4th ISEKI-Food E-conference

Food Texture, Quality Safety and Biosecurity
in the Global Bioeconomy

Book of Abstracts

10 – 12 November, 2021
ONLINE

ISEKI Food Association

BOOK OF ABSTRACTS

ISEKI E-conferences

Food Texture, Quality Safety and Biosecurity in the Global Bioeconomy

10-12 November 2021.

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ORGANISING INSTITUTIONS

Banat's University of Agricultural Sciences and Veterinary Medicine "King Mihai I of Romania" - Timişoara

ISEKI Food Association

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Kiriaki ZINOVIADOU (Perrotis College / American Farm School of Thessaloniki, Greece)

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DAY 1

10 NOVEMBER 2021

9:30 am CET – 3:45 pm CET

CONFERENCE OPENING

Chaired by:

Katherin Flynn (ISEKI-Food Association, France)

9:30 am CET **Margarida VIEIRA**	Welcome from ISEKI and presentation of the organisation
9:40 am CET **Cosmin Alin POPESCU**	Welcome message from the Banat's University of Agricultural Sciences and Veterinary Medicine "*King Michael I of Romania*" from Timisoara.
9:45 am CET **Isidora RADULOV**	Traditions and perspectives within the Banat's University of Agricultural Sciences and Veterinary Medicine "*King Michael I of Romania*" from Timisoara.

SESSION 1

Chaired by:

Gerhard SCHLEINING (ISEKI-Food Association, Austria)

Diana Veronica DOGARU (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

INVITED SPEAKERS

10:00 am CET	Valorization of food by-products as sustainable packaging materials ***Rui CRUZ***
10:30 am CET	From molecular interactions to texture ***Christos RITZOULIS***

ORAL PRESENTATIONS

Chaired by:

Rui CRUZ (University of Algarve, Portugal)

Teodor Ioan TRASCA (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

11:00 am CET	Multilocus DNA metabarcoding of complex mixtures containing members of the Boraginaceae family: a step further to assure food safety and quality

Inês CARVALHO LEONARDO, Martijn STAATS, Marleen VOORHUIJZEN, Valerie VAN DER VORST, Bas FRONEN, Jorge CAPELO, Maria Teresa BARRETO CRESPO, ***Frédéric BUSTOS GASPAR***

11:15 am CET Development of pâtés of high nutritional value using non-conventional marine resources

Sandra ISIDRO, ***Filipa R. PINTO****, Ana M. DUARTE, Sónia BARROSO, Maria M. GIL*

11:30 am CET Optimization of spray drying variables for chickpea cooking water (aquafaba) powder with maximum protein and saponin contents

Nihat YAVUZ*, Selçuk OK, Hudayar BEGLIYEW*

11:45 am CET The Organic Food Choice Pattern: Are Organic Consumers Becoming More Alike?

Teresa MADUREIRA, Fernando NUNES, José VEIGA

12:00 am CET - 12:15 am CET **COFFEE BREAK**

SESSION 2 - STUDENT SESSION

Chaired by:

Maria PAPAGEORGIOU (International Hellenic University, Greece)

Mariana Atena POIANĂ (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

Ersilia Călina ALEXA (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

ORAL PRESENTATIONS & COMPETITION

12:15 am CET Rheological, textural, and microstructural properties of dough with rice bran oil and its fraction

***Hui Yi ENG**, Norazatul Hanim MOHD ROZALLI*

12:30 am CET Investigating patterns of species utilization in Greek elasmobranch products with DNA barcoding

***Zoi GIAGKAZOGLOU**, Chrysoula GUBILI, Andrew M. GRIFFITHS, Archontia CHATZISPYROU, Konstantinos TOULOUMIS, George MINOS, Ioannis E. BATJAKAS, Anastasia IMSIRIDOU*

12:45 pm CET Natural Spices from Local Markets in North Macedonia as Potential Antimicrobials

Natalija ATANASOVA-PANCEVSKA, Dzoko KUNGULOVSKI, **Sofija KOSTANDINOVSKA**

1:00 pm CET Optimization of the identification of dairy propionic acid bacteria using mass spectrometry

***Carola BÜCHER**, Johanna BURTSCHER, Konrad J. DOMIG*

1:15 pm CET Heat-treated olive pomace paste: a safe edible ingredient for the food industry

***M. Manuela SOUSA**, M. Antónia NUNES, Joana C. LOBO, Josman D. PALMEIRA, Susana MACHADO, Diana MELO, Anabela S. G. COSTA, Rita C. ALVES, Helena FERREIRA, M. Beatriz P. P. OLIVEIRA*

1:30 pm CET Evaluation of hypoglycemic activity and hypolipidemic effects of berry-processing by-products

Ieva JUREVIČIŪTĖ, *Ina JASUTIENĖ, Milda KERŠIENĖ, Daiva LESKAUSKAITĖ*

1:45 pm CET Physicochemical and rheological properties of yogurt fortified with fibre-rich cranberry pomace as affected by stage of pomace addition and storage time

Laurita VARNAITĖ, *Daiva LESKAUSKAITĖ*

12:00 am CET - 12:15 am CET **LUNCH BREAK**

SESSION 3 - STUDENT SESSION

2:00pm CET – 3:00 pm CET

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PI_1 Watermelon by-products as functional component in sponge cakes

Zhivka GORANOVA, Todorka PETROVA

PI_2 Technological and sensory properties of sweet gluten-free biscuits based on cereals and pseudocereals

Eva IVANIŠOVÁ, Jozef IŠTVAN, Veronika VALKOVÁ

PI_3 The impact of partial replacing wheat flour with sesame protein powder on volume and sensory properties of bread

Veronika VALKOVÁ, Hana ĎÚRANOVÁ, Zuzana TÓTHOVÁ, Lucia GABRÍNY

PI_4 The quality characteristics of muffins enriched with rape bee pollen

Miriam SOLGAJOVÁ, Janka NÔŽKOVÁ

PI_5 Comparative study of the minerals concentrations of some assortments of grilled and baked fish preferred by 20 to 70+ years old consumers in Romania

Gabriela BRAD, Diana Alexandra GHEORGHIU, Mihaela Andreea POPA, Liliana TUDOREANU

PI_6 Assessment of the mycotoxicological risk of contamination of gound red peper by aflatoxicenic fungi

Karina GRIGORYAN, Varduhi HOVSEPYAN, Mariam SARGSYAN

PI_7 Comparison of the lipid fractions of trending seeds (chia, flax, poppy, and sesame)

Diana MELO, M Antónia NUNES, Cristina MILLÁN-YUBERO, Manuel ÁLVAREZ-ORTÍ, M Beatriz P P OLIVEIRA

PI_8 Physico-chemical, nutritional and sensory study on the inclusion of seed oils in the formulation of puff pastry to elaborate Miguelitos de la Roda

Cristina MILLÁN-YUBERO, Diana MELO, M Antónia NUNES, Elena MARTÍNEZ, M Beatriz P P OLIVEIRA, José E PARDO, Manuel ÁLVAREZ-ORTÍ

PI_9 Extraction efficiency of stinging nettle (*Urtica dioica* L.) leaves and roots phenolic compounds

Živilė TARASEVIČIENĖ, Miglė VITKAUSKAITĖ, Aurelija PAULAUSKIENĖ

PI_10 Fruit leathers enriched with berries press cake powder and cannabis seeds chemical composition and physical properties

Aurelija PAULAUSKIENĖ, Živilė TARASEVIČIENĖ

PI_11 Thermal transition of osmotically processed beef meat by differential scanning calorimetry

Dafni DIMAKOPOULOU-PAPAZOGLOU, Athina LAZARIDOU, Costas BILIADERIS, Eugenios KATSANIDIS

PI_12 Rheological and textural properties of 3D-printed snacks and breakfast cereals enriched with grain by-products

Matea HABUŠ, Svitlana MYKOLENKO, Bojana VOUČKO, Duška ĆURIĆ, Damir JEŽEK, Zoran HERCEG, Dubravka NOVOTNI

PI_13 Evaluation of the antimicrobial potential of *Physalis Ixocarpa* Brot. husk extracts against food pathogens

Brian Armstrong RODRIGUEZ CARRILLO, Juliana MORALES CASTRO, Maria Ines GUERRA ROSAS, Damian REYES JAQUES

PI_14 Evaluation and discrimination of fruit-based pasta by ATR-FTIR-PCA

Simelda Elena ZIPPENFENING, Dina GLIGOR (PANE), Claudia Izabela OPRINESCU, Daniel Ioan HADARUGA, Adrian RIVIS, Nicoleta Gabriela HADARUGA

3:00 pm CET - Closing of Day 1 of the conference

DAY 2

11 November

1:55 PM CET - 6:30 PM CET

1:55 pm CET **Liliana TUDOREANU** Welcome to day 2 of the conference

SESSION 4

Chaired by:

Adrian RIVIS (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

Liliana TUDOREANU (University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania)

INVITED SPEAKERS

2:00 pm CET	**Maria FONT I FURNOLS**	Consumers attitudes and beliefs towards meat quality
2:30-pm CET	**Jesus Simal GANDARA**	Possibilities for Metabolic Profiling

Chaired by:

Paola PITTIA (University of Teramo, Italy)

Despina Maria BORDEAN (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

ORAL PRESENTATIONS	
3:00 pm CET	Influence of apple varieties and microflora diversity on the sensory and volatile profiles of apple cider ***Paul Cristian CALUGAR**, Elena MUDURA, Teodora Emilia COLDEA*
3:15 pm CET	Development of nature-inspired surfaces to prevent biofouling in the food industry **Luciana GOMES**, Kathryn WHITEHEAD, Filipe MERGULHÃO
3:30 pm CET	Determination of tetracycline residues in red meat available in Oman **Sumaiya AL KINDI**
3:45 – 4:00 pm CET	**COFFEE BREAK**

SESSION 5 - STUDENT SESSION

Chaired by:

Victor ACHA (LaSalle Beauvais, France)

Corina Dana MIŞCĂ (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

ORAL PRESENTATIONS & COMPETITION

4:00 pm CET Biotechnological Characterization of Lactic Acid Bacteria to Enhance Quality of Fermented Milk Products

Mohammad Khairul ALAM, *Roberta PRETE, Giorgia PERPETUINI, Federica FLAMMINII, Carlo PERLA, Paola PITTIA, Aldo CORSETTI*

4:15 pm CET Evaluation of structural behavior in the process dynamics of oleogel based tender dough products

Anda Elena TANISLAV, *Andreea PUȘCAȘ, Adriana PĂUCEAN, Elena MUDURA, Vlad MUREȘAN*

4:30 pm CET Prickly-pear: nutritional differences between an irrigated and a non-irrigated culture

A.O.S. JORGE, *A.S.G. COSTA, M.B.P.P. OLIVEIRA*

4:45 pm CET Oleogel-in-hydrogel bigel: A novel fat substitute in fermented sausages

Konstantına ZAMPOUNI, *Christina SIACHOU, Thomas MOSCHAKIS, Eugenios KATSANIDIS*

5:00 pm CET Identification of biomarkers for the authentication of Alpine Cheeses

Hannah INNERBICHLER, *Verena WIEDEMAIR, Katrin BACH*

5:15 pm CET Influence of a coffee silverskin extract on glucose intestinal transporters: an apparent synergism between caffeine and 5-O-caffeoylquinic acid

Juliana A. BARRETO PEIXOTO, *Nelson ANDRADE, Susana MACHADO, Anabela S. G. COSTA, M. Beatriz P. P. OLIVEIRA, Fátima MARTEL, Rita C. ALVES*

5:30 pm CET Textural properties of some assortments of grilled and baked fish preferred by 20 to 50+ years old consumers in Romania

Diana Alexandra GHEORGHIU, *Gabriela BRAD, Sorin Cătălin TOMESCU, Liliana TUDOREANU*

5:45 am CET High-pressure processing and lytic bacteriophage cocktail PhageGuard S as a synergistic hurdle system towards Salmonella inactivation in egg white

Cláudia MACIEL, *Ana CAMPOS, Norton KOMORA, Carlos A. PINTO, Teresa R.S. BRANDÃO, Jorge A. SARAIVA, Paula TEIXEIRA*

SESSION 6

6:00 – 7:00 pm CET

POSTER SESSION:VIRTUAL POSTER ROOM AND BREAKOUT ROOMS IN ZOOM

PII_1 Effect of the cranberry pomace on the characteristics of meat systems

Justina NARKEVICIUTE, Rimante VINAUSKIENE, Viktorija EISINAITE

PII_2 Development and characterization of chicken fat bigels structured with carnauba wax and gelatin

Gintare BALTUONYTE, Viktorija EISINAITE, Rimante VINAUSKIENE

PII_3 Potential to develop breads with Greek wheat landraces with high sensory and textural properties

Styliani PROTONOTARIOU, Ioanna MANDALA, Ricos THANOPOULOS

PII_4 Microsystem based emulsification of aqueous peppermint extracts as a time and energy saving alternative to the batch high shear emulsification process

Filip GRGIĆ, Davor VALINGER, Tamara JURINA, Jasenka GAJDOŠ KLJUSURIĆ, Maja BENKOVIĆ, Ana JURINJAK TUŠEK

PII_5 Impact of alginate concentration on texture and the release of hemp (*Cannabis sativa* L.) bioactives from alginate microbeads – an optimization study

Ema STAŽIĆ, Davor VALINGER, Tamara JURINA, Jasenka GAJDOŠ KLJUSURIĆ, Ana JURINJAK TUŠEK, Tomislav BOSILJKOV, Maja BENKOVIĆ

PII_6 The influence of taste, texture and appearance on the level of consumer acceptability for functional liquid products

Catalin BILBIE

PII_7 *Opuntia ficus-indica* (L.) Miller cladodes: effect on different types of cancer cell lines

Nelson ANDRADE, Liliana ESPÍRITO SANTO, Juliana A. BARRETO PEIXOTO, Cláudia SILVA, Rita C. ALVES, M. Beatriz P. P. OLIVEIRA, Fátima MARTEL

PII_8 Biotechnological tools for cereal dietary fibre modifications

Aleksandra TORBICA, Miloš RADOSAVLJEVIĆ, Miona BELOVIĆ, Nevena DJUKIĆ, Stefan MARKOVIĆ, T. TAMILSELVAN, Pichan PRABHASANKAR

PII_9 Evaluation of gluten-free composite flours from the point of view of their rheological and baking properties

Tatiana BOJŇANSKÁ, Alena VOLLMANNOVÁ, Eva IVANIŠOVÁ

PII_10 Mineral profile of olive pomace from different crops in Portugal

L. ESPÍRITO SANTO, A. LA ROCCA, M. Manuela SOUSA, A. S.G. COSTA, M. A. NUNES, R. C. ALVES, A. ALMEIDA, M. B. P.P. OLIVEIRA

PII_11 The influence of flour heat pre-treatment on the acrylamide and 5-hydroxymethylfurfural (HMF) content in breads

Zuzana CIESAROVÁ, Kristína KUKUROVÁ, Aleksandra TORBICA, Miona BELOVIĆ, Jana HORVÁTHOVÁ, Ľubomír DAŠKO, Viera JELEMENSKÁ, Miloš RADOSAVLJEVIĆ

PII_12 Exploring the development of a "clean-label" gluten free bread

Evangelia PAPAGIANNI, Kali KOTSIOU, Costas G. BILIADERIS , Athina LAZARIDOU

PII_13 Analysis of The Suitability of Yeast for Enriching The Waste Biomass of Rapeseed Meal

Dawid DYGAS, Joanna BERŁOWSKA

PII_14 Utilisation of marula fruits

Shonisani Eugenia RAMASHIA, Mpho MASHAU, Ephraim KGATLA, Masiza MIKASI, Mashudu MAKHADO

7:00 pm CET - Closing of the Day 2 of the conference

DAY 3

12 November

9:25 am CET – 2:30 pm CET

9:25 am CET **Isidora Radulov** Welcome to day 3 of the conference

SESSION 7

Chaired by:

Ersilia Călina ALEXA (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

Isidora RADULOV (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania

INVITED SPEAKERS

9:30 am CET Prediction of Solar Cooking Impact on Products Quality – The Case of Red Lentils

Cristina L.M. Silva

10:00 am CET Stability of dietary polyphenols

Jiambo Xiao

Chaired by:

Kiriaki ZINOVIADOU (Perrotis College / American Farm School of Thessaloniki, Greece)

Claudia Izabela OPRINESCU (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

Laura POP (University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania)

STUDENT SESSION: SHORT ORAL & POSTER COMPETITION

10:30 am CET Natural deep eutectic solvents as ecological extraction media to isolate bioactive compounds from saffron floral by-products

Debora CERDA-BERNAD, *Estefania VALERO-CASES, Andromachi TZANI, Anastasia DETSI, Maria Jose FRUTOS-FERNANDEZ*

10:40 am CET Comparative analysis of Clostridium tyrobutyricum genomes reveals high genetic diversity

Lucija PODRZAJ, *Johanna BURTSCHER, Konrad DOMIG*

10:50 am CET Exploring the development of a "clean-label" gluten free bread

Evangelia PAPAGIANNI, *Kali KOTSIOU, Costas G. BILIADERIS, Athina LAZARIDOU*

11:00 am CET Analysis of The Suitability of Yeast for Enriching the Waste Biomass of Rapeseed Meal

Dawid DYGAS, *Joanna BERŁOWSKA*

11:10 am CET Rheological and textural properties of 3D-printed snacks and breakfast cereals enriched with grain by-products

Matea HABUŠ, *Svitlana MYKOLENKO, Bojana VOUČKO, Duška ĆURIĆ, Damir JEŽEK, Zoran HERCEG, Dubravka NOVOTNI*

11:20 am CET Evaluation and discrimination of fruit-based pasta by ATR-FTIR-PCA

Simelda Elena ZIPPENFENING, *Dina GLIGOR (PANE), Claudia Izabela OPRINESCU, Daniel Ioan HADARUGA, Adrian RIVIS, Nicoleta Gabriela HADARUGA*

11:30 am CET Evaluation of the antimicrobial potential of Physalis Ixocarpa Brot. husk extracts against food pathogens

Brian Armstrong RODRIGUEZ CARRILLO, *Juliana MORALES CASTRO, Maria Ines GUERRA ROSAS, Damian REYES JAQUES*

11:30 am CET - 12:30 am CET **LUNCH BREAK**

SESSION 8

Chaired by:

Marco DALLA ROSA (University of Bologna, Italy)

Diana Veronica DOGARU (Banat's University of Agricultural Sciences and Veterinary Medicine "*King Mihai I of Romania*" - Timişoara, Romania)

ORAL PRESENTATIONS

12:30 am CET	Food literacy and the use of mobile applications in the context of sustainable food consumption ***Anna ROGALA**, Renata NESTOROWICZ, Ewa JERZYK*
12:45 pm CET	Olive oils from the Mediterranean basin ***Diego PLANETA***
1:00 pm CET	Choices in Sustainable Food Consumption: How (Low Intake) Organic Consumers Behave in a World-Leading Region of Organic Production ***Nunes FERNANDO**, Teresa MADUREIRA, José VEIGA, Pablo SARALEGUI*
1:15 pm CET	Knowledge about trends in the consumers' behaviors in an organic supply chain on the food market – the case of Poland **Renata NESTOROWICZ**, Ewa Jerzyk, Anna ROGALA

SESSION 9

1:15 pm CET – 2:30 pm CET

***POSTER SESSION*:VIRTUAL POSTER ROOM AND BREAKOUT ROOMS IN ZOOM**

PIII_1 Development of novel dairy products with increased protein levels from Jersey cow milk

Grigorios NELIOS, Anastasios NIKOLAOU, Panayiotis PAPAZILAKIS, Yiannis KOURKOUTAS

PIII_2 Microbiological quality of se-soft cheese "Lori" during the shelf-life

Karine GRIGORYAN, Mariam SARGSYAN, Varduhi HOVSEPYAN

PIII_3 Monitoring the changes of the microbiological state and chemical composition of pitted dried plums: Application of different packaging materials and selected storage conditions

Aleksandra TEPIĆ HORECKI, Zdravko ŠUMIĆ, Vera LAZIĆ, Dragoljub CVETKOVIĆ, Jelena RAIČEVIĆ, Anita MILIĆ, Tatjana DANIČIĆ

PIII_4 Citrus and onion by-products as valuable sources of compounds with technological functionality for the formulation of food emulsions

Federica FLAMMINII, Alessandra DE BRUNO, Valeria IMENEO, Graziana DIFONZO, Francesco CAPONIO, Paola PITTIA, Carla Daniela DI MATTIA

PIII_5 Mineral profile of four varieties of Opuntia ficus-indica cladodes

L. ESPÍRITO SANTO, L. KOCANOVÁ, Ana Olívia JORGE, A. S. G. COSTA, A. ALMEIDA, M. B. P. P. OLIVEIRA

PIII_6 Okra powder as an innovative and natural ingredient for gluten-free breadmaking

Deborah TUFARO, Carola CAPPA

PIII_7 Combined effect of heating, pH, salt, and ethanol on denaturation of whey proteins

Marios ANDREADIS, Costas G. BILIADERIS, Thomas MOSCHAKIS

PIII_8 Ability of ethanol-treated whey proteins to form cold-set gels after removal of ethanol

Marios ANDREADIS, Garoufalia CHARITOU, Costas G. BILIADERIS, Thomas MOSCHAKIS

PIII_9 Pea proteins isolation and characterization of their technological functionality

Giulia D'ALESSIO, Federica FLAMMINII, Lilia NERI, Paola PITTIA, Carla Daniela DI MATTIA

PIII_10 Development of Sour Cherry MAP technology

Gergő SZABÓ

PIII_11 *Rubus ulmifolius* mixed with *Pollicipes pollicipes*: a potential food product

Joaquina PINHEIRO, Hugo SÁ, Raul BERNARDINO, Sérgio LEANDRO, Rui GANHÃO

PIII_12 Effect of 1-MCP anti-ripening treatment on the quality of tomatoes at different stages of ripening

Zsuzsanna HORVÁTH-MEZŐFI, Gergő SZABÓ

PIII_13 The effect of modified atmosphere packaging on the quality characteristics of micro-greens

Gob MONIKA

PIII_14 White Tea vs Green Tea - phytochemical contents and in vitro antioxidant properties

Florina RADU

PIII_15 Mascarpone cheese: evaluation of chemical, physico-chemical, physical, microstructural properties affecting its quality

Johnny CIANCETTA, Marco FAIETA, Federica FLAMMINII, Paola PITTIA

PIII_16 *New assortments of bread with protective effect against cardiometabolic diseases*

Georgiana Roxana TOMOSOIU, Corina PREDESCU, Liliiana TUDOREANU

PIII_17 Natural deep eutectic solvents as ecological extraction media to isolate bioactive compounds from saffron floral by-products

Debora CERDA-BERNAD, Estefania VALERO-CASES, Andromachi TZANI, Anastasia DETSI, Maria Jose FRUTOS-FERNANDEZ

PIII_18 Comparative analysis of Clostridium tyrobutyricum genomes reveals high genetic diversity

Lucija PODRZAJ, Johanna BURTSCHER, Konrad DOMIG

PIII_19 Determination of tetracycline residues in red meat available in Oman

Sumaia AL KIND

SESSION 1

INVITED SPEAKERS

ISI_1

VALORIZATION OF FOOD BY-PRODUCTS AS SUSTAINABLE PACKAGING MATERIALS

Rui CRUZ

University of Algarve, Portugal

In the food industry, packaging has a crucial function in containing and protecting food from different external factors, such as microorganisms and oxygen, among others, from spoilage and damage, contributing to preserve food products quality and guarantee food safety during its shelf-life, however, huge amounts of solid wastes are generated and discarded in terrestrial and marine ecosystems, contributing to a negative environmental impact. The search for viable alternatives with suitable packaging properties is continuously under study and the reduction of these wastes can be achieved with the development of new environmentally friendly packaging systems. Several by-products produced by different industries, from plant and animal origin, from the skin, peels, pulp, seeds, pomace, shells, and viscera among others, have been used to develop different types of packaging systems with different properties. These sustainable packaging materials allow on one hand to decrease the use of plastic materials, but on the other hand to increase the valorization of by-products. Future challenges include a change in the consumer behavior to use less, reuse, recycle and recover, and to promote more sustainable and less harmful alternatives with the valorization of by-products, as well as concrete actions designed to make the vision for a more circular economy a reality.

ISI_2

FROM MOLECULAR INTERACTIONS TO TEXTURE

Christos RITZOULIS

Department of Food Science and Technology
International Hellenic University, Alexander Campus, 57400 Thessaloniki, Greece

During the oral processing of foods, mixing occurs between the food and saliva. The co-existence of key food ingredients, such hydrocolloids, with saliva components, such as mucin, lead to macroscopic (rheological) changes in the food matrix; these can be directly traced to colloidal-level events (phase separations), which are in turn based on molecular-level events. This presentation summarizes the current understanding of molecular-level interactions between mucin and selected hydrocolloidal ingredients, and the effect of such interactions on the colloidal and macroscopic properties of foods. The conclusions argue that the texture of foods is a personalized experience, based in large on the interplay between the salivary components of individuals and the orally-processed food. The findings are discussed in light of personalized nutrition, focused on xerostomic and dysphagic people.

ORAL PRESENTATIONS*

***Name of presenting author is underlined**

OPI_1

MULTILOCUS DNA METABARCODING OF COMPLEX MIXTURES CONTAINING MEMBERS OF THE BORAGINACEAE FAMILY: A STEP FURTHER TO ASSURE FOOD SAFETY AND QUALITY

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Multilocus DNA metabarcoding (mDNAm) provides great potential for multispecies identification in complex multi-ingredient food samples, being invaluable for food safety assessment when certain ingredients containing toxic compounds. Members of the Boraginaceae (B) family of plants are recognized pyrrolizidine alkaloids producers. These compounds have been associated with food poisoning (hepatotoxic, mutagenic, hepatocarcinogenic), as well as interferents in nucleic acids-based methodologies (e.g., DNA barcoding), by alkylating and covalently binding to DNA.

In this work, characterized mixtures were used to assess how species identification using a mDNAm approach can be affected by the presence of species belonging to the B family. The mixtures were composed of (I) 100% (w/w) non-B and (II) 70% (w/w) non-B and 30% (w/w) B freeze-dried plant samples. DNA was recovered using 2 DNA extraction methods (conventional and commercial kit), without and with the addition of a physical and chemical in-house developed pre-treatment, to reduce the number of molecules that can interfere with downstream processing.

The quality of the extracted DNA was first evaluated and subsequently processed using a mDNAm method based on Illumina MiSeq amplicon sequencing of nuclear (ITS2) and plastidial (matK, rbcL, trnL) DNA barcode markers [https://doi.org/10.1093/gigascience/gix080].

When compared to a non-B mixture, the presence of B species in the mixture decreased the overall quality and amplifiability of the recovered DNA. Also, the read quality resulting from DNA metabarcoding was affected, thereby complicating species identification. However, the addition of a pre-treatment step before DNA extraction, improved all the measured parameters for the conventional DNA extraction method, being less effective for the commercial kit.

The mDNAm approach using DNA extracted with the conventional method combined with the in-house pre-treatment method can help reveal the presence of species that otherwise would not be detected. Therefore, the proposed methodological modifications enable the use of the mDNAm technique to provide a comprehensive assessment regarding safety, quality, authenticity, and integrity of food commodities that could include toxic and disease-causing members of the B family.

Keywords: Multilocus DNA metabarcoding, Boraginaceae, Pyrrolizidine alkaloids, Food safety and quality, Food authenticity and integrity.

Aknowledgements*:* Conducted under project 02 / SAICT / 2017 / 31074, financed by Programa Lisboa 2020, Portugal 2020, and EU (ERDF).

OPI_2

DEVELOPMENT OF PÂTÉS OF HIGH NUTRITIONAL VALUE USING NON-CONVENTIONAL MARINE RESOURCES

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Consumers are increasingly aware of the relationship between food and health, and therefore there is an incresing demand for value-added foods that can offer beneficial effects on health and well-being. Allied to this demand, it is important to value marine resources that are widely available and nutritionally rich. These resources, both conventional and non-conventional, can be key ingredients in the development of new products. High consumption convenience products like pâtés are commonly associated with unhealthy foods, tendentially decreasing its consumption. In order to break this trend, it is important to innovate formulations to improve the nutritional value by using new ingredients.

The aim of this work was to develop and characterise ready-to-eat, nutritionally balanced pâtés, using traditional ingredients (gilthead sea bream (Sparus aurata) from aquaculture and wild anchovy (*Engraulis encrasicolus*)) and non-conventional ones (macroalgae (*Ulva rigida*, *Porphyra umbilicalis, Gracilaria gracilis*), microalgae (*Chlorella vulgaris*) and halophytes (*Salicornia ramosissima*)) as sodium salt replacers and source of vitamins and minerals.

The results allowed to achieve 4 formulations (2 with anchovies and 2 with sea bream) with high protein content (20 % of the energetic value of the final product), low saturated fat content (Σ saturated fatty acids + Σ trans fatty acids < 1,50 g/100 g), source of elements such as P, Cu and Fe (>15 % Recommended Daily Allowance) and high iodine content (>30 % Recommended Daily Allowance). With no salt or sugar added to the prototypes developed, claims of low sugar content (< 5.00 g/100 g) and reduced sodium content (< 0.12 g/100 g) were also obtained, according to the European Community Regulation nº 1924/2006.

In addition, with the anchovy formulations, it was possible to obtain products that are a source of fibre and high in Mg.

Analysis of colour and texture revealed similarity to analogue products already available on the market, facilitating their acceptance by the consumer. Food sensory analysis reveals an acceptance above 68 %.

These Pâtés, as ready-to-eat products with a long shelf life, stand out from similar products already on the market for their high nutritional value and for the incorporation of non-conventional ingredients, making them more sustainable products.

Keywords: algae, *Salicornia ramosissima*, aquaculture, ready-to-eat, sustainability

Aknowledgements*:* The support of FEDER thought the project POCI-01-0247-FEDER-024517 and FCT thought the project UIDB/04292/2020.

OPI_3

OPTIMIZATION OF SPRAY DRYING VARIABLES FOR CHICKPEA COOKING WATER (AQUAFABA) POWDER WITH MAXIMUM PROTEIN AND SAPONIN CONTENTS

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Chickpea cooking water (aquafaba) has been gaining increased attention due to its potential as an alternative foaming and emulsifying agent. While most research conducted on aquafaba focused on its liquid form, obtaining a dry product with high quality is another hot topic. In this study, aquafaba will be dried using a laboratory scale spray dryer. Response surface methodology will be used to optimize inlet air temperature (130, 150, 170°C), feed rate (4, 6, 8 mL/min), and aspirator speed (80, 90, 100 m3/hr) variables in order to produce aquafaba powder with maximum protein and saponin contents while maintaining moisture level below 6% (d.b.). Aquafaba powder quality parameters such as color, bulk density, solubility, foaming capacity, and foam stability will also be determined and compared to egg white powder.

Keywords: aquafaba, spray drying, protein, saponin

OPI_4

THE ORGANIC FOOD CHOICE PATTERN: ARE ORGANIC CONSUMERS BECOMING MORE ALIKE?

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There is no doubt that the search for organic products is already more than a trend; it is an indisputable reality. More and more people are opting for a healthier lifestyle that starts with food, which has awakened a growing interest in understanding the reasons for these purchases. The motivational attributes of consumers' decisions regarding the consumption of organic products are the main aim of this study. The survey included 250 respondents that filled a questionnaire by email and by personal interviews. We used a non-probabilistic sampling method, namely convenience sampling and the best–worst scaling method to analyze 10 attributes of organic purchasing decisions. Then, we studied the impact of the classification variables age, gender, academic level, place of residence, children under 18 living at home, and place of purchase of organic products on the attributes. Applying a chi-square test, we only obtained statistically significant differences for children under 18 living at home and the certification warranty ($p = 0.011$). The results show the dominance of credence attributes and egoistic motivations on organic consumption and may indicate a path towards the standardization of the organic consumer profile. This study emphasized that we may be facing a new organic consumer, for whom health-related factors are not just significant but overwhelming as well.

Keywords: organic food, attributes, Bestworst scaling, consumer behavior

Aknowledgements*:* This work is supported by Portuguese Foundation for Science and Technology, project UIDB/05937/2020.

SESSION 2 - STUDENT SESSION

ORAL PRESENTATIONS* & COMPETITION

***Name of presenting author is underlined**

OP&CI_1

RHEOLOGICAL, TEXTURAL, AND MICROSTRUCTURAL PROPERTIES OF DOUGH WITH RICE BRAN OIL AND ITS FRACTION

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The rice bran oil can be used to produce semisolid fractions through solvent fractionation. This study aimed to investigate and compare the rheological, textural, and microstructural behavior of the dough with commercial shortening (DS), rice bran oil (DO), and rice bran oil fraction (DF), therefore, understand the effect of shortening type on the bread dough making. The rheological behavior of dough was determined by the rheometer through oscillatory strain sweep, frequency sweep, and creep recovery test. All the storage moduli (G') were significantly higher than loss moduli (G") with tan δ less than 1. The G' and G" of DS (20,580.00 ± 2,337.15 Pa; 8,364.83 ± 1,043.95 Pa) was significantly higher than DO (11,893.33 ± 1,319.84 Pa; 5,240.00 ± 607.59 Pa) and DF (16,548.33 ± 3387.93 Pa; 6,479.17 ± 1439.49 Pa). On the other hand, DO had the highest creep deformation (3.28×10-6 Pa-1) for the creep recovery test that indicated its low resistance to the stress. The recovery percentage of the dough was within the range of 41.69-58.99%. The textural profile analysis was done using a texture analyzer. The results showed that the adhesiveness of DS [(-198.04) ± (-59.27) g.sec] was significantly higher than DO [(-80.75) ± (-15.65) g.sec] and DF [(-113.29) ± (-44.79) g.sec]. The microstructure of the dough was also observed by scanning electron microscope (SEM).

Keywords: shortening, rice bran oil, dough, texture and rheology, microstructure

Aknowledgements*:* Research University Grant (RUI) (1001.PTEKIND.8014086) from Universiti Sains Malaysia (USM).

OP&CI_2

INVESTIGATING PATTERNS OF SPECIES UTILIZATION IN GREEK ELASMOBRANCH PRODUCTS WITH DNA BARCODING

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Mislabeling of seafood products and marketing of protected species remains a worldwide issue despite the labeling regulations set at a local, European and International level. Food authenticity has received an increasing focus due to high profile cases of substitution/mislabeling, with many investigations identifying sales of endangered or prohibited species.In Greece, only three shark species (Mustelus mustelus, M. punctulatus and M. asterias) that are sold under the commercial term "Galeos" are officially designated. On the other hand, in batoid species where broad "umbrella" labeling is allowed, there is a variety of species being grouped under a single category. DNA barcoding has proven to be the most popular and accurate detection method of fraudulent seafood products. This study investigated the patterns of species utilization in Greek elasmobranch products, the mislabeling rates and the protected species occurrence, using two mitochondrial genes, the cytochrome c oxidase subunit I (COI) and the 16S ribosomal RNA (16S). A total of 87 shark and 114 batoid samples were collected from various retailers and markets across eight Greek cities.The results revealed an

extremely high level of mislabeling (56%) for shark meat, while only moderate levels (13.5%) for batoids.

Over half of products originated from shark species that are locally listed as threatened by the IUCN Red List of species, and 23% originated from species with prohibitions on landings. Additionally, 19.8% of the batoid samples are locally threatened, whereas 3.5% belonged to species with prohibitions on landings. Overall, the mislabeling rates for "Galeos" products probably relate to some degree of unintentional misidentification and confusion surrounding the designation in Greece. However, large growing sharks were identified among the mislabeled samples, which likely demonstrates deliberate substitution in some extent. For "Vatos" products mislabeling could be unintentional, as rays and skates are notoriously difficult to identify.

Keywords: Elasmobranch, Seafood, Mitochondrial DNA, Greek Market, Mislabeling

Aknowledgements*:* Funding was provided by the Fisheries Society of the British Isles and the Save Our Seas Foundation

OP&CI_3

NATURAL SPICES FROM LOCAL MARKETS IN NORTH MACEDONIA AS POTENTIAL ANTIMICROBIALS

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Spices are parts of plants that due to their properties are used as colorants or preservatives in food. The uses of spices have been known since long time, and the interest in the potential of spices is remarkable due to the chemical compounds contained in spices, such as phenylpropanoids, terpenes, flavonoids and anthocyanins. Spices, such as clove, cinnamon, oregano and rosemary among others, are known and used in food industry for a long time. These spices have the potential to be used as preservatives in many foods to replace chemical preservatives. Main chemical compounds in spices also confer other properties providing a variety of applications to spices, such as natural flavoring. Antimicrobial activity of spices extract has been evaluated against Salmonella enteridis and Listeria monocytogenes, the most common food-borne pathogens. Clove, cinnamon, oregano and rosemary were explored against test microorganisms by microdilution test, with concentrations ranging from 0.5 mg/ml-8 mg/ml. Among spices, all four showed good antimicrobial activity against two tested bacteria. Clove showed the best antimicrobial effect amongst all the tested spices, having Minimum Inhibitory Concentration (MIC) less than 1 mg/ml against both bacteria. Therefore, spices have great potential to be further tested and developed as novel safe antimicrobial agents, especially against Listeria monocytogenes than Salmonella enteridis.

Keywords: Preservatives, Antimicrobial, Spices, Food-borne pathogens

OP&CI_4

OPTIMIZATION OF THE IDENTIFICATION OF DAIRY PROPIONIC ACID BACTERIA USING MASS SPECTROMETRY

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The ability to produce propionic acid, as well as other phenotypic similarities unite a group of bacteria that are known as 'propionic acid bacteria'. This group includes dairy-relevant PAB (dPAB) members, which are allocated in two genera: Acidipropionibacterium and Propionibacterium. dPAB are frequently isolated from raw milk, cheese and products thereof. P. freudenreichii is used as a starter culture in Swiss-like cheeses. Depending on the cheese type, however, propionic acid fermentation is undesired and dPAB are considered contaminants. Particularly, P. freudenreichii may cause severe sensory defects, e.g. excessive eye formation, spotting and off-flavors. Thus, reliable detection and identification of dPAB is crucial in upholding high cheese quality. Unfortunately, dPAB grow very slowly on solid media with incubation times from 7 to14 days and available media for cultivation often lack selectivity. Hence, an additional identification step of dPAB is recommended after cultivation. A fast and easy solution is the identification by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS), but only 12 dPAB comparison spectra are included in the official database, often impeding correct identification. The aim of this study was to optimize the identification of dPAB. To that end, an improved reference database was created by generating new spectra from 27 selected dPAB strains from international culture collections. Moreover, the impact of factors such as a varying incubation time (7–11 days), growth media and sample preparation (extended direct transfer or extraction) methods were compared by analyzing 8 strains of two genera.

In addition, test strains were identified by 16S rDNA sequencing and results were compared to MALDI-TOF MS identification with and without the extended database. Surprisingly, the extended direct transfer leads to superior identification compared to the extraction method and the results of the study indicate that an incubation time of 8 days yields optimal identification. The amended reference database further optimized dPAB identification and may help gaining more in-depth knowledge about dPAB, supporting high-quality cheese production.

Keywords: MALDI-TOF MS, cheese quality, propionic acid bacteria, Identification

OP&CI_5

HEAT-TREATED OLIVE POMACE PASTE: A SAFE EDIBLE INGREDIENT FOR THE FOOD INDUSTRY

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Olive oil production generates high quantities of olive pomace (OP), a by-product composed by olives' skin, pulp, and stones. Although, the stones must be removed to allow its' use in food, which results in olive pomace paste (OPP).

This study aimed to access OPP heat-treated chemical composition and its' microbiological safety. OP was collected in Trás-os-Montes, and the stones were removed with a stainless-steel sieve. Then, 4 heat-treatments were applied to OPP: 65 oC/30 min, 77°C/1 min, 88 oC/15 sec, 120 oC/20 min. After, it were performed: nutritional analysis [1]; vitamin E[2] and fatty acid[3] profiles; FRAP[4]; DPPH● inhibition[4]; phenolics[4], flavonoids[4] and hydroxytyrosol (HPLC/DAD/FLD) contents; microbial total counting (22°C; 37C).

OPP has a low lipid fraction (2.4%) of great interest due to the high MUFA/PUFA, and α-tocopherol content (1.5 mg/100 g), a vitamer of high clinical relevance (prevents cells membrane oxidation). It also showed a high content of hydroxytyrosol (0.14 g/100 g). Treatments significantly affected vitamin E, phytochemicals, and fat, however all eliminated OPP microbial load. Moreover, treatment 88°C/15 sec has the best industrial potential since it required less time and preserved OPP quality attributes: vitamin E, fatty acids, and phytochemicals.

To conclude, OPP heat-treatment assures consumers' safety and the upcycling of OPP as a healthy and functional food ingredient.

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OP&CI_6

EVALUATION OF HYPOGLYCEMIC ACTIVITY AND HYPOLIPIDEMIC EFFECTS OF BERRY-PROCESSING BY-PRODUCTS

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Berry processing produces large quantities of berry by-products, most of which are pomace. It contains high amounts of dietary fibers that are considered part of a healthy human diet.

The objective of this study was to investigate the hypoglycemic and hypolipidemic effects of dried berry pomace before and after their extraction with supercritical CO_2 and ethanol. In this study we used black currant (BC), cranberry (CR), lingonberry (LN) and sea buckthorn (SB) berry pomace which contained 37.8-37.95%, 57.55-59.78%, 63.42-65.66% and 59.93-61.81% of insoluble dietary fiber respectively and 7.63-8.17%, 12.24-12.99%, 7.20-7.45% and 12.74-13.43% of soluble fiber respectively. Pomace were evaluated by hydration properties, binding properties of oil, cholesterol, sodium cholate and absorption of glucose. The hydration properties of berry pomace could contribute to swelling and absorption of water, which leads to increase in bulk volume and reduction in calories of the food. Binding properties of oil and cholesterol could reduce absorption of lipids in the digestive system, while binding of sodium cholate could promote conversion of cholesterol to bile acids, as well as absorption properties of glucose could retard in vitro glucose diffusion.

The results showed that non-extracted berry pomace had higher hydration properties but lower oil binding capacity than extracted ones and this could be due to higher amount of soluble dietary fiber in the non-extracted berry pomace.

Non-extracted berry pomace also displayed higher cholesterol binding capacity (highest was detected in CR pomace at pH 7 – 23.13 mg/g, lowest - in extracted LV pomace at pH 2 – 11.41 mg/g) and sodium cholate binding capacity (highest in BC pomace – 74.78 mg/g, lowest in extracted SB pomace – 12.78 mg/g) in comparison with those of extracted berry pomace. Analysis of glucose absorption capacity indicated that with increasing glucose concentration, the ability of berry pomace to bind glucose increased as well. The results of berry pomace effect on glucose diffusion rate showed that with time glucose dialysis retardation index decreases and diffusion rate increases. The results of this study show that dried berry pomace has a potential to be used as a healthy functional food component and thus lessen the agro-industry by-products waste.

Keywords: berry pomace, dietary fiber, binding capacity, hypoglycemic effect, hypolipidemic effect

OP&CI_7

PHYSICOCHEMICAL AND RHEOLOGICAL PROPERTIES OF YOGHURT FORTIFIED WITH FIBRE-RICH CRANBERRY POMACE AS AFFECTED BY STAGE OF POMACE ADDITION AND STORAGE TIME

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Cranberry pomaces (CP) remaining after juice pressing are composed of skins, seeds, and stems of the fruit and are rich in dietary fibres and phytonutrients which have a positive effect on human health. Besides that, pomaces are characterised as the potential stabilizer of food structures. The aim of our research was to investigate the impact of fibre-rich cranberry pomaces on the rheological and physicochemical properties of yoghurt. More specifically, the effect of pomace dose (0, 2 and 4.5 %) and stage of addition (before and after fermentation) to the yoghurt was evaluated.

Yoghurt samples fortified with fibre-rich CP were stored at +4°C temperature for 28 days and their analysis was performed every 7 days. Rheological properties of yoghurt were characterised by recording flow curves, thixotropy and mechanical spectra. Physicochemical properties were evaluated by particle size and distribution, syneresis, total phenolic content and antioxidant properties of the products. Also, the viability of yoghurt starter bacteria in yoghurts fortified with CP had to be checked due to claims about the antimicrobial properties of phenols presented in CP.

All yogurt samples showed weak gels behaviour as G’ > G” throughout entire frequency range with higher G’ values for CP fortified yoghurt compared to the control. Loss tangent of all samples decreased with storage, indicating that the rearrangement of the gel structure towards a more solid-like behaviour took place. CP added before or after fermentation were able to increase the viscosity and decrease the syneresis of yoghurts compared to their respective controls.

Additionally, all samples were characterized as thixotropic materials, and these properties remain during entire storage time.

As for physicochemical properties, both yoghurt's formulations with CP showed polydisperse systems characteristics, while the control sample was monodispersed. Yoghurt fortified with 4.5% of CP had higher total phenols content and higher antioxidant activity than yoghurt with 2% of CP. During the storage time, these properties of the samples were stable, and no significant differences were observed between both yoghurt's formulations. The number of viable yoghurt starter bacteria was 10^8 – 10^9lg CFU/g yoghurt during refrigerated storage of all samples

Keywords: yoghurt, cranberry pomace, rheology, total phenols

SESSION 3

POSTER SESSION:VIRTUAL POSTER ROOM AND BREAKOUT ROOMS IN ZOOM

PI_1

WATERMELON BY-PRODUCTS AS FUNCTIONAL COMPONENT IN SPONGE CAKES

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Chemical analysis of watermelon rind powder revealed that it contains 11.55% moisture, 10.37% protein, 62.22% carbohydrates, and 2.18% fat. Three samples of watermelon rind flour cakes containing 15% and 30% watermelon rind powder in combination with wheat flour were processed. Cakes were prepared as per the standard method but replacing only wheat flour with different levels of watermelon rind powder in the basic formulation of cake. The replacement of wheat flour by watermelon rind powder was 15% and 30%. The addition of watermelon rind powder in sponge cakes improves their physical characteristics. The difference in respect to the specific volume between the control cake sample and the sponge cakes with watermelon rind powder is minimal. The springiness of cakes with watermelon rind powder is smaller, the crumb tenderness is smaller, while the structure is stable at high loads expressed by a lower shrinkage in comparison with the control cake sample.

The sponge cakes containing an additive of watermelon rind powder was very good sensory characteristics. The sensory analysis demonstrates that the structure is fine-porous in all kinds of investigated sponge cakes. The control cake sample and the cakes with watermelon rind powder have an approximately similar form. The crumb pores of cakes with watermelon rind powder in the investigated two kinds of cakes are with thicker walls, small and equal in size.

The odor of the cakes with watermelon rind powder is perceived as more pleasant than the control cake-sample one. The color of the cakes with watermelon rind powder is perceived well by the testers.

The intensity of the sweetness for all investigated sponge cakes is close, but when the concentration of the watermelon rind powder is greater a bitter aftertaste is read.

Keywords: sponge cake, watermelon, quality, functional component

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PI_2

TECHNOLOGICAL AND SENSORY PROPERTIES OF SWEET GLUTEN-FREE BISCUITS BASED ON CEREALS AND PSEUDOCEREALS

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Biscuit is a popular snack which is consumed by people of various age, it is practical and has long storability span. The interest of the market to gluten-free food is increasing. The wheat flour in the biscuit can be changed with gluten-free cereals, like sorghum, millet and pseudocereals like buckwheat and quinoa. The aim of this study was to evaluate technological (dry matter content, volume, width, height, loss during baking) and sensory (9point hedonic scale; appearance, consistency, smell, taste, aftertaste and overall acceptability) profile of gluten-free biscuits prepared from red quinoa, sorghum, millet and teff. The dry matter content in evaluated biscuits was in line ~ 94 %. The volume ranged from 7 cm3 (biscuits from teff) to 9 cm3 (biscuits from millet and biscuits from quinoa). The height ranged from 4 mm (biscuits from teff) to 7 mm (biscuits from sorghum and biscuits from quinoa). The same tendency was observed in parameter width which was the smallest in biscuits from teff (36 mm) and the highest in biscuits from quinoa (44 mm). The loss during baking was with accordance to standard and was not greater than 15 %, whereas ranged from 9.7 % (teff) to 14.55 % (quinoa). Sensory properties of prepared biscuits were evaluated overall as good with the best score in a taste, consistency and overall acceptability in biscuits prepared from red quinoa and millet. Gluten-free biscuits with the addition of less-known cereals and pseudocereals are a suitable product that complements the nutritional parameters of a gluten-free diet, but at the same time they can increase the range of enriched statements on the food market for ordinary consumers.

Keywords: quinoa, teff, millet, sorghum, loss during baking, dry matter

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PI_3

THE IMPACT OF PARTIAL REPLACING WHEAT FLOUR WITH SESAME PROTEIN POWDER ON VOLUME AND SENSORY PROPERTIES OF BREAD

Veronika VALKOVÁ, Hana ĎÚRANOVÁ, Zuzana TÓTHOVÁ, Lucia GABRÍNY

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Bread has been traditionally used as a selective foodstuff for enrichment research, as it is a staple food product consumed daily all over the world. Sesame (Sesamum indicum L.) protein is a very heat stable ingredient making it suitable for baking applications. The specific purpose of the present study was to evaluate the effects of sesame protein powder (SPP) additions on the qualitative properties of wheat bread. For this purpose, SPP was added to wheat flour to produce four blends containing the protein at the levels of 1, 2, 5, and 10%. The doughs were prepared by mixing different blends with water, yeast, salt and saccharose in a spiral mixer Diosna SP 12 (Diosna Dierks & Söhne, Osnabrück, Germany). Immediately after mixing, the doughs were transferred to the fermented cabinet (40 min; 32 °C) and then the loaves were baked first at 180 °C with addition of 160 ml steam for 17 min followed by baking at 210 °C for 10 min in a laboratory oven MIWE cube (Pekass Ltd, Pilsen, Czech Republic). After baking, loaves were cooled to room temperature for 2 h and consequently evaluated for their volume (Volscan Profiler 3000, Stable Micro Systems, England) and sensory properties (a five-point scale was used to evaluate shape and overall bread appearance, crust surface and properties, overall appearance of the bread, aroma, taste, and overall bread acceptability) by 10 semi-trained panelists. According to the volume established, with increasing addition of SPP (1, 2, 5, and 10%), a gradual significant ($P < 0.05$) decrease in volume of bread loaves (568.23 ± 0.58 mL/g; 553.27 ± 1.55 mL/g; 546.93 ± 1.21 mL/g, 495.13 ± 1.85 mL/g, respectively) was noted as compared to the control sample (596.30 ± 2.22 mL/g). The results of sensory rating showed that the differences in the evaluated parameters between the individual experimental bread samples were not statistically significant.

Interestingly, the sample with the highest (10%) SPP addition was the most accepted (87.33 ± 3.51 points) by panelists.

Finally, our technological trials revealed that in spite of the lowest volume of bread partially supplemented with 10% of SPP, its sensory properties were the most preferred by consumers. Thus, SPP at the level of 10% seems to be a suitable ingredient for production of bread with high protein content.

Keywords: bread, sesame protein, volume, sensory evaluation

Aknowledgements: This publication was supported by the project Drive4SIFood 313011V336, co-financed by the ERDF.

PI_4

THE QUALITY CHARACTERISTICS OF MUFFINS ENRICHED WITH RAPE BEE POLLEN

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Bee pollen is valuable natural product in terms of its nutritional and functional characteristics. The aim of this study was to explore the potential application of various additions of rape bee pollen such as 16% (1g of bee pollen per product) and 32% (2g of bee pollen per product) for the production of bee pollen enriched muffins. Muffins are one of the most consumed confectionery products in the world. According to this fact an attempt was to find an optimal recipe for muffins with the addition of bee pollen. Physical characteristics (height, width and weight) and sensory quality of muffins (color (presence), color (intensity), shape, bee flavor (presence), bee flavor (intensity), bee taste (presence), bee taste (intensity), aftertaste, chewiness and overall acceptability) were explored. The height and width of muffins decreased after addition of bee pollen comparing with control sample. Individual variants with the addition of bee pollen showed higher weight compared to products without the addition of bee pollen. Sensory characteristics revealed that fortification of muffins with bee pollen provided muffins with liking score ranged from 6.0 – 7.0 for all attributes tested. Muffins were characterized by a pleasant, but sightly pollen smell and taste as well as darker surface when compared to the control. The highest scores were received with the addition of 16% of bee pollen.

Keywords: rape, bee pollen, muffins, sensory quality, physical characteristics

Aknowledgements*:* This research was supported by 06-GASPU-2021

PI_5

COMPARATIVE STUDY OF THE MINERALS CONCENTRATIONS OF SOME ASSORTMENTS OF GRILLED AND BAKED FISH PREFERRED BY 20 TO 70+ YEARS OLD CONSUMERS IN ROMANIA

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Introduction. Nutritionists' and consumers' interest for minerals concentration in cooked food is growing due to mineral's importance for human health and the need for understanding degenerative diseases evolution mechanisms. Several contaminants may be present in fish and seafood such aș Hg, Cd, As, Cr, Pb and Sn due to urbanization, industrialization and agronomic activities which led to heavy metal pollution and accumulation in aquatic systems.

Material and methods. Five carps, trouts, mackerels and salmons respectively were bought from Bucharest markets. Half of each fish was cooked in cooking bags in an oven at 180C. The second half of each fish was grilled. The determination of the concentration of Ag, Al, B, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Ga, In, K, Mg, Mn, Na, Ni, Pb, Pd, Sr, Tl and Zn, în fish sample was by inductively coupled plasma optical emission spectroscopy. MedCalc software was used ford data statistical analysis.

Results.Regardless the cooking method the Cd and Pb concentrations in cooked carp and trouts samples were lower than the method detection limit (less than 0.001 mg/kg). The study compare the mineral concentrations according to the species and according to the preparation method. To highlight the statistical differences, we applied the t where appropriate and the non-parametric test Mann-Whitney for data not normally distributed. The average daily amount of minerals ingested from fish consumption are estimated using the equations proposed by Guo et al., (2016) for adults and children, which depend on the

concentration of the mineral in fish, the average value of consumption per person and the average value of body weight.

Conclusion. Significant differences for the K concentrations were found only between baked and grilled trout samples (p = 0.0216), the highest concentration was found for the grilled trout. For each fish asortment, there were no significant differences between mineral concentrations regarless the method of preparation. There are significant differences between minerals concentrations between salmon and mackrel for B, Ca, K, Mn, Na,and Zn concentration, however no signifficant diferences were found for trout and carp regardeless the method of perparation.

Keywords: cooking method, fish, mineral composition, contaminants, carp

PI_6

ASSESSMENT OF THE MYCOTOXICOLOGICAL RISK OF CONTAMINATION OF GROUND RED PEPPER BY AFLATOXIGENIC FUNGI

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Red pepper (*Capsicum annum*) is a good substrate for development of filamentous fungi – potential producer of mycotoxins, that represents a great risk for consumers. The main purpose of this research – is a risk assessment of contamination of local produced red pepper at different stages of production by filamentous fungi, especially (in particular) aflatoxigenic fungi from section A.Flavi. All collection points showed samples with high fungal contamination, but the mycobiota composition varied as a result of different environmental conditions. Alternaria spp. and Fusarium spp. were predominantly isolated from fresh fruits of C. annuum. Penicillium spp. was the most frequent genus in all analysed points. *Penicillium brevicompactum* and *P. crustosum* were the most abundant species. Among *Aspergillus*, *A.piperis*, *A. sclerotioniger* and *A. nomius* were dominant after the drying phase. One of the main critical points in the production of ground red pepper is the stage of receiving and sorting of raw materials. Properly sampling plan for the selection of raw materials, as well as sorting are significant factors affecting the degree of contamination of raw materials by fungi, potential producers of aflatoxinsand ochratoxin A.

Thus, proper risk assessment and determination of critical control points in accepting process of raw materials is an effective method to prevent the development of aflatoxigenic fungi. It is shown that hygienic condition of the equipment for grinding, including various types of sifter are important critical points that also need to be monitored for contamination degree by aflatoxigenic fungi. In model experiments has been studied the fungicidal activity of different biocides against species from *A.flavi* section.

The broad characterization of the fungal community of C. annuum carried out in this study, could be a guideline for future mycotoxin analyses performed directly on the pod. Understanding the role and dynamics of mycobiota and its relationship with the toxins present in this substrate, will be useful to establish and improve control measures considering the specificities of each point in the C. annuum production chain.

Keywords: red pepper, filamentous fungi, degree of contamination, aflatoxin B1, sampling plan, risk assessment

PI_7

COMPARISON OF THE LIPID FRACTIONS OF TRENDING SEEDS (CHIA, FLAX, POPPY, AND SESAME)

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Nowadays, there are several seeds trending in diets due to their nutritional value and potential therapeutic benefits, e.g., lower risk of cardiovascular disease. Therefore, it is important to update the current knowledge about these seeds by performing chemical characterizations, particularly of their lipid fractions since they are fat rich matrices. This work aimed to compare the lipid fractions of chia, flax, poppy, and sesame seeds by determining their total fat contents by Soxhlet method, fatty acids (FA) profiles by GC-FID, and vitamin E profiles by HPLC-DAD-FLD. Regarding the results, sesame presented the highest total fat content (53%), flax and poppy presented similar contents (38% and 39%, respectively), while chia has the lowest (33%). Chia and flax were richer in α-linolenic acid (ALA, C18:3n3, 66% and 57%, respectively), presenting high polyunsaturated fatty acids (85% and 73%, respectively) contents and low C18:2n6/C18:3n3 ratios (0.3). Poppy major FA was linoleic acid (LA, C18:2n6, 63%).

Sesame presented similar contents of LA (42%) and oleic acid (OA, C18:1n9, 41%), revealing the highest monounsaturated (MUFA, 41%) and saturated fatty acids (SFA, 17%) contents. Concerning vitamin E, α-tocopherol (the most biological active isomer) was identified in all seeds (59-118 mg/kg), in the highest content in sesame (118 mg/kg). γ-Tocopherol was the major isomer in all seeds (96-290 mg/kg), in the highest content in sesame (290 mg/kg). Hence, sesame presented the highest total vitamin E (432 mg/kg), while poppy the lowest (175 mg/kg).

α-Tocotrienol was only identified in sesame (23 mg/kg), whereas δ-tocopherol was only identified in chia (3 mg/kg). Sesame seeds presents the most stable fat to oxidation due to their higher content of OA (41%) and total vitamin E (432 mg/kg). All products should be included in a varied food pattern and active lifestyle.

Keywords: Fat content, Fatty acids, GC-FID, Vitamin E, HPLC-DAD-FLD

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PI_8

PHYSICO-CHEMICAL, NUTRITIONAL AND SENSORY STUDY ON THE INCLUSION OF SEED OILS IN THE FORMULATION OF PUFF PASTRY TO ELABORATE MIGUELITOS DE LA RODA

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Puff pastry is made from a laminated dough, where the main ingredients are flour (generally wheat flour), water, and a shortening consisting generally of animal fat or hydrogenated vegetal fat with a great proportion of saturated fatty acids and trans fats. Thus, commercial puff pastry usually contains significant amounts of saturated fatty acids, the consumption of which should be moderated due to possible health risks, especially related to cardiovascular diseases. However, the reduction of saturated fatty acids is not easy in puff pastry according to the special texture properties provided by these ingredients. In this work, different seed oils (poppy, chia, pumpkin and melon), rich in polyunsaturated fatty acids (PUFA), are included in the formulation of puff pastry to reduce the proportion of saturated fatty acids. Different physical (height, color, texture profile analysis), chemical (fatty acids, vitamin E), nutritional (proximate composition) and sensory (acceptance test with 60 consumer-judges) parameters were analyzed to evaluate the behavior of the puff pastry, where saturated fats (margarine elaborated from partially hydrogenated palm oil) are partially substituted by seed oils, in the elaboration of a typical Spanish cake called "Miguelito de la Roda". When the physical parameters were considered, texture profile analysis showed slightly higher values of hardness and lower values of cohesivity in puff pastry where margarine was partially substituted by

seed oils compared to control. However, the most promising result was found when the fatty acid composition was considered.

The inclusion of seed oils in the formulation of puff pastry originated an increase in PUFA (27.87 % in the control; 39.04 % in puff pastry with chia oil; 43.04 % in puff pastry with poppy oil). The increase in PUFA proportion when chia oil is used is due to the high content of linolenic acid (C18:3) in this oil, while when the rest of seeds are used, the increase in PUFA is mainly due to the high content of linoleic acid (C18:2). Regarding sensory properties, the values of overall aspect, the taste and texture of the Miguelitos elaborated from the puff pastry with seed oils were slightly lower than the control, but in any case, all of them showed average values above 0, which means that consumers liked them.

Keywords: Functional foods, polyunsaturated fatty acids (PUFA), Texture Profile Analysis (TPA)

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PI_9

EXTRACTION EFFICIENCY OF STINGING NETTLE (*URTICA DIOICA* L.) LEAVES AND ROOTS PHENOLIC COMPOUNDS

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Stinging nettle (*Urtica dioica* L.) with all plant parts is a good source of phytochemically active phenolic compounds. The extraction of phenolic compounds and their free radical scavenging capacity depend on the solvents used and the extraction conditions. Therefore the research aimed to compare the extraction efficiency of stinging nettle (*Urtica dioica* L.) phenolic compounds using different polarity solvents and optimizing extraction conditions.

The research consisted of two different experiments. First of all, was determined the efficiency of the solvent. For that reason, the 5 g of dry leaves and roots of stinging nettle was macerated in dark bottles with the different solvents (50 %, 70 %, and 96 % ethanol as well as 50 %, 70 %, and 96 % methanol) at 4°C temperature for 72 hours. Extracts filtrated and the total amount of phenols, flavonoids, and antioxidant activity (ABTS radicals scavenging capacity) was determined using double beams UV-Vis spectrophotometer. The results of the first experiment showed that the highest efficiency of the phenols extraction was in leaves with 96 % of methanol, therefore, studies on the efficiency of the extraction conditions were performed with this solvent. Briefly, 5 g of dry leaves were mixed with 150 ml of 96 % methanol and extracted at different temperatures (30, 50, 70 °C) and time (20, 40, and 60 min.) in ultrasound bath AGRO LAB AU-65 (Italy) with an ultrasonic frequency of 40 kHz. Data analysis was carried out with STATISTICA. The results were analyzed by using a one and two – way analysis of variance. The study showed that nettle leaves contain about 5.2 times more phenolic compounds than roots. The studies revealed high levels of phenolic compounds and flavonoids in the leaves extract with 96 % methanol, respectively 21.6 mg g -1 GAE and 20.11 mg g-1 QE.

In the roots, extraction of phenolic compounds was most efficient using 50 % methanol (12.54 mg g-1 GAE), the significant highest content of flavonoids was determined using 50 % ethanol (0.63 mg g-1 QE) as a solvent. The most efficient conditions for obtaining the maximum amount of phenolic compounds from the leaves of Urtica dioica L. are extraction with 96 % methanol in an ultrasound bath at 70 °C temperature, for 40 minutes (28.7 mg g-1 GAE). The highest content of flavonoids was determined in extracts prepared at 70 °C for 60 minutes (43.81 mg g-1 QE).

Keywords: solvents, phenolic content, antioxidant activity, *Urtica dioica* L.

PI_10

FRUIT LEATHERS ENRICHED WITH BERRIES PRESS CAKE POWDER AND CANNABIS SEEDS CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES

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Dried fruit and berry cake obtained by squeezing juice can be used to enrich other foods with biologically valuable compounds. Fruit leathers – a product for the production of which not only fruits and berries, but also their press cake powder can be used. These supplements strengthen the texture of the product and are also used as a functional additive. The aim of this work was to evaluate the effect of the dried press cake powder on the chemical composition, and texture of fruit leathers. The fruit leathers were made from apple-dates or plums-dates puree with chokeberry, raspberry, black currant dried press cake powder, cannabis seeds, and walnuts. Total carotenoids, total polyphenols, total flavonoids, total anthocyanins, colour, and texture were determined. The biggest total carotenoids content (2.27 mg 100g-1 d.w.) was established in fruit leathers made from apple puree with cannabis seeds additive. The addition of raspberry press cake and cannabis seeds increased the number of total polyphenols and flavonoids in apple-dates puree leathers and was found significantly the highest, accordingly 7.37 and 6.05 mg 100g-1 d.w. The anthocyanins content (116.31 mg 100g-1 d.w.) in plums-dates leathers with chokeberry press cake addition was the biggest to compare with other samples. The darkest color (L* = 19.02) was apple-dates leathers with black currant press cake powder, and the brightest was plums-date leathers with cannabis seeds (L* = 28.91), and apple-dates leathers with raspberry press cake powder, cannabis seeds, and walnuts (accordingly L* = 28.45, L* = 28.29). The biggest break strength (8.8 N) was established for the fruit leathers made from apple-dates pure with raspberry press cake powder, cannabis seeds, and walnuts additives.

Keywords: fruit leathers, berry press cake

PI_11

THERMAL TRANSITION OF OSMOTICALLY PROCESSED BEEF MEAT BY DIFFERENTIAL SCANNING CALORIMETRY

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The cellular structure of muscle tissue and meat, such as the semi-permeable cell membranes, play the most crucial role in mass transfer phenomena during meat processing. An in-depth understanding of the effect of low temperatures on meat structure is important for improving the efficiency of processes that involve mass transfer, such as osmotic dehydration. The objective of the present study was to investigate the effect of low temperature on meat structure using differential scanning calorimetry (DSC). Beef meat pieces were immersed in 25% NaCl solution and osmotic dehydration was conducted at 15°C for 3 hours. Thermal behavior of raw and freeze-dried samples of fresh and osmotically dehydrated beef meat was studied by DSC. Upon heating of samples from -40 to 100 °C, broad endothermic transitions were observed with maxima around 0 and 12 °C, while minor transitions were noted at ~ 55, 65, and 73 – 77°C. The endothermic transition at around 12°C can be attributed to phase transition of the solid gel phase to a liquid crystalline phase of cell membrane lipids, involving mostly phospholipids. A first order melting transition was also exhibited by all freeze-dried meat samples supporting the notion for 'melting' of lipid hydrocarbon chains in the molecular assemblies of membrane lipids. Thus, the aforementioned phase transition of membrane lipids affects the permeability of the membranes, and thereby can exert a strong impact on diffusion kinetics during osmotic processing. The results are interesting and provide useful information for the temperature sensitivity of structural components governing water and solute diffusion processes in meat.

Keywords:Meat, Biological membrane, Thermal transition, Differential scanning calorimetry

Aknowledgements*:* Dafni Dimakopoulou-Papazoglou would like to thank the Greek State Scholarships Foundation (IKY) (MIS-5033021).

PI_12

RHEOLOGICAL AND TEXTURAL PROPERTIES OF 3D-PRINTED SNACKS AND BREAKFAST CEREALS ENRICHED WITH GRAIN BY-PRODUCTS

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3D-printing is an emerging technology advantageous in the use of alternative raw materials such as grain by-products. This study aimed to investigate dough rheology, printing quality and textural properties of 3D-printed snacks and breakfast cereals made with grain by-products. Four snack recipes consisted of oat flour, sunflower oil, salt, baking soda, glucose oxidase, water, and either of the following: 1) wheat bran and pea protein (mixture WS), 2) pumpkin seed cake (WPFS), 3) defatted flaxseed flour (WFFS), 4) amaranth bran and rice protein (AS). Two breakfast cereal recipes consisted of oat flour, rice protein, wheat bran, baking soda, glucose oxidase, water, and sugar (WSBC) or honey (WHBC). Different 3D shapes were extruded using the Createbot S3 printer and baked at 180°C for 18 min (snack) or 10 min (breakfast cereal). 3D-printing precision, shape accuracy and deformation were determined by digital image analysis. Amplitude and frequency sweep tests were performed on dough using the MCR 92 Oscillatory rheometer (Anton Paar, Austria). Cutting tests were performed on final products with the TA.HDplus texture analyser (Stable Micro Systems, UK). All properties determined were significantly dependent on the dough mixture. The most viscous mixture with the largest G' and G'' values was WS. Dough for snacks printed with higher precision (between 95 and 98%) and shape was deformed less during baking (between -12 and -48%) than dough for breakfast cereals (between 68 and 82% and 75

and 80%, respectively). Snacks shrank, while breakfast cereals spread during baking.

With the exception of AS mixture, baked snacks were harder (from 1.68 to 2.84 g) than the breakfast cereals (from 0.63 to 0.78 g). Overall, the WPFS dough mixture was printed with the highest precision (98%) and showed the highest shape accuracy (98%) and the lowest deformation (12%). We can conclude that mixtures with grain by-products can be accurately 3D-printed in various shapes, but further modifications are required to avoid undesirable shape deformation in post-processing.

Keywords: amaranth and wheat bran, flaxseed flour, pumpkin seed cake, complex viscosity, printing quality

Aknowledgements*:* This work has been financed by Croatian Science Foundation (IP 3829 and Young researchers' career development).

PI_13

EVALUATION OF THE ANTIMICROBIAL POTENTIAL OF *PHYSALIS IXOCARPA* BROT. HUSK EXTRACTS AGAINST FOOD PATHOGENS

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Tomatillo or tomate de cáscara (*Physalis ixocarpa* Brot.) is an important fruit for the Mexican diet and economy, it currently belongs to one of the most cultivated plants in Mexico, surpassed only by chili pepper, potato, tomato, and onion. This fruit is also used in the United States, parts of Europe and Asia. On the global scale more than 90 species are known, 45 of which are native to Mexico, and they are essential to the diet of Mexican public, its main use being an ingredient for sauces. Its calyx being bitter and paper-like, server the plant as protection for its fruit, and it's an agroindustry residue. Not much information about this fruit is available, nonetheless, some research has been done over other species like *P. peruviana y P. alkekengi*, demonstrating that the genus is capable of functional properties and has bioactive compounds. The goal of the present investigation is the evaluation of the antimicrobial activity of calyx extracts on microorganisms that cause food spoilage, with this it seeks add value to this residue and to increase the knowledge about the properties of *P. ixocarpa* with an emphasis on antimicrobial potential. Extraction of tomatillo calyx will be done by various conventional and non-conventional methods, additionally, antimicrobial activity, minimum inhibitory concentration and minimum bactericidal and fungicidal concentration will be measured. Furthermore, a treatment of lettuce leaves with Physalis ixocarpa extracts will be done to assess the in situ efficacy of the extracts.

Keywords: Antimicrobial activity, *Physalis ixocarpa*, Tomatillo Husk, Agro-Industrial Residue, Plant extract

PI_14

EVALUATION AND DISCRIMINATION OF FRUIT-BASED PASTA BY ATR-FTIR-PCA

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Fruits are valuable source of biologically active compounds, especially antioxidants and vitamins. Among them, forest fruits are very rich in colored antioxidants (anthocyanins). These properties are useful for the organoleptic characteristics of food products, such as cereal pasta. The main goal of the study was to evaluate of various fruit-based pasta by ATR-FTIR (attenuated total reflectance – Fourier transform infrared spectroscopy) and discriminate the pasta samples by multivariate statistical technique PCA (principal component analysis). Pasta samples were obtained from different cereal flours, such as wheat (*Triticum durum* Desf.), rice (*Oryza sativa* L.) and oat (*Avena sativa* L.), using or not egg yolk in the recipes. Fruit-based pasta was obtained with the fresh fruit juice that replace the water in the classical pasta recipes. After formatting and drying, the final products were finely ground and analyzed by ATR-FTIR (Bruker Vertex 70 FTIR, spectral range 4000-400 cm^{-1}, resolution 4 cm^{-1}). Both unprocessed and processed (boiled, dried and finely ground) pasta samples were analyzed. The characteristic FTIR bands (wavenumbers and intensities) were used for PCA discrimination. Unprocessed-processed samples and the type of cereal flours (wheat, rice and oat) were well discriminated especially through the specific wavenumbers and intensities corresponding to polysaccharides and proteins in cereal flours (C-O-H deformation of the glucose ring around 1646 cm^{-1}, stretching vibrations of C-OH groups around 998 cm^{-1}). The best discrimination by ATR-FTIR-PCA was obtained for unprocessed and processed samples.

Good results were also obtained for discrimination of pasta samples with or without egg yolk addition (especially through the C=O stretching from lipids at ~1740 cm^{-1} and amide II band at ~1539 cm^{-1}.

Type of fruits allows discriminating unprocessed and processed pasta by C=O and C=C stretching vibration of flavonoids at 1734 cm-1 and 1618 cm^{-1}, as well as those corresponding to anthocyanidins (1636 and 1224 cm-1 for aromatic rings). The ATR-FTIR-PCA was for the first time applied for fruit-based pasta. It is a powerful technique for evaluating the quality of fruit-based pasta and for discriminating such healthy food products through the overall composition that includes egg and fruit addition.

Keywords: cereal pasta, fruits, ATR-FTIR-PCA, discriminant analysis

SESSION 4

INVITED SPEAKERS

ISII_1

CONSUMERS ATTITUDES AND BELIEFS TOWARDS MEAT QUALITY

Maria FONT I FURNOLS

IRTA – Institute of Food Research and Technology

Consumers are the last step in the production chain, and it is important to know their behaviour, preferences, and perceptions of meat, which are affected by sensorial, psychological and marketing factors, in order to satisfy their demands. Some examples were presented to show how the importance of meat quality attributes depends on consumers' lifestyle. Preferences of meat color, fatness and intramuscular fat content varied between and within countries, as well as beliefs about meat quality. The information provided about the sex of the animal or the production system influences consumers' meat acceptability. Positive and negative disconfirmation situations occur quite often as well as the assimilation effect, as a strategy to diminish consumers discomfort when expectations are not confirmed.

ISII_2

POSSIBILITIES FOR METABOLIC PROFILING

Jesus Simal GANDARA

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Metabolomics is a young field of knowledge that arises linked to other omics such as genomics, transcriptomics, and proteomics. This discipline seeks to understand the performance of metabolites, identifying, quantifying them, and thus understanding its mechanism of action. This new branch of omics science shows high potential, due to its noninvasive character and its close relation with phenotype. Several techniques have been developed to study the metabolome of biological samples, fundamentally nuclear magnetic resonance (NMR), and mass spectrometry (MS), or a combination of several techniques.

These techniques are focused to separate, detect, characterize, and quantify metabolites, as well as elucidate their structures and their function on the metabolic pathways they are involved. However, due to the complexity of the metabolome, in most cases it is necessary to apply several of these techniques to understand completely the whole scenery. This contribution is aimed to offer a summary of the current knowledge of these analytical techniques for metabolomics and their application to different fields as food or health sciences. Each technique shows different advantages and drawbacks depending on their technical characteristics and limitations, some factors, such as the aim of the study or the nature of the biological sample will condition the choice. Regarding their applications, NMR has been employed specially to identify new compounds and elucidate structures.

The use of MS has gained popularity because of its versatility, easiness to be coupled to separation techniques and its high sensitivity. Metabolomics applications in different science fields are growing each year, due to advances in analytical techniques and combination with other omics that allow to increase the comprehension of metabolic

processes. Further development of analytical tools is necessary to continue exploiting all the possibilities of metabolomics [1].

ORAL PRESENTATIONS*

***Name of presenting author is underlined**

OPII_1

INFLUENCE OF APPLE VARIETIES AND MICROFLORA DIVERSITY ON THE SENSORY AND VOLATILE PROFILES OF APPLE CIDER

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Introduction: In recent years, cider has become very popular among consumers, and global cider production is constantly growing. Sensory qualities are the decisive factor in consumer preferences; therefore, alcoholic and malolactic fermentation require special attention. Apple variety and the maturity of the fruit are the significant attributes that influence the volatile composition of cider.

Aims: This study aims to summarize and synthesize the apple varieties that are suitable for obtaining cider, biotechnological stages of alcoholic and malolactic fermentation, as well as the types of microorganisms involved in these processes.

Materials and Methods: The recent literature was reviewed by searching the following databases: Web of Science, Science Direct, Scopus and Google Scholar, using specific descriptors and keywords.

Results: Each type of yeast involved in the fermentation process obtains different sensory characteristics in the finished product. Co-fermentations also play an essential role in the diversity of flavour compounds. The critical step in the formation of volatile compounds and the definition of flavours is malolactic fermentation. As the primary role, the transformation of malic acid into lactic acid takes place under the action of different types of microorganisms.

Conclusion: There are various researches conducted to improve the quality and production of cider which is increasingly popular. Therefore, the diversity of the microflora involved in the fermentation processes influences the variety of volatile and polyphenolic compounds.

Keywords: cider production, fermentation, volatile compounds, phenolic compounds

OPII_2

DEVELOPMENT OF NATURE-INSPIRED SURFACES TO PREVENT BIOFOULING IN THE FOOD INDUSTRY

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Food contact surfaces are usually colonized by microorganisms, even following cleaning and disinfection. They can grow as biofilms, which are contamination sources of finished products, reducing their shelf life and causing foodborne diseases. The dynamics of microbial adhesion to a food contact surface may be affected by (i) the surface topography, chemistry, and physicochemistry, (ii) the presence of other microorganisms, and (iii) hydrodynamics. In previous work, we have shown that the surface material is one of the parameters with the strongest impact on biofilm onset [1]. Our interest is focused on the development of biomimetic self-cleaning and antifouling surfaces that prevent adhesion due to an unfavorable topography or chemistry. This study produced a biomimetic surface using a moulding technique that emulated the topography of the self-cleaning Gladiolus hybridus (Gladioli) leaf [2]. A comparison of topographies was performed for unmodified wax surfaces (control), biomimetic wax surfaces, and Gladioli leaves using Optical Profilometry and Scanning Electron Microscopy. The results demonstrated that the biomimetic wax surface and original leaf had similar surface roughness parameters. The self-cleaning properties of the biomimetic and control surfaces were compared by evaluating their propensity to repel Escherichia coli and Listeria monocytogenes attachment, adhesion, and retention in mono- and co-culture conditions. When the assays were carried out in monoculture, the biomimetic surfaces retained fewer bacteria than the control surfaces. However, when using co-cultures, the cell numbers were only reduced on the biomimetic surfaces following retention assays.

Altogether these results provide valuable information into the antifouling physical and chemical mechanisms found in plant leaves, which are particularly attractive for food engineering purposes [3].

Keywords:food processing industry, biofilm, antifouling surface, biomimetic, food safety

***Aknowledgements*:** European Union's Horizon 2020 research and innovation programme under grant agreement No. 952471 (SurfSAFE).

OPII_3

DETERMINATION OF TETRACYCLINE RESIDUES IN RED MEAT AVAILABLE IN OMAN.

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Tetracycline is one of the antibiotics which is heavily used in livestock production in different forms; injection or ingestion. In some countries, tetracycline is used as growth promoter whereas in the European Union it was banned. The accumulation of long exposure of antibiotics residues might cause acute or chronic toxicity to the organs and the entire body. Many cases of human allergic reactions, imbalance in intestinal microflora and other diseases have been linked to antibiotics residues in the meat (Abdul-Razaq and Mohammed, 2017; Elbagory et al., 2017). Researchers from different countries reported that level of tetracycline residues were above the MRL (Verma, M. K., et al. 2021; K. Bahmani, et al., 2020). The aim of this study was to investigate the presence of tetracycline residues in imported red meat in the Sultanate of Oman and to compare the levels of tetracycline residues in liver, and muscles. The fresh samples were taken from the same goat body namely liver and muscle and were collected from a slaughterhouse in Muscat. The extraction was done using Agilent Enhanced Matrix Removal—Lipid (EMR—L) product. Two standards of tetracycline groups were used, Oxytetracycline hydrochloride and chlorotetracycline. The final extracts were analyzed using Aglient 6460 LC-MS/MS. Out of 28 muscle and liver samples, oxytetracycline and chlorotetracycline were detected in one muscle sample in triplicates with average concentration of 228.2 µg/kg and 292.6 µg/kg, respectively. Whereas oxytetracycline was found in one liver with average concentration of 3201.9 µg/kg (These concentrations were above the MRL GSO 2481/2015, CX/MRL 2-2018 and EU 37/2010. In conclusion, the presence of tetracycline groups in imported meat needs more studies in imported livestock.

Keywords: antibiotic residues, Red meat, goat, chlorotetracycline, oxytetracycline

SESSION 5 - STUDENT SESSION

ORAL PRESENTATIONS* & COMPETITION

***Name of presenting author is underlined**

OP&CII_1

BIOTECHNOLOGICAL CHARACTERIZATION OF LACTIC ACID BACTERIA TO ENHANCE QUALITY OF FERMENTED MILK PRODUCTS

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Introduction: Exopolysaccharide (EPS)-producing lactic acid bacteria (LAB) have received increasing interest in the dairy industry because of their capability to improve rheological, sensory and organoleptic characteristics, including texture and functional properties of fermented milks, produced with either individual or mixed strains of Lactobacillus delbrueckii subsp. bulgaricus (LB) and Streptococcus thermophilus (ST). Therefore, the aim of this study was to evaluate the technological and functional traits of selected strains of LB and ST, with a particular focus on EPS production in fermented milk.

Methods: 14 ST and 6 LB strains were characterized by evaluating the carbohydrate fermentation profile using API KIT 50 CH, acidification activity at three different temperatures (30°C, 37°C and 42°C), and EPS production. The EPS production was determined by evaluating the color of the colonies grown in ruthenium red agar plates, and quantified by phenol-sulfuric acid. Partially skimmed UHT milk was used to prepare the fermented milks, characterized by monitoring the pH (till 4.55-4.65), rheological measurement (viscosity and flow curve), EPS quantification and antioxidant activity (DPPH, ABTS and FRAP).

Results: The different strains exhibited different fermentation profiles. LB strains showed a faster acidification kinetic than the ST. ST strains produced more EPS than LB. Additionally, the apparent viscosity change of fermented milks, prepared with the selected strains indicated a shear-thinning and non-Newtonian fluid behavior of the samples and,

depending by strains and EPS production, a thickening effect was observed.

Finally, fermented milks prepared with selected mix strains exhibited interesting textural properties along with a higher antioxidant activity when compared with the commercial products.

Conclusions: The results of the present study reveal that selected strains could be considered as a potential source of EPS and the respective fermented milks exhibit interesting viscosity pattern and high antioxidant activity. Research is ongoing to evaluate additional qualitative attributes (e.g. aroma volatile compounds pattern and aroma release, microstructural properties, and sensory properties) of fermented milks.

Keywords: Exopolysaccharide, Fermented milk, Lactic acid bacteria, Rheological measuements, Antioxidant Activity

Aknowledgements: PON Ricerca e Innovazione 2014-20, azione I.1 "Dottorati innovativi con caratterizzazione industriale" for MKA

OP&CII_2

EVALUATION OF STRUCTURAL BEHAVIOR IN THE PROCESS DYNAMICS OF OLEOGEL BASED TENDER DOUGH PRODUCTS

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Replacement of solid fats with liquid oils is accepted when the plastic properties of the fats are maintained in the product. In order to avoid major differences in texture, oil separation and other problems caused by the substitution of saturated fats, new methods for structuring oil must be used for the development of unsaturated fat alternatives with properties and functions similar with those of solid fats. Regulation (EU) 2019/649 states that trans fatty acids are substances that have been identified as having harmful effects on human health. Oleogelation is a useful alternative to structure vegetable oils by limiting the use of trans or saturated fats.

The aim of this study was to evaluate the behavior of structured lipids, by obtaining and characterizing some oleogels and integrating them into tender dough products.

Five experimental prototypes were obtained: PM- blank sample with commercial shortening, P1- oleogel with 10% carnauba wax, P2- oleogel with 10% glycerol monostearate, P3- oleogel with 16% mixture of β-sitosterol:lecithin, P4- oleogel with 10% mixture of β-sitosterol:beeswax. These were subjected to physical analysis (texture profile, oil binding capacity, rheological measurements) in order to establish the structural behavior. They were used in the formulation of biscuits, in order to completely replace shortening fats and to highlight the influence on the quality of the finished product. All the oleogels formulated with sunflower oil and various structuring compounds led to the formation of a stable gel.

Oleogel with mixture of β-sitosterol:beeswax has a significantly higher hardness (6.37 N), a property attributed to the superior structuring capacity offered by these oleogelators, result correlated with the percentage of oil loss (0.05%). The crystalline phase was sufficiently structured to develop a network to maintain the oil in a gel-like structure, with oil losses relative to the initial oleogel mass being reduced (<3.2%). Regarding the dough, the hardness value for the sample formulated with oleogel with carnauba wax (92.49 N) was significantly higher, compared to the dough obtained with commercial shortening (16.15 N).

Thus, in addition to meet the need for unsaturated fatty acids, the use of oleogels has the potential to create foods with desired physical and sensory properties.

Keywords: trans fats, oleogel, structured lipids, shortening, physical analysis

Acknowledgements: This work was supported by a grant, project number PN-III-P1-1.1-TE-2019-2212, within PNCDI III.

OP&CII_3

PRICKLY-PEAR: NUTRITIONAL DIFFERENCES BETWEEN AN IRRIGATED AND A NON-IRRIGATED CULTURE

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Opuntia ficus-indica is a plant native to Mexico. In the European continent, it has been gaining territory due to its behavior as an invasive plant adapted to poor soils. In Portugal, its presence is notorious in the Alto Douro and Alentejo regions, where summer temperatures are high and the soils dry. Although it is an invasive plant, both fruits and palms are edible, and its ability to grow in soils with little water availability makes it a plant adapted to climate change. Its cultivation in national territory is currently a reality, contributing to food diversity.

This study aimed to evaluate the nutritional changes due to irrigation in two samples from the region of Freixo-de-Espada-à-Cinta, Alto Douro. One of the samples was collected from a wild specimen, naturally present in the region, only exposed to rainwater. The second sample was collected from a specimen exposed to daily watering. The fruit samples were divided into the various parts (seed, skin, pulp and juice) for separate testing. AOAC [1] methods were used to determine the macronutrient content and the results were expressed in % dry weight.

The wild sample consistently presented a lower moisture compared to the watered one (79% and 82% in the whole fruit). The lipid content of the wild plant seed was more than 3 times higher than that of the plant that benefited from irrigation (2.4% vs 7.8%). The same happened in the protein content (10% vs 5%) and in the ashes (9.7% vs 4.9%) that were the double on the wild plant. The wild sample also showed a higher percentage of total sugar.

We can conclude that the plant has a better production of macronutrients in its wild state, with the absence of irrigation. These results demonstrate the plant's amazing adaptation to arid climates, encouraging its cultivation in unproductive lands due to lack of water.

Keywords: opuntia, *Opuntia ficus-indica*, prickly-pear

Acknowledgements: This work was supported by UIDB/50006/2020 (FCT/MCTES-Portugal), SYSTEMIC and AgriFood XXI I&D&I (NORTE-01-0145-FEDER-000041) projects.

OP&CII_4

OLEOGEL-IN-HYDROGEL BIGEL: A NOVEL FAT SUBSTITUTE IN FERMENTED SAUSAGES

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Fermented sausages are popular semi-dry meat products with a high fat content. Moreover, the fat in fermented sausages exists as visible fat particles that participate in the controlled and continuous release of moisture allowing for proper fermentation and flavour/aroma development. Reducing the fat content in fermented sausages may result in undesirable sensorial characteristics concerning the texture and palatability of the finished products. Therefore, the partial replacement of pork back fat in such products cannot be achieved by direct substitution with liquid vegetable oils, but requires the formation of a stable, solid-like system. For this purpose, gel-like lipid structures (such as oleogels) have been used. A novel and promising substitute of animal fat, that, additionally, allows for the reduction of total fat, are the bigel systems. Bigels (or hybrid gels) are biphasic semi-solid systems that combine both water-based gels (hydrogels) and oil-based gels (oleogels) and are characterized by enhanced physicochemical and thermodynamic stability. The application of bigels as fat replacers could lead to the improvement of the nutritional profile of fermented sausages by decreasing the content of saturated fatty acids and cholesterol.

The aim of the study was to formulate and characterize fermented sausages produced with bigels as fat substitute. Bigels were formulated by mixing olive oil oleogels and hydrogels in 20:80 and 40:60 ratios. The oleogels were structured by monoglycerides and the hydrogels with gelatin and k-carrageenan. The bigels were used to substitute 50% of the pork backfat. Lipid oxidation levels and microbiological characteristics of the sausages were evaluated and compared to control samples formulated with pork backfat.

The substitution of pork back fat by bigels affected the pH, weight loss and the lipid oxidation levels of the sausages. Total viable counts, lactic acid bacteria and Micrococcaceae were not affected by the fat substitution.

The use of bigels in fermented sausages could be a way to obtain new meat products with improved nutritional characteristics.

Keywords:Fermented sausages, Bigels, Oleogels, Hydrogels, Fat substitute

Acknowledgements: The research was supported by the Hellenic Foundation for Research and Innovation (H.F.R.I.) Project Number:3601

OP&CII_5

IDENTIFICATION OF BIOMARKERS FOR THE AUTHENTICATION OF ALPINE CHEESES

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The European Union (EU) protects the names of traditional foods by registering their product specifications and granting them a geographical indication (GI) quality label. The EU labels eligible foods either a protected designation of origin (PDO) or a protected geographical indication (PGI) label depending on the extent of connection between food and specified area. EU quality schemes add value to traditional foods, which translates to preserving long-established food and feed production techniques, sustaining rural areas, creating identity, and making EU's food products competitive on a global market. EU's quality labels improve the visibility of traditional foods and aid consumers in making more sustainable food choices. GI labeled foods are premium foods and thus targets to food fraud that causes financial damage to genuine producers, ruins consumers' trust and may put consumers' health at risk. This doctoral project supports the EU's fundamentals in ensuring food safety and integrity of foods. The project aims at identifying biomarkers for the authentication of protected Alpine Cheeses from Austria, Germany and Italy. The project's approach is to set up a database composed of chemical, microbiological, rheological, sensory, thermophysical, and non-published historical data of Alpine and non-Alpine Cheeses with and without protected status. This database will form the foundation for detecting intrinsic characteristics of distinct Alpine Cheeses that will apply as potential biomarkers. Potential biomarkers of raw materials and processing biomarkers will be validated on protected Alpine Cheeses. Potential, geographical markers will be validated on non-Alpine Cheeses produced within the Alpine Region.

Biomarkers proven effective will unequivocally link protected Alpine Cheeses to their production specification that regulates permitted raw materials, the processing method, and the geographical area of production. The project concludes with the identification of biomarkers for protected Alpine Cheeses. However, biomarkers may also be applied for the authentication of non-Alpine protected Cheeses and Alpine Foods other than cheese. The project will also produce a database that exhaustively describes traditional Alpine Cheeses and it might find further use in follow-up projects.

EU food authenticity, integrity and quality, Development of an inter-regional database for traditional alpine cheeses, Multivariate statistics for the identification of biomarkers in alpine cheeses, Validation of biomarkers as detectors for food fraud in alpine cheeses.

OP&CII_6

INFLUENCE OF A COFFEE SILVERSKIN EXTRACT ON GLUCOSE INTESTINAL TRANSPORTERS: AN APPARENT SYNERGISM BETWEEN CAFFEINE AND 5-O-CAFFEOYLQUINIC ACID

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Coffee silverskin is the main by-product of coffee roasting. In a previous study [1], a silverskin extract, prepared using a green method of extraction, was able to concentration-dependently influence glucose (3H-DG) uptake by the human intestinal epithelial (Caco-2) cell line. At the highest concentration tested (1 mg/ml extract; 24-h treatment), it caused a significant reduction (~17%) of 3H-DG uptake.

In this work, the influence of this extract (1 mg/ml extract; 24-h treatment) on glucose intestinal transporters (GLUT2 and SGLT1) expression levels were assessed by RT-qPCR. In addition, the effects of caffeine and 5-O-caffeoylquinic (found to be major components of the extract, by chemical characterization by RP-HPLC-DAD), alone and combined, on 3H-DG uptake glucose uptake were also studied.

The extract significantly reduced the mRNA expression levels of GLUT2 (~71%, $p<0.05$) and tended to reduce the mRNA expression of SGLT1 (~12%, $p>0.05$). Moreover, neither caffeine nor 5-O-caffeoylquinic acid were able to influence 3H-DG uptake when tested individually, but significant inhibitions were found (~16%, $p<0.05$) when combined. This effect was quite similar to that observed for the extract, suggesting a major role of this synergistic activity between both compounds in the silverskin extract.

Overall, these results indicate that silverskin might be a useful ingredient in the development of a functional product aimed at preventing metabolic disorders, such as type 2 diabetes, due to their richness in bioactive compounds that possess the ability to reduce intestinal glucose uptake.

Keywords: Coffee silverskin, Glucose uptake, Caffeine, 5-O-caffeoylquinic acid, By-products valorization and Health promotion

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P&CII_7

TEXTURAL PROPERTIES OF SOME ASSORTMENTS OF GRILLED AND BAKED FISH PREFERRED BY 20 TO 50+ YEARS OLD CONSUMERS IN ROMANIA

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Introduction: There is very little information about the textural properties of different fish varieties depending on the method of preparation and the preference of consumers.

Materials and methods: A survey was conducted over more than 100 Romanian consumers between 20 to 50+ years old, to identify the preferred type of fish and type of fish home cooking.

The sensory analysis of cooked fish was developed by a panel of 6 panellist (20 to 30 years old) with training in food rheology and texture.

The textural parameters for the cooked fish measured by instrumental double-compression test were hardness for the first compression (hardness I), hardness for the second compression (hardness II) and chewiness. Data statistical analysis was conducted using the MedCalc 19.8 software.

Results: The survey among Romanian consumers of 20 to 30 years old showed that the salmon, mackerel and carp were preferred while the survey among consumers of 50+ years old showed that mackerel, carp and trout were the most often consumed fish. The two survey also showed that grilling and baking are the most common cooking methods for the identified four species of fish.

The sensory analysis developed by the panel of 6 panellist showed that for chewiness there was no significant difference between species and the two cooking methods (grilled and baked).

Following instrumental measurement, significant differences were found for hardness II for mackerel (P= 0.0474), respectively carp (P= 0.002) and trout (P= 0,0159) between the two methods of preparation as well as for chewiness for carp (P= 0.0117) and trout (P= 0,002). The statistical analysis of hardness I and II showed no significance.

Conclusions: The instrumental measurement of chewiness and hardness I, respectively hardness II showed that there are borderline significant differences between cooking methods for all samples of fish assortments. However, no significant difference was found between the salmon, mackerel, carp and trout samples cooked using the same method. For grilled and baked salmon, mackerel, carp and trout, the textural properties have little influence over the consumer's choice. These results could be significant to retailers explaining the consumers' preferences for specific fish.

***Keywords*:** food texture, sensory analysis, texture profile analysis, consumer preference.

OP&CII_8

HIGH-PRESSURE PROCESSING AND LYTIC BACTERIOPHAGE COCKTAIL PHAGEGUARD S AS A SYNERGISTIC HURDLE SYSTEM TOWARDS SALMONELLA INACTIVATION IN EGG WHITE

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Salmonella spp. still represents a major public health concern as the etiological agent of foodborne diarrhoeal illnesses. Salmonella Enteritidis is the most common serovar associated with non-typhoidal salmonellosis in the United States and Europe, through the ingestion of raw, undercooked eggs or egg-derived food products. The consumption pattern has changed worldwide, towards a growing demand for minimally processed foods. The association of emerging technologies with conventional antimicrobial agents has been scarcely exploited as a feasible multi-hurdle decontamination approach. The purpose of the present work was to develop a novel non-thermal technology through the combination of mild high pressure processing (HPP, 300 MPa) with the bacteriophage PhageGuard S towards a 4-strain *Salmonella* cocktail inactivation in egg white. A preliminary set of experiments allowed to establish the most adequate parameters to be employed in the proposed system. Concerning the HPP (200 to 600 MPa) resistance pattern of thirteen food and clinical *Salmonella* strains belonging to serovars *Enteritidis, Typhimurium* and *Senftenberg*, a prominent intrastrain heterogeneity was observed and as expected, higher pressure magnitudes elicited a lower survivability. Regarding the impact of the pressure processing on the egg white viscoelastic profile, it was found that from 400 MPa onwards the complex viscosity and elastic modulus

increased noticeably. The second part of the work sought to investigate the decontamination potential of the proposed treatment.

In the challenge assays performed in egg white comprising a high bacterial load (107 CFU mL-1), HPP per se was not able to accomplish a prominent bactericidal effect, whilst the combination with the bacteriophage elicited *Salmonella* inactivation to values below the detection limit. The association of the two hurdles was determined to be a synergism. Moreover, a scarce impact on the physical features of egg white – color, foaming capacity and rheological properties - was observed throughout the 7-day refrigerated storage (4ºC). To our knowledge, this is the first study documenting a sustainable non-thermal technology as a suitable alternative to egg white pasteurization since the synergistic system HPP-PhageGuard S accomplished a Salmonella 5-log reduction.

Keywords: *Salmonella enterica* cocktail, High Pressure Processing, PhageGuard S, hurdle technology, synergistic system

SESSION 6

POSTER SESSION:VIRTUAL POSTER ROOM AND BREAKOUT ROOMS IN ZOOM

PII_1

EFFECT OF THE CRANBERRY POMACE ON THE CHARACTERISTICS OF MEAT SYSTEMS

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Foods that contain a higher proportion of dietary fiber promote a healthier lifestyle, and their regular intake is known to reduce obesity and diseases such as colon, cardiovascular disease, obesity, and cancer. According to the American Association of Nutritionists, it is recommended that an adult consume 25-30 g per day insoluble and soluble fiber 3:1. Enriching foods with fiber not only improves their nutritional value but also changes their functional and technological properties.

The aim of study was to evaluate the effect of differently milled (0,2 mm and 0,5 mm) cranberry pomace before and after CO_2 extraction addition on the technological and textural properties of meat systems. The cranberry pomace tested in meat systems at 1,5 % 5 % and 9 % concentration. It was found that increase in cranberry pomace concentration affected decrease in pH and thermal losses while hardness increased from 11.64 to 58.22 N. It was also obtained that meat systems containing pomace showed lower cohesiveness and springiness values, comparing with control. The most visible effect was in samples with 1.5 % and 5 % pomace addition as those samples were easier to chew. The highest applied concentration affected the highest values of hardness (58.22 N) as well as chewability (5.48). Meat systems with pomace before CO_2 extraction were higher in hardness values, meanwhile particle size of the pomace had no general tendency on the textural properties. These results indicated that cranberry pomace has great potential not only to be used as a natural source of dietary fibers in meat systems but also to improve technological properties such as texture or yield.

Keywords: meat systems, cranberry pomace, texture

PII_2

DEVELOPMENT AND CHARACTERIZATION OF CHICKEN FAT BIGELS STRUCTURED WITH CARNAUBA WAX AND GELATIN

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Chicken fat have high amount of unsaturated fatty acids that are known for their positive health effects. However, potential application of chicken fat is limited because of the low melting temperature (semi-liquid state) that highly affect the technological properties of meat products. Fat solidification could be a great solution in order to apply chicken fat instead solid pork lard.

Chicken fat bigels were structured with carnauba wax (10% in oleogel phase) and gelatin (5% in hydrogel phase) at a different oleogel:hydrogel ratio (20:80, 30:70, 40:60, 50:50, 60:40, 70:30, 80:20). Stability, colour, swelling ability, textural and rheological properties were evaluated.

All obtained bigels were stable and it was found that increase in oleogel fraction affected increase in cohesiveness from -0.5 to -5.2. According to the rheological results, all bigels exhibited solid-like characteristics since the storage modulus were larger than loss modulus. Higher fractions of oleogel increased the mechanical strength (storage modulus and hardness) of bigels. Changes in colour coordinates were also obtained as L* decreased from 89.89 to 72.38 and b* increased from 13.64 to 24.78 after decrease in hydrogel amount. Higher proportion of hydrogel was beneficial for water swelling ability as bigels with oleogel fraction higher than 50 % were unable to absorb water. The obtained results showed that formulated bigels have a potential to be applied in food products instead of solid animal fat.

Keywords: bigel, chicken fat, structurisation

PII_3

POTENTIAL TO DEVELOP BREADS WITH GREEK WHEAT LANDRACES WITH HIGH SENSORY AND TEXTURAL PROPERTIES

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Landraces are traditional varieties which developed thanks to human and nature selection through years. There is evidence that wheat landraces have superior quality characteristics and health benefits compared with modern wheat. In the present study, whole wheat flour from 4 Greek wheat landraces (*milos, kalavrita, karpathos –patmos*) and 1 modern cultivar (*elisavet*), were used to produce bread.
Bread formula contained 100 g flour, 1.5 g salt, 2 g dry yeast and 70 g water. Doughs fermented for 70 min at 35°C and baked for 20 min at 180°C. Sensory evaluation of breads was carried out by 10 trained panelists the day of production using representative slices. A nine-point scale (1 for low intensity and 9 for high intensity) was used to evaluate crumb darkness, pore quantity and dimension, toasted flavor, flavor and odor intensity, crumbliness and hardness of the crumb, and overall acceptability. Physical evaluation included color (*CIE-L*a*b** uniform color space), firmness (recorded with an Instron using the AACC 74–09 method), cell density (cells/cm^2), surface porosity (%) and average pore diameter (mm) of bread crumb (determined using a flatbed scanner and Image analysis software). According to sensory results crumb and crust of *kalavrita* bread were significant brighter than all the other samples. Crumb darkness was correlated significantly negatively with crumbliness (*-0.971*, *P<0.05*) and toasted flavor (*-0.974*, *P<0.05*).

Overall acceptance was high enough for all the samples (5.19-6.86), but *milos* bread had the highest value (6.86).
Milos and *elisavet* breads, had the smallest pores.
Firmness was significantly higher in *elisavet* (10.72 N) compared to landraces bread (6.89-8.20 N).
Regarding color, *kalavrita* bread presented significantly the highest *L** value (60.86) and lowest *a** value (4.45) compared to all the other samples. Analysis of physical properties showed that results were in agreement with sensory evaluation. Simple linear models could be used to describe the relationship between firmness and hardness; crumb darkness and color parameter as *L*a*b**; pore dimension and pore diameter. The above models explained good enough the data variability as R^2 ranged between *0.8565* and *0.9814*. In conclusion, results revealed that Greek wheat landraces gave breads with remarkably sensory and physical properties.

Keywords: bread, wheat landrace, sensory evaluation

Acknowledgements : This research is co-financed by Greece and the European Union (European Social Fund- ESF) through the Operational Programme «Human Resources Development, Education and Lifelong Learning» in the context of the project "Reinforcement of Postdoctoral Researchers - 2nd Cycle" (MIS-5033021), implemented by the State Scholarships Foundation (IKY).


PII_4

MICROSYSTEM BASED EMULSIFICATION OF AQUEOUS PEPPERMINT EXTRACTS AS A TIME AND ENERGY SAVING ALTERNATIVE TO THE BATCH HIGH SHEAR EMULSIFICATION PROCESS

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Peppermint (*Mentha piperita* L.) is used in traditional medicine as a herb with many positive effects on human health which are attributed to the bioactives present in the plant (rosmarinic acid, flavonoids, menthol and menthone). These compounds are extracted from the peppermint plant by means of different extraction methods, with aqueous extraction being the most common one. However, after the extraction process, the phenolic compounds, in order to exert their positive health effects, have to reach the target tissue undamaged and have to be protected from harsh conditions of the digestive system. The most common method of protecting the phenolics is microencapsulation. One of the newer techniques being explored nowadays is emulsification, which is often done by high shear batch homogenization. Although this technique ensures the production of stable emulsions with small droplet diameters, it consumes high amounts of energy and requires a certain time period to obtain stable emulsions. In this work, a continuous, microsystem based emulsification process is proposed as an alternative to the high shear process. Optimization of the emulsification process, in a microfluidic teardrop micromixer system, using polyethylene glycol as emulsifier (PEG 1500, PEG 6000 and PEG 20000) was performed and the effect of the emulsifier amount, oil amount and total flow rate on the microemulsion stability expressed as zeta potential and average Feret diameter was analysed. The values of zeta potential ranged from 0.0081 to -6.57 mV, indicating low stability of the produced emulsions. The

effect of PEG type was also visible, with higher molecular weight PEG resulting in emulsions with lower zeta potential.

However, the values of the average Feret diameter and the microscopic images revealed that emulsions with a uniform droplet sizes and a very low polydispersity index were obtained. Based on the optimization experiment, in order to produce a stable emulsion using the microsystem, significantly higher concentration of PEG as an emulsifier is required to keep the emulsion from destabilizing in comparison to the batch system.

Keywords: peppermint, microfluidics, emulsion, PEG, average Feret diameter

PII_5

IMPACT OF ALGINATE CONCENTRATION ON TEXTURE AND THE RELEASE OF HEMP (*CANNABIS SATIVA* L.) BIOACTIVES FROM ALGINATE MICROBEADS – AN OPTIMIZATION STUDY

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Beside its application in the textile and pharmaceutical industry, industrial hemp (*Cannabis sativa* L.) is attracting more and more interest in the food industry as a part of the functional food portfolio. Namely, it has been discovered that the plant contains numerous bioactives that can act as therapeutic agents and have antibacterial activity. Hemp's bioactives usually have an astringent taste that is often unappealing to the consumers and has to be masked by the addition of other, stronger aromas to the product. The other way of masking undesirable taste in food products is microencapsulation. In this study, alginate, as one of the most widely used, inexpensive and environmentally friendly encapsulating material was used. The aim of this study was to define the optimal conditions for microencapsulation of hemp bioactives. Experiments were performed according to the Box-Behnken design which included 3 factors on three levels: (i) alginate concentration (2, 3 and 4 %), (ii) extract concentration (50, 75 and 100 %) and (iii) concentration of the receiving $CaCl_2$ solution (1.75, 2 and 2.5 %). Seventeen samples of microcapsules were produced and their physical properties were analyzed: particle size, firmness, compressibility and dry matter content. Chemical properties were analyzed as well: antioxidant activity, total polyphenols content (TPC), microencapsulation efficiency and the bioactives released from the microcapsules. Statistical analysis showed that concentration of alginate solution had significant effect on particle size, dry matter content, TPC,

antioxidant activity, release of active substances and microencapsulation efficiency.

Extract concentration had a significant effect on the particle size and the TPC, antioxidant activity and release of active substances.

The results also showed that the beads with higher hardness and compressibility also had lower amounts of bioactives released from the encapsulation matrix. The determined optimal conditions for physical properties were: 4 % alginate solution, extract concentration of 75 %, and 2.25 % CaCl2 solution; and for chemical properties: 3 % alginate solution, 75 % extract and 2 % CaCl2 solution.

Keywords: alginate, hemp, optimization, bioactives

PII_6

THE INFLUENCE OF TASTE, TEXTURE AND APPEARANCE ON THE LEVEL OF CONSUMER ACCEPTABILITY FOR FUNCTIONAL LIQUID PRODUCTS

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Introduction: In the process of development and innovation of beverages with functional additives an important aspect is the definition of the optimal sensory profile in order to obtain a high level of acceptance from the target consumers. The purpose of the research was to study the influence of sensory attributes (taste, texture, appearance, general impression) on the degree of consumer acceptance.

Methods: A sensory test was performed with a panel consisting of 20 target consumers, according to ISO 8589 by the hedonic acceptance method. The products were presented sequentially monadically. The tested samples were represented by 4 drinks with fruit juice: pineapple-kiwi (PK), red grapes-strawberry (GS), blueberry-raspberry (BR), mango-lemon (ML) and functional additives: anti-inflammatory ingredient, bioactive peptides, carbohydrates with low glycemic index.

Results: The results obtained for the global assessment made it possible to group tested samples in two categories. The first category was represented by products that crossed the acceptance threshold (PK, GS, BR), with scores of global appreciation between 7-7,45. The second category was represented by the ML product that did not cross the acceptance threshold, obtaining a score at the global appreciation of 6. The products with the highest level of acceptance for appearance (70%) were the red products (GS, BR). As far as that goes of texture perception, the products GS and BR were evaluated as similar, while PK and ML products were perceived as significantly different from each other. In terms of taste, three of the products were preferred (BR score 7.55; PK score 7.45; GS score 7.2) and ML was evaluated under acceptance threshold.

Conclusion: The results obtained in the sensory test showed a positive correlation coefficient (0.65) between taste and general appreciation. The general assessment was influenced by the texture to a lower measure than the taste, but the texture was strongly influenced by the appearance of the product. The products with the highest level of acceptance for appearance (GS, BR 80%) had the least influence of textures in the general appreciation (12%). The product with the lowest level of acceptance for appearance (ML 50%) showed the greatest influence of textures in the general assessment (28%).

Keywords: Functional beverages, hedonic sensory test, texture

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PII_7

OPUNTIA FICUS-INDICA (L.) MILLER CLADODES: EFFECT ON DIFFERENT TYPES OF CANCER CELL LINES

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Opuntia ficus-indica (L.) Miller is a perennial, succulent, and branched shrub that has been appointed as an interesting sustainable and functional food source, in part due to its cladodes, which represent the main by-product of this culture. These cladodes are a source of several bioactive compounds presenting, besides others, anti-tumoral effects1.

The aim of this work was to explore the anticarcinogenic properties of an aqueous extract of O. ficus-indica cladodes. For this, 3 distinct human cancer cell lines were used: a breast cell line (MCF-7), a pancreatic cell line (AsPC-1), and a colorectal cell line (HT-29). Cells were exposed to the extract (1 mg/mL) or to its vehicle for 24 h. Cell viability was determined by measuring cellular leakage of lactate dehydrogenase (LDH) to the extracellular culture medium2. Cell proliferation rates were determined with the 3H-thymidine incorporation assay2. Culture growth was determined using the sulforhodamine B (SRB) assay, which reports on intracellular protein content2.

The results revealed that the cladodes extract was cytotoxic (LDH) only to HT-29 cells. Moreover, culture growth (SRB) was not disturbed by the extract in these cell lines. These 3 cell lines saw their proliferation rates (3H-thymidine incorporation) significantly reduced by the extract (to 70%, 72%, and 78% of control - AsPC-1, MCF-7, and HT-29, respectively).

These results show that the O. ficus-indica cladodes extract (1mg/mL) exerted antiproliferative effects in AsPC-1, MCF-7, and HT-29, being

cytotoxic only to HT-29 cells. Overall, this extract showed an appealing antineoplastic potential and, therefore, it should be further explored and studied as a cheap complementary agent.

Keywords: Food sustainability, Anticarcinogenic potential, Opuntia ficus-indica cladodes valorization, MCF-7, HT-29, and AsPC-1 cancer cell lines

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PII_8

BIOTECHNOLOGICAL TOOLS FOR CEREAL DIETARY FIBRE MODIFICATIONS

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Cereals and pseudocereals are important components of most diets, as a good source of energy and both macro and micro nutrients. Dietary fibre (DF) functional foods have been paid more attention because of their good performance in physiological functions and appropriate taste. In terms of healthier lifestyle and diet, incorporation of DF in food, as well as DF modification during food preparation, has to follow strict food safety guidelines. The biotechnological tools for DF modification that have mild processing conditions (without harsh chemical treatments) and specific and/or targeted effect include application of enzymes (both endogenous and exogenous) and microbial fermentation.

Based on their origin, enzymes can be broadly classified into two types, endogenous and exogenous. Germination and sprouting activates various biochemical pathways for the synthesis of enzymes for hydrolysing stored substrates. Endogenous enzymes mainly involved in breakdown of complex substrates into simpler units, whose activity affects the quality and processing characteristics of grains. Also, to increase the nutritional value of raw grains and its fractions, various exogenous enzymes from external sources are added. Enzymes are recognized as processing aids and enzymatic modifications are effective on the quality enhancements of dietary fibre by modifying the structure or altering the composition.

Different fermentation procedures are used for the modification of dietary fibre from cereals. All fermentation processes have been shown that, beside dietary fibre modification, increase the nutritional value and digestibility of bakery products. This is reflected in the increase of bioavailability of phenolic compounds after fermentation, which are usually found in plants bound to dietary fibre and therefore released by the activity of microbial enzymes. Additionally, phytic acid – the most common antinutrient found in cereals and legumes, is significantly reduced by fermentation processes. The application of biotechnological processing allows the use of less utilized cereals and their by-products, thus improving the nutritional value of bakery products and lowering the waste generation.

Keywords: cereals dietary fibre, enzymes, fermentation, safe food processing

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PII_9

EVALUATION OF GLUTEN-FREE COMPOSITE FLOURS FROM THE POINT OF VIEW OF THEIR RHEOLOGICAL AND BAKING PROPERTIES

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The increasing occurrence of celiac disease as a major reason for following a gluten-free diet requires innovation and expansion of the product range. These products, in addition to the absence of celiac active proteins, should meet nutritional requirements and contain a range of essential nutrients and biologically active food ingredients. As part of our research, various recipes for gluten-free flours enriched with nutritionally beneficial ingredients (naturally gluten-free flours and heat-treated whole seeds) were verified. Their rheological properties and technological quality of bakery products were evaluated.

The ability of doughs prepared without gluten, which has a key function in capturing fermentation gases, was monitored using a rheofermentometer (Rheo 4). Composite flours composed of naturally gluten-free raw materials with the addition of guar gum and lecithin were used. The least gases were generated and trapped in the dough, which consisted of three flours (rice, corn, chickpeas) in different proportions, and in which there was a higher proportion of guar gum and lecithin compared to the others. The decrease in retention was 18% to 23% compared to the other two gluten-free samples, which had results similar to the control wheat flour.

As part of the experimental baking, breads were prepared (10 samples with a different composition of composite flours and with the addition of heat-treated seeds), which were evaluated in terms of their volume, specific volume, volume yield and aspect ratio of a middle slice (Volscan). The specific volume values ranged from 1.24 g/cm^3 to 2.21 g/cm^3, averaging 1.57 g / cm^3. These values are lower than standard for pure wheat flours (control T650 3.44 g/cm^3) or for wheat-rye flours

(control T650 + T500 2.48 g/cm^3). Commercial gluten-free flour with the addition of heat-treated seeds was evaluated as the most suitable.

From the originally prepared composite flours, the most suitable was a mixture of corn starch, soy granules, amaranth flour, guar gum, with the addition of heat-treated 6 types of seeds (specific volume 1.64 g/cm^3).

The creation of new and better recipes that take into account the nutritional needs of consumers is still necessary, and our results confirm that it is possible to prepare bakery products intended for celiacs with a designed nutritional composition.

Keywords: gluten-free, rheofermentometer, bread

Acknowledgments: This study was supported by the project VEGA 1/0113/21

PII_10

MINERAL PROFILE OF OLIVE POMACE FROM DIFFERENT CROPS IN PORTUGAL

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Eco-nutrition integrates major challenges for food consumption: health, ingredients/products of natural origin and environmental sustainability [1]. During the olive oil processing, a by-product is obtained – the olive pomace. This by-product has been receiving special attention due to its high environmental impact. On the other hand, it can be a source of compounds with great health benefits [2].

This work aimed to detail the mineral profile of 9 olive pomace samples of different crops from the north and south of Portugal. 4 macro elements (Na, K, Ca, Mg) and 27 trace elements (7Li, 9Be, 11B, 27Al, 48Ti, 51V, 52Cr, 55Mn, 57Fe 59Co, 60Ni, 65Cu, 66Zn, 75As, 82Se, 85Rb, 88Sr,90Zr, 98Mo, 111Cd, 118Sn, 121Sb, 125Te, 133Cs, 137Ba, 182W, 208Pb and 209Bi) were considered. It was used ICP-MS for the determination of trace elements, flame photometry for Na and K, and atomic and molecular spectrophotometry for Ca, Mg and Fe [3].

Results showed that olive pomace stands out for its composition of macro elements and essential trace elements. The mineral composition values of olive pomace for K, Ca and Mg were comprised between 20-30, 1-2 and 0.5-1 g/kg respectively. For trace elements such as 57Fe, 55Mn and 66Zn, the values varied between 30-70 (Fe) and 1020 µg/g, respectively.

This study aims to support olive pomace as a functional ingredient for the food industry, ensuring food security and promoting food diversity, considering the olive pomace mineral profile.

Keywords: Olive pomace, mineral profile, food industry, sustainability

Acknowledgments: Projects UIDB/50006/2020 (FCT); SYSTEMIC and AgriFood XXI (NORTE-01-0145-FEDER-000041; M.A.N. (BD/130131/2017) and RA (CEECIND/01120/2017).

PII_11

THE INFLUENCE OF FLOUR HEAT PRE-TREATMENT ON THE ACRYLAMIDE AND 5-HYDROXYMETHYLFURFURAL (HMF) CONTENT IN BREADS

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In the recent years, there is an increased demand for the bakery products that contain fewer hydrocolloid additives. However, that is hard to achieve when non-wheat flours are used as a primary ingredient, due to their poor technological properties. One of the ways to physically modify the technological properties of flours is to apply dry or wet heat (extrusion) treatments. These treatments have profound effect on the starch and protein components of flours, making them more suitable for the production of bakery products. However, heating of materials rich in reducing sugars and proteins, such as flours, can trigger the formation of acrylamide and HMF, especially in low moisture conditions. The aim of this study was to determine how heat pre-treatment of flours affects acrylamide and HMF content in non-wheat breads.

Breads were prepared from four types of wholegrain flour (rye, oat, sorghum and millet) as the blends of dry heat treated (70%) and extruded (30%) flours of respective cereals. Firstly, acrylamide and HMF contents were calculated based on the ratio of flours in the used flour blends. Then, acrylamide and HMF were determined in the whole loaf in order to compare calculated and determined results.

Acrylamide was detected in breads in the range from 105 to 312 μg/kg of fresh weight, higher than the benchmark level of 100 μg/kg set for this type of product by European Commission regulation 2017/2158.

HMF values determined in breads were between 3.3 and 8.0 mg/kg of fresh weight, which are typical for this commodity.

Comparing determined values with calculated ones, it can be concluded that in the millet and sorghum samples, the acrylamide formation reaction is dominant in relation to acrylamide degradation reaction. In case of oat and rye samples, the degradation of acrylamide prevailed over its formation. According to our previous findings, this was caused by a higher amount of yeast used in this formulation than usually used for production of bread.

Keywords: acrylamide, HMF, heat treatment, extrusion, wholegrain flours

Acknowledgments: Slovakian contracts APVV-17-0212; SK-SRB-18-0035; 313011V3360008; Serbian contract 451-03-9/2021-14/200222

PII_12

EXPLORING THE DEVELOPMENT OF A "CLEAN-LABEL" GLUTEN FREE BREAD

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Inclusion of food additives into gluten free bread formulations is a common and inevitable practice to improve batter rheological properties and final product quality attributes. However, gluten free breads are still characterized by inferior sensorial and nutritional characteristics compared to wheat breads. In this study, flaxseed slurries were employed to develop a "clean-label" gluten-free bread. Flaxseed gum dispersions due to their mucilaginous properties can replace other hydrocolloids commonly used as texture improvers in gluten free breads as well as flaxseeds themselves, rich in dietary fiber and proteins, can further improve the nutritional value of the fortified products. Thus, following aqueous extraction of flaxseed, the resultant slurry (FS) was incorporated into bread formulations at levels of 3.0 and 4.5 g flaxseed/100 g base flour mixture (rice flour:corn starch 1:1), while a control gluten free bread formulation was also prepared with methylcellulose (MC) inclusion instead of FS. Rheometry and back extrusion testing revealed that inclusion of flaxseed preparations significantly increased, in a concentration-dependent manner, the apparent viscosity, hardness and consistency of the composite batters.

Texture analysis showed that crust hardness, and crumb hardness, cohesiveness and chewiness of FS fortified breads, at both fortification levels, were similar to those of MC bread, but exhibited significant lower loaf specific volume than control, and higher staling extent, as assessed by monitoring crumb hardness upon product storage (48h at 25°C). Nevertheless, overall acceptability of both FS breads scored higher by a trained sensory panel than the control product; moreover, flaxseed gave to the breads a pleasant nutty taste and flavor. In general, flaxseed seemed to be a promising improver for a "clean-label" gluten free bread product.

Keywords: Gluten free bread, Flaxseed gum, Batter rheological properties, Bread quality parameters, "clean label"

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PII_13

ANALYSIS OF THE SUITABILITY OF YEAST FOR ENRICHING THE WASTE BIOMASS OF RAPESEED MEAL

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The constantly growing population on Earth forces us to reconsider food management practice. Access to food may become major problem in the future. To prevent further deterioration, United Nations established the Sustainable Development Goals. These assumptions define e.g., hunger reduction, ensuring stable development, care development for the natural environment and climate.

The conducted research was aimed at development of technology to produce protein rich animal feed from rapeseed meal waste biomass. Various portions of rapeseed meal (10 g, 12.5 g, 15 g) were hydrated (90 ml) and sterilized. A 4-hour long pre-hydrolysis process with cellulolytic and pectinolytic enzymes was performed, followed by the addition of ammonium sulfate as an additional nitrogen source. Next, samples were inoculated with selected yeast strains and simultaneous saccharification and fermentation (SSF) was performed for 48 hours at ambient temperature. During the analysis, the sugar content and liquefaction level of biomass were tested. The effectiveness of yeast growth after the SSF processes and the change of the feed component amino acid profile were also estimated.

It was found that the pre-hydrolysis process successfully degrades the polysaccharides, however the increase of rapeseed meal portion in the sample has negative influence on the degree of biomass liquefaction. The highest growth of yeast was registered for the *Yarrowia lipolytica* strain ŁOCK 0264 (ΔlogN = 2.91), and the lowest for *Candida humicola* ŁOCK 0013 (ΔlogN = 0.92). The analysis of the amino acid profile proved increased content of essential amino acids.

rapeseed meal, enzymatic hydrolysis, yeasts, amino acid profile, waste biomass .

Keywords: rapeseed meal, enzymatic hydrolysis, yeasts, amino acid profile, waste biomass

SESSION 7

INVITED SPEAKERS

ISIII_1

PREDICTION OF SOLAR COOKING IMPACT ON PRODUCTS QUALITY: THE CASE OF RED LENTILS

Loïse BAUDIER and Cristina L.M. SILVA

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Cooking with the direct use of solar energy has been known since the 18th century. The devices concentrate the sunlight and convert it into heat energy. Solar cookers are relatively cheap, some being powerful, and contribute to many sustainable development goals. However, they require skilled operators, once their performance depends on many variables, such as the weather conditions, the cooker model, the pan, and the amount of food. This oral presentation presents the case study of using isothermal kinetics of red lentils colour and texture changes to predict the final quality of cooked red lentils using a box-type solar cooker. It was possible to integrate isothermal models along with dynamic solar cooking conditions and predict red lentils quality.

ISIII_2

STABILITY OF DIETARY POLYPHENOLS

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Quercetin is evidently instable in Dulbecco's modified Eagle's medium (DMEM) at 37 °C. However, the underlying mechanism of this instability is not clear yet. The stability and new degradation products of quercetin in DMEM at 37 °C were investigated *via* in UPLC-MS-MS analysis. With increasing incubation time, quercetin formed various degradation products derived from its dimer and there were numerous isomers formed during this process. Ascorbic acid significantly improved the stability of quercetin by protecting quercetin from auto-oxidation in this medium. Ascorbic acid also significantly improved the stability of quercetin in the presence of A549 cells. Via enhancing the stability of quercetin in cell culture, ascorbic acid obviously enhanced the antiproliferative effect of quercetin towards A549 cells.

Keywords: Quercetin and luteolin; A549 and Caco-2 cells; metabolites; quinones

SHORT ORAL* & POSTER COMPETITION

***Name of presenting author is underlined**

OP&CIII_1

NATURAL DEEP EUTECTIC SOLVENTS AS ECOLOGICAL EXTRACTION MEDIA TO ISOLATE BIOACTIVE COMPOUNDS FROM SAFFRON FLORAL BY-PRODUCTS

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Saffron and its floral by-products are suitable and affordable raw materials for the production of sustainable and highly bioactive healthy food ingredients. Considering that only stigmas are used for saffron spice, the current production system is generating several hundreds of tons of tepal wastes, representing an enormous lack of profitability and sustainability. Consequently, the valorization of saffron floral by-products by developing stable functional ingredients leads to the environmental impact minimization. Thus, the main aim of this study was to develop innovative green extraction processes from saffron floral by-products by using ecological extraction media such as Natural Deep Eutectic Solvents (NaDES), a new category of green solvents with exceptional properties, and ultrasound-assisted extraction (UAE) to improve the extraction yield and to reduce the extraction time. Response surface methodology was used to optimize process parameters. Several UAE variables were studied: time (5−35 min), power (60−180 W) and NaDES (Glycerol:L-proline (2:1 M ratio)/water ratio ([v:v (30%:70%−90%:10%)]) in order to maximize the extraction of bioactives (Total Phenol Content (TPC), Total Flavonoid Content, and antioxidant capacity by DPPH assay). The mass:solvent ratio was set at 1:20 w/v. The results indicated that depending of the time, power or % of NaDES used during the UAE, the responses were different. The optimal extraction was using 20 min, 180 W and 90% of NaDES (TPC values: 88.96 ± 1.08 mg GAE/g dw), and there was an improvement of TPC extraction respect to conventional methods (32.82 ± 2.23 mg GAE/g dw).

Regarding DPPH assay, the results revealed the potential antioxidant activities of saffron floral by-products in the optimal extracts.

Thus, NaDES combined with UAE was an efficient green strategy in order to obtain high added value compounds of saffron floral by-products to develop new functional ingredients.

Besides, it should be noted that UAE is a method that could be easier scaled up at an industrial scale comparing to other methods. Therefore, with this study we could contribute to the improvement of the sustainability of the saffron spice production and profitability of this industrial sector taking advantage of a high-value biomass that is currently unexploited.

Keywords: saffron flower, phenolic content, antioxidant properties, added value ingredients, green chemistry

OP&CIII_2

COMPARATIVE ANALYSIS OF *CLOSTRIDIUM TYROBUTYRICUM* GENOMES REVEALS HIGH GENETIC DIVERSITY

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Clostridium tyrobutyricum is an endospore forming bacterium causing severe spoilage of cheeses that seriously affects dairy industry. Recently, we demonstrated that cheese spoilage potential of *C. tyrobutyricum* is strain-dependent. However, a comprehensive analysis of genetic diversity, functional traits and their potential link to spoilage ability remains unclear. Therefore, the aim of this study was to analyze possible links between genomic characteristics and diversity of spoilage potential *of C. tyrobutyricum*. To this end, 12 *C. tyrobutyricum* strains previously isolated from cheese and raw milk were sequenced and comparative genome analysis was performed with a total of 29 *C. tyrobutyricum* strains. The pan-genome of *C. tyrobutyricum* was found to be open, and comprised 9770 gene families, of which 12.08% genes were shared by all strains constituting the core genome, while the remaining 88.92% were variably represented genes, i.e. accessory genome, constituting the basis of its high genomic diversity. Among these variable genes, 63.20% genes were specific to a single strain representing unique genomes. In addition, the diverse distribution of unique genes in strains, ranging from 5 to 981, further emphasized the heterogeneity of the species *C. tyrobutyricum*. Functional analysis showed that the core genome is mainly enriched in groups of genes related to basic functions of intracellular survival, while the accessory genome showed the existence of several strain-specific genes related to secondary structure and repair and defense mechanisms that might provide diverse advantages.

Furthermore, the accessory genome contained a large percentage of genes with unknown function, pointing out that our knowledge on the functions of *C. tyrobutyricum* genes is far from being complete.

This study provides a valuable resource for future studies investigating the genetic diversification of *C. tyrobutyricum*. Increased knowledge of the impact of this bacterial species on cheese quality may help to avoid cheese spoilage and reduce food waste, and in turn support the development of sustainable food production chain.

Keywords: *Clostridium tyrobutyricum*, late blowing, cheese, comparative genomics, pangenome

OP&CIII_3

EXPLORING THE DEVELOPMENT OF A "CLEAN-LABEL" GLUTEN FREE BREAD

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Inclusion of food additives into gluten free bread formulations is a common and inevitable practice to improve batter rheological properties and final product quality attributes. However, gluten free breads are still characterized by inferior sensorial and nutritional characteristics compared to wheat breads. In this study, flaxseed slurries were employed to develop a "clean-label" gluten-free bread. Flaxseed gum dispersions due to their mucilaginous properties can replace other hydrocolloids commonly used as texture improvers in gluten free breads as well as flaxseeds themselves, rich in dietary fiber and proteins, can further improve the nutritional value of the fortified products. Thus, following aqueous extraction of flaxseed, the resultant slurry (FS) was incorporated into bread formulations at levels of 3.0 and 4.5 g flaxseed/100 g base flour mixture (rice flour:corn starch 1:1), while a control gluten free bread formulation was also prepared with methylcellulose (MC) inclusion instead of FS.

Rheometry and back extrusion testing revealed that inclusion of flaxseed preparations significantly increased, in a concentration-dependent manner, the apparent viscosity, hardness and consistency of the composite batters. Texture analysis showed that crust hardness, and crumb hardness, cohesiveness and chewiness of FS fortified breads, at both fortification levels, were similar to those of MC bread, but exhibited significant lower loaf specific volume than control, and higher staling extent, as assessed by monitoring crumb hardness upon product storage (48h at 25°C).

Nevertheless, overall acceptability of both FS breads scored higher by a trained sensory panel than the control product; moreover, flaxseed gave to the breads a pleasant nutty taste and flavor.

In general, flaxseed seemed to be a promising improver for a "clean-label" gluten free bread product.

Keywords: Gluten free bread, Flaxseed gum, Batter rheological properties, Bread quality parameters, "clean label"

Acknowledgments: Project was funded by EYDE-ETAK under the call RESEARCH-CREATE-INNOVATE (grant number T1EDK-01669)

OP&CIII_4

ANALYSIS OF THE SUITABILITY OF YEAST FOR ENRICHING THE WASTE BIOMASS OF RAPESEED MEAL

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The constantly growing population on Earth forces us to reconsider food management practice. Access to food may become major problem in the future. To prevent further deterioration, United Nations established the Sustainable Development Goals. These assumptions define e.g., hunger reduction, ensuring stable development, care development for the natural environment and climate.

The conducted research was aimed at development of technology to produce protein rich animal feed from rapeseed meal waste biomass. Various portions of rapeseed meal (10 g, 12.5 g, 15 g) were hydrated (90 ml) and sterilized. A 4-hour long pre-hydrolysis process with cellulolytic and pectinolytic enzymes was performed, followed by the addition of ammonium sulfate as an additional nitrogen source. Next, samples were inoculated with selected yeast strains and simultaneous saccharification and fermentation (SSF) was performed for 48 hours at ambient temperature. During the analysis, the, the sugar content and liquefaction level of biomass were tested. The effectiveness of yeast growth after the SSF processes and the change of the feed component amino acid profile were also estimated.

It was found that the pre-hydrolysis process successfully degrades the polysaccharides, however the increase of rapeseed meal portion in the sample negatively affects on the degree of yeast biomass liquefaction. The highest growth of yeast was registered for the Yarrowia lipolytica strain ŁOCK 0264 ($\Delta \log N = 2.91$), and the lowest for Candida humicola ŁOCK 0013 ($\Delta \log N = 0.92$). The analysis of the amino acid profile proved increased content of essential amino acids.

Keywords: rapeseed meal, enzymatic hydrolysis, yeasts, amino acid profile, waste biomass

OP&CIII_5

RHEOLOGICAL AND TEXTURAL PROPERTIES OF 3D-PRINTED SNACKS AND BREAKFAST CEREALS ENRICHED WITH GRAIN BY-PRODUCTS

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3D-printing is an emerging technology advantageous in the use of alternative raw materials such as grain by-products. This study aimed to investigate dough rheology, printing quality and textural properties of 3D-printed snacks and breakfast cereals made with grain by-products. Four snack recipes consisted of oat flour, sunflower oil, salt, baking soda, glucose oxidase, water, and either of the following: 1) wheat bran and pea protein (mixture WS), 2) pumpkin seed cake (WPFS), 3) defatted flaxseed flour (WFFS), 4) amaranth bran and rice protein (AS). Two breakfast cereal recipes consisted of oat flour, rice protein, wheat bran, baking soda, glucose oxidase, water, and sugar (WSBC) or honey (WHBC). Different 3D shapes were extruded using the Createbot S3 printer and baked at 180°C for 18 min (snack) or 10 min (breakfast cereal). 3D-printing precision, shape accuracy and deformation were determined by digital image analysis. Amplitude and frequency sweep tests were performed on dough using the MCR 92 Oscillatory rheometer (Anton Paar, Austria). Cutting tests were performed on final products with the TA.HDplus texture analyser (Stable Micro Systems, UK). All properties determined were significantly dependent on the dough mixture. The most viscous mixture with the largest G' and G'' values was WS. Dough for snacks printed with higher precision (between 95 and 98%) and shape was deformed less during baking (between -12 and -48%) than dough for breakfast cereals (between 68 and 82% and 75

and 80%, respectively). Snacks shrank, while breakfast cereals spread during baking.

With the exception of AS mixture, baked snacks were harder (from 1.68 to 2.84 g) than the breakfast cereals (from 0.63 to 0.78 g). Overall, the WPFS dough mixture was printed with the highest precision (98%) and showed the highest shape accuracy (98%) and the lowest deformation (12%). We can conclude that mixtures with grain by-products can be accurately 3D-printed in various shapes, but further modifications are required to avoid undesirable shape deformation in post-processing.

Keywords: amaranth and wheat bran, flaxseed flour, pumpkin seed cake, complex viscosity, printing quality

Acknowledgments:This work has been financed by Croatian Science Foundation (IP 3829 and Young researchers' career development).

OP&CIII_6

EVALUATION AND DISCRIMINATION OF FRUIT-BASED PASTA BY ATR-FTIR-PCA

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Fruits are valuable source of biologically active compounds, especially antioxidants and vitamins. Among them, forest fruits are very rich in colored antioxidants (anthocyanins). These properties are useful for the organoleptic characteristics of food products, such as cereal pasta. The main goal of the study was to evaluate of various fruit-based pasta by ATR-FTIR (attenuated total reflectance – Fourier transform infrared spectroscopy) and discriminate the pasta samples by multivariate statistical technique PCA (principal component analysis). Pasta samples were obtained from different cereal flours, such as wheat (*Triticum durum* Desf.), rice (*Oryza sativa* L.) and oat (*Avena sativa* L.), using or not egg yolk in the recipes. Fruit-based pasta was obtained with the fresh fruit juice that replace the water in the classical pasta recipes. After formatting and drying, the final products were finely ground and analyzed by ATR-FTIR (Bruker Vertex 70 FTIR, spectral range 4000-400 cm^{-1}, resolution 4 cm^{-1}). Both unprocessed and processed (boiled, dried and finely ground) pasta samples were analyzed. The characteristic FTIR bands (wavenumbers and intensities) were used for PCA discrimination. Unprocessed-processed samples and the type of cereal flours (wheat, rice and oat) were well discriminated especially through the specific wavenumbers and intensities corresponding to polysaccharides and proteins in cereal flours (C-O-H deformation of the glucose ring around 1646 cm^{-1}, stretching vibrations of C-OH groups around 998 cm^{-1}). The best discrimination by ATR-FTIR-PCA was obtained for unprocessed and processed samples.

Good results were also obtained for discrimination of pasta samples with or without egg yolk addition (especially through the C=O stretching from lipids at ~1740 cm^{-1} and amide II band at ~1539 cm^{-1}.

Type of fruits allows discriminating unprocessed and processed pasta by C=O and C=C stretching vibration of flavonoids at 1734 cm^{-1} and 1618 cm^{-1}, as well as those corresponding to anthocyanidins (1636 and 1224 cm^{-1} for aromatic rings). The ATR-FTIR-PCA was for the first time applied for fruit-based pasta. It is a powerful technique for evaluating the quality of fruit-based pasta and for discriminating such healthy food products through the overall composition that includes egg and fruit addition.

Keywords: cereal pasta, fruits, ATR-FTIR-PCA, discriminant analysis

OP&CIII_7

EVALUATION OF THE ANTIMICROBIAL POTENTIAL OF *PHYSALIS IXOCARPA* BROT. HUSK EXTRACTS AGAINST FOOD PATHOGENS

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Tomatillo or tomate de cáscara (*Physalis ixocarpa* Brot.) is an important fruit for the Mexican diet and economy, it currently belongs to one of the most cultivated plants in Mexico, surpassed only by chili pepper, potato, tomato, and onion. This fruit is also used in the United States, parts of Europe and Asia. On the global scale more than 90 species are known, 45 of which are native to Mexico, and they are essential to the diet of Mexican public, its main use being an ingredient for sauces. Its calyx being bitter and paper-like, server the plant as protection for its fruit, and it's an agroindustry residue. Not much information about this fruit is available, nonetheless, some research has been done over other species like *P. peruviana y P. alkekengi*, demonstrating that the genus is capable of functional properties and has bioactive compounds. The goal of the present investigation is the evaluation of the antimicrobial activity of calyx extracts on microorganisms that cause food spoilage, with this it seeks add value to this residue and to increase the knowledge about the properties of *P. ixocarpa* with an emphasis on antimicrobial potential. Extraction of tomatillo calyx will be done by various conventional and non-conventional methods, additionally, antimicrobial activity, minimum inhibitory concentration and minimum bactericidal and fungicidal concentration will be measured. Furthermore, a treatment of lettuce leaves with Physalis ixocarpa extracts will be done to assess the in situ efficacy of the extracts.

Keywords: Antimicrobial activity, *Physalis ixocarpa*, Tomatillo Husk, Agro-Industrial Residue, Plant extract

SESSION 8

ORAL PRESENTATIONS*

***Name of presenting author is underlined**

OPIII_1

FOOD LITERACY AND THE USE OF MOBILE APPLICATIONS IN THE CONTEXT OF SUSTAINABLE FOOD CONSUMPTION

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These deliberations aim to examine the dependencies between the level of Food Literacy and the usage of nutrition mobile applications supporting sustainable consumption habits. The following types of applications were analyzed: the applications that make it easier to choose food products in the store based on their characteristics (e.g., Polish, organic, healthy) or ingredients (e.g., E-free, gluten-free); applications that help reduce food waste; and applications that enable cheaper food purchases in stores and meals in restaurants.

The study was conducted using the Computer Assisted Web Interview on a sample of 600 Polish Internet users. The interview questionnaire was based on scales used in research on similar issues, verifying food literacy (Short food literacy questionnaire, SFLQ) and acceptance and use of technology (Unified Theory of Acceptance and Use of Technology, UTAUT).

The results show that respondents with higher levels of FL are more eager to use the nutrition mobile applications as support in following a sustainable consumption pattern in comparison to those with lower FL levels. Moreover, the behavioral intention to applications usage rises with the rise of the FL level. The strongest dependencies were observed for the applications that help choose food products in the store based on their characteristics or ingredients.

Keywords: food literacy, sustainable consumption, mobile applications

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OPIII_2

OLIVE OILS FROM THE MEDITERRANEAN BASIN

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Sicily, located in the center of the Mediterranean basin, has represented for centuries a meeting point between different civilizations that have contributed to creating a wide genetic diversification of the Sicilian olive heritage, which has led to an improvement in the quality of the olive trees. In Sicily, today this diversification is comparable with other typical varieties of the Mediterranean basin, especially from an analytical point of view. Two international varieties were analyzed such as Arbequina and Koroneiki, two main Sicilian varieties such as Biancolilla and Nocellare del Belice, two minor varieties in the Sicilian varietal panorama such as Crastu and Tonda Iblea and finally two neglected varieties, which represent a production extremely limited, such as the Buttone di gallo and the Cavalieri.

Keywords: Olive oil, Arbequina, Nocellara Belice, Tonda Iblea, Cavalieri

OPIII_3

CHOICES IN SUSTAINABLE FOOD CONSUMPTION: HOW (LOW INTAKE) ORGANIC CONSUMERS BEHAVE IN A WORLD-LEADING REGION OF ORGANIC PRODUCTION

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The consumption of organic products has consistently increased over the last decades, covering increasingly diversified consumers, both in the characteristics and the reasons associated with consumption. This heterogeneity evidences the need to deepen the reasons for the purchase and consumption of these products. The motivational attributes of consumers' decisions regarding the consumption of organic products are the main aim of this study. The survey included 250 respondents from Andalusia (Spain) who filled a questionnaire by email and personal interviews. We used a non-probabilistic sampling method, namely convenience sampling and the best–worst scaling method, to analyze ten attributes of organic purchasing decisions. Health benefits and environmental impact are the main attributes that explain the consumption of organic products. Then, we studied the impact of the six classification variables on the attributes. Applying ordinal regressions, we found that having children under 18 at home and a consumer's academic level contribute in a relevant way to explain the valorization of health benefits attribute. Also, the place to purchase organic food and academic level correlates with the valuation of GMOs in food. Andalusia is one of the largest European regions for organic production but with minor relevance in consumption. Nevertheless, despite this apparent paradox, the results of the present study point to a consumer profile very similar to other European countries with consolidated organic consumption.

Keywords: Organic food, Attributes, Best-worst scaling, Consumer behavior, Andalusia

OPIII_4

KNOWLEDGE ABOUT TRENDS IN THE CONSUMERS' BEHAVIORS IN AN ORGANIC SUPPLY CHAIN ON THE FOOD MARKET – THE CASE OF POLAND

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The paper aims to determine the level of knowledge about trends in the consumers' behaviors on the food market at different levels of the organic supply chain – from farm to fork. The following trends were analyzed: the importance of price in food purchases, the number of vegetarians, the number of overweight and obese people, knowledge about organic products, and their availability. In addition, the predictions of specific food products' consumption were collected (such as meat, sugar, low-fat food, gluten-free products, and separate categories of organic food (vegetables and fruits, cereal products, organic meat). Our research results show that short supply chains have a better chance of building a competitive advantage based on knowledge about consumers' behaviors. The largest discrepancies in the assessment of trends are noticeable when comparing the opinions of consumers and food producers and they concern the importance of price, meat and sugar consumption, and the number of people on a meat-free diet. The results show producers' strong tendency to maintain the status quo and a reluctance to change the way they operate.

Keywords: trends in the consumers' behaviors, organic supply chain, organic food

Acknowledgments: The project *Economics in the face of the New Economy* financed within the Regional Initiative for Excellence programme of the Minister of Science and Higher Education of Poland, years 2019-2022, grant no. 004/RID/2018/19, financing 3,000,000 PLN

SESSION 9

POSTER SESSION:VIRTUAL POSTER ROOM AND BREAKOUT ROOMS IN ZOOM

PIII_1

DEVELOPMENT OF NOVEL DAIRY PRODUCTS WITH INCREASED PROTEIN LEVELS FROM JERSEY COW MILK

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In the past few years, a decline in classic dairy products sales like milk and yoghurt has been noticed, thus raising the concerns in the dairy industry. However, research developments in the agri-food sector along with modern consumers' lifestyle indicate a worldwide trend towards a more balanced, health-promoting and targeted nutrition. Hence, novel dairy products with increased protein levels could represent a promising alternative with distinct nutritional identity and increased added value. In this vein, fermented milk beverages like kefir and ayran, as well as European style yoghurt, were developed using Jersey cow milk. Jersey milk nutritional advantage comparing to the common Holstein milk was confirmed resulting in ~20% enhanced calcium and protein content. Interestingly, the new developed yoghurts contained ~10% advanced protein amount (up to 4.26±0.04 g/100 g yoghurt), while the dairy beverages were enriched by a ~30% excess protein concentration compared to common commercial products. Notably, all products were accepted during the preliminary sensory evaluation and were characterized as premium quality products. In conclusion, data supporting the development of novel dairy products identified as "specialty" category foods, with great market potential, are presented.

Keywords: Jersey, Milk, Kefir, Ayran, Yoghurt

Acknowledgments:This research has been co-financed by the European Regional Development Fund of the European Union and Greek national funds through the Regional Operational Programme "Eastern Macedonia and Thrace" (project: JerseyMILK, code: ΑΜΘΡ4-0040593).

PIII_2

MICROBIOLOGICAL QUALITY OF SEMI-SOFT CHEESE "LORI" DURING THE SHELF-LIFE

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Sustainable production of high quality cheese is one of the important issues of dairy industry. Improved cheese quality is basically linked to its microbiological safety. This can be achieved by studying the key factors affecting the prevalence and viability of the opportunistic pathogenic and pathogenic bacteria and their toxins during cheese production and storage, as well as developing new technologies to reduce the level of cheese contamination. The aim of present study was to determine the microbiological quality of semi soft cheese during the shelf-life. Two types of semi soft cheeses (more than 40 samples) were sampled at different time points during the storage and analyzed for presence of coliforms bacteria and *E. coli*. Water activity, pH and NaCl content were monitored in order to evaluate the possibility of growth potential of pathogens during the shelf-life of semi soft cheese. As a part of the microbial risk assessment, predictive models have been developed to describe the relationship between several factors (pH, aw and time) and growth possibility of coliforms in semi-soft cheese. These microbial risk assessments have identified that risk increased in cheese with high moisture content. Predictions from these studies have been used for microbial risk assessment as a part of exposure assessment. In 85% of the analyzed samples the bacteria from Enterobacteriacea family counts exceeded the International Standard. Soft cheeses support the growth of coliforms according to determined pH values (5.4-6.1), water activity (0.97-0.94), and NaCl content (0.5-1.6%). The high microbial content of the cheese samples especially coliform bacteria and E. coli reflects generally the poor hygienic conditions during production and storage, lack of refrigeration and absence of heat treatment to eliminate microorganisms.

Keywords: Microbiology, *E. coli*, Cheese, Extrinsic factors, Shelf life

PIII_3

MONITORING THE CHANGES OF THE MICROBIOLOGICAL STATE AND CHEMICAL COMPOSITION OF PITTED DRIED PLUMS: APPLICATION OF DIFFERENT PACKAGING MATERIALS AND SELECTED STORAGE CONDITIONS

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Plum (*Prunus domestica* L.) belongs to the genus *Prunus L*. together with apricots, peaches, sweet and sour cherries. Plums could be used fresh or processed in different products such as dried plums, jam, pasteurized and frozen plums, fruit salad and similar products. Dried plums are very hygroscopic, and also subjected to oxidative changes under the influence of oxygen and light. Physical and chemical processes caused this way, results in the change of the product, so it is necessary to choose the appropriate packaging material that will protect the product from deterioration during storage. The main goal of this research was to monitor changes of the microbiological state and chemical composition of pitted dried plums, depending on the quality of the applied packaging and selected storage conditions. During the six-month storage, changes of plum samples in the original multilayer polymer packaging and paper packaging were monitored. The samples were stored at a refrigerator temperature of 4 ± 1°C and at room temperature of 19 ± 1°C. The following analyzes were conducted in investigated samples: microbiological analysis, dry matter content, ash content, hydroxymethylfurfural content, brown component content, total phenol content, total monomeric anthocyanin content, vitamin C content and texture.

Keywords: dried plums, packaging, microbiological state, chemical composition

Acknowledgments: The research is part of the Project 451-03-9/2021-14/200134

PIII_4

CITRUS AND ONION BY-PRODUCTS AS VALUABLE SOURCES OF COMPOUNDS WITH TECHNOLOGICAL FUNCTIONALITY FOR THE FORMULATION OF FOOD EMULSIONS

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The agro-food industry generates high amounts of by-products whose valorization can represent a renewable source for some already in use food additives or even originate new added-value ingredients with functional compounds and properties, which will benefit the entire food system. In this context, onion and citrus by-products are rich sources of limonoids and flavonoids with high biological activity and potential technological functionality useful for the formulation of functional foods. The aim of this work was to study technological properties of bioactives-rich extracts obtained from citrus and onion by-products and their behavior in emulsified model systems. In a first step the surface activity of citrus (PAE and UPAE) and onion (MCE and MBE) extracts, obtained with different extraction methods, was investigated. PAE, resulted the most surface active and therefore was assessed for emulsifying capacity in a model O/W emulsion. Results revealed a low emulsifying ability when used as single emulsifier, providing a polymodal droplet size distribution with low dispersion level. In a second step, O/W emulsions containing PAE and MCE (1% w/w) were added with pea proteins (2% w/w) and inulin (2.5 and 10%); the former was selected as emulsifier, the latter as thickening and prebiotic compound. All the model systems were assessed for physical and oxidative stability.

The results showed an increase of droplet size when 10% of inulin was used; however, the systems enriched with extracts showed an improved dispersion level with respect to the control.

All the emulsions showed a shear-thinning behavior with higher viscosity values for the systems prepared with inulin 10%; the systems enriched with both the extracts generally showed lower viscosity values compared to the control. The emulsified systems showed high resistance toward oxidation, with an enhanced protection when MCE and inulin 10% were present, reporting similar induction period values. This study provides promising results about the potential use of such bioactives-rich extracts, recovered from citrus and onion by-products, for the formulation of emulsified products. This research is supported by PRIN 2017, grant n. 2017JTNK78.

Keywords: food by-products, bioactives, technological functionality, food ingredients, emulsions

PIII_5

MINERAL PROFILE OF FOUR VARIETIES OF *OPUNTIA FICUS - INDICA* CLADODES

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Consumers are concerned to food choices and food diversity, favoring the healthiest with described benefic effects [1]. At the same time, they pay attention to the companies' behavior in what concerns to sustainability measures.

Opuntia ficus-indica (L.) Miller, starting as an invasive plant, becomes an alternative food source due to its biofunctional compounds [2].

This study aimed to evaluate the mineral profile of different varieties of cladodes of *O. ficus-indica*, with 2 years of maturation, from plants producing cactus pear with white, orange and red pulp. The samples were cultivated in Portugal (Torres Novas) in the organic production mode.

31 mineral elements were analyzed: 4 macro elements (Na, K, Ca, Mg) by flame atomic absorption spectrometry; and 27 trace elements (7Li, 9Be, 11B, 27Al, 48Ti, 51V, 52Cr, 55Mn, 57Fe 59Co, 60Ni, 65Cu, 66Zn, 75As, 82Se, 85Rb, 88Sr, 90Zr, 98Mo, 111Cd, 118Sn, 121Sb, 125Te, 133Cs, 137Ba, 182W, 208Pb and 209Bi) by inductively coupled plasma-mass spectrometry [3].

All samples had considerable calcium contents (30-110 g/kg of dry weight (dw)). Cladodes also presented high levels of potassium (10 - 50 g/kg of dw). Relevant levels of trace elements were also identified, such as manganese (15-330 µg/g of dw), zinc (5-30 µg/g of dw) and boron (10-20 µg/g of dw).

Cladodes should deserve attention as an alternative raw material to increase food security and diversity due to their nutrient content [4].

The obtained results reveal cladodes also as a good source of minerals and demonstrate the potential of this by-product for the development of functional foods, nutritionally enriched and balanced, contributing to increase the producer's incomes and promoting sustainability.

Keywords: Opuntia ficus-indica, Cladodes, Mineral profile, food diversity, sustainability

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PIII_6

OKRA POWDER AS AN INNOVATIVE AND NATURAL INGREDIENT FOR GLUTEN-FREE BREADMAKING

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Okra (*Abelmoschus esculentus*) is a plant belonging to the Malvaceae family. The whole pod is edible and gluten-free (GF). The goal of this work was to evaluate the technological properties of okra powder (OP) and to study a possible application in GF bread. Effects of OP addition to GF dough and bread in combination with other hydrocolloids (hydroxypropylmethylcellulose -HPMC- and psyllium fibre -Psy-) were explored. A mild stabilization process (vacuum drying at 50°C) of fresh okra pods was applied to preserve the mucilage as much as possible. Dried okra was ground into a powder having a particle size lower than 1000µm, in order to obtain a new ingredient for GF baking. Drying and grinding allowed to reduce moisture from 90.7 to 15.6 g/100g and to significantly ($P<0.05$) increase brightness (L*) and red component (+a*). OP showed 3.5 to 22 times higher water binding capacity than rice flour (RF), corn starch (CS) and pea protein isolate (PP), while foaming properties were negligible. Furthermore, OP significantly reduced the pasting temperature without modifying the peak and final viscosity of mixtures made of CS, RF, HPMC or Psy. In addition, the lower setback values of OP-mixtures suggested OP may contribute to constrain bread stiffening. Lastly, the quality of three breads containing HPMC+Psy (as reference, STD), HPMC+OP and Psy+OP in addition to a basic recipe was compared. In respect to STD, OP-doughs required less water to reach the desired consistency (200±20 Brabender Unit) and showed higher dough stability. The rheofermentographic test evidenced that all doughs have high CO_2 retention coefficients (>90%), but HPMC was necessary to reach a high dough development. Accordingly, HPMC+OP bread presented a height similar to STD and significantly higher than Psy+OP bread. Furthermore, OP combination with HPMC turned out in a soft bread (hardness equal to 0.337 vs. 0.231 N of STD), while combination with Psy gave a harder and darker bread.

As regards crumb structure, Psy+OP led to loaves characterized by larger holes compared to STD.

The results of this study may be relevant for the food industry and the community as they evidenced that okra can be valorised by processing it into a powder to be used as a new ingredient having interesting physicochemical properties.

Keywords: okra powder, hydrocolloid, gluten-free bread, dough rheology

PIII_7

COMBINED EFFECT OF HEATING, PH, SALT, AND ETHANOL ON DENATURATION OF WHEY PROTEINS

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Ethanol strongly induces whey proteins' denaturation when present in a concentration more than 20% w/w. However, the physical state of whey proteins following removal of ethanol, has to be explored in order to effectively utilize these materials in different food product formulations. The aim of this study was to investigate the combined effect of heating (70°C, 80°C and 90°C), pH (9.0–3.0), salt (0–300 mM NaCl), and ethanol concentration (0–90% w/w) on the extent of denaturation of a whey protein isolate (WPI) preparation. Protein denaturation events were evaluated with a newly developed spectroscopic method, based on the analysis of difference UV-spectra, as well as by rheological testing using steady shear and dynamic measurements. Moreover, the impact of a 10-fold dilution of the preheated WPI-samples with double distilled water when alcohol was added either initially in the aqueous protein dispersion or after the heat treatment was also assessed. Results showed that heating did not contribute to any additional denaturation, either in the presence of ethanol initially or when ethanol was incorporated after theheat treatment. Samples with 30 and 50% w/w ethanol and at pH between 4.5 and 6.5 showed maximum turbidity values at 600 nm, indicating extensive denaturation and enhanced aggregation under these conditions, which may be due to attractive electrostatic forces modulated by ethanol in the isoelectric point region of whey proteins.

Furthermore, with increasing ionic strength until 150 mM NaCl the viscosity of the samples was enhanced, whereas with further addition of NaCl there was a decrease in viscosity of the protein dispersions (3.0% w/w). Upon removal of ethanol, the heat-treated solutions showed a greater degree of denaturation (~45%) compared to the unheated samples (~35%).

Generally, the synergistic effect of heating, acidification and salt addition in the presence of ethanol can be exploited for future applications of WPI dispersions in the development of novel food products.

Keywords: WPI; ethanol; UV-difference spectra; 10-fold dilution; denaturation; reversibility;

Acknowledgments: Hellenic Foundation for Research and Innovation (H.F.R.I.) (Project Number: HFRI-FM17-3661)

PIII_8

ABILITY OF ETHANOL-TREATED WHEY PROTEINS TO FORM COLD-SET GELS AFTER REMOVAL OF ETHANOL

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This study deals with the ability of whey proteins, previously treated with ethanol, to form cold-set gels after the removal of alcohol by freeze-drying. The gels were examined by means of rheology and confocal laser scanning microscopy. Dynamic rheological measurements showed that ethanol-free aqueous dispersions formed free-standing gels upon cooling (5.0°C) and subsequent heating (70.0 °C), even at low protein concentrations (8.0% w/w); this concentration is lower than the critical gelling concentration of the native whey proteins (~ 12.0% w/w).

It was also observed that ethanol-free gels exhibited significantly higher storage modulus values (G'= 300 Pa) than their counterparts without pretreatment of proteins with ethanol (G'= 0.15 Pa). This indicates that the denaturation of whey proteins caused from ethanol is partially retained after the removal of the denaturing agent. Furthermore, the melting point of the ethanol-free gels increased with protein concentration (8.0–12.0% w/w). Generally, the partial

retention of the denaturing effect of ethanol on whey proteins, after its removal, may lead to new applications in the food and pharmaceutical industries.

Keywords: WPI; ethanol; ethanol-free gels; reversibility; rheology; freeze-drying;

Acknowledgments: Hellenic Foundation for Research and Innovation (H.F.R.I.) (Project Number: HFRI-FM17-3661).

PIII_9

PEA PROTEINS ISOLATION AND CHARACTERIZATION OF THEIR TECHNOLOGICAL FUNCTIONALITY

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Proteins, especially those of animal origin, have been widely used in the food industry as emulsifiers to stabilize oil-in-water emulsions; however, in recent years, there has been an increasing interest in the use of plant proteins as emulsifiers, due to greater attention by the food market towards sustainability and formulation of healthy and/or vegan products and meat substitutes. Pea proteins (PP) are the ones that have become more popular, thanks to their low production cost and high nutritional value. Globulins are the major storage proteins and include three fractions: legumin, vicilin and convicilin, firmly linked together and forming a very compact structure; moreover, pea proteins show low surface charge and solubility: all these features prevent a good expression of technological properties and in particular of emulsifying ones. Depending on the raw material and on the unit operations adopted for the isolation of the protein fraction, the technological functionality of PP may vary significantly. High dynamic pressure (HDP), a technology commonly used to homogenize food products, has recently found application as a pre-treatment to modulate technological properties of specific compounds. Aim of this work is thus to provide an in-depth characterization of the technological functionality of pea protein isolates that will be submitted to HDP pre-treatments to modify their functionality in the stabilization of emulsion-based products. Commercial proteins, F85M and C9, were donated by Roquette (Lestrem, France) and Cosucra (Warcoing, Belgium), respectively while a pea protein isolate (IP) was obtained at a laboratory scale. Different analyses were carried out, from a structural and technological viewpoint, to get information at different length scales: circular dichroism, thermal properties, free sulfhydryl groups, solubility, water and oil holding capacity, interfacial properties and emulsifying capacity.

The analyses highlighted significant differences between samples, probably due to the isolation procedures that led to various structural changes and consequently showed different functional properties and emulsifying abilities. DSC and circular dichroism demonstrated that commercial proteins resulted already denaturated, so IP was selected for future structural modifications.

Keywords: plant proteins, pea proteins, technological properties, emulsions

PIII_10

DEVELOPMENT OF SOUR CHERRY MAP TECHNOLOGY

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Nowadays storage development of sour cherry is always a big problem. Keeping sour cherry fresh is a difficult and complex task. In our research we have aimed to store the fruit in special storaging conditions and pre-treated by new technologies like washing (microbubble, ozone, hot water, tap water), edible coating, store in ozonated atmosphere. Measured parameters were firmness, colour, gas contenration in MAP boxes atmosphere, respiration, brix and a special scale. Regarding results pre-treatings can be effective investigating MAP systems during storage. It can be seen that treated sour cherry groups has lower level of microbes and higher level of sufficient quality specifics. Used edible coating can be preserved firmness and colour in cherry samples.

Keywords: MAP

PIII_11

RUBUS ULMIFOLIUS MIXED WITH POLLICIPES POLLICIPES: A POTENTIAL FOOD PRODUCT

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The stalked barnacle (*Pollicipes pollicipes*) harvested in Berlengas Nature Reserve is one crustacean very valuable for the fisherman and consumer, mainly due their dimension and for the suis generis flavour. Due the growing demand, both by fisherman and consumers, the legislation (Portaria n.º 232/2011), aims to control and guarantee the sustainability of this kind of stalked barnacle. This action can resulted in elevated quantity of the crustacean with low economic value and with a negative impact for the fisherman, the environment and society. In this sense, the creation of a value chain that justifies not wasting this barnacle, in a view of a circular economy, will be developed through the Project PAS. The main goal of this study was to evaluate the impact of blackberry (*Rubus ulmifolius*) in one food in development: stalked barnacle pâté. Colour and sensorial analysis (appearance, flavour, global appreciation, and purchase intention) of barnacle pâté samples (CTR-without RU; RU2.5%, RU10%), were evaluated after processing. The obtained results indicated a slight decrease in luminosity leading to darkness of pâté samples perceived by sensorial analysis. Also, the red fruit odour of both enriched pâté samples was equally denoted in RU2.5% and RU10%. The enriched barnacle pâté with blackberry was indicated with moderate creaminess (73.68%), where the addition of this fruits leading to this appreciable quality attribute. In overall, the development of stalked barnacle pâté enriched with blackberry contributes to valorisation of crustacean with low economic value, leading to a positive impact at social and environmental level.

Keywords: barnacle, quality, pâté, colour, valorisation

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PIII_12

EFFECT OF 1-MCP ANTI-RIPENING TREATMENT ON THE QUALITY OF TOMATOES AT DIFFERENT STAGES OF RIPENING

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The most important fresh vegetable in the world is the tomato. Continuing changes in shopping and eating habits justify increasing the storage potential of tomatoes. There is therefore a need to develop postharvest technologies, including anti-ripening treatments. The measurements were carried out by applying an anti-ripening treatment with 1-MCP (1-methylcyclopropene) to tomatoes at different stages of ripeness and then by studying the quality changes of the tomatoes during postharvest storage. During storage, we monitored colour change, respiration and ethylene production, the changes in firmness using an acoustic firmness sensor (AFS) and chlorophyll content change using two different fluorometers. By examining the results obtained, it was concluded that the anti-ripening treatment is less effective on tomatoes at the stage of ripening that no longer contain green pigment or contain just a little green pigment.

Keywords: tomato, anti-ripening, 1-MCP, postharvest

PIII_13

THE EFFECT OF MODIFIED ATMOSPHERE PACKAGING ON THE QUALITY CHARACTERISTICS OF MICRO-GREENS

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The effect of modified atmosphere packaging on the quality characteristics of micro-greensMicro-greens are sensitive plants. Once harvested, their shelf life is limited even under appropriate environmental conditions.In addition to the examination of processing parameters in the production of micro-greens, it is important to determine the steps that will help increase the shelf life of products and increase food safety. Attention must be paid to the production of raw materials, storage and processing of semi-finished and finished products.An important aspect of the study is the packaging technique and the extent to which the appropriate parameters (modified atmosphere, perforated packaging material, temperature) can affect the shelf life as well as the food safety parameters.A modified atmosphere, with the right storage temperature and packaging, can help provide conditions that, while not sterile, can reduce exposure to pathogens and have the effect of increasing product quality retention.The process: investigation of the shelf life of colored and green-leafed micro-greens in MAP and in atmospheric oxygen packaging at 4 ° C for 7 days in perforated and perforation-free plastic packaging.During storage, a daily sensory test and a daily gas composition within the packaging material were performed with a DanSensor gas composition tester. Test result: Storage in non-perforated packaging is not appropriate with either a modified atmosphere or atmospheric oxygen. Color-leafed and green-leafed micro-green plants can be stored well in perforated packaging under atmospheric oxygen at 4 ° C for 7 days without deterioration. Modified atmospheric packaging is not favorable for micro-green plants. Their surface got wet, as a result of which the product started to deteriorate.

Keywords: micro-green vegetable saled packaging

PIII_14

WHITE TEA VS GREEN TEA - PHYTOCHEMICAL CONTENTS AND IN VITRO ANTIOXIDANT PROPERTIES

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Camellia Sinensis (tea plant), has been a reason for medical and even political controversy over time - but its use for the preparation of tea has remained constant over time. There are two major varieties, *Camellia sinensis* var. Sinensis and *Camellia sinensis* var. assamica, used for tea. Approximately 20% of the world's tea production is accounted by green tea, and only 2% by white tea. The purpose of this research was to investigate the influence of the infusion time on the chemical composition and antioxidant activity of the white and green tea respectively. A comparison of the bioactive compounds and antioxidant activities between white and green tea was also conducted. Antioxidant activity (AA) of the tea was determined by 2, 29-azinobis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) 2, 2-diphenyl-1-picrylhydrazyl radical (DPPH), and the ferric-reducing antioxidant power (FRAP) assays. Determination of total phenolics content (TPC) was done using Folin Ciocalteu assay and the results for TPC were expressed as mg gallic acid equivalents per 100 ml of tea. RP-HPLC/PDAD technique was used for the quantification of caffeine and total catechin content (TCC). Results showed that both white and green tea were rich in phytochemicals, giving high antioxidant ability. The levels of bioactive compounds and the antioxidant activity of the two types of tea increased with the infusion time. Green tea had higher antioxidant property than white tea but the polyphenolic content of green teas was found to be similar to white tea, which makes the latter tea type a potential substitute for people interested in consuming polyphenols for health reasons. The level of caffeine (58.88 ±0.51 mg/100 ml) in white tea was 2.5 time higher in comparison with green tea (23.55±0.80 mg/100 ml).

Total polyphenols content had close values for the two varieties of tea (228 mg/ml) and antioxidant capacity (450 µmol/100 ml) of green tea was 5 times higher, respectively.

In conclusion, this study shows that hot drink of white and green tea is a good habit and white tea may be a better choice in some case due to the fact that TP and caffeine are the mainly metabolites responsible for the bioactivity and its sensory properties.

Keywords: *Camelia sinensis*, white tea, green tea, antioxidant capacity, bioactive compounds

PIII_15

MASCARPONE CHEESE: EVALUATION OF CHEMICAL, PHYSICO-CHEMICAL, PHYSICAL, MICROSTRUCTURAL PROPERTIES AFFECTING ITS QUALITY

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Mascarpone is a typical Italian dairy product obtained from the acidification and heating of the cream of cow milk. Thanks to its sensory properties and its creamy texture, mascarpone is highly appreaciated both as such as well as as ingredient in dairy based-desserts. Limited are the studies carried out to characterise this dairy product taking into account the properties that determine its technological functionality.

Thus, the evaluation of some physico-chemical, physical (rheological, colloidal, color) and microstructural properties of two commercial mascarpone products (HQM and LQM) by using instrumental techniques was carried out. The two products, characterised by high aw values (ca. 0.99), showed a pH between 6.30±0.1 and 5.86±0.12, for HQM and LQM respectively. Mascarpone has a white-to-pale yellow colour and the YI (yellow index) ranged between 15.88±1.34 and 11.75±0.80 for LQM and HQM, respectively, likely due to a different content of carotenoids from the initial cream. Rheological measurements carried out at 4 and 20°C, highlighted a prevalence of the elastic moduli (G′ >> G″) especially at 4°C, indicating a high rigidity of the matrix that increses at lower temperature. Laser diffranction analysies were carried out to characterise the dispersed lipidic phase of the two products and a different lipidic distribution between the two products (one mono-disperse, the second bi-modal) was observed and different D[4,3] values were determined likely resulting from a different degree of homogeneisation of the creamduring processing. Particle size data are in agreement with the Confocal Laser Scanning Microscopy Analysis that showed a different dispersion state of the lipidic fraction in the acqueous phase where a partly gelled protein network could be also observed.

These results will contribute to understand the technological functionality of mascarpone and its effect on the quality and stability in complex and formulated dairy products.

Keywords: Mascarpone cheese, Chemical characterization, Physico-chemical characterization, Thermal Characterization, Physical characterization

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PIII_16

NEW ASSORTMENTS OF BREAD WITH PROTECTIVE EFFECT AGAINST CARDIOMETABOLIC DISEASES

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The development of personalized food products in terms of concentration of minerals and polyphenols as well as textural properties is of great interest to consumers, the medical field and the food industry.

The aim of our research was to identify the textural properties, and mineral and phenolic content of three genuine assortments of personalized bread containing grape seeds (P1) powder and liophilyzed hawthorn (P2) and rosehip (P3) fruits powders as well as the consumers acceptability of the three personalized products with protective effect against cardio-metabolic diseases.

The texture profile analysis was performed using a Texture Analyser TA Plus (Llyod Instruments). The total mineral concetrations for Ca, Fe K, Mg, Mn, Na, Sr and Zn were measured using and iCAP 6000 ICP Emission Spectrometer (Thermo Scientific) instrument separately for the crust and crumb of each bread assortment. The statistical analysis was performed using the MedCalc software. For the sensory acceptability test 200 consumers aged between 18 and 25 years old were interviewed.

The chewiness and cohesiveness (instrumental measurement) of the three assortments of bread were not significantly different however there were significant differences between minerals concentrations for the three bread assortments as well as for the concentrations of flavonoids and polyphenols. The highest concentration of Ca was found for the bread crust the P2 (255,15mg/kg wet weight) and the lowest concentration for the crust of the P1 assortment (87,90mg/kg wet weight). However highest flavonoids concentrations were found for the crust of P3 (24,66mg CE/g) and the lowest in the crust of P2. The highest poliphenolic content was found for P3 crust (43,28 mg GAE/g).

Without being aware of the bread assortments composition 72.5 % of consumers were in favor for buying P3, 65% were in favor to buy P2 and only 60% were in favor to buy P1.

Our study showed that the bread assortment containing liophilyzed rosehip (P3) fruits powder is the most effective product to be include in diets with protective effect against cardiometabolic diseases.

Keywords: personalized bread, textural properties, flavonids, poliphenols, consumers acceptability

PIII_17

NATURAL DEEP EUTECTIC SOLVENTS AS ECOLOGICAL EXTRACTION MEDIA TO ISOLATE BIOACTIVE COMPOUNDS FROM SAFFRON FLORAL BY-PRODUCTS

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Saffron and its floral by-products are suitable and affordable raw materials for the production of sustainable and highly bioactive healthy food ingredients. Considering that only stigmas are used for saffron spice, the current production system is generating several hundreds of tons of tepal wastes, representing an enormous lack of profitability and sustainability. Consequently, the valorization of saffron floral by-products by developing stable functional ingredients leads to the environmental impact minimization. Thus, the main aim of this study was to develop innovative green extraction processes from saffron floral by-products by using ecological extraction media such as Natural Deep Eutectic Solvents (NaDES), a new category of green solvents with exceptional properties, and ultrasound-assisted extraction (UAE) to improve the extraction yield and to reduce the extraction time. Response surface methodology was used to optimize process parameters. Several UAE variables were studied: time (5−35 min), power (60−180 W) and NaDES (Glycerol:L-proline (2:1 M ratio)/water ratio ([v:v (30%:70%−90%:10%)]) in order to maximize the extraction of bioactives (Total Phenol Content (TPC), Total Flavonoid Content, and antioxidant capacity by DPPH assay). The mass:solvent ratio was set at 1:20 w/v. The results indicated that depending of the time, power or % of NaDES used during the UAE, the responses were different. The optimal extraction was using 20 min, 180 W and 90% of NaDES (TPC values: 88.96 ± 1.08 mg GAE/g dw), and there was an improvement of TPC extraction respect to conventional methods (32.82 ± 2.23 mg GAE/g dw).

Regarding DPPH assay, the results revealed the potential antioxidant activities of saffron floral by-products in the optimal extracts.

Thus, NaDES combined with UAE was an efficient green strategy in order to obtain high added value compounds of saffron floral by-products to develop new functional ingredients. Besides, it should be noted that UAE is a method that could be easier scaled up at an industrial scale comparing to other methods. Therefore, with this study we could contribute to the improvement of the sustainability of the saffron spice production and profitability of this industrial sector taking advantage of a high-value biomass that is currently unexploited.

Keywords: saffron flower, phenolic content, antioxidant properties, added value ingredients, green chemistry

PIII_18

COMPARATIVE ANALYSIS OF *CLOSTRIDIUM TYROBUTYRICUM* GENOMES REVEALS HIGH GENETIC DIVERSITY

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Clostridium tyrobutyricum is an endospore forming bacterium causing severe spoilage of cheeses that seriously affects dairy industry. Recently, we demonstrated that cheese spoilage potential of *C. tyrobutyricum* is strain-dependent. However, a comprehensive analysis of genetic diversity, functional traits and their potential link to spoilage ability remains unclear. Therefore, the aim of this study was to analyze possible links between genomic characteristics and diversity of spoilage potential *of C. tyrobutyricum*. To this end, 12 *C. tyrobutyricum* strains previously isolated from cheese and raw milk were sequenced and comparative genome analysis was performed with a total of 29 *C. tyrobutyricum* strains. The pan-genome *of C. tyrobutyricum* was found to be open, and comprised 9770 gene families, of which 12.08% genes were shared by all strains constituting the core genome, while the remaining 88.92% were variably represented genes, i.e. accessory genome, constituting the basis of its high genomic diversity. Among these variable genes, 63.20% genes were specific to a single strain representing unique genomes. In addition, the diverse distribution of unique genes in strains, ranging from 5 to 981, further emphasized the heterogeneity of the species *C. tyrobutyricum*. Functional analysis showed that the core genome is mainly enriched in groups of genes related to basic functions of intracellular survival, while the accessory genome showed the existence of several strain-specific genes related to secondary structure and repair and defense mechanisms that might provide diverse advantages.

Furthermore, the accessory genome contained a large percentage of genes with unknown function, pointing out that our knowledge on the functions of *C. tyrobutyricum* genes is far from being complete.

This study provides a valuable resource for future studies investigating the genetic diversification of *C. tyrobutyricum*. Increased knowledge of the impact of this bacterial species on cheese quality may help to avoid cheese spoilage and reduce food waste, and in turn support the development of sustainable food production chain.

Keywords: *Clostridium tyrobutyricum*, late blowing, cheese, comparative genomics, pangenome

PIII_19

DETERMINATION OF TETRACYCLINE RESIDUES IN RED MEAT AVAILABLE IN OMAN

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Tetracycline is one of the antibiotics which is heavily used in livestock production in different forms; injection or ingestion. In some countries, tetracycline is used as growth promoter whereas in the European Union it was banned. The accumulation of long exposure of antibiotics residues might cause acute or chronic toxicity to the organs and the entire body. Many cases of human allergic reactions, imbalance in intestinal microflora and other diseases have been linked to antibiotics residues in the meat (*Abdul-Razaq and Mohammed*, 2017; *Elbagory et al*., 2017). Researchers from different countries reported that level of tetracycline residues were above the MRL (Verma, M. K., et al. 2021; K. Bahmani, et al., 2020). The aim of this study was to investigate the presence of tetracycline residues in imported red meat in the Sultanate of Oman and to compare the levels of tetracycline residues in liver, and muscles. The fresh samples were taken from the same goat body namely liver and muscle and were collected from a slaughterhouse in Muscat. The extraction was done using Agilent Enhanced Matrix Removal—Lipid (EMR—L) product. Two standards of tetracycline groups were used, Oxytetracycline hydrochloride and chlorotetracycline. The final extracts were analyzed using Aglient 6460 LC-MS/MS. Out of 28 muscle and liver samples, oxytetracycline and chlorotetracycline were detected in one muscle sample in triplicates with average concentration of 228.2 µg/kg and 292.6 µg/kg, respectively. Whereas oxytetracycline was found in one liver with average concentration of 3201.9 µg/kg (These concentrations were above the MRL GSO 2481/2015, CX/MRL 2-2018 and EU 37/2010. In conclusion, the presence of tetracycline groups in imported meat needs more studies in imported livestock.

Keywords: antibiotic residues, Red meat, goat, chlorotetracycline, oxytetracycline

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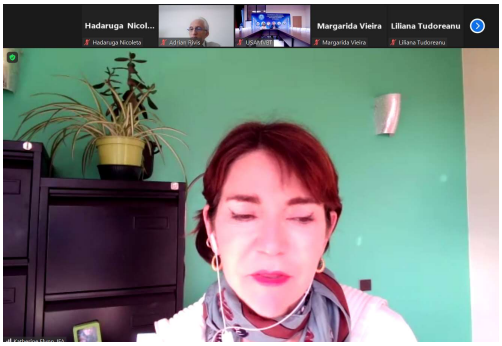
Photo album

ISEKI E-conferences
Food Texture, Quality Safety and Biosecurity in the Global Bioeconomy
10-12.11.2021

All images in the photo gallery were published with the consent of the e-conference participants. Participants who have expressed their disagreement with the publication of their photos are not present in this album.

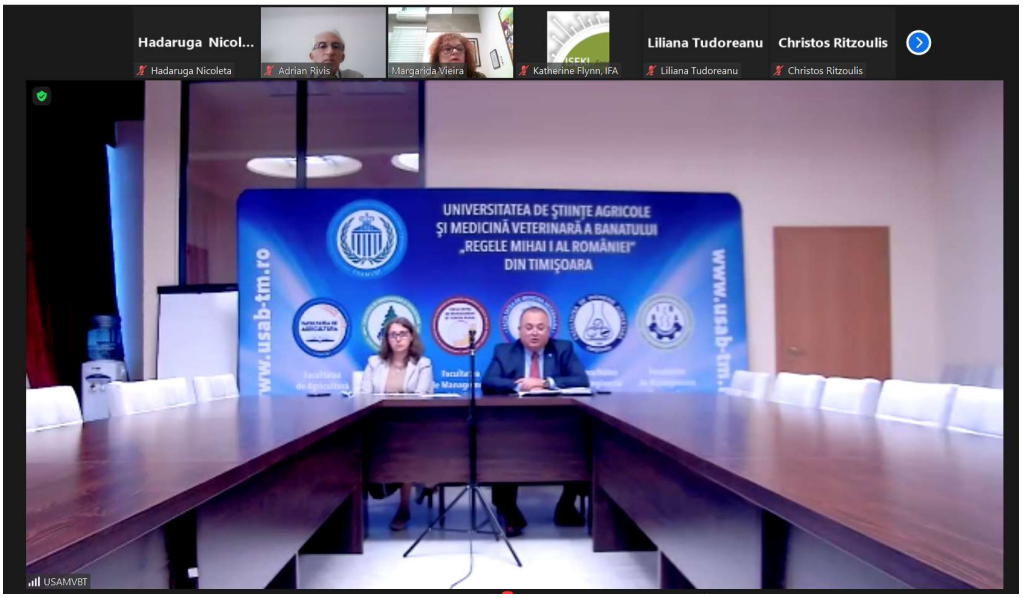
Welcome from ISEKI and presentation of the organisation

Moderator:



Dr. Katherin Flynn (France)

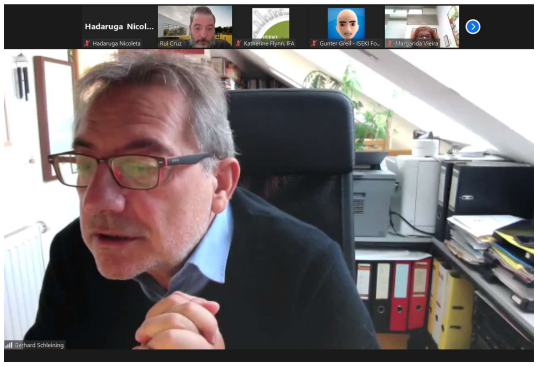
Professor Margarida VIEIRA (Portugal)



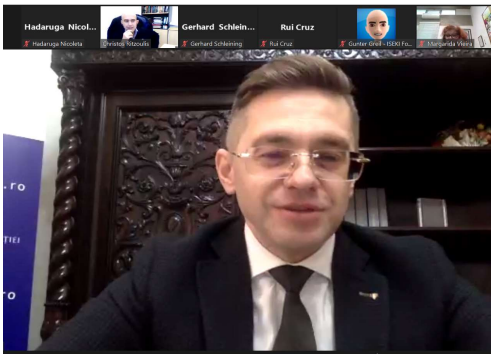
Vice-rector Professor Isidora RADULOV **Rector Professor Cosmin Alin POPESCU**

SESSION 1- INVITED SPEAKERS

Moderator:



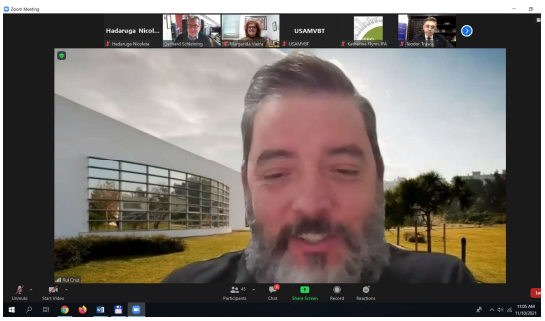
Gerhard Schleining (Austria)



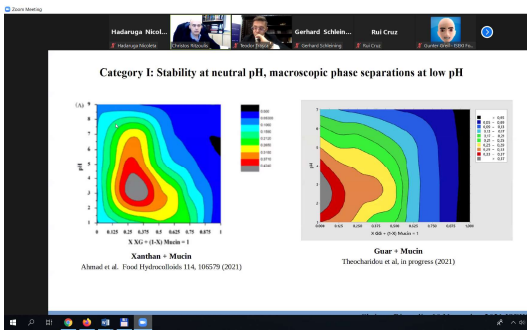
Teodor Ioan Trasca (Romania)

Rui CRUZ

Valorization of Food by-products as Sustainable Packaging Materials



Christos RITZOULIS
From molecular interactions to texture



SESSION 2- ORAL PRESENTATIONS & COMPETITION

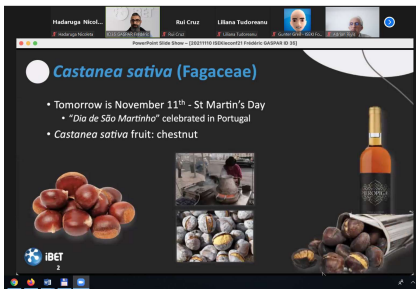
Moderator:

Gerhard Schleining (Austria)

Diana Veronica Dogaru (Romania)

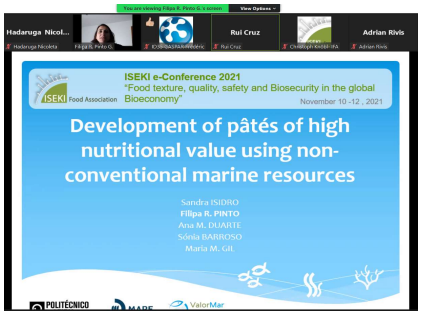
Multilocus DNA metabarcoding of complex mixtures containing members of the Boraginaceae family: a step further to assure food safety and quality

Inês CARVALHO LEONARDO, Martijn STAATS, Marleen VOORHUIJZEN, Valerie VAN DER VORST, Bas FRONEN, Jorge CAPELO, Maria Teresa BARRETO CRESPO, ***Frédéric BUSTOS GASPAR***



Development of pâtés of high nutritional value using non-conventional marine resources

Sandra ISIDRO, ***Filipa R. PINTO****, Ana M. DUARTE, Sónia BARROSO, Maria M. GIL*

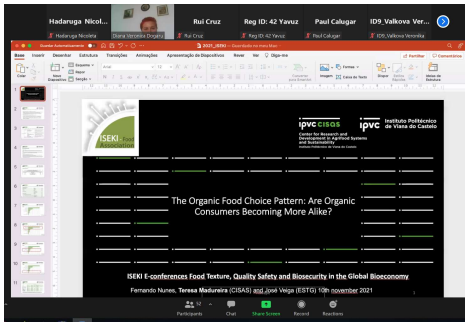


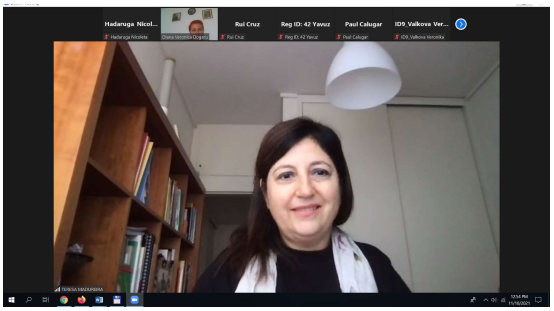
Optimization of spray drying variables for chickpea cooking water (aquafaba) powder with maximum protein and saponin contents

Nihat YAVUZ, *Selçuk OK, Hudayar BEGLIYEW*

The Organic Food Choice Pattern: Are Organic Consumers Becoming More Alike?

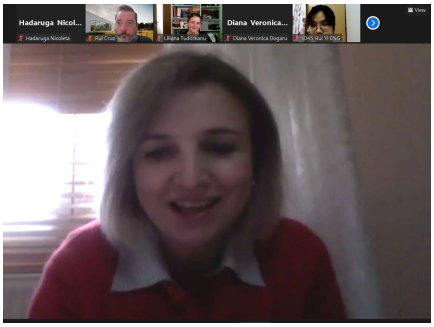
Teresa MADUREIRA, Fernando NUNES, José VEIGA



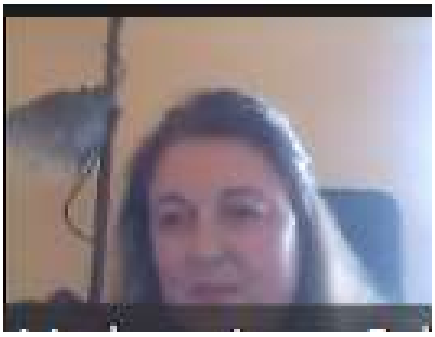


SESSION 2 - STUDENT SESSION

Moderator:



Maria PAPAGEORGIOU (Greece)



Mariana A. POIANĂ (Romania)

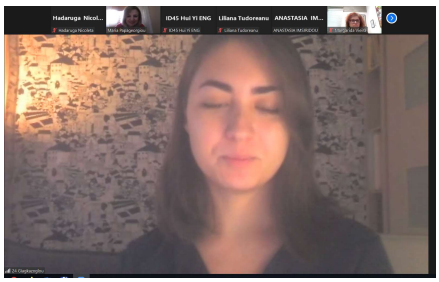
Ersilia Călina Alexa (Romania)

Rheological, textural, and microstructural properties of dough with rice bran oil and its fraction

***Hui Yi ENG**, Norazatul Hanim MOHD ROZALLI*

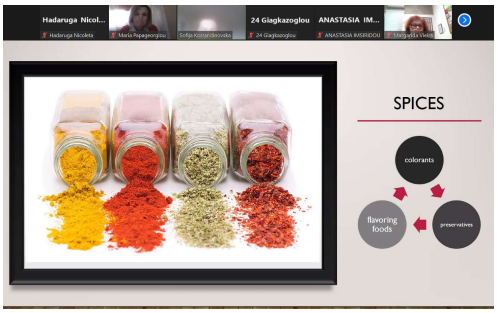
Investigating patterns of species utilization in Greek elasmobranch products with DNA barcoding

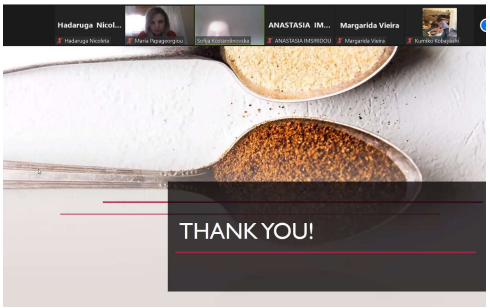
***Zoi GIAGKAZOGLOU**, Chrysoula GUBILI, Andrew M. GRIFFITHS, Archontia CHATZISPYROU, Konstantinos TOULOUMIS, George MINOS, Ioannis E. BATJAKAS, Anastasia IMSIRIDOU*



Natural Spices from Local Markets in North Macedonia as Potential Antimicrobials

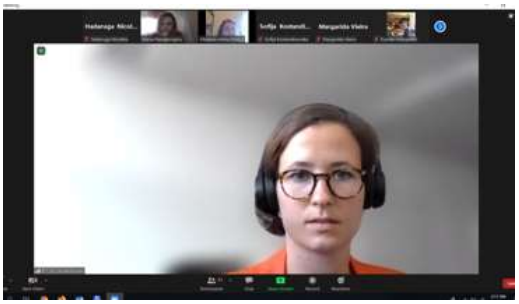
Natalija ATANASOVA-PANCEVSKA, Dzoko KUNGULOVSKI, **Sofija KOSTANDINOVSKA**





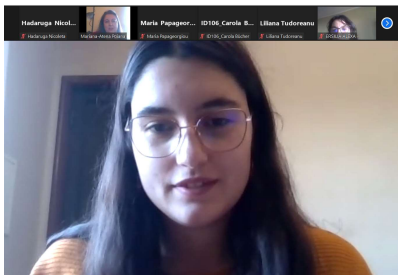
Optimization of the identification of dairy propionic acid bacteria using mass spectrometry

Carola BÜCHER, *Johanna BURTSCHER, Konrad J. DOMIG*



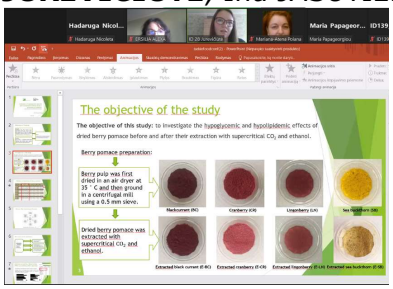
Heat-treated olive pomace paste: a safe edible ingredient for the food industry

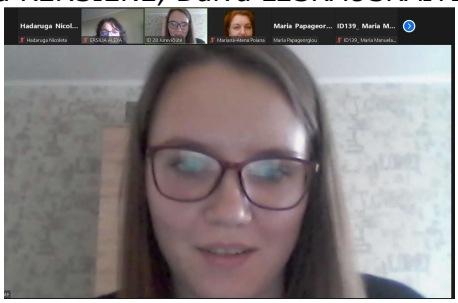
M. Manuela SOUSA, *M. Antónia NUNES, Joana C. LOBO, Josman D. PALMEIRA, Susana MACHADO, Diana MELO, Anabela S. G. COSTA, Rita C. ALVES, Helena FERREIRA, M. Beatriz P. P. OLIVEIRA*



Evaluation of hypoglycemic activity and hypolipidemic effects of berry-processing by-products

Ieva JUREVIČIŪTĖ, *Ina JASUTIENĖ, Milda KERŠIENĖ, Daiva LESKAUSKAITĖ*





Physicochemical and rheological properties of yogurt fortified with fibre-rich cranberry pomace as affected by stage of pomace addition and storage time

Laurita VARNAITĖ, *Daiva LESKAUSKAITĖ*

SESSION 4

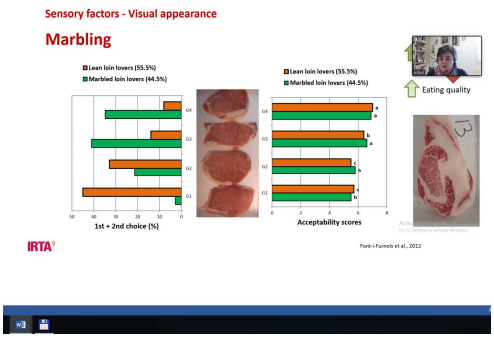
Moderator:

Liliana TUDOREANU (Romania)

Adrian RIVIS (Romania)

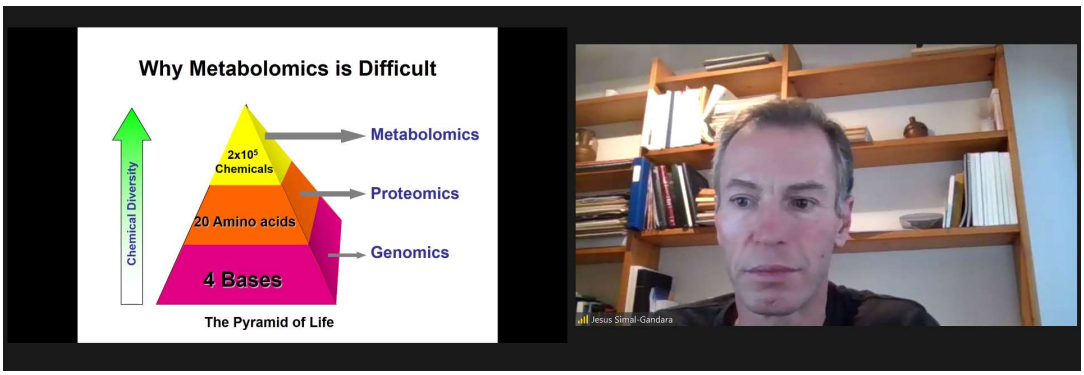
Maria FONT I FURNOLS

Consumers attitudes and beliefs towards meat quality



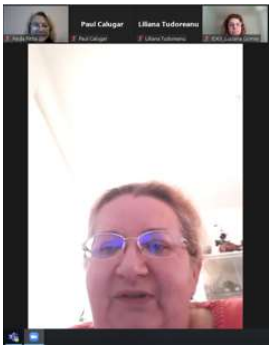
Jesus Simal GANDARA

Possibilities for Metabolic Profiling



Moderator:

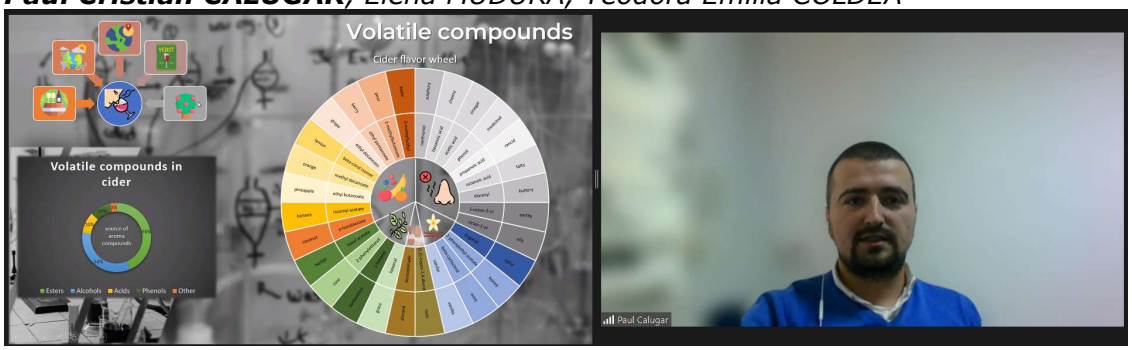
Paola PITTIA (Italy)



Despina Maria Bordean (Romania)

Influence of apple varieties and microflora diversity on the sensory and volatile profiles of apple cider

Paul Cristian CALUGAR, *Elena MUDURA, Teodora Emilia COLDEA*

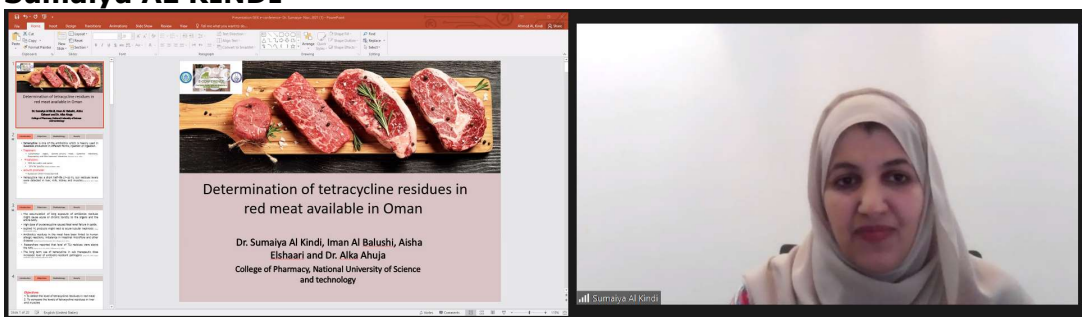


Development of nature-inspired surfaces to prevent biofouling in the food industry

Luciana GOMES, Kathryn WHITEHEAD, Filipe MERGULHÃO

Determination of tetracycline residues in red meat available in Oman

Sumaiya AL KINDI



SESSION 5

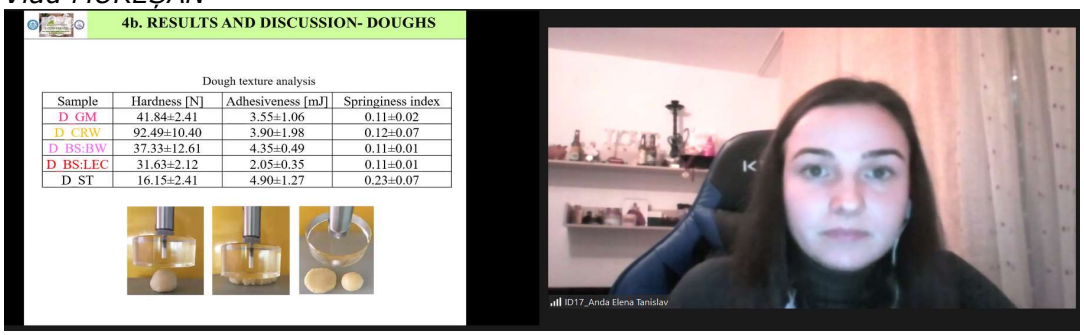
Moderator:

Victor ACHA (France)

Corina Dana Mişcă (Romania)

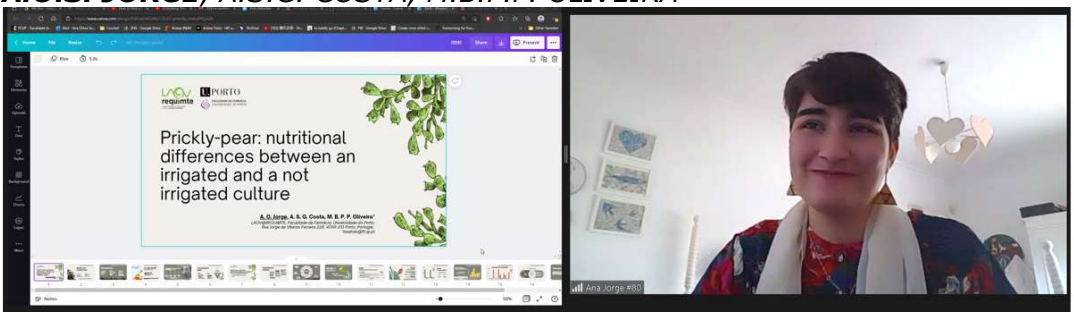
Evaluation of structural behavior in the process dynamics of oleogel based tender dough products

Anda Elena TANISLAV, *Andreea PUȘCAȘ, Adriana PĂUCEAN, Elena MUDURA, Vlad MUREȘAN*



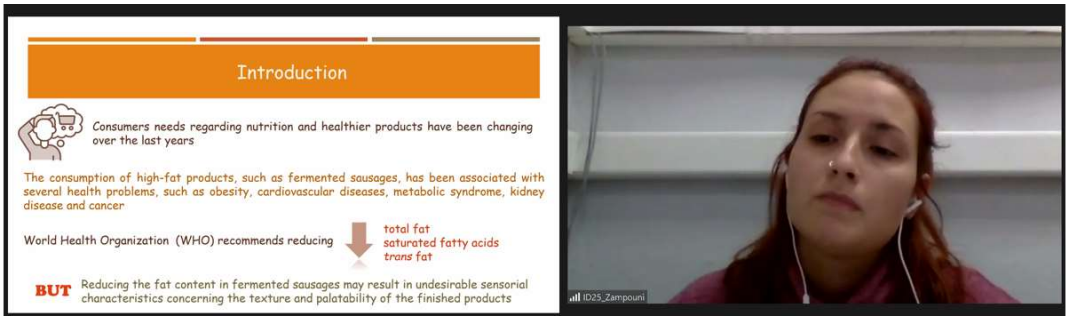
Prickly-pear: nutritional differences between an irrigated and a non-irrigated culture

A.O.S. JORGE, *A.S.G. COSTA, M.B.P.P. OLIVEIRA*



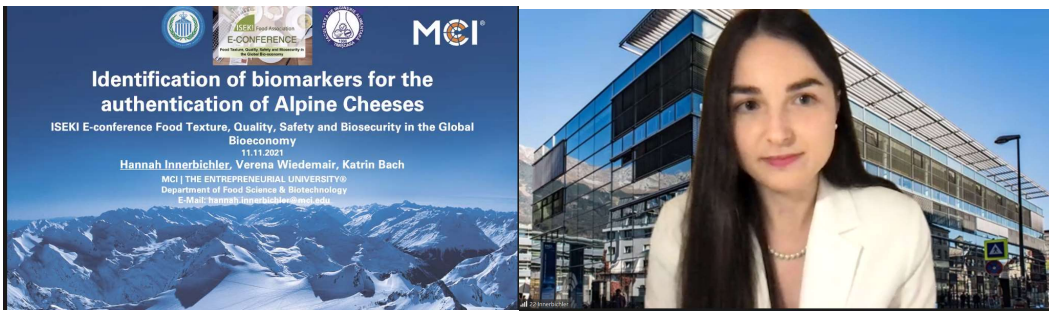
Oleogel-in-hydrogel bigel: A novel fat substitute in fermented sausages

Konstantına ZAMPOUNI, *Christina SIACHOU, Thomas MOSCHAKIS, Eugenios KATSANIDIS*



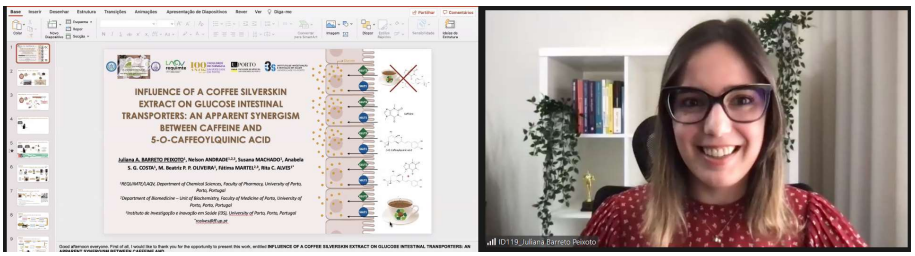
Identification of biomarkers for the authentication of Alpine Cheeses

Hannah INNERBICHLER, *Verena WIEDEMAIR, Katrin BACH*



Influence of a coffee silverskin extract on glucose intestinal transporters: an apparent synergism between caffeine and 5-O-caffeoylquinic acid

Juliana A. BARRETO PEIXOTO, *Nelson ANDRADE, Susana MACHADO, Anabela S. G. COSTA, M. Beatriz P. P. OLIVEIRA, Fátima MARTEL, Rita C. ALVES*

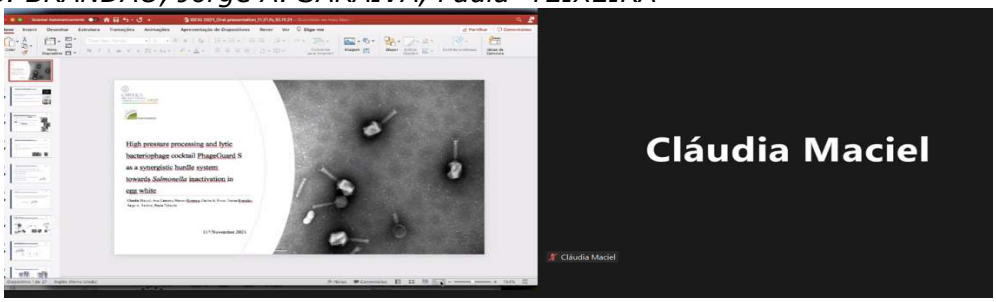


Textural properties of some assortments of grilled and baked fish preferred by 20 to 50+ years old consumers in Romania

Diana Alexandra GHEORGHIU, *Gabriela BRAD, Sorin Cătălin TOMESCU, Liliana TUDOREANU*

High-pressure processing and lytic bacteriophage cocktail PhageGuard S as a synergistic hurdle system towards *Salmonella* inactivation in egg white

Cláudia MACIEL, *Ana CAMPOS, Norton KOMORA, Carlos A. PINTO, Teresa R.S. BRANDÃO, Jorge A. SARAIVA, Paula TEIXEIRA*



SESSION 7

Moderator:

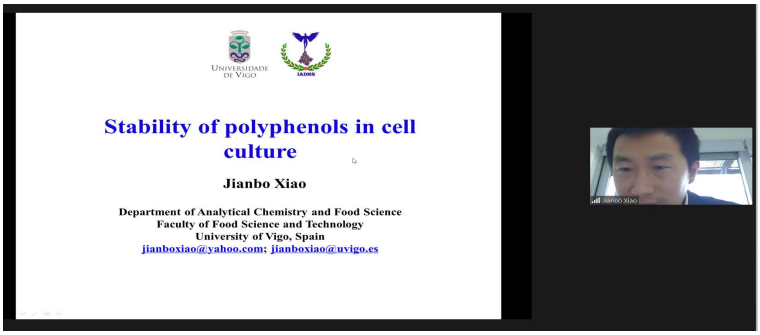
Isidora RADULOV (Romania) **Ersilia Călina Alexa (Romania)**

Prediction of Solar Cooking Impact on Products Quality – The Case of Red Lentils

Cristina L.M. SILVA

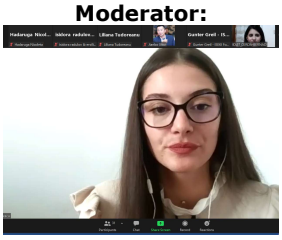
Stability of dietary polyphenols

Jiambo XIAO

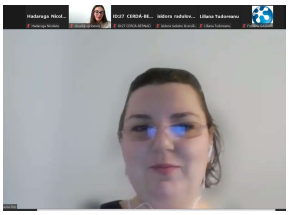


Moderator:

Kiriaki ZINOVIADOU (Greece)



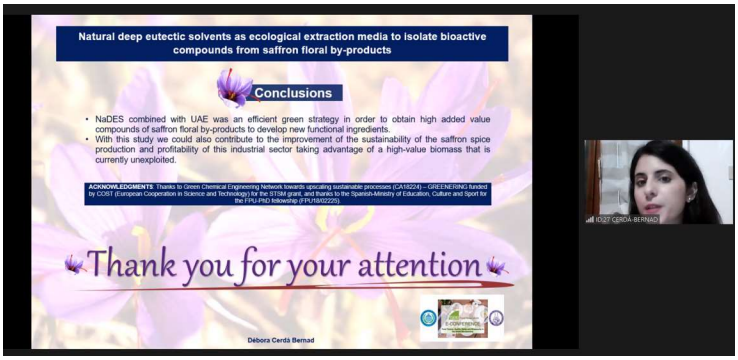
Claudia Izabela OPRINESCU (Romania)



Laura POP (Romania)

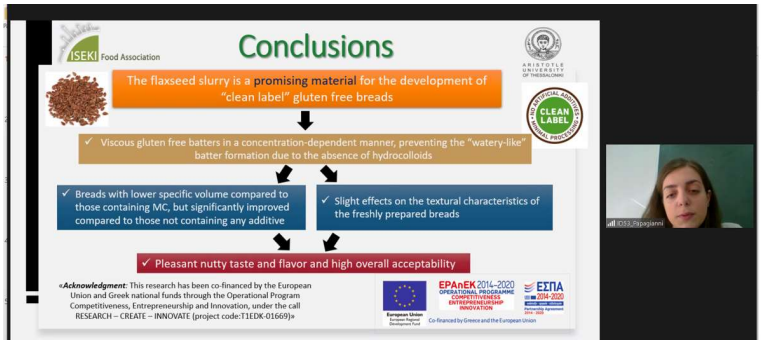
Natural deep eutectic solvents as ecological extraction media to isolate bioactive compounds from saffron floral by-products

Debora CERDA-BERNAD, *Estefania VALERO-CASES, Andromachi TZANI, Anastasia DETSI, Maria Jose FRUTOS-FERNANDEZ*



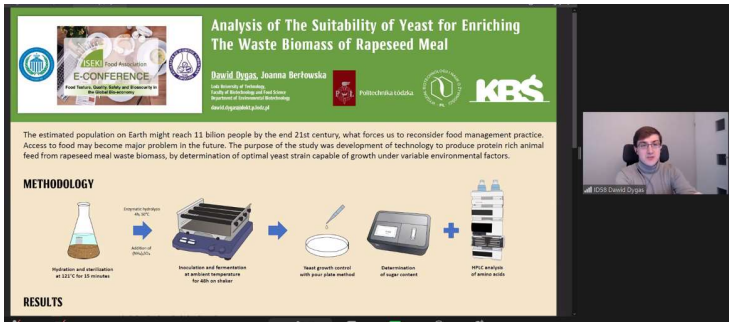
Exploring the development of a "clean-label" gluten free bread

Evangelia PAPAGIANNI, *Kali KOTSIOU, Costas G. BILIADERIS, Athina LAZARIDOU*



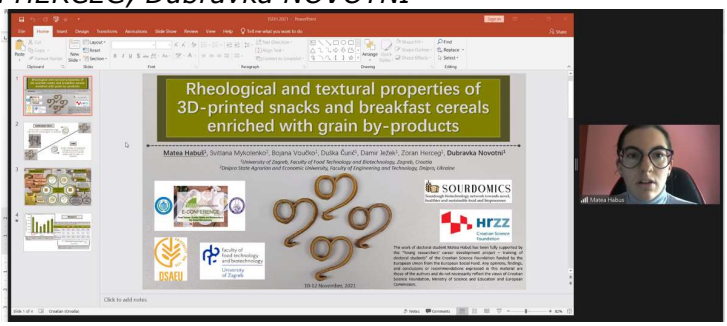
Analysis of The Suitability of Yeast for Enriching the Waste Biomass of Rapeseed Meal

Dawid DYGAS, *Joanna BERŁOWSKA*



Rheological and textural properties of 3D-printed snacks and breakfast cereals enriched with grain by-products

Matea HABUŠ, *Svitlana MYKOLENKO, Bojana VOUČKO, Duška ĆURIĆ, Damir JEŽEK, Zoran HERCEG, Dubravka NOVOTNI*



Evaluation and discrimination of fruit-based pasta by ATR-FTIR-PCA

Simelda Elena ZIPPENFENING, *Dina GLIGOR (PANE), Claudia Izabela OPRINESCU, Daniel Ioan HADARUGA, Adrian RIVIS, Nicoleta Gabriela HADARUGA*

Evaluation of the antimicrobial potential of Physalis Ixocarpa Brot. husk extracts against food pathogens

Brian Armstrong RODRIGUEZ CARRILLO, *Juliana MORALES CASTRO, Maria Ines GUERRA ROSAS, Damian REYES JAQUES*

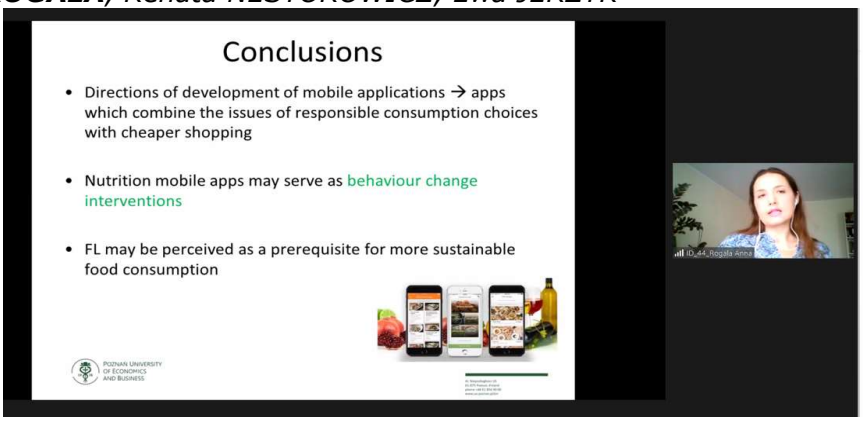
Moderator:

Marco DALLA ROSA (Italy)

Diana Veronica Dogaru (Romania)

Food literacy and the use of mobile applications in the context of sustainable food consumption

***Anna ROGALA**, Renata NESTOROWICZ, Ewa JERZYK*

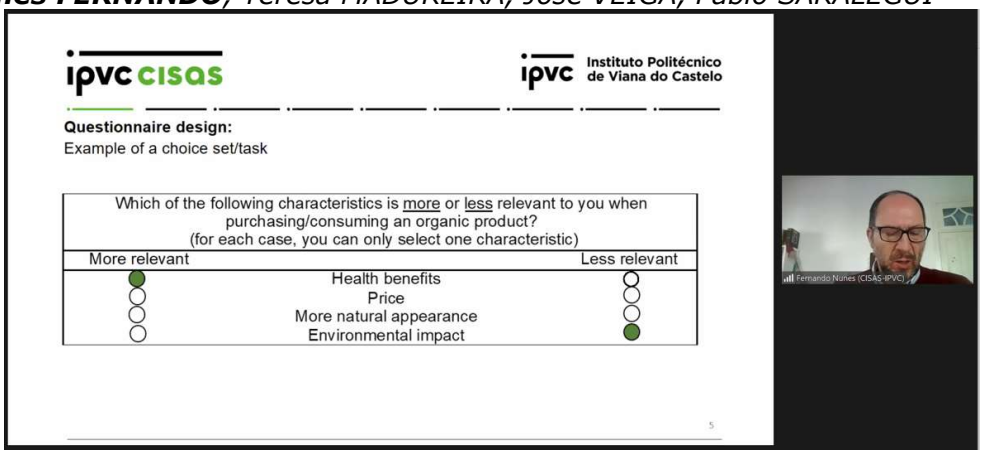


Olive oils from the Mediterranean basin

Diego PLANETA

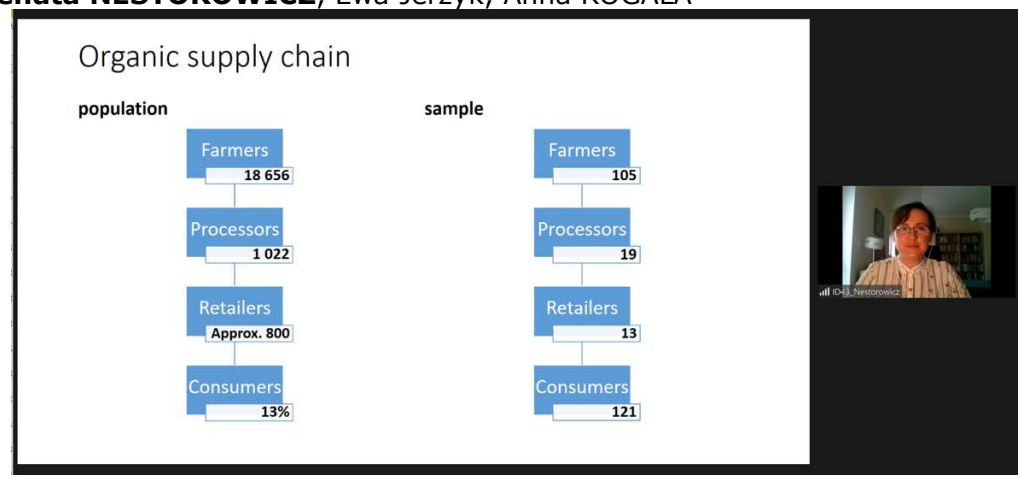
Choices in Sustainable Food Consumption: How (Low Intake) Organic Consumers Behave in a World-Leading Region of Organic Production

Nunes FERNANDO, *Teresa MADUREIRA, José VEIGA, Pablo SARALEGUI*



Knowledge about trends in the consumers' behaviors in an organic supply chain on the food market – the case of Poland

Renata NESTOROWICZ, Ewa Jerzyk, Anna ROGALA

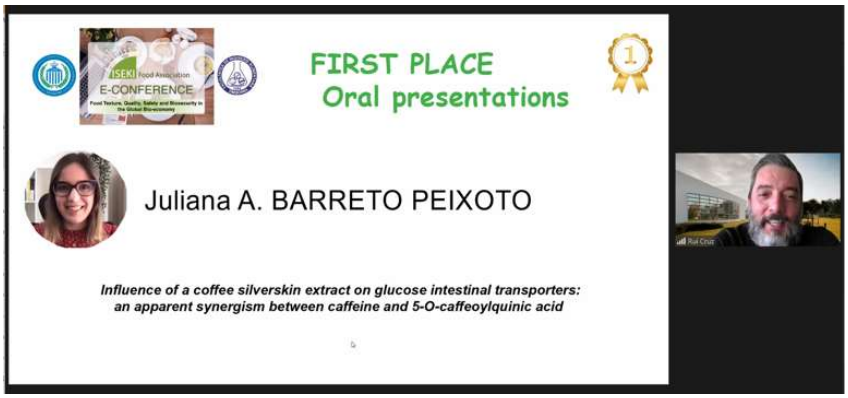


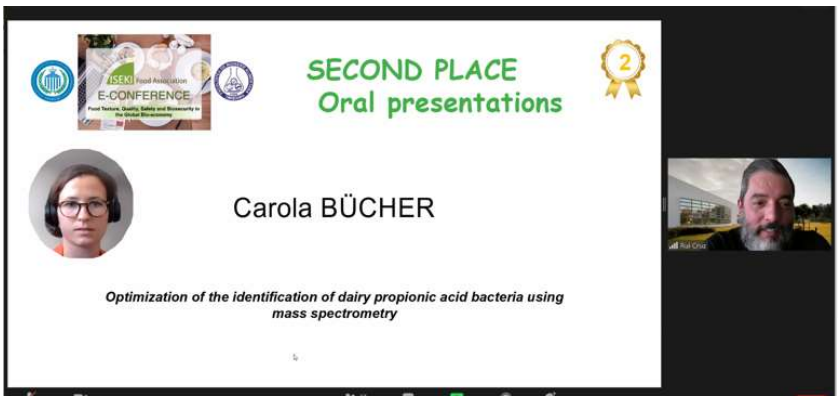

ISEKI Food Association
E-CONFERENCE
Food Texture, Quality, Safety and Biosecurity in the Global Bio-economy

Prizes


1
2
3

ORAL PRESENTATIONS & COMPETITION

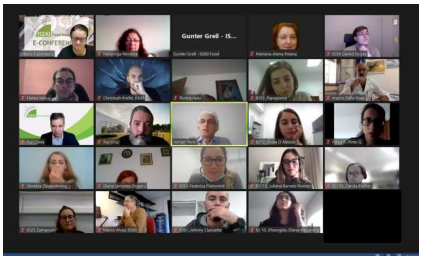


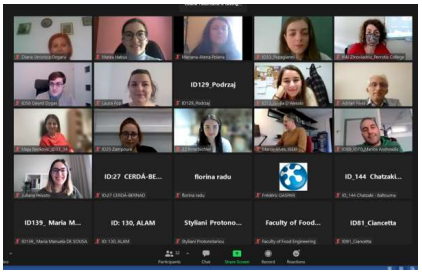


STUDENT SESSION: SHORT ORAL & POSTER COMPETITION


ID129_Podrzaj


ID129_Podrzaj


Gunter Greil - IS...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florina radu
ID_144_Chatzaki...
ID139_Maria M...
ID: 130, ALAM
Styliani Protono...
Faculty of Food...
ID81_Ciancetta

Abbreviations:

IS - Invited Speakers
OP&C - Oral & Poster Competition
OP - Oral Presentations
P – Poster
I - first day
II - second day
III - third day

4th ISEKI-Food E-conference

ISEKI-Food e-conferences aim to create an international platform for communication across continents and disciplines. They bring together scientists and support students from various areas of research in specific food-related fields to exchange and share information in support of the relationship of food to human health and well-being.

The topic of the 4th ISEKI-Food E-conference was "Food Texture, Quality Safety and Biosecurity in the Global Bioeconomy". The conference focused on topics regarding the contribution of the food industry to a sustainable bioeconomy.

www.iseki-food.net/iseki-e-conferences

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1st ISEKI E-conference,
20 May 2016

2nd ISEKI E-conference,
25 – 26 November 2019

3rd ISEKI E-conference,
18 – 19 November 2020

4th ISEKI E-conference,
10 – 12 November 2021