SoyRenSeq: A Novel Approach for Disease Resistance Gene Discovery and Application for Soybean Improvement

Funding: $500,000

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Overview of Project Objectives
The central goals of this basic and tool development, collaborative, multi-state, and multi-disciplinary project are to explore, apply, and optimize the RenSeq (resistance gene sequencing method) technology for accelerated identification of candidate resistance (R) genes conferring resistances to various soybean pathogens prevalent in the Midwest, and for development of disease-resistant soybean cultivars by precise resistance gene selection. Specific objectives are to: develop a high-quality RenSeq platform for the soybean research community; sequence and assemble NBS-LRR gene clusters in major soybean lines that carry resistance to soybean pathogens in the Midwest; analyze resistance gene expression and responses to various soybean pathogens; evaluate resistance to various pathogens and mapping of major resistance genes and QTL; develop candidate R-gene-based molecular markers for precision breeding.

Key Results
The team has made progress with three of the five objectives, with work on two objectives to start in FY24. The team annotated, or designated locations of individual genes on DNA sequences, on 30-40 new NBS-LRR genes in several genomes, totaling 800-900 new NBS-LRR genes, which were not previously annotated. A subset of 48 resistant soybean lines have been collected, evaluated and chosen for RenSeq this year. The team also made progress on cultivar evaluation and mapping for pathogen resistance genes, with team members focusing on specific pathogens predominant in their state.

Benefit to Farmers
This project will explore, apply and optimize the game-changing new gene identification and sequencing technologies for rapid discovery of resistance genes to Midwest soybean pathogens. Adding disease resistance genes into soybean cultivars will improve soybean protection from disease and increase profitability to soybean growers.

Links
[SoyRenSeq: A Novel Approach for Disease Resistance Gene Discovery and Application for Soybean Improvement](#)
USB National Soybean Checkoff Research Database