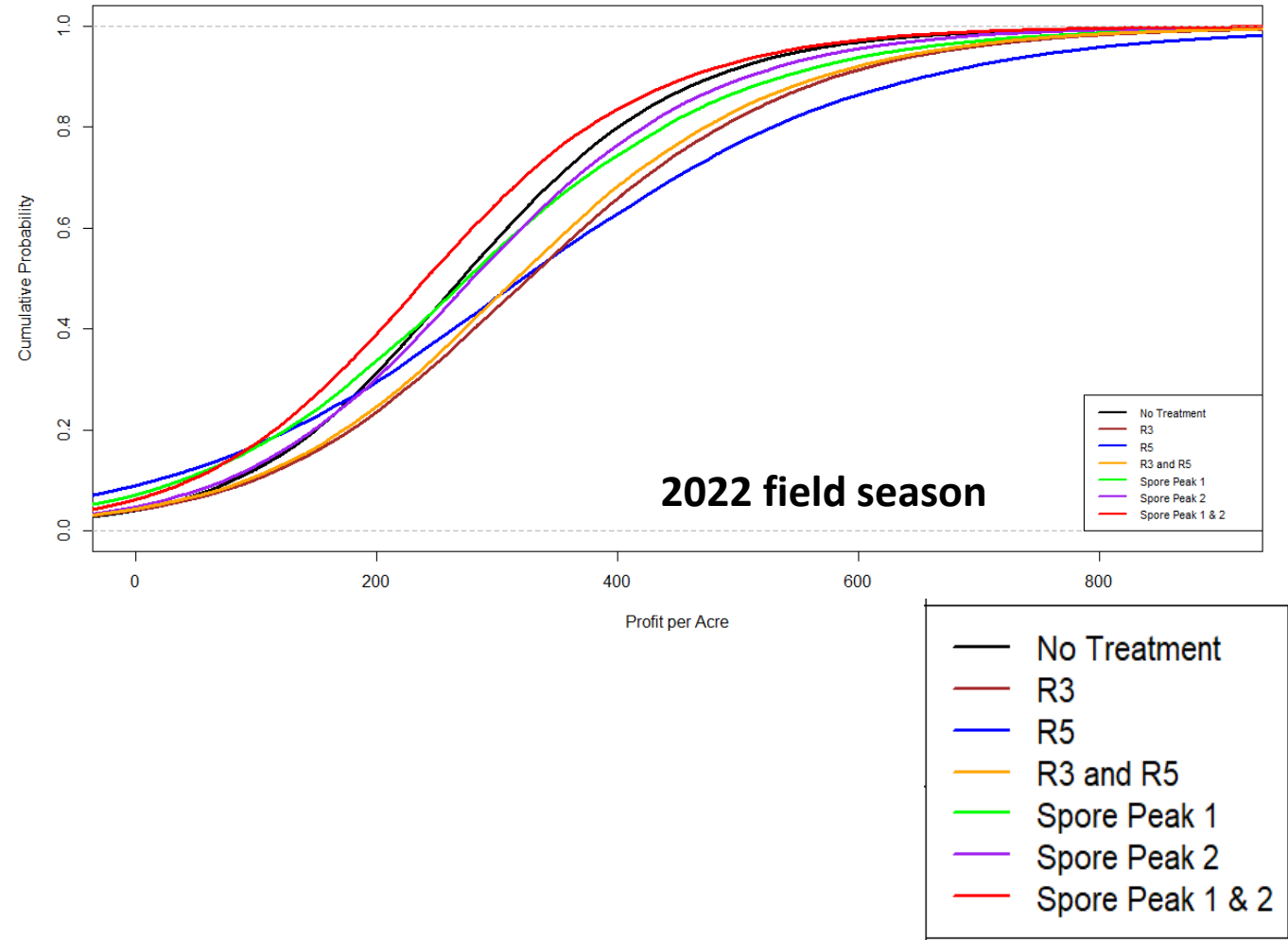


Economic analysis indicated that treatments had an observable effect on profit risk relative to untreated plots

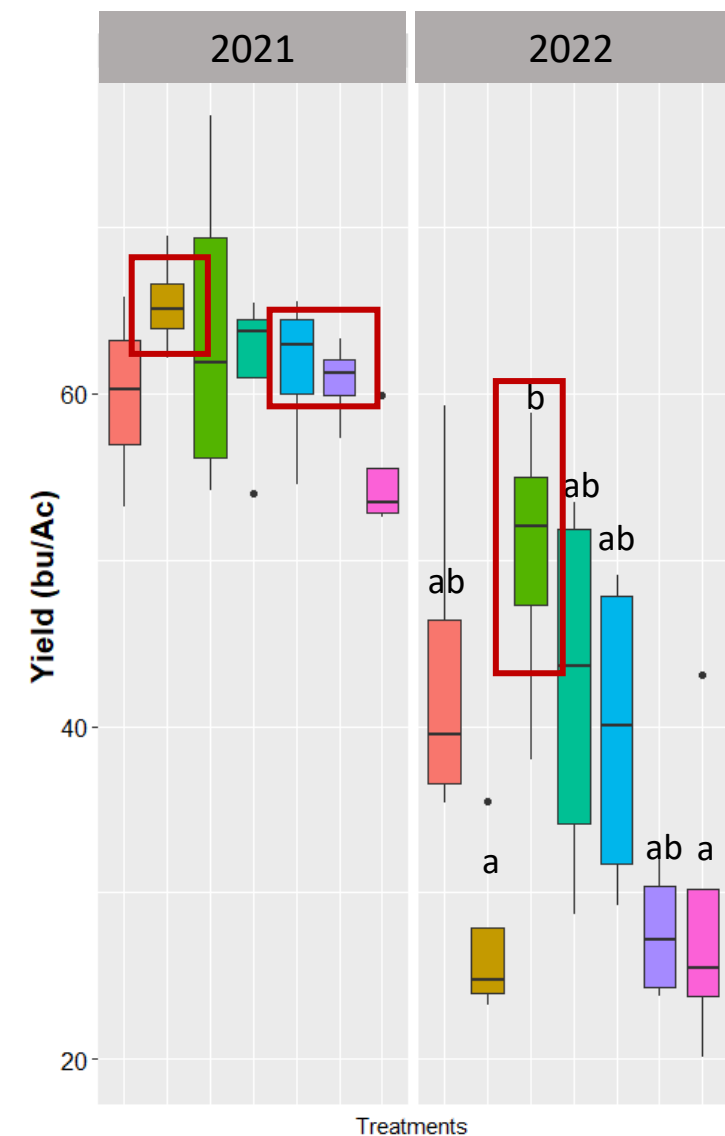
Spore peak treatments had the greatest effect on reducing profit risk



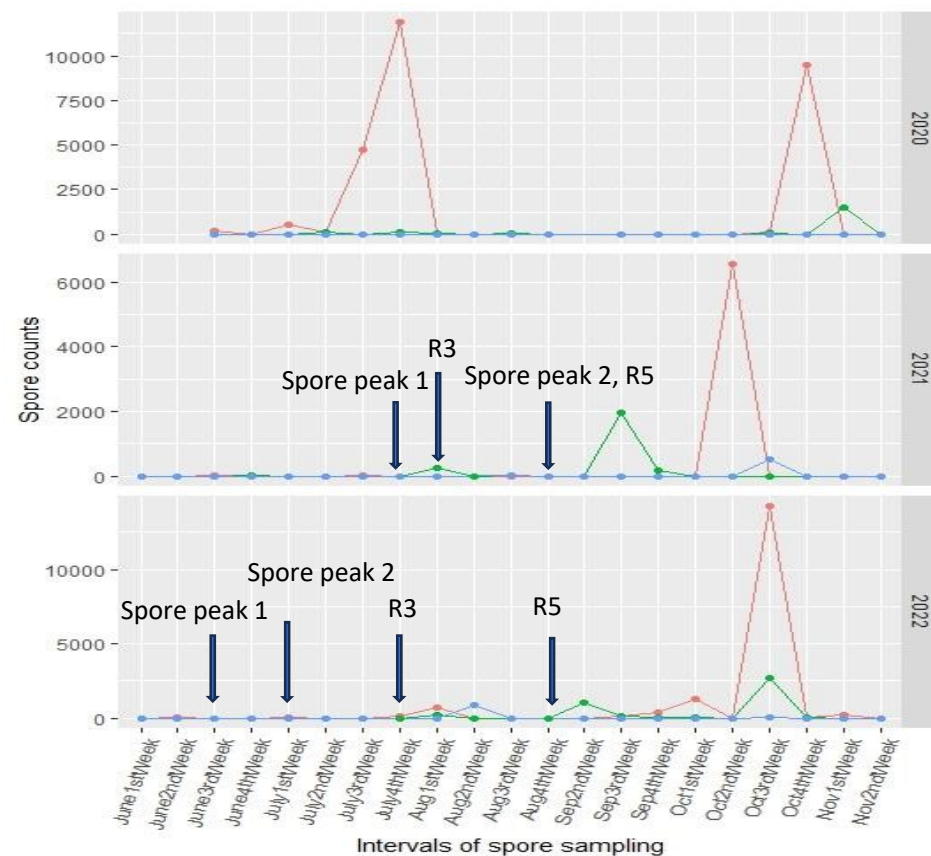
R3 and R5 applications had the greatest effect on reducing profit risk



Challenge: Accuracy of fungicide applications can be determined only in hindsight

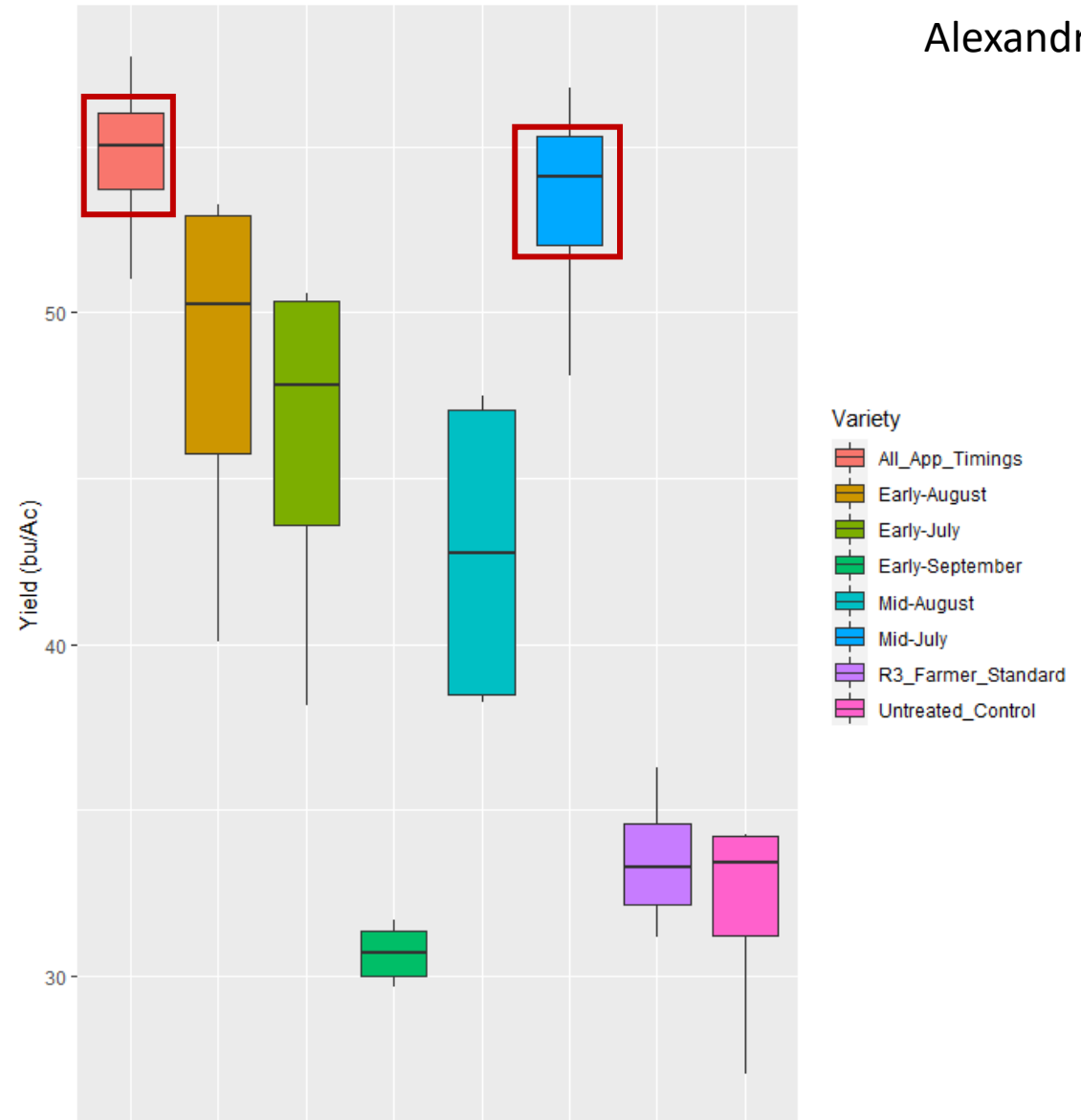


Baton Rouge



New/ongoing studies to target spore peaks show promising trends

Fungicide trials to target spore peaks	
One susceptible, one resistant, 2022-2023	
Growth stage-based application	R3
Spore peak-based application	Early June (start at V2)
	Mid-June
	...
	Early-September (stop at R6)
Negative control (unsprayed)	-
Positive control (all application timings)	Multiple sprays



**Develop decision (fungicide application)
advisory tools, example “Frogspotter” tool**

Credit: Dr. Damon Smith



Cercospora leaf blight is primarily initiated by airborne spores, which may serve as 'windows of susceptibility' for disease management

- Multiple peaks of CLB pathogen spores (predominantly *Cercospora cf. flagellaris*) observed prior to symptoms
- Fungicide applications to target spore peaks show promising yield and economic trends, but needs optimization
- Ongoing work aims to better predict and target spore peaks for CLB management

Acknowledgements

Collaborators on project

LSU AgCenter: Drs. Vinson Doyle, Trey Price, Boyd Padgett

Mississippi State University: Dr. Tom Allen

University of Arkansas: Drs. Terry Spurlock, Lawson Connor

University of Wisconsin: Dr. Damon Smith

University of Kentucky: Dr. Carl Bradley

University of Missouri: Dr. Lyndon Coghill

Lab Personnel: Nelomie Galagedara, Stephanie Ramos, Jonathan Amie, Undergraduate student workers



Multi-regional soybean check-off

THE LOUISIANA
Soybean & Grain
RESEARCH & PROMOTION BOARD



National Institute of Food and Agriculture
U.S. DEPARTMENT OF AGRICULTURE



Experimental evidence for the role of air borne inoculum

If *C. kikuchii* were the primary pathogen and seeds the primary source of inoculum, then we would expect that:

1. Planted seeds, blighted leaves, and harvested seeds would have similar proportions of species
2. Disinfesting seeds would reduce disease incidence and severity

