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Abstract
Iowa crop producers and agronomists are well aware of soybean cyst nematode (SCN), the plant-parasitic nematode that is widespread through the Midwest and can seriously reduce soybean yields. And many people are aware of other plant-parasitic nematodes that can cause significant yield reductions on corn. But most crop professionals probably are unaware that there is a corn cyst nematode that has been in the northeastern United States since 1981. And just recently, a new cyst nematode species that reproduces on corn was discovered in Tennessee.

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New cyst nematode species on corn

by Greg Tylka, Department of Plant Pathology

Iowa crop producers and agronomists are well aware of soybean cyst nematode (SCN), the plant-parasitic nematode that is widespread through the Midwest and can seriously reduce soybean yields. And many people are aware of other plant-parasitic nematodes that can cause significant yield reductions on corn. But most crop professionals probably are unaware that there is a corn cyst nematode that has been in the northeastern United States since 1981. And just recently, a new cyst nematode species that reproduces on corn was discovered in Tennessee.

Adult females and cysts of the soybean cyst nematode. (G. Tylka)
Adult females and cysts of the nematode discovered on corn in Tennessee in 2006. (R. Heinz and M. Mitchum)

Corn cyst nematode known in United States since 1981

The corn cyst nematode, *Heterodera zaeae*, initially was reported in India in 1970. It was first discovered in the United States in Kent County, Maryland, in 1981. The corn cyst nematode has been found only in four counties in Maryland (Cecil, Harford, Kent, and Queen Anne’s) and in Cumberland County, Virginia. The fields known to be infested with the corn cyst nematode were quarantined by the United States Department of Agriculture in 1981, but the quarantine was lifted in 1996.

The biology of the corn cyst nematode is similar to that of SCN. The life cycle takes 18-21 days under ideal conditions, and several generations can occur in a growing season. The ideal temperature for the corn cyst nematode is 86 °F, which is considerably higher than the 78 °F optimum temperature for SCN. All of the numerous corn hybrids tested in the 1980s in Maryland were susceptible to the corn cyst nematode. Other host plants of the corn cyst nematode include barley, oats, rice, sorghum, sugarcane, wheat, and several grass weeds.

New species of cyst nematode discovered on corn in 2006

On July 29, 2007, at a scientific conference, university nematologists from Missouri, Nebraska, and Tennessee and USDA nematologists announced that a new cyst nematode species was discovered on corn. Juveniles and cysts (egg-filled, dead females) were discovered in a soil sample taken from a field of stunted corn in northwestern Tennessee (Obion County) in 2006. University of Missouri nematologists made the discovery and verified reproduction of the nematode on corn and also found no reproduction on soybean in greenhouse tests. The nematode reproduced well on many different corn hybrids but poorly on other monocots. No dicots were found to be hosts. The cysts of this nematode look different than those of the corn cyst nematode discussed above, and genetic analyses confirmed that the nematode was not the corn cyst nematode. The nematode appears identical to a cyst nematode discovered on goosegrass, a weed, in Lauderdale County, Tennessee, in 1978.

Will new cyst nematode species affect corn production in Iowa?
It is difficult to predict whether the new cyst nematode discovered on corn in Tennessee will move into other states and eventually reach Iowa. But in the 11 years since the quarantine was lifted on the fields infested with the corn cyst nematode in Maryland and Virginia, the nematode has not been found in any other state.

It also is unclear how damaging the new cyst nematode discovered in Tennessee would be to corn if it moved to the Midwest. The corn cyst nematode, H. zeae, causes significant yield reductions only in hot environments, such as in India and Pakistan. Currently, it is not possible to predict how the new cyst nematode discovered on corn in Tennessee might affect Iowa corn yields because details such as the length of the nematode life cycle, number of generations per season, optimum temperature, survival in frozen soil, and ability to damage corn are not available.

New cyst nematode species on corn would hinder SCN field sampling and research

Spread of this new cyst nematode on corn into fields in the Midwest would seriously hinder field soil sampling as well as research on the biology and management of SCN. Currently, no other cyst nematode species commonly exist in Iowa corn and soybean fields, and eggs recovered from cysts extracted from Iowa soils are assumed to be SCN eggs. But eggs of SCN and other cyst nematodes look similar and cannot be distinguished by appearance. Determining SCN egg population densities for management or research purposes would be impossible using current techniques if other cyst nematodes were present. A stain that is specific for SCN eggs currently is not available, and developing such a stain likely would take years.

*Greg Tylka is a professor of plant pathology with extension and research responsibilities in management of plant-parasitic nematodes.*

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