Proceedings of the

NATIONAL CONFERENCE ON MULTIDISCIPLINARY RESEARCH 2020

VIRTUAL POSTGRADUATE SYMPOSIUM

"Inspiring Sri Lankan Youth for Tomorrow's Science"

NCMR 2020

08th October 2020

ORGANIZED BY THE YOUNG SCIENTISTS' ASSOCIATION, NATIONAL INSTITUTE OF FUNDAMENTAL STUDIES, SRI LANKA

NIFS

NIFS-YSA

Main Sponsor: BANK OF CEYLON BOC Bankers to the Nation

NCMR 2020

Proceedings of the

National Conference on Multidisciplinary Research - 2020

Virtual Postgraduate Symposium

08th October 2020

"Inspiring Sri Lankan Youth for Tomorrow's Science"

ISSN 2756-9063

Proceedings of the National Conference on Multidisciplinary Research - 2020

8th October 2020

Published by:
Young Scientists' Association (NIFS-YSA),
National Institute of Fundamental Studies,
Hanthana Road, Kandy,
Sri Lanka
www.nifs.ac.lk
Tel: +94 (0) 812 232 002
Email: ysa@nifs.ac.lk

Cover page Design & Page setup:
Umair Khaleelullah
Anjana Rathnayake
Buddhika Karunarathne
Ishara Sandamali

Main sponsor:
Bank of Ceylon

ADVISORY COMMITTEE

Prof. Saman Seneweera, Director, NIFS

Prof. Siril Wijesundara,

Dr. Kumari Thilakarathne

Dr. Lakmal Jayarathne

Dr. Shalini Rajakaruna

EDITORIAL COMMITTEE

Prof. M. C. M. Iqbal (Editor in Chief)

Prof. Lakshman Dissanayake

Prof. Siril Wijesundara

Prof. Lalith Jayasinghe

Prof. Deepal Subasinghe

Dr. Vageesha Gunasekara

Dr. Rasika Dissanayake

ORGANIZING COMMITTEE (NCMR – 2020)

Ms. Maheshika Perera
(Conference co-chair, NCMR 2020)
Ms. Surendranie Cabral de Mel
(Conference co-chair, NCMR 2020)
Mr. Pubudu Nuwan Dissanayake
(Co-chair, NIFS-YSA)
Ms. Kaushalya Hettiarachchi
(Co-chair, NIFS-YSA)
Mr. Indika Sarakoon
(Secretary, NIFS-YSA)
Ms. Nimanthika Samarasinghe
(Secretary, NIFS-YSA)
Ms. Upuli Nakandala
(Treasurer, NIFS-YSA)
Ms. Himashi Narampanawa
(Treasurer, NIFS-YSA)
Mr. Umair Khaleelullah
(Committee member, NIFS-YSA)
Ms. Abira Satkunanathan
(Committee member, NIFS-YSA)
Ms. Sanjila Marasinghe
(Committee member, NIFS-YSA)

Mr. Anjana Rathnayaka
Mr. Buddhika Karunarathne
Mr. Mahesh Senarathne
Ms. Ovini Dissanayake
Ms. Tharangika Bowange
Ms. Sewwandi Kaushalya
Ms. Afka Deen
Ms. Ishara Sandamali
Ms. Rasika Gunarathne
Ms. Jayani Bandara
Ms. Anuradha Rajapakshe
Ms. Hansani Vinodya
Ms. Hasithi Smarasinghe
Ms. Waruni Senavirathna
Ms. Niranjala Madubhashini
Ms. Pramodya Jayasinghe
Mr. Dulan Edirisinghe

ACKNOWLEDGEMENTS

Secretary, NIFS
Director's office- NIFS
Advisory Committee, NIFS-YSA
Science Education and Dissemination Unit-NIFS
Accountant and the Accounts Division of NIFS
Administrative Officer and the Administrative Division of NIFS

MESSAGE FROM THE CHAIRMAN, NATIONAL INSTITUTE OF FUNDAMENTAL STUDIES

I am sending this message in my capacity as the Chairman of the National Institute of Fundamental Studies, which is a prestigious premier research institution in Sri Lanka.

This is an unprecedented event, undertaken during the COVID 19 global challenge. It is very difficult for us to gather face to face, and you as the Young Scientists Association (YSA) which is a part of the NIFS has done a marvellous job in organising this virtual conference. You have successfully received 61 abstracts of which, 16 would be oral presentations and 45 presented as posters. Having poster presentations as a virtual event is a real challenge and I am so delighted that the organizers have managed to live beyond everyone's expectations.

YSA, which is comprised of postgraduate students, volunteers, and undergraduate students at the NIFS appears to me as a dedicated group of enthusiasts, running into their second year. Last year there had only been an institutional event, but today it has become a national event. However, as I learnt there are a quite a few international presentations too.

I wish to share one sentiment, which is close to my heart. You all are young budding scientists, who are going to be future research leaders in this country. I want to make an appeal to all of you. We need a culture shift and conduct research for people's benefits. Up to now the great majority of intellectuals, researchers, and academics conduct research for their promotions. Many thesis are gathering dust in libraries. They publish to ensure a good CV and to go to conferences. I am not against such personal achievements and personal capacity building. But our research has to go beyond us. It has to bring benefits to the people. Because we are products of free education, we use public knowledge, and we use public money.

I have no doubt whatsoever this conference is going to offer very stimulating presentations and discussions. Please take everything possible away from this conference and determine to be leading scientists not only for our nation, but for the whole globe. Knowledge is for people's benefit and has no boundaries.

I would like to thank the organizing committee for asking me to share my thoughts. I would once again like to congratulate the Organising Committee for the spirit and courage shown in holding this event.

Professor Athula Sumathipala
Chairman,
National Institute of Fundamental Studies.

MESSAGE FROM THE DIRECTOR, NATIONAL INSTITUTE OF FUNDAMENTAL STUDIES

I am delighted to send this message to the National Conference on Multidisciplinary Research 2020, organized by the National Institute of Fundamental Studies (NIFS) Young Scientists Association. NIFS is a national institute mandated to conduct scientific research on fundamental and advanced studies, focusing on national development and advancing science. NIFS scientists are expected to engage in cutting-edge research that will not only impact Sri Lankan society, but also advance scientific knowledge globally.

Over the past four decades, NIFS has trained over 1,500 graduate students, mostly MSc, MPhil and PhDs covering chemical, physical, biological and environmental sciences. As part of NIFS 'leadership development program for young researchers, we established the NIFS Young Scientists' Association (NIFS YSA) in 2018 to create an environment for research culture and a dynamic working and learning environment for postgraduate students. NIFS-YSA is a much-needed platform to develop our young scientists' leadership skills.

In 2019, the NIFS-YSA organized its first annual research symposium, enabling young researchers within NIFS to present and share their research. This year, NIFS-YSA took a step further in organizing a national-level conference for which we received abstracts from many institutions across the country as well as from foreign institutions. This year, due to the COVID 19 pandemic, organizers faced a new challenge in organizing a virtual conference. I would like to thank all the members of the organizing committee, advisory committee and editorial committee for their tireless efforts to make this event a success, and to congratulate all those presenting their research today.

Professor Saman Seneweera,
Director,
National Institute of Fundamental Studies.

MESSAGE FROM THE ADVISORY COMMITTEE, NCMR - 2020

National Institute of Fundamental Studies (NIFS) is well known for its sound research work and postgraduate student training. The NIFS is consistently ranked as the leading Research Institute in Sri Lanka by the Webometrics Ranking.

NIFS It is not only a perfect place for young scientists to develop their research skills but also a place for them to build-up skills on leadership, teamwork, and pave a pathway for their innovations and creativity.

On behalf of the advisory committee for the National Conference on Multidisciplinary Research (NCMR)-2020 I extend my heartfelt warm welcome to all the participants. This national event will be academically beneficial to all young scientists and we assure you a great deal of knowledge with “Inspiring Sri Lankan Youth for Tomorrow's Science".

I wish to extend my warm welcome to all the participants from all over Sri Lanka, hoping the most benefits from this outstanding virtual conference. Many thanks are extended to our talented young scientist team and colleagues at our institution who spent much time and efforts with a dedication to the success of this conference.

Dr. Kumari Tilakaratne
Advisor, NCMR – 2020,
Head,
Science Education & Dissemination Unit,
NIFS

MESSAGE FROM THE ADVISORY COMMITTEE, NIFS - YOUNG SCIENTISTS' ASSOCIATION


It's a great pleasure to write this message on behalf of the advisory committee of the Young Scientists Association of the NIFS. In the brief history of the Young Scientists Association of NIFS, National Conference on Multidisciplinary Research (NCMR) 2020 has been able to attract the attention of a large number of postgraduate students nationally as well as internationally. Since the inception of this event in the year 2019, this is the second consecutive year of the symposium and this time the YSA has opened up a new online platform to conduct the conference as a virtual symposium.

NCMR has drawn expertise from all over the country carrying the theme, "Inspiring the youth for tomorrow's science" to give an opportunity for local postgraduate students, and international participants from a wide range of disciplines ranging from the humanities to natural sciences, to disseminate their research findings and also foster academic discourse which could lead to future collaborations.

Working with the young scientists of the NIFS has always been a great experience throughout the last year since we took over the responsibility to guide them in the activities of the YSA in 2019. The enthusiasm of the organizing committee of the NCMR 2020 is commendable and their leadership qualities were visible throughout the process of organizing this event. It was a great pleasure to watch them working together as a team to overcome every challenge came on their way, from converting the conventional symposium to a virtual one due to the unexpected global pandemic to finding sponsorships in this difficult period for all industries. However, with their great effort the event has now come to a reality and would like to congratulate the organizing committee and all the presenters of NCMR 2020.

We are honoured to have Prof. Nilwala Kottegoda as our keynote speaker and Dr. Hasini Jayathilake as our guest speaker at NCMR 2020. We hope that the young scientists will get inspired by their talks and as the staff advisors of the conference we hope that this event will create continued dialogue among the participants during and beyond the NCMR 2020.

Dr. Shalini Rajakaruna & Dr. Lakmal Jayaratna
Advisors
Young Scientists' Association
NIFS.

MESSAGE FROM THE EDITOR-IN-CHIEF, NCMR 2020

The National Conference on Multidisciplinary Research (NCMR) hosted by the National Institute of Fundamental Studies (NIFS) is being held this year in a virtual mode, a consequence of the Covid-19 pandemic. The invitation to submit abstracts for this conference resulted in an unprecedented 70 submissions. We also invited Abstracts in the Social Sciences, an area of nationally relevant research, which is mandated by the Act of the NIFS. A research division on Social Sciences is now in the process of being established at NIFS and would commence its activities soon.

The conduct of research in the sciences has progressed from narrow limited areas in the past into integrated multidisciplinary areas. The NIFS itself conducts research in many such disciplines with interactions between the research groups from within the institute and also from outside. This is very relevant and important today in a national context for application of the sciences in a social and commercial context. This is also reflected in the abstracts received for the NCMR from different disciplines. Multidisciplinary research is also facilitated by many common tools that have been developed such as analytical instruments and GIS. Thus, it is a timely necessity to provide a forum for multi-disciplinary research, the objective of this conference.

Last year this conference was confined to research activities of the young scientists from the NIFS. This year, our young scientists decided to extend this opportunity to a national level inviting abstracts and presentations from researchers island-wide. The editorial process was conducted through a double-blind reviewing of the abstracts by two eminent reviewers for each abstract in the relevant disciplines.

I wish to thank the many reviewers who accepted our invitation and reviewed the abstracts who submitted their reviews on time despite their busy schedules. Your contribution helped us to maintain high standards and also to help the young scientists to improve their submissions.

I also wish to thank the editorial committee of senior scientists and student coordinators, who assisted me to coordinate and manage the review process efficiently.

Prof. M.C.M. Iqbal
Editor-in-chief, Proceedings of NCMR -2020
Associate Research Professor
Plant and Environmental Sciences
NIFS

MESSAGE FROM THE CONFERENCE ORGANISERS, NCMR-2020

It is our pleasure and honour to pen down this message as the organisers of the National Conference on Multidisciplinary Research (NCMR) 2020. NCMR 2020 is the second consecutive research symposium organized by the Young Scientists' Association (YSA) of the National Institute of Fundamental Studies (NIFS), Sri Lanka. While the first was organized as a conference for research students within the NIFS, this year the association has taken a step further in organizing a National level symposium for postgraduate students and early career researchers of Sri Lanka. Given the COVID 19 pandemic situation, the event was planned as an online conference.

The YSA was established in 2018 under the guidance of the Director of NIFS Prof. Saman Seneweera and since its inception, the YSA has been a very active organization within the NIFS, organizing and conducting events to mould and groom the future scientists of Sri Lanka. YSA includes postgraduate students, undergraduates and volunteers of NIFS who engage with research at the NIFS. The aim of the YSA is to support early career researchers to achieve research excellence. We engage with activities as a community of young people encouraging members to share their knowledge, improve their research skills and also develop their personalities while working in unity and a sense of team spirit within the institution.

The Annual research symposium is one of the main events organised by the YSA and our special thanks go out to the former co-chairs of the YSA and the organisers of last year's symposium, NIFS-Young Scientists Symposium on Multidisciplinary Research 2019 for creating a strong foundation for the YSA to continue with this endeavour. This year's research symposium is organised under four fields; biological sciences, chemical sciences, physical sciences and social sciences, for which we received abstracts from researchers from various Sri Lankan and foreign institutions. We would like to congratulate all the presenters of NCMR 2020 and hope this virtual conference will give you the opportunity to network and share your knowledge with the research community from around the country.

Organising this event would not have been possible if not for the dedication and hard work of the members of the NIFS-YSA and we would like to thank them all for their support in organising this event. We also take this opportunity to extend our sincere thanks to the Director of NIFS, advisory committee and the editorial committee of NCMR 2020, advisors of NIFS-YSA and the expert reviewers of abstracts, for their guidance and support to make this event a reality. We would also like to express our gratitude to all the scientists and the administrative staff of the NIFS for their support in organising this event. Last but not least, we would also like to extend our heartfelt appreciation to Prof. Nilwala Kottegoda, our key note speaker, Dr.Hasini Jayathilake, our guest speaker and to our sponsor, Bank of Ceylon for their contribution in making NCMR 2020 a success.

Maheshika Perera
&
Surendranie Cabral de Mel
(Co-chair, NCMR 2020)

Pubudu Dissanayake
&
Kaushalya Hettiarachchi
(Co-chair, NIFS-YSA)

MESSAGE FROM THE KEYNOTE SPEAKER, NCMR - 2020

Prof. Nilwala Kottegoda

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

I wish, I knew; Lessons to Triumph as a Young Scientist

Youth plays a pivotal role in the economic development of any country in a multitude of capacities including but not limited to intellect and labour. As the world moves towards innovation and knowledge based economies, the potential of young scientists to facilitate a rapid economic growth is immense. Unfortunately, in developing countries like Sri Lanka the efforts of young scientists in propelling the national development is minimal. One of the key attributes to this problem is the challenges faced by young scientists at the start of their career. Difficulty of finding postgraduate positions, unavailability of suitable job opportunities and scientific infrastructure have hindered the opportunities to harvest the true talents of young scientists. To thrive in this context, young scientists themselves should be skillful to think out of the box and take the paths less travelled contributing to revolutionize economic development through science in a unique way. No matter how strenuous the inception of the journey, preserving the scientific integrity and ethics must be the indispensable qualities of young scientists in order to be a respected true scientist in the long run. One piece of advice from my 20 year journey as a scientist to the younger generation is that the voyage of a scientist has been and will always be assiduous and if you want to be a part of science history books start with solving the problems of your own country.

Be you! The great scientist inside you is waiting to unravel!

List of Abstracts

BIOLOGICAL SCIENCES

Ending the diagnostic odyssey of rare/undiagnosed diseases – experience from Sri Lanka 1
D. Hettiarachchi, *B.A.P.S. Pathirana, N.F. Neththikumara, V.H.W. Dissanayake*

Effect of pre-treatment with carbimazole on the outcome of Radioactive Iodine -131 therapy for patients with hyperthyroidism 2
R. Sanooz, D.K.K. Nanayakkara

Post vaccination immunity against hepatitis B among a group of medical students in Sri Lanka 3
S. Gunawardana, V. Luxana, I. Premathilake, R. Jayalatharachchi, S. Gamage

Sero-prevalence of measles antibodies in a population of medical students in Sri Lanka 4
V. Luxana, S. Gunawardana, M.I.P. Premathilake, D. Gamage, S. Ginige, S. Gamage, R. Jayalatharachchi, C. Madhushanka, T. Haputhanthri, J. Perera

Asthma control and physical activity level amongst asthmatic adults: results from Colombo, Sri Lanka 5
K.H.A.Y. Kariyawasam, S.W. Wimalasekera

In-silico approach to Gateway® cloning of human Argonaute, Dicer and TRBP genes using SnapGene 6
C.S. Dharmarathna, Y.I.N.S. Gunawardena, R.S. Dassanayake

Antioxidant properties of flower extracts of Ceylon Spinach (*Talinum paniculatum*) 7
H. Mylvaganam, T.L. Suraweera, N.Y. Jayanath, S.I. Jayathilaka,W.P.K.M. Abeysekera, P.D.S.M. Fernando, W.K.S.M. Abeysekera

Spatial distribution of water quality parameters in the Embilikala lagoon of Bundala National Park, Sri Lanka 8
K.P.K. Madushani, M.D. Amarasinghe, R.M.C.S. Ratnayake, D.D.G.L. Dahanayaka

♦ Synthetic small RNAs conferring dengue virus resistance in mosquito vector *Aedes aegypti*: a computational study 9
S.D. Denipitiyage, Y.I.N.S. Gunawardene, M.D. Hapugoda, R.S. Dassanayake

Tetracycline repressible female paralysis of *Aedes aegypti* for dengue control: a computational study 10
P.V.D. Dilani, Y.I.N.S. Gunawardene, R.S. Dassanayake

Potential of *Panicum maximum* root wash as a bio-fertilizer for mung beans 11
P.W.I.M. Chandrasekara, P.C.U. Wanninayake, S. Hettiarachi, M.A.P.W.K. Malaviarachchi

Seasonal variation of yield and physiological traits of cowpea cultivated in the dry zone of Sri Lanka 12
A.M.T.M. Alahakoon, I. Wijayaraja, M. Piyarathne, D.A.U.D. Devasinghe, L.K. Weerasinghe, D.P. Kumarathunge, D.M.D. Dissanayake, T.A.B.D. Sanjeewa, W.C.P. Egodawatta, D.M.S. Duminda, R.A.A.S. Rathnayake, W. Malawiarachchi, S. Amarathunge, W.A.J.M. De Costa, N. Geekiyanage

A preliminary determination of crude proteins from Sri Lankan seaweeds; a novel alternative source of proteins 13
J. Samarathunga, I. Wijesekara, M. Jayasinghe

♦ *Oral Presentation*

♦ Assessing the allelic diversity of *OsNrAMP5* among traditional Sri Lankan rice varieties by *in silico* analysis 14
S. Tharanya, L.D.U.T. Gunawardhana, N.U. Jayawardana

Altering of plant growth and physiology of rice (*Oryza sativa* L.) at vegetative stage under elevated arsenic in soil 15
K.S. Manawasinghe, R. Chandrajith, S. Seneweera

Study of induced mutagenesis of tea (*Camellia sinensis* L.) using somatic embryo cultures 16
S. Sukirtharuban, K.K. Ranaweera, M.A.B. Ranatunga, S.A.C.N. Perera

Foraging guilds of waterbirds at selected sites in Jaffna and Kilinochchi districts, Northern Sri Lanka 17
G. Kandasamy, D.K. Weerakoon, A. Sivaruban, H.B. Jayasiri

♦ Preliminary study on cyanobacterial diversity in water sources of CKDu endemic Girandurukotte area, Sri Lanka 18
K.D.H.S.M.S. De Silva, M.A.T.M. Senevirathne, R.P. Wanigatunge, A.U. Rajapaksha, M.S.Vithanage, D.N. Magana-Arachchi

A preliminary study to micro propagate *Madhuca longifolia* ("Mee") using nodal cuttings and apical shoots as explant 19
H.G.M.K. Karunarathna, J.P. Eeswara, M.C.M. Iqbal

♦ Diversity of phylum Proteobacteria in four hot springs of Sri Lanka based on 16S rRNA metagenomic analysis 20
D.G.S.N. Samarasinghe, R.P. Wanigatunge, D.N. Magana-Arachchi

♦ Fine mapping of grain zinc using synchrotron-based XFM revealed genetic variation in grain Zn distribution in wheat cultivars 21
L.C.J. Kamaral, S. Neate, D.J. Paterson, P.M. Kopittke, T.M. Rajaratne, S. Seneweera

Responses of Asian elephants (*Elephas maximus*) to an electronic training collar 22
S.J. Cabral de Mel, R.K. de Mel, M.H. Senanayake, R. Bandaranayake, S. Seneweera, A. Dangolla, D.K. Weerakoon, T. Maraseni, B.L. Allen

♦ Screening of α-amylase inhibitory activity of endophytic fungal strains associated with *Costus speciosus* 23
B.M.S. Nilmini, N.S. Kumar, N.K.B. Adikaram, L. Jayasinghe

Spatial variation of soil organic carbon fractions in Blue carbon ecosystems at Erukulampiddy, Sri Lanka 24
D.D.M.O. Dissanayake, J.A.V.R. Jayasinghe, G.A.D. Perera, H.K. Kadupitiya, S. Seneweera, R.R. Ratnayake

♦ Nutrient partitioning of wheat (*Triticum aestivum* L.) grain is influenced by elevated CO_2 and heat stress 25
C.H. Samarasinghe, Z. Hassan, T.M. Rajaratne, L.C.J. Kamaral, S. Seneweera

Anticandidal activity and cytotoxicity of the hydroalcoholic extract of *Phyllanthus niruri* (Stone-Breaker) 26
F.C. Maia, G.K. Wijesinghe, T.R. de Oliveira, S.N.B. de Feiria, F. Joia, J.P.Barbosa, G.C. Boni, V.A.P.D.Franco, J.F. Höfling

♦ *Oral Presentation*

Patterns of diversity and turnover of pleurostict Sericini chafers (Coleoptera: Scarabaeidae) of Sri Lanka: A preliminary investigation of samples from Knuckles conservation forest 27
U.G.S.L. Ranasinghe, J. Eberle, C. Bohacz, S.P. Benjamin, D. Ahrens

A study on quality of life of renal patients in Sri Lanka 28
M.T.D. Kulaweera, J.H.D.S.P. Tissera

PHYSICAL SCIENCES

Numerical modeling of hybrid 3D/2D organic-inorganic halide perovskite solar cell under low light conditions and AM1.5G full sun spectrum 29
N.L. Adihetty, D.R. Ratnasinghe, M.L.C. Attygalle, N.S. Narayan, P.K. Jha

Novel spatiotemporal data mining ensemble techniques for developing a dynamic system for short-term flood forecasting in Ratnapura area 30
K.S. Saubhagya, C.D. Thilakarathne, G.P. Lakraj, S. Viswakula

Gel polymer electrolytes based on fumed silica filler for magnesium batteries 31
H.T.G. Shashintha, H.N.M. Sarangika, V.P.S. Perera, M.A.K.L. Dissanayake, G.K.R. Senadeera, J.M.K.W. Kumari

♦ Combined molecular dynamics – representative volume element modeling of thermal conduction of graphene monolayer deposited on an amorphous silicon dioxide substrate 32
H. Wijekoon, A. Rathnayake, A. Wijayasinghe, D. Subasinghe

Development of a power-on-demand thermoelectric mobile phone charger 33
K.K.S. Kumara, N.D. Subasinghe

Analysis of effective thermal conductivity in suspended and supported graphene: Representative volume element approach 34
R.A. Rathnayake, H. Wijekoon, N.D. Subasinghe

♦ Characteristics of electrolytic copper fractals 35
S.B.A.D.Y. Jayawardena, H.A.P.P.B. Jayathilake, N.D.Subasinghe

Enhancing the capacitance of activated charcoal powder based supercapacitors by varying the amount of jack fruit latex binder 36
P.N. Dissanayake, P.M. Sirimanne, K. Thennakone, D.G.B.C. Karunarathne, K.D.M.S.P.K. Kumarasinghe, G.R.A. Kumara

Enhancing the efficiency of solid-state dye-sensitized solar cells by using dye cocktail with seven dyes 37
P.N. Dissanayake, G.R.A. Kumara, P.M. Sirimanne

Development of a self-controlled fault-tolerance multiple-node sensor network (SCFTMNSN) for multi- resolution data-control applications 38
S.A.D.O.V. Chandrakumara, A. Pallegedara

CHEMICAL SCIENCES

♦ Computational investigation of antioxidant potential of major catechins found in green tea: DFT study 39
S.S. Wijesooriya, D.R. Pandithavidana

♦ *Oral Presentation*

♦ Computational investigation of causative agents of chronic kidney disease of unknown etiology (CKDu) 40
R.M.H. Rajapaksha, D.R. Pandithavidana

Study of rare earth minerals in selected placer deposits of Sri Lanka 41
N.M. Batapola, N.P. Dushyantha, H.M.R. Premasiri, A.M.K.B. Abeysinghe, L.P.S. Rohitha, I.M.S.K. Ilankoon, N.P. Ratnayake, D.M.D.O.K. Dissanayake, P.G.R. Dharmaratne

♦ Evaluation of sex pheromone emitted by female *Leucinodes orbonalis* Guenee; Brinjal Fruit and Shoot Borer 42
M.S.F. Nusra, P.A. Paranagama, L.D. Amarasinghe, D.N. Udukala

Calcium ion removal of drinking water by using potential water purifying materials: Biochar from coconut shell, rice husk and bamboo 43
U.K.M. Malka, R.C.L. De Silva, D.S.M. De Silva

♦ Bioactive extracts from an endophytic fungi from *Myristica fragrans* 44
E.A.I.A. Perera, N.S. Kumar, N.K.B. Adikaram, L. Jayasinghe

Unexpected air pollution spike in Sri Lanka, November 2019 45
S.M.D.M.C. Senarathna, R. Jayaratne, S. Abeysundara, B.M.G.D. Yasaratne, S.D. Dharmaratne, R. Weerassoriya, G. Bowatte

Heavy metal contents in aquatic plant species in a water body according to their occurrence 46
S. Arasaretnam, D.M.A. Dissanayake

Cinnamomum verum (True cinnamon) leaf essential oil: Anti-*Candida* effect and cytotoxicity 47
G.K. Wijesinghe, F. C.Maia, T.R. de Oliveira, S.N.B. de Feiria, F. Joia, J.P. Barbosa, G.C. Boni, V.A.P. Defávari Franco, J.F. Höfling

Stability of *Cinnamomum zeylanicum* ("Sri Vijaya" variety) water extract in different storage conditions 48
H.G.N. Dewangani, B.M. Jayawardena, W.A.N.M. Wariyapperuma

Assessment of proximate composition and some phytochemicals in four different accessions of Hingurala (*Dioscorea alata*) 49
B.K.H.H. Batuwita, J.M.J.K. Jayesinghe

SOCIAL SCIENCES

Exploring how mindfulness affects false memories and the impact of memory encoding method 50
W.A.N.I. Weerasinghe

Masculine ideologies and transformation of masculine gender norms: a concept analysis and review of literature 51
T.J. Gunawardena

♦ Quality of maternal health care: the standpoints of urban pregnant mothers 52
A.W.N. Naleefa

♦ The impact of explosion of weapon induced displacement: The case of Salawa army camp, Kosgama 53
I.K. Galagama

♦ *Oral Presentation*

♦Influence of traumatic exposure on suicidal ideation in seventeen districts of Sri Lanka 54
F.S. Jabir, P.B. Dissanayake, K. Jayaweera, L. Dissanayake, A. Sumathipala

Perceived medical errors and the relationship between the quality of sleep of shift working among government nurses: A preliminary study 55
L.C. Nawarathne, A.A.T.D. Amarasekara

Creating supportive home environments through health promotion approach in order to enable families to engage in proper safety measures during Corona outbreak period 56
M.A.H. Kaushani, R.M.C.D. Rathnayake, T.N. Weerasekara, S. Wijesundara, D. Nawodini[1], N. Welagedara, N. Rathnayake, G.N.D. Guruge

An analysis of changes in patterns of substance usage among substance users during COVID-19 pandemic period in Hambanthota, Kegalle, Kilinochchi, Matale districts, Sri Lanka 57
F.B.N.S. Baduge, L. Mathankumar, J.A.E. Madumadhawa, H.M.S.C. Dissanayake, S. Gunasekara, N. Rathnayake, G.N.D. Guruge

Assessing behaviors of substances users during the curfew period with the COVID-19 outbreak in Sri Lanka 58
R.M.C.D. Rathnayake, H.G.D.T. Madhushani, K.H.M.T.P. Kolongahapitiya, A.R.U. Nasfa, A.M.F. Alhana, T.B.B. Makelwala, S.D.S.R. Karunarathne, N. Rathnayake, G.N.D. Guruge

Assessing the changes in patterns of substance usage during the COVID-19 pandemic 59
R.M. Yalini, W.M.S.A. Wijesundara, M.W.A.K. Airawansha, F. Zahra, J.P.P. Vishalka, W.M.R.A. Wanninayake, G.N.D. Guruge

A survey to identify the changes in patterns of substance abuse during COVID-19 pandemic 60
H.D.N. Soysa, S.P. Senevirathne, J. Kanmanirajah, N.M. Nasman, S.D.S.R. Karunarathne, G.N.D. Guruge

Improving awareness on safety precautions and health habits among people during corona outbreak using health promotion approach 61
H.G.D.T. Madhushani, R.M.C.D. Rathnayake, A.R.U. Nasfa, K.D.E.H. Gunathunga, J.F. Husna, L.G.T. Madhushan, T. Simaya, A wanninayake, G.N.D. Guruge

♦ *Oral Presentation*

BIOLOGICAL SCIENCES

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Ending the diagnostic odyssey of rare/undiagnosed diseases – experience from Sri Lanka

D. Hettiarachchi*, B.A.P.S. Pathirana, N.F. Neththikumara, V.H.W. Dissanayake

Human Genetics Unit, Faculty of Medicine, University of Colombo

**dineshani@anat.cmb.ac.lk*

The diagnostic odyssey (i.e. the time from presentation to diagnosis) of a rare disorder is between 2-5 years, due to the need to perform a plethora of tests based on clinical suspicion. With the introduction of whole-exome sequencing, this time gap has reduced tremendously. We report our experience in implementing Whole Exome Sequencing (WES) test, which capture and sequence >99.4% of all the protein coding genes to diagnose rare genetic disorders in Sri Lanka. A database of demographic, clinical and genomic data of patients presenting to The Human Genetics Unit, Faculty of Medicine University of Colombo with rare undiagnosed conditions, from November 2014 to March 2019, was maintained prospectively and analysed retrospectively. A total of 150 patients were sequenced, of which 57.3% (n = 86) were males and 42.6% were females. Age range was 2 months to 54 years. Among them 19 (12.6%) were novel variants. The predominant system involved and the percentage of cases in which the genetic aetiology was confirmed is as follows: neurological (24.6%, n = 37, 48.6%, n = 18), musculoskeletal (16.6%, n = 25, 40%, n = 10), metabolic (9.3%, n = 14, 78.6%, n = 11), intellectual disability (41.1%, n = 12, 16.7%, n = 2), ophthalmology (3.33%, n = 5, 100%, n = 5), cardiac (2.6%, n = 4, 50%, n = 2), endocrine (2.7%, n=4, 75%, n=3), and other disorders (32.6%, n = 49, 53.1%, n = 26). Overall, the genetic etiology of the condition was confirmed in 51% (n = 77) of patients. The median time from presenting to our clinic to diagnosis was 14.25 [IQR 8.5-20] weeks. In the absence of WES in the past, most of these patients would not have had a genetic confirmation of their condition. Today we can arrive at a diagnosis in the majority within 3-4 months. Hence, WES is a good diagnostic tool for confirmation of the genetic etiology of rare undiagnosed disorders.

Keywords: *whole exome sequencing, rare disorders, genetic testing, undiagnosed diseases*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Effect of pre-treatment with carbimazole on the outcome of Radioactive Iodine - 131 therapy for patients with hyperthyroidism

R. Sanooz[1*], D.K.K. Nanayakkara[2]

[1]*Faculty of Health-Care Sciences, Eastern University, Sri Lanka*
[2]*Faculty of Medicine, University of Peradeniya*

[*]*sanoozarm@yahoo.com*

The outcome of radioactive iodine-131 (RAI) therapy is influenced by many factors. Pre-treatment with antithyroid drugs (ATD) is considered as affecting the outcome of RAI therapy. Carbimazole and methimazole have minimal effect on the outcome of RAI therapy compared to propylthiouracil. The aim of the study was to identify the difference in the pre-treatment carbimazole dose and duration between the different outcomes of radioiodine therapy among hyperthyroid patients. Fifty hyperthyroid patients consented for the study after receiving 10 mCi RAI and they were followed up at the Nuclear Medicine Unit, Peradeniya to monitor the clinical outcome of RAI therapy. Therapeutic outcome for RAI therapy was assessed at 06 months after RAI therapy by clinical assessment and biochemical thyroid function tests (free thyroxine (fT4) and TSH levels). Ethical clearance for the study was obtained from Ethical Clearance Committee, Faculty of Medicine, University of Peradeniya. Independent sample t-test was used to analyse the data using SPSS version 25. Graves' disease was high (70%) among the participants compared to toxic multinodular goiter (30%). Six months after RAI therapy, 84% of the patients had therapeutic success and 16% had therapeutic failure. The mean pre-treatment carbimazole dose was 30.48 mg/day and the mean pre-treatment duration was 51.07 months for the patients who had therapeutic success. Patients with therapeutic failure had mean pre-treatment carbimazole dose of 38.13 mg/day and mean pre-treatment duration of 41.71 months. The mean pre-treatment dose and duration between both therapeutic outcomes had no statistical difference (pre-treatment dose, P value = 0.193, 95% CI-19.784-4.486; pre-treatment duration, P value = 0.563, 95% CI-26.344 -45.061). We conclude that pre-treatment carbimazole dose or the duration has no effect on the outcome of the 10 mCi fixed dose RAI therapy.

***Keywords**: hyperthyroidism, radioactive iodine therapy, carbimazole*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Post vaccination immunity against hepatitis B among a group of medical students in Sri Lanka

S. Gunawardana, V. Luxana, I. Premathilake*, R. Jayalatharachchi, S. Gamage

Department of Microbiology, Faculty of Medicine, University of Colombo

**isharap@micro.cmb.ac.lk*

Vaccination against Hepatitis B virus (HBV) is the mainstay of prevention of hepatitis B infection in healthcare workers. Previous studies conducted among groups of healthcare workers and medical students in Sri Lanka have shown variable rates of immunity following HBV vaccination. Post vaccination immunity against HBV is not carried out routinely among medical students. The aim of this study was to determine the presence of immunity against HBV in a population of medical students who had undergone immunization against HBV. A descriptive study was conducted using serum samples obtained from consenting medical students in a single batch, in the Faculty of Medicine, University of Colombo. Presence of immunity was determined by detection of hepatitis B surface antibody (HBsAb) titre of ≥10 mIU/ml as detected by a validated commercial enzyme-linked-immunosorbent-assay (Monolisa™ HBsAb ELISA). The sample consisted of 112 (63.3%) females and 65 (36.7%) males. All have received three doses of Hepatitis B vaccine (0, 1, 6 schedule), with the last dose three years prior to the study. HBsAb was <10 mIU/ml in two students (4.29 mIU/ml and 9.29 mIU/ml). All others (98.9%, n = 175) showed an adequate immunity (mean 738 ± 513.9 mIU/ml). Out of them, 66.9% (n = 117), 20.0% (n=35), 13.1% (n = 23) had antibody levels >400 mIU/ml, 100-400 mIU/ml and <100 mIU/ml, respectively. A significantly higher mean antibody titre (p = 0.028) was detected among females (mean 794.4 ± 492.7 mIU/ml) when compared to males (mean 618.3 ± 541.8 mIU/ml). This study reports a high rate of protective immunity among the study population even three years after completion of the primary course of vaccination. Similar to previous studies, immune response in females is higher than in males. However, as there are still persons who do not have adequate immunity, it is essential that routine post vaccination testing is carried out, enabling further actions.

Keywords: *hepatitis, post vaccination immunity, medical students*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Sero-prevalence of measles antibodies in a population of medical students in Sri Lanka

V. Luxana[1], S. Gunawardana[1], M.I.P. Premathilake[1*], D. Gamage[2], S. Ginige[2], S. Gamage[1], R. Jayalatharachchi[1], C. Madhushanka[1], T. Haputhanthri[2], J. Perera[1]

[1]*Faculty of Medicine, University of Colombo*
[2]*Epidemiology Unit, Colombo*

[*]*isharap@micro.cmb.ac.lk*

Sri Lanka owns a successful childhood immunization programme which played a major role in eliminating indigenous measles in 2019. To sustain the measles elimination status, identifying susceptible populations and implementing preventive strategies is important. A group of medical students in a single batch were identified to have measles in early 2019 and the following study was carried out as a part of the outbreak control strategy. To assess the immunity against measles in the medical students among whom the measles cases were reported. Serum samples of consenting medical students belonging to a single batch (born in 1994-1996) were analyzed for Measles IgG using Euroimmune® enzyme-linked-immunosorbent-assay (ELISA) at the Faculty of Medicine, University of Colombo. Results were categorized as positive, negative and borderline as per manufacturer's instructions. All borderline samples were cross tested with a second ELISA (AccuDiag® measles-IgG-ELISA). Results were analyzed using SPSS software. The sample consisted of 94 females (56%) and 74 males (44%). Measles IgG was positive in 67.3% (n = 113, mean titre = 1958.9 ± 1468.3 mIU/ml) and negative in 23% (n = 39) from the first ELISA. Mean antibody titres between females (1454.2 ± 150.0 mIU/ml) and males (1487.3 ± 173.0 mIU/ml) did not differ significantly. Sixteen were equivocal in the first ELISA. In cross testing, ten of these tested positive, three tested negative and the remaining three tested equivocal. Immunity to measles within the study population is far below the WHO recommended immunity target of 95% for the given age group (>15 years) and hence, carries a substantial risk of expansion of the outbreak. Borderline samples should be further evaluated using a neutralization assay.

Keywords*: measles, immunity, antibodies, Sri Lanka*

Acknowledgement: *The World Health Organization for providing Euroimmune® measles IgG ELISA*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Asthma control and physical activity level amongst asthmatic adults: results from Colombo, Sri Lanka

K.H.A.Y. Kariyawasam[1*], S.W. Wimalasekera[2]

[1]*Department of Nursing and Midwifery, Faculty of Allied Health Sciences, University of Sri Jayewardenepura, Sri Lanka*
[2]*Department of Physiology, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka*

[*]*akikariyawasam10@gmaiI.com*

Sri Lanka has a high prevalence of asthma. Physical activity has been shown to produce health benefits to adults with asthma; however, the association between physical activity and asthma control in adults is unknown. The aims of the study were to determine: asthma control, the level of physical activity and the association of asthma control and physical activity amongst adult asthma patients. A descriptive cross-sectional study was conducted on 180 diagnosed patients attending asthma clinics of two hospitals in Colombo district. Base line data were obtained by an interviewer administered questionnaire. Asthma control was assessed using Asthma Control Test (ACT) and respiratory function was assessed by spirometry and peak expiratory flow rate. Airway inflammation was determined by Fraction of exhaled NO (FeNO). Level of physical activity was determined by the International Physical Activity Level Questionnaire. The data was analyzed using Statistical Package for Social Sciences (SPSS) software (version 25). Amongst asthma patients, 60% were females. Asthma was controlled in only 33.33%. ACT scores of males was significantly higher than of females ($p = 0.035$). The level of physical activity was moderate in 43.3% and low in 38.9%. There was no significant difference in the level of physical activity between males and females ($p = 0.404$). The level of physical activity and asthma control was significantly different ($p = 0.001$). The present study demonstrated a positive correlation between these two parameters ($r^2 = 131$, $p = 0.030$). In conclusion, an association between asthma control scores and level of physical activity was observed. A cultural taboo amongst asthma patients is to not engage in activities that produce shortness of breath. However, emerging studies have established that regular physical activity decreases the number of recurrences of asthma attacks and the severity of asthma. Thus, regular physical activity needs to be encouraged amongst asthma patients in Sri Lanka.

Keywords: *asthma, adults, physical activity level, asthma control*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

In-silico approach to Gateway® cloning of human Argonaute, Dicer and TRBP genes using SnapGene

C.S. Dharmarathna[1*], Y.I.N.S. Gunawardena[2], R.S. Dassanayake[1]

[1]*Department of Chemistry, Faculty of Science, University of Colombo, Colombo 03*
[2]*Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya, Ragama*

[*]*chethanasithumini@gmail.com*

Much time and effort are wasted during cloning, because a cloning procedure needs lots of planning and there could still be possible errors due to our inability to visualize the process. Computational simulation of cloning is a good solution to this issue as it makes the cloning process simple by giving a virtual platform to plan the cloning beforehand and observe the errors before they could happen. SnapGene is such a software that also provides a depository of annotated plasmid files together with ways to simulate different cloning strategies including Gateway® cloning. SnapGene also facilitates the documentation and sharing of the data easily. Human Argonaute, Dicer and TRBP proteins are involved in a post transcriptional gene regulation referred to as RNA interference pathway. In an attempt to reconstitute human RNA interference pathway in a yeast model system, the step wise cloning of the human Argonaute, Dicer and TRBP genes were done by using SnapGene to construct yeast expression Gateway® plasmids. Gateway® destination plasmids, pAG413GAL-ccdB, pAG416GAL-ccdB, pAG415GAL-ccdB were selected to clone the genes. The plasmids have three different auxotrophic markers to facilitate the selection of the transformants after yeast transformation. Genes were cloned at the *att*R1 site of the Gateway® destination plasmids, and under the control of GAL1 promoter so that they are capable of expressing by galactose induction after yeast transformation. All expression plasmids produced were CEN-based and would exist extra chromosomally in yeast. Altogether, the simulation of Gateway® cloning to produce yeast expression plasmids using SnapGene showed that all three genes were cloned in a proper reading frame and can be successfully expressed in a yeast model system in future studies.

Keywords: *SnapGene, Gateway®cloning, Argonaute, Dicer, TRBP*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Antioxidant properties of flower extracts of Ceylon Spinach (*Talinum paniculatum*)

H. Mylvaganam[1], T.L. Suraweera[2,3], N.Y. Jayanath[4*], S.I. Jayathilaka[4], W.P.K.M. Abeysekera[5], P.D.S.M. Fernando[6], W.K.S.M. Abeysekera[7]

[1]*Department of Food Technology, Faculty of Technology, Rajarata University of Sri Lanka, Mihintale, Sri Lanka*
[2]*Department of Plant, Food and Environmental Sciences, Faculty of Agriculture, Dalhousie University, Truro, Nova Scotia, Canada*
[3]*Beatrice Hunter Cancer Research Institute, Halifax, Nova Scotia, Canada*
[4]*Department of Food Science and Technology, Faculty of Agriculture, University of Peradeniya, Sri Lanka*
[5]*Herbal Technology Section, Industrial Technology Institute, Malabe, Sri Lanka*
[6]*Department of Biochemistry, Jeju National University, School of Medicine, Jeju, South Korea*
[7]*Department of Agricultural Technology, Faculty of Technology, University of Colombo, Colombo, Sri Lanka*

[*]*jayanath11@gmail.com*

Talinum paniculatum, commonly known as Ceylon spinach or *Gas Nivithi*, is an underutilized crop, which is reported to have many traditional medicinal and dietary uses in Sri Lanka. However, the functional properties of different parts of this plant have rarely been studied. This study was aimed at determining the antioxidant properties of methanolic and aqueous extracts of its flowers *in-vitro*. Fresh, undamaged flowers were dried at a temperature of 50 °C for 24 hours followed by milling and sieving. Sample extraction was carried out separately with 80% methanol and distilled water in a hot water bath at 59.6 °C for 37 minutes. The antioxidant activity of these two types of extracts was studied in terms of total phenolic content (TPC), total flavonoid content (TFC), ferric reducing antioxidant power (FRAP), DPPH and ABTS radical scavenging activity. The TPC of aqueous and methanolic extracts of flowers were not significantly different ($p>0.05$), where, TPC values for aqueous and methanolic extracts were 26.30 ± 2.9 mg gallic acid equivalents (GAE)/g and 26.51 ± 1.87 GAE/g, respectively. Total flavonoid content of flowers was 17.66 ± 0.66 and 14.32 ± 1.55 mg Quercetin/gf or methanolic and aqueous extract, respectively, where the TFC was significantly high ($p<0.05$) in methanolic extract. Aqueous extract of flowers contained 30.68 ± 2.97 mg Trolox/g FRAP which was significantly higher ($p<0.05$) compared to the FRAP of methanolic extract (18.66 ± 2.57 mg Trolox/g). DPPH radical scavenging activity was significantly high ($p<0.05$) in aqueous extract (IC50: 0.68 ± 0.06 mg/mL) compared to methanolic extract (IC50: 0.44 ± 0.01 mg/mL) while ABTS radical scavenging activity was significantly higher ($p<0.05$) in methanolic extract (IC50: 35.08 ± 0.84 µg/mL) compared to its aqueous extract (IC50: 29.87 ± 0.24 µg/mL). In conclusion, both aqueous and methanolic extracts of *Talinum paniculatum* flowers had antioxidant properties via various modes of actions with different levels.

Keywords: *antioxidant, aqueous extract, flowers, methanol extract, Talinum paniculatum*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Spatial distribution of water quality parameters in the Embilikala lagoon of Bundala National Park, Sri Lanka

K.P.K. Madushani[1*], M.D. Amarasinghe[1], R.M.C.S. Ratnayake[1], D.D.G.L. Dahanayaka[2]

[1]*University of Kelaniya, Kelaniya*
[2]*The Open University of Sri Lanka, Nawala*

[*]*kpkmadushani@gmail.com*

Water quality in the Bundala wetland seemed to be affected by agriculture; however, the spatial distribution of the water quality parameters in the lagoon has not been studied in detail. The surface water quality of Embilikala lagoon in Bundala wetland, which is the most affected lagoon out of the other three, is investigated in this study to determine the spatial distribution of parameters for two years during wet and dry seasons. Samples were collected randomly from fifteen locations throughout the lagoon and analyzed for nitrate-nitrogen, ammonium-nitrogen, total nitrogen, orthophosphate, total phosphate, pH, salinity, and electrical conductivity (EC). The analyzed parameters were interpolated using the inverse distance weighting tool in ArcMap 10.2.2 software. The geostatistical analysis was used for cross-validation. Concentrations of the nitrate-nitrogen, ammonia-nitrogen, total nitrogen ranged from 0.3606-0.4952 mg/L, 0.2112-0.4084 mg/L, 0.6895–0.5161 mg/L, respectively. Orthophosphate and total phosphate concentrations ranged from 0.0139–0.0203 mg/L and 0.0236–0.0403 mg/L, respectively. The pH, EC, and salinity ranged from 7.57–7.97, 270.95–459.25 μS/cm, 0.028–0.045 g/L. Generally, the northern section of the lagoon showed a higher concentration of nitrate-nitrogen, which is directly fed by agricultural drainage canals. Other nitrogen forms like inorganic ammonia-nitrogen and total nitrogen also showed similar spatial distribution patterns. Orthophosphate and total phosphate were also higher in the northern part of the lagoons where more agricultural lands and residential lands are located. EC and salinity are higher in the southern section of the lagoon as the agricultural drainage released to the northern section dilutes the lagoon waters. The present study provides an insight into the spatial distribution of the water quality parameters and suggests managing the anthropogenic impact on the lagoon especially from the northern section.

Keywords: *water quality, Embilikala lagoon, agricultural drainage*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Synthetic small RNAs conferring dengue virus resistance in mosquito vector *Aedes aegypti*: a computational study

S.D. Denipitiyage[1], Y.I.N.S. Gunawardene[2], M.D. Hapugoda[2], R.S. Dassanayake[1*]

[1]*Department of Chemistry, Faculty of Science, University of Colombo, Colombo 03*
[2]*Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya, Ragama*

[*]*rsdassanayake@chem.cmb.ac.lk*

The dengue disease is caused by the dengue virus (DENV), consisting of four serotypes (DENV 1-4), transmitted by the mosquito vector *Ae. aegypti*. Dengue has been declared as the most significant challenge in South-East Asia, imposing a growing burden on infected populations. To date, dengue control has mostly relied on vector control strategies, which have become ineffective. There is, therefore, an urgent need for novel vector control strategies. RNA interference (RNAi), an evolutionary conserved, sequence specific post-transcriptional gene silencing process, is identified as a key mosquito innate defense against DENV. Therefore, researchers have used RNAi-based effector genes to develop DENV-resistance in mosquito vectors. However, DENV-resistant genes effective against all serotypes have not been developed to date. To fill this void, a polycistronic cluster of nine DENV-targeting synthetic small RNAs (ssRNA) was designed to process through endogenous miRNA pathway; a pathway of RNAi. ssRNA sequences were selected from previous studies based on the sequence conservation and targeted regions across DENV genomes using sequence data available in the NCBI Virus Variation Resource, to ensure effective virus suppression. All ssRNA sequences were examined for off-target effect prediction using the BLAST tool available at VectorBase Bioinformatics Resource. No significant interaction was identified against any transcript of *Ae. aegypti*. The *Drosophila melanogaster* miR6.1 stem-loop sequence was modified to target nine sites as previously described. The polycistronic cluster of ssRNA was placed under the *Ae. aegypti* carboxypeptidase A (AeCPA) gene promoter to elicit blood meal-inducible, midgut-specific expression of the effector molecules in females. This ensures the formation of ssRNA, soon after ingestion of viremic blood when the virus is in its most vulnerable state to reduce DENV replication. The whole gene cassette was designed to clone into a *piggyBac* vector containing 3xP3-DsRed as a transgenesis marker. Further experiments could make them candidates for effective control of dengue in population replacement strategies.

Keywords: *dengue; dengue virus, Ae. aegypti, RNA interference, synthetic small RNA*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Tetracycline repressible female paralysis of *Aedes aegypti* for dengue control: a computational study

P.V.D. Dilani[1], Y.I.N.S. Gunawardene[2], R.S. Dassanayake[1*]

[1]*Department of Chemistry, Faculty of Science, University of Colombo, Colombo-03*
[2]*Molecular Medicine Unit, Faculty of Medicine, University of Kelaniya, Ragama*

[*]*rsdassanayake@chem.cmb.ac.lk*

Dengue is the most medically important arthropod-borne viral disease threatening one-third of the world's population. In the absence of efficient vaccines or drugs, the most promising strategy is focusing on control of the principal mosquito vector, *Aedes aegypti*. Release of insects carrying dominant lethal genetic system (RIDL) based on sterile insect technique (SIT) can be adapted to control the transmission of the dengue virus by suppression of the vector population. In the RIDL strategy, genetic sterility is achieved in mosquitoes using tetracycline dependent-repression of a dominant lethal gene. In the present study, the RIDL based genetic constructs were designed *in silico* to be integrated into the *Ae. aegypti* genome. The designed RIDL based tet-off bi-partite system contains a driver gene construct and an effector gene construct. For the driver gene construct, tetracycline repressible transactivator gene *(tTA)* was placed under the control of the *Ae. aegypti* carboxypeptidase, a gene promoter to elicit blood meal inducible and mid gut-specific expression of tTA in female adult mosquito and the whole gene construct was cloned into *piggyBac* transposon system containing td Tomato fluorescent protein as a transgenesis marker. Sequences of insect-specific toxin gene as the effector gene and a secretory signal peptide were selected from a previous study to develop the effector construct in which the effector was designed to be secreted out of the midgut tissue. The whole effector construct was designed to clone into *piggyBac* transposon system containing enhanced green fluorescent protein (eGFP) as a transgenesis marker. We anticipate that the integration of the two constructs into *Ae. aegypti* genome would result in blood meal-inducible and midgut-specific expression of the effector in the absence of tetracycline, ensuring the late acting paralysis of female adult mosquitoes and will be more effective in developing highly penetrant female-specific RIDL mosquitoes in dengue control.

Keywords*: Aedes aegypti, mosquito, transgenic, bi-partite system*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Potential of *Panicum maximum* root wash as a bio-fertilizer for mung beans

P.W.I.M. Chandrasekara[1*], P.C.U. Wanninayake[1], S. Hettiarachi[1], M.A.P.W.K. Malaviarachchi[2]

[1] *Rajarata University of Sri Lanka, Mihintale*
[2] *Field Crops Research and Development Institute, Mahailluppallama*

[*]*meks.im25@gmail.com*

Chemical pollution in soils and water due to excessive use of chemical fertilizer is a growing economic, environmental and health concern. Thus, the main objective of the study was to introduce farmer friendly bio-fertilizer with significant benefits to encourage farmers to reduce the use of chemical fertilizers. This study mainly focused on the holistic approach in the use of rhizosphere microflora *in toto.* The efficacy of root wash of Guinea grass (*Panicum maximum* Jacq), as a source of Plant Growth Promoting Rhizobacteria (PGPR) to reduce the use of chemical fertilizer for mung bean (*Vigna radiata*) was studied. Whole rhizosphere consortium present in root wash as a treatment was suggested to avoid the loss of many microorganisms by culturing and loss of properties of isolates in laboratory culture. The field trials were conducted at Field Crops Research and Development Institute, Mahailluppallama. Treatments used were 100% fertilizer, 50% fertilizer, 25% fertilizer and no amendment as the controls and *Panicum maximum* rhizosphere root wash as an amendment (100% fertilizer + root wash, 50% fertilizer + root wash, 25% fertilizer + root wash and root wash only). Three replicates of eight plots of 1.5 m × 1.5 m (with plant distance 10 cm; row distance 30 cm) were arranged in RCBD. Thirty-nine plants were used for data collection, leaving out plants in the periphery to avoid edge effect. Data were collected at pre-harvesting stage and harvesting stage, and analyzed statistically. Plants treated with root wash in various fertilizer regimes and root wash alone showed similar or higher seed yields compared to plants treated with 100% fertilizer. These preliminary results clearly indicate that the use of fertilizer can be drastically reduced when combined with the *Panicum maximum* rhizosphere root wash. Further studies in farmer fields and metagenomics studies are needed for confirmation.

Keywords: *PGPR, harvest data, rhizosphere, holistic approach, chemical fertilizer*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Seasonal variation of yield and physiological traits of cowpea cultivated in the dry zone of Sri Lanka

A.M.T.M. Alahakoon[1], I. Wijayaraja[1], M. Piyarathne[1], D.A.U.D. Devasinghe[1], L.K. Weerasinghe[2], D.P. Kumarathunge[3], D.M.D. Dissanayake[1], T.A.B.D. Sanjeewa[1], W.C.P. Egodawatta[1], D.M.S. Duminda[1], R.A.A.S. Rathnayake[1], W. Malawiarachchi[4], S. Amarathunge[2], W.A.J.M. De Costa[2], N. Geekiyanage[1*]

[1]*Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura 50000, Sri Lanka*
[2]*Faculty of Agriculture, University of Peradeniya, Peradeniya 20400, Sri Lanka*
[3]*Plant Physiology Division, Coconut Research Institute, Lunuwila 61150, Sri Lanka*
[4]*Field Crop Research and Development Institute, Mahailuppalllama, Sri Lanka*

[*]*nalakagee@gmail.com*

Cowpea (*Vigna unguiculata* (L.) Walp.) is an important pulse grown in Sri Lanka owing to both economic and nutritional benefits. It is believed to tolerate drought and temperature stress and grown mainly in the dry zone cropping systems during *Yala* and *Maha* seasons. However, there is a possibility to continue cultivation in unoccupied arable lands during off-seasons. This study was conducted to evaluate the seasonal difference in yield and physiological parameters of three cowpea varieties (*Dawala, Waruni* and *MI 35*) during two seasons; *Yala* 2019 and off-season (January to March) 2020. The experiments were conducted at the Field Research Unit, Faculty of Agriculture, Rajarata University. Mean temperatures of the site during *Yala* season and off-season were 27.3°C and 29.2°C, respectively. At 50% flowering, light-saturated net photosynthetic rate (A_{sat}) was measured as 2200 µmol photons m^{-2} s^{-1} at [CO_2] of 400 ppm, light and CO_2 saturated net photosynthetic rate (A_{max}) was measured as 2200 µmol photons m^{-2} s^{-1} at [CO_2] of 1800 ppm. Dark respiration (R_D) was measured in dark-adapted leaves at ambient [CO_2]. Instantaneous and intrinsic water use efficiencies (WUE) were also calculated. Physiological traits of varieties significantly varied between seasons such that, A_{sat} in *Waruni* and *Dawala* ($p = 0.0008$, $p = 0.05$) were significantly higher in *Yala* season compared to *MI-35*. Also, A_{max} in *Dawala* ($p = 0.0003$), was significantly higher in the *Yala* season compared to two other varieties. Intrinsic WUE of varieties was significantly different between the seasons. Despite the differences in water use and photosynthetic traits of cowpea, the yield remained unaffected in all varieties when they were grown closer to optimal growth temperatures (i.e. 30 °C) irrespective of the growing season. Thus, it can be concluded that all the cultivars tested in this experiment are equally suitable for off-season cultivation.

Keywords: *photosynthesis, respiration, seasonal cultivation, water use efficiency*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

A preliminary determination of crude proteins from Sri Lankan seaweeds; a novel alternative source of proteins

J. Samarathunga, I. Wijesekara*, M. Jayasinghe

Department of Food Science & Technology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

**isuruw@sci.sjp.ac.lk*

Recently, the global demand for proteins is increasing with population growth. Although seaweeds are often promoted for their polysaccharides, they demonstrate higher protein contents even more than some terrestrial plants. Therefore, application of protein extracts will be a value addition. This study was carried out to determine seaweed proteins and the protein profile of selected seaweed species of Sri Lanka. Initially, crude protein contents of seaweeds harvested from the same geographical location were evaluated. Naturally grown *Turbinari aornata* (Phaeophyta), *Gracilaria salicornia* (Rhodophyta), *Caulerpa lentilifera* (Chlorphyta) and a cultivated variety *Kappaphycus alverezii* (Rhodophyta) were collected from Jaffna in December 2019 and their crude protein contents were determined. For the analysis, freshly harvested seaweeds were washed, oven dried (at 60 ºC), powdered and sieved to obtain similar particle size and were preserved in airtight containers at room temperature. After drying, yield was reduced nearly 10 times of the fresh samples. The crude protein content (%) and moisture content (%) of the above seaweeds on dry weight basis were 8.1586 ± 0.0059, 9.6193 ± 0.0119, 14.511 ± 0.009, 10.528 ± 0.0652 (protein content) and 8.52 ± 0.01, 9.09 ± 0.08, 8.74 ± 0.03, 9.33 ± 0.04 (moisture content), respectively. The results revealed that the crude protein content of seaweed species varied as *Caulerpa lentilifera> Kappaphycus alverezii> Gracilaria salicornia> Turbinaria ornata*. In addition, the determination of the soluble proteins and the protein profiles of the above seaweeds are in progress.

Keywords: *seaweeds, protein, protein profile*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Assessing the allelic diversity of *OsNrAMP5* among traditional Sri Lankan rice varieties by *in silico* analysis

S. Tharanya[1,2*], L.D.U.T. Gunawardhana[2], N.U. Jayawardana[1,2]

[1]*Postgraduate Institute of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka*
[2]*Department of Agricultural Biology, Faculty of Agriculture, University of Peradeniya, Sri Lanka*

[*]*stharanya1992@gmail.com*

Cadmium (Cd) is a naturally occurring heavy metal, which brings serious toxic effects when accumulated via the food chain. Rice (*Oryza sativa*), the staple food for more than half of the world's population is considered to be the major route of Cd entry into the human body. *OsNramp5* is a major gene which is involved in the root uptake of Cd in rice. This study was designed to identify the different allelic forms of *OsNRAMP5* among Sri Lankan rice germplasm. Allelic forms may result in differential gene expression that in turn, regulate the degree of Cd accumulation in rice roots. In the preliminary analysis, the genic haplotypes of *OsNrAMP5* within the 47 traditional Sri Lankan rice varieties were queried. The genomic sequences of *OsNrAMP5* (~7291 bp) were retrieved from SNP seek database along with a reference variety *Nipponbare* (*japonica*), which is low in Cd accumulation and cultivar 93-11 (*indica*), which is high in Cd accumulation. The sequences obtained were aligned using ClustalW in MEGA6 and analyzed for haplotypes using the variable sites including all known Insertions and Deletions and Single Nucleotide polymorphism within the region. Sequences with ambiguities were deleted manually and nucleotide diversity of the gene was analyzed using DnaSP v5.0. A high haplotype diversity of 0.88 was obtained for genic region of *OsNramp5.* A total of 14 genic haplotypes were found among the Sri Lankan traditional rice germplasm and haplotype 1 was the most abundant (25%). In the polymorphism analysis, varieties *Pannithi* and *Godawel* showed similar variations to *Nipponbare*. Therefore, these two varieties have the potential to display reduced Cd accumulation, and hence, future experiments include assessing the expression level of *OsNrAMP5* in *Pannithi* and *Godawel* in comparison with a low Cd accumulating reference variety.

Keywords: *cadmium, root uptake, root expression, traditional rice*

Acknowledgment: *This research was funded by World Bank AHEAD/DOR/STEM. No. 52 grant, University of Peradeniya, Sri Lanka.*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Altering of plant growth and physiology of rice (*Oryza sativa* L.) at vegetative stage under elevated arsenic in soil

K.S. Manawasinghe[1,2*], R. Chandrajith[3], S. Seneweera[4]

[1]*Postgraduate Institute of Science, University of Peradeniya*
[2]*Horticultural Crops Research and Development Institute, Gannoruwa*
[3]*Department of Geology, Faculty of Science, University of Peradeniya*
[4]*National Institute of Fundamental Studies, Hanthana Road, Kandy*

**ksmanawasingha@gmail.com*

Arsenic (As) is a class one human chronic carcinogen and also not an essential element to plant growth and development. More importantly, the bioavailability of As and its consequent accumulation in rice grains could increase under flooded conditions. A poly-tunnel experiment was carried out to investigate the effect of As in soil on plant physiology and plant growth in the vegetative stage (40 days from seed sowing). A factorial experiment was conducted with treatments of 10 mg As kg^{-1} with controls, by using commercially growing traditional and improved ten rice cultivars. Pearson correlation coefficient (r) was used to analyze the data statistically. Plant growth, in terms of its height (r = -.746), tiller count (r = -.809) and, shoot biomass (r = -.886), was strongly and negatively correlated with As level in the soil. The tiller count decreased under As stress by 46% and 52% in traditional and improved varieties, respectively. The total shoot biomass of traditional varieties decreased by 65% while a 62% drop was observed in improved varieties, with the application of As. The plant height was reduced by 28% in traditional varieties and by 21% in improved varieties under the elevated As level. Arsenic level in the soil showed strong negative correlations with the total chlorophyll content in the leaf blades (r = -.913) and, it directly affected photosynthesis. The chlorophyll content was decreased by 31% in traditional varieties and 25% in improved varieties with the addition of As. The chlorophyll content in rice plants showed strong positive correlation with plant growth parameters, such as tiller count (r = .804), Plant height (r = .614) and total biomass (r = .914). These findings suggest that high As in the soil could impair photosynthesis leading to a significant reduction of rice plant growth.

Keywords*: arsenic; photosynthesis; plant growth; vegetative stage*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Study of induced mutagenesis of tea (*Camellia sinensis* L.) using somatic embryo cultures

S. Sukirtharuban[1*], K.K. Ranaweera[2], M.A.B. Ranatunga[2], S.A.C.N. Perera[3]

[1]*Postgraduate Institute of Agriculture, University of Peradeniya, Sri Lanka*
[2]*Plant Breeding Division, Tea Research Institute of Sri Lanka, Talawakelle, Sri Lanka*
[3]*Faculty of Agriculture, University of Peradeniya, Peradeniya, Sri Lanka*

[*]*sukirtharubanag@yahoo.com*

Tea (*Camellia sinensis* L.) is one of the major plantation crops, which contributes to the agricultural economy of Sri Lanka. Genetic variability is essential for crop improvement. In crops, mutation induction is used to artificially enhance genetic diversity using physical mutagen such as ionizing radiation (gamma rays), which has been widely used in mutation induction. The objectives of this research were to find out the Lethal Dose 50 (LD_{50}) value of the gamma rays for induced mutation and determine the parameters such as colour change, changes in developmental stages, germination, secondary somatic embryogenesis and the production of somatic embryos during somatic embryogenesis after the irradiation. Two month old globular somatic embryos of "TRI2043" tea cultivar were exposed to (Co-60) gamma rays in the dose range 0 (control) to 350 Gy with 50 Gy intervals at the rate of 8.763 kGy h^{-1} by Gamma chamber 1200. Subsequently, irradiated somatic embryos along with the control were kept for observation in a controlled environment. The results revealed that LD_{50} values to be 205.55 Gy, 108.04 Gy and 82.07 Gy after 8, 12 and 16 weeks of irradiation, respectively, as per the reduction in the survival rate of somatic embryos. The average rates and values of the parameters were comparatively higher in the control than irradiated somatic embryos. These results suggest that further studies are needed to enhance the precision of the obtained results by using somatic embryos of various ages from diverse leading tea cultivars such as TRI2024 with improved mutation methods for an efficient induction of mutagenesis in tea.

Keywords: *gamma ray, induced mutagenesis, lethal dose, somatic embryogenesis, survival rate*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Foraging guilds of waterbirds at selected sites in Jaffna and Kilinochchi districts, Northern Sri Lanka

G. Kandasamy[1*], D.K. Weerakoon[2], A. Sivaruban[1], H.B. Jayasiri[3]

[1]*Department of Zoology, University of Jaffna, Sri Lanka*
[2]*Department of Zoology, University of Colombo, Sri Lanka*
[3.]*Ocean University of Sri Lanka, Crow Island, Colombo 15, Sri Lanka*

[*]*vadhana.gk@gmail.com*

There is a knowledge gap in interpreting foraging guilds of waterbirds in the northern region of Sri Lanka. The present study was conducted in eight study sites namely Mandaitivu, Mankumban, Kayts, Kavutharimunai, Pallai, Thadduvankoddy, Sarasalai and Nagarkovil to compare density of foraging guilds in coastal wetlands. Waterbirds were counted by using binocular and spotting-scope and identified through a standard field guide. The data were collected once a month from December 2016 to November 2018 along three transects of 500 m in length from 0600hrs to 1800hrs based on the habitat heterogeneity. Kruskal Wallis test and hierarchical agglomerative cluster analysis were used to analyze similarities among sites. Altogether 81 species of waterbirds were classified into ten guilds according to their taxonomic groupings and foraging habits, as dabbling ducks, large wading birds, fishing pelicans, filter-feeding flamingos, vegetation gleaners, diving waterbirds, fishing seabirds, water-associated passerines, water-associated raptors and shorebirds based on the information in literature. Dabbling ducks were dominanted in Mandaitivu (36.91%), Mankumban (39.07%), Kayts (30.14%) and in Sarasalai (24.49%) due to availability of shallow waters. Shorebirds dominanted saltmarsh and mudflats in Pallai (68.18%) and offshore sandbars in Kavutharimunai (43.94%). Shorebirds (27.19%) and dabbling ducks (28.51%) dominated marshlands in Thadduvankoddy. Deep water enabled diving birds (21.67 %) to dominate Nagarkovil during rainy season. According to the dendrogram, Sarasalai was separated due to the rich habitat heterogeneity. Pallai separated due to the lowest density. Mangroves in Mandaitivu, Kavutharimunai and Nagarkovil showed high density of shorebirds. Saltmarsh in Mankumban and Kayts were inhabited by similar species. Kruskal-Wallis test revealed that density varied significantly among eight sites ($H = 40.12$, $p = 0.000$) due to habitat heterogeneity. It can be concluded that density and guilds utility per site depend on the foraging accessibility and habitat heterogeneity. Sarasalai was the richest site in terms of density of waterbirds.

Keywords: *guilds, waterbirds, Jaffna, Kilinochchi*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Preliminary study on cyanobacterial diversity in water sources of CKDu endemic Girandurukotte area, Sri Lanka

K.D.H.S.M.S. De Silva[1], M.A.T.M. Senevirathne[1], R.P. Wanigatunge[2], A.U. Rajapaksha[3], M.S. Vithanage[1,3], D.N. Magana-Arachchi[1*]

[1]*Molecular Microbiology and Human Diseases Project, National Institute of Fundamental Studies, Kandy*
[2]*Department of Plant and Molecular Biology, Faculty of Science, University of Kelaniya*
[3]*Ecosphere Resilience Research Center, Faculty of Applied Sciences, University of Sri Jayewardenepura*

[*]*dhammika.ma@nifs.ac.lk*

Cyanobacteria are prokaryotic photosynthetic organisms and considered as the pioneering organisms of planet Earth. Some cyanobacteria species produce toxic secondary metabolites, referred to as cyanotoxins. Among them microcystin (MC), cylindrospermopsin (CYN), anatoxin-a (ANA-a) and nodularin (NOD) have shown hepatotoxic, dermatotoxic, neurotoxic and cytotoxic effects in humans. Attention towards the cyanotoxins in the water sources of dry zone in Sri Lanka has been increased due to its potentiality for causing the Chronic Kidney Disease of unknown etiology (CKDu). This study focused on CKD and CKDu patients in a region of high CKDu prevalence, in Girandurukotte, and the presence of cyanotoxins in their drinking waters. Water samples (n = 57) were collected into sterilized brown glass bottles from wells, tube-wells, and reservoirs. The study population included nine CKD patients, 24 CKDu patients, and five healthy individuals. 50 ml of each water sample was centrifuged at 3500 rpm for 10 minutes and a mixture of 500 µl of supernatant and the pellet were inoculated into cyanobacterial specific BG11 medium and incubated at 28 °C under fluorescent light with intensity of 4.8×10^{-4} cm^{-2} W - 5.9×10^{-4} cm^{-2} W a 16:8 h D/L cycle for 4 weeks. Cyanobacterial growth was observed in 77% water samples. *Chroococcus, Oscillatoria, Anabaena, Gloeocapsa, Raphidiopsis,* and *Microcystis* were reported as the dominant cyanobacterial genera. Among them, *Oscillatoria* and *Anabaena* are potential MC, CYN and ANA-a producers while *Microcystis* species produce MC and ANA. Moreover, *Raphidiopsis* species are considered as potent CYN and ANA producers. Potential microcystin, cylindrospermopsin, anatoxin-a, and nodularin producing cyanobacteria were identified from 36% CKD, 68% CKDu and 15% of healthy individuals' well waters, 18% from reservoirs and 9% from other sources. According to results presence of potential cyanotoxin producers were found to be high in well waters of CKDu patients. The study is in progress to find the relationship between cyano-toxicity and CKDu disease.

Keywords: *cyanobacteria, cyanotoxin, CKDu, groundwater, drinking water*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

A preliminary study to micro propagate *Madhuca longifolia* ("Mee") using nodal cuttings and apical shoots as explant

H.G.M.K. Karunarathna[1], J.P. Eeswara[2], M.C.M. Iqbal[1*]

[1]*National Institute of Fundamental Studies, Kandy*
[2]*University of Peradeniya, Peradeniya*

[*]*iqbal.mo@nifs.ac.lk*

Madhuca longifolia, a dry zone woody plant, termed as "Mee" or "butternut tree" in different parts of the world, belonging to the family Sapotaceae is economically important and is also termed as the panacea of Ayurveda medicine. Natural propagation of woody plants through seeds is problematic due to the seasonality in seed production, loss of viability and seed coat imposed dormancy delaying germination. To mitigate these problems, micropropagation was identified to produce a large number of healthy plants. The protocol was designed to reduce the cost associated with synthetic nutrients by using coconut water (CW) (from immature nuts, 5-6 months after flowering) as a natural growth enhancer. Young nodal cuttings and apical shoots collected from mature plants were sterilized with 15% NaOCl for 10 min, followed by 0.1% $HgCl_2$ for 3 min. Experiments were set as a Complete Randomized Design with ten replicates and data were analyzed with ANOVA in Minitab 17.1.0. Apical shoots (100%) and nodal cuttings (92.50%) in ½ MS (Murashige and Skoog) medium with 6-benzylaminopurine (BAP) and 10% CW showed the highest shooting rate. Similarly, bud break was early in apical shoots (15.93 ± 0.35 days) and nodal cuttings (9.63 ± 2.63 days) in ½ MS media with 0.5 mg/L BAP and 20% CW. Reduced rate of CW (5%) with 0.2 mg/L BAP resulted in best shoot growth for apical shoots (3.16 ± 0.64 cm) and auxiliary shoots (2.95 ± 0.32 cm) within 8 weeks. The results highlight that apical shoots have a higher affinity than nodal cuttings to promote new shoots confirming that CW is a good source of nutrients to enhance *in vitro* growth of *M. longifolia*. The current research can be further improved using different explants to optimize protocols for micro-propagation of *M. longifolia* for large scale production of plants for reforestation.

Keywords: *Madhuca longifolia, coconut water, 6-benzylaminopurine, apical shoots, nodal cuttings*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Diversity of phylum Proteobacteria in four hot springs of Sri Lanka based on 16S rRNA metagenomic analysis

D.G.S.N. Samarasinghe[1], R.P. Wanigatunge[2], D.N. Magana-Arachchi[1*]

[1]*National Institute of Fundamental Studies, Hantana Road, Kandy*
[2]*Department of Plant and Molecular Biology, Faculty of Science, University of Kelaniya*

[*]*dhammika.ma@nifs.ac.lk*

Sri Lanka harbours several hot springs, but majority of them are not yet explored for microorganisms and require comprehensive studies to unravel their unknown and untapped phylogenetic and functional diversity. The aim of this study was to perform metagenomics analysis on four major hot springs located in Sri Lanka to reveal the diversity and distribution of Proteobacteria. Water samples were collected from four hot springs (40 °C-54 °C) located at Mahapelessa, Wahawa, Mahaoya, and Nelumwewa. Genomic DNA was extracted from the water samples using modified Boom's method and was subjected to 16S rRNA metagenomic sequencing using Illumina platform. The results were analyzed using GAIA: Metagenomics data analysis software to identify bacteria (Operational taxonomic units/ OTU) and to determine their relative abundance. OTU analysis was carried out with a cut-off similarity value at 97%. The 16S rRNA gene amplicon of V3-V4 region metagenome sequencing revealed a unique taxonomic diversity of the resident thermophilic Proteobacteria communities in those hot springs. Proteobacteria was dominant in all sampled hot springs; Mahapelessa (57.4%), Wahawa (46.7%), Mahaoya (86.3%) and Nelumwewa (47.7%), with 78 genera belonging to 6 classes; Alphaproteobacteria (44.9%), Betaproteobacteria (33.3%), Gammaproteobacteria (14.1%), Deltaproteobacteria (3.85%), Hydrogenophilalia (2.56%) and Epsilonproteobacteria (1.28%). Among them *Burkholderi acepacia* and *Stenotrophomonas maltophilia* were the most abundant species recorded in all hot springs. Seven different bacterial species were unique to Wahawa and three species were unique to Mahaoya. *Vogesella perlucida* and *Vibrio fluvialis* were detected only in Nelumwewa and Mahapelessa hot springs, respectively. Nitrogen fixing bacteria; *Azospirillum halopraeferens, Bradyrhizobium liaoningense,* and *Bradyrhizobium elkanii*; Sulphate reducing bacterium *Desulfovibrio alkalitolerans* were also identified. *Hydrogenophilus hirschii*, *Hydrogenophilus thermoluteolus* and *Petrobacter* sp. were recorded and they were known as thermophiles in previous studies. This is the first report of a high resolution profile of proteobacteria diversity in Sri Lankan hot springs.

Keywords: *Proteobacteria, hot springs, 16S metagenomics*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Fine mapping of grain zinc using synchrotron-based XFM revealed genetic variation in grain Zn distribution in wheat cultivars

L.C.J. Kamaral[1], S. Neate[1], D.J. Paterson[2], P.M. Kopittke[3], T.M. Rajaratne[4], S. Seneweera[1, 4*]

[1]*Centre for Crop Health, University of Southern Queensland, Toowoomba, Queensland, 4350, Australia*
[2]*Australian Synchrotron, ANSTO, Clayton, Victoria 3168, Australia*
[3]*School of Agriculture and Food Sciences, The University of Queensland, St Lucia, Queensland, 4072, Australia*
[4]*National Institute of Fundamental Studies, Hanthana Road, Kandy, 20000, Sri Lanka*

[*]*saman.se@nifs.ac.lk*

Zinc (Zn) is an important micronutrient in human nutrition, where it regulates growth and development. Accordingly, an inadequate dietary intake of Zn causes a range of health-related complications. The people at most risk of Zn deficiency are those who depend upon wheat, with this having a low Zn concentration and poor bioavailability. However, there is considerable variation in grain Zn among wheat cultivars, and we hypothesize that the major bottleneck for Zn biofortification is linked to Zn loading and spatial variation in accumulation in the grain. To test this hypothesis, mapping of grain Zn was carried out using synchrotron-based X-ray fluorescence microscopy (XFM) with two genetically contrasting wheat cultivars, PBW343 (Zn efficient) and Goldmark (Zn inefficient). We obtained longitudinal and transverse sections (80 μm thickness) from mature grains. The elemental distribution within the wheat grain sections was examined *in situ* using XFM beamline at the Australian Synchrotron. A double Si (111) crystal monochromator was used to select a monochromatic beam of 18.5 keV X-rays, which was focused (2.0 μm × 2.0 μm) using Kirkpatrick–Baez mirrors. The XFM signal was collected using a 384-element Maia detector, and raw XFM data were analyzed using GeoPIXE software. Our results demonstrated that most of the Zn were localized in the seed embryo of Zn efficient PBW343 (170 mg kg^{-1}) compared to Zn inefficient Goldmark (130 mg kg^{-1}). Further, the highest embryonic Zn was located in shoot primordium and root primordium, whilst the highest Zn was in the shoot primordium. The highest shoot primordium Zn concentration was observed in PBW343. These findings suggest that embryonic Zn concentration is likely to play as a physiological marker that can be used for future Zn biofortification in wheat.

Keywords*: zinc, wheat, synchrotron based XFM, embryo*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Responses of Asian elephants (*Elephas maximus*) to an electronic training collar

S.J. Cabral de Mel[1,2], R.K. de Mel[2], M.H. Senanayake[2], R. Bandaranayake[3], S. Seneweera[1,2], A. Dangolla[4], D.K. Weerakoon[5], T. Maraseni[1], B.L. Allen[1,6*]

[1]*University of Southern Queensland, Toowoomba, Australia*
[2]*National Institute of Fundamental Studies, Kandy, Sri Lanka*
[3]*Department of National Zoological Gardens, Sri Lanka*
[4] *Department of Veterinary Clinical Sciences, University of Peradeniya, Peradeniya, Sri Lanka*
[5]*Department of Zoology and Environmental Sciences, University of Colombo, Colombo 03, Sri Lanka*
[6]*Centre for African Conservation Ecology, Nelson Mandela University, Port Elizabeth, South Africa.*

[*]*Benjamin.Allen@usq.edu.au*

Asian elephants (*Elephas maximus*) play a major role in human-wildlife conflict across its range in countries. Fixed electric fencing is widely used to manage human-elephant conflict by constraining the movements of elephants**.** However, fixed fences have number of shortcomings such as regular fence breaching, high costs of maintenance and lack of flexibility in changing the location of fenced area. Advances in aversive geofencing technology, such as satellite linked animal-borne warning collars, has the potential to revolutionise the management of elephants as these can be used as virtual fences. However, knowledge of how captive elephants respond to such animal-borne aversive stimuli is required before efficacy testing of these devices can occur. A preliminary study was conducted on captive Asian elephants in Sri Lanka to determine their responses to an electronic training collar typically used for dogs. This collar, which is capable of delivering mild electric stimuli at various strengths, was tested on three captive elephants at a confined location. Elephants wore a dummy collar for three consecutive days prior to the experiment. Each experimental session comprised of 2 x 10 min testing periods (one for two different locations around the neck) with a five min break between sessions. During each testing session, 10 stimuli (one stimulus per minute) were delivered and elephants' responses were recorded. Subsequently the collar was removed and the elephant's wellbeing was monitoredfor three consecutive days. Responses shown by elephants varied but all showed more pronounced reactions at higher stimuli strengths. Elephants responded by touching the collar (27.08%), showing an involuntary muscle twitch (23.96%), turning away (8.33%), moving backwards (7.29%) and trunk lifting (5.21%). Our results show that electric stimuli from the collar were able to generate aversive responses from elephants, suggesting that aversive geofencing devices have the potential to constrain elephant movement.

Keywords: *Asian elephants, human-elephant conflict, aversive conditioning, elephant behaviour*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Screening of α-amylase inhibitory activity of endophytic fungal strains associated with *Costus speciosus*

B.M.S. Nilmini, N.S. Kumar, N.K.B. Adikaram, L. Jayasinghe*

National Institute of Fundamental Studies, Kandy, Sri Lanka.

**lalith.ja@nifs.ac.lk*

Diabetes mellitus is a well-known carbohydrate metabolic disorder that affects the body's ability to create or utilize insulin marked by abnormal glucose levels in the blood stream. Inherited and/or earned paucity in production of insulin by the beta cells of pancreas are the prominent causes of this chronic disease. *Costus speciosus* is a renowned medicinal plant used in traditional medicine to treat diabetes patients in Sri Lanka. Endophytic fungi dwell asymptomatically within the intracellular spaces of healthy plant tissues and they synthesize similar bioactive compounds as those originating from their host plants. With this in mind, the present study was initiated to determine the *in vitro* anti-diabetic activity of endophytic fungal strains associated with *C. speciosus* by screening for α-amylase inhibitory activity, which is responsible for postprandial hyperglycemia. Surface treated fresh leaves of *C. speciosus* were cultured in Potato Dextrose Agar resulted in two types of endophytic fungi (SB/CS/C & SB/CS/F). They were cultured large scale in Potato Dextrose Broth and the mediums were extracted to ethyl-acetate (EtOAc) and the mycelia were sequentially extracted with EtOAc and Methanol (MeOH). The ability of fungal extracts to inhibit α-amylase enzyme activity was determined by chromogenic dinitrosalicylic acid (DNSA) method and the results revealed that the both EtOAc extracts of SB/CS/C and SB/CS/F showed high inhibitory activity with IC_{50} of 116.51 ppm and 250.78 ppm, respectively. The α-amylase enzyme inhibitory activity of these endophytic fungal extracts may lead to reduction of reactive hyperglycemia in diabetic condition. Further, identification of the isolated endophytic fungi by molecular means and screening anti-diabetic activity of isolated compounds are in progress.

Keywords: *anti-diabetic activity, endophytic fungi,α-amylase inhibitory activity*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Spatial variation of soil organic carbon fractions in Blue carbon ecosystems at Erukulampiddy, Sri Lanka

D.D.M.O. Dissanayake[1], J.A.V.R. Jayasinghe[1], G.A.D. Perera[2], H.K. Kadupitiya[3], S. Seneweera[1], R.R. Ratnayake[1*]

[1]*National Institute of Fundamental Studies, Kandy, Sri Lanka*
[2]*Department of Botany, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka*
[3]*Natural Resources Management Centre, Peradeniya, Sri Lanka*

[*]*renuka.ra@nifs.ac.lk*

Soils of Blue carbon ecosystems may play a key role in mitigating global climate change through functioning as major carbon sinks. The soil dynamics and vegetation patterns lead to create variations in organic carbon fractions in the soil. Hence, with an intention of explaining the current status of soil carbon fractions and its spatial variation, a study was conducted at Erukulampiddy, Mannar Island, focusing on the mangroves and saltmarsh ecosystems. Random sampling was performed representing mangroves, saltmarsh and littoral woodlands, and samples were collected from top layer (0-15 cm from the surface) and immediately below layer (15-30 cm). Subsequently, Microbial Biomass Carbon (MBC), Permanganate oxidizable carbon (POXC), Water soluble carbon (WSC) and total soil organic carbon (SOC) were determined. Descriptive and multivariate statistics were carried out using MINITAB 17 statistical package. The mean values for carbon fractions at the site for top soil layer were 0.034% ± 0.003 for WSC, 1.806% ± 0.264 for SOC and 382.288 ± 35.325 mg kg^{-1} for POXC. Further, POXC varied significantly ($P > 0.05$) between the examined two soil layers. Principal component (PC) analysis revealed a major variation in SOC and POXC over the site (PC loadings for SOC = 0.653 and POXC = 0.651). A cluster analysis performed based on SOC and POXC revealed of clear clusters of sample points and, sampling sites with no vegetation or with beach strand vegetation or proximal part of the lagoon appeared to be clustering together. They were marked with low POXC and low SOC. Meantime, a cluster of sample points which dominated with *Avicenia* or *Rhizophora* spp. showed a high SOC stock but with a high proportion of soil POXC. These confirm the high spatial variation of soil carbon fractions and unstable soil C stocks in Blue carbon ecosystems at Erukulampiddy, Mannar Island, Sri Lanka.

Keywords: *soil carbon sequestration, climate change mitigation, mangroves and saltmarsh ecosystems*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Nutrient partitioning of wheat (*Triticum aestivum* L.) grain is influenced by elevated CO_2 and heat stress

C.H. Samarasinghe[1], Z. Hassan[2], T.M. Rajaratne[1], L.C.J. Kamaral[3], S. Seneweera[1, 2, 3*]

[1]*National Institute of Fundamental Studies, Hanthana Road, Kandy, 20000, Sri Lanka*
[2]*Department of Agriculture and Food Systems, Faculty of Veterinary and Agricultural Sciences, The University of Melbourne, Parkville, Victoria. 3010 Australia*
[3]*Centre for Crop Health, University of Southern Queensland, Toowoomba, Queensland, 4350, Australia*

[*]*saman.seneweera@usq.edu.au*

Carbon dioxide concentration [CO_2] in the atmosphere has been progressively rising from approximately 280 µmol/mol during the pre-industrial era to a current average of approximately 410 µmol/mol and is predicted to increase by up to 500-1000 µmol/mol by the year 2100. Elevated atmospheric CO_2 (eCO_2) causes warmer temperatures and more frequent droughts, which will adversely affect wheat grain yield and quality, thus challenging the nutrient security of mankind. This study investigated how eCO_2 influences micronutrient concentration and its partitioning within the grain under different temperature regimes at the Australian Grains Free Air CO_2 Enrichment (AGFACE). The wheat cultivar, Zebu was grown under ambient CO_2 (a[CO_2]) (~389 µmol/mol) and eCO_2 (~550 ± 10% µmol/mol) at two different times of sowing (TOS), early TOS and late TOS to be exposed to different temperatures during reproductive growth. At each given condition, elemental concentrations of the grain were determined in the endosperm and aleurone layer separately. The concentrations of micronutrients were measured using ICP-AES and data were analyzed by Genstat 18th edition. Zn, Fe and Ca concentrations in both endosperm and aleurone layer were significantly suppressed by e[CO_2] at $P<0.05$ with predominant changes in Fe in the aleurone layer (early TOS, a[CO_2]; 118.62 mg/kg and e[CO_2]; 98.57 mg/kg) and endosperm (early TOS, a[CO_2]; 50.48 mg/kg and e[CO_2]; 45.27 mg/kg, late TOS a[CO_2]; 41.06 mg/kg and e[CO_2]; 39.47 mg/kg). Late sowing treatment significantly reduced nutrient concentration in the endosperm layer (Zn-19.6%; Fe-10.3%; Ca-18.9%) ($P<0.05$). The results of this study indicate that an elevated CO_2 level has significantly reduced the wheat grain quality, particularly in the partitioning of nutrients between the endosperm and aleurone layer.

Keywords: *wheat; elevated CO_2, heat stress, nutrient quality, aleurone layer*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Anticandidal activity and cytotoxicity of the hydroalcoholic extract of *Phyllanthus niruri* (Stone-Breaker)

F.C. Maia*, G.K. Wijesinghe, T.R. de Oliveira, S.N.B. de Feiria, F. Joia, J.P.Barbosa, G.C. Boni, V.A.P. Defávari Franco, J.F. Höfling

Area of Microbiology and Immunology, Department of Oral Diagnosis, Piracicaba Dental School, State University of Campinas, SP, Brazil

**flcmaia@hotmail.com*

Phyllanthus niruri Linn. (*Phyllanthaceae*), known as "Stone-Breaker" has been used for millennia in the treatment of several human diseases, including microbial infections. This study aimed at evaluating the antifungal activity of hydroalcoholic extract of *P. niruri* (HE-Pn) against *Candida albicans* (ATCC MYA-2876) and the cytotoxicity against *HaCaT* cells and *Galleria mellonella* larvae. HE-Pn was prepared using the whole plant and 70% alcohol maceration technique followed by solvent evaporation. The residue was lyophilized to obtain crude extract. Chemical analysis of the extract was done using GC-MS. Antifungal activity of HE-Pn was assayed using agar well diffusion method. The Minimum Inhibitory Concentration (MIC) and the Minimum Fungicidal Concentration (MFC) were determined through CLSI broth microdilution. Effect of HE-Pn on the adhesion and formation of the germ-tube was evaluated using established protocols. The cellular morphology of *C. albicans,* after exposure to HE-Pn was observed using Transmission Electron Microscope (TEM). Cytotoxicity of HE-Pn was determined by*in vitro* assay with human keratinocytes (*HaCaT*) and *in vivo* with *G. mellonella*. Chlorhexidine digluconate was used as positive control. The major component of HE-Pn was ethyl ester of linolenic acid. The growth of the planktonic *C. albicans* was inhibited by HE-Pn. MIC and MFC were 0.5 mg/mL and 16 mg/mL respectively. Candidal adhesion was significantly inhibited at 32 mg/mL. At 2.0 mg/mL of HE-Pn germ-tube formation of *C. albicans* was completely inhibited. *Candida* cells treated with HE-Pn showed chemical stress responses, such as the cytoplasmic vacuoles, granules, as well as chromatin condensation and cell wall detachments through TEM. HE-Pn did not exhibit any toxic effect on *in vitro HaCaT* cells and *G. mellonella*. The extract showed good anti-*Candida* activity and a potential to be used as a therapeutic alternative against *C. albicans* infections with little or no toxicity to the host.

Keywords: *Phyllanthus niruri, hydroalcoholic extract, Candida albicans, antifungal*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Patterns of diversity and turnover of pleurostict Sericini chafers (Coleoptera: Scarabaeidae) of Sri Lanka: A preliminary investigation of samples from Knuckles conservation forest

U.G.S.L. Ranasinghe[1,3*], J. Eberle[1,2], C. Bohacz[1], S.P. Benjamin[1,3], D. Ahrens[1]

[1]*Zoologisches Forschungsmuseum A. Koenig, Adenauerallee, Bonn, Germany*
[2]*University of Salzburg, Austria*
[3]*National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka*

[*]*lakmalisanky@gmail.com*

The comparison of species richness and composition at different spatial and temporal scales is important in biodiversity analysis. These parameters are mandatory for a comprehensive understanding of the evolutionary background of species diversification and niche separation within a specific community. However, such studies have rarely been done in tropical, species rich, very old, and isolated islands like Sri Lanka. Here, we examined the spatiotemporal variation of assemblages of Sericini in the Knuckles forest range. We determined how composition, species richness, and abundance vary with different habitats and different seasons across the forest. We conducted two field surveys in Pitawala Patana (Knuckles-North) and Deanston (Knuckles-South) in February and October 2019. Six UV light traps were placed in different habitat types at each location for three consecutive days. Species accumulation curves indicated saturation for the series of trapping events. Species were sorted to morphospecies based on the complex shape of the aedeagus. Preliminary statistical analyses were done using principal component analyses and plots were performed using PAST Version 3.25. Specimens were selected for DNA sequencing of the barcoding gene region (*Cox1*), for each presumptive morphospecies per site. A total of 365 Sericini specimens were captured, comprising 18 species, of which five were new to science. Four species (*Maladera lindulana*, *M. cervicornis*, *Serica lurida*, *Selaserica nitida*) were co-occurring in both seasons, while three species (*Periserica* sp, *M. weligamana*, *Sel. athukoralai*) disappeared and 11 species (10 *Maladera* species, 1 *Selaserica* species) emerged after the Southwest Monsoon season. The number of specimens per trap varied significantly with the season. The results suggest high spatiotemporal variation of Sericini assemblages across the investigated forest range. Moreover, a preliminary analysis of DNA barcode data suggests that the geography of the forest mountain range might play an important role as a physical barrier, potentially promoting speciation processes.

Keywords: *Sericini, Scarabaeidae, pleurostict*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

A study on quality of life of renal patients in Sri Lanka

M.T.D. Kulaweera*, J.H.D.S.P. Tissera

University of Colombo, Colombo, Sri Lanka

**darshi0830@gmail.com*

In Sri Lanka, patients with Chronic Kidney Disease (CKD) receiving maintenance dialysis face multitude of challenges threatening their physical and psychological well-being and thus Quality of Life (QOL). They are crippled by the long-standing chronic physical symptoms of CKD, which hamper their day to day work. Therefore, this study assesses the QOL of CKD patients and its association with individual disease burden symptoms adjusted for confounders. Data was collected by the National renal disease prevention and research unit - Ministry of Health where access was granted in hospital information and follow up QOL data through telephone interviews on 853 patients located in 12 districts. The selected set of variables included general information such as gender, ethnicity, marital status, occupation and QOL data etc. SF-36 is a questionnaire, which consists of 36 items that describe QOL; it was given to each patient and the calculated SF-36 score was considered as the response variable in the analysis. Mean and the standard deviation of QOL of CKD patients were 42.5, 25, respectively. The Dialysis Symptom Index (DSI) is another questionnaire containing 30 items, each of which describes a specific physical or emotional symptom and was used to assess prevalence and severity of the disease. The highest prevalence of symptoms were feeling tired or lack of energy (73.33%), shortness of breath (65.95%), worrying (59.9%), swelling in legs (59.67%), feeling sad (58.76%), muscle cramps (57.03%), bone or joint pain (56.54%), and decreased appetite (52.18%). The severely burdening symptoms were, feeling tired or lack of energy, shortness of breath, decreased appetite, worrying, swelling in legs, and feeling sad. A multiple linear regression model was fitted to identify the factors associated with QOL and it was significant at 0.05 level with adjusted $R^2 = 0.7905$. In conclusion, patients receiving maintenance dialysis experience a similar overall burden of physical and emotional symptoms and comparably low QOL. Age, current monthly income, accommodation and DSI were the factors which were associated with QOL of CKD patients. These findings suggest that significant attention should be paid to these health-related domains.

Keywords: *chronic kidney disease, quality of life, SF-36 questionnaire, dialysis symptom index, multiple linear regression*

PHYSICAL SCIENCES

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Numerical modeling of hybrid 3D/2D organic-inorganic halide perovskite solar cell under low light conditions and AM1.5G full sun spectrum

N.L. Adihetty[1], D.R. Ratnasinghe[1], M.L.C. Attygalle[2*], N.S. Narayan[3], P.K. Jha[3]

[1]*Faculty of Graduate Studies, University of Sri Jayewardenepura, Nugegoda*
[2]*Department of Physics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda*
[3]*Department of Physics, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara 390002, India*

[*]*lattygalle@sci.sjp.ac.lk*

Hybrid organic-inorganic halide perovskite solar cells (PSCs) have acquired significant research attention because of their low cost and high performance. We have numerically modeled p-i-n structure perovskite solar cells with intrinsic layers of 3D-$CH_3NH_3PbI_3$ (3D-MAPI) and 2D sheets of $CH_3NH_3PbI_3$ (2D-MAPI) hybrid organic-inorganic halide perovskites. 2D-MAPI layer is mainly used in the simulation to enhance the stability of the 3D-MAPI layer. Poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT: PSS), which is an organic hole transporting material (HTM), has been used as a p-type layer. The fullerene derivative material, (6,6)-phenyl-C61-butyric acid methyl ester (PCBM), which is an organic electron transporting material (ETL), has been used as an n-type layer. The performance of this p-i-n type perovskite solar cell model was studied by employing Solar Cell Capacitance Simulator (SCAPS-1D) software under indoor low light conditions and outdoor AM1.5G full Sun spectrum. The indoor low light intensity produced by the artificial light source is about 20 W/m^2 as compared to the outdoor light intensity of 1000 W/m^2. In this study, Tungsten Halogen lamps were used as low light illumination sources to model the indoor low light conditions. We have numerically obtained, the power conversion efficiencies of the baseline model of PSCs underlow light intensities of 10 W, 20 W, 50 W Tungsten Halogen lamps, and AM 1.5G full Sun spectrum as 11.47%, 12.04%, 12.16%, and 24.71% with the open-circuit voltages (V_{OC}) of 1.07 V, 1.09 V, 1.12 V, and 1.26 V respectively. Due to the high absorption properties of the 3D and 2D halide perovskite materials, the hybrid organic-inorganic halide perovskite solar cells can be used for indoor applications. Our findings revealed in this work can be useful to practically develop indoor applications of solar cells in the future.

Keywords: *perovskite-based solar cell, power conversion efficiency, light intensity, SCAPS-1D, low light conditions*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Novel spatiotemporal data mining ensemble techniques for developing a dynamic system for short-term flood forecasting in Ratnapura area

K.S. Saubhagya[1,2*], C.D. Thilakarathne[1], G.P. Lakraj[1], S. Viswakula[1]

[1]*Department of Statistics, University of Colombo, Colombo*
[2]*Sri Lanka Technological Campus, Padukka*

[*]*shanthisaubhagya@gmail.com*

Kalu river, that discharges the largest volume of water to the ocean, has taken a priori attention due to its high-level of vulnerability for inundation. When it inundates, Ratnapura, which is in the lower flood plain of the river, is affected by frequent flooding especially, during the southwest monsoon period. This leads to heavy damages to public and private properties. Due to enormous hardships in the complete mitigation, flood forecasting has been recognized as a feasible measure of flood preparedness. Even though the flood forecasting is being done by numerous non-engineering modeling methods, spatiotemporal data incorporation to forecast flood events has taken a significant attention, nevertheless, it is still in a developing stage. Spatiotemporal data are large in volume, complex and show chaotic patterns and non-linear behaviour. In order to quantify these characteristics, data mining techniques are identified as appropriate tools. In this study, we expect to build a user-friendly dynamic system that uses an integrated methodology to forecast the rainfall at Ratnapura area along with the substations. Then forecasted rainfall values, coupled with other flood related data will be used to model water level to alert the people who live in flood prone areas in Ratnapura. Water level forecasts with sufficient lead time will also allow the relevant authorities to take necessary actions. Finally, based on the water level at Ratnapura, inundation maps will be obtained to alarm the upcoming flood events along the downstream areas of the Kalu river.

Keywords: *flood forecasting, dynamic system, spatiotemporal data, data mining techniques*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Gel polymer electrolytes based on fumed silica filler for magnesium batteries

H.T.G. Shashintha[1,2*], H.N.M. Sarangika[1], V.P.S. Perera[3], M.A.K.L. Dissanayake[2,4], G.K.R. Senadeera[2,3], J.M.K.W. Kumari[2,4]

[1]*Department of Physical Science and Technology, Faculty of Applied Science, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka*
[2]*National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka*
[3]*Department of physics, The Open University of Sri Lanka, Nawala, Nugegoda, Sri Lanka*
[4] *Postgraduate institute of Science, University of Peradeniya, Sri Lanka*

[*]*gayanshashintha94@gmail.com*

The project was focused on designing a novel, low cost, highly conductive gel polymer electrolyte using fumed silica fillers and Mg^{2+} salt. Gel polymer electrolytes synthesized with fumed silica fillers, low molecular weight poly(ethylene glycol), average Mn 400 and $Mg(BH_4)_2$, exhibit conductivities ~10^{-4} S/cm at room temperature (25 °C). Under this project, an electrolyte sample series was synthesized by varying the weight ratio of $Mg(BH_4)_2$: polyethylene glycol: fumed silica. and their conductivity measurements were taken at different temperatures ranging from 25 °C to 65 °C. The highest conductivity achieved was 1.9686 $\times 10^{-4}$ S/cm, and the corresponding sample consisted of 2.0 mg of $Mg(BH_4)_2$, 2.0 mL of poly(ethylene glycols), and 0.16 g of fumed silica. The electrolyte with the highest conductivity was used in a battery setup with a Mg pellet as the anode and TiO_2 mixture (TiO_2 - P_{25} semiconductor powder, carbon powder and PVDF binder) as the cathode, made by doctor blading on to an FTO glass with 1 cm^2 area. The open circuit voltage (V_{OC}) of the battery of configuration Mg/Gel Electrolyte/TiO_2-C was measured through a circuit of an external 60 kΩ resistance. At 25 °C the open circuit voltage was 1.722 V. The battery was run for 48 hours straight and the V_{OC} values were measured at every 2 hours. The V_{OC} value was stabilized at 1.418 V after the initial 48-hour period. The short circuit current density was also stabilized at 73.6118 μA/cm^2 after 48 hours of discharge period through 60 kΩ load, from the initial current density of 179.5211 μA/cm^2. This preliminary study concludes that the prepared electrolyte has high stability. Possibility of using this electrolyte in rechargeable Mg batteries will be studied.

Keywords: *SiO_2, magnesium borohydride, PEG, titanium dioxide*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Combined molecular dynamics – representative volume element modeling of thermal conduction of graphene monolayer deposited on an amorphous silicon dioxide substrate

H. Wijekoon[1,2], A. Rathnayake[1,2], A. Wijayasinghe[1], D. Subasinghe[1*]

[1]*National Institute of Fundamental Studies, Hanthana Road, Kandy, Sri Lanka*
[2]*Postgraduate Institute of Science, University of Peradeniya, Sri Lanka*

[*]*deepal.su@nifs.ac.lk*

Due to their higher electrical and thermal conductivity properties, graphene and graphene-based materials have largely attracted the attention in the field of materials science. The electrical conductivity of suspended monolayer graphene is up to 240 000 Ω^{-1} m^{-1} and thermal conductivity is between 2100-5300 W m^{-1} K^{-1} which is one of the highest values known so far. The remarkable electrical and thermal properties make graphene a perfect material to be used in electrical devices. However, graphene has limitations when it is to be used as a thermoelectric material due to its high thermal conductivity. In an attempt to reduce its thermal conductivity, we have experimentally deposited a few layers of graphene onto a Si/SiO_2 substrate using a thermal evaporation technique. To the best of our knowledge, this methodology was used for the first time in the world. The reduction of graphene's thermal conductivity, when supported on a substrate, was first predicted by Klemens et al. The experimental investigations on this phenomenon was previously reported by Seol and Prasher. In this work, we developed an analytical model using a Representative Volume Element (RVE) approach to explain the heat transport of supported graphene. To calculate the in-plane thermal conductivity and inter-layer thermal conductivity between the graphene and SiO_2 layers and to validate the analytical model, we performed extensive molecular dynamics (MD) simulations. The graphene-SiO_2 system was built and analyzed using Visual Molecular Dynamics (VMD) v1.9, and MD calculations were performed using the Large-scale Atomic/Molecular Massively Parallel Simulator (LAMMPS) code. The results from the MD simulations were in excellent agreement with the analytical model, which indicates that our analytical model can be used to accurately describe the heat transport in supported-graphene.

Keywords: *graphene, thermal conductivity, molecular dynamics, computational*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Development of a power-on-demand thermoelectric mobile phone charger

K.K.S. Kumara[1,2], N.D. Subasinghe[1*]

[1]*National Institute of Fundamental Studies, Hanthana Road, Kandy, Sri Lanka*
[2]*Postgraduate Institute of Science, University of Peradeniya, Sri Lanka*

[*]*deepal.su@nifs.ac.lk*

With the ever-increasing demand for energy and fast depleting fossil fuel reserves, it is imperative to develop technology to improve the energy efficiency of existing systems and to develop novel renewable energy sources. Harvesting waste heat dissipated from industrial applications, automobiles, and other power conversion applications, and improving renewable energy sources has become an important area of research. Thermoelectric generators directly convert heat energy into electrical energy using the *Seebeck* effect. Thermoelectric generators (TEGs) have p-type and n-type thermoelectric elements connected thermally in parallel and electrically in series. When a temperature gradient across the two sides of a TEG (SP1848 SA 27145 module) is maintained, an electric current is generated, providing the potential to utilize this for power generation. TEGs are solid-state, reliable, noiseless, lightweight, and without moving parts. TEGs can produce electric power on demand, using any type of heat source, be it solar energy or biofuel, or waste heat from a kiln or automobile engine, or even body heat, making them versatile devices. Aprototype of a thermoelectric mobile phone charger is described here. An oil lamp placed in a metal container provides the heat to the TEG and the cold side is attached to a heat sink that is immersed in a water container. Special design was introduced to avoid the surface of the TEG getting over-heated. When temperatures 88 °C on the hot side and 30 °C on the cold side were maintained, the TEG produced an open-circuit voltage of 1.164 V and a current of 296 mA. A DC converter connected to the generator increased the thermoelectric voltage to 5.23 V and maintained the current at 255 mA, providing sufficient power to charge a mobile phone. The output power was 1.33 W. Further research is being conducted to improve the efficiency and to develop small scale and affordable thermoelectric devices.

Keywords: *renewable energy, thermoelectric generators, seebeck effect, efficiency*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Analysis of effective thermal conductivity in suspended and supported graphene: Representative volume element approach

R.A. Rathnayake[1,2], H. Wijekoon[1,2], N.D. Subasinghe[1*]

[1]*National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka*
[2]*Postgraduate Institute of Science, University of Peradeniya, Sri Lanka*

[*]*deepal.su@nifs.ac.lk*

Graphene, the miracle material of the 21st century, has emerged as one of the most promising nanomaterials because of its unusual combination of superb properties. It can be used as a serious alternative to replace many standard materials for various applications. Nowadays, graphene is identified as an excellent thermoelectric material in the field of thermoelectricity. Anyhow, if such material is determined to be used as a thermoelectric material, it should have a high Seebeck coefficient and excellent electrical conductivity as well as low thermal conductivity. Suspended monolayer graphene has a high electrical conductivity value up to 240000 $\Omega^{-1}\,m^{-1}$ and a high thermal conductivity value between 3000-5300 $W\,m^{-1}\,K^{-1}$. Thus, the noted problem here is this high thermal conductivity value makes it unfit for use as a thermoelectric material. Based on previously reported work, the reduction of thermal conductivity when a few layers of graphene supported on a SiO_2 substrate, we developed an analytical model to predict the effective thermal conductivity of supported graphene. The analytical model is developed based on the concept of Representative Volume Element (RVE), which is widely used to determine the effective material properties of nano-structured materials. This model was validated using extensive molecular dynamics (MD) simulations in our previous work. Then, the results were compared with the previously developed RVE model for suspended graphene, and the dramatic reduction of thermal conductivity of supported graphene was observed.

Keywords: *representative volume element, supported graphene, thermal conductivity, thermoelectricity*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Characteristics of electrolytic copper fractals

S.B.A.D.Y. Jayawardena[1,2], H.A.P.P.B. Jayathilake[2], N.D. Subasinghe[2*]

[1]*Postgraduate Institute of Science, University of Peradeniya, Kandy*
[2]*National Institute of Fundamental Studies, Hanthana Road, Kandy*

[*]*deepal.su@nifs.ac.lk*

Some of the nature's creations can be revealed as fractals which exhibit the scale invariance of their heterogeneities. Since they are stable structures over a considerable time span, it implies the ability of those fractals in achieving the lowest possible energy level. While natural fractal formations are independent of human activities, certain fractal growths can be created in a laboratory environment. Copper clusters formed during electro-deposition of ions follow the Diffusion Limited aggregation (DLA) model and exhibit fractal characteristics. These irregular dendritic aggregates start the growing process from a seed particle attached to the cathode. In this study we mainly focused on the variation of Cu dendrites grown in a circular cell with respect to the supply current and the initial metal ion concentration of the aqueous solution. The circular cell was made up with an acrylic petri dish, ring shaped copper anode placed around the edge of the petri dish and a copper rod cathode inserted at the centre of the petri dish. Copper sulphate aqueous solution was used as the medium and ions were undergone a Brownian motion until the voltage is supplied. Copper ion concentration was varied from 0.1 M to 1.5 M and supply current was varied from 0.15 A to 1.59 A. Ten sets of experiments were conducted under different ion concentrations and supply currents. Then the fractal patterns were digitalized and fractal dimensions were determined by applying the box counting method. Highest fractal dimension (1.9005) was found for the lowest ion concentration (0.1 M) and the lowest supply current (0.15 A), proving that random Brownian motion is more prominent, when the driving forces are weaker. Moreover, several linear characteristics (mass, number of primary branches, average radius) were compared. Studying the mechanism of this irreversible tree-like metal aggregates is important as it reveals the technology which can be advantageous in various fields like nano-technology, architecture, constructions and medicine.

Keywords: *fractals, copper aggregates, electro-deposition, fractal dimension, dendritic pattern*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Enhancing the capacitance of activated charcoal powder based supercapacitors by varying the amount of jack fruit latex binder

P.N. Dissanayake[1,2], P.M. Sirimanne[2], K. Thennakone[1], D.G.B.C. Karunarathne[1], K.D.M.S.P.K. Kumarasinghe[1], G.R.A. Kumara[1*]

[1]*National Institute of Fundamental Studies, Kandy*
[2]*Uva Wellassa University, Badulla*

[*]*grakumara2000@yahoo.com*

A supercapacitor, also known as a double layer capacitor is a high-capacity capacitor which has a capacitance value much greater than other capacitors, but with lower voltage limits. Activated charcoal is used as a preferred electrode material to fabricate super capacitors. In order to fabricate the device a binder should mix with activated charcoal. Synthetic binders are widely used for this purpose. For the first time, we are using natural purified jack-fruit latex as the binder with activated coconut shell charcoal powder to prepare the electrode for supercapacitors. To prepare the electrodes; different percentages 10%, 15%, 20% w/w jack fruit latex was mixed with 90%, 85%, 80% w/w activated coconut shell charcoal powder respectively and dissolved in 1 mL of 2-propanol. Prepared solution was pasted on two pre heated titanium plates and a separator was inserted in-between them. In order to obtain purified latex, ethanol saturated with jack fruit latex solution was added to a NaCl solution and obtained the precipitated jack fruit latex after 12 hours. H_2SO_4 was used as the electrolyte. Cyclic voltammetry characteristics for fabricated supercapacitors and FTIR for jack fruit latex were obtained**.** As is observed, maximum specific capacitance of 51 F g^{-1} was obtained when the Jack fruit latex weight percentage is 10%.

Keywords: *supercapacitor, capacitance, jack fruit latex, activated charcoal, coconut shell*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Enhancing the efficiency of solid-state dye-sensitized solar cells by using dye cocktail with seven dyes

P.N. Dissanayake[1,2], G.R.A. Kumara[1], P.M. Sirimanne[2*]

[1]*National Institute of Fundamental Studies, Kandy*
[2]*Uva Wellassa University, Badulla*

[*]*psirimanne@hotmail.com*

Dye-sensitized solid-state solar cells (DSSCs) belong to the third-generation of photovoltaic cells. In DSSCs, the dye used plays a major role in achieving of maximum performance. Usually, a single dye is used as the sensitizer in these devices. Since the light absorption by a single dye is limited to a particular wavelength region, it is very difficult to get higher efficiencies from the DSSCs fabricated with a single dye. Therefore, one of the techniques uses in the efficiency enhancement of these DSSCs is the co-sensitization with different dyes, usually with two different dyes which absorb the sunlight in different wavelength regions. In this study, we have explored the possibility of using a mixture of seven dyes, namely, fluorescein, 4,5,6,7-tetrafluorofluorescein, 5(6)-carboxyfluorescein, erythrosine B, mercurochrome, rose bengal and eosin Y as the photosensitizer of the DSSC with TiO_2|dye|CuI cell configuration. To prepare the multi-dye-coated electrodes; mesoporous TiO_2 layer was deposited on compact TiO_2 layer coated FTO glass plates and dipped in the mixture of dye solution for 12 hours. DSSCs fabricated either with multi-dye-coated photoanodes or single dye-coated photoanodes were characterized by current-voltage and incident photon to current efficiency (IPCE) measurements. Among the DSSCs tested with above dyes, DSSCs fabricated with mercurochrome dye showed the highest overall efficiency of 1.06% under the illumination of 100 mW cm^{-2}, whereas, the DSSCs fabricated with the dye cocktail showed 1.79% efficiency under the same illumination condition. This is an impressive 70% enhancement in the overall power conversion efficiency.

Keywords: *cocktail, multi dye, mercurochrome, efficiency, seven dyes*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Development of a self-controlled fault-tolerance multiple-node sensor network (SCFTMNSN) for multi- resolution data-control applications

S.A.D.O.V. Chandrakumara, A. Pallegedara*

Faculty of Engineering, University of Peradeniya, Sri Lanka

**achalaxp@gmail.com*

Smart City concept is getting popular and many IoT devices are introduced into the market. The proposed research mainly focuses on developing a low-powered self-maintenance reliable sensor network to support IoT sensors and devices for data collection and control where the GSM network and electricity are not available. The proposed solution will be available to be used in future for many services such as emergency services for environment data collection; weather, air-pollution, road-traffic, spreading of epidemics, flooding and security services. The services of the proposed network can also be used for general social needs; calling an ambulance, fire department or police. Moreover, security police can use these nodes to locate the exact point of gunfire by calculating decibel value via sensory microphones with minor configurations. These nodes will design to be self-powered and easy to maintain at low cost. The nodes will act as charging points for drones on the long run in terms of disaster management missions and weather applications, such as forest-fire, flooding, localization and map-generation, remote-sensing, finding the dissemination patterns of epidemics such as dengue, covid19 and remote monitoring of agricultural farms. The system indicates and triggers when the device undergoes fault-operation and will be able to repair autonomously or be able to communicate with the ground station for critical reimbursements. The proposed sensor network, nodes will gather data while it is maintaining uninterrupted network coverage. Data will be analyzed in a dedicated server to make decisions and predictions, thus proposed sensor-network will have extra potential adaptations in industrial and research dimensions. Tests show 2 km with disturbance and without a line of sight upon less than 150 mA current, in a highly-populated area with radio transmission with disturbances.

Keywords: *fault-tolerance, sensor-network, multi-node*

CHEMICAL SCIENCES

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Computational investigation of antioxidant potential of major catechins found in green tea: DFT study

S.S. Wijesooriya*, D.R. Pandithavidana

Department of Chemistry, Faculty of Science, University of Kelaniya, Kelaniya 11600

**sanduniwijesooriya0829@gmail.com*

Among numerous types of antioxidant compounds, polyphenolic compounds form an essential class of chain-breaking compounds that have the potential to quench reactive radical intermediates produced during the oxidative processes of both biological and commercial essential materials. Antioxidants as external supplements are used to maintain the concentration of free radicals as low as possible and to avoid oxidative stress. They are heavily used in the food industry to maintain the quality of the ready-to-eat foods and to boost the shelf life. Among these, plant polyphenolic compounds, green tea is rich in catechins. The dominant green tea catechins are (-)-epicatechin (EC), (-)-epicatechin-3-gallate (ECG), (-)-epigallocatechin (EGC), and (-)-epigallocatechin-3-gallate (EGCG). Density functional theory (DFT) studies have been carried out to explore the antioxidant properties of these catechins. The reaction enthalpies related to three major mechanisms of primary antioxidant actions, i.e., hydrogen atom transfer (HAT), single-electron transfer - proton transfer (SET-PT), and subsequent proton loss-electron transfer (SPLET) were computationally investigated using B3LYP/ 6-311++G (d,p) level of theory and employing IEF-PCM solvation model for aqueous phase studies. Calculations of HOMO and LUMO energies further elucidated the radical scavenging capacity of catechins. The hydrogen atom transfer mechanism (HAT) was the most probable mechanism for the antioxidant action of these catechin molecules. The highest antioxidant activity was demonstrated by the 3'- hydroxyl group (-OH) of the ECG molecule, and the EGCG molecule showed the highest average antioxidant potential. The observed trend of escalating the antioxidant aptitude of catechin molecules was EC < EGC < ECG < EGCG. The simulations frontier molecular orbitals revealed that the EGCG molecule exhibited the lowest energy gap of HOMO-LUMO as possessing the peak antioxidant potential. These computational insights positively encourage designing structurally novel catechins which will be more beneficial in the pharmaceutical industry.

Keywords: *antioxidant, epicatechin, DFT study, polyphenols*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Computational investigation of causative agents of chronic kidney disease of unknown etiology (CKDu)

R.M.H. Rajapaksha*, D.R. Pandithavidana

Department of Chemistry, Faculty of Science, University of Kelaniya, Dalugama

**harindurajapaksha@gmail.com*

The chronic kidney disease of unknown etiology (CKDu) has been a significant health issue in Sri Lanka within the last three decades. Many investigative efforts have been carried out to identify its unknown origin and several risk factors which have been associated. The analyses of pesticides and their metabolites in urine and blood samples demonstrated that they were present at a significant level of blood and renal filtrate. Groundwater samples analyzed in CKDu affected areas have revealed a significant level of heavy metals and hardness in them. According to evidences of literature, AMP-activated protein kinase (AMPK), protein kinase-C, glutaminase, apoptosis signaling kinase-1, acetylcholinesterase, cytochrome-P450, and glutathione-S transferase have caused progression of CKDu. The binding of heavy metal ion to enzymatic proteins also may alter the mode of action of the enzyme. The secondary interactions between small ligands (pesticides) and macromolecules were computationally investigated using molecular docking. In this study, eleven major pesticides and their metabolites were docked with the above-mentioned enzymes. Most of the tested pesticides were organophosphates. The majority of the analyzed ligands demonstrated a significant binding affinity to those enzymes, and some ligands were found to be interacting with active sites and as well as with inhibitory sites of the enzymes. The binding of metal ion to enzymatic proteins was analyzed using the "fragment transformation" method. According to computational investigations, the descending order of binding affinities of these metal ions across all the proteins followed as Ca^{2+}> Mg^{2+}> Mn^{2+}> Zn^{2+}> Cd^{2+}> Co^{2+}> Fe^{2+}> Fe^{3+}> Cu^{+}> Hg^{2+}> Cu^{2+}> Ni^{2}. Among these heavy metals investigated, Cd^{2+} and Hg^{+2} indicated exceptionally high binding to AMPK. These investigations positively supported the hypothesis that CKDu might be caused due to binding of these metal ions, pesticides, and their metabolites and these findings provide an insight into the multi-factorial origin of CKDu.

Keywords: *ckdu, pesticides, heavy metals, molecular-docking*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Study of rare earth minerals in selected placer deposits of Sri Lanka

N.M. Batapola[1*], N.P. Dushyantha[1], H.M.R. Premasiri[1], A.M.K.B. Abeysinghe[1], L.P.S. Rohitha[1], I.M.S.K. Ilankoon[2], N.P. Ratnayake[1, 3], D.M.D.O.K. Dissanayake[1], P.G.R. Dharmaratne[1]

[1]*Department of Earth Resources Engineering, University of Moratuwa, Sri Lanka*
[2]*Discipline of Chemical Engineering, School of Engineering, Monash University Malaysia, Jalan Lagoon Selatan, Bandar Sunway, Selangor Darul Ehsan 47500, Malaysia*
[3]*Ocean University, Mattakuliya 1500, Sri Lanka*

**nadee92madhubhashani@gmail.com*

Rare earth elements (REEs) are a group of 17 elements including 15 lanthanides along with Sc and Y. REEs have become a defining component of global industrial revolution, since these elements are critical constituents in green energy, high-tech, military and aerospace industries. Considering the strategic value of REEs, many countries are now actively engaged in exploring new RE mineral sources. The world's major RE mineral sources are carbonatites, placer deposits and ion adsorption clays, whereas bastnaesite, monazite and xenotime are the primary RE minerals processed in the RE industry. In this context, Sri Lanka has been renowned for its high enrichment of monazite rich placer deposits, particularly in the northeast and southwest coasts. Moreover, previous geochemical studies in the alluvial beds of Sri Lanka have also reported significant REE concentrations. In this regard, Kalu river mouth and Belihul Oya were selected in this study to focus on rare earth mineral explorations. Beach sand samples (n = 30) covering all the regions around Kalu river mouth and stream sediment samples (n = 15, covering 2 km upstream to the Samanala-wewa reservoir) in Belihul Oya were collected and subjected for X-ray diffraction (XRD) analysis for mineral identification. Based on the results obtained, RE minerals, such as monazite (Ce) and xenotime were identified in beach sand samples, whereas monazite, loparite and xenotime were found in the stream sediment samples. The identification of these RE minerals can be considered as positive signs, and thus, detailed studies are required, including reserve estimations, RE grade and radioactivity of minerals. This will be supportive to determine the economic viability of REE extraction in Sri Lanka considering socio-techno-economic aspects.

Keywords: *REEs, RE minerals, Sri Lanka, placer deposits*

Acknowledgment: *AHEAD/DOR/6026-LK/8743-LK*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Evaluation of sex pheromone emitted by female *Leucinodes orbonalis* Guenee; Brinjal Fruit and Shoot Borer

M.S.F. Nusra[1,2*], P.A. Paranagama[2], L.D. Amarasinghe[3], D.N. Udukala[1]

[1]*College of Chemical Sciences, Institute of Chemistry Ceylon, Rajagiriya, Sri Lanka*
[2]*Department of Chemistry, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka*
[3]*Department of Zoology and Environmental Management, Faculty of Science, University of Kelaniya, Kelaniya, Sri Lanka*

[*]*fathimanushra15@gmail.com*

Brinjal Fruit and Shoot Borer-*Leucinodes orbonalis* Guenee is a serious insect pest of brinjal. Pheromone communication in insets plays an important role in the development of insect pest control strategies. The objective of the present work were to evaluate the sex pheromone emitted by adult female *L. orbonalis* and to check the attraction of adult male *L. orbonalis* to the pheromone blend. Super Q entrapment technique was used for the extraction of sex pheromone. Virgin female insects (n = 10) were put in a round bottom flask. One end of the flask was fitted with a Super Q filled cartridge and the other end was connected to an activated charcoal filled glass tube. A water driven charcoal filtered air stream was maintained through the flask. Adsorbed volatiles were eluted with 5 ml of diethyl ether after 24 hours. Gas chromatography coupled with mass spectrometry (GC-MS) technique was used to the identification of pheromone extracted from the female insects. Bioassay using Y-shaped olfactometer with ten doses of extracted sex pheromone (10-100 µg) was used to test the attraction of male *L. orbonalis*. Each dose was tested using 15 male insects separately and replicated 5 times. This assay was carried out between 20-24 h and the test insects were not used repeatedly. GC-MS investigation of pheromone showed a major peak at the retention time of 25.16 and a minor peak of 30.06 minutes. Mass spectrum of the major peak showed fragmentation pattern similar to the E-11-hexadecenyl acetate and minor peak was also identified as E-11-hexadecen-1-ol. Results revealed from the bioassay showed that male insects attracted to the sex pheromone blend and the highest activity was seen around 25 µg. The observed male attraction to the sex pheromone will facilitate the development of effective pest control programs for *L. orbonalis.*

Keywords: *behavioral bioassay, semiochemicals, integrated pest management, Leucinodes orbonalis*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Calcium ion removal of drinking water by using potential water purifying materials: Biochar from coconut shell, rice husk and bamboo

U.K.M. Malka, R.C.L. De Silva*, D.S.M. De Silva

University of Kelaniya, Kelaniya

**russel@kln.ac.lk*

Though water hardness alone is not identified as a health concern, it is evident that higher hardness levels affect badly when combined with certain other factors. Levels exceeding 500 mg L^{-1} $CaCO_3$ hardness is aesthetically unacceptable. Most of the communities in the dry zone, Sri Lanka encounter even higher hardness values. Hardness is caused by several metallic cations in water, but predominantly by calcium and magnesium ions. Most of the adsorption studies reported, do not provide adequate information about the adsorption and retaining capacities of the filter beds, but have observed gradual saturation of the filtering unit. In this study biochar from several abundantly available, low-cost materials; coconut (*Cocos nucifera*) shell, rice husk (*Oryza sativa*) and bamboo (*Bambusa vulgaris*) were examined for their ability in removing calcium ions (Ca^{2+}) from water. Dried (105 °C) raw materials were burned (~450 °C) to produce biochar in a closed vessel on fire. The biochar materials were packed separately in glass columns and examined for Ca^{2+} adsorption by leaching a Ca^{2+} solution (350 mg l^{-1}) through the column until saturation. After saturation, Ca^{2+} was desorbed from the column with de-ionized water. Effluents were analyzed for Ca^{2+} by using flame photometry throughout the whole process. Biochar of rice husk, coconut shell and bamboo showed Ca^{2+} adsorption capacities of 0.54, 0.40 and 0.40 mg cm^{-3}, respectively. The retaining capacity of Ca^{2+} was also calculated by the difference of adsorbed and desorbed Ca^{2+} amount per unit volume. The coconut shell and rice husk biochar showed retaining capacities of 0.06 and 0.04 mg cm^{-3} while bamboo biochar did not show any significant retaining of Ca^{2+}. According to the results coconut shell and rice husk biochar show a promise to use as starting materials in setting up domestic water plants to remove water hardness.

Keywords: *coconut shell, rice husk, bamboo, Ca^{2+}removal, biochar*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Bioactive extracts from an endophytic fungi from *Myristica fragrans*

E.A.I.A. Perera*, N.S. Kumar, N.K.B. Adikaram, L. Jayasinghe

National Institute of Fundamental Studies, Kandy

**lalith.ja@nifs.ac.lk*

This study reports the activity of bioactive extracts of endophytic fungi from condiment plant, *Myristica fragrans*. Morphologically four (A, B, C and D) different types of endophytic fungi were obtained from the triple sterilized leaves of *M. fragrans.* Pure culture of fast growing fungus D was obtained by repeated sub culturing on potato dextrose agar. Pure culture of fungus D was transferred into 1L conical flasks (×90) containing 400 ml of potato dextrose broth (PDB). The flasks incubated at room temperature for seven days and while shaking on 14 days on a laboratory shaker (95 rpm). After completion of 21 days, it was filtered and filtrate was extracted thrice with ethyl acetate (1:1 v/v) and residual mycelium was sequentially extracted using ethyl acetate (EtOAc) and Methanol (MeOH) using sonicator. Two EtOAc extracts were combined based on the thin layer chromatography (TLC) pattern. EtOAc and MeOH crude extracts were preliminary screened for bioassays and 50% inhibition concentration (IC_{50}) was calculated. Adequate level of phytotoxic activity was observed for EtOAc crude extract at 105.12 ppm and 108.22 ppm root and shoot inhibition respectively. MeOH extracts showed moderate level of phytotoxic activity at 603.06 ppm and 990.33 ppm respectively. Brine shrimp toxicity was obtained in both EtOAc and MeOH crude extract showed at 405.38 ppm and 386.44 ppm. EtOAc and MeOH extracts were screened for antifungal activity against *Cladosporium cladosporides* and only EtOAc extract showed an inhibition zone. Both EtOAc and MeOH extracts showed low antioxidant activity and low activity to α-amylase inhibitory assay. Combined EtOAc extract were subjected to chromatographic separation to furnish 9 compounds. Structure elucidation of isolated compounds and determinations of bioactivities of the isolates are in progress. According to the results, phytotoxicity and cytotoxicity potential was observed in both EtOAc and MeOH extract of endophytic fungi of D. Only EtOAc crude extracts of fungus D showed potential antifungal activity.

Keywords: *bioactivity, secondary metabolites, condiment plants, endophytes*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Unexpected air pollution spike in Sri Lanka, November 2019

S.M.D.M.C. Senarathna[1*], R. Jayaratne[2], S. Abeysundara[3], B.M.G.D. Yasaratne[4], S.D. Dharmaratne[5], R. Weerassoriya[1], G. Bowatte[1, 6]

[1]*National Institute of Fundamental Studies, Hantana Road, Kandy, Sri Lanka*
[2]*International Laboratory for Air Quality and Health, Queensland University of Technology, George Street, Brisbane, QLD 4001 Australia*
[3]*Department of Statistics, Faculty of Science, University of Peradeniya*
[4]*Department of Medicine, Faculty of Medicine, University of Peradeniya*
[5]*Department of Community Medicine, Faculty of Medicine, University of Peradeniya*
[6]*Department of Basic Sciences, Faculty of Allied Health Sciences, University of Peradeniya*

**smdmaheshchamika@gmail.com*

Ambient air pollution is a global environmental hazard, particularly affecting urban areas. Sudden spikes of air pollution in the atmosphere in a given area can occur due to many factors, either individually or combined. Generally, local effects are due to anthropogenic sources, while large scale variations occur due to natural events such as dust storms or bushfires and climatic conditions like wind and fluctuations in temperature. During the first two weeks in November 2019, a spike of air pollution prevailed all over Sri Lanka. Such spikes can cause significant adverse health effects in exposed communities. This study aimed to analyze the changing patterns of air pollution in the city of Kandy during this period. Different size fractions of atmospheric Particulates Matter ($PM_{\mu m \text{ in diameter}}$; $PM_{2.5}$, PM_{10}, and PM_{1}) were measured using eight real-time smart air quality monitoring systems called "KOALA" developed by the Queensland University of Technology, Australia. These monitors were located at the National Institute of Fundamental Studies (Sri Lanka) in Kandy between the 23rd of October and the 07th of November 2019. Trends and behaviours of air pollutants were analyzed using time-series graphs. During the study period, an apparent growth of PM variations was observed by 35% for all monitors. Summary results obtained over one week before and the one week during the spike air pollution indicated that 24-hour average $PM_{2.5}$ level in Kandy was 33.3 µg m^{-3} and 51.5 µg m^{-3} respectively. The highest level of air pollution was observed on the 06th of November around 13:00 hours. During this period, the typical daily pattern of air pollution changed. According to global wind model, the wind patterns in the Indian subcontinent may have contributed to this severe air pollution condition occurred in Sri Lanka as a result of high pollution levels in New Delhi.

Keywords: *air quality, $PM_{2.5}$, smart air quality sensors*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Heavy metal contents in aquatic plant species in a water body according to their occurrence

S. Arasaretnam*, D.M.A. Dissanayake

Department of Chemistry, Faculty of Science, Eastern University, Sri Lanka,

*s_arasaretnam@yahoo.co.uk

Commonly plants have an ability to absorb heavy metals from water and soil. The main objective of this study is to determine the cadmium and chromium content in several aquatic plant species in a fresh water body according to their occurrence. Different aquatic plant species (10 samples) from different water levels (immersed, free floating, rooted and floating) were collected from a natural pond which is located in the middle of the sacred city in Anuradhapura. These plants are useful in removing toxic heavy metals and trace elements from contaminated soils and waters. Cadmium (Cd) and chromium (Cr) have been implicated as a causal factor contributing to the CKDs, and the elevated levels of Cd, Cr were reported in waters, soils and in a range of foods commonly consumed by rural communities within the Anuradhapura district. The samples were cleaned well and dried in the oven followed by grinded until get the fine particles (200 µm). The fine particles were used for the acid digestion process by using mixture of 5 ml HCl, 2 ml H_2SO_4 and 20 ml of HNO_3 for liquid sample preparation. Absorption of series of standard solutions of cadmium & chromium and liquified plant samples were measured at the atomic absorption spectroscopy. The results explained that the aquatic plant species have higher levels of cadmium than the water, that in the water body. Further, the aquatic plant species have higher amount of chromium is observed in the water than the cadmium.

Keywords: *heavy metals, aquatic plants, acid digestion process, absorption, spectroscopy*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Cinnamomum verum (True cinnamon) leaf essential oil: Anti-*Candida* effect and cytotoxicity

G.K. Wijesinghe*, F.C. Maia, T.R. de Oliveira, S.N.B. de Feiria, F. Joia, J.P. Barbosa, G.C. Boni, V.A.P. Defávari Franco, J.F. Höfling

Area of Microbiology and Immunology, Department of Oral Diagnosis, Piracicaba Dental School, State University of Campinas, SP, Brazil

**gkwijesinghe1989@gmail.com*

The oil extracted from *Cinnamomum verum* (Lauraceae) leaves has been used as an alternative antimicrobial agent for generations. Though the antibacterial activity of *C. verum* bark and leaf oil was well documented, the anti-*Candida* activity of true cinnamon leaf oil is not clearly studied. The objectives of this study were to evaluate the antifungal activity of *C. verum* leaf oil against planktonic *C. albicans*, *C. dubliniensis* and *C. tropicalis* and determine the toxicity of EO using two experimental models. Anti-*Candida* effect of essential oil (EO) vapor was determined using microatmosphere technique. CLSI M27-A3 broth micro dilution was used in determining Minimum Inhibitory Concentration (MIC) and Minimum Fungicidal Concentration (MFC). Killing time and effect of EO on germ tube formation was determined using standard protocols. Post-exposure intracellular structural changes were visualized using Transmission Electron Microscope (TEM). Cytotoxicity of true cinnamon leaf oil was evaluated with Human Keratinocyte cell line (HaCaT) and *Galleria mellonella in-vivo* model. Chlorhexidine was used as positive control. Chemical constituents of EO was quantified using GS-MS. All experiments were done in triplicates. Multiple means were compared using one way ANOVA and two way ANOVA. Growth of all test strains was inhibited by EO vapor. MIC was 1.0 mg/ml and MFC was 2.0 mg/ml for all test strains. Killing time of EO was 6 hours. *C. albicans* and *C. dubliniensis* germ tube formation was significantly inhibited with 0.5 and 1.0 mg/ml EO. Cytoplasmic granular inclusions, intracellular vacuolation, and cell wall damages were noted with TEM. Cinnamon oil exhibited no toxic effect on HaCaT cells or *in-vivo* model at any tested concentration. Eugenol was the major active compound in true cinnamon oil (77%). *C. verum* oil is a potential anti-*Candida* therapeutic alternative with a minimal toxicity to the host.

Keywords: *Cinnamomum verum, essential oil, Candida spp., antifungal agent*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Stability of *Cinnamomum zeylanicum* ("Sri Vijaya" variety) water extract in different storage conditions

H.G.N. Dewangani, B.M. Jayawardena*, W.A.N.M. Wariyapperuma

Department of Chemistry, Faculty of Science, University of Kelaniya, Sri Lanka

**bimali@kln.ac.lk*

Cinnamon has a long history in culinary usage as a spice and medicinal plant in Ayurvedic medicine as well. Ceylon cinnamon, "Sri Vijaya" cinnamon variety has been identified as a good source of antidiabetic agent. According to the research findings cinnamon pressured water extract shows good antidiabetic properties. The objective of present study was to determine the stability of cinnamon pressured water extract as water-based nutraceutical in different storage conditions. Polyphenol compounds in powdered cinnamon quills were extracted in to water by pressurized water extraction method (0.098 MPa, 200 ml for 10 minutes). This pressurized cinnamon water extract was stored under room temperature (28 ± 2 °C) and refrigerator (4 °C). Three replicates were used per one storage condition. Antidiabetic effect of the extracts was tested by Alpha amylase assay continuously up to seven days. At the end of each day the percentage inhibition values were calculated and IC50 values were obtained using Graph pad prism software. Throughout this period, physical observations of the extracts were recorded. According to the results, the IC50 value of freshly prepared cinnamon water extract was 0.413 mg ml^{-1}. This IC50 value of the sample which was stored in room temperature gradually increased with time and on the fifth day it was 3.45 mg ml^{-1}. From sixth day onwards fungal spores appeared on the upper surface of the extract. Finally, it was fully contaminated by fungi spores. In the sample which was stored in refrigerator the IC50 value was gradually increased and on the seventh day it was 2.41 mg ml^{-1}. In that sample contamination was not observed but sedimentation of dissolved compounds was observed, this may be a one reason for the reduction of activity. In conclusion, freshly prepared cinnamon pressured water extracts display good antidiabetic properties compared to the extract produced by other extraction methods. But in water medium, activity is reduced with time. Further studies are needed to identify a stable matrix for extracts of cinnamon polyphenol compounds which can be stored for longer period of time.

Keywords: *Cinnamon zeylanicum, water extract, stability, Sri Vijaya, biological activity*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Assessment of proximate composition and some phytochemicals in four different accessions of Hingurala (*Dioscorea alata*)

B.K.H.H. Batuwita*, J.M.J.K. Jayesinghe

Department of Food Science and Technology, Faculty of Applied Sciences, University of Sri Jayewardenepura, Nugegoda, Sri Lanka

**bkhhansini@gmail.com*

Tropical root and tuber crops are a significant source of carbohydrates, providing all or part of the recommended daily intake of certain micronutrients. *Dioscorea* yams are highly economical in terms of mass-scale cultivation due to their ability to tolerate adverse environmental conditions and minimum agricultural input requirements. Four underutilized accessions of "Hingurala" (*Dioscorea alata*), namely, Heen Hingurala, Hingurala, Suta hingurala, and Maha hingurala which were recently introduced by the Horticultural Research Institute, Gannoruwa, Sri Lanka, were quantitatively analyzed for the chemical properties. The flour of four accessions was analyzed for the proximate composition using AOAC methods. Macro and micro mineral contents were determined using AOAC methods by atomic absorption spectrophotometry. The total amounts of saponin and alkaloids were determined using standard methods. The flavonoid and polyphenolic contents were analyzed using the aluminium chloride colorimetric method and Folin-ciocalteau method, respectively. The highest moisture content, free fat content and crude fiber content were cited in "Hingurala" with (72.31 ± 4.89%), (0.78 ± 0.07%) and (2.86 ± 0.43%) ($p<0.05$) respectively. The highest protein content was present in "Maha hingurala" (7.38 ± 0.51%), and the ash content was highest in "Heen hingurala" (3.28 ± 0.78%) ($p<0.05$). The highest K and Mg contents were present in "Maha hingurala" while the highest Fe, Na, Ca, Cu, and Mn contents were present in "Suta hingurala". "Hingurala" was cited with the highest Ca content. The results depicted that saponins and alkaloids contents were highest in "Hingurala" (5.94 ± 0.10%) and (0.02 ± 0.01%) ($p<0.05$) respectively. The flavonoid content and the phenolic content were highest in "Maha hingurala", yielding (17.47 mg quercetin/100 g) and (117.82 mg/GAE/100 g) ($p<0.05$) respectively for four accessions. According to the results, majority of the studied analytical parameters were thoroughly affected by the type of accession.

Keywords: *Dioscorea alata, proximate composition, saponin, flavonoid, polyphenols*

SOCIAL SCIENCES

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Exploring how mindfulness affects false memories and the impact of memory encoding method

W.A.N.I. Weerasinghe*

Coventry University, Coventry

**navodyaw1717@gmail.com*

Origins of mindfulness practicing are evident in Buddhist culture and history. Present study explored the effects of mindfulness towards the occurrence of false memories and which out of Acoustic (AE) and Semantic encoding (SE) methods produced more false recalls. Previous studies show mixed results, where some manifested short-term mindfulness increase false recalls (Wilson et al., 2015) and some claimed mindfulness prevents false recalls (Baranski, Was, 2017). This is an experimental study conducted with 34 undergraduates (Mean Age = 20, SD = 1.184, 24 (Female), 10 (Male)) from Coventry University UK. According to university guidelines and time constraints, only a small sample was allowed to be recruited, particularly in compliance with social distancing due to COVID-19 Pandemic. The study involved a control group (mind-wandering) (n = 18) and an experimental group (n = 16), including 11 with previous exposure to mindfulness practices. Only the experimental group was given mindfulness induction and after being subjected to mindfulness or mind-wandering, both groups faced AE and SE. Word lists from The Deese, Roediger, McDermott (DRM) task (Roediger, McDermott 1995) were given randomly during SE and AE for both groups, followed by memory recalling. Recalling the critical word or a word that is not in the list was considered as a false recall. Results from MANOVA and Independent t tests claimed that Number of False Recalls (NoFR) recorded by participants under mindfulness group and mind-wandering group were not different under AE. But under Semantic Encoding (SE), NoFR reported by participants were high in mindfulness group than the ones reported by the mind-wandering group. Concluding that false recalls could be reduced when mindfulness practices are paired with AE memorizing. Examining cognitive mechanisms occurred during mindfulness and elicitation of false memories, considering subjects with non- secular basis (religious) with prolonged mindfulness practice or individuals with neurodegenerative disorders are future avenues for the study.

Keywords: *mindfulness, false memories, encoding method*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Masculine ideologies and transformation of masculine gender norms: a concept analysis and review of literature

T.J. Gunawardena*

University of Peradeniya

**tehaniraji@gmail.com*

Masculine ideology is studied extensively in relation to how it impacts individuals as well as communities. The propagation of certain expectations for males has not only had a negative effect on females but also males. There have been many attempts made around the world, including Asia, to transform these masculine ideologies through a variety of programs in an attempt to ensure psychosocial wellbeing of boys and men. The objective of the current review is to explore concepts relating to masculinities and to develop a framework of understanding relating to its attributes, consequences and intervention programs conducted for masculine gender norm transformation. The review was undertaken as the preliminary for a desk review conducted in relation to the adaptation of a masculine gender norm based transformation program to Sri Lanka as a part of a larger project initiated in collaboration with a non-governmental organization. Leading databases were searched electronically for articles published between the year 2000-2018. Only articles that mentioned "masculinities", "masculine ideologies" and "masculine gender norms transformation" were included. The search for articles took place within a week. An inductive approach was used to identify themes related to the concepts of masculinities. Twenty-five articles identified from 223 abstracts were selected for the purpose of the review. Masculinities is defined in literature as the socially produced but embodied ways of being male. Masculinities stand in contrast with patriarchy. Patriarchy places men in a superior position to women and masculinities is the process through which men become superior. Masculine ideology is defined as the degree to which males endorse masculine attributes. The negative effects of masculine ideology for males include gender role strain, low self-esteem, depression, anxiety, stress and propagation of intimate partner violence. Though there are cross cultural variations in the expression of masculinities the above are all common elements seen in the Sri Lanka male. Engaging men and boys in reforming gender norms is a focal point in intervention programs for mitigating negative effects of masculinities. Many such intervention programs utilize sports as a medium though which an attempt can be made to change masculine gender norms related attitudes among boys and men and thereby promote rising up against violence against women.

Keywords: *masculinities, masculine ideologies, masculine gender norms transformation*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Quality of maternal health care: the standpoints of urban pregnant mothers

A.W.N. Naleefa*

Department of Sociology, Faculty of Arts and Culture, South Eastern University of Sri Lanka

**awnnaleefa@seu.ac.lk*

Maternal care is a branch of preventive medicine. In most cases maternal health services in Sri Lanka claim that they provide quality services based on the physical and human resources they have. However, quality relies not only on availability of physical and human resources but also the psychological response of pregnant mothers and weather they are satisfied about the services received are also equally important. The main objective of the study is to explore, whether pregnant mothers are satisfied on the service they receive during the pregnancy, during the child birth and after the delivery. Using qualitative methods 48 respondents were interviewed using purposive sampling methods. Data collection was carried out at two leading maternity hospitals and two Antenatal clinics in Colombo. At the initial explanation they said 'yes' when asked whether they are satisfied about maternal services. In terms of free of charge service, easy excess, expert human resources, well advanced technology, well equipped wards, and theatre and labour rooms, all the respondents were happy and satisfied that they receive enough free services. However, during childbirth, absence of the partner and fear about pubic shaving and inspection for dilation especially has made them feel invasive and humiliating. They had fear surrounding the child birth process undergoes inside the labour room. Unexplained radical ways of inspections has led the pregnant mothers more weak and fatigue. Respondents reported being coerced, through fear-based language to consent to procedures and interventions. So as suggestions pregnant mothers mentioned that psychological and emotional support should be given throughout the progress of the pregnancy and they mentioned it as 'quality'. Findings can be incorporated into the policy level decision making. When the government improves reproductive and child health care services it should stress the importance of considering psychological and emotional support during the whole process of maternal and childcare services provision.

Keywords: *maternal care, pregnant mother, maternal health*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

The impact of explosion of weapon induced displacement: The case of Salawa army camp, Kosgama

I.K. Galagama*

University of Kelaniya, Kelaniya

**indeewarigalagama@yahoo.com*

Armed conflicts, widespread violence and human rights abuses have created internally displaced persons and, more recently, millions of people get displaced due to natural disasters in countries while other displaced due to internal conflict. This study discussed displaced persons and their problems in the Salawa area after the explosion of the military camp. The major objective of the research was to identify the displaced persons in Salawa area and investigate issues they faced in everyday lives. The specific objective was to find the recommendations brought by governments to resolve the issues and its effectiveness. The study was carried out using a mixed method design using both quantitative and qualitative research methods. The sample was 30 families and data was collected from the Salawa area using direct interviews with participants. The researcher has used a semi-structured questionnaire, survey and interviews to collect the data. The researcher has found that, as a result of the Salawa explosion, many people were displaced and it ushered innumerous negative consequences in their daily lives. The common problem was the negative impact of the explosion on the respondents' socio-economic status, especially their livelihood activities, which in turn affected the overall wellbeing of the families. Even though the government provided some solutions, certain fundamental problems remain as unresolved. Thus, as a result of Salawa exploitation, people faced protection and assistance problems. In conclusion, the Salawa explosion which occurred due to the negligence of the government weapons storage, resulted in considerable displacement of people, and those IDPs can be categorized to conflict-induced displaced persons. In this kind of cases, not only emergency assistance and protection is important for IDPs but local and international level care also need to handle the issue in well-functioning benefits.

Keywords: *conflict, displacement, explosion, IDPs, Salawa*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Influence of traumatic exposure on suicidal ideation in seventeen districts of Sri Lanka

F.S. Jabir[1*], P.B. Dissanayake[1], K. Jayaweera[1], L. Dissanayake[1], A. Sumathipala[1,2].

[1]*Institute for Research and Development in Health & Social Care, Battaramulla*
[2]*National Institute of Fundamental Studies, Kandy*

[*]*sameehajabir@gmail.com*

Suicide is a global health concern, responsible for approximately one million deaths annually. Sri Lanka is known to have one of the highest suicide rates. Several studies have been conducted worldwide suggesting an association between traumatic exposure and suicidal ideation (SI). However, this is the first population-based study undertaken to elucidate this association in Sri Lanka. This case-control study used quantitative data from the Sri Lankan National Mental Health Survey conducted in 2007. Trauma and SI data from 6021 participants (18–65 years) were analysed. Cluster sampling method was used in the identification of the study sample. Trauma and SI were determined using the K questionnaire of Composite International Diagnostic Interview and the SI screening questionnaire respectively. The effect of trauma on SI was calculated using odd ratios. A total of 1557 (25.86%) participants had been exposed to one or more traumatic events. Among them 51.06% (n = 795) were female. SI was present among 5.22% (n = 314) participants, and 76.11% (n = 239) of them were female. SI showed a strong association with trauma ($chi^2 = 89.74$, $p<0.0001$). Participants with exposure to traumatic events were more likely to have SI (crude-OR: 2.91, 95% CI 2.31-3.67). The odds of SI increased with the increasing number of traumatic events ($p<0.0001$). Gender slightly confounded the effect of trauma on SI (aOR: 3.32, 95% CI 2.62-4.21). A major limitation was that the Northern and Eastern provinces were not included due to the civil war at the time. The proportion of participants with SI is significant with a high female preponderance. The results of this study signify that lifetime exposure to trauma greatly influences SI among adults, and that there is a dose-response relationship between the number of traumatic events experienced and subsequent odds of SI. Screening adults exposed to trauma for suicidal risk may be beneficial in preventing self-harm.

***Keywords**: Sri Lanka, suicidal ideation, trauma*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Perceived medical errors and the relationship between the quality of sleep of shift working among government nurses: A preliminary study

L.C. Nawarathne*, A.A.T.D. Amarasekara

University of Sri Jayewardenepura, Nugegoda

* *lahiruchannaka@yahoo.com*

Healthcare workers working in shifts is availably included in the job description. Nurses, who play a significant role, required working in long shifts, have reported sleep disturbances among them. This directly or indirectly affects the quality of care provided. This study was aimed to assess the relationship between the quality of sleep and the quality of care given, specifically assessing sleep quality and errors perceived within a shift. A descriptive cross-sectional study was carried with the aid of a self-administered questionnaire. Among the 50 participants majority was female (92%). 68% of the participants had Poor Sleep Quality by standardized Pittsburgh Sleep Quality Index (PSQI) who scored an overall score equal to or higher than 5. Mean Global PSQI score was 5.94, with a standard deviation (SD) of 3.36 within the subjects. Among the participants, the maximum average shifts for a week was 12 with a Mean ± SD = 8.38 ± 1.09. The majority (36) had Habitual Sleep Efficiency of which was >85%. Statistically, a significant relationship was between shiftwork by duration and perceived moderate and minor medical errors ($p = 0.01$). Nurses who worked in longer shifts perceived more minor and moderate medical errors than those who worked in lesser shifts by duration. However, no statistical significance was observed between sleep quality by PSQI and between any of the categories of medical errors perceived by the nursing officers. Sleep duration was not associated with the errors perceived by the participants. Study participants in this preliminary study had poor sleep quality by PSQI, and the self-reporting errors were unreported or were reported in lower rates.

Keywords: *sleep quality by psqi, medical errors, shift working, nurses*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Creating supportive home environments through health promotion approach in order to enable families to engage in proper safety measures during Corona outbreak period

M.A.H. Kaushani, R.M.C.D. Rathnayake*, T.N. Weerasekara, S. Wijesundara, D. Nawodini[1], N. Welagedara, N. Rathnayake, G.N.D. Guruge

Department of Health Promotion, Faculty of Applied Sciences, Rajarata University of Sri Lanka, Mihintale, Anuradhapura

**hansikakaushani1996@gmail.com*

The outbreak of coronavirus pandemic (COVID-19) has been declared a Public Health Emergency of International Concern. A health promotion intervention was implemented with the voluntary participation of five families in Dolahena village in Gampaha district. The objective of the intervention was to empower the families to engage in proper safety measures in order to reduce the risk of infecting corona virus by creating supportive home environments. Six focus group discussions were conducted with the selected families during a period of three weeks. First the symptoms, safety precautions, and misconceptions about the pandemic were discussed. Then the activities that can be done to protect as a family and ways to create supportive home environments were discussed and planned. Some activities initiated by the participants were marking a tool "light of the home", which indicates whether each family member follows safety behaviours, a place to wash their hands and feet before entering the home, a place to keep things out and preparing a list of items to buy from the shops. Pre and post data were collected using the tool "light of the home". Comments of the participants were analyzed thematically at the end. According to the results out of 24 participants, wearing a mask when going out was increased by 50%. Washing hands and feet before entering the house was increased by 35%. 50% of participants kept bags out for few hours without getting them directly in to the house. 83% of participants started to use a separate cup, plate, handkerchief and a mask for them and cleaned those by themselves and unnecessary touching of face by hands was reduced by 50%. Based on the results, it can be concluded that health promotion approach can be used successfully to create supportive home environments to enable families to engage in proper safety measures to reduce the risk of corona pandemic. This can be developed to a model which is easy to apply for communities by their own to cope up any pandemic situation.

Keywords: *coronavirus pandemic, light of the home, enable families, health promotion approach*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

An analysis of changes in patterns of substance usage among substance users during COVID-19 pandemic period in Hambanthota, Kegalle, Kilinochchi, Matale districts, Sri Lanka

F.B.N.S. Baduge*, L. Mathankumar, J.A.E. Madumadhawa, H.M.S.C. Dissanayake, S. Gunasekara, N. Rathnayake, G.N.D. Guruge

Department of Health promotion, Faculty of Applied Sciences, Rajarata University of Sri Lanka, Mihintale

**naradhibaduge94@gmail.com*

COVID-19 pandemic is affecting people worldwide including substance users. It is important to study the impact of the pandemic on substance users' pattern of usage and associated complications. The objective of this study was to assess the changes in the pattern of substance usage in a selected group of tobacco, alcohol and other substance users such as heroine and cannabis. Mixed research methods were used to assess the pre and post status of COVID-19 epidemics in Sri Lanka. The pre-status is defined as the period before the 1st COVID-19 patient was reported in Sri Lanka and the post-status is defined as 02 months after the lockdown period. A sample of 42 male substance users of age between 18–60 years was recruited for the survey using purposive sampling method. Semi-structured interviews were conducted through telephone calls. The participants were categorized into two groups based on the frequency of usage of a particular substance. The first group consisted with participants who use a particular substance 5 or more than 5 days per week (n = 20). Among them, 70% was tobacco users, 60% was alcohol users and 5% was other substance users. During this pandemic period, 10% of participants have stopped, 65% have reduced and 25% have continued the usage as before. The second group consisted with the participants who use substance up to 4 days per week (n = 22). Among them 36.36% were tobacco users, 81.81% were alcohol users and 27.27% were other substance users. During this pandemic period 95.45% have reduced the usage and 4.54% have continued as before. The factors responsible for the reduction and quitting of substance usage included: reduction of peer influence, limited availability, low income and fear of being contracted with COVID-19 and staying safe at home during this period. As per the results of the survey, the majority of participants in selected districts have shown a reduction of substance usage during the pandemic period.

***Keywords**: substance use, pandemic period, factors*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Assessing behaviors of substances users during the curfew period with the COVID-19 outbreak in Sri Lanka

R.M.C.D. Rathnayake, H.G.D.T. Madhushani*, K.H.M.T.P. Kolongahapitiya, A.R.U. Nasfa, A.M.F. Alhana, T.B.B. Makelwala, S.D.S.R. Karunarathne, N. Rathnayake, G.N.D. Guruge

Department of Health Promotion, Faculty of Applied Sciences, Rajarata University of Sri Lanka, Mihinthale, Anuradhapura, Sri Lanka

**rmc.dineshika@gmail.com*

COVID-19 outbreak is a pandemic which has affected human behaviour all over the world. In Sri Lanka, there was a lockdown period and it affected the normal behaviour of human lives. Lockdown period in Sri Lanka affected the behaviour of substances users also. Objective of this study was to assess behaviours of substances users during the curfew period with the COVID-19 outbreak. The survey that was carried out posed qualitative and quantitative questions on purposively selected participants. The sample comprised of (n=90) male participants in 20-72 years age range from 05 districts in Sri Lanka. Any kind of substances users were included, and non-users were excluded from the survey. Discussions and online survey were used to collect data from participants. Observations were collected and analyzed by the data collectors with the verbal consent of the study participants. Prior to the pandemic, 48 participants were consuming any kind of substances daily or more than 5 days a week and 42 participants were consuming at least once a week and up to 4 days. During the curfew period 13 participants were ceased any kind of substance, 37 participants were reduced usage, 36 participants were continued usage and 04 participants were increased usage. Reasons as mentioned by participants that contributed to change their behaviour were, more time spent with family members, thinking about family happiness, involving in other activities such as gardening, making creative things and understanding harmful effects of using substances. Availability of stored alcohol products and some other substances, positive attitude about consumption of substances, accepting social norms on using alcohol and other substances were reasons indicated by participants who continued and increased usage of substances at the survey. It was clear that close to a 2/3rd had changed behaviour which indicates an overwhelming majority demonstrated a positive change.

Keywords: *behavior change, substance usage, COVID-19*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Assessing the changes in patterns of substance usage during the COVID-19 pandemic

R.M. Yalini*, W.M.S.A. Wijesundara, M.W.A.K. Airawansha, F. Zahra, J.P.P. Vishalka, W.M.R.A. Wanninayake, G.N.D. Guruge

Department of Health Promotion, Faculty of Applied Sciences, Rajarata University of Sri Lanka, Mihinthale, Anuradhapura, Sri Lanka

**mervinyali23@gmail.com*

COVID-19 pandemic influenced the community around the world negatively and the findings of the scientists revealed that COVID-19 causes severe conditions in pneumonia which could severely attack to human lungs and assumed that people who consume or addicted to tobacco, alcohol or other drugs are more vulnerable. The objective of the survey was to assess the changes in patterns of substance usage during the pandemic. The data was collected randomly from the sample of 75 participants who were above 19 years of age (57 males and 18 females). Non-users and random users were excluded in the sample. Eight of them were non-users. Data was collected through Microsoft forms, telephone conversations and WhatsApp group chats. Results of the survey indicated that, 10 (15%) of the respondents were random users, 38 (57%) of them were smoking/consuming alcohol or other substances 1-4 days per week and rest 19 (28%) smoking/consuming alcohol or other substances 5-7 days per week. Except the random users, 19 (33%) participants ceased, 24 (42%) of them reduced 8 (14%) did not make any change in behaviour and 1 (2%) had increased the consumption. Among respondents, 43 (76%) reported that they did not feel any difficulty during the cessation or reduction and 14 (24%) reported that they felt difficulties. 15 (26%) of the participants were very satisfied, 14 (24%) were satisfied, 27 (48%) mentioned nothing to highlight and 1 (2%) was dissatisfied about the changes made in substance usage behaviours. As per the findings of the survey, most of the study participants had reduced or ceased substance usage during the pandemic period because of attitudinal change and non-availability.

Keywords: *COVID-19, substance usage, cessation, reduction*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

A survey to identify the changes in patterns of substance abuse during COVID -19 pandemic

H.D.N. Soysa, S.P. Senevirathne*, J. Kanmanirajah, N.M. Nasman, S.D.S.R. Karunarathne, G.N.D. Guruge

Department of Health Promotion, Faculty of Applied Sciences, Rajarata University of Sri Lanka

**sandalikapabasari@gmail.com*

Substance abuse is a wider problem among Sri Lankan over the last decades. Global substance abuse is responsible for 11.8 million of deaths in 2017. This survey was conducted to identify the patterns of substance abuse among people who are above 18 years of age in Sri Lanka during COVID-19 pandemic. Data was collected through an online self-administrative questionnaire which was distributed through WhatsApp groups and emails. Participants had a voluntary choice to engage with the survey within a week. Pattern of substance abuse was identified by analyzing the collected data. Questionnaire was randomly distributed through Google form and received 142 responses. Majority of participants (137) belong to 18-25 age category (96.5%) and other 5 participants (3.5%) belong to 25-55 age category. Among them 51 were male (92.7%) and 4 were females (7.3%) who consume any substance. Out of 55 respondents who abuse substances, all (100%) were alcohol users, 41.8% were cigarette smokers, 34.5% were cannabis users and 3.6% were using other substances. Most of the respondents were occasional users of substances (54.5%) and none of them were daily users. Due to the COVID-19 pandemic overall substance abuse positively changed in 47 participants (85.5%). From them, 03 participants tried to reduce usage, 32 participants stopped usage and 12 reduced their regular level of consumption. Rest of 08 (14.5%) were not changed usage. Potential Factors that contribute to the above changes that vote by participants were, reducing physical availability of substances, restrictions of travelling due to curfew, lack of affordability and identified substance abuse as a risk factor to COVID-19. The majority of participants were satisfied about their decision to reduce or quit substance usage. According to the results of the survey, majority of participants have reduced the substance abuse during pandemic period.

Keywords: *COVID-19 pandemic, online survey, substance abuse*

ISSN 2756-9063
Proceedings of the National Conference on Multidisciplinary Research-2020
Young Scientists' Association, National Institute of Fundamental Studies, Sri Lanka
October 08, 2020

Improving awareness on safety precautions and health habits among people during corona outbreak using health promotion approach

H.G.D.T. Madhushani, R.M.C.D. Rathnayake*, A.R.U. Nasfa, K.D.E.H. Gunathunga, J.F. Husna, L.G.T. Madhushan, T. Simaya, A wanninayake, G.N.D. Guruge

Department of Health Promotion, Faculty of Applied Sciences, Rajarata University of Sri Lanka, Mihinthale, Anuradhapura, Sri Lanka

**dilinitmadushani@gmail.com*

COVID 19 is an infectious disease caused by a newly discovered coronavirus. The virus that causes COVID 19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or exhales. In Sri Lanka total COVID 19 confirmed cases has increased to 2814 with 2391 recovered and 11 deaths in July 31, 2020. The objective of our study was to improve awareness of safety precautions and health habits among people through social media. This intervention was conducted with 100 Facebook users. A Facebook group called "our work in our hand" was created and social media users were reached through it. As the initial step, a post was published which demonstrated a hand washing place containing soap or liquid hand wash that is to be used before entering the house. Then the Facebook admin challenged group members to make a hand washing place in their home which responds to prevent Corona transmission and upload a picture on it. There was a healthy competition in the page. There were twenty-eight active participants who accepted the challenge and uploaded a picture on hand washing place responds to prevent Corona transmission in their home. The page admin received positive comments and reactions for this hand washing concept. There were one hundred twenty five reactions and twenty six positive comments for those posts. Comments were thematically analyzed and reactions were counted at the end. According to the results, social media users has improved their awareness about hand washing concept and other safety precautions during Corona pandemic and they have empowered to engage in those safety measures to reduce the transmission of Corona virus. Promoting health can be delivered to the community through social media effectively.

Keywords: *COVID 19, hand washing, empower, safety precautions, health habits*

BOC

SMARTGEN

The Next Generation's Savings Account

THE DIGITAL BANKING REVOLUTION

- OPEN AN ACCOUNT IN JUST TEN MINUTES
- INSTANT ONLINE BANKING FACILITY
- NO PASSBOOK
- INSTANTLY ACTIVATED DEBIT CARD
- MONTHLY E-MAIL STATEMENTS
- INSTANT SMS ALERTS

FOLLOW US ON

www.boc.lk

BANK OF CEYLON

BOC

Bankers to the Nation

NIFS-YSA
NCMR-2020

National Conference on Multidisciplinary Research

ISSN 2756-9063