

# NATIONAL SOYBEAN NEMATODE STRATEGIC PLAN 2018-2022

**What's your number?**

Take the test.  Beat the pest.

The **SCN** Coalition™

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The United Soybean Board (USB) and the North Central Soybean Research Program (NCSRP) have joined forces on a national research, education and outreach effort on nematodes affecting soybeans. Their **ultimate goal is to maximize farmer profitability and sustainability** in the face of **increasing nematode threats**.



The National Soybean Nematode Strategic Plan was developed by a team of scientists from throughout the soybean-producing regions of the US and Canada to guide current and future nematode research, after a USB/NCSRP review identified gaps, needs and opportunities. The objective is to coordinate and support complementary projects and programs to develop short- and long-range solutions for parasitic nematode control. These encompass the spectrum of basic and applied research and Extension aimed at increasing and applying molecular, genetic, biological and agronomic understanding of the host, pest, environment and cropping systems for durable integrated nematode management. The USB and NCSRP have established **six goals and anticipated benefits for soybean farmers**.

## GOAL 1: Develop genomic and genetic tools, resources and data. (Nematode focus)



- Develop high-quality reference genomes and transformation technology to improve genetic research on plant-parasitic nematodes.
  - Allows researchers to identify and characterize nematode genes and find vulnerabilities of nematodes to chemical, biological, genetic and bioengineered control as new management tools for farmers.
- Develop a quick soil test that lets farmers identify and characterize soybean cyst nematode (SCN) field populations as production threats, then work with seed and crop protection suppliers to provide targeted management prescriptions.

## GOAL 2: Discover, leverage and enhance native nematode resistance in soybean. (Soybean focus)



- Characterize host genetics and host-nematode interactions to improve the understanding of resistance mechanisms for best management strategies.
- Improve and diversify existing resistance sources that are already available to farmers, including maximizing yield potential and combining or stacking resistance genes.
- Identify and evaluate new sources of genetic resistance and breed them into high-yielding backgrounds in all maturity groups for targeted management options.
- Develop multi-nematode- (such as root-knot and reniform) resistant germplasm for farmers in the Southern US.

### **GOAL 3:** Engineer resistance using molecular tools to generate or improve nematode resistance in soybean. (Transgenic focus)



- Advance transgenic and gene editing technologies and tools for more efficient and effective engineered resistance.
- Develop new transgenic sources of nematode resistance for farmers.
  - Identify and modify: soybean plant disease-susceptibility genes; parasitism genes in nematodes; and the mechanism in non-host plants that prevents nematode parasitism
- Stack new engineered resistance with native resistance from traditional breeding to provide farmers with novel modes of action.

### **GOAL 4:** Assess the impacts of new management practices on nematode population dynamics. (Management focus)



- Optimize and confirm the effects of various agronomic practices.
  - Rotation with non-host crops
  - Rotation with different sources of resistance
  - Management of other soybean diseases
  - Effects of cover crops
- Identify soil, root and rhizosphere microbes that naturally control nematodes, and develop tools and methods for farmers to use these in nematode management.
- Evaluate products and practices for nematode management.
  - Effectiveness and economics of different production practices, chemical and biological control agents and seed treatments
  - Variety performance trials assessing nematode control, overall plant health and yield

### **GOAL 5:** Conduct nematode surveys for improved diagnostics and economic impact. (Information focus)



- Update national surveys of plant-parasitic nematodes against the major resistance source lines to help farmers plant the most effective sources of resistance for their fields.
- Standardize sampling and processing of soil samples for more accurate results for farmers.
- Provide farmers with population type data and variety recommendations quickly.
- Improve modeling tools and risk management platforms for estimates of potential soybean yield losses and economic impact of using various nematode management practices.

### **GOAL 6:** Foster Extension education and outreach. (Audience focus)



- Increase awareness and a sense of urgency among farmers for nematode threats and management recommendations in the short and long term.
- Customize nematode management recommendations for farmers and advisors in different geographic regions.
  - Newly emerging SCN regions (Dakotas, Northeast US and Canada)
  - Established SCN regions (North Central states and Ontario)
  - Mixed nematode regions (Southern US)
- Develop farmer-friendly classification language for genetically diverse nematode populations to improve management recommendations.
- Standardize germplasm and variety labeling for farmers and advisors.
- Streamline test plots for farmers to assess lines and seed treatments.