

Genes for drought-tolerance, aflatoxin may mingle to boost corn production

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Scientists plan to put two and two together in a study that will likely yield improved U.S. corn quality and yields.

Two traits that impact corn will be examined by two researchers hoping to use basic scientific discoveries to improve products at the farm level.

[Drought tolerance](#) and [aflatoxin](#) resistance are the targets of the study by Texas AgriLife Research scientists who have been awarded a \$500,000 grant for the project by the U.S. Department of Agriculture.

The idea is to use basic science which identified the drought- and aflatoxin-related genes in the lab of Dr. Michael Kolomiets and apply them in corn breeding through the expertise of Dr. Seth Murray. Kolomiets is a plant pathologist and Murray, the project's lead investigator, is a corn genetics researcher.

"We plan to use basic knowledge we learned from previous studies and translate that through breeding corn for drought tolerance and aflatoxin resistance," Kolomiets said.

The "basic knowledge" stems from discoveries Kolomiets has made in researching a 13-member family of genes called LOX, or lipoxygenase.

He said one LOX family member is connected to a plant's [drought response](#) while another is linked to aflatoxin development.

"A geneticist basically has to break something to see how it works," Kolomiets said. "So in this case, we were able to shut down each gene in the lab to decipher what its function is for the [plant biology](#) and the plant's ability to respond to environmental stresses."

It seems that one of the LOX genes is "hijacked" when droughty conditions are ripe for the Aspergillus fungi to ride into the plant with its toxins. Yet another member of the gene family is the reason for plant aging and death once the plant is under severe [drought stress](#).

Lipids - the fats and oils in plants like corn, soybeans, peanuts, tree nuts and cotton - are sought out, it seems, by pathogens like fungi. So, Kolomiets reasons, preventing the gene hijacking - via a mutation of the gene that has been shut down - will help corn plants avoid problems with these weather-related maladies.

Drought is a recurring problem for corn producers - especially in the southern U.S. and throughout other parts of the world. Aflatoxin, which becomes prevalent in drought years, is a serious issue because it renders corn inedible for humans as well as for many livestock, depending on the content level. Both of these concerns cause a blow to the economy when the [corn](#) supply is cut by lower yields or poor quality, the researchers pointed out.

"Loss in Texas from mycotoxins (mostly aflatoxin) was \$13 million in 2008 - the highest in the nation," according to the researchers.

Murray and Kolomiets will begin the four-year project in January. They will be assisted by Dr. Tom Isakiet, Texas AgriLife Extension Service plant pathologist, who will train graduate students for the project.

Provided by Texas A&M AgriLife Communications

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