

F i e l d

C r o p

D i s e a s e

F a c t s

The soybean cyst nematode (*Heterodera glycines*) is a small parasitic roundworm that feeds on the roots of soybean plants. Found in most areas where soybeans are grown, this pest is considered one of the most important causes of soybean disease in the United States.

The soybean cyst nematode was first reported in Pennsylvania in 2002, and to date its distribution appears limited to Lancaster County. Pennsylvania soybean producers therefore have a unique opportunity to implement management practices that can limit the spread and impact of the soybean cyst nematode in the Commonwealth.

Soybean Cyst Nematode

Symptoms and Signs

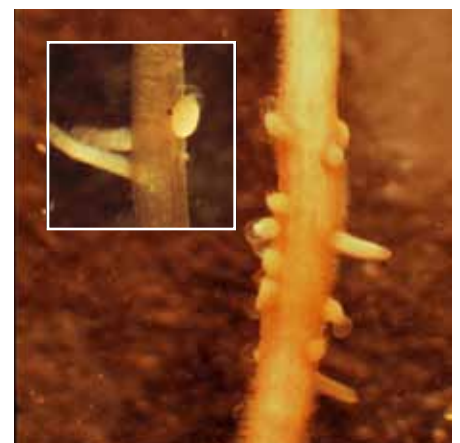
Aboveground symptoms are not a reliable way to diagnose infection by the soybean cyst nematode. In fact, yield losses ranging from 15 to 20 percent can occur without any aboveground symptoms of disease. The most reliable way to diagnose soybean cyst nematode infection is to look for the presence of female nematodes attached to the roots (Figure 1). These females, or cysts, are initially white, then turn yellow and eventually brown with age (Figure 2). The cysts can also be found in soil samples collected from fields infested with the pest.

The nematode survives in the soil as eggs within the cyst; these can move among fields in soil adhering to machinery or in runoff water. Without a suitable host, viable unhatched eggs can remain in the soil for years. In spring the juvenile nematodes emerge from the eggs, move to the roots of susceptible plants, and begin to feed. The feeding nematodes enter the roots and develop into adults. The bodies of female nematodes enlarge and eventually rupture through the outer layers of the root tissue (Figure 2). After fertilization, the female body is filled with eggs. Some of the eggs may hatch during the same season, while others remain within the protective wall of the cyst, where they can survive for many years. The number of cysts and eggs surviving in the soil is directly related to the yield of susceptible soybeans in that field.

Figure 1. Female soybean cyst nematodes feeding on the roots of a soybean plant. Females progress from white to yellow and eventually become brown as they mature. The nematodes are approximately 0.5 mm (1/32 inch) long.



Figure 2. Female soybean cyst nematodes that have ruptured through the outer layers of the root tissue; they are beginning to produce eggs in a clear, gel-like substance.



Management

Management of the soybean cyst nematode begins with confirming its presence in a field. This is best accomplished through soil sampling in the fall as you plan for next year's crop. Samples can be collected by means of a standard soil probe (used for soil nutrient analysis) and then combined in a bucket. Collect samples in a zig zag fashion from throughout the field, taking approximately 20 cores from each 10-acre section. Since nematode populations tend to be clustered in low spots and near field entry ways, include these high-risk areas in your sample.

Mix the samples thoroughly in the bucket, and place 1 to 2 pints of soil in a ziplock bag, marking each bag with a permanent marker. Store the samples in the refrigerator until they can be sent to a testing lab. You can find labs that will evaluate the soil for the soybean cyst nematode by searching on-line with the keywords, "SCN testing labs." Your county extension agent can also help you find a qualified testing lab.

If soybean cyst nematodes are established in a field, management practices focus on keeping the population from reaching damaging levels. Crop rotation is the major means of limiting the buildup of nematode populations. The type of rotation is determined by the nematode's current population level in a given field. If the population is high—greater than 2,000 eggs per 200 cubic centimeters (cc) of soil—then a nonhost crop such as alfalfa, orchard grass, corn, or wheat should be grown for several years and the field sampled again before soybeans are planted.

Once the population is less than 2,000 eggs per 200 cc of soil, the nematode is best managed with a rotation of a resistant soybean crop, a nonhost crop, and a susceptible soybean crop (see table below). It is important not to plant resistant soybeans in fields with high nematode populations or to use the same source of resistance repeatedly, because the nematode population will adjust itself to overcome that source of resistance.

Suggested rotation plan for managing the soybean cyst nematode.

Year 1: Nonhost crop (corn, alfalfa*, small grain)

Year 2: Resistant soybean

Year 3: Nonhost crop

Year 4: Susceptible soybean (if nematode population is less than 250 eggs/200 cc of soil)

*Rotation to a nonhost crop such as alfalfa that persists for several years may be desirable, because it provides additional time for the nematode population to decline.

Acknowledgments

This publication was sponsored in part by funds from The Pennsylvania Soybean Promotion Board and the Northeast Soybean Promotion Board.

Prepared by Erick De Wolf, assistant professor of plant pathology, and John Halbrendt, associate professor of plant pathology

Visit Penn State's College of Agricultural Sciences on the Web: agsci.psu.edu

Penn State College of Agricultural Sciences research, extension, and resident education programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.

This publication is available in alternative media on request.

Penn State is committed to affirmative action, equal opportunity, and the diversity of its workforce.

© The Pennsylvania State University 2004

Produced by Ag Communications and Marketing

Web code XL0088 9/10pdf4459e