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JULY 16-20 2023

7TH INTERNATIONAL CONGRESS ON ADVANCES IN BIOSCIENCE AND BIOTECHNOLOGY

ICABB 2023 CONGRESS

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Editors

İlker CAMKERTEN
Hesham A. EL ENSHASY

Published, 29/07/2023

ISBN: 978-605-69982-8-7

Dear Scientist,

The seventh International Congress on Advances in Bioscience & Biotechnology (icabb) was organized in Aksaray, TÜRKİYE. We are very happy for organizing this congress in such a beautiful city and country that we have strong historical ties.

We wanted to make this conference little bit special by bringing scientist together from different disciplines of biology and biotechnology area and also to open new research and cooperation fields for them. In this sense, we desired to bring the distinguished scientist together to get know each other and to develop and implement new joint projects.

The scientist joined the congress was from different country. Total over the hundered scientist were registered in the congress. The total number of submissions were 83 and after a careful evaluation 38 submissions were accepted by our scientific committee and 3 of them were accepted as poster presentation and, 35 of them were accepted as oral presentation and all those presentations was taken place in the conference booklet.

I would like to thank Prof. Dr. Hesham El Enshasy (Plenary/Orientation Lecture), Dr. Santosh Ramchuran (Plenary Lecture), Prof. Dr. Fikrettin Şahin (Plenary Lecture), Prof. Dr. Samina Mehnaz (Plenary Lecture) and Dr. Ernesto Hernandez (Plenary Lecture) for their valuable presentations.

We would like to send our special thanks to Mr. Musa Köse and Mr. İsmet Uzun, ZENITH Group workers for their special efforts. And finally, the most importantly I would like to thank to all the participants individually who came from far away to join this conference.

President

Prof. Dr. İlker Camkerten

Dear colleagues,

We are honor to welcome you this year in the 7th. International Congress on Advances in Bioscience and Biotechnology (ICABB). We are happy this year to have conference in Aksaray "The historic and wonderful city in the heart of Antolia, Türkiye. The conference this year is attended by many colleagues from all over the world to share their novel research with the scientific society. ICABB is also now considered as international hub for networking and building new partnership in research and to establish new cooperation agreements among researchers and between researchers and industries as well. I am happy to see that our ICABB family is growing from year to year in terms of number and diversity representing many countries around the world. The conference this year covers most of the biotechnology colors (Green: Agriculture and Environment; White: Industry; Red: Medical). In addition, some topics this year present a very interesting integrated research between these three main fields of biotechnology.

I wish you all colleagues who are attending the conference physically in Aksaray or on-line a very nice conference and successful networking with other colleagues toward providing solutions to challenges we are facing nowadays to improve the quality of life on the earth.

With you all nice conference, successful network, and enjoying the beautiful culture of Aksaray.

Prof. Dr. rer. Nat. Hesham Ali El Enshasy

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Dr. Avnish Pareek, Universiti Technology and applied Sciences-Sur Campus, Sultanate of Oman

The list is alphabetized by the last name

CONTENTS

	SESSION A-4 ONLINE	
09:30	**Prof. Dr. Rosli Bin Md Illias** "Alkaliphilic Bacillus lehensis G1: From Basic Sciences to Biotechnology Application" (Plenary)"	24
09:45	**Prof. Dr. Roshanida A. Rahman** "Bioconversion of Biomass: from Waste to Wealth" (Keynote)	25
10:00	**Prof. Dr. Ni Lu Suriani** "Utilization of rhizobacteria to increase antioxidant and phytochemical content of local ginseng (Talinum paniculatum gaertn) leaves"	26
10:15	**Dr. Mahnoor Zameer** "Optimization of Higher Production, Characterization, Antimicrobial and Anticancer Activity of Bioactive Metabolites Isolated from Pseudomonas aurantiaca PB-St2"	27
10:30	**Dr. Daniel Dailin** "Maximizing Pullulan Production: Unlocking the Potential of Aureobasidium melanogenum DSM2402 Through Bioprocess Optimization"	28
10:45	**Dr. Siti Pauliena Mohd Bohari** "Wound-Healing Nanocream Formulation from Hibiscus Sabdariffa Linn. Extract"	29
11:00	**Dr. rer. Nat. Ismail Bin Ware** "Bioactive Compounds from Peperomia Obtusifolia"	30
11:15	**Dr. Sri Rahayu** "Triple Combination Rhizome Extract İn Enhancing Synergistic Antioxidant Activity Against Free Radicals"	31
11:30	**Dr. Zuhaili Binti Idham** "Optimization of Persicaria Odorata Oil Using Subcritical Water Extraction"	32
11:45	**Dr. Koh Yen Min** "Development of High Cell Mass Production Platform for Limosilactobacillus Reuteri Using Mixed Substrates Cultivation System"	33
12:00	**Dr. Mohd Faizal Bin Mohamad** "Case Study on The Scale-Up of Herbal Extract Production"	34
12:15	**Dr. Nurul Elia Aqila Binti Abu Rahim** "Immobilization of cyclodextrin glucanotransferase on rice husk biochar for cyclodextrin production"	35

	SESSION A-5 ONLINE	
13:30	**Dr. Ting Ho** "Industry trend: regenerative farming" (Keynote).	36
13:45	**Dr. Hanhan Dianhar** "Radicals Scavenging and Anti-İnfectives of İndigenous simpor Leaf Extract (Dillenia suffruticosa Martelii Griff) Of İndonesia"	37
14:00	**Dr. Chioma Stella Anyairo** "Screening of the Bacteriocinogenic Potentials of Some Bacillus Strains Isolated from Miang for Potential Probiotics Application in Fish Farming"	38

14:45	**Dr. Humayun Kabir** "Predicting the in Silico and in Vitro Plant-Growth Promoting Potential of Plant-Associated Bacteria Isolated from Miang Tea Leaves (Camellia Sinensis Var. Assamica)"	39
15:00	**Dr. Zulekha Zameer** "Comparative Analysis of Metabolic and Morphological Characteristics of Dof1 Transgenic Wheat Under Nitrogen Stress"	40
15:15	**Dr. Siti Alyani Binti Mat** "Beneficial Microorganisms in Conventional Micro-Based Biofertilizers"	41
15:30	**Dr. Ida Madiha Yusoff** "Phytochemical, Antioxidant, And Antibacterial Properties of Coloured Lip Balm Enriched with Citrus Essential Oil: Tangerine (Citrus reticula L.), Lemon (Citrus lemon L.), Bergamot Orange (Citrus bergamia).	42
15:45	**Dr. Abdullahı Ibrahım Uba** "Molecular Dynamics Studies of Taxol Bound to Tubulin Dimer-GDP Interface).	43
19:00	**Gala Dinner**	

BIOTECHNOLOGY SOLUTIONS TO MINIMIZE THE IMPACTS OF CLIMATE CHANGE AND TO SOLVE PROBLEMS RELATED TO HUMAN HEALTH AND FOOD SECURITY

Plenary (& Orientation) Lecture

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Abstract:

Nowadays, biotechnology is considered as one of the key research field based on its wide range of applications and providing solutions and safe approach to overcome most of SDGs Challenges. Applications of biotechnology ranged from waste water treatment and bioremediation up to the production of high value therapeutic proteins, stem cell-based therapy and cloning technology. Climate change is one of the major threats we face nowadays and providing innovative solutions to mitigate the effect of climate change and to adapt to the new climate changes we face is critical for shaping of the human life on the earth. For example, food security is one of the main challenges we face with crucial need to have solutions to provide quality and healthy foods in the current irreversible and unpredictable changes in earth climate. However, climate changes not only affect the soil-water-air quality, water availability, which directly affect the plant yield, nutritional value and safety, but also can affect the overall all production and supply chain of food. This presentation provides a comprehensive global scenario of the current and future potential solutions for climate change mitigation and adaptation to minimize its effect of food availability and safety. It will also discuss the possible biotechnological solutions to minimize the impact of climate change on human health.

THE IMPACT OF DISRUPTIVE BIO-BASED INNOVATIONS GLOBALLY

Plenary Lecture

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Abstract:

Disruptive bio-based innovations are having a significant impact globally in moving away from the use of petrochemical feedstocks. However, there are many challenges in establishing a sustainable bioeconomy that will contribute to a country's socio-economic development through the creation and growth of new bio-based industries. The CSIR's Chemical Cluster believes that challenges in establishing a sustainable bioeconomy for the country can be enhanced by focusing on Small-to-Medium-Enterprises (SME) development and support as the main vehicle for economic growth. There is a strong focus on re-industrialization and the drive towards circular economy approaches using bio-based innovations. We believe that this will concomitantly lead to import replacement and increasing the competitiveness of local industries through the development of innovative knowledge products, processes, and relevant skills in support of new and established industries in the biomanufacturing sector. The CSIR has established several industry-facing centers that foster innovation, technology development support and entrepreneurship. These include the Biomanufacturing Industry Development Center (BIDC), the Industrial Biocatalysis Hub (IBH), and the Biorefinery Industry Development Facility (BIDF) which use an open innovation model that provides access to infrastructure and resources to enable technological advances that create and sustain bio-based industries and promote job creation. This session highlights the capabilities and offerings in biomanufacturing at the CSIR and showcases key industrial biotechnology innovations that have successfully led to commercialization. Also, key insights into how we have adopted rapid bioprocess development, optimization, and scale-up strategies to enable the "concept-to-commercial" model to be successful in a short-time frame to allow bio-based technologies and products for local and international uptake.

Keywords: Disruptive Technologies, Bio-Based, Innovations, Bio-Economy

[*]*CSIR Biomanufacturing Technologies*

APPLICATIONS OF BORON IN REGENERATIVE MEDICINE

Plenary Lecture

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Abstract:

Burn, chronic (non-healing) wounds and dermatitis are the major challenge of current dermatological applications. The destruction of skin integrity or tissue by biological, physical or chemical causes is the most common and destructive forms of wounds. Acute wounds usually heal within 3-6 weeks without the need for professional treatment modalities. However, chronic wounds are mainly associated with infection and prolonged inflammation, healing impairment and continuous tissue degradation. Radiation dermatitis is a common side effect of radiotherapy, which is one of the most frequently used treatments for cancers. Some people will experience mild redness and itchiness, while others may suffer painful, broken skin that is prone to infection. Any deformation that can occur in skin integrity can leave the human body vulnerable to many pathological conditions such as infection, excessive fluid loss and electrolyte imbalance. Although a vast amount of products have been introduced in the market, claiming to provide a better optimization of local and systemic conditions of patients, they do not meet the expectations of clinicians and patients. Therefore, developing new, safe, self-applicable, effective, and cheap wound care products with broad-range antimicrobial activity has always been an attractive area for scientists.
Therefore, a novel antimicrobial carbopol-based hydrogel formulated with boron and pluronic block copolymers was developed by Dr. Fikrettin Sahin, and evaluated for its healing activity using in vitro cell culture techniques. In addition, the preclinical and clinical studies were conducted to determine the effect of a novel hydrogel formulation containing NaB on the acute and chronic wounds healing. The results revealed that while both boron compounds significantly increased MSCs differentiation, and proliferation, migration, vital growth factor, and gene expression levels of dermal cells along with displaying remarkable antimicrobial effects against bacteria, yeast, and fungi, NaB displayed greater antimicrobial properties as well as gene and growth factor expression inductive effects. Preclinical and clinical studies proved that NaB-containing gel formulation enhanced healing rate of chronic wounds, burn and completely prevent the radiation-induced dermatitis in breast cancer tested. Therefore, experimental data showed that NaB, and its pluronics combination, could be used in dermatological clinics and be a future solution for chronic wounds and dermatitis.

Keywords: Boron-Based Gel, Wound Healing, Antimicrobial, Burn, Radiation Dermatitis.
Yeditepe University and TUBA

PSEUDOMONAS AURANTIACA – A BACTERIUM 'EXTRAORDINAIRE'

Plenary Lecture

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Abstract:

Pseudomonas aurantiaca - A rare species of Pseudomonas, till now few strains have been reported globally including Pakistan. Most of these have their genome sequenced due to their significant importance in agriculture. It is a gram-negative rod shape bacterium, well known for its ability to promote plant growth and kill plant pathogens, mainly due to production of large number of primary and secondary metabolites. In addition, it has ability to produce extracellular enzymes such as pectinase, protease, lipase and cellulase; and solubilizes potassium and zinc in soil to make it available to the plants. Our group has isolated large number of plant growth promoting bacteria including P. aurantiaca. Nine strains of this species have been isolated from sugarcane, cotton, paragrass, and cactus. These strains have been used as biofertilizer and promoted the growth of wheat, rice, corn, sugarcane, cucumber, bell pepper, and tomato under controlled environment and field conditions. These strains inhibited the growth of fungal pathogens including Fusarium spp. and Colletotricum falcatum, of economically important plants, rice, wheat, sugarcane, corn, etc., on plate assay. Several metabolites have been extracted and reported from these strains. Among these are phenazine derivatives, bacteriocins (antibacterial pepetides), Cyclic lipopeptides, Quorum sensing signals (Acyl homoserine lactones), Pyoverdin, Pyocin, pyoluterin, rhizoxin analogue, auxins, HCN, and pyrrolnitrin. A new compound "Lahorenoic Acid" (alkyl-substituted aromatic acid) has been reported by our group. Production of these metabolites vary depending on strain and growth media. Genomes of five strains PBST2, ARS38, RP4, FS2 and G7 are sequenced. Bacterial cultures and their metabolites have shown positive results for antimicrobial activity against human bacterial pathogens, antifungal and anticancer activity. These bacteria have great potential to be used as biofertilizer, biopesticide, and play role in cure of human diseases.

Keywords: Pseudomonas, Biofungicide, Biofertilizer, Microbial Metabolites

SUSTAINABLE SYSTEMS FROM PRICKLY PEAR CACTUS NOPALES

Plenary Lecture

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Abstract: The challenges from climate change require well-coordinated global efforts to impulse a circular economy for achieving Sustainable Development Goals. System approaches like those bringing together agriculture and biorefineries are needed to propose environmentally friendly and energy efficient solutions. Biomasses from the first to fourth generations look insufficient to meet current demands on products, energy, power and heat. Brown biotechnology could offer opportunities to exploit plants from arid regions. For instance, prickly pear cactus nopales. These strong invasive cacti are known for requiring comparatively less water, energy, care, carbon footprint and aggrotech than other biomass feedstocks. It seems possible to propose a novel sustainable biorefinery strategy using sustainable nopales. Well-designed systems can integrate experiments and assessments of realistic scenarios based on life cycle assessment, energy balances and efficiency. This enables a cleaner design for ethanol production from nopales in tune with the circular economy and sustainable development. We studied four realistic scenarios of systems blending agriculture-biorefinery, considering two fertilisers, two pretreatments and two operational modes. The scenarios were evaluated in terms of environmental effects via LCA and efficiency of storing energy in the ethanol molecule. Traditional acid hydrolysis and neutralisation do not lead to cleaner and energy efficient ethanol producing systems. Ionic liquids could offer a positive opportunity if fit-for-purpose chemical engineering designs are deployed. The best scenario considers organic fertilisers, ionic liquids and recycling and reuse of materials. It leads to a cleaner and energy efficient agriculture-biorefinery system for ethanol production. Also, it had the lowest impacts on environmental potentials such as acidification, eutrophication, global warming and more. This design also used the lowest amount of energy per unit of energy stored as ethanol fuel. Besides, it showed the best energy efficiency to capture net energy as ethanol fuel by three-fold compared to the worst scenario. Systems bringing together agriculture and biorefineries with fifth generation biomasses like nopales and novel biomass pretreatment can deliver beter solutions to help people, the environment and the climate.

PROCESS OPTIMIZATION OF 'HALAL' GELATIN PRODUCTION FROM OMANI FISH SPECIES

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Abstract:

Gelatin is a partial degraded collagen protein hydroxylate. It has specific rheological propertiy that is used extensively in industry. Most of the commercial gelatin produced is porcine and bovine in origin. This commercially gelatin has religious, socio-culture, and sanitary issues and world-over it is not accepted by many communities and creeds. Given this, an alternative source of gelatin is imperative from some halal source. Fish is considered halal, and can be utilized for halal gelatin production. During fish processing 40-60% /unit weight of fish waste is generated. However, the classical alkali or acid treatment for gelatin production does not work well with fish collagen because of its specific imino acid composition. Therefore, the enzymatic process for gelatin production from fish industry waste is used. So far such a process is not optimized for the warm water fish species waste. In our preliminary studies it was observed that this enzymatic gelatin production has some challenges. Firstly, since the gelatin has a specific visco-elastic rheological property, a strict treatment time and optimum temperature must be maintained for enzymatic treatment. Secondly, during product purification, molecules of desired size needs to be effectively removed from rest of the protein hydroxylates; and finally, the ready to harvest gelatin molecules must be protected from the indigenous proteolytic enzymes of the fish waste as well as from treatment enzyme. Given these challenges, the present study was conducted using a previously reported local thermophillic B. licheniformis thermo-alkaline protease. Process optimization was done on two most common warm water Omani catch fish species using experimental design and it was found that at 55-56°C, 2ml crude enzyme/100gms of fish waste, for 4 hours of treatment time at pH 9.5, 47% of working gelatin was produced as per GMIA manual of standards. The predicted results were found close to the actual results.

Keywords: Gelatin, Collagen, Halal Product, Process Optimization, Bioprocessing, Protease, Warm-Water Fish Species

*Preliminary part of this study was supported by The Research Council, Ministry of Higher Education, under the FURAP program.

BLIND DOCKING AGAINST HIV-1 PROTEASE USING AUTODOCK 4.2.6

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Abstract:

Currently, the HIV/AIDS virus is a major impediment to global health and development. Due to various negative effects, the development of a reliable vaccination is a now pipe dream. In addition, HIV-1 protease is accountable for rectifying the gag and gag-pol polyproteins during virion maturation. However, antiretroviral therapy (ART), increases the life expectancy of HIV-positive patients which is now being given to 14.9 million people globally. Tragically, there are still no HIV-1 therapeutics that work effectively. In this study, blind docking was performed in virtual box 6.1 using AutoDock 4.2.6 to determine effective phytochemicals that can target HIV protease (PDB ID: 2R5Q). Twenty phytochemicals were selected and a clinical trial drug (darunavir) was selected as a control. When the grid box was generated, the x, y and z values were 14.814, -15.206, and -54.457 and spacing were set to 0.54. Also, the genetic algorithm population was set to 150. Additionally, blind docking redocking value of 1.658Å was performed to validate the procedure. The ligands were evaluated according to the binding energy (BE) and inhibition constant (Ki), and the best potential phytochemicals were determined: carandinol (BE: -10.55, Ki: 18.54), withaferin A (BE: -9.96, Ki: 49.66), lupatic acid (BE: -9.77, Ki:68.9), maslinic acid (BE: -9.25, Ki:166) and sambunigrin (BE: -9.07, Ki: 68.73) kcal/mol, nM respectively. The best-docked poses and amino acid interactions were visualized using BIOVIA DS. The common amino acid interactions were observed in LEU24, LEU97 and PRO1. Moreover, common conventional hydrogen bonds were perceived in ASN98 and ILE3. In addition, ADMETlab2.0 was used to analyze ADMET properties. Withaferin A was the optimum ligand because it acknowledged the five Lipinski rules, exhibited significant Kis and consistent BEs, and also had an optimum logP. Additionally, findings anticipate the use of withaferin A for anti-viral purposes due to its good oral bioavailability.

Keywords: Keywords: Antiretroviral Therapy, Binding Energy, Inhibition Constant, Phytochemicals

**This research depicts the new therapeutics target for the HIV disease condition*

EXPLORING ELEMENTAL BALANCES AND STATISTICAL OPTIMIZATION TO EXPLOIT PGPR AND NITROGENASE PRODUCTION POTENTIAL OF GLUCONACETOBACTER DIAZOTROPHICUS UNDER BIOPROCESS SETTINGS

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Abstract:

Design of biopocesses to optimize microbial growth and production of industrial enzymes for food, feed as well as agriculture are of great interest both scientifically and economically. Gluconacetobacter diazotrophicus is rod-like shaped Gram-negative bacterium, with plant growth stimulating activity and being tolerant to acetic acid. Interestingly, it exibits nitrogenase activity, a key enzyme of the biological fixation pathway, thereby being potential of organic fertilizer, promising reduction in chemical fertilizer use. Despite its potential, very little is known on G.diazotrophicus under on bioprocess settings: only ad hoc media compositions are defined, elemental balances for fermentation is seldomly characterized, no optimization studies. However, being an important cost parameter as well as key to study (part of) the metabolism, finding a suitable/optimum medium composition and characterization of metabolism under production conditions is of great interest.

Statistical (as opposed to mechanistic) optimization is a technique used to explore relationships among explanatory variables as well as optimize systems where little is known on the mechanistic details of the system. The approach is nearly-universally applicable, typically uses an empirical model built using generated data to explore and optimize the system within a predefined domain. In particular Response surface methodology, uses a sequence of designed experiments (Central Composite or Box Behnken design) to obtain an optimal response using a second-degree polynomial model as an approximation.

The talk will provide a brief overview on bioprocess options for G.diazotrophicus, efforts on finding optimum medium composition for its growth using response surface methodology based on Box-Behnken experimental design, and translating the optimum conditions into benchtop scale bioreactor and full characterization in its C, electron, and ATP-balances. The results will be discussed vis-à-vis enzyme production and PGPR potential.

Keywords: Gluconacetobacter Dizatrophicus, Medium Optimization, Nitrogenase, Response Surface Methodology, Elelemental Balances

**This study is supported by TÜBİTAK, with project Nr 221M301*

EXTREMOZYMES CHARACTERIZATION: A CASE STUDY ON THE THERMOPHILIC BACTERIAL ALPHA-AMYLASE TFAMY48

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Abstract:

Extreme ecosystems such as thermal springs are known to harbor thermophilic microorganisms that produce thermostable enzymes, which are of interest to various industries that operate under extreme physicochemical conditions. Algeria, which is rich in thermal springs, has become a focus of research on thermophiles and their enzymes.

A study conducted on thermophilic bacteria isolated from a thermal spring in Algeria identified Tepidimonas fonticaldi as a producer of a highly active (30 U/mL) amylase, named TfAmy48. The enzyme was purified and characterized to determine its enzymatic properties. It was found that the optimal activity of TfAmy48 occurs at pH 8 and a temperature of 70°C, with the presence of calcium shifting the optimum to 80°C. The monomeric enzyme has a molecular weight of 48 kDa and is sensitive to classical inhibitors such as heavy metals, but not to chelating agents in detergents such as EDTA and EGTA. The enzyme's characteristics suggest its potential as an additive in detergents.

In comparison to a commercial enzyme, Termamyl® 300L, TfAmy48 was found to have superior relative and residual activity in the presence of different detergents and their constituents. The gene encoding TfAmy48 was cloned into E. coli BL21 using the expression vector pTrc99A, enabling the overexpression of the enzyme up to an activity of 300 U/mL. Homology modeling was used to elucidate the enzyme's structure.

In conclusion, the study characterized the thermostable amylase enzyme TfAmy48 produced by Tepidimonas fonticaldi from a thermal spring in Algeria. The enzyme's properties suggest its potential application in the detergent industry.

Keywords: Thermophilic ; Tepidimonas Fonticaldi ; A-Amylase ; Detergent Formulations. *

OPTIMIZATION OF PLASMA OZONE PRETREATMENT FOR LIGNIN EXTRACTION FROM BANANA PEELS FOR POTENTIAL COSMETIC APPLICATION

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Abstract:

Lignin derived from banana peels has huge application in cosmeceuticals industries. Lignin can act as natural UV protection due to its UVA and UVB absorbing properties and is believed to become a super alternative for the commercial UV protection products widely used in the market. Lignin from banana peels can be extracted by undergoing pretreatment. In this study, ozone pretreatment conditions were optimized and applied towards banana peel. To confirm the success of the pretreatment, compositional analyses were conducted before and after the ozone pretreatment. Subsequently, the pretreated banana peels underwent three different extractions (basic organosolv, soda and formic acid extraction) and the efficiency of the extraction methods were compared. The results revealed that formic acid extraction shows the least amount of lignin left in the banana peel (4.4 ± 0.25%) compared to basic organosolv and soda extraction methods with 8.91 ± 1.07% and 5.95 ± 1.15% remaining lignin, respectively. Meanwhile, the lignin-containing hydrolysate after the plasma ozone pretreatment was also collected. All type of lignin collected from different strategies were formulated into cosmetic creams. Structural characterizations using Fourier transform infrared (FT-IR) spectroscopy and Scanning Electron Microscope (SEM) were performed for all samples. The ozone pretreatment demonstrated an efficient method for pretreatment of banana peels, as it was capable of reducing lignin up to 39.14%. Sun Protection Factor (SPF) of lignin-based cream from banana peels showed significant values ranging from 1 to 13 according to the types and concentrations of the lignin used. Highest SPF values (13.219 ± 1.36) was obtained from the cream incorporated with the lignin from the hydrolysate. Lignin-based cream of formic acid lignin, soda lignin and solution lignin portrayed good UVB absorption, while basic lignin shows good UVA protection and thus proves its significant potential in cosmetics applications.

Keywords: Lignin, Plasma Ozone, Pretreatment, Banana Peels, UV, Cosmetic

**This work was financially supported by the Universiti Teknologi Malaysia (UTM) under the UTM Fundamental Grant, UTM-FR (20H88)*

INFLAMMATORY BOWEL DISEASE IN A HORSE: CLINICAL PRESENTATION AND CECUM MICROBIAL PROFILE

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Abstract:

In the clinical examination of the 11 year old horse brought to the hospital with complaints of chronic diarrhea, pain and weight loss, it was observed that the heart rate increased, the respiratory rate and body temperature were normal. Anemia, dehydration and neutropenia were detected in the hemogram findings, while a decrease in total protein and albumin values and an increase in liver enzymes were detected in the blood biochemistry findings. The horse died on day 4 after being treated for suspected inflammatory bowel disease (IBD). In order to clarify the etiology of the disease and to investigate the taxonomic bacterial composition, DNA extraction was performed for metagenomic analysis by taking samples from three different parts of the cecum. For bacterial profiling, primers that amplify the V3-V4 region of the 16S rRNA gene were used. Amplicon readings from the Illumina MiSeq System were analyzed using quantitative insights into microbial ecology 2 QIIME2 (2022.11) software. Campylobacter rectus (36.1%) and Roseburia inulinivorans (18.3%) were found to be higher in the areas of the cecum showing hemorrhagic lesions compared to the less inflamed parts. As a result, when the examination findings, hemogram and biochemistry changes and bacterial profile were evaluated together, it was determined that the case was compatible with IBD and the taxonomic bacterial composition of the disease was revealed.

Keywords: IBD, Bacterial, Clinical, Cecum

BIOAVAILABILITY ENHANCEMENT OF COENZYME Q10 USING CYCLODEXTRIN

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Abstract:

The increasing prevalence of heart disease, diabetes, cancer, and immune diseases because of unhealthy lifestyles has increased the demand for healthy food and supplements across the country, thereby raising the demand for Coenzyme Q10 (CoQ10) products among health-conscious consumers. CoQ10 is a critical component of the electron transport chain, which is responsible for producing adenosine triphosphate (ATP) and is frequently used as a supplementary treatment for some diseases. As human ages, the body production of CoQ10 reduces thus impairing ATP synthesis resulting in decreasing energy production and potential cellular damage. The hydrophobic property of CoQ10 powder limits its bioavailability as a supplement, which was reported less than 10%. Various strategies have been implemented in developing stable and soluble CoQ10 nutraceutical supplements with high bioavailability and efficacy. Emulsification of CoQ10 improves its bioavailability and enables its use in a wide range of products, such as skincare, supplements, and functional foods. The stability and effectiveness of the emulsified CoQ10 are depending on several factors, such as the type and concentration of emulsifier used, the pH of the formulation, and the manufacturing process. The use of cyclodextrins enhances the emulsification process by improving the solubility and stability of the molecule. The hydrophobic cavity of the cyclodextrin molecule encapsulates the CoQ10 molecule, forming an inclusion complex. This complex increases the solubility and stability of CoQ10 in the aqueous phase, preventing aggregation and degradation of the molecule. Overall, the use of cyclodextrins as emulsifiers for CoQ10 improves the bioavailability and stability of the molecule, making it more useful for various applications, such as in the pharmaceutical and cosmetic industries.

Keywords: Emulsification, Cyclodextrin Complex, Coq10, Bioavailability

**This study is supported by Kamarizs Medicare Sdn. Bhd.*

OPTIMIZING AND PURIFYING LACCASE FROM THE NEWLY ISOLATED WHITE ROT FUNGUS, CERRENA SP. WICC F39.

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Abstract:

White rot fungi have been studied extensively on a global scale due to their potential use in biotechnology. Of the ligninolytic exoenzymes produced, laccase has been one of the most studied and is associated with a variety of green oxidation processes. However, difficulties with producing sufficient quantities of these enzymes in economically viable processes have held back the study of ligninolytic enzymes. In this study, local soils were screened for white rot fungi producing ligninolytic enzymes and eight isolates were identified as potentially useful from 119 candidates. Cerrena sp. WICC F39 was selected for its high laccase activity and optimization work was conducted using ligninocellulosic wastes in submerged culture. The optimization work was conducted using both OFAT and statistical methods with OFAT producing 110% more laccase activity than the statistical method. Characterization of laccase from Cerrena spp. WICC F39 showed a molecular mass of 62 kDa, a fold of purification of 5834.68 with 158.6% recovery and an ABTS substrate Km and Vmax value of 0.107 mM and 77101.00 S-1 mM-1 respectively. The optimum pH, optimum temperature, pH stability and thermal stability of laccases were 2.5, 60°C, 4–6, 20-80°C, respectively. Sodium azide was found a true inhibitor for laccases from Cerrena spp. WICC F39. In accordance with the results showed in this study, such high-level secretion of laccase and other ligninolytic enzymes make Cerrena spp. WICC F39 as a potential candidate for enhanced bioremediation.

Keywords: Cerrena, Rice Straw, Submerged Fermentation, Purification

SACCHAROMYCES BOULARDII BIOTECHNOLOGY AND PROBIOTIC FUNCTIONAL FOOD DEVELOPMENT

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Abstract:

Over the past half century, modernization, population growth, has been associated with changes to energy-dense, appetizing but nutrient-poor foods, contributing to an increased risk of developing several diseases. In this context, we have tried to develop three types of functional foods (pasta, cereals and chips) based on the probiotic strain Saccharomyces boulardii for preventive purposes against digestive diseases and diarrheal symptoms with potential health benefits. In order to carry out this study, a questionnaire survey was distributed online and in the field on the consumption of probiotics and functional foods in Algeria, which allowed us to formulate functional foods that are appropriate to the expectations of the consumer. A series of tests were applied on functional foods (AF) developed namely the strain viability test, analysis of microbiological, physico-chemical, organoleptic, nutritional and «liking» quality. For the viability test, remarkable results were obtained, indeed the probiotic strain was able to survive in the three food matrices. The other tests ensured that our FAs are of satisfactory quality and comply with Algerian legislation. These formulations were patented. The AF market is continuously growing worldwide, which leads us to believe that the research and development of this field in Algeria is crucial and requires a lot of attention and future investigation.

Keywords: Functional Food, Probiotic, Saccharomyces Boulardii, Formulation, Pasta, Chips.

ANTIVIRAL EFFECT OF ESSENTIAL OILS ON TOBACCO MOSAIC VIRUS IN PLANT TISSUE CULTURE MODEL

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Abstract:

Tobacco Mosaic Virus (TMV) is one of the first plant viruses to be discovered. It is described as a positive single-stranded RNA viruses with a length of approximately 300 nm rod-shape morphology. TMV can infect the roots, stems, and leaves of live tobacco plants. Unlike other viruses, it can remain in the death plant tissue for a long time and maintain its virulence effect because of its morphological characteristics. TMV can infect 150 different plant species, including tomato, pepper, eggplant, tobacco, spinach, petunia and marigold. It follows the path of mechanical transmission and can spread with the hands, clothes, or tools of the workers. Thus, it can show contamination even from factory to factory. TMV affects the development process of chloroplasts in infected plants, creates mosaic-patterned yellow-dark green necrotic spots on the leaves of the plant and affects fruit development. Since there are no currently available options or products for management of the plant viruses including TMV, it can cause serious damage in agriculture and negatively affect the food sector in the long term. The annually agricultural lost cost attributable to plant viruses are estimated more than $30 billion in worldwide. For this reason, there is a need to develop antiviral substances for plant viruses, which will protect plant viral contamination, reduce the virulence effect or inhibit the viral replication in infected plants. In order to develop such products, it is thought that it should be done in controlled areas such as plant tissue culture in order to protect the health of other plants. Therefore, in this project it was aimed to isolate TMV from dried tobacco samples, proliferate the virus in plant tissue culture and perform antiviral experiments. Briefly, mature plant callus parts were infected with isolated TMV and passaged on agar. Infection period was observed during 7 days on agar culture. Accordingly, the infected group was defined as pale and brown, while the control group appeared lively and green. Then, the callus was fragmented and TMV isolation was done by ultracentrifugation. TMV were detected by Transmission Electron Microscopy (TEM). In our ongoing project, the antiviral activity of lavender and tea tree essential oils will be tested against TMV in callus agar and/or suspension culture. Antiviral activity analysis will be done by RT-PCR method. According to preliminary results it was shown that both lavender and tea tree essential oil applications were effectively inhibited TMV in both callus culture.

Keywords: TMV, Antiviral, Lavandula, Lavender Oil, Tea Tree Oil, Callus Culture, Plant Viruses*

LONG-TERM NUTRITION WITH MEAT AND BAKERY MEALS, REFLECTION ON THE HEMATOLOGICAL PROFILE: AN EXPERIMENTAL STUDY ON RODENTS

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Abstract:

Background/Aim: In the modern world, it is concerning low-quality food or so-called „fast food“, of the barbecue type and at the same time oversaturated with carbohydrate and lipid components, which inevitably leads to obesity and other, often malignant diseases, in humans and some pets. On the other hand, obese people try to correct an inadequate diet, consuming only one or two types of food, neglecting the intake of unbalanced and insufficient amounts of essential nutrients, in which is leading the so-called meat diet, that is widespread and as such represents an attempt to correct obesity. In the research, we used the animal model of the laboratory rat, which is omnivorous in terms of nutrition, which represents a certain similarity with humans and pigs, so the rat is the animal of choice in our study. The aim of the study is to determine the possible adverse effects of long-term consumption of meat products and bakery products, following the hematological status of the examined animals. Material and methods: Twenty-four rats were randomly divided into three groups, eight in each group. The first group (A) was fed with bakery products. The second group (B) was fed with meat products. The third group (C) was fed with conventional, briquetted food for rodents, and it represented the control group. The animals consumed the specified food for seven weeks (49 days). The analysis of hematological parameters was determined using the cell counter „Idex Laser Cyte“ flow hemocytometer and the usual parameters were determined. Results: The Bonferroni test of individual differences between the two experimental and control groups show that in group (A) the MCV was significantly lower compared to group (B) (MD=-4.45, $p<0.001$) and the control group (MD=-3.08, $p=0.014$), MCH compared to group (B) (MD=-2.08, $p<0.001$) and the control group (MD=-0.9, $p=0.013$), MCHC compared to the meat group (MD=-1.26, $p=0.052$). Group (A) had higher results for WBC compared to the group (B) (MD=2.97, $p=0.031$) and for PLT (MD=418.0, $p=0.004$). Group (B) had significantly higher results for the parameter MCH compared to the control group (MD=1.18, $p=0.001$) and for the variable MCHC (MD=1.38, $p=0.031$), while it had lower results for WBC in compared to the control group (MD=-3.10, $p=0.002$) and PLT (MD=-301.8, $p=0.042$). Conclusion: We concluded that a long-term diet exclusively with group (A) bakery products, as well as group (B) meat products, adversely affected a number of hematological parameters. In support of this statement, certain poikilocytotic forms of erythrocytes were determined after microscopic analysis of the peripheral blood of the examined animals.
Keywords: Bakery Products, Meat Products, Hematological Parameters

FORMULATION DEVELOPMENT OF A WOUND HEALING CREAM FROM EXTRACTS OF OPUNTIA SPP.

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Abstract:

Herbal medicines are being used by about 80% of the world population primarily in the developing countries for primary health care. Various studies have been done to assess the wound healing potential of Cactaceae family. Wound healing agents support the natural healing process, reduce trauma and likelihood of secondary infections and hasten wound closure.

This study aimed at formulating and preparing herbal cream from Opuntia stricta; establishing the quality, wound healing efficacy and toxicity profile of the prepared herbal Cream.

Ethanolic extracts of the aerial parts of the study plant were prepared and screened for presence of alkaloids, flavonoids, terpene, steroids, and anthraquinones.

Formulation of Herbal Skin Cream for wound healing was successfully developed that met the relevant pharmaceutical characteristics. The prepared formulations are then evaluated for parameters like physical properties, pH, viscosity, Spreadability and stability of the formulated cream. The prepared formulations showed good Spreadability, no evidence of phase separation and good consistency during the study period. Stability parameters like visual appearance, nature, viscosity and pH of the formulations showed that there was no significant variation during the study period. The prepared formulations showed proper pH range that is approximately pH 6; it confirms the compatibility of the formulations with skin secretions. The creams were found to be stable during stability to ICH guidelines (40±2 °C/ 75±5 % RH) for 3 months.

In-vitro Diffusion studied conducted on all the 8 formulations has shown good diffusion when compared to other formulations.

Now it can be possible to develop creams containing herbal extracts and can be used as a barrier to protect skin.

Keywords: Wound Healing; Antimicrobial Activity, Antioxidant Activity; Formulation; Opuntia Stricta

**THE HIGHER SCHOOL OF BIOLOGICAL SCIENCES OF ORAN. ALGERIA*

EFFECTIVE AND EFFICIENT PROLIFERATION OF BHK-21CELLS USING SERUM-FREE-MEDIUM IN FED-BATCH CULTURE SYSTEM FOR FMD VIRUS PRODUCTION

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Abstract

Foot-and-mouth disease (FMD) is a highly contagious and devastating a viral disease of cloven-hoofed animals and is considered a severe threat to the livestock industry worldwide. Today, BHK 21 cells adapted to suspension culture systems are widely used in large-scale inactivated FMD vaccine production. The serum is a broad supplement in animal cell culture media. Although it has many advantages, it has many drawbacks and a substantial cost. Current biotechnological approaches to cell culture avoid using serum; therefore, this study aims to grow BHK-21 suspension cells in serum-free media (SFM) in stirred bioreactors. In our study, BHK-21 cells were maintained in suspension culture up to 20 passages in a 2L stirred bioreactor. After ten passages of suspension cell culture, SFM was used without serum, while control groups were maintained with 6M medium, including 10% serum. FMDV culture was prepared between the 10th and 20th passages level of the cells. During the process, the growth kinetics of the cells culture, antigenicity and infectivity of the FMD virus were assessed comparatively. The determined cell count and percentage of viability of the cultures in both media complied with each other. Also, virus antigenicity and infectivity values of the virus harvests were similar for the test and control groups (SFM and 6M). This study showed that large-scale suspension BHK-21 cells used in industrial-scale production of the FMD vaccine could be grown in SFM without serum without compromising quality and quantity.

Keywords: Serum-Free Medium, BHK-21 Cells, Foot-And-Mouth Disease, Vaccine, Pilot-Scale Production

[*] *This study is supported by the General Directorate of Agricultural Research and Policies (TAGEM) and the ŞAP Institute*

THE EFFECT OF FULLERENE C_{60} NANOPARTICLE ON COX-2, HO-1, P53 AND CASPASE-3 PROTEIN SIGNALING PATHWAYS AGAINST LIVER TISSUE INJURY

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Abstract:

In this study, the treatment effect of fullerene C_{60} nanoparticle against liver tissue damage caused by 7,12-dimethylbenz [a] anthracene (DMBA) in Wistar albino female rats was investigated. The animal experiments part of this study was conducted in the Firat University Experimental Animal Research Center (FUDAM) with the permission of the Firat University Animal Experiments Ethics Committee dated 27.01.2021 and numbered 2021/02. In this study, 60 Wistar albino female rats (n=60, 8 weeks old) were used. These rats were divided into 4 groups and each group included 15 rats. Groups are as follows: (1) Control Group: Group fed with standard diet; (2) Fullerene C_{60} Group: The group given Fullerene C_{60} (1.7 mg/kg bw, oral gavage); (3) DMBA Group: The group given DMBA (45 mg/kg bw, oral gavage); (4) Fullerene C_{60} + DMBA Group: The group given Fullerene C_{60} (1.7 mg/kg bw, oral gavage) and DMBA (45 mg/kg bw, oral gavage). The rats were decapitated after 16 weeks and their liver tissues were examined. Expression levels of COX-2, HO-1, p53 and caspase-3 proteins in liver tissue were determined by western blotting technique. Compared to the DMBA-treated group, COX-2 protein expression level was decreased in the fullerene C_{60} administered groups, while the HO-1, p53 and caspase-3 protein expression levels were significantly increased. According to the results, it was determined that fullerene C_{60} has a preventive and therapeutic effect on liver tissue damage.

Keywords: Caspase-3, COX-2, HO-1, p53

**This work was supported by Scientific Research Projects Coordination Unit of Firat University. Project number: FF. 20.07.*

**This study was supported by the Council of Higher Education (CoHE) 100/2000 Biotechnology priority field doctoral project and The Scientific and Technological Research Council of Turkey (TUBITAK) 2211/C program.*

EFFECT OF DIFFERENT EXOSOME ISOLATION METHODS ON EXOSOME CHARACTERIZATION AND EFFICIENCY

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Abstract:

Objectives: Exosomes, one of the extracellular vesicles, provide intercellular communication, are considered extracellular organelles. The isolation of exosomes, which are frequently used in drug studies, especially in cell-free cellular therapy and nano-size, are made with different methods, and each method has advantages and disadvantages. It was aimed to investigate the effects of exosome characterization, proliferative effect and by using two of the most widely used isolation methods, ultracentrifugation, and commercial kit.

Research Methods: L929 mfibroblast cell line was used in the study. Cells were grown in DMEM without FBS for exosome. The medium transferred into two different tubes. One of the tubes was used for exosome isolation by ultracentrifugation (15000xg); the other was used for isolation with a commercial kit, the miRCURY Exosome Kit. Exosome were characterized by SEM, NTA and surface markers and compared according to isolation methods. The effect of exosomes on proliferation was compared on A549 and Wl38 cell lines.

Results and Conclusion: The shape of exosomes isolated by ultracentrifugation with SEM is smaller and more constricted, their number is higher. The shape of the exosomes isolated with the kit is more compatible with the literature, and they are seen in the form of round membranes and in small numbers. While there was no difference between the two groups in NTA results, less CD63 was detected in exosomes obtained in ultracentrifugation. The antiproliferative effect was the same in both groups; It was determined that exosomes obtained from ultracentrifuge isolation were more effective, especially in the study performed on the Wl38 cell line (P=0.001). As a result, isolation performed with a mass yielded more successful results in characterization; On the other hand, isolation by ultracentrifuge gave more successful results in terms of demonstrating the function of exosomes.

Keywords: Exosome, Isolation Methods, Proliferation, Cell Culture

PRELIMINARY PHYLOGENETIC FINDINGS OF THE NEAR EASTERN FIRE SALAMANDER (SALAMANDRA INFRAIMMACULATA, MARTENS, 1885) IN ANATOLIA

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Abstract:

The Near Eastern Fire Salamander (Salamandra infraimmaculata), a globally categorized as near threatened species in the IUCN Red List, is distributed in southern and eastern parts of Türkiye, north of Iraq, northwest of Iran and along the Levant. There are three known subspecies of fire salamanders in Anatolia, which are, S. i. infraimmaculata, S. i. orientalis and S. i. semenovi. All knowledge about subspecies boundaries is only based on morphological and morphometric studies so far. Except for a few samples, there is no genetic characterization using mtDNA or nuclear genes. To reveal the phylogenetic relationships among those three subspecies, we sequenced the 638 bp long mitochondrial cytochrome oxidase I gene (cox1) in 148 individuals collected from 41 localities throughout their range in Türkiye. Phylogenetic analyses indicated that these three subspecies formed well-supported monophyletic groups. The nominotypical subspecies S. i. infraimmaculata split off first from the ancestral population and is now found only in the south of Hatay province. Subspecies S. i. orientalis is the next diverged group and is found in Adana, Osmaniye, Kahramanmaraş, Adıyaman and the north of Hatay provinces. The last monophyletic group, S. i. semenovi, is distributed in eastern Anatolia ranging from Erzincan south to Batman and Şanlıurfa. Interestingly, a previously unknown but related population is found in Mersin province. The relationship within this last subspecies is unresolved as more samples are needed to conclude whether the Mersin populations are a separate taxon or not. We argue that better understanding the intraspecific variation and determining the precise distributional boundaries for this threatened species are critical to developing effective conservation strategies.

Keywords: S.I. Infraimmaculata, S.I. Orientalis, S.I. Semenovi, Cox1 Gene

Acknowledgement: **This study was supported by TUBITAK 121Z819.*

DNA ISOLATION AND GENDER DETERMINATION FROM ONE SHED FEATHER OF RAMPHASTOS TUCANUS BIRD

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Abstract:

Gender determination by PCR method is important in birds whose gender cannot be determined morphologically,. DNA sources to be isolated for gender determination in birds may consist of samples such as blood, fresh feathers, feces, tissue, and saliva. It is important to obtain DNA non-invasively in birds. This case study was planned on a caged and waiting feather sample belonging to a Ramphastos Tucanus bird brought to Kayseri Zoo. In this study DNA isolation from shed and waiting feather and gender determination with universally declared primer pair are aimed. The obtained feathers were delivered to the laboratory under sterile conditions. DNA isolation was isolated by standard phenol-chloroform isolation method. The OD260/280 ratio of the DNA obtained 1.84 and the amount was determined as 73 ng/µl. As a result of the analysis performed with the gender-specific primer, a single band representing the male gender was observed.

Keywords: Bird, Shed Feather, Gender Determination, Pcr

CONSTRUCTION OF NEW GENERATION PROBIOTICS: TECHNICAL DEMANDS

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Abstract:

Problem. The search and implementation of naturally derived probiotic components for creating synbiotics products that possess both technological and physiological functionality is promising for the 3P medicine application. Today, the production of pharmabiotics has gained new significance through the use of “next-generation” probiotic strains. Therefore, there is a need to develop new, more affordable and reliable technological procedures for screening, cultivation and store of any unique strains or its composition. Research methods. The work is based on the analysis and systematization of our experimental and theoretical scientific data. Results. Special attention should be paid to the safety of strains, their functional characteristics, produced metabolites, adhesive properties, allowing successful colonization of the host's epithelial cells along with no exhibiting inhibitory effect to the commensal representatives, and ability to specifically modulate local and systemic immune responses. Since conventional probiotic preparations contain live cultures, this requires strict demands to enable their viability, appropriate transportation, as well as mandatory compliance with the shelf life, which is usually longer for lyophilized preparations compared to liquid or gel forms (up to three months). In addition to optimizing the composition of the nutrient medium, great attention is given to the microorganism cultivation, particularly to the nature (source) and concentration of carbon in the medium and its influence on biomass accumulation. Analysis of trends in the processing industry in Western Europe and America shows that cryogenic technologies occupy a priority position in obtaining high-quality food products and additives with increased content of biologically active compounds.

Conclusions. The lyophilization is the commonly accepted method, since microbial strains can be stored significantly longer than frozen. Lyophilized preparations require fewer types of filler in the final product, ensuring their standardization and relative stability during long-term storage. The manufacture of NG probiotical strains mixed with prebiotical components requires revision of technical procedure.

Keywords: Pharmabiotics, 3P Medicine, Probiotic Strains, Technological Procedures*

ALKALIPHILIC BACILLUS LEHENSIS G1: FROM BASIC SCIENCES TO BIOTECHNOLOGY APPLICATION

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Abstract:

Extremophilic microorganism have been a great interest to scientific and industrial communities not only for fundamental scientific knowledge discovery but most importantly for its potential in biotechnological application. Bacillus lehensis GI is an alkalophilic bacterium that was isolated in Malaysia. The bacterium high pH survivability and capability to express hydrolytic enzymes including cyclodextrin glucanotransferase, maltogenic amylase, levanase and many more has led to further investigation on its pH adaptation characteristics as well as the functionality and structural studies of its biocatalysts. Antiporter gene or protein involved in pH adaptation has been identified and cloned into E. coli for functional study. Another interesting feature of this Bacillus lehensis G1 is its ability to secrete enzymes extracellularly. Proteomic approach was used to identify several potential signal peptides and secretive efficiency study was carried out using E. coli as the expression host to investigate their extracellular expression and secretion efficacy. The study on extremophilic microorganism such as alkalophile Bacillus lehensis G1 has led us to the importance of understanding biological and fundamental scientific knowledge for future application in biotechnology industries.

Keywords: Extremophile, Signal Peptides, Ph Adaptation, Hydrolytic Enzymes

[*]Plenary talk (video, Invited by Chairman)

BIOCONVERSION OF BIOMASS: FROM WASTE TO WEALTH

(Keynote)

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Abstract:

Industrial production of many products heavily relies on fossil resources. In the meantime, biomass from lignocellulosic has received significant attention as an alternative material due to its renewable nature and abundant availability. Various bioconversion technologies have been used to produce or extract value-added products from biomass. However, the bioconversion efficiency process depends on the types of biomass used as a raw material, which are different in terms of their compositions and the processes involved. In most cases, the bioconversion of lignocellulosic biomass usually involves three stages which are pretreatment, hydrolysis and fermentation processes. The processes are necessary for breaking down polysaccharides into monosaccharides and eventually for efficient conversion into targeted products. Several bioconversion studies into value-added products were conducted using different lignocellulosic biomass sources obtained in Malaysia. Conversion of biomass oil palm frond into xylooligosaccharide and pineapple leaves fibre into total reducing sugar involved pretreatment and enzymatic hydrolysis. In contrast, the fermentation process involved converting tropical fern into pectinase enzyme and local lignocellulosic biomass into mycelium-based biofoam. These studies also focus on optimizing bioprocessing parameters involved to improve the production yield. Therefore, bioconversion of lignocellulosic biomass showcases different biomass properties, product variations, pretreatment and hydrolysis methods, as well as fermentation conditions, which are valuable input for current and future renewable sources of industrial raw materials.

Keywords: Bioconversion, Lignocellulosic, Biomass, Pretreatment, Hydrolysis

**This study is supported by research grant under Universiti Teknologi Malaysia*

UTILIZATION OF RHIZOBACTERIA TO INCREASE ANTIOXIDANT AND PHYTOCHEMICAL CONTENT OF LOCAL GINSENG (TALINUM PANICULATUM GAERTN) LEAVES

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Abstract:

The development of organic herbal products from the local community is expected to support tourism and increase regional economic income. One of the local herbal products that has the potential to be developed is local ginseng tea because it has properties to increase immunity and stamina. To provide added value from this product, it is necessary to plant organically, because organic products are in great demand in the world because they are free of harmful chemicals. One method that can be used to improve the quality of this local ginseng tea such as phytochemical content, antioxidants, and chlorophyll is to use rhizobacterial biostimulants. The methods used are the calorie metric method for phytochemical analysis, DPPH method for antioxidant analysis, IAA analysis method to determine the content of IAA hormone in rhizobacteria, nitrogen-fixing test using Jensen media to determine the ability of rhizobacteria to fix nitrogen, and bacterial ability test to dissolve phosphate using pikovskaya media The results obtained from preliminary tests that 50 types of rhizobacteria were taken from plant roots. From the IAA test, 17 positive IAA hormones were obtained, these 17 rhizobacteria were tested nitrogen fixing and testing the ability of rhizobacteria to dissolve phosphate. 4 rhizobacteria were taken with the best IAA hormone content, fixing nitrogen and dissolving phosphate, then applied to ginseng plants in the field at a concentration of 2% each. As a result, the four rhizobacteria can increase the content of antioxidants, phytochemicals, and chlorophyll in ginseng plants when compared to controls. The highest antioxidant content with an IC50% value (31.03 ppm) in the very strong antioxidant category was found in tingho 6 isolate, the highest total flavonoid content (87.03mg QE/100 mL) was found in tingho 7 isolate, the highest total phenol content (791.92 mg GAE/100g) was found in tingho 7 isolate, the highest chlorophyll content was found in tingho 9 isolate (1422.26 ppm)

Keywords: Phytochemicals, Ginseng, Medecine, Local

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OPTIMIZATION OF HIGHER PRODUCTION, CHARACTERIZATION, ANTIMICROBIAL AND ANTICANCER ACTIVITY OF BIOACTIVE METABOLITES ISOLATED FROM PSEUDOMONAS AURANTIACA PB-ST2

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Abstract:

Metabolites and plant growth promoting abilities of Pseudomonas chlororaphis subsp. aurantiaca, PB-St2, have been extensively studied. This study focuses on isolation and optimization of higher yield of bioactive metabolites, from PB-St2, and their potential as antimicrobial and anticancer agents. Initially, maximum production of metabolites was optimized at different temperatures and incubation periods. PB-St2 was subjected to bulk extraction (5 L) and metabolites were detected by thin layer chromatography (TLC), and purified through gravitational column chromatography and HPLC; and characterized by LC-MS. Collected fractions were screened for antimicrobial activity against fungal phytopathogens (Fusarium equiseti, Fusarium incarnatum, Alternaria alternata, Colletotrichum falcatum) and bacterial human pathogens (Bacillus cereus, Pseudomonas aeruginosa, Salmonella enterica, Klebsiella oxytoca) and anticancer activity (HepG-2 , SF767). Bacterial culture grown at 32°C for 72 h yielded 5 g crude extract. Through gravitational chromatography, two pure compounds, Mupirocin and Phenazine Carboxylic Acid (PCA); and a complex of three compounds (PC3) were isolated from crude extract. PC3 was further purified by HPLC and three compounds, pyoluteorin, PCA and 2-hydroxyphenazine (2-OH-phz) were identified. Complex of compounds PC3, and PCA exhibited highest inhibitory activity against B. cereus and A. alternata. Maximum antifungal activity of 2-OH-phz was observed against A. alternata followed by C. falcatum and F. incarnatum. PC3 also achieved the highest IC50 against HepG-2 and SF767 cell lines followed by PCA and 2-OH-phz.

Keywords: P. Aurantiaca; Bioactive Metabolites; Chromatography; Antimicrobial; Anticancer

Higher Education Commission (HEC) of Pakistan

MAXIMIZING PULLULAN PRODUCTION: UNLOCKING THE POTENTIAL OF AUREOBASIDIUM MELANOGENUM DSM2402 THROUGH BIOPROCESS OPTIMIZATION

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Abstract:

Pullulan is a water-soluble homopolymer composed of maltotriose subunits. It is a bio-degradable biopolymer essentially a linear glucan containing α-1,4 and α-1,6 linkages in the ratio of 2:1. The unique structural and physical properties of pullulan provide its structural flexibility, easy derivability, and superior solubility. It has potential applications in the pharmaceutical, food industries and as biodegradable plastic because of its advantageous chemical and physical properties. Some of its outstanding properties including low viscosity, non-toxicity, slow digestibility, high plasticity, and excellent film-forming capabilities. Pullulan is produced by Aureobasidium pullulans which is also called black yeast. Although pullulan shows great potential in industries, the high production cost and low productivity are the major drawbacks. Thus, the main objective of the present work is to focus on bioprocessing optimization for high pullulan production by Aureobasidium melanogenum DSM 2404. The experiment started with selecting the best medium production and was followed by medium optimization using one- factor-at-a-time method and statistical method in the shake flask. Using the optimal medium compositions obtained, the effect of pH-controlled and uncontrolled pH conditions were compared in a bioreactor. The cultivation medium that produced the highest pullulan production from statistical optimization was composed of (in g L-1): sucrose 57.47; BSFL powder, 5.03; K2HPO4, 20.0; MgSO4.7H2O, 0.6; NaCl, 1.0. On the other hand, the optimal medium composition using one-factor-at-a-time method composed of (in g L-1): sucrose 40.0; BSFL powder, 6.0; K2HPO4, 18.0; MgSO4.7H2O, 0.6; NaCl, 1.0. The maximal pullulan production obtained from the statistically optimized medium was 33.11 g L-1, which was 158.17% higher than the unoptimized medium (12.83 g L-1), and 18.12% higher than the medium optimized using one-factor-at-a-time (28.03 g L-1). Further cultivation in a 16-L bioreactor using controlled and uncontrolled pH shows that higher pullulan production was obtained from uncontrolled pH condition (37.53 g L-1) compared to controlled pH condition (26.87 g L-1). Cultivation of culture in a 16-L bioreactor under uncontrolled pH condition using statistically optimized medium composition shows an increment of 192.69% pullulan production when compared to unoptimized medium composition in the shake flask.

Keywords: Optimization, Aureobasidium Melanogenum DSM 2404, Pullulan, Production*

M FORMULATION FROM HIBISCUS SABDARIFFA LINN. EXTRACT

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Abstract:

Hibiscus sabdariffa Linn. (HSL) or otherwise commonly known as 'Roselle' or 'Karkade', has been widely known for its traditional use as food and herbal medicine. It is a plant that grows in tropical regions such as Malaysia. It has been widely studied for its antimicrobial and antioxidant properties due to the presence of anthocyanins for wound healing application, but formulating it into a stabilized topical delivery cream is still lacking. This study aims to investigate the wound-healing activity of HSL and formulate it into a nanocream for topical delivery. The cytotoxicity of the ethanolic HSL extract was assessed via MTT assay on HSF 1184 cells and results have shown that the IC50 value of the HSL extract was 1000µg/mL, indicating that it is weakly cytotoxic to HSF 1184 cells. The HSL extract was further verified for its wound-healing activity on HSF 1184 cells via Scratch assay and at a concentration of 250µg/mL showed the highest cell migration activity of HSF 1184 compared to the control (without treatment). Then, the HSL extract was formulated into a water-oil based nanocream. Based on characterization, it had a mean droplet size of 477.03nm, polydispersity index of 0.542, conductivity value of 0.11 mS/cm, pH of 5.53, and no phase separation was observed in both centrifugation tests and freeze-thaw cycles. The characteristics of the HSL nanocream indicate that it is a stable W/O formulation that is suitable to be applied on skin. In a nutshell, HSL extract demonstrated a great potential as natural wound healing treatment as it is weakly cytotoxic, and shows potential for accelerating cell migration, and can be incorporated into a stable nanocream for topical delivery.

Keywords: Hibiscus Sabdariffa Linn., Cytotoxicity, Wound Healing, Nanocream, Formulation

**This work was funded by the Ministry of Education (MOE) through Fundamental Research Grant Scheme (FRGS/1/2020/STG01/UTM/02/8)*

BIOACTIVE COMPOUNDS FROM PEPEROMIA OBTUSIFOLIA

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Abstract:

Peperomia obtusifolia (L.) A. Dietr., native to Middle America, is an ornamental plant also traditionally used for its mild antimicrobial properties. Chemical investigation on the leaves of P. obtusifolia resulted in the isolation of two previously undescribed compounds, named peperomic ester (1) and peperoside (2), together with five known compounds, viz. N-[2-(3,4-dihydroxyphenyl)ethyl]-3,4-dihydroxybenzamide (3), becatamide (4), peperobtusin A (5), peperomin B (6), and arabinothalictoside (7). The structures of these compounds were elucidated by 1D and 2D NMR techniques and HREIMS analyses. Compounds 1–7 were evaluated for their antifungal (against Botrytis cinerea, Septoria tritici and Phytophthora infestans), antibacterial (against Bacillus subtilis and Aliivibrio fischeri), and antiproliferative (against PC-3 and HT-29 human cancer cell lines) activities. The known peperobtusin A (5) was the most active compound against the PC-3 cancer cell line with IC50 values of 25.6 µM and 36.0 µM in MTT and CV assays, respectively. This compound also induced 90% inhibition of bacterial growth of the Gram-positive B. subtilis at a concentration of 100 µM. In addition, compound 3 showed anti-oomycotic activity against P. infestans with an inhibition value of 56% by using a concentration of 125 µM.

Keywords: Piperaceae, Peperomia Obtusifolia, Isolation, Cytotoxicity, Anticancer, Antibacterial

TRIPLE COMBINATION RHIZOME EXTRACT IN ENHANCING SYNERGISTIC ANTIOXIDANT ACTIVITY AGAINST FREE RADICALS

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Abstract:

Rhizomes of medicinal plants which are known to contain secondary metabolites of phenols and flavonoids. The purpose of this study was to determine the antioxidant activity of the combination of extracts of the rhizome. The combination used for comparison in the extract mixture was extract A (1:1:1), extract B (1:2:1), extract C (2:1:2), and ascorbic acid was used as a positive control. This research uses descriptive and experimental methods. The research design used was a completely randomized design with two factorials, the first factor was a combination of extracts consisting of 3 variations A (1:1:1), extract B (1:2:1), and extract C (2:1:2) . The second factor is concentration consisting of 5 variations (10, 50, 100, 150, 200 ppm). Data were analysed using a two-way ANOVA test and further analysed by Duncan's test. This study showed that the combination of extracts A, B, and C contained secondary metabolites of phenols and flavonoids. The types of flavonoid compounds contained in the combination of extracts A, B, and C are flavanones and dihydro flavanols. The results showed that the combination of extract B with a concentration of 200 ppm in the DPPH method was the most optimal variation in reducing free radicals (78.21%). Based on the ABTS method, the combination of extract A with a concentration of 200 ppm was the best free radical scavenger (91.11%). The results of the analysis of antioxidant activity based on the FRAP method showed that the combination of extract A with a concentration of 200 ppm was able to reduce free radicals (52.76%). The analysis of the DPPH, ABTS, and FRAP methods shows that the combination of extracts as a source of antioxidants has the scavenging ability so that the combination of extracts can be used as an alternative antioxidant.

Keywords: Rhizomes, Antioxidant, Synergistic, Free Radicals

**This study is supported by BLU funding of FMIPA UNJ Jakarta*

OPTIMIZATION OF PERSICARIA ODORATA OIL USING SUBCRITICAL WATER EXTRACTION

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Abstract:

Persicaria odorata (P. odorata), commonly known as Vietnamese coriander or kesum, is a herbal plant widely used in Malaysian traditional cuisines and known for its unique flavor and medicinal properties. As the demand for natural extracts from botanical sources continues to grow, the development of sustainable and environmentally friendly extraction methods become crucial. Subcritical water extraction (SWE) has emerged as a green extraction process that only used water as solvent that offers numerous advantages over conventional solvent extraction methods. The study was aimed to identify the optimal conditions to obtain high oil yields from P. odorata by using SWE. An experimental design utilizing the Box-Behnken design was employed to systematically investigate the effects of three important parameters: temperature, extraction time, and volume of water. The temperature range explored in this study was 130-180 °C, the extraction time was varied from 10 to 20 minutes, and the volume of water was ranged from 15 to 20 mL. The obtained experimental results were analyzed using response surface methodology to evaluate the individual and interactive effects of the parameters on the oil extraction efficiency. Significant findings from the optimization process revealed that temperature exerted the most dominant influence on the extraction process. The optimum operating conditions obtained for SWE extraction of global oil yield were at 164°C, 16 minutes and 17 mL with predicted yield of 17.68 % per dry weight of sample. The findings highlight the potential of SWE as a sustainable and efficient method for extracting oil from herbal plants, contributing to the promotion of sustainable resource utilization and reducing the environmental footprint associated with extraction processes.

Keywords: Persicaria Odorata, Response Surface Methodology, Subcritical Water Extraction

DEVELOPMENT OF HIGH CELL MASS PRODUCTION PLATFORM FOR LIMOSILACTOBACILLUS REUTERI USING MIXED SUBSTRATES CULTIVATION SYSTEM

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Abstract:

The rising concerns about environmental and economic trends have prompted an expanding interest in green science technology. There is a growing interest in value-added chemicals such as 1,3-propanediol (1,3-PDO) using biological approaches and sustainable feedstock such as glycerol. Limosilactobacillus reuteri (L. reuteri), an exclusive obligate heterofermentative lactic acid bacterium, employs both Embden, Meyerhof and Parnas (EMP) and phosphoketolase (PKP) pathways for cell growth on a carbon source such as glucose as the substrate and hence produces lactate, acetate and ethanol. In addition, L. reuteri is also a potential bio-factory for the production of 1,3-PDO. This study aims to develop a new cultivation strategy for optimised biomass production on a semi-industrial scale. In this study, the effect of various operational strategies was studied for biomass production of the L. reuteri DSM 20016 strain. The cultivations were performed at a shake flask level. The compositions of the best cultivation medium were optimised to increase the biomass. The concentration of the cultivation medium was optimised using one-factor-at-a-time (OFAT) and Response Surface Methodology (RSM). The main medium components studied included glucose, lactose and yeast extract. In comparison to the un-optimised cultivation medium, the optimisation process using OFAT and RSM increased biomass significantly by 29.26% and 109.66%, respectively. RSM-optimised cultivation medium produced a biomass of 62.21% higher than OFAT-optimised cultivated medium. The optimised medium was further cultivated in batch mode using a 5 L bioreactor. In batch fermentation, biomass produced 194.10% and 162.85%, under uncontrolled and controlled pH respectively, was noticeably higher compared to the shake flask level. The findings of this study improved the process of L. reuteri production by using a carbon sources mixture and a single nitrogen source as the feedstock in a shake flask level. Furthermore, L. reuteri production also improved on a semi-industrial scale under batch mode uncontrolled pH.

Keywords: Bio-Fermentation, Biomass Production, Probiotics

[*]HG BIOCHEMICAL SDN BHD

CASE STUDY ON THE SCALE-UP OF HERBAL EXTRACT PRODUCTION

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Abstract:

The demand for herbal medicine are expected to increase substantially in the upcoming years. Effective scaling-up plays a crucial role in ensuring laboratory findings could be brought to the market. One of the scaling-up study was on Eurycoma longifolia root, (commonly called tongkat ali, pasak bumi, or longjack). In this study a dimensional analysis was used for the solid-liquid extraction process as cost-effective and scalable method used for herbal extraction industry. The dimensionless number ShSc-1 was determined to be suitable model. Under the optimal extraction conditions, a laboratory-scale extraction yielded an extract yield of 8.76% with a ShSc-1 number of 0.0312. With a scale-up factor of 7.65, the pilot-scale extraction achieved an extract yield of 8.65%, ShSc-1 number of 0.0376 with an error of 1.37% and. This study's findings offer valuable insights for successfully transitioning from laboratory-scale to pilot-scale extractions, which paved the way for effective production of herbal extract.

Keywords: Herbal Extract, Scale-Up, Dimensional Analysis, Dimensionless Number

IMMOBILIZATION OF CYCLODEXTRIN GLUCANOTRANSFERASE ON RICE HUSK BIOCHAR FOR CYCLODEXTRIN PRODUCTION

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ABSTRACT

Cyclodextrin glucanotransferase (CGTase) is a highly catalytic efficient enzyme that is used to produce cyclodextrin (CD) which has a high demand in cosmetic, pharmaceuticals, food and agricultural industries. The instability of CGTase is a nagging issue because the activity is easily affected by harsh conditions, especially extreme pH, and temperature, thereby reducing product formation. Adsorption enzyme immobilization technology is a versatile method that has been used to improve enzyme stability, efficiency, and reusability. However, the method often suffers from enzyme leaching problem that limits CD production. In this study, CGTase was immobilized onto activated rice husk biochar (ARHB) using an adsorption and covalent bonding method for cyclodextrin (CD) production. Optimization of the CGTase immobilization onto the ARHB was investigated using one factor at a time and Response Surface Methodology (RSM) by measuring the effects of immobilization contact time, immobilization temperature, pH immobilization, agitation rate, ARHB to CGTase ratio, enzyme concentration, and crosslinker glutaraldehyde (GA) concentration on the immobilization efficiency. A kinetic model and adsorption isotherm that describe enzyme adsorption immobilization on the RHB and ARHB was deduced. The recovery efficiency and reusability test were conducted to ensure the effectiveness of the CGTase-ARHB immobilized to produce CD. Thus, immobilization of CGTase on ARHB improved CGTase stability and reduced enzyme leaching hence increase the CD production, hence suggesting that ARHB proved to be an effective support for the immobilization process of enzymes.

Keywords: Cyclodextrin Glucanotransferase, Rice Husk Biochar, Activated Carbon, Enzyme Immobilization.

**Myrgs*

INDUSTRY TREND: REGENERATIVE FARMING

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Abstract:

The Back2Nature Regenerative Farm's with Soil Microbes

Back2Nature Regenerative Farm is based in Kuala Pilah, Malaysia. Its focus is to harness the powers of soil microbiome for quality food cultivation. The objective is to demonstrate the technical and economic feasibility of growing food without resorting to toxic agrochemicals against plant diseases and synthetic fertilizers to promote plant growth. We applied selected local soil microbes on the cultivation of chili, papaya, black ginger, star fruits, eggplant, rosella, passion fruits, and herbal plants with surprising results.

Our experiment on the dry, hard and tired clayish soil on our farm with soil bioremediation has yielded positive results over a two-year period. This lead us to conclude that selected high performance mycorrhizae fungi and solubilizing bacteria, when working in concert as a consortium, are capable of restoring natural fertility to soil. Nutrient recycling involving the use of appropriately formulated organic composts with high performance soil microbes are expected to feature more prominently in regenerative farming in the future. We have produced a range of bio-products on the farm to support our experiment.

Current food and agriculture practices are heavily influenced by the adoption of 1960s "Green Revolution" of large-scale industrial chemical farming approach. The focus of conventional agricultural practices on raising output yield and lowest unit cost for mass produced foods. Such practices have inadvertently led to an explosion of chronic diseases worldwide, including obesity, type 2 diabetic, autism, various types of cancers, neurodegeneration, social isolation, environmental degradation and loss of biodiversity. It is urgent to develop a more sustainable approach to food cultivation by harnessing the powers of soil microbiome.

Over the past 3 years, we have made a number of breakthrough discoveries on identifying and isolating specific microbes which can raise the growth performance of plants, suppress plant diseases and remediate toxic substances in the soil ecosystem. We are in the process of introducing such bio-products to the user community to raise awareness about regenerative farming. Our soil is indeed rich with diverse biological resources waiting to be tapped for higher quality of life.

Keywords: Regenerative Farming Microbes

*BACK2NATURE

RADICALS SCAVENGING AND ANTI-INFECTIVES OF INDIGENOUS SIMPOR LEAF EXTRACT (DILLENIA SUFFRUTICOSA MARTELII GRIFF) OF INDONESIA

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Abstract:

Many studies have focussed on the use of the plant as a promising source of radical scavenging, and anti-infective agents. Plants have been used for centuries as one of the main components of traditional medicine in different cultures. Indigenous plant sources in many countries and regions may promote different potentials and provide a wide range of health benefits. Increased threat of microbial resistance against the currently used antibiotics, creates increased demand for the potential application of plant extracts (as the historical biofactory of antimicrobial metabolites) for medical applications. This study evaluates the radical scavenging and anti-infective properties of indigenous Simpor leaf extract from Indonesia. A factorial Completely Randomized Design (CRD) with two factors (graded maceration and concentration was assigned in radical scavenging analysis and one factor (concentration) for anti-infectives against Bacillus cereus and Escherichia coli. Radicals of ABTS and FRAP were used at 734 nm and 593 nm absorbance. Data were analyzed with ANOVA (sig. 0.05). Results suggest that Indigenous Simpor extract has good scavenging activity against ABTS and FRAP at 60 ppm (85.05% and 56.04%). Moreover, the concentration of 0,25 g/ml extract showed anti-infective properties with an inhibition zone of 10,73 ± 0,85 mm on B. cereus. While no positive result was seen on E. coli. It can be concluded that the Indigenous Simpor of Indonesia possesses radical scavenging and anti-infective potentials on gram positive bacteria.

Keywords: Radicals, Anti-Infective, Simpor, Indigenous

**This study is supported by BLU funding of FMIPA UNJ Jakarta*

SCREENING OF THE BACTERIOCINOGENIC POTENTIALS OF SOME BACILLUS STRAINS ISOLATED FROM MIANG FOR POTENTIAL PROBIOTICS APPLICATION IN FISH FARMING.

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Abstract:

With the high need for bio-antimicrobials that effectively serve as an alternative to conventional antibiotics and beneficial feed additive in fish farming, this communication elucidated the bacteriocinogenic potentials of six Bacillus strains (K2.1, K6.1, K7.1, K15.4, K22.6, K29.2) isolated from Miang. Streptococcus agalactiae and Aeromonas hydrophila were this study's pathogenic strains of interest. From our antimicrobial agar well diffusion assay, strains K15.4 and K29.2 have broad antimicrobial activity against these indicator strains. With an inhibition zone(mm) of 9 and 20.4, respectively, against Streptococcus agalactiae and 22 and 34 against Aeromonas hydrophila. However, strain K7.1 inhibited only Streptococcus agalactiae with an inhibition zone(mm) of 10; strains K2.1, K6.1 and K22.6 showed no antimicrobial activity against all the indicator strains. The 16S rRNA identification of these Bacillus strains revealed (K2.1, K6.1, K7.1, K15.4 and K22.6) are Bacillus tequilensis and (K29.2) is Bacillus siamensis. Their phylogenetic analysis revealed their close genetic relatedness to Bacillus subtilis, thus reassuring their probiotic safety. As potential probiotic strains, their antibiotics resistance was assayed against some selected antibiotics (10µg/ml of erythromycin 30mg/ml, chloramphenicol 35mg/ml, streptomycin 20mg/ml, kanamycin 25mg/ml and ampicillin of 25mg/ml) via agar well diffusion. Our result revealed that only Bacillus tequilensis strains K6.1 and K15.4 were slightly resistant to streptomycin. Furthermore, their protease activity, evaluated via a nutrient agar + 10g/l skim milk plate, was positive with a suitable IP (proteolytic index). This additional property has buttressed these strains as multifunctional probiotics. Therefore, subsequent in vivo and in vitro studies are required to ascertain these properties' efficacy properly.

Keywords: Antimicrobials, Aquaculture, Antibiotic-Resistant Microbes, Miang, Probiotics And Protease Enzymes.

PREDICTING THE IN SILICO AND IN VITRO PLANT-GROWTH PROMOTING POTENTIAL OF PLANT-ASSOCIATED BACTERIA ISOLATED FROM MIANG TEA LEAVES (CAMELLIA SINENSIS VAR. ASSAMICA)

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Abstract:

A total of 70 endophytic bacteria were isolated from Miang tea leaves out of which two strains including Pseudarthrobacter enclensis NIO-1008T and Curtobacterium citreum DSM 20528T were selected due to their ability to produce high levels of indole acetic acid (IAA). The gene sequences of these bacterial species were retrieved from NCBI and screened against an online repository of 5,565 plant-associated bacteria (https://plabase.cs.uni-tuebingen.de/pb/plaba_db.php) where a match was found to Pseudarthrobacter phenanthrenivorans J015, Pseudarthrobacter chlorophenolicus Mor30.16, Curtobacterium citreum DSM 20528 and Curtobacterium citreum NS330 respectively with >98% sequence identities to the original query sequences (NCBI BLAST). The algorithm predicted plant growth promoting traits such as colonizing plant system (34%), stress control (20%), competitive exclusion (14 - 16%), biofertilization (10 - 13%), phytohormone production (10%), bioremediation (9%) and plant immune response stimulation (1%). Furthermore, 5,986 (Curtobacterium citreum) & 3738 (Pseudarthrobacter enclensis) protein sequences were retrieved from UniProtKB (www.uniprot.org). The curated sequences were supplied as a FASTA or. fas format input file to PLaBAse database (https://plabase.cs.uni tuebingen.de/pb/form.php?var=PIFAR-Pred) for analysis and annotation of plant bacterial only interaction factors (proteins) “PIFAR” using blasp+hmmer algorithm. Possible factors predicted for the genomes included: Cellulose_synt, Pilin, dps, katB, katE, katG, pip, galU, gpsX, gumH, ethylene, salycilic_hydroxylase, galU, rfb303 amongst others. Using the blast as well as blast+hmmer modes, the plants growth promoting traits were also annotated and 5220 possible genes were predicted as able to facilitate plant-growth promotions by the bacteria. Preliminary in vitro experiments using Pseudarthrobacter enclensis NIO-1008T and Curtobacterium citreum DSM 20528T treated sunflower and tomato seeds showed a significant increase in %germination and other plant growth parameters compared to untreated controls. Future research could work towards molecular optimization of these bacterial strains for better applications in biofertilization.

Keywords: Camellia Sinensis; Endophyte; Growth Promotion; Protein Sequence; Biofertilizer

COMPARATIVE ANALYSIS OF METABOLIC AND MORPHOLOGICAL CHARACTERISTICS OF DOF1 TRANSGENIC WHEAT UNDER NITROGEN STRESS

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Abstract:

Over the last century, the increased crop production has largely been attributed to rampant input of nitrogen fertilizers, which either gets lost through leaching or volatilization, hence resulting in environmental pollution and several human health hazards. In order to cater this widespread concern, the need of the hour is to engineer crops that require less fertilizer input and use the applied nitrogen in an efficient manner. In this regard, a number of transcription factors have been reported to improve the nitrogen use efficiency (NUE) in plants. Triticum aestivum Dof1 (TaDof1) is a transcription factor that modulates the activity of multiple genes, specifically that are involved in carbon and nitrogen metabolism under nitrogen-limiting conditions. Previously, transgenic wheat plants overexpressing TaDof1 were developed, and assessed with respect to their expression profiles along with biochemical and morphological traits (Hasnain et al., 2020). The main premise of the current investigation was to compare the role of TaDof1 in T2 generation of six different transgenic wheat lines (F1, G1, G2, G3, G4, G5) in terms of their metabolic, biochemical, and morphological traits under normal and nitrogen deficient conditions. The screening of positive plants was done through BASTA and conventional PCR. The expression level of TaDof1 in transgenic lines was evaluated through obtaining total RNA from each group. Then, the expression level of four genes (Glutamine synthetase, nitrite reductase, phosphoenolpyruvate carboxylase and pyruvate kinase) associated with TaDof1 in carbon and nitrogen metabolism were quantified through RT-PCR and real time PCR. Moreover, a number of biochemical and morphological assays were also performed.

Keywords: Triticum Aestivum L.; Tadof1 Transcription Factor; Nitrogen Use Efficiency; Quantitative RT-PCR

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BENEFICIAL MICROORGANISMS IN CONVENTIONAL MICRO-BASED BIOFERTILIZERS

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Abstract:

Modern agriculture must be more productive, more sustainable and environmental friendly. There are macronutrients such as Nitrogen (N), Phospohorus (P), Potassium (K), and Sulfur (S) which is greatly contributes to the vital crop production. Apart from that, beneficial microorganisms may also be instrumental to crop improvement and fertilizers efficiency. Some of the beneficial microorganisms consist of biological N2 fixation, P solubilisation and phytohormone production. Microbial-based bioformulations that increase plant performance are greatly needed and in particular bioformulations that exhibit complementary and synergistic effects with mineral fertilization. In this study, four fertilizers are analysed for five analyses which are Total Lactobacillus count, Yeast Count, Actinomycetes bacteria, Nitrifying Bacteria and Nitrogen Fixing Bacteria. It was observed that the insect-based organic fertilizer detected no Lactobacillus, Actinomycetes and Nitrogen Fixing Bacteria. Meanwhile, fish emulsion fertilizer verified that most of the beneficial microbes are not strong compares to other fertilizers. EM microorganisms have proffered that some of the beneficial microbes are substantial among other fertilizers. Continuous designing, developing and testing on the microbial-based formulation fertilizers to be used in efficient integrated plant nutrient management system has gained worldwide interest recently to enhance crop productivity and soil fertility. This presentation highlights the recent developments in the quality control approaches for biological feterilizers for the qualitative and quantitative detection of functional microbes.

Keywords: Microbial-Based Biofertilizer, Beneficial Microorganisms, Biological N2 Fixation

PHYTOCHEMICAL, ANTIOXIDANT, AND ANTIBACTERIAL PROPERTIES OF COLOURED LIP BALM ENRICHED WITH CITRUS ESSENTIAL OIL: TANGERINE (CITRUS RETICULA L.), LEMON (CITRUS LEMON L.), BERGAMOT ORANGE (CITRUS BERGAMIA).

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Abstract:

Citruses are well-known for their application in cosmeceutical product. The cosmeceutical product, such as coloured lip balm, gained attention among various age range. Application of citrus to coloured lip balm enhanced the product's value. The phytochemical, antioxidant, and antibacterial properties of coloured lip balm enriched with tangerine (Citrus reticula L.), lemon (Citrus lemon L.), bergamot orange (Citrus bergamia) were examined. The result showed that lemon exhibited the highest total phenolic content, total flavonoid content, and the strongest DPPH scavenging activities compared to tangerine and bergamot. However, the study showed that coloured lip balm enriched with tangerine, lemon, and bergamot essential oil did not show any antibacterial properties against two tested foodborne pathogens namely Staphylococcus aureus and Escherichia coli. This study indicated that coloured lip balm enriched with citrus essential oil has potential as a natural antioxidant agent.

Keywords: Phenolic, Flavonoid, Ultrasound, Foodborne Pathogens, Citrus

**We would like to thank Institute of Bioproduct Development, Universiti Teknologi Malaysia for support throughout the study.*

MOLECULAR DYNAMICS STUDIES OF TAXOL BOUND TO TUBULIN DIMER-GDP INTERFACE

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Abstract:

Microtubules are one of the major components of the eukaryotic cell cytoskeleton. Heterodimers composed of GTP-bound α- and β-tubulin molecules polymerize into microtubule protofilaments and associate laterally to form hollow microtubules. Taxol is a chemotherapy drug used to treat ovarian, lung, Kaposi's sarcoma, esophageal, cervical, breast, and pancreatic cancers. Taxol stabilizes microtubules, disrupts mitosis, and ultimately affects cell division. However, the mechanism of taxol binding to the αβ-tubulin dimer interface with GTP is still unclear. To elucidate this mechanism, three complexes (tubulin dimer-GDP, taxol-bound tubulin dimer-GDP, and tubulin dimer-GTP) were constructed and subjected to microsecond molecular dynamics simulations coupled with MMGBSA binding energy calculations. The MM-GBSA calculations revealed that taxol increased the overall binding affinity between α-tubulin and β-tubulin proteins. Furthermore, taxol reduced the conformational changes of the dimer as reflected in the root-mean-square displacement (RMSD) profile. Also, the root-mean-square fluctuation (RMSF) profile showed that residual variation was greatly reduced, especially at the interface. This supports the role of taxol in stabilizing the protein interface and preventing the dissociation of α-tubulin and β-tubulin. These results provide further insight into the interaction of taxol and heterodimers and may aid future drug design targeting this protein.

Keywords: Taxol, αβ-tubulin dimer interface, stability, MD simulations, MMGBSA

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