



MycoKey Newsletter

Your
key actions
to manage
mycotoxins in
food and feed
chains

What 's on MycoKey

MycoKey is developing innovative and integrated solutions to support stakeholders in effective and sustainable mycotoxin management along food and feed chains in Europe and China.

We're pleased to present the progress of the project, and introduce our multidisciplinary research .

In the first 18 months, the MycoKey partners created the basis to organize a strong interactive team, which is conducting an international work to achieve ambitious objectives.

The Kick off meeting was held in April 2016 in Italy, while the General Assemblies have been held in Italy and Belgium, respectively in March and September 2017.

The project is developing the **MycoKey App** for mobile devices, easy and friendly to be used by farmers and end users in the field and along the food chain. The app integrates key information and practical solutions for mycotoxin management, and allows users to mitigate potential mycotoxin risk.

The project is also strongly contributing to improve the cooperation on this topic between **Europe** and **China**. The first studies are being conducted in both areas, to better investigate different and severe mycotoxin contaminations in crops. In June 2017, the MycoKey Chinese Consortium project, funded by Chinese Government, had the kick off meeting in Beijing together with European MycoKey representatives.

In this issue we're presenting our main activities.

Enjoy your lecture!

Connecting Research&Industry along the chain

The MycoKey mission

An integrated multi-disciplinary approach is part of the MycoKey strategy. Research organization and

industries are working together to develop smart and global solutions for end users. All the steps of the food

and feed chains are being addressed in a perspective of sustainability and cost-effective solutions.



News

- *1st MycoKey International Conference in Belgium, 11-13 September 2017*
- *Training course: Rapid Methods for Mycotoxin Detection in the Food Chain, in Italy, 9-13 October 2017*
- *Training course: Strategies for minimization of mycotoxins and toxigenic fungi in food chains in Italy, 16-19 October 2017*
- *MycoKey Fellowships 2nd call, September 2017*
- *MycoKey kick off meeting in China, 6-7 June 2017*

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Communication & Dissemination

coordinated by CNR, Italy

MycoKey International Conference

The first project International Conference will be held in Ghent, Belgium from 11 to 14 September 2017.

The congress is open for all contributions related to the following topics in mycotoxin research:

- Global impact of mycotoxins
- Biodiversity and toxigenic fungi monitoring
- Mycotoxin analytical challenges



- Prevention
- Animal health and toxicology
- Impact of climate change
- Challenges for developing countries
- Remediation and intervention
- Human health and toxicology
- Modelling & ICT solutions

Rapid Methods for Mycotoxin Detection in the Food Chain

The training course will be hosted by the Institute of Sciences of Food Production (ISPA-CNR) of Bari, Italy from 9 to 13 October 2017.

The course will give information about major issues associated with mycotoxin analysis and contamination along the food chain.

Lectures and laboratory training will be provided on routinely used and new screening tools for rapid, robust and user-friendly analysis of mycotoxins, including validation aspects.

Practical training in the laboratory will cover most of the course and trainees will be assisted individually in the laboratory by ISPA-CNR staff expert in instrumental and immunochemical analysis of mycotoxins.

“rapid & smart technologies for advanced detection”



Strategies for minimization of mycotoxins and toxigenic fungi in food chains

The training course will be hosted by the Institute of Sciences of Food Production (ISPA-CNR) of Bari, Italy from 16 to 19 October 2017.

The course aims at training smart, integrated, sustainable solutions and innovative tools to manage and reduce the major mycotoxins (aflatoxins, fumonisins, trichothecenes and ochratoxin A) in economically important food and feed chains (maize, wheat, barley, dried fruits

and grape) in pre and post-harvest. Advanced technologies in the field of chemical detection, molecular analysis, modelling and ICT solutions will be covered by highly qualified international instructors, by lectures and laboratory experiences.

“hands on & active lab for mycotoxins”

MycoKey fellowships



**second call deadline
Sep 30, 2017**

4 MycoKey Fellowships for Short learning visits are now available for **students** and **young researchers**.

The fellowships aim at favouring education and training exchanges with special attention to youngs and researchers coming from East Europe Countries.

The learning visit it's expected to be a great experience to be conducted in a MycoKey research organization in an exciting work environment.

MycoKey fellows will be involved in innovative research activities, and contribute at developing new solutions for global implementation.

Deadline for applications: **September 30th 2017.**

More info at www.mycokey.eu

MycoKey Kick off meeting in China

The Chinese consortium is made of 11 partners, coordinated by Prof. Feng Jie, Institute of Plant Protection, Chinese Academy of Agricultural Sciences (IPP-CAAS).

The kick off meeting has been held in Beijing on 6 and 7 June 2017. The MycoKey Coordinator and CNR, DLO and UGENT scientists attended the meeting to share the Chinese programme.



The Chinese research is focused on on wheat and maize breeding, population diversity of toxigenic fungi, forecasting, rapid detection technology, biological and chemical control, mycotoxin detoxification and ICT solutions. Links and methodologies to reinforce the collaboration between the Chinese and European Mycokey partners have been implemented too, thus contributing to effectively enhance the EU-CHINA dialogue.

Global mycotoxin knowledge

coordinated by UCSC, Italy

The Global mycotoxin knowledge aims at keeping the existing information useful for both scientists and stakeholders.

To this scope

- **Predictive models** for contamination of aflatoxin and fumonsin in maize were delivered. They will be used into **MycoKey app** to help farmers for mycotoxin management.

- **Guidelines** to optimize maize management for mycotoxin mitigation were prepared as further help for farmers.
- **Working groups (WG)** were defined, for discussion/update on crop chains, with a significant involvement of MyToolBox experts.
- **Round Tables (RT)** have been organized in Ghent, to discuss on

**international round tables
and working groups**



relevant tools for mycotoxin management.

- **Agreements** with several International Peer-reviewed journals were established to optimize the dissemination process.



Toxigenic fungi monitoring

coordinated by DLO, The Netherlands

In the first 18 months the focus of the work was on mycotoxin risk models and genotyping monitoring & on-site detection.



The working group has achieved the following results:

- A prototype mechanistic model to predict how *F. graminearum* grows, reproduces, attacks and produces DON in maize plants in the field
- A preliminary draft of the predictive model for understanding and preventing mycotoxin contamination in maize is available
- An updated prediction model for DON contamination on Flemish wheat varieties is available for end users and will be extended to other geographical areas
- A database of DNA sequences for developing an universal barcode of toxigenic fungi will be hosted by the Westerdijk Institute (formerly known as CBS), as established by ongoing agreement
- Assays called LAMP for detecting quickly *Aspergillus* species and *Fusarium* species in the field have been developed
- Whole genome sequences for several *Fusarium* species were generated and allow us to see where the genes that regulate the mycotoxin production are located.

Mycotoxin monitoring

coordinated by UGENT, Belgium

A new method of evaluating the maize contamination by correct dust sampling and by analyzing it has been developed.

Kits that allow a quick detection of many mycotoxins at the same time in the field are under development, especially for the *Fusarium* mycotoxins deoxynivalenol, zearalenon and fumonisins.

A new system for mycotoxin detection in the food products, based on their binding to certain DNA structures called aptamers, is in progress.

Several immunoassays based on fluorescence polarization have been developed. These assays allow a rapid detection of mycotoxins in the crop products because of

a fluorescence reaction between a given mycotoxin and the antibody. In particular, new assays for T2/HT2, the most toxic *Fusarium* species, were obtained.

A new system for the carcinogenic aflatoxin B1 detection in wheat by using a real-time electrochemical profiling (REP) was developed, while methods for aflatoxin B1 in dried fig and Ochratoxin A in raisin are in progress.

Finally a study showing that aflatoxin concentrations increase when contaminated maize and hazelnuts were infused with water.

“focus on sampling, FPIAs and toxicokinetics”

Prevention in the field

coordinated by WBF, Switzerland

Important experiments for the control of *A. flavus* a species producing aflatoxins in maize kernels have been carried out in Ghana in maize fields. Non aflatoxin producing strains of *A. flavus* have been used. These fungal strains were able to limit the growth and the reproduction of the toxigenic *A. flavus* in the field. A strong reduction of aflatoxin accumulation in maize kernels was obtained. Same studies in Italy, Romania, Serbia and China are in progress.

Surveys on barley for studying the effects of agronomic factors (crop rotation, tillage, fungicide use and variety

selection) on the *Fusarium* colonization of ears started in Switzerland and Romania. In China, the main species of *Fusarium* that colonize the crop residues in the soil of rice, maize and wheat have been studied.

In Switzerland, formulates of the fungal biological control agent called *Chlonostachis rosae* to be spread in the soil has been developed.

In Italy, maize lines that tolerate the contamination by *Fusarium* species causing the rot of the ears have been developed and genes related to this tolerance were detected.

“wheat, maize, and rice analyzed to prevent contamination”



Intervention Strategies

coordinated by VTT, Finland

Potential biocontrol agents (BCA) have been identified from commercial sources and partner's culture collections to prevent *Fusarium* head blight in cereals.

Preliminary experiments at laboratory scale were designed and performed for ozone treatment of *Aspergillus flavus* and *Penicillium* species.

New natural compounds from Brassicaceae family plants, called isothiocyanates have been used to reduce the growth of *Aspergillus flavus* and its aflatoxins production in maize. Also they were able to inhibit the growth of *Penicillium*

nordicum in wheat and barley during three months storage simulating silo conditions. Barley samples with low and high *Fusarium* infection from the crop 2016 were selected for malting trials experiments using biological agents able to control *Fusarium* contamination and potentially useful for innovative technology for malting industry initiated.

Two food safety related questionnaires were prepared in order to assess how far the activities related to practical implementation of hazard analysis in primary production (Global GAP) and mill industry (HACCP), as parts of food safety management systems, have been advanced in different countries.



Remediation

coordinated by CNR, Italy



A case study on the efficacy of industrial-scale cleaning equipment in reducing aflatoxin

content in contaminated maize was performed by using a Bühler Grain Plus mechanical separator. An aflatoxin reduction of 10-20% was observed, with increasing level of aflatoxin in the incoming material.

Several materials including minerals, biopolymers, organic materials, yeast cell wall/yeast extracts and/or mixtures of them have been in vitro

tested for their ability in binding simultaneously several mycotoxins. These compounds added to the feed will allow to reduce the negative effects of mycotoxins to animals.

Some microbes can destroy the mycotoxins using their enzymes. They have been tested during the wine processing and were shown able to reduce the Ochratoxin A contamination in wines.

The edible fungus *Pleurotus eryngii* was shown able to degrade aflatoxin B1 and other mycotoxins when present on the same substrate of growth of species producing the

mycotoxins. In particular, this species of *Pleurotus* used two enzymes, two laccases for the degradation of mycotoxins produced by *Aspergillus* species (Aflatoxin B1 and M1,) and *Fusarium* species (zearalenon, T-2 toxin, and Fumonisin B1).

Chemical methods for the simultaneous determination of mycotoxins in samples from the biogas production have been developed/ and optimized.

The possibility of extracting DNA from all biogas samples to know the kind of microbes occurring has been optimized and will allow to understand which

ICT solutions and chain management

coordinated by DLO, The Netherlands

The identification of the the required components, data and software tools, for the preparation of the MycoKey app. to be available for the smartphone of farmers and end users, is in progress.

We started to design the MycoKey app and the companion app to record field observation that would be of interest for the MycoKey app.



MycoKey app structure

DLO translated the landing page and this is now available in Dutch, German, French, Italian.

This would allow users to navigate and contact people in their native languages.

The app first release will be presented during the MycoKey International Conference in Ghent, September 2017.

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your key actions
to manage
mycotoxins in food
and feed chains



The MycoKey consortium is active from 2016. It gathers 32 research organizations, associations, and industries from 14 countries, with a strong participation of Chinese academia and research institutions. It can count on over 150 researchers and experts, who strongly interact to join a common objective: to provide integrated solutions for mycotoxin management along the food and feed chain. The Consortium interdisciplinarity, multi-actor nature, and its integrated approach serve the mission of the project, by providing expertise in several fields of scientific and innovation knowledge.

The MycoKey Consortium has a large International network, cooperates with global institutions, and will contribute to suggest recommendations for food safety policies.



Please invite your networks, customers and stakeholders to visit the MycoKey [website](http://www.mycokey.eu) and join our [newsletter](#) !

We will be pleased to provide information about

mycotoxins

food & feed safety

advanced technologies and tools for mycotoxin management

training

workshops

conferences

learning visits

scientific alliances

project agreements

networking

...and more...



