

NOVEL MICROFLUIDIC DEVICE FOR IN-FIELD PURIFICATION, AMPLIFICATION, AND DETECTION OF DNA FROM MYCOTOXIN- PRODUCING FUNGI

A portable, low-cost microfluidic device enables early, accurate detection of crop-damaging fungi like *Fusarium graminearum*, improving crop yield through timely fungicide application and enhancing food safety testing.

Researchers at Purdue have designed a portable, easy to use microfluidic device to detect mycotoxin-producing fungi *Fusarium graminearum*. *Fusarium* head blight (FHB) is the disease that is caused by a *Fusarium* infection in cereal crops, causing an estimated annual loss of \$1.469 billion USD as well as vomiting, nausea, headaches, and fever if eaten by the consumer. Typically, levels of the mycotoxin produced by *Fusarium* are measured after harvest/processing due to budget limitations, however, if farmers were able to detect *Fusarium* infection in their crops early on, fungicides could be effectively used to increase crop yield.

The researchers have developed a microfluidic device with a limit of detection of 0.408 $\mu\text{g/mL}$ of *Fusarium graminearum* DNA, much less than the required limit of detection of 6.25 $\mu\text{g/mL}$. Due to the inclusion of dried reagents suspended within the matrix, the device can be stored for long periods of time at room temperature, it is portable, inexpensive, and disposable after use. Additionally, the microfluidic device is designed such that multiple additional channels could be added to the design to test for other mycotoxin-producing fungi in series.

Technology Validation: Microfluidic device prototype tested with *Fusarium graminearum* samples with primers for DNA detection. The fluorescence of the microfluidic device with both the *Fusarium* sample and the primers was found to be significantly ($p < 0.05$) higher than the control device.

Advantages:

- Accurate

Technology ID

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Category

Agriculture, Nutrition, &
AgTech/Precision Agriculture &
Smart Farming
Agriculture, Nutrition, &
AgTech/Food Safety &
Traceability
Biotechnology & Life
Sciences/Analytical & Diagnostic
Instrumentation

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- Low cost
- Portable
- Easy to use
- Non-perishable
- Expandable design

Applications:

- Agriculture Industry
- Food Testing Services

TRL: 4

Intellectual Property:

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crop yield, food testing, agriculture industry, Fungal Pathogens