INAUGURAL RESEARCH SYMPOSIUM 2024

JOINTLY ORGANIZED BY

SRI LANKA COLLEGE OF STATE SCIENTISTS AND
MINISTRY OF PUBLIC ADMINISTRATION

Book of Abstracts

Gate for Integral Research towards Nation Building

29th - 30th August 2024

ISBN: 978-624-6618-00-1

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Published by:

Sri Lanka College of State Scientists (SLCSS)

No 933, Rampitiya Road, Ragama (Colombo North)

SRI LANKA COLLEGE OF STATE SCIENTISTS

Inaugural Research Symposium 2024

"Gate for Integral Research Towards Nation Building"

29th and 30th August 2024

Colombo - Sri Lanka

PREFACE

We, the members of the Association of Government Scientific Officers (AGSO) which is the Trade Union of the Government Scientific Officers were unable to perform total scientific activities such as academic research and in-house method developments. Innovations thus our Specialists and officers unable to perform to their capacity. Therefore, the scientist's potential was not converted into the upliftment of the nation's vision of prosperity.

To overcome this pitfall, we the state scientists had brainstorming sessions and the result was forming a professional body resulted in the formation of the Sri Lanka College of State Scientists (SLCSS).

The initial activity of SLCSS was to conduct a series of Webinar on the "**Role of Science beyond the New Normality "**on covid pandemic situation

The content of this book is the outcome of the proceedings of the workshop "The Complete Researcher: From Design to Manuscript" focused on guiding you through the process of workplace-based research, from the initial design to the final manuscript conducted by Sri Lanka College of State Scientists (SLCSS) jointly with Sri Lanka Scientific Services Division of the Ministry of Public Administration on the 20-10-2023. This initiative opens the path for a research culture among the state scientific consortium and a firm foundation for dynamic research and urges the future scientific community to carry out the mission.

The scientific research work presented in this symposium is the outcome of routine scientific work of the state scientific officers under the circumstances of no separate financial vote for research. For quality research, more state funds are required.

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Message from the Secretary - Ministry of Public Administration, Home Affairs, Provincial Councils and Local Government

I am pleased to forward this message on the occasion of the inaugural Research Symposium jointly organized by the Scientific Service Division of the Ministry of Public Administration and Sri Lanka College of State Scientists-2024, centered on the theme "**Gate for Integral Research towards Nation Building**," scheduled to be taken place on 29th, 30th August 2024.

This symposium will provide an invaluable platform for sharing newly generated knowledge with vast variety of stakeholders and a broader scientific community. As the scientific service is comprise of multi-disciplinary scientists from various departments and state sector ministries, this event is both timely and significant to thrive in fast moving technological arena. It will bring into the public eye the current research being conducted by state-sector scientists, fostering the exchange of ideas and the establishment of interdisciplinary links and dialogue at both local and global levels.

Further, the insights and discoveries presented here will undoubtedly play a pivotal role in informing and guiding policymakers in their decision-making process. Together let's continue to bridge the gap between research and practice fostering collaboration and synergy to achieve sustainable and impactful outcomes for the goodwill of the general public.

I extend my warm and sincere gratitude to the organizing committee of the symposium, in collaboration with the Sri Lanka Scientific Service Board, for their dedicated efforts. I wish the symposium every success and convey my best wishes for all future endeavours.

Pradeep Yasarathna
Secretary
Ministry of Public Administration, Home Affairs,
Provincial Councils and Local Government

Message from the Director- Scientific Services Division

I am delighted to witness this annual symposium and abstract book, where you have shared the groundbreaking research findings conducted across diverse scientific disciplines. This event is not just a platform for presenting findings, but a vibrant gathering of minds committed to pursuing knowledge and innovation.

As you peruse the abstract booklet, you will discover the remarkable work of state sector scientists from pioneering studies in chemistry, physics, biology, environmental science, and many other scientific disciplines to advancements in science and technology. Each abstract is a testament to the hard work, creativity, and dedication of the researchers who strive to push the boundaries of understanding.

This year we ignite the first initiative of this symposium with an e-abstract booklet paving ways to thrive in

Multi-disciplinary scientific exploration. I encourage you all to engage with the research being presented and incorporate new insights towards sustainable Innovation.

I extend my deepest gratitude to all who contributed to this event, from the researchers to the organizing committee. Your commitment ensures that scientific Service remains at the forefront in Public Service scientific research and education in the country.

G.I.D. Chathuradhi Wijesinghe
Director, Scientific Services Division
Ministry of Public Administration, Home Affairs,
Provincial Councils and Local Government

Message from the President - Sri Lanka College of State Scientists

It has been a great pleasure to organize the Inaugural International Research Symposium under the Theme "Gate for Integral Research towards Nation Building" jointly by the Sri Lanka College of State Scientists (SLCSS) and Sri Lanka Scientific Service (SLSS) under the patronage of Ministry of Public Administration and Home Affairs, Sri Lanka.

There was a long-felt need to bring the Government Scientists under one umbrella to enhance scientific output and performance thus the SLCSS was inaugurated on the day of 18th September 2021

Our first activity was organizing a series of lectures as Zoom meetings covering scientific topics such as "The infallible path to Win a Research Grant" by Professor Meththika Vithanage, University of Sri Jayewardenepura on 18 September 2021, "How to obtain research allowance and ethical clearance" by Mr. P.M. Darmathilaka, Director General Scientific Innovations on 02nd October 2021 and "Research from workplace base studies" by Dr. Devaka Weerakoon, University of Colombo on 16th October 2021.

Government Science Profession is an active group of people with one goal in common: to make a real difference through science. To do this, SLCSS wants to help embed science into government decision-making and raise the capability of individual scientists in government.

I extend my sincere gratitude to all Senior Scientists involved in formulating the constitution of the College. Also, I extend my sincere appreciation to all participants, speakers, sponsors, and partners for their enthusiastic support and commitment to make this endeavour a success.

I eagerly anticipate your participation and look forward to the dynamic discussions to improve your professional careers.

I look forward to the continued support from all concerned to take this SLCSS to greater heights in the near future and together, let us explore new horizons and shape the future of science for the vision Nation Building.

J.M.R. Jayasundara

President - Sri Lanka College of State Scientists

Message from the Chair of the Symposium Organizing Committee

It is with great pleasure that I welcome all participants to the inaugural symposium of the Sri Lanka College of State Scientists (SLCSS). Our six-day workshop, titled “The Complete Researcher: From Design to Manuscript,” has been dedicated to guiding you through every stage of workplace-based research, from the initial design to the final manuscript.

As we approach the final days of the workshop, many of you have achieved significant milestones, while others are making excellent progress. The theme of this symposium, "Gate for Integral Research Rewards Nation Building," highlights the critical role of integrated applied research in advancing national development. Our scientists are fortunate to apply their specialized knowledge in pure sciences directly to nation-building, a rare and valuable opportunity.

This symposium is poised for great success, thanks to our collaboration with the Sri Lanka Public Administration. It comes at a pivotal moment in the evolution of our scientific service, as we experience significant advancements that empower our scientists to play key roles in specialized fields.

I express my sincere gratitude to the present secretary, Mr. Pradeep Yasarathn, and additional secretaries as well as former secretary Mr. KDNR Asoka and additional secretaries to the Ministry of Public Administration, who given this opportunity. Special thanks go to Mrs. RMNEK Ranasinghe, former Director of Scientific Services and current Additional Secretary of Parliament Affairs; co-chair of the symposium, Mrs. Chachuradhi, Director; Mrs. Nawanjalee Lamahewa, Assistant Director; and their staff in the Scientific Services of Public Administration, for their unwavering support. Your contributions have been essential to the success of this symposium and to the broader goal of applied research across disciplines.

My heartfelt thanks also go to our retired senior research officers, Mr. R. Ramesh and Mrs. S. Wijendra, as well as the committees, sub-committees, and their coordinators, who have worked tirelessly to organize this event. Their efforts have been instrumental in enhancing knowledge in workplace-based research, from abstract and poster presentations to preparing this abstract book with an ISBN number, and publishing it on the websites of the Ministry of Public Administration and SLCSS, as well as producing hard copies for invitees.

A special thanks to the Secretary of the Ministry of Public Administration and the Director General of the National Science Foundation (NSF) for their encouraging messages included in this abstract book. I also greatly appreciate the scientists who submitted abstracts for poster presentations on short notice.

A strong research proposal is crucial for success, and I am grateful to the resource persons who shared their expertise and knowledge and provided valuable guidance in refining participants' proposals and manuscripts. The last but not least, I express my gratitude to members of the editorial board. Their dedication to reviewing and improving research proposals and abstracts has been vital, often involving in physical gathering, online late-night discussions, and multiple revisions. The dynamic nature of our scientific service has truly coloured this symposium.

I wish all participants a rewarding and memorable experience and look forward to future opportunities for collaboration.

Mrs. Sriyani Amarasinghe

Vice-President - Sri Lanka College of State Scientists

Message from the Director General - National Science Foundation

Society and citizens face numerous challenges. These wicked problems are difficult or impossible to solve because of its complexity and interconnected nature. Further, these problems are often multifaceted and require holistic approaches that take into consideration multidimensional approach. Hence, in this context his highlights the need to develop tools with the capacity to foresee, mitigate or prevent and respond to complicated, dynamic challenges with resilience. In this regard, scientific research and development is critical in decision-making because it provides decision-makers with the knowledge and insights they need to make sound decisions.

The broad scope of this event and the selected title, “The Complete Researcher: From Design to Manuscript” is a workplace-based research forum, conducted by the Sri Lanka College of State Scientists (SLCSS) and provides a unique meeting ground for researchers spanning the whole spectrum of government officers in the scientific discipline. This initiative opens the path for a research culture among the state scientific consortium and a firm foundation for dynamic research and urge the future scientific community to carry out the mission.

I hope that some fruitful collaborations can be established while sharing the knowledge through this conference for uplifting the human life highlighting the role of state scientists to discover solutions where the present society is facing. I would like to express my sincere gratitude to the Sri Lanka College of State Scientists (SLCSS), symposium committee members and the reviewers for their efforts in ensuring a rigorous review process to select high-quality papers. I sincerely hope that this unique multidisciplinary conference will provide the participants with a truly transformative experience through a variety of knowledge and perspectives.

Dr. Sepalika Sudasinghe

Director General, National Science Foundation

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- Mr. R. Ramesh: Former Senior Research Officer, Medical Research Institute, Colombo
- Ms. WAS Wijendra: Senior Research Officer, Medical Research Institute, Colombo
- Ms. Shiromi de Silva: Senior Research Officer, Medical Research Institute, Colombo
- Dr. (Ms.) Jeewani Harishchandra: Entomologist, Anti-Malaria Campaign
- Dr. (Ms.) Dilusha Wickramasingha: Research Officer, Medical Research Institute, Colombo
- Mr. Lakitha Ruvinda: Physicist, Apeksha Hospital, Maharagama
- Ms. Deleepa Endagamage: Senior Lecturer at the Department of Decision Sciences, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura
- Dr. Sameera Vishwakula: Senior Lecturer, Department of Statistics, University of Colombo
- Prof. Sevvandi Jayakody: Chair Professor to the Department of Aquaculture and Fisheries, Wayamba University of Sri Lanka
- Dr. Ruwan J. Illeperuma: Senior Lecturer of zoology, Faculty of natural science, Open University of Sri Lanka
- Mr. Dilip Kumara: Former Physicist, National Hospital, Galle
- Prof. Hiran Jayaweera: Department of Physics, Colombo University
- Prof. Champa D. Jayaweera: HOD/Department of Chemistry, University of Sri Jayewardenepura

RESOURCE PERSONS

Dr. (Mr.) J.M. Seneviratne

Former Director (Regulations), Department of Export Agriculture, Peradeniya

Contribution/Discussed topic:

- *Workplace-based research prioritized on real-time problems*
- *Development of spice crop varieties*
- *Spice crop breeding*
- *Biotechnological applications in agriculture*

Mrs. Sriyani Amarasinghe

Senior Biochemist, National Hospital Sri Lanka

Contribution/Discussed topics:

- *Literature review and utilization of AI tools in the research journey*

Prof. (Mrs.) Champa D. Jayaweera

Head of the Department, Department of Chemistry, University of Sri Jayewardenepura

Contribution/Discussed topics:

- *Shared their expertise and knowledge and provided valuable guidance in refining participants' proposals and manuscripts*

Mr. R. Ramesh

Former Senior Research Officer, Medical Research Institute, Colombo

Contribution/Discussed topic:

- *Ethics for work-place based research*

Ms. Dileepa M. Endagamage

Senior Lecturer, Department of Decision Sciences, University of Sri Jayewardenepura

Contribution/Discussed topics:

- *Identification of the Research Problem, Definition of the Study Scope and Practical Implications, Establishment of Research Goals and Objectives, and Formulation of an Effective Title and Keywords.*
- *Formulation of objectives, conceptual framework, and operationalization chart.*
- *Link the objectives with the analytical tools. Sample selection methods based on the probability and non-probability methods*

Prof. (Mr.) Hiran H E Jayaweera

Professor, Department of Physics, University of Colombo

Contribution/Discussed topics:

- *Shared their expertise and knowledge and provided valuable guidance in refining participants' proposals and manuscripts*

Dr. (Mr.) Ruwan J. Illeperuma

Senior Lecturer, Department of Zoology, Faculty of Natural Science, Open University of Sri Lanka

Contribution/Discussed topics:

- *Shared their expertise and knowledge and provided valuable guidance in refining participants' proposals and manuscripts*

Mrs. W.A.S. Wijendra

Senior Research Officer, Medical Research Institute, Colombo

Contribution/ Discussed topics:

- *Identification of the research problems and literature review*

Prof. (Mrs.) Sevvandi Jayakody

Chair Professor to the Department of Aquaculture and Fisheries, Wayamba University of Sri Lanka

Contribution/Discussed topics:

- *Shared their expertise and knowledge and provided valuable guidance in refining participants' proposals and manuscripts*

Mrs. Shiromi de Silva

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Contribution/Discussed topics:

- *Statistical approaches for workplace-based research on higher priority hot topics*
- *Sample size calculation*

Dr. (Mr.) Sameera Vishwakula

Senior Lecturer, Department of Statistics, University of Colombo.

Contribution/Discussed topics:

- *Statistical analysis using statistical Software*

Dr. (Mrs.) Dilusha Wickramasinghe

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Contribution/Discussed topics:

- *Importance of Problem Identification, Literature Review, and Key Research Elements in Research proposal writing.*

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The Department of Health, Sri Lanka

The Ministry of Health is responsible for providing health services for all the citizens of the country. The goal is to provide a sufficient quality service to people in need of promotive, preventive, curative, rehabilitative, and palliative healthcare that would achieve potential health gains.

Sri Lanka Scientific Service officers are contributing to the health service by giving their scientific expertise in numerous ways. **Research officers, Biochemists, Chemists, Medical Physicists Entomologists, Parasitologists, and Pharmaceutical Analysts** are representing the Sri Lanka Scientific Service at the Ministry of Health Nutrition and Indigenous Medicine**.**

Research Officers attached to the Medical Research Institute engage in rigorous studies spanning infectious diseases, treatment modalities, and preventive measures, with the potential to directly impact public health outcomes. They are contributing for researches in diversified areas in the fields of Virology, Bacteriology, Parasitology, Rabies, Nutrition, Biochemistry, Immunology, Entomology, Molecular Biology, Pharmacology, Electron Microscopy and Mycology

Biochemists in state hospitals perform high-performance tests, assist in diagnosis, and collaborate with health professionals. They develop new techniques, ensure diagnostic quality, manage laboratory operations, and perform technical validations. Chemists of Sri Lanka Scientific Service working in the Ministry of Health are attached to the Food Quality Control laboratories (FQCLs). The principal objective of these laboratories is to provide reliable test reports for the samples submitted by the authorized sampling officers, law courts, and other customers. The Medical Physicists at Cancer Hospitals perform an important role working along with a wide range of medical, technical, and administrative staff such as the radiation oncologist, and the radiotherapy technologist to ensure the accurate delivery of all aspects of a treatment prescription.

Pharmaceutical Analysts in the National Medicines Quality Assurance Laboratory provide the technical support needed to operate the quality assurance system in Sri Lanka by monitoring the compliance of the drugs, devices, cosmetics, and borderline products concerning quality, safety, and efficacy by laboratory testing of samples at pre- and post-marketing stages and issuing recommendations based on findings. Scientific officers at the toxicology laboratory of the Institute of Forensic Medicine and Toxicology belongs to Sri Lanka Scientific Service assist judicial medical officers and other legal authorities by providing valuable scientific evidence based on the results of the chemical analysis of autopsy samples and patient samples. Entomologists are providing technical expertise to control and eliminate vector-borne diseases in Sri Lanka. They are providing novel knowledge, expertise skills, and research-level experience for the field of entomology. Regional Malaria Officers (Anti-malaria campaign) were crucial in eliminating malaria in Sri Lanka. This role has now been restructured into Entomologist positions to enhance expertise in vector management and disease control.

The National Measurement Laboratory, Measurement Units Standards and Services Department (MUSSD), Sri Lanka

Measurement Units, Standards and Services Department (MUSSD) is established under the Measurement Units, Standards and Services Act No. 35 of 1995. MUSSD functions under the purview of the Ministry of Trade, Commerce and Food Security. MUSSD is situated at the new premises in the **Techno City** in Mahenawatta, Pitipana, Homagama since December 2015.

Metrology is the subject of interest of the MUSSD. Science of measurements and its applications are generally called **Metrology**. As every country in the world has a specific establishment called National Metrology Institute (NMI) MUSSD has been recognized to be the NMI in Sri Lanka. MUSSD has established under the same act the National Measurement Laboratory (NML) as its main body which is responsible for the establishment and maintenance of the National Measurement Standards, and International System of Units (SI) in Sri Lanka.

Measurements related to various physical quantities such as mass, length, time, temperature, pressure, volume, electric current, voltage & electric resistance, humidity, chemical measurements, etc. are frequently necessary for daily life activities. All the scientific research and regulatory activities carried out internationally and locally for sustaining a unity of physical quantities and measurement units can be defined as Metrology.

Can be mainly divided into three categories as Scientific Metrology, Industrial Metrology, and Legal Metrology. Establishment of the National Measurement System of the country via the National Measurement Laboratory (NML), Representation, establishment, maintenance, and dissemination of National Measurement Standards for various physical quantities, Implementation of the International System of Units (SI) in Sri Lanka, Maintenance of international measurement traceability through periodic calibrations of the National Measurement Standards, Upgrading the calibration and measurement capabilities (CMC) by participating in international bilateral and multilateral inter-comparisons related to various physical quantities, Metrology research activities, Generating Sri Lanka Standard Time and broadcasting via www.sltime.org, Providing calibration services for the industrial community in Sri Lanka, Dissemination and promotion of measurement parameters and technology necessary for different fields, Providing Type Approval for weight, measures, weighing and measuring instruments in the trade sector, Verification of weights, measures, weighing and measuring instruments used in the trade sector in the country are main activities which is carried out by the MUSSD as vested by the said act 35 of 1995.

MUSSD maintains international collaboration in Metrology being an associated member of the General Conference on Weights and Measures (CGPM), a full member of the International Organization of Legal Metrology (OIML), and a full member of the Asia Pacific Metrology Program (APMP). Further MUSSD is a signatory of the Mutual Recognition Arrangement of the International Committee on Weights and Measures (CIPM MRA).

The Department of Labour Scientific Service Officers in the Occupational Hygiene Division, Sri Lanka

Scientific Service Officers in the Occupational Hygiene Division are vital to safeguarding worker health, contributing significantly to national development. The division's vision emphasizes that a healthy worker is an asset, while its mission focuses on the comprehensive well-being of workers—physically, mentally, socially, and spiritually.

Key activities of the officer include:

- **Hazard Identification:** Recognizing potential workplace hazards such as physical, chemical, biological, psychosocial, and ergonomic risks.
- **Risk Assessment and Control:** Evaluating and mitigating risks to ensure a safe working environment.
- **Environmental Monitoring:** Regularly checking factors like illumination, heat stress, ventilation, and noise levels to maintain safety standards.
- **Safety Audits:** Conducting audits to ensure compliance with occupational safety regulations in factories' ordinances.
- **Awareness Programs:** Educating employees and employers about occupational safety and health practices.
- **Expert Evidence:** Providing crucial insights in cases of industrial accidents and diseases.

Through these activities, the Scientific Service Officers ensure that workplaces not only meet regulatory standards but also foster a safe and healthy environment, crucial for the well-being of workers and the nation's economic stability.

The Ministry Subject to Science, Technology, and Research, Sri Lanka

Officers of the Sri Lanka Scientific Service (SLSS) assigned to the Research Division of the Ministry of Science, Technology, and Research play a pivotal role in advancing the nation's research sector and disseminating scientific knowledge. Their responsibilities are aligned with the Ministry's mandate to foster research development and popularize science across the country.

Research Facilitation: The Research Division is primarily focused on research facilitation and is responsible for guiding five research institutions and two research grant-awarding bodies. These institutions are assisted in developing their annual research action plans, and the Division closely monitors the progress of these plans. The Division also plays a crucial role in identifying national research needs and facilitating stakeholder discussions to promote a responsive and dynamic research culture.

A key initiative currently being undertaken by the Division includes the development of a National Research Roadmap, which will provide strategic direction for research activities in the country. Additionally, the Division is working on establishing a centralized mechanism to manage government-funded research projects and oversee the performance of research institutions. This ensures a coordinated approach to the management of research resources and outputs.

Furthermore, the Division oversees the grant-awarding process and monitors internationally collaborative research programs, ensuring that these projects align with national priorities and deliver meaningful outcomes. The Division also handles all other research-related duties assigned to the Ministry.

Science Popularization: In addition to research facilitation, the Research Division is actively involved in the networking and coordination of science popularization activities. This includes the organization and management of events by institutions under the Ministry's purview, such as the annual National Science Day celebration. By coordinating these activities, the Division helps to promote scientific awareness and education, fostering a culture of scientific inquiry and innovation within the community.

The Government Analyst's Department, Sri Lanka

The Government Analyst's Department, being the only forensic science laboratory in Sri Lanka, consists of two major divisions namely Food Science and Forensic Science. Food Science Division includes four areas namely Food, Liquor, Milk, and Water. Forensic Science Division has nine (09) major disciplines as Forensic Ballistics, Forensic Serology and DNA, Forensic Toxicology, Explosives and Fire Investigation, Narcotic Drugs, Forensic Questioned Documents, Computer Forensic and Forensic Miscellaneous Section.

The Department proves to be a service-providing institution in that it provides scientific-analytical, advisory, and consultancy services. The Government Analyst's Department issues analytical reports upon scientific examination and analysis of productions (evidence) referred to it by the Law Courts, Department of Police, Department of Customs, Department of Excise, Local Government Institutions, Ministry of Health, Port Authority as well as other Government Departments and Statutory Bodies. Further, it carries out analysis to ensure the quality of food, liquor, milk, and dairy products with the samples being referred to the Department by the various Government Departments and state-sponsored bodies. Additionally, the samples received from the Department of Customs are also analyzed for quality. The Questioned Documents Section prepares analytical reports after examination of the questioned documents forwarded by the Courts of Law.

All productions (evidence samples) submitted for testing are analyzed according to various acts and ordinances such as the Food Act, National Environment Act, Excise Ordinance, Tobacco and Alcohol Act, Cosmetics, Drugs and Devices Act, Control of Pesticides Act, Fire Arms Ordinance, The Explosives Act, Poisons, Opium and Dangerous Drugs Ordinance, Motor Traffic Act, Criminal Procedure Code, Civil Proceeding Code, Evidence Ordinance etc.

Moreover, the Department provides investigation and consultancy service to the Police Department for crime scene investigations related to grave crimes such as explosions, shootings, fires and fatal motor traffic accidents in the country. Further scientists in the toxicology section attend for food testing in the missions of foreign VIP delegations in Sri Lanka. In support of scientific reports issued by Government Analyst's Department, officers appear before courts for expert testimony.

The Department also functions as the scientific/technical consultant to other Government Departments and Government sponsored institutions. The contribution by the officers to the Sri Lanka Standard Institute for making standards is an important service. The experts also assist in Technical Evaluation Committees of the Ministry of Defense for purchasing of arms, ammunition and an explosive substance for the Ministry of Defense.

Further, Department provides training for Judicial Medical Officers, Police, Scenes of Crime officers, three forces, trainee lawyers of Attorney's General Department and public health inspectors etc, on forensic and food science.

The Department of Export Agriculture, Sri Lanka

The Department of Export Agriculture (DEA) is the main government institution that works under the scope of the Ministry of Agriculture and Plantation Industries. Established in 1972, the DEA plays a pivotal role in the Research and Development of a diverse range of Export Agricultural Crops (EAC) namely Black Pepper, Cardamom, Clove, Nutmeg, Coffee, Cocoa, Vanilla, Betel, Citronella, Lemongrass, Ginger, Turmeric, Goraka and Arecanut using productivity, production and quality improvement.

The DEA is driven by a clear vision of achieving "Excellence in Exports of Spices and Allied Products." The Research and Development divisions of the Department of Export Agriculture were established alongside the department's establishment in 1972. The Development Division has expanded its operations to Seventeen key districts, focusing on the cultivation of EACs. The department's first research station was set up in Matale and now it has evolved into the Central Research Station. Additionally sub research stations were established in Narammala, Walpita, Kundasale, Delpitiya and Nilambe to enhance the department's research capabilities. Identifying the importance of scientific approach to agriculture economics, a separate unit was established for Economic Research activities related to EACs.

Both Research and Development divisions are responsible for providing farmers with the necessary technical knowledge and support to adopt modern, sustainable agricultural practices for EACs through training programs, workshops, TV and radio programs and field demonstrations. The department actively promoted Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP) for EACs emphasizing the importance of implementing food safety standards within the domestic production system which complies with the global export market.

With the aim of providing a live experience of EACs to both local and foreign tourists, the DEA recently established the National Spice Garden in Matale, the only national spice garden in Sri Lanka.

Currently, a dedicated team of officers belonging to Sri Lanka Scientific Service are working permanently within the department together with officers belonging to other services contributing in the economic development of Sri Lanka, making it an indispensable institution for the growth of the nation’s agricultural exports.

The Department of Meteorology, Sri Lanka

Regarding the origins of the Department of Meteorology, which is the oldest institution under the scope of the Ministry of Defense, the first formal meteorological observation in Sri Lanka started in 1867 under the Survey Department. Later in 1909, a separate section called the Colombo Observatory was established for meteorological work in the premises of the present Meteorological Department. The Colombo Observatory was made an independent department in 1948 with the primary objective of providing weather and climate services. At present, the Department of Meteorology is working as the statutory agency of the government to provide services related to meteorology and climate science. Authorized National Agency for Early Warning of Meteorological and Climatological Disasters and Tsunamis.

The main vision of the department is to be the best intelligence center providing weather and climate services in Sri Lanka by national and international standards to the public sector, private sector organizations, and the public.

The department provides relevant weather forecasting services and warnings of severe weather conditions (including cyclones, strong winds, lightning, and gusts) for international aviation and maritime activities, agriculture, energy, fisheries, shipping, insurance and other areas of interest. Also providing meteorological and climatological data and data for a national framework and research activities, organizing educational, training programs and workshops in the fields related to the specified themes for school students, policymakers and decision-makers interest groups, exhibits, and resources.

The Meteorological Department is headed by the Director General of Meteorology. The department consists of twenty-three regional offices scattered in the country including meteorological offices established at Katunayake, Mattala and Rathmalan Airports to provide meteorological services for international and domestic flights. 38 Automatic Weather Observing Stations and 135 Automatic Rain Gauge Stations are functioning under the direct management of the Department for data acquisition. In addition, 35 agro-meteorological centers for obtaining agro-meteorological data and around 450 rainfall centers for obtaining rainfall data throughout the island are maintained with the support of various institutions.

There are 34 scientists are working as meteorologists and most of them are working as operational weather forecasters in the Department of Meteorology. They provide weather and climate information, forecasts, and bad weather warnings to the general public as well as various sectors in various temporal and spatial scales. Temporal scales span from nowcasting/very short-term (several hrs ahead), short-term (day ahead), mid-term (week to month ahead), and long-term (years to decades ahead) term. Meteorologists are providing weather and climate forecasts for water, Irrigation, power, and energy sectors, for maximizing the usable component of the water and generated power.

The Forest Department, Sri Lanka

The Forest Department of Sri Lanka is a key government agency responsible for the management, conservation, and sustainable development of the country's forest resources which was established in 1887. The department plays a vital role in protecting the rich biodiversity of Sri Lanka, with the Mission to conserve, protect, and sustainably manage forest resources for the benefit of current and future generations and with the vision of ensuring a sustainable, productive, and healthy forest ecosystem that supports the social, economic, and environmental well-being of the country. Based on the latest forest cover assessment the existing forest cover of Sri Lankan is 29.7%. The Forest Department is headed by the Conservator General of Forests, who is supported by the Conservator of Forests and other senior officials. The department is organized into several regions (5) and divisions (23).

The primary responsibility of the Forest Department is to conserve and manage the forest resources of Sri Lanka. This includes protecting natural forests, promoting reforestation, and ensuring the sustainable use of forest resources. Sri Lanka is a biodiversity hotspot, home to numerous endemic species. The Forest Department works to protect the country's unique biodiversity through the establishment and management of protected areas, such as conservation and reserve forest areas. The department promotes sustainable forest management practices, ensuring that forest resources are used in a way that meets the needs of the present without compromising the ability of future generations to meet their own needs. This includes regulating timber harvesting, controlling illegal logging, and promoting agroforestry.

Reforestation and afforestation are key strategies employed by the department to restore degraded forest lands and increase forest cover. The department undertakes tree-planting campaigns and promotes community participation in reforestation efforts. The Forest Department is responsible for enforcing forest laws and regulations to prevent illegal activities such as unauthorized logging, encroachment on forest lands, and wildlife poaching. Forest officers are empowered to take legal action against violators. The Forest Department has separate research divisions, located in Kubalpola and the Badulla which conduct research on various aspects of forest ecosystems, including flora and fauna, forest health, and sustainable management practices. The Forest Department promotes ecotourism as a means of generating revenue while conserving natural resources. This includes developing and managing nature trails, eco-lodges, and other facilities that allow visitors to experience Sri Lanka's natural beauty without harming the environment. The Forest Department faces several challenges, including deforestation, illegal logging, human-wildlife conflicts, and the impacts of climate change. Addressing these challenges requires continuous effort, collaboration with various stakeholders, and the implementation of innovative conservation strategies

The Department of National Museums, Sri Lanka

The Department of National Museums (DNM) of Sri Lanka serves as a vital institution connecting tangible and intangible heritage to the public, inspiring discovery, and creativity, and promoting cultural and natural values. With a mission to provide meaningful museum services and a vision to become the leading museum service provider in South Asia by 2035, the DNM is committed to the acquisition, documentation, and scientific preservation of artifacts and specimens reflecting Sri Lanka's rich cultural and natural heritage.

From 2023 to 2027, the DNM has set several key fiscal priorities to enhance its role further and reach. These include delivering strong attendance results for the 150th-anniversary celebrations of the Colombo National Museum, accelerating its digital strategy to stay relevant in a mobile-connected world amidst growing competitionෙ increasing awareness of and access to research and collections, refining exhibition strategies to broaden appeal, enhancing school group attendance to fulfill its educational mission, and increasing annual revenue. It is responsible for collecting, documenting, and preserving artifacts and specimens across fields such as archaeology, anthropology, botany, zoology, entomology, and geology. It provides a robust research service through the National Museum Library, which houses some of the oldest preserved books and manuscripts in Sri Lanka. The department also conducts and publishes research, reprints rare books, and offers educational programs, workshops, and seminars to promote knowledge in related fields. Furthermore, the DNM acts as a resource institution for university students and higher education institutions, provides consultancy services for museum setups by external agencies, and contributes to national income by promoting museum visits both locally and internationally.

The Department of Archaeology, Sri Lanka

Sri Lanka has a long history of both tangible and intangible heritage as a country. The Department of Archaeology has been established to protect the tangible heritage for the next generation. Tangible assets like old coins, Buddha statues, clay pots etc are being found through excavations done by the department and those metallic, clay and other types of tangible assets are forwarded to the chemical conservation division of the Department of Archaeology to conserve those items depending on the physical nature of each item.

Mural paintings and sculpture conservation is also another action taken by the chemical conservation division. World heritage sites like Sigiriya, Dambulla cave temple consist of many mural paintings and the Department of Archaeology is the apex body of conserving those paintings. Novel technology of conservation found through researches done in other countries is also considered in this conservation process.

Lichen removal and suppression of wild trees grown on monuments are also done by the Department of Archaeology. In order to prevent addition of harmful chemicals to water streams, the Department of Archaeology is following an environmental friendly traditional method for plant suppression.

The Department of National Botanic Gardens, Peradeniya, Sri Lanka

Sri Lanka's botanic Gardens have a long and proud history, punctuated by colonialism, industrial change and wars. Throughout this period the Gardens have continued to flourish, and the plant collections and herbarium grown and now days the Gardens represent a significant national asset for Sri Lanka. The plant collection and herbarium are important resources for both teaching and research, serving as reference for the different plant families, genera and species represented.

Gardens provide an area for leisure where examples of plants from around the world demonstrate the diversity and beauty of the plant kingdom to share knowledge and expertise in conservation, biodiversity, floriculture and sustainability. The Gardens exist for people; and over 2milion of them visit the gardens annually.

All the botanic gardens are managed and maintained by the Department of National Botanic Gardens, employing almost 450 people. All Botanic Gardens functioned under the Department were started during the early years of the 19th century. The Royal Botanic Gardens, Peradeniya (1821); Botanic Gardens in Hakgala (1861) and Botanic Gardens, Henarathgoda, Gampaha (1876) were established by the British to conduct experiments on exotic economic plants and explore plant wealth on the island.

These institutions were responsible for all major plant introductions for economic and environmental development in Sri Lanka. In addition to the main 3 Botanic Gardens a National Medicinal Plant Garden was established in 1950s at Ganewatta to promote conservation, sustainable use and management of Medicinal Plants in Sri Lanka. Two new botanic gardens were established in Hambanthota for ex-situ conservation of Dry Zone plants and in Avissawella for ex-situ conservation of Wet Zone plants with expectations of the economic development of the country.

All the botanic gardens are working towards achieving the vision, of being the finest botanic garden in the tropics by providing opportunities for the public to study, sustainably conserve, and admire plant resources in natural and man-made environments regional centers for plant life, and the national red list authority for plants. Current activities within the Department of National Botanic Gardens include: education and training high quality scientific research with contributions to biodiversity, ex-situ conservation and public education and addressing in-situ conservation measures; biodiversity, floriculture as well as it is responsible for the maintenance and development of the Botanic Gardens and its allied units.

The Department of National Zoological Gardens, Sri Lanka

Dehiwala Zoological Gardens was started by Mr. John Hargenbergin early 1920's as a private collection in 11 acres. It was officially taken over by the Government on the 1st of July 1936. It was established as an independent public department in 1946 and later administrative and management functions were subjected to the National Zoological Gardens Act no. 41 of 1982. At present, the Department consists of four ex-situ conservation operational units namely: Dehiwala Zoo, Pinnawala Elephant Orphanage, Pinnawala Zoo and Ridiyagama Safari Park. Apart from these Gonapola farm, Kahapola farm and Diyagama farm is in operation to produce animal feed.

Ex-situ conservation plays a pivotal role in the protection and preservation of endangered species, and the Department of National Zoological Gardens in Sri Lanka is at the forefront of these efforts. Established with the mission of conserving the rich biodiversity of Sri Lanka, this department operates a network of zoological gardens dedicated to safeguarding both native and exotic wildlife. The primary objective of these gardens is to provide a sanctuary for species facing critical threats in their natural habitats, thereby contributing to global conservation efforts.

Through well-managed breeding programs, habitat replication, and public education, the Department of National Zoological Gardens aims to enhance genetic diversity, foster a deeper understanding of wildlife, and promote conservation awareness among the Sri Lankan public. This holistic approach underscores the department's commitment to preserving the natural heritage of Sri Lanka while contributing to broader global conservation goals.

This holistic approach not only contributes to wider global conservation goals but also underscores the Department of National Zoological Gardens' dedication to preserving Sri Lanka's natural heritage. The department's commitment to excellence in conservation and management has been recognized through the receipt of National Productivity Awards from 2019 to 2022. These accolades reflect the department's effective and innovative efforts in ex situ conservation, highlighting its significant impact on both national and global scales.

The Department of Wildlife Conservation, Sri Lanka

The conservation of Sri Lanka's indigenous flora and fauna is a national priority, and the Department of Wildlife Conservation (DWC) plays a crucial role in safeguarding these natural resources. Entrusted with the long-term protection of wildlife across Sri Lanka's land and sea territories, the DWC operates under the legal framework of the Fauna and Flora Protection Ordinance (FFPO). The department manages an extensive network of Wildlife Protected Areas (WLPAs) that spans over 12,500 km², which accounts for 18.9% of Sri Lanka's land surface. To date, the DWC has established 109 WLPAs, including 40 National Reserves and 69 Sanctuaries.

The FFPO also provides legal protection for wildlife resources outside the designated protected areas. The DWC is the authority responsible for enforcing these laws, ensuring that wildlife conservation extends beyond the boundaries of WLPAs.

In addition to preserving biodiversity, the DWC's network of WLPAs plays a vital role in protecting large-scale reservoirs and their catchment areas, which are essential for agriculture and hydro-power generation in Sri Lanka. Most major reservoirs, Tank catchment areas and also the upper catchments of major rivers fall within these protected areas. The DWC safeguards over 40 reservoirs that are crucial for agriculture and hydro-power generation.

Vision: Conservation of wildlife heritage for present and future generations.

Mission: Ensure the conservation of wildlife heritage through participatory management.

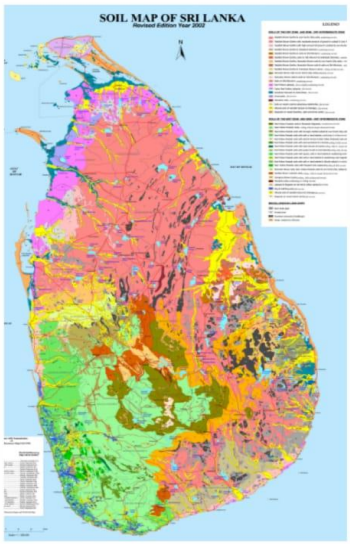
Objectives:

- Develop national strategic plans and programs for wildlife conservation, aligned with national and international policies.
- Secure and enhance protected areas representing all natural ecosystems in Sri Lanka, ensuring the sustainability of wildlife populations.
- Identify, classify, and manage protected areas based on scientific research and regulations, while monitoring their status.
- Prepare and implement conservation plans for endangered species.
- Facilitate eco-tourism in protected areas, with a focus on ecosystem conservation.
- Enforce the Fauna and Flora Protection Ordinance and other regulations to combat illegal wildlife exploitation.
- Promote scientific research relevant to wildlife management in Sri Lanka.
- Enhance the skills of DWC staff through training, encouragement, and motivation.
- Increase public participation in conservation activities through awareness programs.
- Encourage communities living around protected areas to engage in conservation efforts, while improving their socio-economic conditions by reducing their dependency on protected areas.



The Department of Irrigation, Sri Lanka

The Land Use Division of the Irrigation Department conducts reconnaissance soil surveys, detailed medium-intensity soil surveys and detailed soil surveys, determines all possible land use options for a given area, and produces soil maps, land use maps, and land suitability maps at the national, provincial, district, project, and farm levels. The division provides essential soil data for planning and designing irrigation projects and makes recommendations for suitable crops and land use types.



The division also monitors the water quality of major and medium irrigation reservoirs and rivers and conducts chemical and physical analyses of soil and water. Also conduct quantitative assessments of potential hazards such as potential acidity, alkalinity and salinity.

The Geology Branch of the Irrigation Department carries out geological investigations and prepares geological maps required for proposed irrigation projects. It also prepares final geology reports based on data obtained from borehole logging and geophysical investigations. Additionally, the branch provides training for drilling assistants in the field of geology as needed.

"Gate for the Integral Research towards Nation Building"

SYMPOSIUM PROGRAMME

At Auditorium, 19th Floor, District Secretariat Office-Colombo

Day 1: Thursday, 29th August, 2024

Inauguration Ceremony		
8:30 – 9:00	Registration	
9:00 – 9:10	The lighting of the oil lamp and the National Anthem	
9.10 – 9.20	Welcome Address	Ms. Chathuradhi Wijesinghe Director, Scientific Service, Ministry of Public Administration
9.20 – 9.30	Address by Chief Guest	Mr. Pradeep Yasarathna Secretary, Ministry of Public Administration
09.30 – 09.45	Address – Workshop Overview	Mr. J.M.R. Jayasundara President SLCSS
09:45 –10:00	Launching of SLCSS Website	
10:00 –10.15	Vote of thanks	Ms. N. Sriyani Amarasinghe, Senior Biochemist, NHSL Vice president SLCSS Symposium organizing committee Co-chair,
10.15 – 10.45	Tea & Poster display for non-participants	
10.45 – 11.00	Keynote Speech 1 Guest of Honour	Mr. L. Gunarathna Former Director General, Export Agriculture
11.00 –11.30	Keynote Speech 2	Dr. Sepali Sudasingha Director General, NSF
11.30 – 12.00	Review of the workshop by participants	
12:00 –12:45	Lunch	
Symposium Session 1		
12:45 – 14:00	Natural Sciences (Oral Presentations)	
14:00 –14:15	Tea & Poster display for non-participants	
14:15 – 15:30	Natural Sciences (Oral Presentations) cont.	

Day 2: Friday, 30th August, 2024

Symposium Sessions 2 & 3		
9:00 – 10:30	Chemical Sciences (Oral Presentations)	
10:30 –10:45	Tea & Poster display for Non-participants	
10:45 – 12:00	Physical Sciences (Oral Presentations)	
12:00 – 12:45	Lunch	
12:45 – 15:15	Closing Ceremony and Distribution of Certificates	
15:15 – 15:30	Thanking Speech	Mr. Lakitha Ruvinda General Secretary, SLCSS

SECTION 1

Abstracts submitted by the participants of the workshop titled

"The Complete Researcher: From Design to Manuscript".

Session 01 – Natural Sciences (Oral Presentations)

EVALUATION PANEL

- Dr. Sevvandi Jayakody: Chair Professor to the Department of Aquaculture and Fisheries, Wayamba University of Sri Lanka
- Dr. J.M. Seneviratne: Former Director (Regulations), Department of Export Agriculture
- Ravindra Jayanetti: Former Regional Malaria Officer, Anti-Malaria Campaign

PRESENTERS

NS 1 Application of Four Body Condition Scoring Indices to Assess the Wellbeing of Asian Elephant (Elephas maximus maximus) at the Pinnawala Elephant Orphanage, Sri Lanka

Medawala UGMS - *Elephant Orphanage, Pinnawala, Rambukkana, Sri Lanka*

NS 2 Suitability of Conversion of Pine Plantation to Broad Leaved Forest. A Study in Matara and Galle Districts

Heenatigala M - *Northern Regional Office, Forest Department, Vavunia*

NS 3 Assessment of Selected Larvicides for the Control of Aedes Species (Diptera: Culicidae) under Laboratory Condition

Kariyawasam CS - *Office of the Regional Director of Health Service, Kalutara, Sri Lanka*

NS 4 Evaluate The Effect of Stem Cutting Hanging Duration and Number of Nodes on Nursery Performance of Vanilla (Vanilla planifolia) In Sri Lanka

Munasinghe MSS - *Intercropping and Betel Research Station, Narammala, Sri Lanka*

NS 5 Comparative Effectiveness of Sterilization Methods on In-Vitro Shoot Multiplication of Vanilla (Vanilla planifolia)

Rupasinghe PAHI- *Tissue culture research station and Central Plant Nursery, Department of Export Agriculture, Walpita, Sri Lanka*

NS 6 Characterization of Aedes Mosquito Breeding Habitats in High-Risk Areas of Kalutara District, Sri Lanka: Implications for Targeted Dengue Vector Control

Indika AVDJ - *Unit of Medical Entomology, National Institute of Health Science, Kalutara, Sri Lanka*

NS 7 Breeding Habitat Distribution of Dengue Vector in Five Selected High-Risk MOH Areas in Batticaloa District and Potential Risk for Disease Transmission: A Cross-Sectional Study

Dharshini K - *Office of the Regional Director of Health Services, Batticaloa*

NS 8 Determination of the Peak Active Period of Dengue Vectors, Using Two Adult Collection Techniques to Optimize Space Spraying in The Kegalle District, Sri Lanka

Wickramasinghe TKC - *Regional Director of Health Services Office-Kegalle*

NS 9 Determination Of The "Level of Receptivity" For the Reported Malaria Cases In 2021 & 2022 For Optimizing the Resource Allocations

Fernando MAST - *Anti Malaria Campaign, Colombo, Sri Lanka*

NS 10 Breeding Habitats and Spatio-Temporal Distribution of *Anopheles stephensi* and *Anopheles culicifacies* Larvae in Jaffna Peninsula, Sri Lanka

Priyadarshani S - *Anti-Malaria Campaign*

NS 11 Re-Catalog of wet preserved Skinks specimens deposited in the Colombo National Museum, Sri Lanka

Somarathna KPLP - *Zoology Division, Department of National Museums, 53, Sir Marcus Fernando*

NS 12 Evaluating The Thermal Stability of Metal-Impregnated Biochar Derived from Elephant Dung for Enhanced Agricultural and Environmental Applications

Abeysinghe N - *Department of National Zoological Gardens, Sri Lanka*

NS 13 Characteristics and diversity of breeding sites of Aedes aegypti and Aedes albopictus in the coastal belt of Galle district, Sri Lanka.

Dissanayake DMDS - *Regional Director of Health Services office-Galle*

NS 14 Impact of Climatic Factors on Filarial Vector Density and Infection Rate in Habaraduwa Medical Officer of Health Area in Galle District, Sri Lanka

Dassanayaka DMT - *Anti Filariasis Campaign, Ministry of Health, Sri Lanka*

Session 02 – Chemical Sciences (Oral Presentations)

EVALUATION PANEL

- Prof. Champa Jayaweera: Head of the department, Department of Chemistry, University of Sri Jayewardenepura
- Ms. Dileepa M. Endagamage: Senior lecturer, Department of Decision Sciences, University of Sri Jayewardenepura
- Ms. Deepika Seneviratne: Government Analyst, Government Analyst's Department

PRESENTERS

CS 1 Iodine Loss in Iodized Salt, Is It True? A Study on Factors Affecting Loss of Iodine from Iodized Salt

Amarathunga YN - *Department of Nutrition, Medical Research Institute, Sri Lanka*

CS 2 Assessment of Iodine Levels in Iodized Salt across Selected Districts in Sri Lanka

Ranasinghe RAKDK - *National Institute of Health Sciences, Kalutara, Sri Lanka*

CS 3 Impact of Reverse Osmosis Treatment on Chemical Parameters of Well Water in North Western Province, Sri Lanka

Dharmadasa ADJD - *Provincial Food Laboratory (North Western Province), Sri Lanka*

CS 4 Effect of Occupational Noise Exposure on the Hearing of Employees in Textile Industries in Kalutara District: A Pilot Study

Dilrukshi OC - *Department of Labour, Colombo, Sri Lanka*

CS 5 Relationship Between Blood Alcohol Concentration and Reported Cases of Road Traffic Accidents and Suicidal Attempts in Colombo District;

A Retrospective Analysis (2018-2022)

Uluwita NDSA - *Institute of Forensic Medicine and Toxicology, Colombo, Sri Lanka*

CS 6 Implementation of Patient-Based Real-Time Data Monitoring System for TSH And Free T4 Assays at The National Hospital, Sri Lanka

Thilakarathna RMLP - *Department of Chemical Pathology, National Hospital, Sri Lanka*

CS 7 Detection of Herpes Viral DNA in Suspected Herpes Encephalitis Patients in Sri Lanka-A Retrospective Study

Harshani HBC - *Medical Research Institute, Colombo-08, Sri Lanka*

Session 03 – Physical Sciences (Oral Presentations)

EVALUATION PANEL

- Mr. Dilip Kumara: Former Senior Physicist, Teaching Hospital, Karapitiya
- Mr. Sarath Premeal: Director, Department of Meteorology
- Mr. Dilan Fernando: Senior Medical Physicist, Asiri American Oncology Institute Cancer Centre (Pvt) Ltd.

PRESENTERS

PS 1 Development of a 1-D Gamma Analyzer Software Tool for Verification of Radiotherapy Beam Profiles and Percentage Depth Doses

Ruvinda KKDL - *National Cancer Institute, Maharagama*

PS 2 A simple tool for evaluating Lead Equivalent Thickness and Uniformity for Protective Aprons Used in Radiology

Rajapaksha RLRAS - Teaching Hospital, Kurunegala, Sri Lanka

PS 3 Impact of Contact Deformation and Vertical Shrinkage of Long Gauge Blocks Used in Mechanical Comparison Method

Naminda ADD - Dimensional Metrology Division, National Measurement Laboratory Measurement Units, Standards and Services Department

PS 4 Measuring Dose Reduction in Radiotherapy Caused by the Carbon Fiber Treatment Couch Top for 6 MV Photons Beam at Various Gantry Angles at A Fixed Couch Position

Ramalingam A - Teaching Hospital Jaffna

PS 5 Evaluation of Normalized Cumulative Dose Received from Patients Treated with Radioactive Iodine (131I) Therapy

Munasinghe A.S - National Cancer Institute of Maharagama, Sri Lanka

PS 6 Comparative Analysis of Radiotherapy Dose Distribution in Bilateral Breast Cancer: IMRT vs. VMAT vs. 3DCRT Planning

Kumari TN - National Cancer Institute, Maharagama, Sri Lanka

Session 1:

Natural Sciences

Oral presentations

Application of Four Body Condition Scoring Indices to Assess the Wellbeing of Asian Elephant (*Elephas maximus maximus*) at the Pinnawala Elephant Orphanage, Sri Lanka

Medawala UGMS[1*], Ranawana KB[2], Abeysundara SP[3]

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[2] *Department of Zoology, Faculty of Science, University of Peradeniya, Sri Lanka*
[3] *Department of Statistics & Computer Science, Faculty of Science, University of Peradeniya, Sri Lanka*
**mail2mihiran@gmail.com*

Introduction: Annually, due to HEC, 70 humans and 250 elephants lose their lives, and about 14 elephant calves become orphans. Pinnawala Elephant Orphanage (PEO) is an institution for taking care of orphaned elephants in the wild in Sri Lanka. As a decent indicator of health and management, the body condition score (BCS) index is being subjectively used, which measures the body fat reserves of animals, particularly over the bony prominences.

Objectives: The study aimed to assess the body condition of elephants at PEO using various BCS indices and determine the most suitable index for ongoing monitoring. Additionally, the study sought to identify outlier elephants with extreme body condition scores and propose targeted interventions to enhance their care.

Methodology: The four body condition scoring methods were used to score 62 elephants at PEO. The 0 to 11-point scoring system was used in Wemmer's index. Fernando's index is based on the comparison of five reference photographs with a score from 1 to 10. Wijeyamohan's index is based on the extent of visibility of bone depressions, scoring from 1 to 10. Morfeld's index is based on three anatomical regions, using a 1 to 5-point scoring system. The relationships between BCS scores and variables such as age, sex, and origin were analyzed.

Results & Discussion: The body conditions of elephants at PEO were independent of age, sex, or origin within the population. Four elephants were outliers on the lower end, while six elephants achieved the highest scores across all BCS indices. Neela, Ninja, and Thammanni were outliers due to health-related issues, while Kumari, at 57 years old, was an outlier due to age, both of which contributed to their poor body conditions. The six elephants who received full scores may be obese or overweight. All of them were female, and their obesity may be attributed to middle age, which can result in higher fat deposition and motherhood. Due to simplicity and user-friendliness, Fernando's BCS index is the most reliable index.

Conclusion: The overall body condition of the elephant population at PEO is satisfactory, and regular use of Fernando's BCS index is recommended for effective monitoring and care.

Keywords: Asian elephant; *Elephas maximus*; Body Condition Scoring Index; PEO

Acknowledgement: Special thanks to Dr. Premakanta, former DG of DNZG, for his invaluable support.

Suitability of Conversion of Pine Plantation to Broad Leaved Forest. A Study in Matara and Galle Districts

Heenatigala M[1*], Aluwihare WS[2] and Jayarathne A[3].

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[2]Social Forestry and Extension Division, Forest Department, Battaramulla
[3]Forest Department, Battaramulla
**mohanhee@gmail.com*

Introduction: Pine (*Pinus caribaea*), plantation covering 16,714 hectares exists in Sri Lanka, with 2433 in Matara and 477 hectares in Galle districts. Conversion of pine lands to broadleaved forests has been ongoing, in wet zone of Sri Lanka including Matara and Galle districts, though issues such as lack of comprehensive studies, public acceptance, and species selection persist. Officers primarily focus is on *Dipterocarpus zeylanicus* (Hora) as the species for pine conversion activities, rather than the mixed varieties.

Objectives: The objectives of this study were to evaluate the environmental and economic viability, and social acceptance, and to identify and recommend suitable plant species for such conversion programs in the wet zone of Sri Lanka.

Methods: Sites were selected where pine plantations were converted to broadleaved forests from 2012 to 2023, with one site in Galle and nine in Matara districts. Plant species used for the conversion, number of plants, plant height, DBH (Diameter at Breast Height) were recorded. Based on the Forest Department guidelines (2014), one sample was taken in each 4 ha of pine-converted lands. Three local residents were also interviewed for 10 ha of lands. Plant species diversity was assessed using Shannon Weiner Index, and also assessed the enhancement of species richness and soil conditions through photo monitoring techniques.

Results & Discussions: Species such as *Symplocos cochinchinensis*, *Dillenia rotusa*, and *Anacardium occidentale*, which were used for planting, show significant growth at the site located in Galle district, while *Dipterocarpus zeylanicus* shows better establishment at the sites in Matara district. Local people have a highly positive perception of this program in both districts because the conversion program has significantly increased their income. The Shannon-Weiner Index values indicate higher species richness in Galle compared to the Matara district.

Conclusions: The community has shown strong acceptance of the program. Converted land of Galle district exhibits significantly higher species richness and biodiversity compared to selected sites in Matara district. Utilizing mixed species tailored to the local conditions, such as *Symplocos cochinchinensis*, *Dillenia rotusa*, *Anacardium occidentale*, and *Dipterocarpus zeylanicus*, is recommended for the pine conversion programs in the wet zone.

Keywords: Shannon -Weiner index, species richness, Income level, Social Acceptance

Acknowledgement: I would like to express my gratitude to the Field Officers of the Forest Department in both Galle and Matara Divisions. They are contributions have been invaluable to the success of my research.

Assessment of Selected Larvicides for the Control of *Aedes* Species (Diptera: Culicidae) under Laboratory Condition

Kariyawasam CS

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Introduction: In Sri Lanka *Aedes aegypti* and *Ae. albopictus* act as the vectors of dengue. At present, Temephos is the main larvicide applied for the vector control by the public health authorities of Sri Lanka. In addition to that *Bacillus thuringiensis israelensis* (Bti), Spinosad and Polydimethylsiloxane are commercially available larvicides designated as larvicides for generalized and domestic use in Sri Lanka.

Objectives: This study aimed to determine the bio-efficacy and residual effect of Temephos sand granules, Bti H-14 mosquito dunks, Spinosad bilayer tablets, and Polydimethylsiloxane as the larvicides against *Aedes* species under laboratory conditions.

Methods: Laboratory bioassay was conducted and evaluated at the label dose with three replicates. *Aedes* eggs were collected by placing ovitraps in Kalutara district. Laboratory-reared 3rd and 4th instar larvae were used for the experiment. Mortality of mosquito larvae was recorded after 24 hours. To detect the residual effect, the experiment was carried out for up to 35 weeks. One-way ANOVA test was used to determine the significant difference in larval mortality between treatment and control.

Results & Discussion: Both *Ae. aegypti* and *Ae. albopictus* showed 100% mortality for Temephos and Spinosad within the first 24 hours. Nevertheless, Bti and Polydimethylsiloxane gave 92 – 95% and 0 -16% larval mortality respectively indicating that Temephos, Spinosad, and Bti are fast acting larvicides than Polydimethylsiloxane. Moreover, Spinosad, Temephos and Bti caused 100% mortality of *Aedes* larvae respectively up to 25th, 14th and 5th week of post treatment indicating Spinosad and Temephos have the longest residual effect than Bti. Also, there was a significant difference ($p < 0.05$) between mortality of treatment and control of Spinosad, Temephos and Bti respectively throughout the 35 weeks, up to 31st and 14th week.

Conclusion: This study indicates that Spinosad, Temephos and Bti can effectively control *Aedes* mosquito vectors in Kalutara district. Further studies should be conducted under different field conditions to get more information on the effectiveness and residual effect of these larvicides. Extensive lab and field trials are required to ascertain the larvicidal activity of Polydimethylsiloxane against *Aedes* species.

Keywords: *Aedes* species, Spinosad, Temephos, *Bacillus thuringiensis israelensis* (Bti), Polydimethylsiloxane, Residual effect

Acknowledgement: We extend our gratitude to the Sri Lanka College of State Scientists (SLCSS), and the Ministry of Public Administration for their invaluable support.

Evaluate The Effect of Stem Cutting Hanging Duration and Number of Nodes on Nursery Performance of Vanilla (*Vanilla planifolia*) In Sri Lanka

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Introduction: Vanilla (*Vanilla planifolia*) is a commercially significant vine, widely cultivated in tropical climates for its flavor and aromatic properties. Vanilla is propagated either vegetatively by stem cuttings or by micropropagation. In commercial cultivations propagation by stem cuttings is more profitable.

Objectives: The aim of this study is to investigate the effect of stem cutting hanging duration and the number of nodes on the nursery performance of Vanilla. Given the challenges of direct field planting in dry seasons, this research focused to identify optimal conditions for nursery plant production.

Methods: Vanilla cuttings were subjected to different hanging durations (0, 10, 20, and 30 days) and node counts (3 and 5 nodes). Growth parameters such as new leaves, new shoots, new roots, root length, and survival were assessed using a Complete Randomized Design (CRD).

Results & Discussion: The results of the Multivariate Analysis of Variance (MANOVA) showed significant effects of both node count and hanging duration, as well as their interaction on the growth of Vanilla cuttings. Cuttings with 5 nodes and no hanging (0 days) displayed superior performance, achieving the highest mean number of new roots (1.64) and root length (23.04 cm) while maintaining the highest survival rates. In contrast, extended hanging durations (30 days) consistently resulted in reduced growth across all parameters.

Conclusion: The study concludes that a combination of a higher node count (5 nodes) and no or minimal hanging duration (0–20 days) is more effective for enhancing the nursery performance of Vanilla cuttings, promoting robust root, shoot, leaf, and node development.

Keywords: *Vanilla fragrance*, Nursery, Nodes, Hanging duration

Acknowledgement: We gratefully recognize the invaluable support provided by the Department of Export Agriculture, the Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration.

Comparative Effectiveness of Sterilization Methods on *In-Vitro* Shoot Multiplication of Vanilla (*Vanilla planifolia*)

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Introduction: The *in vitro* propagation of Vanilla (*Vanilla planifolia*) has gained significant attention due to its economic value and increasing demand in the global market. Successful shoot multiplication is crucial for efficient plant production and propagation. Sterilization of explants and culture media is a critical step in preventing contamination and ensuring healthy plant growth. This study investigated the effectiveness of two sterilization methods namely autoclaving (Control) and the CSUP (see sap) method, which involves rinsing glassware and accessories with Sodium hypochlorite (NaOCl) on the survival and growth of Vanilla shoots *in vitro* to identify a superior method for the enhancement of shoot initiation and overall plant development.

Objective: This study aimed to compare the effectiveness of two sterilization treatments on the *in vitro* shoot multiplication of Vanilla.

Methods: The experiment employed a completely randomized design with 25 experimental units. Two treatments were tested: T1 (Control): Autoclaved culture medium, T2:(CSUP) Glassware and accessories were rinsed with 5% NaOCl before culture medium preparation (without autoclaving the culture medium). Selected shoot tips were washed under running tap water for 30 minutes, followed by disinfection with a surfactant solution containing disinfectant and fungicide. Subsequently, the tips were treated with 20% NaOCl solution for 10 minutes and rinsed with sterilized distilled water. The treated explants were then cultured in test tubes under T1 and T2 treatments. After 30 days, shoot initiation, number of leaves, and plant height were recorded. Data analysis included a Pearson Chi-Square test for survival and contamination counts, and descriptive statistics for growth parameters.

Results & Discussion: The CSUP Treatments (T2) showed a significantly higher survival rate (12 vs. 5) and lower contamination rate (13 vs. 20) compared to the control (T1), with a Pearson Chi-Square value of 4.466 ($p = 0.037$). The CSUP Treatments also resulted in a greater average number of leaves (3.8 vs. 3.0) and taller plants (3.88 cm vs. 3.02 cm). The R-squared value for plant height was higher in the CSUP treatments (52.45%) compared to the control (25%).

Conclusion: Rinsing glassware and accessories with 5% NaOCl before culture medium preparation significantly enhances survival rates, reduces contamination, and promotes better growth in Vanilla *in vitro* shoot multiplication compared to the conventional autoclaving method.

Keywords: CSUP, Low-cost micropropagation, Sodium hypochlorite (NaOCl)

Acknowledgement: The authors gratefully acknowledge the support provided by the Ministry of Public Administration, the Review Committee, and Mrs. M.S.S. Munasinghe.

Characterization of *Aedes* Mosquito Breeding Habitats in High-Risk Areas of Kalutara District, Sri Lanka: Implications for Targeted Dengue Vector Control

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Introduction: Rapidly spreading mosquito-borne disease, Dengue, is transmitted by *Aedes aegypti* and *Aedes albopictus*. As there is no efficient vaccine and specific treatment for dengue, vector control remains the cornerstone to prevent outbreaks. Understanding the breeding habitats characteristics of dengue vectors are crucial in implementing effective vector control strategies.

Objectives: To characterize the *Aedes* mosquito breeding habitats in two high-risk areas in the Kalutara district from January to December 2019.

Methods: The study was conducted in the Kalutara and Beruwala MOHs and study site was divided into three areas namely Urban, Semi-urban and Rural. All the possible places for *Aedes* breeding were examined. The larvae were collected and transferred to entomological laboratory at the National Institute of Health Science in Kalutara for identification. The collected data were statistically analyzed using IBM SPSS statistics version 23, at α =0.05level of significance.

Results & discussion: During the study, 8,657 houses were surveyed, revealing 1.85% positivity for *Ae. aegypti*, exclusively in urban areas (4.23%), where water storage containers were the preferred breeding habitats. About 12.18% of houses were positive for *Ae. albopictus* across all study areas, with the highest percentage in rural areas (17.83%) and a strong preference for breeding in temporary removal items. The larvae of *Ae. aegypti* were exclusively found in artificial habitats and larvae of *Ae. albopictus* were predominantly found in artificial habitats (98.28%) without significant differences ($\chi 2 = 28.437$, $p = 0.729$, df =28). Most of the breeding habitats of both vectors were found in outdoor shaded areas and composed of plastics followed by polythene with significant differences for both *Ae. aegypti* ($\chi^2 = 21.099$, df=11, $p = 0.049$) and *Ae. albopictus* ($\chi^2 = 28.761$, df=12, $p = 0.004$).

Conclusions: The study reveals distinct patterns in the breeding habits of both vectors, which have significant implications for vector control strategies. *Ae. aegypti* is predominantly an urban mosquito, favoring water storage containers, while *Ae. albopictus* exhibits a broader habitat range, thriving particularly in rural areas. Additionally, both species are strongly associated with plastic and polythene materials, emphasizing the importance of waste management and environmental sanitation in mosquito control.

Keywords: Dengue, *Ae. aegypti*, *Ae. albopictus*, Breeding Habitats characteristics

Acknowledgement: We gratefully recognize the invaluable support provided by the Director of the National Institute of Health Science, the Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration.

Breeding Habitat Distribution of Dengue Vector in Five Selected High-Risk MOH Areas in Batticaloa District and Potential Risk for Disease Transmission: A Cross-Sectional Study

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Introduction: Dengue fever is a significant public health concern in tropical and subtropical regions, including Sri Lanka, where *Aedes aegypti* serves as the primary vector for transmission. The Batticaloa district has been identified as a high-risk area for dengue outbreaks.

Objective: This study aimed to assess the prevalence and distribution of *Aedes* breeding sites across five high-risk Medical Officer of Health (MOH) areas in the Batticaloa district.

Methods: A cross-sectional entomological survey was conducted across five selected high-risk MOH areas in the Batticaloa district from January 2022 to December 2023. The survey involved the identification and inspection of potential *Aedes* mosquito breeding containers. Each container was examined for the presence of *Aedes* larvae. Larval indices were calculated for each MOH area.

Result & Discussion: Total of 6199 potential breeding sites were examined at 12,000 premises, and 6% (n = 742) were positive for *Aedes* larvae. During the study period, 974 *Aedes* positive containers were identified. The Batticaloa MOH area reported the highest number of larvae, with a significant portion originating from discarded non-degradable containers (24%). Conversely, the KPC MOH area had the fewest larvae, with temporary removal sites being the most common breeding habitats (24%) and commodes the least frequent (1%). Across all MOH areas, temporary removal sites and discarded non-degradable containers emerged as the most significant breeding habitats, underscoring the impact of poor waste management and environmental conditions on mosquito proliferation. *Ae. aegypti* was predominantly found across all targeted MOH areas, whereas *Ae. albopictus* was only observed in the Kaluwanchikudy MOH area. Larval indices varied among MOH areas. Kaluwanchikudy MOH exhibited the highest Premises Index (PI) of 8%, Container Index (CI) of 27%, and Breteau Index (BI) of 11%, indicating a higher concentration of breeding sites and an increased risk for dengue transmission. Despite lower indices in other areas, the presence of breeding sites across all five MOH areas highlights a widespread risk for potential dengue outbreaks.

Conclusion: These findings underscore the need for targeted vector control interventions, particularly in areas with high larval indices and prevalent breeding sites, to mitigate the risk of dengue transmission in the Batticaloa district.

Keywords: dengue fever, outbreak, vector control, *Aedes aegypti*, larval survey,

Acknowledgment: We gratefully recognize the invaluable support provided by the Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration.

Determination of the Peak Active Period of Dengue Vectors, Using Two Adult Collection Techniques to Optimize Space Spraying in The Kegalle District, Sri Lanka.

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Introduction: Dengue is becoming a major global and local health problem, mainly in urban and semi-urban settings. It is now endemic in more than 100 countries. As effective vaccines or medicine are not available, vector control is important in controlling dengue. Space spraying is a commonly used vector control intervention to eradicate infected dengue vectors. The correct timing targeting the peak active period of vectors is crucial for its effectiveness. Peak active period can be determined using adult vector collection techniques, such as Human Landing Collections (HLC) and Human Double Net Trap (HDN).

Objectives: This study aimed to determine the peak active period of dengue vectors to optimize space spraying and to verify the effectiveness of HDN and HCL on dengue vector sampling.

Methods: This study was conducted in two different localities namely Dehiovita and Mawanella, which are declared as sentinel sites for entomological surveys in Kegalle district. In each location, HLC and HDN techniques were performed with hourly collections for 24 hours, each month from July 2023 to March 2024. Adult mosquitoes were identified up to the species level. Results were analyzed using descriptive statistics using Minitab- 14 statistical software.

Results & Discussion: The mean number of dengue mosquitoes collected by HLC in two localities was significantly different from each other (Dehiovita = 3, Mawanella = 14.1 P= *0.011*). However, the mean numbers from HDN were not significantly different (*P= 0.05*). The total number of dengue vectors collected by HLC was higher than the number collected by HDN (p=0.379). In both sites, two peaks of active periods were observed; confirming bimodal biting behavior of Dengue vectors. When the two peaks were compared, vectors were highly active in the evening between 1600–2000 hours compared to 0006-0010.

Conclusion: HLC technique is more effective in monitoring the peak active period of dengue vectors compared to HDN. The data obtained from this study helps to determine the correct timing for the fogging operation to maximize the mortality of the dengue vectors. Therefore, it's advisable to carry out space spraying during evening hours (1600–2000) when the dengue mosquitoes are highly active.

Keywords: Dengue, *Aedes*, Peak active period, HLC, HDN

Acknowledgment: We are grateful to the staff of the Office of the Regional Director of Health Services- Kegalle, the Entomology teams of MOH- Mawanella, MOH Dehiovita and support provided by the Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration.

Determination Of The "Level of Receptivity" For the Reported Malaria Cases In 2021 & 2022 For Optimizing the Resource Allocations

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Introduction: Since the last indigenous malaria cases were reported in 2012, Sri Lanka has been certified malaria-free by the World Health Organization (WHO) in 2016. However, about 50 imported malaria cases are reported annually in the country. The implementation of relevant vector control activities based on the level of receptivity is important to minimize the potential malaria transmission risk where the cases are reported. The level of receptivity in a location is one of the major factors considered for resource optimization of the vector control.

Objectives: This study aims to assess the receptivity to malaria transmission in locations where malaria cases were reported in Sri Lanka during 2021 and 2022.

Methods: Malaria patients reported from January 2021 to December 2022 in Sri Lanka were included in the study. Entomology surveys were conducted in locations where the reported patients spent their nights during the previous two weeks before the onset of fever/ clinical features until treatment started the level of receptivity was determined for each location using the receptivity measuring guide published in the "Guidelines for Entomological Surveillance of Malaria in PoR Phase 2019".

Results & Discussion: A total of 63 malaria cases were reported, and 113 entomological surveys were conducted, revealing varied levels of malaria receptivity across different locations. Ten percent of the surveyed locations were classified as "High Receptive," all within Semi-arid and Dry climatic zones. Meanwhile, 47% of the locations were categorized as "Moderate Receptive" and were distributed across all climatic zones. "Low Receptivity" was observed in 34% of the locations, predominantly in the Wet zone (84%). Additionally, 9% of the surveyed locations, all in the Wet zone, exhibited No Receptivity.

Conclusion: Determining the level of receptivity is vital for the effective implementation of vector control activities. These findings emphasize the urgent need for region-specific malaria surveillance and control strategies, especially in areas with high receptivity. "High Receptive" locations should be prioritized by optimizing vector control resources, including trained personnel, appropriate equipment, and sufficient insecticide supplies, to ensure the proper execution of control measures.

Keywords: Malaria, Receptivity, Entomology survey, vector.

Acknowledgement: We extend our gratitude to the Sri Lanka College of State Scientists (SLCSS), and the Ministry of Public Administration for their invaluable support.

Breeding Habitats and Spatio-Temporal Distribution of *Anopheles stephensi* and *Anopheles culicifacies* Larvae in Jaffna Peninsula, Sri Lanka

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Introduction: *Anopheles culicifacies,* the primary malaria vector, is widely distributed in the Jaffna district. *An. stephensi,* a highly efficient and competent vector of urban malaria, was first identified in Mannar Island, Sri Lanka, in 2016. Currently, this species is present in a few Medical Officer of Health (MOH) areas of Jaffna and Kalmunai Districts. Understanding the breeding habitats and spatio-temporal distribution of malaria vector larvae is crucial for developing and implementing effective vector control strategies

Objectives: To investigate the larval ecology of *An. stephensi* and *An. culicifacies* to provide knowledge for tailored vector control interventions to control these vectors in Jaffna Peninsula.

Methods: The study was conducted in all 14 MOH areas in the Jaffna peninsula from January to December 2021. Larval surveys were conducted monthly in potential breeding habitats such as wells, ponds, cement tanks, and ground pools for *An. stephensi* and *Anopheles culicifacies.* Breeding sites were mapped using GPS.

Results & Discussion: Out of 9175 breeding habitats surveyed 78.8% were wells and 21.2% were cement tanks, 0.1% were ponds and 0.02% were ground pools. A total of 897 *An. stephensi* and 746 *An. culicifacies* larvae were collected from 161743 dips. *An. stephensi* positivity in wells, cement tanks, ground pools, and ponds were 2.58%, 0.14%, 0.01%, and 0% respectively while *An. culicifacies* positivity was 2.76%, 0.08%, 0.01% and 0.05% respectively. High numbers of *An. stephensi* larvae were observed in November, March, and August, whilst *An. culicifacies* larvae were observed in February, June, and December. Jaffna, Nallur and Point Pedro MOH areas were reported with *An.stephensi,* and all MOH areas in Jaffna except Uduvil reported with *An. culicifacies.*

Conclusion: This study reveals that both *An. culicifacies* and *An. stephensi* predominantly breed in wells in Jaffna district. These findings on breeding habitat preferences and spatio-temporal distribution can be applied for planning and implementation of effective integrated vector control measures for *An. culicifacies* and *An. stephensi* in Jaffna peninsula, Sri Lanka.

Keywords: Breeding habitats, malaria, *Anopheles stephensi*, *Anopheles culicifacies*

Acknowledgement: The support given by the Director, Anti-Malaria Campaign, Regional Malaria Officer, and the entomology team of the Jaffna regional malaria office is duly acknowledged.

Re-Catalog of Wet Preserved Skinks Specimens Deposited in The Colombo National Museum, Sri Lanka

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Introduction: The skink fauna of Sri Lanka has been the subject of extensive research by local and international researchers for over one and a half centuries. Consequently, the collections derived from those studies at the Colombo National Museum have become a valuable resource for future researchers worldwide. However, these collections have not been properly cataloged in the museum's records, highlighting an urgent need for re-cataloging to facilitate quick access and retrieval of primary data. This study aims to catalog the Sri Lankan wet-preserved skink collection to enhance proper museum management and accessibility.

Objectives: The primary objective of this study is to catalog the scattered wet-preserved skink collection, to document the quantitative diversity, and to enhance accessibility for researchers.

Methods: The study involved cataloging all available wet-preserved skink specimens, including type specimens, in the Colombo National Museum's zoology division. Information such as the accession number already given in the labels, designated type, locality, date of collection, name of the collector, and any additional remarks (as noted on the labels) were recorded in a Microsoft Excel database.

Result & Discussion: A total of 30 species were cataloged, including one *Chalcides sp*., one *Chalcidocep sp*., one *Dasia sp*., nine *Eutropis sp*., nine *Lankascincus sp*., one *Lygosoma sp*., and eight *Nessia sp*. The collection includes 10 holotype specimens and three foreign specimens of *Scelotes caffer* (Peters, 1861). In total, 909 non-type specimens were cataloged, along with an additional 11 specimens that were not identified at the species level. A significant portion of the collection was gathered between the early 1900s and late 1940s by P.E.P. Deraniyagala, with recent additions from 1990 to 2017 by Rohan Pethiyagoda and associates. The specimens are listed alphabetically by genus and include the original genus and species names, authors, and publication years.

Conclusion: Cataloging the museum's skink collection provides a comprehensive overview and facilitates research. This re-cataloging process is essential for maintaining delicate, old collections. The effort to re-catalog the wet-preserved skink specimens at the Colombo National Museum marks a significant step in enhancing the understanding of the skink fauna's quantitative measures and overall diversity.

Keywords: Museum collections, wet preserved, Re-Catalogue, Skink fauna

Acknowledgement: I thank Mrs. Sanuja Kasthuriarachchi, Director General of the Department of National Museums for her guidance and approval on this re-cataloguing process. I extend my special thanks to Dr. Manori Goonatilake, Director (Science) and the staff of Zoology Division for their kind help with all curatorial part of this museological work. Further, I thank Dr. Kanishka Ukuwela, Mr. Sameera Karunarathna, Mr. Suneth Kanishka and Mr. Dineth Kanishka for their assistance in taxonomic work.

Evaluating The Thermal Stability of Metal-Impregnated Biochar Derived from Elephant Dung for Enhanced Agricultural and Environmental Applications

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Introduction: Biochar is a form of charcoal that is produced by heating organic waste in an oxygen-depleted environment. Elephant dung, rich in lignocellulose, is an appealing raw material for biochar synthesis**.** The accumulated dung at Pinnawala Elephant Orphanage remains underutilized. Converting it into modified biochar offers an effective waste management solution, with the resulting metal-impregnated biochar providing numerous benefits for agriculture and the environment. It can improve soil properties, enhance nutrient retention and availability, and increase crop nutrient use efficiency.

Objectives: This study aims to evaluate the thermal stability of the Mg and Iron metal-impregnated biochar with unmodified biochar.

Methods: Pre-synthesized elephant dung biochar at 500°C (BC500), along with Mg^{2+} and Fe^{3+} impregnated biochar (MgBC500 and FeBC500, respectively), were used in the study. Thermal decomposition characteristics were analyzed using a thermogravimetric analyzer under an N_2 atmosphere at a heating rate of 10°C/min, from ambient temperature to 800°C. A sample mass of 5.0±0.5 mg was used for each biochar sample, with an N_2 gas flow rate of 60 mL/min. Samples were held at 800°C for 20 minutes under an N_2 atmosphere.

Results & Discussion: BC500 showed a 7.5% weight loss at 234°C, likely due to moisture content. FeBC500 and MgBC500 exhibited 7.1% and 12.5% weight losses, respectively. At higher temperatures, most volatile matter decomposed, causing further weight loss. MgBC500 showed a 33% weight loss due to volatile compounds in Mg-modified biochar, while FeBC500 and BC500 experienced 29% and 25% weight loss, respectively, due to cellulose and hemicellulose decomposition. Fixed carbon content was highest in BC500 (58.4%). Ash content was found to be highest in FeBC500 (17.5%), followed by MgBC500 (10.7%) and BC500 (8.9%), indicating more inorganic compounds in the modified biochar.

Conclusion: The study highlighted that FeBC500 had the highest ash content, reflecting a greater presence of inorganic compounds, which may enhance its potential for soil enrichment. Conversely, BC500 maintained the highest fixed carbon content, suggesting better thermal stability and carbon retention. The enhanced physicochemical characteristics of the biochar suggest it could play a pivotal role in sustainable agricultural practices and effective waste management strategies.

Keywords: Biochar, Thermal Stability, Organic Waste, Chemical Properties

Acknowledgement: The authors acknowledge the support from "Research and Graduate Studies," Khon Kaen University, Thailand.

Characteristics and diversity of breeding sites of *Aedes aegypti* and *Aedes albopictus* in the coastal belt of Galle district, Sri Lanka.

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Introduction: In Sri Lanka, the vectors of dengue fever (DF) and dengue hemorrhagic fever (DHF) are *Aedes aegypti* and *Aedes albopictus*. Both *Ae. aegypti* and *Ae. albopictus* lay their eggs in small containers. Understanding the characteristics of these containers will help in effective dengue vector control.

Objectives: The current study intends to look into the characteristics and diversity of breeding sites of dengue vectors in three chosen locations in the coastal belt of Galle District from January to June 2024.

Methods: Six larval surveys were conducted, at random in the Galle, Ambalangoda, and Hikkaduwa MOH areas of the Galle District. The larvae of *Aedes* species were collected and identified from positive containers. The container type, container material, inner surface colour, water depth, water volume, shade level, and type of debris in the container were recorded. The Statistical Package for the Social Sciences (SPSS data editor 20.0) was used to analyse the data.

Results & Discussion: Out of 537 breeding sites sampled, 265 were positive for *Aedes aegypti* and *Aedes albopictus* larvae. Artificial containers had a higher larvae density (56.4%) compared to natural containers (3.57%) for both *Aedes* species ($P < 0.05$). The relative larval abundance of tyres (rubber) (9.41%), plastic cups (7.99%), and metal cups (9.82%) were high for *Aedes aegypti*, whereas that of plastic cups (11.24%) was high for *Aedes albopictus*. Dark-coloured breeding sites (black, brown) had higher relative larvae abundance for both *Aedes spp*. compared to bright coloured and colourless ones ($P < 0.05$). A high relative abundance was found in containers at ground level for both *Aedes* spp, and it was lower in containers at >100 cm ($P < 0.05$). Both larvae of *Ae. albopictus* (29.28%) and *Ae. aegypti* (41.79%) were most abundant in containers holding 50-100 ml of water ($P>0.05$). Both *Ae. aegypti* (6.52%) and *Ae. albopictus* (74.14%) showed a higher relative abundance in shaded containers ($P<0.05$). When plant debris was present in the containers, the larval abundance of *Ae. aegypti* and *Ae. albopictus* was considerably high ($P<0.05$).

Conclusion: Recognizing the characteristics and productive breeding sites of Aedes mosquitoes is crucial for implementing effective vector control interventions and using larvicides appropriately.

Keywords: *Aedes*, Breeding Habitat Characteristics, Larval Survey, Relative Abundance

Acknowledgement: We extend our gratitude to the Sri Lanka College of State Scientists (SLCSS), and the Ministry of Public Administration for their invaluable support.

Impact of Climatic Factors on Filarial Vector Density and Infection Rate in Habaraduwa Medical Officer of Health Area in Galle District, Sri Lanka

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Introduction: Sri Lanka eliminated lymphatic filariasis as a public health problem in 2016 by achieving the elimination target of microfilaria (mf) rate <1% and now in the post-validation surveillance (PVS) period. Vector control is a main strategy that should be paid attention to interrupt ongoing low-grade transmission. The relationship between environmental conditions and vector infection will be investigated in order to plan targeted measures to limit disease transmission via vectors.

Objective: To determine the impact of climatic factors on filariasis main vector: *Culex quinquefasciatus* density and infection in Habaraduwa Medical Officer of Health (MOH) area in Galle district, Sri Lanka.

Methods: Indoor resting *Cx. quinquefasciatus* mosquitoes were collected from randomly selected houses within the Habaraduwa MOH area from December 2022 to February 2024 using mouth and mechanical aspirators. The collected female *Cx. quinquefasciatus* were dissected to identify the parasite. The mosquito density and infection rate were calculated. Climatic data for Galle district were gathered from the Department of Meteorology in Colombo, Sri Lanka. The correlation between climatic factors and vector density and infection rate was studied using Pearson's correlation analysis.

Results & Discussion: Total number of 1157 adult female mosquitoes was collected from 414 premises. Premise positive rate for infected mosquitoes was 2.6%. Maximum relative humidity (r=0.171) and minimum temperature (r=0.270) were positively correlated with vector density, but it was not significant. Minimum relative humidity (r=-0.260) and minimum temperature (r=-0.260) were negatively correlated with vector density. However, a correlation was not observed between vector density and rainfall. The vector infection rate with minimum relative humidity (r=-0.115) and minimum temperature (r=-0.389) had the negative correlations but it was not associated significantly. There were no correlations of vector infection with rainfall, maximum relative humidity and maximum temperature during the study period.

Conclusions: The study revealed climatic factors have no significant impact on mosquito resting density and infection rate in Habaraduwa MOH area during the study. Longitudinal analysis for an extended period of time would give a more accurate result.

Keywords: Filariasis vector, mosquito density, infection rate, climatic factors

Acknowledgement: We gratefully recognize the invaluable support provided by the Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration.

Session 2:

Chemical Sciences

Oral presentations

Iodine Loss in Iodized Salt, Is It True? A Study on Factors Affecting Loss of Iodine from Iodized Salt

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Introduction: Iodine is an essential micronutrient for the human body. As the body cannot synthesize iodine, it should be supplied through diet. Inadequate iodine as well as excessive intake results in negative effects on thyroid functioning. Recommended iodine content of iodized salt produced in Sri Lanka (SL) is 15- 30 mg/kg. Loss of iodine may occur at the time of consumption due to various factors.

Objectives: The study aimed to determine if recommended iodine fortification levels were followed in SL and to assess effect of factors on iodine loss namely light, storage condition, heat and addition of salt at different stages of heating.

Methods: Commonly available brands of both powder and crystal salts (fifteen each) were randomly purchased from local markets in selected areas in the Colombo district. Initial iodine content and iodine content after storing for period of 4 weeks in dark, light and intermediate environments, and in different containers (coconut shell, glass jar, plastic container, and original package) were measured. The effect on iodine level in adding salt at different stages; before heating, while heating, immediately after heating, 10 minutes after removal from heat, after cooling, was also assessed. Methods SLS 79:2019 and SLS 80:2019 were used in the analysis. Statistical analysis was performed through One-way ANOVA.

Results & Discussion: Salt powder samples 36.6% did not comply with recommended iodine fortification levels while 46.6% crystal samples didn't comply. Results showed a significant loss of iodine in crystal samples after 4 weeks of exposure to light. Further, crystal samples showed significant iodine loss when stored in plastic, glass, or coconut shell for 4 weeks. Interestingly, no significant loss was detected when stored in the original packaging. It was observed adding of salt prior to heating had significant loss of iodine in both powder and crystal samples of salt.

Conclusion: Both powder and crystal forms of salt showed significant deviation from the recommended iodine fortification level in SL. Minimum iodine loss was observed when stored inside original package in dark or intermediate environment conditions. Thus, in household practice, it is acceptable to store salt in the above conditions. Further, the addition of salt after cooking is justified by the study.

Keywords: Factors affecting iodine loss, iodized salt, recommended fortification levels

Acknowledgement: Grateful appreciation is extended to the Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration for their valuable support.

Assessment of Iodine Levels in Iodized Salt across Selected Districts in Sri Lanka

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Introduction: The Universal Salt Iodization (USI) program was introduced by the World Health Organization (WHO) to combat iodine deficiency and prevent excessive intake by using salt as a carrier for iodine and initially set fortification limits as 15-30 ppm in Sri Lanka. Hence, it is crucial to investigate the iodine levels in commercially available salt to ensure that the population receives an adequate amount of iodine.

Objectives: To assess the iodine levels in commercially available iodized salt, comply with the fortification limits set by Sri Lankan regulations and to investigate the variations in Iodine content across different geographical regions within the country and among various salt brands.

Methods: Commercially available iodized salt packets (both in powder and crystal forms) manufactured within three to nine months were purchased from selected districts (Galle, Matara, Hambantota, Monaragala, Badulla, and Kalutara) identified by the Public Health Inspectors and stored at room temperature and protected from direct sunlight until the iodine levels were measured according to the SLS 79:2019 (crystal salt) and SLS 80:2019 (powdered salt) guidelines.

Results & Discussion: A total of 556 salt samples, including both powdered (446) and crystal (110) forms, from 65 different brands across six districts, were analyzed. Among the analyzed samples, only 64.93% fell within the recommended range. However, 31.47% of the sample had iodine levels lower than 15 ppm in contrast 3.60% of the sample had iodine levels exceeding 30 ppm. The iodine level of salt samples from the Badulla district was significantly less compared to the other five districts. Further, with regards to the different brands (only considered $n \geq 10$) out of 14 brands, the mean iodine values of 4 brands were found to be below the lower limit, the rest were within the range.

Conclusion: The fortification limits set by Sri Lankan regulations are not maintained in notable commercial products. Therefore, more stringent regulatory methods should be implemented.

Keywords: Iodine levels, Universal Salt Iodization (USI), Fortification iodine limits.

Acknowledgement: The support given by the Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration is acknowledged.

Impact of Reverse Osmosis Treatment on Chemical Parameters of Well Water in North Western Province, Sri Lanka

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Introduction: Chronic Kidney Disease of unknown etiologic (CKDu) is a significant health issue in the North Western Province (NWP) of Sri Lanka. Reverse Osmosis (RO) treated water is commonly used in the region as a preventive measure. This study examines the impact of RO treatment on key chemical parameters of well water, focusing on Total Dissolved Solids (TDS), pH, alkalinity, and chloride levels, and evaluates the water quality against the SLS 614:2013 standards.

Objectives: To assess the effectiveness of the RO process in reducing chemical contaminants in well water and its compliance with SLS 614:2013 water quality standards.

Methods: Water samples were collected from 40 stations across the NWP. Chemical parameters of the well water (feed water) and RO-treated water were analyzed using standard methods. A paired samples t-test was conducted to evaluate the differences in TDS, pH, alkalinity, and chloride levels pre- and post-RO treatment. Additionally, a one-sample t-test was used to compare these values with the SLS 614:2013 standards.

Results & Discussion: RO treatment significantly reduced TDS, alkalinity, and chloride levels in well water. The mean TDS dropped from 1276.35 mg/L to 68.33 mg/L ($t(39) = 15.473$, $p < .001$), alkalinity from 361.30 mg/L to 39.40 mg/L ($t(39) = 14.418$, $p < .001$), and chloride from 423.75 mg/L to 49.48 mg/L ($t(39) = 9.529$, $p < .001$). However, the pH of RO-treated water fell below the SLS 614:2013 standard of 6.5, decreasing from 7.200 to 6.175 ($t(39) = 7.081$, $p < 0.001$; $t(39) = -2.175$, $p = .036$).

Conclusion: While RO treatment effectively reduces TDS, alkalinity, and chloride to within acceptable limits, it also lowers pH below recommended standards, indicating potential acidity concerns. Further research is needed to optimize the RO process to ensure balanced pH levels.

Keywords: Reverse Osmosis, Water Quality, Chronic Kidney Disease, pH, Total Dissolved Solids, Alkalinity, and Chloride

Acknowledgement: We extend our sincere appreciation to the Sri Lanka College of State Scientists (SLCSS), the Ministry of Public Administration, and Mr. Lakminda Thilakarathne, Biochemist, Teaching Hospital, Kandy for their invaluable support.

Effect of Occupational Noise Exposure on the Hearing of Employees in Textile Industries in Kalutara District: A Pilot Study

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Introduction: Noise-Induced Hearing Loss is hearing loss caused by loud sounds. It may be temporary or permanent. Temporary hearing loss can be treated, but permanent hearing loss cannot be cured. Occupational noise exposure is a major source of noise pollution for employees. So, it is crucial to take preventive actions to minimize employees' exposure to high noise levels. Many employees in factories in Sri Lanka are not concerned about high level noise exposure while performing their duties. Therefore, it is important to investigate whether noise exposure levels affect the hearing status (hearing ability) of employees.

Objectives: This study aims to assess the impact of noise exposure, working hours, service period, and age on the hearing status of employees in five textile factories which carry out operations such as knitting, weaving, and winding in the Kalutara District. The research seeks to identify occupational hazards related to noise and offer insights for protecting workers' hearing health.

Methods: Noise exposure levels were measured, and-audiogram results were collected from 200 randomly selected employees at five textile factories. Additional data, including age, service period, and daily working hours, were gathered through a survey. The gathered data were analyzed using SPSS.

Results & Discussion: A significant negative correlation ($r = -0.505$, $p<0.01$) was observed between the exposed sound level and the hearing status (hearing ability) of employees. The service period also has a significant negative impact on employees' hearing ability ($r = -0.286$, $p<0.01$), while the number of working hours had no considerable effect. The percentage of employees exposed to the high noise level (>=85 dB) during an eight-hour shift is 9%. When considering this 9% data, the overall chi-square test does not show a significant association ($p = 0.261$) between the exposed sound level and the hearing status of employees. However, the linear-by-linear association test indicates a significant linear trend between these two variables ($p= 0.037$).

Conclusion: Overall, the study shows that noise exposure levels cause a significant negative effect on the hearing ability of employees in textile industries in Kalutara District.

Keywords: Noise, Hearing Loss, Hearing Status, Occupational Noise Exposure

Acknowledgement: The support given by the Ministry of Public Administration and the Sri Lanka College of State Scientists (SLCSS).

Relationship Between Blood Alcohol Concentration and Reported Cases of Road Traffic Accidents and Suicidal Attempts in Colombo District; A Retrospective Analysis (2018-2022)

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Introduction: Alcohol consumption is a significant public health issue worldwide, with considerable implications for safety and well-being. Blood Alcohol Concentration (BAC) measures the amount of alcohol in a person's bloodstream and high BAC impairs reaction time, coordination, and judgment, increasing the risk of collisions and severe injuries or fatalities. Sri Lanka has experienced a notable number of Road Traffic Accidents (RTAs) and suicides, emphasizing the need for in-depth studies to understand the contributing factors. Therefore, examining the relationship between BAC, the incidence of RTAs, and suicidal cases is of prime importance.

Objectives: This study aimed to explore the impact of Blood Alcohol Concentration (BAC) on social issues like suicides and road traffic accidents in reported cases from the Colombo district, Sri Lanka.

Methods: A retrospective study based on case records of BAC from 2018 to 2022 was conducted. Blood samples from autopsy cases were analyzed using headspace gas chromatography with a flame ionization detector (HSGC-FID) at the Institute of Forensic Medicine and Toxicology. Total of 531 cases were studied.

Results & Discussion:

Among 531 total autopsy cases, 53 suicidal cases and 109 RTAs were identified and descriptive analysis was by SPSS. A significant proportion of suicidal cases (22.64%) and RTAs (26.61%) in the Colombo district were associated with BAC at or above the threshold limit (≥80 mg/100 ml). These results emphasized the critical role that alcohol consumption plays in contributing to societal issues such as suicide and traffic-related incidents.

Conclusion: The data suggests a pressing need for routine alcohol analysis in all cases of suicides and RTAs in the Colombo district to better understand and address the impact of alcohol on these societal problems. Implementing such measures could aid in the development of targeted interventions and policies aimed at reducing the prevalence of alcohol-related incidents, thereby enhancing public safety and well-being. Further analysis with more data is essential for understanding the full scope of the impact of alcohol on suicides and RTAs in the Colombo district. By systematically incorporating routine alcohol analysis, can gain deeper insights into how alcohol contributes to these incidents. This data could be pivotal in identifying patterns and correlations that might not be apparent otherwise.

Keywords: Blood Alcohol Concentration, Road Traffic Accidents, Suicidal cases

Acknowledgement: We extend our gratitude to the Sri Lanka College of State Scientists (SLCSS), and the Ministry of Public Administration for their invaluable support.

Implementation of Patient-Based Real-Time Data Monitoring System for TSH And Free T4 Assays at The National Hospital, Sri Lanka

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Introduction: Quality control is crucial in laboratory testing to ensure the precision and accuracy of patient sample results. Internal quality control (IQC) samples, typically run once daily, are inadequate for detecting systematic errors. Patient-based real-time quality control (PBRTQC) offers a promising solution to these limitations.

Objectives: This study aims to develop and implement a quality control protocol using patient-based real- time data to analyze failure and review analytical errors in thyroid-stimulating hormone (TSH) and free thyroxin (FT4) measurements. The study also seeks to verify appropriate block sizes, truncation limits, and the method's sensitivity, documenting the PBRTQC procedure's performance.

Method: TSH and FT4 results were extracted from the laboratory database over 14 months, accounting for variability in patient populations, reagent lots, and calibrator lots. Systematic errors were identified and excluded. Data normalization was achieved through monthly partitioning and Box-Plot and logarithmic transformations. Artificial biases of varying degrees were introduced randomly in 400 test results. Bias detection curves were generated against introduced bias, with minimum bias limits set at 12% for FT4 and 20% for TSH. The number of moving average (MA) results necessary for bias detection was counted post-bias introduction.

Results and Discussion: Bias detection truncation limits were beneficial due to the non-normal distribution of data. The optimal block size for MA calculation was 40 for both biomarkers. Specific truncation limits were established: mean ± 1.5 IQR for FT4 and mean ± 1.0 IQR for TSH. The MA method showed high sensitivity, detecting biases >20% for FT4 and >30% for TSH. However, the lack of stratification of patient data, imprecision of the assay, and high biological variation of TSH were limit the sensitivity of this method.

Conclusions: This study demonstrates that the PBRTQC is effective in detecting systematic errors in real-time, thereby enhancing the reliability of TSH and FT4 measurements. The implementation of optimized block sizes and specific truncation limits significantly improves the sensitivity of error detection, promoting better laboratory quality control. Implementing a more stringent data stratification method will significantly enhance the power of error detection.

Keywords: Real-time data monitoring, Moving average, TSH, Free T4, Quality control

Acknowledgement: We gratefully recognize the invaluable support provided by Laboratory staff – Immunoassay laboratory, the Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration.

Detection of Herpes Viral DNA in Suspected Herpes Encephalitis Patients in Sri Lanka-A Retrospective Study

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Introduction: Encephalitis is a rare and serious brain infection that can be fatal. Viruses are common infectious agents causing encephalitis. Prompt detection of human herpes viruses in Cerebrospinal fluid (CSF) is crucial for early diagnosis and timely initiation of appropriate treatment, as this can significantly improve patient outcomes.

Objectives: This study aimed to determine the presence of herpes simplex virus type 1, 2 (HSV-1, 2) and varicella–zoster virus (VZV) in cerebrospinal fluid samples (CSF) of suspected herpes encephalitis (HE) patients and to analyze demographic and associated clinical features.

Methods: All CSF samples from HE suspected patients from different hospitals and/or facilities received at Medical Research Institute in Sri Lanka from January 2022 to January 2023 were included in this retrospective study. Real-time PCR was used to detect HSV1, 2 and VZV DNA in the samples.

Results & Discussion: From 1801 suspected herpes encephalitis cases mean age 25.67; range 2/365 - 88 years, (male: female; 1003: 798), Total 18 (0.99%) were positive for herpes viral DNA (male: female; 13: 5). HSV-1(9, 0.50%), HSV-2 (5, 0.28%), HSV1 & 2 (1, 0.06%), and VZV (3, 0.17%). HSV-1 positivity: infants 0.54% (1/184), children 0.65% (4/618), adults 0.63% (4/627). HSV-2: children 0.16% (1/618), adults 0.48% (3/627), older adults 0.57% (1/175). VZV: adults 0.31% (2/627), older adults 0.57% (1/175). Prominent symptoms: fever and headache.

Conclusion: HSV-1, HSV-2 and VZV DNA were detected in CSF samples as causative agents of encephalitis suspected patients and no significant association was observed with age groups. The low number positivity may due to late collection of sample, cold storage, and repeated freezing and thawing of sample.

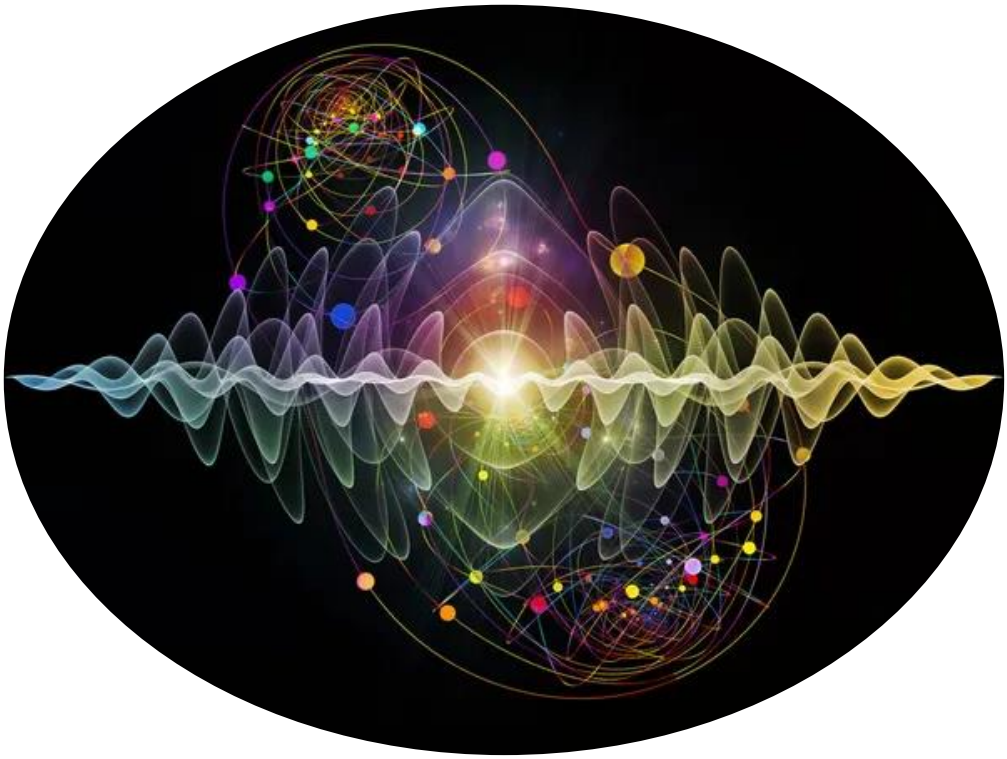
Keywords: Cerebrospinal fluid, Encephalitis, Herpes simplex virus, PCR, Varicella–zoster virus

Acknowledgement: The support given by staff of the Department of Virology, Medical Research Institute, Sri Lanka, Ministry of Public Administration and Sri Lanka College of State Scientists (SLCSS) is duly acknowledged.

Session 3:

Physical Sciences

Oral presentations



Development of a 1-D Gamma Analyzer Software Tool for Verification of Radiotherapy Beam Profiles and Percentage Depth Doses

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Introduction: Accurate verification of radiotherapy beam profiles and percentage depth doses (PDD) are crucial for ensuring effective and precise treatment planning. Conventional methods for beam profile verification involve complex and costly commercial tools, which can be a formidable barrier in resource-limited settings.

Objective: This research aims to develop a cost-effective, one-dimensional (1-D) Gamma Analyzer Software Tool (GAST) designed to facilitate the verification of radiotherapy beam profiles and PDDs.

Methodology: A 1-D GAST was developed using MATLAB software to calculate the gamma index for beam profiles. The proposed tool compared based on gamma index with measured, modeled profiles and commissioning data or baseline profiles and PDDs, addressing the need for economical and practical solutions in quality assurance.The analyzer compared acquired data with modeled profiles or commissioning data, ensuring precise alignment. Validation was performed by comparing results with existing available some systems using selected beam profiles and PDDs for 6 MV and 15 MV Linac beams.

Results & Discussion: The developed GAST consisted features for normalization, rescaling, relocating profiles and PDDs, and re-centering profiles to address phantom setup errors. It allowed customization of accepted criteria for distance and dose percentage deviations. Users can also view histograms with a customized range of gamma values for each points. The developed 1-D GAST demonstrated on par with the gamma index calculations for selected beam profiles and PDDs results from available some systems for above beam energies. Manual calculations for beam profiles and PDDs in a 10x10 cm^2 field size also aligned with the analyzer's outputs. These results confirm the tool's precision and reliability, validating its effectiveness as a cost-effective alternative for radiotherapy quality assurance.

Conclusion: The developed 1-D GAST can serve as a reliable alternative for calculating one-dimensional gamma analysis for dose profiles and PDD, providing consistent results comparable to existing tools.

Keywords: 1-D gamma analyzer, radiotherapy beam profile verification, Quality assurance, Gamma index

Acknowledgements: I acknowledge the Ministry of Public Administration including the Director and staff of the Scientific Service Division and the Sri Lanka College of State Scientists (SLCSS) for their invaluable support and for providing this opportunity.

A simple tool for evaluating Lead Equivalent Thickness and Uniformity for Protective Aprons Used in Radiology

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Introduction: There are lead or lead-equivalent (Pb-eq) aprons used for radiation protection. Knowing Lead Equivalent Thickness and Uniformity of protective aprons during purchase is necessary to maintain adequate radiation safety.

Objectives: The study aimed to evaluate the lead equivalence and uniformity of aprons based on simple quality assessment tool.

Method: The penetration of primary radiation through lead sheets (thickness from 0 to 0.85mm) and five different aprons of nominal 0.5 mm, 0.35 mm, and 0.25mm lead equivalence was measured using CR X-ray unit. At 80 and 90kVp beams with 100mA and 0.1s, the Mean Pixel Values and Linear Mean Pixel Values were recorded with the lead thickness. The graph of mean pixel value vs. lead thickness of the lead sheet was used as a calibration curve to verify the lead equivalence thickness of aprons. Standard Deviation (SD) and Coefficient of Variance (CV) were calculated for aprons to verify the uniformity of aprons.

Results & Discussion: The graph of pixel values vs lead thickness and the graph of $\ln(I/I_0)$ vs lead thickness have linear regression. Therefore, it was easy to find lead equivalent thickness, when the pixel value of the CR image was known by using the graph of pixel values vs lead thickness or when the incident and transmitted intensity were known by using the graph of $\ln(I/I_0)$ vs lead thickness. The lead equivalence of the lead aprons in primary beams ranged from 0.20 to 0.59 mm.

Conclusion: This study has demonstrated the linear relationship between the mean pixel value of CR image and lead thickness. Therefore, this study validates as an inexpensive alternative methodology to checking the lead equivalency and uniformity of radiation protection apparel in a clinical setting when an R/F detector is unavailable.

Keywords: Computed Radiography (CR), R/F Detector, Lead Aprons, Radiation Protection

Acknowledgement: We extend our gratitude to the Sri Lanka College of State Scientists (SLCSS), and the Ministry of Public Administration for their invaluable support.

Impact of Contact Deformation and Vertical Shrinkage of Long Gauge Blocks Used in Mechanical Comparison Method

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Introduction: The calibration of long gauge blocks in vertical orientation is influenced by two primary phenomena: contact deformation and vertical shrinkage. When employing the comparison method on a comparator where both gauge blocks are positioned vertically, the reference gauge block and the block under test experience not only gravitational shrinkage but also deformation from contact at the top and bottom of the comparator. Understanding and mitigating these effects is crucial for accurate calibration in metrology applications.

Objectives: This study aims to quantify the vertical shrinkage and contact deformation effects on both the test and reference gauge blocks. It seeks to determine whether these effects significantly contribute to the measurement uncertainty in central deviation measurements.

Methods: Long gauge blocks made of steel with nominal lengths ranging from 125 mm to 500 mm were employed in this study. These gauge blocks were sourced from three esteemed manufacturers: KOBA Germany (grade K), TESA Switzerland (grade 0), and MITUTOYO Japan (grade 1). Mechanical properties, including Young's modulus and Poisson ratio, were extracted from manufacturer-provided reference data. Material densities were determined through laboratory measurements. Additional specifications related to the gauge block comparator were obtained from the manufacturer.

Results & Discussion: Total contact deformation results in the comparison of KOBA and TESA gauge blocks = 0.5 nm and that of TESA and MITUTOYO gauge blocks = 1 nm. Estimated vertical shrinkage of 400 mm steel gauge blocks of the three manufacturers = 29 nm each and that of 500 mm steel gauge blocks of the three manufacturers = 45 nm each. Further the contact deformation results with contact tips made of diamond was compared with results. The total effect (deformations from the top and bottom) is almost equal to that effect with tungsten carbide tips. (0.52 nm, and 1.1 nm respectively)

Conclusion: The vertical shrinkage is larger than the effect of contact deformation. Contact deformation between the contact tips of the comparator and measuring surfaces of the gauge blocks exists in a negligible range (1 nm). Also the grade of gauge blocks does not contribute to a big change in contact deformation and vertical shrinkage. Shrinkage effect is significantly large for blocks beyond 400 mm. However the effect provides equal contributions in both reference block and test block because the comparison is always between two blocks of same nominal length. So the uncertainty contributions from vertical shrinkage and contact deformation can be neglected.

Keywords: Gauge Block Comparator, Mechanical Comparison, Central Deviation

Acknowledgment: We extend our gratitude to the Sri Lanka College of State Scientists (SLCSS), and the Ministry of Public Administration for their invaluable support.

Measuring Dose Reduction in Radiotherapy Caused by the Carbon Fiber Treatment Couch Top for 6 MV Photons Beam at Various Gantry Angles at A Fixed Couch Position

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Introduction: In radiation therapy, treatment couches are crucial for supporting patients and ensuring stillness during treatment. Carbon fiber has emerged as a preferred material for couch construction due to its strength, lightweight nature, and effective radiation absorption properties, making carbon fiber couches a safer and more accurate option for radiation therapy. This investigation focuses on examining the variations in dose reduction across different gantry angles, aiming to provide insights into optimizing treatment delivery techniques and improving patient outcomes

Objective: The main objective of this study was quantification and understanding of the extent of dose reduction in radiotherapy resulting from the presence of a carbon fiber treatment couch top when utilizing a 6 MV photons beam, particularly examining variations across different gantry angles at a fixed couch position.
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Methods: The readings were taken with a fixed field size of 10 × 10 cm² and an SSD of 100 cm. The posterior beam gantry angles were adjusted at intervals of 10° from 90° to 270°, both without a couch and with a couch in place. This procedure was repeated for field sizes of 20 × 20 cm² and 15 × 15 cm². Additionally, the couch position was changed to an SSD of 110 cm, and the entire procedure outlined above was repeated.

Results & Discussion: The highest attenuation percentages were observed at gantry angles of 100°, 110°, 250°, and 260° for SSD values for both 100cm and 110cm, across each field size. The higher attenuation percentage was observed at 110cm SSD. Conversely, the lowest attenuation was observed at a gantry angle of 190 degrees. For 110cm SSD, the maximum attenuation percentage was observed for the field sizes of 15 × 15 cm² and 20 × 20 cm², with the gantry angles of 100° and 250°, with values of 15.32% and 15.54%, respectively.

Conclusion: The highest attenuation percentage was observed at 110cm SSD. However, specific gantry angles, such as 250° and 260°, as well as 100° and 110°, exhibited the maximum attenuation percentage in our research. Conversely, the lowest attenuation percentages were observed at a 190° gantry angle. The treatment planners should avoid these gantry angles to prevent low doses due to couch attenuation.

Keywords: SSD - Source to Skin Distance, MV-Megavolt

Acknowledgement: I would like to express my sincere gratitude to the consultants at Trail Cancer Hospital and the Medical Superintendent at Base Hospital Tellippalai for their invaluable support and permission to allow me to take readings at the Radiotherapy Department. Their cooperation was crucial in the successful completion of this work

Evaluation of Normalized Cumulative Dose Received from Patients Treated with Radioactive Iodine (^{131}I) Therapy

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Introduction: Surgical resection of the thyroid gland followed by radioactive iodine (^{131}I) therapy is the common therapeutic procedure for thyroid cancer patients. The International Commission on Radiological Protection insists that medical staff, relatives and caregivers receive the biggest dose while patients are undergoing ^{131}I therapy. There are few studies available for assessment of cumulative dose of ^{131}I patients at post administration. The evaluation of cumulative dose received from the patient is important to ensure effective treatment while minimizing potential side effects to hospital staff and others due to radiation.

Objectives: The objective of the study is to evaluate normalized cumulative dose received at each period of time from a patient who are treated with radioactive iodine (^{131}I) therapy.

Method: Fifty patients aged 25 to 70 years, who underwent total thyroidectomy and received 100 mCi of ^{131}I, were included. External whole body dose rates were measured at 0.5, 6, 20, 24, 30, 48 and 54 hours post-treatment, at distances of 1, 1.5, 2, and 3 meters from the patient, focusing on neck, stomach, and foot levels.

Results & Discussion: Normalized cumulative dose at 1m from neck level was 1.35685 and 0.49488 μSv.MBq^{-1} through 0-24 h and 24-48 h. In past studies states it is 0.56756 and 0.16216 for Brazilians as well as 0.58793 and 0.1895 for Chinese patients and was unable to compare data for 54-72 h due to patient discharging after 48 hrs in clinical practice. In the study, the dose rate drops significantly within 48 hrs (from 0.049 to 0.007 μSvh^{-1}. MBq^{-1} for neck), indicating a rapid decay in radiation. Cumulative dose Vs time states the cumulative dose at the foot level is very low compared to other areas within 36 hrs after ^{131}I administration and later it becomes similar to other body levels. For 36-42 hrs time period the cumulative values for neck, abdomen and foot were 0.10490, 0.10260 and 0.09482 μSv.MBq^{-1} respectively.

Conclusion: The study indicates that Sri Lankan patients exhibit higher normalized cumulative doses of radiation compared to their counterparts in China and Brazil. In emergency situations, accessing the patient's foot side is recommended safe and safer within 36 hrs after the therapy and awareness of the evaluated data on normalized cumulative doses can be vital information for the hospital staff in managing ^{131}I patients while ensuring radiation safety.

Keywords: Radioactive Iodine, Cumulative dose

Acknowledgment: We gratefully recognize the invaluable support provided by the Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration.

Comparative Analysis of Radiotherapy Dose Distribution in Bilateral Breast Cancer: IMRT vs. VMAT vs. 3DCRT Planning

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Introduction: The incidence of synchronous bilateral breast cancer (SBBC) though relatively rare compared to unilateral cases, has garnered increased attention due to its impact on treatment decision making and patient outcomes. There are three treatment plans Intensity-Modulated Radiation Therapy (IMRT), Volumetric Modulated Arc Therapy (VMAT), and 3D Conformal Radiation Therapy (3DCRT). It is important to find out and evaluate the efficacy of the three distinct planning modalities and to analyze the impact on critical structures such as the heart and lungs, assessing the organ-at-risk (OAR) sparing associated with each technique.

Objectives: This study aims to evaluate and compare the planning parameters, including Planning Target Volume (PTV) coverage, for IMRT, VMAT, and 3DCRT in patients with bilateral breast cancer treated at the Maharagama National Cancer Institute (NCIM) in Sri Lanka.

Methods: This is a retrospective study including patients from NCIM. Patients with SBBC who have undergone radiotherapy using IMRT, VMAT, or 3DCRT were included. Treatment plans for each technique were evaluated based on Planning Target Volume (PTV) coverage and sparing of organs at risk (OARs) such as the heart and lungs. Dosimetric parameters, including dose-volume histograms were analyzed to assess PTV coverage and OAR sparing. Statistical methods paired sample t-test analysis were used to compare the efficacy of the three techniques.

Results & Discussion: VMAT and IMRT revealed both superior PTV coverage and dose conformity compared to 3DCRT, with slightly better results in VMAT. However, 3DCRT showed lower doses to the heart and lungs. The findings emphasized the need to balance effective tumor coverage with minimizing exposure to critical organs. While 3DCRT resulted in lower mean doses to the heart (3.13 Gy) and lungs (5.38 Gy), both IMRT and VMAT provided better PTV coverage and dose conformity. However, these advanced techniques also led to higher mean doses to the heart (IMRT: 8.34 Gy, VMAT: 8.09 Gy) and lungs (IMRT: 11.36 Gy, VMAT: 11.04 Gy).

Conclusion: Our analysis highlights the advantages and trade-offs of different radiotherapy techniques for SBBC treatment. The results underscore the importance of tailoring treatment approaches to balance effective tumor control with minimizing risks surrounding critical organs.

Keywords: Planning Target Volume, Intensity-Modulated Radiation Therapy, Volumetric Modulated Arc Therapy, 3D Conformal Radiation Therapy, dose-volume histograms.

Acknowledgment: We gratefully recognize the invaluable support provided by the National cancer institute – Maharagama , Sri Lanka College of State Scientists (SLCSS) and the Ministry of Public Administration. Special acknowledgement to Mrs. Shiromi de Silva, Research office, MRI for the statistical analysis.

SECTION 2

Selected abstracts from non-participating members of SLCSS.

PRESENTERS

PP 1 Molecular identification of *Candida* species and assessment of the antifungal susceptibility of *Candida albicans*, isolated from immunocompromised patients in Apeksha Hospital in Sri Lanka

Wijendra WAS- *Department of Molecular Biology, Medical Research Institute, Sri Lanka*

PP 2 Effectiveness of Garlic Extraction Against Soft Rot Disease Caused by Bacterial Pathogen Ervinia spp in Carrots (*Dacus carota*)

Priyadarshani HAA - *Department of National Zoological Gardens, Dehiwala, Sri Lanka*

PP 3 A Case Study of Extremely Heavy Rainfall Over the Southwestern Part of Sri Lanka on 1st June 2024

Warnasooriya ARP - *Department of Meteorology, Colombo, Sri Lanka*

PP 4 A Morphoanatomical and Chemical Study of *Coleus hadiensis* (Forssk.) A. J. Paton.

Edirisinghe EAB - *Pharmaceutical Botany Section, Bandaranaike Memorial Ayurveda Research Institute, Nawinna, Maharagama, Sri Lanka.*

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Molecular identification of *Candida* species and assessment of the antifungal susceptibility of *C. albicans*, isolated from immunocompromised patients in Apeksha Hospital in Sri Lanka.

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Introduction: *Candida* is an opportunistic pathogen and candidemia is a bloodstream infection caused by *Candida* that leads to high morbidity and mortality. In recent years, increasing number of *Candida* infections among cancer patients and rapid and accurate species level identification of pathogen are major problems in effective management of immunocompromised cancer patients in Sri Lanka. Molecular identification method allows for species-level identification is crucial for effective management.

Objective: The objectives of this study were to identify the Candida isolates collected from immunocompromised patients to the species level using PCR-RFLP methods and to assess the *in vitro* susceptibility of identified *C. albicans* isolates.

Methods: A total of 52 *Candida* isolates collected from immunocompromised patients at Apeksha hospital were identified using PCR-RFLP method. The ITS1/ITS4 region of *Candida* isolates was amplified using specific primers. The amplified products were digested using the *Msp*I restriction enzyme and digestion pattern was used in identification. Identified *C. albicans* isolates were tested for *in vitro* susceptibility to the Fluconazole, Itraconazole, Amphotericin B, Ketoconazole, Clotrimazole and Miconazole according to the CLSI M27-A3 standard.

Results & Discussion: *Candida tropicalis* was the most prevalent species (38%) among the 52 isolates, followed by *Candida parapsilosis* (31%), *Candida albicans* (13%), *Candida glabrata* (8%), *Candida krusei* (4%), *Candida haemulonii* (4%), and *Candida intermedia* (2%). All *C. albcans* were susceptible to Fluconazole and Miconazole (100%). One isolate was susceptible (14.29%), four were intermediate (57.14%) and two were resistant (28.5%) to Ketoconazole and also one was susceptible (14.29%), six were intermediate (85.71%) and none of isolates were resistant to Itraconazole. All isolates were intermediate (100%) and none were susceptible or resistant to Clotrimazole. Finally, for Amphotericin B four were resistant (57.14%), three were intermediate (42.86%) and none of isolates were susceptible to Amphotericin B.

Conclusion: PCR-RFLP is a better approach for identifying *Candida* isolates to species level which is important for choosing proper antifungal treatment mainly in immunocompromised patients. These findings provide valuable insights into the prevalence of *Candida* species and options for effective management of candidemia.

Keywords: *Candida*, PCR-RFLP, Candidemia, Immunocompromised, Antifungal susceptibility testing

Effectiveness of Garlic Extraction Against Soft Rot Disease Caused by Bacterial Pathogen *Ervinia spp* in Carrots (*Dacus carota)*

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Introduction: *Erwinia carotovora* is a bacterial pathogen responsible for soft rot in a variety of plants, considered one of the most frequent diseases all over the world (Sherf and Macnab, 1986; Agrios, 1997). Many plants contain one or more chemicals with antimicrobial activity. Botanical extractions with antibacterial effects can inhibit or kill bacteria and are used to manage bacterial infections.

Objectives: To find out an economically and ecologically sustainable method to control soft rot disease in carrots.

Methodology: Anti-bacterial properties of fresh garlic extract were tested against *Erwinia carotovora* under laboratory conditions. The wells prepared in the seeded agar plate were filled with 30 µl of aqueous garlic extraction. After an overnight incubation, the inhibition zones were measured. Next, the antibacterial effect of the volatiles of the garlic was checked using the method. Further, the antibacterial effect of different concentrations (0.75, 1.00, 1.5) of overnight incubated bacteria suspension was checked over the width of inhibition zones. Finally, the anti-bacterial effect of garlic extraction was checked with different well sizes.

Results & Discussion: Results revealed significant inhibition zones against the growth of *Ervinia carotivora* in the Petri dishes with the aqueous extracts of garlic. ($p>0.001$). The mean width of the inhibition zone was 1.43cm. It concluded that garlic extraction contained strong anti-bacterial compounds. Further results showed that there are antibacterial compounds in the volatiles of the garlic extraction. The width of the inhibition zone in agar plates differed with the concentration of *Ervinia carotivora*. The highest width of the inhibition zone was recorded to the minimum bacterial concentration (0.75). After the 24-hour incubation period, the bacterial concentration was considered as 1 (equal to $8x10^{6}$.) Finally, results showed that there were no significant differences between the widths of the inhibition zones of different sizes of wells

Conclusion: Results indicated that aqueous garlic extract has strong antimicrobial activity. These findings suggest that garlic extraction can be used as an effective biological agent for managing soft rot as an aqueous application

Keywords: Bacterial soft rot, garlic extracts, *Erwinia carotovora*

Acknowledgement: The support given by staff of the Department of Virology, Medical Research Institute, Sri Lanka, Ministry of Public Administration and Sri Lanka College of State Scientists (SLCSS) is dually acknowledged.

A Case Study of Extremely Heavy Rainfall Over the Southwestern Part of Sri Lanka on 1st June 2024

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Introduction: The unprecedented high intense rainfall observed over South-Western (SW) part of Sri Lanka on 1 June 2024 caused landslides and floods over some parts in Rathnapura, Matara, Galle Kalutara and Gampaha districts, which resulted in significant damage to life, agriculture, transport, power and other sectors, affecting more than 100,000.00 people including 16 casualties.

Objectives: This study is focused on analysing the synoptic and dynamic situation on 1 June 2024 over and vicinity of Sri Lanka.

Methods: synoptic observation, ERA and JRA-3Q Reanalysis data are used to generate synoptic charts. Behavior of atmosphere at different levels was analyzed by using ITACS software as well as GRADS. Satellite data were also analyzed.

Results & Discussion: Automatic rain gauge stations data suggest that the rainfall rate was extremely intense (75-100 m/hour) for 2-hour duration at Ehaliyagoda in Rathnapura and Akurassa in Matara districts. Analysis showed that this extreme rainfall was associated with the interaction and the blocking of Atmospheric River (AR) by north–south-oriented low-level deep trough extending up to 850 hpa level along with east west oriented trough axis at 700hpa over Sri Lanka. Favorable vertical wind shears up to 500hpa, lower level horizontal wind shear and 200hpa divergence also enhanced the instability. Further a deep moisture gradient similar to dry line over SW part also triggered this high intense rainfall from 11.00 p.m on 1 June to 01.00 a.m. on 2 June 2024.

Conclusion: Under the influence of blocking of lower-level AR coming from Arabian sea on 1 June 2024 by deep lower level trough provided a large amount of continuous moisture supply to the middle part of SW region and enhanced instability by a deep moisture gradient (like a dry line). The upper-level divergence and vertical and horizontal wind shear provided by mid and upper tropospheric easterlies resulted in exceptionally heavy rainfalls over the Southwestern region.

Keywords: Extremely heavy rainfall, trough, Dryline, wind shear

Acknowledgement: The support given by the European Center for Medium Range Weather Forecasting and Japan Meteorological Agency for providing reanalysis data.

A Morphoanatomical and Chemical Study of *Coleus hadiensis* (Forssk.) A. J. Paton.

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Introduction: Medicinal plants have been utilized for centuries to enhance human health, and the use of herbal remedies for treating a range of illnesses has grown globally. *Coleus hadiensis* (Forssk.) A. J. Paton, commonly known as Iriveriya, is a medicinal plant native to Sri Lanka. It is extensively employed in traditional and Ayurveda practices for addressing conditions such as dysentery, vomiting, diarrhea, and both acute and chronic liver congestion. This plant belongs to the family Lamiaceae and morphological identification is controversial. Consequently, establishing accurate identification standards is crucial for assessing and ensuring the quality of herbal medicines to safeguard public health.

Objective: The current study aimed to analyze morphological, anatomical and chemical parameters of *Coleus hadiensis* to avoid misidentification and use of adulterants to minimize risks.

Method: Fresh plant materials were collected from Bandaranaike Memorial Ayurveda Research Institute herbal garden and the plant material was evaluated according to WHO guidelines for a range of pharmacognostical parameters. These included the assessment of macroscopic and microscopic observations, powder characteristics such as smell, color & texture and some physicochemical parameters such as loss on drying, extractive values, total ash content, and acid-soluble value were also examined. Thin layer chromatography (TLC) was carried out on the methanolic plant extract, employing a developing solvent system of hexane and ethyl acetate (8:1).

Result & Discussion: Stem fleshy, quadrangular in shape, reddish and hairy. Pubescent leaves, and veins are prominent beneath and dotted with amber-colored oil globules with a characteristic aromatic smell that mainly contributes to identification. The cross-section of a stem shows a characteristic quadrangular shape and is covered with numerous hairs. They are multicellular and unbranched uniseriate with 2-4 cells. The TLC analysis of this plant revealed a distinctive pattern and the chromatogram displayed specific spots as black and blue respectively at F_{ry} 0.64, 0.68 under UV (365 nm) and the purple spot at R_f 0.61, a yellow and reddish purple spots at 0.64, 0.68 after spraying with vanillin sulfuric acid.

Conclusion: TLC profiles, and sensory and microscopic characteristic features can be used to authenticate *Coleus hadiensis* raw material used in herbal preparations.

Key words: Iriveriya, Lamiaceae, texture, pubescent, TLC

Acknowledgement: The support given by Sri Lanka College of State Scientists (SLCSS) is dually acknowledged.

Pharmacognostic Evaluation of *Alpinia calcarata* Roscoe (Heen araththa) Used in Ayurveda

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Introduction: The quality of finished herbal products is influenced by the quality of the raw materials used. Rhizome of *Alpiniacalcarata*(Zingiberaceae); Heen araththa in Sinhala possess a variety of bioactivities and are heavily used in traditional medicine in Sri Lanka. If there are any substitutes or adulterants that can be used to replace *A. calcarata* raw material, hence it is essential to develop standard parameters for the correct and standardized raw material to authenticate and compile to the use of all parties.

Objectives: The research intends to examine morphological, anatomical, and chemical characteristics to accurately identify the rhizome of *Alpinia calcarata* in both its fresh and dried forms.

Methods: Rhizome samples were collected from three different locations. Fresh roots were used to observe morphology, organoleptic properties and microscopical features. Free-hand transverse sections were taken and observed under Axio microscope. Air - dried rhizomes were subjected physicochemical parameters and analysis of TLC profile according to WHO guidelines. Ethanol extracts were used to analyze TLC. TLC analysis were done using ethyl acetate extract and a profile was developed on Hexane: Ethyl acetate (10:3) and observed under UV light, 10% Sulfuric acid and Iodine vapor as spray reagents.

Results: Fresh rhizome of *A. calcarata* much branched and light to dark brown externally and yellowish internally. The cross-section consists of a brown-coloured epidermis externally and thin-walled cells internally. Cortical cells are rich in simple and compound starch grains, oil globules, and collateral vascular bundles. Endodermis is thin-walled cells with suberized radial walls forms numerous yellow oleoresin cells containing stele. The percentage values of physicochemical parameters of Loss on drying, total ash, acid insoluble ash, water soluble ash, water extractive, and ethanol soluble extractive values were 15.7977, 8.6595, 1.0410, 4.73683, 5.399and 20.55 respectively. TLC profile displayed prominent black spots at Rf values 0.22, 0.30, 059, and 089 under 254nm and fluorescence blue at 0.73, black at 0.22 and 0.3 under UV (365 nm).

Conclusion: The findings from this research, including macroscopic and microscopic features as well as thin-layer chromatography profiles, can be utilized to authenticate and standardize the rhizome of *Alpinia calcarata* used in ayurveda preparation.

Key words: *Alpinia calcarata,*Heen araththa, starch grains, microscopy.

Acknowledgement: We would like to express our sincere gratitude to the Sri Lanka College of State Scientists (SLCSS) for their invaluable support and contributions to this work

Toxicological Findings in a Suicidal Case of Lethal Cyanide Poisoning

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Introduction: Cyanide is extremely poisonous and has historically used in mass murders and suicides. It rapidly inhibits cytochrome C oxidase enzyme, blocking oxygen utilization by tissues. Acute exposure via inhalation or ingestion can cause coma and death within minutes. The lethal doseof cyanide is 1-3 mg/ L in blood. A 46 year old male committed suicide at his residence and was found to have consumed someforms of chemicals. The postmortem blood along with white and orange solids found at the scene were sent to the forensic toxicology laboratory, Government Analyst`s Department of Sri Lanka for toxicological investigation.

Objectives: The objective of the study is to determine the cause of death through a detailed toxicological examination and to aid in making well-informed decisions during the judicial process.

Methods: The solids found at scene were screened for the presence of free cyanide using benzidine- copper acetate reagent. Further, a Headspace-GC-MS system with GS-GASPRO column was used for the confirmation. Before Headspace-GC-MS analysis, the samples were treated with sulfuric acid to release gaseous hydrogen cyanide (HCN). The postmortem blood sample was also prepared accordingly, and quantitative analysis was performed using Headspace-GC-MS. Further, the orange solid was analyzed by X-ray fluorescence spectroscopy (XRF).

Results & Discussion: The positive result obtained from screening test for the white solid indicate the presence of cyanide. The result was confirmed by Headspace-GC-MS. Headspace-GC-MS confirmed HCN release upon sulfuric acid treatment of the orange solid, and XRF detected potassium andiron, suggesting it could be potassium ferricyanide. The Headspace-GC-MS analysis of the postmortem blood sample revealed 63 mg/L of cyanide.

Conclusion: The detection of a high dose of cyanide in the blood and its presence in solids confirmed the use of cyanide in suicide, aiding the judicial medical officer in determining the cause of death.

Keywords: Cyanide, Headspace-GC-MS, potassium ferricyanide, XRF, lethal dose

Acknowledgement: The support given by the Sri Lanka College of State Scientists (SLCSS) is duly acknowledged.

Acute Sulfur-Containing Gas Poisoning in Fisherman: A Case Study

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Introduction: The decomposition of fish in storage tanks could potentially lead to the production of toxic gases such as methane, hydrogen sulfide (H_2S), methanethiol, dimethyl sulfide, and dimethyl disulfide, posing significant toxic effects, health risks, and environmental concerns. We report a fatality due to toxic gas inhalation from a fishing vessel's storage tank, where large numbers of fish had decayed. At a fishing harbor, a fisherman felt unwell while retrieving fish and collapsed into the tank. Three others who came to assist also fell ill and collapsed. All four were rescued and hospitalized; one died, and the others recovered after treatment. An autopsy was performed by the Judicial Medical Officer (JMO), and both lungs and blood were sent to the forensic toxicology laboratory of the Government Analyst's Department (GAD) for the analysis of toxicology with the blood samples of the other three fishermen who survived.

Objective: To determine the factors contributing to the deaths and discomforts.

Methods: At the scene, gas samples were collected in the air collector bags via an air sampler (Supelco,USA) and the liquid inside the storage tank was collected for toxicology analysis. Preliminary tests for toxic gases were performed during the scene visit via a gas measurement instrument (PS500). The sent lungs and blood samples were prepared for the confirmation analysis of toxic gases by headspace gas chromatography mass spectrometry (HS-GC/MS) using the GS-GASPRO column. Further, the collected air samples and liquid were also prepared for the analysis of toxic gases by HS-GC/MS.

Results & Discussion: H_2S gas, together with dimethyl sulfide and methanethiol, was detected in both air and liquid samples collected from the storage tank. Methanethiol and carbon disulfide were detected in both the blood and lung samples of the deceased. Further, carbon disulfide was detected in the blood samples of all the other three fishermen who survived, but methanethiol was not detected. The presence of these gases was confirmed by running standards and matching with the NIST 2017 library, together with retention time.

Conclusion: These findings assist the JMO in determining the cause and manner of death.

Keywords: Hydrogen sulfide, HS-GC/MS, Toxic gases, Retention time

Acknowledgement: The invaluable support provided by the Sri Lanka College of State Scientists (SLCSS) is gratefully acknowledged.

Determination of Mercury and Steroids in Facial Whitening Creams Available in Sri Lankan Market

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Introduction: Mercury is one of the primary toxic heavy metals of concern in facial whitening creams. Accumulation of mercury in blood can cause allergic reactions, skin irritation, or adverse effects on the nervous system.Use of steroids is also prohibited in cosmetics. Steroids are suspected to be illegally added in cosmetic preparations in order to enhance the curative effect against some skin diseases.

Objectives: Skin whitening substances like mercury and added steroids have many side effects. Levels above maximum permissible limit would be harmful to both skin and other body organs. Considering the toxic effects of these whitening compounds, it is necessary therefore to control their exposure to human by quantifying their levels in skin whitening creams. Little work has been reported on the levels of mercury and steroids in facial whitening creams sold in the Sri Lankan market. In view of the above situation, the purpose of this research work is to determine the level of mercury and number of steroids, betamethasone, dexamethasone, Hydrocortisone acetate, Triamcinolone acetonide and Betamethasone 17 – valerate in facial whitening creams available in the Sri Lankan market.

Methods: Five different brands of whitening creams each with three different batches were collected from the market based on their availability and reputation to determine mercury by inductively coupled plasma mass spectrometry (ICP-MS) and same products were analyzed to identify five different steroids by High performance liquid chromatography (HPLC).

Results & Discussion: The minimum limit of quantification for mercury (as Hg) is recorded as 0.01 mg / L and it was revealed that the mercury levels in the samples were below the Limit of Quantification (LOQ). Specified limit of detection (LOD) for all steroids in sample solution is 250 µg/g, in asean method. Calculations are shown that the steroid concentrations in all samples are below the LOD.

Conclusions: The study showed the mercury level of tested facial whitening creams are below the detection limit. Betamethasone, Dexamethasone, Hydrocortisone acetate, Triamcinolone acetonide and Betamethasone 17 – valerate were negatively identified in all five facial whitening creams. Hence all the tested whitening cream samples were found to comply with the standards set for mercury and steroids

Key words: Steroids, Inductively Coupled Plasma Mass Spectrometry (ICP-MS), High performance liquid chromatography (HPLC), Limit of Detection (LOD)

Acknowledgement: The support given by the Department of Chemistry, University of Colombo and the National Medicines Quality Assurance Laboratory, Sri Lanka duly acknowledged.

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ISBN: 978-624-6618-00-1