PROCEEDINGS

of the

3rd Annual Postgraduate Research Showcase

GRS 2023

"Innovative sustainable food production systems through research and knowledge sharing"

5th September 2023

Faculty of Livestock, Fisheries and Nutrition
Wayamba University of Sri Lanka

Third

Annual Graduate Research Showcase (GRS)

of the

Faculty of Livestock, Fisheries and nutrition

of the Wayamba University of Sri Lanka

Innovative sustainable food production systems through research and knowledge sharing

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Third Annual Graduate Research Showcase (GRS) of the Faculty of Livestock, Fisheries and nutrition of the Wayamba University of Sri Lanka 2023

Message from the Chairman – Faculty Higher Degree Committee

I am delighted to write this message to the Proceedings of the 3rd Graduate Research Showcase (GRS-2023). It is with great pride, pleasure and honour that the Higher Degree Committee in the Faculty of Livestock, Fisheries and Nutrition has been successful in organizing the third GRS physically this time.

The objective of this GRS is to showcase current postgraduate research and disseminate up-to-date, high-quality and original research highlights to the scientific community. This great event will also provide an opportunity for our postgraduate students to communicate and interact with Academics and other Researchers. We hope that they will receive useful guidance/suggestions for their experimental methods and designs, data analysis, and completion of their theses. The research culture at the Wayamba University of Sri Lanka is deeply entrenched, and as a result, student enrolment in research-based postgraduate programs is rapidly increasing. Faculty of Livestock, Fisheries and Nutrition (FLFN) is privileged to have researchers of a high caliber to guide these students in their chosen fields. As a result, the faculty is gaining significant recognition as a hub of applied research and most of the research outcomes presented at GRS-2023 have resulted from multi-disciplinary research including aquaculture and fisheries, livestock and avian sciences, applied nutrition and food science & technology. Accordingly, the FLFN can offer a leading and lively research environment and has many outstanding areas of research strength. For the 3rd GRS, there are about 25 postgraduate students to make presentations under the theme "Innovative sustainable food production systems through research and knowledge sharing". As most of these postgraduates are presenting their ongoing research findings, we provided a platform for them to snapshot their research highlights.

On behalf of the Faculty Higher Degree Committee, I wish to thank all our postgraduate students for their contributions to the GRS-2023. I would like to express my sincere gratitude to Senior Prof. Udith K. Jayasinghe, the Vice-Chancellor of the Wayamba University of Sri Lanka and Senior Prof. (Mrs.) C.V.L. Jayasinghe, the Dean of the Faculty of Livestock, Fisheries and Nutrition for the valuable support and guidance given in organising GRS-2023. Dr. S.T. Goanpinuwala is greatly acknowledged for her utmost contribution as the Coordinator of GRS- 2023 to make this event a great success. Prof. M.D.S.T. de Croos, former Chairman of the Faculty Higher Degree Committee-FLFN also greatly acknowledged as he is the Initiator of the GRS. I congratulate and appreciate all our postgraduate students who showcase their research highlights. I convey my thanks to all postgraduate supervisors who guided the students for this great achievement. On behalf of the Faculty Higher Degree committee, I wish to thank all our postgraduate students, reviewers and Organizing Committee- GRS-2023 for their great contribution. Also, all academic and non-academic staff of the faculty assisted in various ways to organise the 3rd GRS-2023.

Professor KDPP Gunathilake

Chairman-Faculty Higher Degree Committee – 2023

Message from the Dean,
Faculty of Livestock, Fisheries and Nutrition

It is a great pleasure to write this message as the Dean, Faculty of Livestock, Fisheries and Nutrition, for the 3rd consecutive Graduate Research Showcase which will be conducted this year as "GRS 2023", a platform for our postgraduates to showcase their vibrant research, inventions and innovations.

Faculty of Livestock, Fisheries and Nutrition is the leading faculty offering Master of Philosophy and Doctor of Philosophy Degrees at Wayamba University of Sri Lanka. We are proud of our growing number of postgraduate students. This year, there are 22 students presenting their findings at the GRS 2023. This platform provides graduate students a professional-level training in their career and capacity building for effective science communication.

The faculty is committed to conducting impactful research. I would expect the multidisciplinary research culture of the faculty to further evolve while nurturing a future generation of young scientists. I believe that this will provide us with an opportunity to serve together for the betterment of the humanity and country's development.

I congratulate all postgraduate students and academics for their extended research work. I expect exciting and fruitful discussions and interactive exchange of knowledge at this event.

I am grateful to our Vice-Chancellor Senior Professor Udith K. Jayasinghe for his thoughts and support. I highly appreciate the Chairman and the members of the Faculty Higher Degree Committee, the co-ordinator, and the organizing committee of the GRS 2023 for their passion and hard work in organizing this event. I especially mention the involvement of the postgraduate students in organizing this event, I hope this culture will continue to enrich.

I wish you every success with "GRS 2023, on the theme "Innovative sustainable food production systems through research and knowledge sharing"!

Senior Professor (Mrs) CVL Jayasinghe
Dean, Faculty of Livestock, Fisheries and Nutrition
Wayamba University of Sri Lanka

Message from the Vice-Chancellor, Wayamba University of Sri Lanka

I am pleased to write this message to mark the e-Proceedings of the "Graduate Research Showcase 2023" conducted by the Faculty of Livestock, Fisheries & Nutrition for the 2nd Time, which showcases the research highlights of 25 postgraduate students who are currently pursuing their MPhil/PhD Degrees in the Wayamba University of Sri Lanka through this Faculty.

The Graduate Research Showcase is an immense opportunity for the postgraduate students to present their outcomes of their research work to the outsiders, including professionals, academic personal, younger generation of the faculty and as well as to the peers sharing their valuable outcomes aiming a remarkable impact to the entire society nationally and internationally. In advance this will hugely admire the outstanding achievements of the dedicated graduates in a broader manner where it would strengthen the current abilities of these students towards more research aimed culture.

I really appreciate the untiring efforts of the Dean and the organizing committee and other academic and non-academic staff members attached to the Faculty of Livestock, Fisheries & Nutrition, for the idea of having such a successful event.

I wish all success to the 25 presenters who are showcasing their heard earned, precious achievement to the audience, who are eagerly waiting and I wish them all success in their future endeavors.

Senior Professor Udith K. Jayasinghe
Vice-Chancellor
Wayamba University of Sri Lanka

Key-highlights index

Plenary 1

Biochar – Its role in offsetting processing emissions

by

Professor Jim R. Jones

Professor of Chemical and Bioprocess Engineering
School of Food and Advanced Technology
Massey University, New Zealand

Many industries are rich in biomass residues, which is particularly true of processing plants where stalks, peelings, skins, heads, or bones are essentially waste, and where disposal to landfill creates methane emissions which greatly increase the overall product carbon footprint. To sustainably manage these residues, industries look first for value creation through secondary products, but these are often small volume and usually leave their own residue that must be treated before disposal. These accumulating residues must be managed on an annual cycle, and many jurisdictions disallow their stockpiling or landfilling. Instead, the best environmental outcome is required. Using the residues for bioenergy through anaerobic digestion, or thermal processing for bioenergy and biochar are among the options. Of these, biochar provides the best carbon footprint, in fact, so good that the net sequestration it offers can be used to offset other processing and transport emissions. Furthermore, with the rise of the international voluntary markets, biochar as a sequestration vehicle can be monetised, which until now has not been possible because the costs associated with biochar production are not currently covered by the C market, or by the biochar fertiliser and liming values. However, this is fast changing, since the IPCC proposed in 2019 a protocol for biochar to be included in national inventories as a soil amendment contributing to increases in soil C.

Plenary 2

Building a Research Culture in Sri Lanka

by

Professor Veranja Karunaratne

Vice-Chancellor

SLTC Research University

Padukka, Sri Lanka

Sri Lanka has recognized the importance of research in creating and disseminating knowledge, which is essential for a country's healthy economy and living standards. The country's research capacity can be measured by the allocation of funds of gross domestic product spent on research, number of researchers, number of publications in refereed journals, and number of patents. In 2020, Sri Lanka allocated 0.12 percent of its Gross Domestic Product (GDP) for research, whereas the world average is 2.23 percent.

The higher education system in Sri Lanka comprises 16 state universities, 18 postgraduate and independent institutes, and hundreds of recognized higher educational institutes governed by the private sector. Many degree programs have been designed in such a way that undergraduates get the opportunity to expose themselves to academic research under the full supervision of lecturers. The researching culture that gets started from this stage then gets continued with their next academic qualifications including the postgraduates and even when they enter the corporate sector.

Sri Lankan researchers have made globally recognized achievements in diverse fields, including new discoveries, new concepts, and theories. Sri Lanka has a researching culture that gets started from undergraduate level and then gets continued with their next academic qualifications including the postgraduates and even when they enter the corporate sector.

The recent economic crisis has reduced research funding disbursed by the National Research Council, the National Science Foundation and Sri Lanka Council for Agricultural Research policy. This coupled with the very little research funding available in State Universities, has frustrated the scientific community. In addition, this and the prevailing economic hardships have led to a brain drain of young faculty, making the situation even worse.

According to 2020 data, Sri Lankan scientific community publishes about 1140 research publications in SCI journals. These publications are generated by about 6000 researchers and 3900 post graduate students. Although according to the National Intellectual Property Office Data, 272 patents were filed in 2020. However, 223 of these were non-resident registrations. However, of the total exports, high tech exports count less than 1%. Increasing the latter will be a major contributor in Sri Lanka becoming an upper middle income country in the near future.

GRS/01

Enhancement of bioavailability of phosphate by microbial methods to sustainable utilisation of Eppawala rock phosphate

Aberathna A.A.A.U.[a], Premarathne J.M.K.J.K.[a]*, Jayaweera B.P.A.[a], Prathapasinghe G.A.[a], Liyanage J.A.[b], Fernando C.A.N.[c], Satharasinghe D.A.d, Jayasooriya A.P.[d] and Jinadasa R.N.[e]

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Key-highlights

- Phosphate solubilising microorganisms (PSM) were isolated from soil samples.
- Genus of the PSMs were morphologically identified.
- The solubilising ability of High Graded Eppawala Rock Phosphate (HERP) of isolated microorganisms was studied qualitatively and quantitatively.
- Optimisation of HERP solubilisation by best selected PSMs was done.
- A combination of best selected PSMs on HERP solubilisation was tested.

GRS/02

Mangrove vegetation mapping in Kala Oya estuary, Sri Lanka using Landsat 8 and Sentinel-1A imagery in Google Earth Engine cloud computing platform

Abeygunawardana A.P.[a*], Jayakody S.[b], Wikramanayake E.[c], Fernando S.[d] and Wickramarathne C.[e]

[a]Department of Animal Science, Faculty of Animal Science and Export Agriculture, Uva Wellassa University, Badulla 9000, Sri Lanka; [b]Department of Aquaculture and Fisheries, Faculty of Livestock, Fisheries and Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila, 60170, Sri Lanka; [c]WWF Hong Kong, Kwai Chung,Hong Kong; [d]No:02, Pallekubura, Doragamuwa, Kandy, 20000 Sri Lanka; [e]International Water Management Institute (IWMI) Colombo 10120, Sri Lanka.

Key-highlights

- Current study proposes a robust mapping approach by integrating optical image and SAR Data using random forest classifier for mangroves.
- The resultant mangrove forest map of Kalaoya Estuary at 30 m spatial resolution has an overall/users/producer's accuracy greater than 90%.
- Study confirmed gradual increase in mangrove extent of Kala oya estuary from 2017 to 2021.
- This approach is ideal for data deficient situations, using freely available optical images and radar.
- This method can produce initial maps of mangroves for ground truthing.

GRS/03

Enhancing bioavailability of Eppawala rock phosphate by chemical and physical method to be used in poultry rations

Manopriya S.[a], Premarathne J.M.K.J.K.[a*], Jayaweera B.P.A.[a], Prathapasinghe G.A.[a], Jayasooriya L.J.P.A.P.[b], Satharasinghe D.A.[b], Fernando C.A.N.[c], Mantilaka M.M.M.G.P.G.[d] and Liyanage J.A.[e]

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Key-highlights

- Eppawala rock phosphate can be used as a primary source of phosphorus to synthesise different calcium phosphate compounds such as dicalcium phosphate (DCP).
- DCP can be synthesised using different sources of calcium carbonates as the source of calcium.
- Eggshells can also be used as a calcium carbonate source to synthesise DCP.
- The wet precipitation method of DCP synthesis critically depends on pH.
- Using Eppawala rock phosphate and eggshell to synthesise feed-grade DCP could be beneficial in the context of utilising underutilised resources.

GRS/04

Development of a culture-based fishery for giant freshwater prawn in Sri Lankan reservoirs

Digamadulla D.S.[a], Wijenayake W.M.H.K.[a], Jayasinghe J.M.U.K.[b] Amarasinghe U.S.[c] and De Croos M.D.S.T.[a*]

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Key-highlights

- Differentiation of public intervention (PI) and public-private intervention (PPI) practiced in culture-based fishery (CBF) was achieved.
- Results show that PPI is efficient for a rapid growth at a short timeline, but creates a monopoly in the long run.
- Appraised mixed opinions of giant freshwater prawn CBF stakeholders on the priorities of both PI and PPI approaches.
- Study identifies the need of policy enforcement to strengthen community based CBF management.

GRS/05

Effect of improved school garden and school food environment on food literacy among secondary school children

Karunanayaka M.M.S.[a*], Perera T.[a] , Silva K.D.R.R.[a], Mohotti J.[b] and Hunter D.[c]

[a] Department of Applied Nutrition, Faculty of Livestock, Fisheries & Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila, 60170, Sri Lanka; [b]Department of Crop Science, Faculty of Agriculture, University of Peradeniya; [c]Alliance of Bioversity International Rome, Italy.

Key-highlights

- Addressing food literacy early in life is a compelling way to persuade individuals to engage in healthy dietary behaviours.
- The school food environment has been identified as an ideal setting to promote food literacy among secondary school children.
- The study aims to promote food literacy among secondary school children through improved school gardens and school food environments.
- The status of school gardens and school food environment in Sri Lanka will be investigated using a mixed-method approach.
- Nutrition interventions will be implemented in selected schools to investigate their effect on improving food literacy among adolescents compared to control schools.

GRS/06

Comparative analysis and optimisation of DNA extraction methods for high throughput genomic studies of Elasmobranch tissues

Anjani P.A.D.L.[a,b], Akshay Tanna[b], Daniel Fernando[b], Emily Humble[c], Shaili Johri[d] and Gayashani Sandamalika W.M.[a*]

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Key-highlights

- Tissues in ethanol, dried tissues, and frozen tissues of shark and ray species were used for the DNA extraction.
- DNA extraction was done using Qiagen DNeasy blood & tissue kit, Hotshot DNA extraction kit by Bento Bioworks, Macherey-Nagel Nucleospin kit, and Bio-Rad Chelex method.
- DNA quantity, quality, efficiency, cost-effectiveness, and ability to conduct PCR amplification were used to compare each DNA extraction method.
- The Bio-Rad Chelex method had the highest efficiency, lowest cost for extraction, and a high yield of DNA for all tissue types.
- Qiagen DNeasy blood & tissue kit gave high-quality DNA and it was used for metabarcoding to build up a DNA reference library for elasmobranch species of Sri Lanka.

GRS/07

Production trends and yield predictive models for culture-based fisheries in irrigation reservoirs of Sri Lanka

Adikari A.M.A.N.[a], Amarasinghe U.S.[b], Perera H.A.C.C.[b], Clive J.[c] and De Croos M.D.S.T.[d*]

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Key-highlights

- Stocking and production data of finfish species and Giant Freshwater Prawn (GFP) (*Macrobrachium rosenbergii*) in 48 reservoirs (2012-2021) were analyzed.
- The mean annual yields of carp, tilapia, and GFP in small, medium, and major reservoirs were related to stocking density separately.
- The mean annual yields of carp, tilapia, and GFP in small, medium, and major reservoirs were related to reservoir area separately.
- The levels of significance of various relationships were evaluated in relation to stocking performance and the natural recruitment of fish.

GRS/08

Associations of dietary fat intake and visceral adiposity with cardiovascular disease risk markers in Sri Lankan healthy adults

Perera U.L.D.S*, Chandrasekara A. and Rathnayake K.M.

Department of Applied Nutrition, Faculty of Livestock Fisheries and Nutrition, Wayamba University of Sri Lanka, Makandura (NWP), 60170, Sri Lanka.

Key-highlights

- Implications of Sri Lankans diet on cardiovascular disease (CVD) risk markers is still unclear.
- In the CocoHeart-Sri Lankan cross-sectional study, 401 healthy adults had measurements of arterial stiffness and visceral adiposity using standard equipment.
- A fasting blood sample was collected to determine glycaemic and lipid biomarkers.
- Higher intakes of dietary fat were associated with higher visceral adiposity.
- Visceral adiposity independently predicted about 11% of the variability in systolic blood pressure and fasting triacylglycerol concentration.

GRS/09

Taxonomic identification and present status of jellyfish resources in coastal waters of Sri Lanka

Karunarathne K.D. and De Croos M.D.S.T.*

Department of Aquaculture and Fisheries, Faculty of Livestock, Fisheries and Nutrition, Wayamba University of Sri Lanka, Makandura, Gonawila (NWP) 60170, Sri Lanka.

Key-highlights

- The "*Waya-gel*-survey", the first-ever jellyfish survey conducted in coastal waters around Sri Lanka, from 2017 to 2020, reported 01 new species, 22 first records, with an updated full checklist of jellyfish.
- The effect of physicochemical parameters of coastal waters on the diurnal and seasonal variations of jellyfish was identified.
- The ecological and economic importance of jellyfish were described based on their status.
- The stakeholders' opinions on the local jellyfish industry were analysed in spotting the strengths, weaknesses, opportunities and threats.
- Around 800 scientific literature from 1800 to 2022 was tabulated in contrasting the broader spectrum of species-wise jellyfish usage.

GRS/10

Identification and characterisation of bioactivity of selected under-utilised legumes grown in Sri Lanka for the formulation of functional food products

Hettiarachchi H.A.C.O.[a]*, Jayatilake S.[a], Chandrasekara A.[b] and Gunathilake K.D.P.P. [a]

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Key-highlights

- Flour of selected legumes: *Mucuna pruriens* and *Canavalia gladiate* were analysed for anti-diabetic, anti-obesity and anti-hypertensive properties using *in-vitro* bio assays.
- Both legume seed flours were incorporated in formulating an instant soup mix for treating obesity-related disorders evaluated using bio assays and human clinical trials.
- *In-vitro* anti-obesity activity evaluated using pancreatic lipase inhibitory assay, was 14.39 mg Orlistat equivalent per g dry weight of the legume-based instant soup mix.
- Significant reduction in waist circumference, HbA1c%, total cholesterol level and LDL level was observed among the subjects who consumed the legume-based instant soup mix.
- Despite the absence of a significant reduction in BMI and fasting blood sugar, there was a significant increase in HDL levels of subjects who consumed legume-based soup mix.

GRS/11

Updating Land Use/Cover (LULC) for Hanthana Environmental Protection Area (EPA)

Fernando T.T.[a,b*], Jayakody S.[a], Ratnayake R.[c], Gunawardena J.A.R.[b] and Kadupitiya H.K.[d]

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Key-highlights

- Accurate LULC maps are vital for development of ecosystem services based management plans.
- Existing LULC (2018) was first updated through high resolution satellite images available in Q-GIS and Google Street View for Hanthana EPA with a 1 km buffer.
- Textural, colour, pattern, canopy cover anomalies detected were noted.
- Ground truthing is then performed to further verify noted anomalies.
- A reduction seen in extent of abandoned paddy/tea, mixed tree & perennials, scrublands while there was an increase in extent of grasslands, tea, planted forests and built-ups.

GRS/12

Nudging for good: Real-time AI-driven diagnostics and behaviour change to improve adolescents' diets and nutrition in Sri Lanka

Karunarathna H.M.N.J.[a*], Perera H.A.T.[a], Gelli A.[b] and Silva K.D.R.R.[a]

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Key-highlights

- The aim of the proposed study is to modify, validate and examine the feasibility of using an AI mobile application to improve the diets of adolescent girls in Sri Lanka.
- About 6000 food images which represent the most commonly consumed food items by adolescent girls will be taken to train the AI model.
- The portion sizes, weights, conversion factors, recipes and food composition information will be provided for the developers to develop the AI application.
- The developed AI application will be validated against weight food record and 24-hour recall dietary assessment methods.
- The feasibility of the AI application to assess the food and nutrient intakes will be assessed by using it in a real-life context.

GRS/13

Estimates of population parameters of giant freshwater prawn and other constituent finfishes to ensure strategies for enhancing yields in selected irrigation reservoirs in Sri Lanka

Pilagolla S.A.S.[a], Amarasinghe U.S.[b], Clive J.[c], Perera H.A.C.C.[b] and De Croos M.D.S.T.[a*]

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Key-highlights

- The recent addition of Giant Freshwater Prawn (GFP) *(Macrobrachium rosenbergii)* has a greater economic and social benefit in Culture-based fisheries (CBF).
- Estimated population parameter and growth models of GFP and fish ensure the development of an adequate management plan for 03 categories of perennial reservoirs in Sri Lanka.
- The poor recovery rates of stocked GFP post larvae, ineffective fishing methods and a significantly higher proportion of damaged GFP caught by gillnets result in low profits.
- The behaviour of GFP for the newly developed trap to minimise physical damage to the GFP at harvesting and to improve catchability to gain high profits is being studied.

GRS/14

Opinions of stakeholders in relation to current secondary school food literacy education and school food environment in Sri Lanka

Rathnayake M.P.S.[a*], Nanayakkara J.[b], Perera T.[a], Worsley T.[c], Booth A.[b] and Silva K.D.R.R.[a]

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Key-highlights

- The aim was to explore the broad range of stakeholders' opinions regarding the current status of secondary school food literacy education and school food environment.
- Interviews and focus group discussions were conducted with students, teachers, principals, parents, education administrators, food and health professionals, and canteen managers.
- Requirements of revising the curricula and pedagogical strategies to develop the skills and behaviours of the students were emphasized.
- Uneven distribution, limited teaching-learning resources among schools, unhealthy school food environment, and undervaluing of these subjects were reported barriers.

GRS/15

Reproductive biology and population dynamics of a slipper lobster species *Thenus orientalis* on the eastern coast of Sri Lanka

Wickramaratne I.U.[a*], Thilakarathne R.M.G.N. [b] and De Croos M.D.S.T.[c]

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Key-highlights

- Assessment of the abundance and distribution of slipper lobsters off the eastern coastal waters of Sri Lanka was initiated.
- Reproductive biological aspects which are essential for the management of the lobster resource were evaluated by collecting monthly lobster samples.
- Population dynamics of the slipper lobsters on the eastern coast of Sri Lanka were determined.
- Evaluation of the market & socio-economical aspects of the fishers engaged in the slipper lobster fishery was initiated.
- Revisiting the regulations and provision of recommendations for effective slipper lobster fishery management strategies are to be conducted.

GRS/16

The distribution pattern and habitat use of wild elephants in and around Maduruoya National Park, Sri Lanka

Wilson A.S.C.[a]*, Jayakody S[b], Pathmalal U.K.G.K[c]

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Key-highlights

- Majority of the elephants were found to move out of the park during the months of February to May.
- Last five years much of the HEC incidence recorded were between months of April and May.
- About four natural elephant corridors around Maduruoya Naitonal Park linked to other national parks and forest reserves.
- The habitat improvement practices, community engagement and awareness programmes are some proposed measures for mitigating HEC.

GRS/17

Preliminary study on the comparison of lipid contents of four microalgae species

Walpita C.C.[a], Walpita C.N.[b] and De Croos M.D.S.T.[a*]

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Key-highlights

- Although globally microalgae have been extensively studied as an alternative source of lipids, very few studies have been reported on microalgal species of Sri Lanka.
- This preliminary study compared the yield of lipids extracted from four microalgae species using standard protocols.
- Extracted lipid contents vary between 11 – 19% among the four species of microalgae.
- Further investigations are needed in analysing the fatty acid profile of the extracted lipids of four species.
- The lipid extraction protocol needs to be further modified to suit a local industry.

GRS/18

Development of an economically feasible protocol to extract type-I collagen from the skin offcuts of the Yellowfin tuna (*Thunnus albacares*)

Ampitiya A.G.D.M.[a], Gonapinuwala S.T.[a], Fernando C.A.N.[b] and De Croos M.D.S.T.[a*]

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Key-highlights

- Collagens, a major structural protein in fish skin, was extracted from the skin off-cuts of three commercial fish species and Yellowfin tuna skin was identified as the most suitable raw material.
- The conventionally used purification step and acid extraction step was simplified by the shorter and less expensive alternative steps.
- The resultant collagen yields were similar to the reference and varied between 55-62% on a dry weight basis.
- All extracted collagens were type I, highly pure and confirmed the native triple-helix structure.
- This study confirmed the possibility of using skin offcuts as a potential source of collagen and the modified method as a potential industrially-applicable protocol.

GRS/19

Formulation of millet and rhizome flour incorporated noodle and evaluation of their functional properties using in vitro assays and human clinical trial

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Key-highlights

- A noodle was formulated by incorporating *Panicum milaceum, Paspalum scrobiculatum, Setaria italica, Lasia spinosa, and Nelumbo nucifera*. Incorporation level was 40%.
- Newly formulated noodle was rich in dietary fiber and resistant starch with a low level of starch compared to 100% wheat flour noodle.
- Formulated noodles had 65.75% of α amylase inhibition action and 70.85% of amyloglucosidase inhibition action that showed anti-diabetic properties.
- A randomised, placebo-controlled human clinical trial was conducted to assess the functionality of the product, basically in weight management.
- The findings indicated positive changes in anthropometric and biochemical parameters associated with improved insulin sensitivity, in intervention group compared to placebo.

GRS/20

Extraction and characterisation of chitosan from shellfish waste for product development

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Key-highlights

- According to estimates, approximately 1.6 million kg of shell waste is discarded annually from Sri Lankan processing plants.
- The traditional chitosan extraction protocol was modified to a reliable and effective protocol to utilise this accumulated waste in shellfish industry.
- Modified method saves 8.10% of chemicals and 13% of energy indicating its high potential to be executed at the industrial level.
- Extracted chitosan was solubilised with 10% vinegar and fortified with Vit-E nano emulsion to form an edible film with excellent antioxidant and UV screening abilities.
- This film has a potential to be used as an active biodegradable edible film for wrapping fatty foods which are often susceptible for oxidation.

GRS/21

Determinants of Fruit and Vegetable consumption and effective behavioural change interventions to increase consumption

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Key-highlights

- Increasing Fruit and Vegetable (F&V) intake requires end-to-end approach starting with consumers, understanding dietary patterns and addressing barriers to consumption.
- This research aims to find out drivers of F&V intake among Sri Lankan population, as a part of Fruit and Vegetables for Sustainable Healthy Diets (FRESH) Initiative.
- A qualitative study will be conducted to identify individual, social and physical environmental factors affecting F&V consumption behaviours among adult women and adolescents.
- A quantitative study will be conducted as baseline data collection, to determine the current dietary food and nutrient intake among adult women focusing on F&V.
- Behavioural change communication intervention will be designed and implemented in selected locations in Sri Lanka and its impact will be evaluated after one year.

GRS/22

Characterisation of maturity and quality indices and evaluation of postharvest life of pomegranate (*Punica granatum* L.) Kalpitiya Hybrid

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Key-highlights

- Newly fertilized flowers were identified by petal fall and tagged assuming that, it was the first day of fruit set.
- Fruits were harvested at 14 day intervals to measure the physiological and chemical parameters.
- The total soluble solid content (TSS%) of juice showed a gradual increase from the 2nd week to the 10th week, from 9.86 ± 0.17 % to 12.84 ± 0.22 %.
- The peel thickness of the fruits was gradually decreasing with maturity, where it was 0.38 ± 0.02 mm in the 2nd week and 0.24 ± 0.01mm in the 10th week.
- The color of the arils changed from white to purplish red during the first 10 weeks due to the variation of the anthocyanin content, and the l*, a*, and b* values of the 4 week old arils were 54.93 ± 8.98, -0.14 ± 0.38, 17.42 ± 0.94, and the 10 week old arils were 44.49 ± 4.17, 19.97 ± 4.51, 15.16 ± 1.17.

GRS/23

Legal provisions and institutional structure for Environmental Impact Assessments (EIAs) in Sri Lanka

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Key-highlights

- Two authorities (CEA and NWPEA) and two departments (DWC and DoFC) conduct EIAs and CEA operates under National Environmental Act (1980, Part 1V C - Section 23A).
- Fauna and Flora Protection Ordinance (1937, Sec.9A), Forest Ordinance (1885, Sec.16) and North-Western Province Environmental Statue (1990, Sec.44 – 48) provide provisions.
- Partly completed data indicate that from 1993 to 2023, a total of 308 EIAs and 720 IEEs have been conducted in Sri Lanka.
- The highest proportion of assessments has been conducted for tourism (13%), transport (11%), and hydropower (10%) in the country.
- The highest number of assessments have been done in Uva followed by Central Province.