

IOWA STATE UNIVERSITY  
University Extension

# SOYBEAN CYST NEMATODE MANAGEMENT

## FIELD GUIDE



*A visual aid for identifying  
and defending your soybean  
fields from yield-robbing SCN.*

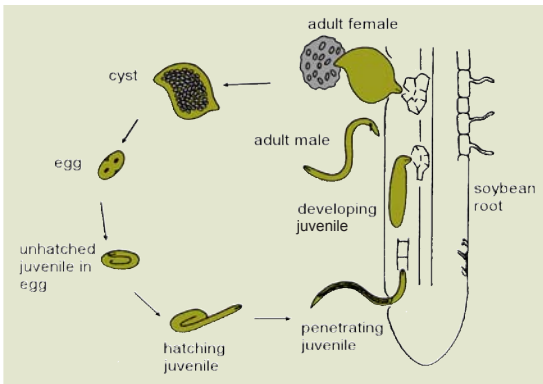
A microscopic image of a soybean stem, showing a large, pale, oval-shaped cyst attached to the stem. The stem is covered in fine, white, hair-like structures. The background is a light blue-green color.

# SCN BIOLOGY

*Soybean cyst nematode is the most destructive pest of soybeans in the world. Understanding nematode biology is key to recognizing early infestation and managing its negative economic impact.*

# LIFE CYCLE

The SCN life cycle has three major stages: egg, juvenile and adult. In the summer, when soils are warm, the life cycle can be completed in 24 to 30 days. Juvenile worms hatch from eggs and penetrate soybean roots. After entering the soybean root, juveniles move through the root until they reach the vascular tissue, where they begin to feed. The juveniles inject secretions that modify root cells and convert them into feeding sites. As the juvenile nematodes feed, they swell. Female nematodes eventually become so large that they break through the root tissue and are exposed on the surface of the root.



**Diagram of the SCN life cycle.**

*Note: all stages are not drawn to same scale.*

Male nematodes change back to worms as adults, migrate out of the root into the soil and mate with the lemon-shaped adult females.

After male nematodes mate with and fertilize adult females, SCN females produce 50 to 100 eggs outside of the body and then the female body fills internally with 200 or more eggs each. There are several SCN generations in a single growing season. Not all eggs produced by a female will hatch at the same time.

When the adult SCN female dies, the body wall toughens into a protective cyst around the eggs. Eggs within the cyst can survive for 10 or more years.

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SCN damages plants and reduces soybean yield by:

- Taking food from the soybean plant
- Stunting or dwarfing roots
- Disrupting root vascular tissue function
- Reducing effectiveness and number of nitrogen-fixing nodules
- Causing wounds for other pathogens to enter roots

## Stages in the SCN Life Cycle

### SCN eggs

(Each  $1/200$  inch long)

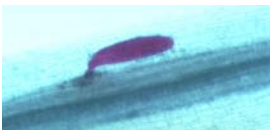


### SCN juvenile entering the soybean root

(Juvenile  $1/50$  inch long)

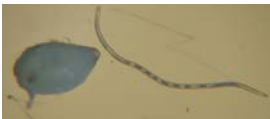


### SCN juvenile (stained purple) developing inside soybean root



### SCN female (left) and worm-shaped male

(Female  $1/32$  inch long, male  $1/16$  inch long)



### Adult SCN female with egg mass on soybean root



### Egg-filled SCN cyst



# SYMPTOMS

## Below-ground

Roots infected with SCN are generally dwarfed or stunted and can have a decreased number of nitrogen-fixing nodules. SCN infections also may make the roots more susceptible to attack by other soil-borne plant pathogens. Roots infected with SCN and other soil-borne pathogens are generally discolored.



*SCN-infected roots on right are stunted, discolored, and have fewer nitrogen-fixing nodules than uninfected roots on left.*

The only unique sign of SCN infection is the presence of adult females and cysts on the soybean roots.

## **Above-ground**

SCN can cause several above-ground symptoms, such as stunting, yellowing and early maturation of the crop. However, above-ground symptoms of SCN are not unique. They often are mistaken for symptoms of damage from soil compaction, iron deficiency chlorosis and other nutrient deficiencies, drought stress, herbicide injury or other plant diseases. SCN injury often remains undetected for several years because the nondescript symptoms are attributed to other causes.



*Uneven plant height caused by SCN.*



*Mid-season yellowing caused by SCN.*



*Severe stunting and yellowing of leaf margins caused by SCN.*



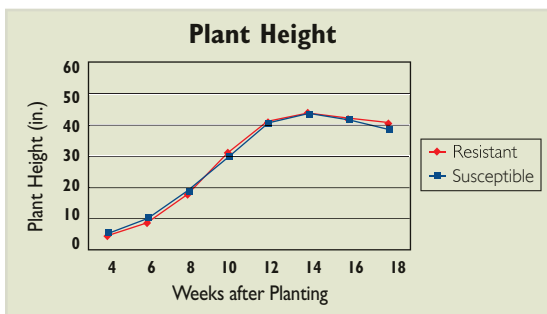
*Severe stunting and overall foliar yellowing caused by SCN.*



*Early senescence of soybeans due to SCN infection.*

## No obvious symptoms

In many instances, SCN infection does not cause any above-ground symptoms, even when causing significant yield loss. The data in the following graphs are from an Iowa field experiment in which a resistant and a susceptible soybean variety were grown in an SCN-infested field. Plants were removed and measured every two weeks throughout the growing season.



The height of the two varieties was the same during the growing season (above) and leaf weight was nearly identical until the last month of the season (top graph next page).

Despite no difference in height and no difference in leaf weight until the last month of the

growing season, the resistant soybean variety yielded more than five bushels per acre more than the susceptible soybean variety.

