



**Annual Science Research Symposium 2023**

# PROCEEDINGS

(Literature Reviews)







**Proceedings of the**  
**1<sup>st</sup> Annual Science Research Symposium**  
(Literature Reviews)  
11<sup>th</sup> October 2023

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**Advancing Health Through Science**



# Preface

With profound pleasure and a deep sense of privilege, we introduce the proceedings of the Annual Science Research Symposium 2023 (ASRS'23) to the esteemed authors and delegates of this remarkable event. Within these pages, we offer you a compendium of knowledge that we trust you will find both insightful, exciting, and inspiring.

The ASRS'23, organized by the Faculty of Science at NSBM Green University, stands as a testament to the unwavering commitment of our young scientists. This symposium serves as a platform for these emerging scholars to share their research findings, ignite discussions, and stimulate intellectual curiosity. This symposium, however, is more than just a presentation of academic achievements; it is a catalyst for the advancement of knowledge. It empowers our students with invaluable skills, nurtures connections with experts, and fosters the growth of a dynamic research ecosystem within our Faculty of Science.

In celebrating this milestone, it is our privilege to extend our gratitude to Prof. E. A. Weerasinghe, the Vice-Chancellor of NSBM Green University, whose visionary leadership has been a driving force behind the triumph of this conference. We also acknowledge the invaluable support and guidance of Deputy Vice-Chancellor, Prof. Chaminda Rathnayaka, and Prof. Baratha Dodankotuwa, the Head of Academic Development and Quality Assurance who played a pivotal role in realizing this event's potential. Finally, we thank all participants, faculty members, mentors, and the NSBM Green University community for their invaluable support.

Within these proceedings, you will discover a wealth of diverse research endeavors, each contributing to the broader mission of Advancing Health Through Science. We hope this compilation informs, educates, and kindles the flames of curiosity, inspiring you to explore new frontiers in scientific inquiry. As we navigate the depths of scientific exploration together, we collectively contribute to a brighter, healthier future. We invite you to delve into the pages of ASRS'23 proceedings with enthusiasm, curiosity, and an open mind. Let this compendium be a source of inspiration, and may it spark collaborations, ignite new ideas, and chart the course for future breakthroughs in the realm of science and health.

**The Conference Organising Committee**  
**ASRS'23**



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## Message from the Dean



**Dr. Nuwanthi Katuwavila**  
**Senior Lecturer / Dean**  
**Faculty of Science**  
**NSBM Green University**

I am happy to welcome you to the inaugural Annual Science Research Symposium at the Faculty of Science, NSBM Green University. It is with great pride and enthusiasm that we gather here today to present the very first effort of our students in the field of scientific research. The symposium represents a significant milestone in our commitment to fostering a culture of innovation, inquiry, and discovery within our academic community.

In today's rapidly evolving world, scientific research plays a pivotal role in addressing the complex challenges and opportunities that confront us. Whether it be in the realms of biology, chemistry, medicine, physics, environmental science, or any other field, our researchers are at the forefront of exploring novel solutions and generating insights that have the potential to transform our society for the better. This symposium serves as a platform for our researchers to not only share their findings but also to engage in meaningful discussions, exchange ideas, and forge collaborations.

I would like to extend my heartfelt gratitude to all the participants, both presenters and attendees, for your dedication and passion for science. Your contributions are essential to the success of this event, and I encourage you to make the most of this opportunity to connect with your peers and discover the cutting-edge research happening within our community. I also wish to express my sincere appreciation to the organizing committee, faculty advisors, and staff members who have worked tirelessly to make this symposium a reality. Your unwavering commitment to nurturing the interest of knowledge is truly commendable.

As we embark on this exciting journey of discovery together, I am confident that the First Annual Science Research Symposium will inspire us all to reach new heights in our scientific endeavors. I look forward to the stimulating discussions, breakthrough insights, and collaborative endeavors that will undoubtedly emerge from this event. I congratulate all of the presenters and wish you all the best in your future research endeavours.

## **Message from the Head - Department of Biomedical Science**



**Dr. Damayanthi Dahanayake**  
**Senior Lecturer / Head**  
**Department of Biomedical Science**  
**Faculty of Science**  
**NSBM Green University**

The Annual Science Research Symposium (ASRS) is our first attempt to share the research experiences of science undergraduates with the community. This initiative not only showcases the hard work and dedication of the students but also emphasizes the importance of research culture early on their academic journey. By providing this platform for third-year students to present their literature reviews, they have a valuable opportunity to develop their skills as researchers and presenters. I believe this experience will serve as a foundation, propelling them toward greater heights in their individual research endeavors. I extend my heartfelt gratitude to our esteemed faculty members, whose guidance and mentorship have been instrumental in shaping the research endeavors of our students. I hope the very first science symposium of NSBM 2023 would be a great success.

## Message from the Conference Chair



**Dr. Miruna Rabindrakumar**  
**Senior Lecturer**  
**Faculty of Science**  
**NSBM Green University**

It is my distinct pleasure to welcome you all to the Annual Science Research Symposium, organized by the Faculty of Science at NSBM Green University. It is an event that celebrates the ingenuity and dedication of our budding undergraduate scientists. This symposium is not only a platform for our young scientists to showcase their initial works but also to exchange ideas, foster collaborations, and inspire one another. Importantly, it will be their initial step to the research world.

While I congratulate, I extend my deepest gratitude to our students for their tireless efforts and dedication to showcasing their research work. In addition, I wish to express my appreciation to the supervisors, mentors, advisors, and faculty members for their diligent guidance and support in nurturing these inquisitive minds.

The Dean of the Faculty and Head of the Department provided much-needed encouragement and guidance, without whom this conference would not be a possibility. The immense support given by our faculty staff and organizing committee are exceptional.

Thank you for being a part of this remarkable journey. Together with our budding scientists, let us forge new paths and push the boundaries of what is known. I hope the Annual Science Research Symposium of the Faculty of Science, NSBM, will be a memorable experience for all who join us.

# **Organising Committee**

## **Conference Advisors**

Dr. Nuwanthi Katuwavila  
Dr. Damayanthi Dahanayake

## **Conference Chair**

Dr. Miruna Rabindrakumar

## **Conference Secretary**

Ms. Inoka Jayasundara

## **Committee Members**

Dr. Madavi Hewadhikaram  
Ms. Sharini Samaranayaka  
Ms. Sachini Malsha Thennakoon  
Ms. Nivedha Uthayarajan  
Ms. Chathurika Jagadoge  
Ms. Devanji Karunaratne  
Ms. Bigunika Menuwarage

## **Editorial Committee**

Dr. Samindi Jayawickrama  
Dr. Bhagya Deepachandi  
Dr. Udeshika Yapa

# Programme of the Symposium

<b>Event</b>	<b>Time</b>
Welcoming the guests and lighting of the oil lamp	10.00 am - 10.10 am
Welcome speech by Conference Chair	10.10 am - 10.20 am
Speech by the Head of the Department of Biomedical Science	10.20 am - 10.30 am
Keynote speech	10.30 am - 10.50 am
Distribution of tokens of appreciation	10.50 am - 11.00 am
Oral presentation 1	11.00 am - 11.30 am
Vote of thanks	11.30 am - 11.40 am
Refreshments with poster observations	11.40 am - 12.15 am
Oral presentations	12.15 am - 2.30 pm
Distribution of awards	2.30 pm - 3.00 pm



# Profile of the Keynote Speaker



**Dr. Chanaka Sandaruwan**  
**Senior Research Scientist**  
**Sri Lanka Institute of Nanotechnology (SLINTEC)**  
**Homagama**

Dr. Chanaka Sandaruwan, a proud product of Royal College in Colombo, boasts an impressive educational journey that has propelled him to great heights in the world of science and technology. He began by earning a Diploma in Computer Science from the British Computer Society, UK. Building on this, he pursued a Bachelor of Science in Molecular Biology and Biochemistry from the University of Colombo, demonstrating his multifaceted academic interests. He continued to excel in his studies, earning a Master of Science in Analytical Chemistry from the University of Colombo, and Master of Business Administration, specializing in Technology Commercialization, from the Open University of Sri Lanka, highlighting his passion for bridging the gap between technology and business.

The zenith of Dr. Sandaruwan's academic achievements came with his Doctor of Philosophy in Nanoscience and Nanotechnology from the prestigious Sri Lanka Institute of Nanotechnology, a testament to his dedication to cutting-edge research and innovation. Furthermore, he holds a Master of Science in Sustainable Process Engineering from the University of Moratuwa. His professional memberships include being a Chartered Chemist and a Member of the British Computer Society, Institute of Chemistry Ceylon, Sri Lanka Association for the Advancement of Science (SLAAS), and Sri Lanka Academy of Young Scientists (SLAYS). Dr. Sandaruwan's diverse educational background and extensive professional affiliations reflect his commitment to both science and technology.

# Abstract of the Keynote Speaker

## Natural product development for biomedical advances

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A natural product is a naturally occurring compound that can be extracted from natural resources. Sri Lanka is blessed with a number of natural resources, including thousands of plant species and other biological species that produce natural products. Extraction of such natural products from natural materials is considered important in chemistry as these natural compounds can be used in alternative medicines. Most of the natural products extracted from Sri Lankan natural resources have unique properties due to genetic and geographical factors. For example, Sri Lankan cinnamon extracts have no hepatotoxic compounds like Coumarin, which is highly found in Chinese cinnamon. Local knowledge that has been accumulated over thousands of years carries this vital information, which is helpful in natural product development for commercial purposes. Compositional analysis and bioactivity assays are the first steps of the natural product development process. Screened natural product extracts are then converted into consumer products. Here, nanotechnology-based advanced formulation approaches must be considered to enhance the stability, water solubility, and bioavailability of those compounds and consumer product formulations. These products are mainly categorized under nutraceuticals and cosmeceuticals. Further, fundamental studies regarding such extracts may also open novel pharmacological avenues. Thus, research in natural product development is the key to biomedical advances in the future. Additionally, these studies help create new market segments globally with the exceptional performances of Sri Lankan natural products.

*Keywords: Natural Product Extracts, Sri Lankan Natural Resources, Nutraceuticals, Cosmeceuticals, Nanotechnology*



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## **Abstracts of the Oral Presentations**

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## **Medical Remedies for Alopecia**

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Alopecia is a pathological illness characterized by hair loss, manifesting in diverse forms and patterns. Numerous variables, such as genetics, autoimmune diseases, hormone dysregulations, and environmental factors, are found in contributing to the development of Alopecia, mainly by altering the hair growth cycle. Therefore, understanding the morphology of hair and its growth cycle is essential for comprehending the mechanisms underlying all types of alopecia and creating effective treatments for them. Androgenetic alopecia, which is also referred to as male pattern hair loss or female pattern hair loss and Alopecia areata are the two most prevalent forms of Alopecia. Therefore, to combat alopecia, numerous synthetic drugs are being used. Minoxidil, Finasteride therapy, and Dutasteride are a few of them. But with the use of these synthetic drugs, it was found that they potentially cause severe adverse effects, such as irritant contact dermatitis, hypertrichosis, and sometimes cancers. Researchers are therefore investigating natural substances for their anti-alopecia properties with minimum side effects and with enhanced efficacy. Grape seed extract, Salvia plebeia leaf extract, Sophora flavescens root extract, Carthamus tinctorius L. floret extract and Phyllanthus emblica L. are some of the plants that have been tested for their potential anti-alopecia properties and have demonstrated a significant success. So, in conclusion, this review will provide a comprehensive review about alopecia and its different types, the prevailing treatment modalities, the side effects and about the natural substituents with anti-alopecia properties and their effectiveness.

*Keywords: Alopecia, Minoxidil, Dihydrotestosterone (DHT), 5- alpha reductase, anti-alopecia properties*

## **Genetic Polymorphism of Kappa-Casein and its Association with Bovine Milk Properties**

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Enhancing the milk properties such as, yield, compositions, rennet coagulation time and thermal resistance of bovine milk not only has a substantial effect on the dairy industries' profitability but also on the nutritional value, which has a direct impact on human health. Evidence shows that genetic polymorphisms, especially in kappa-casein gene (CSN3), plays a crucial role in determining milk properties. However, the findings were controversial. Hence, our review focuses on identifying the most impactful CSN3 variants affecting milk properties. Casein accounts for 80% of milk protein, of which kappa-casein is more vital than alpha-s1, alpha-s2, and beta-caseins, as it acts as a stabilizer and ensures the colloidal state of micelles. Furthermore, it is essential for the coagulation of milk, increasing digestion, preventing neonate hypersensitivity to ingested proteins, and inhibiting gastric pathogens. It is also a slow-digesting protein that causes sustained release of amino acids and helps in weight reduction. Of the fourteen variants (A, B, B2, C, D, E, F1, F2, G1, G2, H, I, and J) and one synonymous variant (A1) of CSN3 identified, the A and B diallelic variants caused by SNPs rs43703015 and rs43703016 are the most prevalent and have significant effects on milk properties. Several studies have shown significant associations between variant B and higher protein and fat contents, and shorter rennet coagulation time, while variant A was significantly associated with increased milk yield. Similarly, the AB genotype was significantly associated with higher N-acetylneuraminic acid content. However, no significant associations were observed between CSN3 variants and the contents of lactose, calcium, phosphorous, and thermal resistance. In conclusion, A and B variants can be used as good markers for choosing bovines for selective breeding, which results in beneficial modifications of milk constituents and commercially valuable properties which contributes towards the economic growth and a promising treatment for malnourishment.

*Keywords: Kappa-casein, Single nucleotide polymorphisms, Variants A and B, Milk properties, Bovines*

**Understanding a Sore Throat and its Management**

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Pharyngitis or sore throat accounts for millions of healthcare visits yearly, making it one of the most common reasons for seeking medical attention. This review aims to provide a detailed understanding of the current knowledge on pharyngitis, including its causes, diagnosis, and management options. Pharyngitis can be caused either by viral or bacterial agents, in which viral agents account for most of the pharyngitis cases (70-95%). In bacterial pharyngitis (strep throat), Group A streptococcus bacteria (GAS) is the most common causative agent. It is associated with several complications, i.e., rheumatic fever and suppurative complications (e.g., peritonsillar abscess) if untreated. Diagnosis of pharyngitis is based on physical examinations and laboratory investigations, e.g., throat cultures and rapid antigen detection tests. In terms of management, viral pharyngitis is self-limiting and therefore, no antibiotics are needed, whereas opposingly bacterial pharyngitis requires antibiotics as their treatment. According to the guidelines given by the World Health Organization and the Infectious Disease Society of America, Penicillin and Amoxicillin are considered as the first choices of drugs for GAS pharyngitis. This review highlights the complexity of sore throat along with its causes, diagnosis, and treatment approaches. Knowing the causes of sore throat and managing options are essential in healthcare fields to prevent misuse and overuse of antibiotics. Further studies are needed to evaluate the public perception of antibiotics for sore throat and assess the antibiotic usage pattern for sore throat in Sri Lanka.

*Keywords: Viral pharyngitis, GAS pharyngitis, Antibiotics*

**The Impact of Long Non-coding RNAs on Chemically Induced Abiotic Stress Tolerance in Plants**

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The plant genome exhibits a significant amount of transcriptional activity. However, approximately 98% of the resulting transcripts do not code for any functional proteins. Non-coding RNAs play a pivotal role in developmental and regulatory processes observed in plants. This literature review focuses on long non-coding RNAs (lncRNAs) that have a length exceeding 200 nucleotides. LncRNAs act as regulators of gene expression on epigenetic, transcriptional and post-transcriptional levels. This is carried out via complex molecular mechanisms in which lncRNAs act as scaffolds, guides, signals or decoys. LncRNAs can coordinate gene expression in response to a variety of environmental stimuli that have adverse effects on plants. Several studies demonstrate that a large number of lncRNAs are differentially expressed in plants following exposure to abiotic stresses, such as conditions of heat, drought, cold and salinity. In cases of severe abiotic stress, a plant's basal stress tolerance response is unable to sufficiently protect the plant. A key strategy that has been historically employed in enhancing this basal response is the exogenous application of chemical compounds such as methyl jasmonate and salicylic acid. Chemical priming in this manner can lead to a more rapid and amplified stress tolerance response as a result of the plant 'remembering' the previous stress exposure. This review hypothesizes that one of the mechanisms by which external chemical application leads to stress tolerance is by inducing lncRNAs to carry out regulation of gene expression. There is only a limited body of literature examining the correlation between chemical priming and lncRNAs and therefore further investigation is required. As climate change worsens and abiotic stresses become more prevalent, understanding how plants survive in extreme environmental conditions is crucial for developing ways to preserve crop productivity, such as by the genetic engineering of stress-resilient species.

*Keywords: long non-coding RNAs, gene expression regulation, abiotic stress tolerance, chemical priming, priming-induced stress memory*

**Knowledge, Attitudes and Practices related to Iron Deficiency Anemia among  
Children and Adolescents**

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Anemia is a blood disorder that affects health and quality of life. Iron deficiency anemia is a type of anemia that develops if a person does not have enough iron store in the body. The World Health Organization (WHO) states that anemia is a serious global public health issue. The WHO has recognized iron deficiency anemia (IDA) as the most common nutritional deficiency in the world. Iron deficiency anemia is a severe health problem. Studies have shown that educational levels and knowledge about nutritional activators and inhibitors of iron absorption would affect subjects' knowledge about iron deficiency anemia. Attitude towards anemia, seriousness of anemia, preparation of iron rich foods, and self-confidence in preparing iron rich foods are all important factors in improving hemoglobin levels. Practices such as eating the day before, consuming vitamin C-rich fruits could facilitate iron absorption and eating green leafy vegetables which are rich in iron frequently can promote the regeneration and count of hemoglobin. This will improve the hemoglobin level in the body. The overall percentage of students who believe that phytate and calcium rich foods would worsen IDA is very much lower. Female students in average were found to have a serious health issue with iron deficiency anemia. To the extent that was known, there are a limited available study on the effects of adolescent nutrition education towards IDA in school students of Sri Lanka.

*Keywords: Iron Deficiency Anemia, Knowledge, Attitude, Practice, Children*

## Recombinant Production of Omega-3 Fatty Acids in Bacteria Enhances the Dietary Sources that are Available for Human Consumption

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Omega-3 and omega-6 polyunsaturated fatty acids are crucial for the well-being of humans and other mammals. The body requires alpha-linolenic acid (18:3n-3) and linoleic acid (18:2n-6) polyunsaturated fatty acids to synthesise other omega-3 and omega-6 polyunsaturated fatty acids. However, the conversion rate of these conditionally essential nutrients to other polyunsaturated fatty acids is low. Therefore, it is necessary to obtain these essential nutrients from external sources. Fish, other seafood, marine algae, and certain fungi and marine bacteria are all excellent sources of omega-3 fatty acids. However, alternative dietary sources have been investigated due to the fast-diminishing fish population caused by increased demand, ocean pollution, low productivity, and difficulties in producing omega-3-producing microalgae and marine bacteria as part of large-scale industrial culturing. After the discovery and production of the 20-kb downsized gene cluster from the marine bacterium *Shewanella baltica* MAC1, which was involved in the production of both eicosapentaenoic acid and docosahexaenoic acid, alternative recombinant dietary sources for omega-3 were produced. Conclusions made that cloned *E. coli*, which can produce eicosapentaenoic acid and docosahexaenoic acid, cannot be used directly in food products since it has not been classified as a food-grade microorganism. Therefore, researchers invested more effort into developing recombinant food-grade microorganisms that carry the 20 kb gene cluster. Consequently, they were successful in cloning and expressing 20 kb DNA fragments in *Lactococcus lactis* subsp. *cremoris* MG1363, *Streptococcus thermophilus* ST21, and probiotic EcN 1917/probiotic *E. coli* Nissle 1917.

*Keywords: omega-3, polyunsaturated fatty acids, eicosapentaenoic acid, docosahexaenoic acid, Shewanella baltica* MAC1



**From Genes to Medicines: Transcriptome Analysis of Secondary Metabolite Biosynthesis in Solanaceae Medicinal Plants**

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Secondary metabolites produced in plants are not important for the basic life functions of plants, but they are essential for the survival of the plant against environmental stresses. Plant secondary metabolites possess many industrial applications in the pharmaceutical, cosmetic, agricultural, and nutritional industries. Plant secondary metabolites can be mainly categorized into three classes, which are phenolics, terpenoids, and alkaloids. Therefore, the isolation and characterization of plant secondary metabolites have gained special interest in recent years. There are various methods for synthesizing plant secondary metabolites, which are field cultivation, chemical synthesis, plant cell, tissue, organ culture, and plant metabolic engineering. Metabolic engineering of plant secondary metabolites in heterologous organisms requires the elucidation of secondary metabolite biosynthetic pathways. The emergence of high-throughput RNA sequencing has led to effective transcriptomics data mining, followed by de novo transcriptome assembly. Functional annotation of de novo assembled sequences emphasizes biological functional information. Moreover, other significant applications of RNA-seq data include differential gene expression analysis, the identification of molecular markers, and the identification of transcription factors. Solanaceae family plants synthesize a wide range of secondary metabolites and many de novo transcriptome studies have been conducted in many plants to emphasize the biosynthetic pathways. However, still in *Datura* species, *Brugmansia* species, *Mandragora* species, some *Solanum* species, some *Physalis* species, *Hyoscyamus niger*, and in many more plants in the Solanoideae, Cestroideae, and Nolanoideae subfamilies of the Solanaceae family, a very limited number of de novo transcriptome studies or none have been performed for the analysis of medicinally important secondary metabolite biosynthetic pathways.

*Keywords: Secondary metabolites, RNA sequencing, De novo assembly, Functional annotation, Solanaceae family*

**The Effect of Sound Meditation on  
Optimum Human Mental and Physical Functioning**

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Sound meditation is a practice that uses various sounds and vibrations to induce a state of deep relaxation and inner peace. By immersing oneself in the soothing sounds, one can experience a heightened sense of mindfulness, release stress, reduce depressed mood, improve the brain power, and enhance mental and physical health. It is an easy and effective meditation method where practitioners utilize gongs, bells, tuning forks, nature sound, music, drums, singing bowls, saying mantras, sound bath etc. Sound meditation affects human behaviors, emotions, brain structure and health. During sound meditation mood stabilizing hormones and neurotransmitters such as dopamine, serotonin, and melatonin are released in limbic brain regions. It reduces stress and anxiety leading to more adaptive and positive behaviors. Sound meditation also leads to an increase in the grey matter density in the brain that is important for memory and learning. Sound meditation and sound healing are shown to have many physical health outcomes such as lowering blood pressure and stroke recovery. Sound healing is a holistic practice that utilizes sound vibrations to promote physical, mental, and emotional well-being, facilitating the body's natural healing processes. The outcome depends on what frequency is used and on what vibration or rhythm. For example, 432 Hz (natural/ healing frequency) encourages balance and relaxation. 528 Hz (love frequency/ DNA repair frequency) is known to have a good effect on emotions, relationships, and even cellular healing. 639 Hz is found to enhance communication, comprehension, and harmony in relationships, both with others and inside oneself. Solfeggio frequency (741 Hz) has effects on detoxification and purification of the mind and body. 852 Hz is associated with waking intuition, inner strength, and increased consciousness. Thus, sound meditation has shown promising effects on enhancing optimum human mental and physical function, offering a holistic approach to overall well-being.

*Keywords: Mindfulness, Sound meditation, Mental health, Physical health, Sound healing*

**A Greener Way to Say Goodbye: Human Composting as a Green Alternative Option in Sri Lanka**

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Human composting, a technique that uses bacteria and organic materials to speed up natural decomposition, represents a viable long-term option for end-of-life practices. This new method produces nutrient-rich compost appropriate for many ecological projects, such as reforestation. There is a possibility of introducing human composting as an environmentally responsible burial option in Sri Lanka in view of growing environmental concerns. There is a need to conceptualise a prototype that fits with Sri Lanka's distinctive ethical and environmental backdrop, as well as to discuss the benefits of human composting in more detail. Also, the difficulties that can arise due to the legal repercussions of adopting this unique practice should be thoroughly considered. It is vital to look for greener alternatives to conventional burial techniques in a society where natural resources are running out and pollution levels are rising. It appears in the form of human composting, which offers an ecological loop in which the deceased replenish the planet they once called home. Sri Lanka offers a favourable environment for such an environmentally friendly transition because of its abundant vegetation and great cultural appreciation for nature. Human composting will be smoothly incorporated into the existing cultural landscape by considering the flora and wildlife, climate, and religious beliefs of the locale. There are many obstacles to the widespread adoption of human composting, from making sure that organic matter breaks down effectively to ethical and legal acceptance. Further studies are needed to analyse these complications and offer a thorough analysis of the applicability and viability of human composting in Sri Lanka. It will pave the way for a more harmonious interaction between life's end and the new life of nature in Sri Lanka by addressing the advantages, suggesting a culturally sensitive prototype, and noting potential obstacles.

*Keywords: human composting, Sri Lanka, environmental concerns, reforestation, ecological loop*

**Study of Health Benefits of Black Tea Compared to Green Tea**

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Tea is the most consumed beverage in the world after water. According to the oxidation processes, there are main three types named as green tea, black tea, and oolong tea. Green tea is not fermented, black tea is fully fermented, and oolong tea is semi-fermented depending on the degree of enzymatic oxidation or fermentation. Epicatechin, epigallocatechin, epicatechin-3-gallate, and epigallocatechin-3-gallate are the main polyphenol derivatives found in green tea. In black tea production, due to the polymerization and oxidation process, theaflavin and thearubigin are the main polyphenols formed. Due to their unique processing methods, green tea and black tea have distinct antioxidant profiles and bioactive compounds. Caffeine, amino acids, vitamins, carbohydrates, lipids, minerals, and volatiles are also present in both green tea and black tea. Health effects on both green tea and black tea occur due to their antioxidant ability. Both have a positive impact on reducing cardiovascular diseases, obesity, diabetes mellitus, hypertension, and atherosclerosis conditions and both have anti-viral, anti-microbial, and anti-cancer effects. They also can improve bone health and oral health. The consumption rate of tea is involved in gaining health benefits. According to the higher number of research on green tea compared to black tea causes higher usage and higher popularity of green tea. Therefore, well-designed human trials are needed to further investigate green tea and black tea health outcomes. Unlike green tea, the health benefits of drinking black tea are not widely explored. This review is mostly concerned with green and black tea on numerous health benefits related to their compounds and a brief explanation of their molecular structures.

*Keywords: Green tea, Black tea, Fermentation, Polyphenols, Caffeine*

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## **Abstracts of the Poster Presentations**

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**Evaluation of Anti-inflammatory Potential of *Hibiscus rosa-sinensis* Flower**

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Inflammation is a biological response of the immune system to noxious stimuli. Typically, non-steroidal anti-inflammatory drugs which are used to treat inflammatory diseases associated with several adverse effects. Therefore, it is important to search for natural plant-based remedies to treat inflammatory conditions. *Hibiscus rosa-sinensis* is a flowering plant which is widely used as a home remedy in Sri Lanka. This review aims to identify the bioactive compounds present in *H. rosa-sinensis* flower extract and the different mechanisms related to their anti-inflammatory activity. *H. rosa-sinensis* flower is a rich source of flavonoids, non-flavonoids, tannins, alkaloids, glycosides, saponins, terpenoids, vitamins, and other organic acids. The anti-inflammatory potential of flower extract is contributed mainly by the flavonoids and anthocyanins while other compounds such as alkaloids and vitamins contribute to the anti-inflammatory activity in a lesser extent compared to polyphenolic compounds. The anti-inflammatory activity of *H. rosa-sinensis* flower is expressed via several mechanisms including the reduction of oxidative stress, inhibition of NF- $\kappa$ B and MAPK pathways, alterations of the arachnoid acid pathway, inhibition of iNOS enzyme and caspase activity, and reduction of polymorphonuclear leukocyte infiltration. This review highlights that *H. rosa sinensis* flower is a rich source of different bioactive compounds that exhibit anti-inflammatory activities. Further studies are recommended to isolate the specific bioactive compounds of *H. rosa sinensis* flower extract related to the different mechanisms of anti-inflammatory activity.

*Keywords: Hibiscus rosa-sinensis, anti-inflammatory, bioactive compounds*

**Impact of Herbal Treatments for Vitiligo Disease**

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Vitiligo is a common skin disorder resulting from the breakdown of functional epidermal melanocytes. The global prevalence of vitiligo ranges from 0.5% to 2%, with higher rates reported in certain populations. Melanocytes, responsible for skin color, are destroyed, leading to the appearance of smooth, white patches on the skin. The progression of vitiligo is influenced by various factors, including genetics, autoimmunity, psychosis, melanocyte self-destruction, trace element deficiency, oxidative stress, and other biochemical and environmental variables. Recent research has identified herbal plant extracts as potential agents for re-pigmentation and regeneration of normal skin color. Specific components of these herbal plants, such as alkaloids, phenols, terpenes, flavonoids, lectins, saponins, glycosides, triterpenoids, furocoumarin, thymoquinone, curcuminoids, glycyrrhizin, and stigmasterol, play crucial roles in promoting re-pigmentation. Therapies involving these herbal compounds have shown promise in increasing tyrosinase activity and reducing oxidative stress, which are two important aspects of vitiligo treatment. The combination effect of these herbal plants lies in the synergistic interaction between their various active compounds, working together to provide a more comprehensive approaches to vitiligo treatment. The key research findings with herbal plant therapies for melanocyte re-pigmentation in vitiligo patients are discussed in detail. The review aims to comprehensively evaluate the efficacy of herbal plant therapies for melanocyte re-pigmentation in vitiligo patients. By studying the activity of the key components of the herbal plants and the research work, it becomes evident that the combinational effect of these herbs, with optimum ratios, can provide more significant benefits for the vitiligo treatment.

*Keywords: Vitiligo, Melanogenesis, Tyrosinase, Herbal plants, Melanocytes*



**Anti-cancer Activity of *Flueggea leucopyrus* (Willd) (Katupila)**

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Cancer is a chronic disease that is characterized by the abnormal proliferation of body cells due to failures in cellular modulation and obstruction of cell cycle progression and gives rise to malignant tumor cell formation with the possibility of becoming metastatic. Worldwide cancer is the second leading cause of death. Chemotherapy, radiotherapy, and surgery are the main treatments of cancer. But due to the high toxicity there are many sides effects from those treatments such as hair loss, cancer pain, nausea, and vomiting. Therefore, researchers are interested in using substances derived from natural sources for cancer treatments due to their low toxicity and high efficacy. Currently, 40000-70000 herbal plants have been identified with potent anti-cancer activity. *Fluggea leucopyrus* also known as Katupila is a multifunctional medicinal plant used in traditional system of medicine in Sri Lanka. This herb is used as an alternative cancer treatment due to the anti-cancer activity of this plant. Mainly the phytochemicals, which are specific secondary metabolites found in various parts of this plant is responsible for anti-cancer activity of it. Many studies have revealed that phytochemicals such as alkaloids, phenols, tannins, flavonoids and saponins are present in leaves, barks, fruits, and aerial parts of this plant. Among these phytochemicals researchers have identified that berginin is the main active compound. Bergenin is capable of inhibiting galectin-3 enzyme, which contain anti-apoptotic activity that promote tumor formation and proliferation. Also, many phytochemicals act as antioxidants. Many studies have been done to indicate the effective anti-cancer activity of this plant against variety of cancers including ovarian carcinoma, breast cancer and endometrial carcinoma. Therefore, this study gives the overall anti-cancer activity of the phytochemicals present in the plant and examples of effective use of the anticarcinogenic property on cancer treatment proving the highly medicinal value of the plant.

*Keywords: Flueggea leucopyrus, anti-cancer activity, cancer, phytochemicals*

**Role of Vitreous Humor Electrolytes Concentration in Postmortem Interval Estimation**

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The post-mortem interval (PMI) is the time between death and the post-mortem examination. Determining the PMI is a critical aspect of forensic medicine in identifying criminal and civil cases. Estimation of electrolytes in various body fluids, including the vitreous, cerebrospinal, pericardial, and synovial, can be used to identify PMI. However, the estimation of electrolytes in vitreous fluid became the matrix of choice in current forensics in determining the PMI. Hence, we reviewed the role of vitreous humor electrolyte concentrations in PMI estimation. Vitreous humor is a hydrophilic, transparent gel that lies in the eyeball, between the retina and the lens. It contains 99% water, 0.9% electrolytes, and 0.1% proteins and polysaccharides. It maintains the eye shape, positions the retina, and protects against mechanical trauma while passing light to the retina. Isolation and collection of vitreous fluid are simpler and less prone to contamination than other body fluids. It is also avascular and compartmentalized, which protects it from putrefaction and allows it to be utilized even after a catastrophic head injury. These distinct features of vitreous humor make it a better matrix for postmortem biochemical analyses. Among the electrolytes found in the vitreous humor, the concentration of potassium was identified as the most accurate indicator for the estimation of PMI. Several studies have shown a significant positive correlation between the potassium concentration and PMI. The concentrations of sodium and chloride did not show strong correlation with PMI. Eye orientation, sex, age, cause of death, and temperature are some of the factors that have shown to affect the electrolyte concentrations in vitreous humor. However, these findings are controversial. With the growing importance of forensic medicine, identifying the factors affecting electrolyte concentration of vitreous humor in cadavers is crucial for the correct identification of PMI.

*Keywords: Post-mortem interval, vitreous humor, electrolytes concentration, body fluids*

**A Comprehensive Study on Anticancer Properties of *Annona muricata***

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Cancer is a complex disease characterized by the unrestrained proliferation and dissemination of abnormal cells. The issue continues to be a notable public health concern on a global scale, with millions of new cases and fatalities being reported annually. Despite significant advances in cancer treatment, it remains a major challenge due to current therapies' high cost and toxicity. Phytochemicals naturally found in plants are crucial resources for developing novel drugs and potential cancer therapies. The clinical efficacy of these anticancer agents has been demonstrated against diverse neoplastic cell lines. Further research in this area has the potential to enhance cancer treatment methods. Among the various plants known for their effectiveness in combating cancer, *Annona muricata* (*A. muricata*), commonly referred to as soursop, stands out for its anticancer properties. This tropical plant, native to Central and South America, the Caribbean, and West Africa, has a long history of traditional medicinal use, including its application in cancer treatment. Acetogenins, alkaloids, phenolic compounds, and other active compounds are only a few of the phytochemicals present in *A. muricata*, which are biological abilities to fight off lung, liver, prostate, colon, pancreas, and breast cancers. In addition, *A. muricata* demonstrates a certain level of toxicity and can potentially cause severe effects. This review examines the potential of nanoparticles to enhance the anticancer capabilities of *A. muricata*. Moreover, the intention behind this review is to provide a thorough analysis of the efficacy of *A. muricata* in the treatment of various forms of cancer, as well as the current progress made in its application via nanoencapsulation.

*Keywords: Annona muricata, Anticancer, Phytochemicals, Toxicity, Nanoparticles*

**Developing a Loop Mediated Isothermal Amplification Based Diagnostic Test Kit for Leptospirosis as a Point of Care Detection Method in Sri Lanka**

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Leptospirosis is a global zoonotic disease that is most prevalent in developing nations. The recurring outbreaks and numerous fatalities of the disease in Sri Lanka have raised significant public health concerns. The high prevalence of this disease in rural areas, especially in the farming community, is correlated with the contamination of water sources. The increased mortality is primarily associated with the delay in diagnosis and treatment. Currently the primary methods for detection and diagnosis are Microscopic Agglutination Test and Polymerase Chain Reaction Test, both of which have specific limitations relevant to each. The applicability of Polymerase Chain Reaction is limited by the high cost associated with its required instrumentation. Considering this, the proposed alternative is a novel technique known as Loop mediated isothermal amplification, which is observed to be more rapid, affordable, and simplistic in contrast. This method shows a sensitivity of 96.8 % and a specificity of 97 %, with the capability to produce results within 30 minutes, which is crucial for point of care diagnosis. The Loop mediated isothermal amplification technique shows great potential to be implemented to develop a test kit for Leptospirosis, that is relatively more rapid, inexpensive, portable, and applicable in rural settings. Despite these advantages, several limitations do exist, mainly due to the scarcity of studies conducted with large clinical samples, leaving the sensitivity of this test uncertain. The development of a kit using Loop mediated isothermal amplification, would reduce the mortality rate associated with delayed diagnosis of Leptospirosis by facilitating detection at an earlier stage than PCR.

*Keywords: Point of care diagnosis, Polymerase chain reaction, loop mediated isothermal amplification, microscopic agglutination test, molecular diagnostic method*

**An Overview of Nanomaterials in Water Purification, Health Effects and Future Aspects**

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The lack of pure water has become a major threat to humans today. About 1.2 billion of people lack access to safe drinking water, while about 2.6 billion have little or no sanitation. Apart from the currently available purification methods, the world is focusing on cutting-edge technologies with promising results. As a rapidly developing field, nanotechnology is vital for many industries. Nanomaterials have emerged as a trending topic in environmental research, because of their high surface area, nano- and micro- interface characteristics and remediation potential. From the last few decades onwards, nano filtration methods have taken high attention. Synthetic nanomaterials which composed with defined chemical composition and size distribution, like carbon nanotubes and metal oxide nanoparticles are highly in use commercially, while clay and polysaccharides are naturally occurring nanostructures that are being used in water filtration for a long time. Under synthetic nanomaterials, carbon nanomaterials are advantageous in the treatment of wastewater due to their wide surface area and selective character for aromatics. A variety of metal, metal/non-metal oxide nanoparticles, such as zeolite, silica, titanium dioxide, and silver nanoparticles, have also been incorporated into polymeric matrices. They are capable of adsorbing solid materials from water, while removing biological contaminants like bacteria and viruses. Due to their non-toxicity, biodegradability, etc., natural nanoparticles like clay and polysaccharides have drawn a wide attention. This review critically examines the nano filtration techniques now in use, their modifications, and their toxicity, particularly regarding synthetic nanoparticles.

*Keywords: Water purification, nanotechnology, nanomaterials*

**CRISPR Cas9: The Gene Editing Revolution in Biomedical Science**

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Gene editing is the technique of modifying a DNA sequence of an organism to fix or remove undesirable genetic mutations or to introduce favourable features. Among the variety of gene editing techniques, the CRISPR Cas9 system stands as the most significant gene-editing tool with its remarkable level of accuracy and precision. The CRISPR Cas9 system was adapted from a bacterial defense mechanism against invasive viruses, where a CRISPR RNA molecule and an enzyme called Cas-9 are used to locate and cleave specific sequences of DNA, allowing researchers to either introduce new DNA sequences or repair damaged or mutated ones. A new era in biomedical science has begun with the development of CRISPR Cas9 technology, with its potential to impact diverse areas including genetic diseases, drug screening, and immunotherapy. By creating animal and cell-based models of human diseases, CRISPR Cas-9 provides an improved comprehension of pathogenic pathways and the discovery of novel therapies. Furthermore, CRISPR Cas-9 is a helpful tool for the production of new medications, helping researchers find potential therapeutic targets and genes associated with drug resistance. By precisely modifying disease-causing mutations through gene therapy, it is possible to treat conditions like sickle cell anemia, muscular dystrophy, and cystic fibrosis. This method has also demonstrated promise in the study of cancer, with the possibility to inhibit oncogenes or improve human immunological defense against malignancies. Overall, the numerous applications of CRISPR Cas-9 make it a useful tool for advancing biological research and improving human well-being. However, the unimaginable capabilities of the CRISPR Cas9 technique lead to ethical concerns such as the risk of unintended off-target consequences and the potential development of designer babies. Researchers are attempting to increase the technology's efficiency and specificity, while fixing ethical and safety concerns as the system has already shown a promising future in biomedical science, despite the challenges.

*Keywords: CRISPR Cas9, gene editing, biomedical science, genetic diseases, ethical concerns*

**Green Tea Adulterations and Identification Techniques**

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Green tea adulteration (GTA) is a widespread practice in industries that deteriorates its superiority. We reviewed the studies on GTA, and the analytical techniques used to identify it. Green tea is made from the non-fermented leaves of the tea plant *Camellia sinensis*, which is popular for its health benefits. Polyphenols, especially catechins, including EC ((-)-epicatechin), ECG ((-)-epicatechin gallate), EGC ((-)-epigallocatechin), and EGCG ((-)-epigallocatechin gallate), are accountable for the health and therapeutic benefits such as anti-thrombotic, anti-tumor, anti-inflammatory, anti-microbial, anti-diabetic, and anti-obesity properties of green tea. Further, green tea helps to acquire amino acids, vitamins, minerals, and trace elements essential for normal physiological functions. However, the beneficial effect of green tea is challenged by intentional or unintentional adulterations. In most cases, the adulterations are done intentionally by humans to seek high profits. Green tea is commonly adulterated with chicory, acetamiprid, cashew, sibutramine, and sugar and glucose syrup. Chicory is a common adulterant used to enhance the aroma of green tea. It has sedative effects that impair the central nervous system and cause oral and respiratory problems. The adulteration with sugar and glucose syrup while enhances the taste and luster of green tea, it reduces the production costs. This causes threatening effects for diabetic patients who believe green tea has anti-diabetic properties. The addition of cashew nut husk could cause intoxication and allergies. Further, the sibutramine intake enhances the risk of heart attacks and strokes. Several chromatographic techniques and spectroscopic methods are used in the determination of GTA. Although these techniques are sensitive, they are more expensive and require long sample preparations and trained professionals. The therapeutic effects of green tea are diminished by GTA, and consumers experience numerous potentially fatal side effects. Hence, there is an urgent need for simple and low-cost methods of quantifying GTA in market products.

*Keywords: Camellia sinensis, green tea, food adulteration, green tea adulterations, identification techniques*

**Identification of SSR Markers in Genus Solanum of Solanaceae Plant Family and its Importance**

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The Solanaceae family is one of the largest and most economically important angiosperm families, with important food, spice, and medicinal plants. The genus *Solanum*, which contains numerous agricultural and medicinal species, is particularly significant within this family. The SSR markers are small repeating DNA sequences found throughout the genome and are incredibly helpful for studying genetic diversity, gene mapping, and marker-assisted selection in plants. They allow breeders to quickly create improved cultivars with desirable traits like disease resistance, high yield, and quality. Because these markers are highly informative, codominant, and repeatable, they are useful for identifying genetic variation within and between populations. The Solanaceae family has the economic significance of a few widely and commonly used *Solanum* species, such as *Solanum tuberosum*, *Solanum lycopersicum*, *Solanum melongena*, and *Solanum nigrum*, emphasizing their contributions to agricultural and industrial applications. The genetic diversity within this genus highlights the importance of effective molecular tools for its study and exploitation. While these species are well-researched, there is untapped potential in other *Solanum* species that have not yet been explored through SSR markers. This review undertakes the task of assessing the feasibility and significance of employing SSR markers as genetic tools in these less-studied *Solanum* species. Also, it covers SSR development methodology, including next-generation sequencing (NGS), RNA sequencing, DNA isolation, and marker validation methods. The challenges and advancements in the development of SSR markers are also discussed.

*Keywords: SSR Markers, Solanaceae, Solanum, RNA Sequencing, genetic diversity, breeding*



**Differentiation Therapy for Leukemia**

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Differentiation therapy encompasses the concept of phenotypic conversion, wherein immature neoplastic cells are induced to differentiate into mature benign forms. The main principle of this therapy includes the transformation of neoplasms by the induction of terminal differentiation of the afflicted cell progenies via various biological and chemical agents, and thus the consequent reversion of arrested cellular differentiation, restoration of self-renewal capabilities, and concomitant inhibition of uncontrolled cellular proliferation. The hallmark success of differentiation therapy is demonstrated in the treatment of acute promyelocytic leukemia with all-trans retinoic acid. This indicates enormous clinical potential for the field of differentiation therapy as both a standard form of cancer treatment and as a means of chemoprevention. However, resistance, desensitisation, and complications in the patient's response to these differentiation agents have posed various limitations to the spectrum of treatable leukemia. Research for the future betterment of therapeutic techniques thus involves a key focus in the areas of elucidation of leukemia-related signaling pathways and receptors involved (like Retinoic Acid Receptor isoforms in different leukemic subtypes), and the identification of new differentiation targets, like specific proteins (Creatinine Kinase 2, Dihydro-Orate Dehydrogenase) and genes (FMS-like tyrosine kinase 3), more efficient combinatorial therapies for substitution of chemotherapeutic drug conjugates (such as the All-Trans Retinoic Acid/Arsenic Trioxide conjunction), synergisms for retinoid sensitization (Bortezomib) as well as other alternatives as prophylactic regimens for the expansion of the spectrum of leukemia treatable by differentiation therapy. Although different differentiation agents are currently in use for the treatment of leukemia, therapeutic complications, and limitations exist. Therefore, novel agents of differentiation are currently being researched to expand the spectrum of treatable leukemic subtypes.

*Keywords: differentiation therapy, neoplastic cells, cellular differentiation, acute promyelocytic leukemia, therapeutic complications*

**The Role of Molecular Profiling with Relevance to Cancer of Unknown Primary**

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Cancer of unknown primary site is a rare form of malignancy characterised by prominent metastases that seem to lack any identifiable primary tumour from which they originated. It is a heterogeneous clinicopathological syndrome associated with a poor prognosis and short survival times, alongside considerable difficulties in diagnosis, management, and treatment. Excluding a small minority, many patients have unfavourable presentations, with no apparent survival benefit imparted by site-specific therapy compared to traditional empiric regimens. However, for patients who fall within this treatment-responsive minority, the elucidation of this primary has several favourable implications. As such, with the progression of molecular diagnostic techniques such as molecular profiling, the prescription of more personalised and tailored therapy following accurate primary site identification is steadily becoming more prevalent. Numerous completed and ongoing trials are contributing to discovering new avenues of clinical diagnosis, and while standard pathology and immunohistochemistry remain the gold standard for diagnostic investigations, molecular techniques have shown considerable progress in making up for what these techniques lack. Despite this favorability, it has yet to become a routine means of diagnosis, stemming from the lack of both studies and knowledge on cancer of unknown primary itself. Its progression towards applicability will require innovative trial designs that allow a better understanding of cancer of unknown primary and the use of more novel methods.

*Keywords: Cancer of unknown primary, Molecular profiling, Diagnostic Tool, Tumour of Origin Assays, Site-Specific Therapy*

## **Smart Nano Packaging Materials for Food Industry**

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The food packaging sector is always looking for novel solutions to ensure the quality, safety, and longevity of its products. In recent years, applying nanotechnology to food packaging is a workable solution to these challenges. The objective of this review is to study smart nano packaging materials and study their interaction with polymer matrix while developing packaging materials, and the positive and negative impact of these nano-based food packaging. Nanotechnology is an important technology to improve smart nano packaging. Smart packaging has the potential of both intelligent and active packaging. It provides a total packaging solution that on the one hand monitors changes in the product or the environment (intelligent) and on the other hand acts upon these changes (active). The mechanical, antioxidant and antimicrobial properties, thermal stability and barrier properties of the packaging material are improved by the integration of appropriate nanomaterial in the polymer matrix, which extends the shelf life of the food products. In this review, nanocellulose, nano starch, protein nanoparticles, chitosan nanoparticles, nano clays, and nano additive materials such as carbon nanotubes, silver nanoparticles, zinc oxide nanoparticles, and titanium dioxide nanoparticles impact on packaging structure and properties have been discussed. The most prominent smart nano packaging materials and their enhanced properties when reinforced with polymer matrix have also been compared. These include nano sensors that are used to detect specific chemical compounds, infections, and poisons in food when they are integrated into food packaging. There are numerous advantages and disadvantages associated with smart nano packaging. As a developing technology, the knowledge about risk associated with nano packaging is minimum. Nanomaterials for packaging show enormous potential for changing the packaging sector due to its strongly improved properties. To ensure responsible and widespread usage in the future, comprehensive assessment of their safety and regulatory aspects is necessary.

*Keywords: nanotechnology, nanomaterials, food industry, smart packaging*

**Identification and Evaluation of an Efficient Penicillin-producing Fungi from Soil**

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Penicillin, a potent and widely applied antibiotic renowned for its efficacy in combating bacterial infections, has served as a focal point of intensive scientific inquiry. In this comprehensive investigation, our aim is to delve deeply into the vast reservoir of fungal species derived from soil samples, assessing their potential as prolific producers of innovative compounds. Utilising developments in contemporary biotechnology, this investigation examines the utilization of various fungus species present in the ecosystem to develop innovative products. Cutting-edge technological methods, including Polymerase Chain Reaction, UV-visible spectrophotometry, antibiotic susceptibility tests, and advanced culture preparation techniques, were employed to improve the accuracy and effectiveness of this study. The identification of notably productive penicillin-producing fungi from soil samples comprised the primary focus of this research. Additionally, the study details the detection process of penicillin-producing fungi in soil and assesses their productivity through rigorous assessment using antibiotic susceptibility tests and UV-VIS spectrophotometry. This study highlights the urgent need to search natural ecosystems for potential antibiotic reservoirs. With their proven ability to combat antibiotic resistance, fungi highlight the crucial part that resources produced from soil can play in the ongoing effort to protect public health. Considering these discoveries, the endless variety of soil ecosystems stands out as a promising frontier in the ongoing fight against diseases that are resistant to antibiotics, providing new opportunities for study, discovery, and innovation.

*Keywords: penicillin, fungi, soil, antibiotic resistance, UV-visible spectrophotometry*

**Unlocking the Antimicrobial Potential of Avocado Seeds: A Sustainable Solution from Food Waste**

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Food waste poses a global challenge, with 1.3 billion tonnes of food discarded annually. Addressing this issue requires sustainable solutions that span the food supply chain. Avocado processing generates substantial waste, including seeds, which, despite their nutritional richness, are often overlooked. Harnessing the bioactive potential of these seeds holds promise for sustainable development and environmental responsibility. Avocado seeds, typically considered inedible waste, contain an array of valuable components, including vitamins, minerals, proteins, lipids, and numerous bioactive substances, such as phytochemicals. Researchers have developed various extraction methods to unlock the bioactive potential of these seeds, leading to extracts with diverse health-enhancing properties, including antioxidant, anti-microbial, and anti-cancer attributes. This study focuses on the antimicrobial capabilities of avocado seeds, with particular emphasis on their antibacterial and antifungal properties. Avocado seed extracts exhibit significant antimicrobial activity against a spectrum of microorganisms, including pathogenic bacteria, fungi, and protozoa. Research findings suggest that chloroform seed extracts from avocado seeds hold promise as potential antimicrobial agents against non-tuberculous mycobacteria and drug-resistant *M. tuberculosis*. These observations underscore the antimicrobial potential of avocado seeds, hinting at their viability as alternative sources of antimicrobial agents, particularly as we grapple with the global challenge of antibiotic resistance. In a world striving for sustainability and the responsible utilization of resources, avocado seeds stand as an untapped reservoir of bioactive compounds with diverse health benefits, including their notable antimicrobial properties. The pursuit of innovative applications for avocado seeds not only mitigates food waste but also holds the promise of addressing pressing health and environmental challenges. This research opens doors to novel avenues for the development of eco-friendly antimicrobial drugs derived from an unlikely source—avocado seeds.

*Keywords: Avocado seeds, food waste, sustainable development, phytochemicals, antibiotic resistance*



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