Mississippi Corn Promotion Board
2021 Progress Report

Project Title: Evaluating the Mississippi State University Corn Hybrid Trial Program for Plant Diseases

PI: Tom Allen

Department: Biochemistry, Entomology, Molecular Biology, and Plant Pathology

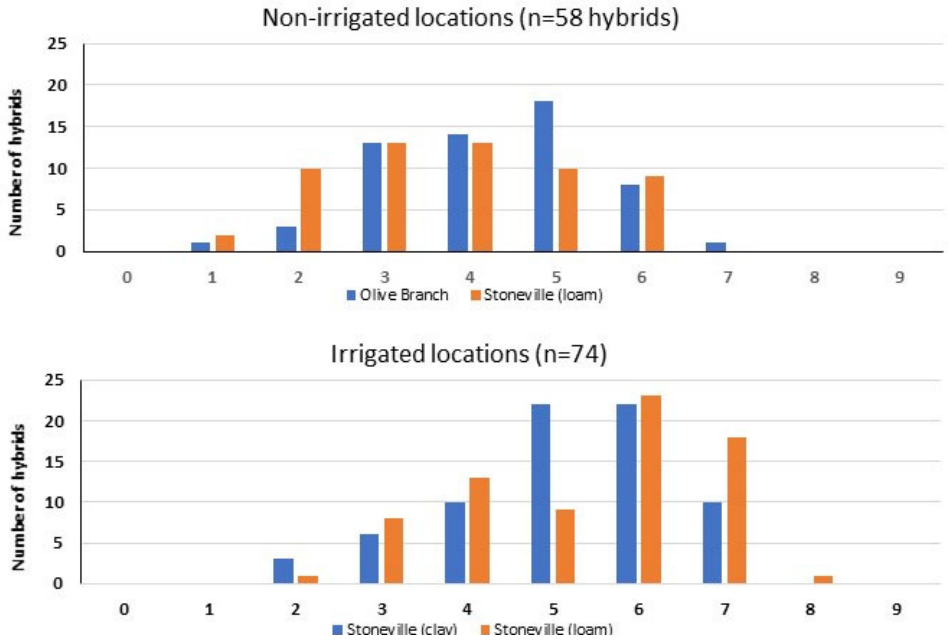
Project Summary (Issue/Response)

Foliar diseases remain a constant issue that in some situations can limit the profitability of corn production in Mississippi. One of the best ways to manage diseases remains the use of disease resistant hybrids. However, data are lacking on the response of commercially available corn hybrids to important diseases that regularly occur in the Mississippi corn production system including Curvularia leaf spot and southern corn rust. For the most part, Curvularia leaf spot remains a relatively "new" disease in the Mississippi corn production system. However, over the past several seasons we have been able to build a reliable series of disease observations to describe some of the more susceptible as well as resistant commercial hybrids. Farmers rely on these data to make decisions regarding the hybrids to plant on their farms. Determining the response of corn hybrids to plant diseases in the Mississippi corn production system is an important first step to providing corn farmers with valuable information as to the response of corn hybrids to potentially yield-limiting foliar diseases. Even though seed companies provide information on the hybrids sold in our production system, evaluating commercial offerings within our production system is important to determine how the environment impacts the incidence and severity of plant diseases and how those diseases may ultimately impact yield.

Project Results/Outcomes

During 2021, ten Mississippi State University official corn hybrid (OHT) trial locations were observed for the presence of foliar diseases. The only location that was not observed was Crystal Springs where a spring rain damaged plots present and made disease evaluations difficult. Each location was evaluated shortly after dent for the presence of economically damaging foliar diseases as well as any additional issues (e.g., lodging). Curvularia leaf spot, NCLB, and SCLB were some of the more commonly observed diseases. In addition, the 2021 season marked the first year when observable differences in the OHT offerings could be evaluated for southern rust. Typically the presence of resistance within commercial germplasm to southern rust has not been observed for more than a decade when the last hybrid was sold with advertised resistance to southern rust. In general, even though eight locations were observed for the differences in southern rust between hybrids, the data from four of the locations (irrigated: Stoneville – clay, Stoneville – loam; non-irrigated: Olive Branch, Stoneville – loam) were more dramatic and likely provided better information for corn farmers. In addition, southern rust remains one of the most potentially yield-limiting foliar diseases in the Mississippi corn production system. The ability to evaluate corn hybrids and their responses to the southern rust fungus can provide valuable information to corn farmers and potentially help manage the disease through hybrid resistance instead of relying on fungicide applications. Moreover, hybrid resistance to southern rust could offer more long-term benefits for Mississippi's corn farmers.

Project Results



Figures. Frequency of hybrids contained in the irrigated and non-irrigated OHTs exhibiting southern corn rust in each evaluation category based on a 0-9 evaluation score where 0-3 essentially represents Resistant entries, 4-5 represents moderately-resistant entries, 6 represents moderately-susceptible entries, and 7-9 represents Susceptible entries.

Project Impacts/Benefits

Based on the results of the evaluations conducted during 2021, corn farmers in Mississippi can rely on these data to aid in selecting corn hybrids that are resistant to some of the more important foliar diseases. As one example from the 2021 season, southern corn rust was widespread throughout the production system. Observations were made at four key OHT locations (Stoneville (three separate hybrid trials), and Olive Branch) that suggested there were significant differences between the sensitivities of commercially available corn hybrids to the southern rust fungus. Not only will these data aid corn farmers in making informed decisions as to the most resistant corn hybrids this may also guide fungicide application decisions. In situations where southern corn rust tolerant hybrids are planted corn farmers may not need to make a fungicide application and can therefore rely on the hybrid genetics to reduce the potential yield losses associated with the disease.

Project Deliverables

Following the 2021 evaluations, two blog posts were developed to disseminate the information to the broader ag-related community as to the response of the hybrids in the MSU OHT program. One blog post covered the entries as evaluated at the irrigated locations (n=4) while the second blog post covered the entries as evaluated at the non-irrigated locations (n=5).

In addition to the blog posts with the aid of the Mississippi Corn Promotion Board a publication was submitted to serve as first official report of Curvularia leaf spot in the Mississippi corn production system. The publication will be in an upcoming issue of the journal Plant Disease at some point in 2022.