Field tour set for Oct. 1

Soybean cyst nematode spreads in Delaware

NEWARK, Del. — An infestation of soybean cyst nematode involving about 10 acres of soybeans has been found on a farm near Bridgeville. University of Delaware Extension plant pathologist Bob Mulrooney made the identification during a recent, routine visit. Last fall he identified another infestation in a field near Viola, so the pest appears to be spreading in Delaware.

"We knew it was just a matter of time before we started seeing the nematode around the state," says Mulrooney. "It's been found in several places now, and it's very difficult to keep it from spreading."

SCN was first found in Delaware during a nematode survey three winters ago. At that time, the specialist discovered infestations in fields near Georgetown and Angola.

As a result of these findings, he initiated a soybean variety trial at the University's Georgetown Substation the following summer aimed at identifying nematode-resistant varieties suitable for use on Delmarva. He also began testing nematicides for control of SCN. Both programs are now in their third year.

Uncontrolled, SCN can have considerable economic impact on soybean yields. In his 1980 variety trial the yield dropped from 37 bushels an acre with Forrest, which is resistant to Race 1 and 3 of the cyst nematode, down to 25 bushels an acre with Essex, which is highly susceptible. Some Essex plots produced only 10 bushels. At $7 a bushel, this 12-bushel loss amounts to $84. Multiply that by 100 acres and you're talking about a crop loss of $8,400.

No one knows yet the extent of the cyst nematode's spread in Delaware. "I think we're to the point now where somebody's got to get up in a plane to scout for potential SCN infestations in other fields around the state," Mulrooney says.

Above-ground symptoms, while not diagnostic, include the presence of oval areas of yellowed, stunted plants. These patches appear to be streaked out in the direction of tillage. They're more pronounced under conditions of low fertility or drought stress. But they'll appear even under optimal growing conditions where high populations of SCN exist, he says. The yellowing is due to nitrogen deficiency, caused by inhibition of nodule formation and damage to soybean roots. Potassium deficiency is another common sign.

Positive diagnosis of SCN depends on examination of plant root systems for cysts. The roots must be dug and carefully washed free of soil. Root systems on heavily infected plants are greatly reduced, exhibit root-rot damage and have few or no Rhizobium nodules.

If you look closely, you'll see tiny (one-half to one-quarter the size of a pin head) pear-shaped cysts clinging to the roots. These are female SCN and may vary in color from white (immature) to yellow or brown (mature). Each cyst contains 200-600 eggs. These eggs are able to survive drastic extremes in soil temperature and moisture. In fact, SCN can survive eight years or more in the absence of a host. But populations decline rapidly within one year if no host is present.

In the presence of a host crop, SCN populations can build up rapidly. The life cycle of the nematode requires only about 21 to 24 days. Thus, one cyst containing 400 eggs could result in more than 10 trillion cysts within a year.

Though SCN can move through the soil only a few inches a year on its own, cysts can be spread to anything that moves soil. SCN is most likely to be carried in the soil that sticks to tractors, tillage equipment, trucks, combines, or other field equipment. It's simply not practical to remove all the potentially infested soil from these. The SCN may also travel in soil pellets in seed lots.

The best way to avoid losses with SCN is by crop rotation. With a corn/soybean rotation you can usually avoid serious problems with this pest. But Mulrooney discourages continuous soybean production in fields where the nematode is present.

"Where rotation may be impractical, we feel we have a system for managing the nematode in continuous soybeans — at least one that has worked in Mississippi," he said.

This system calls for using a resistant variety one year, growing a non-resistant one the second, and then switching back to a resistant variety again. By alternating varieties this way, taking yearly soil samples, and keeping good field records of varieties grown, you should be able to stay in continuous soybeans as far as SCN is concerned. It's not the ideal way, but can be done.

The specialist cautions against continuous use of resistant soybean varieties. Growers who did this in the mid-West found the varities soon lost resistance as a new race of nematodes developed.

Nematodes can also be used to control SCN. The problem with them is their cost. You have to have a certain level of damage before it pays to use one.

During the 1980 drought, all the soybeans in Mulrooney's nematicide trial suffered, but he reports getting a nine-bushel increase over the untreated control with one product, Temik. With $7 beans, that would amount to a savings of $63 an acre — enough to pay for treatment, he says.

Initially, his variety trials for nematode resistance included only late-season soybeans. In 1981, with the help of a $1200 grant from Delaware's soybean check-off fund, he was able to expand the program to include early and mid-season maturity groups as well.

Twenty-four varieties are included this year, 21 of them resistant to some or all of the known races of SCN. Essex, Ware, and Williams — all highly susceptible — are being used as controls. "We're looking at available varieties known to be resistant, so that we can identify any which are adaptable to our area," he says.

Growers interested in visiting either in Mulrooney's plots will have a chance to do so Thursday, October 1, from 8:30 to 11 a.m. At that time the University of Delaware will conduct a tour of soybean research and demonstration plots at the Georgetown Substation. The tour will feature projects supported in part by soybean check-off funds, so farmers can see how this money is being spent. Watch your newspaper for further details on the tour.

Entomologists seek bug-resistant soybeans

NEWARK, Del. — As the cost of insecticides and their application increases, some growers are asking, "If plant breeders can breed disease resistance into soybeans, why can't they make them insect resistant, too?"

There's no reason why this can't be done, says University of Delaware extension pest management specialist Mark Graustein. But first you've got to find a genetic source of resistance.

"To date," he says, "relatively little effort has been made to find insect resistant lines and breed this trait into acceptable production varieties." There's growing interest in doing so, however.

The U.S. Department of Agriculture recently conducted a limited amount of research of this sort in cooperation with several southern land-grant universities. But most of this work was done using non-commercial lines crossed with commercial varieties. The resulting soybeans would not meet requirements for commercial production in Delaware.

Scientists involved in that study were looking for resistance to Mexican bean beetle and corn earworm, as well as bean leaf beetle and cabbage looper. The last two insects are present locally but are not considered serious pests of Delaware grown soybeans.

One MBB resistant variety, Shore, was released for use in the Mid-Atlantic area several years ago but it has not been widely adopted by commercial growers, Graustein says. One problem is that it's never yielded as well as some other varieties. It also is a late maturing bean.

Each year a number of soybean varieties are evaluated at the University of Delaware's Agricultural Experiment Station for their seed quality, resistance to certain diseases and nematodes, as well as their potential yield. Until now, no one has taken a close look at how they respond to pressure from insect pests.

This year the Delaware Soybean Board awarded a $2,400 grant to the Delaware Cooperative Extension Service to help evaluate soybean varieties already being field tested at the experiment station for their resistance, tolerance or relative susceptibility to insects, in addition to their other production qualities.

The evaluation takes advantage of the variety trails set out by Edward L. Wisk, associate scientist at the university's Georgetown Substation. All 40 of the varieties he is testing at four locations throughout the state – Selbyville, Georgetown, Felton and Newark – are being rated for insect injury by entomology graduate student Charles Magolda under the supervision of Graustein.

In addition, insect populations–both pest as well as beneficial–are being monitored in other trails being conducted by Wisk and agronomist William H. Mitchell where planting date, row spacing and tillage method are major variables.

In this study, five of the varieties most widely grown locally – Essex, Union, Miles, Ware and Williams – are being compared in plots near Georgetown and Newark.

The evaluation of insect pest resistance began in late May and will continue through September. Magolda is working full-time in order to rate injury and collect weekly insect population data from each variety involved in the two trails.

So far, reports Graustein, the most significant insect pests that have been observed are the potato leafhopper, bean thrips, and two spotted spider mites.

"There have been no apparent differences in injury or pest populations between the varieties we've looked at, he says. "But the data haven't all been analyzed yet. Mexican bean beetle pressure has been very light so far this year. But there may be some increased pressure later in the season, along with pod worm pressure.

Because the varieties being tested weren't developed with insect resistance in mind, the specialist says the likelihood of finding any highly resistant varieties is low. But the evaluation can still be quite valuable varieties.

In turn, this information may lead to more elaborate testing. In time, it may also result in the development of highly productive lines with at least strong tolerance — perhaps even resistance — to major insect pests of soybeans in Delaware.