

New shelter construction for DREC to support grain quality research “Evaluating fungicide efficacy, desiccant applications, and delayed harvest for soybean grain quality. Project # 42-2022

2022 MSPB Final Report

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Rationale/Justification for research

Soybean seed quality remains a concern with seed companies and growers; however, we can only naturally capture this data in years when conditions are present. The need for more reliable shelters in which research can be conducted consistently every season is invaluable to resolving the seed quality issue. Many variables attribute to seed value after harvest including seed size, vigor, germination and seed health. Pod and stem blight caused by the *Phomopsis*/ *Diaporthe* complex are one of the most important seed borne diseases affecting the quality of seed and causes more losses in soybean than any other fungal pathogen worldwide. *Phomopsis longicola* Hobbs is the primary cause of seed decay (PSD) in soybean, *Glycine max* (L.). Previous research indicates *P. longicola* isolate aggressiveness differs between geographic regions and isolates from weeds were more aggressive towards soybean than soybean isolates. Additional research suggests overhead irrigation or rainfed environments produce an increase in *Phomopsis* sp. infection in seed. Soybean growers in the mid-southern U.S. have suffered extreme economic losses from *P. longicola* which can be attributed to the adoption of the early soybean production system. In 2009 0.33 metric tons of soybean were lost to PSD across 16 southern states. Symptoms of this disease include shriveled, elongated seed which appear chalky and have reduce seed germination and emergence. Seed will also have reduced oil content and viability which will incur potential docking at the grain elevator. Seed infection is more severe with early maturing cultivars, when harvest is delayed and environmental conditions continue to be warm and humid during late season and harvest. Current management strategies for this disease include crop rotation with non-hosts, tillage, fungicide applications during pod-fill and resistant cultivars, although these are limited to non-existent. Funding new shelters will prevent delays in research due to nonfunctional shelters (current situation) because of lack of companies willing to repair the current shelters. New shelter construction is needed for the continuation of research of additional management options for issues surrounding damaged grain. Reduced soybean seed quality is a major concern with late season harvests with warm humid environments. Grain reports from local elevators report an average of 6.98 % damage in some situations. *Phomopsis* Seed Decay (PSD) caused by the fungus *Phomopsis longicola* has been known to cause substantial economic losses in soybean in the southern United States. In 2009 an estimated 0.33 million metric tons were lost to this disease. Previous research suggests there are a number of organisms present along with *P. longicola* on harvested seed and pods; therefore, additional research is needed to evaluate the effects of pathogens and other contributing factors in seed quality reduction.

The objectives of this research include identification of seed pathogen with ITS methods, fungicide efficacy to prevent growth of fungi, and evaluation of fungicide combined with desiccant application effects on seed quality. Experiments will be designed to identify the primary causal organism, and the response of the pathogen to fungicide application.

Report of Progress/Activity

Objective 1: Construct shelters equipped with overhead irrigation capabilities to create environments for reducing soybean grain quality

Results

The demolition of the old rainouts shelters was completed on May 4, 2023. The new shelters were ordered and arrived at the Delta Research and Extension Center May 22, 2023. Plans for field leveling were discussed to prevent drainage issues with new shelters, but after multiple planning sessions with our engineer Davis Steele construction has been directed to another field which will not only resolve the drainage issues which may occur but also provide protection from environmental conditions which could be damaging to the shelters. Construction of the shelters will be completed as soon as possible. Upon that timing late season experiments will be initiated to provide data for the 2023 growing season.

Discussion

Although demolition and construction have taken longer than anticipated into the 2023 growing season, the new shelters will provide a more dependable resource for future research surrounding soybean grain quality concerns.