An Integrated Approach to Enhance Durability of SCN Resistance for Long-term, Strategic SCN Management (Phase III)

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Overview of Project Objectives

The battle between soybeans and soybean cyst nematode (SCN) depends on the genetics of both. Soybeans may express resistance genes to combat infection and the nematode expresses virulence genes that may overcome resistance. Scientists continue to search within the soybean and the soybean cyst nematode genomes for traits that can help fight this problematic pathogen. The main challenge in this project is identifying SCN virulence genes to understand how the nematode infects soybean varieties and how those genes might be modified or silenced to prevent infection. Other objectives include developing and evaluating new combinations of resistance genes and how rotations of these soybeans impact SCN infection, reproduction, and population densities in the field. The multi-pronged approach will provide farmers with additional tools for SCN resistance beyond PI88788- and Peking-type varieties.

Key Results

The research team has made tremendous progress in accomplishing project goals. The Baum and Hudson labs have conducted complementary efforts to accurately sequence and characterize SCN genomes. They've analyzed SCN genes and their gene products to identify candidate SCN virulence genes and their proteins (effectors) for further studies on nematode/soybean protein interactions that determine resistance or susceptibility. The Mitchum lab continued testing subtle genetic differences in those expressed virulence genes for their contribution to SCN's ability to infect soybeans.

Soybean seeds were harvested to plant the following crop year and soil samples were collected from each plot to determine SCN egg population densities and virulence on several different SCN-resistant soybean genotypes. The Illinois breeding group has collected agronomic data on 25 lines in advanced trials and 152 lines in preliminary trials. All these lines contained either Peking resistance with or without PI88788-type resistance genes.

The Scaboo group grew over 5,000 plants for marker-assisted selection of important genes. They are moving new resistance gene candidates into the breeding program for cultivar development.

Benefit to Farmers

The genetic resources developed and knowledge gained from this project will provide immediate and long-term benefits to soybean producers and researchers in the private and public sectors. New lines developed with resistance to novel SCN virulence genes and gene products will protect growing soybean plants and help reduce SCN populations in soybean fields to protect yields today and tomorrow.

Links

An Integrated Approach to Enhance Durability of SCN Resistance for Long-term, Strategic SCN Management (Phase III)
USB National Soybean Checkoff Research Database

Novel Discovery Could Fortify Farmers' Defenses Against SCN
SRIN article

Researchers Continue to Strengthen and Refine Soybean SCN Resistance
SRIN article