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Soybean checkoff organizations team up to tackle nematodes via National Soybean Nematode Strategic Plan

Waukesha, Wis. (Feb. 28, 2019) – Because nematodes are a constantly evolving pest, the North Central Soybean Research Program and the United Soybean Board have joined forces on a National Soybean Nematode Strategic Plan. Soy checkoff organizations are working with public universities and agricultural companies to coordinate and support complementary projects to develop short- and long-term solutions for parasitic nematode control.

The strategic plan encompasses research, education and outreach efforts with the ultimate goal of maximizing farmer profitability in the face of increasing nematode threats. There are six main goals:
1: Develop Nematode Genomic and Genetic Tools, Resources and Data (Nematode focus)
2: Discover, Leverage and Enhance Native Nematode Resistance in Soybean (Soybean focus)
3: Engineer Resistance Using Molecular Tools to Generate or Improve Nematode Resistance (Transgenic focus)
4: Assess the Impacts of New Management Practices on Nematode Population Dynamics (Management focus)
5: Conduct Nematode Surveys for Improved Diagnostics and Economic Impact (Information focus)
6: Foster Extension, Education and Outreach (Audience focus)

A more detailed description of these goals and expected farmer benefits can be found at TheSCNcoalition.com. The SCN Coalition is helping share information about the strategic plan and research progress with soybean farmers and the industry.

The trouble with nematodes
"Nematodes are incredibly complex foes, and we need to find new solutions for soybean growers and protect current management tools," says Melissa Mitchum, University of Missouri nematologist and one of the strategic plan's authors.

Mitchum cites soybean cyst nematode (SCN) as an example of why farmers need new solutions. "We've managed SCN for 20-plus years using basically one tool: SCN-resistant varieties. Unfortunately, 95 percent of SCN-resistant varieties have the same genetic source of resistance from PI 88788," she explains. "In effect, over two decades we've selected more aggressive SCN populations that can overcome our main management tool. But farmers may not be aware of this."

Short-term and long-term solutions
The situation with SCN shows why the plan has short-term and long-term projects. "Shorter term, The SCN Coalition has funding from checkoff and industry partners to encourage soybean farmers to take another look at SCN," Mitchum says. The SCN Coalition is asking farmers to test their fields so they know their nematode numbers, rotate resistant varieties, rotate to non-host crops and consider nematode-protectant seed treatments.

Longer term, checkoff-funded researchers are working to develop new solutions and an integrated, multipronged approach to managing SCN. “Researchers are looking at new native and biotech traits, new chemistries, new biologicals, new management practices and rotation strategies,” she adds.

Scientists notch several successes

One example of a research success in the field of soybean genetics: Researchers have determined the identity of the most important SCN resistance genes in soybean, *Rhg1* and *Rhg4*; discovered that these genes are repeated throughout the plant’s genetics; and shown that the number of copies of these genes matters. The higher the copy number, the higher the resistance levels.

“That’s why some SCN-resistant varieties with PI 88788 resistance are more effective than others,” Mitchum explains. “Some have higher copy numbers of those genes.”

Another success story involves discovering new sources of native (non-GMO) resistance and stacking them with existing sources of SCN resistance. Checkoff-funded researchers recently created a four-gene stack using two recently discovered resistance genes from wild soybean (*Glycine soja*), a resistance gene from PI 567516C and *Rhg1* from PI 88788. This stack has been bred into high-yielding backgrounds and released to the industry.

Scientists have also generated high-quality reference genomes for SCN and root-knot nematode that serve as good “genetic roadmaps.” These allow researchers to look for nematode vulnerabilities to chemical and bioengineered control and develop new management tools for farmers.

For example, using the recently published SCN reference genome, researchers have identified hundreds of candidate parasitism genes in SCN. They are currently working to identify how those genes function.

“The long-term goal is to inhibit those genes in the nematode, stack that technology with natural resistance and provide farmers with a novel mode of action,” Mitchum says. “We want to use as many different modes of action as possible to keep nematodes from evolving to overcome our tools.”

About The SCN Coalition

The SCN Coalition is a public/checkoff/private partnership formed to increase the number of farmers who are actively managing SCN. Our goal is to increase soybean farmers’ profit potential and realize higher yields. Partners in The SCN Coalition include university scientists from 28 states and Ontario, grower checkoff organizations including the North Central Soybean Research Program, United Soybean Board and several state soybean promotion boards, and corporate partners including BASF, Bayer, Growmark, Pioneer, Syngenta and Winfield United.

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