



INTERNATIONAL ASSOCIATION FOR
CEREAL SCIENCE AND TECHNOLOGY

ICC & safe food and feed through an Integrated **ToolBox** for **My**cotoxin Management

Michaela Pichler
LACC4 in Mexico City, 11-14 March 2018

Safe Food and Feed through an Integrated **ToolBox** for **Mycotoxin** Management



O. McNerney, R. Krska, B. Poschmaier, I. van der Fels-Klerx, J. Gilbert,
M. Pichler, S. Edwards, M. Suman, N. Magan, V. Rossi, F. Bagi, C.
Fauhl-Hassek, M. de Nijs



This project has received funding from the European Union's [Horizon 2020 research and innovation programme](#) under grant agreement No 678012.

The mycotoxin issue in the EU



- **Majority of EU's Rapid Alert System for Food & Feed (RASFF) rejections were due to mycotoxin contamination**
- Considering an average EU-wide production of wheat, maize & oats of about 203 mt since 2005 (worth about 33 b€), **losses can easily exceed 1 billion € per year**
- Mycotoxins account for **5-10% of annual crop losses worldwide**
- **Grain & grain based food** account for the **largest contribution to mycotoxin exposure** in the EU population
- **Extreme weather events** as a result of climate change **are increasingly affecting the mycotoxin map** in Europe and world-wide.

The MyToolBox Approach



The MyToolBox Approach

Pre-harvest:

- **Biofumigation** and accelerated biodegradation combined with **minimum tillage** targeting *Fusarium*
- **Resistant plant cultivars** and the use of **atoxicogenic *Aspergillus* strains** to obtain aflatoxin free maize in the EU
- **Novel forecasting approaches** to predict potential fungal contamination in maize and wheat



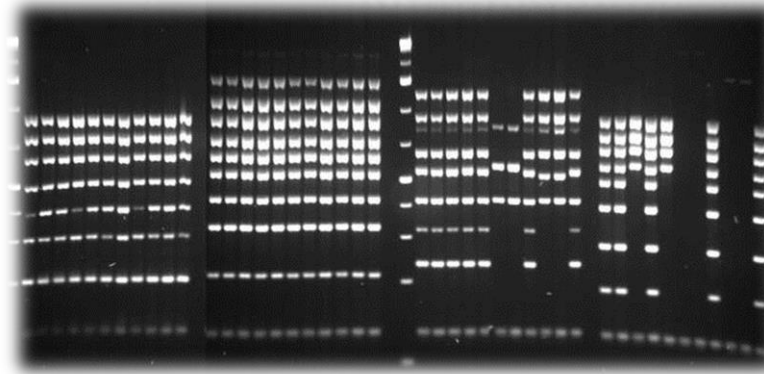
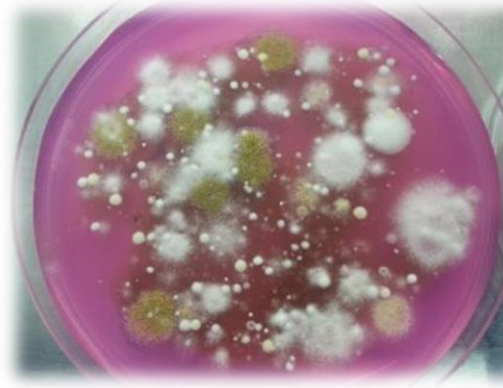
The MyToolBox Approach

Pre-harvest: Resistant plant cultivars



The MyToolBox Approach

Pre-harvest: **Atoxigenic isolates of *Aspergillus flavus***



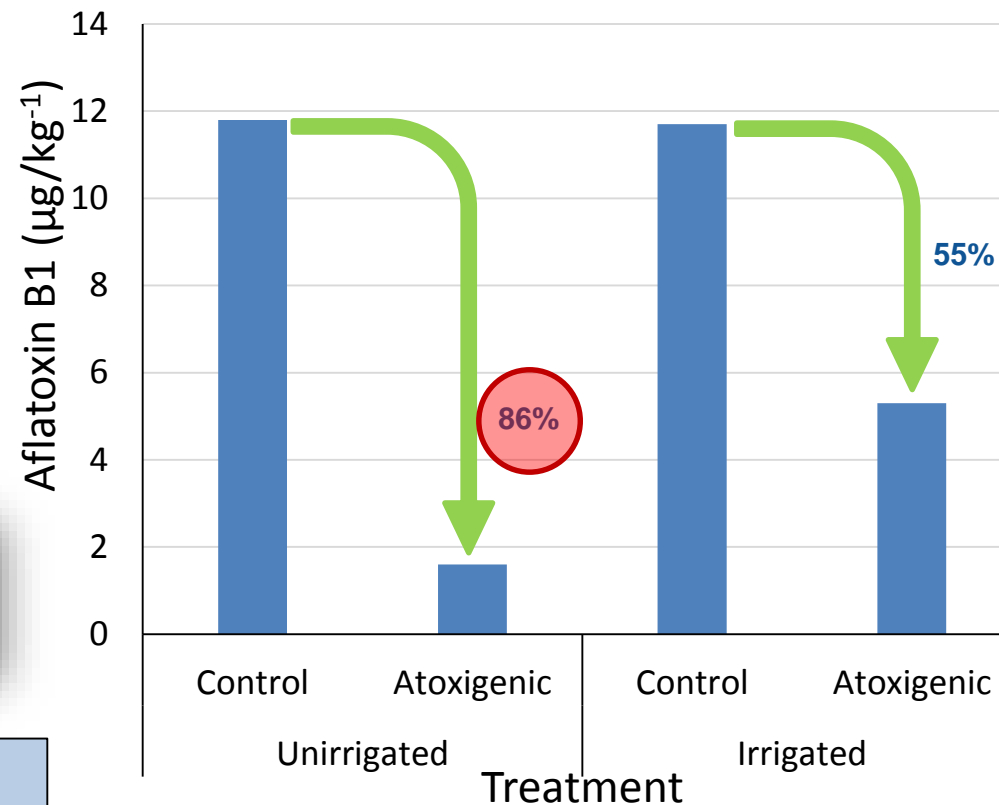
Characterization of atoxigenic isolates of *A. flavus* from Serbia completed at Peter Cotty's lab in Univ. of Arizona/USDA

The MyToolBox Approach

Pre-harvest: **Atoxigenic isolates of *Aspergillus flavus***



Isolate filed
for patenting!!



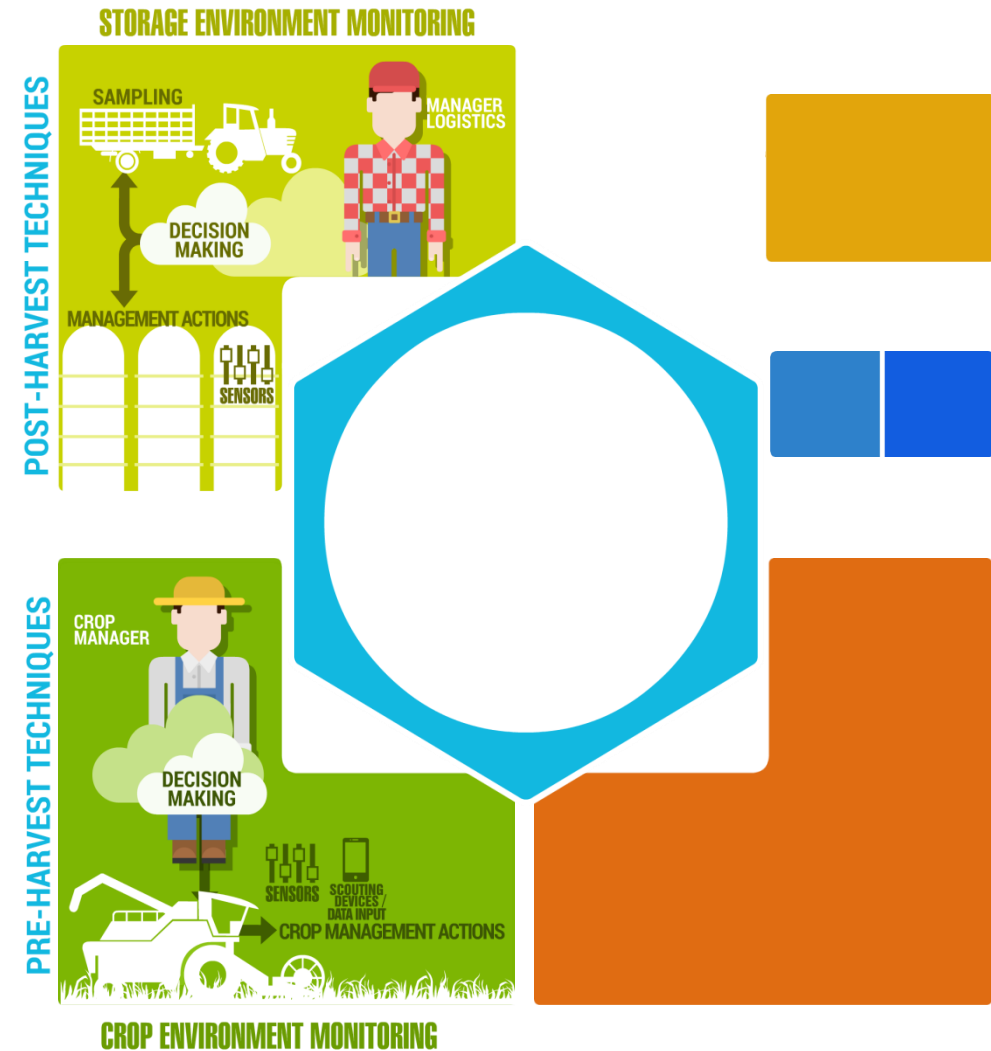
The MyToolBox Approach



Harper Adams
University

Post-harvest

- To establish real-time post-harvest environmental monitoring systems for storage of cereals



The MyToolBox Approach



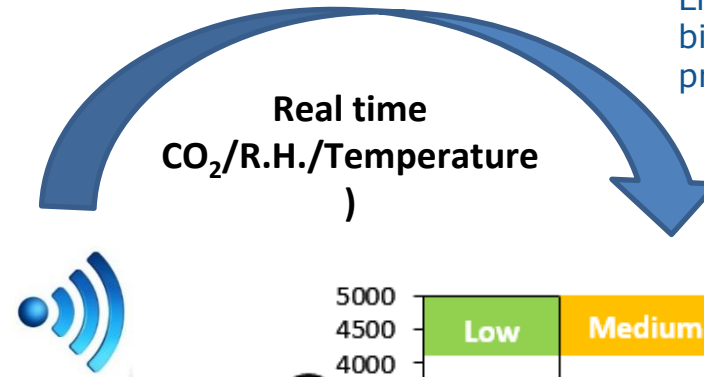
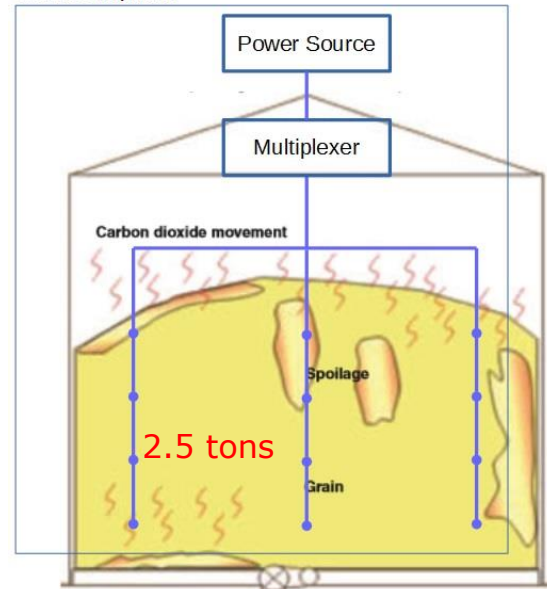
Barilla
The Italian Food Company Since 1877.



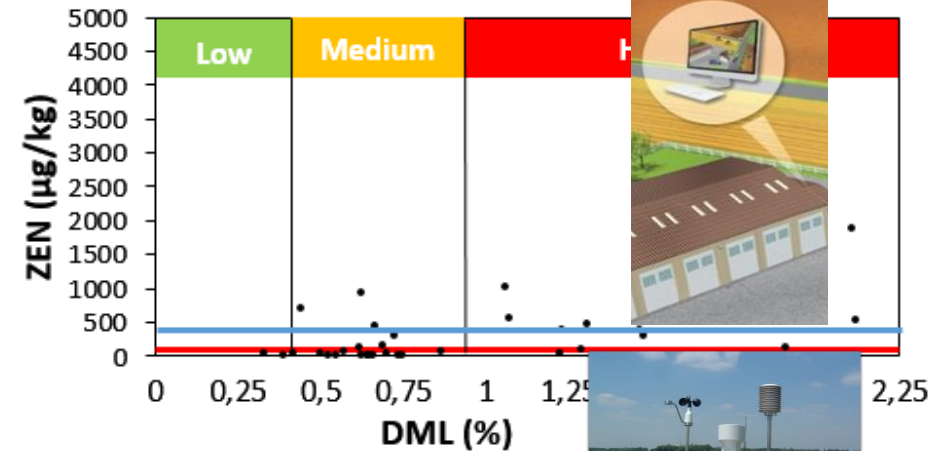
Harper Adams University

Post-harvest: Real time environmental monitoring system

ATEX compliant



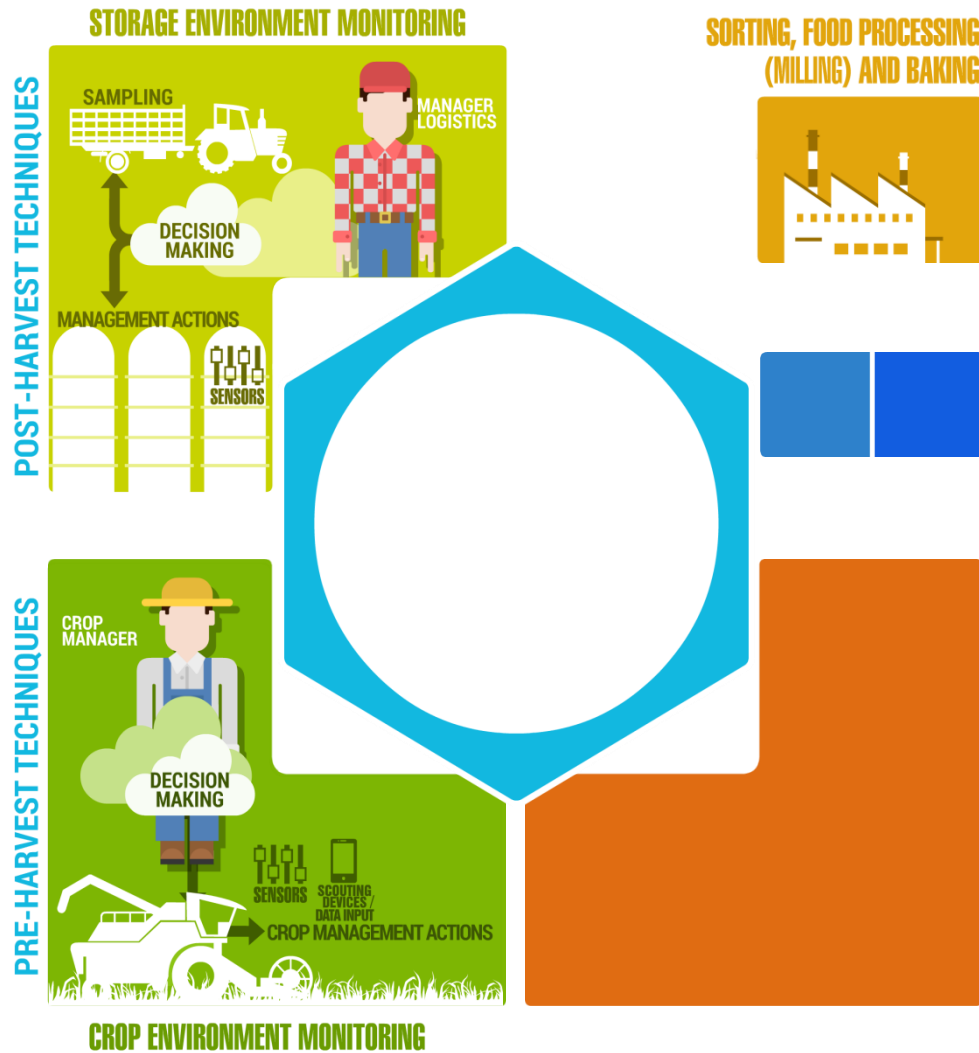
Linking physical data with biological models of ZEN production



- CO₂ production linked to nutritional losses
- calculated as **dry matter losses**
- risk of **ZEN contamination above EU limit**

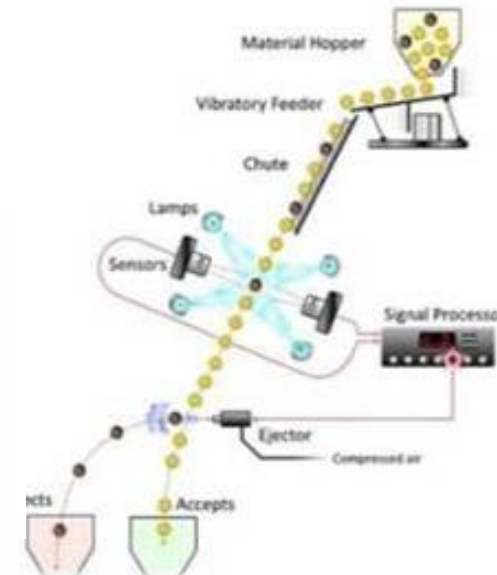
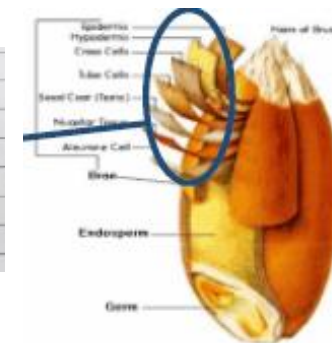
The MyToolBox Approach

Barilla
The Italian Food Company. Since 1877.



Sorting, Food Processing & Baking

- To reveal the **thermal processing factors** relevant for the reduction & transformation of mycotoxins
- **Innovative (pre-)milling** for accurate separation of grain tissues



The MyToolBox Approach

Barilla
The Italian Food Company. Since 1877.



Sorting, Food Processing & Baking: Thermal processing factors

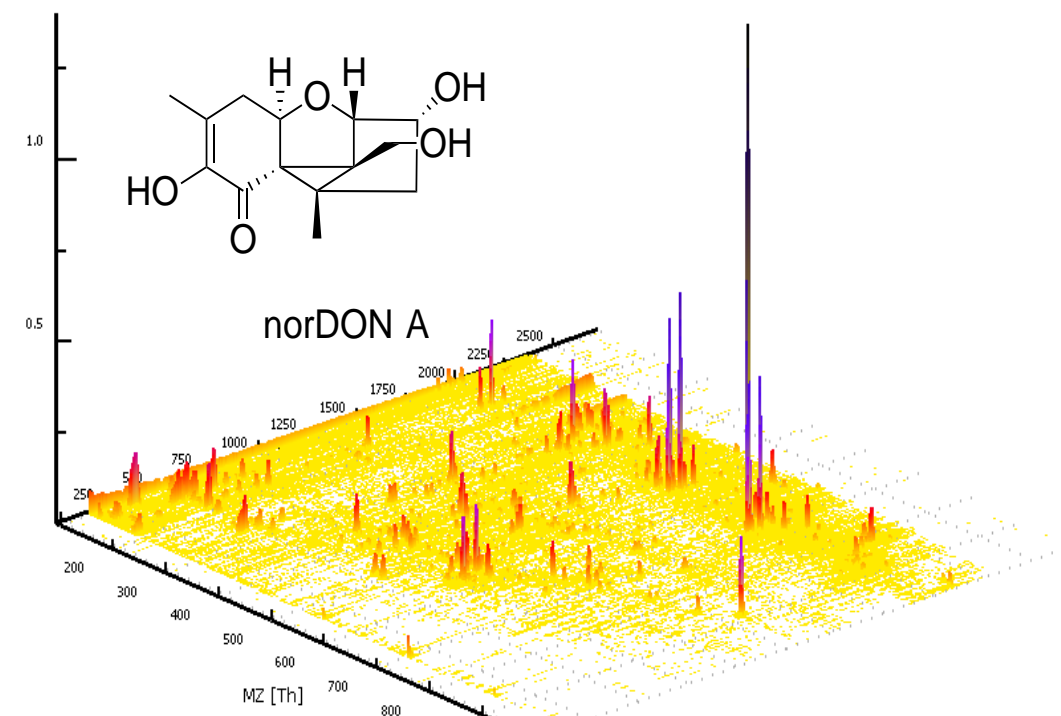
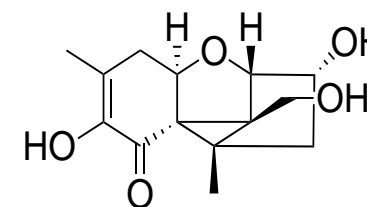
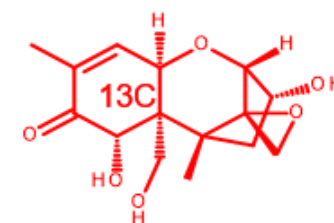
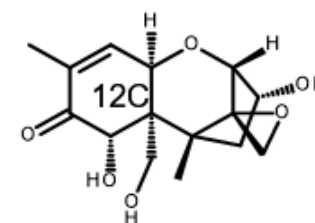
Baking biscuits in pilot plant:



1st oven: 180°C for 8 min (caramelisation – browning)

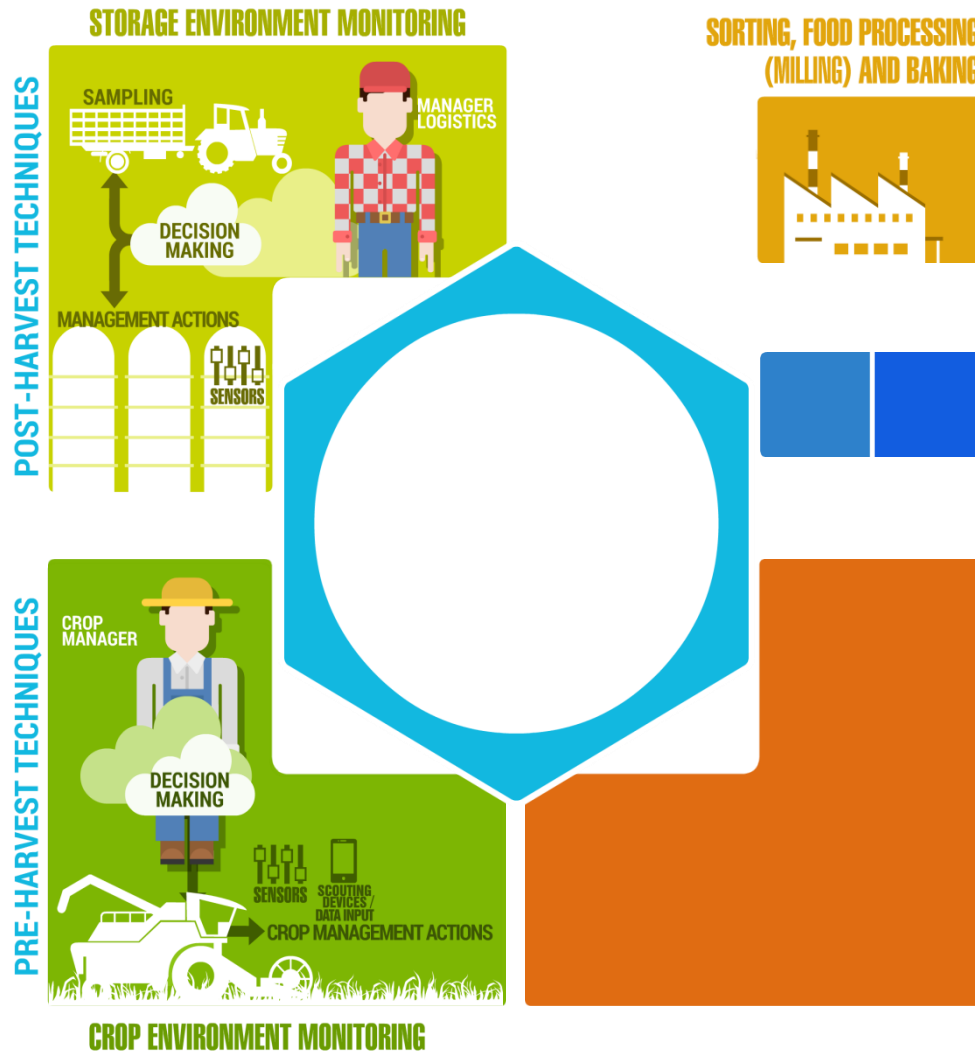
2nd oven: 100°C for 10 min (reduce moisture)

+ ^{12}C DON / ^{13}C DON



The MyToolBox Approach

Barilla
The Italian Food Company. Since 1877.



Sorting, Food Processing & Baking

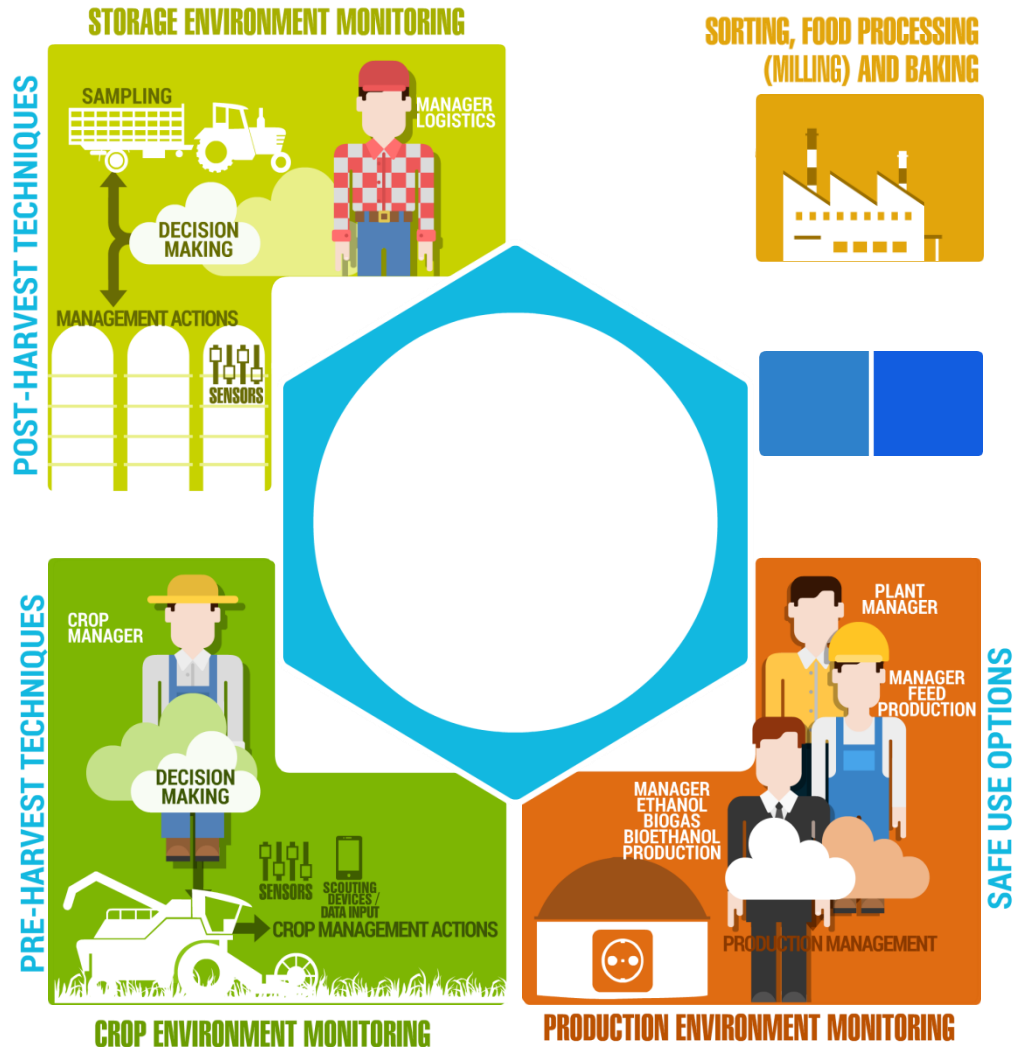
- To develop **non-invasive real time sorting of dried figs** for aflatoxin B1 using hyperspectral imaging

The MyToolBox Approach

≡ **Biomin** ≡



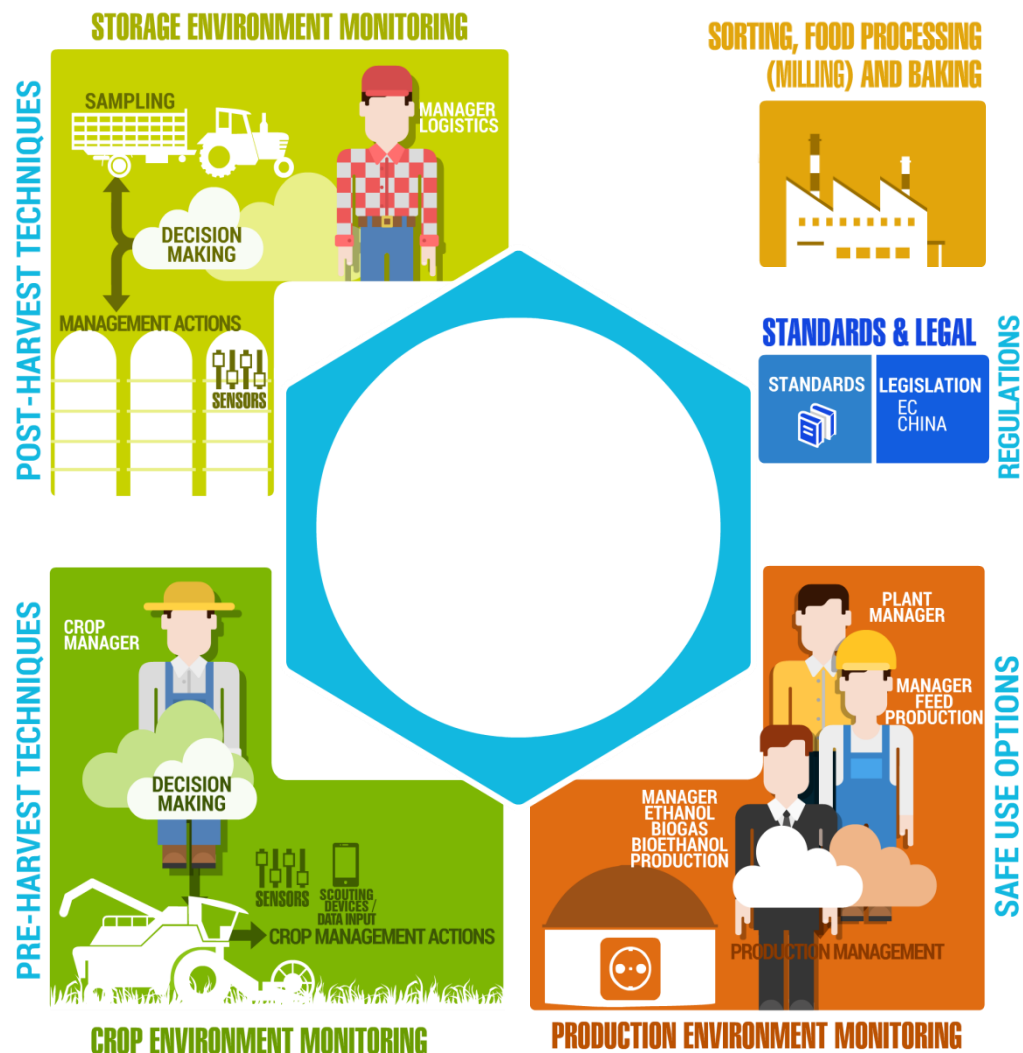
 SÜDZUCKER



Safe-Use Options

- Utilising a novel generation of **mycotoxin degrading enzymes** for the safe use of mycotoxins contaminated batches to efficiently **produce biogas and bioethanol**
- To minimize the mycotoxin content in dried distillers' grain soluble (**DDGS**) as **valuable by-product**

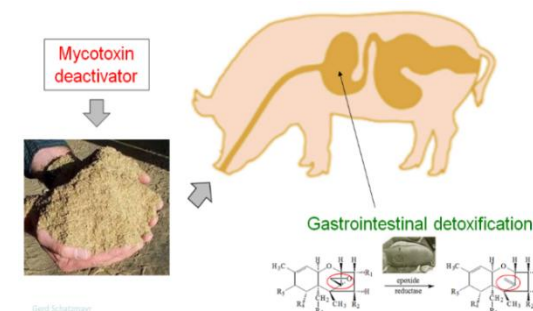
The MyToolBox Approach



Contribution to Standard-setting & Coop. with China

- To work with relevant bodies such as **EFSA & DG Santé** for standard setting
- To contribute to the standard settings for **authorisation of mycotoxin-detoxifying feed additives in China**

~475 million pigs are farmed in China, representing nearly 60% of the world's total pig population

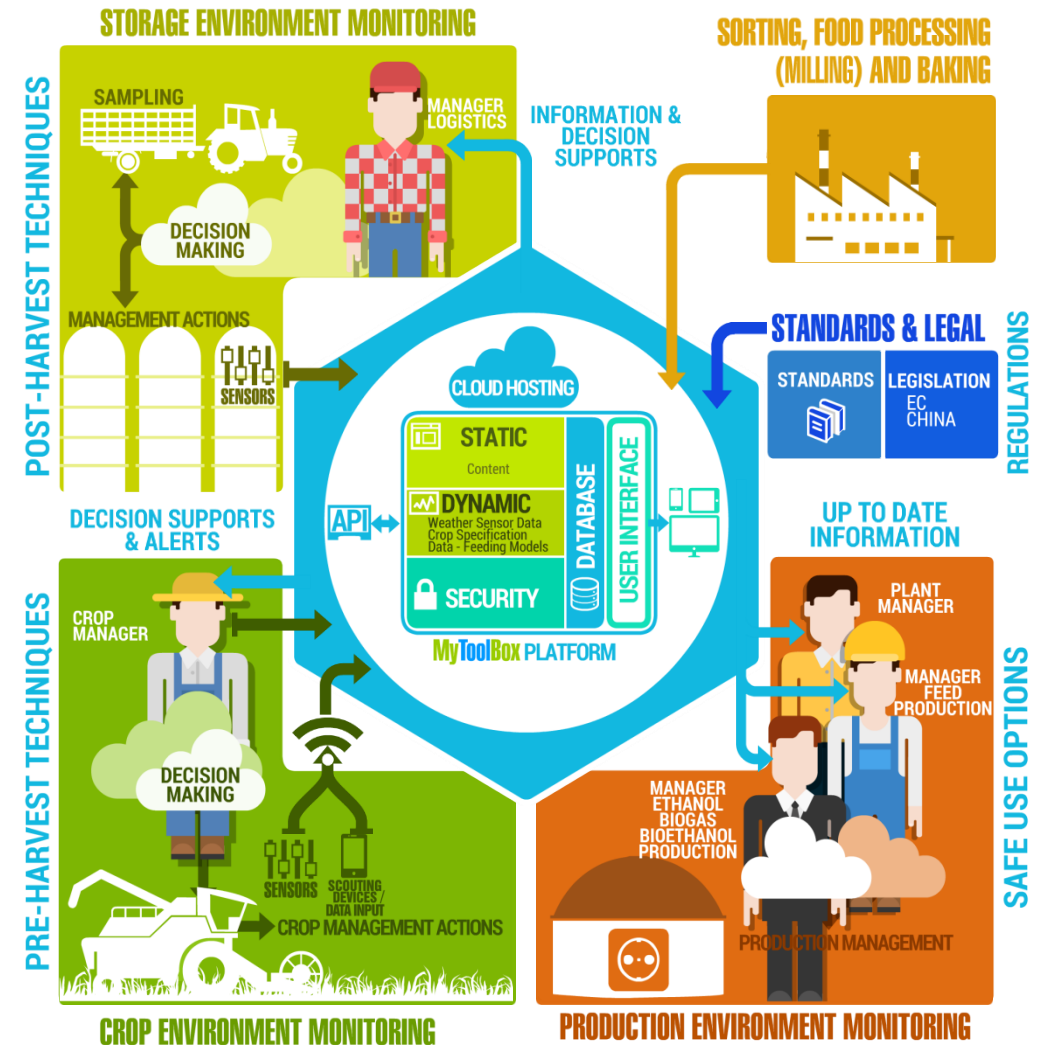


The MyToolBox Approach



The MyToolBox e-platform

- To design & validate an integrated MyToolBox e-platform for decision support in mycotoxin management
- Information, tools & guidance will be provided
- Access through PCs, tablets or smartphones



The MyToolBox Approach



The MyToolBox e-platform:
Decision support in mycotoxin
management in field

Forecasting



Registering and login



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%

The MyToolBox Approach





The MyToolBox e-platform: Silo management

FACILITIES LIST + 01  SILO1 <

Search facilities

ID	Facility	Name	Date	Capacity m³	C02	Humidity	C02
01	Facility1	Silo1	23/04/2017	28			
		Silo1					
		Silo2					
02	Facility2						
03	Facility3						

C02: 25.25°C Humidity: 31% C02: 43pmm

Fungus:  Aspergillus Mycotoxin:  Aflatoxin



The MyToolBox Approach

Integrated approaches for mycotoxin management shall

- **go beyond the field-to-fork concept** incl. safe use options of mycotoxin contaminated batches, such as microbial energy conversion
- *soil-field-crop-food processing-waste management-alternative energy* to ensure food & feed security and safety **within a sustainable economic approach**
- consider **supply chains from China** and **other countries** importing food crops to the EU
- **consider entire food and feed chains and involve end users**
- **Cooperation with like-minded groups & people**

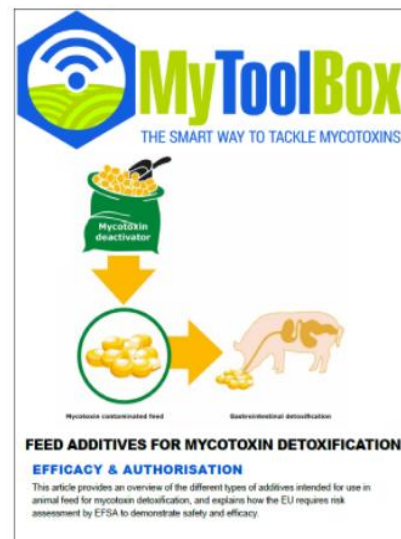
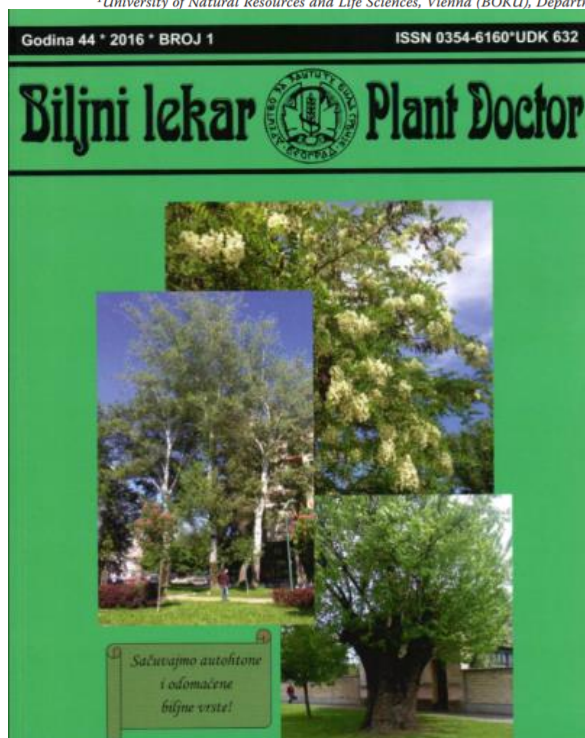
The MyToolBox Approach

World Mycotoxin Journal, 2016; 9 (4): 487-495

Safe food and feed through an integrated toolbox for mycotoxin management
MyToolBox approach

R. Krška¹*, M. de Nijs², O. McNeerney³, M. Pichler⁴, J. Gilbert⁵, S. Edwards⁶, M. Suman⁷, N. Ma van der Fels-Klerx², F. Bagi¹⁰, B. Poschmaier¹, M. Sulyok¹, F. Berthiller¹ and H.P. van Egmond

¹University of Natural Resources and Life Sciences, Vienna (BOKU), Department of Agrobiology



er 2016

OPINION ARTICLE

霉菌毒素A和伏马毒素）。

该RASFF通报系统还显示，进口到欧盟的易受感染的水果中，黄曲霉毒素污染风险在过去的五年里，RASFF通报了292例中国进口花生中黄曲霉毒素含量超标的预警。



方法



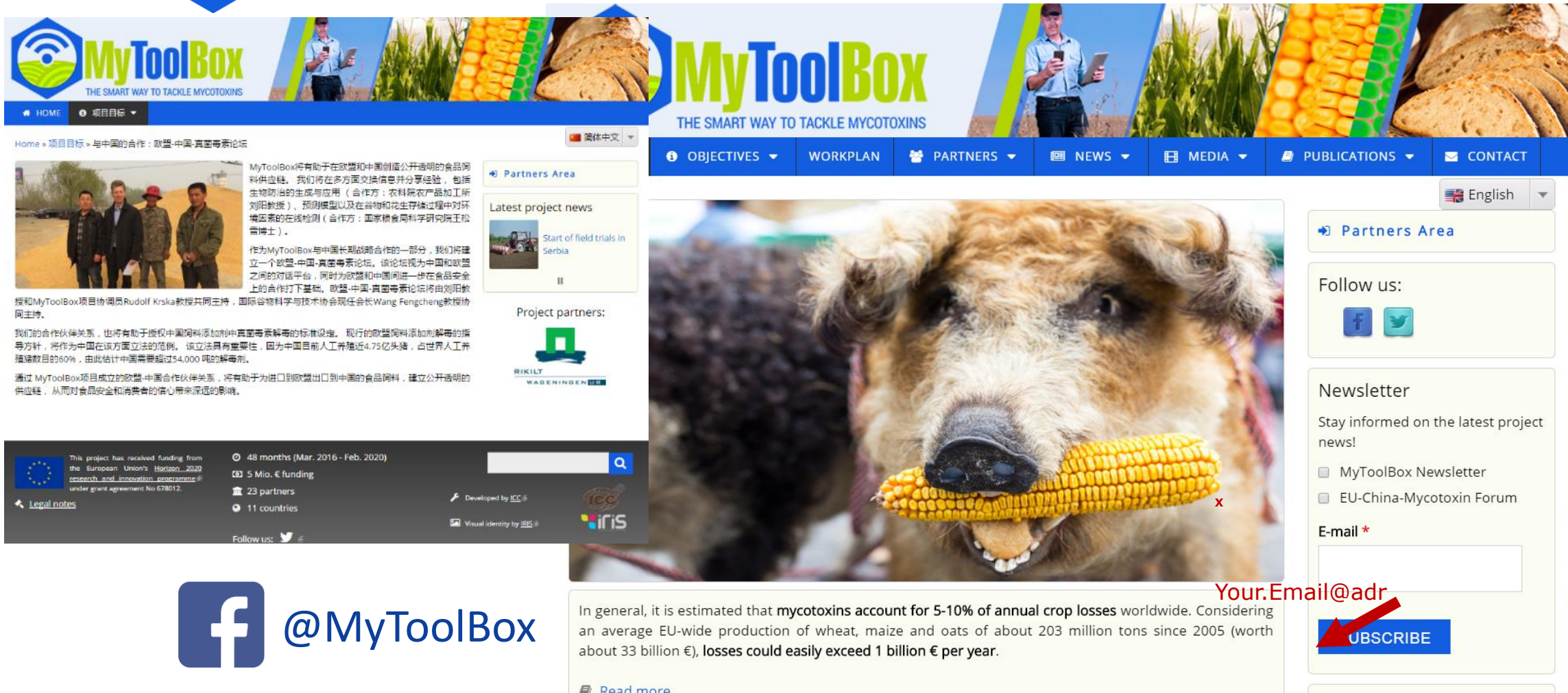
真菌毒素是真菌的浓度条件下也对毒素对食品和饲料产生影响，它们在各种注。

由于真菌毒素对食具有显著的影响，中的污染受到了广面的低分子量二胺也对动物和人类具取被感染的作物，作物，进入食品综合征和猪的肺水肿有紧密联系。近年来为了控制了越来越多的重视，对含有真菌毒素的食品的销售和

预警系统（RASFF）发出的大多数通报，是由于检出真菌毒素，主要来自于谷物和基于这些谷物的生的真菌毒素（脱氧雪腐镰刀菌烯醇 DON，T-2/H



The MyToolBox Approach



The screenshot displays the MyToolBox website interface. The header features the MyToolBox logo and the tagline "THE SMART WAY TO TACKLE MYCOTOXINS". The navigation bar includes links for HOME, 项目目标 (Project Objectives), OBJECTIVES, WORKPLAN, PARTNERS, NEWS, MEDIA, PUBLICATIONS, and CONTACT. The main content area is divided into several sections: a "Partners Area" with a photo of four men and text about the project's goals; a "Latest project news" section titled "Start of field trials in Serbia"; a "Project partners" section listing RIKILT and Wageningen UR; and a large image of a pig eating corn. A sidebar on the right contains a "Partners Area" link, social media icons for Facebook and Twitter, a "Newsletter" sign-up form, and an "E-mail" subscription form with a red arrow pointing to the "SUBSCRIBE" button. The footer includes funding information from the European Union, project duration (48 months), budget (5 Mio. €), number of partners (23), and countries (11). It also mentions the development by ICC and visual identity by IRIS.

MyToolBox THE SMART WAY TO TACKLE MYCOTOXINS

HOME 项目目标

Home » 项目目标 » 与中国的合作：欧盟-中国-真菌毒素论坛

MyToolBox将有助于在欧盟和中国创造公开透明的食品饲料供应链。我们将在多方交流信息并分享经验，包括生物防治的生成与应用（合作方：农科院农产品加工所刘阳教授）、预测模型以及在谷物和花生存储过程中对环境因素的在线检测（合作方：国家粮食局科学研究院王松雷博士）。

作为MyToolBox与中国长期战略合作的一部分，我们将建立一个欧盟-中国-真菌毒素论坛。该论坛视为中国和欧盟之间的对话平台，同时为欧盟和中国间进一步在食品安全上的合作打下基础。欧盟-中国-真菌毒素论坛将由刘阳教授和MyToolBox项目协调员Rudolf Kriska教授共同主持，国际谷物科学与技术协会现任会长Wang Fengcheng教授协同主持。

我们的合作伙伴关系，也将有助于强化中国饲料添加剂中真菌毒素解毒的标准设定。现行的欧盟饲料添加剂解毒的指导方针，将作为中国在该方面立法的范例。该立法具有重要意义，因为中国目前人工养殖4.75亿头猪，占世界人工养殖数目的60%，由此估计中国需要超过54,000吨的解毒剂。

通过MyToolBox项目成立的欧盟-中国合作伙伴关系，将有助于为进口到欧盟出口到中国的食品饲料，建立公开透明的供应链，从而对食品安全和消费者的信心带来深远的影响。

Partners Area

Latest project news

Start of field trials in Serbia

Project partners:

RIKILT WAGENINGEN UR

Partners Area

Follow us:

Facebook Twitter

Newsletter

Stay informed on the latest project news!

☐ MyToolBox Newsletter

☐ EU-China-Mycotoxin Forum

E-mail *

48 months (Mar. 2016 - Feb. 2020)

5 Mio. € funding

23 partners

11 countries

Developed by ICC

Visual identity by IRIS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 678012.

Legal notes

Follow us: Twitter Facebook

In general, it is estimated that mycotoxins account for 5-10% of annual crop losses worldwide. Considering an average EU-wide production of wheat, maize and oats of about 203 million tons since 2005 (worth about 33 billion €), losses could easily exceed 1 billion € per year.

Read more

Your.Email@adr

SUBSCRIBE

 @MyToolBox

 @MyToolBoxEU

www.MyToolBox.eu



Thank you for your attention!



Think Cereals – Think ICC



ICC - International Association for Cereal Science and Technology

Marxergasse 2
1030 VIENNA
Austria

HQ Phone: +43 1 70772020

E: michaela.pichler@icc.or.at

I: www.icc.or.at

ICC Officials & Headquarter in Vienna/AT

