

Mycotoxin prediction modelling @Mytoolbox

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26-10-2020



Mycotoxin development

- Input data:

- Toxin concentration of the grain field at harvest
- Agronomics of the field
- Hourly weather data related to the field
- Crop phenology



- Output: Predicted toxin concentration at grain harvest

Various modelling types (1)

■ Empirical

- Statistical relationships between input (agronomics, weather, crop phenology) and output (toxin concentration)

■ Mechanistic

- Biology of fungus and toxin production
- Based on experimental data

■ Machine learning

- Based on input data, and relationships among them

■ Combinations !

Various modelling types (2)

■ Maize/corn

- Aflatoxins and fumonisins
- European level, grid basis

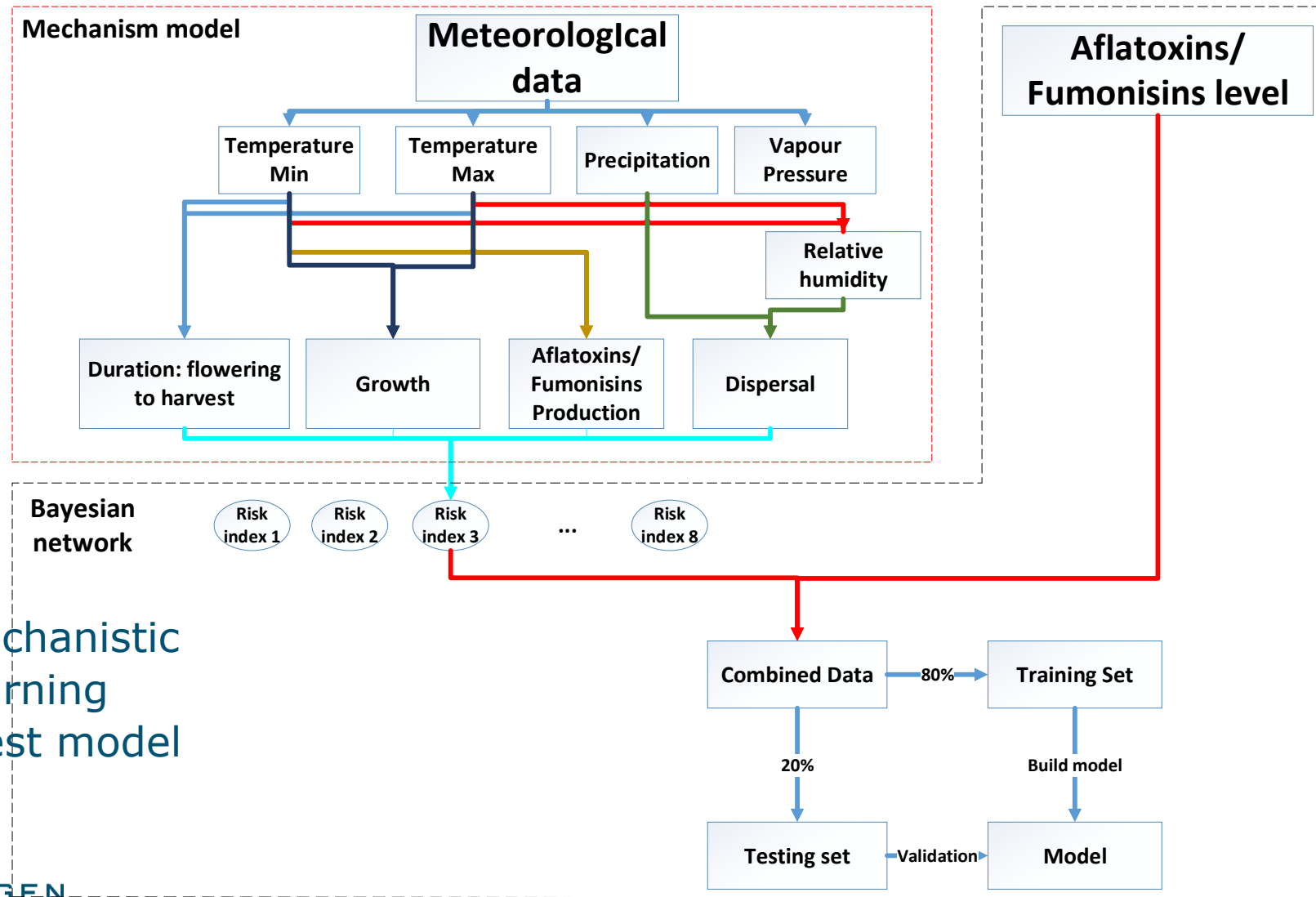


■ Wheat

- Deoxynivalenol and zearalenone
- NW Europe: Regional level, grid basis
- Ensemble modelling: multiple model output, weighted estimate per grid



Mycotoxin- maize model description



Combination Mechanistic and Machine learning modelling for best model accuracy

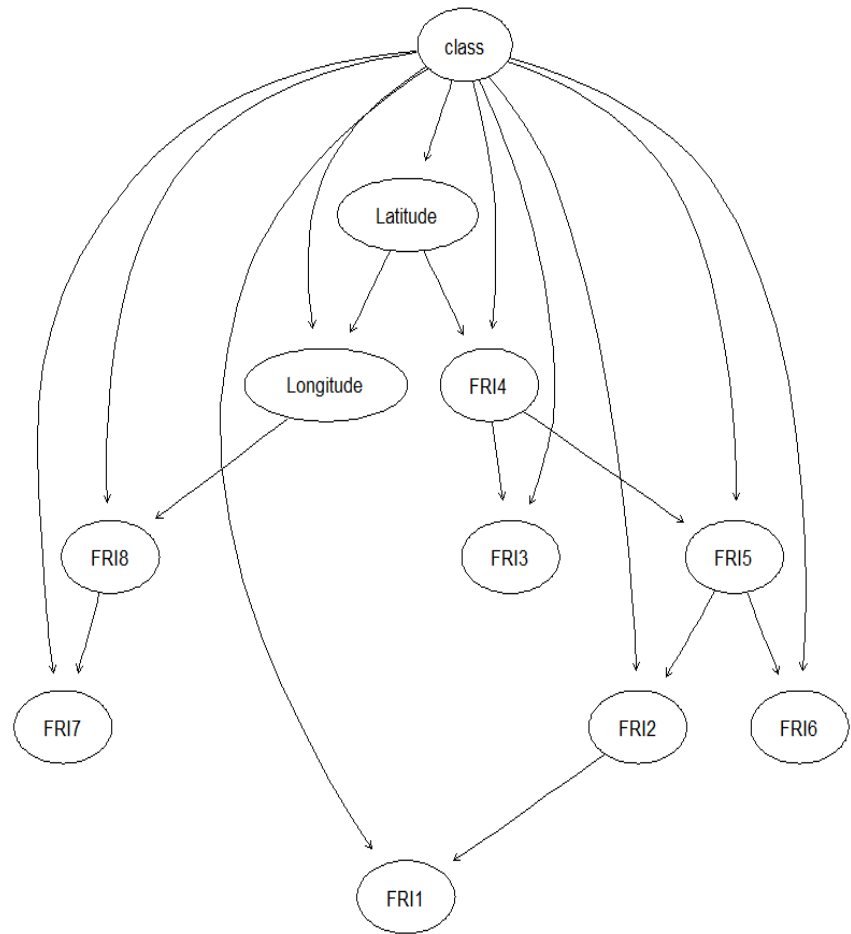
Aflatoxin - maize model



Model accuracy validation: 84% low classes and 84% high classes

		Prediction					
		Training set		Internal validation set		External validation set	
Observation		High	Low	High	Low	High	Low
	High	116	23	22	5	17	3
	Low	72	390	20	104	32	65

Fumonisin - maize model



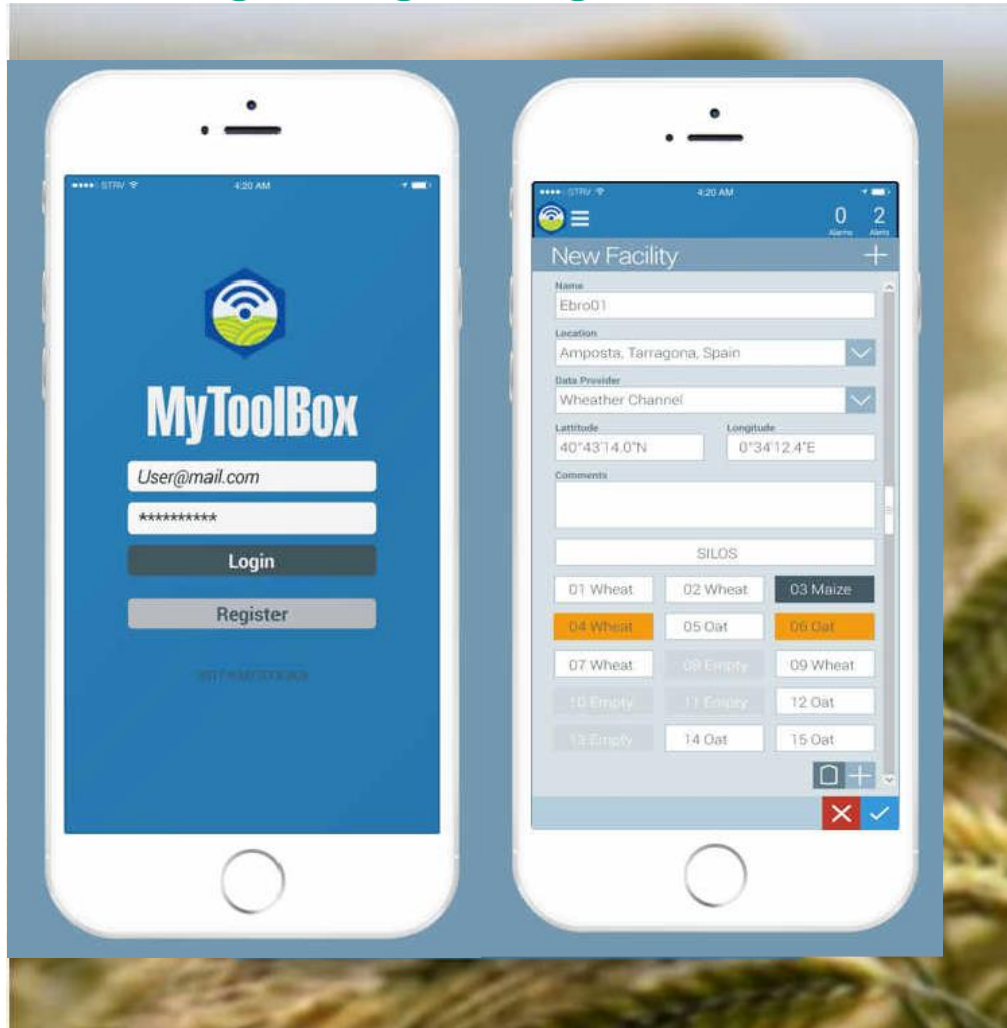
Model accuracy for external validation 80%

		Prediction					
		Training set		Internal validation set		External validation set	
Observation		High	Low	High	Low	High	Low
	High	28	11	10	6	4	4
	Low	18	51	3	18	5	32

MyToolbox E-platform

Decision support in mycotoxin management

Registering and login



Forecasting

03 Wheat

Name
03- Wheat

Fungicide Treatment
0 times

Heading Date
21-05

Flowering Date
25-07

Harvest Date

Risk of DON at harvest:

> 1250 ppb
500-1250 ppb
<500 ppb

Consider fungicide spray to reduce risk of DON at harvest

For more detailed results click on current day

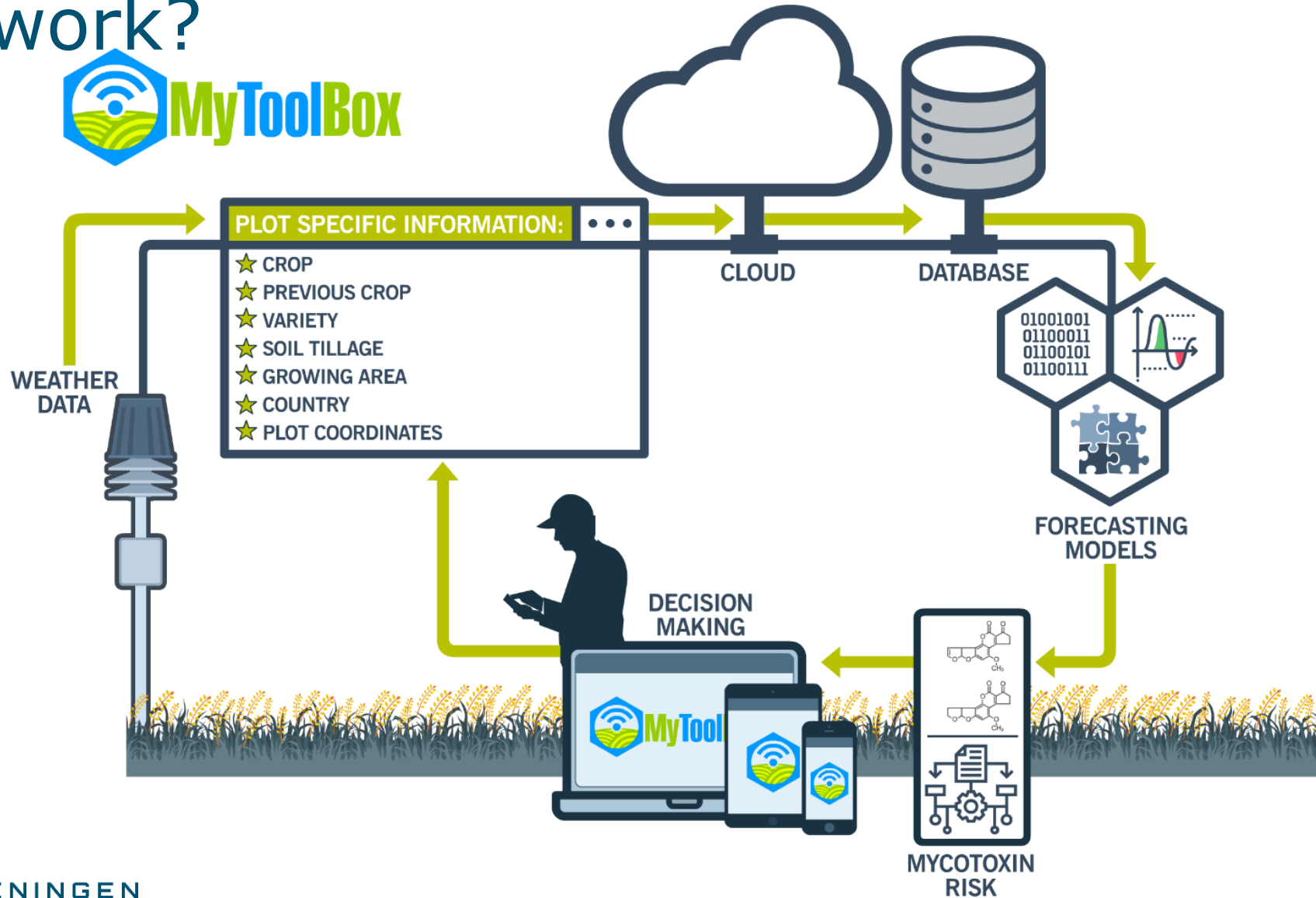
July

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

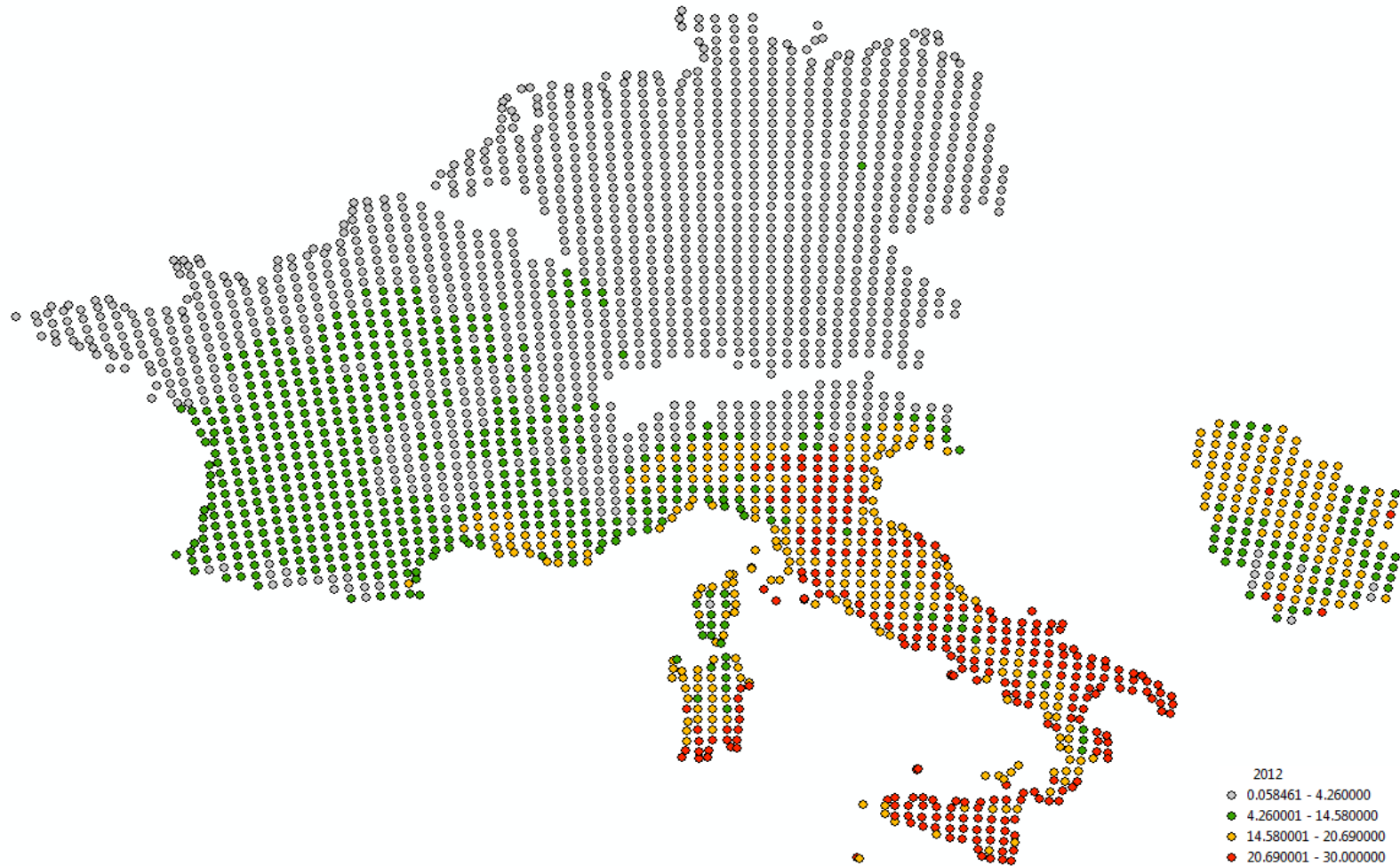
Probability at harvest:
>1250 ppb : 5%
500-1250 ppb : 75%
<500 ppb : 20%



How do mycotoxin forecasting models work?



Aflatoxin maize EU model



Predicted aflatoxin contamination class, 2012

AFRICA: There are no commercially successful models to predict **aflatoxins** in any commodity. But a model has been proposed to draw probability maps in Africa (Masuoka, Chamberlin and Elias 2010).

83rd JECFA (kindly provided by David Miller)

The consortium MyToolBox



Kick-off meeting
on March 8/9, 2016, @ BOKU/UFT, Tulln



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