



UNIVERSITÀ  
DI TORINO

## PROCEEDINGS OF THE



# 26<sup>TH</sup> WORKSHOP ON THE DEVELOPMENTS IN THE ITALIAN PHD RESEARCH ON FOOD SCIENCE TECHNOLOGY AND BIOTECHNOLOGY

# ASTI

19<sup>TH</sup> - 20<sup>TH</sup> - 21<sup>ST</sup>  
SEPT 2022

## UniASTISS

Polo Universitario Asti Studi Superiori  
"Rita Levi Montalcini"

## UNIVERSITÀ DEGLI STUDI DI TORINO



## **Proceedings of the 26<sup>th</sup> Workshop on the Developments in the Italian PhD Research on Food Science, Technology and Biotechnology**

Università degli Studi di Torino – Asti (Italy), 19<sup>th</sup>-21<sup>st</sup> September 2022

*Abstract:* This book collects the conference proceedings of the 26<sup>th</sup> *Workshop on the Developments in the Italian PhD Research on Food Science Technology and Biotechnology*, held at the *UniASTISS Polo Universitario Asti Studi Superiori “Rita Levi Montalcini”* from 19<sup>th</sup> to 21<sup>st</sup> September 2022. The goal of the conference is to gather PhD students from all Italian universities of whom projects deal with food-related topics to define the state of the art of the Italian academic research in this area of study.

*Keywords:* Food science, Food technology, Microbiology, Biotechnology, Italian PhD Research, PhDFood 2022.

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## 26<sup>th</sup> PhD Workshop Program

Workshop venue: **UniASTISS**

Polo Universitario Di Asti Studi Superiori "Rita Levi Montalcini"  
Piazzale Fabrizio De André, Asti, Italy



### Monday, September 19, 2022

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Registration opens at 10:00 time

13:30 – 14:00

**Workshop opening ceremony and welcome note**  
(Aula Magna 1, in parallel streaming Aula Magna 2)

**Maurizio Rasero**, Sindaco Città di Asti  
**Mario Sacco**, Presidente Polo Universitario UniASTISS  
**Stefano Geuna**, Magnifico Rettore Università di Torino  
**Rosalba Lanciotti**, Presidente SIMTREA  
**Ernestina Casiraghi**, Presidente SISTAL

14:00 – 14:45

**Plenary lecture (Aula Magna 1, in parallel streaming Aula Magna 2)**  
"The 12 pleasures of science"  
**Marcel Zwietering**, Wageningen University, The Netherlands

14:45 – 16:15

**Parallel session 1: Microbial fermentation (Aula Magna 1)**  
Session Chairs: **Monica Gatti**, **Gianluigi Mauriello**

**Marilisa Giavalisco**, SAFE, University of Basilicata  
"Use of *Lactiplantibacillus* strains and yeasts for the production of fermented table olives and extra virgin olive oil"  
**Anđela Martinović**, DeFENS, University of Milano  
"The ability of *Streptococcus thermophilus* ST870 to modulate urease activity in healthy subjects' fecal samples depends on the biomass production process"  
**Samantha Rossi**, DISTAL, University of Bologna  
"Biotechnological approaches to valorise alternative protein source, waste and by-products of food industries."

14:45 – 16:15

**Parallel session 2: Bakery products (Aula Magna 2)**  
Session Chairs: **Maria Cristina Messia**, **Monica Laureati**

**Veronica Oliviero**, Department of Agriculture, University of Napoli Federico II  
"Design and validation of healthy leavened bakery products: Focus on chemical-physical and sensory properties"  
**Martina Moretton**, DI4A, University of Udine  
"Formulation and processing strategies for obtaining bakery products tailored to the elderly's needs"

**Alice Costantini**, Faculty of Science and Technology, Free University of Bozen-Bolzano  
“Leavened baked goods for improving the functionality”

**Oumayma Toumi**, Department of Agricultural Sciences, University of Sassari  
“Use of response surface methodology to investigate the effect of partial substitution of sodium chloride with *Salicornia ramosissima* powder in wheat dough and bread”

16:15

6<sup>th</sup> What For Award, Federalimentare

Video presentation of the selected final proposals (Aula Magna 1 and Aula Magna 2)

16:15 – 17:00

Coffee break

Poster viewing (PhD I year Aula 6 - ground floor; PhD II year Aula seminari – first floor)

17:00 – 18:30

Parallel session 3: Food analysis (Aula Magna 2)

Session Chairs: **Ernestina Casiraghi**, **Angelita Gambuti**

**Silvio Iacovino**, DiAAA, University of Molise

“Flour rheological properties assessed through empirical and fundamental methods”

**Anna Luparelli**, Department of Chemistry, University of Bari

“Development of innovative methods for the multiple analysis of allergens in processed foods”

**Luca Menegoz Ursol**, DI4A, University of Udine

“Optimization of rapid analytical protocols for monitoring the contamination with hydrocarbons of petrogenic origin in the olive oil supply chain”

**Giacomo Bedini**, DIBAF, University of Tuscia

“Use of non-destructive analysis techniques for the technological and chemical-physical characterization of fruit and vegetables and for monitoring of the drying process”

17:00 – 18:30

Parallel session 4: Microbial characterization (Aula Magna 1)

Session Chairs: **Alessio Giacomini**, **Marisa Manzano**

**Cecilia Crippa**, Department of Agricultural and Food Sciences, University of Bologna

“Application of Next Generation Sequencing for the characterization of microbial hazard in Italian dairy and meat food productions realized in small-scale plants”

**Federica Barbieri**, Department of Agricultural and Food Sciences, University of Bologna

“Characterization of new bio-protective and functional lactic acid bacteria isolated from spontaneously European fermented sausages”

**Luca Bettera**, Food and Drug Department, University of Parma

“Non-starter Lactic Acid Bacteria: origin and characterization for a potential targeted use in cheesemaking”

**Rossella Filardi**, DeFENS, University of Milano

“Isolation and characterization of new isolates of *Akkermansia muciniphila* with a focus on antibiotic-resistance phenotypic and genotypic traits”

## Tuesday, September 20, 2022

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- 08:30 – 09:15**      **Plenary Lecture (Aula Magna 1, in parallel streaming Aula Magna 2)**  
“From idea to business start-up - developing entrepreneurial skills for life”  
**Jonathan Tait**, EIT Food, Belgium
- 09:15 – 10:45**      **Parallel session 5: Food sustainability (Aula Magna 1)**  
Session Chairs: **Monica Anese, Massimiliano Rinaldi**
- Mirella Noviello**, DiSSPA, University of Bari  
“Sustainable approaches to winemaking and wine aging”
- Marika Valentino**, Department of Agricultural Sciences, University of Napoli Federico II  
“Biopolymer active coating to extend the shelf-life of minimally processed fruits and vegetables”
- Angela Michela Immacolata Montone**, DIIN, University of Salerno  
“Development of edible coating functionalized with hydroxyapatite, complexed with bioactive compounds for the shelf-life extension of food products”
- Valeria Frigerio**, DeFENS, University of Milano  
“Shelf-life estimation as a strategic tool for the eco-design of a sustainable food packaging”
- 09:15 – 10:45**      **Parallel session 6: Food biotechnology (Aula Magna 2)**  
Session Chairs: **Prospero Di Pierro, Angela Capece**
- Serena Malabusini**, DeFENS, University of Milano  
“Bioethology of a promising parasitoid associated with fig pests”
- Chiara Purgatorio**, Food Sciences, University of Teramo  
“Alternative antimicrobial strategies for the replacement of traditional preservatives and evaluation of the impact on stability and safety of food products”
- Francesca Melini**, DIBAF, University of Tuscia  
“Application of metabolites secreted by plant growth-promoting bacteria to selected crops and evaluation of nutritional quality thereof”
- Francesco Salini**, DI4A, University of Udine  
“Heterologous expression of two novel antimicrobial peptides and investigation of their dedicated protease”
- 10:45**                **6<sup>th</sup> What For Award, Federalimentare**  
**Video presentation of the selected final proposals (Aula Magna 1 and Aula Magna 2)**
- 10:45 – 11:30**      **Coffee break**  
**Poster viewing (PhD I year Aula 6 - ground floor; PhD II year Aula seminari – first floor)**
- 11:30 – 13:30**      **Parallel session 7: Food processing (Aula Magna 2)**  
Session Chairs: **Maria Cristina Nicoli, Giuseppe Gambacorta**
- Nazarena Cela**, SAFE, University of Basilicata  
“Optimization of microbrewing process for high quality gluten free beer production”
- Aniello Falciano**, Department of Agricultural Sciences, University of Napoli Federico II  
“Processing and innovation in the Neapolitan Pizza manufacturing”
- Fosca Vezzulli**, DiSTAS, Università Cattolica del Sacro Cuore  
“Multifactorial traceability and characterization of green and roasted coffee”

**Davide Emide**, DeFENS, University of Milano  
“The complexity of protein network in foods: insight in the protein structure in cereal products”

**Andrea Bresciani**, DeFENS, University of Milano  
“Effects of processing on pulses and related products”

11:30 – 13:30

**Parallel session 8: Probiotics, prebiotics and nutraceuticals (Aula Magna 1)**

Session Chairs: **Carlo Rizzello**, **Fabio Minervini**

**Stefan Klettenhammer**, Faculty of Science and Technology, Free University of Bozen-Bolzano

“Innovative techniques to encapsulate food-grade bioactives”

**Claudia Cappello**, Food engineering and Biotechnology, Free University of Bozen-Bolzano

“A novel functional herbal tea containing probiotic *Bacillus coagulans* GanedenBC<sup>30</sup>: an *in vitro* study using the Simulator of the Human Intestinal Microbial Ecosystem (SHIME)”

**Margherita D'Alessandro**, Department of Agricultural and Food Sciences, University of Bologna

“Development and investigation of functional foods conceived for specific categories of consumers and produced with selected strains isolated from healthy vaginal environment and human breast milk”

**Annalisa Porrelli**, DiSSPA, University of Bari

“Functional food and *per os* microbial delivery system with a potential role in the prevention of diseases related to the human intestinal microbiota”

**Giovanni Turchetti**, DIBAF, University of Tuscia

“Identification and characterization of bioactive plant extracts and evaluation of viable use in the food industry”

13:30 – 14:30

**Lunch**

**Poster viewing (PhD I year Aula 6 - ground floor; PhD II year Aula seminari – first floor)**

14:30 – 15:15

**Plenary lecture (Aula Magna 1, in parallel streaming Aula Magna 2)**

**“The future of wine-making... the role of the scientific research”**

**Luigi Moio**, University of Napoli Federico II and President of the OIV, Italy

15:15 – 16:45

**Parallel session 9: Food circularity (Aula Magna 1)**

Session Chairs: **Matteo Mario Scampicchio**, **Rossella Di Monaco**

**Patricia Dahdah**, Department of Agricultural Sciences, University of Sassari

“Valorization of olive oil extraction by-products through functional bread making”

**Marco Montemurro**, DiSSPA, University of Bari

“Exploitation of unconventional plant matrices and agri-food waste through biotechnological processes”

**Marica Troilo**, DiSSPA, University of Bari

“Grape pomace as an innovative flour for the formulation of bakery products: how nutritional, textural and sensorial properties were affected?”

15:15 – 16:45

**Parallel session 10: Targeted nutrition (Aula Magna 2)**

Session Chairs: **Ilario Ferrocino**, **Francesca De Filippis**

**Massimiliano Tucci**, DeFENS, University of Milano

“Definition and validation of a healthy and sustainable dietary pattern, enriched with



plant-based foods rich in bioactives compounds, in the context of the MIND FoodS Hub project”

**Flavia Casciano**, DISTAL, University of Bologna

“*In vitro* study of short-term effect on gut microbiota of foods and ingredients for specific consumer categories”

**Cinzia Franchini**, Department of Food and Drug, University of Parma

“Promotion of nutrition knowledge and sustainability of dietary behaviors in different student populations”

**Veronica D'Antonio**, Bioscience and Agro-Food and Envr. Technology, University of Teramo

“Role of typical foods from Abruzzo region in reducing oxidative, inflammatory and metabolic stress in frail elderly people and/or affected by degenerative diseases”

- 16:45 – 17:00**      **Awarding Ceremony (Aula Magna 1, in parallel streaming Aula Magna 2)  
Fondazione Prof. Roberto Massini – ETS**
- 17:00 – 18:30**      **Poster viewing and discussion  
(PhD I year Aula 6 - ground floor; PhD II year Aula seminari – first floor)**
- 17:30 – 19:00**      **PhD Coordinators meeting (Aula 5)**
- 19:00**                **Bus departure from the Workshop venue (Piazzale Fabrizio De André, Asti) to the Gala Dinner**
- 20:00**                **Gala Dinner (Foro Boario Pio Corsi, Piazza Garibaldi, Nizza Monferrato, AT)**
- 23:30 (est.)**        **Bus departure from the Gala Dinner venue back to Asti and Torino**

## Wednesday, September 21, 2022

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- 09:00 – 09:45**      **Plenary lecture (Aula Magna 1, in parallel streaming Aula Magna 2)  
“Sustainable nutrition: the new challenge for the Italian food system”  
Mauro Fontana, President of the Italian AgriFood Cluster (CLAN), Italy**
- 09:45 – 11:45**      **Parallel session 11: Innovation in the food system (Aula Magna 1)  
Session Chairs: Marco Dalla Rosa, Fernanda Galgano**
- Federico Basso**, DI4A, University of Udine  
“Hyperbaric storage: An innovative and sustainable technology to extend stability and improve functionality of food”
- Giulia D'Alessio**, Bioscience and Agro-Food and Envr. Technology, University of Teramo  
“Impact of high dynamic pressure treatments on the physicochemical properties and technological functionality of pea proteins”
- Giulia Romano**, DI4A, University of Udine  
“Optimization of cooking for food service: matching quality and nutritional requirement as drivers for development of innovative tools”

**Mehmet Onur Oral**, DAFNE, University of Foggia  
“Adding unprecedented economic and social values to the side- and by-products of Mediterranean fruit and vegetables by reshaping them in novel source of nutrients and tailored food products mediated by 3D printing technology”

**Vincenzo Valentino**, Department of Agricultural Sciences, University of Napoli Federico II  
“Validation of Microbiome Mapping Strategies for the Food Industry”

9:45 – 11:45

**Parallel session 12: Wine quality and analysis (Aula Magna 2)**

Session Chairs: **Fabio Mencarelli, Daniela Fracassetti**

**Francesco Maioli**, DAGRI, University of Firenze  
“Monitoring and management of chemical and physical wine parameters by using different tank materials into the winemaking process”

**Giulia Scalzini**, DISAFA, University of Torino  
“What is the best time to harvest red grapes cv. Nebbiolo destined to withering? A three-years study”

**Sabrina Voce**, DI4A, University of Udine  
“Yeast strain and processing technology affect the composition of yeast autolysates: characterization and potential effects on wine evolution”

**Paola Bambina**, SAAF, University of Palermo  
“<sup>1</sup>H-NMR-based metabolomics to assess the impact of the soil on the chemical composition of Nero d’Avola red wines”

**Rolla El Harati**, Department of Agricultural Sciences, University of Sassari  
“Utilization of citral as antimicrobial on the mutants of Σ1278b library of *Saccharomyces cerevisiae*”

11:45 – 12:30

**Awarding ceremony (Aula Magna 1, in parallel streaming Aula Magna 2)**  
*6<sup>th</sup> What For Award, Federalimentare*

12:30 – 13:00

**Closing ceremony (Aula Magna 1, in parallel streaming Aula Magna 2)**

13:00 – 14:30

**Lunch and farewell**

14:00

*Post-event: COSTAL meeting (Aula 5)*

## List of contributions

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103	<b>Giulia Andreani</b> University of Parma	Using consumer science to improve healthy and sustainable eating behavior	<b>27</b>
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## **Eco-design tool development for sustainability optimization in food production systems and food waste reduction**

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This PhD research project aims at developing an eco-design tool based on Life Cycle Assessment methodology to allow food systems have a reliable resource when approaching to sustainability. The project wants to identify the most appropriate model to evaluate accurately the eco profile of selected food productions and provide a user friendly and strategic decision-making tool for businesses.

### **Sviluppo di strumenti di eco-design per l'ottimizzazione della sostenibilità nei sistemi di produzione alimentare e la riduzione degli sprechi alimentari**

Questo progetto di ricerca di dottorato mira a sviluppare uno strumento di eco-design basato sulla metodologia di valutazione del ciclo di vita per consentire ai sistemi alimentari di disporre di una risorsa affidabile in ambito di sostenibilità. Il progetto vuole identificare il modello più appropriato per valutare con precisione il profilo ecologico di produzioni alimentari selezionate e fornire uno strumento decisionale di facile utilizzo e strategico per le aziende.

#### **1. State-of-the-Art**

The food supply chain is one of the main contributors to several pressing environmental problems such as climate change, eutrophication, and biodiversity loss (EEA, 2018), aiming to a sustainable food system is therefore a priority.

To reach a sustainable food system, is fundamental the cooperation of all the actors involved in the supply chain, from the cultivation step, through production and transformation ones also including the use and consumption phase, and not neglecting the waste management processes.

To monitor and then reduce environmental impact along the food supply chain it is fundamental to use recognized and validated methodologies. In this context, the Life Cycle Assessment (LCA) can provide the response representing a scientific method internationally recognised (ISO, 2021a and ISO, 2021b) that allows to assess environmental impacts through a rigid methodology and can help to design and increase sustainability in the food supply chain (Colley et al., 2020).

The LCA methodology is identified as a means of achieve a more sustainable food system, but at the same time, significant issues concerning its use emerge.

On the one hand, food supply chain stakeholders argue that the rules, the models, the descriptions of the inputs required for a LCA, and the interpretation of the results are too difficult to define, identify and understand. As a result, they only hire professional analysts to assist them in understanding the system and applying LCAs to identify all potential sources of uncertainty in the model's output and to use the LCA model effectively and responsibly in any decision-making process (Cucurachi et al., 2022). On the other hand, LCA tools are increasingly being used to provide decision makers with quantitative evaluations of the decisions they make throughout the lifecycle of their products, systems, or services. However, the current generation of tools or is (i) aimed for specialists or users with extensive experience in industrial and environmental operations (Borrion et al., 2019) or (ii) represent well-publicized open-source solutions lacking scientific foundations that can only undermine the system and do not serve as a support tool for environmental management.

The preliminary results of an ongoing bibliographic and commercial review project revealed that there are currently more than 100 tools available that can be used in the food chain, with 35% of them completely free, 43% require registration to access the tool, and the remaining 20% require a subscription. Solely 91 percent of these tools analyse only farm or field activities (with only 26 percent analysing the meat and dairy industry), while only 9 percent present a solution that analyses the entire chain from farm to consumer. More than 70% of the tools only provide results related to the carbon footprint, whereas less than 30% of the tools provide a comprehensive and complete study of the system's environmental impacts.

It is also evident that there is a substantial heterogeneity among the LCA tools proposed by the market in fact, even if they offer a solution to monitor agricultural and field operations, they do not respect common LCA methodologies and some of these are obsolete or do not offer a complete picture of the resulting environmental impacts from the activities analysed. To interface with the largest number of operators in the agri-food chain, it is essential to work in the direction of simplifying the LCA analysis, moving from methodologies that may seem complex to tools that reduce the possibility of making mistakes and guide the user throughout the process. of analysis. however, it is essential not to stop only at field / breeding operations, even if these lead to the evaluation

of the environmental impacts of most of the food raw materials, one should go beyond what are the current boundaries analysing the processes of transformation, packaging and quantifying the potential food waste along the supply chain to create a new generation of LCA tools.

This PhD program aims at offering a concrete solution to the problems listed above, to create a set of tools that are based on scientific criteria and are reliable and recognized throughout the supply chain, capable to be used by the greater number of operators in the food chain starting from the grower / breeder up to the distributor.

## 2. PhD Thesis Objectives and Milestones

Within the overall objective mentioned above this PhD thesis project can be subdivided into the following activities according to the Gantt diagram given in Table 1:

- A1) **Critical analysis of LCA tools to identify strengths and weaknesses** in terms of (i) application field, (ii) food systems evaluated, and (iii) methodological approaches underlying the different tools (A 1.1). Moreover, the same analysis will help in the identification of food production chains with high necessity to monitor the system.  
 Milestones: the ranking of the tools and the identification of two food chains to be analysed.
- A2) **Development of eco-design tool for two production chains.** From the results of activities A1 strengths and weaknesses points of the different tools identified and analysed will be considered. Guidelines and recognised procedures will be used to give to the tool developed a robust structure for both mathematical and statistical aspects. The activity will require different steps: execution of the full LCA study of the system identified (A 2.1), simplification of the assessment procedure (A 2.2) and the creation of a tool (A 2.3).  
 Milestone: the final version of the (beta version) eco-design tool.
- A3) **Validation of the tool developed** via statistical analysis to obtain reliable and recognised tool. In this activity the tool will be stressed using different data to check the output. Moreover, the tool can be statistically compared with the reference LCA study to identify its compliance, variability factors, and criticisms. Finally, once the tool has been validated, it can be compared with some of the tools identified and analysed (A1) to quantify the variability range among the available tools.  
 Milestone: the validation of the created tool.
- A4) **PhD project management activities.** PhD thesis, scientific papers, and oral and/or poster communications preparation.

Table 1. Gantt diagram

Activities	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
<b>A1 Critical analysis of LCA tools to identify strengths and weaknesses</b>	█	█	█	█																				
1. Identification of methodological strengths and weaknesses of the different tools	█	█	█	█																				
<b>A2 Development of eco-design tool for two production chains</b>				█	█	█	█	█	█	█	█	█	█	█	█	█								
1. Execution of the full LCA study				█	█	█	█	█	█	█	█	█	█	█	█	█								
2. Simplification of the assessment procedure									█	█	█	█	█	█	█	█								
3. Eco-design tool development												█	█	█	█	█								
<b>A3 Validation of the tool developed via statistical approach</b>																	█	█	█	█	█	█	█	█
1. Test using different data of different origin																	█	█	█	█	█	█	█	█
2. Comparison with with full LCA studies and other tools																	█	█	█	█	█	█	█	█
<b>A4 PhD project management activities</b>	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█

## 3. Selected References

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