

# Will climate change increase the risk of aflatoxin in US corn?

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As climate change continues to alter weather patterns around the planet

including the Midwest, researchers at Michigan State University (MSU) are modeling the impact on crops such as corn.

"The United States is the largest exporter and donor of field [corn](#) around the world," said Felicia Wu, a John A. Hannah Distinguished Professor and an international expert on food safety in the Department of Food Science and Human Nutrition and the Department of Agricultural, Food, and Resource Economics in the College of Agriculture and Natural Resources at MSU. "Here in the U.S., we consume field corn in the form of corn chips, [corn flakes](#), corn grits and corn tortillas; as opposed to sweet corn, which is frozen, canned and eaten off the cob. Field corn is also used for animal feed and for ethanol production."

The fungi *Aspergillus flavus* and *Aspergillus parasiticus* produce aflatoxin, which can infect peanuts, tree nuts and corn. Aflatoxin not only degrades corn quality but can also cause [health problems](#) for humans and animals, depending on the amount and length of time it is ingested. While aflatoxin contamination occurs annually in the southern United States because of the hot and [dry climate](#), it has rarely been a serious problem in the Corn Belt region of the U.S.

"When we ran our near-term climate model scenarios, we found that between 2031 and 2040, aflatoxin is going to become more of a problem in the U.S. Corn Belt in the Midwest," Wu said. "The last time there was a serious problem was in 2012, when we had an unusually hot and dry summer throughout the Midwest; particularly Iowa, Illinois and Indiana."

Wu's research was published April 5, 2022 in the journal *Environmental Research Letters*. Co-authors on the paper include her former doctoral student Jina Yu (Hong Kong Baptist University), David Hennessy (Iowa State University) and Jesse Tack (Kansas State University).

Hot and dry conditions encourage fungi spores to be airborne, which

increases their chances of contaminating crops. Water helps plants withstand stress that makes them vulnerable to harmful fungi. Steps growers, grain elevators and processors can take to reduce the risk of [aflatoxin contamination](#) include storing corn harvests in cool, dry conditions and keeping crops irrigated to the extent possible, given declining water tables.

Researchers are already using both biotechnological and conventional breeding techniques to develop hybrid crops that can withstand drought, insect damage and fungal infections. In many parts of the world, corn growers are using biocontrol to reduce aflatoxin. Biocontrol infects plants with *Aspergillus* fungi, which is unable to produce aflatoxin because these fungi competitively exclude the fungi that produce aflatoxin.

Another possibility shifts crop production further north or further south geographically where the climate is cooler or wetter to reduce aflatoxin risk. That, however, impacts farms that have been passed down for generations.

For consumers concerned about eating [field corn](#) and their aflatoxin risk, Wu suggests eating your greens and garlic. "Green leafy vegetables are good for your overall health," Wu said. "Chlorophyll has a sandwich molecular structure that traps aflatoxin molecules so that humans excrete them before the toxin can enter our bloodstream."

Also, [cruciferous vegetables](#) like broccoli, cauliflower, kale and allium vegetables like garlic, onions and leeks can help detoxify carcinogens in our bodies.

"We predict seeing an increase in aflatoxin problems over the next 10-20 years," Wu said. "So, we need to rely on technologies and a whole suite of interventions that can reduce the problem."

**More information:** Jina Yu et al, Climate change will increase aflatoxin presence in US Corn, *Environmental Research Letters* (2022).  
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