



**MYTOXPLEX PROJECT**  
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# OUTLINE OF THE PRESENTATION

- MytoxPlex background
- Condensed material and methods
- Results for unprocessed cereals, feed and **food**
- Implications



# MYTOXPLEX BACKGROUND

- EFSA call on T-2 and HT-2 complex
- Up-and-coming *Fusarium* species in Belgium
- Focus on food, but also unprocessed grains and feed
- Partners:



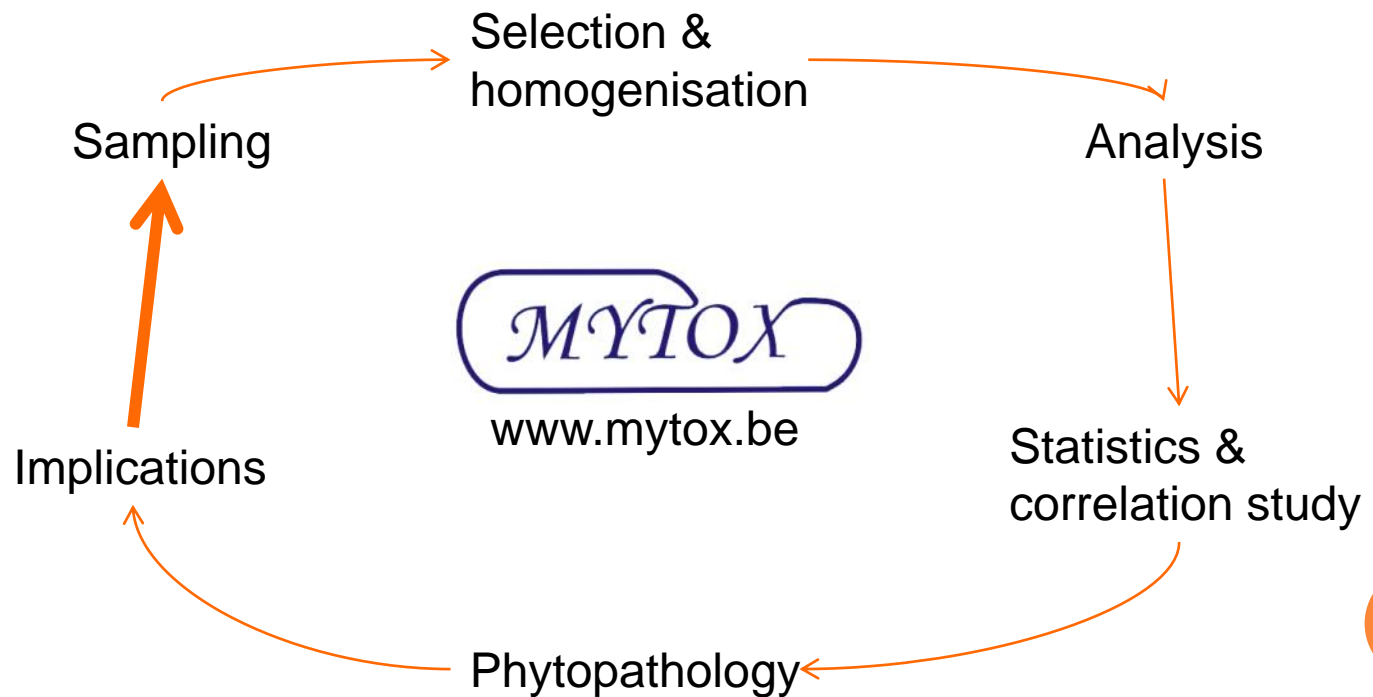
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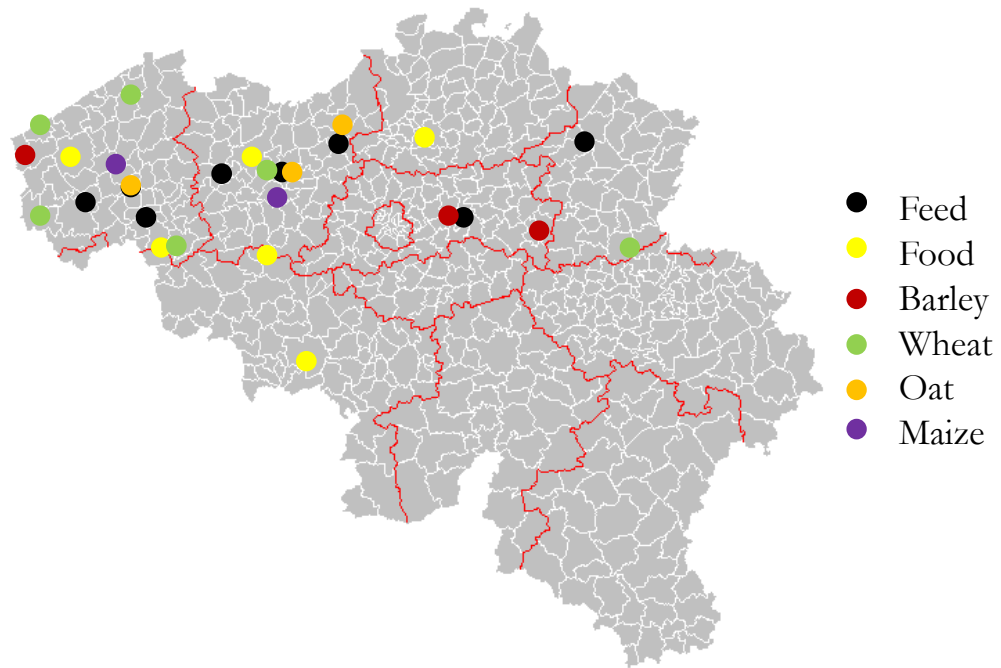
# MYTOXPLEX BACKGROUND

**MYTOX** = valuable combination of interests:

development of new analytical techniques  
monitoring of toxin levels in grains, food and feed  
phytopathology behind the occurrence of mycotoxins



# MATERIAL AND METHODS: SAMPLING



# MATERIAL AND METHODS: SELECTION & HOMOGENISATION

- Unprocessed grains: ground with mixer  
Barley, wheat, triticale, maize

N = 178

- Feed samples: pulverizing of +/- 200 grams  
**Oat feed**, mixed feed (diverse origins)

N = 26

- **Food samples**: pulverizing of +/- 100 grams  
**Breads and breakfast cereals**

N = 45



## MATERIAL AND METHODS: ANALYSIS

- Extraction of mycotoxins from the ground cereal matrix: acetonitril extraction
- Detection of 12 mycotoxins in 11 minute run:  
DON, DON-3G, 3-ADON, 15-ADON, FUS-X  
NEO, DAS, T-2, HT-2  
ZEN, A-ZEL, B-ZEL
- LOQ T-2: 18-22  $\mu\text{g}/\text{kg}$ ; HT-2: 10-18  $\mu\text{g}/\text{kg}$
- Analysis of fungal DNA on the same samples:  
detection of 9 different *Fusarium* species



## RESULTS: UNPROCESSED CEREALS

- Barley (N = 65):
  - T-2: 2 positive samples (mean = 18,5 µg/kg)
  - HT-2: 2 positive samples (mean = 16 µg/kg)
  - No *F. langsethiae*, but *F. sporotrichioides* in 2nd sample
- Wheat (N = 93):
  - T-2: 0 positive samples
  - HT-2: 1 positive sample (17 µg/kg)
  - No *F. sporotrichioides*, highest detected load of *F. langsethiae*
- Triticale (N = 10): no positive samples
- Maize (N = 10): no positive samples

No conflicts with 2013/165/EU





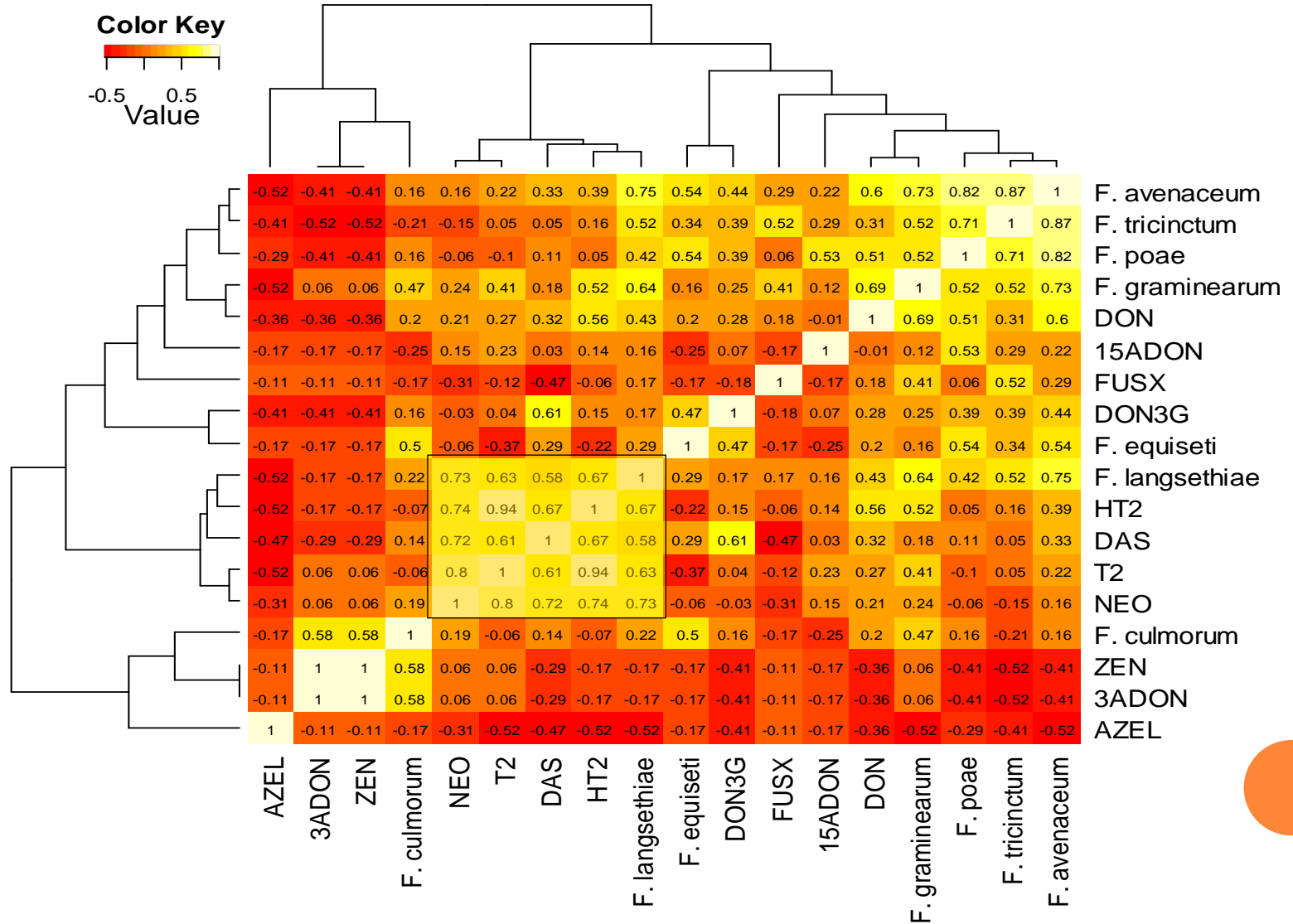
## RESULTS: FEED

- 16 mixed feed samples:
  - Show a mycotoxin and fungal profile very similar to wheat, barley and triticale field samples
- 10 oat feeds:
  - T-2: detected in 9 samples (19 – 190 µg/kg)
  - HT-2: detected in every sample (34 – 405 µg/kg)
  - No *F. sporotrichioides* detected in the samples, but *F. langsethiae* in every sample

No conflicts with 2013/165/EU



# RESULTS: OAT FEED



# RESULTS: FOOD

- 25 analyzed breads:
  - T-2: detected in 2 samples (mean = 24 µg/kg)
  - HT-2: detected in 12 samples (19 – 21 µg/kg)
  - No *F. langsethiae*, no *F. sporotrichioides*
    - Degradation of DNA during production process?
  - 16 breads were advertised as “whole-wheat”
    - 2 positive T-2 samples
    - 10 of the 12 positive HT-2 samples

Indicative level for T-2 + HT-2 (25 µg/kg) exceeded twice (44 µg/kg)



## RESULTS: FOOD

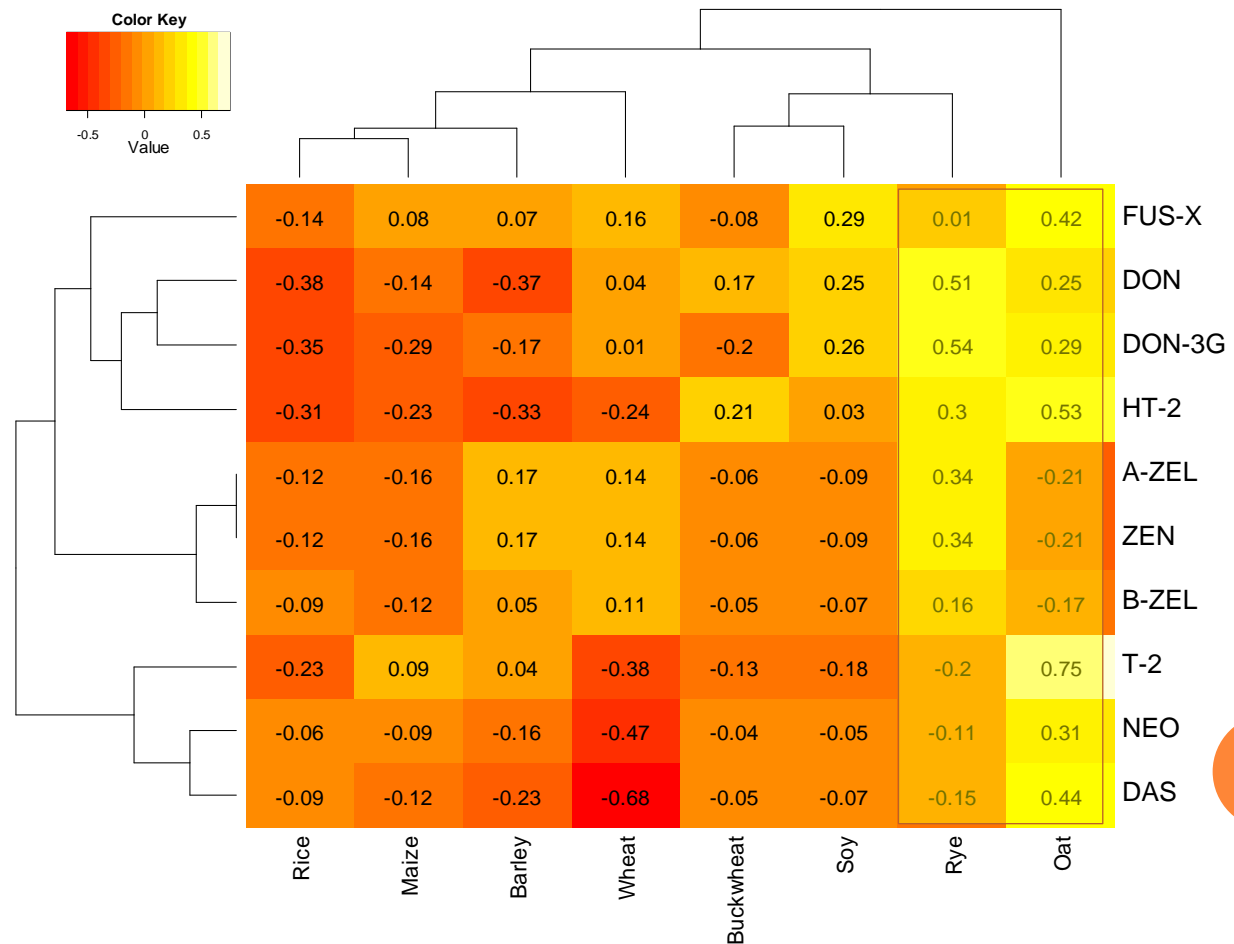
- 20 analyzed breakfast cereals:
  - T-2: detected in 7 samples (24 – 59 µg/kg)
  - HT-2: detected in 6 samples (20 – 92 µg/kg)
  - No *F. sporotrichioides*, but *F. langsethiae* detected in all positive samples

Indicative level for T-2 + HT-2 (75 µg/kg) exceeded once  
(151 µg/kg)



# RESULTS: FOOD

- Division of all food samples according to cereal ingredients:



# RESULTS: FOOD

## MycoMask project (Marthe De Boevre):

### 1. Probabilistic risk assessment on T-2 + HT-2 intake

- Extensive survey on cereal-based food products (2010-2011)
- Detailed information on consumer habits in Belgium
- TDI for T-2 + HT-2: 100 ng/kg b.w.
- Fiber-enriched bread: 16.60 % > TDI
- Bran-enriched bread: 1.89 % > TDI
- Oatmeal: 0.02 % > TDI
- All cereal based foods: 4.11 % > TDI

→ De Boevre et al. (2013), Toxicology Letters



# RESULTS: FOOD

## MycoMask project (Marthe De Boevre):

### 2. Fate of DON and DON-3G during baking of bread

- Simulation of breadmaking process:
  - Flour → white bread: no effect on DON and DON-3G
  - Flour/bran (85/15) → grey bread: increase in DON and DON-3G

What (enzymatic) reactions lead to this increase?

→ an interesting case for future research!



# IMPLICATIONS

- Origins of T-2 and HT-2 complex in the field are rather unclear
- T-2 and HT-2 in oat (feeds) are caused by *F. langsethiae* but do not exceed indicative levels
- Rye and oats in food samples may lead to increased risk for T-2 and HT-2 contamination
- Co-occurrence of T-2 and HT-2 with NEO and DAS: other toxic “type A trichothecenes”!





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## ○ Industrial partners

