

Biocontrols

Show Promise

Specialist Says Corn Rotation May Curb Nematodes Best

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Renaform nematodes are a significant pest in cotton in the Mississippi Delta. Dr. Jimmy Smith, research professor at the Delta Research & Extension Center, said rotation with corn is one of the best methods of control.

"The chemicals, I would say, are semi-effective, expensive and somewhat questionable in their efficacy," he said. "On our best land here in the Delta we have had tremendous decreases in yields because of renaform nematode."

The renaform nematodes have moved into the Delta within the last 10-15 years. They are especially a problem along streams such as Deer Creek Cassidy Bayou. Some extremely productive land has shown a drop in yields of 20 percent to 30 percent.

So that is something that we did this spring and it's absolutely amazing what you see."

Smith showed photos of the female nematodes connecting to the roots and the gelatinous mass they produce around themselves in which the eggs are put.

"In the untreated plots, the number of these nematodes with the egg mass around them is absolutely unbelievable," he explained. "It is just like grapes on a vine, they are just as thick as they can be."

His group did counts of nematodes on those early roots and it appears that Temic, a widely used product, showed the best control. However, Nemout was in between that and the untreated check, along with the other products of Avicta and Aries and others like that.

"Of course, we are going to carry it through with all the plant indices on these plots, along with the yields and everything else," he said.



Dr. Jimmy Smith, research professor at the Delta Research & Extension Center, said rotation with corn is one of the best methods of control for renaform nematodes.

"Here at Stoneville we have the National Biological Control Laboratory, one of the largest laboratories of its type," Smith said. "It is a federal lab, and I used to be a scientist at the federal lab. We worked to develop biocontrol of crop pests in the United States. I have always been interested in biocontrol and have worked in it some early in my career. At a cotton meeting four years ago I talked with some people and they knew of an organism, *Paecilomyces lilacinus*, which is a fungus that shows some indication of controlling nematodes."

He said the organism was produced in Germany by an east German scientist who had worked in this area before while East Germany was still a communist country.

"After Germany was reunited, they did away with some of the East German laboratories, so after his lab was closed, he started his own company," Smith said. "He has a method of developing the spores of this fungus and he can mass develop them."

In 2006 Smith acquired some of the product and started looking at it on cotton. The first year he did many application methods, trying to get the organism to the root of the cotton plant.

"We saw some indication that it was efficacious," he said. "We looked at bole counts and square counts and other plant indices, but yield at the end of the year wasn't significantly different, because nematodes are very spotty. In fields that are not uniformly covered, testing with our typical agricultural test methods is difficult. From an entomological point of view, using methods that we have used in the past to research nematodes is much more difficult than researching insects or weeds. Last year we set up a more extensive test with a product that has 10 times more spores. In fact, the number of spores in a gram of this material is one to the tenth, which gets up to one hundred billion per treatment. So we set up a test and looked at some of the standard products. Of course, we had complete untreated seed and this product that we call NemOut™. Then we are going to look at it side dressed too."

Smith and his group went to Clemson University during the Christmas holidays and spent 10 days in a nematode course.

"Of course we learned a lot being non-nematologists, but one thing we found out about was that you need to look at the roots of these early cotton plants," he said. "You can dye these roots with food coloring and look at them under a microscope and see the nematodes on the roots.

"However, it was amazing how you can tell the difference between the treated roots and the untreated roots."

Since Smith is not far from retirement, his main goal is to stimulate interest in biocontrolled nematodes.

"I want the federal lab to be involved and work in identifying other organisms for nematode control," he said. "In fact they are looking at one organism, *Pasteuria penetrans*, that has promise for nematode control."

"Also, I think we have at least one company in the United States that is interested in being a distributor for this German product," he reported. "They have tests out now across the cotton belt on cotton and peanuts and some other things, so I feel the precedent has been established for doing biocontrol on nematodes on cotton, which, up until 2006 was not being done at all."

He said it would be ideal if researchers could get something that would reproduce in the soil and prevent these types of nematode populations from building.

"One thing we did see right away is when we brought in roots from fields that had followed corn we didn't see any nematodes on them and that was just a startling thing to see," he said. "The nematodes don't reproduce on corn, so when you grow corn in a field for a year or two, then it becomes renaform free. We have known for the last several years at Stoneville that we can increase cotton yield about 14 percent by rotating with corn, and this is the reason."

"What is so nice about this is that any consultant can dye these roots with food coloring, take pictures and see the renaform infestation," Smith added.

He explained the simple procedure of dyeing the roots, by taking a solution of food coloring, putting chopped roots into the coloring in a beaker or jar. Then the solution can be microwaved until the solution boils. From that point, after cooling, they can be put in a petri dish under a microscope and photographed with a camera that enables a focus of less than a half inch.

Smith said he bought a microscope off of ebay for \$65 and any consultant or farmer can do that to look at those roots.

"It is not something that takes a lot of scientific equipment and know how, it is pretty amazing what you can do with the thing," he summed. Δ