What is Fusarium graminearum, the fungus a Chinese scientist pleaded guilty to smuggling into the US?

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Wheat infected by *_Fusarium_*, a toxic fungus, has kernels that appear white with orange at the base.

Klaus-Dietmar Gabbert/picture alliance via Getty Images

A Chinese plant scientist at the University of Michigan who drew national attention in June 2025 when she was arrested and accused of smuggling a crop-damaging fungus into the U.S. pleaded guilty on Nov. 12, 2025, to charges of smuggling and making false statements to the FBI. Under her plea agreement, Yunqing Jian, 33, was sentenced to time served and expected to be deported.

Her arrest put a spotlight on Fusarium graminearum, a harmful pathogen. But while its risk to grains such as wheat, corn and rice can be alarming, Fusarium isn't new to American farmers. The U.S. Department of Agriculture estimates it costs wheat and barley farmers more than $1 billion a year.

Tom Allen, an extension and research professor of plant pathology at Mississippi State University, explains what Fusarium graminearum is and isn't.

What is Fusarium graminearum?

Fusarium graminearum is a common fungal plant pathogen that creates problems for farmers across the U.S.

It causes a disease in barley and wheat called Fusarium head blight, or scab. It can also damage rice and rot corn ears and stalks. In severe cases, scab could cut a farm's yield by 45%.

Scab has been responsible for some of the greatest annual crop losses in the U.S. In 2024, estimates from extension and research plant pathologists suggested scab reduced the U.S. wheat crop by approximately 31 million bushels or roughly 2%.

When compared with other wheat diseases that harm the head and kernels, scab is by far the most concerning because it occurs across wide areas and affects the crop at advanced growth stages.

Why is Fusarium graminearum a concern?

As a plant pathogen, the fungus responsible for scab produces a mycotoxin in grain that can harm humans and livestock. In addition, when wheat grain used for seed is infested with the fungus, the seeds are less likely to germinate and produce new plants in the next growing season.

The mycotoxin is widely categorized as a vomitoxin. It can induce vomiting if ingested in high enough concentrations, but prolonged exposure can also cause gastronintestinal damage, harm the immune system and inflame the central nervous system.

In animals, repeated exposure to the mycotoxin in food can decrease their growth and weight, and livestock can develop an immune response to the toxin that can harm their ability to reproduce.

The U.S. Food and Drug Administration has issued advisory levels, basically limits for the amount of mycotoxin considered a health hazard in grain products.

Since barley and wheat are important as food for humans and livestock, harvested grain is routinely tested when farmers bring their crops to grain elevators for sale. Entire loads of grain may be rejected if they're found to have mycotoxin concentrations above the FDA limits.

Wheat can be treated to remove scabby kernels. If mycotoxin levels aren't too high, it could also be used for livestock feed. The advisory threshold for the mycotoxin is higher for adult cattle and chickens, at 10 parts per million, than it is for humans, at 1 ppm.

What does the law say about importing and moving plant pathogens?

These risks are why importing and even moving plant pathogens within the U.S. is regulated by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service, or USDA-APHIS, through the Plant Protection Act of 2000.

Federal law restricts the movement of plant pathogens, including bacteria, fungi and viruses, even for research purposes, as well as their release into the environment. A scientist who wants to move a plant pathogen, either within the U.S. or from outside the U.S., must go through a permitting process with USDA-APHIS that can take up to six months to complete.

A sign at a Colombian airport warns about the spread of a type of *Fusarium* that affects bananas and plantains.

Jeffrey Greenberg/Universal Images Group via Getty Images

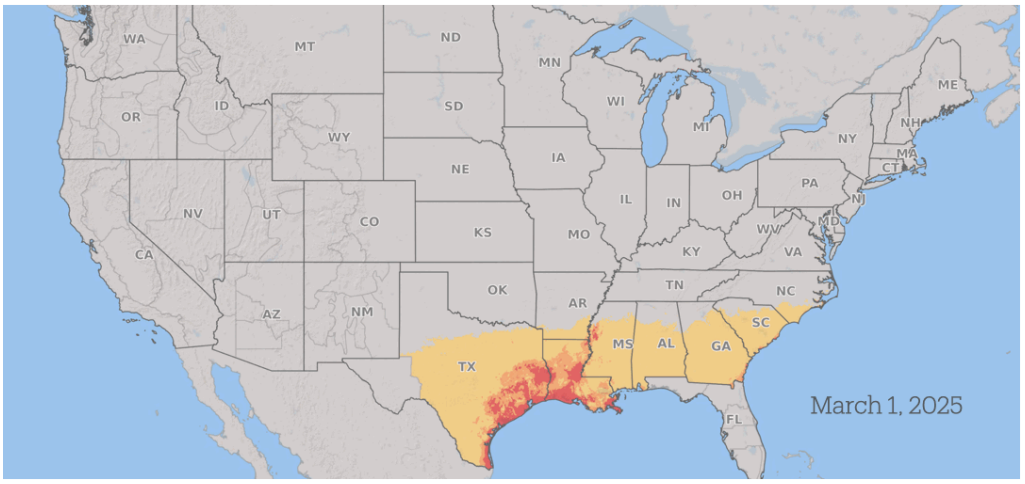
The goal of these rules is to reduce the risk of introducing something new that could be even more destructive for crops.

Even with Fusarium graminearum, which has appeared on every continent but Antarctica, there is potential for introducing new genetic material into the environment that may exist in other countries but not the U.S. and could have harmful consequences for crops.

How do you manage Fusarium graminearum infections?

Fusarium graminearum infections generally occur during the plant's flowering, rainfall and periods of high humidity during early stages of grain production.

Wheat in the southern U.S. is conducive to infection during the spring. As the season progresses, the risk from scab progresses north through the U.S. and into Canada as the grain crops mature across the region, with continued periods of conducive weather throughout the summer.



How Fusarium graminearum risk progressed in 2025. Yellow is low risk, orange is medium risk, and red is high risk. Fusarium Risk Tool/Penn State

Between seasons, Fusarium graminearum survives on barley, wheat and corn plant residues that remain in the field after harvest. It reproduces by producing microscopic spores that can then travel long distances on wind currents, spreading the fungus across large geographic areas each season.

In wheat and barley, farmers can suppress the damage by spraying a fungicide onto developing wheat heads when they're most susceptible to infection. Applying fungicide can reduce scab and its severity, improve grain weight and reduce mycotoxin contamination.

However, integrated approaches to manage plant diseases are generally ideal, including planting barley or wheat varieties that are resistant to scab and also using a carefully timed fungicide application, rotating crops, and tilling the soil after harvest to reduce residue where Fusarium graminearum can survive the winter.

Even though fungicide applications may be beneficial, fungicides offer only some protection and can't cure scab. If the environmental conditions are extremely conducive for scab, with ample moisture and humidity during flowering, the disease will still occur albeit at reduced levels.

Plant pathologists are making progress on early warning systems for farmers. A team from Kansas State University, Ohio State University and Pennsylvania State University has been developing a computer model to predict the risk of scab. Their wheat disease predictive model uses historic and current environmental data from weather stations throughout the U.S., along with current conditions, to develop a forecast.

In those areas that are most at risk, plant pathologists and commodity specialists encourage wheat growers to apply a fungicide during periods when the fungus is likely to grow to reduce the chances of damage to crops and the spread of mycotoxin.

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