UNI - IN ALLIANCE 2024

"A Sustainable Future: Bridging the Gap Between Nature and Technology"

10th Undergraduate Research Symposium

Organized by
B.Sc. (Hons) Degree in Applied Sciences

Proceeding Book of the 10th Undergraduate Research Symposium

"UNI-IN ALLIANCE 2024"

Faculty of Applied Sciences

University of Sri Jayewardenepura, Nugegoda, Sri Lanka

16th August 2024

Organized by

B.Sc. (Honours) Degree in Applied Sciences

Organized by the Students of B.Sc. (Honours) Degree in Applied Sciences, University of Sri Jayewardenepura

16th August 2024

The material published in this document has been supplied by the authors, reviewed by expert reviewers in the relevant fields and has been edited by the editorial board of the Symposium. The views expressed by therein remain the responsibility of the named authors and do not necessarily reflect those of the editorial board of the symposium.

This publication was funded by the University of Sri Jayewardenepura, Sri Lanka.

Book compiled by:

Ms. T. S. N. de Zoysa

Ms. W. W. G. V. R. Wijewickrama

B.Sc. (Honours) Degree in Applied Sciences

Faculty of Applied Sciences

University of Sri Jayewardenepura

Gangodawila, Nugegoda, Sri Lanka.

SYMPOSIUM ORGANIZING COMMITTEE

Advisory Board	Prof. Upul Subasinghe
	Prof. Pahan Godakumbura
Editor in Chief	Dr. A. U. Rajapaksha
Editor	Dr. R. S. Diyabalanage
Editorial Committee	Prof. P. Gunawardene
	Prof. W. K. I. L. Wanniarachchi
	Dr. B. V. N. C. Vidanage
	Dr. D. Weerathunga
	Dr. G. G. T. Chandratilake
	Dr. I. Munaweera
	Dr. I. Senanayake
	Dr. K. A. K. Gnanaweera
	Dr. K. V. K. Gunathilake
	Dr. P. W. Jayatunga
	Dr. R. M. Silva
	Dr. R. Wimalasekara
	Dr. S. Fernando
	Dr. S. Kandeepan
	Mr. R. A. D. D. Dharmasiri
	Ms. A. P. U. Hansamali
	Ms. W. S. S. Thilakarathna

SYMPOSIUM ORGANIZING COMMITTEE (STUDENTS)

Uni-In Alliance Symposium 2024

President	Mr. N. M. M. Nasar
Secretary	Ms. S. S. A. D. Dilsara
Vice President	Mr. W. D. T. Madusanka
Junior Treasurer	Ms. M. H. S. M. Perera
Financial Coordinator	Ms. P. K. K. Perera
Webmaster	Ms. F. H. S. R. Silva
Publication Coordinator	Ms. T. S. N. de Zoysa
Assistant Publication Coordinator	Ms. W. W. G. V. R. Wijewickrama
Publication Team	Ms. A. S. Ameer
	Ms. N. A. A. S. T. Nishshanka
	Mr. M. L. C. Piyumal
	Mr. H. M. P. P. Herath
	Ms. K. A. S. D. Samarasinghe

Technical Coordinator	Mr. D. D. N. Vilochana
Event Coordinator	Ms. A. K. S. S. Alawaththa
Logistics Coordinator	Ms. D. U. I. Wickramarathne
Head of Decorations	Mr. D. B. T. L. S. Piyadasa
Head of Facilitations	Ms. M. M. Gunawardhana
Designing Coordinator	Ms. R. M. A. U. Kumari
	Mr. H. A. K. D. Premasiri

BOARD OF REVIEWERS

Senior Prof. W. T. P. S. K. Senarath

Prof. C. M. Nanayakkara

Prof. D. S. A. Wijesundara

Prof. G. H. J. Lanel

Prof. J. M. J. K. Jayasinghe

Prof. K. W. M. A. Jayasinghe

Prof. M. L. C. Attygalle

Prof. M. Vithanage

Prof. N. C. Ganegoda

Prof. N. G. S. S. Gamage

Prof. P. K. D. D. P. Pitigala

Prof. P. N. Dasanayake

Prof. R. M. C. S. Ratnayake

Prof. V. G. T. N. Vidanagama

Prof. W. L. I. Wijesekara

Dr. A. D. D. S. Amarasekara

Dr. A. H. Ekanayake

Dr. A. Iddagoda

Dr. A. T. Cooray

Dr. B. P. W. Fernando

Dr. C. D. Jayasinghe

Dr. C. H. W. M. R. B. Chandrasekara

Dr. C. Jayasinghe

Dr. C. Pathirana

Dr. C. R. Munasinghe

Dr. C. Wickramarachchi

Dr. D. A. Daranagama

Dr. D. Kumarathunga

Dr. D. N. Jayawardane

Dr. D. S. Manamgoda

Dr. D. S. Tennakoon

Dr. L. Weerasinghe

Dr. M. A. D. Somendrika

Dr. M. L. A. M. S. Munasinghe

Dr. M. T. M. Perera

Dr. M. Udugama

Dr. N. Devpura

Dr. N. I. De Silva

Dr. N. Silva

Dr. P. De Silva

Dr. P. G. T. Harshani

Dr. P. K. C. B. Wijerathne

Dr. P. Liyanaarachchi

Dr. D. P. W. Jayatunga

Dr. R. M. Silva

Dr. R. N. P. de Silva

Dr. R. Sanjeewa

Dr. R. Wimalasekera

Dr. S. Abeywickrema

Dr. S. Fernando

Dr. S. Kandeepan

Dr. S. Rajapaksha

Dr. S. Senanayake

Dr. S. Tennakoon

Dr. T. M. K. K. Jinasena

Dr. T. M. S. U. Gunathilake

Dr. T. Rathnayaka

Dr. T. Senapathi

Dr. U. A. Jayawardena

Dr. U. Karunarathna

Dr. U. Wijenayake

Dr. W. N. N. K. Perera

Dr. D. Weerathunga

Dr. H. Harischandra

Dr. H. Pathberiya

Dr. H. P. N. Perera

Dr. H. W. H. Premachandra

Dr. I. Munaweera

Dr. I. U. Kariyawasam

Dr. J. K. Walpita

Dr. K. A. K. Gnanaweera

Dr. K. M. Thambugala

Dr. K. N. Samarasekera

Dr. L. J. S. Undugoda

Dr. W. N. Silva

Air Vice Marshal K. M. K. Keppetipola

Mr. A. Jayasanka

Mr. A. L. K. R. Fernando

Mr. G. Udugama

Mr. K. S. Manatunga

Mr. R. A. D. D. Dharmasiri

Ms. C. H. Jayasuriya

Ms. D. H. S. W. Dissanayake

Ms. D. S. Rodrigo

Ms. E. M. M. W. K. O. Bandaranayaka

PANEL OF DEPARTMENT COORDINATORS AND ORGANIZING COMMITTEE OF UNI-IN ALLIANCE 2024

Seated - left to right : Ms. W. S. S. Thilakarathna (Teaching Assistant), Ms. A. P. U. Hansamali (Teaching Assistant), Dr. P. W. Jayatunga (Genetics and Molecular Biology), Dr. S. Fernando (Biology (Zoology)), Dr. D. T. D. Weerathunga (Polymer Science & Technology), Prof. P. I. Godakumbura (Coordinator- B.Sc. (Honours) Degree in Applied Sciences), Senior Prof. M. M. Pathmalal (Vice Chancellor), Prof. S. M. C. U. P. Subasinghe (Dean, Faculty of Applied Sciences), Dr. A. U. Rajapaksha (Asst. Program Coordinator), Dr. R. S. Diyabalanage (Asst. Program Coordinator), Dr. R. Wimalasekara (Botany & Biology), Dr. K. V. K. Gunathilake (Zoology), Dr. B. V. N. C. Vidanage (Mathematics), Dr. I. Senanayake (Aquatic Resource Management) , Dr. S. Kandeepan (Physics), Dr. G. G. T. Chandrathilake (Env. Mgt & Forestry), Dr. I. Munaweera (Chemistry)
Absent : Prof. P. Gunawardene (Economics), Mr. R. A. D. D. Dharmasiri (Electronics & Embedded Systems)

Standing – left to right : Ms. P. K. K. Perera (Financial Coordinator), Ms. R. M. A. U. Kumari (Designing Coordinator), Ms. W. W. G. V. R. Wijewickrama (Assistant Publication Coordinator), Ms. T. S. N. de Zoysa (Publication Coordinator), Ms. D. U. I. Wickramarathne (Logistics Coordinator), Mr. W. D. T. Madusanka (Vice President), Mr. D. B. T. L. S. Piyadasa (Head Of Decorations), Mr. N. M. M. Nasar (Chairperson, Symposium), Mr. H. A. K. D. Premasiri (Designing Coordinator), Mr. S. A. D. M. Prabath (President), Ms. M. M. Gunawardhana (Head of Facilitations), Ms. F. H. S. R. Silva (Webmaster), Ms. S. S. A. D. Dilsara (Secretary), Ms. A. K. S. S. Alawaththa (Event Coordinator), Ms. M. H. S. M. Perera (Junior Treasurer)

Message from Senior Prof. Pathmalal M. Manage

Vice Chancellor

University of Sri Jayewardenepura

It is with great pleasure that I extend my warmest greetings to all participants of the 10th UNI-IN ALLIANCE Research Symposium, organized by the Society of Industrial Scholars of the University of Sri Jayewardenepura, scheduled for 16th August 2024. This event is a significant occasion in our journey towards enabling a culture of research and innovation.

The theme of this year's symposium, "A Sustainable Future: Bridging the Gap between Nature and Technology," captures the critical need to harmonize technological advancements with environmental sustainability. In an era where the rapid pace of technological progress often challenges our natural world, it is imperative that we seek solutions that integrate these two contexts. This symposium aims to facilitate the exchange of innovative ideas, bringing out the emerging trends, and identifying new opportunities in standards and related products, all contributing to a sustainable future.

Research plays a major role in this endeavor. By going into the depths of scientific inquiry and innovation, we discover new pathways to address the pressing issues of our time. The importance of research cannot be overstated—it is the foundation to build a better, more sustainable world. Through research, we not only advance our understanding of complex phenomena but also develop practical solutions that have the potential to transform lives and communities.

One of the primary objectives of this symposium is to provide a platform for undergraduate students across Sri Lanka to showcase their research findings. This opportunity not only highlights their dedication but also emphasizes the importance of utilizing scientific knowledge for technological advancements and employability. By encouraging our young scholars to engage in research, we are investing in a future where innovation and sustainability go hand in hand.

I would like to express my heartfelt gratitude to all contributors, organizers, and participants for their efforts in making this symposium a success. Your efforts in bridging the gap between nature and technology are very admirable and essential for the betterment of the society.

Thank you.

Message from Prof. Upul Subasinghe
Dean
Faculty of Applied Sciences
University of Sri Jayewardenepura

As the Dean of the Faculty of Applied Sciences at the University of Sri Jayewardenepura, it is my pleasure to extend my well wishes for the Research Symposium organized by the Society of Industrial Scholars. This year's theme, "A Sustainable Future: Bridging the Gap Between Nature and Technology," reflects the commitment to addressing the pressing challenges of our time through innovative and collaborative research.

This symposium aims to facilitate the exchange of cutting-edge ideas on current research, showcase emerging trends and identify new opportunities in standards and related products. By bringing together scholars, researchers and industry experts, we hope to foster a vibrant dialogue that will lead to sustainable solutions and technological advancements.

A key focus of this symposium is to provide a platform for undergraduate students across Sri Lanka to present their research findings. I believe that empowering our young scientists and engineers to apply their scientific knowledge is crucial for driving technological progress and enhancing employability.

I extend my heartfelt gratitude to all participants, presenters and organizers for their dedication and contributions. Your efforts are instrumental in making this event a success and in advancing our shared vision of a sustainable future.

We look forward to your active participation and to the fruitful discussions that will undoubtedly emerge from this symposium.

Message from Prof. Pahan Godakumbura

Coordinator

B.Sc. (Honours) Degree in Applied Sciences

Faculty of Applied Sciences

University of Sri Jayewardenepura

 I am delighted to extend my heartfelt congratulations on the successful organization of the 10th Annual **"Uni-In Alliance Symposium 2024"** in the B.Sc. (Honours) Degree in Applied Sciences program of the University of Sri Jayewardenepura. Building on the remarkable success of previous years, this year's symposium continues our tradition of academic excellence and innovation.

Our theme for 2024, "**A Sustainable Future: Bridging the Gap between Nature and Technology**," underscores our commitment to exploring the symbiotic relationship between the natural world and technological advancement. Our symposium, organized by dedicated undergraduate students pursuing the B.Sc. (Honours) degree in Applied Sciences, aims to present cutting-edge research findings across 11 diverse disciplines. This event serves as a unique platform for our students to showcase their innovative work, exchange ideas, and engage with over 50 leading corporate representatives. The main objectives of the symposium are to facilitate the exchange of ideas on current research, showcase emerging trends, streamline standard details, and identify new opportunities for standards and related products.

These goals are designed to foster academic and industry collaboration, ensuring that our research has a meaningful impact on technological advancements and societal progress. Through dynamic discussions and debates, the symposium will identify gaps and priorities for research and practice-based innovations, highlight areas of academic research with strong industry needs and facilitate better evaluation of technical content for subsequent publications. Furthermore, I am thrilled to announce a "FUTURUM 2024" competition focused on AI-related innovations, open to all universities. This competition aims to foster a culture of innovation and excellence in the field of artificial intelligence, with a distinguished panel of judges comprising university lecturers specializing in relevant AI fields. Moreover, I am proud to highlight that the 10th Uni-in-Alliance Symposium continues to uphold our commitment to sustainability.

We have once again achieved the Premium level of the *Yale Green Event Certification*, recognizing our efforts in minimal waste generation, effective waste management, and local sourcing of food and beverages. As we gather to explore, learn, and innovate, I encourage all participants to engage actively, share your insights, and collaborate towards our shared goal of a sustainable future. On behalf of the Faculty, I extend my deepest gratitude to our organizers, speakers, sponsors, and reviewers whose dedication and expertise have made this event possible.

Together, let us bridge the gap between nature and technology, paving the way for a brighter, more sustainable world.

I wish the 10th Annual "**Uni-In Alliance Symposium 2024**" a grand success!!

LIST OF DEPARTMENT COORDINATORS IN B.SC. (HONOURS) DEGREE IN APPLIED SCIENCES

Management Science	Dr. K. A. K. Gnanaweera
Chemistry	Dr. I. Munaweera
Polymer Science and Technology	Dr. D. T. D. Weerathunga
Mathematics	Dr. B. V. N. C. Vidanage
Physics	Dr. S. Kandeepan
Statistics	Dr. R. M. Silva
Economics	Prof. P. Gunawardene
Environmental Management and Forestry	Dr. G. G. T. Chandrathilake
Botany	Dr. R. Wimalasekara
Zoology	Dr. K. V. K. Gunathilake
Biology (Zoology)	Dr. S. Fernando
Biology (Botany)	Dr. R. Wimalasekara
Aquatic Resource Management	Dr. I. Senanayake
Electronic and Embedded System	Mr. R. A. D. D. Dharmasiri
Genetics and Molecular Biology	Dr. P. W. Jayatunga

TABLE OF CONTENTS

Biological Sciences

Business & Management Studies

Chemical & Environmental Sciences

Engineering, Technological Sciences & Innovation

Environmental & Resource Economics

Food Science & Nutrition

Forestry & Agriculture

Information Technology & Computing

Mathematics & Applied Statistics

Polymers & Material Sciences

Theoretical & Applied Physics

Acknowledgement

AGENDA

UNI-IN ALLIANCE 2024

16th August 2024

Venue: Senate Boardroom, University of Sri Jayewardenepura

07:45-08:10	Registration
08:10-08:15	Lighting the Oil Lamp and University Anthem
08:15-08:30	Welcome Address by Mr. Nazhan Nasar, Chairperson of the Symposium
08:30-08:40	Speech by Senior Prof. Pathmalal M. Manage, Vice Chancellor, University of Sri Jayewardenepura
08:40-08:45	Video Presentation (Introduction to Symposium)
08:45-08:55	Speech by Dean of the Faculty of Applied Sciences, Prof. Upul Subasinghe
08:55-09:05	Symposium E-book Release
09:05-09:15	Speech by Guest of Honour, Senior Prof. Sudantha Liyanage, Chairman, Sri Lanka Rupavahini Corporation (SLRC)
09:15-09:35	Keynote Speech by Prof. Ranjith Premasiri, Professor, Department of Earth Resources Engineering, University of Moratuwa
09:35-09:45	Speech by Platinum Sponsor – Mr. Senura Dharmadasa, Senior Manager - Group Sustainability and Compliance, Star Garments Group
09:45-10:15	"FUTURUM" – AI Competition
10:15-10:20	Group Photo
10:20-10:30	Tea Break
10:30-12:30	Session 1: Oral and Poster Presentations (at Faculty Premises)
12:30-13:15	Lunch Break
13:15-15:30	Session 2: Oral and Poster Presentations (at Faculty Premises)
15:30-15:45	Tea Break
15:45-15:55	Address by Prof. Pahan Godakumbura, Coordinator, B.Sc. (Honours) Degree in Applied Sciences
15:55-16:10	Entertainment Item
16:10-16:15	Speech by Dr. Anushka Rajapakshe, Assistant Coordinator, B.Sc. (Honours) Degree in Applied Sciences
16:15-17:10	Awarding Ceremony
17:10-17:15	Speech by Dr. Saranga Diyabalanage, Assistant Coordinator, B.Sc. (Honours) Degree in Applied Sciences
17:15-17:20	Concluding Remarks and Vote of Thanks by the Secretary of the Symposium
17:20-17:25	National Anthem

Time	Oral Presentations: Morning Session				
	Biological Sciences	**Biological Sciences**	**Chemical and Environmental Sciences**	**Theoretical and Applied Physics**	**Business and Management Studies**
Morning Session	**ID 5** *In Vitro* Evaluation of Plant Growth Promoting and Bio-Controlling Potentials of *Trichoderma* Strains Isolated from Banana Rhizosphere. **De Silva U. A. U.**	**ID 47** Evaluation of the Anti-Tumorigenic Potential of the Aerial Roots of *Ficus benghalensis* **Dhanusha A. K. D. A.**	**ID 2** Effect of Concentration on the Uptake of Lead (Pb) from Aqueous Solution by *Azolla pinnata.* **Kanesamoorthy T.**	**ID 6** Neutron Activation Analysis to Determine Isotopes of Elements in Portland Cement Using Delayed Gamma Emission. **Perera D. D. B.**	**ID 19** Mediating Effect of Green HRM on its Drivers and Job Satisfaction: A Study of ABC Bank PLC. **Yapa M. U. N.**
	ID 8 Diversity of Mosquitoe Breeding in Different Types of Phytotelmata in Moratuwa MOH Area. **Lankapathy W. U. J.**	**ID 51** Performance of Rice Varieties in Low Nitrogen Fertility Conditions. **Perera M. A. D.**	**ID 3** Determination of Heavy Metals in *Oreochromis niloticus* from Kalametiya Lagoon in Southern, Sri Lanka. **Peramuna P. A. N. D.**	**ID 13** Fabrication of Lead Sulfide (Pbs) and Cadmium Sulfide (CdS) Quantum Dots Embedded Photovoltaic Cells with Gel Electrolyte. **Dassanayake M. S.**	**ID 26** Mediating Effect of Workplace Spirituality with its Drives and Employee Engagement: A Study of ABC Apparel Company. **Herath H. M. S. H.**
	ID 25 Effect of 4-Chlorophenoxyacetic Acid (4-Cpa) And Gibberellic Acid-3 (Ga3) Application in Enhancing Yield and Quality of Protected House Grown Tomato (*Lycopersicon Esculentum* L. Variety: Thilina). **Sarathchandra N. S. A.**	**ID 62** Optimization Of SYBR Green Based Quantitative PCR Assay to Detect DNA Originated from *Mycoplasma gallisepticum* and *Mycoplasma synoviae.* **Ranathunga B. D. D. T.**	**ID 10** Pyrolytic Rice Char as an Adsorbent to Remove Methylene Blue Dye from Wastewater. **Vishwani L. L. D.**	**ID 39** Determining Orbital Periods of Low-Inclination Su-Uma Stars Using Superhump Periods. **Piyadasa D. B. T. L. S.**	**ID 37** Analyzing The Impact of Influential Factors on Work Attitudes Among Generation-Z Employees: A Case Study in the Sri Lankan it Services Sector. **Katuwandeniya K.**

Time	Biological Sciences	Biological Sciences	Chemical and Environmental Sciences	Theoretical and Applied Physics	Business and Management Studies
Morning Session	**ID 27** Evaluation of the Phosphate Solubilizing Efficacy of *Penicillium oxalicum* (Bt9) in the Production of Phospho-Compost and the Effect on Growth of Selected Plant. **Sathsarini W. M. B. B.**	**ID 72** Identification of *Bph*2 and *Bph*3 Brown Planthopper (Bph, *Nilaparvata lugens stål*) Resistant Genes in Advanced Rice Lines Developed by Rice Research and Development Institute, Sri Lanka. **Dilsara S. S. A. D.**	**ID 28** Analyzing Vegetation Change in the Mahaweli D System through NDVI and Remote Sensing Techniques from 1993 to 2022. **Ariyasigha U. D. H. P.**	**ID 48** Radial Velocity Study of a Selected Bright Star Observed at 45 cm Telescope at Arthur C Clarke Institute for Modern Technologies. **Wijesinghe W. M. R. Y.**	**ID 40** Impact of Financial Literacy on Financial Responsibility among Gen Z Employees in Sri Lanka's Apparel Sector: Moderating Roles of Impulsive Buying, IGD, and Internal Locus of Control. **Kavindya K. G. A.**
	ID 30 Evaluation of Sustainable Approaches for Management of Leaf Fall Disease in Rubber (*Hevea brasiliensis).* **Wijewickrama W. W. G. V. R.**	**ID 89** Microplastics Contamination in Marine Organisms of Different Trophic Levels from Dikkowita Harbor **Dissanayake D.M.K.S.**	**ID 88** Impact of Raw Material Composition on Shrinkage and Water Absorption Properties of Ceramic Floor Tiles. **Abeysinghe C. S. D.**	**ID 49** Low-Resolution Spectroscopic Study of Pulsating Star - CC Andromedae. **Munasinghe K. M.**	**ID 50** An Empirical Study of Artificial Intelligence in Digital Marketing Implementation Challenges for Colombo Street Food Businesses. **Nasar N. M. M.**
		ID 87 Detection of Drought Resistant Genes in Selected Rice (*Oryza Sativa* L.) Varieties. **De Zoysa T. S. N.**		**ID 53** Mapping Urban Green Space Using Sentinel-2 in Colombo Area: A Neural Network Approach. **Nanayakkara R. S. K.**	**ID 82** Mediating Effect of Organisational Commitment on its Drivers and Retention: A Study of ABC Engineering Solutions. **Liyanage B. L. D.**

Time			Polymer and Material Sciences	Theoretical and Applied Physics	Business and Management Studies
Morning Session			**ID 58** Formulation of Poly Vinyl Chloride (PVC) based Solvent Cement using Recycled PVC from Electric Cables. **Gayandi J. W. U.**	**ID 63** Investigation on the Stabilization of Silver Nanoparticles on Radiation-Grafted Recycled Polyester Fabric. **Siriwardane S. M. D. N. S.**	**ID 64** Professional Employees' Green Behavior: Special Reference to Apparel Garment Companies in Biyagama Export Processing Zone (BEPZ). **Wijesekara M. S. U. R.**
				ID 66 Evaluating the Levels of Radiofrequency Electromagnetic Radiation in Occupational Environments. **Perera M. H. S. M.**	

Time	Oral Presentations: Evening Session			
	Mathematics and Applied Statistics	**Information Technology and Computing**	**Environmental and Resource Economics**	**Forestry and Agriculture**
Evening Session	**ID 36** A Comparative Study of Arch-Garch and Machine Learning Algorithms in Predicting Stock Closing Price of Selected Sri Lankan Insurance Companies in Colombo Stock Exchange. **Perera W. M. P.**	**ID 55** Development of an Artificial Intelligence System for Automated Extraction of Vital Medical Information from Healthcare Documents for Medical AI. **Mihiranga A. T.**	**ID 52** Factors Influencing Savings in Sri Lanka: An Analysis at the Micro and Macro Level. **Sandamini S. S. K**	**ID 9** Monitoring Coconut Leaf Nitrogen using Different Vegetative Indices by Multispectral Images Analysis. **Samarakoon S. M. A. B. K.**
	ID 38 Tax Policy- The Effects of Base Erosion and Profit Shifting on Sri Lanka's Tax Revenue. **Tharushika H. D. J.**		**ID 65** Towards Sustainable Telecommunications: An Integrated Study on E-Waste Management in Sri Lanka's Telecommunication Sector. **Jayathilaka K. G. M. E.**	**ID 45** Evaluation of F_5 Breeding Lines for Thrips Resistance in Rice (*Oryza sativa L.*). **Gunawardhana M. M.**
	ID 57 Analysis Of Reduction of Packaging Paper Rejection in The Packaging Division of Healthcare Global Business Unit a Glove Manufacturing Company. **Perera P. S. S.**		**ID 67** Assessing the Impact of Fertilizer Policy Changes on Paddy Production in Gampaha District and Analyzing the Dynamic Interrelationships between Paddy Production, Rice Import, and GDP In Sri Lanka. **Sandapperuma S. A. A. S. N.**	**ID 80** Exploring Vegetation Composition and Profile in Gallwaysland National Park, Nuwara Eliya. **Dimuthumani K. H. P.**

Time	Engineering, Technological Sciences and Innovation	Environmental and Resource Economics	Food Science and Nutrition
Evening Session	**ID 4** Gesture Recognition for Human-Computer Interaction using Deep Learning. **Weerawanni W. M. C. R.**	**ID 70** The Relationship between Renewable Energy Generation, Economic Growth and Green Energy Investments. **Jayasundara P. N.**	**ID 15** Microencapsulation of Country Borage (*Plectranthus Amboinicus* L.) Leaf Extract in Chitosan: Effect of Fortification on Bioactivity Retention. **Kayooriha S.**
	ID 71 Spiral Drawing Test Integrated with Sensor-Equipped Pen on Tablet: A Machine-Learning Approach for Enhanced Neuro Diagnosis of Parkinson's Disease and Essential Tremor. **Silva F. H. S. R**.	**ID 74** Exploring the Influential Factors of Energy Saving Behaviour. **Narayana S. N. B. M. N. U.**	**ID 17** Development of Vinegar using Selected Traditional Rice Varieties and Use of By-Products to Formulate Cookies. **Yakupitiya I. A.**
		ID 75 The Influential Factors of Life Satisfaction and the Willingness to Pay for the Establishment and Maintenance of a Community Garden. **Jayarathne W. A. D. R.**	**ID 22** *Listeria* Contamination in Pasteurized Milk and Selected Edible Green Leaves Collected from Colombo District with a Focus on Food Safety and Disease Prevention in Sri Lanka. **Rajapaksha M. N. K. K. P.**
		ID 76 Factors Influencing Photovoltaic Solar Technology Adoption among Households in Hambantota District Sri Lanka. **Dheerasingha D. A. H. N.**	**ID 73** Establishment of a Test Protocol for Thermal Process Validation of Value-Added Coconut Products in Sri Lanka using Surrogate Microorganism *Escherichia coli* (Migula) Castellani and Chalmers (Atcc® Baa-1427 ™). **Imalka S. P. S.**

Time	Poster Presentations: Morning Session	Time	Poster Presentations: Evening Session	
	Mathematics and Applied Statistics		**Biological Sciences**	**Business and Management Studies**
Morning Session	**ID 34** Investigation of the Frequency of Life Insurance Claims Based on the Client Database of ABC Company. **Ishuwara W. A. D. S.**	**Evening Session**	**ID 33** The Anti-Diabetic Potential and Phytochemical Analysis on Plant Parts of *Pongamia Pinnata* and *Prunus armeniaca.* **Lokunarangoda D. G.**	**ID 18** Factors Affecting Job Satisfaction Among Machine Operators: A Study of ABC Textile Manufacturing Company. **Kaushalya H. T. S.**
	ID 54 Mitigation of the Customer Complaints Regarding the Assortment of Gloves with Mixed Hand and Size Specifications. **Ishara W. A. S.**		**ID 46** In-Vitro Antioxidant and Anti-Inflammatory Activity of *Cinnamomum zeylanicum* Blume Barks and Leaves from Three Different Provinces of Sri Lanka. **Ameer A. S.**	**ID 24** The Impact of Brand Awareness and Consumer Trust on Purchase Intention of Fairness Cream Products: The Mediation Effect of Ethical Awareness. **Wijerathne K. H. N.**
	ID 83 Improving Gold Loan Allocation with Predictive Analytics and Customer Scoring. **Alawaththa K. S. S.**		**ID 59** Remediation of Massive Mold Growth in a Hospital in Colombo, Sri Lanka. **Wickramarathna W. P. P.**	**ID 32** Employees' Awareness on Green Practices: Special Reference to X&Y Chemicals Company. **Kariyawasam U. G. P. M.**
			ID 69 Antidiabetic Activity and Antioxidant Activity of *Cordia Dichotoma* (Boraginaceae) Bark and Leaf Decoctions. **Weerawaradana W. P. C. S.**	**ID 44** Mediating Effect of Job Satisfaction on the Relationship Between it's Drivers and Job Retention: A Study of ABC Apparel Company in Sri Lanka. **Kumari H. V. N. M.**

Time	Poster Presentations: Evening Session	
	Biological Sciences	**Business and Management Studies**
Evening Session	**ID 84** In Silico Identification of Potential Anti-Alzheimer's Disease Drug Leads to Cholinergic and Neuroinflammation Pathologies from Medicinal Plants of Sri Lanka. **Athukorala W. A. A. V. D.**	**ID 61** Factors Affecting Value Based Ethical Culture: Special Reference to Horana Export Processing Zone in Sri Lanka. **Nawagamuwa A. C.**
		ID 78 The Perception of Digital Marketing Adoption: Special Reference to Automotive Spare Parts Industry in Sri Lanka. **Ranasinghe R. A. H. S.**

BIOLOGICAL SCIENCES

ID 5

IN VITRO EVALUATION OF PLANT GROWTH PROMOTING AND BIO-CONTROLLING POTENTIALS OF *TRICHODERMA* STRAINS ISOLATED FROM BANANA RHIZOSPHERE

De Silva U. A. U., Abeysinghe S.[*]

Department of Botany, Faculty of Science, University of Ruhuna, Matara, Sri Lanka.
saman@bot.ruh.ac.lk

Trichoderma is a species-rich fungal genus, commonly found in soil and root ecosystems. These species are recognized for their beneficial effects on plant growth and protection from biotic and abiotic stresses. *Trichoderma* species achieve plant growth promotion mainly by increasing the availability of macro and micronutrients, producing phytohormones, and producing siderophores. Additionally, it is reported that *Trichoderma* species employ various strategies to combat plant pathogenic microorganisms, including competition for space and nutrients, mycoparasitism, antibiosis, and inducing plant defence mechanisms. Due to these multifaceted benefits, *Trichoderma* has become a subject of numerous research studies. In the present study, four *Trichoderma* isolates (T13, Tk, Th, and Tc) previously isolated from banana rhizosphere were evaluated for their ability to express plant growth promoting and biocontrol capabilities *in vitro.* Specific objectives of this study were to assess these isolates' ability to solubilize nutrients, produce indole acetic acid (IAA), siderophores, and antagonize the plant pathogenic fungus *Fusarium oxysporum*. Nutrient solubilizing ability was evaluated for phosphate (PO_4^{3-}), potassium (K), zinc (Zn), and silicate (SiO_4^{4-}). According to the results, while none of the isolates solubilized phosphate when using calcium phosphate, positive results were observed with rock phosphate. All four isolates exhibited positive results for zinc and silicate solubilization, but negative for potassium solubilization. Interestingly, all four isolates produced IAA in the presence and absence of L-tryptophan, suggesting their potential for independent IAA synthesis. Furthermore, all isolates displayed positive results for siderophore production and exhibited strong antagonistic activity against *Fusarium oxysporum*. Among the isolates, T13 excelled in plant growth promotion, exhibiting the highest levels of soluble phosphate (using rock phosphate), zinc, and silicate solubilization, and IAA production with L-tryptophan, all statistically significant at α = 0.05. Interestingly, isolate Tk matched T13 in zinc solubilization but displayed the highest IAA production without L-tryptophan. In conclusion, all four *Trichoderma* isolates possess promising potential for application in agriculture due to their combined plant growth promoting and biocontrol capabilities. However, isolate T13 emerged as the most effective based on its superior performance in nutrient solubilization and IAA production. Further investigations are warranted to explore the potential of all isolates for practical agricultural use.

Keywords: *Trichoderma spp., biofertilizers, biocontrol agents, Fusarium oxysporum*

ID 8

DIVERSITY OF MOSQUITOE BREEDING IN DIFFERENT TYPES OF PHYTOTELMATA IN MORATUWA MOH AREA

Lankapathy W. U. J., Jayaratna R. L.[*]

Department of Biological Sciences, Faculty of Applied Sciences, Rajarata University of Sri Lanka.
ravindrajayaratne@as.rjt.ac.lk

Phytotelmata are small water-filled cavities or plant structures that serve as significant breeding habitats for mosquitoes including the vectors of dengue, *Aedes aegypti* and *Aedes albopictus*. This study aimed to investigate mosquito species breeding in various types of phytotelmata in the Moratuwa MOH area, a high-risk dengue zone in Sri Lanka and raise public awareness about these overlooked habitats' significance in dengue vector breeding. The mosquito larval survey was carried out over five months from September 2023 to January 2024, using 100 locations randomly. A total of 206 mosquito larvae were collected from various phytotelmata, including leaf axils of plants, tree holes, and bamboo stumps. Mosquito larvae were identified into the species level using a standard mosquito larval key once brought into the laboratory. The study identified four mosquito species belonging to the subfamily Culicinae including dengue vectors: *Ae. aegypti*, *Ae. albopictus*, *Malaya genurostris* and *Armigeres subalbatus*. According to the Shannon Weiner diversity index species diversity was highest in *Pandanus* species. The most prevalent mosquito, *Ae. albopictus* (n = 92, 46.9%) was, particularly found in bamboo stumps and leaf axils than *Pandanus* sp. Notably, *Ae. albopictus* was found in seven of the examined nine habitats, while *Ae. aegypti* was found exclusively in *Neoregelia* sp. Bamboo stumps (n = 11, 28.2%) and *Alocasia* sp. (n = 11, 28.2%) were the main phytotelma habitats positive for mosquito larvae found in Moratuwa MOH area. With the increasing water content in phytotelmata especially in *Pandanus* sp. (r = 0.8846) and Bamboo stumps (r = 0.8860) the number of mosquito larvae increased. The findings emphasize the presence of dengue larvae in natural water containers emphasizing the importance of public awareness of phytotelmata as potential mosquito breeding sites to minimise dengue transmission risk. Furthermore, this study emphasizes that targeting natural breeding habitats, such as bamboo stumps and *Alocasia* sp., alongside man-made habitats, is essential for an effective vector control.

Keywords: phytotelmata, mosquito breeding, dengue, vectors

ID 25

EFFECT OF 4-CHLOROPHENOXYACETIC ACID (4-CPA) AND GIBBERELLIC ACID-3 (GA3) APPLICATION IN ENHANCING YIELD AND QUALITY OF PROTECTED HOUSE GROWN TOMATO (*LYCOPERSICON ESCULENTUM* L. VARIETY: THILINA)

Sarathchandra N. S. A.[1], Illangakoon I. W. M. I. W. T. K. [2, *], Wimalasekera R.[1]

[1]*Department of Botany, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*
[2]*Horticultural Crop Research and Development Institute, P.O. Box 11, Gannoruwa rd, Peradeniya, Sri Lanka.*
thanujalkiilangakoon@gmail.com

Protected agriculture has several benefits for producing high-quality and high-yield vegetables. The yield and quality of protected house grown vegetables can be further enhanced using appropriate plant growth regulators (PGR) if applied at right concentration at correct growth stage. A study was conducted at Horticultural Crop Research and Development Institute (HORDI), Peradeniya, to identify the effect of PGR, synthetic auxin-CPA (4-chloro phenoxy acetic acid) and Gibberellic acid (GA3), their combinations and concentration on yield and quality improvement of tomato (variety 'Thilina') under protected house condition. The experiment was laid out as a Completely Randomized Block Design with 07 treatments and replicated thrice. The following 07 treatment combinations; 4-CPA at 10 ppm, 4-CPA at 15 ppm, GA3 at 10 ppm, GA3 at 15 ppm, 4-CPA at 10 ppm + GA3 at 10 ppm, 4-CPA at 15 ppm + GA3 at 15 ppm and control with no 4-CPA and GA3 were tested. Growth and yield parameters were recorded at 30th, 45th, 50th, 60th, 65th, 75th, 80th, and 100th days after transplanting (DAT). Results revealed that the application of 4-CPA at 15 ppm recorded the highest plant height at 30 DAT (60.46cm ± 0.01), number of flowers per cluster at 80DAT (14.68 ± 0.18) and total yield per plant (2255.47g ± 0.05). Application of 4-CPA at 15 ppm and GA3 at 15 ppm recorded the highest 1000 seeds weight (3318.38mg ± 0.01) and 3477.21mg ± 0.01). Application of GA3 at 10 ppm and 15 ppm has an effect on increasing seed number per fruit (61.97 ± 0.01, 66.73 ± 0.01). Furthermore, 4-CPA and GA3 had different effects on post-harvest weight loss of fruits at room temperature. The results suggest that the application of 4-CPA and GA3 at 10 ppm and 15 ppm during flowering and vegetative growth stage can increase the yield of tomato under protected house condition.

Keywords: plant growth regulators, protected agriculture, yield and quality improvement

ID 27

EVALUATION OF THE PHOSPHATE SOLUBILIZING EFFICACY OF *PENICILLIUM OXALICUM* (BT9) IN THE PRODUCTION OF PHOSPHO-COMPOST AND THE EFFECT ON GROWTH OF SELECTED PLANT

Sathsarini W. M. B. B.[1], Idroos F. S.[1, *], Sandamali T. G. I.[2]

[1]Water quality and Algae Research, Department of Zoology, University of Sri Jayewardenepura, Sri Lanka.
[2]Regional Rice Research and Development Center, Bombuwala, Sri Lanka.
sumaiyaidroos@sci.sjp.ac.lk

The frequent application of chemical phosphate (P) fertilizers is costly and has become a critical obstacle in the current agriculture sector of Sri Lanka. Hence, the present study was conducted to evaluate the impact of fungal inoculum *Penicillium oxalicum* (Bt9), on bio solubilization of Eppawala Rock Phosphate (ERP) enriched compost. The experimental design was Completely Randomized Design (CRD) with four compost treatments. Each treatment was replicated four times. Treatment 1 (T1) was incorporated with *Penicillium oxalicum* (Bt9) + sugar, Treatment 2 (T2) was incorporated solely with *P. oxalicum* (Bt9), Treatment 3 (T3) was incorporated solely with sugar and Treatment 4 (T4) as the control; lack of both *P. oxalicum* (Bt9) and sugar. The released bio available Phosphorus (P) content of each treatment was evaluated using Ammonium Molybdate blue colour method. A pot experiment was conducted for tomato (*Solanum lycopersicum*) using phospho-compost and soil in 1:1 ratio to evaluate the impact of bio solubilization of ERP in compost by *P. oxalicum* (Bt9) on the plant growth. The results exhibited significantly higher ($p \leq 0.05$) plant growth parameters (shoot length, root length, and total plant length) in Treatment 1 and 2 compared to Treatment 3 and 4. Treatment 1 exhibited the highest shoot length, highest root length and highest total plant length respectively 24.24 ± 1.31 cm, 9.60 ± 0.51 cm and 43.16 ± 2.59 cm. This study concluded that *P. oxalicum* (Bt9) had significant effect on increasing phosphate solubilization and promoting the plant growth of tomato (*Solanum lycopersicum*). Thus, ERP enriched compost inoculated with *Penicillium oxalicum* (Bt9) could be an alternative in the place of imported chemical P-fertilizer.

Keywords: bio available Phosphorus, bio solubilisation, chemical P- fertilizer

ID 30

EVALUATION OF SUSTAINABLE APPROACHES FOR MANAGEMENT OF LEAF FALL DISEASE IN RUBBER (*HEVEA BRASILIENSIS)*

Wijewickrama W. W. G. V. R.[1], Thambugala K. M.[1, *], Liyanage K. L.[2]

[1]Genetics and Molecular Biology Unit, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Genetics and Plant Breeding Department, Rubber Research Institute, Nivithigalakele, Mathuagama, Sri Lanka.
kasun@sci.sjp.ac.lk

Natural rubber is produced by the exudates of rubber tree, *Hevea brasiliensis*, and it is significantly contributing to various industries worldwide. However, the cultivation of this economically important crop is constantly challenged by fungal diseases, particularly leaf fall disease caused by pathogens such as *Neopestalotiopsis* sp. and *Colletotrichum* sp. Despite the severity of these diseases, there is a significant and unique research gap in exploring sustainable and effective management strategies. In response, this study investigated the fungicidal properties of plant extracts from Marigold, Sri Lankan Cinnamon, and Neem, as well as the potential of seawater to control leaf fall disease in *Hevea brasiliensis*. By determining the efficacy of these natural compounds against commercially available fungicides and assessing rubber clone resistance, this research aims to contribute to developing environmentally friendly and sustainable approaches for disease management in rubber cultivation. This study aimed to investigate the efficacy of plant extracts, seawater, and commercial fungicides on the growth of *Neopestalotiopsis* sp. and *Colletotrichum* sp.; causative agents of rubber leaf diseases. Cultures were sub-cultured and treated with plant extractions, seawater, and fungicides. Additionally, detached leaf assays were conducted on selected clones to observe the tolerance of rubber clones to leaf fall disease. Results suggest promising control measures against rubber leaf diseases. The study uncovered significant antifungal activity in specific plant extracts. Neem extract, consistently inhibited both *Neopestalotiopsis* sp. and *Colletotrichum* sp. fungal growth, with inhibition percentages ranging from 40% to 87% against *Neopestalotiopsis* sp. and 48% to 58% against *Colletotrichum* sp. The dry marigold extracts also showed promise, exhibiting inhibition percentages ranging from 48% to 83% against *Neopestalotiopsis* sp. and 55% to 67% against *Colletotrichum* sp. Similarly, cinnamon extract displayed inhibition percentages between 76% and 84% against *Neopestalotiopsis* sp. and 40% to 96% against *Colletotrichum* sp. Among rubber tree clones, RRISL 52 exhibited the most severe damage in the detached leaf assay, while clones such as RRISL Centennial 04, RRISL Centennial 03, RRISL 2006, RRISL 203, and RRIC 100 displayed relatively lower levels of damage. Notably, RRISL 121, despite being commonly affected by leaf fall disease in natural settings, exhibited relatively good leaf health in the laboratory setting. These findings underscore the potential of specific plant extracts and resilient rubber tree clones in the management of leaf fall disease, offering practical implications for disease control.

Keywords: rubber tree, leaf fall disease, plant extracts, antifungal activity, disease management

ID 33

THE ANTI-DIABETIC POTENTIAL AND PHYTOCHEMICAL ANALYSIS ON PLANT PARTS OF *PONGAMIA PINNATA* AND *PRUNUS ARMENIACA*

Lokunarangoda D. G.[*], De Silva W. S.

Department of Biotechnology, Faculty of Science, Horizon Campus Malabe, Sri Lanka.
dharani.geethahansi123@gmail.com

Diabetes mellitus remains a prevalent chronic health condition, necessitating effective interventions to mitigate its complications. Alpha-glucosidase inhibitors have been integral in attenuating postprandial hyperglycemia; however, the demand for novel, efficacious, and natural therapeutics persist alongside the prevalent use of synthetic drugs. This study aimed to evaluate the alpha-glucosidase inhibitory potential of extracts derived from *Pongamia pinnata* and *Prunus armeniaca* leaves, roots, barks, and pods by assessing the characteristics of thin-layer chromatography (TLC) profiles and preliminary phytochemical screenings in identification of particle separations and Phyto-constituents. Sequential extraction methodologies were employed to procure crude organic solvents from the plant materials. TLC analysis revealed distinctive separation patterns, with methanolic extracts of *Prunus armeniaca* exhibiting numerous discernible spots, whereas *Pongamia pinnata* demonstrated a diverse array of separations across all solvent systems employed. Qualitative phytochemical analyses unveiled a rich phytoconstituent profile in methanolic extracts, particularly abundant in phenols, alkaloids, saponins, flavonoids, and terpenoids. Notably, saponins were predominantly present in hexane extracts. Subsequent evaluation of alpha-glucosidase inhibitory activity revealed promising results. *Prunus armeniaca* roots exhibited significant inhibition, with an inhibitory percentage of 95.868% at a concentration of 400 µg/ml and an IC50 value of 4.63 µg/ml. Similarly, *Pongamia pinnata* roots demonstrated considerable inhibition, achieving an inhibitory percentage of 92.630% at 200 µg/ml, with an IC50 value of 4.64 µg/ml. Root extracts of both plant species exhibited notable potency, surpassing other plant parts in alpha-glucosidase inhibition. Conclusively, the roots of both *Prunus armeniaca* and *Pongamia pinnata* hold promise as potential sources of natural alpha-glucosidase inhibitors. Further research and development efforts may focus on formulating preclinical drug candidates, followed by rigorous clinical trials to ascertain safety and efficacy profiles. Successful outcomes could culminate in the production and market availability of novel therapeutics derived from these botanical sources, catering to the evolving landscape of diabetes management.

Keywords: *TLC analysis, alpha-glucosidase, phosphate buffer, sequential extraction*

ID 46

IN-VITRO ANTIOXIDANT AND ANTI-INFLAMMATORY ACTIVITY OF *CINNAMOMUM ZEYLANICUM* BLUME BARKS AND LEAVES FROM THREE DIFFERENT PROVINCES OF SRI LANKA

Ameer A. S.[1], Widanapathirana C. U.[2], Tennakoon S. H.[1], Kruppu A. I.[3, *]

[1]*Genetics and Molecular Biology Unit, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*
[2]*National Cinnamon Research and Training Centre, Department of Cinnamon Development, Thihagoda, Sri Lanka.*
[3]*Institute for Combinatorial and Advanced Research and Education, General Sir John Kotelawala Defense University, Sri Lanka.*
kuruppua@kdu.ac.lk

Ceylon Cinnamon, *Cinnamomum zeylanicum* Blume is a spice with a plethora of medicinal benefits making it a potential therapeutic prospect and a lucrative economic venture for Sri Lanka as the largest true cinnamon provider to the world. In order to turn raw cinnamon into value-added products, it is important to understand the different constituents present in each plant part and their biochemical activity in comparison to each other. This study compared the bark against leaves of true cinnamon for their medicinal properties. Three bark samples and three leaf samples from three provinces; Southern (Matara District), Western (Kalutara District) and Sabaragamuwa (Rathnapura District) were analysed. They were subjected to an aqueous extraction and assessed by a Thin Layer Chromatography. Their medicinal properties were assessed in-vitro, where measurements included the total polyphenolic content (TPC), 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity, 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid (ABTS) radical scavenging activity, and protein denaturation activity via the egg albumin assay. The clearest spots were observed for leaf samples from Southern (Matara) and Sabaragamuwa (Rathnapura) provinces. Both their R_f values were calculated to be 0.2651. The presence of anti-oxidant, and anti-inflammatory activity of cinnamon extracts were detected. Ceylon cinnamon bark from Rathnapura had a particularly strong reaction on the skin upon contact. Cinnamon leaves from Rathnapura had the highest phenolic content of 79.626 ± 0.049mg GAE/g amongst the six samples, while the bark samples showed the lowest phenolic content of 10.675 ± 0.0135mg GAE/g. For the DPPH assay and ABTS assay a lowest IC_{50} value of 0.0023 ± 0.10 mg/mL and 0.2808 ± 0.32 mg/mL was recorded respectively for the bark sample from Rathnapura while the IC_{50} for the standard butylated hydroxytoluene (BHT) was recorded as 0.0103 mg/mL for DPPH and 0.0705 mg/mL for ABTS. For the anti-inflammatory assay the lowest IC_{50} value of 0.3021 ± 0.70 mg/mL was recorded for the bark sample from Matara while the IC_{50} for standard Ibuprofen was recorded as 0.1042 mg/mL. Overall, in-vitro antioxidant activity for Ceylon Cinnamon bark was determined to be higher than that for leaves. Marked differences were not observed based on geographical location. However cinnamon bark from Rathnapura district had stronger physical properties despite that being the sample that recorded the lowest levels of phenolic content in the TPC analysis. Further studies will be done to analyse anti-tumour activity.

Keywords: *Ceylon Cinnamon, antioxidant, anti-inflammatory, medicinal effects*

ID 47

EVALUATION OF THE ANTI-TUMORIGENIC POTENTIAL OF THE AERIAL ROOTS OF *FICUS BENGHALENSIS*

Dhanusha A. K. D. A.[1], Dayarathna S.[2], Tennakoon S. H.[1, *]

[1]Genetics and Molecular Biology Unit, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Allergy, Immunology and Cell Biology Unit, Faculty of Medical Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
samawansha@sci.sjp.ac.lk

Cancer remains a global health challenge, prompting the exploration of alternative therapies to mitigate the side effects of conventional treatments. Medicinal plants, such as *Ficus benghalensis* (the banyan tree), have gained attention due to their unique chemical properties and lower toxicity compared to synthetic drugs. The aerial roots of *F. benghalensis* are rich in secondary metabolites, exhibiting potent antioxidant properties. Several studies highlight their significant pharmacological potential, including antioxidant, anti-inflammatory, and anti-tumour actions. However, we are the first group to disclose the anti-tumorigenic potential of an aerial root decoction of *F. benghalensis* in Sri Lanka. This study aimed to investigate the cytotoxicity and apoptotic activity of the aerial root decoction of *F. benghalensis* on MCF-7 breast cancer cells. In this study, fresh aerial roots of *F. benghalensis* were utilized to prepare a decoction by boiling 60g (12 '*kalan*') of plant material with 1920 mL (8 '*patha*') of drinking water in an earthen pot over a low flame, until the volume was reduced to 240 mL (1 '*patha*'), following traditional Ayurvedic practices for preparing '*Kasaya*'. Subsequently, the decoction was freeze-dried to produce the test extracts. MCF-7 human breast cancer cells were cultured and maintained in DMEM at 37 °C. A stock solution (10,000 µg/mL) of the lyophilized powder was prepared, followed by a series of dilutions to obtain the desired experimental concentrations. The effects of the extract on cytotoxicity were assessed using the MTT assay at 24-, 48-, and 72 hours post-treatment. Morphological changes were observed under a microscope, and cell migration was evaluated using a wound-healing assay. DNA fragmentation analysis was conducted to investigate apoptosis induction. Tamoxifen was used as a positive control for comparison. Data (n=3) were analysed using GraphPad Prism to determine IC_{50} values, and statistical significance was determined via one-way ANOVA with Tukey's post hoc test ($p \leq 0.05$). The MTT assay revealed dose- and time-dependent cytotoxic effects, with IC_{50} values decreasing from 768.4 ± 54.7 µg/mL at 24 hours to 441.9 ± 38.6 µg/mL at 72 hours, indicating increased potency over time. Morphological analysis revealed classic apoptotic characteristics, such as cell shrinkage and detachment reflecting that the tested extract exerts its effects on the cancer cells. The extract also inhibited cell migration *in-vitro*, suggesting anti-metastatic properties. DNA fragmentation assays confirmed apoptosis, although no typical laddering was observed, likely due to small DNA fragments. Our study demonstrates a significant anti-tumorigenic activity of *F. benghalensis* aerial root decoction on breast cancer. This suggests its potential as a low-cost anti-cancer agent, warranting further research to elucidate the involved mechanisms.

ID 51

PERFORMANCE OF RICE VARIETIES IN LOW NITROGEN FERTILITY CONDITIONS

Perera M. A. D.[1], Rupasinghe M. G. N.[2, *], Munasinghe M.[1]

[1]Department of Botany, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2] Soil and plant nutrient division, Regional Rice Research and Development Center, Bombuwala.
neranjanirupasinghe@gmail.com

Nitrogen (N) is an important nutrient for the growth and development of rice. Nitrogen use efficiency (NUE) is varied among varieties. A field experiment was conducted at the Regional Rice Research and Development center, Bombuwala during Maha season 2023 to study the performances of rice varieties in low nitrogen fertility conditions. In Split–plot design, the popular seven rice varieties Bw 372, Bw 367, Bw 363, Bg 359, Bw 312, Bg 300 and Bw 272-6b were grown in sub plots with three nitrogen levels (0 Kg/ha,50 Kg/ha and 100 Kg/ha) in the main plots with 4 replicates. The plant height, shoot dry weight, grain yield per plant, total grains per panicle, filled grains per panicle, 1000-grain weight and tissue nitrogen, phosphorus and potassium content were recorded. The grain yield of most of the rice varieties was significantly higher at 100 N kg/ha level. When increasing nitrogen level, the plant height, grain yield, grain weight and 1000 grain weight of most of the rice varieties were increased significantly. But shoot dry weight, total grains per panicle, filled grains per panicle were showed high at 50 N Kg/ha nitrogen level. However, Bw 367 showed high yield (578.25 g/m^2) at 100 N Kg/ha nitrogen level and Bw 372 showed the high yield at both 0N Kg/ha (404 g/m^2) and 50N Kg/ha (623.75 g/m^2) nitrogen levels. Moreover, Bg 300, Bg 359 and Bw 372 showed the high NUE at 50 N Kg/ha and these are 22.375%, 23.75%, 21.6% respectively. Both Bg 359 and Bw 367 showed the highest NUE of 46.4% and 48.25% respectively at 100 N Kg/ha level. Hence the application of N at the rate of 50 N Kg/ha along with rice variety Bw 372 can be recommended for achieving significantly high yield and high NUE under low nitrogen fertility conditions. Followed by Bg 359 and its yield was comparatively low (474.75 g/m^2). However, it showed significantly similar NUE percentage to Bw 372.

Keywords; *Nitrogen, Nitrogen use efficiency, rice, low country wet zone*

ID 59
REMEDIATION OF MASSIVE MOULD GROWTH IN A HOSPITAL IN COLOMBO, SRI LANKA

Wickramarathna W. P. P.[1], Dissanayake S. A. M. S.[2], Jayammanna W. S. S.[2], Thambugala K. M.[1, *]

[1]Genetics and Molecular Biology Unit, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Envirinmental Studies and Services Division, National Building Research Organization, 99/1, Jawatta Rd, Colombo 05, Sri Lanka.
kasun@sci.sjp.ac.lk

As occupants in a hospital, patients are susceptible to air contaminants which can include biological agents dispersed throughout the premises where experience water intrusions such as flooding or water leaks, resulting in mould growth can seriously compromise the health and require medical intervention further. The World Health Organization (WHO) affirms that occupants of damp, mouldy buildings have an increased chance of respiratory problems, such as shortness of breath and worsening asthma associated with elevated levels of airborne mould spores. Massive growth of mould emerged in a government hospital in Colombo. Mould samples were collected using the swab method and identified using a light microscope. Three biocides were selected based on commercial availability, cost, and current hospital cleaning procedures: Dettol, Lysol, and TCL powder. The treatments were carried out both in vitro (laboratory) and in vivo settings (hospital). In vitro, ten subcultures were prepared, and three subcultures of each mould species were treated autonomously with biocides. Growth and morphological changes were measured throughout the treatments. *In vivo* setup, the treatment was carried out to determine mould susceptibility to biocides (system 1-spraying biocides directly to the act mould colonies on the wall) and regrowth duration (system 2-cleaning building walls: wiping using wet cloths & scraping using sandpapers with selected biocides separately, followed by a 4-month pre-trial with 70% alcohol). *Cladosporium* sp., *Penicillium* sp., and *Aspergillus* sp. are the most common moulds in the hospital. The study found that Dettol was the most efficient biocide in the laboratory setting, while Lysol was the least effective. System 1 found both Dettol and TCL were effective mould treatments. System 2 showed no mould regrowth over the observation period and no discernible difference in mould regrowth during the pre-trial. This study concludes that *Cladosporium* sp., *Penicillium* sp., and *Aspergillus* sp., were the commonly identified mould species, and Dettol, TCL was more effective in treating moulds. System 2 showed sustained efficacy in delaying mould regrowth. Nevertheless, the observation period should be prolonged to determine the durability of the biocide treatment in the mould abatement containment area.

Keywords: *mould, hospitals in Sri Lanka, biocides, treatments, remediation*

ID 62

OPTIMIZATION OF SYBR GREEN BASED QUANTITATIVE PCR ASSAY TO DETECT DNA ORIGINATED FROM *MYCOPLASMA GALLIESPTICUM* AND *MYCOPLASMA SYNOVIAE*

Ranathunga B. D. D. T.[1], Samarasekera K. N.[1], Govinna M. M.[2], Nadeeshani K. A. S.[2], Lokugalappatti L. G. S.[2], Jinadasa H. R. N.[3], Satharasinghe D. A.[2, *]

[1]Department of Botany, Faculty of Applied Sciences, University of Sri Jayewardenepura, Sri Lanka.
[2]Department of Basic Veterinary Science, Faculty of Veterinary Medicine & Animal Science,
University of Peradeniya, Sri Lanka.
[3]Department of Veterinary Pathobiology, Faculty of Veterinary Medicine & Animal Science,
University of Peradeniya, Sri Lanka.
dilansatharasinghe@yahoo.com

Mycoplasma gallisepticum (MG) and *Mycoplasma synoviae* (MS), are major pathogens causing significant economic losses in the global poultry industry. Diagnosis of MG and MS mainly depends on isolation and identification, detection of specific antibodies, and molecular detection. A rapid and accurate diagnostic technique is crucial for preventing and controlling avian pathogens in Sri Lanka. This study aimed to optimize a SYBR Green based quantitative Polymerase Chain Reaction (qPCR) assay for rapid detection of MG and MS DNA in commercial broilers sold in live bird markets. The protocol was optimized using QuantiNova™ SYBR® Green PCR Kit by targeting specific genes as the 16S rRNA gene of the *Mycoplasma* genome and mgc2, vlhA genes for MG and MS, respectively. Optimization of the method was carried out through changes in primer concentration, template concentration and temperature adjustment between 60 °C to 95°C during the melt curve analysis with the temperature transition rate of 0.5 °C/5 sec, which enhanced specificity and reduced processing time. The protocol was successfully available to optimized and it effectively detected MG and MS, confirmed by single peak results in melt curve analysis that showed no primer dimers or non-specific amplifications. The melting temperatures were obtained as 82 °C for *Mycoplasma* and 77.5 °C, 79 °C for MG and MS respectively. Using optimized qPCR assay, screening of nearly 300 samples from live bird markets taken from commercial broilers revealed a *Mycoplasma* prevalence of 37% in the studied areas, with 82% identified as MG and 45% as MS. The optimized protocol can be used in future for screening and rapid diagnosis of infection from MG and MS in commercial poultry birds. This would help to reduce economic losses and enhance animal health by improving pathogen detection.

Keywords: *Mycoplasma gallisepticum (MG), Mycoplasma synoviae (MS), qPCR, SYBR green, optimization*

ID 69

ANTIDIABETIC ACTIVITY AND ANTIOXIDANT ACTIVITY OF *CORDIA DICHOTOMA* (BORAGINACEAE) BARK AND LEAF DECOCTIONS

Weerawaradana W. P. C. S.[1], Senerath W. T. P. S. K.[1, *], Nawarathne T. K.[2]

[1]Department of Botany, The Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Quality Assurance, Research and Development Laboratory, Bandaranayake Memorial Ayurveda Research Institute, Nawinna.
wtpsk2011@yahoo.com

Cordia dichotoma (*Lolu*) is a traditional medicinal plant in Sri Lanka that is well-known for its medicinal properties, including antidiabetic, antiulcer, anti-inflammatory, immune-modulator, and analgesic activities. Although there are some records of studies conducted to assess the phytochemicals and medicinal values of *C. dichotoma* in other countries, no previous study was reported in Sri Lanka. This study aims to evaluate the antiglycation and antioxidant activity of *C. dichotoma*, crucial to Sri Lanka's Ayurveda drug production. Bark and leaf samples of *C. dichotoma* were collected separately from Yakkala, Nawinna, Alawwa, Haldunmulla, Galgamuwa, and Giradurukotte. Decoctions (1: 8) from bark and leaf samples were prepared and freeze-dried before bioassays. Antioxidant activity was investigated using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay. The antidiabetic activity was determined using glucose uptake capacity by yeast cells. As a preliminary study of antidiabetic activity, the Galgamuwa bark sample was selected for glucose uptake capacity by yeast cells because it showed the highest antioxidant activity. All bark and leaf decoctions (n=3) of *C. dichotoma* showed notable antioxidant activity compared to the gallic acid (standard). The antioxidant activity of bark decoction from different localities exceeds their respective antioxidant activity of leaf decoction with lower IC_{50} values (P < 0.05). Galgamuwa bark decoction exhibited the highest antioxidant activity from all samples with IC_{50} of 45.8813 ppm. The tested bark samples of *C. dichotoma* showed significantly higher IC_{50} values, indicating varying antioxidant activity among samples collected from different localities. Further, this kind of variation of IC_{50} values can also be seen in leaf samples. In addition, results revealed a linear increase (r=0.9659) in glucose uptake by yeast cells with a gradual increase in the concentration of the test sample, which conforms to the antidiabetic activity. The results concluded that all leaf and bark C. *dichotoma* possesses antioxidant activity, and Galgamuwa bark decoction has good antidiabetic and antioxidant properties. Further, it can be concluded that the same species from different geographic areas bear different phytochemical profiles, which may be correlated with the variation of antioxidant activity. When using herbal medicine or the herbal drug industry, it is necessary to consider the locality and the season in which samples are collected, especially in *C. dichotoma*. Furthermore, the present study conformed to the medicinal value of *C. dichotoma* to the extent used for antidiabetic drug preparation.

Keywords*: Cordia dichotoma, Sri Lanka, antidiabetic, antioxidant, different geographic localities*

IDENTIFICATION OF *BPH*2 AND *BPH*3 BROWN PLANTHOPPER (BPH, *NILAPARVATA LUGENS STÅL*) RESISTANT GENES IN ADVANCED RICE LINES DEVELOPED BY RICE RESEARCH AND DEVELOPMENT INSTITUTE, SRI LANKA

Dilsara S. S. A. D.[1], Dhammika W. A. R.[2, *], Sarathchandra S. R.[2], Dasanayake P. N.[1], Kariyawasam I. U.[1]

[1]Department of Botany, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2] Rice Research and Development Institute, Batalagoda, Sri Lanka.
dhammikamuna@gmail.com

Rice (*Oryza sativa* L.) is the main food staple in Sri Lanka and a dietary essential for more than half of the world's population. The Brown Planthopper (BPH, *Nilaparvata lugens Stål*) is recognized as one of the most destructive insect pests in rice, significantly reducing percentage amount of crop yields globally. Introducing BPH resistant rice varieties is the most effective and environmentally friendly method available to control pest. The current study was carried out for the molecular screening of ten advanced rice lines developed by Rice Research and Development Institute, Sri Lanka to identify the *Bph*2 and *Bph*3 resistant genes using two SSR markers (RM463 and RM589). The ten advanced rice lines used in the study were IR71033-121-15/AC4992, (4345) Bg251/ IR71033-121-15, (4346) Bg251/ IR71033-121-15, (4389) Bg300/IR71033-121-15, (4390) Bg300/IR71033-121-15, (4391) Bg300/IR71033-121-15, (4392) Bg300/IR71033-121-15, (4394) Bg300/IR71033-121-15, (4395) Bg300/IR71033-121-15 and (4396) Bg300/IR71033-121-15. Two varieties; Bg380 and Ptb33 were used as susceptible check and resistant check, respectively. Primer sequence 5´TTCCCCTCCTTTTATGGTGC3´ and primer sequence 3´TGTTCTCCTCAGTCACTGCG5´ were used as forward and reverse primers, respectively to develop RM463 marker and primer 5´ATCATGGTCGGTGGCTTAAC3´ and primer 3´CAGGTTCCAACCAGACACTG5´ were used as forward and reverse primers, respectively to develop RM589 marker. Polymerase Chain Reaction was performed to amplify the markers and the amplified products were checked on 2% agarose gel and were scored. All tested advanced rice lines and Ptb33 rice variety contained both BPH resistant genes *Bph*2 and *Bph*3 while the other rice variety Bg380 (used as susceptible check) contained only *Bph*2 gene. The findings of the study elucidate the usefulness of the advanced rice lines for the development of BPH resistant rice varieties.

Keywords: *rice, BPH resistance, Bph2 gene, Bph3 gene, SSR marker*

ID 84

IN SILICO IDENTIFICATION OF POTENTIAL ANTI-ALZHEIMER'S DISEASE DRUG LEADS TO CHOLINERGIC AND NEUROINFLAMMATION PATHOLOGIES FROM MEDICINAL PLANTS OF SRI LANKA

Athukorala W. A. A. V. D.[1], Jayatunga D. P. W.[1, *], Senathilake K. S.[2]

[1]Unit of Genetics and Molecular Biology, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Institute of Biochemistry, Molecular Biology and Biotechnology (IBMBB), University of Colombo.
pamoda@sci.sjp.ac.lk

Alzheimer's Disease (AD) is the major form of dementia, accounting for 60-70% of cases and affecting over 50 million people globally. The World Health Organization has identified dementia as a global health priority due to its rapid increase, with the number of dementia patients expected to triple by 2050. Researchers are focused on developing drugs to prevent or slow AD progression, as the current treatments targeting characteristic pathology have not been successful due to safety concerns, and undesirable side effects, revealing the multi-factorial nature of AD. Considering the high prevalence of AD, there is an urgent need for effective treatment options. The present study focused on finding muti-target drug leads from medicinal plants available in Sri Lanka using *in silico* docking method. Acetylcholinesterase (ACHE), and Cyclooxygenase 2 (COX2) were selected as targets to address AD via the cholinergic system, and neuroinflammation mechanism respectively. Molecular docking was performed against three separate structures of each chosen target using a plant phytochemical library with 1608 compounds, belonging to 29 plants. Ligands with the best binding affinities toward three structures were assessed for dug-likeness. Most drug-like compounds were further investigated for binding interactions and complex stability using Molecular Dynamic Simulation (MDS). Subsequently, binding affinities were estimated using Molecular Mechanics with Generalized Born and Surface Area solvation calculations. The study identified a promising compound for developing anti-AD drugs. Dehydropipernonaline from *Piper longum* known as "*Thippili*" was found to be a more effective ACHE inhibitor with higher binding affinity and also inhibited COX2, making it a potential drug lead for targeting both the cholinergic pathway and neuroinflammation in AD. As the cholinergic system is the target of currently available drugs for AD and neuroinflammation plays a key role in AD progression, this ligand can potentially serve as a multi-target drug leading to the development of a medication for AD.

Keywords: *Alzheimer's disease, multi-target drug leads, neuroinflammation, molecular docking, acetylcholinesterase*

ID 87

DETECTION OF DROUGHT RESISTANT GENES IN SELECTED RICE (*ORYZA SATIVA* L.) VARIETIES

De Zoysa T. S. N.[1], Senanayake D. M. J. B.[2, *], Pathirana M. G. S. P.[2], Munasinghe M. L. A. M. S.[1]

[1]*Department of Botany, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*
[2]*Rice Research and Development Institute (RRDI), Batalagoda, Sri Lanka.*
dmjbsenanayake@gmail.com

Rice (Oryza sativa L.) is essential for global food security, feeding over half of the world's population and supporting socio-economic stability and cultural practices. Increasingly frequent and severe droughts negatively impact on rice cultivation by reducing water availability, leading to lower yields, and threatening global food security. Understanding the molecular mechanisms of drought resistance in rice is useful in developing drought resultant varieties. In Sri Lanka, dry and intermediate zones' erratic rainfall pattern during the Yala season severely challenges rainfed rice cultivation, causing significant crop losses. As a result, around 35% of rainfed rice farmers abandon paddy cultivation due to water shortages, affecting national rice production and food security of the country. The objective of this study was to investigate the presence of drought resistant genes in selected rice varieties and their expression at the reproductive phase. Molecular screening conducted at the Rice Research and Development Institute (RRDI), Batalagoda, Sri Lanka revealed varying degrees of drought tolerance among different rice accessions. Ten germplasms/ varieties/ lines (Bg300, Bg314 AERON 10-25, Bg251, SVIN 226, 15-SAC-DT-102-1, Bg310, AERON 10-05, CNI 9024, and Bg 11-1051), which were under imposed drought from an ongoing drought screening trail, were used for the subsequent molecular analyses. RNA extraction of each rice germplasm/ variety/ line was performed using tender leaves collected at the reproductive phase with TRIzol® (Life Technologies, Grand Island, NY, USA) method. RT-PCR and PCR amplifications were carried out with the OsNAC14 and OsbZIP72 primer pairs. Bg314 AERON 10-25, Bg251, SVIN 226, 15-SAC-DT-102-1, Bg310, AERON 10-05, CNI 9024, and Bg 11-1051 exhibited positive expressions for both two genes in molecular studies, indicating their suitability for breeding drought-tolerant rice varieties. This study provides valuable insights into the genetic basis of drought resistance in rice varieties, particularly the suitability of them for rainfed cultivation in Sri Lanka. The identification of promising germplasms/varieties/lines and key drought resistant genes lays the foundation for the development of drought-tolerant rice varieties, essential for ensuring food security and enhancing the resilience of agricultural systems in the face of climate change-induced water scarcity.

ID 89

MICROPLASTICS CONTAMINATION IN MARINE ORGANISMS OF DIFFERENT TROPHIC LEVELS FROM DIKKOWITA HARBOR

Dissanayake D. M. K. S., Ranatunga R. R. M. K. P.[*]

Department of Zoology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Gangodawila, Nugegoda, Sri Lanka.
ranatunga@sci.sjp.ac.lk

Pollution by ubiquitous microplastics (MP) particles pose a growing threat to ecosystems. Aquatic organisms such as finfish, shellfish, marine mammals, and zooplankton may mistakenly consume microplastics as prey, leading to bioaccumulation. This study delved into identifying the occurrence of microplastics of selected residing organisms in the Dikkowita Fishery Harbour with respect to trophic levels. Eleven groups of marine organisms were collected, considering the trophic levels, feeding habits and habitats withing the harbour. All the fish and shellfish samples were tested separately for gut, gills and muscle tissues. Samples were subjected to acid digestion, in the case of calcareous shells, alkaline digestion and wet peroxide digestion. The MP abundance shape, colour and size were determined using the stereo microscope. Polymer types were determined via micro-Fourier Transform InfraRed (micro-FTIR) spectroscopy. A comparison was made with the data collected before the X-Press Pearl ship catastrophe. All selected marine organisms were contaminated with MPs. A positive correlation was found between MP abundance and gut and muscle tissue weight, total body weight and total body length. Microplastics were mostly found in the gut, and the gills. Muscle tissues were slightly contaminated with MPs. Detritivores showed higher levels amount of microplastic contamination (4.43 ± 1.64 MP/g), and benthic habitats were highly contaminated (2.89 ± 0.87 Mean total MPs/g). Along the trophic level, the amounts of MPs in muscle tissues showed a decreasing trend. According to the results, the dominant MP colour was blue (49%), the common size range was 250-100 µm (28.41%), and the dominant type was fibre (43.43%). Polypropylene (PP), polystyrene (PS), high-density polyethylene (HDPE), low-density polyethylene (LDPE), and polyamide (PA) were among the dominant polymer types identified. The results underscore the potential transfer of MPs from the environment into marine organisms through food, potential accumulation within their tissues, and subsequent health risks for consumers.

Keywords: *MP, bioaccumulation, trophic levels, polymer identification*

UNI-IN ALLIANCE - 2024

BUSINESS & MANAGEMENT STUDIES

"A SUSTAINABLE FUTURE : BRIDGING THE GAP BETWEEN NATURE AND TECHNOLOGY"

ID 18

FACTORS AFFECTING JOB SATISFACTION AMONG MACHINE OPERATORS: A STUDY OF ABC TEXTILE MANUFACTURING COMPANY

Kaushalya H. T. S., Iddagoda Y. A.[*]

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
anuradhaiddagoda@sjp.ac.lk

Understanding the factors that influence job satisfaction is crucial for effective human resource management, especially in industries prone to high turnover rates. Recently, the human resources department at ABC Textile Manufacturing Limited noted a significant rise in complaints and turnover among their machine operators. To address this issue, a study was conducted to explore the relationships between leadership, work-life balance, personal characteristics, and job satisfaction within this group. A quantitative deductive technique was utilised in the study to analyse the replies of 125 machine operators who were chosen through random sampling from a population of 1000. To evaluate the significance and correlations between the variables, regression analysis was implemented. The study discovered that, in contrast to predictions, leadership had not a significant impact on machine operator job satisfaction. But study also showed that personal character and work-life balance were significant that affect job satisfaction. These results highlight the crucial role that work-life balance and personal character perform with regard to job satisfaction. The results offer a solid framework for putting data-driven organisational initiatives into practice with the goal of improving employee satisfaction and retention. These programmes can create a supportive work environment by highlighting the value of personal growth and work-life balance. It is essential to promote machine operators' professional development and well-being with strategies including career development opportunities, wellness initiatives, and flexible work schedules. Workload management strategies can help foster a positive company culture. In the end, these initiatives increase overall organisational resilience and success by fostering long-term engagement, reducing turnover rates, and promoting job satisfaction within ABC Textile Manufacturing Limited.

Keywords: *job satisfaction, personal character, leadership, work life balance*

ID 19

MEDIATING EFFECT OF GREEN HRM ON ITS DRIVERS AND JOB SATISFACTION: A STUDY OF ABC BANK PLC

Yapa M. U. N., Iddagoda A.*

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
anuradhaiddagoda@sjp.ac.lk

Today, being green is a trend in almost all the fields in the world; the Human Resource Management field is no exception. The research problem addresses the mediating effect of green HRM with drivers and job satisfaction. This is a quantitative study that intends to identify the factors that affect Green Human Resource Management, including organizational culture and leadership. Organizational culture is the set of values, beliefs, attitudes, systems, and rules that outline and influence employee behaviour within an organization. Leadership is the ability of an individual or a group of people to influence and guide followers or members of an organization, society, or team. This research investigates the mediating effect of Green Human Resource Management (GHRM) practices on the relationship between its drivers and job satisfaction within the context of ABC Bank PLC. Job satisfaction refers to employees' overall feelings about their jobs. Comprehending the relationship between environmental issues, human resource management strategies, and employee satisfaction becomes crucial as businesses adopt more sustainable initiatives. Drawing on a sample from ABC Bank PLC, data was collected through surveys measuring the key drivers of Green HRM and job satisfaction. Statistical analysis, including mediation analysis, was conducted to assess the mediating role of Green HRM practices. The findings shed light on how specific drivers of Green HRM influence job satisfaction through the implementation of environmentally friendly HR practices as a cross-sectional study, the study was conducted in a non-contrive setting, with minimum researcher interference. Five hypotheses have been developed to test the nomological network/conceptual framework. The study found that the results suggest that leadership has no significant impact on Green HRM, while organizational culture has a significant impact on Green HRM. And also results suggest that Green HRM has a significant impact on job satisfaction. Green HRM mediates both independent variables, Leadership, and organizational culture. Implications for theory and practice are discussed, highlighting the importance of integrating sustainability initiatives into HRM strategies to enhance employee well-being and organizational performance. Another important component of green human resource management is that it caters to the eco-friendliness of the Human Resource Management side. The sample size is 100, and the unit of analysis is the individual, i.e., public listed bank managerial and executive employees.

Keywords: *leadership, organizational culture, green HRM, job satisfaction, EVLN theory*

ID 24

THE IMPACT OF BRAND AWARENESS AND CONSUMER TRUST ON PURCHASE INTENTION OF FAIRNESS CREAM PRODUCTS: THE MEDIATION EFFECT OF ETHICAL AWARENESS

Wijerathne K. H. N., Gnanaweera K. A. K. *

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
kamal@sjp.ac.lk

In this globalized era, consumer wants and needs are undoubtedly becoming more varied as they have changed over time. As a result, the market is overflowing with a wide range of goods and services, from well-known companies to just launched new ones. The fairness cream industry is expanding quickly these days and has seen a lot of new businesses emerge. This industry's rapid expansion underscores the importance of understanding the factors that influence consumer behaviour, especially brand awareness and consumer trust which are crucial in shaping purchase intentions. The purpose of this study is to measure the relationship between brand awareness and consumer trust towards customer's purchase intention on fairness cream products in the Sri Lankan market. The mediating role of ethical awareness in these relationships was also examined. The population consisted of fairness cream consumers who are in the Western Province of Sri Lanka and the sample size was 263 respondents aged 18 to 61 years. Convenience sampling was used and data collected were analysed using Pearson correlation, multiple regression analysis and Sobel test. Based on the results of the research that has been done, shows that brand awareness has a positive and significant effect on purchase intention as evidenced by the results of the t-test with a significant level of 0.000, consumer trust also has a positive significant effect on purchase intention with a significant level of 0.047. According to the Sobel test, the results obtained a p-value of less than 0.05, indicating a statistically significant mediation. Therefore, ethical awareness significantly mediated the relationship between brand awareness and purchase intention of fairness cream products, as well as consumer trust and purchase intention of fairness cream products. Market players in the fairness cream industry should focus more on brand awareness and consumer trust as both were found to be significant for the increase in purchase intention. Additionally, integrating ethical considerations into marketing strategies can enhance consumer perceptions and drive purchasing decisions.

Keywords: *brand awareness, consumer trust, ethical awareness, purchase intention, mediating effect*

ID 26

MEDIATING EFFECT OF WORKPLACE SPIRITUALITY WITH ITS DRIVES AND EMPLOYEE ENGAGEMENT: A STUDY OF ABC APPAREL COMPANY

Herath H. M. S. H., Iddagoda Y.A.[*]

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
anuradhaiddagoda@sjp.ac.lk

This study was conducted to identify the mediating effect of workplace spirituality with its drives (personal character and religiosity) and employee engagement in ABC Apparel Company. Here the independent variables are personal character and religiosity. Workplace spirituality is the mediating variable. And employee engagement is the dependent variable. When considering the apparel sector, it can be considered as the engine of Sri Lankan economy. Due to this, the competency within this sector is very high. ABC Apparel Company is one of the leading companies in Sri Lankan Apparel Sector. "What is the mediating effect of workplace spirituality with its drives (personal character and religiosity) and employee engagement" is the research problem, on which the study was focused. In the study five hypotheses were tested, using a quantitative approach. Both primary and secondary data were collected. Primary data was collected from a sample of 100 managers and executives. Convenient sampling was used as the sampling technique. According to the results of the study, Personal character has an impact on workplace spirituality. But Religiosity has not an impact on workplace spirituality. Workplace spirituality has an impact on employee engagement. When considering the mediation effect of workplace spirituality, Workplace spirituality mediates the relationship between personal character and employee engagement. But workplace spirituality does not mediate the relationship between religiosity and employee engagement. Creating a friendly working environment by providing necessary facilities and opportunities, providing proper HPM practices training to the managers/ leaders of the departments as well as close supervision of the employees by the leaders/ managers of the departments are some recommendations, provided in this paper.

ID 32

EMPLOYEES' AWARENESS ON GREEN PRACTICES: SPECIAL REFERENCE TO X&Y CHEMICALS COMPANY

Kariyawasam U. G. P. M., Gnanaweera K. A. K.[*]

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
kamal@sjp.ac.lk

With increasing awareness of environmental issues, there has been a rising demand for environmentally responsible corporate operations. Prior research has shown that studies on green practices are very limited in Sri Lanka. Main objectives of this study were to assess the level of employee awareness regarding green practices within X&Y Chemicals company, to evaluate the influence of employee perception of green practices on their overall awareness and to examine the role of environmental training in enhancing employee awareness on green practices. The dependent variable of this study was the employee awareness on green practices. One of the independent variables of this study was the employees' perception regarding the effectiveness of green practices while the other independent variable was environmental training provided to employees. This study further investigated moderating effect of leadership influence on green practices between employee awareness and employee perceptions on green practices and mediating effect of the employees' pro-environmental behaviour between employee awareness on green practices and environmental training of employees. Quantitative research method was used in this study. For the sampling purposive sampling technique was used. Data collection was done using a structured questionnaire. Questionnaire surveys were conducted on a sample of N=157 employees of the company that includes 13 managers, 42 executives and 102 non-executive staff and data were collected from 106 employees. SPSS Statistical software was used to analyse data and interpret results. Results have showed that both employee perception on green practices and environmental training were significantly and positively associated with employee awareness. Furthermore, it was revealed that pro-environmental behaviour mediated the relationship between environmental training and employee awareness. Significant differences were found in employee awareness levels when grouped them according to age, position in the company, educational level and industry experience. This study highlights the role of employees in green manufacturing practices and their ability and motivation to implement changes in companies. It highlights how fostering a positive perception of green practices and providing comprehensive environmental training can significantly enhance employee awareness. Furthermore, the study underscores the significance of promoting pro-environmental behaviour as a link between environmental training and awareness indicating that practical engagement in green practices can reinforce the information acquired during training. Therefore, this study provides insights to help X&Y Company and other companies in the manufacturing sector to identify various factors that affects employee awareness on green practices, and to increase awareness levels within organizations to achieve overall sustainability.

Keywords: *green practices, employee awareness, sustainability*

ID 37

ANALYZING THE IMPACT OF INFLUENTIAL FACTORS ON WORK ATTITUDES AMONG GENERATION-Z EMPLOYEES: A CASE STUDY IN THE SRI LANKAN IT SERVICES SECTOR

Katuwandeniya K.[1], Gnanaweera K. A. K.[1, *], Arsakularathna N.[2]

[1]Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Altria Consulting (Pvt) Ltd, 98/3, Havelock Road, Colombo 05, Sri Lanka.
kamal@sjp.ac.lk

Previous research has highlighted the influence of job security, personal branding, manager behaviour, and self-performance assessment on employees' work attitudes. With the entry of Generation-Z into the modern workforce, understanding their attitudes and expectations becomes crucial for attracting and retaining them within organizations. Despite numerous global studies on this topic, there remains a notable gap in addressing it within the demographic context of Sri Lanka. Given the employed populations and literacy rates in the country, the Colombo district was selected to conduct the study. Study employs a quantitative research design, gathering data from 203 Generation Z employees in the IT services sector in Colombo District, Sri Lanka. Data were collected using a structured questionnaire to investigate the impact of job security, personal branding, manager behaviour, self-performance assessment and burnout on work attitudes. The findings reveal that job security ($\beta = 0.330$, $p < 0.001$) and personal branding ($\beta = 0.138$, $p = 0.023$) significantly influence the work attitudes of Generation Z employees in Sri Lanka's IT services sector. In contrast, self-performance assessment ($\beta = 0.058$, $p = 0.421$) and manager behaviour alone ($\beta = 0.036$, $p = 0.611$) do not show a significant direct impact on work attitudes. However, burnout plays a crucial moderating role; it significantly affects the relationship between manager behaviour and work attitudes (manager behaviour with moderator: $\beta = 0.259$, $p = 0.003$; burnout as moderator: $\beta = 0.359$, $p < 0.001$). In conclusion, this study offers insights into the unique dynamics of Generation Z employees in Sri Lanka. The significant impact of job security and personal branding on work attitudes underscores the importance of creating stable job environments and fostering strong personal brands among employees. The moderating effect of burnout on the relationship between manager behaviour and work attitudes highlights the need for organizations to address burnout proactively to leverage managerial support effectively. These findings contribute to a deeper understanding of Generation Z's work attitudes, providing practical recommendations for employers in the IT services sector to attract, retain, and engage this new generation of workers. The study's implications extend to developing targeted HR strategies that enhance job security, personal branding, and manager-employee relationships while mitigating burnout to create a more productive and satisfied workforce. By focusing on this demographic within the local context, this research offers unique insights into workforce dynamics in Sri Lanka, filling a critical gap in the literature and providing a foundation for future studies on Generation Z in different cultural and organizational settings.

Keywords: *job security, personal branding, burnout, self-performance assessment, manager behaviour*

ID 40

IMPACT OF FINANCIAL LITERACY ON FINANCIAL RESPONSIBILITY AMONG GEN Z EMPLOYEES IN SRI LANKA'S APPAREL SECTOR: MODERATING ROLES OF IMPULSIVE BUYING, IGD, AND INTERNAL LOCUS OF CONTROL

Kavindya K. G. A., Gnanaweera K. A. K.[*]

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
kamal@sjp.ac.lk

This study explores the impact of financial literacy on financial responsibility among Generation Z employees in Sri Lanka's apparel sector, with a focus on the moderating effects of impulsive buying, internal locus of control, and internet gaming disorder (IGD). The objectives are to determine financial literacy's impact on financial responsibility and how these moderating factors affect this relationship. The sample size was 207 Gen Z functional-level employees. Data were collected using a validated questionnaire which was distributed physically among the functional-level employees in six garment factories located in Hikkaduwa, Baddegama, Koggala, Niyagama, and Wadduwa areas in Galle and Kalutara Districts. Data was analysed using SPSS Version 25.0 and Microsoft Excel. Descriptive statistics, correlation analysis, and multiple linear regression were used to test the hypotheses. Results showed that financial literacy positively affects financial responsibility, accounting for 20% of the variance. Internet gaming disorder significantly moderated this relationship, weakening the positive effect of financial literacy. Impulsive buying also negatively moderated the relationship, indicating that higher impulsivity reduces the likelihood of translating financial literacy into financial responsibility. Conversely, an internal locus of control positively moderated the relationship, showing that those who believe in their control over outcomes benefit more from financial literacy. The study concludes that while financial literacy is crucial for promoting financial responsibility among young employees, its effectiveness is influenced by impulsive buying, internet gaming disorder, and internal locus of control. In conclusion, financial literacy programs must target impulsive buying and internet gaming disorder while fostering an internal locus of control to effectively promote financial responsibility among young employees in the apparel sector.

Keywords: *financial literacy, financial responsibility, internet gaming disorder (IGD), impulsive buying, internal locus of control*

ID 44

MEDIATING EFFECT OF JOB SATISFACTION ON THE RELATIONSHIP BETWEEN IT'S DRIVERS AND JOB RETENTION: A STUDY OF ABC APPAREL COMPANY IN SRI LANKA

Kumari H. V. N. M., Iddagoda Y.A.[*]

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
anuradhaiddagoda@sjp.ac.lk

Apparel industry has been the Sri Lanka's largest gross export earner, and it is considered as one of the biggest industries in Sri Lanka. The purpose of this study is to bridge a population gap, which is there is no empirical evidence on the mediating effect of job satisfaction on the relationship between dynamics of job satisfaction, i.e., work-life balance, rewards and recognition and employee retention in a nomological network/conceptual framework, in ABC Apparel Company in Sri Lanka. In order to bridge the identified population gap, a set of hypotheses was developed based on theoretical and empirical justifications. This is a quantitative study with hypothesis testing through correlational investigation in a non-contrived setting. Conducted with a minimum researchers' interference, the time horizon of this study is cross-sectional with individual unit of analysis, i.e., sewing machine operators in ABC Apparel Company, using 103 samples selected based on non-probability convenience sampling through about 1600 of sewing machine operators, but 68 were valid. Data was gathered through a self-administrated printed questionnaire and company reports. They were utilized using a 5-point Likert scale. Analysis of data was done by using SPSS 28.0 version. The findings suggest that rewards and recognition have a positive and significant influence on job satisfaction, Work life balance has a positive and significant impact on job satisfaction and also job satisfaction has a positive and significant influence on retention. Moreover, there is no mediating effect of job satisfaction on the relationship between work-life balance and retention and there is a mediating effect of job satisfaction on the relationship between rewards and recognition and retention in ABC Apparel Company. The current study has analysed only one apparel company. Future research can be extended to the industries like the IT, banking, and healthcare sectors. And also, it is better to expand the research by including variables like organizational culture, leadership style, and employee performance.

Keywords: work *life balance, rewards and recognition, job satisfaction, retention*

ID 50

AN EMPIRICAL STUDY OF ARTIFICIAL INTELLIGENCE IN DIGITAL MARKETING IMPLEMENTATION CHALLENGES FOR COLOMBO STREET FOOD BUSINESSES

Nasar N. M. M., Gnanaweera K. A. K.[*]

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
kamal@sjp.ac.lk

This research study aimed to investigate the challenges faced by Colombo Street food businesses in implementing artificial intelligence (AI) in digital marketing strategies and how customers are influenced to adopt AI in digital marketing to street food businesses. The advancement of AI technology is rapidly increasing; therefore, businesses are trying to apply AI to their marketing strategies. However, street food businesses are still working with traditional frameworks because they are facing some challenges in adopting AI-driven digital marketing activities. Data were collected by using structured questionnaires and interviews based on that with owners and managers of street food businesses. The research employed a deductive approach and quantitative design of the study. The research involves 115 sample sizes of street food businesses in Colombo. Data analysis was done by using SPSS statistical analysis and Microsoft Excel 365. Then evaluate the validity and reliability of statistics analysis. The result of data analysis, the risk of investment, knowledge, perception of business infrastructure availability, and trustworthiness have a direct impact on customer influence for AI in digital marketing. Technological infrastructure has a negative moderate impact on the relationship between trustworthiness and customer influence. There was no mediating impact form perception of business infrastructure availability on the relationship between risk of investment and customer influence. Furthermore, the study found the risk of investment, trustworthiness, quality of required time, and technological infrastructure have a strong positive relationship with customer influence. Knowledge has a moderately positive relationship with customer influence. Finally, the study shows most customers are influenced to adopt AI in digital marketing. A limited of a sufficient model to study this kind of research topic was the major challenge faced by researchers when conducting this research. And certain restrictions emerged when collecting secondary data since there was insufficient availability of statistical information pertaining to the street food industry in Sri Lanka. Furthermore, future researchers can study customer's gratification and experiences with a combination of AI with digital marketing. And future studies can be done by using different data from different Street food areas and different small-scale businesses because this single study cannot be comprehended on AI and digital marketing.

Keywords: *street food, artificial intelligence (AI), digital marketing, customer influence, risk of investment.*

ID 61

FACTORS AFFECTING VALUE BASED ETHICAL CULTURE: SPECIAL REFERENCE TO HORANA EXPORT PROCESSING ZONE IN SRI LANKA

Nawagamuwa A. C., Gnanaweera K. A. K.*

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
kamal@sjp.ac.lk

Although companies increasingly recognise the growing threat of industrial pollution as a threat to the environment, there are still difficulties in adapting environmental values into corporate culture. Therefore, it is important to sustain a value-based ethical culture in companies, considering both social and environmental aspects. Managers and operational employees in collaboration assist in acting and enhancing ethical values within the framework of the organization. This study aims to investigate factors affecting the value-based ethical culture of companies in the Horana Export Processing Zone (HEPZ). Here, a quantitative research approach has been used to achieve the research objectives. Data were collected using a 5-point Likert scale questionnaire about managerial awareness of CER and interest in green practices by 88 managerial level staff and operational employees' interest in CER and awareness of green practices by 103 operational employees using a random sampling method by conducting interviews with respondents covering all 18 companies in Horana Export Processing Zone (HEPZ). The data on managerial awareness of corporate environmental responsibility and interest in green practices and operational employees' interest in corporate environmental responsibility and awareness of green practices on value-based ethical culture were analysed using SPSS version 27. The results indicate that those factors have a strong positive linear correlation with value-based ethical culture. According to the results of the descriptive statistics data, the existence of the value-based ethical culture among the companies in the Horana Export Processing Zone is relatively high. Furthermore, the findings of the study proved that managerial awareness of CER, managerial interest in green practices, and operational employees' interest in CER have a positive and significant impact and operational employees' awareness of green practices has a stronger positive and significant impact on value-based ethical culture. And also, managerial green behaviour acts as a mediator on relationship between managerial interest in green practices and value based ethical culture. Operational employees' awareness of CER and interest in green practices, and value based ethical culture are mediated by operational employees' green behaviour.

Keywords: ethical culture, value- based, corporate environmental responsibility, green practice.

ID 78

THE PERCEPTION OF DIGITAL MARKETING ADOPTION: SPECIAL REFERENCE TO AUTOMOTIVE SPARE PARTS INDUSTRY IN SRI LANKA

Ranasinghe R. A. H. S., Gnanaweera K. A. K.[*]

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
kamal@sjp.ac.lk

The rapid expansion of the internet and digital technologies has revolutionized marketing approaches globally, with digital marketing largely replacing traditional methods. The majority of people in today's tech-driven world spend significant time online, especially on social media sites. As a result, digital marketing offers companies enormous opportunities to engage with customers all over the world and successfully market their goods and services. In the South Asian region, there has been a digital revolution with a sharp rise in internet usage. However, the automotive spare parts industry in Sri Lanka has been slow to adapt, despite the potential benefits observed in other regional countries and local industries. This study aims to bridge this gap by exploring the potential for digital marketing adoption in the Sri Lankan automotive spare parts industry and proposing innovative strategies to reshape industry perceptions and drive adoption. The main objectives are to determine how important the factors affect the perception of digital marketing adoption and the role of digital marketing in the automotive spare parts industry in Sri Lanka. The secondary objectives are assessing the current state of digital marketing applications and making recommendations for useful implementations of digital marketing strategies in the automotive spare parts industry in Sri Lanka. Through a comprehensive survey of 152 respondents and employing advanced statistical analyses such as correlation and regression analyses, the research examines the relationships between variables. Focus groups and interviews provide the numerical results with additional depth and vitality. The obtained results exhibit that external forces influence the perception of digital marketing adoption like perceived industry pressure, perceived customer pressure, and trialability in the industry of Sri Lankan Automotive Spare Parts. However, organizational readiness remains impact less, it can be overshadowed by other external catalysts. Recommendations stemming from the study advocate for industry stakeholders to collaborate on initiatives such as training programs to enhance digital marketing literacy, organizing investment tools for experimentation, fostering trust, addressing free-riding concerns through cooperation among industry players, encouraging cross-industry collaborations, and integrating adaptable technologies across the value chain.

Keywords: *digital marketing, automotive spare parts industry, perception, digital marketing adoption, Sri Lanka*

ID 82

MEDIATING EFFECT OF ORGANISATIONAL COMMITMENT ON ITS DRIVERS AND RETENTION: A STUDY OF ABC ENGINEERING SOLUTIONS

Wasana B. L. D., Iddagoda Y. A.*

Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
anuradhaiddagoda@sjp.ac.lk

This study examines how organisational commitment mediates the relationship between leadership, organisational culture and employee retention. There is a research gap regarding the empirical evidence of the relationship between leadership, organisational culture, organisational commitment, and retention at ABC Engineering solutions. Additionally, the literature lacks studies on the mediating effect of organisational commitment on these factors. The objectives of this study are to examine the impact of leadership and organisational culture on organisational commitment, to investigate the mediating role of organisational commitment between these factors and retention, and to explore the direct impact of organisational commitment on retention. This study employs a descriptive research design. The data gathered from 129 executive and above level employees in ABC Engineering Solutions were analysed and a set of hypotheses were established and developed based on the theoretical and empirical accounts. A total of five hypotheses were tested, and all were substantiated with the analysis of empirical data. The study found that both leadership and organisational culture significantly impact organisational commitment, which in turn positively affects employee retention. Additionally, the results confirmed that organisational commitment mediates the relationship between these factors and retention. This may provide a clearer picture of the ways that internal organisational dynamics affect worker behaviours and overall organisational performance. The broader implications extend beyond this specific organisational context. The study recommends that organisations need to enhance leadership development, cultivate a positive organisational culture and employee wellbeing to enhance retention which leads to higher levels of employee satisfaction and productivity.

Keywords: *mediating effect, organisational commitment, retention, leadership, organisational culture.*

CHEMICAL &
ENVIRONMENTAL SCIENCES

"A SUSTAINABLE FUTURE : BRIDGING THE GAP BETWEEN NATURE AND TECHNOLOGY"

ID 2

EFFECT OF CONCENTRATION ON THE UPTAKE OF LEAD (Pb) FROM AQUEOUS SOLUTION BY *AZOLLA PINNATA*

Kanesamoorthy T., Ukwattage N.[*]

Department of Environmental Technology, Faculty of Technology, University of Colombo.
nadeesha@et.cmb.ac.lk

Lead (Pb) is one of the very toxic heavy metals that affect the entire food chain and disrupt the health system of human beings and phytoplankton. Removal of Pb from contaminated water or wastewater can be achieved through phytoremediation techniques. Azolla species, commonly known as water fern are potential hyperaccumulator plants which are being investigated for the removal of Pb from contaminated water. The concentration of Pb in the solution may significantly influence the uptake rate. Typically, higher concentrations of Pb may lead to greater accumulation up to a certain threshold, after which toxicity effects may reduce the plant's efficiency. In this study, we investigated the effect of metal concentration on the removal of Pb from an aqueous solution by *Azolla pinnata*. One gram of healthy mature *Azolla pinnata* plants were introduced to the 100 ml aqueous Pb solutions of concentration 2.5 ppm, 5.0 ppm, and 10.0 ppm. As a control experiment, another set of plants were grown in 100.0 mL of deionized water. The plants were raised for 21 days under controlled temperature conditions of 25-30°C. Five replicates were maintained for the treatments and the control. To minimise the solution evaporation and to optimize the efficiency of metal uptake the indirect sun radiation condition was provided throughout. The location of each experimental unit was shuffled to avoid receiving biased environmental conditions. After 07 days 10.0 mL of the nutrient Albert solution was added into each experimental and control unit to ensure healthy plant growth. After 21 days, the plants were removed from the solution by filtering and oven dried. The plants were digested with dry acid and the Pb concentration of plant tissue digestate was measured using atomic absorption spectroscopy (AAS). The metal concentration of the filtered solutions was also analysed using AAS. The results were used to calculate the performance indices - Relative Growth Rate (RGR), Metal Removal Efficiency (MRE), Bioconcentration Factor (BCF), and Translocation Factor (TF). The results were analysed using the Analysis of Variance statistical test at the significance level of $P < 0.05$ followed by Tukey's pairwise comparison. Based on the results, the Pb concentration of 5.00 ppm in the aqueous solution showed the highest percentage of MRE (95.65%±4.46), BCF (12.26±1.03), and TF (0.48±0.15). The 10.00 ppm solution showed the highest RGR of 0.08497 ± 0.00227 g/day for the plants. The results revealed a promising potential of Pb removal from aqueous solution by *Azolla pinnata,* confirming its potential use in phytoremediation of Pb-contaminated water.

Keywords: *Azolla pinnata, lead (Pb) removal, relative growth rate (RGR), metal remove efficiency (MRE), bioconcentration factor (BCF), translocation factor (TF)*

ID 3

DETERMINATION OF HEAVY METALS IN *OREOCHROMIS NILOTICUS* FROM KALAMETIYA LAGOON IN SOUTHERN, SRI LANKA

Peramuna P. A. N. D.[1, *], Wijesinghe R. D. N.[1], Sanjaya H. L. K.[2]

[1]Department of Fisheries and Aquaculture, Faculty of Fisheries and Marine Sciences & Technology, University of Ruhuna, Matara, Sri Lanka.
[2]Department of Limnology & Water Technology, Faculty of Fisheries and Marine Sciences & Technology, University of Ruhuna, Matara, Sri Lanka.
nilakshi.dilshani1996@gmail.com

Kalametiya Lagoon is one of the largest Lagoon in southern Sri Lanka with an active lagoon fishery. According to field observations, Nile Tilapia accounts for the majority of the total catch in the lagoon. The lagoon is currently affected by various anthropogenic activities such as urbanization, agricultural activities, and modifications of the watershed including irrigation projects. Therefore, this study aimed to determine the concentration of heavy metals in water, sediments, and different tissues of *Oreochromis niloticus* (Nile Tilapia) in Kalametiya lagoon. The concentration of Copper (Cu), Lead (Pb), and Cadmium (Cd) in water and sediment samples, as well as in different tissues (gill, skin, liver, flesh) of the captured fish, were analysed by using the Atomic Absorption Spectrophotometer. The water and sediment samples were collected from three different sites as three replicates from each. The fish samples (n = 10) with total length (15.8 – 17.6 cm) and total weight (90.3 – 117.1 g) were collected representing the entire lagoon from fishermen. Histological analysis of fish gill and liver tissues was performed to observe any deformations due to heavy metal exposure. According to the heavy metal concentrations in water, sediments, and fish samples, Cu had the highest level in all samples. The results of the study revealed that the concentrations of heavy metals ranged as Cu, (0.4887 – 0.7330 mg L^{-1}), Cd (0.0095 – 0.0415 mg L^{-1}), and Pb (0.0332 – 0.0748 mg L^{-1}) in lagoon water and those were exceeded the permissible limits stipulated by CEA. The mean heavy metal concentration in lagoon sediments was decreased in the following order, Cu > Pb > Cd. All the metal concentrations near the lagoon mouth were significantly higher ($p < 0.05$) than the other two sites. Cu, Pb, and, Cd levels in four tissues of fish were significantly lower than the FAO recommended limits for fish. Histological observations revealed that the shape of the hepatic cells in the liver had a slightly shrinking appearance, whereas, in the gill tissues, minor lifting of secondary lamellae was observed. The results showed that the heavy metal concentrations in fish were below the standard tolerance limits of FAO; however, further periodical studies are needed due to the bioaccumulation and biomagnification nature of heavy metals which may pose consumers a risk in the future.

Keywords: heavy metal, kalametiya lagoon, Nile tilapia

ID 10

PYROLYTIC RICE CHAR AS AN ADSORBENT TO REMOVE METHYLENE BLUE DYE FROM WASTEWATER

Vishwani L. L. D., Ranaweera S. A.[*]

Department of Chemistry, Faculty of Science, University of Ruhuna, Matara, Sri Lanka.
samantharan@chem.ruh.ac.lk

The release of dye-contaminated wastewater into the freshwater bodies poses significant adverse effects on the environment and human health. Therefore, advanced treatment methods for effective removal of dye from wastewater is an urgent and essential task. This study aimed to remove methylene blue (MB) from simulated wastewater using rice biochar derived from waste rice grains. The waste rice grains were pyrolyzed at 500 °C temperature for efficient decomposition. Then the formed rice biochar was milled and passed through a 63μm sieve to collect pristine biochar. Another portion of sieved Waste Rice Biochar (WRB) was activated by treating it with 0.1 M KOH at 85 °C (1:4 w/w ratio) to obtain Activated Rice Biochar (WRB-A). Both variants were characterized by Fourier Transform Infrared Spectroscopy (FT-IR) and Scanning Electron Microscope (SEM). SEM images showed that the activation improves the surface structure and porosity. The adsorption of MB by WRB and WRB-A were studied in detail and compared with commercially available activated charcoal (AC). The effects of process parameters such as pH (3-8), contact time (1-10 hrs.) and temperature (30 ºC-80 ºC) on MB removal were evaluated. Isotherm studies were carried out at different MB concentrations (200 -2000 mg/L) using 10 g/L dosage of biochar at an optimum 40 ˚C. Initial and final concentrations of MB were recorded in each experiment using UV-visible spectrophotometer. Langmuir isotherm model was best fitted with the experimental equilibrium data for both WRB and WRB-A with 0.9837 and 0.9135 R^2 values respectively and the Freundlich isotherm model was fitted well with the AC with a 0.9737 R^2 value. WRB-A had a greater adsorption capacity (250 mg/g) compared to that of WRB and AC which had adsorption capacities of 100 mg/g and 9.260 mg/g respectively. The dye removal capability of the WRB was higher than most of the biochar-related studies reported in the literature whereas the WRB-A was exceptional to almost all of the reports published in the literature. Thermodynamic parameters suggested that the MB adsorption onto biochar surface is endothermic and spontaneous. Overall data confirmed that the preparation and utilization of waste rice biochar as an adsorbent for the removal of dyes from wastewater might be efficient and encouraging.

Keywords: *biochar, methylene blue, adsorption, rice, isotherm, activation*

ID 28

ANALYSING VEGETATION CHANGE IN THE MAHAWELI D SYSTEM THROUGH NDVI AND REMOTE SENSING TECHNIQUES FROM 1993 TO 2022

Ariyasigha U. D. H. P.[1], Kumara M. A.[1, *], Nishshankaarachchi N. H. S.[2]

¹Department of Forestry and Environmental Management Science, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
²Mahaweli Development Authority, 500, T. B. Jayah Mawatha, Colombo 10, Sri Lanka.
anuruddha.env.masl@gmail.com

The Mahaweli Development Project is Sri Lanka's largest and most critical multi-purpose development endeavour. These projects have significantly affected the landscape and land use patterns within the Mahaweli D system and caused changes. The primary objective of the study is to analyse the vegetation cover changes resulting from these developmental activities over the period from 1993 to 2022, using *Landsat 5 TM* and *Landsat 8 OLI/TIRS* satellite imagery. The study also examines changes in built-up areas and water areas. *ArcGIS* software was used to assess land cover changes, while *SPSS* was employed to investigate *Pearson's correlations* between vegetation area, built-up area, and water area. The reliability of the findings was ensured through accuracy analysis and the *Kappa index*, conducted using *Google Earth Pro*. These indices were classified using the Natural Break Method (Jenks Method). Results indicate a significant increase in vegetation cover from 1993 to 2022, analysed in six segmented periods. The vegetation cover increased from 26,188 ha in 1993 to 50,209 ha in 2022, a percentage increase of approximately 91.7%. To address errors in *NDVI (Normalized Difference Vegetation Index)* and *NDBI (Normalized Difference Built-up Index)* calculations that misidentified 2,262 ha of paddy areas as vegetation or built-up areas, corrections were made by specifically calculating and removing these *paddy-specific classifications,* ensuring more accurate land cover assessments. The *Kappa index values* for these periods were 0.9, 0.85, 0.75, 0.75, 0.9, and 0.85, respectively. *Kappa index* values above 0.75 generally represent strong agreement, indicating reliable classification accuracy for most periods. The data reveals a substantial positive trend in vegetation cover, suggesting that the Mahaweli Development Projects have significantly influenced the region's ecological dynamics. Notably, the water area demonstrates a positive correlation with the vegetation area while the built-up area exhibits a negative correlation. In conclusion, the Mahaweli Development Projects have significantly enhanced vegetation cover in the Mahaweli D system while also transforming built-up and water areas. This study underscores the importance of comprehensive land management practices and demonstrates the efficacy of satellite imagery and *GIS* tools in monitoring environmental changes. The findings remind us to keep an eye on development projects to make sure they grow the economy without harming nature.

Keywords: *mahaweli development project, vegetation cover, ecological sustainability, ecological dynamics, pearson's correlation*

IMPACT OF RAW MATERIAL COMPOSITION ON SHRINKAGE AND WATER ABSORPTION PROPERTIES OF CERAMIC FLOOR TILES

Abeysinghe C. S. D.[1], Godakumbura P. I.[1, *], Habarakada M.[2]

[1]Department of Chemistry, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2] Manager Quality Assurance, Lanka Walltiles, Meepe, Sri Lanka.
pahanig@sjp.ac.lk

Over the years, the ceramic tile industry has become an essential consumer finish product in Sri Lanka. Ceramic tiles are made from a composite material, that contains non-metallic inorganic raw materials such as ball clay, feldspar, silica sand, and dolomite which forms a solid green tile by the compaction of powder state and firing of the tile forms new crystal structures. This study focused on seeking the impact of raw materials on water absorption and shrinkage and improving the quality of the floor tile by reducing the formation of defects. The major requirement of ceramic floor tiles that should be overcome is decreasing the amount of water absorption by keeping in controlled value of firing shrinkage. For the test series, 6 inches × 6 inches of tiles were made. The firing process was done using a double firing method; biscuit firing and glost firing and the tiles were placed in those kilns at 1080 °C and 1197 °C respectively. Chemical analysis of the raw materials gave an idea of the chemical composition of the raw materials. Increasing the percentage of dolomite in the ceramic floor tile body formula from 1.5 % to 4.0 % increases the shrinkage of the finished tile and decreases the percentage of water absorption. Increasing the percentage of dolomite raises the loss of ignition because the amount of $CaCO_3$ and $MgCO_3$ increases with the proportion of dolomite. Increasing the percentage of feldspar which contains more fluxing agents results in better tile characteristics. To reduce the water absorption and increase the shrinkage in ceramic floor tiles, the percentage of silica sand should be decreased, while increasing the percentage of feldspar, which contains more fluxing agents, in the floor tile body formula. At the same time, increasing the percentage of ball clay in the same formula enhances the overall properties of the ceramic floor tiles. SEM images help to observe the microstructural view of the surface such as the formed crystal structures during the firing process and the pores within the tile.

Keywords: water absorption, shrinkage, raw materials, chemical analysis, fluxing agents

ENGINEERING, TECHNOLOGICAL SCIENCES & INNOVATION

ID 4

GESTURE RECOGNITION FOR HUMAN-COMPUTER INTERACTION USING DEEP LEARNING

Weerawanni W. M. C. R., Vanderlan C. H.[*], Thanthriwatta T. P. S., Gamlath O. G. Y. N.

Department of Electrical and Information Engineering, Faculty of Engineering, University of Ruhuna, Galle, Sri Lanka.
chvanderlan99@gmail.com

Human-computer interaction (HCI) through gesture recognition offers an alternative paradigm to traditional input methods, such as mouse and keyboard, presenting a more accessible, intuitive, and user-friendly interface. It also enables users to perform tasks more rapidly with enhanced time efficiency while, at the same time being less device-intensive, reducing dependency on traditional input devices. In this project, we propose a novel approach to HCI by training a deep learning model and utilizing this model to identify user hand gestures in real-time through a webcam, thereby developing user-friendly software where different applications can be controlled using a gesture. While extensive research has been conducted on gesture recognition using deep learning, practical applications in the form of software solutions remain limited. Our project uses a deep Convolutional Neural Network (CNN) model with 4 convolutional layers, 4 max pooling layers, 1 flattened layer, and 2 dense layers. The model was trained on a dataset that contains 22,000 images of 10 different static hand gestures. 65% of the data was obtained from 7 different Kaggle datasets to obtain a wide variety of gesture data. The remaining 35% was created by ourselves with the contribution of three individuals to obtain diverse data. Gesture palm, thumbs up, rock, thumbs left, V, L, Swag, C, Three Fingers, and Scissors are the 10 gestures included in the dataset. Data augmentation techniques such as rotation, scaling, flipping and data mirroring were used. The final model obtained 95.80% testing accuracy,99.70% training accuracy, 95.83% precision,95.80% recall, and 95.81% F1 score. In the backend system, real-time obtained input data is preprocessed using the difference method. The difference is obtained using webcam frames and the first frame. Then the tracked and cropped hand image is fed into the trained model for gesture prediction. After the model development, predicted gestures were implemented in controlling 6 applications including video players, YouTube, presentation, reading, and Zoom. This system operates in two modes which are interchangeable when needed, auto and manual mode. Auto mode allows the user to open the application using gestures and to perform specific actions using gestures. Manual mode gives the opportunity to open the application manually and then perform action with gestures. This software includes a user-friendly interface to guide the users and voice-to-text conversion is incorporated to perform some actions such as searching videos on YouTube and adding comments in reading mode. Also, the user gets the ability to reset the first frame to reduce noise when detecting the hand. However, the user-friendly interface is still in progress which is the next phase of the development. Through this project, we aim to contribute to the advancement of HCI technologies, providing a robust and versatile tool that not only enhances accessibility but also streamlines user interaction with computers by leveraging the power of deep learning and computer vision.

Keywords: human-computer interaction, gesture recognition, deep learning, computer vision

SPIRAL DRAWING TEST INTEGRATED WITH SENSOR-EQUIPPED PEN ON TABLET: A MACHINE-LEARNING APPROACH FOR ENHANCED NEURO DIAGNOSIS OF PARKINSON'S DISEASE AND ESSENTIAL TREMOR

Silva F. H. S. R.[1], Kandeepan S.[1, *], Fernando S. C. R.[2], Maduranga D. R. M.[2]

¹Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
²Department of Computer Science, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
ssivayini@sjp.ac.lk

Neurological disorders like Parkinson's Disease (PD) and Essential Tremor (ET) present significant diagnostic challenges, often relying on clinical assessments. This study addresses this gap by proposing a sensor-equipped pen system for neuro diagnosis. To capture motor function and handwriting features, the system combines advanced machine learning techniques with user demographics, coordinates, and sensor data, such as accelerometer, and gyroscope data. This approach aims to facilitate accurate and efficient diagnosis thus improving patient care and outcomes. With ethical consent, the study was conducted at *Colombo South Teaching Hospital - Kalubowila*. The total dataset was 53, consisting of participants matched for age, including 12 healthy individuals, 9 ET patients, and 18 PD patients recruited from the neurology clinic. Data were collected using a sensor equipped pen on a tablet, capturing spirals. The patients' tremors getting worse during the tasks made data collection difficult, but the study still managed to collect enough information for analysis. The *LILYGO® TTGO ESP32 T-Display Wi-Fi Bluetooth Module* and *MPU 6050* were used in the development of the system's hardware, leading to the creation of a lightweight, low-power prototype that could transmit data in real-time. With a 16-hour battery life, this wireless design ensures compatibility for patients with movement disorders. The target of software development was to provide a user-friendly interface that captures real-time task drawings, sensor data, and patient information. The system has capabilities for drawing line width variation based on pressure, real-time graphing of sensor data, and test management choices. Two machine learning models were developed: an ensemble model using *CatBoostClassifier* and a *Convolutional Neural Network (CNN)* for image classification. Because there was a larger dataset available for the PD group, the testing revealed higher accuracy for them. The final ensemble model obtained 71.15% overall accuracy. In conclusion, the sensor-equipped pen system shows potential for enhancing the objective data collection and advanced machine learning analysis used in the diagnosis of PD and ET. Future work should focus on expanding the dataset, refining the models, categorising drawings by medical treatments, pen miniaturisation, and exploring additional biomarkers to further enhance diagnostic accuracy.

Keywords: *neurological disorder, convolutional neural network, real-time data capture, motor function, wireless design*

ENVIRONMENTAL &
RESOURCE ECONOMICS

"A SUSTAINABLE FUTURE : BRIDGING THE GAP BETWEEN NATURE AND TECHNOLOGY"

ID 52

FACTORS INFLUENCING SAVINGS IN SRI LANKA: AN ANALYSIS AT THE MICRO AND MACRO LEVEL

<u>Sandamini S. S. K</u>., Jayasekara K. D. De. S.*, Gunawardena U. A. D. P.

Resource Economics Unit, Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
deshikaj@sci.sjp.ac.lk

This research examines both macroeconomic and microeconomic variables that affect saving behaviour in Sri Lanka. Given the nation's unstable economy, which is marked by rising inflation, diminishing foreign reserves, and fluctuating interest rates, it is critical to comprehend how these elements affect deposits in the banking sector. The main goal is to examine how savings are affected by macroeconomic factors like inflation and interest rates as well as microeconomic factors such as monthly income, higher expenses, interest rate, and prevailing economic conditions. The study uses two different approaches: a Multiple Linear Regression (MLR) model for microeconomic analysis and a Vector Autoregressive (VAR) model for macroeconomic analysis. Relevant secondary data for the period 1980–2022, obtained from the Central Bank of Sri Lanka are used for the macroeconomic analysis, while primary data gathered from 172 individual depositors of major banks, via a structured questionnaire are used for the microeconomic analysis. The VAR model indicates considerable dynamic interactions between inflation, interest rates, and domestic savings. The Granger causality test shows that domestic savings significantly predict inflation and interest rates. The MLR analysis reveals that higher interest rates and monthly income positively influence total deposits, whereas higher expenses negatively affect savings. The adjusted R-squared value of the model is 0.6391, confirming the higher explanatory power of the model. The results highlight the significance of individual financial behaviour and macroeconomic stability in influencing domestic savings. Policymakers should pay attention to these outcomes when developing strategies to increase savings and financial stability. The negative consequences of economic instability can be mitigated by promoting savings through goal-oriented saving plans, financial literacy, and favourable interest rates. This study offers important insights for the development of economic policy and advances the understanding of savings behaviour in the context of developing economies.

Keywords: *behaviour, influential factors, macroeconomic relationships, multiple linear regression, vector autoregressive model*

ID 65

TOWARDS SUSTAINABLE TELECOMMUNICATIONS: AN INTEGRATED STUDY ON E-WASTE MANAGEMENT IN SRI LANKA'S TELECOMMUNICATION SECTOR

Jayathilaka K. G. M. E., Jayasekara K. D. De S.[*], Gunawardena U. A. D. P.

Resource Economics Unit, Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
deshikaj@sci.sjp.ac.lk

Electronic waste (E-Waste) has become a major global issue due to the rapid evolution of technology. In response to the escalating electronic waste concerns within Sri Lanka's telecommunications sector, this research aimed first to quantify and project the e-waste generated by telecommunication towers of all main telecommunication service providers in the country. Secondly, the study aims to investigate the factors that affect the consumers' willingness to pay for the e-waste recycling process adopting the Theory of Planned Behaviour and the Value Belief Norm theory, using Partial Least Square Structural Equation Modelling (PLS-SEM). Thirdly, the study aims to estimate consumers' willingness to pay for the door-to-door e-waste collecting process for recycling using the Contingent Valuation Method using a logistic regression model. The data have been collected from 382 participants from the Telecommunication industry. Results revealed that the electronic equipment found in Telecommunication towers includes network equipment and batteries. It is expected that by 2036, the total number of telecommunication towers in Sri Lanka will reach 39,069. Regarding the PLS-SEM, the results revealed a significant positive effect of personal/moral obligations for e-waste management ($\beta = 0.170$, p-value <0.05), satisfaction of management support ($\beta = 0.279$, p-value <0.05), attitudes regarding the e-waste ($\beta = 0.261$, p-value <0.05), intention to manage e-waste ($\beta = 0.575$, p-value <0.05) and employee behaviour in domestic waste management ($\beta = 0.255$, p-value <0.05) on employee willingness to pay. Intention to manage e-waste was partially mediate the relationship between the attitudes and willingness to pay. Standardized Root Mean Squared Residual (SRMR) value was 0.044, confirming the acceptable model fit. The internal consistency reliability, convergent validity and discriminant validity were also established. Finally, the Contingent Valuation Method revealed that the level of education, sector of residence, monthly household income, and, years of service significantly affected WTP for the door-to-door e-waste collection process. These findings may help policymakers to develop environmentally friendly e-waste management policies.

Keywords: e-waste, recycling behaviour, PLS-SEM, contingent valuation method (CVM), willingness to pay (WTP)

ID 67

ASSESSING THE IMPACT OF FERTILIZER POLICY CHANGES ON PADDY PRODUCTION IN GAMPAHA DISTRICT AND ANALYZING THE DYNAMIC INTERRELATIONSHIPS BETWEEN PADDY PRODUCTION, RICE IMPORT, AND GDP IN SRI LANKA

Sandapperuma S. A. A. S. N. Jayasekara K. D. D. S. [*], Gunawardena U. A. D. P.[*]

Department of Forestry and Environmental Science, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
djayasekara1113@gmail.com
prasanth@sjp.ac.lk

Sri Lanka's agricultural sector plays a crucial role in the nation's well-being. Though agriculture contributes only around 7% towards GDP, it employs over 27% of the population and provides income for millions. As rice is the staple food of Sri Lankans, paddy cultivation is not only an agricultural activity for the country, but a cornerstone of sustainable development and a socio-economically important sector. This research aims to evaluate the impact of the recent ban on the importation of chemical fertilizer on paddy production in Gampaha District using Difference-in-Differences (DID) approach. The study utilized both primary and secondary data. Using two-stage cluster sampling the primary data were gathered through a questionnaire survey conducted at 11 agrarian services centres and 309 farmers from the above centres were chosen through random sampling. Additionally, a Vector Autoregressive (VAR) model was analysed to examine the dynamic interrelationships between rice production, rice imports, and Sri Lanka's GDP. Data analysis was conducted using STATA and EVeiws software packages. The results revealed that the ban on chemical fertilizer importation significantly ($p<0.05$) reduced paddy yield in Gampaha District by 0.26 metric tons per acre. This emphasizes that chemical fertilizer plays a crucial role in paddy cultivation. It was also found that factors such as land extent and irrigation mode influence paddy production. A vast majority (77.76%) of Gampaha district, which is classified under the low country wet zone, depends on rainfed agriculture. Land extent shows a strong positive relationship with paddy production and significantly ($p<0.05$) increases production by approximately 0.76 metric tons per acre. Result of the Granger causality test indicates that changes in production have a statistically significant ($p<0.05$) effect on imports. The results of error variance decomposition analysis reveal that the contribution of production is low in both the short run and the long run. The impulse response analysis reveals that a shock to production has a varied long-term impact on rice imports. The findings of this study are useful for policymakers in designing effective fertilizer policies that promote sustainable paddy production and contribute to Sri Lanka's food security and economic well-being.

Keywords: *fertilizer policy, paddy production, difference-in-differences approach, economic impact, vector autoregression analysis*

ID 70

THE RELATIONSHIP BETWEEN RENEWABLE ENERGY GENERATION, ECONOMIC GROWTH AND GREEN ENERGY INVESTMENTS

Jayasundara P. N., Jayasekara K. D. De S.*, Gunawardena U. A. D. P.

Resource Economics Unit, Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
deshikaj@sci.sjp.ac.lk

Renewable energy has been considered an effective way to solve environmental pollution and energy crisis in Sri Lanka. In response to its financial crisis, Sri Lanka focuses on renewable energy to ensure energy security and reduce reliance on imported fossil fuels. However, the development of the renewable energy sector depends on economic growth and the financial sector. Therefore, this study aims to reveal the relationship between renewable energy generation, economic growth, and green energy investments in Sri Lanka. Data on quarterly real GDP, renewable energy generation, and Market capitalization data related to green energy stock investments were obtained from the Department of Census and Statistics, the Ceylon Electricity Board, and the Bloomberg Comprehensive database respectively. The period under consideration was from 2005 to 2023. The Auto Regressive Distributed Lag (ARDL) approach to cointegration is employed for the analysis of data. The error correction model and Granger Causality test were also applied subsequently. According to the results of the ARDL Bounds testing, economic growth and renewable energy generation are in a long-run equilibrium relationship. The model was found to be stable and satisfies all the requirements related to diagnostic tests, including tests for serial correlation, normality, and homoskedasticity. It was also revealed that GDP in the previous lag had a positive effect on hydroelectric power generation. Market capitalization related to green energy stock investments has a positive impact on hydroelectric power generation. Considering the results of the Error Correction Model (ECM), the Error Correction Term (ECT) is significant ($3.19 \times 10^6 < 0.05$), which implies that 56% of the discrepancy between long-term and short-term renewable energy generation is corrected within a quarter. The Granger causality test results reveal that a bidirectional causality relationship exists between economic growth and renewable energy generation in Sri Lanka. The study suggests that Sri Lanka can benefit from developing its renewable energy infrastructure. The outcomes are useful for policymakers to suggest new strategies to promote renewable energy generation, leading to environmental benefits and cleaner air. Furthermore, unique strategies will be required to address the impact of economic condition and stock market investments. Equity and debt financing should be encouraged for investments in renewable energy projects.

Keywords: ARDL methodology, renewable energy, granger causality, cointegration

ID 74
EXPLORING THE INFLUENTIAL FACTORS OF ENERGY SAVING BEHAVIOUR

Narayana S. N. B. M. N. U., Jayasekara K. D. De. S.[*], Gunawardena U. A. D. P.

Resource Economics Unit, Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
deshikaj@sci.sjp.ac.lk

The household energy consumption in Sri Lanka has increased over the years and the increasing demand has become a major concern. Therefore, efficient use of energy is considered pivotal. Responsible energy consumption and saving energy are aspects of human behaviours. Therefore, understanding human behaviours and their influential factors is crucial in promoting saving energy and responsible energy consumption. In this study, the factors influencing energy saving behaviour in Sri Lanka within the frameworks of Value Belief Norm (VBN) Theory, Theory of Planned Behaviour (TPB) and Goal Framing Theory (GFT) were explored. The main objectives of the study were to investigate whether energy conservation intentions are significantly influenced by personal norm, subjective norm, gain goal and energy consumption awareness, to investigate whether energy conservation behaviours are significantly influenced by energy conservation intention, to investigate whether willingness to pay (WTP) for energy efficient appliances or applications is significantly influenced by intention and energy conservation behaviours and to investigate whether energy conservation behaviour mediates the relationship between energy conservation intention and willingness to pay. Data were collected from randomly selected 223 individuals in the Western Province, Sri Lanka, using a structured questionnaire. Partial Least Square Structural Equation Modelling (PLS-SEM) was used to analyse the collected data. The results of the study indicated that personal norm, subjective norm and gain goal positively influence energy conservation intention. Energy conservation behaviours are influenced by energy conservation intentions. Willingness to pay (WTP) for energy-efficient appliances or applications is influenced by both the intention and energy conservation behaviours. Energy consumption awareness does not have an impact on energy conservation intention. Furthermore, energy conservation behaviour partially mediates the relationship between energy conservation intention and willingness to pay. Internal consistency reliability, convergent validity and discriminant validity were established and the model fit was acceptable. The outcomes are useful for setting future energy policies, and promoting the importance of conserving energy in the country. Government incentives and rebates for conservation efforts and energy efficiency policies are recommended to be developed as the gain goal plays a significant role in influencing the intention to save energy.

Keywords: *household energy consumption, energy conservation intention, energy conservation behaviour, willingness to pay*

ID 75

THE INFLUENTIAL FACTORS OF LIFE SATISFACTION AND THE WILLINGNESS TO PAY FOR THE ESTABLISHMENT AND MAINTENANCE OF A COMMUNITY GARDEN

Jayarathne W. A. D. R., Jayasekara K. D. De. S., Gunawardena U. A. D. P.[*]

Department of Forestry and Environmental Sciences, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
prasanth@sjp.ac.lk

Life satisfaction is a subjective evaluation of overall well-being or contentment, influenced by personality traits, mindset, health, and finances. Globally, measuring life satisfaction has been given consideration due to the stressful lifestyle of people. the first objective of this study is to reveal the influential factors of life satisfaction using potential influential factors such as dietary habits, leisure activities, work-life balance, and neighbourhood characteristics, with special emphasis on environmental attributes. Community gardens and shared urban green spaces can be considered as a factor that might enhance well-being, by promoting mental health and fostering community engagement for individuals. Accordingly, the second objective of the study aims to reveal the willingness to pay (WTP) for the establishment and maintenance of a community garden. The textile and apparel industry in Sri Lanka, which significantly contributes to the economy while offering employment opportunities, was selected to carry out the survey. primary data were collected from 228 employees selected via the two-stage cluster sampling method. Ordered logistic regression analysis and Contingent Valuation Method (CVM) were employed to analyse data under the two objectives respectively. The results revealed that having impact to green spaces near residences and spending leisure time with family and friends significantly impacts life satisfaction. Establishing community gardens near residential areas can enhance employees' well-being and productivity. As revealed by the results factors affecting willingness to pay include age, family size, garden size, income, and gender.

Keywords: life satisfaction, community gardens, willingness to pay, contingent valuation method

ID 76

FACTORS INFLUENCING PHOTOVOLTAIC SOLAR TECHNOLOGY ADOPTION AMONG HOUSEHOLDS IN HAMBANTOTA DISTRICT SRI LANKA

Dheerasingha D. A. H. N., Jayasekara K. D. De. S.[*], Gunawardena U. A. D. P.

Resource Economics Unit, Department of Forestry and Environmental Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
deshikaj@sci.sjp.ac.lk

The energy crisis combined with the economic crisis and increased environmental pollution has become a serious challenge to the sustainable development of Sri Lanka as a developing country, despite the fact that the government has already paid attention towards the photovoltaic solar (solar PV) technology. In developing countries, research studies conducted on rooftop solar PV systems as a clean energy source for achieving sustainable development goals are limited. The Theory of Planned Behaviour and Goal Framing Theory were used as the foundation for the research study. Investigating the factors influencing the adoption of solar PV technology among households in Hambantota District, Sri Lanka was the main objective of the study. In addition, the preferences of individuals towards solar PV are also revealed. Primary data were collected from 223 respondents in Hambantota District, through a survey conducted using a structured questionnaire. Net Accounting was the most preferred approach among respondents. Partial least square structural equation modelling (PLS-SEM) was used to analyse the collected data. Empirical results of the study revealed that perception of benefits ($\beta = 0.375$, $p<0.05$), environmental concern ($\beta = 0.252$, $p<0.05$) and attitude ($\beta = 0.252$, $p<0.05$) positively influence the willingness to adopt solar PV technology while subjective norm does not have a significant impact. The influence of environmental concern on attitudes was also significantly positive (($\beta = 0.218$, $p<0.05$). Moreover, attitudes partially mediate the relationship between environmental concern and willingness to adopt solar PV technology ($\beta = 0.218$, $p<0.05$). The model fit was acceptable, and the internal consistency reliability, convergent validity and discriminant validity were also established. The findings emphasized the important role of perception of benefits, environmental concern and attitude in influencing individuals to adopt solar PV technology, which should be taken into consideration by policymakers when promoting the solar PV technology as a residential renewable energy source for energy crises. In addition, offering financial incentives is also suggested to enhance the adoption of solar PV technology.

Keywords: *photovoltaic solar technology, willingness to adopt, theory of planned behaviour, goal framing theory, structural equation modelling*

![UNI-IN ALLIANCE - 2024 logo]

FOOD SCIENCE & NUTRITION

MICROENCAPSULATION OF COUNTRY BORAGE (*PLECTRANTHUS AMBOINICUS* L.) LEAF EXTRACT IN CHITOSAN: EFFECT OF FORTIFICATION ON BIOACTIVITY RETENTION

Kayooriha S.[*], Gunathilake K. D. P. P.

Department of Food Science and Technology, Faculty of Livestock, Fisheries and Nutrition, Wayamba University of Sri Lanka.
kayooriha@gmail.com

Country borage (*Plectranthus amboinicus*) leaves, a rich source of various phenolic compounds with potent antioxidant and anti-inflammatory properties, are capable of combating reactive oxygen species produced in the human body and offer immense potential for functional food development. However, their sensitivity to gastrointestinal (GI) conditions results in low bioactivity, hindering their utilization. The present study aims to enhance the bioactivity of these phenolic compounds through encapsulation for functional food incorporation. The ethanolic extract of freeze-dried *P. amboinicus* leaves was encapsulated in chitosan (CS), a natural biopolymer derived from crab shells using the technique of ionic gelation with sodium tripolyphosphate (TPP) as the cross-linking agent, and the retention of bioactivity was evaluated under simulated gastrointestinal and dialysis conditions. Chitosan, known for its positive surface charges, is ideal for encapsulating *P. amboinicus*' rich phenolic content, particularly negatively-charged phenolic acids. TPP is one of the most effective nontoxic anionic polymers for ionic crosslinking with cationic amino groups of CS. The encapsulated particles were characterized by their chemical properties using Fourier-transform infrared (FT-IR) spectroscopy, and the morphological properties using scanning electron microscopy (SEM). Encapsulation efficiency and loading capacity of encapsulated particles were $76.38 \pm 2.00\%$ and $34.09 \pm 1.70\%$ respectively. *In vitro* digestion studies revealed a significantly higher release of polyphenols ($p < 0.05$) in simulated intestinal fluid and dialyzed fractions of encapsulated extract compared to non-encapsulated extract. FT-IR spectra revealed the possible interactions between CS and TPP as well as CS and the extract, ensuring successful encapsulation. SEM showed that the extract encapsulated in CS-TPP envelope is present at the micro-scale, confirming microencapsulation. The targeted delivery of polyphenols to their absorption site in simulated GI conditions confirms the encapsulation system's potential as a functional food fortificant. The findings of the current study may be useful for the food industry to formulate functional foods with optimum health benefits of these leaves and further research on stability of these polyphenols to storage and food processing conditions could be assessed.

ID 17

DEVELOPMENT OF VINEGAR USING SELECTED TRADITIONAL RICE VARIETIES AND USE OF BY-PRODUCTS TO FORMULATE COOKIES.

Yakupitiya I. A.[1], Sujith G. P. T. [2, *], Ranaweera K. K. D. S.[1]

[1]Department of Food Science and Technology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Europa Quality Foods Ltd., No.25, Stage 2, Templeburg Industrial Estate, Panagoda, Homagama, Sri Lanka.
gptsujith490@gmail.com

The utilization of traditional rice varieties in vinegar production presents a significant opportunity to preserve cultural heritage and biodiversity while enhancing product diversity and flavour profile. The present study was focused on developing rice vinegar using three traditional rice varieties Ma wee, Suwandel and Madathawalu with intention of predicting their suitability in development of rice vinegar. In this study selected rice varieties were subjected to saccharification, alcoholic fermentation and acetic acid fermentation. After the acetic acid fermentation, the highest acidity was observed from Ma wee (3.33%), followed by Suwandel (2.88%) and Madathawalu (1.65%). In this study it compared the antibacterial activity, total phenolic content and total flavonoid content of three rice vinegars. The highest total phenolic content and flavonoid content were reported by Madathawalu rice vinegar followed by Ma wee and Suwandel. Subsequent analysis revealed Ma wee vinegar to possess the highest acidity and notable levels of phenolic and flavonoid contents, making it the most suitable for commercial vinegar production. Although Madathawalu demonstrated the highest phenolic and flavonoid contents, its lower acidity may limit its commercial use. Suwandel while providing satisfactory results, was outperformed by Ma wee in all significant measures. Additionally exploring the potential of by-products from vinegar processing for cookie production offers a sustainable solution for minimising waste and creating value-added products in the food industry. The developed cookies, which substituted 50% of wheat flour with residual rice, showed high consumer acceptance. The proximate composition, mineral composition and physical properties of developed cookies were determined. The proximate composition of developed cookie was reported as 4.45 ± 0.45 % moisture, 11.77 ± 0.59 % protein, 54.43 ± 0.27 % carbohydrate, 17.82 ± 1.39 % fat, 1.86 ± 0.16 % ash and 7.33 ± 0.12 % crude fibre. The average total phenolic content of the product was recorded as 419.29 ± 15.05 mg GAE/kg of the sample. These findings underscore the potential for integrating environmentally sustainable practices within the food industry offering a dual benefit of enhanced product range and sustainability.

Keywords: rice vinegar, traditional rice, residual rice, waste management

ID 22

LISTERIA CONTAMINATION IN PASTEURIZED MILK AND SELECTED EDIBLE GREEN LEAVES COLLECTED FROM COLOMBO DISTRICT WITH A FOCUS ON FOOD SAFETY AND DISEASE PREVENTION IN SRI LANKA

Rajapaksha M. N. K. K. P.[1], Pathirage S.[2], Samarasekera K. N.[1, *]

[1]Department of Botany, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Medical Research Institute, Colombo 08.
kaumadi@sci.sjp.ac.lk

Food safety is a critical public health concern, especially concerning food products contaminated with bacteria like *Listeria*. When considering the research conducted on the isolation and characterization of *Listeria sp*. from pasteurized milk and fresh green leaves globally, no research has been published within the past five years in Sri Lanka. Therefore, with an emphasis on food safety and illness prevention, this study evaluated the presence of *Listeria* contamination in pasteurized milk and selected edible green leaves gathered from the Colombo District in Sri Lanka. Twenty samples of pasteurized milk and ten samples from each Lettuce (*Lactuca* sp.), Mukunuwenna (*Alternanthera* sp.), and Gotukola (*Centella* sp.) were randomly collected from markets and shops in the Colombo district. The primary enrichment of *Listeria* sp. in the samples was carried out in Tryptone Soya Broth (TSB) and selective enrichment in Listeria Selective Enrichment Broth (LSEB). The enriched broth, after incubation was transferred to Listeria Selective Agar (LSA), and the inoculated plates were observed for the presence of typical colonies for *Listeria* sp. The confirmation of the typical colonies on LSA was carried out through Gram's staining, motility at 22 °C, and biochemical tests such as catalase, oxidase, indole, esculin hydrolysis, haemolysis, and CAMP tests. The results indicated that 35% of the pasteurized milk samples were contaminated with *Listeria* species, highlighting a significant risk in dairy consumption. Among the types of green leaves tested, Gotukola had the highest contamination rate at 40%, followed by Mukunuwenna and Lettuce, both at 30%. These findings suggest a widespread presence of *Listeria* in both dairy and green leaves products within the Colombo district. To reduce the danger of foodborne infections, this study emphasizes the necessity of strict hygiene standards in the manufacturing and handling of pasteurized milk and commonly consumed green leaves. To further validate these findings, extending study efforts to other regions of Sri Lanka and boosting sample sizes is required. Identification of *Listeria* isolates at the molecular level to obtain more precise knowledge about the strains that are present and their possible effects on health is recommended. Moreover, expanding the scope of the research to encompass other food categories such as diverse vegetables and dairy items may facilitate the development of all-encompassing food safety protocols throughout Sri Lanka.

Keywords: *Listeria sp., food safety, foodborne pathogen, pasteurized milk, edible green leaves*

ID 73

ESTABLISHMENT OF A TEST PROTOCOL FOR THERMAL PROCESS VALIDATION OF VALUE-ADDED COCONUT PRODUCTS IN SRI LANKA USING SURROGATE MICROORGANISM *ESCHERICHIA COLI* (MIGULA) CASTELLANI AND CHALMERS (ATCC® BAA-1427 ™)

Imalka S. P. S.[1], Manamgoda D. S.[1, *], Divisekara D. M. W. D.[2], Madage S.S.K.[2], De Silva A. B. G. C. J.[2], Hewajulige I. G. N.[2], Jayawardena T. M. D. A.[2]

[1]*Department of Botany, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*
[2]*Food Technology Section, Modern Research and Development Complex, Industrial Technology Institute, Malabe, Sri Lanka.*
dsmanamgoda@sci.sjp.ac.lk

Coconut (*Cocos nucifera*) is a versatile and valuable natural resource, common in tropical regions which offer a bounty of products including King Coconut Water (clear naturally sweet liquid), Coconut milk (aqueous extract of coconut endosperm) and Desiccated coconut (finely grated, dried coconut meat). Coconut products have short shelf-life due to spoilage caused by microbial activity, chemical deterioration due to lipid autoxidation, lipolysis, and oxidation of unsaturated fatty acids. Thermal treatment has been used extensively to lower the microbial load in processed coconut products. Poor thermal processing results in these kinds of contaminations, which lower product shelf life and raise safety concerns. To assure product safety, temperature monitoring mechanisms are used to validate thermal operations. Therefore, development of a test procedure is essential for validating thermal processes. This study aimed to establish a comprehensive test protocol for the thermal process validation of value-added coconut products in Sri Lanka using the surrogate microorganism *Escherichia coli* (Migula) Castellani and Chalmers (ATCC® BAA-1427™). *Escherichia coli* (ATCC 1427) was purchased from American Type Culture Collection and retrieved as per the manufacturers' instructions. Main experiments were focused on three thermal processes pasteurization of King Coconut water, spray drying of coconut milk, and steam blanching of coconut pieces (Desiccated Coconut). Pre decided concentration (10^8 CFU/ml) of *Escherichia coli* (ATCC 1427) was inoculated to the coconut samples prior to each experiment. Coconut products were allowed to undergo thermal cycles and the log reduction of *Escherichia coli* (ATCC 1427) was observed by plating the thermally processed Coconut products on Tryptone Soy Agar media. Time temperature readings were taken during thermal processing. All experiments were conducted in triplicates, and the enumeration was carried out. According to the results of pasteurization of King Coconut water, above 6 log reduction was achieved for highest reaching temperature 96.0 °C for the time duration 42.0 min. More than 3 log reduction was observed for maximum highest reaching temperature of 165.0 °C and a treatment time of 45.0 min in the spray drying process of coconut milk. Steam blanching of desiccated coconut resulted above 4 log reduction reaching maximum temperatures 89.0 °C for 10 min. Results revealed that developed protocols are repeatable, reproducible and can be applied to ensure the microbial safety of value-added coconut products in the commercial usage.

Keywords: *thermal processing, value added coconut products, surrogate microorganisms, log reduction, Escherichia coli (Migula) castellani and chalmers (ATCC® BAA-1427™)*

FORESTRY & AGRICULTURE

"A SUSTAINABLE FUTURE : BRIDGING THE GAP BETWEEN NATURE AND TECHNOLOGY"

ID 9

MONITORING COCONUT LEAF NITROGEN USING DIFFERENT VEGETATIVE INDICES BY MULTISPECTRAL IMAGES ANALYSIS

Samarakoon S. M. A. B. K., Rupasinghe C. P.[*], Seneweera S.

Department of Agricultural Engineering and Environmental Technology, Faculty of Agriculture, University of Ruhuna81100, Matara, Sri Lanka.
chintha@ageng.ruh.ac.lk

Effective nutrient management in coconut farming can be challenging due to the crop's extensive biomass production that necessitates a substantial amount of nutrients. Nitrogen (N) is particularly crucial among all the necessary nutrients, and its inadequate or excessive supply can result in severe financial consequences. Multispectral data is commonly used to identify nutrient stress, pests, and water stress across various crops. The study was hypothesized that multispectral data can be used to identify the nitrogen signature of the coconut and thereby enable the design of Nitrogen (N) fertilizer in a more precise manner. This research was conducted to investigate the relationship between UAV-derived vegetation indices and nutrient condition of coconut plantation and to develop model to estimate nutrient content by using UAV technology. By deploying Unmanned Aerial Vehicles (UAV), critical vegetation indexes such as Normalized Difference Vegetative Index (NDVI), Normalized Difference Red Edge (NDRE), Chlorophyll Index (CI) green, and Chlorophyll Index red edge were measured by using PIX4D and ArcGIS software. The experiment was conducted at the Farm located at the Faculty of Agriculture in Mapalana, Kamburupitiya. Analysis of the data showed significant correlations among spectral data and Soil-Plant Analysis Development (SPAD) values. Furthermore, soil Nitrogen percentage as ground data were estimated by collecting explorations to optimize data acquisition. Data processing explored higher correlations between crop and soil variables with NDVI, NDRE CI green and CI red edge. Further, NDRE and CI green were well correlated with SPAD had R-squared values of 71.3% and 73.4%, respectively. The study discovered that SPAD and NDVI and CI red edge had the lowest association as the R-Squared coefficient of determination was 55.4% and 63.7% respectively. The study found that the R-squared values for the correlation between soil nitrogen percentage and NDVI were observed to be 57.2%. Soil N % with NDRE, CI green and CI red edge had coefficient of determination (R-Squared) value as;38.7%, 30.5% and 44.2% respectively. Our result reveal that NDRE and CI green are more effective in estimating leaf nitrogen concentration in the canopy and then helped to facilitate to measure vegetation indices. The models would enable authorities to make successful decisions about coconut nutrient management and the yield production.

Keywords: *coconut cultivation, N management, precision agriculture, unmanned aerial vehicles, vegetation indices*

ID 45

EVALUATION OF F₅ BREEDING LINES FOR THRIPS RESISTANCE IN RICE (*ORYZA ZATIVA L.*)

Gunawardhana M. M.[1], MIllawithanachchi M. C.[2, *], Samarasekera K. N.[1], Vithanage M. U. A.[2]

[1]Department of Botany, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Rice Research Station, Labuduwa, Akmeemana, Sri Lanka.
withanamcm@yahoo.com

Rice thrips (*Stenchaetothrips biformis*) poses a significant threat to rice production in Sri Lanka, causing up to a 1.5% loss in annual production valued at Rs.300-600 million. Thrips mainly affect the Low Country, Wet Zone, late-planted rice plants in the rain-fed cultivation areas. The difficulties and unsuitability of current thrips preventive methods have created a need for a new variety of rice thrips resistance and high yield. This study focuses on evaluating the phenotypic characteristics of F₅ generation breeding lines for thrips resistance under the field infested condition during the *Maha* season 2023/2024. There were 48 lines of two crosses (Th 12-5/At 362 and Th 55-1/At 362), thrips-resistant mother plants (Th 55-1 and Th 12-5), improved variety (At 362) and reference varieties (*Dahanala* and Bg 94/1) used for the experiment. The experiment was conducted at the Rice Research Station in *Labuduwa* using a Randomized Complete Block Design (RCBD) with two replicates. Each plot had a plant spacing of 15 cm × 15 cm. Data were collected on damage severity caused by thrips during the first three weeks after seed establishment using standard evaluation system recommended by the department of agriculture, trichome density on the newly emerged 5th leaf, and agro-morphological characteristics. Genetic variability assessment for quantitative traits was conducted to assess the relative effectiveness of selection based on phenotypic expression of traits. Both crosses recorded high heritability for plant height, culm height, thousand grain weight, number of tillers and number of panicles. High phenotypic and genotypic coefficient variance were recorded for seeds per panicle, number of tillers and number of panicles in both crosses. A high genetic advance was recorded for plant height, culm height and seeds per panicle in both crosses. The highest damage severity of thrips was recorded in Bg 94/1 reference variety while *Dahanala*, the other reference variety was recorded for the least damage. Progeny lines of two crosses recorded lower damage severity compare to Bg 94/1 and At362. There were 3 progeny lines from cross 1 (Th 55-1/At 362) and 20 progeny lines from cross 2 (Th12-5/At362) exhibited promising characteristics including trichome density, plant height, number of tillers and panicles, thousand grain weight and seeds per panicles for thrips resistance and yield improvement warranting further selection and breeding efforts. Future research directions should explore additional morphological features like leaf cuticle structure and leaf wax composition to enhance rice resistance towards thrips damage.

Keywords: rice thrips, thrips resistance, Trichome density, heritability

EXPLORING VEGETATION COMPOSITION AND PROFILE IN GALLWAYSLAND NATIONAL PARK, NUWARA ELIYA

Dimuthumani K. H. P.[1], Chandrathilake G. G. T.[1, *], Nilanthi R. M. R.[2], Jayawardana N. C.[2]

[1]*Department of Forestry and Environmental Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*
[2] *Department of Wildlife Conservation, No. 811/A, Jayanthipura rd., Battaramulla, Sri Lanka.*
thilakawansha@sjp.ac.lk

This research presents a comprehensive assessment of the vegetation composition and profile within Gallwaysland National Park (GNP), the smallest national park in Sri Lanka encompassing 29.2 hectares in Nuwara Eliya. Despite its ecological importance, prior studies on the floristic diversity of GNP have not been published. This study aims to bridge this knowledge gap by evaluating the park's vegetation structure and diversity through detailed ecological analyses, providing essential data that will contribute to the conservation and management of the park's unique botanical heritage. In order to comprehensively profile the vegetation, six 50×5 m plots were randomly established within the park's homogenous forest structure. Each 50×5 m plot included a 5×5 m subplot at one end and within each 5×5 m subplot, a 1×1 m plot was randomly located. The 50×5 m plots focused on woody perennials, the 5×5 m plots on saplings and the 1×1 m plots on herbaceous layers. Additionally, a vegetation profile diagram was developed to document vertical distribution covering vegetation within 5 m on either side of a 50 m transect. Data collected included the height, crown height and crown width of seedlings that were at least 1 m in height. This study assessed the biodiversity and evenness of different vegetation layers within GNP. Woody perennials, sampled in 50×5 m plots, exhibited the highest average diversity (H') at 2.1963 and an average evenness (J') of 0.8836, indicating a diverse and relatively evenly distributed species composition. Saplings, measured in 5×5 m plots, showed a lower average diversity (H') of 1.3584 but a higher average evenness (J') of 0.9406, suggesting fewer species but a more uniform distribution among them. Woody perennial species like *Eucalyptus grandis*, *Acacia melanoxylon*, *Acronychia pedunculata, Melicope lunu-ankenda, Symplocos acuminata and Neolitsea fuscata* exhibited high Importance Value Index (IVI) values in the 50×5 m plots, highlighting their significant role in shaping habitat characteristics. Similarly, sapling species such as *Neolitsea fuscata, Syzygium revolutum, Acronychia pedunculata, Psychotria nigra* var. *nigra* and *Cinnamomum ovalifolium* showed notable dominance in the 5×5 m plots. The study provides detailed insights into GNP's vegetation and ecological dynamics aiding future research and conservation efforts.

Keywords: *Gallwaysland national park, vegetation composition, ecological analysis, shannon's index values, important value index.*

INFORMATION TECHNOLOGY AND COMPUTING

ID 55

DEVELOPMENT OF AN ARTIFICIAL INTELLIGENCE SYSTEM FOR AUTOMATED EXTRACTION OF VITAL MEDICAL INFORMATION FROM HEALTHCARE DOCUMENTS FOR MEDICAL AI

Mihiranga A. T.[1], Wanniarachchi W. K. I. L.[1, *], Herath U. H. M. E. M.[2]

¹Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
²Deep Data Insight, 5200 Maryland Way, Suite 320, Brentwood, TN 37027, U.S.A.
iwanni@sjp.ac.lk

Accurate summary of medical conversations is critical for efficient communication and information retrieval in healthcare. This study mainly focuses on the data preparation, finding a solution for medical entity extraction and fine tuning a model for medical dialogue summarization. Data preparation involves extracting text from medical documents in various forms such as Word documents, Images and PDF. Here, both open-source libraries and paid models were investigated for text extraction. Furthermore, the ability of cloud-based APIs to identify relevant medical entities such as medical terminology, Diagnoses, Medications, Procedures were investigated within the extracted medical texts. Here, the Mistral-7B-Instruct-v0.1 for medical conversation summarizing was used for fine tuning. We have investigated parameter efficient fine-tuning (PEFT) approaches named as QLoRA (Quantized Low-Rank Adaptation) to increase training efficiency of the fine-tuning process. The implementation method includes configuring the development environment, installing the required libraries, loading the medical dialogue dataset and pre-processing the data. Then QLoRA was used to configure the PEFT approach for the basic model. Finally, we've trained the PEFT adapter and assessed the finetuned model's performance using both human evaluation and ROUGE metrics which is a typical tool for determining summary quality. The PEFT model's performance gains were consistent across ROUGE-L which is 0.2395 compared to 0.2001 and ROUGE-Lsum which is 0.2394 compared to 0.2027. It is reflecting a rise of 3.94% and 3.67% compared to ORIGINAL model scores. The substantial improvements in ROUGE scores observed with the PEFT model suggest that fine-tuning the Mistral-7B-Instruct-v0.1 model using this method effectively enhanced its ability to summarize medical conversations. The significant rise in all ROUGE scores particularly ROUGE-L and ROUGE-L sum, indicates that the PEFT model generates summaries that are not only more factually accurate but also better reflect the structure and phrasing of the original conversations.

Keywords: *medical artificial intelligence, natural language processing, conversation summarisation, medical entity extraction, text extraction.*

MATHEMATICS &
APPLIED STATISTICS

ID 34

INVESTIGATION OF THE FREQUENCY OF LIFE INSURANCE CLAIMS BASED ON THE CLIENT DATABASE OF ABC COMPANY

Ishuwara W. A. D. S.[*,] Jayasinghe C. L.

Department of Statistics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
sewminiishuwara2000@gmail.com

Nowadays life insurances are becoming much more important as the uncertainty of the lives in the country is increasing. Most of the time, people get a life insurance with the intention of ensuring that the immediate family members are able to find their basic needs and are able to maintain their standard living. Therefore, this study was focused to give an understanding to the research companies about the behaviour of the life insurance claims in different situations in order to act accordingly while adjusting the premiums when needed. To achieve this research explores how often people claim insurance, under pandemic situations like COVID-19 and economic major changes of the country. Also, what is the impact of death claims to the company, what are affecting to the recurrence of the hospitalization claims and how the different kinds of diagnosis are affecting their claims in life insurance policies. In order to conduct the analysis models like Poisson logistic regression model, Binary logistic regression model, Ordinary logistic regression model, Time series regression model, Cox proportional hazard model in survival analysis and visualization tools have been used. It was observed that age and gender of the policy holder are affecting for the recurrence of hospitalization claims and comparatively male policy holders have higher chance of making more hospitalization claims and there is also a positive relationship between dollar rate and the claim amount. Moreover, the number of policy claims under claim type, claimant type, diagnostic and gender of the claimant have increased for every level during the Covid 19 period compared to the time period before the pandemic. It was also found out that there is a very low probability of occurring a death claim in the first fifteen years from the commencement of a policy and policy holders who are having diagnoses like natural sickness are more likely to die after thirty years from the commencement of the policy. Finally, the results show that having a diagnosis related to cancer, cardiovascular diseases, diabetes, gastritis, lung disease, physical pain and discomfort and viral fever have a higher possibility of having higher number of policy claims (more than 10 claims) emphasizing the need of a healthy life style in people. Hence this research provides valuable insights into life insurance claim behaviour, informing strategic decisions regarding premium adjustments. By understanding the dynamics of insurance claims in various contexts, companies can adapt their premiums to better serve policyholders amidst evolving uncertainties, ultimately fostering greater financial security and stability for individuals and families.

Key words: life insurance claims, survival analysis, covid 19, economic changes, regression models

ID 36

A COMPARATIVE STUDY OF ARCH-GARCH AND MACHINE LEARNING ALGORITHMS IN PREDICTING STOCK CLOSING PRICE OF SELECTED SRI LANKAN INSURANCE COMPANIES IN COLOMBO STOCK EXCHANGE

Perera W. M. P., Perera K.M.P.[*]

Department of Statistics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
manjula@sjp.ac.lk

The insurance industry is an emerging sector in the market due to the uncertainties encountered in our daily lives. Insurance services provide financial arrangements for risks in return of a premium paid by the customer. There has been a significant growth in insurance sector stock prices in Colombo Stock Exchange (CSE) for the last couple of years due to the growth rate of the insurance companies. Therefore, accurate stock price prediction for insurance companies will accompany investors whether to buy stocks. Softlogic Life Insurance PLC, HNB Assurance PLC and LOLC General Insurance PLC were selected for the study by comparing ROE ratio of the ten insurance companies listed in CSE. ARCH-GARCH, KNN, SVR, and LSTM models were employed to analyse the data of three companies, focusing on both short-term and long-term forecasts. These models were used to predict the closing stock prices over a period of one week and one month, respectively, utilizing the previous day's closing price as a base. Results show that GARCH model gives accurate results for long-term prediction for all three companies while SVR algorithm predicts accurate results for Softlogic Life Insurance PLC while KNN algorithm predicts accurate results for other two companies. This study demonstrates that machine learning models exhibit increased predictive accuracy with larger datasets compared to traditional ARCH-GARCH models. Finally, the foundation of this study would be very useful to stakeholders to take decisions about their future investments for these three companies in CSE.

Keywords: insurance, KNN, LSTM, SVR, ARCH-GARCH

ID 38
TAX POLICY- THE EFFECTS OF BASE EROSION AND PROFIT SHIFTING ON SRI LANKA'S TAX REVENUE

Tharushika H.D.J.[*], Pathberiya H. A.

Department of Statistics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
hdjtharushika@gmail.com

Tax policy, revenue generation, and related issues are now prominent in public debate, most notably with the increased attention towards addressing Base Erosion and Profit Shifting (BEPS) activities. However, while there is considerable empirical evidence for developed nations on the effects of tax policy and tax competition on tax revenue due to BEPS activities, there is almost none for Sri Lanka and neighbouring South Asian nations. Hence, this study uses macroeconomic data from Sri Lanka for 32 years and data from seven other South Asian nations for 20 years to explore the effects from tax policy and tax competition on tax revenue due to BEPS activities. The Auto-regressive distributed lag ("ARDL") bound testing methods and panel data analysis methods were used in studying relationships between tax revenue and statutory corporate income tax rates ("CIT") controlling for other macro-economic variables. The panel data analysis was carried out for the seven South Asian nations which include Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan, and Sri Lanka. The results suggested that BEPS activities significantly affect the tax revenue of Sri Lanka due to domestic tax policy. Meanwhile, the other countries in the South Asian region are not significantly affected by BEPS activities due to their domestic tax policy. Moreover, tax competition within the South Asian region do not significantly affect Sri Lanka or any other country in the region, rather the entire region is collectively affected by BEPS activities irrespective of the individual domestic tax policy. The study concludes that addressing the vulnerabilities identified in tax administration and enforcement, coupled with continuous policy refinement and regional cooperation, can strengthen the resilience against BEPS activities and enhance revenue collection efforts.

Keywords: BEPS, tax policy, tax competition, ARDL models, panel data regression models

ID 54

MITIGATION OF THE CUSTOMER COMPLAINTS REGARDING THE ASSORTMENT OF GLOVES WITH MIXED HAND AND SIZE SPECIFICATIONS

Ishara W. A. S.[*], Liyanaarachchi P., Silva R. M.

Department of Statistics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
sahanishara38@gmail.com

This study focused on mitigating the complaints regarding mixed sizes and mixed hand gloves, two among the various issues reported by this glove manufacturing and exporting company. These issues stemmed from human error rather than the production process. The study examined the entire glove manufacturing and exporting process, which was later divided into three major parts: glove production, glove selection, and glove packing. Since the production process could not be influenced, the entire process was divided, and root causes were identified. Cause and effect diagrams were then used to identify potential causes for the aforementioned glove issues in the areas of Man, Machine, Method, Material, Environment, and Measurement. Currently, single sampling of acceptance sampling is used in the glove selection process, but this study suggested implementing double sampling. These two sampling methods were compared, showing that the acceptance of defective lots could be reduced with double sampling. However, even with the double sampling method, a defective lot could still be accepted. Thus, the packing region was observed to identify factors affecting glove packaging inspection, revealing that machine performance and shift schedules affect the inspection process. To determine the impact of these factors, a Two Factor Factorial Design was employed, revealing that glove inspection is separately affected by machine performance and shift schedule, but not their interaction. Overall, the study concludes that these glove issues result from the carelessness and ignorance of employees and procedural failures affecting the process. The use of the double sampling method is recommended in decision-making. Furthermore, machine areas should be changed, their performance should be improved, and the night shift should be improved by adding experts in the field.

Keywords: *mixed size, mixed hand, customer complaints, acceptance sampling, factorial design*

ID 57

ANALYSIS OF REDUCTION OF PACKAGING PAPER REJECTION IN THE PACKAGING DIVISION OF HEALTHCARE GLOBAL BUSINESS UNIT A GLOVE MANUFACTURING COMPANY

Perera P. S. S.[*], Liyanaarachchi P., Silva R. M.

Department of Statistics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
sahanperera58@gmail.com

This study investigated the reduction of packaging paper rejection in the packaging division of Healthcare Global Business Unit, a glove manufacturing company. The focus was on the Smart Packing Outer Line (SPOL) machines, where paper rejects occurred, leading to financial losses for the company. The objectives were to identify significant causes of increased paper rejects (NPR) and propose actions to minimise them. A DMAIC (Define, Measure, Analyse, Improve, Control) methodology from the Lean Six Sigma concept was employed. Pareto charts identified the most critical categories of paper rejects, while cause-and-effect diagrams uncovered the root causes, many of which were related to human errors. To address these, training sessions were recommended. A 2^4 factorial design experiment with one replication revealed that glove type, glove size, and feeding point length significantly influenced the number of empty packs, while the feeding team was not a significant factor. Interaction plots guided the adjustment of feeding point lengths for two machines. Hypothesis testing assessed whether the number of product changes exceeded the company's standard, as frequent changes contributed to increased NPR. The analysis suggested limiting product changes to reduce paper rejects and associated costs. The study quantified the potential financial savings achievable by implementing the recommended actions, highlighting the economic benefits of addressing paper rejection issues in the packaging division.

Keywords: 2^k factorial design with on replicate, hypothesis testing, pareto chart, cause and effect diagram

ID 83
IMPROVING GOLD LOAN ALLOCATION WITH PREDICTIVE ANALYTICS AND CUSTOMER SCORING

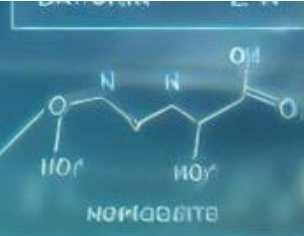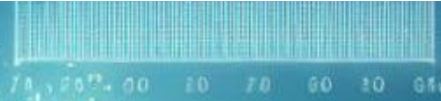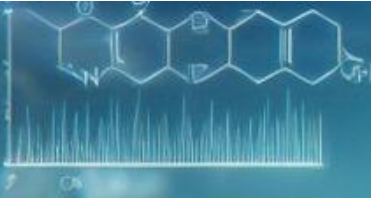Alawaththa K. S. S.[1], Lanel G. H. J.[1, *], Wanninayaka S.[2]

[1]*Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*
[2]*LB Finance Pvt. Ltd., Corporate Office, Kollupitiya, Sri Lanka.*
ghjlanel@sjp.ac.lk

Asset-based loans serve as a vital resource for fulfilling urgent and short-term financial needs worldwide, with gold pawning emerging as a leading option. To attract new customers, banks and financial institutions engage in competition by offering additional loan advance amounts. Identifying customers' creditworthiness provides a competitive advantage in determining the optimum advance amounts. The primary objective is to devise a system capable of predicting customers' repayment ability. Identifying the factors affecting repayment behaviour and assigning scores to the customers' repayment ability are the specific objectives of the research. This thesis utilizes secondary data for analysis, employing various statistical tests such as ANOVA, Chi-square, Cramer's V square, and logistic regression for hypothesis testing and other analyses. A customer scoring system is developed using predicted probabilities of pawning status, while machine learning techniques including random forest, feature scaling, standardization, and K-fold cross-validation aid in predicting customer repayment behaviour. Factors such as interest rate, article weight, education background, and occupation significantly influence gold loan repayment behaviour. This study identified a four-month maturity period as the optimal time period for the gold loans. Additionally, the purpose for obtaining the loan and the purity type of the gold article exert a notable impact on repayment status. Customers' creditworthiness can be assessed by comprehensible values provided by the customer rating system, while the prediction model achieves an accuracy rate of 98.7% in forecasting customers' repayment status.

POLYMERS & MATERIAL SCIENCES

"A SUSTAINABLE FUTURE : BRIDGING THE GAP BETWEEN NATURE AND TECHNOLOGY"
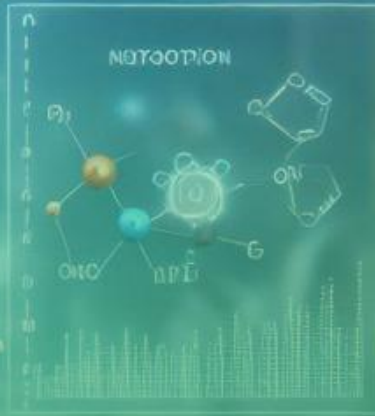
ID 58

FORMULATION OF POLY VINYL CHLORIDE (PVC) BASED SOLVENT CEMENT USING RECYCLED PVC FROM ELECTRIC CABLES

Gayandi J. W. U.[1, *], Weerasinghe R. L. P.[1], Jayasekara D.[2]

[1]Department of Chemistry, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Packaging Development Executive, Orel Corporation Pvt (Ltd), Meegoda, Sri Lanka.
umeshawaduge1997@gmail.com

Solvent cement based on Poly Vinyl Chloride (PVC) is used for bonding PVC pipes and fittings. The main aim of this study is to formulate a PVC solvent cement based on waste PVC that fulfils the minimal bond strength requirements for PVC pipes and fittings. Lap shear strength test was used as the experimental approach to evaluate and compare the performance of waste PVC solvent cement against PVC solvent cement prepared from commercially available PVC resin. Material characterization was done for identifying the functional groups of waste PVC (WPVC) and virgin PVC (VPVC) resin using ATR-FTIR. This study attempts to reduce PVC waste by using PVC recycled from waste electric cables to manufacture PVC solvent cement. Consequently, this can be applied within industries engaged in construction sector, where there is often involvement in both of the manufacturing processes of electric cables and PVC solvent cements in the same industrial entity. Results from this study showed that it is possible to successfully formulate a PVC solvent cement by mixing waste PVC with virgin PVC resin used in PVC solvent cement manufacturing. Notably, the PVC solvent cement with a composition of 75% VPVC and 25% WPVC by weight showed lap shear strength values recorded at average of 1.22 MPa, 2.03 MPa and 3.52 MPa after curing periods of 2-hours, 16-hours and 72-hours respectively. Additionally, the study explored how temperature affected the curing of PVC solvent cement bond. It was concluded that samples that are cured at higher temperature are capable of forming stronger bonds. A notable 70.64% increase in lap shear strength was observed for 75% VPVC- 25% WPVC solvent cement sample than when cured at higher temperature (50˚C) compared to curing at room temperature (27˚C). Through the goals of waste reduction and product development, this study offers a comprehensive strategy to promote environmental sustainability and improve industrial efficiency in the PVC manufacturing industry.

Keywords: PVC solvent cement, waste PVC, lap shear strength test, FT-IR

THEORITICAL & APPLIED PHYSICS

ID 6

NEUTRON ACTIVATION ANALYSIS TO DETERMINE ISOTOPES OF ELEMENTS IN PORTLAND CEMENT USING DELAYED GAMMA EMISSION

Perera D. D. B. *, Jayalath C. P., Mendis D. R. A.

Department of Physics, Faculty of Science, University of Peradeniya, Sri Lanka.
buddheenperera98.bp@gmail.com

Cement is a major component in the construction industry. The radioactive isotopes present in cement is vital, as their radiation levels should be within the accepted radiation limits of exposure for humans. In this study, Neutron Activation Analysis (NAA) has been carried out on Portland cement samples from different factories in Sri Lanka and for imported cement to qualitatively identify the isotopes present. The activity of the Am-Be neutron source, used for the neutron activation process was 9.48 Ci, as on December 2023. The gamma rays emitted by the collected samples before and after the activation were captured by a 2"× 2" thallium doped sodium iodide NaI (Tl) scintillation detector, with a Pulse Recorder and Analyzer (PRA) to observe the gamma spectrum of isotopes present in the Portland cement. By using the standard gold foil activation technique, thermal neutron flux (Φ_{th}), epithermal neutron flux (Φ_{epi}), and the ratio f (Φ_{th}/Φ_{epi}) of the Am-Be source were determined to be 2.36×10^7 neutrons m^{-2} s^{-1}, 1.50×10^6 neutrons m^{-2} s^{-1} and 15.73 respectively. The isotopes identified via NAA are Na-23, Mg-27, Al-27, Si-30, S-36, Cl-32, Cl-37, K-40, K-41, Ca-46, Ti-44, Cr-48, Mn-55, Fe-60, Ni-56, Cu-64, Zn-68, Zn-70, As-75, Rb-87, Sr-84, Zr-96, Ba-134, Ba-138, Tl-205, Pb-211, Pb-214, Bi-214. NAA is an efficient technique in the identification of short-lived isotopes in a bulk sample. The X-Ray Fluorescence (XRF) measurements of the samples were also analyzed to verify the results obtained via the NAA. The average density and mass attenuation coefficient of Portland cement was measured to be 1440.13 kg m^{-3} and 1.76×10^{-2} kg^{-1} m^2 respectively, for the Cs-137 photopeak at 662 keV.

Keywords: *NAA, XRF, gamma, spectroscopy, cement*

ID 13

FABRICATION OF LEAD SULFIDE (PbS) AND CADMIUM SULFIDE (CdS) QUANTUM DOTS EMBEDDED PHOTOVOLTAIC CELLS WITH GEL ELECTROLYTE

Dassanayake M. S.[1], Bandara T. M. W. J.[2, *], Karunarathne A. K.[3]

[1]Department of Environmental and Industrial Sciences, Faculty of Sciences, University of Peradeniya, Peradeniya, Sri Lanka.
[2]Department of Physics, Faculty of Sciences, University of Peradeniya, Peradeniya, Sri Lanka.
[3]National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka.
wijendra@sci.pdn.ac.lk

Quantum dots (QDs) are very small semiconductor nanoparticles that undergo quantum confinement. Quantum dot-sensitized solar cells (QDSSCs), which belong to the third generation of solar cells, can be prepared by embedding QDs into the photoanode. In QD solar cells, QDs act as the photosensitizer. Due to their nano-size, the optical and electrical properties of QDs are different from those of their bulk material. The quantum dot-embedded photovoltaic cells are promising for advancing solar cell technology, offering improved efficiency, stability, and environmental sustainability. Polysulfide electrolytes are more suitable for QDSSCs. By embedding two or more QD types in the photoanode, the efficiency of the solar cell can be expected to be higher than using one type of QD, because one type of QD may not be able to absorb a large range of the solar spectrum. In this research, PbS and CdS QDs were used and PbS QDs, known for their efficient light absorption in the near-infrared region, are coupled with CdS QDs, which absorb light in the visible spectrum. This synergistic combination is expected to facilitate a broader absorption range, leading to improved photon harvesting. In the fabrication process, 2 layers of TiO_2 were used, with spin coating employed for the first layer and the doctor blade method for the second. CdS and PbS QDs were gradually grown on the mesoporous TiO_2 layer using successive ionic layer adsorption and reaction (SILAR) method. The cell performances were investigated by varying the number of SILAR cycles, which was fixed to 10. However, in this study, the addition of PbS did not exhibit any efficiency enhancement of CdS QDs sensitized cells. Therefore, the maximum efficiency of 0.71% was observed in CdS QDs-embedded solar cells with the polysulfide gel electrolyte and Pt counter electrode, with a V_{oc} of 0.40 V and J_{sc} of 5.57 mA cm^{-2}. For the PbS and CdS QDs co-sensitized solar cells (QDCSSCs), the maximum efficiency was 0.07%, with a V_{oc} of 0.21 V and J_{sc} of 1.35 mA cm^{-2}, which was given by the cell, which has 9 CdS and 1 PbS SILAR cycles. And PbS QDSSC which was fabricated using 10 SILAR cycles was not shown any efficiency value. Therefore, CdS QDSSC is optimized by 10 SILAR cycles but PbS and CdS QDCSSCs were not optimized by fixing SILAR cycles to ten. These low performances of QDCSSCs may result due to the recombination of charges.

Keywords: quantum dots, solar cell, Cadmium Sulfide (CdS), Lead Sulfide (PbS)

ID 39

DETERMINING ORBITAL PERIODS OF LOW-INCLINATION SU-UMA STARS USING SUPERHUMP PERIODS

Piyadasa D. B. T. L. S.[1], Jayawardane D. N.[1, *], Medagangoda I.[2]

[1]Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Arthur C. Clarke Institute for Modern Technologies, Moratuwa, Sri Lanka.
dnj@sjp.ac.lk

This study addresses the challenge of determining orbital periods in low-inclination (<65°) SU UMa dwarf novae, which lack detectable orbital modulations in their light curves. Although measuring radial velocity through spectroscopy data is a more accurate technique for determining orbital periods in SU UMa binary systems, including those without eclipses, the scarcity of freely available spectroscopy data due to the faintness of SU UMa systems poses significant challenges in obtaining precise results. In this study, a statistical model using photometry data is proposed to determine the orbital periods of SU UMa systems with non-detectable orbital modulations due to low inclination angles. This method offers greater accuracy compared to models by Howell & Hurst (1994) and Warner (1995), who used 19 and 39 SU UMa systems, respectively. Our model utilizes orbital periods accurately known for 355 SU UMa systems from the "Ritter Cataclysmic Binaries Catalogue (7.21 Edition)." The model can be defined as follows: $P_{orb}=0.9136\times P_{sup} +0.0988$ where P_{orb} and P_{sup} are the system's orbital period and superhump period, in hours, respectively. This model exhibits a root mean square error (RMSE) of 0.0206 for the catalogued data mentioned above, while the models of H & H and Warner show RMSE values of 0.0279 and 0.0240, respectively. For the SU UMa systems with orbital periods between the Period-Minimum (~76 minutes) and the Period-Gap-Minimum (2 hours), the H & H model, the Warner model and this model show minimum deviations, with RMSE values of 0.0286, 0.0221 and 0.0192 respectively, to the bulk catalogue data. This indicates that both previous models and the new model produce more accurate results within this range. It is evident that our model outperformed existing models in determining orbital periods in non-eclipsing, low-inclination (<65°) SU UMa dwarf novae using superhump periods derived from photometry data.

Keywords: *SU UMa, orbital period, superhumps period, non-eclipsing binaries*

ID 48

RADIAL VELOCITY STUDY OF A SELECTED BRIGHT STAR OBSERVED AT 45 CM TELESCOPE AT ARTHUR C CLARKE INSTITUTE FOR MODERN TECHNOLOGIES

Wijesinghe W. M. R. Y.[1], Munasinghe C. R.[1], Gunasekera S.[2, *]

[1]Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Arthur C Clarke Institute for Modern Technologies, Katubedda, Moratuwa, Sri Lanka.
sarajgunasekera@yahoo.com

The determination of the radial velocities of bright stars is a crucial aspect of astrophysical research, which provides insights into stellar dynamics, binary star systems, and exoplanet detection. This study presents a comprehensive approach to measuring the radial velocity of the high-velocity bright star HD 39853 using CCD imaging, spectroscopy, and the IRAF software package. By combining high-resolution observational techniques with sophisticated data analysis tools, precise and reliable radial velocity measurements could be achieved. The HD 39853 star, also known as HR 2065 in the bright star catalogue, is a high-velocity star in the Lepus constellation. High-velocity stars are stars with much higher velocities compared to other stars in the galactic disk. By studying high-velocity stars, valuable insights about the Milky Way's history and structure could be gained. High-resolution spectroscopic data of this star was acquired using a GOTO 45 cm Cassagrain Telescope equipped with a Monk-Gillison type spectrograph. The collected data underwent thorough processing using the IRAF's capabilities and was then primarily focused on detecting the subtle shifts in the star's spectral lines caused by the Doppler effect. The radial velocity of the HD 39853 star obtained from the FXCOR task is 78.19 ± 0.04 km s^{-1}. In this task, the Fourier cross-correlation technique measures the radial velocity. IRAF software is used in this research for the reduction and analysis of astronomical data. The core functionalities of the IRAF software are specially designed for astronomical data processing, which suited this research very well and made the results more precise. The findings of this study will enhance our understanding of HD 39853's movement and its potential planetary system. The measured radial velocity can help determine the presence and orbital characteristics of any undetected companions. Additionally, this research will demonstrate the use of IRAF software for analysing spectroscopic data to measure radial velocity. This thesis will hold significance for researchers investigating exoplanetary systems and stellar movement.

Keywords: radial velocity, high-velocity stars, spectroscopy, IRAF

ID 49

LOW-RESOLUTION SPECTROSCOPIC STUDY OF PULSATING STAR - CC ANDROMEDAE

Munasinghe K. M.[1], Attygalle M. L. C.[1, *], Adassuriya J.[2, *], Zang L.[3, *]

[1]*Department of Physics Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.*
[2]*Astronomy and Space Science Unit, Department of Physics, Faculty of Sciences, University of Colombo, Colombo 03, Sri Lanka.*
[3]*School of Physics and Astronomy, Yunnan University, Kunming 650091, China.*
lattygalle@sjp.ac.lk
janaka@phys.cmb.ac.lk
zanglei@ynu.edu.cn

CC Andromedae is a δ-Scutti type, a short-period pulsating star with a main pulsation period of 0.1249078 days in the constellation Andromeda. The star has been observed in spectroscopy over the entire pulsation cycle with more than 700 low-resolution spectra in the whole visible range using the 50 cm telescope with a spectrograph at Mount Abu Observatory, Rajasthan, India in 3 consecutive days 10th,11th, and 12th December 2016. The aim was to determine the excitation temperature profile of the variable star CC Andromedae. The initial data reductions such as flat fielding correction and extraction of spectra were done using the astronomical software, Image Reduction and Analysis Facility (IRAF). The equivalent width of a spectral line represents the energy emission of that particular wavelength. Utilizing the Boltzmann equation, the excitation temperature of the pulsating star was calculated by analysing the equivalent width of hydrogen line profiles (H_α, H_β and H_γ). The light curve of CC And was observed using photometry data obtained from the Transiting Exoplanet Survey Satellite (TESS) mission. Finally, it was determined that the obtained excitation temperature profile is synchronized with the observed light curve of CC And which can be concluded the temperature variation is in phase with the brightness variation of the star. It was determined that selecting Hydrogen lines with larger wavelength differences would give clearer excitation temperature profiles. This association sheds insight into the nature and behaviour of CC and, potentially aids in a better understanding of its dynamics and properties.

Keywords: δ-scuti stars, pulsating star, excitation temperature, line profiles

ID 53

MAPPING URBAN GREEN SPACE USING SENTINEL-2 IN COLOMBO AREA: A NEURAL NETWORK APPROACH

Nanayakkara R. S. K.[1], Munasinghe C. R.[1], Fonseka H. P. U.[2, *]

¹Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
²Space Applications Division, Arthur C Clarke Institute for Modern Technologies.
panchi.uma@gmail.com

Urban green spaces play an important role in maintaining ecological balance, improving air quality, and providing well-being through recreational activities for urban residents. Accurate mapping of these spaces is essential for effective urban planning and resource management. Given the dynamic nature of green spaces, which is driven by human actions and environmental conditions, the inventories for UGS need to be updated regularly, which is expensive and time-consuming when employing traditional methods. This study aims to classify urban green spaces in Colombo using remote sensing data and machine learning models, resulting in an efficient and effective alternative for urban planning and resource management. Evaluating the performance of machine learning models such as Random Forest, Support Vector Machines, and Logistic Regression in classifying different land cover types is the objective of this study. To differentiate between vegetative and non-vegetative land, the Normalized Difference Vegetation Index was extracted from Sentinel-2 satellite images taken over five years (2018–2023). The validation accuracy of the Random Forest model was 80%, performing better compared to Support Vector Machines (79%) and Logistic Regression (79%) models, with low omission and commission errors, such as 0.08% and 0.47% for urban, and 0.9% and 0.3% for forest classes, respectively. The detection of the green area using all three machine learning approaches was also shown using a map, making it easier to analyse and observe. This research demonstrates the possibility and utility of applying machine learning alongside remote sensing for the sustainable development of cities.

Keywords: *urban green spaces, machine learning, remote sensing, vegetation index, classification accuracy*

ID 63

INVESTIGATION ON THE STABILIZATION OF SILVER NANOPARTICLES ON RADIATION-GRAFTED RECYCLED POLYESTER FABRIC

Siriwardane S. M. D. N. S.[1], Jayewardene D. N.[1, *], Pathirana C. D. R.[2]

[1]Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Gangodawila, Nugegoda, Sri Lanka.
[2]Radiation Processing Section, Industrial Applications Division, Sri Lanka Atomic Energy Board, Orugodawatta, Wellampitiya, Sri Lanka.
dnj@sjp.ac.lk

The utilization of silver nanoparticles (AgNPs) has been gaining significant attention due to their unique properties and wide range of applications, including textiles, paints, catalysts, and sensors. However, the stabilization of AgNPs in various matrices remains a challenge to achieve their optimum performance and functionality. This study focuses on investigating the stabilization of AgNPs on radiation-grafted recycled polyester fabric. In this study, developing the stabilized fabric was presented via a two-step process. The first step involved the radiation-induced grafting of polyester fabric with various monomers, including 20% (v/v%) acrylic acid (AA) with ammonia solution, 50% (v/v%) styrene with 50% (v/v%) methyl methacrylate (MMA), and 100% (v/v%) vinyl acetate (VAc) separately. In the second step, silver nanoparticles (AgNPs) were synthesized by reducing silver ions in silver nitrate to silver atoms using irradiation techniques. All the irradiation processes were performed using a ^{60}Co panoramic wet storage gamma radiation source under a nitrogen atmosphere. The fabric samples were irradiated at 15kGy dose and 0.5kGy/h dose rate at 25°C temperature. The grafted fabrics were characterized using Fourier-transform infrared spectroscopy (FTIR) and scanning electron microscopy (SEM) to confirm the successful grafting. The fabric modification and silver nanoparticle stabilization were successfully confirmed through SEM analysis. Particle size analysis recorded a distribution of particles at 100 nm, providing further confirmation of nanoparticle formation. The crystalline face-centred cubic nature of AgNPs was observed using X-ray diffraction (XRD). XRF analysis confirmed the presence of silver loaded onto the fabric. It was observed that the degree of grafting on recycled polyester fabric was increased when vinyl acetate (VAc) was used as the monomer. The experimental results showed that silver nanoparticles were successfully grafted and stabilized onto recycled polyester fabric. This study highlights the potential of using radiation-grafted polyester fabric for stabilizing silver nanoparticles.

Keywords: *silver nanoparticles, radiation-induced grafting, stabilization, recycled polyester fabric*

ID 66

EVALUATING THE LEVELS OF RADIOFREQUENCY ELECTROMAGNETIC RADIATION IN OCCUPATIONAL ENVIRONMENTS

Perera M. H. S. M.[1], Gamage N. G. S. S.[1, *], Kalansooriya C. M.[2]

[1]Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka.
[2]Electro Technology Laboratory, Industrial Technology Institute, Colombo, Sri Lanka.
shanthagamage@sci.sjp.ac.lk

Non-ionizing radiation is not perceived as a significant threat compared to ionizing radiation, and the radio frequency (RF) range is frequently regarded as safe because many devices around us meet existing safety standards. However, there is a significant gap in current knowledge and guidelines primarily concerned with short-term thermal effects rather than long-term biological consequences. This difference is critical because prolonged exposure to non-ionizing radiation poses potential health risks not adequately addressed by current safety standards. The purpose of this study is to look into the levels of Electric Field (EF), Magnetic Field (MF), and Radio Frequency (RF) power density emitted by everyday occupational electronic devices and compare them to international safety guidelines to assess whether certain work objects' electromagnetic emissions comply with widely used regulatory safety thresholds. EF, MF, and RF radiation levels were measured by an EXTECH model 450 multifield Electromagnetic Field (EMF) meter, from various household electronics, including mobile phones, laptops, power lines, power cables, light switches, terminal switches, extension cables, and plugs considering time and, distance variations separately. The measurements were then compared to internationally accepted safety standards. The study also looked at safe distances to limit exposure and potential health risks. While all devices except mobile phones operate within safe limits for short-term thermal exposure, all are unsafe compared to the long-term biological guidelines including the background radiation. This study identifies a critical gap in existing guidelines, which fail to address the long-term health risks associated with prolonged exposure. Notably, there needs to be more awareness and concern about these risks, even among those with advanced education. It is concluded that there is an urgent need to re-evaluate and update commercial product safety standards to account for long-term biological effects. Raising public awareness of these risks is critical, especially in environments where electronic devices are used frequently throughout the day. This study emphasizes the importance of conducting more comprehensive studies to fully understand the health consequences of prolonged non-ionizing radiation exposure and providing clear recommendations for mitigating these risks through informed policy changes and public education initiatives.

Keywords: *electromagnetic fields, electro hypersensitivity, non-ionizing radiation, radio Frequency, safe distances.*

ACKNOWLEDGEMENT

Vision empowerment

In an ideal world, technology and environment coexist harmoniously and advance sustainable development. Our mission is to bridge the gap between these domains by fostering innovation, research, and cooperation between environmental stewards and industrial researchers.

To address these global issues, uphold ecological balance, and improve human welfare, we seek to cultivate transformative solutions. Our goal is to build a future where technological breakthroughs complement and enhance natural ecosystems by bringing together varied ideas and disciplines.

Join us on this transformative journey as we explore the profound impact of uniting nature and technology, paving the way for a resilient and sustainable world for the betterment of society.

" Technology and sustainability need each other.
Without technology, sustainability cannot scale; without sustainability,
technology loses its purpose "
- Jeremy Oppenheim -