Soybean Cyst Nematodes, Look Out!

Like a stealth army, soybean cyst nematodes, *Heterodera glycines*, can invade a soybean field and cause plant damage and yield loss without ever being seen—until it's too late. This nematode is the No. 1 disease pest of soybeans, contributing to annual losses estimated at 64 million bushels nationwide.

The soybean cyst nematode feeds on the roots of soybeans. It is named for the egg-filled cyst that forms from the body of the female and overwinters in the soil. The eggs hatch the following spring.

Soybean growers may lose 10 to 15 percent of their yield to this pest—even before they see any physical evidence of the nematode, says Gregory R. Noel. He is an Agricultural Research Service plant pathologist in the Crop Protection Research Unit at Urbana, Illinois.

"By the time a grower sees the telltale yellow plant leaves, the nematode has probably been present in the soil for a decade or more," he says.

Now some relief is on the horizon. Noel has been studying a bacterial parasite that may expand growers' defenses. Small-scale field trials indicate *Pasteuria* can keep soybean cyst nematode infestations below the economic damage thresholds.

Pasteuria attacks the nematode and uses it to complete its own life cycle, killing the nematode in the process and thus reducing damage to the soybeans.

The bacterium is an obligate parasite. This means it must have the soybean cyst nematode to complete its life cycle.

It reproduces by means of spores called endospores that are released into the soil. These attach to juvenile nematodes moving through the soil in search of a root to use to complete their own life cycles. The spores then germinate and infect the nematodes.

Noel reports the bacterium was an effective control of soybean cyst nematodes in his own experiment plots.

"Over an 8-year period, we saw a decline in nematode populations in plots in which we were attempting to grow the nematodes for our experiments," he says.

"My graduate assistant, N. Atibalentja, has just completed a 3-year study of the *Pasteuria* and soybean cyst nematode populations. We believe it may be a new species, because it is morphologically distinct from the only other *Pasteuria* found on soybean cyst nematodes, which was reported from Japan several years ago.

Soybean growers have a limited arsenal of defenses against the nematode, Noel says.

"Several years of careful management are required to reduce nematode populations below damaging levels." Farmers have had to rely on crop rotation with nonhost crops—like corn—and planting resistant soybean varieties to deal with soybean cyst nematode.

"Resistance is most effective when used with crop rotation to lower nematode populations," says Noel. "But even then, there are races of soybean cyst nematode for which there is no resistance. So the grower's only option is to plant a nematode-susceptible soybean and suffer yield losses," he says.

The next steps in Noel's research are to identify the species of *Pasteuria* and to determine the effectiveness of this bacterium as a biological control agent for soybean cyst nematodes.—By **Dawn Lyons-Johnson,** ARS.

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The bodies of female soybean cyst nematodes feeding in plant roots form bulbous, egg-filled nodules from which young will hatch the following spring.