

UK Researchers Lead The Way In Anthracnose Stalk Rot Research

LEXINGTON, KY.

Every corn grower's nightmare is to wake up to a field of downed corn caused by corn stalk rot. While there is no cure for stalk rots, University of Kentucky College of Agriculture researchers are studying and working toward ways to fight the fungus that causes anthracnose stalk rot.

There are several types of stalk rot, but anthracnose is one of the most common. It is caused by a fungus called *Colletotrichum graminicola*. It is unique from other types of stalk rot, because its symptoms are visible through discolorations on the leaves of the plant as well as the stalk. Once a plant is infected with anthracnose, its cells begin to rot and die, which can lead to weakened cornstalks and lodging. A widespread epidemic of the infectious stalk rot disease has not happened in the state since 2000, but stalk rots account for an approximate 6 percent yield loss each year according to some industry estimates.

For the past 12 years, researchers in the UK Department of Plant Pathology, led by Plant Pathologist Lisa Vaillancourt, have been at the forefront of learning about all aspects of this disease. They have found several interesting things since beginning the project.

One approach they have taken is to create random mutations in the fungus, removing just one component of the fungus with each mutation. Then the mutants are screened for changes that destroy the fungus' ability to cause disease. When studying this, Vaillancourt and her team discovered that an important enzyme that controls secretion of proteins to other parts of the cell and outside of the fungus is crucial for disease. When this enzyme's operation is interrupted, the disease does not occur.

"It was really a surprise find for us because this enzyme is referred to as a 'housekeeping protein,' which means it is a basic function the fungus needs to survive," she said. "Our mutation succeeded in destroying its ability to cause the disease, but not its essential function for life. That means this enzyme has a special function just in causing disease that we never knew about before."

While this is an important discovery, researchers are studying further to determine what part of the protein regulation causes the fungus to lose its ability to cause disease. They are also examining ways to help cornstalks destroy this function in the fungus to

prevent the disease from taking control of the plant.

A very similar disease to anthracnose stalk rot affects sorghum. While the diseases are similar, the fungus that causes anthracnose stalk rot in corn cannot infect sorghum, and the sorghum disease does not infect corn. UK researchers have discovered the corn fungus apparently is able to suppress the defenses of the corn plant, but sorghum quickly recognizes that fungus and responds by killing it.

"We are trying to understand the basis for this non-host immunity. Our hypothesis is there is a specific protein 'receptor' in corn that the fungus targets when it suppresses corn's defenses, and that there is a different, related receptor in sorghum that the sorghum fungus targets," Vaillancourt said. "If we could change these proteins, we might be able to make corn immune to the corn fungus in the same way that sorghum is immune and vice versa."

In addition, she and her team are observing the way the fungus works its way through cornstalks and studying the basic biology of the disease with the goal of determining which components are critical for the disease to function. Once the group finds the critical points in the disease cycle, they will look for ways to suppress or prevent them from occurring.

"The more we learn about the biology of the disease, the closer we are to being able to combat it," Vaillancourt said.

While research is ongoing, producers can do several things to lessen the chances of their crops developing this disease. Applying the appropriate amount of nitrogen, planting at proper plant densities, planting more resistant varieties, controlling corn borer damage and scouting for the disease late in the growing season helps control losses from stalk rots. Follow the UK fertilizer recommendations to keep the crops from being stressed from too little or too much nitrogen. AGR-1, the publication on UK fertilizer recommendations, is available online at <http://www.ca.uky.edu/agc/pubs/agr/agr1/AGR1.PDF> and through your local Cooperative Extension Service. A UK extension publication that discusses general guidelines for stalk rot control is available online at <http://www.ca.uky.edu/agc/pubs/ppa/ppa26/ppa26.htm>. Δ