North Central Soybean Research Program

Understanding the role of fungicide programs on soybean health and charcoal rot development

Kiersten Wise (Purdue University) and Daren Mueller (Iowa State University) (Co-Project Leaders), Emmanuel Byamukama (South Dakota State University), Martin Chilvers (Michigan State University), Chris Little (Kansas State University) and Damon Smith (University of Wisconsin); kawise@purdue.edu and dsmuelle@iastate.edu

Final Report October 2016

Charcoal rot, caused by *Macrophomina phaseolina*, is a disease of growing importance in the North Central Region; yet current management options are limited. In addition, this disease is more severe when plants are stressed by heat and dry conditions. New fungicide programs and fungicide products are marketed to reduce plant stress, but these products and programs have not been evaluated to determine their impact on charcoal rot development and yield.

The goal of this research is to understand under what conditions fungicides may reduce plant stress and yield loss due to charcoal rot so that we may improve our recommendations to farmers interested in using fungicides to mitigate plant stress and/or to manage charcoal rot.

Project objectives

- Determine the efficacy of pre-emergence fungicides applications on *M. phaseolina* colonization and soybean yield;
- Evaluate various foliar fungicides applied at different times for efficacy against *M. phaseolina* to determine optimum foliar fungicide use for charcoal rot management; and
- Integrate research findings in NCSRP charcoal rot Extension materials.

Results

In year one of the project (2014) we determined that foliar fungicide applications had no effect on reducing infection by the fungus that causes charcoal rot or increasing yield, which is valuable information to provide to soybean farmers in the North Central region since fungicides are an added expense in soybean production. Effects of seed treatments and in-furrow fungicides on charcoal rot development were mixed, with seed treatments reducing final levels of charcoal rot in two of six states. In-furrow fungicides did not reduce charcoal rot, but did improve yield in some trials.

The seed treatment and in-furrow fungicide experiments were repeated in year two (2015). Charcoal rot levels were low across trial locations due to excessive rainfall in many locations. However, in Kansas, charcoal rot was present at high levels, and

seed treatments and in-furrow fungicides did not reduce disease severity or fungal growth in soybean. In-furrow fungicides again improved yield in some locations.

We have consulted with a statistician for the final analysis of our multi-state data, and will be summarizing the results for publication. Our preliminary analyses indicate that fungicide seed treatments and in-furrow applications may not consistently reduce charcoal rot in soybean. This is important information to convey to farmers in the North Central Region since it provides updated information on fungicide efficacy for charcoal rot.