ICFM

International Commission on Food Mycology

Conference 2019

# Food- and Airborne Fungi – Challenges for Food Safety and Supply

## Programme and Abstracts

Freising - Germany, 3-5 June, 2019

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# Food- and Airborne Fungi – Challenges for Food Safety and Supply

Freising, Germany - 3-5 June, 2019

# INTERNATIONAL COMMISSION ON FOOD MYCOLOGY

The commission is a COMCOF (Commissions, Committees and Federations) of the International Union of Microbiological Societies (IUMS) and established in 1990.

The aims of the Commission are:

- to improve and standardise methods for isolation, enumeration and identification of fungi in foods;
- to promote studies of the mycological ecology of foods and commodities;
- to interact with regulatory bodies, both national and international, concerning standards for mycological quality in foods and commodities;
- to support regional initiatives in this area. The Commission further aims to extend understanding of the principles and methodology of food mycology in the scientific community by publishing its findings, and by sponsoring meetings, specialist workshops, courses and sessions dealing with aspects of its work

***Venue:***
Freising is a 50.000 citizen community situated 40 km north east from the city of Munich, which can be reached by train in 20 min. Munich Airport is close by with a direct bus connection.

The city is well known for its rich ecclesiastic history as well as for its importance as a centre of food science and technology as well as beer brewing. The Freising Cathedral (built 1205) it is one of the two home churches to the archbishop of Munich and Freising, one of which was Cardinal Josef Ratzinger, who was elected pope Benedikt XVI in 2005. The workshop will take place at the Pallotti Haus, Pallottinerstraße 2, 85354 Freising (phone +49 08161 9689 0 email freising@pallottiner.org)

The ninth International Foodmycology workshop is organized by

***Ludwig Niessen***
Technical University of Munich, Chair for Technical Microbiology, Gregor-Mendel-Str. 4, 85354 Freising, Germany

and

***Rob Samson***
Westerdijk Fungal Biodiversity Institute, Uppsalalaan 8, 3584 CT Utrecht, The Netherlands

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## 27. Volatile organic compounds produced by yeasts inhibit mycotoxin production by postharvest pathogenic moulds

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Some fruits are highly susceptible to fungal contamination with saprophytes at the postharvest stage which may result in economic losses for producers. Some of them are toxigenic species which may produce mycotoxins, poisonous compounds which pose a risk to consumers' health so that control of toxigenic fungi contamination is needed. Use of biocontrol strategies, specifically yeasts, is an emergent strategy to control mycotoxins in fruits. It has been described that yeasts may have different modes of antagonistic activity against toxigenic moulds including competition for nutrients and space, blockage of mycotoxin-related genes or the production of extra-cellular compounds such as volatile organic compounds (VOCs). The objectives of this study were to: a) evaluate the efficacy of VOCs produced by two yeast strains (*Hanseniaspora uvarum* L793 and *Hanseniaspora opuntiae* L479) to inhibit the growth of some postharvest pathogenic moulds and their mycotoxins (aflatoxins and patulin) production and, b) identify the VOCs producers of the inhibitory activity. In addition, the effect of VOCs on the expression of genes involved in mycotoxin biosynthesis was also examined. For this, a double agar plate technique containing PDA was used. The top plate was inoculated with yeast cells and the bottom plate with spore suspensions of the mould strains and incubated at 20ºC for at least 21 days. Mould growth and mycotoxin quantification were determined at the end of the incubation period. Control samples without the presence of yeasts were also analysed. VOCs produced by both yeasts were extracted by SPME and analysed by gas chromatography. Results showed that VOCs produced by *H. uvarum* L793 produced a great inhibition of mould growth and aflatoxin production. Two of the most active antagonistic VOCs compounds were 1-butanol 3-methyl acetate and 2-phenyl ethyl ester. In addition, it was observed that VOCs affected mycotoxin-related gene expression. The implications for these results are discussed.

## 28. Mycobiota and mycotoxin occurrence in chickpea produced in Argentina

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Chickpea (*Cicer arietinum*) is one of the most cultivated pulses in terms of world production. There is a high demand of this legume due to its nutritional value. Although it is more popular in developing countries, it is becoming recognized throughout the world. Chickpea is often attacked by fungi during pre and post-harvest stages, significantly affecting its productivity. Also some species can be potential mycotoxin producers that can lead to serious threats to human health. Since there is an increasing demand for high quality and innocuous foods, limits for mycotoxin contamination have been established. The aims of this survey were to determinate mycobiota and mycotoxin contamination in chickpea seed samples harvested from different chickpea growing areas in Argentina during the 2018 harvest season. All samples showed contamination with at least one fungal genus. In general, infection levels ranged from 10 to 100%. The most prevalent fungal genera isolated were *Aspergillus* and *Alternaria*. Other fungal genera isolated in less frequency were: *Penicillium, Chaetomium, Rhizopus* and *Fusarium*. Mycotoxin contamination was analyzed in 10 chickpea samples by LC-MS/MS. Although *Fusarium* was not the predominant fungal genus isolated, most detected mycotoxins were

those produced by members of this genus. As a result, deoxynivalenol, zearalenone, beauvericin and alternariol monomethyl ether were detected in all samples, in levels ranging from 26.1 - 626.2 ng/g, 1.71 – 227.1 ng/g, 7.5 – 73.7 ng/g and 0.7 – 14.5 ng/g, respectively. In 40% of analyzed samples, 3-acetyldeoxynivalenol was found in levels ranging from 12.7 - 50.744 ng/g. Alternariol was detected in 30% of samples in levels ranging from 1.4 - 2.3 ng/g. Only one sample was contaminated with fumonisins (16.4 ng/g and 15.3 ng/g for $FB_1$ and $FB_2$, respectively). Another sample was contaminated with 20.5 ng/g of 15- acetyldeoxynivalenol. The occurrence of *Fusarium* mycotoxins at harvest time could indicate that *Fusarium* contamination occurs under field conditions during grain development, when high water activity levels are observed.

## 29. Predictive models for quantitative assessment of antifungal activity of nanoparticles (NPs)

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Metal nanoparticles represent a potential alternative solution to prevent fungal proliferation in foodstuffs since they can effectively act as fungicidal agents for example in packaging material, or air filter coatings. While different experimental procedures for the antifungal activity assessments of metal nanoparticles are available, more quantitative data, including safety limits and effective concentrations, should still be collected and analysed by predictive modelling tools. The application of the different modelling tools is dependent on the experimental designs and the techniques used to assess effectively the antifungal activity of nanoparticles at a microscopic and macroscopic level. This work reviews predictive models suitable for quantitative assessment of antifungal activity of metal NPs. On one hand, regression methods to correlate diameters/radius of colonies with time at different concentrations of NPs are applied to estimate the growth rate of specific fungi. Data can then be further processed by estimating the growth rates per each NPs' concentration. On the other hand, when the focus is on the estimation of the minimum inhibitory concentration (MIC) and the non-inhibitory concentration (NIC) of NPs, the quantification of the fractional areas as reported from turbidimetric measurements can be applied. Analysis by a polynomial logistic regression describing the probability of growth/no growth in the presence of different NPs concentrations can also be effective when performing experiments on agar disk diffusion methods. Recent quantitative methods also include the evaluation of the percentage of germination of spores over the total spores which can assess the germination kinetics, i.e., slope and geometrical lag time of single spores, in presence of NPs. In conclusion, the importance of selecting appropriate modelling structures for estimating accurate and precise parameters that assess the efficacy of antifungal compounds is an important iterative procedure.

## 30. Heat-resistance of *Humicola fuscoatra* and *Talaromyces wortmannii*, two fungal species contaminating industrial packaging materials

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Contamination of packaging materials used by food industries has gained attention in recent years, due to the increasingly widespread use of holistic approaches in considering problems linked to food spoilage by microorganisms. When background or incidental spoilage cases by Filamentous Fungi occur, the search for the responsible organisms must include also Heat Resistant Moulds (HRM), since they are usually associated with raw materials, but they have been recently found in packaging