PROGRAM
&
BOOK OF ABSTRACTS

Edited by

Galin Ivanov, Kiril Mihalev, Georgi Dobrev, Georgi Kostov, Desislav Balev

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University of Food Technologies, Plovdiv, Bulgaria

&

E-learning tools for Food technology and development education (E-Food)

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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 social-economic sciences, our mission is to create the educational and research background for sustainable development in the *Food & Beverage, Wine, Hospitality & Tourism, Essential Oil & Cosmetics, Biotech and Tobacco* industries.

UFT IN NUMBERS

Students (2024): 3509

Programmes:
20 Bachelor
35 Master
24 PhD

Academic staff (2024): 194

Academic publications (till 2024) / of which articles in peer-reviewed international journals:
2060 Scopus &
1388 WoS

FACULTY OF TECHNOLOGY

Programmes in the fields of:

- Food and beverage technology
- Enology
- Food safety and quality management
- Food chemistry and microbiology
- Functional foods
- Food security
- Biotechnology
- Essential oils, cosmetic and tobacco products technology

Joint MSc in Technology of Wine and Wine-Based Beverages (PlovdivWineUni Master) (Since 2023) – the *1st programme in the South-Eastern Europe* developed in cooperation with the International Organisation of Vine and Wine (OIV)

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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, marketing and entrepreneurship
- Environmental management

UFT AND ERASMUS+

Erasmus+
Обогатява житейския опит, разширява кръгозора.

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, two projects – № 2023-1-BG01-KA131-HED-000113186 and № 2024-1-BG01-KA131-HED-000197013 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 project:

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).

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ORAL SESSIONS

Thursday, October 24, 2024
UFT-Plovdiv, Building 2, Horizon Hall

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		Plenary Session Chairs: Kiril Mihalev, Georgi Dobrev
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PL1

CURSE AND BLESSING - THE INTRICATE ROLE OF SECONDARY PLANT METABOLITES IN WINE QUALITY

Fabian Weber[1]

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Wine quality is determined at numerous steps from viticultural handling of the grape vine including infection control, technological steps during processing of grapes, and also by processes during fermentation. Within these different steps, polyphenols play direct and indirect roles, since they possess sensory properties but also impact the course of infections as phytoalexins and affect microbial activity during fermentations.
Infection of grapevines with the grey mold pathogen *Botrytis cinerea* results in severe problems for winemakers worldwide. In the last decades, *Botrytis* management has become increasingly difficult due to the rising number of resistances and the genetic variety of *Botrytis* strains. During the search for sustainable fungicides, polyphenols showed great potential to inhibit fungal growth. The present study revealed two important aspects regarding the effects of grape-specific polyphenols and their polymerized oxidation products on *Botrytis* wild strains. The impact of phenolic compounds on mycelial growth is not correlated to the effect on laccase activity. Instead, mycelial growth and relative specific laccase activity appear to be modulated independently.
Malolactic fermentation (MLF) is an important step in winemaking to improve wine quality by deacidification, increased microbial stability, and modified wine flavor. The phenolic composition of the wine influences the growth and metabolism of the lactic acid bacteria (LAB) used for MLF. The increased cultivation of fungus-resistant grape cultivars which usually accumulate higher amounts of polyphenols might entail fermentation problems. Our results show that wines made from stilbene-rich grapes, such as fungus-resistant cultivars, might have a higher risk for a sluggish or incomplete MLF.

PL2

PROBIOTICS VERSUS POSTBIOTICS: FUNCTIONAL FOOD COMPOUNDS AND HEALTH BENEFITS

Fatih Özogul[1,2], Yılmaz Uçar[3]

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The growing interest in functional foods has led to the exploration of both probiotics and postbiotics for their health-promoting impacts. Probiotics, defined as live microorganisms that provide health benefits to the host when administered in adequate amounts, have long been recognised for their role in improving gut health, modulating immune function and preventing gastrointestinal disorders. However, challenges such as maintaining probiotic viability during food processing and storage have encouraged interest in postbiotics, which are non-viable microbial cells, metabolites or cell components that still exert beneficial health effects.

Postbiotics, including short-chain fatty acids, exopolysaccharides, peptides, and vitamins, offer distinct advantages over probiotics, including greater stability, safety, and ease of integration into food products. Emerging research underlines postbiotics' ability to modulate immune responses, reduce inflammation, and improve gut barrier function without the need for live organisms. Recent studies have also suggested that postbiotics may enhance the bioavailability of certain nutrients and support metabolic health, offering promising applications in functional food development.

This work focuses on comparing the health benefits and functional applications of probiotics and postbiotics, integrating the latest research on their role in gut microbiota modulation, immune health and disease prevention. By comparing their mechanisms of action, safety profiles and practical application in food formulations, this study provides insight into how both probiotics and postbiotics can be used to improve human health. Ongoing advances in the field point to a future where postbiotics may complement or even surpass probiotics in functional food innovation, contributing to the development of more effective and versatile health-promoting foods.

Food Science and Technology

PP1

AN INVESTIGATION ON RYO/MYO TOBACCO CHARACTERISTICS AND SMOKE EMISSIONS AS A FUNCTION OF CIGARETTE DESIGN ELEMENTS

Nikolay Nikolov[1], Violeta Nikolova[2], Todorka Petrova[3], Radka Bozhinova[1], Yovko Dyulgerski[1], Venelina Popova[4]

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Fine-cut tobacco blends for hand-made cigarettes (RYO/MYO) represent a significant part of the contemporary tobacco market in Bulgaria and worldwide. Their popularity is due mainly to the affordable price and the option to adjust cigarette design to smoker's preferences. The objective of the current study was to determine the main physical and chemical characteristics of different brands of RYO/MYO tobacco available on the national market, and to follow the impact of cigarette design elements on the levels of smoke emissions. Four variants of laboratory cigarettes with varying design parameters (length, diameter, paper type and permeability, tobacco weight) using five tobacco brands were analyzed. High share of long strands (over 80%) was found for all blends, and the cut width was below 0.40 mm. Tobacco moisture content was higher than that in sold cigarettes. The nicotine content varied 1.98-2.50%, reducing sugars – 11.30-17.00%, ash – 11.03-13.04%, Cl – 0.65-1.09%, K – 2.58-2.88%. One and the same blend produced different levels of nicotine, tar and CO depending on cigarette design variation, and the reduction of tobacco weight by just 0.07g resulted in over 15% decrease in smoke emissions. In most of the blends and cigarette variants smoke emissions exceeded significantly the limitations.

PP2

APPLICATION OF PEPTIDE NANOSTRUCTURES IN THE FOOD INDUSTRY

Margarita Terziyska[1], Veselin Vladev[1], Zhelyazko Terziyski[2], Iliana Ilieva[1], Stefan Bozhkov[1]

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The purpose of this article is to present the concept of nanotechnology, its growing importance in the food industry, and the challenges associated with its use, with a special focus on peptide nanostructures. Peptide nanostructures are innovative materials that self-assemble into nanometer-scale configurations such as nanoparticles, nanocapsules, and nanofibers. These structures can encapsulate bioactive ingredients such as vitamins, antioxidants, and minerals, providing controlled release and enhanced bioavailability. Peptide nanostructures also exhibit strong antimicrobial properties, making them suitable for use as natural bio-preservatives, reducing the risk of microbial contamination, and extending the shelf life of food products. In packaging, these nanostructures can improve the barrier properties of materials, protecting food from external influences and maintaining its freshness. This article examines current research and applications of peptide nanostructures, highlighting their unique properties and potential benefits for the food industry. Despite their promising potential, it remains important to address issues related to the safety and public acceptance of these technologies to ensure their successful implementation.

PP3

CHANGES IN PHYSICO-CHEMICAL PARAMETERS AND ORGANOLEPTIC PROPERTIES OF DIFFERENTLY DRIED APRICOT, PLUMCOT AND PLUM FRUITS

Dasha Mihaylova[1], Aneta Popova[2], Pavlina Doykina[1], Maria Dimitrova-Dimova[1]

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The preservation of seasonal fruits in the form of drying is an approach that has been applied for centuries. The present study presents the variation of important parameters such as color, water activity, moisture content, pH and sensory parameters of air-, convectively and freeze-dried fruits of "Modesto" apricot, "Stanley" plum and their hybrid "Stendesto".The obtained data showed similar results regarding air-drying and using a fruit dryer. Perceptible differences are reported with freeze-drying, not only in terms of color but also in terms of consistency. Storage within six months showed changes in the sensory parameters (color, consistency, aroma, appearance) for all three drying options. An advantage of convective drying (in a dryer) compared to air drying is the time-saving. In all three variants, the specific pleasant aroma of dried fruit is preserved for the entire storage period. The present study is a pilot for plum-apricot hybrids and their reference to the parent lines.

PP4

CHEMICAL, TECHNOLOGICAL AND SENSORY PROPERTIES OF ENHANCED WHITE CHOCOLATE WITH UNCONVENTIONAL INGREDIENTS

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From the group of confectionery products, chocolate items are among the most preferred by all age groups. One of the four types of chocolate mass is white. Research has proven over the years that there are some health benefits attached to white chocolate as the following: it is capable of improving cardiovascular health, it improves blood circulation, it reduces our vulnerability to heart diseases and it assists in lowering blood pressure. The aim of the current study was the design of white chocolate enriched with unconventional ingredients such as baklava crust crumbs and pistachios. The chocolate products were prepared without and with 10%, 15% and 20% mix of unconventional ingredients. Physicochemical analyses of dry matter, pH, total sugar content and texture were performed. The rheological properties of the obtained chocolate masses were also determined. Results reveals that increasing the amount of mixture decrease the dry matter of the samples and increases the hardness. The addition of baklava and pistachio crust crumbs has a significant impact on the flavor profile of the chocolates. The biggest changes are related to the intensity of perception of the elements of the aroma.

PP5

COMPARATIVE STUDY OF THE ANTIOXIDANT PROPERTIES OF LYOPHILIZED EGG POWDERS FROM JAPANESE QUAIL ENRICHED WITH HERBAL EXTRACTS

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The aim of the research was a comparative analysis of the antioxidant activity of lyophilized albumen, yolk and melange of quail eggs, enriched with aqueous extracts of three medicinal plants - Mursalski tea, dwarf everlast and St. John's wort. Before freeze-drying, the separated parts of the quail eggs were mixed with the aqueous extracts in the following ratios: albumen (1:1), yolk (1:2), melange (1:1.4). The moisture content of resulting freeze-dried powders was below 5%. The addition of the extracts slightly affected the amount of protein, lipids and ash, but significantly increased the content of phenolic substances. The antioxidant activity of the lyophilizates was evaluated by determining the radical scavenging ability towards DPPH and ABTS. The addition of the extracts increased the DPPH radical scavenging activity up to 11 times compared to the control (93.41 μmol TE/g for lyophilized albumen with St. John's wort). When using the ABTS method, the highest value was obtained for the lyophilized albumen with Mursalski tea extract (325.9 μmol TE/g). The obtained lyophilized egg powders enriched with herbal extracts have significantly increased antioxidant activity and could be used in the development of new functional food products with a positive effect on human health.

PP6

COMPLEXATION BETWEEN PHENOLIC COMPOUNDS AND SOY PROTEIN ISOLATE: EFFECTS ON PROTEIN STRUCTURE

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Complexes are formed between phenolic compounds in hydro-ethanol pomegranate peel extracts and soy protein isolate in alkaline environment (pH 9) with pre-treated protein at 90℃. Three different extract concentrations have been used (1, 2 and 3%). The protein-phenol interaction in the complexes has been analyzed through structural, morphological and functional changes using electrophoretic (SDS-PAGE) and spectroscopic techniques (UV-Vis и FTIR) along with scanning electron microscopy. The results indicate changes in the secondary structure of proteins and a strong affinity to bind with polyphenols mainly by way of hydrogen bonds. The data forms a theoretical basis for the interaction between soy protein isolate and polyphenolic compounds in extracts of pomegranate peels. It can be useful in the development of phenol-rich, soy-based functional foods and active biomaterials.

PP7

COMPOSITION OF CAMEL MILK

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This study examined the physicochemical, amino acid, and fatty acid composition, as well as the organoleptic characteristics, of camel, cow and mixed milk samples. The physicochemical analysis of the milk samples revealed that the mean values of the main components were found to be no significantly different from cow milk in some parameters. The pH and titrable acidity (%), which are in very low values, provide proof of an extremely high hygienic condition of milking. Significant differences were observed in the fatty acid and amino acid compositions of the milk samples. The most representative fatty acids in the three groups were C16:0, C18:0, C18:1n9c, C14:0. The milk samples exhibited varying concentrations of certain polyunsaturated fatty acids (PUFAs), including C18:3n3c and C18:3n6c. In the case of camel milk samples, glutamic acid was found to be the most abundant amino acid, followed by proline and leucine. The results of the organoleptic characteristics demonstrate a typical sensory profile. However, camel milk has a distinctive appearance, with a homogeneous liquid and foam on the surface. Its color is white, and its flavor exhibits a subtle salty taste. The results provide a scientific and applied foundation for the development and implementation of new technologies.

PP8

EFFECT OF PHYSICOCHEMICAL PROPERTIES OF MALTITOL ON COLOR CHARACTERISTICS OF SUGAR FREE SPONGE CAKES

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Maltitol (E 956) is a disaccharide sugar alcohol belonging to the group of sweeteners, food additives that are used in food formulations to obtain reduced calorie and weight control products. Its low energy value (2.4 kcal/g), low glycemic index (35 – for powdered maltitol) and 0.9 sweetness intensity make maltitol an appropriate sugar alternative for production of soft drinks, desserts, sweets and dairy products. Physicochemical characteristics of maltitol have important impact on overall quality of produced product – its taste, structure and color properties. The aim of current study was to evaluate some physicochemical properties of maltitol compared to those of sucrose and to determine sweetener's effects on color characteristics of sugar-free sponge cake. Under conditions of acid and enzyme hydrolysis with invertase maltitol is practically not hydrolyzed unlike sucrose which reached degrees of hydrolysis 100% (acid hydrolysis) and 35 % (invertase hydrolysis). Maltitol and sucrose didn't participate in reactions of alkaline degradation and nonenzymatic browning at pH 9, pH 10 and in 70 oC and 80 oC. The replacement of sucrose with maltitol in sponge cake affects its color characteristics. Surface and inner layers of products with maltitol were with lower brightness then those prepared with sucrose.

PP9

EFFECT OF WALNUT FLOUR (JUGLANS SPP.) ADDITION ON WHEAT BREAD CRUMB POROSITY

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Bread is one of the most consumed foods globally and incorporating walnut flour will enhance its nutritional value by including biologically active components. The porosity is a key characteristic of the sensory properties and overall acceptability of the bread crumb. The objective of this study was to investigate the effect of walnut flour on bread crumb porosity by employing image analysis. Six breads were prepared with mixtures of wheat:walnut flour in proportions from 100:0 to 85:15. The number of pores, pore size, total pore area, mean pore size and circularity of the bread crumbs were investigated. The number of pores and their density in 1 cm2 area decrease with an increase of the amount of walnut flour, while the total area of the pores and the average size of the pores increase. Circularity is low and the addition of nut flour has no significant effect on it. The highest percentage of porosity is due to large pores. The area of large pores increases and the area of small pores decreases with the increase of walnut flour. The addition of walnut flour results in an uneven and rough structure of the bread crumb, compared with pure wheat flour bread.

PP10

ELDERBERRY OIL-CAKE „SAMBUCUS EBULUS“ – NATURAL IMMUNE STIMULANT

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In the production of elderberry tincture “Sambucus ebulus”, parts of the berries – oil-cake, which have already passed alcohol fermentation, remain as a waste product. The received results from the conducted analyses on the nutrient profile and energy value, the antioxidant activity and microbiological contamination of the remaining oil-cake, are described in the present research. The nutrient profile and energy value of the elderberry oil-cake (of a 100 g product) contain fibre - 46,25 g, common carbohydrates - 10.90 g, fats - 18.71 g, protein quantity - 10.20 g, common content of ash - 3.18 g and energy value - 345.45 g. The antioxidant activity was determined with the four different in mechanism and conditions of passing methods – DPPH - 32.04±4.23 mMTE/g extract, ABTS -5.97±0.10 mMTE/g extract, FRAP - 3.13±0.17 mMTE/g extract and CUPRAC - 2.23±0.15 mMTE/g extract. The microbiological indicators – common number of mesophilic aerobic and optional anaerobic microorganisms are in the permissible limits 2.102 cfu/g. The spores of the microscopic mold fungi, as well the presence of Enterobacteriaceae, Escherihia coli and Staphylococcus aureus is below the permissible limit, Salmonella sp. is not discovered. The product is not contaminated with the spore-developing and pathogen - Bacillus cereus.

OP1

ENRICHMENT OF VEGETABLE OILS WITH VALUABLE COMPOUNDS FROM HYPERICUM PERFORATUM THROUGH TRADITIONAL AND ULTRASOUND-ASSISTED MACERATION: DIFFERENCES IN EXTRACTION CAPABILITIES AND STABILITY

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The aim of this work is to evaluate the potential of vegetable oils as alternative solvents for recovering lipophilic active ingredients components from flowering parts of Hyrerici herba. The oil extracts were obtained by different procedures: solid-liquid extraction with the application of heat and/or agitation, ultrasound-assisted maceration and a combination thereof, and according to the prescriptions from traditional medicine. The content of total hypericins, polyphenols, flavonoids and photosynthetic pigments were determined by UV-Vis spectrophotometry. It was shown that along with the most used olive and sunflower oil, by the usage of several other oils (sesame seed, grape seed, black seed, almonds, avocado, white mustard, wheat germ, jojoba), it was possible to obtain a macerate containing small quantities of target hypericins, simultaneously with some less polar phenolic antioxidants, and plant pigments, which is expected to improve oxidative stability. Ultrasonic maceration drastically cuts treatment time from days or weeks to less than 3 hours, but required higher temperatures (up to 75°C)to reach yields comparable to traditional maceration. Fourier transform IR spectra of oils before and after the enrichment process were recorded and specific spectroscopic quality indexes were used, and spectroscopic indices were used for verifying and controlling their safety and quality.

PP11

EVALUATION OF COLOR STABILITY OF ICE CREAM WITH SPIRULINA PLATENSIS BY IMAGE PROCESSING

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The aim of current study was to evaluate the color stability of ice cream samples with added Spirulina platensis powder by image processing. The change in color characteristics was monitored during 30 days of storage at -18°C. Images of the examined ice cream samples are processed with iceColor software in order to be extracted representative color for every sample under different lightening conditions. Used software implements three methods for color extraction – scalar defined median color, vector defined median color and average color for pixels that fall in selected area. All defined representative colors are compared versus instrumentally measured colors by Minolta chroma meter (CIE L*a*b* system) using correlation analysis. The results indicate that the highest correlation coefficient (about 0,99 as absolute value) is calculated for images that are captured using embedded flash but for the other two lightening conditions there are also strong correlation (above 0,7). Based on the experimental results can be supposed that control of color changes during storage period could be performed using images processing for images captured with embedded flash (when precision have to be priority) or without any additional lightening (when reduction of energy consumption is more important than precision of color measurement).

PP12

IMPACT OF PROTEIN-PHENOLIC INTERACTION ON THE STABILITY AND BIOACCESSIBILITY OF PHENOLIC COMPOUNDS IN EXTRACT OF POMEGRANATE PEELS

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The objective of this research is to analyze the influence of soy protein isolate (SPI) on the stability and bioaccessibility of phenolic compounds in pomegranate peel extract (ePGP) in a complexes formed between them. The complexes (SPI-ePGP) are formed in an alkaline conditions (pH 9) with pre-treated protein at 90℃ using different extract concentrations (1, 2 and 3%). Bioaccessibility is determined by way of UV-Vis spectroscopy monitoring for changes in the total phenolic content, flavonoids and total monomeric anthocyanins using an in vitro model for simulated digestion. The stability of phenolic compounds is determined after treating the SPI-ePGP and the ePGP with light and heat for 120 hrs. The results from the studies indicate substantial changes in phenolic compound levels during two of the phases of simulated digestion. High phenol levels after stomach digestion go down significantly after intestinal digestion. SPI increases photo- and thermal stability of polyphenols in complexes. The data illustrates the impact of the protein-phenolic interaction on the stability and bioaccessibility of phenolic compounds. It also builds a theoretical foundation for developing functional foods or active materials based on soy protein isolate and extract of pomegranate peels.

PP13

INFLUENCE OF DIFFERENT TYPES OF VEGETABLE MILK ON THE RHEOLOGICAL PROPERTIES AND STABILITY OF SUGAR-FREE STARCH CREAMS

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The effect of oat, almond and coconut milk compared with cow's milk on the rheological properties and stability of sugar-free starch creams was studied. The stability of the creams was assessed by centrifugation of the samples. It was found that creams with almond and coconut milk have the highest stability recorded on the 2nd, 5th and 10th day of storage. Comparison of the strength of the creams was analyzed by penetrometer. The cream with almond milk exhibits the highest strength, and the lowest with oat milk. Rheological studies were performed at 50 °C in controlled shear rate mode. The data show that all systems studied are non-Newtonian fluids. All creams are pseudoplastic fluids. Creams with coconut and almond milk have the highest initial viscosity. Creams obtained with cow's and oat milk, on the other hand, have significantly higher stability.The energy value of the obtained creams was also calculated, with the highest values for cream with cow's milk, and the lowest values for coconut and almond milk.

PP14

INFLUENCE OF THE ADDITION OF GRAPES POMACE DURING SINGLE OR DOUBLE BATCH DISTILLATION ON THE CHEMICAL COMPOSITION OF WINE DISTILLATES

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In many countries, they use the waste grapes pomace from winemaking for the production of grape distillates. For example, in Italy about 85% is the relative share of all distilled beverages, which falls on the grapes pomace distilled beverage "Grappa". This shows how valuable the waste grapes pomace from the wine industry are for the production of drinks with an authentic aromatic and taste character. Adding a certain amount of grape pomace during distillation is dictated by the desire to obtain more pronounced muscat distillates, suitable for making the corresponding quality aromatic brandies. The purpose of the research is to determine the influence of the addition of grapes pomace during single or double batch distillation on the chemical composition of wine distillates. During preliminary tests, it was established that the added amount of grapes pomace should be within 10% of the distilled wine material. As a result of the research, the influence of the addition of grapes pomace during single or double batch distillation on both the main chemical composition and the components determining the aromatic profile of the wine distillates was established.

OP2

NON-CONVENTIONAL YEASTS IN BEER PRODUCTION – A REVIEW

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The beer production has a thousand-year tradition, and its consumption increase constantly. The competitive market requires new technological solutions, which include various modifications in some of the main raw materials - malt, hops or yeast. Brewing yeasts together with wort composition affect significantly beer flavour and aroma, because most of the aromatic beer compounds are intermediate metabolites and by-products of yeast metabolism. The main yeast used in brewing belongs to the kingdom Mycetae (Fungi), phylum Ascomycota, subphylum Saccharomycotina, class Saccharomycetes, order Saccharomycetales, family Saccharomycetacea, genus Saccharomyces. The top-fermenting (ale) yeast belongs to the species Saccharomyces cerevisiae, and the bottom-fermenting (lager) yeast belongs to the species Saccharomyces pastorianus. However, the advent of craft brewing, as well as the increasingly sophisticated taste and health awareness of the consumer, unlocked a new niche in brewing – the use of non-conventional yeast strains. These yeasts included different species of the genus Saccharomyces, as well as species that are contaminating microflora for the various beverage productions such as Candida spp., Hanseniaspora spp., Lachancea spp., Pichia spp., Saccharomycodes spp., Schizosaccharomyces spp., Torulaspora spp., and Zygosaccharomyces spp. The aim of this review is to present the advantages and disadvantages of using non-conventional yeast in beer production.

PP15

PHYSICAL AND CHEMICAL CHARACTERISTICS OF WATER PIPE TOBACCOS

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The aim of the study is to determine the main physical and chemical characteristics of water pipe (hookah) tobacco mixtures sold on the Bulgarian market. The regarded type of tobacco product focuses researchers' interest due to its specific composition, consumption qualities and increasing popularity, especially among younger people, but the available information on the composition and indicators of hookah tobaccos in Bulgaria is too limited. The content of tobacco shreds (from 31.11% to 77.41%) and moisture (30-40%) in the hookah mixtures were analyzed, as well as the main chemical indicators of tobacco and smoke – total reducing sugars, ash, nicotine, total and dry particulate matter, etc. The nicotine content in three of the five samples tested was extremely low – below 0.12%. The amounts of total particulate matter, TPM (from 377.36 to 427.85 mg/g of burnt tobacco) and dry particulate matter, DPM (from 56.34 to 128.20 mg/g of burnt tobacco) were higher than those in cigarette smoke. The obtained results expand the knowledge about this non-traditional for Bulgaria, but increasingly popular tobacco product.

OP3

PREPARATION AND CHARACTERIZATION OF DRY EGG PRODUCTS FROM TECHNICAL EGG WHITE

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Industrial egg processing produces tons of solid and liquid waste. The adhering (technical) egg white is the second waste by volume. Acid-thermal coagulation is a possible approach for the utilization of this animal by-product. The aim is to evaluate the dry product yield, as well as its characteristics. Citric (CA) and phosphoric (FA) acids were used, as well as their combination with n-hexane (CAo and FAo). The highest yield of dry product was obtained for samples FA and LA at pH 4.9 and 5.1, respectively. The acid used does not affect the chemical composition of the finished product. Water activity ranges from 0.50 to 0.65. The highest value of the L* component of the color is for LAo - 80.88, and the a* component is the highest for FA - 5.96, that is, more non-enzymatic browning products are expected for FA. The indicator 2-thiobarbituric acid reactive substances indicating the oxidative changes of the lipid fraction has the lowest values in the samples treated with LA. The hydrolytic and oxidative changes in the protein fraction were not statistically significantly affected by the treatments. The presence of bacteria from the family Enterobacteriaceae, E. coli, and Salmonella spp was not detected.

PP16

STUDY OF CHANGE IN PEROXIDE VALUE AND SEPARATION STABILITY DURING STORAGE OF PEANUT PASTES ENRICHED WITH MALT EXTRUDATES

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Peanut pastes enriched with 2% malt extrudates were developed and three types of stabilizers were added to them in the following quantities: 1% and 2% PS 209; 6% and 8% soy lecithin; 3% and 5% slow-gelling sodium alginate. The changes of the peroxide value and the oil retention capacity of the studied products were monitored for a period of 18 months. It can be summarized from the reported data that soy lecithin in concentrations up to 8% and slow-gelling sodium alginate in concentrations up to 5% are not suitable for stabilizing peanut paste enriched with 2% malt extrudates. The best results for obtaining a stable, without separation product are observed when using 2% stabilizer PS 209. The selected technological stages and parameters are suitable for obtaining peanut pastes, stable during their storage period of 18 months, in non-refrigerated conditions. The aim of the present study is to develop peanut pastes enriched with malt extrudates and to establish the best stabilizer preventing separation of the finished product during storage for 18 months.

PP17

TECHNOLOGICAL PROFILE AND QUALITY LEVEL OF TOBACCOS FROM BASMI VARIETY GROUP DOMINATING THE BULGARIAN MARKET

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The dominance in the current Oriental tobacco market in Bulgaria is largely identified with the demand and supply of "Krumovgrad", "Basma" (GR) and "Katerini" (GR) ecotypes. The aim of the study was to characterize the technological profile and quality level of those tobaccos in two production regions, based on the complex assessment of chemical, visual, smoking and other properties. A comparative analysis and ranking of the ecotypes within each of the regions was carried out. The chemical analysis showed higher nicotine content in the tobaccos of Greek origin - "Basma" (GR) in region Nevrokop (0.75%) and "Katerini" in Gorna Dzhumaya (1.11%), but all samples, regardless of ecotype and production area, had reducing sugars/nicotine ratio considerably higher than optimal values. The rest of the chemical indicators and the expert assessment of tobacco sensory properties revealed tobacco quality variations within each of the regions. The final ranking of the ecotypes in the respective regions, based on the complex evaluation of all quality indicators, suggested that in region Nevrokop the highest quality level was found in "Krumovgrad" ecotype tobacco from Bogolin, followed by "Basma"(GR) from Teplen and "Krumovgrad" from Valkosel, while in region Gorna Dzhumaya better was the tobacco of ecotype "Katerini"

PP18

THE INFLUENCE OF CARRIERS DURING THE DRYING OF HONEY WITH A SPRAY DRYER

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The purpose of this study was the research of carriers such as: (Maltodextrin, Dextrin, Gum Arabic, N-Zorbit) during the drying of honey with a spray dryer. Inlet temperature 215°C, outlet temperature 95°C, rotational speed of disc atomizer 22000 rpm, feed rate of 1 mL/s. Solutions with different percentages of honey bee (40%, 50%, 60%) and carriers are prepared to undergo drying. The properties of obtained powders were quantified in terms of moisture content, bulk density, tapped density, hausner ratio, hygroscopicity, solubility, total and reducing sugar.

PP19

UNDERSTANDING CONSUMERS' FUNCTIONAL BEVERAGES PURCHASE INTENTION: MODELING THE IMPACT OF EXPLANATORY FACTORS

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This study presents the analysis of a model that investigates the influence of consumers' personal values, consumer's innovativeness and functional beverage health benefits on purchase intention toward functional beverages. All measurement scales for the examined factors were taken from specialized sources. The conceptual model was tested with the help of structural equation modeling. The results indicated that all proposed factors were significant predictors of consumers' functional beverages purchase intention.

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OP4

CHOCOLATE CANDIES ENCAPSULATED IN COCOA BUTTER MICROEMULSION CELLS OF PROBIOTIC STRAIN

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Chocolates were prepared with a probiotic strain of Lactiplantibacillus plantarum 13/20 and a prebiotic component of currant, cherry and blueberry flours. The probiotic cells were introduced by encapsulation in cocoa butter and the prebiotic components by dissolution in an alginate gel. The rheological performances of the resulting chocolates were investigated. It was shown that the addition of prebiotic in the amount of 3.5% negatively affected the rheological properties as well as the organoleptic performance. The candies are characterized by higher moisture content. It has been shown that the size of the gel beads significantly affects the rheology of chocolate products. The larger the diameter of the gel beads, the stronger their influence on the rheological properties of the chocolates. The sample with gel pearls and blueberry at 2,5% had the best organoleptic characteristics. The microbiological status of the chocolates was determined. All met the standard requirements for microbiological safety.

PP20

COMFREY (SYMPHYLUS OFFICINALE L.) ROOTS – SOURCE OF POLYPHENOLS AND FRUCTANS

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The aim of this research was to evaluate the polyphenolic content, antioxidant activity and fructans in water extracts from comfrey roots using microwave-assisted extraction. Additional isolation and chemical characterization of inulin from roots was performed. The total phenolic content and total flavonoids were evaluated using spectrophotometric methods. Antioxidant potential was evaluated using DPPH and FRAP methods. Sugars and fructans were evaluated HPLC-RID method. Isolated inulin was characterized for yield, fructose content, degree of polymerization and molecular weights. Its structure was elucidated using FTIR spectroscopy. From the conducted research it was found that comfrey roots were rich sources of total flavonoids 64 mg quercetin equivlents/g dry weight and fructans – 13g/100g dry weight. Antioxidant potential was in higher values using FRAP method. Isolated polysaccharide by microwave-assisted extraction was characterized with fructose content 74,4%, high degree of polymerization (29–33) and molecular weights 5.1-5.3 kDa. FTIR spectroscopy confirmed that isolated polysaccharide was inulin-type fructan with characteristic bands for β(2→1) bonds. To the best of our knowledge this is first detailed analysis of inulin-type fructan isolated from comfrey (Symphylus officinale L.) roots. Comfrey roots was evaluated as sources of flavonoids and inulin and they can find further application in cosmetics and pharmacy.

PP21

CONDITIONS FOR IMMOBILIZATION OF CYCLODEXTRIN GLUCANOTRANSFERASE FROM BACILLUS MEGATERIUM ON DEAE-CELLULOSE ACTIVATED WITH GLUTARALDEHYDE

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Abstract. The aim of the research is investigation on the conditions for immobilization of cyclodextrin glucanotransferase (CGTase) produced by Bacillus megaterium on DEAE-cellulose activated with glutaraldehyde. The used support was chosen as the most suitable one, after testing different supports. Several factors that influence the immobilization process on DEAE-cellulose activated with glutaraldehyde were studied, including enzyme amount, pH, glutaraldehyde concentration and time of immobilization. All tested factors significantly affected the immobilization process of CGTase and the corresponding activity parameters of immobilized biocatalyst. The immobilization process of the enzyme was evaluated by calculating the immobilization yield, immobilization efficiency and activity recovery of CGTase. As a result of the performed studies the optimal conditions for CGTase immobilization on DEAE-cellulose were determined. They were as follows: CGTase enzyme amount 8 U, pH value during immobilization 7.0, 2 % (v/v) concentration of glutaraldehyde, immobilization time of 3 h. At these conditions immobilization yield was 71.87 %, immobilization efficiency was 10.49 %, and activity recovery was 7.54 %, which were significantly improved indicators for enzyme immobilization in comparison to the initial values before the optimization of the immobilization conditions.

OP5

EXAMINATION OF SOME TECHNOLOGICAL PROPERTIES OF LACTIC ACID BACTERIA OF THE GENERA LACTIPLANTIBACILLUS AND LEVILACTOBACILLUS ISOLATED FROM SPONTANEOUSLY FERMENTED SOURDOUGH. PART 1: ENZYMATIC PROFILE

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In the development of symbiotic sourdough starters, it is necessary to examine the enzymatic profile of all potential lactic acid bacteria (LAB) strains. The enzymatic profile of 4 strains of the genus Lactiplantibacillus and 2 strains of the genus Levilactobacillus was investigated using the API ZYM system (Biomerieux®, France) and in separate experiments the amylolytic and proteolytic activity were determined by the agar-diffusion method with wells. All Lactiplantibacillus strains possessed: leucine arylamidase, valine arylamidase, cysteine arylamidase, acid phosphatase, phosphohydrolase, β-galactosidase, α-glucosidase, β-glucosidase and α-glucosaminidase. The two Levilactobacillus brevis strains possessed: lipase C4, esterase lipase C8, leucine arylamidase, valine arylamidase, cysteine arylamidase, acid phosphatase, naphthol-AS-BI-phosphohydrolase, α-galactosidase, β-galactosidase, α-glucosidase, β-glucosidase. Lactiplantibacillus plantarum L1 demonstrated the highest amylolytic activity, and Levilactobacillus brevis X4 has the lowest. Lactiplantibacillus plantarum L1 exhibited the highest proteolytic activity, and Levilactobacillus brevis X4 - the lowest. The proteolysis was due to the production of inducible proteolytic enzymes by the LAB cells, as well as acid hydrolysis resulting from the lactic, acetic and other organic acids produced by the strains. The six LAB strains possess a rich and diverse enzyme profile, which is a prerequisite for their application in the development of symbiotic starters for sourdough bread.

OP6

EXAMINATION OF SOME TECHNOLOGICAL PROPERTIES OF LACTIC ACID BACTERIA OF THE GENERA LACTIPLANTIBACILLUS AND LEVILACTOBACILLUS ISOLATED FROM SPONTANEOUSLY FERMENTED SOURDOUGH. PART 2: ANTIMICROBIAL ACTIVITY AGAINST SAPROPHYTIC MICROORGANISMS

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A positive effect of sourdough application in bread production is an extension of the shelf life of the finished bread due to inhibition of saprophytes by lactic acid bacteria (LAB) from the composition of the sourdough starters. When developing symbiotic sourdough starters, it is important to test the antimicrobial activity of each potential LAB strain against saprophytes. The antimicrobial activity of 4 Lactiplantibacillus strains and 2 Levilactobacillus strains against saprophytes was investigated by the agar-diffusion method with wells. Lactiplantibacillus plantarum Ph2, Lactiplantibacillus paraplantarum Ph3 and Lactiplantibacillus plantarum L1 exhibited high antimicrobial activity against Bacillus sp., while Lactiplantibacillus paraplantarum Ph5 did not suppress their growth. All four strains inhibited Aspergillus niger and Penicillium chrysogenum. Lactiplantibacillus plantarum Ph2, Lactiplantibacillus paraplantarum Ph3 and Lactiplantibacillus plantarum L1 also inhibited Aspergillus flavus, Rhizopus oryzae and Fusarium monilifirme. Both Levilactobacillus brevis strains did not inhibit Bacillus sp. and Mucor luteus, but inhibited Aspergillus niger and Fusarium moniliforme. The suppression was due to a direct antagonism between the LAB cells and the saprophytic cells and to a pH decrease. The antimicrobial activity of the six LAB strains against fungi and Bacillus sp. makes them suitable for application in the development of symbiotic starters for sourdough bread.

OP7

INVESTIGATING THE POSSIBILITIES OF CAPTURING TRANSPORT HYDROPHILIC PARTICLES OF SIO2, ADSORBED PAHS ON THEIR SURFACE IN A CYCLONE-VORTEX WATER LAYER OF ATMOSPHERIC AIR

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Polycyclic aromatic hydrocarbons (PAHs) are a class of chemicals that are contained in coal, crude petrol or are synthesized during the burning of organic matter - food, wood, tobacco, etc. This group of substances are highly toxic to living organisms and represent a serious pollutant in nature.The aim of the present study is to investigate the possibility of trapping transport hydrophilic SiO2 particles, which have adsorbed PAHs on their surface, in a cyclonic-eddy water layer of atmospheric air. The spectral absorption bands of 10 standard substances from the PAHs group were determined. The resulting calibration curves were used to determine the amount of detected substances in the water layer. 50 start-up cycles of the experience setting were conducted, distributed by 5 cycles for each individual substance. The obtained results prove that the degree of PAHs adsorption on the surface of SiO2 nanoparticles is quite low and varies between 1.68 and 5.36%, and this also determines the low degree of capture of free molecules through the cyclone-vortex water layer of atmospheric air.

PP22

ISOLATION, IDENTIFICATION AND INVESTIGATION OF SOME PROPERTIES OF LACTICASEIBACILLUS RHAMNOSUS 1 FOR APPLICATION IN THE COMPOSITION OF PROBIOTICS

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The introduction of lactic acid bacteria into the composition of probiotics requires the constant isolation and identification of new strains isolated from natural sources or spontaneously fermented products, the study and characterization of their properties and the selection of strains with proven probiotic properties. Strain 1, isolated from spontaneously fermented pasteurized milk, was identified by applying physiological-biochemical (API 50 CHL) and molecular-genetic methods (16S rRNA gene sequencing) as a representative of the species Lacticaseibacillus rhamnosus. Some of its probiotic characteristics and its enzymatic profile were determined. Lacticaseibacillus rhamnosus 1 was resistant to antibiotics, inhibitors of cell wall synthesis, but was sensitive to most representatives of the other two groups of antibiotics: inhibitors of protein synthesis and inhibitors of DNA synthesis and/or cell division. The strain inhibited the growth of pathogenic microorganisms (Escherichia coli, Staph. aureus, Salmonella abony, Enterococcus faecalis, Ps. aeruginosa) and the majority of saprophytic microorganisms (Bacillus subtilis, Bacillus cereus, Mucor luteus, Rhizopus oryzae, Aspergillus niger, Fusarium moniliforme) included in the study. Lacticaseibacillus rhamnosus 1 exhibited high proteolytic and amylolytic activity. Lacticaseibacillus rhamnosus 1 has some probiotic properties and after further investigation of other probiotic properties, it can be included in the composition of probiotic preparations.

PP23

MICROWAVE-ASSISTED ISOLATION OF INULIN FROM SHATAVARI ROOTS - CHEMICAL CHARACTERISTICS AND FUNCTIONAL PROPERTIES

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The aim of the current study was to isolate and characterise inulin from roots of shatavari (Asparagus racemosus Willd.) using microwave-assisted extraction. Physico-chemical properties of isolated polysaccharides as yield, purity, colour characterisics, degree of polymerisation, molecular weight and polydispertity were evaluated. Structural elucidation was performed by FTIR and NMR spectroscopy. Functional properties as swelling, water and oil holding capacities, flowability and cohesiveness were evaluated. The isolated inulin was characterized with low degree of polymerization 7-10 and molecular mass of 1.6 kDa. The structure of inulin-type fructan was confirmed by FT-IR and NMR spectroscopies, where the presence of 2-ketose and β (2→1) bonds were found. Inulin showed better oil-holding capacity than water-holding one, good swelling properties 6g/cm3, high cohesiveness and fair flowability. The conducted reseach was the first detailed study for elucidation of structure ad functional properties of inulin from shatavari (Asparagus racemosus Willd.) roots. The isolated inulin is low molecular with good swelling and oil-holding capacities and it can be used in food or farmaceutical formualions as texture modifier or taste enhancer.

PP24

PCR SCREENING OF FEED PRODUCTS FOR DETECTION OF GENETICALLY MODIFIED SOYBEAN

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After the development and approval for commercial use of more than 570 genetically modified (GM) crop events worldwide, the qualitative identification and quantification of transgenic plant materials in feed become a serious challenge in terms of feed safety. In the present study, a PCR screening of feed products for the detection of GM soybean was conducted. The CTAB extraction method produced DNA extracts with high quality – DNA concentrations ranged between 145.25 ng/µl and 442.68 ng/µl and the purity of all analysed extracts was high. The limit of detection (LOD) of PCR method for soybean DNA detection was less than 1 soybean genome copy, demonstrating the high sensitivity of the method. The concentration of 0.01% target DNA was determined as LOD of both PCR methods for detection of CaMV 35S promoter and EPSPS gene. Therefore, these methods could be applied for screening of various feed products for the presence of genetically modified DNA. Further, analytical results showed that CaMV 35S promoter and EPSPS gene were observed in 77.78 % of the analyzed feed products. This demonstrated the widespread distribution of GM crops in feed and set the necessity of strict control for the presence of GMO in feed industry.

PP25

PHYSICOCHEMICAL CHARACTERISTICS AND BIOLOGICAL POTENTIAL OF THE FRUITS OF FOUR MEDICINAL PLANTS FROM DOSPAT REGION, BULGARIA

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This study aimed to investigate the physicochemical characteristics and biological potential of the fruits (dried and frozen) of four medicinal plants from Dospat region, Rhodope Mountains, Bulgaria – rosehip (Rosa canina), black elder (Sambucus nigra), cranberry (Vaccinium vitis-idaea) and juniper (Juniperus communis). The physicochemical properties (moisture, ash, carbohydrates, proteins and vitamin C contents) were determined. Afterwards, the biological activities (total phenolic content - TPC, total flavonoid content - TFC, antioxidant, antimicrobial and anti-inflammatory) of methanolic extracts were investigated. The TPC values varied between 5.37 mg GAE/g dw (dried juniper) and 19.64 mg GAE/g dw (frozen cranberry), while TFC values were from 1.26 mg QE/g dw (dried rosehip) to 9.74 mg QE/g dw (frozen black elder). The values of antioxidant activity determined by the DPPH method were between 24.23 mM TE/g dw (dried juniper) and 154.63 mM TE/g dw (frozen cranberry), while those obtained by the FRAP method varied from 23.06 mM TE/g dw (dried juniper) to 138.54 mM TE/g dw (frozen cranberry). The cranberry and juniper fruits showed moderate to high antimicrobial activity. The juniper and black elder fruits demonstrated high anti-inflammatory potential. The results revealed the great potential of these herbs for application in pharmaceutical and functional food products.

PP26

PHYSICOCHEMICAL PROPERTIES, ANTIOXIDANT POTENTIAL, ANTIMICROBIAL ACTIVITY AND 10-HYDROXY-2-DECENOIC ACID (10-HDA) CONTENT OF BULGARIAN ROYAL JELLY

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Royal jelly is a precious and valuable product secreted by the hypopharyngeal and mandibular glands of worker honey bees (Apis mellifera L.) and used as an essential food for the bee larvae and the queen bee. In recent years, royal jelly has gained a reputation as a "superfood" due to its rich chemical composition, exceptional nutritional value and health benefits. The aim of this study was to investigate the physicochemical properties, antioxidant potential, antimicrobial activity and 10-hydroxy-2-decenoic acid content of 16 Bulgarian royal jelly samples. The moisture content varied between 45.88 and 68.49 %, while pH was between 3.92 and 4.15. The total phenolic content took values from 22.84 to 32.62 mg GAE/g. The values of antioxidant activity determined by the DPPH method were between 8.37 and 68.09 mM TE/g, while those obtained by the FRAP method varied from 12.69 mM TE/g to 34.83 mM TE/g. The 16 royal jelly samples showed moderate to high antibacterial activity, but low antifungal activity. The content of 10-hydroxy-2-decenoic acid (one of the major bioactive components in royal jelly) was from 1.19 to 2.52 mg/g. The obtained results revealed the great potential of royal jelly for application in various functional food products.

PP27

STUDY ON THE METABOLITIC PROFILE OF LACTICASEIBACILLUS CASEI SHIROTA 51C

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Lacticaseibacillus casei Shirota is well-studied probiotic strain who has shown beneficial effects on human health. This study employs metabolomics to explore the metabolic profile of L. casei Shirota 51C, providing insights into its metabolic pathways and potential functional contributions to host health. Through advanced analytical techniques, including mass spectrometry and nuclear magnetic resonance spectroscopy, this research identifies key metabolites, maps metabolic pathways, and discusses the implications for probiotic function and application.

Food Process Engineering

PP28

COMPARATIVE ANALYSIS OF DYNAMIC MODELS DESCRIBING OF THE PROCESS DYNAMICS OF ACETIC ACID FERMENTATION

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This paper presents a comparative analysis of kinetic models describing the dynamics of the acetic acid fermentation process in continuous operation. For this purpose, simulation structural models were implemented, a calculation was made of the values of the kinetic parameters of the models, as a result of which the dependences of the change of the microbial population (biomass), the substrate, the metabolic product and the controlling effect over time were obtained. The synthesized models are verified by means of experimental data realized in laboratory and industrial conditions.

PP29

DESIGN AND IMPLEMENTATION OF CLIENT MANAGEMENT SYSTEM IN THE FOOD INDUSTRY

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The article presents a client management system design and development process in the food industry using Python, PostgreSQL and Tkinter. The main goal of the system is to facilitate the management of customers, materials and suppliers, the generation of summaries and reports, providing an easy-to-use and efficient platform for businesses such as hotels, convenience stores, grocery stores, laboratories, etc. Using the Python language allows for fast and flexible development. In addition, PostgreSQL provides database reliability and scalability. The graphical interface based on Tkinter makes the system intuitive and accessible to users. A client management system significantly benefits the food industry and related sectors. It automates key processes such as tracking customer data, orders and payments, resulting in increased efficiency and reduced administrative workload. Thanks to easy access to information through reports and reviews, businesses can quickly analyze data, optimize their work processes and make more informed decisions.

PP30

EFFECT OF WATERMELON SEED FLOUR QUANTITY ON THE DENSITY AND EXPANSION RATIO OF EXTRUDATES

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Watermelon (Citrullus vulgaris) seeds which are considered as waste have a high nutritional value due to the high content of proteins, minerals and unsaturated fatty acids and for that reason they are suitable for production of functional extruded products. Therefore the focus of this experiment is to investigate the effect of watermelon seed flour content, temperature of the matrix and moisture content on the density and expansion ratio of extrudates from corn grits. A single screw extruder Brabender 20 DN was used for the extrusion cooking. A full factorial experiment 23 with independent parameters watermelon seed flour content (3 % and 10 %), temperature of the matrix (160 °C and 180 °C) and moisture content (14 % and 18 %) was applied. The expansion ratio varies between 1.76 and 2.56 while the density change from 0.103 g/cm3 to 0.159 g/cm3 respectively. The statistical analysis showed that the expansion ratio decrease with the increase of the moisture content and watermelon seed flour content while the density increase.

PP31

ENERGY AUDIT OF AN ENTERPRISE FROM CANNING INDUSTRY

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An energy survey of an enterprise from the canning industry was carried out. The baseline for energy consumption is determined, depending on the energy consumption in the enterprise for the considered period of the survey. The specific costs for energy carriers in the enterprise were calculated, and on this basis an economic and ecological assessment of the proposed energy-saving measures was carried out. A regression equation was derived to determine the energy consumption depending on the processed output of an industrial system.

PP32

EQUILIBRIUM MOISTURE CONTENT AND SORPTION CHARACTERISTICS OF SWEET POTATO

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The equilibrium moisture content of sweet potatoes (Ipomoea batatas) was determined experimentally at a temperature of 20°C, using the gravimetric method. Mathematical dependences describing the sorption and desorption isotherms for relative air humidity from 0 to 85% were obtained. According to the Pass and Slepchenko's method, the equilibrium moisture content of the product was also determined for higher temperatures (40, 60 and 80 °C). The results are summarized and presented in graphic and tabular form.

OP8

EVALUATION OF THE HYGIENIC PERFORMANCE OF LASER TREATED AUSTENITIC STAINLESS STEEL INTENDED FOR DIRECT CONTACT WITH FOOD PRODUCTS

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The austenitic stainless steel 1.4401 (316) is one of the most widely used non-magnetic corrosion resistant alloy in the food processing industry. Its primary components are chromium, nickel and molybdenum. In order to be used in direct or indirect contact with food products, the materials have to meet some rigorous requirements. Their surfaces shall not be prone to retaining contaminants, and shall not undergo corrosion and/or erosion. One approach for achieving this is to make the surface of a material hydrophobic and/or oleophobic. This can be done by applying coating on the surface or by altering its morphology. This article presents an experimental evaluation of the usage of infrared fiber laser beam for treatment of the surface of the stainless steel mentioned above, and the effects in terms of increased wetting angle (contact angle). Scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS) has been used for the evaluation. Wetting angle of nearly 86º has been measured on electro-chemically polished stainless steel. After laser ablation the angle rises to nearly 127º, which is increase of almost 47%.

OP9

EVALUATION OF THE WEAR RESISTANCE OF LASER TREATED STAINLESS STEEL USED IN DIRECT CONTACT WITH FOOD PRODUCTS

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The non-magnetic austenitic grade stainless steel 1.4401 (316) is one of the most popular corrosion resistant alloy used in the food processing industry. Just as any other material approved to be used in direct and indirect contact with food products and drinks, the mentioned steel shall meet rigorous hygienic requirements. Its surfaces shall repel contaminants and not be prone to retaining them. It shall be easily subjected to cleaning and sanitation. One approach for achieving this goal is to make the surface of the material hydrophobic and oleophobic, which can be done either by applying a coating for lowering the surface energy, or by altering the morphology of the surface. The last can be done by blasting the surface with solid beads of glass or ceramics, or by performing laser ablation. This article presents the results of an experimental evaluation of the wear resistance of hydrophobic surface. The surface was first treated with infrared laser and then subjected to extreme hydrodynamic conditions by exposing it cavitation. After laser processing the contact angle (wetting angle) increased by nearly 47%, but dropped by almost 81% after exposure to cavitation.

PP33

EXPERIMENTAL DETERMINATION OF EQUILIBRIUM MOISTURE CONTENT OF HORSERADISH ROOTS

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The equilibrium moisture content of horseradish roots (Armoracia rusticana) was determined experimentally, using the gravimetric method. The equilibrium sorption and desorption curves at different temperatures were plotted (20, 40, 60 and 80 °C). Mathematical dependencies for determination of the equilibrium moisture content at the same temperatures were obtained. The calculated values are presented in tabular form.

OP10

POSSIBILITIES FOR APPLICATION OF ULTRAFILTRATION FOR UTILIZATION OF ROSE WASTEWATER

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This study investigates the possibilities for application of ultrafiltration for utilization of rose waste water obtained from water-steam distillation of rose petals from Rosa damascena Mill. Ultrafiltration was conducted using an UF1-PAN membrane up to volume reduction ratio of 5. The effects of frontal filtration prior to ultrafiltration and temperature (20°C and 50°C) during membrane process were examined. The obtained retentates and permeate were analyzed according to the following parameters: total phenolic content, phenolic acids, flavonoid phenolic content and spectral characteristics. The flux and energy demand were measured during ultrafiltration. The results showed that there was no statistically significant difference between the flux during ultrafiltration with and without frontal filtration, as well as for energy demand at the same working conditions. The temperature rise led to an increase in the flux and a decrease in the energy demand. The total phenolic content, phenolic acids, and total flavonoid content were found to increase in the retentate, while they decreased in the permeate. The principal component analysis was made for all parameters measured and revealed that the samples can be separated into three groups. In further investigations, the retentate will be added to rice grits in order to obtain enriched extruded products.

PP34

POSSIBILITIES FOR COMPUTER-BASED ASSESSMENT THE QUALITY INDICATORS OF KASHKAVAL CHEESE USING IMAGE PROCESSING

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As one of popular type of cheese in Balkan Peninsula, Kashkaval cheese is object of variety of researches related to its quality and safety. A lot of studies are performed in order to provide more objective techniques for sensory evaluation variety of cheese using computer-based technologies. Thus the current study support this trend through evaluation of potential for quality assessment of Kashkaval cheese using images processing. The current study presents two open-source software products – ImageJ and Scilab. Their functionalities are applied for image analysis of three samples of Kashkaval cheese that are produced using different sodium chloride concentration. The cheese samples are also evaluated using standard procedure for sensory evaluation and these results are compared with results of image processing. Specific structural elements with color which is very similar to the color of main cheese matter are effectively detected using different methods for edge detection in Scilab and using analysis of luminance in ImageJ. Another observation indicate that the color of cheese samples could be effectively evaluated using ImageJ or Scilab. As a conclusion, open-source software products for image processing Scilab and ImageJ could be utilized for quality evaluation of Kashkaval cheese to support assessment the visual quality characteristics.

Food, Nutrition and Dietetics

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CHARACTERIZATION OF READY-TO-EAT TAHINI-OAT BARS WITH ADDED VALUE FROM PRUNUS AVIUM L.

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There is an increasing interest in foods with added nutritional value. This study presents the prospect of creating tahini-oat bars as an accessible snack option with added value from Prunus avium L. dried fruits. Four new formulations were developed in order to cater the changing demands of consumers. Physical characteristics, texture analysis, water activity, microbial load, antioxidant potential and sensory profile aided in the evaluation of the newly developed products.The newly presented products are such of enhanced functional characteristics. Their color spectra were significantly different from the control sample. The texture attributes also revealed a difference from the control sample in terms of increased hardness and cohesiveness. The moisture content ranged from 2.90±0.78 % (control sample) to 10.92±1.86 % (Formulation 3). The measured water activity was the lowest in the control sample and the highest in Formulation 1 (0.788±0.006).The study revealed a potential in the development of ready-to-eat healthy snacks.

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THE CONSUMPTION OF SNAIL MEAT: MICROBIOLOGICAL ASPECTS, GOOD PRACTICES AND REGULATORY REQUIREMENTS

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Land Snail Consumption: Microbiological Safety Considerations, Best Practices and Regulations This study has been conducted to determine the microbiological safety challenges associated with the consumption of land snails, emphasizing the risks posed by pathogenic bacteria, parasites, and contaminants. The best practices and guidelines for the safe handling, preparation, and consumption of snails, with emphasis on critical factors such as proper harvesting techniques, hygienic processing, and appropriate cooking temperatures have been examined. A case study was presented, detailing the microbiological analysis of cooked snail meat over a 30-day period to monitor microbial growth and contamination potential. Additionally, the article reviews regional and European regulatory frameworks governing the harvesting, storage, and service of snail meat for human consumption.

Catering, Tourism, Economy of Food Industry, Linguistics

PP37

AGROTOURISM RESEARCH IN LATGALE (LATVIA)

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The promotion of tourism in every country increases the level of employment, the well-being of the population and the level of economic growth, as it is a mechanism for supporting the national economy, so it is important to develop the type of tourism that will have the greatest return . Agritourism could be developed in Latvia , because it would not only develop rural counties, but also educate people.Latgale has beautiful nature, landscapes, good geographical location, so this region would be especially suitable for the creation of an agrotourism nature trail.Research subject : study of agritourism in Latgale.Research methods used in the development of the work :1)method of economic analysis;2)method of graphical representation of statistical data;3)descriptive method.The aim of the work is to investigate and analyze the possibilities of creating agrotourism in Latgale.According to the data of the hiking map created by the Country Traveler, there are 63 nature trails available to tourists in Latvia, and 26 nature trails in Latgale, which, considering Latgale's beautiful natural landscapes and abundant nature, is not enough.