Developing an Integrated Management and Communication Plan for Sudden Death Syndrome

Funding: $110,000

Principal Investigator

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Overview of project objectives

Sudden death syndrome (SDS) is an annual threat in most of the North Central region. Since 2014, the disease has caused an estimated annual loss of nearly 40 million bushels in the U.S., valued at approximately $1.8 billion.

The foundational management strategy for SDS (caused by the pathogen *Fusarium virguliforme*) in soybeans is using resistant cultivars. Researchers have been evaluating industry-standard susceptible and resistant cultivars in the North Central region for the last seven years and have found that resistant cultivars show less disease and more yield than susceptible cultivars in most evaluations.

However, in years when environmental conditions are favorable for disease development, resistance alone does not provide adequate disease control or sufficiently reduce farmer risk. The main goal of this project was to investigate management options that will help ensure resistant cultivars will be as effective as possible in years when SDS risk is high. Further, there are known interactions between SDS and soybean cyst nematode (SCN) that cause significant soybean yield losses. Specific project objectives for 2021 included:

- Determine impact of fungicide and nematicide seed treatments, in-furrow and foliar fungicides on SDS and soybean cyst nematode (SCN).
- Perform field evaluation of integrated SDS management and understand effect on fungus population and soil health.
- Develop models to quantify the negative impact of SDS foliar symptoms and root rot on soybean yield.
- Study genetic and virulence variability of *F. virguliforme* using differential varieties and resistance mapping for foliar chlorosis and necrosis of SDS.
- Communicate research results with farmers, agribusinesses and other soybean stakeholders.

Key results

Researchers in 2021 collected data on the effect of new seed treatments for SDS management, identifying when effective seed treatments would work best as part of an SDS management plan and when seed treatments should be used for SDS as part of a plan for stewardship of seed treatment products. In addition, research identified how some management options may affect the risk of SDS, including the ideal plant population with ILEVO seed protectant to maximize returns. Researchers collected data on how soil phosphorous and potassium levels influence SDS severity and the role of flooding and drainage on reducing risk of SDS.

Other efforts included determining the correlation of SDS symptoms in the field and yield on a plant and small plot basis, calculating level of yield loss and the role of root rot on yield loss. Preliminary data may help identify the effect of SDS on yield using aerial imagery.

Soybean breeding and more basic research include phenotype and linkage mapping of SDS chlorosis and necrosis susceptibility, characterizing possible candidate genes, silencing SDS foliar susceptibility genes to confirm findings and screening isolates to discover potential SDS races. Scientists continue to flag strategies that help farmers understand SDS and make informed best practice decisions.

Benefit to farmers

This project continues to evaluate which practices can be used to best manage SDS. As the disease continues to spread into new areas, early education and improved awareness of the importance of using an integrated SDS management program is critical and must include investigation of both short- and long-range management solutions.

USB National Soybean Checkoff Research Database link

Developing an integrated management and communication plan for soybean SDS