Subcontractor Quarterly Report

Please use this form to clearly and concisely report on project progress. The information included should reflect quantifiable results that can be used to evaluate and measure project success. Comments should be limited to the designated boxes. Technical reports, no longer than 4 pages, may be attached to this summary report.

Project Number:	
Project Title:	Cercospora blight project
Organization:	
Principal Investigator Name:	T.W. (Mississippi State University subcontractors)
Report Period:	December 15, 2017 – March 15, 2018

Project Status: on-going

Data summary as well as preparation for the 2018 season are essentially the only activities to report at this particular time. Data for the variety trial as well as PI lines were submitted to the proper individuals following the 2017 season. The MSU portion of the project attended the planning meeting last week and will provide space for:

-foliar fungicide trials to determine the role of fungicides in managing Cercospora blight.

-two locations for the mini-variety trial for the breeding component of the CLB project (similar to 2017 we will have one trial in Stoneville and a second trial location in Verona, MS (northeast MS)).

-MSU will also provide an additional location for the PI lines from AR/MO to rate for foliar disease during the season and provide those information to the breeders to increase their knowledge base on CLB as well as additional foliar diseases as relates to soybean production in the southern U.S.

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Project Number:	USB Project 1820-172-0124
Project Title:	Enhanced Pest Control Systems for Mid-South Soybean Production
Organization:	University of Missouri
Principal Investigator Name:	Pengyin Chen
Report Period:	December 15, 2017 – March 15, 2018
Project Status:	On-going

CLB Variety Trial:

In 2017 we grew and evaluated 30 selected varieties and advanced breeding lines in a 3 rep test for CLB ratings. CLB incidence and symptoms were light, but there were some varietal difference. Data has been reported to Blair Buckley for summary.

We will continue our collaboration on the 30 entry cooperative test again in 2018. We will monitor the trial throughout the season for CLB and Frogeye Leaf Spot symptoms.

CLB PI's:

In 2017 we also grew and evaluated 500 PI's for CLB ratings for genetic association mapping. Although disease pressure was low, 37 PI's showed some degree of incidence at one or more of the ratings. Data file has been sent to University of Arkansas for overall analysis.

We plan on growing the PI set for association mapping again in 2018. We will monitor for symptoms of CLB and other diseases throughout the season. Hopefully, with another season of data collection, association mapping for CLB resistance can be accomplished.

Advanced Yield Trials

Our 2018 advanced yield trials are composed of 136 high yielding advanced breeding lines. These entries will be grown in 5 locations across three different soil types in Southeast Missouri. These lines will also be grown in Arkansas, Mississippi, and Louisiana for yield. We will monitor these entries for symptoms of CLB and other disease throughout the season.

Crosses

We would like to use lines from the CLB yield trial and a few PIs that have shown CLB resistance for crossing in 2018 to develop new high yielding lines with multiple disease resistance.

Stink Bugs Project:

We have requested 6 best PI's and lines with resistance to Stink Bugs from Jeff Davis to start crossing this summer. Crosses will be made for genetic mapping and breeding purposes.

Enhanced Pest Control Systems for Mid-South Soybean Production

University of Arkansas

Leandro Mozzoni

Project Update Report Period: December 15, 2017 to March 15, 2018

Cultivars/advanced lines in Cercospora Leaf Blight Variety Trial:

In 2017, sixteen varieties and lines from University of Arkansas, including high-yielding conventional, high-yielding Roundup Ready 1 and 2, and high protein lines, were entered in a Cercospora Leaf Blight (CLB) Variety Trial that was conducted in seven different states (MO, TN, AR, MS, AL, LA, and TX). In Arkansas, tests were planted at two locations (Kibler and Marianna) and data were collected by Dr. Rupe and sent to Dr. Price for analysis.

PI screening for CLB, FLS, and PSS:

In 2017, 500 PIs were planted in single rows (one rep) in seven southern locations (Alexandria and Red River, LA; Stuttgart, Keiser, Rohwer, AR; Stoneville, MS, Portageville, MO, and Jakson, TN). Additionally, an extra set of all PIs was grown in Fayetteville, AR for seed increase purposes. CLB and FLS were visually rated in all four AR locations by Dr. Rupe and his team from August to September. Results showed that CLB and FLS disease pressure was not significant in any of the locations in 2017. In addition, leaf samples with CLB and FLS symptoms were collected from each AR location and delivered to Dr. Bluhm's lab late summer. PIs were harvested at maturity in all AR locations and seeds were saved to assure a good supply for 2018 planting. The Purple Seed Stain (PSS) screening of 500 PIs' seeds from all Arkansas locations were conducted on January, 2018. Most PIs' seeds did not show PSS symptoms. On a 0 to 10 scale (0 = no disease and 10 = 100% disease), 51 PIs showed light PSS (0.3 – 2.0) while PI398421 had the highest PSS rating (4.0).

Genome-wide association study for CLB:

CLB screening of the 500 PIs was conducted in eight southern locations (Alexandria and Bossier City, LA; Stuttgart, Keiser, Rohwer, Fayetteville, AR; Stoneville, MS, and Portageville, MO). Out of the all locations, only three locations, Alexandria and Bossier City, LA and Stoneville, MS showed significant disease pressure and also used the same parameter (petiole severity) to rate CLB. Thus, only their data was used for the genome-wide association mapping analysis. 2017 Results indicated that 44 SNP markers were associated with CLB, which was consistent with our 2016 results. These SNPs were located on chromosomes 1, 2, 9, 10, 12, and 18. There were 12 and two SNPs located on chromosomes 12 and 18, respectively, which were previously identified in the 2016 analysis. Jackson et al. (2008) reported that a PSS resistance gene, *Rpss1,* is located on chromosome 18 between Sat_308 and Satt594 markers (physical positions: 11.4 to 22.4 Mb). We identified thirteen SNPs which were located on chromosome 18 with

physical positions from 18.9 to 20.1 Mb. All 13 SNPs were located between the Sat_308 and Satt594 markers. In addition, we also identified 30 new SNP markers associated with CLB traits.

Breeding for CLB resistance:

In 2017, true F_1 hybrid seeds of two crosses (UA 5615C X UA 5014C and UA 5615C X UA 4805) were harvested in Fayetteville, AR. Two genetic populations derived from parents with high-yielding and CLB resistant traits will be advanced in 2018. In addition, two new crosses were made in summer 2017 (UA 5615C x PI471938, and UA Kirksey x PI471938) and F_1 seed will be planted in Fayetteville, AR in 2018. New cross combinations will be designed to integrate CLB resistance to high-yielding variety and lines in 2018.

Final Consideration:

There were at least three different rating methodologies implemented for assessing CLB in the field by different groups. That limits the opportunity for across-location analysis in our GWAS study. It is strongly recommended that a standard and unified protocol for field rating is implemented in 2018.