



Scientific Works of the UFT | Volume LXIX, 2022

FoSET-2022

**69TH International Conference on
FOOD SCIENCE, ENGINEERING AND TECHNOLOGY
September 29-30, 2022 | Plovdiv, Bulgaria**

PROGRAM & BOOK OF ABSTRACTS

**Plamen Mollov, Galin Ivanov, Kiril Mihalev and Georgi Kostov
Editors**



**UNIVERSITY OF
FOOD TECHNOLOGIES
PLOVDIV**



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&
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September 29-30, 2022 | Plovdiv, Bulgaria

Organized by

University of Food Technologies, Plovdiv, Bulgaria

&

**National Program "European Research Networks"
(Project TaiMFoods)**

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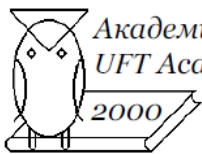
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ORGANIZERS

UNIVERSITY OF FOOD TECHNOLOGIES – PLOVDIV ALMA MATER ALIMENTORUM

The University of Food Technologies (UFT) was established as Higher Institute of Food and Flavour Industries in 1953, originating from one of the oldest food technology faculties in the South-Eastern Europe.

Based on the unique linkage between natural, engineering and economic sciences, **our mission** is to create the educational and research background behind innovations for sustainable development in the **Food & Beverages, Biotech and HoReCa** industries.

UFT IN NUMBERS



Students:
3000



Programmes:
20 Bachelor
35 Master
24 PhD



Academic staff:
200



Academic structure:
3 Faculties – 23
Departments
1 Independent
department



ORGANIZERS

FACULTY OF TECHNOLOGY

Programmes in the fields of:

- Food and beverage technology
- Wine and spirits technology
- Food safety and quality management
- Food chemistry and microbiology
- Food security
- Biotechnology
- Essential oils, cosmetic and tobacco products technology

MSc in Technology of Wine and Wine-Based Beverages

(Since 2023) – the **1st programme in the South-Eastern Europe** developed in cooperation with the OIV



International Organisation
of Vine and Wine
Intergovernmental Organisation

FACULTY OF ENGINEERING

Programmes in the fields of:

- Mechanical engineering
- Heat engineering and energy management
- Computer systems and technologies
- Automation and mechatronics
- Food packaging technique and technologies

FACULTY OF ECONOMICS

Programmes in the fields of:

- Hospitality and tourism
- Culinary management and catering
- Food and tourism economics
- Management and entrepreneurship
- Dietary and environmental management

ORGANIZERS

UFT AND ERASMUS+



Erasmus+ is the EU's programme to support education, training, youth and sport in Europe. The 2021-2027 programme places a strong focus on social inclusion, the green and digital transitions, and promoting young people's participation in democratic life. It supports priorities and activities set out in the European Education Area, Digital Education Action Plan and the European Skills Agenda.

UFT has been awarded the Erasmus Charter for Higher Education with a maximum score of 100 points. It enables UFT to participate in all key actions for the full duration of the Erasmus+ programme up to 2027.

Key Action 1 supports the mobility for students and staff members. Currently, three projects – № 2020-1-BG01-KA103-078088, № 2021-1-BG01-KA131-HED-000003391 and № 2022-1-BG01-KA131-HED-000052447, are under implementation by UFT, allowing approx. 200 mobilities to be realized.

Grants under Key Action 2 contribute to projects that strengthen international cooperation and the sharing of experiences between the participating organizations. Currently, UFT is engaged, as a coordinating institution, in the following projects:

Project title: Safe Food for the European Union (**SafeFood4EU**)
Programme: ERASMUS+ KA220-HED
Project number:
2021-1-BG01-KA220-HED-000027577
Duration: 24 months
Start: 01.01.2022



The project consortium is aiming to develop innovative and interdisciplinary teaching courses in the field of food safety and quality, taking into account the new "Farm to fork" strategy proposed by the Commission as part of the Green Deal. The main expected impact of the project is to raise the awareness of the students about the shift in the next years to more sustainable practices in the EU agri-food sector, including short food supply chains, thus ensuring safe and healthy foods to the consumers, even during crises. The project consortium includes partners from Bulgaria, Germany and the Netherlands.



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ORGANIZERS

Project title: Education for Resource Efficiency in Manufacturing Industries (**EREMI**)

Programme: ERASMUS+ KA220-HED

Project number: 2020-1-BG01-KA203-079076

Duration: 24 (33) months

Start: 01.09.2020



The EREMI team aims to develop and validate an advanced higher education program, including life-long learning, on the interdisciplinary topic of resource efficiency in manufacturing industries and the overall system optimization of low or not digitalized physical infrastructure. The final product will be a free of charge online-based interactive teaching/learning platform, built-in Moodle, targeting university students and postgraduate professional, and serving relevant universities, pupils, and companies for the fast and efficient professional education on this crucial topic for EU-wide industries. The project consortium includes partners from Bulgaria, Germany, Romania and North Macedonia.



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Project title: E-learning tools for Food technology and development education (**E-Food**)

Programme: ERASMUS+ KA220-HED

Project number:

2022-1-BG01-KA220-000085089

Duration: 36 months

Start: 01.12.2022



COVID-19 highlighted the importance of digital education for the digital transformation that Europe needs. The aim of the proposed project is to develop elements of an e-learning training system in the field of food technology, based on open access resources and developed on the basis of new educational standards. These general objectives and their results will be achieved through the realization of development of educational standards and materials for e-learning training for food industry. The project consortium includes partners from Bulgaria (University of Food Technologies), France (University Claude Bernard Lyon 1), Romania (University Lucian Blaga of Sibiu), Spain (University of Zaragoza) and Hungary (University of Debrecen).



Funded by the
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NATIONAL PROGRAM "EUROPEAN RESEARCH NETWORKS" (PROJECT TAIMFOODS)

This conference is being held with the support of the projects "*Strengthening the research excellence and innovation capacity of the University of Food Technologies - Plovdiv through the sustainable development of tailor-made food systems with programmable properties*", part of the National Program "European Research Networks" (Contract between Ministry of Education and Science and University of Food Technologies - Plovdiv № Д01-288 / 07.10.2020).

CONSORTIUM



UNIVERSITY OF FOOD TECHNOLOGIES – PLOVDIV



**BIODYMIA, UNIVERSITY CLAUDE BERNARD LYON
1, FRANCE**



**INSTITUTO AGROALIMENTARIO DE ARAGON –
UNIZAR-IA2, UNIVERSIDAD DE ZARAGOZA, SPAIN**



LYON INGÉNIERIE PROJETS (LIP), FRANCE

Abstract: Foods with programmable properties are systems with special composition prepared by different methods and with well-known mechanisms of acting of the bioactive components. The University of Food Technologies - Plovdiv (UFT) aims to develop research activities in that field as an educational and scientific centre of food technologies in the Republic of Bulgaria in the new programming period for the EU. The TaiMFoods project aims at increasing the overall scientific potential, technological transfer capacity and knowledge of UFT at national and EU level by "twinning" with three leading R&I European organization UNIZAR-IA2, UCBL and LIP. The project has three specific objectives which aim to increase the overall scientific and technological excellence of UFT and to increase the regional potential of UFT as a scientific and education leader in Bulgaria and Europe. The TaiMFoods partners will ground and focus their research and innovation "boosting" strategy on 3 scientific sub-topics connected with: the mechanism of biological activity of biomolecules and microorganisms in the development of foods with programmable properties; the processing methods for increasing food safety and shelf life of foods with programmable properties and perishable foodstuffs; the methods for analysis of the distribution and activity of biomolecules and microorganisms in food matrices. The consortium partners will implement transfer of knowledge activities, training programs and promotion, dissemination and outreach activities. The approach to improve UFT's scientific and innovation capacity in the field of foods with programmable properties and related areas will lead to an increase in the peer-reviewed publications and citations; the number of presentations at international scientific conferences; the number of participations of UFT in Horizon Europe programmes; the number of students and PhD theses in UFT; the number of businesses collaborating with UFT.

Project coordinator: Prof. Georgi Kostov, DSc.

Functional Dean for Educational Programs and Mobilities

SCIENTIFIC PROGRAM

ORAL SESSIONS

Thursday, September 29, 2022
UFT-Plovdiv, Building 2, Horizon Hall

- 9h00 **Registration**
- 10h00 **Opening Ceremony**
Plenary Session
Chairs: Galin Ivaniv, Kiril Mihalev
- 10h30 PL1 INNOVATIONS IN VITICULTURE AND THEIR EFFECTS ON WINE QUALITY
Vittorino Novello, University of Turin, Italy
Professor of Viticulture
Vice-President of the OIV (International Organization of Vine and Wine) Viticulture Commission
President of the EMaVE (European Master of Viticulture and Enology) consortium
- 11h00 PL2 POWER TO THE PLANTS – HOW FOOD TECHNOLOGY IMPACTS LEVELS AND BIOAVAILABILITY OF PLANT FOOD CONSTITUENTS
Ralf Schweiggert, Geisenheim University, Germany
Professor of Analysis and Technology of Plant-based Foods
Head of Department of Beverage Research
- 11h30 **Lunch Break & Poster Session**
Session 1:
Food and Beverage Technology
Food Chemistry, Microbiology and Biotechnology
Chairs: Vanya Gandova, Mariya Bachvarova
- 13h00 OP1 EVALUATION OF THE QUALITY INDICATORS OF TRADITIONAL BULGARIAN ARTISANAL SHEEP'S CHEESE
Stanko Stankov, Hafize Fidan, Tatyana Balabanova, Ivayla Dincheva, Salam A. Ibrahim
- 13h10 OP2 PHYSICOCHEMICAL PARAMETERS OF FOOD EMULSION PRODUCTS WITH SUMMER SAVORY (SATUREJA HORTENSIS L.) ESSENTIAL OIL
Anton Lazarov, Stanko Stankov, Hafize Fidan, Vanya Gandova, Albena Stoyanova

SCIENTIFIC PROGRAM

- 13h20 OP3 MACRO- AND TRACE-ELEMENT CONCENTRATIONS IN GREEN BULGARIAN FRESHWATER ALGAE OF THE GENUS SPIRULINA AND THE GENUS CHLORELLA AND THEIR SUITABILITY FOR FOOD APPLICATIONS
Nicole Parapanova, Kiril Simitchiev, Ginka Antova, Iordanka Alexieva, Iliana Tomova, Galya Toncheva
- 13h30 OP4 PHENOLIC COMPOUNDS EXTRACTABILITY FROM MELNIK 55 GRAPE SOLID PARTS DURING FRUIT MATURITY
Nikolay Stoyanov, Panko Mitev, Mariana Al. Galabova, Silviya Tagareva
- 13h40 OP5 CHANGES IN PROTEIN PROFILE OF BEERS WITH BILBERRY
Petar Nedyalkov, Ivan Bakardzhiyski, Maria Kaneva
- 13h50 OP6 STUDY OF PHYSICAL AND CHEMICAL PARAMETERS OF GOAT MEAT FOR USE IN THE PRODUCTION OF CHILDREN'S FOOD
Gulzhan Tokysheva, Kadyrzhan Makangali
- 14h00 **Coffee Break & Poster Session**
- Session 2:**
Food Quality, Nutrition and Health
Symposium "Food Quality for a Better Quality of Life"
Chairs: Georgi Toskov, Hafize Fidan
- 14h30 OP7 STUDY OF THE TRANSFER OF SOME ELEMENTS IMPORTANT FOR HUMAN HEALTH AND WINE QUALITY IN THE SYSTEM BENTONITE-MODEL MEDIUM
Ivan Bakardzhiyski, Elisaveta Mladenova, Silviya Tagareva
- 14h40 SP1 APPLICATION OF COMPUTER-AIDED MOLECULAR MODELLING APPROACHES FOR RATIONAL DEVELOPMENT OF HEALTHY AND SAFE FOODS
Merilin Al Sharif, Petko Alov, Ivanka Tsakovska, Tania Pencheva, Ilza Pajeva
- 14h50 SP2 CHEESE QUALITY ASSESSMENT BY USE OF NEAR-INFRARED SPECTROSCOPY
Stefka Atanassova, Dimitar Yorgov, Petya Veleva, Todor Stoyanchev, and Zlatin Zlatev
- 15h00 SP3 INFLUENCE OF UNREGULATED STORAGE CONDITIONS ON PHYSICOCHEMICAL, ORGANOLEPTIC AND NIR SPECTRAL CHARACTERISTICS OF YELLOW CHEESE
Stanka Baycheva, Zlatin Zlatev, Petya Veleva, Dimitar Yorgov, Stefka Atanasova

SCIENTIFIC PROGRAM

- 15h10 OP8 NUTRITIONAL SUPPORT IN PATIENTS WITH RHEUMATIC DISEASES
Dren Zhubi, Valentina Pavlova, Marija Srbinoska, Sasko Martinovski
- 15h20 OP09 CARBOHYDRATES NUTRITIONAL FUNCTION
Burbuque Kurtaj-Bajrami, Valentina Pavlova, Zlatko Lozanovski
- 15h30 **Coffee Break & Poster Session**
Session 3:
Food Process Engineering and Control
Essential Oils, Cosmetic and Tobacco Products
Technology
Tourism
Chairs: Stanislava Tasheva, Nesho Toshkov
- 16h00 OP10 INVESTIGATION OF SELECTED INDEPENDENT VARIABLES ON EXTRUSION OF RICE SEMOLINA WITH AND WITHOUT PROPELLER
Yanush Chalamov, Apostol Simitchiev, Ventsislav Nenov, Kiril Vassilev
- 16h10 OP11 PERFORMANCE ANALYSIS OF BULK FOOD DISPENSERS
Ventsislav Nenov, Donka Stoeva, Stefan Dishliev
- 16h20 OP12 DEGRADATION OF METAL IONS IN WASTE WATERS BY USING MORINGA OLEIFERA SEEDS
Nikoleta Stanikina
- 16h30 OP13 INFLUENCE OF VEGETATION ON THE COMPOSITION OF ESSENTIAL OIL FROM (MELISSA OFFICINALIS L.)
Ivan Iliev, Velko Nedelchev, Vanya Gandova, Albena Stoyanova
- 16h40 OP14 GROWTH OF GARDENIA JASMINOIDES SHOOTS IN TEMPORALLY IMMERSION SYSTEMS AND OPTIMIZATION OF IMMERSION PERIODS
Gergana Krasteva
- 16h50 OP15 OPPORTUNITIES FOR INTEGRATED DEVELOPMENT OF RURAL TOURISM ENTERPRISES, AGRICULTURE, LOCAL INDUSTRY AND SERVICES IN RURAL AREAS IN THE MUNICIPALITY OF MINERALNI BANI
Ivanka Lulcheva
- 19h00 **Conference Dinner**

LIST OF POSTERS

- PP1 VIABILITY OF LACTIC ACID BACTERIA IN POLYPHENOL-ENRICHED FERMENTED MILKS
Galina Ivanov, Milena Dimitrova-Dicheva, Kiril Mihalev and Ivelina Ivanova
- PP2 STUDY OF THE EFFECT OF TREATMENT WITH AQUEOUS EXTRACTS BY OREGANO AND WILD BASIL ON RAW POULTRY MEAT
Nikolay Dimitrov, Svetla Dyankova, Ayten Solak, Daniela Miteva, Silviya Ivanova
- PP3 LIPOLITIC AND OXIDATIVE CHANGES IN ACOUSTICALLY ASSISTED FROZEN FATTENED DUCK LIVER
Desislava Vlahova-Vangelova, Desislav Balev, Nikolay Kolev, Stefan Dragoev
- PP4 INFLUENCE OF SALT CONCENTRATION ON MICROBIOLOGICAL GROWTH OF KASHKAVAL CHEESE
Alexander Balabanov, Galin Ivanov, Bogdan Goranov, Mihaela Ivanova, Tatyana Balabanova
- PP5 EFFECT OF SUCROSE REPLACEMENT ON NUTRITIONAL PARAMETERS AND SENSORY CHARACTERISTICS OF THE LOLLIPOPS WITH ISOMALTULOSE
Raina Hadjikinova and Ivanka Petrova
- PP6 STUDY OF THE CHEMICAL COMPOSITION OF LEGUMES OF BELARUSIAN SELECTION
L. V. Rukshan, A. V. Navazhylava
- PP7 DETERMINATION OF HISTAMINE LEVELS IN FRESH FISH USING NEAR INFRARED (NIR) TECHNOLOGY
Vladimir Kitanovski, Sani Demiri
- PP8 EVALUATION OF THE SENSORY AND OXIDATIVE PROPERTIES OF FRESH SAUSAGES WITH ADDED AGARICUS BISPORUS
Tatjana Kalevska, Tanja Stojanovska, Elena Joshevska, Daniela Nikolova Nedelkoska, Sasko Martinovski, Aco Kuzelov
- PP9 INVESTIGATION OF EDIBLE COATINGS ON THE PHYSICAL, CHEMICAL AND MICROBIOLOGICAL CHARACTERISTICS OF PROCESSED MELONS DURING STORAGE
Stoil Zhelyazkov, Gabor Zsivanovits, Maria Marudova
- PP10 COMPARATIVE ANALYSIS OF THE DEGREE OF HYDROLYSIS AND ANTIOXIDANT ACTIVITY OF MILK AND WHEY HYDROLYSATES
Alexander Valchkov, Kamelia Loginovska, Maria Doneva, Nadia Ninova-Nikolova, Petya Metodieva

SCIENTIFIC PROGRAM

- PP11 THE USAGE OF DIETARY SUPPLEMENTS AMONG CANCER PATIENTS IN THE ONCOLOGY CLINIC IN KOSOVO
Kushtrim Dina, Valentina Pavlova, Sasko Martinovski, Marija Srbinska
- PP12 INFLUENCE OF GRAPE PROCESSING TECHNOLOGY ON THE CHARACTERISTICS OF THE OBTAINED DISTILLATES
Panko Mitev, Miroslav Ginev, Mariana Galabova
- PP13 APPLICATION OF INDUSTRIAL ENZYMES IN THE TRADITIONAL TECHNOLOGY OF ALCOHOL FROM STICKY RICE IN NAM DINH PROVINCE, VIETNAM
Tuan Anh Ho, Quang Tu Pham, Thi Hien Dinh, Thi Hanh Vu
- PP14 RESINOID FROM CAPE GOOSEBERRY FRUIT (PHYSALIS PERUVIANA L.) – VOLATILE COMPOSITION AND APPLICATION AS AN ACTIVE INGREDIENT IN A COSMETIC FORMULATION
Nadezhda Mazova, Apostol Simitchiev, Pavel Merdzhanov, Tanya Ivanova, Lazar Lazarov, Venelina Popova
- PP15 ASSESSMENT OF HEAVY METAL LEVELS IN ROLL-YOUR-OWN CIGARETTE AND WATER PIPE TOBACCO BLENDS
Silvia Peeva, Violeta Nikolova, and Nikolay Nikolov, Venelina Popova
- PP16 MICROBIOME STATUS OF UNREGULATED TOBACCO BLENDS FOR HAND-ROLLING CIGARETTES
Tsveta Hristeva, Nikolay Nikolov, Violeta Nikolova, Silvia Peeva
- PP17 RESEARCH OF THE QUALITY OF CHUMIZ GRAIN
L. V. Rukshan, Zh. V. Koshak, E. E. Ribkina
- PP18 INVESTIGATION OF PROBIOTIC PROPERTIES OF LACTOBACILLUS HELVETICUS 2/20 ISOLATED FROM ROSE BLOSSOM OF ROSA DAMASCENA MILL
R. Denkova-Kostova, B. Goranov, T. Tomova, V. Yanakieva, D. Blazheva, Z. Denkova, G. Kostov
- PP19 INVESTIGATING THE GROWTH KINETICS OF LACTOBACILLI STRAINS WITH PROBIOTIC PROPERTIES CULTIVATED IN A LABORATORY BIOREACTOR WITH STIRRING
B. Goranov, R. Denkova-Kostova, Z. Denkova, G. Kostov
- PP20 ISOLATION AND SELECTION OF SAUERKRAUT LACTIC ACID BACTERIA PRODUCING EXOPOLYSACCHARIDES
Aneliya Georgieva, Mariana Petkova, Emanoil Todorova, Velitchka Gotcheva, and Angel Angelov

SCIENTIFIC PROGRAM

- PP21 VALIDATION OF METHOD FOR ANALYSIS OF GLUCOSE IN FOOD ADDITIVES
Metodi Mladenov
- PP22 CHARACTERIZATION OF LUPINE FLOUR AND ISOLATED LUPINE PROTEINS AS POTENTIAL HIGH VALUE FOOD INGREDIENTS
Aleksandra Garmidolova, Ivelina Desseva, Radka Vrancheva, Atanas Pavlov
- PP23 EINKORN (TRITICUM MONOCOCCUM) AND NECTARINE FLOUR MIXTURE – ANTIOXIDANT ACTIVITY, MICROBIOLOGICAL AND SORPTION CHARACTERISTICS
Adelina Vasileva, Albena Durakova, Kliment Georgiev, Hristo Kalaydzhev, Milena Dimitrova-Dicheva and Zhivka Goranova
- PP24 EQUILIBRIUM ISOTHERMS OF RED BEETROOT
Ivan Kiryakov, Mariya Georgieva, Atanas Tashev, Ivan Tashev
- PP25 LABORATORY CONVECTIVE DRYER COMBINED WITH MICROWAVES
Mariya Georgieva, Dimitar Atanasov, Ivan Kiryakov, Atanas Tashev, Milena Nikolova
- PP26 WEB-BASED TOOL FOR FAST QUALITATIVE ANALYSIS OF THE STERILIZATION PROCESS FOR FOODS WITH EXTENDED EXPIRY DATE
Tanya Madzharova, Daniel Hristozov, Elena Mecheva
- PP27 OPENZFS
Daniel Hristozov
- PP28 SOFTWARE TOOL FOR DATA MINING OF PEPTIDES PHYSICOCHEMICAL PROPERTIES
Zhelyazko Terziyski, Margarita Terziyska, Stanka Hadzhikoleva, Ivelina Desseva
- PP29 COMPARISON OF GREEN TECHNOLOGIES FOR VALORIZING SUGAR BEET LEAVES (BETA VULGARIS L.)
Peyman Ebrahimi, Dasha Mihaylova, Anna Lante
- PP30 MICROBIAL GROWTH KINETICS AS A METHOD TO MODEL AND PREDICT THE DEVELOPMENT OF STARTER CULTURES
Sergey Sergeev, Galin Ivanov, Bogdan Goranov, Zlatka Ganeva, Yordanka Gaitanska
- PP31 COMPARATIVE STUDY OF VOLATILE SUBSTANCES IN SPIRITS BEVERAGES DISTILLED BY TWO DIFFERENT INITIAL MATERIALS OF PRUNUS DOMESTICA "STANLEY" IN AN INDUSTRIAL ENVIRONMENT
Mariana Al. Galabova, Nikolay Stoyanov, Panko Mitev

SCIENTIFIC PROGRAM

- PP1 PCR ANALYSIS FOR MEAT PRODUCTS AUTHENTICITY – DETECTION OF HORSE MEAT
Petya Stefanova, Velitchka Gotcheva, Angel Angelov
- PP2 ENHANCING POSTHARVEST QUALITY OF FRESH-CUT PRUNES WITH CHITOSAN-GRAPE SEED OIL EDIBLE COATINGS
G. Zsivanovits, P. Sabeva, D. Iserliyska, S. Zhelyazkov, A. Parzhanova, M. Nesheva
- PP3 EDIBLE PH SENSITIVE POLYSACCHARIDE-ANTHOCYANIN COMPLEX FILMS FOR MEAT FRESHNESS MONITORING
Ayten Solak, Svetla Dyankova, Maria Doneva, Milena Pavlova
- PP4 INVESTIGATION OF THE INFLUENCE OF PARTICLE SIZE AND STORAGE PERIOD ON THE MOISTURE OF GRANULAR SYNBIOTIC PRODUCTS – A STATISTICAL APPROACH
Margarita Terziyska, Maria Doneva, Petya Metodieva, Iliana Nacheva

Friday, September 30, 2022

Networking & Meetings at the UFT-Plovdiv Departments

PL1

INNOVATIONS IN VITICULTURE AND THEIR EFFECTS ON WINE QUALITY

Vittorino Novello

Department of Agricultural, Forestry and Food Sciences – DISAFA,
University of Turin, Turin, Italy
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The quality of the wines has been for a long time considered linked only to the winemaking technique, regardless of the quality of the grapes of origin. In recent times, much attention has been paid to the characteristics of the grapes in obtaining high quality wines, stating that the quality of the wines is achieved in the vineyard. There is therefore a direct correspondence between the characteristics of the grapes and the wines to be obtained. The factors that influence the quality and characteristics of the grapes are linked to the genotype (variety and rootstock), the soil and the climate, but also the cultivation techniques in the management of the vineyard are of great importance.

Addressing climate changes that have a strong influence on viticulture and achieving sustainability in grape production are the current challenges that have stimulated innovations in the sector, with effects on the quality of wines. The innovations concern the critical review of cultivation techniques, in the short and medium term, precision viticulture and the use of disease-resistant vines (downy mildew and powdery mildew) (PIWI, *Pilzwiderstandfähige*).

PL2

POWER TO THE PLANTS – HOW FOOD TECHNOLOGY IMPACTS LEVELS AND BIOAVAILABILITY OF PLANT FOOD CONSTITUENTS

Ralf Schweiggert

Chair of Analysis and Technology of Plant-based Foods
Department of Beverage Research, Geisenheim University, Geisenheim,
Germany
E-mail: Ralf.Schweiggert@hs-gm.de

Consumers worldwide increasingly become aware that a diet rich in fresh or gently processed plant foods is fundamentally important for maintaining good health throughout the lifespan. However, consumers' daily schedules are frequently tight, and home cooking or fresh fruit and vegetable consumption is often difficult and unattractive for large parts of modern societies' populations. Therefore, modern food scientists strive for developing innovative processes and insights to preserve freshness along with maximum levels of health promoting plant compounds, ideally providing them in a well-bioavailable, i.e. resorbable form. Simultaneously, undesired ingredients such as artificial colorants as well as harmful constituents such as mycotoxins need to be avoided and eliminated.

The current talk will present recent research on novel food processing technologies, such as the oxygen-excluding spiral filter press for solid-liquid separation as well as the non-thermal pressure change technology for non-thermal preservation, both enabling a high retention of valuable functional and health promoting constituents. A brief excursion on new insights into the avoidance of mycotoxins from liquid foods will also be presented. Furthermore, the impact of food technological processing on the bioavailability of phenolic compounds and carotenoids will be highlighted and discussed on specific examples, including a staple breakfast food, orange juice, as well as sophisticated technological formulations of health-relevant carotenoids, being also used for food coloration. By presenting the aforementioned, specific examples as case studies, the presentation will demonstrate how food technology continues to bring up new processes, methods and insights that will help to improve the consumers' diet today and in the future.

OP1

EVALUATION OF THE QUALITY INDICATORS OF TRADITIONAL BULGARIAN ARTISANAL SHEEP'S CHEESE

Stanko Stankov^{1*}, Hafize Fidan¹, Tatyana Balabanova², Ivayla Dincheva³, Salam A. Ibrahim⁴

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² Department of Milk and Dairy products Technology, Technological Faculty, University of Food Technologies, 4002 Plovdiv, Bulgaria

³ Agrobiointitute, Agricultural Academy, University of Chemical Technology and Metallurgy, 1164 Sofia, Bulgaria

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The aim of the present study was to evaluate the physical, chemical, and microbiological parameters of artisanal sheep's milk cheese up to one year of its storage. Changes in its composition were observed from the 45th to the 360th day of ripening in clay pots. A 9% increase in dry matter was reported during the ripening period. The water content decreased by 10%, and the titratable acidity decreased more than twice (277 °T). A decrease in the content of oleic fatty acid (C18:1n9c) was observed (from 28.16% on the 45th day to 26.09% on the 360th day of ripening). The content of the palmitic acid (C16:0) also decreased from 30.24% (45th day) to 30.74% (360th day). Changes in the composition of organic acids were also recorded during the ripening period. The lactic acid levels decreased from 27.66% on the 45th day to 8.62% on the 360th day. Microbiological analysis during the ripening period showed that the total microbial status was mainly represented by the total number of lactobacilli (from $1.2 \cdot 10^4$ - to $1.1 \cdot 10^3$ at the end of ripening).

OP2

PHYSICOCHEMICAL PARAMETERS OF FOOD EMULSION PRODUCTS WITH SUMMER SAVORY (*Satureja hortensis* L.) ESSENTIAL OIL

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Summer savory (*Satureja hortensis* L.) is a plant source of essential oil belonging to the Lamiaceae family, which is widely used in the food industry. The present work aims to determine the physicochemical parameters of food emulsions containing the essential oil of summer savory. The savory essential oil with main components carvacrol (63.71%), γ -terpinene (20.47%), and p-cymene (5.08%) was used in this study. Several model variants of emulsions have been developed with varying amounts of emulsifier (2 and 3% soy protein isolate), oil phase (20 and 40% sunflower oil), and essential oil (0.2 and 0.3%). The following physicochemical parameters of the emulsion were determined: Gibbs free energy (ΔG), kJ mol⁻¹, enthalpy (ΔH), kJ mol⁻¹, and entropy (ΔS), kJ K⁻¹ mol⁻¹. This parameter was used to determine the thermal effect of the system. The process was determined as exothermic with the negative enthalpy. Emulsions prepared with 2% soybean protein isolate, 40% oil phase, and 0.4% essential oil were characterized by some good results with high equilibrium constants and high Gibbs energies. Model variants of salad diet dressings had also been developed, with 0.2 and 0.3% essential oil, which were qualified by sensory analysis. The overall evaluation of salad dressings showed that the evaluators perceived with best sensory properties in those with 0.2% essential oil.

OP3

MACRO- AND TRACE-ELEMENT CONCENTRATIONS IN GREEN BULGARIAN FRESHWATER ALGAE OF THE GENUS SPIRULINA AND THE GENUS CHLORELLA AND THEIR SUITABILITY FOR FOOD APPLICATIONS

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Element content of freshwater algae species were determined by atomic emission spectrometry (MP-AES) and ICP mass spectrometry after microwave digestion. Cyanobacteria green algae of the genus Spirulina and the genus Chlorella produced in two Bulgarian laboratories were studied. A comparison was made in the drying technique in samples genus Chlorella. Macro and trace element content in dry samples freshwater algae species were 0.6-14.7 mg/g for calcium, 1.2-6.1 mg/g for magnesium, 5.8-10.4 mg/g for potassium, 2.7-16.2 mg/g for sodium, 0.1-0.5 mg/g for iron, 30-258 µg/g for zinc, 6.8-20.9 µg/g for copper, 9.9-101.8 µg/g for manganese, 0.6-3.7 µg/g for nickel. The concentration ranges of some contaminants have also been determined: 0.1-0.14 µg/g for arsenic, 1.6-2.6 µg/g for lead and less than 0.07 µg/g for mercury. While calcium was the highest macro element concentration, manganese was the highest trace element in samples. Most of the analyzed samples were edible. Data on the content of fiber, carbohydrates and proteins in algae and possible limits for use in food products are presented.

Keywords: ICP-MS, MP-AES, trace element, freshwater algae

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OP4

PHENOLIC COMPOUNDS EXTRACTABILITY FROM MELNIK 55 GRAPE SOLID PARTS DURING FRUIT MATURITY

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Samples from Melnik 55 grape variety (*v.vinifera*) were collected from different stage of grape maturity. Grape seeds and skins from each sample were separated and extracted with model wine solutions with increasing alcohol content simulated alcohol accumulation during wine fermentation. Total phenolic compounds, anthocyanins, skin pigments and tannins in each sample were determined. During grape ripening not only total phenols content of grape skin and seed is changed but also their extractability. Ethanol released during wine fermentation is strong phenol extragents but its role is getting smaller as more ripe is the grape. This tendency is more pronounced in seeds phenolics extractability than in skins.

OP5

CHANGES IN PROTEIN PROFILE OF BEERS WITH BILBERRY

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In the present study, beers with an original extract 12 °P, 14 °P and 16 °P were obtained. During the maturation process, on different stages, bilberries (*Vaccinium myrtillus* L.) from Bulgaria were added. Changes in the protein profile of the beers were investigated, as well as the influence of these changes on the body in the mouthfeel and the head retention of the resulting beers. The electrophoretic analysis of the proteins was performed by SDS-PAGE. The protein concentration was determined by the Bradford method. The sensory evaluation of the beer's body and head retention was conducted by a trained five-membered testing panel. It was found that independently of the original extract, the bilberry addition led to a significant reduction of the protein concentration and the number of protein fractions. Beers with bilberry addition contained between 74% and 94% less proteins, than control beers. The number of protein fractions decreased from 10 in the control beers to 4-6 in beers with bilberry. The fractions with molecular weight 14.2 and 31 kDa were the most stable to the bilberry addition. Their part in the beers with bilberry remained the highest. Despite of the significant changes in protein profiles, the beers with bilberry had very good body in the mouthfeel and head retention.

OP6

STUDY OF PHYSICAL AND CHEMICAL PARAMETERS OF GOAT MEAT FOR USE IN THE PRODUCTION OF CHILDREN'S FOOD

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The issue of rational nutrition of children is still extremely relevant and an effective factor ensuring the preservation of life and health of children. Pathological conditions associated with intolerance to certain components of food are increasingly common. When assessing the chemical composition of experimental samples of goat meat (Zaanen, Alpine, Nubian), no abnormal deviations were detected, and all indicators were in the generally accepted contents of this type of animal muscle tissue. Comparative analysis of goat meat samples shows that the fat content is more than 3 times less than that of lamb. The mass fraction of moisture is higher than mutton by 3-5%. Thus, it confirms that goat meat is a more dietary meat raw material in comparison with lamb. The potassium content among the experimental samples is distinguished by the goat meat of the Nubian breed (4125.83 ± 618.87 mg/kg), which in comparison with the Zaanen (2470.10 ± 370.52 mg/kg) is more than 1.5 times greater, and the Alpine breed (1693.22 ± 253.98 mg/kg) is more than 2 times. The concentration of such essential amino acids as tryptophan, leucine, isoleucine, phenylalanine, methionine allows you to cover from 14% to 30.5% of the daily norm.

OP7

STUDY OF THE TRANSFER OF SOME ELEMENTS IMPORTANT FOR HUMAN HEALTH AND WINE QUALITY IN THE SYSTEM BENTONITE-MODEL MEDIUM

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Sixteen of the most common bentonites on the Bulgarian market, which are used in Bulgarian wine cellars to achieve colloidal stability of wines, are included in this scientific research. There are bentonites with different composition: sodium, calcium, sodium-calcium, activated calcium, as well as mixtures between natural calcium and activated calcium. By atomic inductively coupled plasma-optical emission spectrometry (ICP-OES), inductively coupled plasma mass spectrometry (ICP-MS) and flame atomic absorption spectroscopy (FAAS) their capacity to transfer elements from and to a model medium with wine parameters was investigated. The selected elements which are subject to this study are important for human health as well as for the stability of the wine's clarity.

SP1

APPLICATION OF COMPUTER-AIDED MOLECULAR MODELLING APPROACHES FOR RATIONAL DEVELOPMENT OF HEALTHY AND SAFE FOODS

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Background: The increased interest towards biologically active naturally-derived molecules in food/feed industry implies identification of their potential physiologically relevant forms and beneficial/adverse effects. **Objective:** We aimed at optimization of the systems for quality assessment and evaluation of biological effects of naturally-derived biologically active molecules in healthy foods' development through in silico approaches. **Methods:** Analysis of large databases with information on potential targets or hazardous properties of molecules. In silico estimation of potential therapeutic/toxic molecular modes of actions (MoA). Prediction of metabolic transformations.

Results: A protocol for virtual screening of triterpenoids relevant to metabolic syndrome alleviation was developed. Possible metabolites and MoA of a triterpenoid found in plants from the genus *Astragalus* were predicted. An overview of possibilities for data extraction from food/feed safety-relevant databases is presented. Virtual screening of phenols, as promising healthy food components, against the DrugBank database allowed for identification of potential targets of hydroxyanthraquinones found in *Rubia* spp. and estimation of their potential antibacterial molecular MoA.

Conclusions: The developed models reveal potential MoA of the studied biologically active molecules and can support the identification of other naturally-derived molecules as candidates for healthy dietary supplements. **Key words:** computer-aided molecular modelling, naturally-derived molecules, healthy foods, safe foods.

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SP2

CHEESE QUALITY ASSESSMENT BY USE OF NEAR-INFRARED SPECTROSCOPY

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Dairy products are worldwide spread and have great commercial importance. Rapid and reliable analysis of cheese would be highly desirable both for the manufacturers and consumers. The results of experiments, related to the application of near-infrared spectroscopy for cheese quality estimation will be presented. Several kinds of Bulgarian white brine cheese - natural from cow milk, imitation products with vegetable oil, and cheese with different water content were investigated. Fatty acids composition of samples was determined by using gas chromatography and moisture content by the oven-dry method. Spectra of all tested samples were obtained with a scanning NIRQuest 512 (Ocean Optics, Inc.) instrument in the range of 900-1700 nm using a reflection fiber-optics probe. PLS models were developed for quantitative determination and SIMCA for classification. The misclassification rate of the SIMCA model for discrimination of natural cheese and imitation products with vegetable oil was 2.9%. Quantitative determination of water content based on NIR spectra showed high accuracy, Models for classification of cheese samples into 3 groups according to water content achieved a 5.64% misclassification rate for the independent test set. Results showed the potential of near-infrared spectroscopy as a non-destructive and rapid screening tool for assessing cheese quality and detecting adulteration.

SP3

INFLUENCE OF UNREGULATED STORAGE CONDITIONS ON PHYSICOCHEMICAL, ORGANOLEPTIC AND NIR SPECTRAL CHARACTERISTICS OF YELLOW CHEESE

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In the present work, software and hardware tools are proposed for determining the change in the main characteristics of Bulgarian yellow cheese during storage in conditions not regulated by the manufacturers. NIR images in the 800-1100 nm range of yellow cheese samples from 3 manufacturers were obtained using a GT-903 video camera with the IR-filter removed from the camera lens. Several physicochemical characteristics of the product were determined - active acidity, electrical conductivity, and completely dissolved solids. Data from the organoleptic evaluation of the product are presented. Using ABC-XYZ analysis, informative wavelengths are selected from the spectral features. Spectral indices calculated as ratios of the reflectance coefficients of selected wavelengths were defined and used to predict the storage characteristics of cheese. It has been found that the shelf life of cheese can be predicted with an accuracy of up to 95%, and the active acidity with an accuracy of up to 88%, depending on the manufacturer. The obtained results can be used for analyzes of cheese during its storage and applied in automatic measurement and control systems, as well as in advisory systems for evaluating the quality of cheese in the different stages of its production, transport, and storage.

OP8

NUTRITIONAL SUPPORT IN PATIENTS WITH RHEUMATIC DISEASES

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In this study, Dietary Supplement Questionnaire involving 50 patients with rheumatic diseases was done. The main part of the questionnaire comprises questions regarding the use of dietary supplements (DS), frequency and duration of DS use, type of DS, and dosage among the patients. Different kinds of vitamins, minerals and trace elements are listed as well as botanical or herbal supplements, special teas and immune-stimulating supplements. One of the promising molecules to be used in osteoporosis treatment is the vitamin K. This molecule acts as a cofactor of γ - glutamil carboxylase enzyme which modifies residues of glutamate (GLU) on some bone matrix proteins, such as osteocalcin (OC) and protein GLA of (BMP), enabling them to nucleate the bone mineralization by calcium (Ca^{2+}) phosphate (Pi) salts to form hydroxyapatite. The second part focuses on sources of information regarding DS use and patients' motivation for using DS. Food and supplements will not cure the condition or reverse the damage that has already occurred in humans' bodies, but they may reduce active inflammation, improve symptoms, and decrease the risk of future disease flares.

OP9

CARBOHYDRATES NUTRITIONAL FUNCTION

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One of the major nutrient groups that are necessary for healthy nutrition is carbohydrates abundant in fruit, pastry, cereals, and highly processed foods. Carbohydrates consumed in food yield 3.87 kilocalories of energy per gram for simple sugars, and 3.57 to 4.12 kilocalories per gram for complex carbohydrates in most other foods. Their primary nutritional function is as a source of energy, while dietary fiber is also crucial for digestive health. Carbohydrates perform numerous roles in living organisms. Polysaccharides serve for the storage of energy (e.g. starch and glycogen) and as structural components (e.g. cellulose in plants and chitin in arthropods). The 5-carbon monosaccharide ribose is an important component of coenzymes (e.g. ATP, FAD, and NAD) and the backbone of the genetic molecule known as RNA. The related deoxyribose is a component of DNA. Saccharides and their derivatives include many other important biomolecules that play key roles in the immune system, fertilization, preventing pathogenesis, blood clotting, and development. Cellulose, a polysaccharide found in the cell walls of all plants, is one of the main components of insoluble dietary fiber. Although it is not digestible, insoluble dietary fiber helps to maintain a healthy digestive system by easing defecation. Other polysaccharides contained in dietary fiber include resistant starch and inulin, which feed some bacteria in the microbiota of the large intestine and are metabolized by these bacteria to yield short-chain fatty acids.

OP10

INVESTIGATION OF SELECTED INDEPENDENT VARIABLES ON EXTRUSION OF RICE SEMOLINA WITH AND WITHOUT PROPELLER

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The influence of screws with and without propeller, as well as the independent variables of material moisture, working screw speed, feeding screw speed and die temperature on the changes of some physical and mechanical properties during singles-screw extrusion of rice semolina was studied. The response surface methodology was used with an orthogonal central composite design.

OP11

PERFORMANCE ANALYSIS OF BULK FOOD DISPENSERS

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The performance of screw dispensers for bulk products - with solid screw and screw spring was investigated. The studied variables are their geometrical parameters, rotation frequency and type of dosed material. The analysis carried out covers a comparison of the objective functions between the two types of dispensers, as well as the assessment of compliance of the real performances with their theoretical models. Conclusions for the specific parameters are summarized.

OP12

DEGRADATION OF METAL IONS IN WASTE WATERS BY USING MORINGA OLEIFERA SEEDS

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This study outlines the potentialities of metal ions removal from waste waters through the use of Moringa Oleifera seeds as natural coagulant. The tests were conducted with aqueous extracts from powdered seeds at solid-to-liquid ratio of 1:100 g ml⁻¹, coagulant doses from 9 to 51 ml L⁻¹, homogenization for 2 min at rapid mixing speed and 3 min at slow speed. The investigated elements were Cl ions, As, Fe, Cu, Zn, Cd, Pb, Se, Ni, Mn, Co, Bi, Sb, Cr, Mo, F (0.01 ppm to more than 3 ppm). Different samples were taken from the entrance and exit of a sewage treatment plant. The determination of Chlorine and Fluoride was performed by an automatic Mettler Toledo titrator with an electrode 141 SC and Fluoride selective electrode, ICP-OES determined the concentration of heavy metals, all calibrated before use. The removal ability of the biofloculants varied depending of the type of impurities and dosage used: they decreased effectively the concentration of Cl ions almost proportionally to the amount of extract added, but were effective only for reduction of metal ions with high initial concentration and have no influence of fluoride concentration.

OP13

INFLUENCE OF VEGETATION ON THE COMPOSITION OF ESSENTIAL OIL FROM (MELISSA OFFICINALIS L.)

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Lemon balm (*Melissa officinalis* L.) is a perennial plant of the Lamiaceae family, which is used in folk medicine and the food industry, as well as being processed to obtain essential oil. The aim of the special work is to monitor the influence of vegetation on the composition of the essential oil. The chemical composition of essential oils, obtained by steam distillation from balm cultivated in Northeastern Bulgaria, has been determined. The plants were harvested in two periods of vegetation - the first at the end of June and second - at the end of August 2020. The main components in the oil from the first cut are geranial (26.41%), neral (19.55%), (E) - β -caryophyllene (17.46%), germacrene D (7.86%) and β -citronellal (3.24%). In the oil from the second cut, the main components are geranial (37.26%), neral (28.46%), (E) β -caryophyllene (6.65%), geraniol (4.72%) and β -citronellal (3.04%). The oil from the second harvest has a high content of the main components of geranial, neral and geraniol and a lower content of (E) - β -caryophyllene and germacrene D. Variations in the amounts are also present in other compounds.

OP14

GROWTH OF GARDENIA JASMINOIDES SHOOTS IN TEMPORALLY IMMERSION SYSTEMS AND OPTIMIZATION OF IMMERSION PERIODS

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In the present study, the effect of different immersion regimes on the growth and secondary metabolites production by shoot cultures of *Gardenia jasminoides*, cultivated in Temporary immersion systems (TIS) was investigated. The cultivation was performed for 30 days on MS medium supplemented with 4.0 mg/l BAP. The investigated regimes were 15 min. immersion on every 4, 8 and 12 hours, respectively. The highest amount of accumulated biomass (ADB = 10.86 ± 0.02 g/L) was reached at 15 min. immersion at every 8 hours, whereas the lowest (ADB = 4.65 ± 0.26 g/L) was recorded when 15 min. immersion on every 4 hours was used. HPLC analyses showed that the higher polyphenol content was achieved when shoots were cultivated by using 15 min. immersion on every 12 hours. At this conditions, the shoots produced maximal amounts of chlorogenic acid ($164.82 \pm 32.36 \mu\text{g/g DW}$), caffeic acid ($26,90 \pm 6,80 \mu\text{g/g DW}$), rutin ($891,67 \pm 122,29 \mu\text{g/g DW}$) and rosmarinic acid ($559,19 \pm 19,85 \mu\text{g/g DW}$). The observed antioxidant activity (DPPH, TEAC, CUPRAC and FRAP) was following the accumulation of polyphenols. The study demonstrates that TIS are effective for cultivation of *Gardenia* shoots.

OP15

OPPORTUNITIES FOR INTEGRATED DEVELOPMENT OF RURAL TOURISM ENTERPRISES, AGRICULTURE, LOCAL INDUSTRY AND SERVICES IN RURAL AREAS IN THE MUNICIPALITY OF MINERALNI BANI

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The purpose of this article is to study and analyze the opportunities of achieving integrated development of rural tourism enterprises, agriculture (agribusiness), industry and services in the municipality of Mineralni Bani. The guest houses and small family hotels serve products produced not only by their owners, but also by other producers in the village. The system of connections and interconnections between the different types of business in Mineralni Bani municipality, built not without the assistance of the municipal leadership, helps to achieve a higher degree of completion of the agricultural and animal products produced in the region (they have a higher added value). This strengthens the demand for these products and increases the tourist flow to the tourist sites in the municipality. In this way, in the municipality of Mineralni Bani, the integration between rural tourism enterprises, individual producers of agricultural products and small processing enterprises gives a strong impetus to the development of the rural area. The strengthening of this integration will lead to results that confirm the positive role and contribution of rural tourism to the stabilization of the economy of the Municipality of Mineralni Bani. In the present study, we used a methodological approach, which is realized through specific methods: the survey and interview method, the method of comparison, synthesis and analysis, etc.

PP1

VIABILITY OF LACTIC ACID BACTERIA IN POLYPHENOL-ENRICHED FERMENTED MILKS

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The enrichment of probiotic dairy products with polyphenol extracts from different plant origins is a good approach to enhance the beneficial health effects of functional foods. The purposes of the present study were to evaluate the effect of rose (*Rosa damascena* Mill.) petals polyphenol extract (RPPE) fortification on the lactic acid production and the viability of *Lactobacillus delbrueckii* subsp. *bulgaricus* S19 (*Lb. bulgaricus*), *Lactobacillus rhamnosus* YW (*Lb. rhamnosus*) and *Streptococcus thermophilus* S13 (*S. thermophilus*) in fermented milk samples during refrigerated storage. The fermented milk samples with RPPE (samples R1 and R2) and without RPPE (samples K1 and K2) were stored at 4±2°C for 15 days. The results for physicochemical parameters showed a constant decrease in the pH values from 4.35±0.04 to 3.99±0.03 and an increase in the lactic acid concentration from 8.68±0.17 g/L to 11.45±0.26 g/L, respectively. The residual lactose concentration in the controls (K1 and K2) and supplemented samples (R1 and R2) at the end of the refrigerated storage was about 32.0±0.24 g/L. Good survival of probiotic strains of lactic acid bacteria was observed. The results show that on the 15th day of refrigerated storage, the total count of lactic acid bacteria remains high - about 2.8×10⁸ CFU/ml. Thus, RPPE could be used as a functional ingredient in fermented milk production.

PP2

STUDY OF THE EFFECT OF TREATMENT WITH AQUEOUS EXTRACTS BY OREGANO AND WILD BASIL ON RAW POULTRY MEAT

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Study of the effect of treatment with aqueous extracts by oregano and wild basil on raw poultry meat Abstract. The effect of treatment with aqueous antioxidant extracts of oregano (*Origanum vulgare* L.) and wild basil (*Clinopodium vulgare* L.) in refrigerated storage of raw poultry meat was studied. Physicochemical analyzes of meat samples were performed - total protein, ash, fat, dry matter, cooking loss and pH value in dynamics. The content of malondialdehyde (MDA) and the protein profile were determined. The microorganisms growth rate in meat during storage at 4° C for a period of 14 days was monitored. After the 7th day, the total number of mesophilic microorganisms in the meat samples increased to 7.00 log cfu/g, which is indicative of decay. A significant increase in pH value was observed after 14 days of storage, but there were no significant changes in total protein content and protein profile. In all meat samples, the amounts of MDA on days 7 and 14 were significantly below the thresholds indicated in the literature. Experimental groups treated with extracts showed lower values for MDA content compared to the control, which is an indication of certain inhibition of lipid oxidation processes in meat.

PP3

LIPOLITIC AND OXIDATIVE CHANGES IN ACOUSTICALLY ASSISTED FROZEN FATTENED DUCK LIVER

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The delicate structure of the fattened duck liver requires rapid freezing as quickly as possible. Acoustically assisted freezing meets both the requirement for quick freezing and energy efficiency. For the purpose of the experiment, a fattened duck liver "foie gras" was used. The degree of lipolysis (acid value) and primary (peroxide value) and secondary (2-thiobarbituric acid value) products of lipid oxidization were examined at 2 h post mortem. The oxidative changes were evaluated after conventional (CF) and acoustically assisted freezing (AAF) and at the 6-th and 12-th month of storage at -18 °C. Both time storage and type of freezing affect the degree of lipolysis. The duck liver after AAF had higher degree of lipolysis at the 12-th month of storage at -18 °C. The peroxide value increased almost 2 times in both fattened duck livers (CF and AAF) during the 6 months of storage at -18 °C and stabilizes until the 12-th month. A conclusion was made that the acoustically assisted freezing of the fattened duck liver did not promote higher lipid oxidation compared to the conventional type of freezing.

PP4

INFLUENCE OF SALT CONCENTRATION ON MICROBIOLOGICAL GROWTH OF KASHKAVAL CHEESE

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The aim of the present study was to evaluate the influence of NaCl concentration on the development of microflora in Kashkaval cheese produced from cow's milk. Three cheese samples were obtained - with low (0.7%), medium (1.5%), and standard content of NaCl (3.1%). Microbiological analyzes were performed on the 1st, 15th, 30th, and 45th days after cheese production. It was established that the NaCl content has a significant influence on the activity and development of the microflora in studied samples. It has been observed that the total LAB increased up to 30 days during ripening, after which their concentration decreased. A higher number of LABs characterized samples with 0.7 % and 1.5 % NaCl compared to those containing 3.1 % NaCl. In samples with low salt content, the non-starter microflora such as Psychrotrophic bacteria, yeast, and mold increased more intensively. The data obtained in this study establish that the concentration of NaCl is important for the regulation of activity of microbiological processes during the ripening of the Kashkaval cheese samples.

PP5

EFFECT OF SUCROSE REPLACEMENT ON NUTRITIONAL PARAMETERS AND SENSORY CHARACTERISTICS OF THE LOLLIPOPS WITH ISOMALTULOSE

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Lollipops are one of the most popular confectionary products among the consumers of all over the world. The main ingredient for their production is crystal sugar (sucrose). Its partial or complete replacement with suitable alternatives and sweeteners leads to change in sensory profile of lollipops and the overall perception by consumers. The use of isomaltulose may be consider as a revolution in confectionary industry due to its characteristics as a functional, digestible, non-cariogenic and just as importantly as a low glycemic disaccharide. The aim of the present study was to evaluate the effect of isomaltulose as a sugar replacement in lollipops on main nutritional parameters and sensory charactereristics as appearance (color and opacity), taste, aroma also the texture attribute perceived in a mouth. Results shown that isomaltulose can affect significantly the sensory and texture profile of the lollipops comparing the control products with sucrose.

PP6

STUDY OF THE CHEMICAL COMPOSITION OF LEGUMES OF BELARUSIAN SELECTION

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The prospects of legumes as raw materials for the food industry are determined primarily by the chemical composition and biological value of their seeds. Low humidity and an optimal ratio of the main nutrients of legume seeds create good prerequisites for long-term storage of such raw materials. This makes it possible to provide its long-term reserves for industrial processing, regardless of the climatic conditions of the growing season. The dynamics of changes in the chemical composition of legumes during storage is of theoretical and practical interest for assessing the technological properties and nutritional value of their processed products. However, so far there are no similar studies for legumes of Belarusian selection. We have studied the technological properties and chemical composition of these crops. Certain conclusions and recommendations were made.

PP7

DETERMINATION OF HISTAMINE LEVELS IN FRESH FISH USING NEAR INFRARED (NIR) TECHNOLOGY

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Fresh fish and fish products are highly perishable food. Development of fast, secure and non-destructive technique for estimation the presence and quantity of components which are related with safety of food products is of great interest for science but also and for the industry sector. Above-mentioned idea is the aim of this research work, precisely, determination of histamine levels in fresh fish with the use of different near infrared handheld devices. Histamine is one of biogenic amines among putrescine, cadaverine, tyramine which are nonvolatile amines produced post mortem and are formed from decarboxylation of specific free amino acids in fish or shellfish tissue. Reason why we choose to developing technique for evaluation of histamine levels is EU Regulation 2073/2005 requires the determination of histamine at three different levels: 100, 200 and 400 mg/kg. For reaching the goal we decided to use paper-based technology for collecting samples for evaluation using Whatman grade 2 qualitative filter papers. In the first phase for validation of NIR devices specifications, and for creation of calibration curve we used histamine solution with 1, 5, 10 and 15 %. Results showed clear regression of $R^2=1.00$, which indicates that NIR devices can spot histamine beside small molecular weight.

PP8

EVALUATION OF THE SENSORY AND OXIDATIVE PROPERTIES OF FRESH SAUSAGES WITH ADDED AGARICUS BISPORUS

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The research was conducted to determine the antioxidant effect of mushrooms of the species *Agaricus bisporus* in fresh sausages, their sensory acceptability and loss during heat treatment. For this purpose, sausages were produced with partial replacement of pork meat with the addition of 10% and 15% blanched mushrooms and fresh sausages with meat replacement with 3% and 6% mushroom flour. With the addition of blanched mushrooms, the most sensory acceptable sausages were obtained, in which the highest mass loss during heat treatment was determined, compared to the sausages with the added mushroom flour, where a lower mass loss during heat treatment was determined, a lower value of the peroxide number, but also lower sensory scores especially for the color, appearance and juiciness of the sausages.

PP9

INVESTIGATION OF EDIBLE COATINGS ON THE PHYSICAL, CHEMICAL AND MICROBIOLOGICAL CHARACTERISTICS OF PROCESSED MELONS DURING STORAGE

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The possible use of chitosan coating on fresh-cut melons (*Cucumis melo* var. *Cantalupensis*) was investigated in this research topic. Manually sliced melons were treated with solutions of 10 g.kg⁻¹ chitosan and 10 g.kg⁻¹ chitosan with calcium lactate and then stored at 4 °C for 8 days. Physical, physico-chemical, microbiological and sensory properties of the samples were monitored during the storage period. It was found that chitosan coatings inhibited the growth of microorganisms and affected significantly and positively the storage time of the products. Changes in the sensory qualities of taste were evaluated. A chitosan coating retarded water loss and the drop in sensory quality, increasing the soluble solid content and titratable acidity. The data revealed that applying a chitosan coating preserved effectively the quality and extended the shelf-life of fresh-cut melons. Keywords: edible coatings, physical parameters, dielectric parameters, sensory parameters, shelf-life extension Abbreviations: GlcN- β -1,4-linked glucosamine; Mw - average molecular weight; CFU.g⁻¹ - total number of microorganisms; Rm - impedance real part; Xm - impedance imaginary part Acknowledgements: This research was funded by the Agricultural Academy of Bulgaria, project N^o TN 14: Influence of bioactive edible packaging on the quality of fruits and vegetables during storage (2022-2024) and by Bulgarian National Science Fund (BNSF), grant number KP-06-N37/29". "Innovative packaging, extending the shelf life of fruits and vegetables by multicomponent edible coatings (ECOATFRUIT)".

PP10

COMPARATIVE ANALYSIS OF THE DEGREE OF HYDROLYSIS AND ANTIOXIDANT ACTIVITY OF MILK AND WHEY HYDROLYSATES

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The degree of hydrolysis and antioxidant activity of protein hydrolysates from fresh cow's milk and whey obtained by the action of the proteolytic enzymes papain, bromelain and chymosin were compared. The lowest degree of hydrolysis in fresh milk hydrolysates was reported for sample MP1 (10 min reaction time, treatment with 0.1 mg/ml papain), and the highest percentage was obtained at hydrolyzate MB12 (at 60 min reaction time, treatment with 1.0 mg/ml bromelain). For the whey samples in sample WC1 (10 min reaction time, treatment with 1.0 µl/ml chymosin), the percentage of hydrolysis was the lowest. The highest percentage was achieved at WP12 hydrolyzate using papain at a concentration of 1 mg/ml and a 60-min reaction time. The obtained values for the antioxidant capacity of the hydrolyzed products show a higher activity compared to the starting substrates. The highest activity in the milk hydrolysates of 11.32 mg TE/100 ml was found in variant MB3, and in the whey hydrolysates of 7.83 mg TE/100 ml - in variant WP7. Hydrolysates treated with chymosin had lower TE values compared to the hydrolyzates variants, treated with papain and bromelain.

PP11

THE USAGE OF DIETARY SUPPLEMENTS AMONG CANCER PATIENTS IN THE ONCOLOGY CLINIC IN KOSOVO

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Cancer has a serious negative impact on patients' ability to consume and absorb nutrients and, hence, their functioning so they are especially at risk for malnutrition. Because one cytotoxic mechanism of cancer therapeutics is through the generation of reactive oxygen species (ROS), there has been concern that the use of dietary supplements during treatment, particularly antioxidants, could reduce treatment efficacy. The goal of this study was to determine the usage of dietary supplements (DS) after a cancer diagnosis among patients from the University Clinical Center of Kosovo, Oncology Clinic. The developed questionnaire contains open-end and closed questions as well as multiple-choice questions, allowing multiple answers. The test patients were interviewed about their DS use (intake, frequency, and duration), changes in dietary habits including preferences or avoidance of certain foods since cancer diagnosis. The demographic and clinical data, such as diagnosis, time since diagnosis, tumor stage, treatment history, and comorbidities, have been obtained also. It has been concluded that the nutritionist is very important to implement consultation with patients about preventing potential interactions with anticancer therapies.

PP12

INFLUENCE OF GRAPE PROCESSING TECHNOLOGY ON THE CHARACTERISTICS OF THE OBTAINED DISTILLATES

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In recent years, there has been an increased consumer interest in higher quality products, in particular, high-alcohol beverages produced using a more classical method with batch distillation. In the production of wine distillates, the factors influencing their composition, respectively their quality, can be divided into the following directions: composition of grapes (as raw material), the technology for its processing and alcoholic fermentation to obtain wine material, as well as the method of distillation of the wine material to derive a distillate. Each of these factors is important for the production of quality wine distillate and significantly affects the concentration of chemical substances that determine its aromatic and flavor profile. The present study was carried out with Muscat Ottonel grapes, a raw material typical for the production of Muscat brandies, through double batch distillation. The grapes are processed and vinified according to three different technological schemes. It is established their influence on both the chemical composition of the wine materials and the received distillate fractions, typical for batch distillation.

PP13

APPLICATION OF INDUSTRIAL ENZYMES IN THE TRADITIONAL TECHNOLOGY OF ALCOHOL FROM STICKY RICE IN NAM DINH PROVINCE, VIETNAM

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Based on the traditional technology of alcohol from sticky rice in Nam Dinh province, Vietnam, the experiments were conducted by the way to kept the technological process as well as the proportion of ingredients. The quantity of the sticky rice for every experiments was 10 kg. The obtained results showed that the addition of 0.05% enzyme preparation SEBflo-TL compared to the dry matter of sticky rice leads to an increase of the absolute anhydrous alcohol by 10%. Combined application of 0.05% enzyme preparations SEBflo-TL and 0.08% SEBrew-GL for hydrolysing starch and beta glucan, the amount of obtained anhydrous alcohol is 4.6 liters compared to 4.0 liters in the sample control without enzyme application, increased by 15% and could provide significant economic benefits to producer. In other hand, the composition of the volatile compounds of produced alcohol after the first distillation needs to be corrected by the fractional distillation to improve quality.

PP14

**RESINOID FROM CAPE GOOSEBERRY FRUIT (PHYSALIS PERUVIANA L.) –
VOLATILE COMPOSITION AND APPLICATION AS AN ACTIVE INGREDIENT IN A
COSMETIC FORMULATION**

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Cape gooseberry (*Physalis peruviana* L.), an exotic fruit gaining popularity in Bulgaria, has been recognized as a highly functional food, but has also the potential to be a resource for the fragrance and cosmetic industries. The main objective of this study was to assess the potential of the resinoid (a type of traditional aromatic products) obtained from locally-produced fruit (variety "Plovdiv") for use in cosmetics, by revealing its volatile composition and characterizing the properties of an author-developed resinoid-enriched cosmetic cream. The resinoid (yield 58.78 % DW) was a dark-orange viscous mass, with fruity, caramel notes and smoke accords odor. The GC-MS analysis identified 44 volatiles (98.69%), representing carbohydrates, alcohols, acids, along with minor miscellaneous compounds. A cosmetic cream (O/W emulsion) was developed, incorporating fruit resinoid (1.00%) as an active ingredient, compared to a control sample. Resinoid inclusion affected positively the sensory and physico-chemical properties of the cosmetic cream (color, odor, pH, stability). The studied emulsions had the rheological behavior of pseudoplastic non-Newtonian fluids, and resinoid presence reduced cream viscosity. It could be concluded that Cape gooseberry fruit resinoid had the potential to be a reasonable ingredient in cosmetic preparations; of course, further research is needed to assess its complex effects.

PP15

ASSESSMENT OF HEAVY METAL LEVELS IN ROLL-YOUR-OWN CIGARETTE AND WATER PIPE TOBACCO BLENDS

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The increased consumption of roll-your-own (RYO) cigarettes and water pipe (hookah), both globally and in Bulgaria, necessitated the current investigation aimed at the assessment of heavy metal levels in the tobacco blends used in those products. The concentrations of Mn, Zn, Cu, Cd, Pb, and Ni were determined by AAS in five brands of RYO tobacco (R1-R5) and seven brands of water pipe tobacco (W1-W7), all distributed on Bulgarian market. The average heavy metal contents (mg/kg) in the two types of tobacco blends, RYO and water pipe, respectively, were as follows: Mn - 214.20 and 37.89; Zn - 31.90 and 134.87; Cu - 12.06 and 10.07; Cd - 0.80 and 1.33; Pb - 1.60 and 3.57; Ni - 1.36 and 0.80. RYO cigarette tobaccos contained higher concentration of Mn, Cu and Ni, while water pipe tobaccos - Zn, Cd and Pb. Strong correlations were found between Cu and Zn ($r=0.81$), Cu and Cd ($r=0.90$) in RYO tobacco blends, and between Cu and Zn ($r=0.86$) - in water pipe blends, respectively. The results from the study give reason to recommend that this information be provided to the consumers, who consider the regarded tobacco products as a safer alternative to conventional cigarettes.

PP16

MICROBIOME STATUS OF UNREGULATED TOBACCO BLENDS FOR HAND-ROLLING CIGARETTES

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The research was conducted on 18 samples of RYO tobacco. The density (CFU/g d. m.) of three heterotrophic groups of microorganisms and some physical-chemical indicators were determined. The analyses were performed according to classical methods. Quantitative and qualitative changes at the microbiome as a result of disruption of homeostasis at microbial communities and development of secondary succession in the direction of intensive mineralization processes were found. Statistically significant correlation dependences with the physical-chemical parameters were registered. In addition to a potential risk in terms of sanitary-hygiene and health aspects, the changes also had a negative impact on the consumer qualities of tobacco blends.

PP17

RESEARCH OF THE QUALITY OF CHUMIZ GRAIN

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In the food industry and agricultural production for animal nutrition, there is an acute demand for products that have both therapeutic and prophylactic effect. Chumiza seeds seem to be quite promising in this area. Belarus has created its own varieties of chumiza. However, the technological properties of chumiza seeds of the Belarusian selection have not been sufficiently studied. We have determined the indicators of the physical, physicochemical and chemical properties of chumiza of Belarusian selection. Recommendations are given on the use of chumiza for the production of cereals, flour and animal nutrition. It has been established that in order to increase the yield and improve the quality of chumiza products, it is necessary to apply moisture-thermal treatment of seeds.

PP18

INVESTIGATION OF PROBIOTIC PROPERTIES OF LACTOBACILLUS HELVETICUS 2/20 ISOLATED FROM ROSE BLOSSOM OF ROSA DAMASCENA MILL

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A lactobacilli strain was isolated from rose blossom of *Rosa damascena* Mill and it was identified as belonging to the species *Lactobacillus helveticus* by the application of physiological-biochemical (API 50 CHL) and molecular-genetic methods (sequencing of the 16S rRNA gene). The presence of a number of probiotic properties of *L. helveticus* 2/20 was investigated. The strain exhibited high antimicrobial activity against pathogenic microorganisms that cause food toxicoinfections and intoxications. *L. helveticus* 2/20 survived in the simulated conditions of the gastrointestinal tract - pH=2 and pepsin, pH=4.5 and pancreatin and pH=8 and pancreatin, as well as to the presence of 0.3% bile salts, retaining a significant concentration of viable cells. It has been shown that *L. helveticus* 2/20 cells begin multiplying after removing the extreme conditions. The strain allowed the conduction of industrial cultivation and freeze-drying of the obtained concentrates, with the concentration of active cells in the lyophilic preparations exceeding 10¹² cfu/g. The kinetic parameters of the batch cultivation process in a bioreactor with stirring and the maximum growth rate were determined, revealing the possibilities for scaling up the fermentation process from laboratory to industrial conditions, as well as its management. After further research on the probiotic properties of *L. helveticus* 2/20, it can be included in the composition of probiotics and functional foods.

PP19

INVESTIGATING THE GROWTH KINETICS OF LACTOBACILLI STRAINS WITH PROBIOTIC PROPERTIES CULTIVATED IN A LABORATORY BIOREACTOR WITH STIRRING

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Batch cultivation in a laboratory bioreactor with stirring of the lactobacilli strains with probiotic properties *Lactobacillus casei* ssp. *casei* G17 and *Lactobacillus casei* ssp. *rhamnosus* G16 isolated from pink blossom of *Rosa damascena* Mill was conducted. The changes in the concentration of viable cells were monitored. The growth kinetics was modeled applying the classic and modified logistic curve model and the maximum specific growth rate of the studied strains was determined. The classical model of the logistic curve showed higher maximum specific growth rate for *Lactobacillus casei* ssp. *casei* G17 - 0.133 h⁻¹, compared to *Lactobacillus casei* ssp. *rhamnosus* G16 - 0.120 h⁻¹, while the modified logistic curve model predicted comparable maximum growth rates of 0.105 h⁻¹ and 0.101 h⁻¹ for *Lactobacillus casei* ssp. *casei* G17 and *Lactobacillus casei* ssp. *rhamnosus* G16, respectively. The induction period and the adaptation rate constant of the strains to the fermentation medium and cultivation conditions were determined. *Lactobacillus casei* ssp. *casei* G17 was characterized by a shorter induction period ($\tau_a = 0.72$ h) and a higher adaptation rate constant ($k_0 = 0.390$ h⁻¹) compared to *Lactobacillus casei* ssp. *rhamnosus* G16, in which τ_a and k_0 were 1.66 h and 0.110 h⁻¹, respectively. The established kinetic parameters show that *Lactobacillus casei* ssp. *rhamnosus* G16 needs the addition of growth factors in the fermentation medium, that will help to optimize its composition for scaling up the fermentation process.

PP20

ISOLATION AND SELECTION OF SAUERKRAUT LACTIC ACID BACTERIA PRODUCING EXOPOLYSACCHARIDES

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Fermented plant-based foods, including sauerkraut, offer high nutritional and functional value. Their microflora is dominated by lactic acid bacteria which are a source of different substances with health-promoting benefits and diverse applications in the food industry. Production of exopolysaccharides (EPSs) by lactic acid bacteria attracts particular interest in the food industry due to their rheological properties. In the present study, we isolated 20 strains of lactic acid bacteria from traditional Bulgarian sauerkraut. The isolates were identified by 16S rDNA sequencing and were attributed to *Lactiplantibacillus plantarum* (75%) and *Pediococcus pentosaceus* (25%). All strains were screened for their ability to synthesize exopolysaccharides, and 6 of them proved positive. Since culture media composition and especially the carbon source are a critical factor influencing the yield of bacterial EPSs, the impact of various carbon sources on the EPSs synthesis by the selected producers was explored. The best results were obtained by using glucose and sucrose as sole carbon sources.

PP21

VALIDATION OF METHOD FOR ANALYSIS OF GLUCOSE IN FOOD ADDITIVES

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The dangers of consuming various food and drink products containing substances with a potential risk to human health are the subject of increased interest. There is a drive among manufacturers and the scientific community to ensure safety in the use of various foods and beverages with proven and/or suspected links to one or another disease state. Fast and reliable methods of analysis are increasingly sought for the purpose of establishing the type and concentrations of the contained substances and elements, which methods support the implementation of strict control of the quantitatively regulated levels of various indicators, including main components and impurities. In the present work, a validation procedure of an iodometric method for determining the content of glucose as the main component of three types of nutritional supplements is presented, and results for the analytical characteristics of the method are presented.

PP22

CHARACTERIZATION OF LUPINE FLOUR AND ISOLATED LUPINE PROTEINS AS POTENTIAL HIGH VALUE FOOD INGREDIENTS

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Plant proteins have been the subject of research as a potential source of animal protein substitutes for a long time. Lupine belongs to the genus *Lupinus* and the family Fabaceae and has been used as animal feed until now. In our study, we characterize lupine flour and its derived lupine proteins in terms of chemical composition, antioxidant activity (AOA), and functional properties. The flour possessed 31.46% proteins, 45.11% total dietary fiber, and 7.83 % fats. The results for AOA (DPPH, ABTS, FRAP, and CUPRAC) varied from 1.51 ± 0.09 TE/g sample to 13.10 ± 0.15 TE/g sample. The GC-FID fatty acids analysis revealed that Oleic acid prevailed with $40,55 \pm 0,09$ %, followed by linoleic acid - $29,1 \pm 0,08$ %. The proteins of lupin (LPC) were extracted and tested for their functional properties. LPC possessed 3.5 times better foaming capacity. Compared to flour, LPC possessed inferior water holding capacity but much higher oil holding capacity. Both properties were slightly improved by increasing the concentration of NaCl. LPC was less soluble at pH 4.5 and fully soluble at pH 8.0. Again, increasing NaCl concentration to 0.25 M resulted in much better solubility for all pH values tested.

PP23

EINKORN (TRITICUM MONOCOCCUM) AND NECTARINE FLOUR MIXTURE – ANTIOXIDANT ACTIVITY, MICROBIOLOGICAL AND SORPTION CHARACTERISTICS

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The current paper presents the initial scientific research on a new enriched flour mixture with nectarine powder comprising physicochemical parameters, antioxidant capacity, microbiological load and sorption characteristics data. The mixture of 70% Einkorn and 30% fruit powder from Bulgarian origin as a functional food supplement was blended. The presence of bioactive components was proved by analysis of antioxidant activity by DPPH, ABTS, FRAP and CUPRAC methods. The microbiological indicators, the total count of mesophilic aerobic and facultative anaerobic microorganisms, molds and yeasts, *Escherichia coli*, *Salmonella* spp., coagulase-positive staphylococci and coliforms, were within the permissible norms and no presence of pathogenic microorganisms, were detected in the flour mixture. Adsorption and desorption processes were studied at 10°C, 25°C and 40°C and $a_w = 0.1 \div 0.9$ following static gravimetric methods. The obtained S-shaped equilibrium sorption isotherms confirm the constant trend that with increasing equilibrium moisture content, the temperature decreases in conditions of constant water activity. Based on the obtained sorption capacity data, a calculation of the monolayer moisture content was made using the linearization of the BET model. One of the modified three-parametric models of Oswin, Halsey, Henderson and Chung-Pfost was selected as a suitable model for describing all sorption isotherms.

PP24

EQUILIBRIUM ISOTHERMS OF RED BEETROOT

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The equilibrium moisture content of red beetroot has been studied and the corresponding sorption-desorption curves have been obtained at temperature 20°C. The strain measurement method has been used to establish the sorption curves. Analytical dependence describing the sorption and desorption curves have also been derived. Values of equilibrium moisture contents for temperatures higher than 20°C have been obtained by the Pass and Slepchenko's method. The results are presented in graphical and table form.

PP25

LABORATORY CONVECTIVE DRYER COMBINED WITH MICROWAVES

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A laboratory convective dryer combined with microwaves has been designed and made. It has been made detailed description of his construction and its working principle. Initial experiments has been conducted to test the dryer when drying root vegetables (parsnips) with combined modes. A few qualitative characteristics of the resulting dried product have been presented - total flavonoids, phenols, etc. An assessment of the energy consumption for the drying process has been made.

PP26

WEB-BASED TOOL FOR FAST QUALITATIVE ANALYSIS OF THE STERILIZATION PROCESS FOR FOODS WITH EXTENDED EXPIRY DATE

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A digital calculator algorithm for F-effect calculation in an online environment is presented. The tool gives a value that analyzes the nature of the sterilization process in thermally processed foods. The obtained result is a reference to "F Soft" software for modelling the process with increasing or decreasing the retention time at reaching the required F-effect, ensuring microbiological stability and nutritional value, while preserving the taste qualities of the canned product in real time mode or when reading external data, creating an appropriate mode. The implementation of the web tool is done with PHP programming language and it provides a quick guideline for the quality of the production cycle of the product to be sterilized.

PP27
OPENZFS

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Data integrity is crucial in government, business and public sector. Data lost can mean unrecoverable losses of money, reputation or trust. This paper review a storage system based on ZFS (Zettabyte Storage System) that can present the potential of open source file system that provides strong data integrity, simple management, and big capacity.

PP28

SOFTWARE TOOL FOR DATA MINING OF PEPTIDES PHYSICOCHEMICAL PROPERTIES

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Biologically active peptides (BAP) are the subject of increasing research interest because they are successfully used in the medicine, food, and pharmaceutical industries. Investigating the properties of peptides is a laborious and expensive process. Therefore, to discover biological, physicochemical, and sensory properties of peptides, in silico methods, including data mining or artificial intelligence, are increasingly applied. This greatly shortens the process of studying peptide sequences. This paper presents a software tool that uses a data mining approach to discover a number of physicochemical characteristics of a specific peptide. Working with it is extremely simple - it is only necessary to enter the amino acid sequence of the peptide of interest. The software tool is designed to generate data to increase classification and prediction accuracy and also to facilitate the design of new amino acid sequences. In this way, the proposed software will significantly support the work of scientific researchers.

PP29

COMPARISON OF GREEN TECHNOLOGIES FOR VALORIZING SUGAR BEET LEAVES (BETA VULGARIS L.)

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This study is focused on the valorization of sugar beet leaves (*Beta vulgaris* L.), a prominent by-product wasted during the process of sugar. For doing so, Ultrasound-Assisted Extraction (UAE), Pressurized Liquid Extraction (PLE), and Maceration Extraction (ME) methods were compared by evaluating the extraction yield and the recovery of Total Phenolic Compounds (TPC), Total Flavonoid Content (TFC), individual phenolic profile, DPPH, FRAP, and ABTS. Ethanol and water (70% V/V) were employed as extracting solvents. The TPC for UAE and PLE methods was 4.90 ± 0.083 and 6.46 ± 0.33 (mg GA/mL), respectively, differing significantly ($P < 0.05$) from each other. Moreover, the TFC in the PLE method was the highest with 1.45 ± 0.06 mg QE/mL ($P < 0.05$). The antioxidant activity of extracts was significantly different as the PLE method yielded the highest quantities. Benzoic acid was present only in the PLE extracts, and PLE and ME methods had the highest quantities of syringic acid (0.35 ± 0.00 mg/L) and Pyrogallol (74.80 ± 0.01 mg/L), respectively. However, the extraction yield obtained by the UAE method ($19.58 \pm 0.33\%$) had a significant statistical difference from other methods. Therefore, despite the higher TPC and antioxidant activity obtained by the PLE method, it was proved that UAE yields higher polyphenolic compounds with a lower quantity of beet leaves.

PP30

MICROBIAL GROWTH KINETICS AS A METHOD TO MODEL AND PREDICT THE DEVELOPMENT OF STARTER CULTURES

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A comparative study was conducted on the growth rate of lactic acid bacteria involved in starter cultures for the production of lactic acid products. On the basis of the data obtained on the rate of development, it is possible to predict their development as monocultures or as cultures in symbiotic relationship. In order to achieve the set objective, culture of lactic acid microorganisms in a bioreactor was carried out for 24 hours. Data on the rate of development in the different phases represented by the acid formation curve were recorded for the following strains: *Lactobacillus delbrueckii* subsp. *Bulgaricus* S22; *Streptococcus thermophilus* S1; *Lactobacillus rhamnosus* AS15; *Lactobacillus casei shirota* 51C. The conclusions drawn allow the correct and predictable use of the investigated strains of lactic acid bacteria in starter cultures for the production of lactic acid products.

PP31

**COMPARATIVE STUDY OF VOLATILE SUBSTANCES IN SPIRITS BEVERAGES
DISTILLED BY TWO DIFFERENT INITIAL MATERIALS OF PRUNUS DOMESTICA
“STANLEY” IN AN INDUSTRIAL ENVIRONMENT**

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Analysis of the chemical composition of volatile substances in two distillates from *Prunus domestica* “Stanley” cultivated in the village of Rumyantsevo, Lovech, Bulgaria. Production is in an industrial environment, fermentation and distillation are carried out under equal conditions, but on different starting materials. One batch PDS-1 distilled from fermented mash and second batch PDS-2 distilled from fermented juice. The distillation apparatus is equipped with a rectifying column with 4 trays, as well as a water reflux condenser. Determination of congeners in both samples was done by gas chromatography principle OIV-MA-BS-14:2009. Methodology used for measuring alcohol content, cyanide derivatives, furfural and total acidity is according to the requirements of the OIV. In PDS-1 methanol (1094.7 g/hL a.a.) is almost 8% higher than in PDS-2 (1015.8 g/hL a.a.), it was found insignificant increase of furfural content in distillates of PDS-1 than in PDS-2. Concerning esters, aldehydes and higher alcohols the amount in PDS-1 is significantly higher than in PDS-2, respectively 203.06 g/hL, 14.2 g/hL and 484.6 g/hL in batch fermented with hard particles, and 14.2 g/hL, 8.6 g/hL, 267.9 g/hL in batch produced from fermented juice.

SYMPOSIUM: FOOD QUALITY FOR A BETTER QUALITY OF LIFE

This satellite event is organized by the **National Research Programme "Healthy Foods for a Strong Bio-economy and Quality of Life" (Component 3)**.



НАЦИОНАЛНА НАУЧНА ПРОГРАМА

**"ЗДРАВΟΣЛОВНИ ХРАНИ ЗА СИЛНА
БИОИКОНОМИКА И КАЧЕСТВО НА ЖИВОТ"**

The programme is funded by the Ministry of Education and Science. The main objective is to stimulate targeted research in the fields of agriculture, food and bio-economy, thus ensuring sustainable use and management of natural resources, particularly sustainable food production.

Component 3 of the programme is focused on developing innovative technologies for the manufacturing and packaging of high value-added foods, as well as validating analytical methods (microbiological, molecular-biological, biochemical, chemical, immunological, etc.) for assessment of the quality and (bio-)functionality.

Consortium partners:

Agricultural Academy

Agricultural University – Plovdiv (leading partner)

Bulgarian Academy of Sciences

Sofia University St. Kliment Ohridski

Trakia University – Stara Zagora

University of Food Technologies – Plovdiv

PP1

PCR ANALYSIS FOR MEAT PRODUCTS AUTHENTICITY – DETECTION OF HORSE MEAT

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Food adulteration regarding species origin of meats is a common problem in the meat products sector. With regard to horse meat, its undeclared use in food products is not only a fraud, but could present a health risk since is often associated with the presence of the veterinary drug phenylbutazone in meat products. Therefore, it is important to use reliable methods for authentication of meat products regarding their species composition, which are applicable to complex food matrices. Polymerase chain reaction (PCR) with species-specific primers remains the most widely used analytical approach to detect species-related food adulteration due to its high sensitivity and specificity. The aim of the present study was to establish the authenticity of 20 different meat products on the Bulgarian market without declared horse meat content by using a species-specific PCR method. The specificity test of the PCR method used showed no amplification of DNA from beef and pork. A detection limit of 0.01% horse DNA in three-component meat mixtures was established for the PCR method. The PCR method enabled detection of undeclared presence of horse meat in 25% of the analyzed meat products, which demonstrates the need for strict control regarding authenticity in the meat food chain.

PP2

ENHANCING POSTHARVEST QUALITY OF FRESH-CUT PRUNES WITH CHITOSAN- GRAPE SEED OIL EDIBLE COATINGS

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Edible coatings are traditionally used to improve food appearance and conservation due to their environmentally friendly nature. In this study fresh cut (halved and pitted) prune (var. Stanley) fruits were coated by chitosan grape-seed-oil (GsO) nanoemulsion. Physical, physico-chemical, microbiological and sensorial properties were examined 3 times during 10 days refrigeration storage. The control probes wasted their safety and quality after the 4th days. The coated probes preserved their quality and safety to the end of the storage period. The fruits with chitosan coating shows smaller microbiological contamination but the chitosan GsO coated fruits shows higher values in the sensorial parameters.

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PP3

EDIBLE PH SENSITIVE POLYSACCHARIDE-ANTHOCYANIN COMPLEX FILMS FOR MEAT FRESHNESS MONITORING

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One of the innovative methods for real-time determination of food freshness is the application of pH-indicator sensors, where the color change can be used for the visual detection of acidic/basic volatile compounds formed during product storage due to microbial growth. The aim of the present study is to develop a pH-responsive freshness indicator based on anthocyanins from chokeberry and black carrot, incorporated into an alginate/pectin/Arabic gum composite film. The resulting films show distinct color changes as the pH varies. In general, the color changes from red (pH 2.0 and 3.0) through pink and pale pink (pH 4.0, 5.0 and 6.0) to purple and blue (pH 7.0 and 8.0). The most distinct is the color transition between pH 6.0 and 7.0 for the black carrot extract and the aronia:black carrot mixture (1:3). The applicability of the developed pH-indicator films was demonstrated in fresh chicken meat by tracking the changes during its storage at 4°C for 7 days. The observed results show a distinct color change from pink (day 1-3) to violet and blue on day 7. The developed pH-sensitive films have potential for use in a smart packaging system as a sensor for meat freshness monitoring.

PP4

INVESTIGATION OF THE INFLUENCE OF PARTICLE SIZE AND STORAGE PERIOD ON THE MOISTURE OF GRANULAR SYNBIOTIC PRODUCTS – A STATISTICAL APPROACH

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This article examines the influence of particle size and storage time on the moisture of granular lyophilized synbiotic products - "LYO - Milk Strawberry" and "LYO - Milk Chokeberry". For each of these two products, four variants of mixtures with different types and concentrations of substances (sucrose, locust bean gum, and fructooligosaccharides (FOS)) are prepared. The analysis is based entirely on statistical methods and techniques. The obtained results show that the two factors - particle size and storage time do not have a mutual influence on the moisture of the tested products. However, they have a significant impact individually. It was also found that particle size is directly dependent on the type and concentration of the added substances.