



Climate change amplifies global mycotoxin exposure: Emerging risks and sustainable solutions

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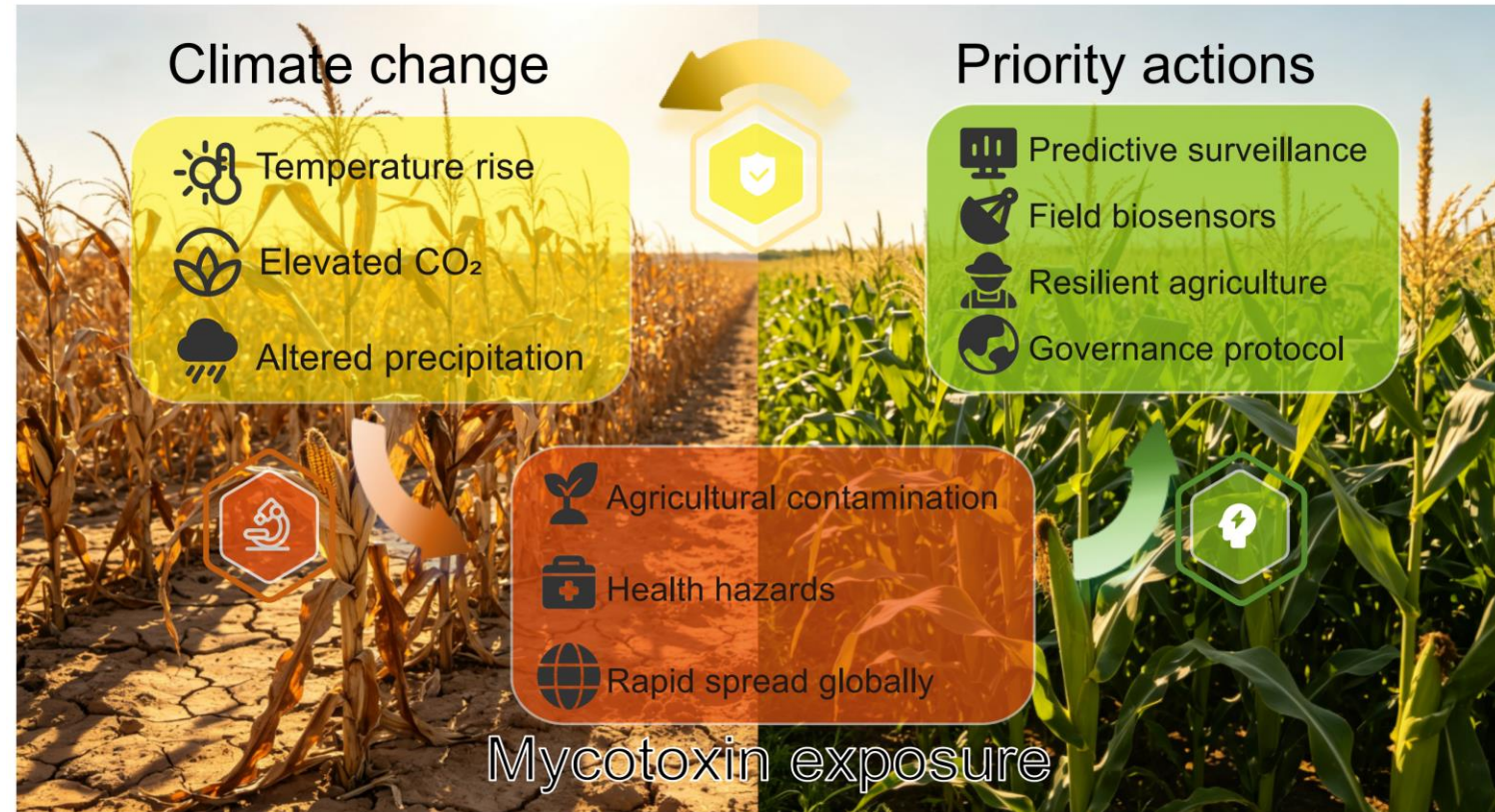
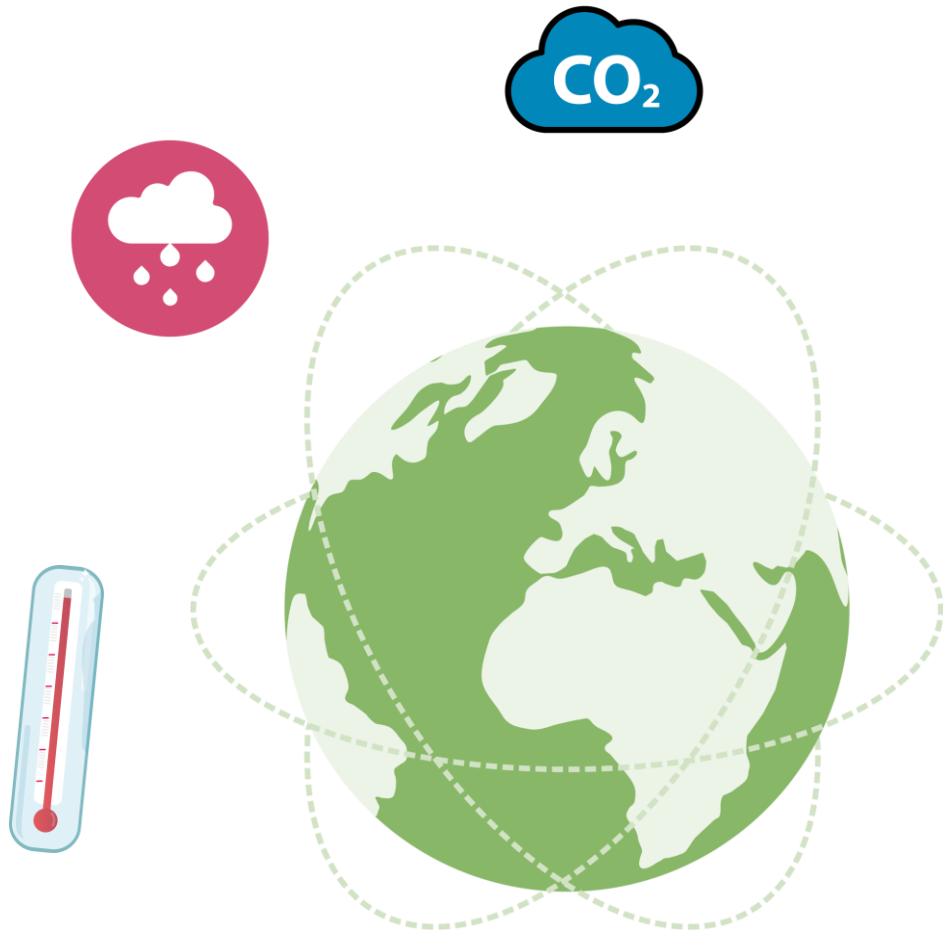


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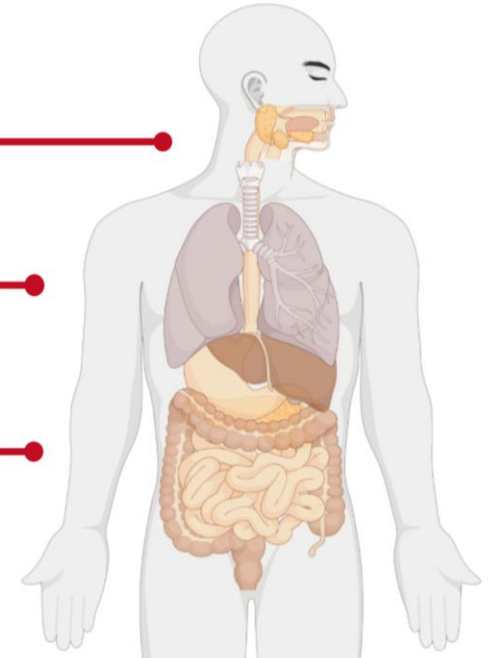
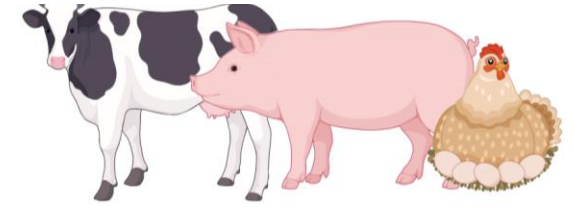
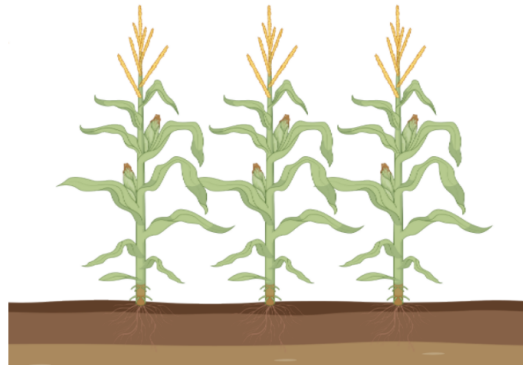


Introduction



Climate change and mycotoxin exposure

High temperature
Precipitation/drought
CO₂ concentration



Human exposure pathways

Figure 1. Schematic overview of climate-driven mycotoxin contamination and human exposure pathways.

The global incidence of mycotoxin contamination continues to rise in a changing climate

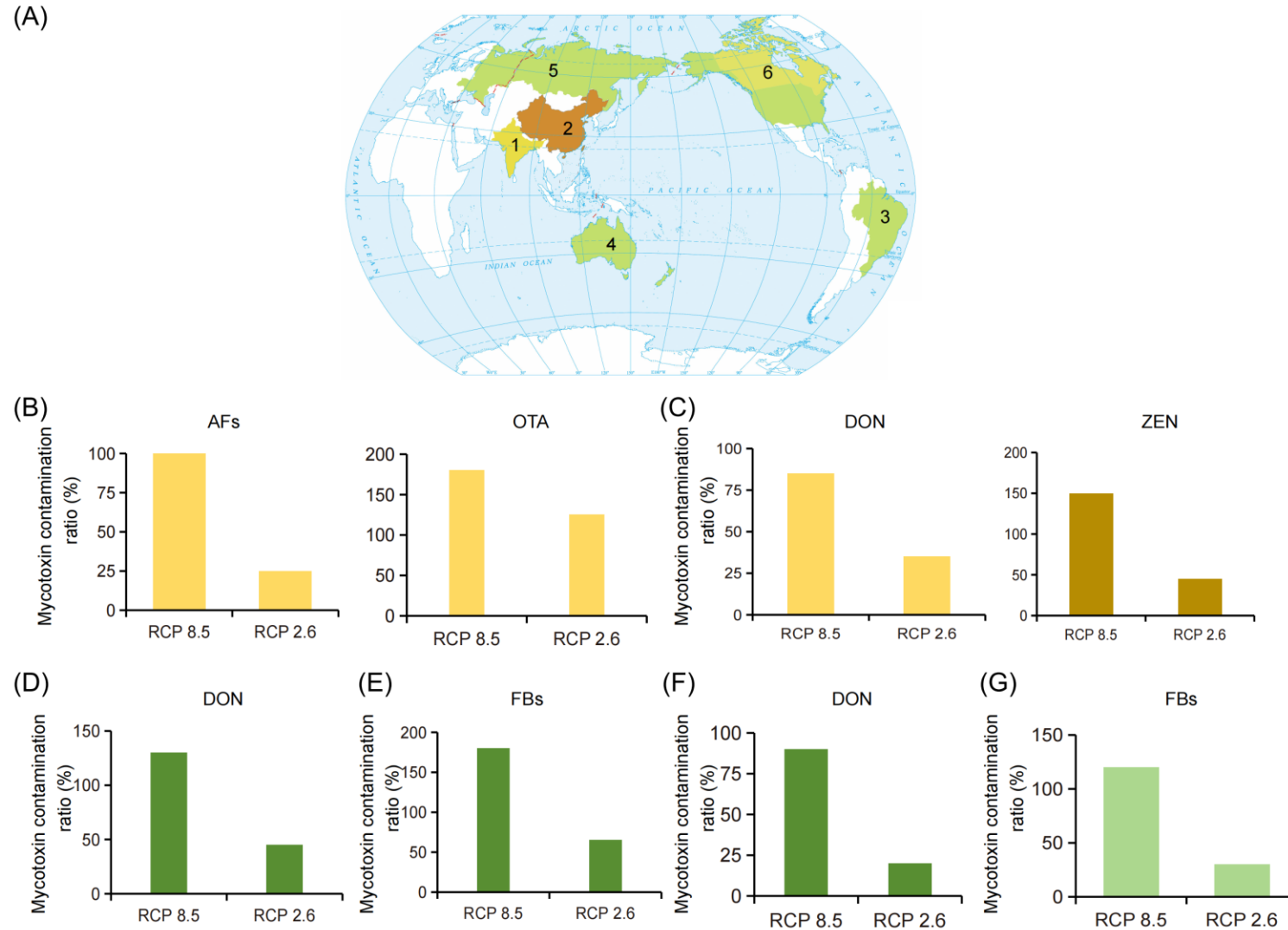


Figure 2. Predicted changes in the infection risk of mycotoxins under climate change scenarios.



Suggestions and measures to address the spread of mycotoxins

Global Predictive Surveillance

- ◆ Climate-crop-fungal growth model
- ◆ High-latitude regions focus
- ◆ Region-specific risk forecasts

- ◆ Advanced biosensors
- ◆ Rapid, in-situ, and accurate detection
- ◆ Cost, field stability, matrix, etc.

Biosensing Technologies

Priority Action

Action 3

Action 2

Last Action

Source-Level Prevention

- ◆ Resistant crop varieties
- ◆ Climate-resilient practices
- Breeding for climate-adapted and pathogen-resistant traits
- Crop rotation
- Tailored to local projections
- Conservation tillage
- Intercropping
- Efficient water mgt

- ◆ Collaborative governance mechanism
- ◆ Focused on developing countries
- ◆ Technology, policy, and local practice

Risk Management Protocol

Figure S1. Schematic overview of the four priority actions proposed to mitigate climate-driven mycotoxin contamination.



Summary

- ❑ Rising temperatures, elevated CO₂, and altered precipitation are driving poleward expansion of mycotoxin contamination since the 1960s.
- ❑ Global surveys show >70% contamination rates for major mycotoxins in staple cereals, threatening food safety and public health worldwide.
- ❑ Low-income countries are disproportionately vulnerable due to limited infrastructure, technical capacity, and awareness.
- ❑ Four priority actions, including surveillance, biosensors, resilient agriculture, and governance, could contribute to mitigating climate-driven mycotoxin risks.

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