

Cotton Research Highlights Field Day At Judd Hill

TRUMANN, ARK.

Two pathogens commonly found in Arkansas cotton fields diminish the root structure of cotton plants, potentially causing loss of yield and quality, said Craig Rothrock, professor of plant pathology for the University of Arkansas System Division of Agriculture.

Rothrock described research conducted with Division plant pathologists Jianbing Ma and Terry Kirkpatrick to quantify the changes in cotton plant roots caused by root-knot nematodes and the black root rot fungal pathogen *Thielaviopsis basicola* during a recent research field day at Judd Hill Plantation near Trumann.

The University of Arkansas System Division of Agriculture and Arkansas State University, which conduct cooperative research on plots provided by the Judd Hill Foundation, hosted the field day. More than 250 visitors attended the event at the Judd Hill Plantation, located about five miles south of Trumann.

Rothrock said root-knot nematodes and *Thielaviopsis basicola* both decreased numerous root structure parameters. In his test plots, interaction between the two pathogens reduced root volume more than either pathogen alone.

Understanding the impact of the pathogens on cotton plant roots is important, Rothrock said, because the damage they do to roots may suppress cotton growth and result in decreased yields. Continuing research should examine their season-long effects on crop growth and development, he said.

In another of the studies featured during the field day, Derrick Oosterhuis, Distinguished Professor of crop, soil and environmental sciences, said very high mid-summer temperatures are one of the main stressors of cotton plants.

"People think that because cotton comes from a hot climate that it likes high temperatures," Oosterhuis said. "Well, it doesn't."

The ideal average temperature range for growing cotton is 86 degrees Fahrenheit in the day to 68 degrees at night, Oosterhuis said. That range was exceeded for extended periods in both 2011 and 2012. At day temperatures above 95 degrees Fahrenheit, there is a significant decrease in leaf growth and carbohydrate production because of decreased photosynthesis and increased respiration, he said. This results in poor fertilization, fewer seeds, smaller bolls, and reduced yield.

When night temperatures are higher than about 75 degrees, he added, respiration increases significantly. Respiration in plants is the intake of oxygen and the breakdown of sucrose to provide energy. During daylight, oxygen is exhaled as a waste product of photosynthesis. At night, photosynthesis does not occur, no oxygen is produced and carbon dioxide is exhaled.

"Therefore, high night temperatures increase respiration, which causes additional loss of carbohydrates," Oosterhuis said. The result is the plant has insufficient sucrose to satisfy its growth needs. The result is loss of cotton bolls and less fiber production. There may also be fewer and smaller seeds per boll.

Oosterhuis is studying the effectiveness of stress-mitigating chemicals that may counter the damaging effects of high temperatures.

Other topics covered during the field day included cotton sustainability through tillage, nitrogen fertilization, irrigation and COTMAN by Tina Teague, a Division of Agriculture entomologist and faculty member of the ASU College of Agriculture; soil moisture monitoring in cotton

by Michele Reba, USDA/ARS research hydrologist from the National Sedimentation Laboratory in Jonesboro; and improving irrigation efficiency with surge valves, by Ray Benson, Mississippi County Extension agent. Δ



Tina Gray Teague, Division entomologist, talks about cotton sustainability through the use of recommended tillage, nitrogen fertilization, irrigation and COTMAN during a research field day at Judd Hill Plantation near Trumann.



Division plant pathologist Craig Rothrock describes what roots reveal about seedling vigor during a research field day at Judd Hill Plantation near Trumann.



Division cotton physiologist Derrick Oosterhuis describes the effects of high temperature stress on cotton during a research field day at Judd Hill Plantation near Trumann.



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