



NETHERLANDS INSTITUTE OF ECOLOGY (NIOO-KNAW)
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Koninklijke Nederlandse Plantenziekte Vereniging | 20th Nov 2025

Linda Gouka
Group Viviane Cordovez

Catching cereal killers

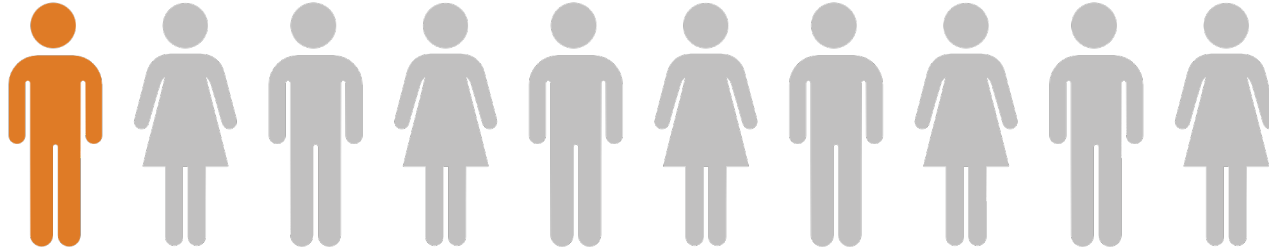
Broodnodige gisten: de stille helden van tarwe



The importance of safe food

Yearly:

Nearly 1:10
people



600 million people fall
ill from food



420.000
die



40 million kids (<5 age) with
food poisoning



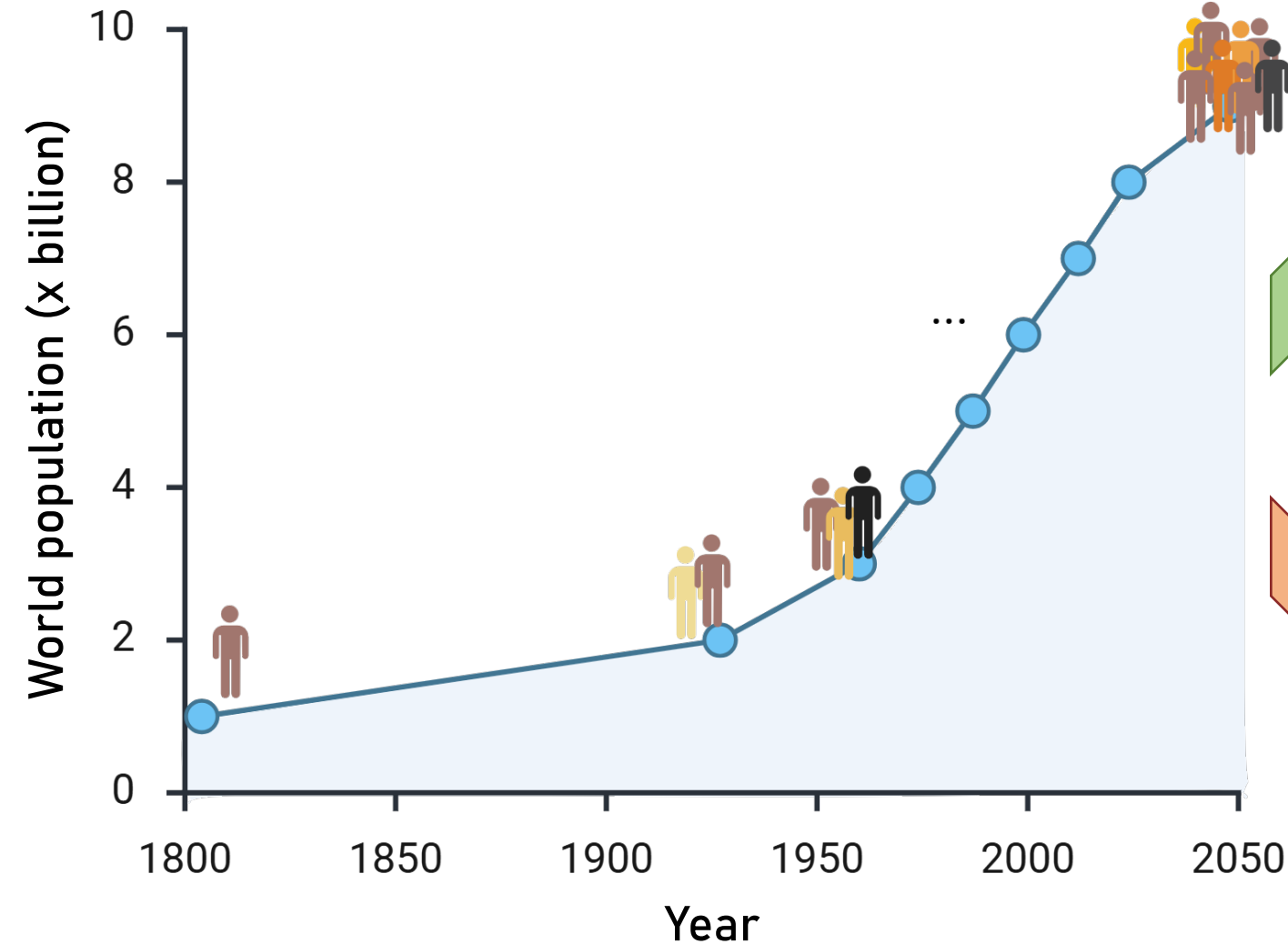
125.000
die



Source: World Health Organization [WHO]

The importance of safe food

The world population keeps increasing

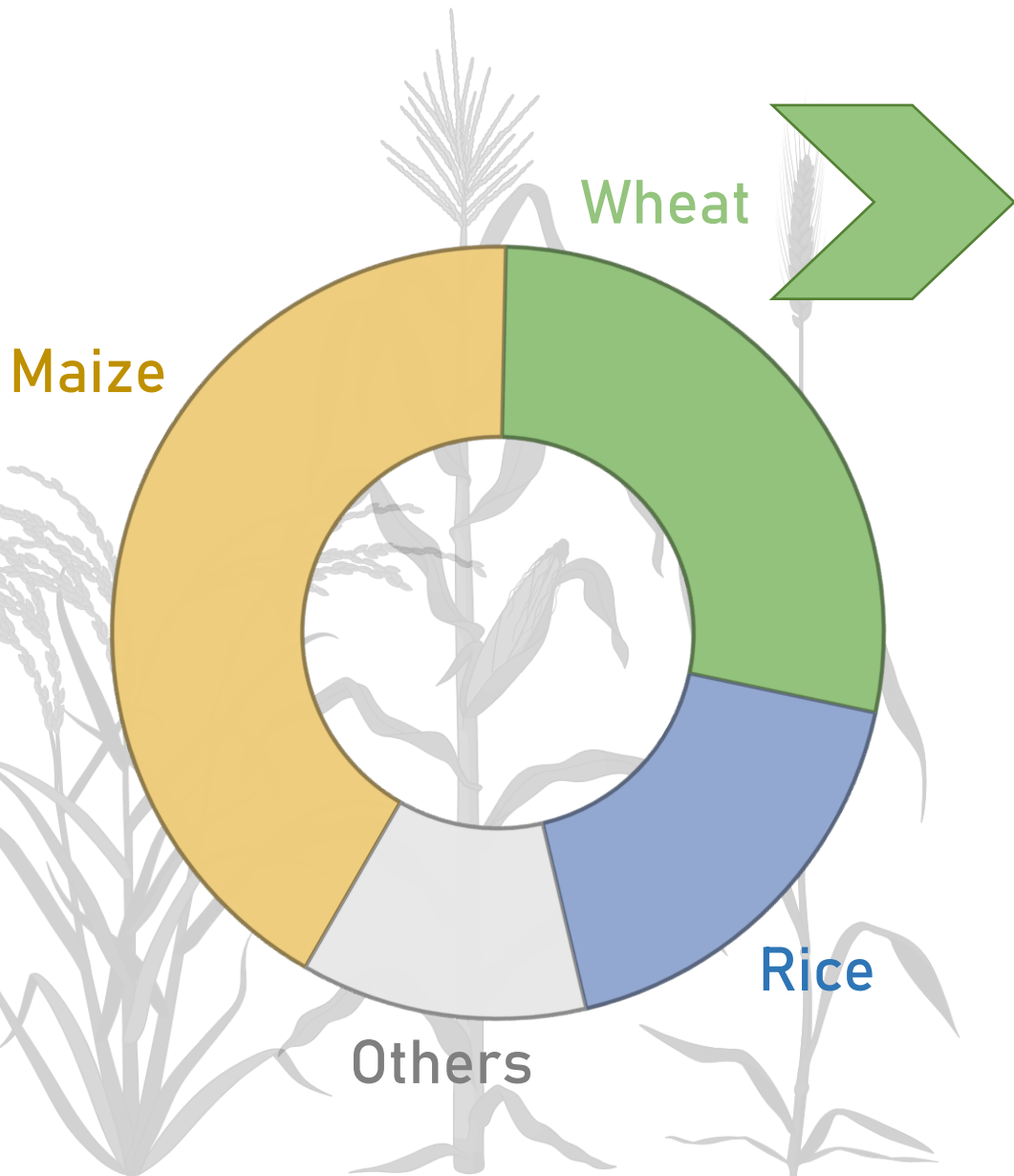


Food production
keeps increasing



20-40% of yield is lost due
to pests and diseases

The vulnerability of our food system



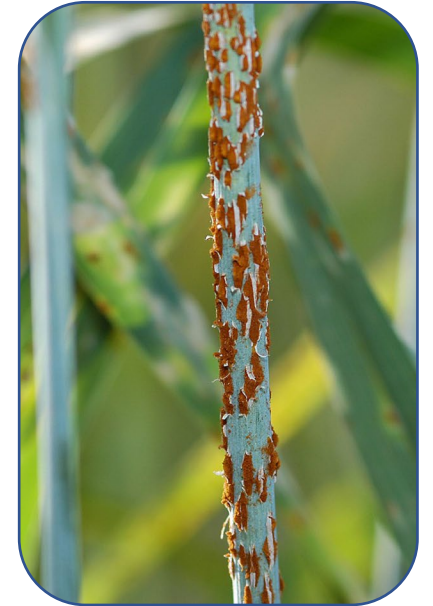
Wheat is extremely vulnerable
Threatened by various fungal
diseases



Fusarium
head blight

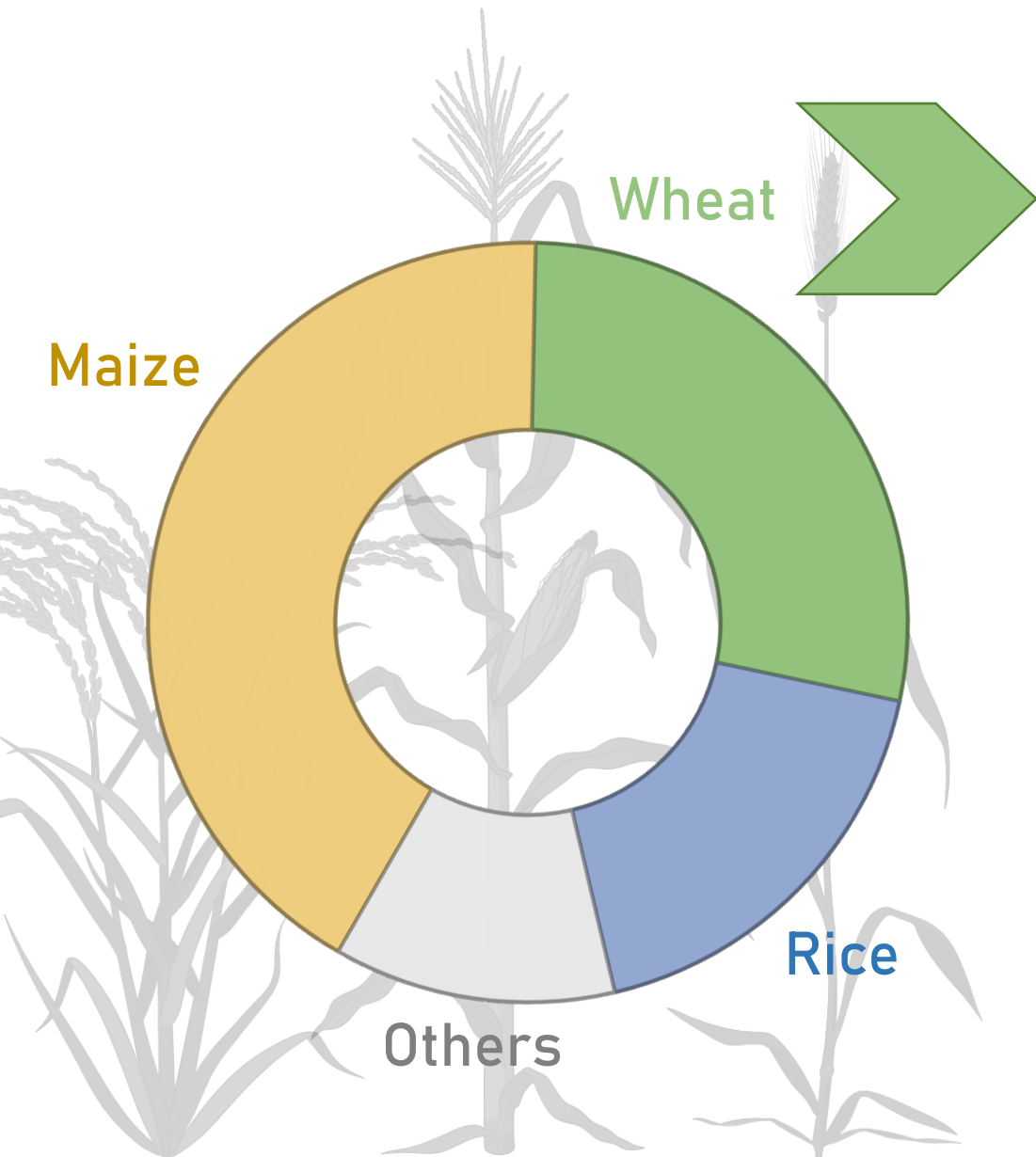


Septoria
tritici blotch



Puccinia
black rust

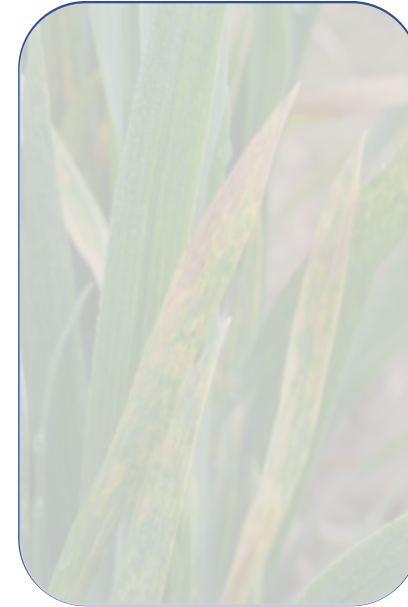
The vulnerability of our food system



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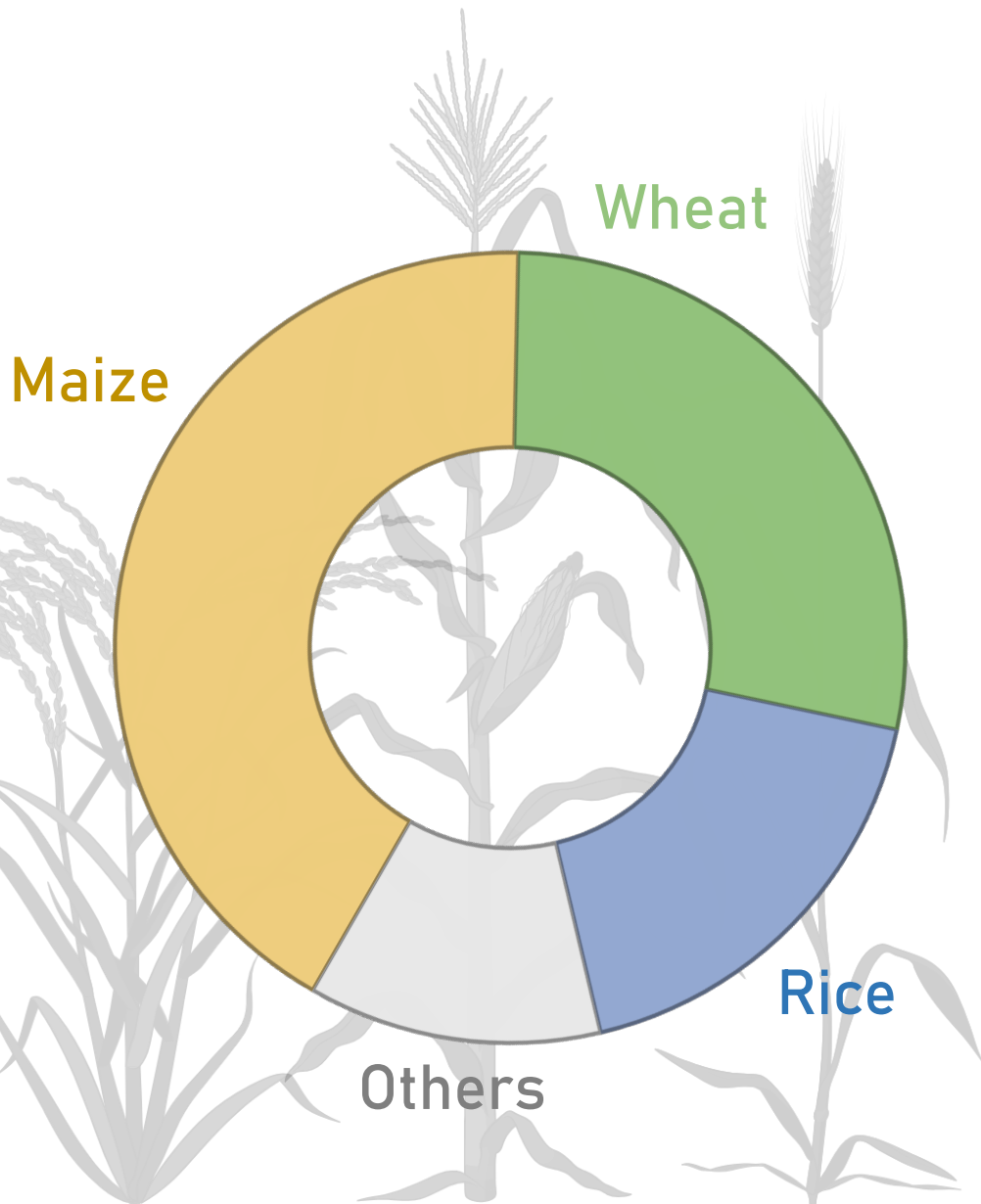


Septoria
tritici blotch



Puccinia
black rust

The vulnerability of our food system



Fusarium Head Blight

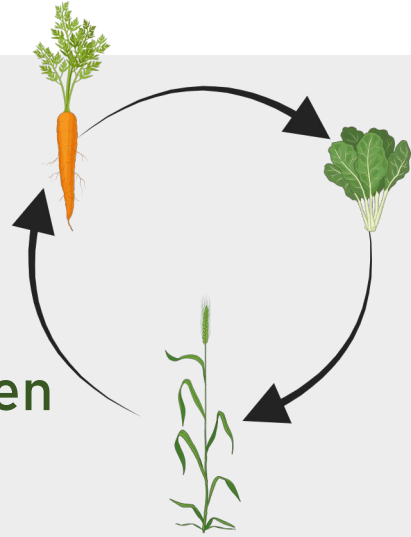


- Shivered and empty grains
- Contamination of mycotoxins (present in 80% of all grains)
- Favored by climate change
- Fungicide use in 40-60% of planted area

Management of plant diseases

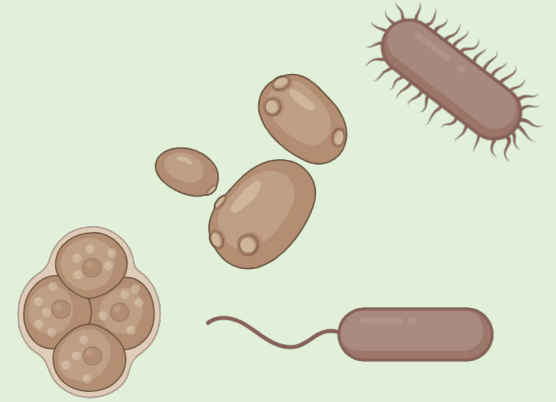
Prevention

- Limited efficacy
- Long-term pathogen survival



Biologicals

- Microorganisms
- Antimicrobials



- Bad for the environment
- Health risks
- Regulations

Chemicals

- Resistance
- Time consuming and limited availability



Genetic breeding

Management of plant diseases

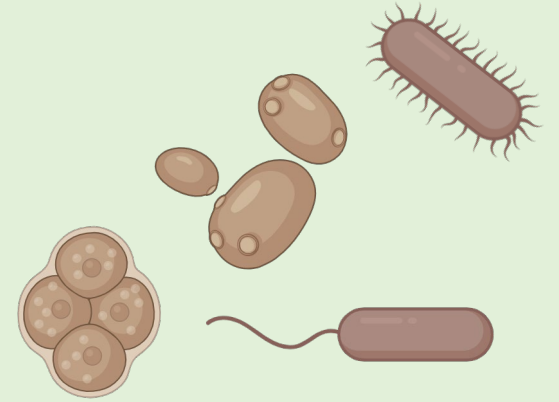
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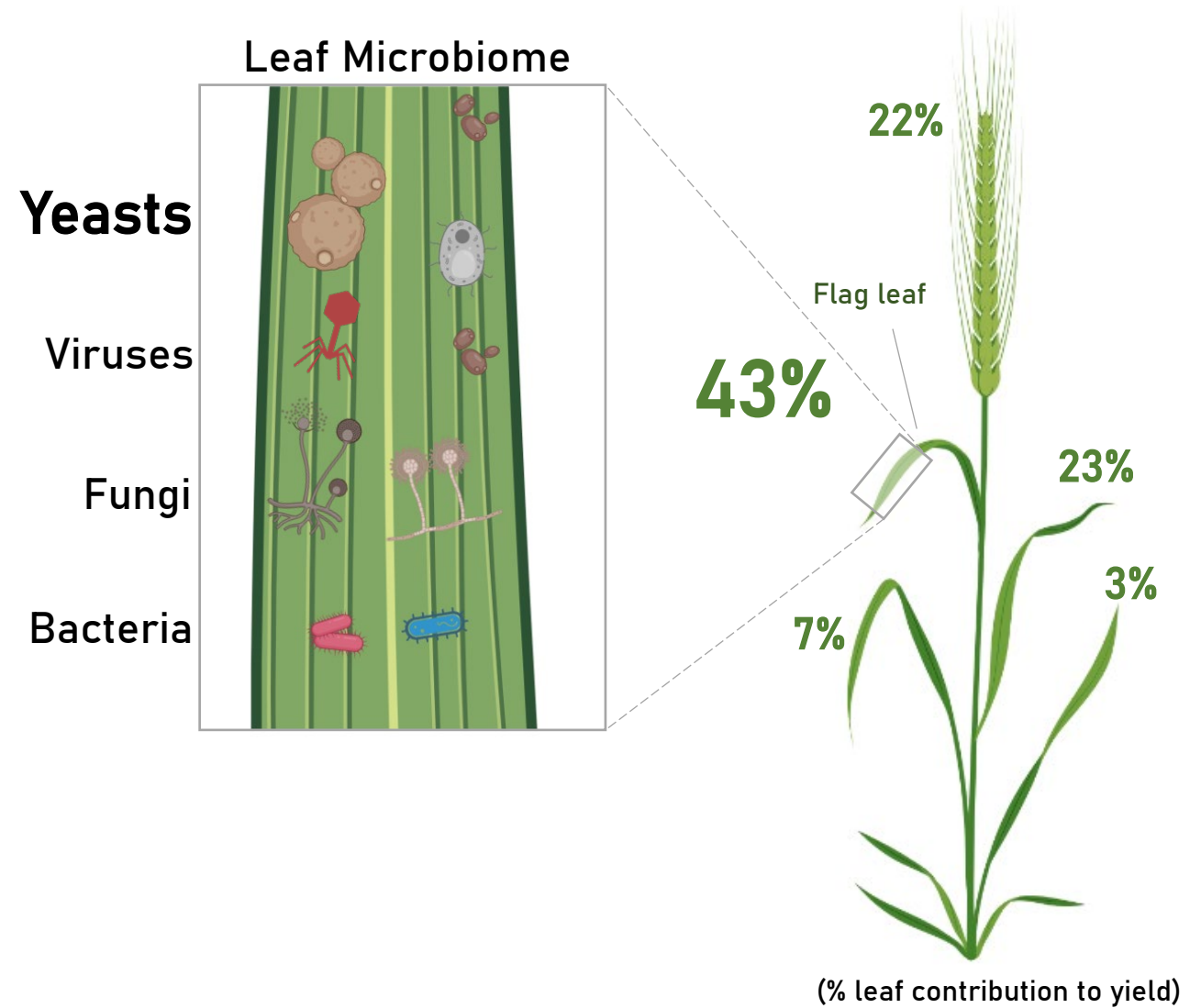
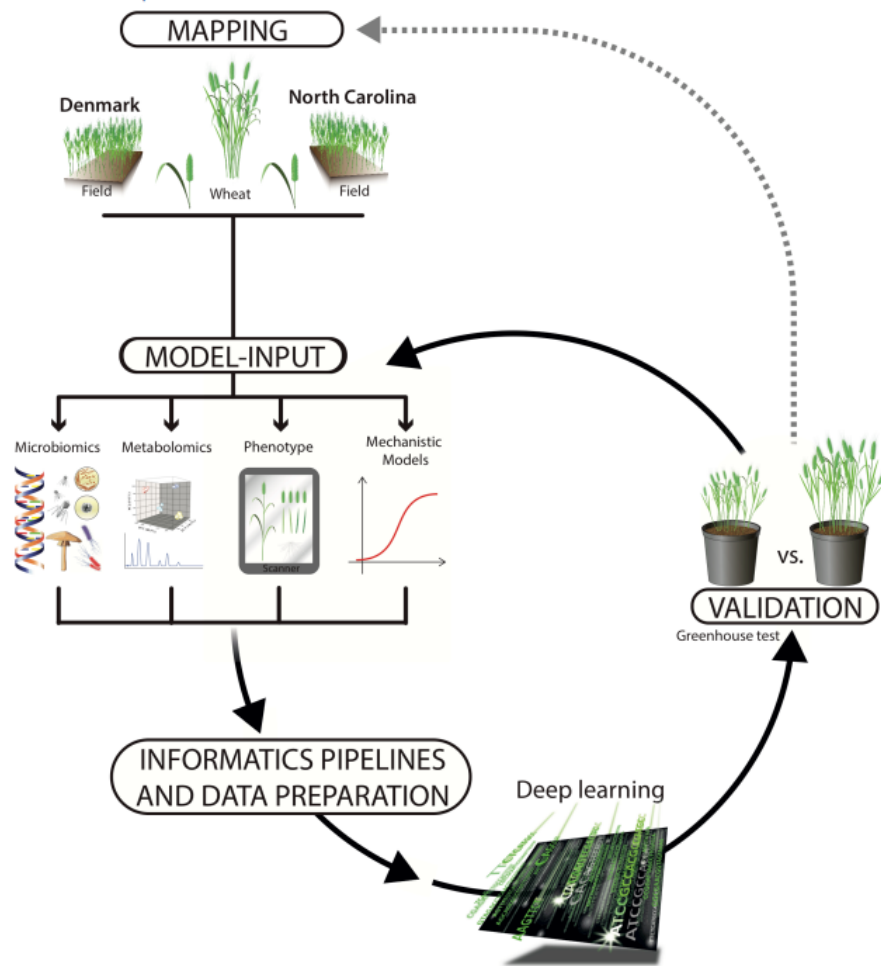
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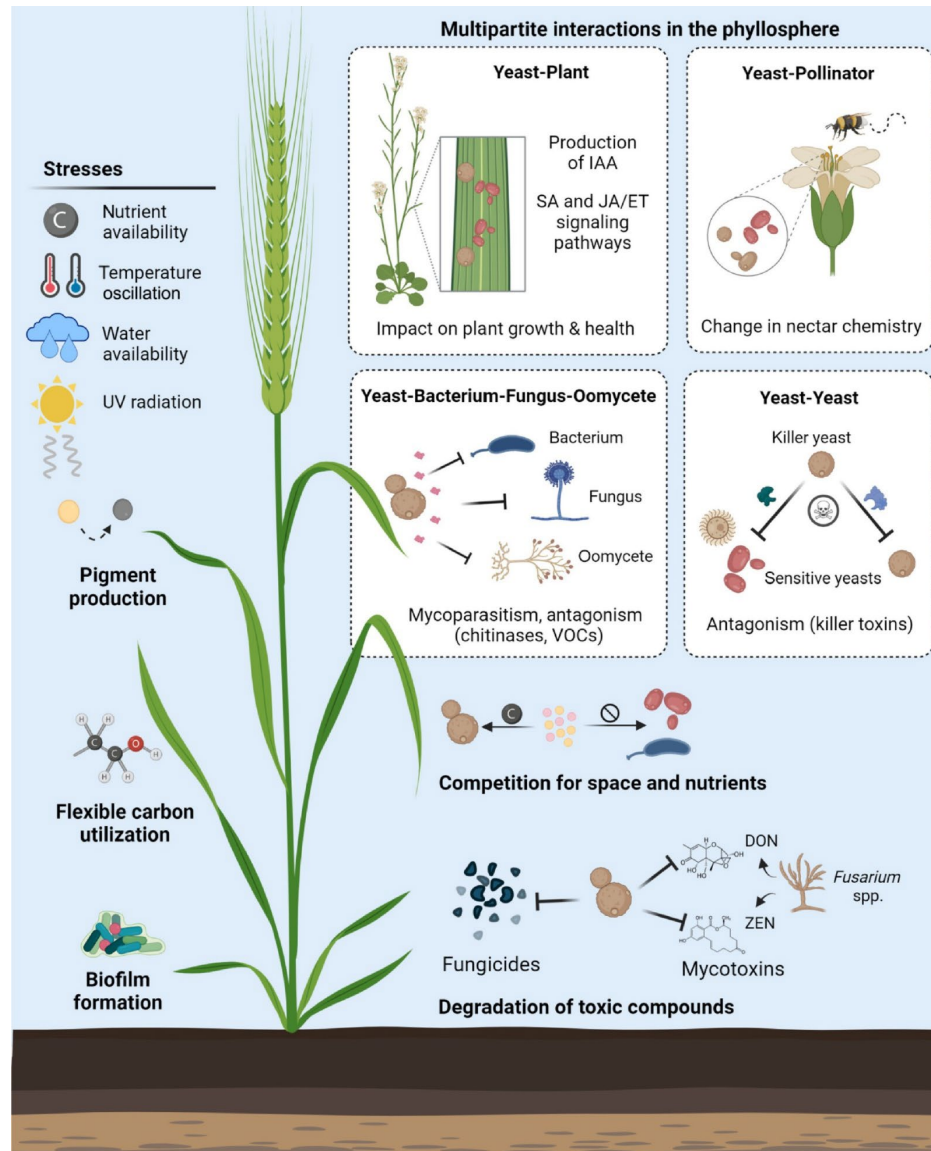
Genetic breeding



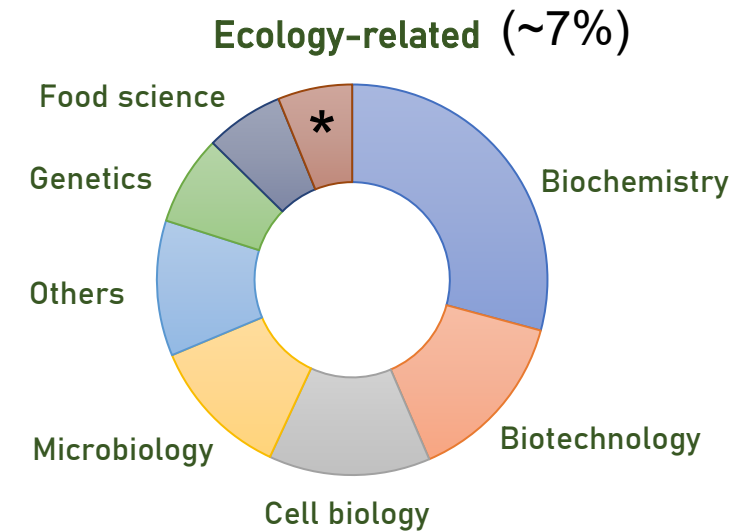
Microbiome Assisted *Triticum* Resilience In X-dimensions



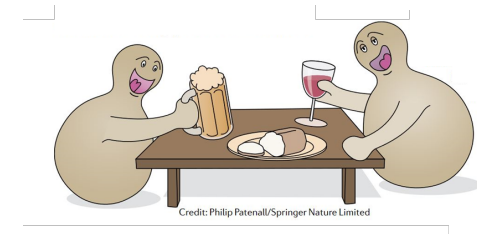
Ecology & functional potential of phyllosphere yeasts



Gouka et al. *Trends in Plant Science* (2022)

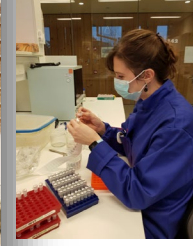
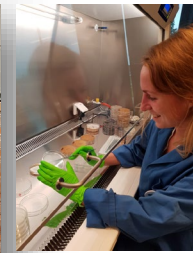
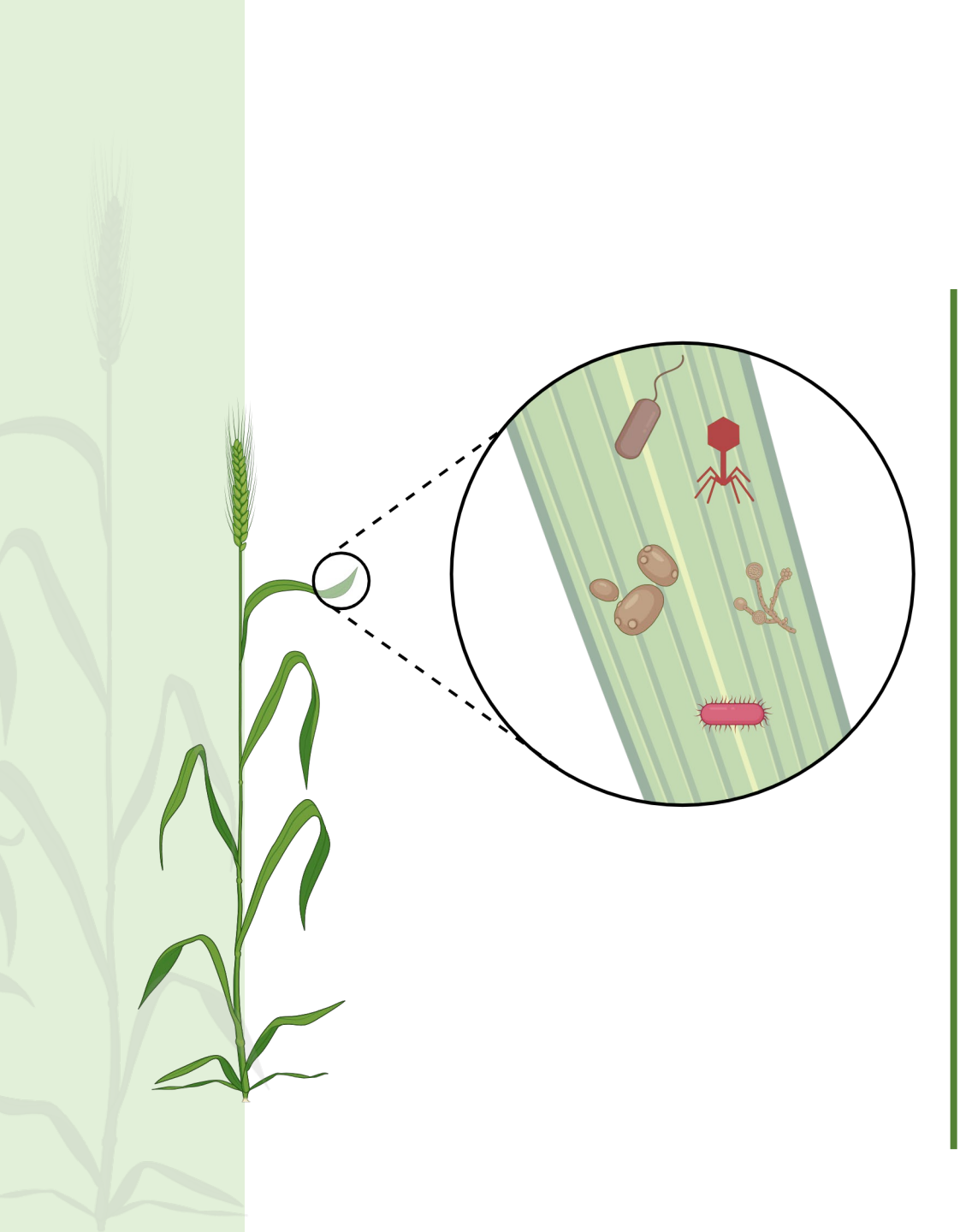


Why yeast?



The Yeast Isolate Repository

Foundation for functional validation

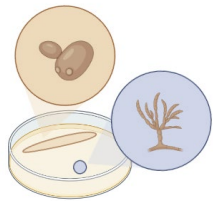


900 isolates
536 sequenced (ITS)

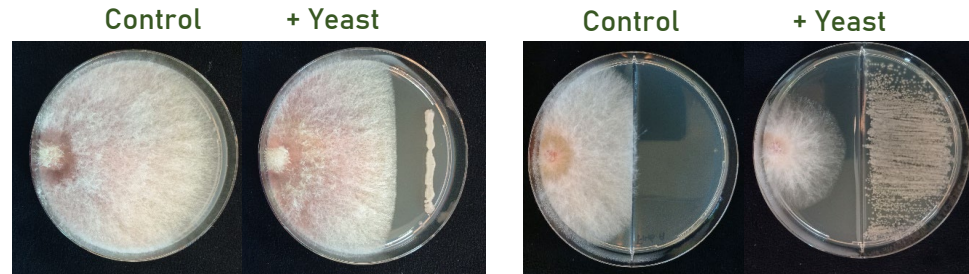
Interactions between phyllosphere yeasts and *Fusarium*



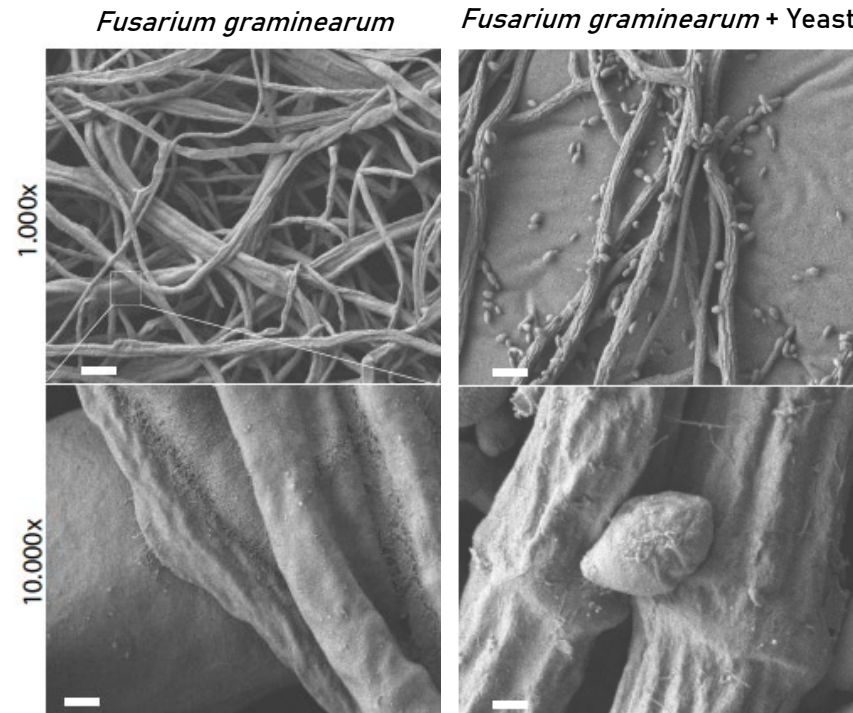
Fusarium graminearum
(Head Blight)



Dual culture assays
& Microscopy (SEM)

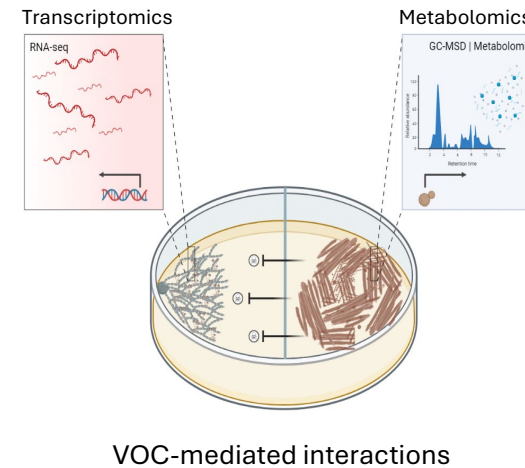
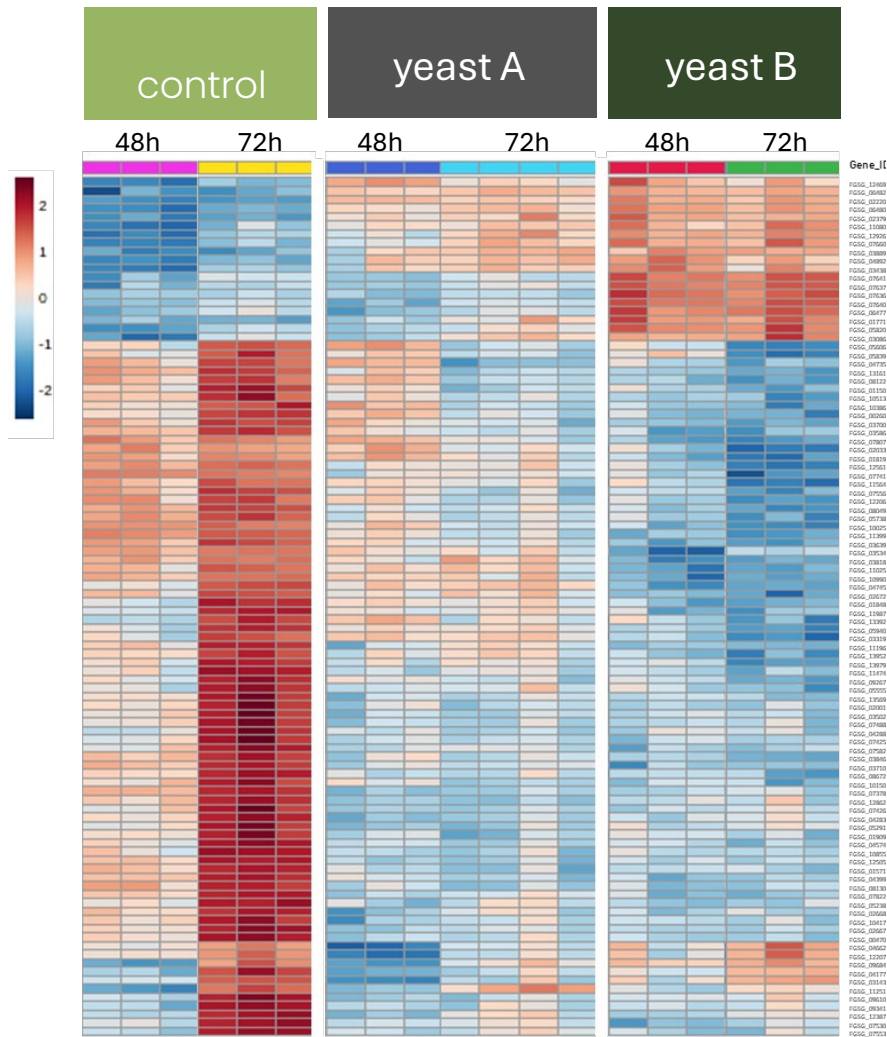


Hyphal growth
inhibition



Altered hyphal
morphology

Molecular & chemical mechanisms

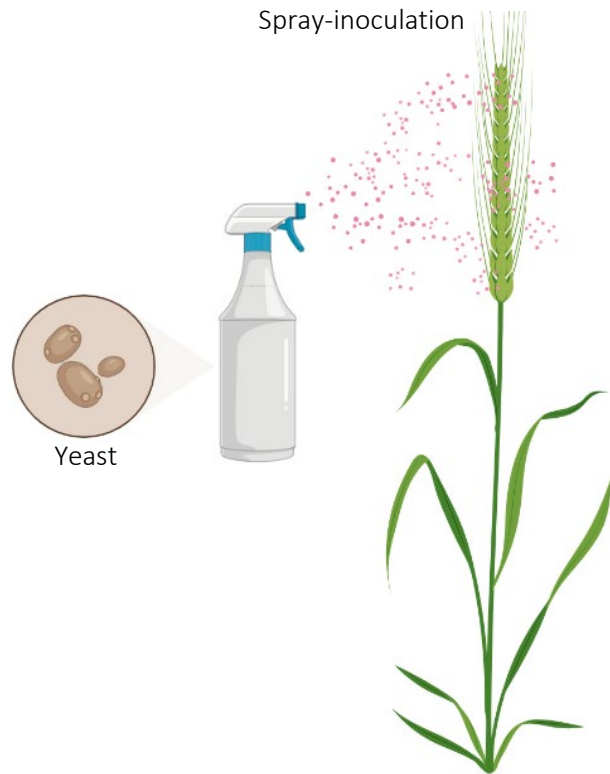


Fusarium triggered minimal expression changes in yeasts

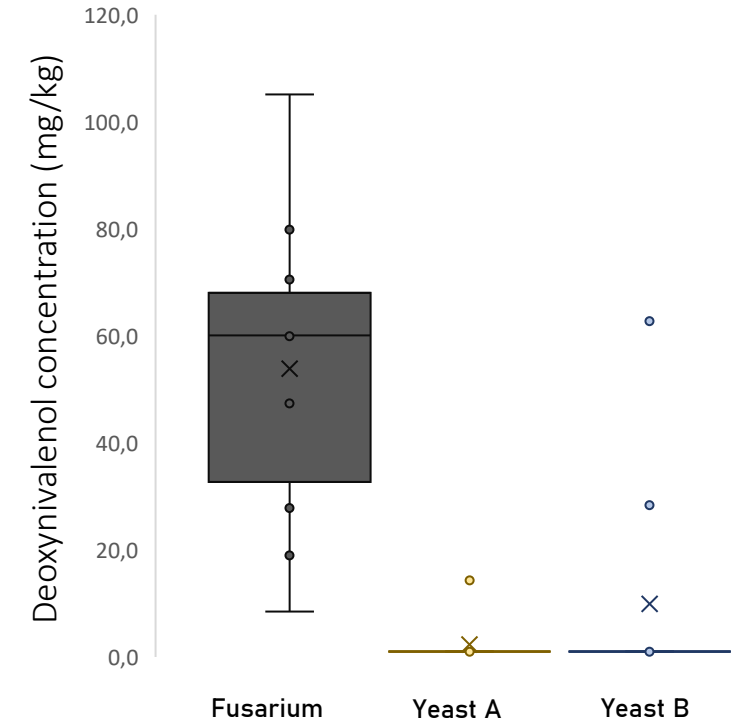
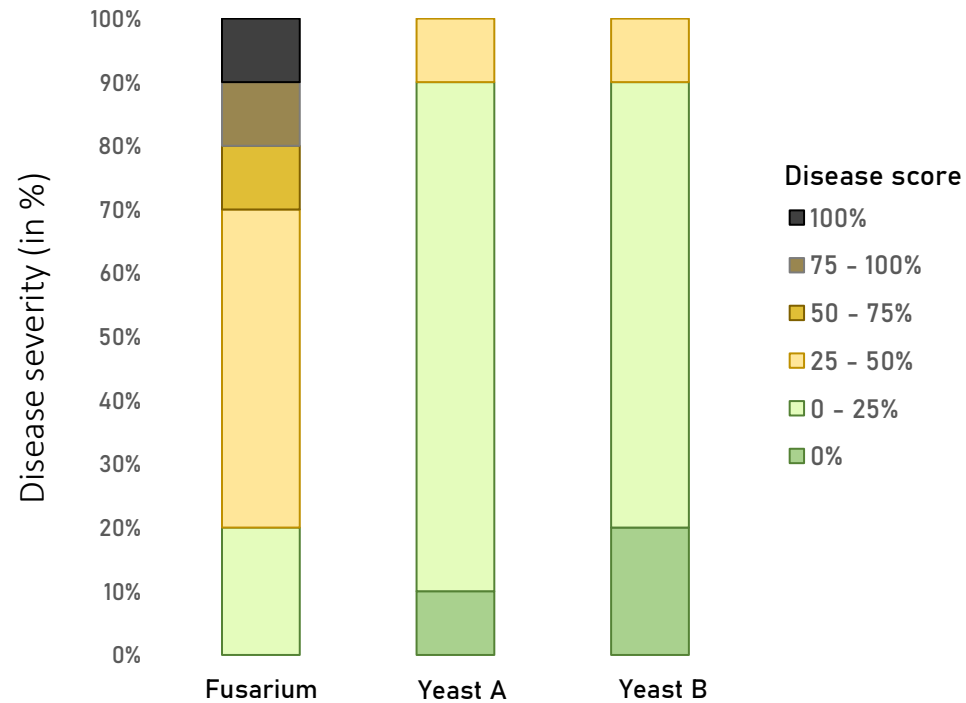
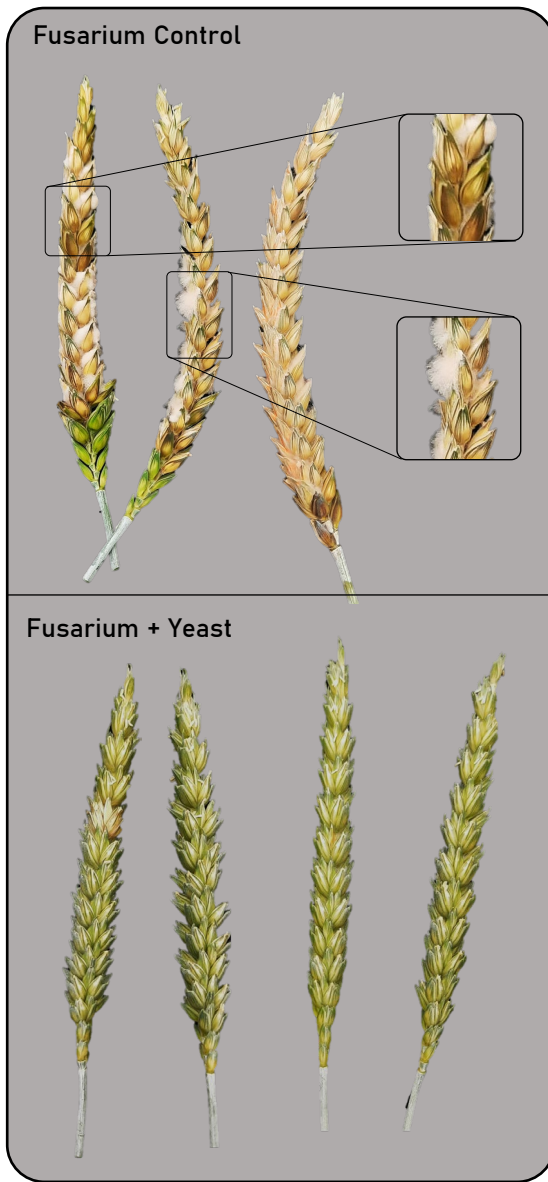
Yeast strongly influenced gene expression in *Fusarium*

Catching cereal killers

Yeast as biological control against FHB

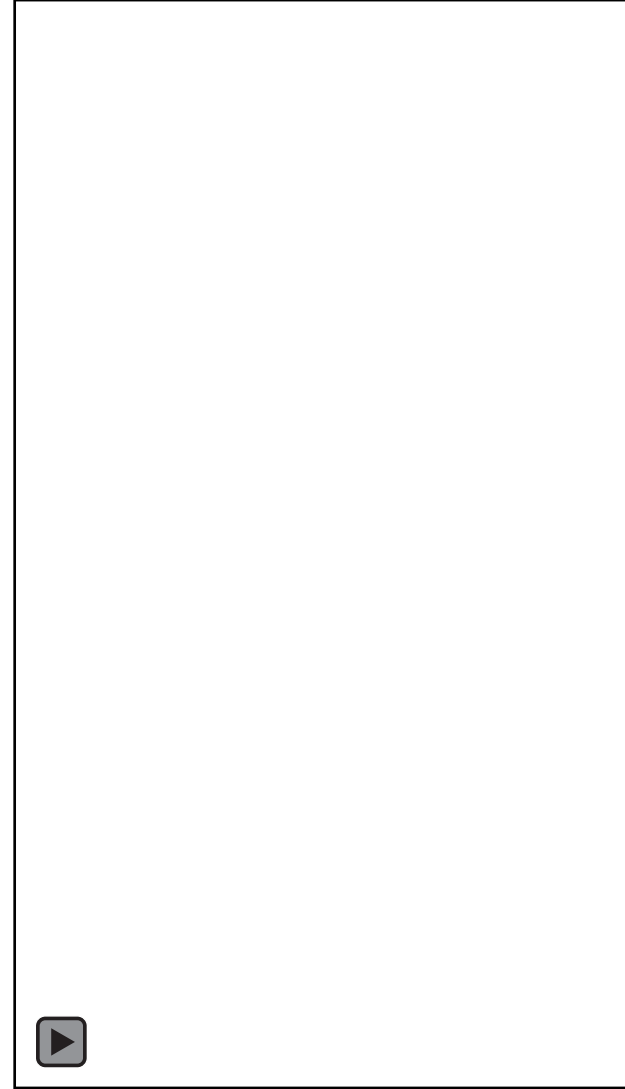
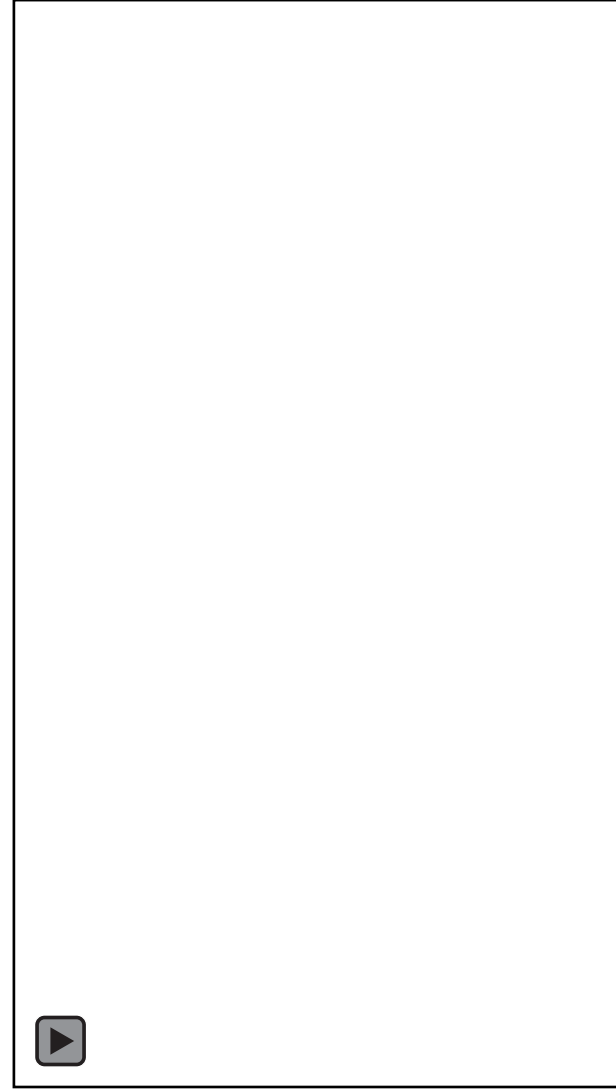
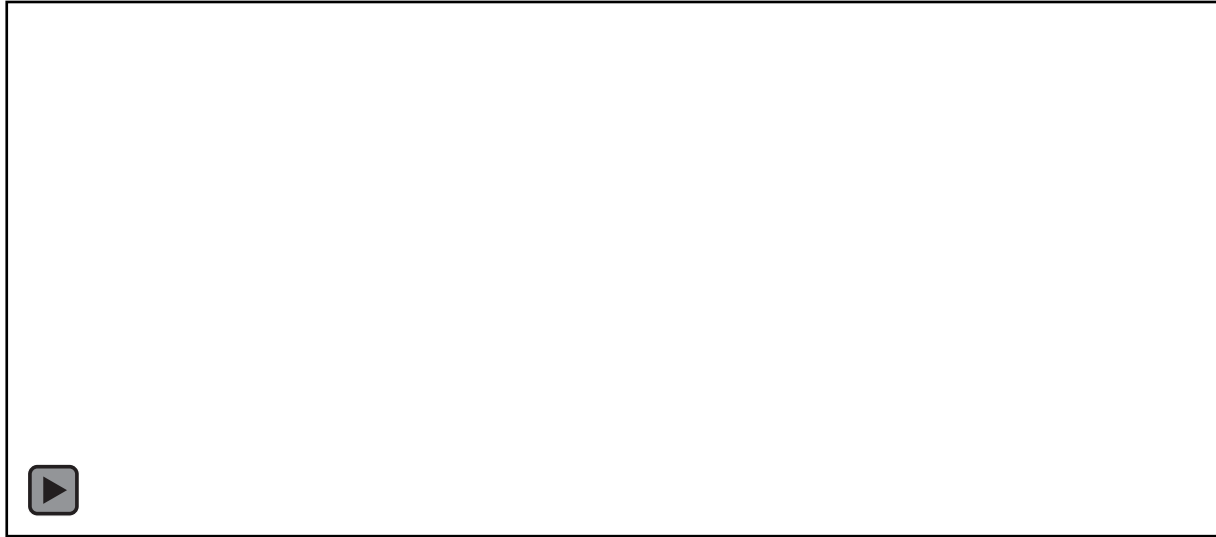


Yeast as biological control against FHB



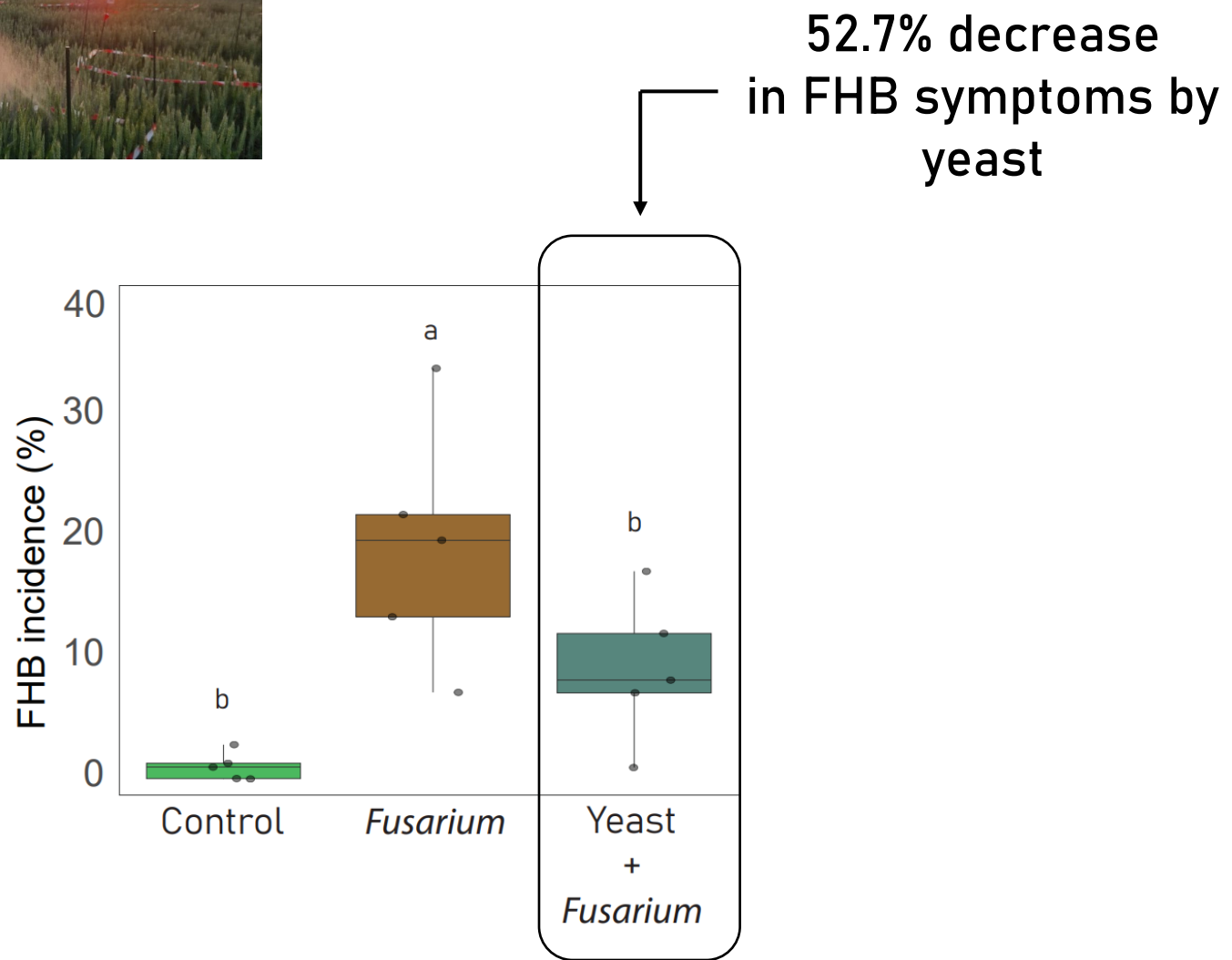
Lower disease severity and DON concentration

Catching cereal killers in the field





Catching Cereal killers



Catching cereal killers

Take-home messages

- The phyllosphere is a reservoir of functionally diverse yeasts
- Phyllosphere yeasts decrease mycotoxin contamination caused by *Fusarium graminearum*
- Phyllosphere yeasts protect wheat against FHB both under laboratory and field conditions





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Thank you!

