

# VIDYA

The Quarterly Newsletter of the National Science Foundation



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## The NSF celebrates World Science Day 2020 on 20<sup>th</sup> November

The World Science Day for Peace and Development has been declared by UNESCO on 10<sup>th</sup> November every year. The celebration highlights the significant role of science in society and the importance and relevance of science in our daily lives by linking science more closely with society. The National Science Foundation (NSF) organizes the World Science Day (WSD) in November every year under a selected theme of importance with the participation of school children, undergraduates, scientists and media personnel.

Considering the current COVID-19 health concerns, NSF is planning to celebrate World Science Day under the theme “Let’s Apply Science to Rebuild the Nation” on 20<sup>th</sup> November 2020 from 10 am -12 pm as a virtual event with the online participation of school students, teachers and invited scientists. The main focus of this event will be on creating research culture in schools and kindling interest among school children to learn and use science in day to day life. Around 300 are expected to participate in the event. The event will be conducted in Tamil language on the same day (20<sup>th</sup> November) from 2 pm - 4 pm.



### World Science Day 2020 Schools Programme

Organized by the National Science  
Foundation of Sri Lanka

Let's apply science  
to rebuild the nation



Join on Zoom

## **Towards a creative and innovative nation.....**

With the new education reforms planned by the government targeting to build up a student-centered education system in place of examination-centered education system, the Science Popularization Division of the NSF (SPD) under the guidance of the Working Committee on STEM Education organized a roundtable discussion on 2<sup>nd</sup> July 2020 at the NSF with key persons involved in the reforms to discuss the proposed changes in the national science and technology education system.

A cross section of distinguished participants comprising of members of the 'Presidential Task Force for Education', institutional heads and key staff members of the Ministry of Education as well as members of NSF WCs on STEM Education and Science Popularization actively contributed to the event.

### ***Proceedings in a nutshell:***

- After the welcome address by Dr P R M P Dilrukshi, Head/SPD, Prof. Ranjith Senaratne, Chairman, NSF opened the discussion by highlighting the importance of revisiting the education system in the country and paying attention to creating a conducive environment for students to learn and question. He also highlighted the importance of identification of the individual potential of students and creating the path for development.
- Dr Chandra Embuldeniya, Chairman, NSF WC on STEM Education presented the background to the discussion.
- Dr Upali Sedera, National Advisor to the Ministry of Education and the Keynote Speaker, made a presentation on the proposed activities of the 'Presidential Task Force for Education'. He provided a comprehensive picture on the existing system of education in the country and changes and improvements proposed during reforms. He elaborated on the 'thematic education' and institutional changes proposed in the reforms.
- Dr Sanath Mahawithanage of Faculty of Medicine, University of Sri Jayawardenapura made a presentation on mindfulness and highlighted the importance of incorporating mindfulness into the school curriculum.
- The discussion ended with the concluding remarks and way forward made by Dr Chandra Embuldeniya.



*Prof. Ranjith Senaratne (Chairman, NSF)  
Opening the discussion*



*Dr Upali Sedera (Keynote Speaker)  
Addressing the gathering*



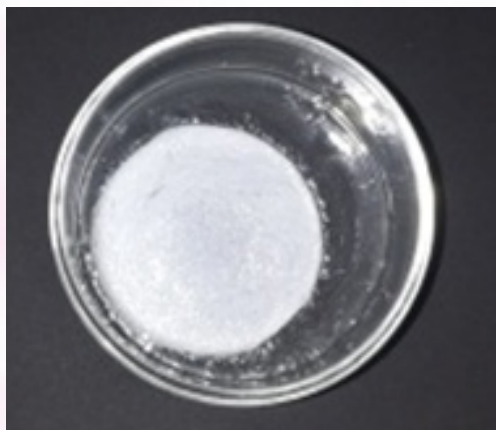
*Prof. Senaratne and Dr Embuldeniya  
At the discussion*

## Harnessing Natural Resources for Power Generation

### Green rechargeable cells and super capacitors from Sri Lankan graphite

Demand for rechargeable cells and super capacitors is increasing at an alarming rate due to escalating use of various devices that require uninterrupted power. At present, rechargeable cells and super capacitors have been deeply integrated into a large number of areas such as transport, health and industries. However, if their safety issues are not addressed properly, flora and fauna around the globe may face serious threats in the near future. In this backdrop, NSF funded a project to develop rechargeable cells and super capacitors using nontoxic materials for electrodes and electrolytes. Mainly, electrolytes were prepared in semi solid state with user friendly materials consisting of a polymer, a salt, and an ionic liquid. Apart from the semi solid nature of these electrolytes, they do not contain any plasticizers which are very toxic in nature.

In place of plasticizers, ionic liquids have been incorporated in electrolyte preparation. The electrodes are based on non-Li metals as well as natural graphite and conducting polymers.



*Ionic liquid-based polymer electrolyte*



*Natural graphite-based electrodes*

This is the first research project carried out in Sri Lanka to fabricate non-Li rechargeable cells and super capacitors using ionic liquid-based polymer electrolytes and natural graphite electrodes.

All electrode materials and electrolytes were developed and characterized in the Department of Electronics, Wayamaba University of Sri Lanka. They exhibited appreciable electromechanical properties and the performance was further optimized by varying the compositions. Device fabrication and characterization were carried out according to the approved standards. Many rechargeable cells and super capacitors fabricated under the project possess promising performance including durability to be used for applications upon further modifications.

#### Investigators

Prof. (Mrs) G. A. K. S. Perera

Prof. K.P. Vidanapathirana

Department of Electronics, Wayamaba University of Sri Lanka

Research Student : Mrs K.W. Prasadini

Grant No : RG/2017/BS/02

## Promoting Healthy Food Habits

### An innovative fermenter to break barrier in rice flour based bakery industry

At present, there is an upward trend for the consumption of fast food, especially bakery items like bread, buns and biscuits due to busy lifestyles and comfort. However, it has been identified that the consumption of such bakery products containing wheat flour is unhealthy and has a direct adverse impact on human health. Frequent consumption of these food items causes non communicable diseases (NCDs), such as diabetes, cardiovascular disease, cancers and leads to unhealthy conditions like obesity.

According to the statistics of the World Health Organization, NCDs result in 75% of total death in Sri Lanka. In addition, there is a high cost associated with the management of NCDs and it is a huge burden to Sri Lankan health sector. As such, the Government has taken initiatives to promote healthy food habits among general public to improve their nutritional levels and to reduce the consumption of fast foods.

In this connection, a “Fermentation Chamber” has been developed through a Technology Development grant of NSF. Developed fermenter is capable of producing bakery products (i.e., bread and biscuits) containing rice flour instead of wheat flour.

According to the existing literature, substitution of wheat flour with 30% rice flour has contributed to the best quality leavened food products in terms of the specific volume and the cellular structure properties. This invention can be applied to substitute wheat flour with 50% of rice-flour in order to obtain leavened food products with improved gas retention capacity and more uniform porous crumb cells distribution pattern. Currently, the research team has developed two fermentation chambers, for domestic and industrial purposes. The main aim of the researchers is to introduce this chamber to the bakery industry to promote rice flour-based bakery products.



*Domestic Fermentation Chamber*



*Industrial-scale Fermentation Chamber*

#### Investigators

Prof. S B Navaratne

Department of Food Science and Technology, University of Sri Jaywardenepura

Prof. (Mrs) C M Navaratne

Department of Agricultural Engineering, University of Ruhuna

Research and Technical Assistants : Ms A M H A Rathnayake, Ms N V G S Madushika,

Ms B A N. Niketha

Grant No : TG/2017/Tech-D/03

## Upcoming events

### National Conference on “COVID -19: Impact, Mitigation, Opportunities and Building Resilience

NSF embarked on organizing a nationally important conference on COVID -19. From the initiation stage NSF has achieved following goals so far ;

#### Updates:

- A successful visit to the National Operational Centre for Prevention of COVID-19 Outbreak (NOCPCO)

Prof Ranjith Senaratne, Chairman, NSF and members of the Steering Committee of the Conference, namely Emeritus Prof. Siri Hettige, Dr Palitha Abeykoon, Prof. Athula Sumathipala, Prof. Ajantha S. Dharmasiri, Prof. Saroj Jayasinghe and Prof. Ajith De Alwis as well as Dr Dilrukshi Ranathunge, Ms Nadeeja Wickremaarchchi and Dr Duwini Padukkage of the NSF visited the NOCPCO on 29<sup>th</sup> September 2020 for a preliminary discussion with Brigadier Vipula Chandrasiri, Chief Coordinator of the Centre.

- Creating a network with North and South America, Europe, Africa, Asia and Oceania

Leading scientists from North and South America, Europe, Africa, Asia and Oceania have agreed to join this event virtually to share their knowledge and experience.

Key Scientists planning to join the event are;

- Prof Malik Peiris (Department of Microbiology, University of Hong Kong, Hong Kong)
- Prof Raina MacIntyre (Head, Biosecurity Research Program, Kirby Institute, UNSW Medicine)
- Prof Nadarajah Sreeharan (Visiting Professor, Kings College, London and Former Senior Vice President & European Medical Director, GlaxoSmithKline Ltd)
- Prof. Dilantha Fernando (Dean, Professor and Plant Pathologist at the University of Manitoba, Canada)

World Health Organization, Ministry of Higher Education, Technology and Innovation, Ministry of Health and Indigenous Medical Services, Ministry of Defense and the Postgraduate Institute of Management of USJP are the strategic partners of the event.

For more information visit the conference website at <https://covidcon.nsf.gov.lk/index.php>



Meeting at the NOCPCO on 29-09-2020

## Dissemination of New Knowledge - Webinar Series by the NSF....

### International Collaborations: Future Prospects

International Relations Office, University of Peradeniya together with National Science Foundation, co-organized a Webinar on “International Collaborations: Future Prospects” on 17<sup>th</sup> September 2020. About 60 participants from Sri Lankan and Foreign Universities and R & D institutions joined this online program.

Expatriate Sri Lankan scientists Prof. Saman Halgamuge, Department of Mechanical Engineering, University of Melbourne, Australia and Prof. Jaya Seneviratne, National Dental Research Institute and NUS Medical School, Singapore were among the participants.

Discussions were held on following topics;

- Some insights into published research by Sri Lankans in STEM: Countries of International Collaboration, funding sources and joint PhD programs
- Opportunities for Sri Lankan researchers to initiate new international collaborations and way forward
- COVID 19: Never let a good crisis go to waste
- South-North University Collaborations: Advantages and Challenges



## Facilitating effective decision making related to infectious diseases

### Modelling in Epidemiology: Challenges in Existing Data

A webinar on ‘Modelling in Epidemiology: Challenges in Existing Data’ was held on 22<sup>nd</sup> September 2020. This was organized to impart the knowledge gained by Dr Naleen Ganegoda, Senior Lecturer, Department of Mathematics, University of Sri Jayawardhanapura through a NSF Training Fellowship grant under the Overseas Special Training Programme (OSTP) in Germany. The keynote speech was delivered by Prof. Thomas Goetz, Mathematics Institute, University of Koblenz-Landau, Germany. About 70 participants from Sri Lanka, Indonesia and Germany joined this online programme. The participation of the health sector practitioners from the Epidemiology Unit, Health Promotion Bureau and the Health Information Unit of the Ministry of Health of Sri Lanka to acquire this knowledge for direct practical applications is noteworthy. Apart from some academics of the University of Colombo - Sri Lanka, some expatriate Sri Lankan researchers in Germany also joined the discussion.

Age-specific and area-specific data in addition to the time-specific formality for advancing mathematical models is important. Such requirements are fulfilled through data processing that includes collection, storing manipulation and better communication of relevant data. This is also an essential pre-condition to exist between mathematical modelers and authorities handling epidemiological data. Some of these were discussed in detail and facilitated through this webinar. Mathematical modelling is a tool for decision making related to infectious diseases. It has a high potential to be applied to Sri Lanka as well under various conditions. As an outcome of this webinar, Dr Naleen Ganegoda has submitted a Concept Note to NSF on ‘Investigating challenges and prospects in data processing of infectious diseases – A way forward for a decision support system for Sri Lankan context’ was forwarded to the relevant health authorities for due consideration for a collaborative project.

## Tapping enormous source of global talent pool for national development

A series of webinars were conducted with expatriate Sri Lankan professionals in Australia, USA, UK, Canada, EU and Japan with a view to obtain their suggestions, comments and proposals towards national development whilst yielding mutually rewarding benefits. Eminent expatriates in various disciplines from around the globe attended those webinars.

Development of the digital platform is near completion and expected to be commissioned in November, 2020. Nearly 750 expatriates from around the world have already registered. So far, the expatriate Sri Lankan scientists have expressed their views and suggestions to improve the proposed Digital Platform and on the aspects of matchmaking with foreign countries and tapping international funding resources, collaborative research & publications, joint mentoring, potentials for technology transfer and capacity building, focus areas and focus groups, etc.

Prof. Dilanthi Amaratunga from the University of Huddersfield, UK is carrying out an online survey on “Constructive engagement and building mutually rewarding partnerships with Sri Lankan expatriates in the UK: Potential for Sri Lankan Universities” together with the NSF which is an activity derived directly due to the digital platform initiative. Its aim is to get the views of the expatriate professionals in UK as to how best they could link up with the NSF digital platform to serve the motherland. As the next step, a roadmap and programme is being developed taking into account the suggestions, comments and proposals by the expatriate professionals.

**A clarion call to Sri Lankan expatriates abroad!**

Opportunity to be engaged with the... mutually rewarding and reinforcing...

digital platform and be a dynamic force...

partner in national development

[www.nsf.gov.lk](http://www.nsf.gov.lk) for details

NATIONAL SCIENCE FOUNDATION SRI LANKA

Zoom Meeting

Participants:

- Wij Arundaran
- Thirakumar Kandam
- Prasad Jayaweera
- Terrence Fernando
- Prasanna Koduwakk
- Harsha Perera
- Madhawa Perera
- Chaminda de Sil...
- Ashani Basnayake
- Devini Padukka...
- Chaminda Wijet...
- Nilu Wansadip...
- Keerthi Devendra
- Devini Padukka...

## Gateway to prudent modern biotechnology

Considering the evolution of Sri Lankan scientific research, modern biotechnology techniques are expected to emerge into the nation in various ways soon. Hence, there is a need for regulations to keep the researchers and the outputs under control to avoid any risks that could harm the society and environment.

To ensure safety, Sri Lanka ratified the Cartagena Protocol on Biosafety in 2004, following which as the signatory body it has obligations to implement regulatory measures. Accordingly, the Ministry of Environment along with Food & Agriculture Organization, Sri Lanka started a project on “Implementation of the National Biosafety Framework in accordance with the Cartagena Protocol on Biosafety” known as “National Biosafety Project”.

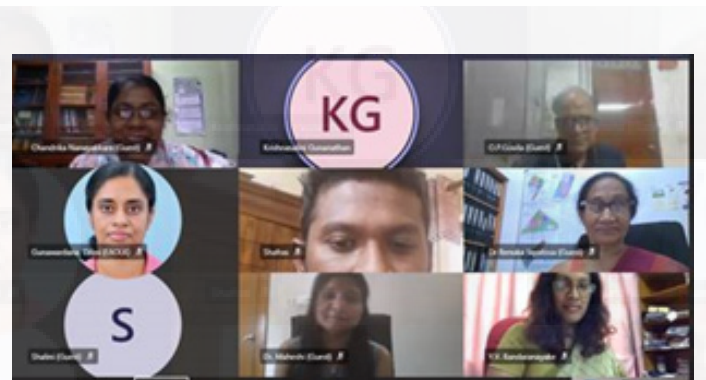
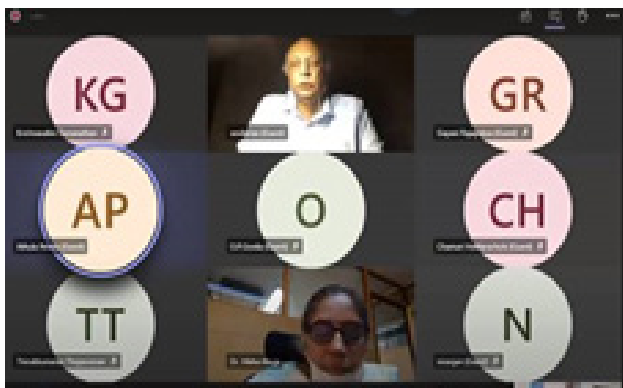


The project consist of four components, i.e. Strengthening policy, institutional and regulatory frame works for biosafety; Enhancing the system for Risk Assessment (RA), Risk Management (RM) and Risk Communication (RC); Developing technical capacity for the detection and identification of LMOs and strengthening biosafety related infrastructure and knowledge development, public awareness, education and participation.

NSF was entrusted with components 2 and 4. Seven guidelines were formulated under component 2 and outreach materials are being developed as a part of component 4 of the project with the technical support from NSF as well as national and international consultants.

Main objective of these guidelines is to ensure that any research or handling products related to genetic modification is done with full caution.

To ensure national experts are aware and trained on the same, NSF along with FAO, SL and International experts organized and conducted training sessions. Initial training sessions were on Guidelines on safe use of GMOs/LMOs in the laboratory from 22<sup>nd</sup> to 24<sup>th</sup> of September. Key topics covered during these sessions were use of GMOs/LMOs in the Laboratory; laboratory facilities, work practices, biosafety for handling and disposal in research involving GMOs/LMOs.





Second training session was held on Guidelines on Institutional Biosafety Committees on 30<sup>th</sup> of September. This mainly made the participants aware of structure of IBSCs, authorities and their responsibilities and how to gather or feed information relevant to institutional biosafety regulations.

Third training session was organized on Guidelines on GM food & feed safety and was held from 6<sup>th</sup> to 8<sup>th</sup> of October 2020. Key areas covered were Approach to Safety Assessment of foods derived from GE plants: Concepts and principles, potential allergenicity, compositional analysis, information requirements towards applying for safety assessment of foods derived from GE plants and Perspectives on safety assessment of foods derived from the next generation of GM plants.

The sessions in short provided basic knowledge related to GM Foods and Feeds research, handling and importation aspects.

There are few more trainings scheduled in the upcoming weeks under Genetically Modified mosquitoes, Confined field trials, Environment Risk assessment & Risk communication guidelines. Even though the actual plan of the project was to have in person sessions, due to the pandemic situation training sessions were conducted virtually. National experts who are working in biotechnology / molecular biology / relevant fields were invited and trained. As a result, participants were expected to further train the upcoming researchers or relevant experts in future.

Under the component 4 of the project there are various draft outreach materials being developed such as story books for children, activity books, glossary and booklets on biosafety and biotechnology. These materials are focused on various stakeholders like school students, teachers, general public and farmers. Major aim of these materials is to provide clear idea about modern biotechnology, its possible effects and how biosafety can prevent any harmful outcomes of the same to all living beings and environment.



## Special Project on Cinnamon

In 2016, National Science Foundation (NSF) signed a MoU with the Ministry of Primary Industries to facilitate research work on cinnamon and cinnamon related activities. The objective of cinnamon project was to best utilize the allocated funds for research to leverage the cinnamon industry and enter the global market effectively.

Research areas covered under this project are ;

- DNA barcoding for Ceylon cinnamon including wild relative varieties.
- Biochemical characterization, development of novel nutraceutical to control diabetics and to develop cinnamon incorporated latex products with antimicrobial properties.
- Ecological and maturity dependency for the quality of cinnamon.
- Scoping study and value chain analysis of Sri Lankan cinnamon industry. A database on cinnamon oil and oleoresin value chain analysis, Geographical Indications (GI) and Decision Support Systems were developed.

In addition to above, awareness programmes were carried out to target communities about quality cinnamon processing and marketing.

The project was completed in August 2020, creating immense knowledge and generating proven evidence for the longevity of the “Ceylon Cinnamon” brand.



## A Regional support mechanism for Science, Engineering Technology and Innovation (SETI)

UNESCO Jakarta, as the Regional Science Bureau for Asia and the Pacific region organized an online Regional Experts Dialogue on SETI priorities and implementation means on 1<sup>st</sup> September 2020. This dialogue was a follow-up to several regional and global consultations. The discussion was aimed to identify key collaboration areas, support mechanisms, and to develop the UNESCO regional SETI strategy, reaching a regional consensus on the role of SETI in delivering SDGs. Prof. Shahbaz Khan, Director of UNESCO Jakarta, moderated the discussion.

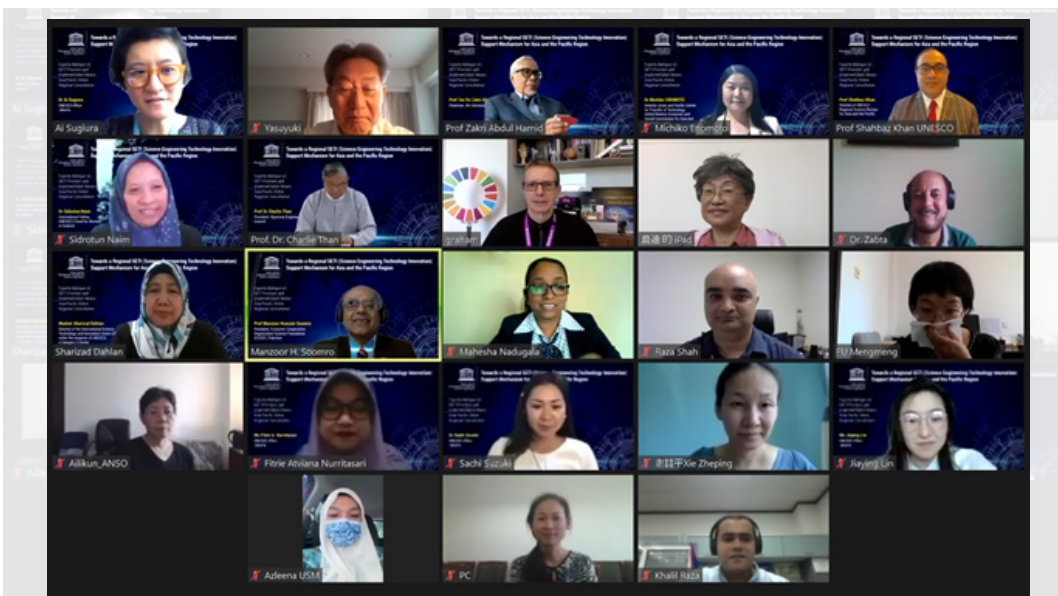
Eleven eminent experts were invited to deliver their views and insights on regional SETI aspects of the six focus areas of UNESCO Science Policy Capacity Building programme. Dr Mahesha Nadugala, Senior Scientific Officer of NSF Research Division representing NSF joined the consultation and presented on “Science policy including open science and STEPAN (Science and Technology Policy Asian Network)”.

Participants from universities, UNESCO science family (Institutes and centres under different disciplines of UNESCO with the Chairs), field officers, as well as Science and Research Centres in the Asia Pacific region joined the dialogue and shared their comments and questions with the experts.

Issues of key concern, inter alia, include:

- Revitalize a regional SETI mechanism with the constitution of a regional advisory committee.
- Develop a strategy to link the regional and national level SETI stakeholders through UNESCO national commission.
- Introduce a science-policy interface at appropriate levels, including cooperation with regional science institutions and UN agencies.
- Mobilize youth, women, and civil society in science related activities.

This expert consultative meeting contributes to the achievement of Sustainable Development Goals, especially, Goal 9: to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.



## NSF Grant outputs

### Profiling the diverse microflora of Sri Lankan dairies

Dairy foods offer a significant promise in reducing malnutrition in many communities in the world. Microbial diversity of dairy environments presents an enormous, largely unexploited genetic and biological pool.

Preserving and controlling the microbiological quality of raw milk is a worldwide concern, however, only few studies have examined the bacterial biodiversity of raw milk and many questions exist as to their role in health and disease.

In this backdrop, a study was carried out to investigate the microbial diversity of raw milk produced in Sri Lankan dairies and to correlate the findings with hygienic conditions and milking practices. In fact, this was the first study carried out on the microbial biodiversity of Sri Lankan dairies which generated a whole profile of the existing microbial communities in raw milk.

Major findings of the project are;

- Microbiome of the Sri Lankan dairies was dominated by microorganisms from 5 Phyla: Actinobacteria, Bacteroidetes, Firmicutes Proteobacteria and TM7.
- Nine bacterial classes were detected: Actinobacteria, Alphaproteobacteria, Bacilli, Bacteroidia, Betaproteobacteria, Clostridia, Flavobacteriia, Gammaproteobacteria and TM7-3.

Furthermore, the beneficial microorganisms with functional and industrial potentials isolated and identified from this study has laid foundation for the establishment of Sri Lanka's first depository of authentic dairy microbial cultures for research and industrial applications within the Food Technology Section of the Industrial Technology Institute. (ITI)



#### Investigators

Dr Ilmi Hewajulige, Dr W W P Rodrigo , Ms D U Rajawardana ,  
Industrial Technology Institute

Dr C M Nanayakkara, Department of Plant Sciences,  
Faculty of Science University of Colombo

Research Student: Ms D U Rajawardana

Grant No : RG/2016/AG/02

## From JNSF to VIDYA Rice varieties rich in amino acids

A research conducted to investigate eight (8) local and three (3) imported rice varieties has revealed some interesting information about the amino acid compositions of the rice varieties consumed in the capital of Sri Lanka. The highest mean total amino acid composition has been reported in *Ponni*, *Basmathi*, *Rathu Nadu* and Fragrant rice which are parboiled varieties, while *Ponni* and *Basmathi* have shown the highest mean essential amino acids. Not surprisingly, the red rice varieties *Nadu*, *Kekulu* and *Kekulu Samba* have reported high total amino acid contents compared to their white counterparts.

Parboiling rice seemed to influence the nutritive value of rice, as parboiled rice

varieties (*Rathu Nadu*, *Sudu Nadu*, *Keeri Samba* and *Samba*) had the highest gamma amino butyric acid (GABA) contents. GABA has been reported to reduce diabetes and high blood pressure while having anti-cancer effects which highlights the importance of consuming parboiled rice over the non-parboiled varieties. Completely polished *Sudu kekulu* had the overall lowest total amino acids, essential amino acids and GABA contents which could possibly be attributed as a result of polishing.

The study highlights that, disregarding the nutritional loss during cooking and irrespective of variety, for an average adult with 50 Kg body weight, consumption of approximately 100g of raw rice after cooking per meal, thrice a day will provide more than 50% of the standard daily requirement of essential individual amino acids recommended by the Food and Agricultural Organization (FAO).

For more information please refer: Liyanaarachchi, G., Mahanama, K., Somasiri, H., Punyasiri, P. and Kottawa-Arachchi, J., 2020. Total and free amino acid contents of popular rice varieties (*Oryza sativa* L.) consumed in the capital city of Sri Lanka. **Journal of the National Science Foundation of Sri Lanka**, 48(2).

<https://jnsfsl.sjloj.info/articles/abstract/9565/>

## Utilizing essential oils to control stem-end rot of mango

Postharvest loss of mango by diseases including stem-end rot which is caused by a group of endophytic fungal pathogens, result in annual financial losses to farmers and traders. Disease control strategies such as the use of synthetic fungicides is controversial due to their carcinogenicity, environmental pollution, development of resistant pathogens etc.

An *in-vitro* antifungal efficacy experiment was carried out for stem-end rot of Karutha Colomban, which is one of the most delightful mango varieties in Sri Lanka, using the essential oils of basil, clove and cinnamon.

Basil and cinnamon bark oils were highly effective against the test fungi *Lasiodiplodia theobromae*, while basil and cinnamon leaf oils successfully inhibited *Pestalotiopsis* sp. The most effective oil against *Phomopsis* sp. was cinnamon bark oil by liquid bioassay, while cinnamon oils at vapour phase were the most effective in controlling *L. theobromae*. *Pestalotiopsis* sp. was efficiently controlled by clove and cinnamon bark oil fumigants. Clove and cinnamon oils were the most effective against *Phomopsis* sp. according to disc volatilization bioassay.



Stem-end rot of  
Karutha Colomban  
mango

During analysis of test oils, methyl chavicol was the most abundant antifungal component in basil oil during GC-MS characterization, while in cinnamon bark oil, it was (E)-cinnamaldehyde. Eugenol displayed the highest abundance in clove and cinnamon leaf oils.

Based on *in-vitro* studies cinnamon bark oil was the essential oil showing the highest antifungal efficacy among the test oils in controlling SER fungal pathogens of mango.

For more information please refer: Kodituwakku, T., Ekanayake, G., Abeywickrama, K. and Jayakody, R., 2020. *In vitro* antifungal efficacy of selected essential oils in controlling fungi associated with the stem-end rot disease of mango (cv. Karutha Colomban) fruits and characterisation of antifungal components. **Journal of the National Science Foundation of Sri Lanka**, 48(2).

<https://jnsfsl.sljol.info/articles/abstract/8952/>

## NSF Activities

### Development of an Online Library Catalogue for Sri Lanka Medical Library

The National Science Library & Resource Centre (NSLRC) of the NSF successfully developed an Online Library Catalogue for Sri Lanka Medical Library using the Open Source Integrated Library Management Software, Koha. Since Koha software is a modern, extremely user friendly and web-based solution for the libraries, the Sri Lanka Medical Library intended to migrate its computerized catalogue from WINISIS to Koha.

4803 book records and 249 journal records were transferred to the new system by converting to the MARC file format and barcodes were generated for all the books and journals. The cataloguing module of Koha allows add/update/delete bibliographic records to Koha and it provides a full functioned Online Public Access Catalog (OPAC) to carry out searches using essential fields such as Keyword, Subject, Title, Author, Publisher, Barcode, ISBN etc.

This software is currently maintained by the NSLRC and the server is placed under the control of the IT Unit of NSF. This is a milestone achieved by the NSLRC in providing service to develop online library management systems. <http://192.248.80.17/>



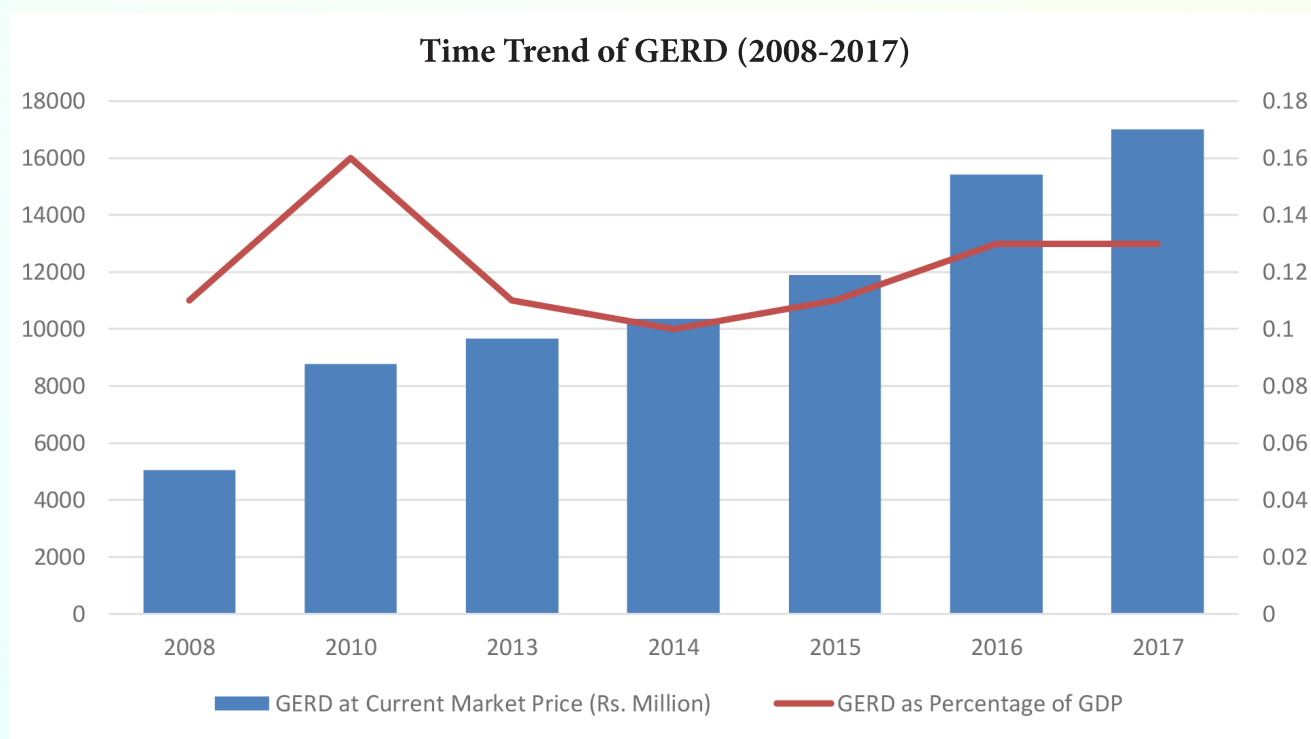
## Research and Development Statistics for Sri Lanka

The National Research and Development Survey is conducted by the NSF on regular basis and the findings of the survey are published in Statistical Handbooks and Statistical Briefs. These publications reflect the status of the R&D activities of the country in the respective year aiming to provide a quantitative overview of the sector performance to policymakers, planners, researchers, scientists, and technologists. To meet the international standards, the statistical indicators presented in the publication have been developed according to definitions and guidelines of OECD and UIS.

Statistical Briefs of National R&D Survey of 2016 and 2017 are now available for public access. The booklets contain information on R&D Expenditure, Human Resource employed in R&D, and R&D outputs of the country in the years of 2016 and 2017.

The Gross Domestic Expenditure on R&D (GERD) relative to the GDP was recorded as 0.13% in both 2016 and 2017 which is a slight increase compared to previous years. The human resource employed in R&D activities in the country also shows an overall upward trend during this period. Number of patents registered in 2016 and 2017 were 124 and 183 respectively.

More information on the R&D activities of the country can be accessed through the publications which are available at <http://www.nsf.ac.lk/index.php/science-for-all/publications/home-7>



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