Developing an integrated management and communication plan for soybean SDS

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The foundational management strategy for sudden death syndrome (SDS) is using resistant cultivars. However, in years when environmental conditions are favorable for disease development, resistance alone does not provide adequate control or reduce farmer risk sufficiently. Also, SDS continues to move into new areas. The main goal of this project is to investigate management options that will help ensure resistant cultivars will be as effective as possible even in unusually conducive SDS conditions.

Project objectives

1. Determine how fungicides and nematicide seed treatment, in-furrow, and foliar fungicides will affect SDS and soybean cyst nematode (SCN)
2. Field evaluation of integrated management of sudden death syndrome and understanding their effect on the population of *F. virguliforme* and soil health
3. Develop models to quantify the negative yield impacts of SDS foliar symptoms and root rot
4. Study genetic and virulent variability of *F. virguliforme* using differential soybean varieties and resistance mapping for foliar chlorosis and necrosis of sudden death syndrome
5. Communicate research results with farmers, agribusinesses and other soybean stakeholders

Research progress

1. In a two year study on the effect of seed treatment and foliar crop protection products on SDS and yield of soybean, planting resistant cultivars and using fluopyram seed treatment were the most effective tools for SDS management. Of all the products tested, fluopyram had the highest efficacy, but plant resistance provided an overall better yield advantage than using fluopyram seed treatment alone.

2. The relationship between SDS and soybean yield is being established. Using data from 57 uniform field experiments conducted in Illinois, Indiana, Iowa, Michigan, Wisconsin, and Ontario, Canada from 2013 to 2017, we found a negative correlation between FDX (mean foliar disease index—a measure of the SDS severity) and yield. The correlation was affected by disease level and soybean variety with a greater effect in higher disease levels and with SDS-susceptible varieties. Currently, we estimate that for every unit of FDX increase, yield will be decreased by 0.5%.

3. In a two-year study to determine the interaction between the fluopyram (IleVO) seed treatment and pre-emergence herbicide in Iowa and Indiana, it was observed that seed treated with ILeVO resulted in higher phytotoxicity at VC-V1 than seed without ILeVO, regardless of preemergence herbicide treatment. The combination of preemergence herbicide and ILeVO did not increase the severity of soybean injury in any year or location compared to either applied alone. See Crop Protection 106:103-109, 2018

4. From our previous SDS management project, we identified the most effective quantitative PCR technique for identifying *F. virguliforme* in soybean plants and in soil. This is an important development that enables evaluation of direct effects of management practices on the SDS pathogen in the field and in soybean plants.

Why this is important
- The project has a direct benefit to soybean farmers by providing evaluations of current and future crop production practices and products.
- Farmers will benefit from management strategies that enhance the effectiveness of SDS-resistant soybean varieties.
- An integrated SDS management program will reducing economic losses to producers through better management of SDS.