



UNIVERSITY OF AGRONOMIC SCIENCES
AND VETERINARY MEDICINE OF BUCHAREST

FACULTY OF BIOTECHNOLOGY



170
years

International Conference

"Agriculture for Life, Life for Agriculture"

BOOK OF ABSTRACTS

SECTION 6

BIOTECHNOLOGY



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BIOTECHNOLOGY

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O.I.1. MITIGATION OF DROUGHT STRESS IN SOLANACEAE VEGETABLES THROUGH SYMBIOSIS WITH PLANT GROWTH - PROMOTING BACTERIA AND ARBUSCULAR MYCORRHIZAL FUNGI. A REVIEW

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Abstract

Plants constitute dynamic systems with different strategies to face biotic and abiotic stress. Water deficit is one of the most challenging abiotic factors increased by climate change, affecting seriously the quality of soils and crop yields, decreasing photosynthetic rate, increasing the accumulation of free radicals, and modifying root morphology. In this regard, the potential role of the host plant - arbuscular mycorrhizal fungi (AMF) and plant growth-promoting bacteria (PGPB) interactions within the rhizosphere in the alleviation of drought stress is being deeply studied. These symbiotic relationships not only allow a major nutrient and water uptake, but also could be integrated as a sustainable approach to improve the growth and productivity of crops under water scarcity conditions. A better comprehension of the mechanisms of these synergies between PGPB and AMF with plants is becoming an important key to develop effective applications of these natural symbiosis. In this work, the highlighted knowledge concerning these associations and their effect in the response of plants under drought stress have been reviewed, focusing on the interactions described in Solanaceae vegetables, one of the most relevant crops in the Mediterranean area.

Key words: arbuscular mycorrhizal fungi, drought tolerance, plant biostimulants, plant growth-promoting bacteria, symbiosis

O.I.2. SELECTING PLANT ASSOCIATED MICROORGANISMS WITH BIOFERTILIZING ACTIVITY

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Abstract

Stimulating plant growth is a continuously pursued goal in agriculture. Therefore, many fertilizing products were developed with time. However, in the European Union (EU), when approving commercial fertilizers and plant protection products, apart from crop productivity considerations, there is also the concern for environmental and consumers' safety. Harmonized guidelines and protocols are thus elaborated and followed by all countries of the EU. Until recently, regulations were only available for inorganic fertilizers, but currently, organic originated products are also considered. Taking into account the Regulation (CE) no. 1009/2019, the goal of this work was to select bio-fertilizing bacteria that can provide nutrients, or improve plant access to low available nutritional resources. The novelty of this work derives mainly from the obtained bacterial consortium, which include Romanian native strains, with endophytic, rhizosphere and soil colonizing capacity. The selected strains have a synergistic effect, and can provide atmospheric nitrogen, solubilize phosphorus, improve micronutrient uptake and ensure plant stress protections. This research was funded by the University of Agronomic Sciences and Veterinary Medicine of Bucharest, Project number 2021-0005/13.07.2021 - Developing a microbial bio-fertilizer technology [Dezvoltarea unei tehnologii de obținere de biofertilizanți de origine microbiană].

Key words: plant growth promoting bacteria, endophytes, biofertilizer.

SUBSECTION II: FOOD BIOTECHNOLOGY

O.II.1. THE EFFICIENCY OF PEPTIDE-PROTEIN EXTRACTS COMBINATION FROM NATIVE PROBIOTICS TO INHIBIT THE GROWTH OF MULTIDRUG-RESISTANT *CITROBACTER FREUNDII*

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Abstract

The occurrence of multidrug-resistant pathogens in the food chain causes health problems in humans, thus searching for novel antimicrobials to combat their growth is required. In this study, the antimicrobial action of several peptide combinations (PCs) consisting of peptide extracts from three native probiotic strains, two Lactobacillus strains, and one Lactococcus, alone or in combination with EDTA (ethylenediaminetetraacetic acid) has been assessed against multidrug-resistant Citrobacter freundii UTNB3Sm1. Time-killing assays indicated the rapid death of C. freundii (90% reduction) when the cells were treated with the selected PCs, suggesting that the inhibitory action is dose-dependent. A marginal inhibitory effect was observed when the peptide extracts were combined with EDTA. Transmission electron microscopy (TEM) revealed structural membrane damage of the cells upon interaction with individual peptide extracts. In addition, scanning electronic microscopy (SEM) analysis revealed different wrinkled and deformed cells covered by debris. Molecular analysis indicated that the selected PCs disrupted the cell wall integrity inducing cell death. Further research is required to prove their efficiency ex vitro to battle against food poisoning and subsequently human infection.

Key words: antimicrobial peptides, *Citrobacter freundii*, probiotics, membrane alteration, TEM, SEM.

O.II.2. IMPACT OF COVID 19 PANDEMIC ON THE FOOD SAFETY REQUIREMENTS IN THE FISH AND SEAFOOD CHAIN

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Abstract

Producing safe and high-quality fish and seafood products, for both domestic and export markets must be considered a priority for the entire fish and seafood chain, from fishers and producers towards consumers and food safety competent national authorities, who should update the relevant food safety legislation and ensure compliance with it. The aim of this study is to highlight the rules of hygiene and food safety that are imposed on the fisheries and seafood sector in order to prevent staff illness with Covid 19 and ensure the safety of products. Several practical recommendations are given for completion and improvement of the current preventive measures such as good hygiene practices to which is added specific protocols to safeguard the health of the employees who works in the fish and seafood production and processing sector.

Key words: *fish and seafood products, food safety, good hygiene practices, preventive measures, fish and seafood production and processing sector.*

SUBSECTION III: MEDICAL AND PHARMACEUTICAL BIOTECHNOLOGY

O.III.1. A REVIEW OF POSTBIOTICS AS NEW HEALTH PROMOTERS

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Abstract

For a long time, probiotics have been widely used as safe microorganisms that can confers a health benefit effects on the host, directly or indirectly. Recently, postbiotics have gained interest as new health promoters. Postbiotics have recently been defined as complex mixture of functional bioactive compounds secreted by probiotics during a fermentation process (such as biosurfactants, proteins, short chain fatty acids, organic acids, bacteriocins, vitamins etc.). According to current data, postbiotics have advantages over live probiotics with regard to: ease extraction, standardization, and storage, availability for industrial-scale-up, specific mechanism of action, impossible to transfer and acquire antibiotic resistance genes and their interaction with the cellular receptors to trigger the targeted responses. However, several aspects related to postbiotics have not been fully elucidated. Here, we provided a critical review of the postbiotic definition, mechanisms of action, underlying their beneficial effects, as well as current trends for applications in foods and pharmaceuticals.

Key words: *probiotics, postbiotics, health benefits, trends.*

O.III.2. ENZYMATIC FISH PROTEIN HYDROLYSATES

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Abstract

Fish protein hydrolysates (FPH), usually short peptides and amino acids, have been reported to possess a wide range of biological activities: antioxidant, anticancer, anti-inflammatory, antimicrobial, immunomodulatory, antilipemic, osteoprotective, opiate, antihypertensive effects (Atef et al., 2021; Atma, 2021; Valero et al., 2020). The aim of our study was to identify the wastes obtained during fish processing in a sturgeon aquaculture farm and to prepare and analyze the protein hydrolysates from these organs (HPLC-MS). The FPH was isolated from sturgeons' organs by using enzymatic hydrolysis and their identification and biologic activities (antioxidants and pro-oxidant capacities) were evaluated. Further studies have to be made to determine the stability, bioavailability, and safety of these FPH for the health food industry or other applications.

Key words: *fish protein hydrolysates, chemical analyses, biologic activities, enzymatic hydrolysis, antioxidants.*

SUBSECTION IV: ENVIRONMENTAL BIOTECHNOLOGY

O.IV.1. ADAPTABILITY OF INVASIVE PLANTS TO CLIMATE CHANGE

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Abstract

Climate change represents one of the greatest environmental challenges of the 21st century, accentuated by deforestation and the degradation of habitats. Changes in vital aspects such as temperature, the amount and distribution of rainfall or the frequency of extreme meteorological phenomena will probably negatively affect ecosystems. The possibilities of invasion will predictably increase, being endemic species especially vulnerable to the effects of climate change. Invasive species are extremely adaptable to climate variability, as evidenced by their current large latitudinal ranges. Generally, invasive plants also have rapid dispersal characteristics, allowing them to vary their ranges in response to changing climatic conditions rapidly. As a result, these species could become more dominant in many areas under changing climatic conditions. In many situations, the environmental stress generated by climate change and invasive plants are synergistic: invasive species can exacerbate the impacts of climate change on ecosystems, and in the same way, climate change can allow new invasions.

Key words: climate change, invasive plants, adaptation, abiotic stress.

O.IV.2. SCREENING OF BACTERIAL CONSORTIA FOR A BIOAUGMENTED BIOASSAY OF FLUSHABLE WIPES BIODEGRADATION

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Abstract

Wet wipes, used for hygienic and cleaning purposes, become a major technical problem for sewage and wastewater treatment facilities. In the meantime, these man-made products also represent a significant source of microplastic pollution in aquatic environments. The flushable wet wipes completely disintegrate, disperse, and biodegrade in the aquatic environment. Developing truly flushable wet wipes and reinforcing the regulation that should protect the sewage system and the environment requires bioassay for biodegradation. One of the main issues of the proposed standardized tests is the high variability of the microbial inoculum used for the biodegradation of the tested products. Our work aims to select bacterial consortia for a bioaugmented bioassay of the truly flushable wipes. We present preliminary results related to selecting such bacterial consortia. The bacterial strains were isolated from the biofilm formed in three wastewater plant. Consortia were formed based on mutual bacterial interactions. Biodegradation capacity was determined in a long-term experiment. The preliminary results support the idea of a bioaugmented bioassay of the flushable wipes.

Key words: *bacterial consortia, bioassay, bioaugmentation, biodegradation, flushable wet wipes.*

POSTER PRESENTATIONS

SUBSECTION I: AGRICULTURAL BIOTECHNOLOGY

P.I.1. ALLELOPATHIC ACTIVITY OF *EUPHORBIA HIRTA* AGAINST *AVENA FATUA* AND *RUMEX DENTATUS* AND IDENTIFICATION OF POTENTIAL ALLELOCHEMICALS

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Abstract

Commercial herbicides are available to eradicate weeds in crops, but all are associated with ill effects. Phenomenon of allelopathy can be utilized to develop eco-friendly herbicides. Here in, allelopathic activity of *Euphorbia hirta* was investigated against *Rumex dentatus* and *Avena fatua* under in vivo conditions, by growing *R. dentatus* and *A. fatua* alone as well as with wheat. The experiments were repeated twice. In vivo bioassays, the effect of 50% and 100% plant extract of *E. hirta* on dry biomass of *A. fatua* and wheat shoot was non-significant, while there was 50% and 67% significant decline in dry biomass of *R. dentatus*, respectively, when grown alone. Moreover, when *R. dentatus* was grown side by side with wheat, there was 71% and 86% decrease in shoot dry weight at 50% and 100% extract concentrations of *E. hirta*, respectively. The spectroscopic analysis of *E. hirta* depicted the presence of allelochemicals, the major ones including quercetin, hexadecanoic acid, methyl ester, and β -sitosterol. It was concluded that the presence of these compounds makes *E. hirta* a suitable candidate to discover newer herbicidal components.

Key words: herbicidal, *Rumex*, *Avena*, allelopathy, weeds.

P.I.2. ASSESSMENT OF GENETIC SIMILARITY AND PURITY DEGREE AMONG SEVERAL ROMANIAN MAIZE INBRED LINES USING SSR MARKERS

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Abstract

Maize (Zea mays ssp. mays) is today one of the most important cereal crops used not only for human consumption but although for feed or for industrial purposes, without the genetic evolution and the active intervention of breeders in the plant constant improvement, maize would not have today significance.

In this study, seeds from thirteen maize inbred lines (LC1-LC13) were analysed using eight SSRs markers recommended for seed varietal purity assessment. The seeds classes for maize inbred lines used in this study were pre-basic and basic seeds. Three of the maize inbred lines chosen for testing from both pre-basic and basic categories were analysed in order to verify that the varietal purity is preserved. High genetic similarity was between inbred line LC1 and LC2. SSR marker phi015 was the most polymorphic marker followed by umc1545, umc1448 and umc1117. The SSRs markers that showed low polymorphism were umc1061 and phi109275. The aim of this study was to select the most informative SSRs markers which fit to prove the varietal purity and to assess genetic diversity for maize seeds.

Key words: SSR markers, maize, varietal purity, genetic diversity.

P.I.3. EPIPHYTIC YEASTS FROM THE BOTANICAL GARDEN “DIMITRIE BRÂNDZĂ” BUCHAREST, FOR DEVELOPMENT OF BIOCIDAL STRATEGIES

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Abstract

A significant number of yeasts with biotechnological potential have been isolated from the surface of the vegetative organs of plants. Numerous epiphytic yeasts have antimicrobial potential and are frequently used to control phytopathogenic fungi. The present study deals with complex characterization of nine yeast strains isolated from the surface of different plants from the Botanical Garden “Dimitrie Brândză” Bucharest. Identification studies using conventional and molecular taxonomy tests (RFLP-PCR, sequencing of ITS1-5.8S rDNA-ITS2 region) revealed that the strains belong to Lachancea, Metschnikowia, Starmerella and Pichia genera. The importance of yeasts in the biomedical field derives from their potential to inhibit the growth of microbial strains responsible for localized or systemic infections in humans and animals. The results showed that Starmerella bombi ST1, Lachancea thermotolerans ST12 and four Metschnikowia reukaufii strains were able to inhibit human microbial pathogens/ potential pathogens strains (Candida sp., Escherichia coli, Pseudomonas aeruginosa) at low pH values. Same strains also inhibited mycelial growth of filamentous fungi belonging to Botrytis cinerea, Aspergillus flavus, Aspergillus ochraceus or Rhizoctonia solani involved in food contamination. In conclusion, the present study allowed the selection of nine newly identified yeast strains with antimicrobial properties that can be further investigated for development of new biocidal strategies.

Key words: *epiphytic yeasts, RFLP-PCR, sequencing, antimicrobial, biocidal strategies.*

P.I.4. GENETIC DIVERSITY AMONG SOME PEARS GENOTYPES FROM WEST PART OF ROMANIA ON THE BASE OF RAPD MARKERS

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Abstract

An important tool in fruit tree breeding programs is genetic variation. In present work were studied the genetic diversity of some pears genotypes from West part of Romania. For this way we used 10 randomly amplified polymorphic DNA (RAPD) primers. Five out of the 10 primers used in this study amplified clear and reproducible bands. The RAPD primers produced 62 bands, and 46 of them were polymorphic, with an average of 12.4 amplicons/primer. The polymorphic bands, registered per primer ranged from 6 (OPA18) to 10 (primer OPA12). Total polymorphism generated by a certain primer (PIC), registered values between 0.39 P11 0.45 OPA18. The discrimination index (PI), presented values among 2.72 for the primer OPA18 and 5.38 for P-25 primer, which had the highest capacity to generate polymorphic bands to genotypes being studied. Results showed the suitability of RAPD analysis in genetic diversity studied of pear landraces.

Key words: genetic diversity, RAPD, pears.

P.I.5. THE GREAT POTENTIAL OF ENTOMOPHTHORALEAN FUNGI FOR BIOLOGICAL CONTROL: A REVIEW

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Abstract

Entomopathogenic fungi are well known for their role in the biological control of pests. The manipulation techniques of filamentous entomopathogenic fungi belonging to order Hypocreales (Beauveria bassiana, B. brongniartii, Metarhizium anisopliae, Lecanicillium longisporum, etc.) are already well developed in the biotechnological industry. At the moment, these types of fungi are the only ones authorized for inundative biological control of pest. However, numerous studies from recent years draw attention to some ecological attributes of order Entomophthorales as being more advantageous than order Hypocreales. In this review, we discuss the general characteristics of the Entomophthorales, the differences between Hypocreales and Entomophthorales, and the advances and challenges of using entomophthoralean fungi as myco-insecticides.

Key words: entomopathogenic fungi, Entomophthorales, entomophthoralean fungi, biological control.

P.I.6. ENTOMOPATHOGENIC BACTERIA VIRULENCE FACTORS AND TARGET PESTS

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Abstract

Bacillus spp. gained worldwide recognition and continues to be both a benchmark in biological control and also an important source of biological material for future genetic approaches. Although predominant bioinsecticidal toxins are derived from Bacillus thuringiensis (Bt) varieties, there are several other virulence factors associated with different Gram-positive bacteria, as well as with Gram-negatives. Identifying the best strains with entomopathogenic activity ensures a high success of pests' biocontrol products. Moreover, detecting virulence factor genes in entomopathogenic bacteria can suggest general host pest spectrum. However, recently found toxins with entomopathogenic activity identified throughout the bacterial kingdom in other species than Bt, can broaden our knowledge regarding insect pest management. This review aims to analyse the status of bacterial based bioinsecticides focusing on Bt varieties accepted as active ingredients in EU commercial pesticides, listing other potential entomopathogenic bacteria, and describing the genetic virulence factors against arthropod and nematode pests.

Key words: *Bacillus, biocontrol, entomopathogens, virulence factor genes.*

**P.I.7. PATHOGENICITY OF *BEAUVERIA BASSIANA*,
B. PSEUDOBASSIANA AND *METARHIZIUM ANISOPLIAE*
INDIGENOUS ISOLATES AGAINST
PLODIA INTERPUNCTELLA AND
GALLERIA MELLONELLA IN LABORATORY ASSAYS**

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Abstract

Using two different bioassay methods, the pathogenicity of three isolates of Beauveria bassiana, one of B. pseudobassiana and one of Metarhizium anisopliae, was evaluated against two model insects, Plodia interpunctella and Galleria mellonella in larval stage. In laboratory conditions, the insects were treated by immersion in a conidial suspension of 1×10^8 UFC/ml and by dusting. Larval mortalities were recorded daily, 14 days post-exposure. All the fungal isolates have been shown to be pathogenic to test insects. Thus, two isolates of B. bassiana determined the highest mycosis percentages for test insects both by immersion and dusting. One B. bassiana isolate (BbTd1) killed P. interpunctella larvae in the shortest time (6 days), and the other isolate (BbTd2) determined the highest mycoses percentage, followed by B. pseudobassiana isolate (BpPa) by both treatment methods. The highest mycosis percentage was determined by BbTd2 and BPa isolates in the dusting treatment. G. mellonella larvae proved to be the least sensitive to fungal treatments applied by immersion (MST>50%). In the dusting treatment, the BbTd1 and MaF isolates induced the highest percentage of mycosis of G. mellonella larvae. All isolates have pathogenicity against test insects, indicating their possible use for biocontrol.

Key words: *Beauveria bassiana, B. pseudobassiana, Metarhizium anisopliae, immersion, dusting.*

P.I.8. COMPARATIVE STUDY OF TWO VARIETIES OF PURPLE FLASH POTATO GROWN *IN VITRO*

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Abstract

Solanum tuberosum L. is considered a major food/feed source since ancient times for both humans and animals. Potato cultivation is important at the global level to its extraordinary yield per unit area, being cultivated in over 120 countries worldwide. Over time, the consumption tendencies regarding potato have changed, and new varieties including purple flesh, are gradually growing in popularity. Purple flash potatoes are native to Peru but during the past decades became popular in Europe as well as in Romania. Among the main varieties of popular purple flash potatoes grown in Romania are 'Salad Blue' and 'Violet Negretin' both being rich in nutritional substances including anthocyanins. The scope of this study is to analyse the in vitro initiation and micropropagation of these cultivars. In this regard the best cultivation media is Murashige & Skoog (1962, MS62) for micropropagation. By adding Gamborg vitamins to MS62 minerals we also tested the effects of chitosan (2 mg/l) and/or active charcoal (2 g/l). Visible positive effects on micropropagation only on the culture medium supplemented with active charcoal were obtained.

Key words: charcoal, chitosan, micropropagation, purple potato.

P.I.9. ACTIVITY OF THYME ESSENTIAL OILS AGAINST PLANT PATHOGENIC FUNGI AND ITS POTENTIAL USE AS SEED DISINFECTANT

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Abstract

*One potential application of essential oils as low-risk biopesticides is as seeds disinfectant. The main goal of this study was to test the activity of thyme essential oil on four strains of seed/soilborne plant pathogenic fungi, *Fusarium graminearum*, *Botrytis allii*, *Rhizoctonia solani*, and *Pythium ultimum*, and to evaluate the effect of the inhibitory doses on plant seed germination. The direct application of thyme essential oil on seeds demonstrates a lack of selectivity. The main effects were related to radicle architecture and development of the primary and lateral roots, both in monocotyl, sorghum (*Sorghum saccharatum*), and in the dicotyls garden cress (*Lepidium sativum*) and white mustard (*Sinapis alba*). One potential solution to the lack of selectivity of direct application of the essential oils is biofumigation, i.e., application by volatilization in the rhizosphere area. Our paper raises this issue of compatibility between the necessary doses to inhibit the plant pathogenic fungi and the effects on plant seeds. Formulation of essential oils as slow-release nanoformulation could reduce phytotoxicity while maintaining and even enhancing the activity against plant pathogens.*

Key words: essential oils, antifungal, fungistatic effect, fungicidal effect, seed germination inhibition.

P.I.10. CELLULAR AGRICULTURE - ALTERNATIVES TO MEAT AND DAIRY

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Abstract

Cellular agriculture offers humanity alternative and complementary food production methods that reduce reliance on conventional agriculture. Elements of cellular agriculture are potential components of a resilient system that secures food and nutrition for future generations, despite the potentially irreversible damages already caused by current agricultural practices. Global warming threatens traditional agricultural practices, ecological biodiversity, soil quality and water stability and thus endangers the sustainability of our current food system. Also, the Earth's population is increasing rapidly, posing great challenges to our conventional food systems. When combined with responsibly practiced conventional agriculture and other environmental measures, cellular agriculture offers humanity a solution to our food needs that can help keep our planet habitable.

Key words: meat, milk, biotechnology.

P.I.11. PLANT BIOSTIMULANTS BASED ON NANOFORMULATED BIOSILICA RECOVERED FROM SILICA-RICH BIOMASS

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Abstract

This review evaluates the technological solutions used to produce nanoformulated plant biostimulants made from biosilica recovered from silicon-rich biomass. Silicon improves root nutrient uptake/nutrient use efficiency, increases plant tolerance to stress, and promotes phytonutrients in edible crop yield. The exact mechanism of silicon action is not yet known. However, it is generally accepted that a flow of soluble silicon species through plant simplast is essential to produce the aforementioned effects. The main difficulties in applying soluble silicon species, silicic acid, and its di- and trimers to plants are related to the polycondensation features at very low concentrations. One of the solutions to this technical problem is to use amorphous silica, which constantly releases small quantities of soluble silicon species. For example, phytoliths formed in several plant species that concentrate the simplast flow of soluble silicon in their simplast are an excellent source of soluble silicon. Nanoformulation increases the surface/volume ratio and further improves the release of soluble silicon species. Our review focuses on the techniques used to extract and nanoformulate the biosilica from silicon-rich biomass.

Key words: biosilica, nanoformulation, plant biostimulant, soluble silicon.

P.I.12. HORMETIC EFFECTS OF HUMIC ACIDS IN MICROALGAE

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Abstract

The paper reviews the dual responses to humic acids (HA) of several microalgae and cyanobacteria species, including Chlorella, Scenedesmus, Selenastrum, Coelastrella, Nostoc, Anabaena. Ecotoxicological concerns initially drove such studies of humic acid effects on photosynthetic aquatic microorganisms. Humic acids arrive in aquatic systems due to dissolved organic matter leached and eroded from the soil. Recently, extracts rich in humic acid were applied to stimulate microalgae production. Both stimulatory effects and inhibitory effects were reported on microalgae growth parameters such as biomass concentration or pigments production, in either case depending on humic acid concentration. Lower doses of HA, usually up to 10 mg/L, have a positive effect, enhancing microalgae light-harvesting efficiency and CO₂ fixation. Higher concentrations of HA determine negative impact: the rate of photosynthesis in microalgae cells decreases and their oxygen consumption is strongly enhanced. Such a dual response phenomenon is typical for hormesis. HA main mechanism of action is through reactive oxygen species stimulation.

Key words: microalgae, humic acid, reactive oxygen species, hormetic effects.

P.I.13. STIMULATION OF SEABUCKTHORN (*ELAEAGNUS RHAMNOIDES*) MICROBIAL SYMBIOSES

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Abstract

*This paper reviews the present knowledge regarding the stimulation of the microbial symbioses of the sea buckthorn (*Elaeagnus rhamnoides* syn. *Hippophae rhamnoides*). Sea buckthorn is an actinorhizal plant, developing nitrogen-fixing symbioses with the actinobacteria from the *Frankia* genus. At the same time, sea buckthorn roots can form endomycorrhizal symbioses with various arbuscular mycorrhizal (AM) fungi. AM symbiosis increases nutrient uptake and nutrient use efficiency, especially on phosphorus and micro-elements. Due to these microbial symbioses, sea buckthorn is an efficient colonizer of marginal lands and a suitable crop for low-inputs organic/ecological farming. Helper bacterial strains were demonstrated to promote microbial symbiosis between *Frankia* actinobacteria or AM fungi with roots of other host plants. Only scarce and indirect information suggests the involvement of gram-positive, endospore-forming bacteria as a helper of microbial symbiosis for sea buckthorn. Also, there is no information regarding the role of rhizosphere signals in promoting the sea buckthorn microbial symbioses. The finding of this paper highlights the need for future works focused on the stimulation of sea buckthorn symbioses.*

Key words: sea buckthorn symbioses, *Frankia* actinobacteria, arbuscular mycorrhizal fungi, bacterial helper, rhizosphere signals.

P.I.14. BIOSYNTHESIS OF INULINASES BY *ASPERGILLUS TERREUS* USING ORANGE PEELS POWDER AS A POTENTIAL SUBSTRATE

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Abstract

Inulinases are an important class of enzymes used in many fields, especially in the food and pharmaceutical industries, to produce fructose syrups. Microbial inulinases are important in the hydrolysis of inulin to produce fructose syrup and FOS. These enzymes are produced by various strains of microorganisms, of which Aspergillus sp. and Kluyveromyces sp. are the most commonly used strains for inulinase production. The goal of the study was to biosynthesis inulinase using the Aspergillus terreus ICCF 262 strain, with inulin and orange peel powder as carbon and energy sources, the enzyme being isolated from the fermentation medium by fractional precipitation with ammonium sulfate followed by purification on DEAE-Cellulose using ion exchange chromatography. Within 7 days of cultivating the fungal strain on a mineral medium containing inulin and orange peel at a final concentration of 2% in the fermentation medium, yields of biotechnological interest were higher than those previously reported in the literature. Through the procedure of isolating and purifying inulinase from the fermentation medium results a specific activity of between 164.6-396.4 U/mg protein.

Key words: *inulinases, Aspergillus terreus, biosynthesis, inulin, orange peel powder.*

**P.I.15. EVALUATION OF THE IMPACT OF
THE TRICHODERMA TREATMENT IN BUZĂU BELL
PEPPER (*CAPSICUM ANNUUM*) CULTURE 10**

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Abstract

In the experimental field of the Vegetable Research and Development Station Buzău, research was carried out on the effect of Trichoderma T85, administered at planting, in granular form, for the culture of bell peppers, Buzău 10 variety, created by SCDL Buzău. In this regard, the growth and development of bell pepper plants, the Buzău 10 variety, the monitoring of the phytosanitary condition of the plants and the harmful and useful fauna from the soil were determined and monitored in dynamics. 5 experimental variants were set up in randomized blocks. This fungal inoculant was applied to V5 - three granules at planting. The obtained results confirm the data presented in the literature: Trichoderma prevents the growth of other pathogenic fungi, very widespread, such as: Alternaria, Botrytis, Colletotrichum, Fusarium, Phytophthora, Pytium, Sclerotinia, Xanthomonas. At the same time, this fertilizer is an environmentally friendly option because it does not pollute groundwater.

Key words: *Trichoderma, Capsicum annuum, fertilizer, pepper fruit production.*

P.I.16. COMPARISON OF DIFFERENT TYPES OF MOLECULAR MARKERS USED IN GENETIC DIVERSITY STUDIES OF BROOMRAPE FROM SERBIA

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Abstract

*The purpose of this study was to investigate the utility of the different types of molecular markers in assessing the genetic diversity of seven Serbian broomrape (*Orobanche cumana* Wallr.) populations, such as ISSR and SSR. The discriminatory potential of SSR markers was on average lower ($R_p = 2.46$) than for ISSR ($R_p = 13.85$), indicating a large interpopulation genetic variability. According to the indices of genetic diversity, a higher intrapopulation molecular variability in the case of SSR markers ($PIC = 0.58$; $H = 0.63$) compared to ISSR ($PIC = 0.33$) was revealed. AMOVA analysis also showed a high genetic diversity within populations with SSR markers (within pops 53% and among pops 47%) and the most genetic diversity among populations with ISSR (34% and 66%, respectively). These results showed a high degree of genetic variations among and within broomrape genotypes from Serbia which favor the evolution of more virulent physiological races of *O. cumana*. This study can serve as scientific support for future researches in monitoring and developing strategies to improve sunflower crops resistant to this pathogen.*

Key words: *microsatellite markers, intra and interpopulation variability, broomrape, populations.*

**P.I.17. EVALUATION OF THE EFFECTS OF
ARBUSCULAR MYCORRHIZAL FUNGI AND PLANT
GROWTH - PROMOTING BACTERIA ON THE INTERNAL
QUALITY OF SPANISH SWEET PEPPER GENOTYPES
(*CAPSICUM ANNUUM* L.) UNDER NUTRIENT AND
DROUGHT STRESS CONDITIONS**

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Abstract

Considering the harmful impact of climate change on agricultural production, it is necessary to develop more resilient strategies to reduce the effect of biotic and abiotic factors, being drought and nutrient stress two important threats in the south-eastern of Spain. In this regard, the symbiotic relationships established between plants and microorganisms of the rhizosphere are showing to be potential stress relievers. Capsicum annuum L. is one of the most economically important crops worldwide. The objective of this preliminary work is to evaluate the influence of arbuscular mycorrhizal fungi (AMF) and plant growth - promoting bacteria (PGPB) on the fruit composition of four Spanish sweet pepper genotypes under water and nutrient scarcity conditions. The cultivars BGV-13004, H1, Cabañeros and Najerano were subjected to different fertilization, irrigation, and microbial conditions. These results showed that AMF and PGPB inoculation could maintain the fructose and glucose contents similar to control under stress conditions. However, vitamin C were significantly higher under water deficit, without a significant effect of the microorganisms' inoculation respect to control. Thus, the results seemed to indicate some alleviation of the effects of stress on the internal composition of sweet pepper.

Key words: arbuscular mycorrhizal fungi, drought tolerance, fruit composition, nutrient stress alleviation, plant growth - promoting bacteria.

P.I.18. THE ANTIOXIDANT EFFECT OF RAW BEE POLLEN COLLECTED FROM ECOLOGICAL CROPS - MINIREVIEW

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Abstract

Bee products containing bee pollen collected from flowers and harvested by humans from the hive, include both active principles produced by plants and active principles added during collection, processing, and storage by bees. Pollen, is one of the most bee products used in apitherapy, is a valuable source of bioactive substances, as it contains most of the active ingredients that are directly assimilable in the human body (vitamins, minerals, hormones and substances acting as prehormones, enzymes and simple carbohydrates) and have by adding in the diet a wide range of indications, recommendations and applications. As a result, this mini-review systematically presents both the highlighting of the influence of pollen in daily human consumption and the analysis of composition, antioxidant activity, quality parameters and sensory properties of biologically active pollen harvested from organically grown honey crops.

Key words: *antioxidant activity, bee pollen, honey, phenolic compounds.*

P.I.19. RESEARCH ON BIOCONVERSION OF LIGNOCELLULOSIC WASTE FOR THE CULTIVATION OF BIOCOMPOUNDS PRODUCING MACROMYCETES

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Abstract

Macromycetes are a topic of great interest for researchers around the globe and in our country, mushrooms are well known for their nutritional, organoleptic and medicinal values. In conformity with current ecological trends, a sustainable solution for environmental protection is to obtain mushrooms by bioconversion of some lignocellulosic waste/by-products of agro-forestry origin and also to observe the qualitative and quantitative impact that different substrate recipes have on mushrooms. Assiduous research has improved the biotechnologies for the production and propagation of mycelium used for seeding spawn, in parallel with obtaining and characterizing extracts rich in bioactive compounds from mycelium and fruiting bodies of edible and medicinal species of the genus Pleurotus. This review proposes a current presentation of the knowledge at the intersection of these research directions, focusing on their applications, targeting the species: P. eryngii, P. ostreatus, P. columbinus.

Key words: *macromycetes, bioconversion, mycelium, biocompounds, Pleurotus spp.*

P.I.20. BIOTECHNOLOGICAL APPLICATIONS OF MYCORRHIZAL PRODUCTS IN INTENSIVE AGRICULTURE

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Abstract

The article analyzes the evolution of mycorrhizal fungi, which have occupied the function of symbiotic partners in association with plants, more precisely with their root system. The advantage brought by the existence of mycorrhizal symbioses for plant nutrition, highlighted the influence that this association has on the growth and development of plants. Mycorrhizae are present in mature ecosystems, ecosystems that show a cyclical and unitary evolution of the components between the biotic and abiotic unit, when mycorrhizal associations have the role of regulating the assimilation of food resources for the plants with which they are associated. In this association, hyphae play an important role in the nutrient cycle, having the function of stopping losses in the ecosystem. The present study aims to highlight the benefits of associating fungi with plant roots on wheat production. Thus, it was cultivated on a small area of wheat on a land where a fungal suspension was inoculated. Cultivated in parallel the control variant, in order to highlight the benefits of mycorrhiza. The obtained productions, the abiotic factors and the evolution of the plants were followed.

Key words: *climate change, abiotic stress, drought and salt tolerance, food security, crop yields.*

P.I.21. IMPROVING AGRICULTURAL PRODUCTION AND FOOD SECURITY UNDER CLIMATE CHANGE CONDITIONS

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Abstract

Climate change represents a major challenge for food security in the coming years, as it is causing a significant reduction of crop yields worldwide, primarily due to the increase in the intensity and frequency of drought periods and the progressive salinisation of irrigated farmland. The best strategy to improve agricultural production appears to be the development of drought and salt-tolerant crop cultivars. Intensive research and promising results in recent years show that this objective will be reached soon, applying classical breeding (supported by modern molecular tools) and plant genetic transformation. In addition, domestication and commercial cultivation of stress-tolerant wild species will also help increase food production. In the meantime, other strategies will contribute, even if more modestly, to enhance stress tolerance and improve crop yields in the frame of sustainable agriculture. They could include using 'new generation' controlled-release fertilisers to optimise plant nutrition or applying a collection of unrelated substances and beneficial microorganisms with activity as 'biostimulants'. In this paper, some examples of these approaches will be discussed, with reference to recent reviews for further reading.

Key words: *climate change, abiotic stress, drought and salt tolerance, food security, crop yields.*

SUBSECTION II: FOOD BIOTECHNOLOGY

P.II.1. USE OF MICROENCAPSULATION AND NANOENCAPSULATION TECHNIQUES IN DAIRY TECHNOLOGY

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Abstract

Encapsulation is a new technology known as packing of food components, enzymes, microorganisms, cells or different substances, which are found in solid, liquid and gas form, with coating materials such as proteins, hydrocolloids, polymers, polysaccharides and lipids. Encapsulation techniques have the high potential to protect the food systems. They are divided into three categories according to sizes of produced capsule: these are nanoencapsulation, microencapsulation and macroencapsulation. Microencapsulation is commonly used in pharmacy, agriculture, cosmetic industries for encapsulation of solid and liquid oils, vitamins, minerals, flavour components, enzymes, and colouring components used in dairy technology. Nanoencapsulation is especially used in packing systems to ensure food safety and to detect pathogen microorganisms. This review is focused on microencapsulation and nanoencapsulation, which maintain the controlled preservation of dairy products.

Key words: *coating materials, dairy products, encapsulation techniques, microencapsulation, nanoencapsulation.*

P.II.2. BIOPOLYMERIC MATERIALS WITH ESSENTIAL OILS: NEW PERSPECTIVES IN THE DEVELOPMENT OF PACKAGING FOR FOOD SUPPLEMENTS

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Abstract

Due to the benefits in use, biopolymer-based materials have gained the interest of researchers and the attention of manufacturers. Being obtained from renewable resources, they are biodegradable and compostable, non-toxic, non-allergenic, easy to use and handle, and have proven their applicability in various fields, such as food, medicine, cosmetics, etc. The present study is based on previous research that has established the optimal composition for the development of materials used in the food supplement industry. This is a highly polluting industry if we take into account the disposable nature of multilayer packaging materials. Thus, the previously obtained and tested composition, based on sodium alginate, agar and glycerol, was improved by the addition of essential oil of lemon, orange and grapefruit, in concentrations of 10 and 20% w/v. Tween 80 was added as emulsifier. The addition of essential oil has improved texture, attributed specific odour and taste, improved solubility, increased thickness and opacity. Unlike the control sample, without essential oil added, the films have higher luminosity, lower retraction ratio and lower transmittance. The samples with lemon and orange essential oil were free of pores and fissures, unlike those with the addition of grapefruit oil, with pores in the structure.

Key words: lemon, orange, grapefruit, hydrocolloids, edible, zero-waste.

P.II.3. PROTEIN QUALITY AND DIGESTIBILITY OF THREE DIFFERENT FORMULATIONS OF CHICKEN-BASED DRY PET FOOD

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Abstract

The dry pet food market is constantly expanding and new formulations are necessary to meet the different nutritional needs of pets. Fresh meats and especially meat meals are the ingredients most used for dry pet food. The kibbles represent the main types of complete food available on the market by virtue of their practicality and long shelf life. Their production process includes mixed thermal and mechanical treatments which, in addition to sanitizing food matrices, help to improve the palatability, digestibility, and durability of the final product. The various industrial processes to which the pet food raw materials are subjected have different effects on nutrient bioavailability and digestibility. Therefore, an analysis of the protein and Amino Acid (AA) content of different dry pet food formulations, together with the in vitro digestibility analysis, can allow a better understanding of which formulation can provide a more balanced diet for pets from a protein point of view. Three different new formulations of dry pet food chicken-based were available to be tested consisting of fresh meats, meat meals, or a mix of these two. The soluble protein concentration was assessed using the Bradford assay, while the crude protein content was determined through the Kjeldahl method. The analysis of the AA was carried out by quadrupole time-of-flight liquid chromatography/mass spectrometry (Q-TOF LC/MS). In the end, the in vitro digestibility was performed by a gastric and small intestine digestion simulation. The results showed that dry pet food consisting only of chicken fresh meats has a higher soluble and crude protein content, and contains more Essential Amino Acids (EAAs) and Branched-Chain Amino Acids (BCAAs) compared to the other formulations. In addition, in vitro digestibility proved to be the highest in the chicken fresh meat formulation, exceeding 90% of the dry weight of the sample. These findings thus make the formulation made by only fresh meats a preferable choice as dry pet food to be introduced in the market.

Key words: dry pet food, kibbles, soluble protein content, protein bioavailability, crude protein content, essential amino acids, branched-chain amino acids, digestibility.

P.II.4. CHARACTERIZATION OF FEED CONTAMINATION BY *FUSARIUM* SP. - A REVIEW

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Abstract

Certain Fusarium species and strains are potential producers of three most important classes of mycotoxins: fumonisins (FB1, FB2, FB3); zearalenone (ZEA) and trichothecenes, such as deoxynivalenol (DON), nivalenol (NIV), or HT-2 toxin and T-2 toxin. The ingestion consequences of these fungal compounds can lead to a range from acute to chronic diseases with high morbidity. The use of contaminated feed can have serious effects not only on health, but also on the productive potential of livestock and poultry, with high risk of further mycotoxins spreading in the food chain to the final consumer. Therefore, this paper aimed to present information on the main mycotoxins produced by different species of Fusarium contaminants, focusing on the toxicological effects on farm animals. The effects of each mycotoxin type on ruminants, horses, pigs, and poultry are described.

Key words: feed, Fusarium, mycotoxins, livestock, poultry.

P.II.5. DEGRADATION PRODUCT ANALYSIS OF DRY PET FOOD CHICKEN-BASED NEW FORMULATIONS

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Abstract

The dry pet food represents the main type of complete food available on the market by virtue of its practicality and long shelf life. Kibbles are produced using two different kinds of raw materials as the main protein source: fresh meats (FMs) and especially meat meals (MMs). Inappropriate transport and storage conditions of these raw materials, together with thermal and mechanical treatments in the case of MMs, may result in undesirable alterations of final products and their protein content. The dry pet food could therefore be subjected to contamination and proliferation of microorganisms which can degrade the organic component and lead to the development of degradation products such as biogenic amines. These nitrogen compounds are produced by microbial decarboxylation of certain amino acids, thus they are usually very present in foods rich in proteins. The ingestion of foods containing large amounts of biogenic amines can cause intoxication and harmful consequences for the pet. It is therefore important to control their concentration in the dry pet food, as they are usually heat resistant. This study aimed at analyzing the possible presence of biogenic amines in three new different types of dry pet food chicken-based through the use of quadrupole time-of-flight liquid chromatography/mass spectrometry (Q-TOF LC/MS). Three different new formulations of dry pet food chicken-based were available to be tested consisting of fresh meats, meat meals, or a mix of these two. The results showed how kibbles made by only fresh meats have a lower concentration of biogenic amines compared to those made by only meat meals or a mix of both, thus making the first a preferable choice as dry pet food formulation.

Key words: dry pet food, kibbles, degradation products, biogenic amines, pet health.

P.II.6. CONVENTIONAL VERSUS MODERN TECHNIQUES USED FOR THE DETECTION OF PATHOGENS IN FOOD MATRICES: A REVIEW

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Abstract

Microbial contamination is one of the most important obstacles in the food industry. In order to control microbial contamination, many methods have been developed over the years to reveal the behaviour and characteristics of microorganisms in order to control them and in order to understand the impact of microorganisms on foods. Increasing concerns about outbreaks of foodborne diseases require rapid on-site and sensitive methods for the detection of microorganisms in various food matrices. In the current review, a brief discussion is presented about the methods used for the detection of pathogenic microorganisms present in food matrices, especially the tools based on nucleic acids extraction.

Key words: *microbial contamination, food industry, food matrices, detection.*

P.II.7. SELECTION AND IDENTIFICATION OF POTENTIALLY PROBIOTICS LACTIC ACID BACTERIA FOR AQUACULTURE IN COTE D’IVOIRE

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Abstract

The probiotic potential of lactic acid bacteria isolated from the gut of Tilapia fish (Oreochromis niloticus) for use in aquaculture feed was tested. The selection tests focused on antibacterial activity, antibiotic susceptibility, biofilm forming ability, hemolytic activity, tolerance to bile salts, tolerance to pepsine and acid pH, hydrophobicity, antioxidant activity and freeze-drying. The lactic acid bacterial isolates selected from all these tests were identified by amplification by PCR followed of sequencing. Thus, from a collection of 154 lactic acid bacteria isolates, only 12 isolates have been selected as potential probiotics. Molecular identification of these isolates selected revealed that they belonged to Pediococcus acidilactici, Pediococcus pentosaceus, Lactobacillus plantarum species with a predominance of Pediococcus acidilactici specie.

Key words: lactic acid bacteria, probiotics, aquaculture, Tilapia fish, Pediococcus acidilactici, Pediococcus pentosaceus, Lactobacillus plantarum.

P.II.8. IDENTIFICATION OF NON-SACCHAROMYCES YEAST STRAINS ISOLATED LOCAL TRADITIONAL SORGHUM BEER PRODUCED IN ABIDJAN DISTRICT (CÔTE D'IVOIRE) AND THEIR ABILITY TO CONDUCT ALCOHOLIC FERMENTATION

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Abstract

Studies on yeasts involved in traditional sorghum beer fermentation in several African countries revealed the presence of two groups: Saccharomyces and non-Saccharomyces. If Saccharomyces strains were reputed for their fermentation performances, the non-Saccharomyces yeast strains have been recognized for their contribution to improve the beverage's organoleptic quality, justifying their use as aromatic starter. However, most studies were focused only on Saccharomyces strains as starter. In this work, the non-Saccharomyces yeast strains included in traditional inoculum of traditional sorghum beer was investigated. Thus, identification of non-Saccharomyces yeast strains by PCR-RLFP followed sequencing of D1/D2 domain revealed the occurrence of 2 species: Issatckenkia orientalis and Pichia kudriavzevii with predominance for Issatckenkia orientalis. Microbial dynamic showed that Issatckenkia orientalis specie was found to beginning fermentation, while Pichia kudriavzevii occurred to end fermentation. Fermentation characteristics showed that Issatckenkia orientalis seemed suitable for sorghum beer production among 2 species identified. Sensory analysis showed that the beers produced from Issatckenkia orientalis and Saccharomyces cerevisiae were characterized the same aromatic note and flavor: cereal and sour, with high perception for beer from Issatckenkia orientalis.

Key words: *Issatckenkia orientalis, Pichia kudriavzevii, non-Saccharomyces, traditional sorghum beer.*

P.II.9. BREAD QUALITY IMPROVEMENT BY ADDING DEHYDRATED SOURDOUGH IN THE RECIPE

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Abstract

The production of sourdough, used for thousands of years, it can be considered that is one of the oldest biotechnological techniques. Currently, methods for manufacturing bakery products using sourdough could improve the texture, flavour, and increase the shelf life from a microbiological perspective. The fermentation process is based on the symbiosis between certain lactic acid bacteria and yeast. If desired to integrate the properties of traditional bread in the industrial manufactured, a profitable and simple to use technology is the utilization of dehydrated sourdough in the recipe. The aim of this paper is to examine the influence of dehydrated sourdough addition over the sensorial and physicochemical properties of wholemeal and white bread. The assessed characteristics were: smell, flavour, crumb appearance, total acceptability, elasticity, acidity, volume and porosity. The study demonstrate that the quality of bread obtained with dehydrated sourdough was improved: higher acidity, better elasticity and porosity, higher volume, higher score for total acceptability, more pleasant flavour and taste. Technological aids such as sourdough utilization can be a very helpful instrument to increase bread quality but also bread shelf life.

Key words: bread, dehydrated sourdough, sensory properties, shelf life.

P.II.10. EVALUATION OF PROBIOTIC PROPERTIES OF YEAST STRAINS ISOLATED FROM RABILÉ, A BURKINA FASO TRADITIONAL BEER FERMENT

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Abstract

*The aim of this work was to identify 20 yeasts isolated from Rabilé a Burkina Faso traditional beer ferment and to evaluate their probiotic properties. Molecular methods, including PCR-RFLP and 5.8S-ITS region sequencing were applied for yeast identification. The capacities of the yeasts to grow at acidic pH and to survive in gastrointestinal digestion condition were studied. Moreover, hydrophobicity, antimicrobial activity against pathogens, antioxidant activity and auto- and co-aggregation abilities were evaluated. Three strains have showed a hemolytic activity and have been removed for the following study. The sequentiation of a fragment from the 5.8S-ITS region gene indicated that *Saccharomyces cerevisiae* was the predominant species, followed by, *Pichia kudriavzevii* and *Rhodotorula mucilaginosa*. All strains normally grew at pH 3.5 and 37°C. All strains evidenced high gastrointestinal resistance, high hydrophobicity, auto- aggregation and co-aggregation abilities. All strains have showed a good antioxidant activity. No strains inhibited the growth of the pathogens assayed. Some strains from Rabilé showed interesting probiotic properties. This study has been the first contribution to the identification and characterization of potential probiotic yeasts isolated from Rabilé in Burkina Faso.*

Key words: yeasts probiotic properties, yeast identification, Rabilé, Burkina Faso.

P.II.11. PERFORMANCE OF GC-MS/MS METHODS IMPLEMENTED FOR DETERMINATION OF ACRYLAMIDE IN CEREALS, POTATO AND COFFEE - BASED PRODUCTS

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Abstract

This paper presents the results obtained between 2015 and 2021 for the development and validation of a GC-MS/MS method for the determination of acrylamide from cereals, potatoes and coffee products, using two techniques. The first technique consisted in extraction in water and purification of AA extracts with Carrez solutions, followed by derivatization and purification of acrylamide derivatives on a chromatographic column with activated florisil. The second technique consisted in extraction and purification of acrylamide by using solid phase extraction, followed by derivatization. In both cases, derivatization was performed with bromine compounds, before purification for the first technique and after purification for the second technique. The functionality of the first technique was demonstrated by the results obtained in the FAPAS tests, on matrices such as 'crispbread' (z-score: 0.2/2015) and 'cookie' (z-score: 0.4/2016; -0.2/2018; -0.1/2019) and for the second technique was demonstrated on matrices such as "French fries, pre-cooked" (z-score: -0.8/2019), 'potato chips' (z-score: 0.0/2020) and 'cookies' (z-score: -0.3/2021). The applicability of the second technique was demonstrated by evaluating the bias (3%) of an 'instant coffee' reference material. These techniques were successfully implemented in the laboratory. ACKNOWLEDGEMENTS: This study was achieved through Core Programme (PN 19 02), with the support of the Ministry of Research and Innovation (MCI), contract 22N/2019, project PN 19 02 03 01 and PO: Competitiveness; Priority Axis 1: Research, technological development and innovation (RDI) in support of economic competitiveness and business development, MySMIS Code: 136213, contract 333/390009/21.01.2021.

Key words: acrylamide, cereals, coffee, GC-MS/MS, potatoes.

**P.II.12. HIGHLIGHTING THE INFLUENCE OF PEA
SPROUTS (*PISUM SATIVUM* L.) ADDED TO MANGO
(*MANGIFERA INDICA* L.) OR KIWI
(*ACTINIDIA DELICIOSA*) SORBET ON THE FINAL
CONSUMER'S PURCHASING PREFERENCES**

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Abstract

*This paper contains theoretical and practical information that has allowed the experimental setup of an effective working protocol for obtaining food sprouts in peas (*Pisum sativum* L.), as well as obtaining mango (*Mangifera indica* L.) or kiwi (*Actinidia deliciosa*) sorbet. In order to create a new product, mango or kiwi sorbet were combined with pea sprouts. The experimental results obtained after performing a sensory analysis of the final products, as well as an online questionnaire filled by the panelists are presented in the paper based on charts, which are demonstrating the influence of pea sprouts on consumers preferences and its purchasing behaviour.*

Key words: kiwi, mango, pea, sorbet, sprouts.

P.II.13. THE USE OF ACID DRIED SOURDOUGH STARTER TO IMPROVE SENSORY PROPERTIES AND BREAD'S SHELF LIFE - A REVIEW

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Abstract

Bread is one of the main products of Romanian food industry that is always present in the human daily diet. Current trends are to return to traditional bread making methods using biotechnological processes based on the use of certain bacterial cultures and yeasts. Thus, different types of dough fermentation are used in the bakery industry, such as: acidic substances, pure microbial cultures and microbial cultures developed on a nutritious support (acid sourdough). Lactic acid bacteria (LAB) represent an important group of GRAS (Generally recognized as safe) microorganisms, as they are used industrially mainly in the production of fermented foods and beverages. They have a major advantage, being recognized as safe elements in the food industry. Lactic acid bacteria are also used in starter cultures, thus contributing to the sensory characteristics of finished products. The present study reviews about the use of acid dried sourdough starter and how it can improved the sensory properties and bread's shelf life.

Key words: *microbial cultures, lactic acid bacteria, biotechnological processes, dough fermentation.*

P.II.14. BUCKWHEAT VS. SORGHUM FLOUR IN GLUTEN-FREE RICE COOKIES ENHANCED WITH PEA PROTEIN POWDER

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Abstract

Buckwheat (BF), sorghum (SF) and coconut (CF) flours as well as pea protein (PP) are considered alternative raw materials for gluten-free baked products. A cookie formulation based on 100% rice flour was control. Rice flour was substituted with different percentages of BF or SF (20%, 30% and 40%) and 20% PP and 10% CF were added to increase cookies nutritional values. This study showed how the addition of buckwheat and sorghum flour influenced the physico-chemical, texture and colour properties as well as the sensory attributes. Samples with 20% and 30% SF or BF had better scores than control, the highest acceptance scores were 6.44 for cookies with 20% SF and 6.11 for cookies with 20% BF. The colour measurement showed that the samples with the addition of SF were lighter than BF. Also, the samples with BF had similar colour to the control. Moreover, by adding different raw materials to rice flour, the level of protein and fiber increased.

Key words: *buckwheat, gluten-free cookies, pea protein powder, sorghum.*

P.II.15. A PHYSICOCHEMICAL AND MORPHOLOGICAL STUDY OF THE *SACCHAROMYCES CEREVISIAE* CELL-BASED MICROCAPSULES WITH COLD-PRESSED OILS

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Abstract

Cold-pressed oils have a high level of polyunsaturated fatty acids (PUFA), but it should be noted that PUFA oxidation is the main reaction that reduces the quality of the oil. Therefore, new methods of protecting oils against unfavorable changes are sought. Encapsulation in yeast cells is a possible solution to these issues. The structure of yeast cells, which consists of a thick and mechanically strong cell wall and a lipid plasma membrane, enables encapsulation of both hydrophobic and hydrophilic active ingredients and ensures high loading capacity. This study describes the possibility of using native yeast cells and yeast after the autolysis process as biocapsules to protect blends of cold-pressed oils with a nutritious ratio of $\Omega 6/\Omega 3$ fatty acids (5:1). The changes of fatty acids during encapsulation, as well as the morphology of the obtained microcapsules were characterized. The National Centre for Research and Development of Poland (NCBR) is acknowledged for funding provided within the programme LIDER under grant agreement No. LIDER/27/0105/L-11/19/NCBR/2020 (PI: Przemysław Kowalczewski).

Key words: *encapsulation, oxidative stability, protection, stability, yeast cells, yeast autolysis.*

**P.II.16. *IN SILICO* APPROACH FOR
THE IDENTIFICATION AND CHARACTERISATION
OF BIOACTIVE PEPTIDES FROM SILVER CARP
COLLAGEN**

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Abstract

The paper aimed to identify in silico bioactive peptides with antioxidant and antihypertensive effects from silver carp collagen. This approach involved the use of a wide range of specialized online databases and tools to identify bioactive peptides from various protein sources. In this case, the collagen type-I alpha-1 protein sequence was extracted from UniProtKB with the identification code A0A077B3P8. The digestion was simulated using the BIOPEP database with the following enzymes: subtilisin, papain and pepsin. ExPASy ProtParam, Peptide Ranker, PepCalc, and ToxinPred showed that silver carp collagen is a significant source of biologically active peptides, health promoters with potential antihypertensive and antioxidant effects. The computational approach used in this study offered useful initial insights for more extensive studies.

Key words: *bioactive peptides, collagen, health effects, in silico, silver carp.*

P.II.17. PRELIMINARY RESEARCH ON USING ORGANIC SEA BUCKTHORN POWDER IN BREAD MAKING

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Abstract

Bread is a food product that represents an important element in human nutrition, considered a convenient type of food, being consumed daily in large quantities in many parts of the world. Adding functional ingredients in bakery products was highly researched lately, because of their ability in the reduction of some chronic diseases besides improving of basic nutritional functions. The aim of the present paper was to obtain bread with different quantities of organic dried sea buckthorn powder ('Sorana' variety), as functional ingredient. For sample characterization, some physico-chemical (dry matter %, aw) and nutritional parameters (antioxidant activity, total phenolic content) were determined, as well as sensorial analysis. The study obtained promising results regarding the use of sea buckthorn powder as ingredient in bread making.

Key words: bread, sea buckthorn powder, ingredient.

P.II.18. STABILIZATION OF SEABUCKTHORN (*ELAEAGNUS RHAMNOIDES*) TURBID JUICES

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Abstract

*This paper reviews the technological solutions used to stabilize the sea buckthorn (*Elaeagnus rhamnoides*, syn. *Hippophae rhamnoides*) juice. Sea buckthorn is a nutraceutical crop of growing interest due to the health benefits of its berries active ingredients - essential (unsaturated) fatty acids, vitamins, antioxidants, and minerals. The turbid juice produced from the whole berries without enzymatic clearance has a higher biological value due to the extraction of the main active ingredients. However, the turbid juice made from sea buckthorn berries has poor physical and chemical stability. The lipids from berry pulp, rich in monounsaturated palmitoleic acid (16: 1n-7), separate from juices and are prone to rapid oxidation. Syneresis also occurs due to the low water-holding ability of the pulp polysaccharides. Oxidation reduces the content of the antioxidant (pro) vitamins. Stabilization is done by physical homogenization and/or utilization of additives with emulsification and/or antioxidant characteristics. The paper analyzes and discusses the advantages and drawbacks of the existing solutions.*

Key words: sea buckthorn, turbid juice, syneresis, oxidation, stabilization, homogenization, additives.

P.II.19. OPTIMAL SENSORY PROFILE DEVELOPMENT FOR NEW SNACK PRODUCTS WITH FUNCTIONAL INGREDIENTS

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Abstract

The purpose of the research was to realize the optimal sensory profile for develop a new snack bar with functional ingredients. The descriptive sensory analysis method was used according to the ISO 6564:2007 standard with a panel of 4 expert evaluators and 4 types of snack products. The quantification of each descriptor was done on the basis of a monopolar scale in 7 points. The values obtained for the sensory descriptors of the optimal profile were: 5.9 surface texture; 3.5 aroma; 3.03 sweet taste; 2.02 sour taste; 1.31 bitter taste; 4.25 firmness of mastication; 3.45 crumbly; 3.31 sticky; 2.68 oily; 3.18 granularity; 3.21 aftertaste duration; 3.34 aftertaste intensity. The attributes with high intensity were the surface texture and firmness. The attributes with low intensity were: smell, sweet taste, crumbly and granularity. The optimal sensory profile of the development of a snack bar with the addition of functional ingredients is characterized by the following sensory descriptors: compact and semi-gloss exterior texture, medium intensity aroma, sweet-sour taste balanced, below average, semi-firm firmness, with some crunchy parts, compact interior texture inhomogeneous and medium crumbly and pleasant aftertaste, with medium intensity and duration.

Key words: *snack bar, sensory profile, sensory analysis.*

P.II.20. THE USE OF LACTIC ACID BACTERIA AND THEIR METABOLITES TO IMPROVE THE SHELF LIFE OF PERISHABLE FRUITS AND VEGETABLES

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Abstract

As a result of biochemical transformation and microbiological contamination that can occur during storing and commercialization, freshly picked fruits and vegetables tend to be very perishable products, thus having a shortened shelf life. Lactic acid bacteria (LAB) are microorganisms that play a crucial role in a wide variety of fermentation processes. Using microorganisms Generally recognized as safe (GRAS), LAB, including their metabolites, is proven to be a promising alternative of food preservation by respecting food safety measures in a natural way. Such metabolites produced and released by probiotic lactic bacteria strains are known as postbiotics. Vegetables and fruits can benefit from the antagonistic activity of postbiotics due to their content of bioactive products, such as short-chain fatty acids, antimicrobial peptides, organic acids, carbohydrates, vitamins and enzymes. This review is focused on the advances of the sustainable biopreservation products to extend the shelf life of perishable fruits and leafy vegetables, by the use of synergic postbiotics from LAB strains.

Key words: *contamination, fruits, vegetables, lactic acid bacteria, postbiotics, shelf-life.*

P.II.21. MOLECULAR DYNAMICS BY LF NMR OF THE *SACCHAROMYCES CEREVISIAE* CELL-BASED MICROCAPSULES WITH COLD-PRESSED OILS

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Abstract

Polyunsaturated fatty acids contained in cold pressed oils undergo unfavorable changes during storage and technological processing. Encapsulation of unstable components in yeast cells allows to significantly extend their shelf-life, but also to reduce e.g. oxidation during thermal processing. The relaxation times of yeast capsules with different blends of oils with a nutritious ratio of $\Omega 6/\Omega 3$ fatty acids (5: 1) with the use of low field nuclear magnetic resonance were analyzed. LF NMR is a noninvasive and nondestructive method used in analysis of the molecular properties of food. It involves measurements of the relaxation time spin-lattice T_1 and spin-spin T_2^ . Both parameters characterize the molecular dynamics of the water and fat protons in the tested sample. Significant changes in the molecular dynamics of protons were shown depending on the composition of the oil blends, as well as the method of preparing the microcapsules. The National Centre for Research and Development of Poland (NCBR) is acknowledged for funding provided within the programme LIDER under grant agreement No. LIDER/27/0105/L-11/19/NCBR/2020 (PI: Przemysław Kowalczewski).*

Key words: *encapsulation, molecular properties, 1H NMR, relaxometry.*

P.II.22. AMINO ACIDS COMPOSITION OF WHEAT-GERMINATED LEGUMES COMPOSITE FLOURS

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Abstract

The aim of this study was to analyze the amino acids content of different legumes types (beans, lentil, soybean, chickpea and lupine) in a raw and germinated form. Also the effect of different levels (0%, 2.5%, 5%, 7.5%, 10%, 15%, 20%, 25%) of legumes addition in a germinated and raw form in refined wheat flour has been discussed. According to our data for the wheat- bean mix, lentil-wheat flour, soybean-wheat flour mix, lupine-wheat flour mix the highest amount of essential amino acid were recorded for the histidine whereas for the mix between chickpea-wheat flour the highest amount of the essential amino acid were recorded for valine. Regarding the amount of non-essential amino acids content the highest levels were obtained for glutamic acid for all the mixes between germinated legumes and wheat flour and the lowest one for glycine.

Key words: *amino acids content, germinated legumes flour, legumes flour, wheat flour.*

P.II.23. STUDY INTO THE USE OF SUGAR KELP (*SACCHARINA LATISSIMA*) SEAWEED IN BAKERY INDUSTRY

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Abstract

*The paper presents some researches related to the use of baby kelp (*Saccharina latissima* (class *Phaeophyceae*)) in the bakery industry, both for bread and snacks. The seaweed was dried by using microwave under vacuum and milled under the size of 30 microns. Four degrees of replacement of white wheat flour (type 480) from the bread recipe were used: 1.5%, 3%, 4.5%, 6%. For these, flour mixtures the main rheological characteristics were analyzed and baking tests were performed by direct method. The analyzes focused on: volume, porosity, color, humidity and sensory analyzes were performed on a group of 50 consumers aged between 18-60 years. The results show a good rheological behavior up to a degree of replacement of 4.5%, but due to the pronounced after-taste, consumers indicated a maximum acceptable level of 3% degree of replacement with algae. Other products developed and tested referred to snacks and biscuits, where after taste was reduced by using 2% of caraway seeds. This work was supported by contract 245/2021, project acronym SUMAFOOD. The authors acknowledge the financial support for this project provided by transnational funding bodies, partners of the ERANET BLUE BIO 2021. This work was supported by contract 245/2021, project acronym SUMAFOOD. The authors acknowledge the financial support for this project provided by transnational funding bodies, partners of the ERANET BLUE BIO 2021.*

Key words: bakery, algae, Sugar Kelp, rheological and sensorial analysis.

**SUBSECTION III:
MEDICAL AND PHARMACEUTICAL
BIOTECHNOLOGY**

**P.III.1. CURRENT STATUS OF THE APPLICATIONS
OF PULLULAN AND ITS DERIVATIVES
IN BIOMEDICAL FIELD**

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Abstract

This review highlights the applications of pullulan in biomedical field, focusing on drug delivery. Pullulan is a microbial exo-polysaccharide produced by yeast like fungus Aureobasidium pullulans and it has been declared safe by FDA in United States and has GRAS status. Pullulan has biocompatible, biodegradable, non-mutagenic, non-toxic, non-carcinogenic, non-immunogenic properties, as well as other functional properties. Furthermore, pullulan can be easily derivatized by several chemical reactions such as etherification, amidification, esterification, oxidation and co-polymerization in order to widen its applications. Due to its unique features pullulan and its derivative is being explored for various biomedical applications like drug and gene delivery, tissue engineering, wound healing, diagnostic imaging, etc. This research was supported through Nucleu project PN 1941-04 01.

Key words: pullulan, biomedical applications, drug delivery, microbial exo-polysaccharide.

P.III.2. PREPARATION AND CHARACTERIZATION OF ANTIBACTERIAL CREAMS CONTAINING PLANT EXTRACTS FOR TOPICAL APPLICATION

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Abstract

The use of herbal cosmetics is increasing in the world market, due to the good activity with no side effects of the active ingredients from plant extracts as compared to synthetic compounds. The aim of the present study was to formulate and characterize herbal creams containing several plant extracts (Arctium lappa, Magnolia virginiana, Tiliae flos) in different combinations. The creams were prepared with different ratio of plant extracts and essential oils, while the composition of the cream base was kept the same. The characterization of the formulated creams was carried out by standard methods, for evaluating the organoleptic characteristics, physicochemical properties, microbiological contamination level and in vitro antibacterial activity against Staphylococcus aureus. Also, the plant extracts were evaluated in terms of cytotoxicity using MTS/MTT assay on L-929 fibroblasts. The creams were homogeneous, non-irritant and easily removable. The pH of creams was in the range of 5.0–5.5 which is safe for human skin. The samples were found to be populated with aerobic bacteria, yeast and fungi up to 10 CFU/g and showed moderate antibacterial activity.

Key words: *plant extracts, antibacterial creams, Arctium lappa, Magnolia virginiana, Tiliae flos.*

P.III.3. HAND SANITIZERS MADE WITH NATURAL INGREDIENTS

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Abstract

Hand hygiene is one of the most important and healthy habits that each of us should practice. The ingredients used in the formulation of hand sanitizers, as well as their concentration, must be chosen carefully not to affect the hand skin. Four sanitizers have been formulated, containing natural products that give a pleasant and moisturizing consistency, a pleasant smell, and an application as easy as possible. Two disinfectants, 96% ethyl alcohol and 99.9% isopropyl alcohol, glycerin, Aloe-Vera pulp and four flavoring substances, tea tree essential oil, lemon essential oil, eucalyptus essential oil, essential oil of lavender, were used. The obtained sanitizers were analyzed from an organoleptic and physico-chemical point of view. The products had a pleasant appearance, a fluid consistency without signs of phase separation, a very pleasant, aromatic odor, a pH around five and, most importantly, an antibacterial effect, along with an effective moisturizing of the skin. The sanitizer solutions were applied to the hands by spraying.

Key words: alcohol, disinfectant, sanitizer, skin.

P.III.4. GENETIC APPROACHES TO SELECT L-ASPARAGINASE PRODUCING *BACILLUS* STRAINS

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Abstract

An important enzyme for both the pharmaceutical and food industries is L-asparaginase (EC 3.5.1.1). This enzyme is produced by a wide variety of microorganisms. However, their potential use as sources of L-asparaginase at industrial scale is limited if glutaminase and urease are also produced. This is mainly due to the complexity and expenses of the purification process required to obtain l-asparaginase which make the production system inefficient. In order to select L-asparaginase highly producing strains, lacking detectable glutaminase and urease activity different isolation steps were established and rapid tests are the first recommended. However such studies need to be completed with quantitative analysis. Moreover, additional molecular studies can also confer useful information regarding the biotechnological potential of the selected strains. The aim of this paper is to correlate the microbiologic and biochemical tests with genetic approaches in order to improve the selection process of biotechnologically relevant Bacillus strains.

Key words: *L-asparaginase, ansA and ansZ genes, Bacillus.*

**P.III.5. *ARCTIUM LAPP*A - A POTENTIAL SOURCE
OF BIOACTIVE COMPOUNDS WITH
PHARMACEUTICAL APPLICATIONS**

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Abstract

*The study provides an overview of the bioactive molecules present in *Arctium lappa*. The main bioactive compounds in this plant, their pharmacological activities, and the main methods of obtaining bioproducts concentrated in these bioactive compounds are summarized. Due to the diversity of pharmaceutical activities of the bioactive components found in *Arctium lappa* (biomolecules with anti-inflammatory, antimicrobial, antioxidant, antitumor properties) this species can be considered a potential source of compounds with therapeutic properties of interest.*

Key words: *Arctium lappa*, pharmacological activities, bioproducts.

P.III.6. LIMONENE - A BIOMOLECULE WITH POTENTIAL APPLICATIONS IN REGENERATIVE MEDICINE

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Abstract

Limonene is a biomolecule that can be easily obtained from plant sources with remarkable biological effects. It is found in large quantities in citrus essential oils (concentrations up to 98%) and moderate amounts in essential oils obtained from various species of geranium. The article presents the reasons why this compound may have potential uses in regenerative medicine, especially in dermatological applications, where these compounds or formulations which contain this compound, alone or via intermediary products which result from metabolization (such as perillyl alcohol) can accelerate wound healing, inhibit skin tumors development, or inhibit pathogenic microorganisms such as Staphylococcus aureus or Pseudomonas aeruginosa. Studies performed in vivo, on healthy persons which have tested in time the skin cleaning products which contain limonene or essential oils with limonene, were confirming that the products with Limonene do not give perturbation to normal skin microbiota. These data recommend Limonene as a potential candidate for regenerative medicine applications in the field of dermatology.

Key words: *limonene, Citrus essential oils, regenerative medicine.*

P.III.7. THE CHARACTERIZATION OF pH VALUE AT PARACETAMOL SINUS AND NORMAL BY RAMAN SPECTROSCOPIES

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Abstract

The biological activity and the pharmaceutical properties of drugs are strongly dependent on their structure. The use Raman spectroscopy in pharmaceutical industry is gaining much popularity as a quantitative tool due to its rapid and non-destructive nature, sample preparation, ease of use and less or no solvent consumption for monitoring quality as well as quantity of the raw materials and finished drug products. In the present work, because Raman spectroscopy is a powerful vibrational spectroscopic technique which has been applied in different biomedical applications, we propose the vibrational Raman characterization of two different commercial paracetamol tablets (normal and sinus), in order to distinguish the various action mode in terms of the pH value and to check the possibility to monitor both pharmaceutical species using spectroscopy. The active compound present in commercially tablets and their influence of pH value have been obtained and discussed.

Key words: Paracetamol normal and sinus, Raman, FT-IR (Fourier-transform infrared spectroscopy).

P.III.8. THE CHARACTERIZATION OF PARACETAMOL DRUGS SPECIES USING RAMAN SPECTROSCOPY

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Abstract

Paracetamol (para-acetaminophenol, N-acetyl-p-aminophenol, 4-hydroxyacetanilide) is a long-established pharmaceutical with analgesic, antipyretic and weak anti-inflammatory activities. Paracetamol can crystallize in three different polymorphic forms known as form I, monoclinic (normal commercial form), II (identified by recrystallization from an ethanolic solution and corresponds to an orthorhombic form) and III was mentioned as a very unstable form. The commercial normal and sinus paracetamol drugs were investigated with Raman spectroscopy to stand out the presence of monoclinic and orthorhombic forms of paracetamol in the solid state, in aqueous solution, and on the glass surfaces after recrystallization. The vibrational fundamentals observed in the spectra are analyzed and compared with data from the literature for the same and structurally similar compounds; this information was employed for the interpretation of experimental FT-Raman and micro-Raman spectra. Because, the vibrational spectral techniques offer several advantages in the context of current research and using these techniques we can identify molecular components in the samples studied, we propose in the present work a characterization of two different commercial paracetamol tablets normal and sinus.

Key words: *Paracetamol normal, Paracetamol sinus, FT-Raman, micro-Raman.*

P.III.9. RHIZOBIAL EXOPOLYSACCHARIDES: STRUCTURE AND APPLICATIONS

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Abstract

Microbial exopolysaccharides (EPS) represent an important group of biologically active compounds produced and secreted by bacteria and fungi, which accumulate outside the cells. Recently, research has been focused on the exploration and discovery of new exopolysaccharides of microbial origin, due to their various biotechnological applications. Rhizobium strains produce a wide diversity of exopolysaccharides, with different structures at the species level, and a large field of applications, such as pharmaceutical, food, and cosmetics industries. In this context, this article aims to present a mini-review of the main EPS synthesized by Rhizobium strains, highlighting their structures and potential applications.

Key words: *applications, exopolysaccharides, Rhizobium spp., structure.*

P.III.10. CHARACTERISATION OF COLLAGENOLITYC ACTIVITY OF *COPRINUS* SPP.

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Abstract

In this research the screening of several higher fungi - basidiomycetes cultures for the presence of collagenolytic activity was carried out. The highest collagenase activity was detected in submerged culture of higher fungus Coprinus lagopides. The enzyme preparation of collagenase was isolated from culture liquid of this producer. The optimum temperature and pH of the collagenolytic activity of the enzyme preparation were determined. The selection of nitrogen and carbon sources and ratios of carbon and nitrogen sources in the composition of nutrient mediums was carried out in order to increase the collagenase activity of fungus submerged culture. In addition to the collagenase activity of producers culture the amount of accumulated biomass, pH and protein concentration in the culture liquid of basidiomycete were also determined.

Key words: *submerged cultivation, basidiomycetes, Coprinus lagopides, collagenase, collagenolytic activity.*

SUBSECTION IV: ENVIRONMENTAL BIOTECHNOLOGY

P.IV.1. GOLD NANOPARTICLES SYNTHESIS BY GREEN MICROALGAE AND THE CYANOBACTERIUM *SYNECHOCYSTIS* PCC 6803 IN LIGHT AND IN DARKNESS, AND POLLUTANTS DEGRADATION BY THESE NANOPARTICLES *IN VITRO*

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The first two authors have contributed equally to this paper

Abstract

The ability of cyanobacteria and green microalgae to synthesize gold nanoparticles is well known, as is the ability to use these nanoparticles to degrade pollutants (e.g., methyl orange, methylene blue, etc.). In this paper we present our original results on the biosynthesis of gold nanoparticles in both light and dark, by the cyanobacterium Synechocystis PCC 6803, green microalga Chlorella sorokiniana UTEX 1230, as well as our two green microalgae strains temporarily named Ra and Rd. In this way we try to find out the contribution of photosynthesis to the synthesis of nanoparticles, as well as the contribution of aerobic respiration to this process. Up to our best knowledge this is the first report concerning the possibility to influence the intracellular position of nanoparticles by varying the conditions of NP synthesis, namely in our experiments the darkness coupled with anaerobiosis. The synthesized nanoparticles were inspected by TEM, both in situ (on ultra-thin sections) and after extraction. The collected gold nanoparticles were further used as catalysts for the degradation of methylene blue.

Key words: cyanobacteria, gold nanoparticles, green microalgae, TEM.

P.IV.2. PETROLEUM ASSIMILATION BY *RHODOTORULA GLUTINIS*

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Abstract

Rhodotorula glutinis is a representative yeast species comprising strains with high ability of biodegrading petroleum and petroleum-related compounds (n-alkanes). In this work, we investigate petroleum and n-hexadecane assimilation by four *Rhodotorula glutinis* strains, three isolated from oil-polluted environments (*R. glutinis* CMGB-RG4, *R. glutinis* CMGB-RG5, *R. glutinis* CMGB-G1) and one from industry (*R. glutinis* CMGB189). The ability to assimilate petroleum and n-hexadecane as sole carbon substrates and the influence of nitrogen substrate (organic – peptone, inorganic - ammonium sulphate) were determined using cell growth. Best rates were obtained using peptone based medium (Yeast Peptone YP) with 1% n-hexadecane for *R. glutinis* CMGB189, CMGB-RG4 and CMGB-RG5, respectively, with 1% petroleum for *R. glutinis* CMGB-RG4 and CMGB-RG5 after six days of adaptative growth. Microscopical observations revealed the appearance of intracellular lipid droplets in most cells grown on petroleum, especially for *R. glutinis* CMGB189, CMGB-RG4 and CMGB-G1. The MATH (microbial adhesion to hydrocarbons) and emulsification (E24%) assays showed that the main mechanism of petroleum assimilation is based on biosurfactant synthesis, while for n-hexadecane direct adhesion to hydrophobic substrate might also be involved. The results suggest that the four *Rhodotorula glutinis* strains have high ability of assimilating petroleum and n-hexadecane using substrate-specific mechanisms, converting them into biocompounds with economic value.

Key words: *Rhodotorula glutinis*, petroleum, n-hexadecane, assimilation, lipids.

P.IV.3. SCREENING OF CULTIVATION MEDIA FOR LDPE BIODEGRADATION BY *PSEUDOMONAS FLUORESCENS*

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Abstract

The research aimed to select the optimal mineral salt medium (MSM) for low-density polyethylene (LDPE) biodegradation by the strain Pseudomonas fluorescens CNM-PFB-01. Four culture media were selected, which differed in salt content, N:P and C:N ratio. After 40 days of submerged cultivation, the following parameters were determined: catalase activity, pH of culture media, biomass accumulation, rate of degradation and the tensile tests of LDPE. It was observed that the strain is catalase-negative both in the control without LDPE and in the presence of LDPE. A weak positive reaction was established only on MSM 4 supplemented with LDPE. In the presence of polyethylene, the pH of the media increased, especially on the MSM 4 - by 0.6 units. The addition of polyethylene to the growth media stimulated the bacterial biomass accumulation by 2-3.6 times. The degradation rate of polyethylene films ranged from 0.37% to 0.86% depending on the culture medium. The tensile test showed increased elasticity of the plastic in the variants treated with bacterial strain. In conclusion, in order to stimulate the biodegradation of LDPE by the strain P. fluorescens CNM-PFB-01, the medium MSM 4 (N: P ratio 4.30: 1 and C: N ratio 0.29: 1) was selected.

Key words: *mineral salt media, catalase activity, LDPE biodegradation, Pseudomonas fluorescens.*

P.IV.4. COVALENT IMMOBILIZATION OF PROTEASES ON POLYLACTIC ACID FOR PROTEINS HYDROLYSIS AND WASTE BIOMASS PROTEIN CONTENT VALORIZATION

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Abstract

*The recovery of the protein component and its transformation into protein hydrolysates, which is typically done chemically, adds significant value to waste biomasses. The production of protein hydrolysates by enzymatic catalysis allows to obtain low molecular weight peptides with fascinating and frequently undiscovered biological properties, and at the same time can guarantee a lower environmental effect and improved product quality. A very interesting aspect is represented by the catalysis obtained by means of immobilized enzymes, in fact, the enzyme immobilization represents a good choice in terms of stability, recyclability, and cost reduction. Moreover, an immobilized enzyme results more stable compared to its free form. In this backdrop, we covalently linked proteases from *Aspergillus oryzae* to polylactic acid (PLA), an eco-friendly biopolymer. The hydrolytic efficiency of immobilized enzymes was assessed testing their stability to temperature and over time, and checking the hydrolysis of model biomasses (casein and bovine serum albumin). Soybean waste extracts were also used as proof of principle.*

Key words: *protein hydrolyzates, biomasses, poly lactic acid, enzyme.*

**P.IV.5. *IN VITRO* MICROPROPAGATION OF
ATRIPLEX HALIMUS L. (XEROHALOPHYTE)**

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Abstract

*Salinization has been identified as a major process of land degradation. It induces desertification effects, such as soil fertility loss, destruction in soil structure, and consequently, plant cover reduction. Soils rehabilitation by halophyte species such as *Atriplex halimus* seems to be a promising way, particularly through biotechnological tools such as in vitro tissue culture which allows efficient and rapid plant multiplication. *Atriplex halimus* (L.) micropropagation from node and apex explants is carried out on MS medium (Murashige and Skoog, 1962) supplemented or not with TDZ (Thidiazuron) at different concentrations. Explants are cultured in Petri dishes then are placed in chamber culture which provides a temperature of $25 \pm 2^{\circ}\text{C}$ and a photoperiod of 16 hours. Apex explants give the highest micropropagation rates with 100% neoformed shoots, in particular on MS medium enriched with 0.5 mg/l TDZ. Whereas, MS-free hormone medium induces an important micropropagation rate (90%) from nodal explants.*

Key words: *micropropagation, MS medium, regeneration, TDZ, *Atriplex halimus*.*

P.IV.6. *PAECILOMYCES* AND ITS IMPORTANCE IN STIMULATING PLANT GROWTH

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Abstract

Biostimulants are natural or synthetic substances that can improve the performances of plants, leading to high yields and good quality of crops. The use of biostimulants is considered a promising and environmental-friendly alternative, reducing of synthetic agrochemicals like pesticides and fertilizers. Biostimulants may contain non-microbial and microbial compounds, such as, humic and fulvic acids, protein hydrolysates, hormones, algae extracts, seaweed extracts, and plant growth-promoting rhizobacteria. Within the framework of project PN 19.23.01.01/2019-2022, our attention was focused on the use of a Paecilomyces lilacinus isolate as biostimulant agent for plants. The experimental study was carried out in greenhouse conditions, tomato seedlings were treated with protein hydrolysates obtained from fungal isolate cultivation on liquid medium containing keratin wastes as carbon and energy source. The data obtained in each experimental variant were analysed with GraphPadPrism 5.0 software. The improved values of growth plant parameters (plant diameter and height, number of branches and leaves/plant) demonstrated the biostimulant capacity of P. lilacinus in tomato plants, one of the most important vegetables worldwide and a strategic crop.

Key words: *biostimulants, keratin substrates, Paecilomyces lilacinus, protein hydrolysates.*

**P.IV.7. ENHANCEMENT OF *BACILLUS SUBTILIS*
SPORULATION BY CULTURE MEDIUM CONTAINING
AGRO-INDUSTRIAL BY PRODUCTS**

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Abstract

Concrete the most globally used construction material is a mixture consisting of water and cement, the second one acting as a binder during the hardening. Concrete can be damaged by various factors like fire, bacterial corrosion, physical and chemical damage from carbonation, corrosion of reinforcements and many others. The formed cracks can increase the permeability of concrete, causing accelerated corrosion of the steel reinforcement and shorting service life. Recent biotechnological approach with microbes as healing agents provides a safe, natural, pollution-free, and sustainable solution to improve the durability of cementitious materials. Bacterial species, especially from Bacillus genus, could precipitate calcium carbonate in proper conditions, through ureolytic pathway which requires the enzyme urease to catalyse urea hydrolysis. The aim of our research performed within the framework of project PED 392/2020 was to use agro-industrial by-products as ingredients of culture medium stimulating the formation of endospores at a Bacillus subtilis strain to be added to cement. Therefore, a number of culture media were evaluated with respect to their ability to support sporulation by strain of Bacillus subtilis that is capable to induce calcite precipitation.

Key words: *agro-industrial by-products, Bacillus subtilis, calcite precipitation, spores.*

P.IV.8. GREEN SYNTHESIS OF SILVER AND GOLD NANOPARTICLES USING EXTRACTS RECOVERED FROM DISTILLATE BIOMASS

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Abstract

Green nanoparticles (NPs) synthesis is an important part of nanobiotechnology due to its environmentally friendly procedures of obtaining quick, stable, benign, and side effects-free metal NPs. The essential oil spent biomass represents an important source of flavonoids and phenolic compounds which have been thoroughly analyzed prior to green NPs synthesis. Their chemical composition was analysed by ultra-high-performance liquid chromatography coupled with a photodiode array detector, and the identified compounds (pyrogallol, gallic acid, quercetin, kaempferol) were similar to those reported by other studies. DPPH• and ABTS•+ assays were used to evaluate the antioxidant activities of the extracts, while the total phenolic content was determined through the Folin-Ciocalteu method, and flavonoids were determined through the AlCl₃ assay with remarkable results. Therefore, the recovered biomolecules from the biomass wastes have mediated fast, easy, and eco-friendly reactions that reduced Ag⁺ to Ag⁰ and Au^{3+/+} to Au⁰ as was observed by UV-Vis, FT-IR spectroscopy. The resulting Ag and Au NPs were stable and had a small average particle size, as was revealed by the SEM analysis (Ahmed et al., 2016; Csakvari et al., 2021). Acknowledgments: This work was supported by the Romanian Ministry of Education and Research, CNCS - UEFISCDI, project number PN-III-P1-1.1-PD-2019-0607, within PNCDI III.

Key words: by-product valorization, distilled biomass, green nanoparticle synthesis, nanobiotechnology, secondary metabolites.

SUBSECTION V: MISCELLANEOUS

P.V.1. BRAZZEIN. THE CURRENT STATE OF THE ART

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Abstract

Brazzein is a tiny protein produced from the African plant Pentadiplandra brazzeana. It has sparked the interest of scientists due to its ability to mimic the sweet taste and its high potential for applications in the food industry due to its stability to heat and pH change. Researchers are interested in replacing carbohydrate sweeteners with plant-based protein sweeteners since these proteins do not provoke an insulin response and are more nutritious for food consumption. To date, over 70 research papers have been published on the topic of Brazzein, but a consistent review has been long due. This paper aims at briefly compiling all the progress on the topic of Brazzein and presenting the state of the art on structure, receptor interaction, expression strategies, sweetness improvement and other features of Brazzein.

Key words: *Brazzein, sweet-protein, production, structure, artificial, sweetener, expression, review.*

P.V.2. SCREENING OF MICROORGANISMS TO OBTAIN MICROBIAL LIPASES

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Abstract

Abstract Because of their diverse applications and their stability and selectivity, lipases gained much attention by industry. The present study aimed to screen lipase producing microorganisms in order to select strains with high capacity of synthesizing this extracellular hydrolase. Lipase producing ability was determined by measuring the halo diameter due to the presence or absence of the opacity area around the colonies in solid agar selective media. For the selection of lipase-producing bacteria three selective growth media were used (M4B, TBA, T80) and the best results were obtained when testing Bacillus subtilis ICCF 20 strain on TBA medium. Selection of lipase-producing yeasts was performed with two selective culture media (M4D and YS) and the best enzyme producer was Yarrowia lipolytica ATCC 16618 ICCF 214 strain cultivated on M4D medium. Regarding the fungi tested as lipase producers, two selective culture media were used (CDA and YS) and the best lipase synthesis ability was recorded for two strains: Aspergillus awamory (P2 C114) ICCF 259 and Aspergillus niger (P4 C36) ICCF 24, both of them cultivated on YS medium.

Key words: lipase, screening, Bacillus subtilis, Yarrowia lipolytica, Aspergillus awamory.

P.V.3. CHARACTERIZATION AND STUDY OF BEECH ACORN USING FT-IR SPECTROSCOPY

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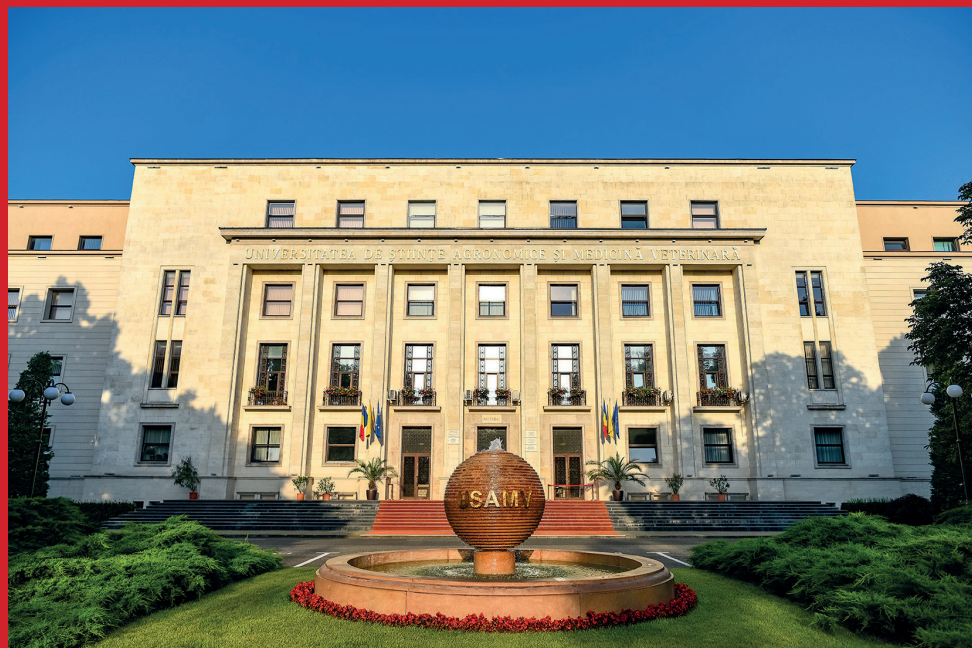
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Abstract

In the last year, FT-IR spectroscopy has been introduced as a very efficient and non-destructive analytical tool for the reliable identification of principal components of samples. The biological activity and the pharmaceutical properties of plants are strongly dependent on their structure. Beech nuts are tasty nutrient-dense nuts produced in the fall by beech trees (Fagus sylvatica). The non-extractable components in bark include polysaccharides (cellulose, hemicellulose and pectic substances), phenolic polymers (lignin and high-molecular-weight tannins) and cross-linked polyesters (cutin and suberin). The beech acorn contains omega 6 and omega 3 which have been shown to have medicinal properties.

Key words: *beech (Fagus sylvatica) acorn, FT-IR (Fourier transform infrared).*



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