

# Advanced Food Mycology Course

DARIS, Center for Scientific Research and Technological Development











## Introduction

Food safety and security are very high on the agenda for food manufacturers and consumers today. This has become more important in the context of the climate change agenda and ensuring that food chains and processed products are safe for consumers. Food spoilage is one of the major challenges faced by food processors, suppliers and retailers. Clearly identification and prevention/minimisation of food spoilage by moulds and their associated contamination with mycotoxins are very important in key staple food chains from farm to fork. Quality can be compromised both aesthetically and nutritionally. Key factors which determine fungal spoilage of raw ingredients and finished food products, especially bakery products, are water activity, temperature, packaging systems and shelf-life considerations. Preservation systems, formulation of products and packaging systems are critical in ensuring that the shelf-life of products can be enhanced under both ambient and cooled storage conditions.

Thus, understanding the causes and identifying the responsible spoilage moulds can go a long way towards prevention of these potentially dangerous spoilage factors. There is thus a need for an understanding of the types of fungal species which can cause spoilage of food products, their ecology and the ability to produce mycotoxins and identify systems which can be utilised to minimise and prevent spoilage from occurring. HACCP approaches can be an important management system to address fungal spoilage and mycotoxin contamination in key relevant food/feed chains.

This 5 day course aims to provide both advanced and detailed training in theoretical and practical ways to identify, understand the ecology of spoilage moulds and the production of mycotoxins, and the development of control strategies for food spoilage mould in food products.



# **Advanced Food Mycology Course**

5 DAYS COURSE

26th to 30th March



## Key learning objectives

To provide:

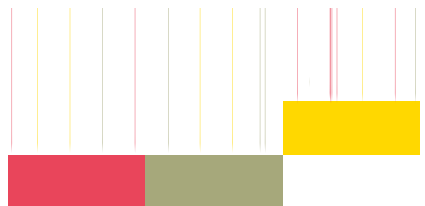
- A thorough understanding of the ecology and physiology of spoilage yeasts and filamentous moulds in key food chains responsible for quality loss
- Methods for identifying spoilage moulds including macroscopic, microscopic and scanning EM approaches
- Preservation systems and their assessment for controlling spoilage moulds and mycotoxin production
- Control strategies using HACCP and hurdle technology approaches for improving shelf-life
- Obtain practical experience in addressing these issues with hands on practical work including growth modelling and mycotoxin analyses



## Objectives/Learning Outcomes/Competences

On successful completion of the course the participants should be able to have:

1. A detailed knowledge of key groups of spoilage moulds responsible for contamination of key food chains
2. An understanding of the importance of spoilage mould identification, their ecology and their ability to produce mycotoxins
3. The capability to integrate different types of knowledge and thinking on mould spoilage of food ingredients and food products in the entire supply chain
4. A conceptual awareness of the importance of fungal ecology and mycotoxins and their risks in key food chains and the impact they have on food safety and quality
5. Knowledge of how to develop a HACCP management plan and identify the CCPs relevant to different food production chains
6. Apply the approaches to industrial food production processes
7. Practical approaches to examining preservation effects on spoilage moulds and the quantification of mycotoxins
8. Hands on experience of using fluorescence measurements to examine efficacy of preservatives and extraction and quantification of mycotoxins



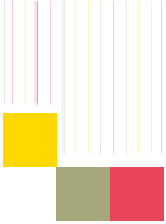


## Syllabus/Range of Topics

This short course is tailored to include both interactive lectures and practical hands on training. Lectures on Fungal ecology, environmental conditions and microbial growth concepts, fungal contamination in different food chains (beverages, cereals, coffee, nuts); heat resistant moulds, ecology of mycotoxigenic moulds in food chains; legislative drivers for mycotoxin control; aerobiology in factory environments; HACCP management tools and group case studies; Practical and demonstration work; Case studies; Group work; use of different tools including scanning EM for identification; fluorescence methods for control of spoilage; mycotoxin analyses; ecology and growth modelling of key spoilage moulds.







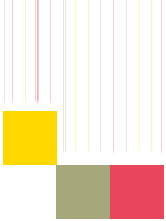
## Topics to be covered

1. Introduction – food mycology do we know enough??
2. Beverage/yeast spoilage/heat resistant fungal spores and problems in beverages
3. Mycotoxins: their importance in different food chains
4. Mycotoxins: regulations and sampling issues
5. HACCP: Principles and Critical Control Point determination; Group case studies
6. Prevention strategies for mycotoxigenic fungi
7. Modelling fungal growth
8. Climate change impacts on moulds/mycotoxins: do we know enough?
9. Analysis and rapid diagnostics – traditional vs. modern approaches
10. Factory environment – mould problems – aerobiology measurements
11. Hands on practical work with spoilage moulds including identification using Scanning EM and other microscopic techniques
12. Examination of food products to understand the relationship between ingredients and relative shelf life of different products (e.g. 1 week to 3-2 months).
13. Practical experience of the importance of environmental factors/preservatives on spoilage /mycotoxigenic moulds and relative mould counts in different products
13. Demonstration sessions for food spoilage moulds: including mycotoxin analyses

## Pre-requisite

An interest in the field of food spoilage and minimisation/prevention strategies in food/feed production chains. Those involve in food safety management.





## Lecturers

Prof. Naresh Magan DSc. (Cranfield University, Bedfordshire, UK) +30 years of experience working on spoilage moulds, mycotoxins and prevention strategies. Prof. Magan has published +270 research papers and is an international authority on this subject. He is a member of the International Commission for Food Mycology.

Dr. Angel Medina (Cranfield University, Bedfordshire, UK). He is Lecturer in Food Mycology with +12 years experience in working on mycotoxins, analysis and prevention strategies. Dr Medina has published +50 research papers on food spoilage, mycotoxins and analyses of toxic secondary metabolites.

Mr. Ghanim Aalthani (DARIS Centre at the University of Nizwa), Nizwa, Sultanate of Oman, 8 years' experience in analytical chemistry( chromatography & spectroscopy).

## Work Load

Lectures:	12
Practical hands on training:	19





## Date

Sunday 26th of March to Thursday 30th of March 2017

## Venue

Lecture theatre: DARIS Centre / Building 26, University of Nizwa

Microbiology Laboratory: DARIS Centre / Building 26, University of Nizwa

## Fee

950 O.R. per person

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# FOOD MYCOLOGY: TIMETABLE FOR THE COURSE

Day	Sunday	Monday	Tuesday	Wednesday	Thursday
Date	26th March	27th March	28th March	29th March	30th March
9:15-10:00	Module introduction background to module and Introduction to the importance of Fungi (NM)	CCPs: How to identify them and implement HACCP approaches (NM)	Recap: Hurdle technology and prevention strategies (NM)	Diagnostics: traditional vs modern technologies for mycotoxin analyses (AM)	Food products: ingredients, shelf life and preservation techniques – measurements in groups (NM/AM)
	Coffee/refreshments	Coffee/refreshments	Coffee/refreshments	Coffee/refreshments	Coffee/refreshments
10:15-11:00	Recap for previous students + new students: Beverages : yeast spoilage+ heat resistance spores (NM)	Group work: HACCP: Flow diagrams and identifying CCPs (NM/AM)	Mycotoxins: Regulations and sampling issues (AM)	Modelling fungal growth data: related to practical work (AM)	Analyses of data from experiments with moulds and environmental factors using Excel (AM)
11:00-12:00	Introduction to HACCP (NM)	Mycotoxins (NM)	Climate change impacts on food security and spoilage moulds /mycotoxins: Do we know enough? (AM)	Mycotoxin extraction and analyses (NM/AM/GA)	Analyses of data from experiments with moulds and environmental factors using excel (AM)
1:00-2:00	Lunch	Lunch	Lunch	Lunch	Lunch
2:00-3:00	Serial dilution/ Plating techniques (groups of 4-3) (NM/AM)	Measurement of fungi in lab (NM/AM)	Measurement of fungi in the lab/ Examination of different spoilage fungi (NM/AM)	Mycotoxin extraction from samples (NM/AM/GA)	Analyses of data from experiments with moulds and environmental factors (AM/NM)
	Coffee/tea	Coffee/tea	Coffee/tea	Coffee/Tea	Coffee/Tea
3:00-5:00	Enumeration of fungi from samples in lab and inoculation experiments (NM/AM) Air sampling of spores in the factory environment	Examination of food spoilage fungal cultures and use of Scanning EM to look at morphological characteristics of different species (NM/AM)	Fluorescence assays to examine efficacy of different fungicides/fungistats for controlling spoilage using viability assays (NM/AM)	Mycotoxin analyses + Measurements of fungi (NM/AM)	Wrap up session and final conclusions of the course: theoretical and practical considerations (NM/AM)



For more details

DARIS Centre for Scientific Research & Technology Development

Co-ordinator

0 0 9 6 8 2 5 4 4 6 5 8 3

0 0 9 6 8 2 5 4 4 6 4 9 8

Fax :

0 0 9 6 8 2 5 4 4 6 2 0 9

Email:

[darisinfo@unizwa.edu.om](mailto:darisinfo@unizwa.edu.om)







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