

AGRI-FOOD SAFETY

Reggio Emilia Campus

By:
UNIMORE Professors
emilio.stefani@unimore.it



What do we mean for “*Agri-Food*”?

Basically - Food of non-animal origin, as:

Fruits and Vegetables
Roots and Tubers
Cereals
Herbs and Spices



The screenshot shows the EFSA website header with the logo and the text 'EUROPEAN FOOD SAFETY AUTHORITY'. Below the header is a breadcrumb trail: 'Home / All contents / Foods of non-animal origin: what are the risks?'. On the right side of the header, there is a language selector showing 'EN' and 'English', and a menu icon with the text 'Menu'. A large yellow arrow points from the 'Menu' text to the list of food categories on the right. At the bottom of the page, the title 'Foods of non-animal origin: what are the risks?' is displayed in a large, bold, dark blue font, with a yellow arrow pointing from the right towards it. Below the title is a small illustration of a yellow bell pepper. At the very bottom, the text 'Published: 13 March 2015 | 4 minutes read' is visible.



Agri-Food associated risks



Rapid Alert System for Food and Feed (RASFF)

PAGE CONTENTS

Why RASFF?

Learn more about RASFF

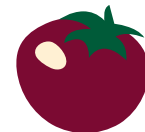
Related links

Why RASFF?

The EU has one of the highest food safety standards in the world – largely thanks to the solid set of EU legislation in place, to keep food and feed safe.

As part of the food safety tools, **the Rapid Alert System for Food and Feed (RASFF)** was established to ensure the exchange of information between member countries to support swift reaction by food safety authorities in case of risks to public health resulting from the food chain.

Its **legal basis** is Article 50 of [Regulation \(EC\) N° 178/2002](#) also known as the General Food Law.



<https://webgate.ec.europa.eu/rasff-window/screen/search>

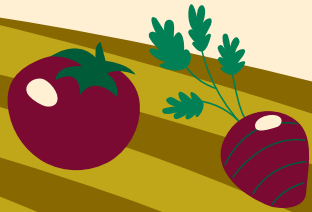


WHAT IS THE AGRI-FOOD SAFETY?



Integrating food safety and **nutrition** in agri-food systems by:

- **Guidelines and regulations** on safety and sustainability of agri-food production;
- Knowledge on **risks**, their **mitigation** and **management**;
- Design of agri-food production systems to **reduce losses** and **increase nutrition**;
- Evaluation of **consumers' perceptions** and **awareness** and development of correct **communication strategies**;
- Ensuring **fair-trade practices**, market access and income generation across agri-food value chains.





01

CHALLENGES

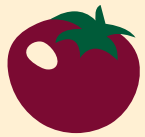
1. Develop **sustainable** production systems
2. Produce **nutricious food** and contribute to **healthy diets**, especially in low income countries
3. Ensure **quality and safety of raw material** and protect consumers' health
4. **Avoid losses** in post-harvest
5. Ensure **traceability** and avoid frauds along the agri-food markets

02

Our Goal: prepare our graduates to be a leading Actor in the Agri-Food area through:

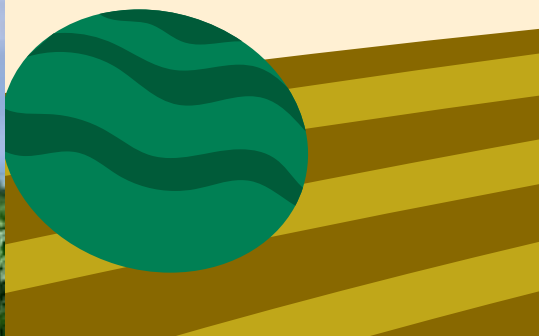
1. An offer of advanced University classes on key subjects;
2. Provision of useful skills to manage the evolution of the agrifood value chains;
3. Training in leading companies or international agencies;
4. Collaboration with our young scientists and/or our international PhD students.





Who will be the Agri-Food specialist?

- A **professional** involved in the development and implementation of **international regulatory issues** concerning agri-food safety.
- A **skilled coordinator** of technical personnel that supervises production, supply and handling of raw materials.
- A **risk manager** able to **address problems and emergencies** that may arise along any step of the agri-food production chain.
- An **excellent communicator** that will play a key role in the **dialogue** among policy makers, companies, farmers, consumers.



LIST OF CLASSES, 2nd Year



01

Good agricultural practices and identity preservation

3 CFU

Prof. Enrico Francia

Biotechnology and safety aspects of vegetable-based foods

3 CFU

Prof. Maria Gullo

02

Animal pests in stored agri-food products and their management

6 CFU

Prof. Lara Maistrello

03

Post-harvest losses and their management

6 CFU

Prof. Emilio Stefani

04

Mycotoxigenic fungi in agri-food and pesticide contamination: analysis and risk management

6 CFU

Prof. Emilio Stefani & Prof. Antonio Prodi



LIST OF CLASSES, 2nd Year

- free choices



05

Chemometrics

6 CFU

Prof. Marina Cocchi

06

Chemical ecology and trophic interaction in agroecosystems

3 CFU

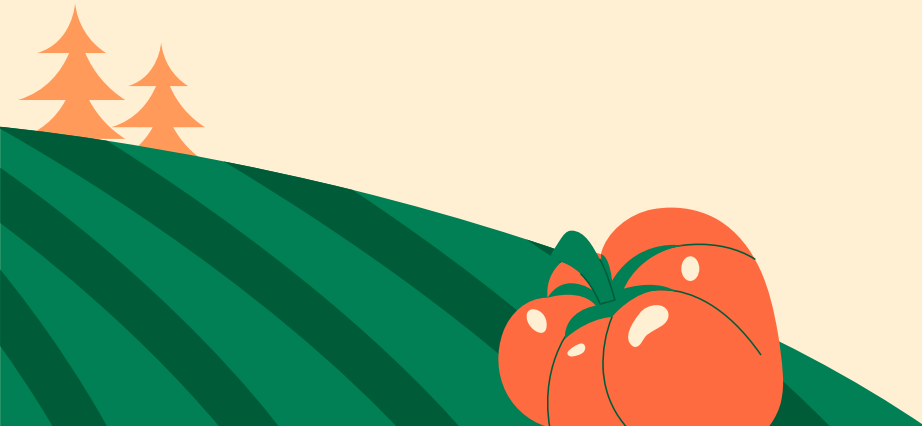
Prof. Elena Costi

07

Ethnobotany: the role of plants in our life

2 CFU

Prof. Anna Maria Mercuri



ROADMAP INFOGRAPHIC

		1 st Semester			2 nd Semester		
Class	CFU						
Animal pests in stored agri-food products and their management	6						
Biotechnology and agronomy for safety and identity preservation of agri-food products	6						
Mycotoxigenic fungi in agri-food and pesticide contamination: analysis and risk management	6						
Post-harvest losses and their management	6						
Chemometrics (free choice)	6						

Classes and Professors:



**Mycotoxins in AgriFood and Pesticide Contamination:
Risk Assessment and Management**

Emilio Stefani & Antonio Prodi

Post-harvest Losses and Their Mngement

Emilio Stefani

**Animal Pests in Stored Agri-food Products and their
Management**

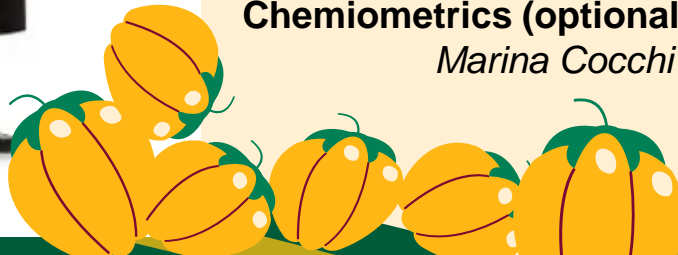
Lara Maistrello

**Biotechnology and Agronomy for Safety and Identity
Preservation of Agri-food Products**

Enrico Francia & Maria Gullo

Chemometrics (optional)

Marina Cocchi



Our teaching classes:



Mycotoxigenic fungi in agri-food and pesticide contamination: analysis and risk management

The issue

Mycotoxins? What are they? Consumers' awareness and perception say: they do not exist. But do you really know how to work/deal with **Mycotoxigenic fungi** in the lab?

And **Pesticides?** Oh, my good Lord, they are killing us all. But: do we **really need** pesticide inputs in agriculture?

Do you really know **how many/how much** pesticides we introduce through each meal?

Multiresiduality: the real challenge! And what about **Cumulative Risk Assessment?**

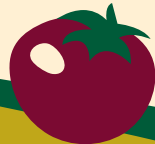
And the environment? How do we deal with **Environmental Toxicology?**



Myth Busting: A recent survey from the Consumer Reports National Research Center of 1,050 Americans found that consumers have some misconceptions about pesticides and organic produce.



Source: Consumer Reports Inc., USA



Risk communication: please, answer



Would sign a petition demanding strict control or total elimination of the chemical **dihydrogen monoxide**?

Reason:

- It can cause excessive sweating and vomiting.
- It is a major component of acid rain.
- It can cause severe skin burns in its gaseous state.
- It can kill if aspirated.
- It contributes to erosion.
- It has been found in tumors of terminal cancer patients.



Mycotoxigenic fungi in agri-food and pesticide contamination: analysis and risk management

Course outcomes

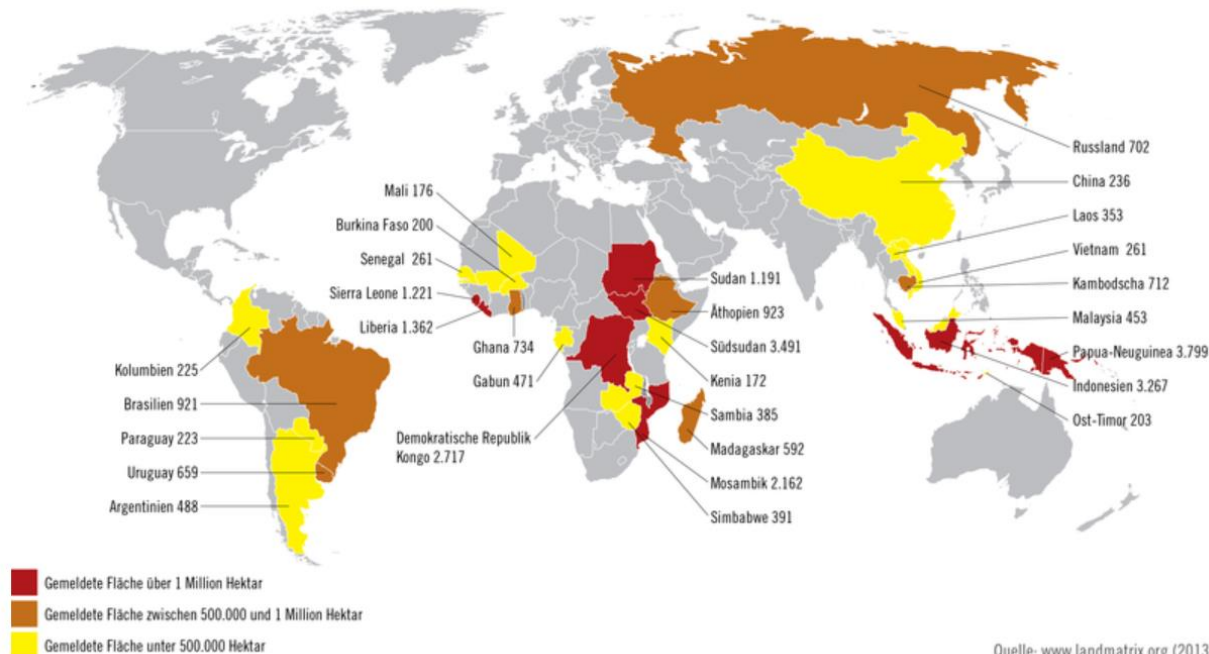
1. Knowledge of the **mycotoxigenic fungi**, their detection, their epidemiology, and their control.
2. Knowledge of the **most important mycotoxins**, their detection and indications for their management in food and feed.
3. A lab experience on how to **isolate** and **identify** mycotoxigenic fungi from agrifood
4. Knowledge on the “real” nature of pesticides: **toxicology** and development of **risk matrices**.
5. Introduction to the **environmental toxicology**.
6. **Cumulative risk assessment** of pesticides.
7. Knowledge of the **RASFF**: the European Alert System for Food and Feed
8. **Consumers’ perception** and indications for a correct **communication strategy** to face mycotoxins and pesticides risks in food and feed.
9. The hidden side of **Bio-pesticides**: a less known biosafety issue.



Post-harvest losses and their management

"Do you not understand that one needs a little more than nothing in order to exist?" - Jean Baudrillard, La société de consommation, Paris, 1970 (free quoting of Shakespeare, King Lear, Act 2, scene 4)

Großflächiger Landkauf und Pachtgeschäfte (in 1000 Hektar)



Quelle: www.landmatrix.org (2013)

Over one third of AgriFood products are lost between harvest and consumption.

Landgrabbing:
a solution to feed the world?



Post-harvest losses and their management

*"Do you not understand that one needs a little more than nothing in order to exist?" - Jean Baudrillard, *La société de consommation*, Paris, 1970 (free quoting of Shakespeare, *King Lear*, Act 2, scene 4)*

The issue

The **post-harvest system** should be thought of as encompassing the delivery of a crop from the time and place of **harvest** to the time and place of **consumption**, with **minimum loss**, maximum efficiency and **maximum return** for all involved. (D. Spurgeon: *The Hidden Harvest*, 1976).



The course programme

1. **Historical and Regional views** of post-harvest losses.
2. **Farm-to-Fork system analysis**: where do we suffer major crop losses.
3. What do we mean for "**Agrifood quality**": the parameters and **Crop Physiology**.
4. The **Commodity System Assessment Methodology**.
5. Sustainable solutions to diminish losses.
6. Operations and management of **Packinghouses**.
7. A list of post-harvest **disorders** and **diseases**

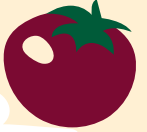


Post-harvest losses and their management

"Do you not understand that one needs a little more than nothing in order to exist?" - Jean Baudrillard, La société de consommation, Paris, 1970 (free quoting of Shakespeare, King Lear, Act 2, scene 4)

Course outcomes

1. Knowledge of the **value chain** for Agri-Food produce: **quality indicators** and **safety issues**.
2. Knowledge on factors and reasons for **post-harvest losses** and approaches for their **mitigation** and **management**.
3. Case studies: e.g. Post-harvest of **Mangoes** in India, The **Banana** production chain in Kenya
4. Introduction to **crop physiology** as a subject to ensure agri-food safety and prevent loss reduction.
5. The **Packinghouse**: design, operations, management, problem solving during the storage time for fruits and vegetables.
6. Knowledge of some important **disorders** and **diseases** affecting fruits and vegetables in post-harvest and methods for their management.



Examples of current Traineeships:



Ateeb Sarosh: Molecular characterisation and management of mycotoxigenic *Fusarium proliferatum* isolates affecting garlic.



Priyanka Kumari: Sustainable post-harvest management of organic bananas against antrachnose fungi.



Taha Sadique: Assessment of nutritional values of uncommon tropical nuts to support their marketing into the European Union.

John Gracian Ishimwe: Characterisation of microbial biocontrol agents against the blue mold of onion.



Biotechnology and agronomy for safety and identity preservation of agri-food products

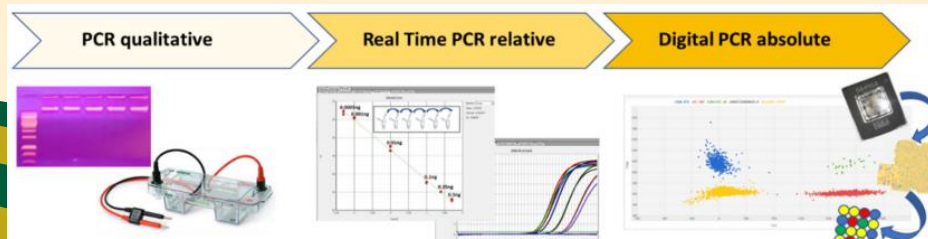


Course outcomes

Knowledge of GAP for the management of **phenotypic** and **genotypic** variability in different agricultural production chains.
Knowledge of the main methods of **traceability** and **identity preservation** of agri-food products in the value chains.

Knowledge of different vegetable fermented foods/beverages and the main **microorganisms** responsible for **fermentation processes**.

Knowledge of **bioprocesses** management considering raw materials, microorganisms, propagation methods and process parameters.



Animal pests in stored agri-food products and their management



The issue

- **Animal pests** infest stored agri-food products, causing **serious quantitative and qualitative damage** and human health problems.
- The **discovery of pests** in food **seriously discredits the producers'** branding. However, the **protection of food** against pests is largely **underestimated**.
- **Chemical control is NOT an option.**



Course outcomes

- Knowledge of the **main animal pests** of stored foodstuffs, the damage they cause, the main factors affecting pest presence, **pest prevention**, control and monitoring techniques.
- Ability to **detect infestations** in products and facilities, correctly identify pests; evaluate and set up appropriate **prevention and monitoring plans**; select the best **management strategies**.
- Raise **awareness of the risks** (economic and health) associated with **pest infestations** in the agri-food sector and the **importance of integrated sustainable management**.



Animal pests in stored agri-food products and their management

Teaching methods

- Classroom teaching with PowerPoint and scientific videos (5 CFU, 40 hours).
- Practical part (1 CFU laboratory, 12 hours):
 - **Laboratory exercises** with digital stereomicroscope observations of the most common pests of stored food products and their damage;

Seminars with professional pest control advisors;

Technical visit to agro-food companies to show how to identify potential infestations, prevention techniques, active and passive monitoring, management strategies in food production/processing/storage facilities.



Animal pests in stored agri-food products and their management

Internship opportunities

- **Sustainable management of food pests:** internship opportunities in **pest control companies** (e.g. EWS)
- **Insects for the valorisation of organic sidestreams** in a circular economy perspective (in the **laboratory or at companies**):

- A) Valorisation of plant by-products** treated with microbial cultures by **black soldier fly larvae** (UNIMORE EntoLab)
- B) Evaluation of bioconversion performance of food packaging** (plastic/bioplastic) by **tenebrionid larvae** (UNIMORE EntoLab)
- C) Industrial research** aimed at **optimising automated plants** for the **management of black soldier fly adults and larvae** (company KINSECT Srl)





Lab premises in via J.F. Kennedy



Lab premises at the Technopole

The Campus in Reggion Emilia



Besta building:
The teaching premises



THANKS!

Do you have any questions?

emilio.stefani@unimore.it

+39 0522 522013

www.unimore.it



CREDITS: This presentation template was created by **Slidesgo**, including icons by **Flaticon**, infographics & images by **Freepik**

Please keep this slide for attribution